

Corrigendum

Request for Proposal

for

Operation and Maintenance Services of Platform Screen Doors and Allied Services in Peshawar BRT System

Issued on.: December 20, 2025

Request for Proposal No.: TPC/OPS/OCB/PSD-AS/2025-26/006

Procuring Entity.: TransPeshawar (The Urban Mobility Company)

Preface

This Request for Proposal is prepared by TransPeshawar (The Urban Mobility Company) and will be used for hiring Service Provider for Operation and Maintenance Services of Platform Screen Door (PSD) and Allied Services in Peshawar BRT System. The procedure of bidding is Single Stage- Two Envelope.

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Section 1 - Instructions to Service Providers

This Section specifies the procedures to be followed by Service Providers in the preparation and submission of their Proposals. Information is also provided on the submission, opening, evaluation of Proposals, and on the award of contract.

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Section 1 - Instructions to Service Providers

A. General

1. **Scope of Proposal**
 - 1.1 In connection with the Invitation for Request for Proposal (RFP) as indicated in the **Data Sheet (DS)**, the Procuring Entity, as indicated in the **DS**, issues this Request for Proposal document for the scope of Services as specified in Section 5 (Schedule of Requirements). The name, identification, and number of contracts of the open competitive bidding (OCB) are provided in the **DS**.
 - 1.2 Throughout this Request for Proposal document,
 - (a) the term “in writing” means communicated in written form and delivered against receipt;
 - (b) except where the context requires otherwise, words indicating the singular also include the plural and words indicating the plural also include the singular; and
 - (c) “day” means calendar day.
2. **Source of Funds**
 - 2.1 The source of funds required by the Procuring Entity for undertaking this procurement is as indicated in the **DS**.
3. **Fraud and Corruption**
 - 3.1 It is required that Service Providers shall observe the highest standard of ethics during the procurement and execution of contract. Khyber Pakhtunkhwa Public Procurement of Goods, Works and Services Rules, 2014 defines corrupt and fraudulent practices as follows:
 - (i) “Corrupt practice” means the offering, giving, receiving, or soliciting, directly or indirectly, anything of value to influence improperly the actions of another party;
 - (ii) “Fraudulent practice” means any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
 - (iii) “Coercive practice” means impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
 - (iv) “Collusive practice” means an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party;
 - (v) “obstructive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in a procurement process, or affect the execution of a contract or deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements before investigators in order to materially impede an investigation

into allegations of a corrupt, fraudulent, coercive or collusive practice; or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation, or acts intended to materially impede the exercise of inspection and audit rights provided for under these rules and

- 3.2 The Procuring Entity will reject a proposal for award if it determines that the Service Provider during bidding or while recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive, or obstructive practices or other integrity violations in competing for the Contract apart from other remedies provided for under the relevant laws.

4. Eligible Service Providers

- 4.1 A Service Provider may be a natural person or private entity, or any combination thereof with a formal intent to enter into an agreement or under an existing agreement in the form of a Joint Venture or as indicated in **DS**. In the case of a Joint Venture,

- (a) all partners shall be jointly and severally liable; and
- (b) the Joint Venture shall nominate a Representative who shall have the authority to conduct all business for and on behalf of any and all the parties of the Joint Venture during the bidding process and, in the event the Joint Venture is awarded the Contract, during contract execution.

- 4.2 A Service Provider, and all parties constituting the Service Provider, shall have the nationality of Pakistan. A Service Provider shall be deemed to have the nationality of Pakistan if the Service Provider is a citizen of Pakistan or is constituted, incorporated, or registered, and operates in conformity with the provisions of the laws of Pakistan.

- 4.3 A Service Provider shall not have a conflict of interest. All Service Providers found to have a conflict of interest shall be disqualified. A Service Provider may be considered to be in a conflict of interest with one or more parties in this bidding process if any of, including but not limited to, the following apply:

- (a) they have controlling partners in common; or
- (b) they receive or have received any direct or indirect subsidy from any of them; or
- (c) they have the same legal representative for purposes of this proposal; or
- (d) they have a relationship with each other, directly or through common third parties, that puts them in a position to have access to material information about or improperly influence the proposal of another Service Provider, or influence the decisions of the Procuring Entity regarding this bidding process; or
- (e) a Service Provider participates in more than one proposal in this bidding process, either individually or as a partner in a joint venture, except for alternative offers permitted under ITSP 13 of the Request for Proposal Document. This will result in the

disqualification of all Proposals in which it is involved; or

(f) a Service Provider or any affiliated entity, participated as a consultant in the preparation of the design or technical specifications of the procurement that is the subject of the proposals; or

4.4 Service Providers shall provide such evidence of their continued eligibility satisfactory to the Procuring Entity, as the Procuring Entity shall reasonably request.

4.5 Apart from above, the Service Providers shall provide their eligibility satisfactory to the Procuring Entity, as indicated in **DS**.

5. Eligible Materials, Equipment and Services

5.1 The materials, equipment, and services to be supplied under the Contract shall have their origin in eligible source countries and all expenditures under the Contract will be limited to such materials, equipment, and services. At the Procuring Entity's request, Service Providers may be required to provide evidence of the origin of materials, equipment, and services.

5.2 For purposes of ITSP 5.1 above, "origin" means the place where the materials and equipment are mined, grown, produced, or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing, or substantial or major assembling of components, a commercially recognized product results that differs substantially in its basic characteristics or in purpose or utility from its components.

B. Contents of Request for Proposal Document

6. Sections of Request for Proposal Document

6.1 The Request for Proposal document consist of Parts I, II, and III, which include all the sections indicated below, and should be read in conjunction with any addenda issued in accordance with ITSP 8.

PART I Bidding Procedures

Section 1 - Instructions to Service Providers (ITSP)

Section 2 - Data Sheet (DS)

Section 3 – Eligibility and Qualification Criteria (EQC)

Section 4 - Bidding Forms (BDF)

PART II Requirements

Section 5 – Schedule of Requirements (SoR)

PART III Conditions of Contract and Contract Forms

Section 6 - General Conditions of Contract (GCC)

Section 7 - Particular Conditions of Contract (PCC)

Section 8 - Contract Forms (COF)

6.2 The Invitation for RFP issued by the Procuring Entity is not part of the Request for Proposal document.

6.3 The Procuring Entity is not responsible for the completeness of the Request for Proposal document and their addenda, if they were not obtained directly from the source stated by the Procuring Entity in the

Invitation for RFP.

- 6.4 The Service Provider is expected to examine all instructions, forms, terms, and specifications in the Request for Proposal document. Failure to furnish all information or documentation required by the Request for Proposal document may result in the rejection of the Proposal.
- 7. Clarification of Request for Proposal Document, Site Visit, Pre-Bid Meeting**
- 7.1 A prospective Service Provider requiring any clarification on the Request for Proposal document shall contact the Procuring Entity in writing through EPADS on or before the date and time indicated in the **DS** or raise his inquiries during the pre-bid meeting if provided for in accordance with ITSP 7.4. The Procuring Entity will respond to any request for clarification in the manner as indicated in the **DS**. Should the Procuring Entity deem it necessary to amend the Request for Proposal document as a result of a request for clarification, it shall do so following the procedure under ITSP 8 and ITSP 20.2.
- 7.2 The Service Provider is advised to visit and examine the Premises and its surroundings and obtain for itself, on its own risk and responsibility, all information that may be necessary for preparing the Proposal and entering into a contract. The costs of visiting the Premises shall be at the Service Provider's own expense.
- 7.3 The Service Provider and any of its personnel or agents will be granted permission by the Procuring Entity to enter its premises and lands for the purpose of such visit, but only upon the express condition that the Service Provider, its personnel, and agents will release and indemnify the Procuring Entity and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.
- 7.4 The Service Providers are encouraged to attend a pre-bid meeting, if provided for in the **DS**. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.
- 7.5 Minutes of the pre-bid meeting, including the text of the questions raised, without identifying the source, and the responses given, together with any responses prepared after the meeting, will be disseminated in a manner as indicated in **DS**. Any modification to the Request for Proposal document that may become necessary as a result of the pre-bid meeting shall be made by the Procuring Entity exclusively through the issue of an addendum pursuant to ITSP 8 and not through the minutes of the pre-bid meeting.
- 7.6 Nonattendance at the pre-bid meeting will not be a cause for disqualification of a Service Provider.

- 8. Amendment of Request for Proposal Document**
- 8.1 The Procuring Entity may amend the Request for Proposal document by issuing addenda at least five (05) days before the deadline for submission of Proposals.
- 8.2 Any addendum issued shall be part of the Request for Proposal document and shall be communicated in manner as indicated in **DS**
- 8.3 To give prospective Service Providers reasonable time in which to take an addendum into account in preparing their Proposals, the Procuring Entity may, at its discretion, extend the deadline for the submission of Proposals, pursuant to ITSP 20.2.

C. Preparation of Proposals

- 9. Cost of Bidding**
- 9.1 The Service Provider shall bear all costs associated with the preparation and submission of its Proposal, and the Procuring Entity shall in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.
- 10. Language of Proposal**
- 10.1 The Proposal, as well as all correspondence and documents relating to the Proposal exchanged by the Service Provider and the Procuring Entity, shall be written in the language specified in the **DS**. Supporting documents and printed literature that are part of the Proposal may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the **DS**, in which case, for purposes of interpretation of the Proposal, such translation shall govern.
- 11. Documents Comprising the Proposal**
- 11.1 The Proposal shall comprise two separate files submitted simultaneously through EPADS portal, one called the Technical Proposal containing the documents listed in TABLE-1, "CONTENTS OF TECHNICAL PROPOSAL" and TABLE-2, "CONTENTS OF FINANCIAL PROPOSAL" under Section 4 (Bidding Forms) of Request of Proposal document.
- 11.2 In addition to the requirements under ITSP 11.1, Proposals submitted by a Joint Venture shall include, in Technical Proposal, a copy of the Joint Venture Agreement entered into by all partners. Alternatively, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Service Provider shall be signed by all partners and submitted with the Technical Proposal, together with a copy of the proposed agreement.
- 12. Letters of Proposal and Schedules**
- 12.1 The Letters of Technical Proposal and Financial Proposal, Schedules along with attachments, and all documents listed under Clause 11, shall be prepared using the relevant forms in Section 4 (Bidding Forms), if so provided. The forms must be completed without any alterations to the text, and no substitutes shall be accepted. All blank spaces shall be filled in with the information as required.
- 13. Alternative Proposals**
- 13.1 Unless otherwise indicated in the **DS**, alternative Proposals shall not be considered.

- 14. Proposal Prices**
- 14.1 The prices quoted by the Service Provider in the Letter of Financial Proposal, EPADS and in the relevant Schedule (s) shall conform to the requirements specified below.
- 14.2 The Service Provider shall submit Proposal for complete scope of services as indicated in Section 5 (Schedule of Requirements) on given forms as identified in Section 4 (Bidding Forms). Proposals submitted for incomplete scope shall be rejected.
- 14.3 The Price to be quoted in Letter of Financial Proposal and in the EPADS shall be the total price of the services. Absence of the total price in the Letter of Financial Proposal and on EPADS portal may result in the rejection of the Proposal. In case there is discrepancy/difference between the Price quoted in Letter of Financial Proposal and the one entered in EPADS portal, the proposal shall be rejected summarily.
- 14.4 The offered price shall be inclusive of taxes, as per requirement of Letter of Financial Proposal, and Service Provider shall be liable for payment of all applicable taxes, duties, minimum wage, and other levies under the Contract as per relevant law.
- 14.5 The entered prices shall be typewritten or if written by hand, must be in indelible ink. The relevant schedule not presented accordingly may be considered nonresponsive.
- 15. Currencies of Proposal and Payment**
- 15.1 The rates shall be quoted by the Service Provider entirely in Pak Rupees.
- 15.2 The currency of payment of contract price shall entirely be in Pak Rupees.
- 16. Period of Validity of Proposals**
- 16.1 Proposals shall remain valid for the period specified in the **DS** after the Proposal submission deadline prescribed by the Procuring Entity. A Proposal valid for a shorter period or absence of period of validity shall be rejected by the Procuring Entity as nonresponsive.
- 16.2 In exceptional circumstances, prior to the expiration of the Proposals' validity period, the Procuring Entity may request Service Providers to extend the period of validity of their Proposals. The request and the responses shall be made in writing. If a bid security is requested in accordance with ITSP 17, it shall also be extended 28 days beyond the deadline of the extended validity period. A Service Provider may refuse the request without forfeiting its bid security. A Service Provider granting the request shall not be required or permitted to modify its Proposal.
- 17. Bid Security**
- 17.1 Unless otherwise specified in the **DS**, the Service Provider shall furnish as part of its Proposal, in original form, a bid security in the form, amount and currency as specified in the **DS**.
- 17.2 Unless otherwise specified in the **DS**, any Proposal not accompanied by a substantially compliant bid security shall be rejected by the Procuring Entity as nonresponsive.

- 17.3 If a bid security is specified pursuant to ITSP 17.1, the bid security of unsuccessful Service Providers shall be returned promptly upon the successful Service Provider's furnishing of the performance security pursuant to ITSP 37.
- 17.4 If a bid security is specified pursuant to ITSP 17.1, the bid security of the successful Service Provider shall be returned as promptly as possible once the successful Service Provider has signed the Contract and furnished the required performance security.
- 17.5 The bid security may be forfeited, if
- (a) a Service Provider withdraws its proposal during the period of proposal validity, except as provided in ITSP 16.2; or
 - (b) the successful Service Provider fails to
 - (i) sign the Contract in accordance with ITSP 36;
 - (ii) furnish a performance security in accordance with ITSP 37;
 - (iii) accept the arithmetical correction of its Proposal in accordance with ITSP 30.
- 17.6 . The bid security of a Joint Venture shall be submitted as indicated in **DS**.

18. Format and Signing of Proposal

- 18.1 The Service Provider shall prepare Proposal comprising the documents as described in ITSP 11.
- 18.2 The Proposal shall be typed or written in indelible ink and shall be signed by a person duly authorized to sign on behalf of the Service Provider. This authorization shall consist of a written confirmation as specified in the **DS** and shall be enclosed in Technical Proposal. The name and position held by each person signing the authorization must be typed or printed below the signature. All pages of the Proposal, except for unamended printed literature, shall be signed or initialed by the person signing the Proposal. If a Service Provider submits a deficient authorization, the Proposal shall not be rejected in the first instance. The Procuring Entity shall request the Service Provider to submit an acceptable/valid authorization within the number of days as specified in the **DS**. Failure to provide an acceptable/valid authorization within the prescribed period of receiving such a request shall cause the rejection of the Proposal.
- 18.3 Any amendments such as interlineations, erasures, or overwriting shall be valid only if they are signed or initialed by the person signing the Proposal.

D. Submission and Opening of Proposals

19. Sealing and Marking of Proposals

- 19.1 Service Providers shall submit their Proposals electronically by uploading PDF file through the KP-EPADS portal (kp.eprocure.gov.pk) under the Single Stage – Two Envelope Bidding Procedure. Procedures for sealing, marking and submission of Proposals electronically is specified in **DS**.

- 20. Deadline for Submission of Proposals**
- 20.1 Proposals must be submitted through EPADS portal not later than the date and time as indicated in the **DS**.
- 20.2 The Procuring Entity may, at its discretion, extend the deadline for the submission of Proposals by amending the Request for Proposal documents in accordance with ITSP 8, in which case all rights and obligations of the Procuring Entity and Service Providers previously subject to the deadline shall thereafter be subject to the deadline as extended.
- 21. Late Proposals**
- 21.1 In accordance with ITSP 20, the EPADS portal shall not permit the submission of any Proposal after the deadline prescribed for submission. Any attempt to submit after the deadline shall be system-restricted, and such Proposals shall neither be received nor considered by the Procuring Entity.
- 22. Withdrawal, Substitution, and Modification of Proposals**
- 22.1 A Service Provider may modify, substitute, or withdraw its Proposal – Technical or Financial – at any time prior to the deadline for submission of Proposals, by using the relevant functions available in the EPADS portal, if any. The system shall record the latest version of the Proposal submitted before the deadline as the valid Proposal.
- 22.2 A Proposal withdrawn through the EPADS portal in accordance with ITC 22.1 shall not be accessible to the Procuring Entity at the time of opening.
- 22.3 No Proposal may be withdrawn, substituted, or modified in the interval between the deadline for submission of Proposals and the expiration of specified period of proposal validity.
- 23. Proposal Opening**
- 23.1 The Procuring Entity will open the Technical Proposals in public at the address, on the date and time and procedure as specified in the **DS** in the presence of Service Providers designated representatives and anyone who chooses to attend. The Financial Proposals along with original bid security will remain unopened until the specified time of their opening.
- 23.2 All Technical Proposals shall be opened one at a time, and the following read out and recorded:
- (a) the name of the Service Provider;
 - (b) the presence of an affidavit stating that a bid security amounting to 2 percent of proposal price without indicating the figure in the letter, has been placed in the Financial Proposal; and
 - (c) any other details as the Procuring Entity may consider appropriate.
- Only Technical Proposals and alternative Technical Proposals, if any, read out and recorded at Proposal opening shall be considered for evaluation. No Proposal shall be rejected at the opening of Technical Proposals.
- 23.3 The Procuring Entity shall prepare a record of the opening of Technical Proposals that shall include, as a minimum, the name of the Service

Provider, the presence or absence of an affidavit (s) and submission of bid security. The Service Providers representatives who are present shall be requested to sign the record. The omission of a Service Provider's signature on the record shall not invalidate the contents and effect of the record. A copy of the record may be distributed to the Service Providers if so requested.

23.4 At the end of the evaluation of the Technical Proposals, the Procuring Entity will invite Service Providers who have submitted substantially responsive Technical Proposals to attend the opening of the Financial Proposal.

23.5 The date, time, and location of the opening of Financial Proposals will be advised in writing by the Procuring Entity. Service Provider shall be given reasonable notice of the opening of Financial Proposals.

23.6 The Service Provider will notify Service Providers in writing who have been rejected on the grounds of their Technical Proposals being substantially nonresponsive to the requirements of the Request for Proposal Document and return their Financial Proposals unopened.

23.7 The Procuring Entity shall conduct the opening of Financial Proposals of all Service Providers who submitted substantially responsive Technical Proposals, in the presence of Service Provider` representatives who choose to attend at the address, on the date, and time specified by the Procuring Entity. The Service Provider's representatives who are present shall be requested to sign the attendance.

23.8 All Financial Proposals shall be opened one at a time and the following read out and recorded:

- (a) the name of the Service Provider;
- (b) Amount of Bid Security;
- (c) the Proposals Prices; and
- (d) any other details as the Procuring Entity may consider appropriate.

Only Financial Proposals read out and recorded during the opening of Financial Proposals shall be considered for evaluation. No Proposal shall be rejected at the opening of Financial Proposals.

23.9 The Service Provider shall prepare a record of the opening of Financial Proposals that shall include, as a minimum, the name of the Service Provider, the Proposal Price, any discounts, and alternative offers. The Service Providers' representatives who are present shall be requested to sign the record. The omission of a Service Provider's signature on the record shall not invalidate the contents and effect of the record.

E. Evaluation and Comparison of Proposals

24. Confidentiality

24.1 Information relating to the examination, evaluation, and comparison of Proposals and recommendation of contract award, shall not be disclosed to Service Providers or any other persons not officially

concerned with such process until information on the Contract award is communicated to all Service Providers.

24.2 Any attempt by a Service Provider to influence the Procuring Entity in the evaluation of the Proposals or Contract award decisions may result in the rejection of its Proposal.

24.3 Notwithstanding ITSP 24.2, from the time of proposal opening to the time of Contract award, if any wishes to contact the Procuring Entity on any matter related to the bidding process, it may do so in writing.

25. Clarification of Proposals

25.1 To assist in the examination, evaluation, and comparison of the Technical and Financial Proposals, the Procuring Entity may, at its discretion, ask any Service Provider for a clarification of its Proposal. Any clarification submitted by a Service Provider that is not in response to a request by the Procuring Entity shall not be considered. The Procuring Entity's request for clarification and the response shall be in writing. No change in the substance of the Technical Proposal or prices in the Financial Proposal, except as permissible under relevant law, shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors discovered by the Procuring Entity in the evaluation of the Financial Proposals, in accordance with ITSP 30 or as provided for under relevant rules.

25.2 If a Service Provider does not provide clarifications of its Proposal by the date and time set in the Procuring Entity's request for clarification, its Proposal may be rejected.

26. Deviations, Reservations, and Omissions

26.1 During the evaluation of Proposals, the following definitions apply:

- (a) "Deviation" is a departure from the requirements specified in the Request for Proposal Document;
- (b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Request for Proposal Document; and
- (c) "Omission" is the failure to submit part or all of the information or documentation required in the Request for Proposal Document.

27. Examination of Technical Proposals

27.1 The Procuring Entity shall examine the Technical Proposals to confirm that it is in compliance with requirement of the Request for Proposal terms and conditions and that all documents requested in ITSP 11.1 have been provided, and to determine the completeness of each document submitted.

27.2 The Procuring Entity shall confirm that the all the documents and information have been provided in the Technical Proposal as per requirement of the RFP and in accordance with ITSP clause 11. If any of the document or information is missing, the offer may be rejected.

28. Responsiveness of Technical Proposal

28.1 The Procuring Entity's determination of responsiveness of Technical Proposal is to be based on the contents of the Technical Proposal itself, as defined in ITSP11.

28.2 A substantially responsive Technical Proposal is one that meets the requirements of the Request for Proposal Document including Eligibility and Qualification Criteria as stipulated under Section 3 (Eligibility and Qualification Criteria) without material deviation, reservation, or omission. A material deviation, reservation, or omission is one that,

(a) if accepted, would:

- (i) affect in any substantial way the scope, quality, or performance of the Services specified in the Contract; or
- (ii) limit in any substantial way, inconsistent with the Request for Proposal Document, the Procuring Entity's rights or the Service Provider's obligations under the proposed Contract; or

(b) if rectified, would unfairly affect the competitive position of other Service Providers presenting substantially responsive Proposals.

28.3 If Technical Proposal is not substantially responsive to the requirements of the Request for Proposal Document, it shall be rejected by the Procuring Entity and may not subsequently be made responsive by correction of the material deviation, reservation, or omission.

28.4 Substantial responsiveness shall be pre-requisite for opening of Financial Proposal. Financial Proposal and sealed envelope of bid security of nonresponsive Service Providers will be returned unopened.

29. Nonmaterial Nonconformities

29.1 Provided that Technical Proposal is substantially responsive, the Procuring Entity may waive any nonconformities in the Technical Proposal that do not constitute a material deviation, reservation, or omission.

29.2 Provided that a Technical Proposal is substantially responsive, the Procuring Entity may request that the Service Provider to submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities in the Technical Proposal related to documentation requirements. Requesting information or documentation on such nonconformities shall not be related to any aspect of the Financial Proposal. Failure of the Service Provider to comply with the request may result in the rejection of its Proposal.

30. Correction of Arithmetical Errors

30.1 During the evaluation of Financial Proposals, the Procuring Entity shall correct arithmetical errors on the following basis:

- (a) If there is a discrepancy between the unit price and the total price that is obtained by multiplying the unit price and quantity, the unit price shall prevail and the total price shall be corrected, unless in the opinion of the Service Provider there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected.
- (b) If there is an error in a total corresponding to the addition or

subtraction of subtotals, the subtotals shall prevail and the total shall be corrected.

(c) If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a), and (b) above.

30.2 If the Service Provider that submitted the lowest evaluated Financial Proposal does not accept the correction of errors, its Proposal shall be disqualified and its bid security shall be forfeited.

31. Evaluation of Financial Proposals

31.1 The Procuring Entity shall evaluate Financial Proposal of substantially responsive Technical Proposals only. Price adjustment due to correction of arithmetic errors, if any, will be affected in accordance with ITSP 30.

32. Comparison of Proposals

32.1 The Procuring Entity shall compare all substantially responsive Proposals to determine the lowest evaluated Proposal, in accordance with ITSP 31.1.

33. Employer's Right to Accept Any Proposal, and to Reject Any or All Proposals

33.1 The Procuring Entity reserves the right to accept or reject any Proposal, and to annul the bidding process and reject all Proposals at any time prior to contract award, without thereby incurring any liability to Service Providers. In case of annulment, all Proposals submitted and specifically, bid securities, shall be promptly returned to the Service Providers.

F. Award of Contract

34. Award Criteria

34.1 The Procuring Entity shall award the Contract to the Service Provider who is substantially responsive to the requirements of Request for Proposal documents and/ or Eligibility and Qualification Criteria and whose financial offer has been determined to be the lowest evaluated financial offer and will be declared as successful Service Provider.

35. Notification of Award

35.1 Prior to the expiration of the period of proposal validity, the Procuring Entity shall transmit the Notification of Award using the form included in Section 8 (Contract Forms) to the successful Service Provider, in writing, that its Proposal has been accepted.

35.2 Until a formal contract is prepared and executed, the notification of award shall constitute a binding Contract.

36. Signing of Contract

36.1 Promptly after notification, the Procuring Entity shall send the successful Service Provider the Contract Agreement.

36.2 Within 28 days of issuance of the Contract Agreement or as indicated in **DS**, the successful Service Provider shall sign, date, and return it to the Procuring Entity.

36.3 The original proposals submitted by the service providers shall be retained by the Procuring Entity

37. Performance

37.1 Within 28 days, or as indicated in **DS**, of the issuance of notification of award from the Procuring Entity, the successful Service Provider shall

Security

furnish the performance security in accordance with the Conditions of Contract, using for that purpose the Performance Security Form included in Section 8 (Contract Forms), or another form acceptable to the Procuring Entity.

- 37.2 Failure of the successful Service Provider to submit the above-mentioned Performance Security or to sign the Contract Agreement shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. In that event, the Procuring Entity may award the Contract to the next lowest evaluated Service Provider whose offer is substantially responsive.

Section 2 - Data Sheet

A. General

| | |
|----------|--|
| ITSP 1.1 | The number of the Invitation for Request for Proposal (RFP) is: TPC/OPS/OCB/PSD-AS/2025-26/006 |
| ITSP 1.1 | The Procuring Entity is: TransPeshawar (The Urban Mobility Company) |
| ITSP 1.1 | The name of the bidding process is: Operation and Maintenance Services of Platform Screen Door (PSD) and Allied Services in Peshawar BRT System The identification number of the Request for Proposal Document is: TPC/OPS/OCB/PSD-AS/2025-26/006 |
| ITSP 2.1 | Govt. of Khyber Pakhtunkhwa. |
| ITSP 4.1 | A Service Provider must be an Association of Persons (AOP) or a Company incorporated in or registered with Registrar of Firms or Security and Exchange Commission of Pakistan (SECP) respectively or any combination thereof in form of a Joint Venture with a formal intent to enter into an agreement or under an existing agreement. |
| ITSP 4.5 | The Service Provider must be: <ul style="list-style-type: none">i. Registered with FBR for income and sales tax and reflected on active taxpayers list of FBR (In case of Joint Venture applicable to all members);ii. Registered with KPRA for sales tax on services (In case of Joint Venture applicable to all members);iii. A valid PEC license in category C-4 or above with EE11 or ME06 or ME07 or ME03 code of specialization (In case of Joint Venture applicable to one member);iv. not be blacklisted by any federal or provincial public entity in Pakistan, is neither insolvent nor bankrupt, is not in the process of winding up nor his/her properties are under the control of receiver nor his/her business activities have been suspended nor legal proceedings for any of the foregoing are imminent or have been initiated against him/her and has fulfilled all obligations under law for the time being in force. (In case of Joint Venture applicable to all members). |

B. Contents of Request for Proposal Document

| | |
|----------|---|
| ITSP 7.1 | Requests for clarification should be received by the Procuring Entity on or before January 08, 2026, 05:00 PM (PST) . Request for clarification shall be received and responded through EPADS. |
|----------|---|

| | |
|-----------------|--|
| ITSP 7.4 | <p>A Pre-Bid meeting will take place.</p> <p>Date: January 08, 2026</p> <p>Time: 11:30 AM (PST)</p> <p>Place: Main Board Room, TransPeshawar (The Urban Mobility Company), First Floor KPUMA Building Near Main BRT Depot, Chamkani, GT Road, Peshawar, KPK, Pakistan</p> <p>A site visit conducted by the Procuring entity will be organized on the date fixed for pre-bid meeting, if so conducted, on the request of prospective service providers.</p> |
| ITSP 7.5 | <p>Minutes of pre-bid meeting will be hoisted on website of the Procuring Entity and sent to all Service Providers who attended pre-bid meeting apart from publishing on EPADS.</p> |
| ITSP 8.2 | <p>The addendum will be hoisted on website of the Procuring Entity or KPPRA or both apart from EPADS and may be published in newspapers if the Procuring Entity deems necessary and if the amendments are of substantial nature.</p> |

C. Preparation of Proposals

| | |
|------------------|--|
| ITSP 10.1 | <p>The language of the Proposal is: English</p> |
| ITSP 13.1 | <p>Alternative Proposals are not permitted.</p> |
| ITSP 16.1 | <p>The Proposal validity period shall be one hundred eighty (180) days.</p> |
| ITSP 17.1 | <p>Bid security shall be submitted in PKR from any scheduled bank of Pakistan to the amount of 2% of Total Proposal Price in shape Bank Guarantee on format as prescribed in Section 4, or in shape of Call Deposit Receipt in the name of Chief Executive Officer (CEO) TransPeshawar. The bid security shall be submitted from the account of the Service Provider who submits the proposal.</p> <p>The Bid Security in original form (in hard form) shall be submitted in separate envelop to the procuring entity on the address given below, on or before the deadline for submission of proposal.</p> <p>The copy bid security shall be kept in Financial Proposal. The Service Provider shall in addition, place an affidavit on E-Stamp paper of PKR150 or above, and duly notarized, in the Technical Proposal stating that a bid security amounting to 2 percent of the total proposal price, without indicating the figure in the letter, has been placed in the Financial Proposal. Otherwise, the Technical Proposal will be considered non-responsive and Financial Proposal will be not be opened.</p> <p>The original bid security shall be kept sealed until opening of Financial Proposal.</p> <p>Procuring Entity Address:</p> <p>Attention: Chief Executive Officer (CEO), TransPeshawar Address: TransPeshawar (The Urban Mobility Company), First Floor KPUMA Building Near Main BRT Depot, Chamkani, GT Road, Peshawar, KPK, Pakistan</p> |

| | |
|------------------|---|
| | <p>The sealed envelope shall clearly mark with:</p> <ul style="list-style-type: none"> • Bidder's name and address; • Name of the procurement; and • The words "Original Bid Security" for [Name of Procurement]". |
| ITSP 17.2 | Non-submission of bid security in prescribed manner shall be sufficient ground for rejection of proposal. |
| ITSP 17.6 | In case of Joint Venture is submitting bid security in the Shape of Call Deposit Receipt, the Bid security may be in the name of any one member of Joint Venture in accordance with ITSP 17.1. |
| ITSP 18.1 | In addition to the original Proposal, the number of copies is: Not Applicable |
| ITSP 18.2 | <p>The written confirmation of authorization to sign on behalf of the Service Provider shall consist of:</p> <p>The authorization is required if the Service Provider is a firm or company or any combination thereof. If the Service Provider is a sole proprietor or individual, he is not supposed to submit authorization if he is not represented by any representative.</p> <p>An authorization shall be provided on the format as given under Section 4 (Bidding Forms) specifying the representative's authority to sign the Proposal on behalf of, and to legally bind, the Service Provider. If the Service Provider is an intended or an existing Joint Venture, the authorization/power of attorney shall be signed by all partners individually and specify the authority of the named representative of the Joint Venture to sign on behalf of, and legally bind, the intended or existing Joint Venture on the relevant Schedule. If the Joint Venture has not yet been formed, also include evidence from all proposed Joint Venture partners of their intent to enter into a Joint Venture in the event of a contract award.</p> |
| ITSP 18.2 | The Service Provider shall submit an acceptable authorization within three (03) working days. |

D. Submission and Opening of Proposals

| | |
|------------------|--|
| ITSP 19.1 | <p>19.1.1. Once signed and stamped, each Proposal (Technical and Financial) shall be scanned and compiled into separate PDF files.</p> <p>19.1.2. The files shall be clearly named as:</p> <ul style="list-style-type: none"> • <i>"Technical Proposal – Operation and Maintenance Services of Platform Screen Door (PSD) and Allied Services in Peshawar BRT System – [Name of Service Provider]"</i> • <i>"Financial Proposal – Operation and Maintenance Services of Platform Screen Door (PSD) and Allied Services in Peshawar BRT System – [Name of Service Provider]"</i> <p>19.1.3. If more than one version of a file is uploaded, the version most recently uploaded before the deadline will be considered the</p> |
|------------------|--|

| | |
|-------------------------|---|
| | <p>Final/Original Proposal.</p> <p>19.1.4. Physical sealing of proposals, except the document (s) required in hard, is not required. However, bidders must ensure that Technical and Financial Proposals are uploaded in separate clearly named PDF files as stipulated above. If the Technical Proposals and the Financial Proposals are submitted together in one file, the Procuring Entity will reject the entire Proposal.</p> <p>19.1.5 Apart from the electronic submission the following documents shall be submitted physically (in hard form), on the address as indicated, on or before the deadline for submission of proposals.</p> <ol style="list-style-type: none"> i. Original bid security ii. Original affidavits <p>Client Address Documents to be Submitted Physically:</p> <p style="text-align: center;">Attention: Chief Executive Officer (CEO), TransPeshawar</p> <p style="text-align: center;">Address: TransPeshawar (The Urban Mobility Company), First Floor KPUMA Building Near Main BRT Depot, Chamkani, GT Road, Peshawar, KPK, Pakistan</p> <p>19.1.5. Any document required physically in original form shall be sealed in an envelope, clearly marked with:</p> <ul style="list-style-type: none"> • Bidder's name and address; • Title of the Procurement; and • The words "<i>Original Bid Security and Affidavits for [Name of Procurement]</i>". |
| <p>ITSP 20.1</p> | <p>The deadline for Proposal submission is:</p> <p>Date: February 02, 2026</p> <p>Time: 11:30 AM (PST).</p> |
| <p>ITSP 23.1</p> | <p>The Technical Proposal opening shall take place at:</p> <p>Main Board Room, TransPeshawar (The Urban Mobility Company), First Floor KPUMA Building Near Main BRT Depot, Chamkani, GT Road, Peshawar, KPK, Pakistan</p> <p>Date: February 02, 2026</p> <p>Time: 12:00 PM (PST).</p> |
| <p>ITSP 35</p> | <p>The following sub-clauses added to ITB 35:</p> <p>35.3. The Successful Bidder shall establish/ incorporate special purpose vehicle (new company) within 07 days of Notification of Award.</p> <p>35.4. The Contract Agreement shall be signed by TPC with the special purpose vehicle (new company) hereinafter called "the Service provider"</p> <p>35.5. Prior to Contract Agreement signing, the Successful Bidder shall furnish Parent Company Guarantee for each of JV member (in case of JV) or bidder bidding in isolation.</p> |

| | |
|------------------|---|
| ITSP 36.2 | Within seven (07) working days of after submission of Performance Security, the Service Provider shall sign the contact |
| ITSP 37.1 | Performance Security shall be provided within twenty-eight (28) working days of issuance of Notification of Award. The following clause is added to ITB 37 ITB 37.3: The Performance Security shall be submitted by the Successful Bidder on behalf of the Service Provider / special purpose company |

Section 3 – Eligibility and Qualification Criteria

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1. Substantial Responsiveness of Technical Proposals

1.1. Substantial responsiveness of each proposal will be determined on the basis of following criteria:

- (a) Technical Proposal shall be determined as complete in accordance with ITB Clause 27;
- (b) Eligibility and Qualification of service provider will be assessed in accordance with the criteria outlined under Clause 2 and 3 below and in term of ITB Clause 4;
- (c) Agree to perform services in accordance with Schedule of Requirements, Standards and best international practices;
- (d) Over all in conformity with Request for Proposal Document.

2. Eligibility

| Criteria | Compliance Requirements | | | Documents | |
|-------------|-------------------------|-----------------------|--------------|-------------|-------------------------|
| Requirement | Single Entity | Joint Venture | | | Submission Requirements |
| | | All Partners Combined | Each Partner | One Partner | |

2.1 Country of Constitution

| | | | | | |
|--|-----------------------|----------------|-----------------------|----------------|---|
| A Service Provider must be an AoP or a company incorporated in or registered with Registrar of Firms or Security and Exchange Commission of Pakistan (SECP) respectively or any combination thereof. | must meet requirement | Not Applicable | must meet requirement | Not Applicable | Schedule 1 or Schedule 1 & 2 along with attachments |
|--|-----------------------|----------------|-----------------------|----------------|---|

2.2 Conflict of Interest

| | | | | | |
|--------------------------|-----------------------|----------------|-----------------------|----------------|------------------------------|
| No conflicts of interest | must meet requirement | Not Applicable | must meet requirement | Not Applicable | Letter of Technical Proposal |
|--------------------------|-----------------------|----------------|-----------------------|----------------|------------------------------|

2.3 Registration with FBR

| | | | | | |
|---|-----------------------|----------------|-----------------------|----------------|---|
| Registered with FBR for income and sales tax and reflected on active taxpayer list. | must meet requirement | Not Applicable | must meet requirement | Not Applicable | Schedule 1 or Schedule 1 & 2 along with attachments |
|---|-----------------------|----------------|-----------------------|----------------|---|

2.4 Registration with KPRA

| | | | | | |
|---|-----------------------|----------------|-----------------------|----------------|---|
| Registered with KPRA for sales tax on Services. | must meet requirement | Not Applicable | must meet requirement | Not Applicable | Schedule 1 or Schedule 1 & 2 along with attachments |
|---|-----------------------|----------------|-----------------------|----------------|---|

2.5 Registration with PEC

| | | | | | |
|---|-----------------------|----------------|----------------|-----------------------|---|
| A valid PEC license in category C-4 or above with EE11 or ME06 or ME07 or ME03 code of specialization | must meet requirement | Not Applicable | Not applicable | must meet requirement | Schedule 1 or Schedule 1 & 2 as attachments |
|---|-----------------------|----------------|----------------|-----------------------|---|

2.6 Not Blacklisted

| | | | | | |
|--|-----------------------|----------------|-----------------------|----------------|---|
| The Service Provider is not blacklisted by any federal or provincial public entity in Pakistan, is neither insolvent nor bankrupt, is not in the process of winding up nor his/her properties are under the control of receiver nor his/her business activities have been suspended nor legal proceedings for any of the foregoing are imminent or have been initiated against him/her and has fulfilled all obligations under law for the time being in force | must meet requirement | Not Applicable | must meet requirement | Not Applicable | Schedule 1 or Schedule 1 & 2 along with attachments (Non-blacklisting certificate on E-Stamp Paper of PKR.150 and dully notarized (affidavit) to the effect) |
|--|-----------------------|----------------|-----------------------|----------------|---|

3. Qualification

3.1 Financial Soundness (Historical Financial Performance)

| Criteria | Compliance Requirements | | | Documents | |
|---|-------------------------|-----------------------|----------------|-----------------------|-----------------------------|
| Requirement | Single Entity | Joint Venture | | | Submission Requirements |
| | | All Partners Combined | Each Partner | One Partner | |
| Submission of audited financial statements for the last three (03) years (2022, 2023 and 2024) to demonstrate the current soundness of the Bidder's financial position. As a minimum, the Bidder's net worth for the last year (2024) calculated as the difference between total assets and total liabilities should be at least PKR. 30 million. | must meet requirement | Not Applicable | Not applicable | must meet requirement | Schedule 3 with attachments |

3.2 Financial Soundness (Average Annual Business Turnover)

| | | | | | |
|--|-----------------------|-----------------------|----------------|----------------|-----------------------------|
| Minimum average annual turnover of one hundred million Pak Rupees (PKR.100,000,000) calculated within last three (03) years from submitted financial statements. | must meet requirement | must meet requirement | Not applicable | Not Applicable | Schedule 3 with attachments |
|--|-----------------------|-----------------------|----------------|----------------|-----------------------------|

3.3 Contractual Experience

| | | | | | |
|--|-----------------------|----------------|----------------|-----------------------|------------------------------------|
| Executed/ongoing one similar contract (operation and/or maintenance contract of electrical and/or mechanical systems) to the worth of two hundred million Pak Rupees (PKR.200,000,000) or more in last 5 years in JV or through separate contract. | must meet requirement | Not Applicable | Not applicable | must meet requirement | Schedule 4 along with attachments. |
|--|-----------------------|----------------|----------------|-----------------------|------------------------------------|

Section 4 - Bidding Forms

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Contents of Technical and Financial Proposals

The Bidders are required to submit their Proposals in two separate envelopes marked as “1. Technical Proposal” and “2. Financial Proposal” as provided below. All the forms/format shall be properly filled and submitted with required attachments. Incomplete or partially filled forms shall not be entertained and rejected.

1. Technical Proposal

“Technical Proposal” shall be comprised of following documents. Order/sequence of document while preparing technical proposal shall be observed to facilitate the assessment of proposals in a systematic manner. Moreover, Technical Proposal shall be numbered.

Table-1

| Order | Document Number and Information Required | Check (Y/N) | Page No. |
|----------|---|-------------|----------|
| A | Proposal Submission | | |
| 1. | Letter of Technical Proposal | | |
| 2. | An affidavit on E-Stamp paper of PKR.150 or above and dully notarized stating that a bid security amounting to 2 percent of the total proposal price, without indicating the figure in the affidavit, has been placed in the Financial Proposal in accordance with ITSP 17.1. | | |
| 3. | Schedule 5. Affidavit of Integrity Pact on E-Stamp Paper of PKR.150 and dully notarized | | |
| 4. | Schedule 6. Authorization/Power of Attorney on E-Stamp Paper of PKR.150 and dully notarized | | |
| B | Eligibility | | |
| 5. | Schedule 1 or Schedule 1&2 “Bidder’s/Lead Partner Information Sheet” and “Joint Venture Information Sheet” | | |
| (i) | Articles of incorporation or constitution and/or certificate of registration with Registrar of Firms or SECP | | |
| (ii) | Certificate of Registration with FBR for income and sales tax and Active Tax Payer List (ATL) showing status | | |
| (iii) | Certificate of Registration with KPRA for sale tax on services | | |
| (iv) | Valid PEC license in category C-4 or above with EE11 or ME06 or ME07 or ME03 code of specialization | | |
| (v) | Non-blacklisting certificate on E-Stamp Paper of PKR.150 and dully notarized (affidavit) to the effect that the Service Provider is not blacklisted by any federal or provincial public entity in Pakistan, is neither insolvent nor bankrupt, is not in the process of winding up nor his/her properties are under the control of receiver nor his/her business activities have been suspended nor legal proceedings for any of the foregoing are imminent or have been initiated against him/her and has fulfilled all obligations under law for the time being in force. | | |
| (vi) | A copy of the Joint Venture Agreement or a Letter of Intent to execute a Joint Venture Agreement in the event of a successful Service Provider shall be signed by all partners and submitted with the Technical Proposal, together with a copy of the proposed agreement. (submitted in case of the Service Provider is a Joint Venture) | | |
| C | Qualification | | |

| Order | Document Number and Information Required | Check (Y/N) | Page No. |
|-------|---|-------------|----------|
| 6. | Schedule 3. Financial Soundness | | |
| (ii) | Audited Financial Statements of relevant years in accordance with schedule 3 | | |
| 7. | Schedule 4: Contractual Experience | | |
| (i) | Letter of Award/Acceptance or contract agreement or any other credible record of Executed/ongoing one similar nature contract (operation and/or maintenance of electrical and/or mechanical systems) to the worth of two hundred million Pak Rupees (PKR.200,000,000) or more in last 5 years in JV or through separate contract. | | |
| (ii) | Contract Completion Certificate or anticipated completion certificate in case the contract is in progress or certificate / letter that the contract is in progress. | | |

Table-2**2. Financial Proposal**

| Order | Document Number and Information Required | Check (Y/N) | Page No. |
|-------|--|-------------|----------|
| 1. | Letter of Financial Proposal | | |
| 2. | Break up of proposal prices | | |
| 3. | Original Bid Security in accordance with ITSP Clause 17. | | |

Letter of Technical Proposal

The Bidder must accomplish the Letter of Technical Proposal on its letterhead clearly showing the Bidder's complete name and address. In case of Joint Venture, if applicable, Letter Head of Lead Partner.

Date:

Request for Proposal Document No.:

To:

Chief Executive Officer (CEO), TransPeshawar,
First Floor, KPUMA Building,
Main BRT Depot, Near NHA Complex,
Chamkani, Peshawar.

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Request for Proposal Document, including Addenda issued in accordance with Instructions to Bidders (ITB) Clause 8.
- (b) We offer to execute in conformity with the Request for Proposal Document the following Services:

[Insert Name of Procurement/Services]

- (c) Our Proposal consisting of the Technical Proposal and the Financial Proposal shall be valid for a period of one hundred eighty (180) days from the date fixed for the Proposal submission deadline in accordance with the Request for Proposal Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- (d) If our proposal is accepted, we commit to obtain a performance security in accordance with the Request for Proposal Document.
- (e) We are incorporated/registered in Pakistan.
- (f) We do not have any conflict of interest.
- (g) We are not participating, as a Bidder in more than one Proposal in this bidding process.
- (h) We agree to permit the Procuring Entity or its representative to inspect our accounts and records and other documents relating to the bid submission.

- (i) We understand that this Proposal, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.

- (j) We understand that you are not bound to accept the lowest evaluated Proposal or any other Proposal that you may receive.

Name of Authorized Representative

Designation

Sign of Authorized Representative

Name of Bidder with Seal.

Date

[Note: In case of Joint Venture Letter of Technical Proposal shall be signed by authorized representatives of all members constituting the Joint Venture along with affixing of respective seal]

Schedule-1**(Eligibility)**

Service Provider or Lead Member must fill out this form and attach respective documents indicated below.

| Service Provider's/Lead Member's Information Sheet | |
|---|--|
| Service Provider's name | |
| In case of Joint Venture Lead member's legal name | |
| In case of a Joint Venture, legal name of each partner | |
| Service provider's/Lead member's country of constitution | |
| Service provider's/Lead member's year of constitution | |
| Service provider's/Lead member's Year of registration with FBR for income tax and sales tax | |
| Service provider's/Lead member's Year of registration with KPRA for sales tax on service | |
| Service provider's/Lead member's year of registration with PEC for category C-4 or above with EE11 or ME06 or ME07 code of specialization | |
| Service provider's/Lead member's legal address | |
| Name of Service provider's authorized representative in case the service provider is a firm/company (In case of JV authorized representative of JV) (name, address, telephone number(s), fax number(s), e-mail address) | |
| Attached are copies of the following documents. | |
| <input type="checkbox"/> 1. Articles of incorporation or constitution or certificate of registration of a firm or company (In case of JV particulars of Lead Member); | |
| <input type="checkbox"/> 2. In case of a Joint Venture, a letter of intent to form a Joint Venture along with copy of proposed JV agreement, or Joint Venture agreement; | |
| <input type="checkbox"/> 3. Certificate of Registration with FBR for income tax and sales tax and reflected on Active Taxpayer List (ATL) (In case of JV particulars of Lead Member); | |
| <input type="checkbox"/> 4. Certificate of Registration with KPRA for Sales Tax on Services (In case of JV particulars of Lead Member); | |
| <input type="checkbox"/> 5. Valid PEC license in category C-4 or above with EE11 or ME06 or ME07 or ME03 code of specialization (In case of JV particulars of one Member); | |
| <input type="checkbox"/> 6. Non-blacklisting certificate on E-stamp paper of PKR.150 and duly notarized to the effect that Service Provider/Lead Member is not blacklisted by any federal or provincial public entity in Pakistan, is neither insolvent nor bankrupt, is not in the process of winding up nor his/her properties are under the control of receiver nor his/her business activities have been suspended nor legal proceedings for any of the foregoing are imminent or have been initiated against him/her and has fulfilled all obligations under law for the time being in force. (In case of Joint Venture applicable to all members) | |

Schedule-2**(Eligibility)**

Each member of the Joint Venture must fill out this form separately and attach respective documents indicated below.

| Joint Venture Information Sheet | |
|---|--|
| Service Provider's name | |
| Joint Venture Partner's legal name | |
| Joint Venture Partner's country of constitution | |
| Joint Venture Partner's year of constitution | |
| Joint Venture Partner's Year of registration with FBR for income and sales tax | |
| Joint Venture Partner's Year of registration with KPRA for sales tax on service | |
| Joint Venture Partner's legal address | |
| Joint Venture Partner's authorized representative information (name, address, telephone number(s), fax number(s), e-mail address) | |
| <p>Attached are copies of the following documents.</p> <p><input type="checkbox"/> 1. Articles of incorporation or constitution or certificate of registration of a firm or company;</p> <p><input type="checkbox"/> 2. Certificate of Registration with FBR for income tax and sales and reflected on Active Taxpayer List (ATL);</p> <p><input type="checkbox"/> 3. Certificate of Registration with KPRA for Sales Tax on Services;</p> <p><input type="checkbox"/> 4. Non-blacklisting certificate on E-stamp paper of PKR.150 and duly notarized to the effect that JV partner is not blacklisted by any federal or provincial public entity in Pakistan, is neither insolvent nor bankrupt, is not in the process of winding up nor his/her properties are under the control of receiver nor his/her business activities have been suspended nor legal proceedings for any of the foregoing are imminent or have been initiated against him/her and has fulfilled all obligations under law for the time being in force.</p> | |

**Schedule-3
Financial Soundness**

Each Bidder must fill out this form.

| Financial Data for last 3 Years | | |
|--|---------------------|-------------------|
| Year 1: 2022 | Year 2: 2023 | Year: 2024 |

Information from Balance Sheet

| | | | |
|-------------------------------|--|--|--|
| Total Assets (TA) | | | |
| Total Liabilities (TL) | | | |
| Net Worth = TA – TL | | | |

Information from Income Statement

| | | | |
|-----------------------------|--|--|--|
| Total Revenues | | | |
| Profits Before Taxes | | | |
| Profits After Taxes | | | |

- Attached are copies of financial statements (balance sheets including all related notes and income statements) for the last 03 years, as indicated above, complying with the following conditions.
- Unless otherwise required by Section 3 of the Request for Proposal Document, all such documents reflect the financial situation of the legal entity or entities comprising the Bidder and not the Bidder's parent companies, subsidiaries, or affiliates.
 - Historical financial statements must be audited by an external auditor approved by SECP having UDIN. In case of a firm the requirement of UDIN will be assessed as per relevant law.
 - Historical financial statements must be complete, including all notes to the financial statements.
 - Historical financial statements must correspond to accounting periods already completed and audited (no statements for partial periods shall be requested or accepted).

Schedule-4

Contractual Experience

Each Bidder must fill out this form.

| Contract of Similar Size and Nature | | |
|---|----------------------------------|---------------|
| Contract No of | Contract Name | |
| Award Date | On Going/Completion Date: | |
| Total Contract Amount | PKR. | |
| If partner in a Joint Venture or subcontractor, specify participation of total contract amount | Percent of Total | Amount |
| Employer's name Address Telephone number Fax number E-mail | | |
| Description of the Similarity in Accordance with Criterion 3.3 of Section 3 (Eligibility and Qualification Criteria) | | |
| | | |
| <input type="checkbox"/> Attached Letter of Award/Acceptance or contract agreement or any other credible record to substantiate information provided in Schedule 3. <input type="checkbox"/> Attached Contract Completion Certificate of the relevant contract (if the project is completed) or anticipated completion certificate if the contract is in progress or letter showing that the project is in progress. | | |

Schedule 5

Affidavit of Integrity Pact

(To be submitted on E-stamp paper of PKR.150 and duly notarized)

(In case of Joint Venture to be submitted by each joint venture partner)

_____ [Name of Bidder] hereby declares its intention not to obtain or induce the procurement of any contract, right, interest, privilege or other obligation or benefit from Procuring Entity/Government of Khyber Pakhtunkhwa (hereinafter called GoKP) or any administrative subdivision or agency thereof or any other entity owned or controlled by it through any corrupt and fraudulent business practice.

Without limiting the generality of the foregoing, _____ [Name of Bidder] represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any natural or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder’s fee or kickback, whether described as consultation fee or otherwise, with the object of obtaining or including the procurement of a contract, right, interest, privilege or other obligation or benefit in whatsoever form from Procuring Entity/GoKP, except that which has been expressly declared pursuant hereto.

_____ [Name of Bidder] certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with Procuring Entity/GoKP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

_____ [Name of Bidder] accepts full responsibility and strict liability for making any false declaration, not making full disclosure, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to Procuring Entity/GoKP under any law, contract or other instrument, be voidable at the option of Procuring Entity/GoKP.

Notwithstanding any rights and remedies exercised by Procuring Entity/GoKP in this regard, _____ [Name of Bidder] agrees to indemnify Procuring Entity/GoKP for any loss or damage incurred by it on account of its corrupt and fraudulent business practices and further pay compensation to Procuring Entity/GoKP in an amount equivalent to ten times the sum of any commission, gratification, bribe, finder’s fee or kickback given by _____ [Name of Bidder] as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever form from Procuring Entity/GoKP.

Name of Authorized Representative

Designation

Sign of Authorized Representative

Name of Bidder with Seal

Date

Schedule 6
Authorization/Power of Attorney

[For a Service Provider participating in the bidding through a representative. In case of a Joint Venture, power of attorney shall be submitted separately by each partner]

[To be submitted on E-stamp paper of PKR. 150 and duly notarized]

[Incomplete/partially filled authorization/Power of Attorney or person authorizing signatory being incompetent shall be treated as deficient]

THIS POWER OF ATTORNEY is executed at _____ **[insert Place]** on this day of _____ **[insert Date]**, by _____ **[insert name of the Service Provider]** at _____ **[insert the address]** (hereinafter, referred to as the "Grantor"), which expression wherever occur in these presents shall also mean and include its successors-in-interest and assigns.

WITNESSETH

WHEREAS the Grantor intends to submit a proposal to the TransPeshawar (The Urban Mobility Company) (hereinafter, referred to as "the Procuring Entity"), in respect of _____ **[Insert Name of Procurement/Service]** (hereinafter, referred to as "the Services"), and to do the follow up related actions (hereinafter, jointly referred to as "the Transaction"), and for this purpose, the Grantor considers it necessary and expedient to appoint a representative/attorney.

WHEREAS the Instructions to Service Providers contained in the Request for Proposal Document (RFP), for the Services, warrants submission of a Power of Attorney to the said appointment.

WHEREAS the Grantor represents and warrants to the Procuring Entity that all corporate and other actions required to give effect to this Power of Attorney have been duly taken and are subsisting.

NOW THEREFORE THIS DEED WITNESSETH the Grantor does hereby, irrevocably and unconditionally, nominate, constitute and appoint Mr./Ms. _____, son/daughter of _____, residing at _____ and holding CNIC No. _____ as its true and lawful attorney holding designation **[insert the designation]** (hereinafter, referred to as "the Attorney") to do or cause to be done all such acts, deeds, matters, and things which the Grantor may now do or in future may become interested to do in connection with the Transaction, including:

1. to visit and inspect the Site, seek clarification of the RFP, and attend the pre-bid meeting;
2. to prepare and submit a Proposal following provisions of the RFP;
3. to attend the Proposal opening event and the bidding process in respect of the Transaction and generally to take such actions and decisions as may be necessary for the bidding;
4. to negotiate, execute (underhand or under seal), sign, and deliver all contracts, instruments, deeds, agreements, applications, and other documents, to make amendments to the same whether or not material, and to submit the same to the Procuring Entity and/or any other interested parties;
5. to receive notices, instructions, and orders for and on behalf of the Grantor(s); and
6. to do all other things and to take all necessary steps incidental to the exercise of the above powers or which the Attorney considers necessary or expedient concerning the foregoing or the effective exercise of any power listed above.

The Grantor agrees that whatever the Attorney shall do or cause to be done according to this Power of Attorney shall be binding on the Grantor.

The Grantor agrees to ratify and confirm whatever the Attorney shall do or cause to be done under this Power of Attorney.

All terms used in this instrument, but not defined herein, shall have the meaning given to them in the RFP.

This Power of Attorney has not been revoked, amended or modified and remain valid and binding on the Granter.

IN WITNESS WHEREOF, the Grantor has executed this Power of Attorney on the date and place first written above.

WITNESSES:
[Signature, Name, Father's Name, and CNIC]

[INSERT NAME OF THE GRANTOR]
[Signature, Name, Designation, and CNIC]

1. _____

2. _____

NOTARY PUBLIC: (Name, Signature, Seal, Number, and Date) _____

Letter of Financial Proposal

The Bidder must accomplish the Letter of Financial Proposal on its letterhead clearly showing the Bidder's complete name and address. In case of Joint venture on letter head of lead partner

Date:

Request for Proposal Document No.:

To:

Chief Executive Officer (CEO), TransPeshawar,
First Floor, KPUMA Building,
Main BRT Depot, Near NHA Complex,
Chamkani, Peshawar.

We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Request for Proposal Documents, including Addenda issued in accordance with Instructions to Bidders (ITB) 8.
- (b) We offer to execute in conformity with the Request for Proposal Documents and the Proposal submitted for the following Services:

"[Insert Name of Procurement/Service]"

- (c) The Total Proposal Price is:

[amount in PKR in words], [amount in PKR in figures]

The proposal price from the breakup of proposal prices should be entered by the Bidder inside this box. Absence of the proposal price in the Letter of Financial Proposal may result in the rejection of the Proposal.

- (d) Our Proposal shall be valid for a period of one hundred eighty (180) days from the date fixed for the proposal submission deadline in accordance with the Request for Proposal Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
- (e) If our Proposal is accepted, we commit to obtain a performance security in accordance with the Request for Proposal Documents.

- (f) We understand that this proposal, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
- (g) We understand that you are not bound to accept the lowest evaluated proposal or any other proposal that you may receive.
- (h) We agree to permit the Procuring Entity or its representative to inspect our accounts and records and other documents relating to the proposal submission.

Name of Authorized Representative

Designation

Sign of Authorized Representative

Name of Bidder

Date

[Note: In case of Joint Venture Letter of Financial Proposal shall be signed by authorized representatives of all members constituting the Joint Venture along with affixing of respective seals]

Schedule-6
(On letterhead of the Bidder)
Breakup of Proposal Prices

1. All Bidders must read items in conjunction with requirements stipulated under Schedule of Requirements and fill the table carefully.
2. All Bidders shall quote the unit rate and total rates and prices against each item inclusive of all applicable taxes for completion of each activity/item in all respect.
3. No cutting or over writing is allowed unless otherwise initialed by the authorized person.

| S. No | Financial Quote | Unit | Quantity (A) | Price/ Unit (PKR) (B) | Total Price in PKR (C)= A x B |
|--|--|--------|--------------|-----------------------|----------------------------------|
| 1 | Monthly Payments offered by the Bidder to TransPeshawar including cost of all taxes but excluding Sales Tax on Services for provision of all services mentioned in RFP/ Contract including its attachments. (C1) | Months | 60 | | |
| 2 | Monthly Revenue for Advertisement Rights under the Agreement or any other benefits available under the contracts / tender documents. (C2) | Months | 60 | | |
| | Monthly Service Payments Offered by the Bidder in PKR in including all taxes but exclusive of Sales Tax on Services | Months | 60 | | =C1-C2 |
| Amount in Pakistani Rupees in words (Amount in integer) | | | | | |

Name of Authorized Representative

Designation

Sign of Authorized Representative

.....

Name of Bidder

Date

**Bid Security
(Bank Guarantee)**

*[Bank’s name, and address of issuing branch or office]*¹

Beneficiary: *[Name and address of the Procuring Entity]*

Date:

Bid Security No.:

We have been informed that ***[name of the Bidder]*** (hereinafter called "the Bidder") has submitted to you its proposal dated ***[please specify]*** (hereinafter called "the Proposal") for the execution of "***[Name of Procurement/service]***" under Request for Proposal ("the RFP").

Furthermore, we understand that, according to your conditions, proposals must be supported by a bid guarantee.

At the request of the Bidder, we ***[name of bank]*** hereby irrevocably and unconditionally undertake to pay you any sum or sums not exceeding in total an amount of ***[amount in words]*** ***[amount in figures]*** upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the proposal conditions, because the Bidder

- (a) has withdrawn its Proposal during the period of bid validity specified by the Bidder in the Letter of Technical and/or Financial Proposal; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidder (hereinafter "the ITB"); or
- (c) having been notified of the acceptance of its Proposal by the Procuring Entity during the period of bid validity, (i) fails or refuses to sign/execute the Contract Agreement, or (ii) fails or refuses to furnish the performance security, in accordance with the Request for Proposal.

This guarantee will expire (a) if the Bidder is the successful Bidder, upon our receipt of copies of the Contract Agreement signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder, or (ii) 28 days after the expiration of the Bidder’s proposal.

Consequently, any demand for payment under this guarantee must be received by us at the office on or before that date.

[Authorized signature(s) and bank’s seal (where appropriate)]

¹ All italicized text is for use in preparing this form and shall be deleted from the final document.

SCHEDULE OF REQUIREMENTS

TransPeshawar is currently operating BRT System in Peshawar which has equipment installed over a stretch of approximately 30 Km from Chamkani to Kharkhano including ramps at different locations, 31 BRT Stations (including proposed station at Aman Chowk), 244 Buses, and approx. 150 off-corridor bus stops. These infrastructures make part of scope of work to the extent explained below in this SOR. TPC will add approx. 102 buses in next one year which will part of the contract. The scope of work includes approximately of 40 Km corridor (including ramps), eight vehicular underpasses, five pedestrian underpasses in stations, and pedestrian bridge crossings at stations.

TransPeshawar (The Urban Mobility Company) has been handed over multiple electrical and mechanical systems in Peshawar BRT system which were installed and / or commissioned by Peshawar Development Authority (PDA) in 2020. Most of the equipment will complete five years of service by end of December 2025. TransPeshawar operated and maintained these equipment/ systems through service provider under service-based contract which are expected to end in 2025. TransPeshawar, in this Schedule of Requirements (SOR), requires detailed operations and maintenance services hereinafter called “Services” of these systems to meet their intended purposes for next five years or other term as may be extended in accordance with contractual requirements. These services will be provided at 31 BRT stations/locations, control center, KPUMA Building, Aman Chowk, Staging Facility at Dabgari and allied infrastructure/ locations.

This SOR outlines the scope, objectives, and requirements for the engagement of a qualified service provider to carry out the operation and maintenance of the electrical and mechanical systems in Peshawar BRT System, ensuring optimal performance, safety, and compliance with relevant standards and regulations. Furthermore, the Service Provider shall at its own cost and risk, coordinate with authorized agent or receive dealership from Original Equipment Manufacturer (OEM) or change equipment / software to provide services or enable Service Provider to provide services in accordance with Schedule of Requirements. This is the critical requirement of agreement as multiple OEM are involved and the Service Provider shall bear the cost of such management, coordination etc.

1.1 Scope Of Services

The Service Provider shall be responsible for all costs of required services mentioned in RFP, Agreement, this **SOR** and their Annexure/ attachments. The operation and maintenance services are required for following systems, sub-systems and Equipment:

- a) Platform Screen Door (PSD) includes but not limited to complete assembly of SCADA software's, control units, power cables and communication cables, motorized sliding doors, emergency escape door, fixed screen glass/ Glass panel (throughout station length at platform level) & elevated part of the stations, local control panel, **UPS**, batteries, bus RF transmitter, emergency button etc. and allied components which are required for its intended use and operation;

-
- b) Transformer at BRT Stations, KPUMA, Aman Chowk and along the BRT corridor. Transformer from and inclusive of but not limited to SY2 units at HT PESCO pole, LT, HT cables/wiring/conduits, termination kits, HRC fuses, LV breaker, bushes, metering cabinet & Transformer itself; and each station HT/LT/ MLV distribution panels, distribution boards, ACPs, earthing system (pits and connections) for transformer, generator, station structure, pedestrian bridge / underpass, escalators, elevators and LT Panels.;
- c) Road Blocker includes but not limited to complete assembly which includes stoppers, pits, road sensors, vehicle sensor, loop detector, boom barriers, **UPS**, power cables (from MLV panel) and communication, Traffic Signals and poles linked with Road Blocker, signs at poles, RFID system, provision of additional RFID tags required for vehicles, motorized arrangements, etc.;
- d) Corridor lights includes but not limited to street/road corridor lights installed on both side of BRT corridor (and provide illumination to mix traffic and BRT corridor) from KPUMA building to Kharkhano Market which includes flood lights in BRT Vehicular Underpasses, street/corridor lights/pole installed above BRT Vehicular underpasses, electric junction boxes, terminal blocks inside the poles junction boxes, pole earthing, LED smart panel, GI protection sheets in elevated part of the corridor/ flyover, corridor lights poles surrounding KPUMA building (within Boundary wall of depot and Railway track), Chamkani Stations within boundary of Depot and Railway line and associated cables from DB to light fixtures. The lights also include at top floor of Dabgari Building (Staging Facility) and inside the building at Staging Facility (two floors). The lights at bicycle track at Mezzanine level from Khyber Bazar to Railway Station is also part of the scope which are fixed under the flyover excluding station area. The scope includes lights on feeder route ramp till road blocker on Kharkhano side, Taj Abad side, Kohat Road side, Saddar ramp, two bridges coming from Nowshehra side (Road Blocker or start of bridge) till Chamkani stations, and Charsada road side at station 09. Maintenance **excludes** lights inside the station building, pedestrian bridges and pedestrian underpasses;
- e) Smart Energy Metering System. TransPeshawar has dedicated source supply from PESCO and installed Smart Energy Metering System at multiple location as check meter to charge and monitor different consumer based on their consumption. These smart meters are installed in KPUMA, ZU Business Centre, Chamkani Depot, Dabgari Depot, Hayatabad Depot, Gulbahar Station and Faisal Colony BRT Station. These meters are capable of operating on pre and postpaid modes. The service provider shall be responsible for operation and maintenance as well as trouble shooting of hardware and software with the third-party agent. The scope also includes procurement of 32 smart meters at 32 locations having connection of 4 connection per meter and allied operation and maintenance cost for data transmission and storage; and
- f) Mandatory Work which are required to be done by the Service Provider.

The detail documents, drawings summary of above mention Equipment/Scope are provided in following Annexes: -

- i. Details of PSD showing location and number (Annex-1)

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- ii. Details of Transformer showing location, capacity and number (Annex-2)
 - iii. Details of Road Blocker showing location and number (Annex-3)
 - iv. Details of Street Light in Corridor (Annex-4)
 - v. Details of Smart Energy Metering System Location and number along with future requirements/ specification of Smart Meters (Annex-5).
 - vi. Details of Distribution Boards and MLVs (Annex-6)
 - vii. Specification of PSD (Annex-7)
 - viii. Specification of Transformer (Annex-8)
 - ix. Specification of Road Blocker (Annex-9)
 - x. Specification of Street Light (Annex-10)
 - xi. Operation and Maintenance Manual of PSD (Annex-11)
 - xii. Operation and Maintenance Manual of Transformers (Annex-12)
 - xiii. Operation and Maintenance Manual of Road Blocker (Annex-13)
 - xiv. Operation and Maintenance Manual of Smart Meters (Annex-14)
 - xv. Details of staging Facility (Annex-15)

1.2 Handing Over of Equipment for Operation and maintenance

- 1.2.1 The Equipment, systems, subsystems as mentioned in Section 1.1 of this document will be handed over to the Service Provider in the state handed over by previous Service Provider and the current Service provider will take-over these equipment /systems for required operation and maintenance in accordance with scope of this Contract/Agreement. The Service Provider shall prepare a detail count to very minute details of each sub-system and submit to TPC for record with market-based pricing of each component duly signed within six months of the contract.
- 1.2.2 If both parties do not agree to extend the Agreement at Termination, the Service Provider shall seek in writing a Handing Back Certificate (HBC) from the TPC at least 60 days before the expiry of the Agreement. The TPC will issue such a certificate within 45 days provided that the equipment handed back is in good condition. Upon obtaining the HBC, the Service Provide shall be deemed clear of all obligations. However, until issuance of HBC which does not affect liability of Service Provider to keep System in fully operational condition even after expiry of Agreement, the Service Provider shall be bound to continue rendering O&M services, and the TPC shall continue to pay for such additional O&M Services. In addition, during this period, TPC and the Service Provider shall work jointly to solve any pending issues (if any). The final Invoice from the Service Provider shall include any such period of Services, which in any case shall not exceed 45 days.

1.3 General Maintenance Obligations of Equipment

The Service Provider shall: -

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- 1.3.1** Ensure that all Equipment are in satisfactory operational condition (fair wear and tear excluded) so that they conform to the operational standards of First-class bus rapid transit system and/or building. This means, in particular, that all Equipment should be clean, tidy, well-maintained, in running conditions and meeting all health and safety requirements;
- 1.3.2** Take responsibility for provision of all replacement parts and supplies for all maintenance issues of Equipment. The Service Provider shall procure any future spare parts and supplies (Spare parts/critical spare parts/consumables lubricants, oil etc. for all equipment's in this Agreement and scope of work) pursuant to documentation provided by the manufacturer, their agent, supplier or required for maintenance and / or operation of Equipment. The spare parts shall be genuine, brand new, non-refurbished, un-altered and imported through proper channel and incorporate all recent improvements in design and material. Service Provider shall provide proof of genuine and/or imported item/spare parts to TPC on demand;
- 1.3.3** The Service Provider shall devise a mechanism to keep himself continuously informed about the operational status/ performance/ efficiency of all equipment and facilities under his areas of responsibilities so as to respond against any malfunctioning, poor performance, non serviceability and failure in a timely manner;
- 1.3.4** In case of any fault/ failure or complaint the response time for the deployed manpower at the BRT for accessing the site and attending the fault shall not exceed 5 minutes;
- 1.3.5** Be responsible for all material and associated costs for repair actions of Equipment caused by theft or other scheduled / unscheduled incidents;
- 1.3.6** Keep record of each spare part used, reason for replacement, total spare used, remaining spare parts etc. and follow Protocol issued by TPC for use, record and inventory of the same. The Service Provider shall provide to TPC such record within three days or other such time notified by TPC;
- 1.3.7** Arrange spare parts store within the vicinity of BRT containing all necessary items / parts required for the maintenance of the said systems. This critical inventory list need be prepared on monthly basis;
- 1.3.8** Ensure that the critical spare part which may hinder the operation for prolonged duration are in stock/warehouse in sufficient quantity to ensure the smooth operations. TPC may notify such spare parts and their quantity to be always available in stock during period of the Agreement. Besides this, service provider shall maintain the inventory of critical spare parts for each month which should be at least 10 % of the installed items (covers in the scope of work) and other items separately in order to avoid any system failure in future. These critical inventory lists need be prepared on monthly basis;
- 1.3.9** Procure, transport and maintain any tools, software and diagnostic equipment, lifting equipment, machinery (boom buckets, lifters & cranes), calibrated test equipment, which are necessary to carry out the Services in accordance with the Agreement;

-
- 1.3.10** Coordinate with authorized agent of Equipment and /or Original Equipment Manufacturer (OEM) for defects / software issues/ maintenance/ overhaul or any other purpose to perform the required services at its own cost and risk;
 - 1.3.11** Follow direction / Protocol of TPC regarding cleaning of Equipment, and submission of weekly, monthly and half-year maintenance schedule regarding Equipment if asked by TPC;
 - 1.3.12** Maintain and provide tags to all electrical and mechanical equipment with QR Codes and 70 RFID tags (design and quality approved by TPC) and link with Asset Management System of TPC;
 - 1.3.13** Maintain all conduits /pipes relevant to the scope of work. Maintain, protect and provide replacement (where required) for all types of wires and cables (both data and power cables/control cables) connecting to Equipment of the same or improved specifications. The conduits / pipes shall be kept water tight so the rain water doesn't infiltrate through those conduits / pipes to other parts/location of the facility;
 - 1.3.14** All equipment /works covered by this Agreement must be repainted if the existing paint is scratched or has deteriorated. The surfaces to be painted should be thoroughly cleaned and washed, and scraped as necessary, prior to applying the new paint, ensuring complete satisfaction of the TPC;
 - 1.3.15** Maintain Asset register having details of all Equipment in his custody with asset number and facilitate TPC to include in their Assets management System, if asked by TPC. Furthermore, the Service Provider shall record inventory in Asset Management System, if authorized by TPC;
 - 1.3.16** Prepare code of conduct for its staff with approval of TPC;
 - 1.3.17** Ensure that all staff who work on the project are registered in biometric system provided by TPC at Stations, KPUMA and other facilities. This is mandatory for permanent staff, reliever, maintenance staff, operation staff, reserve or any other staff who access to the facilities of TransPeshawar in the performance of duties. Office staff of service provider are exempted;
 - 1.3.18** Get insurance to recover damage or theft parts, passenger or staff injury or third-party liabilities;
 - 1.3.19** Get additional information or missing information, at its own cost, about equipment, or its maintenance and operations requirements, if required; and
 - 1.3.20** Ensure and maintain protective devices and earthing systems are operated and maintained to reduce the risk of passengers, to equipment and operations/maintenance personnel from hazardous voltages or currents. Maintenance for each earth pit consists of cleaning of earth pit, checking of earth connection / continuity from equipment's end to earth pit end, fixing of earth plate and measuring of earth resistance with the help of

standard earth resistance test meter. Maintain standard earth resistance by providing standard moisture level deep inside earth pit. The Service Provider shall take required action to maintain desired resistance value required by safety standards /equipment requirement.

1.4 Operation and Control Obligations of Equipment

The Service Provider shall: -

- 1.4.1 Operate reliably Equipment to meet the operational requirements of bus operations, stations and buildings. The Equipment operational hours are 24 hours a day, 7 days a week and 365 days a year;
- 1.4.2 Engage suitable, skilled and appropriate number of human resources to satisfactorily discharge its obligations under this Agreement for safety of public, operation and maintenance of Equipment, and in accordance with minimum figures as mentioned in Section 1.17 (**Minimum Personnel Requirement**) of SOR or mentioned in agreement /SOR;
- 1.4.3 Be responsible for security of equipment which includes internal parts of equipment. TPC has provision general security for stations and corridor through another contractor / service provider.
- 1.4.4 Staff deployed for the assignment must be experienced and trained in their respective areas and able to perform services to the entire satisfaction of the TPC;
- 1.4.5 Ensure deployment of skilled professionals/manpower at strategic locations for smooth operations, immediate response/activities in case of emergency and avoiding potential damage(s) to human life and equipment;
- 1.4.6 Perform operation management services as per OEM recommendations, BRT applicable standards, Operational requirements, TPC regulations, and Interface Requirements (in case of interfaces with other systems);
- 1.4.7 Be responsible for all costs including human resource regarding operation and maintenance of equipment's which includes replacement of parts for preventive, corrective, and operational maintenance and / or defective, Equipment damaged due to whatever reason (s). These includes costs of all services mentioned in the SOR and Agreement;
- 1.4.8 Provide staff or train authorized representative of TransPeshawar or other Service Provider staff to perform operation on/off activity of all systems at its own responsibility. The staff provided by the Service Provider shall be in proper uniform and the uniform includes P-Cap, Jacket (in Winter), Rain Coat (in rain), black casual shoes, safety shoes for relevant staff, full sleeve shirt in winter & half sleeve shirt in summer with Zu logo, and dress of color as approved for different categories;

-
- 1.4.9 Prepare Operation Control and Maintenance Procedure/ Manual for all equipment mentioned in this document, and shall submit to TPC for approval, if asked by TPC. Service Provider shall update Manual from time to time and the Manual shall include operation hours of equipment, routine checks/ daily check-list, preventive and corrective maintenance schedules, standard operation procedures of the equipment, training duration etc. Service Provider shall finalize the details format with TPC and update as and when needed;
 - 1.4.10 Ensure safety tool in working condition and checked periodically as recommended by manufacturer. Provide safety equipment, personal protection equipment and other necessary materials as required for the execution of services under the Agreement;
 - 1.4.11 Respond to operation and maintenance issues reported by TPC or any other approved mechanisms;
 - 1.4.12 Follow instructions / Protocol of TPC regarding procedure of operation, duration of operation of all Equipment, Energy plan and schedule for operation of such Equipment;
 - 1.4.13 Coordinate all hardware and software maintenance activities as well as routine maintenance activities in advance with TPC; and
 - 1.4.14 Maintenance activities on-corridor and stations shall be conducted at night time during non-operational hours of buses.

1.5 Early Warnings by the Service Provider

- 1.5.1 The Service Provider shall inform the TPC in writing at the earliest opportunity of specific likely future events, problems or circumstances whether on Service Provider's part or on TPC's part, that may adversely affect the quality of Services. The Service Provider should also carry out corrective measures required; and
- 1.5.2 If the Service Provider fails to give an early warning without any justified reason, it shall be held responsible for all the consequences thereof.

1.6 Detailed Maintenance Obligations Regarding Software / SCADA System

SCADA system / software is provisioned in the Equipment for PSD, Road Blocker, smart meters, etc. The Service Provider shall maintain SCADA/Remote monitoring System, PLC, website, dashboard, storage, servers and associated equipment. Ensure remote operation of equipment through SCADA from control centre.

1.7 Detailed Maintenance Obligations of Equipment

The Service Provider maintenance and repair obligations shall include but not be limited to: -

- 1.7.1 The Service Provider shall procure any future spare parts, consumables and supplies for all equipment, systems and sub-systems (lube, lubricants, oil, supplies, wires, cables, switches, electrical/ electronic / mechanical gadgets / parts, electrical/ electronic/ mechanical material, etc.) i.e. PCB Cards, control cards, control module, display module,

etc, valves, relays, grease, batteries, switches, breaker, pressure gauges, pumps, motors, submersible pumps non-return valve, sensors, probe, electrical equipment detergents, cleaners, preservative, cotton waster etc.; tools i.e. safety facilities/jackets, personal protection equipment and other necessary materials as required for the execution of duties as required by this contract/Agreement and replace/provide new upon completion of useful life of any equipment/spare parts, batteries etc. if required, pursuant to documentation provided by the manufacturer, their agent, supplier or required for maintenance and / or operation of Equipment;

- 1.7.2** A detailed daily, weekly, monthly, semi-annually and annual maintenance program (Master maintenance Schedule) as per OEM manuals and requirement for each particular equipment shall be developed and implemented by Service Provider. Such schedules shall be produced to TransPeshawar on demand. The operation staff shall maintain a daily operational log book and log sheet for documenting the maintenance data, activities and events as per the requirements;
- 1.7.3** Preventive, corrective and operational maintenance including minor and major overhaul in accordance with the manufacturer's maintenance / operational manual shall be documented. The data documentation shall be in accordance with the maintenance requirements, mentioned herein and those which are given in the manufacturer's instruction manuals;
- 1.7.4** Rectify all faults occurred in relevant Equipment i.e., Water leakage, welding, short circuit, open circuit, phase sequence, under/over voltage, change, under / over voltage, phase missing, leakage current and earth faults etc or whatever reasons;
- 1.7.5** Any repair or replacement required, necessitated or caused as a result of, or generally resulting from, or in connection with, the following;
- i) Accidental or intentional damage to Equipment;
 - ii) Labour disturbances attributed to the Service Provider's employee;
 - iii) Improper or negligent use of the Equipment;
 - iv) Use of Equipment in breach of the terms and conditions of the Agreement;
 - v) Incompetence's of the Service Provider or the employees, subcontractors or any third party in operating, handling, working, or otherwise dealing with the Equipment;
 - vi) Servicing, maintenance or repairs to the Equipment by any third party not in accordance with the OEM recommendations;
 - vii) Minor repairs strictly necessary and carried out in an emergency situation or breakdown;
 - viii) Theft of Equipment or their components;
 - ix) Failure to comply with the manuals applicable to Equipment,

-
- x) Failure or malfunction of any component or equipment which is not provided by an OEM or TPC;
 - xi) Use of contaminated or non-OEM approved lubricants, additives or spare parts;
 - xii) Maintenance, repair or replacement, as the case may be, of or to the paintwork, side railing, approaches to Equipment, structure, stone damage, accident damage, etc. where Equipment are installed and handed over for operation and maintenance;
 - xiii) Attending to breakdowns and generally delivery to or collection or transportation from the point of service, salvage or breakdown;
 - xiv) Non- compliance by the Service Provider with any other obligations under the maintenance provisions specified in the Agreement;
 - xv) Tempering with the Equipment or its parts, controls and any specialized Equipment;
 - xvi) Operating the Equipment in a manner that may harm the Equipment, electrical, mechanical and other components;
 - xvii) Equipment component damage due to Service Provider negligence during maintenance and in checking and maintaining oil, lubricants and fluid levels as applicable in the applicable OEM operating manual; and
 - xviii) Breakdown of equipment due to whatsoever reason.

1.7.6 In addition to above, the Service Provider shall, among other things:

- i) Protect the work area to ensure general public safety prior to start of any Equipment maintenance work;
- ii) Perform the required regular checks, in accordance with the manuals and including the checking of lubricant levels, alignment, calibration, Oil testing etc.;
- iii) Replace lost parts, and safety tool of Equipment or components of Equipment;
- iv) Keep reserve parts, material etc. available in enough number to keep system operational during claim period, if any. The Service Provider shall make good the Defects or damage as soon as practicable and at his own cost during claim period;
- v) Protection and removal of accumulated water in pits and Substation;
- vi) Attend to the fitment, service or repair of any parts or equipment necessary pursuant to any applicable law which may come into force after the Signature Date;
- vii) Carry out maintenance and repairs of the Equipment in accordance with industry best practices to maintain Technical Specification and meet functional Specifications;
- viii) Keep and use the Equipment in a proper and prudent manner and ensure that only duly qualified and competent persons are allowed to operate the Equipment;
- ix) Ensure that the OEM running-in instructions and proper responses to systems warnings are fully understood and properly observed;

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- x) Not use Equipment for any purpose for which it is not designed or its use is specified;
 - xi) Ensure that no components of the Equipment are removed or exchanged except where defective and in the course of normal service, repair or replacement and generally ensure that the Equipment are operated in complete condition;
 - xii) Take all reasonable steps and precautions to minimize damage to the Equipment and in particular, but without limitation, in the event of any defect or failure occurring in the Equipment;
 - xiii) Service the Equipment at relevant intervals in accordance with the relevant Equipment manual, best industry practices and/ or TPC's instructions;
 - xiv) Promptly repair the Equipment in accordance with the relevant Equipment Manual and instructions. The service provider shall provide feasible solution for repeatedly occurring faults resulting operational loss;
 - xv) Ensure that only lubricants, spare parts and additive as prescribed by the OEM/TPC are used. In the event that the Service Provider proposes to use any alternative to the additive as prescribed by the OEM, first obtain authorization from TPC and reasonable conditions may be imposed;
 - xvi) Be responsible for maintenance and repair of all subsystems and equipment and recoup missing or theft items;
 - xvii) Allow TPC's Authorized Representative to inspect the Equipment, have access to and be entitled to, download, all information available from the Equipment (whether directly or indirectly);
 - xviii) Execute required improvements (holes, piping, welding, cutting, replacement, railing etc.), clear the site from all debris and restore the structure to original condition during the performance of his duties; and
 - xix) Responsible for all daily checks.

1.7.7 The Service Provider shall abide by the job safety and measures prevalent and laws in force in Pakistan and the Service Provider shall indemnify and hold harmless the TPC and its employees from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, in respect of the death or injury of any person or loss of or damage to any property arising in connection with the Services and by reason of the negligence of the Service Provider, or their employees, officers or agents. If any proceedings are brought or any claim is made against the TPC that might subject the Service Provider to liability under SOR, the TPC shall promptly give the Service Provider a notice thereof and the Service Provider may at its own expense conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. If the Service Provider fails to notify the TPC within twenty-eight (28) days after receipt of such notice that it intends to conduct any such proceedings or claim, then the TPC shall be free to conduct the same on its own behalf. The TPC shall, at the Service Provider's request, afford all available assistance to the Service Provider

in conducting such proceedings or claim and shall be reimbursed by the Service Provider for all reasonable expenses incurred in so doing.

1.8 Special Obligation Regarding Platform Screen Doors

The Service Provider Shall: -

- 1.8.1 Ensure more than 99.99 % availability (for passenger services) of PSD system measure/evaluated in a month. Total number of PSD doors are 432 ($\pm 5\%$) including proposed Station at Aman Chowk.
- 1.8.2 Periodically check, operate and maintain control units, motorized sliding doors, emergency escape door, fixed screen glass, local control panel, Traffic Signals, UPS, batteries etc;
- 1.8.3 Maintain the auto restart function of PSD is available in case of power shutdown or other similar situations;
- 1.8.4 Replace or provide glass damaged /broken (fixed door glass or PSD glass) due to stone, by passenger or whatsoever reason. The scope of work includes all glass on platform length including PSD and glass of elevated part of the station, where available. The broken glass shall be replaced within 7 days of damage with same specification;
- 1.8.5 Ensure that Emergency Button is always in working conditions;
- 1.8.6 Maintain complete PSD system along with allied equipment, cables, system, transmitter installed in buses etc.;
- 1.8.7 Assists the janitorial staff in cleaning the PSD`s;
- 1.8.8 Promptly alert the Control Centre in case of malfunctioning issues pertaining to system and progress of troubleshooting;
- 1.8.9 Displays appropriate warning signs for passengers during maintenance activities carried out during Service Hours/bus operation hours. Replace, as and when required, stickers related to scope of work; and
- 1.8.10 Perform any other function which are required for Equipment keeping them in operational state and to perform intended purpose.

1.9 Special Obligation Regarding Transformers at Station, KPUMA and in the Corridor

The Service Provider shall: -

- 1.9.1 Be responsible for maintenance of Transformer and ensure Transformer 99.99 % availability for bus operation and buildings. Total number of Transformers are 33.
- 1.9.2 Be responsible for maintenance of Transformer and replacement of oil;

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- 1.9.3 Be responsible for painting of one transformer cabinet per month (two coats) with high quality paint as approved by TPC. The work includes cleaning and surface finishing. The transformer cabinet shall be painted once in contract life;
 - 1.9.4 Stock & maintain trolley mounted mobile certified three (03) Emergency Transformers, one with the rated capacity (630 KVA) and two others with the rated capacity of 200 KVA each for emergency back-up in case of failure of any Transformer due to whatever reason. Mobile Emergency Transformer shall be made available within two months of agreement signature. Mobile Transformer shall be moved throughout the BRT corridor, Control centre, Commercial Centres of TPC and Stations along with allied accessories for successful restoration of the power at affected facility. This trolley mounted mobile Transformer shall always be positioned (24 x 7) in KPUMA or other location identified by TPC. Service Provider shall also be responsible for transportation and termination of cable at location where mobile Transformer is required within two hours;
 - 1.9.5 Immediately coordinate with PESCO and generate a complaint if main WAPDA supply is not available at any station and KPUMA building. Coordinate with PESCO officials to resolve all types of Transformer faults and HT / LT faults i.e. under / over voltage, connect / disconnect 11 KVA supply from pole, transformer fuse/isolating rods/links with consent of relevant PESCO sub-division;
 - 1.9.6 Make sure any Permit To Work (PTW) required for the execution of work may be attained by service provider from PESCO concerned department as and when required. The scope of this Agreement covers rating from 100KVA to 630kVA placed in different locations throughout the corridor & associated buildings;
 - 1.9.7 Dressing of cables at BRT Stations excluding related to ITS equipment but includes main cables of stations, lighting cables, fans cables, etc.
 - 1.9.8 Replacement of oil and dispose waste (Oil, used spare parts etc.) in accordance with environmental laws; and
 - 1.9.9 Any other activity which is required for proper upkeep and running of Transformers.

1.10 Special Obligation Regarding Road Blocker including Boom Barrier & Traffic Signals

The Service Provider Shall: -

- 1.10.1 Keep the Road Blockers (including boom barriers, D-shape blocker, RIFD reader, hydraulic pumps, hydraulic jack, dewatering pumps, motors, DBs, sensors, Traffic signals in corridor etc.) available during operation 99.99 %. Total number of Road Blockers are 22 (± 10 %).
- 1.10.2 Detail maintenance including painting of Traffic Signal lights;
- 1.10.3 Be responsible for operation and maintenance of all traffic signal lights in the corridor including Traffic signal installed at intersection of corridor (**6 sets of Traffic Signals**) and Nasir Bagh Road (if so provided by TPC). The maintenance works involves pole

maintenance, loops, signal lights, power cable (from DB to Equipment), signal head, control panels, controller etc.

- 1.10.4 Keep technical team available for handling emergency in case of non-operation of road blocker system breakdown;
- 1.10.5 Periodic cleaning of Road Blocker from dirt, mud etc.;
- 1.10.6 Periodic overhauling of loop detector including asphalt, concrete surface, boom barrier, motorized mechanism etc. The work includes laying and removal of asphalt and concrete surface;
- 1.10.7 Arrange additional RFID stickers/ tags as and when required for new buses and replacement of damaged RFID in existing buses (50 numbers every year for buses/cars) at KPUMA Road Blocker of design and quality approved by TPC;
- 1.10.8 Be responsible for installation of rubber / Delineator (illuminated) and their routine maintenance / replacement at Corridor Access Points in front of Road Blocker in mix traffic for safety of mix traffic vehicles;
- 1.10.9 Be responsible for removal of water from Road Blocker pits, regular painting of Road Blockers including yellow marking, and all other activities which are required for safe operation of Road Blockers, safety of bus operations, safety of Road Blockers, passengers, general public and mix traffic vehicles; and
- 1.10.10 Do all necessary activities (operation and maintenance) required for keeping Road blocker (including associated equipment, RFID's, Signals, UPS, control panels etc.) in operational state and procurement of any additional equipment /software if required.

1.11 Special Obligation Regarding Corridor Lighting

The Service Provider shall: -

- 1.11.1 Ensure that lights (LED lights, pole/corridor lights, Lights under the Bridge at Stations, search lights, lights in corridor underpasses, above cycle track at Mezzanine level, etc.) installed in Corridor (from Chamkani station to Kharkhano inclusive of feeder ramps), Malik Saad corridor area green belt & washroom, Staging Facility, BRT Vehicular underpasses, flyover, KPUMA Building surrounding area (within Boundary wall of depot and Railway track), Chamkani Station surrounding area are operational by more than 98 % at all times with respect to intended use and performance. Total number of corridor/street lights and tunnel/flush lights are 3113 ($\pm 5\%$) and 942 ($\pm 5\%$) respectively.
- 1.11.2 Do require schedule/periodic maintenance of corridor lights include cleaning;
- 1.11.3 Replace the defective/fused lights, burnt wires, switches, breaker, etc. all that required for the smooth running of the lighting system;

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- 1.11.4 Maintain sensors of corridor lights and ensure its cleaning and functionality on regular basis;
 - 1.11.5 Maintain GI protection sheets or other materials installed at junction boxes of street lights in elevated part of the bridge on both sides of street poles. The regular maintenance activities need to be conducted to avoid theft and tighten / close after maintenance activities;
 - 1.11.6 Provide/ maintain numbering (asset tagging) to each pole in the corridor which are mentioned under this scope of work; and
 - 1.11.7 Perform any other functions which are required for the intended use of the lights.

1.12 Special Obligation Regarding Smart Metering System

The Service Provider shall be responsible:

- 1.12.1 For maintenance of smart metering system which includes, digital metering unit, current Transformer's, Chargers, relays box, and associated components. Total number of Smart Meters are 36 ($\pm 20\%$);
- 1.12.2 For software installed in the metering system, data acquisition, cloud storage charges, and transmission from devices to web-portal. The service provider shall be responsible for telecommunication charges for the SIM installed in Equipment and shall also be responsible for installation of signal booster (at Faisal colony, Gulbahar colony, and Hayatabad depot) if required;
- 1.12.3 For calibration of the meters, maintenance, repair, replacement of the part and components associated with metering system;
- 1.12.4 For managing the Web portal, troubleshooting the portal in case of any faults and updating time to time as per the requirement and instructions of TPC for the improvement of the system;
- 1.12.5 For all the payments related to website charges/ hosting, data communication charges associated with smart Metering System;
- 1.12.6 For generation of monthly operation report from the portal as per category provided by TPC by target date;
- 1.12.7 For Bill generation for all the consumers (approximately 150) as identified by TPC at specified date;
- 1.12.8 For procurement, operation and maintenance of additional 32 smart meters (each must have four connection) for tuck shops to be installed at BRT stations along with associated wiring, storage charges, cabinet, telecommunication charges etc. Each smart meters shall have capacity of four separate consumers;
- 1.12.9 Secure data of the system for the term of the agreement; and

1.12.10 For generation of monthly financial reports for all the transactions made during the month.

1.13 Mandatory Provision of Works/ Procurement related to KPUMA Building & BRT System

The Service Provider shall execute the following mandatory works as part of the Agreement:

- 1.13.1 The Service Provider shall be responsible for the maintenance (including hardware, software, licensing etc.) of 85 ($\pm 10\%$) screens along with accessories (from screen till ticket office including cables) which are installed at BRT Stations. The Service Provider shall also be responsible for the operation (ON/Off) or uploading of media on the screen. Similarly, TPC has installed Multipurpose Board at multiple locations at BRT Stations and backlit board at UOP and Hashtnagari. The Service Provider shall be responsible for the maintenance of these multi-purpose boards. TPC shall allow advertisement on Mobile App & Bicycle Kiosk. The Advertisement shall be allowed in accordance with Advertisement Policy (**Appendix-II**). The Service Provider shall provide 20 % of air time to TPC for public service messages of BRT or public service messages of the Government / Department and 15 days per board per year for static advertisement / Multi-purpose Board. The Mobile App and Bicycle Kiosk has limited capacity of images (three at a time) uploading/ storage and shall be accepted with such system limitation. Furthermore, the Service Provider is allowed to generate revenue out of these 85 screens, Zu Peshawar Mobile App, Bicycle Kiosk and Multi-purpose Boards;
- 1.13.2 The Service Provider shall be responsible for maintenance of approximately 60 number of speed board installed along the corridor and change their stickers with High Intensity Prismatic (HIP) Stickers as and when required.
- 1.13.3 The Service Provider shall be responsible for the performance of drainage pipe installed in elevated section and responsible for opening, or replacement due to damage where required. The Service Provider representative shall inspect all such drain prior to rain and during rain; and clear / repair blockage by opening of pipes or replacement whatever action is required. This action is required for elevated portion of the section from Chamkani to Kharkhano Bridge. The Service Provider staff, with the permission of TPC, may also be allowed to walk in corridor during rain to see the potential drain blockage. The Service Provider shall also be responsible for maintenance, opening and replacement of drainage pipe (both rigid and flexible) from Station roof gutter to corridor at 31 Stations.
- 1.13.4 The Service Provider shall be responsible for regularly check/ inspection and maintenance of privacy louvers installed along the elevated section of corridor and flyovers including welding, lapping etc. or any other activity required for protection.
- 1.13.5 The Service Provider shall arrange and position a Bucket Crane permanently in KPUMA premises or any other location authorized by TransPeshawar. The crane will be utilized for maintenance of equipment/ corridor lights under the Agreement, maintenance of

drains as well as perform such other activities / function of TransPeshawar as directed by TPC at Station, depot, KPUMA, etc. The crane shall also be used for removal of flags/ items / advertisement at height along the corridor / ZU Peshawar infrastructure and also for fixation of flags, if so asked by TPC.

- 1.13.6** The Service Provider shall be responsible for the maintenance of electrical system and lights at Malik Saad Station area in corridor where bus take turn for Charsada Road route. The work involves replacement of lights, cable etc. in green belt as well as in two sets of wash room/ building.
- 1.13.7** The Service Provider shall be responsible for the maintenance of Rock Wall installed in seven (07) underpasses in Peshawar BRT. The maintenance work includes procurement / provision of any missing tiles or damaged during the contract period.
- 1.13.8** The Service Provider shall engage at least one Uniform Janitorial Staff (17 hours a day for 7 days) for cleaning of steel bridge of elevated Bicycle track at Mezzanine Level from Khyber Bazar till Dabgari which is approx. 2 Km (from landing ramp of Khyber Bazar to landing ramp of Dabgari and inclusive of ramp). The cleaning excludes stations area which are fenced. The Service Provider shall also be responsible for minor maintenance of Bicycle Track at floor and fence level. The Janitorial may perform any other function so asked by TPC
- 1.13.9** The Service Provider shall be responsible for maintenance, Housekeeping and Janitorial Services and security of Staging Facility which includes street lights at top floor used for Parking of buses, lights / fans inside the building at Staging Facility, entry to corridor at same level and electrical system (cables, etc.) from Distribution Board to light/fans etc. The Staging Facility building has two floors and multiple rooms. The security staff shall be responsible for closing and opening of gate at staging facility gate opening toward corridor at time prescribed by TPC as well control entry to Staging Facility parking floor from rest of the building. The Service Provider shall engage at least one security /staff per shift (365 days & 24 hours) for the protection of Staging Facility which includes street lights, top floor of Staging Facility building and emergency vehicles/buses parking therein. The Service Provider shall also be responsible for Housekeeping and Janitorial Services of Staging facility with deployment of at least one person per shift on permanent basis for 17 hours and 7 days for cleaning of Staging Facility and cleaning of common washrooms. Electricity bill shall be the responsibility of TPC.;
- 1.13.10** One room at Dabgari Staging Facility which shall be furnished (chairs, table, sound system & projector including allied accessories, cables etc. as approved by TransPeshawar) by the Service Provider. The training room shall be fit for training purposes at least 50 persons or till the maximum capacity of one hall. The room shall be used for training of BRT Staff on the approval of TPC. The Service Provider shall be responsible for maintenance of the one room and facilities.
- 1.13.11** One room at Dabgari Staging Facility which shall be furnished (chairs, table & computer(s) as approved by TransPeshawar) by the Service Provider and used as mini

control Centre for monitoring of Service Provider activities in stations, corridor and KPUMA building and shall be operational for 24 x 7. TPC may also consider limited access of Corridor CCTV to the mini control center. Furthermore, TPC may assign rooms in Staging Facility Building to other contractors of ZU Peshawar and the Service Provider shall keep management of the rooms in accordance with TPC allocation. TransPeshawar may consider allocation of additional room for Service Provider office requirements only subject to approval of TPC and deduction of PKR. 80 / square feet (covered area only) from invoice with 10 % annual increment. However, in such cases the charges of electricity shall be on Service Provider subject to check meter installation.

1.13.12 The Service Provider shall procure, operate and maintain one (01) new Changan Karvaan van or equivalent for the operational activities /inspection activities of ZU Peshawar and TransPeshawar along with three drivers. The vehicle shall have AC / Heating arrangement and shall be in good condition. The vehicle shall be branded with ZU Peshawar logo as approved by TransPeshawar. The vehicle shall be utilized by staff of TransPeshawar for inspections both in day and night and also in emergency for transportation of "Fire Team" in the corridor. The Service Provider shall accordingly responsible to arranged one (01) driver in night and one (01) driver in day time. The vehicle is expected to operate approximately average daily of 60 Km ($\pm 15\%$) calculated on year basis by TPC while for the rest of the kilometres / day shall be utilized by Service Provider for their operational and maintenance activities. The vehicle shall always be in neat and clean condition.

- a) The Service Provider shall be responsible for operation and maintenance activities including fuelling, oil change, maintenance of log book etc. The ownership of vehicles will rest with the Service Provider. The vehicle shall be a registered and token taxes paid timely and installed with GPS for measurement of travel distance. The GPS report and kilometers shall be visible to TPC and kilometer report shared with TPC.
- b) The driver should be in good physical and mental condition, wearing uniform as approved by TransPeshawar and must hold valid driver license. The drivers shall perform six days a week with maximum of 26 days annual leave.

1.14 Service Provider/ Control Centre Executives Responsibilities at Control Centre

The Service Provider shall depute full time one (01) Control Centre Executives (CCE) at same time for Control Centre for 17 hours a day with not more than 8 hours per shift and 365 days a year. The CCE`s shall be Mechanical and/or Electrical Engineer. The CCE shall perform following activities in addition to his own tasks:

- 1.14.1** The CRE shall work as a liaison between TPC, Service Provider, and Other Service Providers and monitor / report the overall maintenance activities, and perform other duties related to the scope of the Agreement as per instruction of the TPC;
- 1.14.2** CCE/ Service Provider shall download PESCO bills of Stations and KPUMA building, maintain detail entries in excel (in format approved by TPC), prepare monthly electricity

costs, comparison with last year/ months cost/unit wise. Each month or at any other interval, the report shall be submitted to TPC in accordance with agreed format for PESCO bills;

- 1.14.3 CCE / Service Provider shall record / prepare report of the reading of check meters, smart meters, corresponding calculation of units charged, unit rates, comparison with last month's/ years etc. In accordance with agreed format for Tuck Shops, underpasses shops, ATM, TVM, Bicycle Stands, Sui Gas bill at Islamia College, Advertisement or any other Check meters where recovery shall be made;
- 1.14.4 Monitor load performance, outages, smart meters installed in system (Stations, Depot, Zu Business Centre, Mall of Hayatabad, Control Centre etc.) under the scope of Agreement and prepare report accordingly;
- 1.14.5 Coordinate with Station staff, field staff, control center staff of BRT system Service Provider / contractor, record incidents and emergencies in Incident Management System, respond to Complaint Management System, report emergencies and provide necessary support;
- 1.14.6 Prepare daily operation report and share with TPC next day both in summarized and detailed format;
- 1.14.7 Monitor the performance of field/ station staff, activities under the Agreement and equipment performance and ensure compliance of the contractual requirement; and
- 1.14.8 Any other task assigned by the TPC.

1.15 Service Provider/ Operator Responsibilities at Stations & KPUMA Building

- 1.15.1 Check/ inspect illegal power connection at least monthly and randomly at Underpasses of Faisal Colony, Gulbahar, Hashtnagari, Malik Saad and Tehkal underpasses. The Service Provider will check that no illegal power connection is taken by shopkeepers from underpasses. Similarly, activities /inspection shall be along the corridor. The Service Provider shall ensure that non authorized persons not take connection from street lights for construction or lighting. This includes civil work contractor working in corridor and/or Stations by TPC, PDA or any other party contractor;
- 1.15.2 Take monthly readings of all meters including Check Meters installed in Stations for Tuck Shop, ATM`s, Advertisement, or any other purposes and keep record of such activities. The Service Provider shall also be responsible for maintenance and calibration of these meters at least once in a year.
- 1.15.3 Provide necessary support to other Service Providers as directed by TPC for connections at Station, KPUMA or any other location; and
- 1.15.4 All staff of the Service Provider shall be registered in Attendance Management System of the TPC and record attendance of IN & Out accordingly. No Staff shall perform duty more than 8 hours.

1.16 Labor Laws Compliance for the Staff Engaged by Service Provider

The Service Provider shall ensure labor laws compliance related to the staff deployed by the Service Provider for the performance of the duties. The Service Provider shall not only ensure compliance but shall also perform the followings task and assume responsibilities:

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- 1.16.1** Submit salary payment schedule to TPC within seven (07) days of start of services and ensure payment within seven (07) days or other such period are paid to the staff;
- 1.16.2** Ensure that staff are getting regular weekly OFF, casual leaves, sick leaves and other legal leaves in accordance with Labor Laws. The Service Provider shall ensure 32 days of leaves per year against sick/ casual leaves or as per labor laws whichever is higher;
- 1.16.3** Ensure that staff who worked on special days (Eid Days etc.) are compensated in accordance with Labor Laws;
- 1.16.4** Nominate Focal person to pursue claims of the Staff in EOBI and ESSI for reimbursement, issuance of EOBI/ESSI Cards and other such facilitation required during service or post death by their families at Government Office;
- 1.16.5** Ensure Insurance for employees in accordance with labor laws. The Service Provider shall provide proof of claims of recovery or start of pension (whichever is applicable) is started within three months after the death of the employee or injury / disability;
- 1.16.6** Engage Reserve Staff against Staff Clause 1.17 to work on their behalf in case of weekly off, sick leave, casual Leaves and any other leave under the Applicable Law;
- 1.16.7** Ensure that Employee are insured (Group Insurance) with minimum of following limits or Labor laws or applicable laws whichever is higher:

Death in case off-duty: PKR 1 million

Death in case of on-duty: PKR 2 million

If the Employees are not insured or paid timely then such amount shall be deducted from the invoice of the Service Provider for payment to the Employees or legal heirs along with LD`s for delay; and

- 1.16.8** The Service Provider shall not deduct any amount more than 3 % or any other amount notified in Labor Laws against Liquidated Damages for non-performance by the employee.

1.17 Minimum Personnel Requirement

- 1.17.1** The Service Provider engage four (04) personnel (Inspectors) with minimum qualification of diploma to perform the tasks as assigned by TransPeshawar.

a)He shall sit in Service Provider or TPC office (as desired by TPC) and must have computer, work stations, and camera to perform the following functions: -

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- ✧ Conduct inspection of buses, corridor, off-corridor buses, bicycle station, depot etc. on behalf of TransPeshawar;
 - ✧ Prepare a report of such inspection for TransPeshawar on format as agreed by TransPeshawar;
 - ✧ Visit at least monthly under the BRT flyover in mix traffic and submit drainage pipe report which requires maintenance. The Inspector shall also highlight any overhanging material (sheet, concrete, debris etc.) and the Service Provider shall remove with crane as soon as observed;
 - ✧ Visit at least monthly under the BRT flyover in mix traffic and submit report of illegal poster/ graffiti on BRT pillars/washrooms/ flyover or any other infrastructure. Removal of posters are not part of the scope of work;
 - ✧ Conduct inspection in day or night as assigned by TransPeshawar;
 - ✧ Conduct equipment counts at depot, station or other facility as assigned by TPC;
 - ✧ Prepare condition report of assets such as bicycle stations, bicycles, buses, off-corridor stops, washroom etc.
 - ✧ Perform analysis, prepare formats, prepare report or maintain record under the instruction of TransPeshawar; and
 - ✧ Perform any other task at office or conduct field visit or any other task assigned by TransPeshawar.

b) The Service provider shall bear the cost of Transportation of field or office visits or arrangement of motor cycle or other vehicle for inspection. Each Inspector shall be equipped with at least motorcycles for visits.

c) The personnel shall work six (06) days a week with exception of 26 days annual leave.

d) The Inspectors shall perform the task in accordance with SOP defined by TransPeshawar and must have Uniform approved by TPC.

e) TransPeshawar may decrease/increase the number of personnel (Inspectors) at the discretion of TransPeshawar. However, in case of adjustment, the monthly price shall be adjusted @ two times of the minimum wages enforced at that time. The increase / decrease shall be through contract amendment beyond mentioned quantities.

1.17.2 The minimum personnel requirements are as follows: -

| Staff Category | Requirement |
|---|---|
| Control Centre Executives (CCE) | One (01) at same time per shift (two shifts) for 17 hours a day and 365 days a year excluding reserve |
| One Security / Staff at Staging Facility | 01 Staff per shift (Total three shifts) excluding reserve in Uniform |
| One Janitorial Staff per Shift for Staging Facility | 01 Staff per shift (Total two shifts) excluding reserve in Uniform |
| Drivers (Fixed staff with six days duty including reserve staff) for vehicle dedicated for inspection of vehicles | Total three persons in Uniform |
| Inspectors | Total four persons to perform functions on behalf of TPC and wearing approved Uniform. |
| One Janitorial Staff per Shift for Bicycle Track | 01 Staff per shift (Total two shifts) excluding reserve in Uniform |
| Two Uniform Staff at Regi Intersection for stopping of traffic to cross bus toward Nasir Bagh Road safely. In case, the staff is not utilized will be accommodated in the system as per TPC instructions | Two (02) at same time per shift (two shifts) for 17 hours a day and 365 days a year excluding reserve |
| <p>The above are minimum Personnel and the Service Provider shall depute additional staff and calculate reserve staff as required to perform scope of work, and meet KPI's.</p> <p>The above is designation and Personnel shall not work for more than eight (08) hours a day. The Service Provider shall estimate reserve personnel accordingly except where mentioned specifically.</p> <p>Service Provider shall get Uniform Approved separately for each category from TPC.</p> | |

1.18 Additional Services

The agreement has a five-year term and over the time equipment / services may be added or removed due to changing urban dynamics or expansion of system which are relevant to scope of work. The equipment or services beyond the quantities mentioned in SOR (including permissible limit/allowance) shall be adjusted if increased or decreased. Therefore, in such situation, the following adjustment shall be made in monthly price for operation and maintenance for following equipment including allied system/ accessories/ services except where mentioned: -

- a) Per Road Blocker @ PKR. 15,000 per month

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- b) Procurement, installation and testing of Transmitter for additional buses @ PKR 83,000 per bus inclusive of all applicable taxes as one time. However, the equipment cost will be adjusted for CPI and will not be part of monthly price.
 - c) Per Smart Meter @ PKR.1000 per month
 - d) Per Station PSD O&M cost (including accessories) @ PKR. 80,000 per month
 - e) Transformer including LV panels PKR. 8000 per month
 - f) RFID tag @PKR. 500 per tag of high quality and design as approved by TPC.

The above prices shall be adjusted for inflation with CPI for equipment. The Human Resource is linked with minimum wage. The additional cost will become part of Contract Price/ monthly service payments. Base price/ CPI index for adjustment will be same as mentioned in Payment Calculation Schedule and price will be adjusted annually after completion of year. For subsequently adjustment, the additional work/services/equipment will be adjusted in monthly service payments as per prevailing formula. The adjustment in contract price shall be through contract amendment.

1.19 Monthly Operation Report

No later than 17:00 PM on the 3rd Business Day of each month, starting on the last Business Day of the first Calendar month after the Commencement Date, the Service Provider shall submit to TPC a report on the Performance of its obligations under the Agreement (on TPC demand) during the previous month, covering at a minimum:

- a) List of Staff /Operator working and updated on monthly basis for the duration of the Agreement by the way of an exception report indicating the incoming and exiting staff/Operator for implementation in attendance system of TPC;
- b) Report on regarding spare parts usage & balance in warehouse;
- c) Detail record of all service, repair and maintenance;
- d) List of tools, software, diagnostic equipment etc. maintained;
- e) Full details on any Severe Defect maintenance / operations on Equipment;
- f) Report on illegal poster / graffiti / advertisement on BRT infrastructure/ pillars etc.
- g) Monthly Electricity Comparison Report;
- h) Quarterly drainage report:
 - i) Performance on KPI's;
 - j) Items required by TPC for monitoring and performance evaluations;
 - k) Payment made to EOBI and ESSI for the previous month; and
 - l) Other reports as directed by TPC.

1.20 KEY PERFORMANCE INDICATORS

- i. The Service Provider's performance of operation, maintenance and services shall be evaluated by means of key performance indicators ("**KPIs**"). Failure to comply with KPIs ("**Failure Events**") shall lead to the application of performance deduction as per the below table ("**Performance Deduction**" or "**PDP**");
- ii. The Service Provider shall, pay the Liquidated Damages depending on its performance in achieving the agreed performance regime as measure during course of the Agreement.
- iii. The Liquidated Damages for failure to achieve Key Performance Indicators (KPI) parameters will be implemented in accordance with Key Performance Indicators.
- iv. Except for information available through SCADA system /Software, Network Monitoring System or complaint management system, or other system generated reports known to the Service Provider; any other information, if any, used by the TP to evaluate KPI will be transferred to the Service Provide once a week on request. The Service Provide will have the right to justify through concrete evidence the outcome of the aforesaid systems, on as-and-when basis, that are subject to Liquidated Damages as per KPI, prior to settlement of monthly payments, but in any case, no later than one week from the submission of the Invoice.
- v. The Liquidated Damages is the final and full remedy of the TPC for the Service Provider failure to achieve the KPI targets, and such Liquidated Damages shall be deemed to have offset any breach whatsoever due to the lapses/deficiencies in performance. However, revenue loss shall be additional and deducted from monthly invoice.
- vi. Any breach of defined service levels will entail Liquidated Damages which shall not exceed 10% of the monthly payments to be paid under the Agreement/Contract to Service Provider.

A) General Violations and Their Liquidated Damages applicable to the Agreement

| Sr. No | KPI | Failure Event | Performance Deduction Percentage |
|--------|----------------------------------|---|--|
| 1 | Prevention of Severe Accidents | <p>Accident involving Equipment and software due to the Service Provider fault or malfunctioning of equipment resulting in death or severe physical injury of a passenger or other person or</p> <p>Operation of Road Blocker on bus or any vehicles causing damage and the reason is attributable to the Service Provider fault or malfunctioning of Road Blocker (Severe Accident)</p> | 10% per occurrence |
| 2 | Prevention of Material Accidents | <p>Accident involving Equipment and software due to the Service Provider fault or malfunctioning of equipment resulting in minor physical injury of a passenger or other person or material damage to the TPC assets (Material Accident)</p> | 5% per occurrence |
| 3 | Prevention of strikes | Number of operating minutes in which the Service Provider or its staff did strike and shutdown system partially or fully | 5 % per incident which continue for more than 20 minutes plus loss of passenger revenue (if any) |
| 4 | Repetition of issues | Occurrence of same issues by more than 5 times in the same month in same or multiple equipment | 3 % per 5 occurrences |
| 5 | Safeguarding of operational data | Some operational data irrecoverably lost | 1% per occurrence |

| Sr. No | KPI | Failure Event | Performance Deduction Percentage |
|--------|--|--|--|
| 6 | Transparent self-reporting | False or misreporting of monthly operations report | 5 % per occurrence |
| 7 | Operations and Maintenance Manual | Operation and Maintenance activity not carried out in accordance with the Manual | 3 % per occurrence |
| 8 | Delay of Mandatory Works or one-time activities in SOR or other vehicle or Equipment (Crane, Mobile Transformer, Vehicles etc.), under the Agreement | Failed to execute mandatory works or other one-time activity required in SOR <i><u>Note: This deduction shall be addition to non-service deductions if any.</u></i> | 10 % per month beyond six months 20 % per month beyond 8 months <i><u>Note: This will be applied separately for each activity.</u></i> |
| 9 | Delay of Performance Security and Insurances | The Performance Security and Insurance are not submitted by Expiry Day of previous Performance Security or Insurance. | Holding of monthly payments of the month where expiry of Performance Guarantee or Insurance falls till the time Performance Guarantee and/ or Insurance submitted and 0.5 % per day for the delay period beyond Expiry Date. |

| Sr. No | KPI | Failure Event | Performance Deduction Percentage |
|--------|--|---|--|
| 10 | Labor Laws Compliance | <p>a) Minimum Wage Not Paid</p> <p>b) Insurance Amount Not Paid upon death</p> <p>c) EOBI & ESSI case not pursued of deceased or affected</p> <p>d) No compliance of any other aspect of Labor Laws</p> <p>e) Salary not paid within 7 days of starting calendar month (10 samples will be collected randomly each month)</p> | <p>a) Deduction of not paid amount + 0.05 % per employee</p> <p>b) Deduction as Non-Service from Invoice and 2 % deduction each month till amount is paid</p> <p>c) 2 % per occurrence each month per employee till amount is paid</p> <p>d) 1 % per occurrence</p> <p>e) LDs as follows: 10 % per occurrence for non-compliance in delay of salary for more than 50 % of sample 5 % per occurrence for non-compliance in delay of salary between 25-50 % of sample 2 % per occurrence for non-compliance in delay of salary below 25 % of sample</p> |
| 11 | Control Centre Executives responsibilities, Service Provider KPUMA/CC responsibilities, Station Staff Responsibilities | Non-Compliance to any aspect related to responsibilities of CCE at CC, KPUMA building and Staff at Station | <p>5 % per occurrence for non-compliance related to qualification & availability</p> <p>4 % per occurrence for absence of any member on permanent basis</p> <p>3 % per occurrence for not performing duties in accordance with standards and requirements</p> <p>2 % per occurrence for not provision of quality reporting</p> <p>1 % per occurrence for any other minor violation</p> |

| Sr. No | KPI | Failure Event | Performance Deduction Percentage |
|--------|--|---|---|
| 12 | Non- functionality of system or sub-system | <p>If the functioning of equipment are not working properly in a month for same function & system.</p> <p>(e.g PSD doors not operating properly with bus, earthing system not proper, etc.).</p> <p>5 % non-functionality shall be considered violation, if minimum 16 equipment are inspected and so on for other percentages. Figure work out will be rounded to nearest integer.</p> | <p>5.1 % - 10 % ; PD of 5 %</p> <p>10.1 % - 15 % ; PD of 10 %</p> <p>More than 15 %; PD of 20 %</p> |
| 13 | Failure to address / replace damage parts or any other item which is quite visible and can generate complaint due to aesthetic and could be addressed without highlighting | Worn out stickers, damage buttons, sensors, loose wires, or any other similar items. | 4 % per occurrence per item |
| 14 | Drainage System in elevated part | Water accumulated in elevated part of corridor due to choking / blockage of Drainage pipes in rain | 3 % per occurrence |
| 15 | Privacy Louvers in Corridor | Privacy Louvers in corridor | 2 % per 10 loose louvers in corridor identified in 1 Km inspected length |

| Sr. No | KPI | Failure Event | Performance Deduction Percentage |
|--------|--------------------------------|---|--|
| 16 | Dragnet clause | Any act/instance that is non-conforming or a violation of Agreement, Schedules of Requirements, Operation Specification Schedule, Rules or Regulations of TPC, Instructions given by the TPC or violation of Protocol unless covered by another KPI | 2.5 % per occurrence |
| 17 | Frequently occurred violations | Occurrence per violation listed in table below (Failure Event), unless covered by another KPI Note: This Liquidated Damages will be only applicable, if any other Liquidated Damages is not applicable under the Agreement/Contract | 1.5 % per occurrence per item/ equipment |

a) Frequently occurred violations. The table below defines the frequently occurred violations that are covered in the KPI's.

| Sr.No | Failure Event |
|-------|---|
| 1 | Late arrival of staff at KPUMA/ control centre as defined by TPC (calculated per person) |
| 2 | Road blocker not functional or any other equipment and system not functional (irrespective of power failure) (calculated per device) |
| 3 | Loose hanging parts of lights |
| 4 | Late opening or early closing of Equipment |
| 5 | Staff not available in the Control Centre (Per person per day) |
| 6 | Lazy work by staff/smoking at stations or prohibited space (per occurrence per person) |
| 7 | Staff seen spitting (per occurrence) |
| 8 | Not attending/responding complaints received on complaint management system or share through other mechanism devised by TPC (calculated per day) or reporting on incident management system |
| 9 | Reports in required format are not provided (calculated per month per report) |

| Sr.No | Failure Event |
|-------|--|
| 10 | Late or non-submission of required report at start of the month (calculated per day) or date specified by TPC |
| 11 | Absence of the staff at designated points for more than 10 minutes (calculated per occurrence) |
| 12 | Failed to inform malfunctioning Equipment (per occurrence) |
| 13 | Failed to facilitate physically disabled person (calculated per instance) |
| 14 | Lack of policies that promote environment for female employee (calculated per instance) |
| 15 | Service Provider office in location that is not accessible by specially challenged persons (calculated per month) |
| 16 | Delay of repair to TPC property in TPC prescribed time caused by Service Provider (In addition to cost recovery of asset) (calculated per day) |
| 17 | Misuse of TPC infrastructure (per instance). LD may be multiplied by factor 1 to 5 upon discretion of TPC based on severity |
| 18 | Allowing passengers to BRT without security check or fare (per instance) or travelling without fare |
| 19 | Non-availability of online attendance of staff assigned to stations (calculated per day) |
| 20 | Tools and equipment, spare parts etc. are laying in non-designated location or creating safety issues |
| 21 | Failure of any equipment or subsystem or fail to maintain system accordance with standards and specification (calculated per day per equipment) |
| 22 | Failure to carry personal or vehicle identification by staff per day |
| 23 | Refusal or failing to provide information prescribed in the Agreement (per instance) |
| 24 | To refuse to accept the visits of the TPC inspectors to station, to hide information or to provide partial or erroneous information (per instance). |
| 25 | Disruption of, or negative impacts on, the BRT Vehicle Services due to any conduct of the Service Provider such as sitting in stairs, on floor, or obstructing passage way (per instance) |
| 26 | Accumulation of water in any Equipment pits or any other location where there is a likelihood of damage to any equipment, or likelihood of mosquito infestation. (per instance) |
| 27 | Misuse of Utility Connections or their wastage (In addition to cost recovery from Service Provider) |
| 28 | Emergency not reported to TPC within 15 (fifteen) minutes of its occurrence |
| 29 | Parts/equipment installed are of inferior quality/ noncompliant to technical specifications of those under specification per instance. The LD may be multiplied from factor 1 to 5 based on discretion of TPC and severity of violation. |
| 30 | Asset Register is not maintained, not up-to-date or incomplete or RFID tags missing (per instance) |
| 31 | Failure to disclose or inform the TPC about operational issues and/or safety incidents that have subsequent impact on operation and such information is not available through information systems, such as SCADA etc. (per instance) |

| Sr.No | Failure Event |
|-------|--|
| 32 | Personnel does not adhere to code of conduct or misbehaves with TPC staff, other Service Provider Staff, its own staff or passengers (TPC can suggest the Service Provider to take punitive actions or terminate the employment of such responsible employees in addition to Liquidated Damages) |
| 33 | Execute works without precautionary measures for passengers/general public safety or without permission of TPC (per instance) |
| 34 | Non-compliance or discrimination in to vulnerable segment of society in jobs |
| 35 | Failure to remove breakdown service/maintenance staff vehicle from the BRT corridor before commencement of Operations or failure to arrange or failure to arrange backup delivery vehicle within one hour in case of breakdown |
| 36 | Use of Non-standard tools / stairs or wooden stair or equipment for maintenance by the staff |
| 37 | Leaking or sharing of information/ video of System with unauthorized people without permission or sharing of information which are not part of the scope of work (May lead to removal of staff from BRT System) |

B) Smart Meter KPI's

| Sr.NO | Smart Metering System Fault Rectification (FR) | | |
|-------|---|------------------------|---|
| | <p>Fault shall be considered based on number of units effected: -</p> <ol style="list-style-type: none"> Critical Category Fault (CCF): Smart Meter is not operational, dashboard is not accessible, smart meters is offline, or not transmitting data at the time of requirement due to hardware fault, communication failure, tampering, not submitting GSM & Server charges or any other reason. Resolution time is 4 hours in case no parts are required; 8 hours in case parts are required and available, and damage/fault are arisen under normal use. In case of damage/fault out of normal use, timelines to rectify are to be justified, conveyed in writing in 90 minutes and shall be adhered to. High Category Fault (HCF): Smart Meter is online but recording consumption outside $\pm 2\%$ accuracy range, providing inconsistent or unreliable readings. Resolution time is 12 hours. Low Category Fault (LCF): Meter is functional but has minor issues such as delayed reporting, intermittent connectivity (brief offline greater than 24 hours), or missing auxiliary data, without affecting billing or operational accuracy. Resolution time is 24 hours. <p>TF = Total Faults Considered for KPI-1: = A + B x (C/ D) A = No of Faults Responed above the assigned resolution time but within 2 times the Assigned Resolution Time for a Particular Category; B = No of Faults Responed in more than 2 times the Assigned Resolution Time for a Particular Category C = Average Actual Resolution Time of 'B' expressed in units of Assigned Resolution Time of the Category under Consideration D = Assigned Resolution Time of the Category under Consideration</p> | | |
| | FR | Threshold of FR | Performance Deduction Percentage (PDP) |
| 1 | CCF= (Critical Fault solved within assigned resolution time) / (Critical Fault solved within assigned resolution time +TF Critical) x 100 | More than 98 % | 1 x TF _{Critical} |
| 2 | HCF= (High Fault solved within assigned resolution time) / (High Fault solved within assigned resolution time +TF High) x 100 | More than 95 % | 0.5 x TF _{High} |
| 3 | LCF= (Low Faults solved within assigned resolution time) / (Low | More than 90 % | 0.2 x TF _{Low} |

| | | | |
|--|--|--|--|
| | faults solved within assigned resolution time +TF Low) x 100 | | |
|--|--|--|--|

C) Platform Screen Doors (PSD) KPI's

| Sr.N | KPI-1: PSD System Fault Rectification (FR) | | |
|------|---|------------------------|-----------------|
| | <p>Fault shall be considered based on number of units effected: -</p> <p>1. Critical Category Fault (CCF): Complete shutdown of PSD during bus operations hours at station leading to service loss. OR There is a situation in which operations of PSD may lead to safety issues for passengers. Resolution time is 2 hours in case no parts are required; 4 hours in case parts are required and available, and damage/fault are arisen under normal use. In case of damage/fault out of normal use, timelines to rectify are to be justified, conveyed in writing in 90 minutes and shall be adhered to.</p> <p>2. High Category Fault (HCF): The PSD can operate but not as per designed and intended functional use or within acceptable limits specified and there is likelihood of service loss. Resolution time is 12 hours.</p> <p>3. Low Category Fault (LCF): The PSD can operate but not as per designed and intended functional use or within acceptable limits specified. There is no likelihood of service loss or safety issue and a possible workaround exists. Resolution time is 24 hours.</p> <p>TF = Total Faults Considered for KPI-1: = A + B x (C/ D) A = No of Faults Responded above the assigned resolution time but within 2 times the Assigned Resolution Time for a Particular Category; B = No of Faults Responded in more than 2 times the Assigned Resolution Time for a Particular Category C = Average Actual Resolution Time of 'B' expressed in units of Assigned Resolution Time of the Category under Consideration D = Assigned Resolution Time of the Category under Consideration</p> | | |
| | FR | Threshold of FR | PDP |
| 1 | CCF= (Critical Fault solved within assigned resolution time) / (Critical Fault solved within assigned resolution time +TF Critical) x 100 | More than 98 % | 1 x TF Critical |
| 2 | HCF= (High Fault solved within assigned resolution time) / (High Fault solved within assigned resolution time +TF High) x 100 | More than 95 % | 0.5 x TF High |
| 3 | LCF= (Low Faults solved within assigned resolution time) / (Low faults solved within assigned resolution time +TF Low) x 100 | More than 90 % | 0.2 x TF Low |

| FAULT CATEGORY IDENTIFICATION FOR KPI-1 AND OPERATIONAL PENALTY ON OCCURANCE | | |
|--|---|--|
| Sr.No | INCIDENT | FAULT CATEGORY |
| 1 | PSD sensor not responded to obstruction. | Critical |
| 2 | Beep Alarm malfunctioning during opening and closing of PSD | Critical |
| 3 | PSD generating Mechanical rubbing sound | High |
| 4 | PSD is Operational but with Damaged / Missing Parts | High |
| 5 | PSD system failed to sense arrival of bus and failed to Open doors automatically. | Critical |
| 6 | Door did not response to Emergency Push Buttons. | Critical |
| 7 | Others. | Category to be decided by the TPC under fault categories defined |

D) Road Blocker KPI's

| Sr.No | KPI-2: Road Blocker Fault Rectification (FR) | | |
|-------|---|-----------------|-----|
| | <p>Fault shall be considered based on number of units effected: -</p> <ol style="list-style-type: none"> Critical Category Fault (CCF): Complete shutdown of Road Blocker during bus operations hours leading to service loss. OR There is a situation in which operations of Road Blocker may lead to safety issues for bus operation. Resolution time is 2 hours in case no parts are required; 4 hours in case parts are required and available, and damage/fault are arisen under normal use. In case of damage/fault out of normal use, timelines to rectify are to be justified, conveyed in writing in 90 minutes and shall be adhered to. High Category Fault (HCF): Road Blocker can operate but not as per designed and intended functional use or within acceptable limits specified and there is likelihood of service loss. Resolution time is 12 hours. Low Category Fault (LCF): Road Blocker can operate but not as per designed and intended functional use or within acceptable limits specified. There is no likelihood of service loss or safety issue and a possible workaround exists. Resolution time is 24 hours. <p>TF = Total Faults Considered for KPI-1: = A + B x (C/ D) A = No of Faults Responded above the assigned resolution time but within 2 times the Assigned Resolution Time for a Particular Category; B = No of Faults Responded in more than 2 times the Assigned Resolution Time for a Particular Category C = Average Actual Resolution Time of 'B' expressed in units of Assigned Resolution Time of the Category under Consideration D = Assigned Resolution Time of the Category under Consideration</p> | | |
| Sr.No | FR | Threshold of FR | PDP |

| | | | |
|---|--|----------------|----------------------------|
| 1 | CCF= (Critical Fault solved within assigned resolution time) / (Critical Fault solved within assigned resolution time +TF Critical) x 100 | More than 98 % | 1 x TF _{Critical} |
| 2 | HCF= (High Fault solved within assigned resolution time) / (High Fault solved within assigned resolution time +TF High) x 100 | More than 95 % | 0.5 x TF _{High} |
| 3 | LCF= (Low Faults solved within assigned resolution time) / (Low faults solved within assigned resolution time +TF Low) x 100 | More than 90 % | 0.2 x TF _{Low} |

| FAULT CATEGORY IDENTIFICATION FOR KPI-3 AND OPERATIONAL PENALTY ON OCCURANCE | | |
|--|---|--|
| Sr.No | INCIDENT | FAULT CATEGORY |
| 1 | Road Blocker did not respond automatically to bus arrival | Critical |
| 2 | Loop detector or RFID defective | Critical |
| 3 | Road Blocker generating Mechanical rubbing sound | High |
| 4 | Road Blocker are not visible at night due to non-cleaning or fade-out color | High |
| 5 | Boom barrier are defective | Critical |
| 6 | Operational but damaged / with missing parts / in dilapidated condition. | Critical |
| 7 | Any component not maintained in accordance with standard | High |
| 8 | Others. | Category to be decided by the TPC under fault categories defined |

Categories under this fault category shall be defined by TPC for violation in scope of work.

The Service Provider shall be responsible to pay any damages cost to buses or vehicles due to faulty operation of Road Blocker.

E) Street Lights KPI's

| Sr.No | KPI-3: Street Lights Fault Rectification (FR) |
|-------|--|
| | <p>Fault shall be considered based on number of units effected: -</p> <ol style="list-style-type: none"> Critical Category Fault (CCF): Lights Off in section(s) of corridor between two stations or more than 500 meter. Resolution time is 2 hours in case no parts are required; 4 hours in case parts are required and available, and damage/fault are arisen under normal use. In case of damage/fault out of normal use, timelines to rectify are to be justified, conveyed in writing in 90 minutes and shall be adhered to. High Category Fault (HCF): Lights Off in section(s) of corridor in more than 200 meter and less than 500 meter. Resolution time is 12 hours. |

| | <p>3. Low Category Fault (LCF): Lights Off in section(s) of corridor in less than 200 meter or individual lights/ pole. Resolution time is 24 hours.</p> <p>TF = Total Faults Considered for KPI-1: = A + B x (C/ D) A = No of Faults Responded above the assigned resolution time but within 2 times the Assigned Resolution Time for a Particular Category; B = No of Faults Responded in more than 2 times the Assigned Resolution Time for a Particular Category C = Average Actual Resolution Time of 'B' expressed in units of Assigned Resolution Time of the Category under Consideration D = Assigned Resolution Time of the Category under Consideration</p> | | |
|-------|---|-----------------|----------------------------|
| Sr.No | FR | Threshold of FR | PDP |
| 1 | CCF= (Critical Fault solved within assigned resolution time) / (Critical Fault solved within assigned resolution time +TF Critical) x 100 | More than 98 % | 1 x TF _{Critical} |
| 2 | HCF= (High Fault solved within assigned resolution time) / (High Fault solved within assigned resolution time +TF High) x 100 | More than 95 % | 0.5 x TF _{High} |
| 3 | LCF= (Low Faults solved within assigned resolution time) / (Low faults solved within assigned resolution time +TF Low) x 100 | More than 90 % | 0.2 x TF _{Low} |

Categories under this fault category shall be defined by TPC for violation in scope of work.

F) Transformer & Distribution/MLV KPI's

| Sr.No | KPI-4: Transformer, Distribution Board /MLVs Fault Rectification (FR) |
|-------|---|
| | <p>Fault shall be considered based on number of units effected: -</p> <ol style="list-style-type: none"> Critical Category Fault (CCF): Complete shutdown of electricity in complete BRT system (Stations, Along corridor and KPUMA and any other allied infrastructure) due to Transformer and/ or MLV/Distribution Board failure leading to service loss. OR There is a situation in which Transformer and/or MLV/distribution board may lead to safety issues for public/passengers. Resolution time is 2 hours in case no parts are required; 4 hours in case parts are required and available, and damage/fault are arisen under normal use. In case of damage/fault out of normal use, timelines to rectify are to be justified, conveyed in writing in 90 minutes and shall be adhered to. High Category Fault (HCF): Transformer and/or MLV/Distribution Board can operate but not as per designed and intended functional use or within acceptable limits specified and there is likelihood of service loss. Resolution time is 12 hours. Low Category Fault (LCF): Transformer and/or MLV/Distribution Board can operate but not as per designed and intended functional use or within acceptable limits specified. |

| | <p>There is no likelihood of service loss or safety issue and a possible workaround exists. Resolution time is 24 hours.</p> <p>TF = Total Faults Considered for KPI-1: = A + B x (C/ D) A = No of Faults Responded above the assigned resolution time but within 2 times the Assigned Resolution Time for a Particular Category; B = No of Faults Responded in more than 2 times the Assigned Resolution Time for a Particular Category C = Average Actual Resolution Time of 'B' expressed in units of Assigned Resolution Time of the Category under Consideration D = Assigned Resolution Time of the Category under Consideration</p> | | |
|-------|--|-----------------|----------------------------|
| Sr.No | FR | Threshold of FR | PDP |
| 1 | CCF= (Critical Fault solved within assigned resolution time) / (Critical Fault solved within assigned resolution time +TF Critical) x 100 | More than 98 % | 1 x TF _{Critical} |
| 2 | HCF= (High Fault solved within assigned resolution time) / (High Fault solved within assigned resolution time +TF High) x 100 | More than 95 % | 0.5 x TF _{High} |
| 3 | LCF= (Low Faults solved within assigned resolution time) / (Low faults solved within assigned resolution time +TF Low) x 100 | More than 90 % | 0.2 x TF _{Low} |

Categories under this fault category shall be defined by TPC for violation in scope of work.

The Service Provider shall get following incentive as reduction in Liquidated Damages in monthly payments for following activities:

- a) @0.5% if the Service Provider engage female staff more than 10 % of total staff of project (for Stations and Control center staff only) in an invoice month.
- b) @0.5% if the Service Provider engage special person (verifiable from CNIC as special person) more than 3 % of total staff of project (for Office, Stations and Control center staff only) in an invoice month.
- c) @0.5% if the Service Provider i) gives/ arrange insurance to the deceased family within two months, ii) pursue and start EOBI pension within four months for the deceased family iii) Pursue and maintain disability allowance from ESSI during disability period. Each of the three will be treated as separate benefits for reduction of PDP.

Note: No credit will be carried over to next month. Furthermore, incentive will be provided up to 0 % PDP.

Appendix-II

The Service Provider engaged in advertisement services or given advertisement rights in BRT system shall strictly observe the following Guidelines, SOP's, and procedures while conducting Advertisement Services in Peshawar BRT System.

1. Definitions:

- a) "Advertising Locations" means the locations where advertisement product to be installed / fixed or already fixed / installed of dimension, specification, numbers as given in Agreement.
 - b) "Advertising Product" means the advertisement type (SMD, LCD, backlit, steel light pole, Bridge Pillars, frame etc as the case may be) to be installed at Advertising Location of the dimension, specification, numbers as given in Agreement.
 - c) "Advertising Content" means the information to be displayed or run on Advertisement Product which may be of static, dynamic or visual as per agreement.
 - d) "Other Service Providers/Contractors" means Service Provider or any subcontractor of the Service Provider, bus operator, System Control Goods Services Provider and any other contractors appointed by TPC in connection with the BRT System.
 - e) "Working Hours" means office hours as notified by TPC which are 9 AM to 5 PM as updated time to time.
 - f) "Business Day" means office days as notified by TPC / Government which are Monday to Friday or as updated through notification.
2. The Service Provider shall strictly observe Advertising Locations designated/ permissible dimensions, specification and installation for Advertising Products. The Advertising Location and Advertising Product will be available to customers for advertising their brands, products or services and use the Advertising Location and Product strictly in accordance with the agreement.
 3. The Service Provider shall be responsible for procurement, installation, operation, and maintenance of Advertising Product on Advertisement Location under the Agreement along with allied services under this policy.
 4. The Service Provider has permission for Advertisement Product and Advertisement Location as given in the agreement and is not exclusive rights for whole BRT System. TPC reserve the right to give / tender for other locations as per standard procedure.
 5. The detail of required services are as follows: -
The Service Provider shall:
 - a) Procure, install, operate, and maintain Advertisement Product at Advertisement Location as provided part of Schedule of Requirements;

-
- b) Keep the Advertising Locations and Advertising Product clean, tidy and maintained to its original form in terms of body paint, glass panels, etc.;
 - c) all times during the Term of the Service Agreement, ensure that the Advertising Locations are kept in original state of good repair and in a satisfactory operational condition and are maintained in accordance with the provisions of the Service Agreement and as instructed by TPC;
 - d) Keep detailed maintenance and repair records during currency of the Service Agreement. The TPC shall be entitled to audit such records upon giving the Service Provider twenty-four (24) hours' prior notice (s);
 - e) get permission or License or approval from district, town, any other federal or provincial government department/agency relevant to performance of the Service Agreement and shall be liable for payment of any charges, fees, taxes etc. in lieu thereof;
 - f) Be responsible for the conduct of its labor, subcontractor, contractors, advertiser or any other person which are working at Advertisement Location;
 - g) Use the Advertisement Locations in accordance with the terms and conditions of the Service Agreement and the Applicable Laws, including all applicable labour, environmental and health and safety regulations.
 - h) not fix, repair, replace, alter/change the Advertising Products or Advertising Contents during operation hours i.e., 5 AM to 11:00 PM which cause disturbance to Bus Operation. In addition, prior approval from the TPC, in all such cases, shall be required to ensure that activity does not disturb or have potential of disturbance;
 - i) not make or allow to be made any alterations or additions whatsoever to the Advertising Locations specified by TPC in the service agreement prior to TPC approval;
 - j) pay for all ancillary services relating to management of Advertising Locations, including insurances of Advertising Product, assessments, utility bills,taxes, consultancy services, advises, repairs etc;
 - k) not cause or permit to be caused any damage to the Advertising Locations, if so than the Service Provider would be bound to maintain its to its original form;
 - l) Observe occupancy policy and regulations as and when notified by the Govt./TPC;
 - m) Restrict themselves to scope of work under the agreement and avoid interference with BRT infrastructure / systems;
 - n) Share the design and installation procedure for Advertisement Product with TPC for approval. Any damage during installation shall be restored to original position. No hole, modification etc. shall be done to assets without permission; and
 - o) Provide a certificate from professional engineer having valid PEC registration certifying that the proposed structure holding Advertising Product is stable enough to withstand the load. Service Provider shall share the proposed arrangements of the structure with TPC for record;
6. The Service Provider shall allow free of cost 20 % airtime (calculated on monthly basis) to display advertising contents regarding awareness of bus operation or government awareness campaign videos or public service messages of any government departments within 1 hour. Similarly, the Service Provider shall allow 15 days per board per year on static boards / Advertising Location for public service messages of any government departments. Service

Provider shall have no right to object on content or material and 20 % is unconditional time / space.

7. The Service Provider shall strictly restrict the advertisement of following contents: -
 - a) Election/political campaigns on Advertisement Product and Location if so notified by Election Commission of Pakistan or Federal, Provincial or Local Governments or Government Department/Authority/Agency etc. The No Objection Certificate (NOC) will be required from Election Commission of Pakistan for Election/ political campaigns on Advertisement Product and Location during General Elections;
 - b) The Service Provider shall not allow any Advertising Content which are prohibited under the Law or local culture and ethical standards or controversial in nature or used for maligning of individual etc.;
 - c) Anything which is illegal or which may be or become a nuisance (whether actionable or not), annoyance, inconvenience or disturbance to the TPC or to other Service Providers/Contractors or any owner or occupier of neighbouring properties; and
 - d) The Service Provider shall be responsible for removing of illegal Advertising Products or Advertising Contents as notified by government or as per determination of the TPC within one (01) hour of notification.
8. The Advertisement Product installed on locations which are permanently welded or fixed will be the ownership of TPC at term of the agreement (if any). Similarly, other items such as cables, frames, energy meters etc. (if any) installed will be the property of TPC at Term of the the agreement. These items are mentioned in **Appendix-A**. The Service Provider shall bring the Advertising Locations in original, clean and tidy condition in accordance with the provisions of the Service Agreement for items which are allowed to remove.
9. The Service Provider shall ensure safety and security of public, public property, passengers, private parties, mix traffic vehicles etc.during the performance of duties/ services under the agreement. The Service Provider shall: -
 - a) Be liable for any mishap/harm to the general public/traffic due to whatsoever reason;
 - b) Be liable for any loss or damage caused to the Advertising Product at any time during currency of the Service Agreement due to whatsoever reason (electricity surge, thefts, mishandling, accidents, incidents, storm, earthquake, public protest etc);
 - c) Be responsible for reimbursement of cost or repair of property of Other Services Provider / Contractor and / or TPC;
 - d) Be responsible for responding to complaint of emergency nature within 15 minutes or remove any obstruction which hinder safe bus operation or mix traffic operation or other emergency nature within 15 minutes. If not removed, shall be removed by TPC at cost and risk of Service Provider;
 - e) Be responsible to keep Advertisement Product installed in such a way to avoid blockage of CCTV view;
 - f) Indemnify the TPC against all losses, claims, demands, actions, proceedings, damages, costs, expenses or other liability in any way arising from the Service Agreement; and

-
- g) Be responsible for re-reimbursement of cost and/ or settlement of dispute if public or private property damaged or public injured due to whatever reason during Advertisement Product installation or in operation phase.
10. The Service Provider shall maintain the following standards at Advertising Locations:
- a) The Service Provider shall strictly plan/perform installation of Advertising Product after operation hours i.e., 11:00 pm- 5 AM in BRT corridor after getting Corridor Access Form from TPC in office Working Hours on Business Day;
 - b) The Service Provider shall be responsible to clear Advertising Locations from any debris, rust etc. after installation or after removal of Advertising Product;
 - c) The Service Provider shall not encroach corridor for installation, maintenance and replenishment/replacement of Advertising Product;
 - d) The Service Provider shall ensure that mixed traffic is kept undisturbed due to Advertisement Product installation or operation.
 - e) The Service Provider shall make sure to restore or maintain the TPC's property to original position forthwith, if affected by the Service Provider;
 - f) The Service Provider shall not do such act or actions which harm passengers of the TPC and bus operation;
 - g) The Service Provider in no way shall interrupt the other Service Provider / Contractors engaged in BRT operation from performance of their duties; and
 - h) The Service Provider shall ensure compliance of Applicable Laws and Supreme Court of Pakistan's orders and other Government laws, rules and regulations governing the advertising business already issued or updated from time to time and shall make aware themselves from such information.
11. The Service Provider shall estimate revenue and relevant risks of Advertising Products and Advertising Locations based on ground / existing situations, prevailing market conditions and changing market conditions. All revenue risks due to whatsoever reasons of advertisement falls on Service Provider.
12. The Advertisement Location may be changed by TPC due to operation requirements, construction by TPC or provincial Government, or other external factor which are unavoidable. In such situation, TPC shall provide alternate location without price adjustments.
13. The requirements regarding power / electricity connection for Advertisement Product during installation phase and operation phase shall be as per following procedure: -
- a) The Service Provider shall be responsible for for arrangement of light, power, electricity, generator, allied equipment etc. required for installation/repair of Advertisement Product.
 - b) The Service Provider shall arrange power / electricity connection from PESCO at its own cost and risk for operation. The Service provider may request to TransPeshawar for availability of power connection/ electricity for Advertising Product required during operation. TransPeshawar may, at sole discretion, allow connection from existing power supply/ Genset from Stations. However, all costs of procurement, laying of cable, procurement of Energy Meter/ Check Meter, civil works and other charges from BRT

Station till the product shall be the responsibility of Service Provider. The laying of cable shall be in accordance with procedure approved by TransPeshawar and inside the duct through engagement of relevant experts. The electricity/ Energy meter and cable once installed shall be the property of TransPesahwar. The Service Provider shall be responsible for restoration of work damaged during installation. If TransPeshawar does not allow, the Service Provider shall do own arrangement of electricity connection from PESCO.

- c) In case TPC allow electricity / power connection from BRT Station / Facility for operation phase, Service Provider shall deposit estimated quarterly electricity cost in advance. The Service Provider shall not get discount in electricity bill, if Solar are installed by TransPeshawar. The Service Provider shall pay electricity bill on monthly basis and the formula for cost of per unit kWh determination shall be as follows:

= (TOTAL PKR AMOUNT IN PESCO BILL FOR THE RESPECTIVE MONTH/TOTAL UNITS CONSUMED IN PESCO BILL FOR THE RESPECTIVE MONTH) + GENSET CHARGES @PKR 10

THE COST OF UNIT SHALL BE MULTIPLIED WITH UNITS RECORDED FROM ENERGY METER TO ARRIVE AT MONTHLY ELECTRICITY COST FOR PAYMENT.

- d) Service provider has to install electricity meter for the supply of electric power and in case of faulty meter, the service provider has to replace it when notified by TransPeshawar. The electricity meter shall be of vendors as approved by TransPeshawar and calibrated by TransPeshawar. The Service Provider shall be responsible for the physical security of their Product or safety devices required against electricity surge for the product or theft of cable or damage of screen / material or stone pelting, protest, hailstorm, etc.
- e) The details of Advertisement Product, Advertisement Location, their dimension, number and specifications are as follows: -

Advertisement Location # 1:

Total number of Screen: 85 at 30 BRT Stations

Advertisement Product: Digital LED Screens with Nayatel Connection, Server, joy box and Software with centralized facility of uploading of material

Dimensions: 50 inch Screen with no sound for video

Ownership of Material at End of Term of Agreement: All ownership of software, screen, cables etc of TransPeshawar.

Electricity Charges for Operation of Screen: On TransPeshawar

Advertisement Location # : 2

Total Quantity/ Number: 140 Board at multiple BRT Stations

Advertisement Product: Static Boards for pasting of material

Dimensions: Length x width and number as follows:

450mm x 600mm = 71 Numbers

600mm x 900mm = 50 Numbers

750mm x 1500mm = 19 Numbers

Ownership of Material at End of Term of Agreement: All ownership of Advertisement Product is of TransPeshawar.

Electricity Charges for Operation of Screen: Not Electricity Powered Advertising Product

Advertisement Location # : 3

Total number of Bicycle Kiosk: 32 installed Bicycle Stations

Advertisement Product: Dynamic Boards/ Screen for uploading of material from Control Centre

Dimensions: Screen with no sound for video as per existing dimensions.

Ownership of Material at End of Term of Agreement: All ownership of Advertisement Product is of TransPeshawar.

Electricity Charges for Operation of Screen: Not on Service Provider

Advertisement Location # : 4

Total Quantity/ Number: 01

Advertisement Product: ZU Peshawar Mobile App with uploading of material from Control Centre

Dimensions: Not Required

Ownership of Material at End of Term of Agreement: TransPeshawar.

Electricity Charges for Operation of Screen: Not Required

Advertisement Location #: 5

Total Quantity/ Number: 8 ($\pm 50\%$) (single / double side)

Location: University of Peshawar

Advertisement Product: Backlit Board

Dimensions/ area: 167 inch x 71 inch ($\pm 20\%$)

Ownership of Material at End of Term of Agreement: TransPeshawar.

Advertisement Location # : 6

Total Quantity/ Number: 13 ($\pm 50\%$) (single / double side)

Location: Hashnagari Station

Advertisement Product: Backlit Board

Dimensions/ area: 167 inch x 71 inch ($\pm 20\%$)

Ownership of Material at End of Term of Agreement: TransPeshawar.

| DETAILS OF PSD SHOWING LOCATION AND NUMBER | | | |
|---|------------------|----------------------|-----------------|
| S.NO | LOCATIONS | STATION NAMES | QUANTITY |
| 1 | BS01 | CHAMKANI | 16 |
| 2 | BS02 | SARDAR GHARI | 16 |
| 3 | BS03 | CHUGHAL PURA | 16 |
| 4 | BS04 | FAISAL COLONY | 16 |
| 5 | BS05 | OLD HAJI CAMP | 16 |
| 6 | BS06 | LAHORE ADDA | 16 |
| 7 | BS07 | GULBAHAR CHOWK | 18 |
| 8 | BS08 | HASHTNAGRI | 16 |
| 9 | BS09 | MALAK SAAD SHAHEED | 16 |
| | BS09-FR-09 | MALAK SAAD SHAHEED | 4 |
| 10 | BS10 | KHYBER BAZAR | 24 |
| 11 | BS11 | SHOBA BAZAR | 16 |
| 12 | BS12 | DABGARI GARDENS | 16 |
| 13 | BS13 | RAILWAY STATIONS | 16 |
| 14 | BS14 | FC CHOWK | 16 |
| 15 | BS15 | SADDAR BAZAR | 16 |
| 16 | BS16 | MALL ROAD | 16 |
| 17 | BS18 | TEHKAL PAYYAN | 16 |
| 18 | BS19 | TEHKAL BALA | 12 |
| 19 | BS20 | ABDARA ROAD | 12 |
| 20 | BS21 | UNIVERSITY TOWN | 16 |
| 21 | BS22 | PESHAWAR UNIVERSITY | 16 |
| 22 | BS23 | ISLAMIA COLLEGE | 16 |
| 23 | BS24 | BOARD BAZAR | 16 |
| 24 | BS25 | MALL OF HAYATABAD | 16 |
| 25 | BS26 | BAB-E-PESHAWAR | 6 |
| 26 | BS27 | HAYATABAD PHASE 3 | 6 |
| 27 | BS28 | TATARA PARK | 6 |
| 28 | BS29 | PDA | 6 |
| 29 | BS30 | HOSPITAL CHOWK | 6 |
| 30 | BS31 | KARKAHNO MARKET | 12 |
| Total No Of PSD | | | 432 |

(±5%)

DETAILS OF TRANSFORMERS SHOWING LOCATION, CAPACITY AND NUMBER

| S,NO | LOCATIONS | STATION NAMES | QUANTITY | CAPACITY (KVA) |
|---------------------------------|-----------|---------------------------|-----------|----------------|
| 1 | KPUMA | CONTROL CENETR AND OFFICE | 1 | 630 |
| 2 | | TUBE WELL | 1 | 100 |
| 3 | BS01 | CHAMKANI | 1 | 100 |
| 4 | BS02 | SARDAR GHARI | 1 | 200 |
| 5 | BS03 | CHUGHAL PURA | 1 | 200 |
| 6 | BS04 | FAISAL COLONY | 1 | 200 |
| 7 | BS05 | OLD HAJI CAMP | 1 | 200 |
| 8 | BS06 | LAHORE ADDA | 1 | 200 |
| 9 | BS07 | GULBAHAR CHOWK | 1 | 200 |
| 10 | BS08 | HASHTNAGRI | 1 | 200 |
| 11 | BS09 | MALAK SAAD SHAHEDD | 1 | 200 |
| 12 | BS10 | KHYBER BAZAR | 1 | 200 |
| 13 | BS11 | SHOBA BAZAR | 1 | 200 |
| 14 | BS12 | DABGARI GARDENS | 1 | 200 |
| 15 | BS13 | RAILWAY STATIONS | 1 | 200 |
| 16 | BS14 | FC CHOWK | 1 | 200 |
| 17 | BS15 | SADDAR BAZAR | 1 | 200 |
| 18 | BS16 | MALL ROAD | 1 | 200 |
| 19 | BS17 | AMAN CHOWK | 1 | 200 |
| 20 | BS18 | TEHKAL PAYYAN | 1 | 200 |
| 21 | BS19 | TEHKAL BALA | 1 | 100 |
| 22 | BS20 | ABDARA ROAD | 1 | 100 |
| 23 | BS21 | UNIVERSITY TOWN | 1 | 200 |
| 24 | BS22 | PESHAWAR UNIVERSITY | 1 | 200 |
| 25 | BS23 | ISLAMIA COLLEGE | 1 | 200 |
| 26 | BS24 | BOARD BAZAR | 1 | 200 |
| 27 | BS25 | MALL OF HAYATABAD | 1 | 100 |
| 28 | BS26 | BAB-E-PESHAWAR | 1 | 100 |
| 29 | BS27 | HAYATABAD PHASE 3 | 1 | 200 |
| 30 | BS28 | TATARA PARK | 1 | 200 |
| 31 | BS29 | PDA | 1 | 100 |
| 32 | BS30 | HOSPITAL CHOWK | 1 | 100 |
| 33 | BS31 | KARKAHNO MARKET | 1 | 200 |
| Total No Of Transformers | | | 33 | |

| DETAILS OF ROAD BLOCKER SHOWING LOCATION AND NUMBER | | | | |
|--|---------------------------------|-----------|-----------------|---|
| S.NO | BETWEEN STATIONS/Station | | QUANTITY | ROUTE |
| | BS | BS | | |
| 1 | BS-03 | BS-04 | 2 | Chamkani-Pishtakhara Chowk |
| 2 | BS-09 | BS-09 | 2 | Shah alam pul-Kohat Adda Chamkani-Pishtakhara Chowk |
| 3 | BS-12 | BS-13 | 2 | Shah Alam Pul-Kohat Adda |
| 4 | BS-15 | BS-16 | 2 | Chamkani-Pishtakhara Chowk |
| 5 | BS-16 | BS-19 | 2 | To Airport |
| 6 | BS-25 | BS-26 | 2 | Mall of Hayatabad-Phase 6 Terminal |
| 7 | BS-27 | BS-28 | 2 | Mall of Hayatabad-Phase 7 Terminal |
| 8 | BS-31 | BS-31 | 2 | Karkhano Market-Phase 7 Terminal |
| 9 | KPUMA | | 2 | |
| TOTAL NUMBERS | | | 18 | |

| DETAILS OF STREET LIGHT IN CORRIDOR | | | | |
|--------------------------------------|-------------------|-------------------------|----------------------------|--|
| S.No | Station no | Single arm poles/Lights | Double arm poles/lights | Overhead/ Underpass Poles/lights |
| 1 | KPUMA | 11/11 | 0 | 0 |
| 2 | BS-01 | 08/08 | 10/10 | 0 |
| 3 | BS-02 | 0 | 75/150 | 0 |
| 4 | BS-03 | 0 | 53/106 | 1/4 |
| 5 | BS-04 | 0 | 37/74 | 0 |
| 6 | BS-05 | 0 | 52/104 | 0 |
| 7 | BS-06 | 0 | 40/80 | 1/4 |
| 8 | BS-07 | 0 | 27/54 | 0 |
| 9 | BS-08 | 0 | 41/82 | 0 |
| 10 | BS-09 | 25/25 | 19/38 | 1/4 |
| 11 | BS-10 | 33/33 | 14/28 | 0 |
| 12 | BS-11 | 33/33 | 0 | 0 |
| 13 | BS-12 | 49/49 | 6/12. | 0 |
| 14 | BS-13 | 45 | 13/26 | 0 |
| 15 | BS-14 | 24 | 19/38 | 0 |
| 16 | BS-15 | 22 | 30/60 | 0 |
| 17 | BS-16 | 10 | 66/132 | 0 |
| 18 | BS-17 | 0 | 37/74 | 0 |
| 19 | BS-18 | 0 | 106/212 | 0 |
| 20 | BS-19 | 0 | 51/102 | 0 |
| 21 | BS-20 | 0 | 43/86 | 0 |
| 22 | BS-21 | 0 | 40/80 | 0 |
| 23 | BS-22 | 0 | 47/94 | 0 |
| 24 | BS-23 | 0 | 38/76 | 0 |
| 25 | BS-24 | 0 | 55/110 | 0 |
| 26 | BS-25 | 0 | 66/132 | 0 |
| 27 | BS-26 | 0 | 73/146 | 0 |
| 28 | BS-27 | 0 | 74/148 | 0 |
| 29 | BS-28 | 0 | 49/98 | 0 |
| 30 | BS-29 | 0 | 33/66 | 0 |
| 31 | BS-30 | 1 | 58/116 | 0 |
| 32 | BS-31 | 1 | 121/242 | 0 |
| 33 | Aman Chowk | 31/31 | 03/06. | 0 |
| Total | | 293/293 | 1396/2792 | 12 |
| Details of Lighting Poles at Dabgari | | | | |
| S.No | Description | Nos. | No Of Lights (120W LED) | |
| 1 | 12 MTR double arm | 5 | 10 | |
| 2 | Wall arm | 33 | 30 | |
| Total | | 38 | 40 | |

| Flood Lights detail | | |
|---------------------|--------------------------------------|------------|
| S.No | Description | Nos. |
| 1 | 120 Watt LED Flood Lights in | 54 |
| 2 | 120 Watt LED Tunnel Light under | 125 |
| 3 | 45 Watt LED Flood Light under Bridge | 336 |
| 4 | 30 Watt LED Flood Light under Bridge | 427 |
| Total | | 942 |

Note: The quantities may vary by +/-5%

Annex-05

| Details of Smart Metering Devices Installed | | | |
|---|--------------|---|-----------|
| S. No. | Device Type | Location | Quantity |
| 1 | Transforcure | KPUMA Building-630 KVA Transformer | 1 |
| 2 | Transforcure | KPUMA Building-400 KVA Transformer | 1 |
| 3 | Transforcure | KPUMA Building 100 KVA Transformer | 1 |
| 4 | Electrocure | Ground Floor Electrical Room | 2 |
| 5 | Electrocure | 2nd Floor Electrical Room | 1 |
| 6 | Electrocure | Roof-Top (VRF Outdoor Units) | 2 |
| 7 | Transforcure | Chamkani Depot-Slow Charger 2000KVA Transformer | 1 |
| 8 | Transforcure | Chamkani Depot-Slow Charger 1500KVA Transformer-1 | 1 |
| 9 | Transforcure | Chamkani Depot-Slow Charger 1500KVA Transformer-2 | 1 |
| 10 | Transforcure | Chamkani Depot-Tube-Well 100KVA Transformer | 1 |
| 11 | Transforcure | Chamkani Depot-Washing Bay 200 KVA Transformer | 1 |
| 12 | Transforcure | Chamkani Depot-WorkShop 400 KVA Transformer | 1 |
| 13 | Transforcure | Chamkani Depot-Tube-Well 100KVA Transformer | 1 |
| 14 | Transforcure | Chamkani Station-BS-01 100KVA Transformer | 1 |
| 15 | Electrocure | BS-04 Faisal Colony | 3 |
| 16 | Electrocure | BS-07 Gulbahar | 4 |
| 18 | Transforcure | Hayatabad Depot- Charger 1500 KVA Transformer | 2 |
| 19 | Transforcure | Hayatabad Depot- Workshop 630 KVA Transformer | 2 |
| 20 | Transforcure | Hayatabad Depot- Commercial 100 KVA Transformer | 1 |
| 22 | Electrocure | BS-02 Sardar Gari | 2 |
| 23 | Electrocure | BS-03 Chughal Pura | 2 |
| 24 | Electrocure | BS-05 Old haji Camp | 1 |
| 25 | Electrocure | BS-06 Lahore Adda | 2 |
| 26 | Electrocure | BS-07 Gulbahar | 1 |
| Total Units Installed | | | 36 |

Note: The quantities may vary in the limit of +/- 20%

Annex-6

| DETAILS OF DISTRIBUTION BOARD & MLV IN KUPMA BUILDING (Reach-01, Reach-02 & Reach-03) | | | | |
|---|------------------|----------------------|-----------------|-------------------------------------|
| Reach-01, Reach-02 & Reach-03 | | | | |
| S.NO | LOCATIONS | STATION NAMES | QUANTITY | DESCRIPTIONS |
| 1 | BS01 | CHAMKANI | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 2 | BS02 | SARDAR GHARI | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 3 | BS03 | CHUGHAL PURA | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 4 | BS04 | FAISAL COLONY | 4 | DB-MLV,DB,300A Stand Alone |
| 5 | BS05 | OLD HAJI CAMP | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 6 | BS06 | LAHORE ADDA | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 7 | BS07 | GULBAHAR CHOWK | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 8 | BS08 | HASHTNAGRI | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 9 | BS09 | MALAK SAAD SHAHEDD | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 10 | BS10 | KHYBER BAZAR | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 11 | BS11 | SHOBA BAZAR | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 12 | BS12 | DABGARI GARDENS | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 13 | BS13 | RAILWAY STATIONS | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 14 | BS14 | FC CHOWK | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 15 | BS15 | SADDAR BAZAR | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 16 | BS16 | MALL ROAD | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |

| | | | | |
|------------------------|------|---------------------|------------|-------------------------------------|
| 17 | BS17 | AMAN CHOWK | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 18 | BS18 | TEHKAL PAYYAN | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 19 | BS19 | TEHKAL BALA | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 20 | BS20 | ABDARA ROAD | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 21 | BS21 | UNIVERSITY TOWN | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 22 | BS22 | PESHAWAR UNIVERSITY | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 23 | BS23 | ISLAMIA COLLEGE | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 24 | BS24 | BOARD BAZAR | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 25 | BS25 | MALL OF HAYATABAD | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 26 | BS26 | BAB-E-PESHAWAR | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 27 | BS27 | HAYATABAD PHASE 3 | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 28 | BS28 | TATARA PARK | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 29 | BS29 | PDA | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 30 | BS30 | HOSPITAL CHOWK | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| 31 | BS31 | KARKAHNO MARKET | 4 | DB-MLV,DB-01,DB-02,300A Stand Alone |
| Total No Of DBs | | | 124 | |

(±5%)

PLATFORM SCREEN DOORS (PSDs) SPECIFICATIONS

| S/No | Specification Description | Compliance | Deviation(If Any) | Remarks |
|------|---|------------|-------------------|---------|
| 1 | PSDs Operational Cycles: Operational cycles test as per standard 10,000,000 cycles (Test report to be provided) | | | |
| 2 | High Performance BLDC Motor: type high performance three coil-brushless motor of 24V and 10,000,000 minimum cycles, with Certificates according to standards UNE-EN 16005:2013 > 10,000,000 cycles. | | | |
| 3 | Motor Type " High Performance Out Door, VVVF type, Heavy Duty Suitable for Mass Transit outdoor use, water proof complete system, IP-65 Protection rating according to IEC 60529 Standards | | | |
| 4 | Door Stops Machined Door stops machined in steel and anti-noise rubbers in the area of contact with the carrier | | | |
| 5 | Transmission Toothed Belt: Transmission toothed belt for connection to the belt fitting. Toothed belt coupling located with independent carrier in the center of the sliding blade made of 4-5 mm steel to keep centre of gravity of traction. | | | |
| 6 | Certificate IP-65 Protection Rating: Certificate IP-65 Protection rating according to IEC 60529 Standards | | | |
| 7 | Maximum Thrust force: Maximum Thrust force according to European Standards less than 220N CE Certificate: CE Certificate in Low Voltage Directive UNE EN 61000 2004/108/CE, Machinery Di-rective 2006/42/CE, RoHs 2002/95/CE | | | |
| 8 | Minimum Functional BRT Doors: Minimum functional BRT doors installation of 2000 PSDs doors worldwide. Experience in PSD installations accrediting, with BRT-AT installations in 7 different cities and countries as a minimum. | | | |
| 9 | Local experience: Local experience must be from 250-500 BRT doors installations in Pakistan. Vendor and manufacturer should have sufficient experience in all types of PSDs and APG | | | |
| 10 | Suitable for Outdoors Application: All equipment should be suitable for outdoors Application (IP-55). | | | |
| 11 | Working Temperature Range: Working temperature range should be from 0°C-to- 50°C, | | | |
| 12 | Humidity Tolerance: Humidity tolerance should be relative humidity of 85% non-condensing. | | | |
| 13 | SCADA Compatibility: All doors should be linked to central control station by SCADA for faults, alarms and maintenance issues. | | | |
| 14 | Vehicle detection system through reflective photoelectric sensors of adjustable range type WBE000TA02, compact body, and long range adjustable to a maximum distance of 2 m. Type IP-67 rated for demanding and intensive applications. Receiver equipped with two-segment diodes. This can be done independently of the color or background. It incorporates the ability to place two sensors very close or facing each other without interfering with each other. Adjustable long range reflectivity. Consume of 50 mA or less. Operation at 24V DC. | | | |
| 15 | Modular Based Device: The incorporation of new devices is done without the need to change in-stalled devices and can be expanded simply by incorporating more communication cards and repro-gramming the main board. | | | |
| 16 | Power Backup: System should be capable of Self-contained Power backup system for 200 cycles (Opening and Closing) | | | |
| 17 | Quality Management System ISO 9001:2015 (Certificate to be provided) | | | |
| 18 | Environmental Management System ISO 14001:2015(Certificate to be provided) | | | |
| 19 | Directive 2006/95/EC: EN 60335-2-103:2005 + A11:2010 AND EN 60335-1:2012 + A11:2014 + AC:2014 | | | |
| 20 | Directive 2004/108/EC: o EN 61000-6-3:2007 + A1:2012 o EN 61000-3-2:2014 o EN 61000-3-3:2013 o EN 61000-6-1:2007 o EN 61000-4-2:2010 o EN 61000-4-3:2007 + A1:2008 + A2:2011 o EN 61000-4-4:2013 o EN 61000-4-5:2015 o EN 61000-4-6:2014 o EN 61000-4-8:2011 o EN 61000-4-11:2015 | | | |
| 21 | Relating to the motor: o EN 60529 IP65. o Certificate 10,000,000 of cycles UNE-EN 16005:2013 | | | |
| 22 | Relating to wiring: o EN 60754-1:2014 o EN 60754-2:2014 | | | |
| 23 | Relating to glazing: o EN 12600:2003 | | | |

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| | | | | |
|----|--|--|--|--|
| 24 | <p>Relating to profiles:</p> <ul style="list-style-type: none"> o DIN 50049, DIN 17162 o ASTM A 480 o ISO 7599:2011 | | | |
| 25 | <p>SLIDING DOOR OPERATOR</p> <ul style="list-style-type: none"> - Door Operator for platform screen doors PSDs SCREEN SYSTEM, BRT-AT of two (02) or three (03) center-opening door leaves which includes: - Body in extruded aluminum EN10204 silver anodized surface finishing and dimensions W=122 mm and H= 200 mm, with fixing guides to install all the mechanical and electronic elements of the operator - Reinforced side covers in 3 mm thick steel finished with black hot-melt paint. - Front cover with reinforcing folds, self-locking and fastening with anti-vandal screw. - Control module and independent motor interconnected by each other. Fixing carriers system for the moving door leaf by reinforced screws and machined steel plate of 4-5 mm. High performance PA66-GF10 wheels - Adjustable derailment guide. - Toothed belt coupling located with independent carrier in the center of the sliding blade made of 4-5 mm steel to keep Centre of gravity of traction. - Adjustable tension pulley, machined with galvanized electrolytic UNE EN ISO 2081 or 1015 | | | |
| 26 | <p>Automatic Door operator for Platform Screen Doors for BRT system (Components):</p> <ul style="list-style-type: none"> - Microprocessor - Function card: Electronic. - Programming Unit. - All cabling till termination with SCADA equipment. - 24 VDC motor. Brushless, maintenance-free. - Transmission: Toothed Belt. - Working temperature: -25 °C / 50 °C - Relative Humidity: 85%, non-condensing - Power supply: AC 110 - 220 V, 50/60 Hz. - Maximum consumption: <150W. - Standby power consumption: 10 W - Consumption at medium speeds: <100 W. | | | |
| 27 | <p>Automatic Door operator for Platform Screen Doors for BRT system (Components):</p> <ul style="list-style-type: none"> - Fuse: F3A 250V. - Adjustable opening speed: 150 - 460 mm /s. - Adjustable closing speed: 130 - 460 mm /s - Closing force: 1500 N. - Braking speed: 200 - 600 mm /s - Hold open time: 0-9 s. - Opening Width: Adjustable. - Braking Distance: Adjustable - Anti-crushing: Closing force <50N - Static force: Adjustable 90-150 N - Frequency of use: Continuous. - Provision of manual operating system in-case of failure of automatic system with each door - Connection to PC: through RJ45 connector - Power backup system for 200 cycles (Opening and Closing) - Certificate 10,000,000 cycles. - IP-65 rating according to IEC 60529 | | | |
| 28 | <p>FRAMES AND PROFILES FOR PSD:</p> <ul style="list-style-type: none"> - Profiles made of extruded aluminum quality EN 10204 for moving door leaves: AS-300 EKO of 60x20 mm on the upper and lower horizontal part, vertical profiles with dimensions 22x20mm, glass finish framed in the whole of the perimeter of the moving leaves. - Finish: aluminum quality EN 10204, silver anodized surface finishing, for 8mm glazing. - Horizontal profile type double "H" - Horizontal profile "H" with external wall thickness of 2.95 mm. with double internal reinforcement of 2 mm, anchoring holes at all angles for the inner wall, thickness of 3 mm in the area where the glass is installed. Internal recess is every 4 mm to place EPDM seals. Reinforced Internal divisions separated 14.10 mm. Clamping brackets for placement of the metal anchor of the sliding carriers. - Vertical profile type "H" with a wall thickness of 3 mm in the area where the glass is installed, 2 mm in the central part where the central reinforcement is located and 4 mm in the lower part where anchor-ing plate of the sliding carrier is located. There are 4 mm internal recesses for EPDM joints. 14 mm gap to install the glass and 10.36 mm for the plate. | | | |
| 29 | <p>FRAMES AND PROFILES FOR PSD:</p> <ul style="list-style-type: none"> - The anodized must be the EWAA / EURAS quality mark designated by significant surfaces class 15 = minimum average thickness 15 microns by the standards established by the ANODISERS ASSOCIATION EUROPEAN EWAA / EURAS - The numerical designation of the alloy of the profiles is UNE EN-573-1 and of the extrusion according to UNE EN-755 and UNE EN-12020 standards. - In compliance with the profiles according to EN 755-1 the profiles are regulated by EN 15088: 205 for aluminum and aluminum alloys, structural products for construction and technical inspection and supply conditions. - All profiles must be tested in accordance with the quality requirements UNE-EN 573-3: 2014 and UNE-EN 12020-2: 2009.- Universal floor guides adjustable in stainless steel. Mechanized in cold with-out welds and without bond adhesives. Upper metal plate for fixing the glass and lower plate to adjust the thickness of the glass / Profiles. Adjustment measures from 08 to 40mm. | | | |

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|----|---|--|--|--|
| 30 | <p>ELECTRONIC OF COMMUNICATION, CONTROL AND DIAGNOSIS OF THE PSD BRT SYS:</p> <p>Door operator control and communication devices allow the synchronization of the doors and peripheral devices.</p> <ul style="list-style-type: none"> - The main or control operator has a main Multifunction board type WBE000TA01 that allows synchronization between door operators and secondary doors. This card executes the actions of the devices and sends them to the communication cards. - Communication card type WBE000TA00 installed in all operators which allows communication between the main and secondary doors of the platform. - Flat shielded wire MECPLCAG90 type IDC FLAT WIRE 10 ways for connection of control and communication cards. - UTP type wire and RJ-45 connector for connection of the operators. - The programming of the control card allows programming different opening / closing commands according to the type of Bus and doors to be synchronized. - The control and communication system is ready to assign any of the functions type RF, AT, DI. | | | |
| 31 | <p>Vehicle Detection System:</p> <p>through reflective photoelectric sensors of adjustable range type WBE000TA02, compact body, and long range adjustable to a maximum distance of 2 m. Type IP-67 rated for demanding and intensive applications. Receiver equipped with two-segment diodes. This can be done independently of the colour or background. It incorporates the ability to place two sensors very close or facing each other without interfering with each other. Adjustable long range reflectivity. Consume of 50 mA or less. Operation at 24V DC.</p> <ul style="list-style-type: none"> - The incorporation of new devices is done without the need to change installed devices, and can be expanded simply by incorporating more communication cards and reprogramming the main board. - It incorporates software in the main card that allows the management of the doors and the installed safety devices. - The system allows the migration of technology to any of the activation and control systems RF, AT, DI, MX. - The PCGRUL-01 allows the operation of the indicative traffic light of open and closed doors. - The system allows the incorporation of a monitoring, control, tracking system and SCADA supervision that can be done locally or remotely, this will be done online and in real time. - Electronic Control Cards that incorporate a system to visualize the functioning of the devices through LED diodes that show in real time the operation of these, if they are active or need to be replaced. | | | |
| 32 | <p>Vehicle Detection System:</p> <ul style="list-style-type: none"> - The control board WBE000TA01 allows the recording of informative messages that facilitate the user to use the BRT system. You can enter two messages in two different languages. - Scalable PSD system with the possibility of incorporating new devices. - It incorporates an opening device capable of making an emergency intervention of all the doors simultaneously - Incorporates the possibility of placing an opening device in each of the doors of the platform - The sound signal can be programmed and deactivated according to the need of the sound operation. It has programmed volume control. - The system keeps the doors closed and locked without the need to install an additional lock. The thrust forces are higher than 1500 Newtons. - Allows the inclusion of linear LED light signals, colored lamps, etc - The system allows the programming of door closing without possibility of reopening and with an alert through an acoustic and luminous alarm. - Operators have a control module interconnected to a control module of the motor. | | | |
| 33 | <p>Vehicle Detection System:</p> <ul style="list-style-type: none"> - PSD electronics ready for the integration of a people counting system for bus access and exits - Scalable system BRT SCREEN SYSTEM, with the option of integrating various visual control devices, CCTV, SCADA, bus monitoring, etc. - The system integrates a SCADA that incorporates online status of doors, maintenance notification, number of door life cycles, time of arrival and stop of the buses in the station, peripheral device failures, and information regarding arrival / departures of buses. | | | |
| 34 | <p>SCADA (REMOTE MONITORING AND CONTROL SYSTEM OF BRT-AT SYSTEM)</p> <p>System of Remote Supervision, Control and Data Acquisition facilitate real-time feedback with field devices and controls the process automatically. It provides all the information generated in the production process (supervision, quality control, production control, data storage, etc.) and allows its management and intervention.</p> <p>Includes:</p> <ul style="list-style-type: none"> - Application software for local or remote stations - Connection to a local or remote PC to a central server. - On Line Monitoring of the doors operation. - Remote intervention of security opening of one or group of doors. - Monitoring of peripheral devices - HMI Human-Machine Interface located in the station. - Operating cycle counter, maintenance alert and control settings | | | |

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|----|---|--|--|--|
| 35 | <p>SCADA (REMOTE MONITORING AND CONTROL SYSTEM OF BRT-AT SYSTEM)</p> <ul style="list-style-type: none"> - Allows the sending of an audible alert of use or emergency. - Operation history for assessment of usage statistics. - GBRTSCDIS1 HMI device touch panel 17 "TFT-LED True Flat where an easy-to-learn functional scheme is incorporated. Includes OS Windows 7 - Main control PC for integration with other devices of the monitoring system and connected to super-visory HMIs. - PC touch panel 17 "TFT-LED True Flat GBRTSCCC01 with an OS Windows 7 Professional 64 bits for visualization of maintenance alarms, situation of the emergency opening push button, positioning sen-sors, signal lights, etc. - Communication module WBE000GE07 between the HMI and the door operator AG90 /200. - UTP type cable and RJ-45 connector for interconnection of devices. Maximum distance of 100 mt. - SCADA working environment, adaptable to the particular application intended to develop. Open ar-chitecture system (able to adapt according to the needs of the owner). Easy communication both with the user and central control equipment. | | | |
| 36 | <p>UPS (UNINTERRUPTIBLE POWER SUPPLY)</p> <p>UPS, uninterruptible power supply backup system for PSDs and SCADA installed in each of the stations.</p> <p>Specifications: Segun indicaciones del fabricante de PSDs cumpliendo con las necesidades de carga por cada estación.</p> <p>According to PSDs manufacturer's instructions that comply with the charge needs per station.</p> | | | |
| 37 | <p>WARRANTY:</p> <p>All system should have minimum warranty of two years. And the supplier will provide O&M services for continuous 08 years (after the completion of first TWO years of warranty) & will sign off the separate contract with TransPeshawar.</p> | | | |
| 38 | <p>SPECIAL TERMS AND CONDITIONS:</p> <p>The manufacturer will directly looks after & supervise the installation/implementation of the BRT System till the commissioning and system performance.</p> <p>Daily Opening and Closing Cycles of PSD: PSD doors will be subject to heavy and intensive use. They should have the capacity to make 1000 to 1500 cycles of opening and closing daily. The motor must be certified by an independent laboratory of 10,000,000 cycles of opening and closing with a 7 year warranty without the need for repair.</p> | | | |
| 39 | <p>SPECIAL TERMS AND CONDITIONS:</p> <p>European Origin: The PSD doors will be from Europe and CE marked with sufficient technical assistance and original spare parts. The import of all equipment/components will be varified through shipping documents. The supplier must guarantee the existence of the components and spare parts of the doors in at least 5% of the number of units to be placed. @# The list of spare parts will be shared with the client.</p> <p>FAT(Factory Acceptance Test): The supplier will be responsible for FAT at the factory premises for atleast TWO persons(One Consultant & One Client)including all exenses(boarding/lodging/travelling expenses/air tickets-both ways)</p> | | | |

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CRE PSBRTC Project

Pump's Specifications & Compliance

| Pump's Information | Specifications | Compliance | Deviation (If Any) | Remarks |
|---|--|------------|--------------------|---------|
| Number of pumps | 02 per underpass/ per site | | | |
| Pump Type | Submersible | | | |
| Country of Origin | German preferably OR any European | | | |
| Power Input -P1 | 4-5 KW OR Fit for the purpose | | | |
| Power Input -P2 | 4 KW | | | |
| Main Frequency | 50 Hz | | | |
| Liquid Type | Muddy Water/Drainage Water/ Stingy Water | | | |
| Flow Rate/ Discharge Rate | > 260 GPM(US) | | | |
| Maximum Head (TDH) | 11-12 METER | | | |
| Type Of Impeller | Super Vortex/S- Tube Impeller (*Which is Suitable) | | | |
| Treatment of All Cast Iron Parts | Cataphoresis Treatment | | | |
| Approvals | CE, EN12050-1 | | | |
| Pump Inlet | 100 mm | | | |
| Discharge Pipe size | 100 mm | | | |
| Maximum Particle Size | 3 1/8 inch | | | |
| Pump Housing | Cast Iron (EN-GJL-250)EN-GJL-250 | | | |
| Impeller Housing | Cast Iron (EN-GJL-250)EN-GJL-250 | | | |
| Motor Housing | Cast Iron (EN-GJL-250)EN-GJL-250 | | | |
| Primary Shaft Seal | SIC | | | |
| Secondary Shaft Seal | Carbon/ Ceramics | | | |
| Rated Voltages | 3 X 380-415 Volts | | | |
| Voltages Tolerance | +10/-10% | | | |
| Maximum Starts Per Hour | ≥ 20 | | | |
| Rated Current | 10.1 - 10.1 Amps | | | |
| Rated Current at 3/4 load | Specified by the manufacturer | | | |
| Rated Current at 1/2 load | Specified by the manufacturer | | | |
| Starting Current | < 70 Amps | | | |
| Cos Phi - Power Factor | 0.72 | | | |
| Cos phi - p.f. at 3/4 load | 0.63 | | | |
| Cos phi - p.f. at 1/2 load | 0.5 | | | |
| Rated Speed | 1400-1500 RPM | | | |
| Locked-rotor torque | Specified by the manufacturer | | | |
| Breakdown torque | Specified by the manufacturer | | | |
| Moment of inertia | Specified by the manufacturer | | | |
| Motor Efficiency at Full Load | 87.40% | | | |
| Motor Efficiency at 3/4 Load | 87.10% | | | |
| Motor Efficiency at 1/2 Load | 85.00% | | | |
| Number of Poles | 4 | | | |
| Start Method | Star/Delta OR Direct Online | | | |
| Enclosure Class (IEC 34-5) | IP68 | | | |
| Insulation Class (IEC 85) | H | | | |
| Motor Protection | THERMAL SWITCH | | | |
| Thermal Protection Internal | Yes | | | |
| Length of Cable | As per site requirement | | | |
| Cable Type | LYNIFLEX | | | |
| Max Hydraulic Efficiency | 59% | | | |
| Max Ambient Temperature | 104 °F | | | |
| Max Operating Pressure | 87 psi | | | |
| Flange Standard | DN | | | |
| Pump Outlet | DN 80 | | | |
| Pressure Stage | PN 10 | | | |
| Max Installation Depth | 65.6 Feet | | | |
| Density | 62.29 lb per cubic feet | | | |
| Pump Liquid | Muddy water, stringy solids and debris-laden liquids | | | |
| Liquid Temp Range | 32 °F - 104 °F | | | |
| Remote Monitoring through SCADA | Interface with SCADA | | | |
| Discharge Pipe Type | HDPE type/UPVC | | | |
| Discharge Pipe dia | 100 mm inner dia | | | |
| SCADA Interface | Remote Monitoring and Control with CIM Module | | | |
| Level Sensors | Automatic "ON and OFF" | | | |
| Protection | Dry Run Protection | | | |
| Accessories Schedule | As per Drawing | | | |
| Discharge Pipe dia | 100 mm | | | |
| Long Radius Bends 90 Degree | As per Drawing/Requirement at site | | | |
| Dismantling Joints | As per requirement | | | |
| Non Return Valves(NRV) | As per requirement | | | |
| Gate Valves(GV) | As per requirement | | | |
| Tees | As per requirement | | | |
| Guide Rails | As per requirement | | | |
| Lifting Chain | As per requirement on site | | | |
| Complete from all aspects till operational including softwares interface with SCADA, CIM Module, cables & their terminations AND including accessories/pipes, NRVs, Joints, GVs, all plumbing Work PLUS Fault Self Diagnostic | Contractor's Scope | | | |
| Provision, Installation & Commissioning of all pumps as per agreed terms | Contractor's Scope | | | |
| FAT/Pre shipment Inspection at manufacturer's facility | FAT/Pre shipment Inspection for Two Officials (ONE Client & ONE Consultant) including boarding, lodging, TADA & Return Ticket at contractor's cost | | | |
| Complete O&M for TWO years & training to the Owner's technical team. | Contractor's Scope | | | |
| Provision of O&M Manuals & relevant pumping software | Contractor's Scope | | | |

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 Feb 26, 2018
 (Nadeem Qureshi)
 E & M Expert
 BRT, EPCM, MNT

Handwritten Signature
 (Younas Abideen)
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PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

100KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 100KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 06 (CPS)
12KV, rated 200A, with manual operating mechanism,
- 11KV, 10A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

- 100KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical drawing.

LV COMPARTMENT

Incoming:

- TP, MCCB, 250A, 25KA 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 100A, 25KA 02 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

200KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 200KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 20A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

200KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, MCCB, 500A, 65KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 250A, 25KA Adj 02 (Terasaki/Eqv.)
- TP, MCCB, 400A, 36KA Adj 01 (Terasaki/Eqv.)



Chamkani Depot Area - Washing Bays

PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

400KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 400KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint..

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 40A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

400KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical drawing.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1000A,65KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 800A, 50KA Adj 02 (Terasaki/Eqv.)
- TP, MCCB, 100A, 25KA Adj 01 (Terasaki/Eqv.)



Chamkani Depot Area - Workshop & Rest

PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

2000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 2000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 160A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

2000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, ACB, 3200A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, ACB, 3200A, 85KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 200A, 36KA Adj 01 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

630KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 630KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint..

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 50A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

630KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical drawing.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1600A,85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 1250A, 70KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 250A, 25KA Adj 03 (Terasaki/Eqv.)



Chamkani-KPUMA Building

PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

400KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 400KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint..

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 06 (CPS)
12KV, rated 200A, with manual operating mechanism,
- 11KV, 40A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

400KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical drawing.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1000A,65KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 800A, 50KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 100A, 25KA Adj 01 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

200KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 200KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 06 (CPS)
12KV, rated 200A, with manual operating mechanism,
- 11KV, 20A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

200KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, MCCB, 500A, 65KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 400A, 36KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 250A, 25KA Adj 02 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

1500KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 1500KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 125A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

1500KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, ACB, 2500A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 630A, 50KA Adj 04 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

1000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 1000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 06 (CPS)
12KV, rated 200A, with manual operating mechanism,
- 11KV, 80A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

- 1000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1600A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 1600A, 85KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 630A, 50KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 400A, 25KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 200A, 25KA Adj 01 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

2000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 2000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 160A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

2000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, ACB, 3200A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 630A, 50KA Adj 05 (Terasaki/Eqv.)



Charsaddah Road Terminal

PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

2000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 2000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 06 (CPS)
12KV, rated 200A, with manual operating mechanism,
- 11KV, 160A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

2000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, ACB, 3200A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 630A, 50KA Adj 05 (Terasaki/Eqv.)



Kohat Road Terminal

PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

2000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 2000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 160A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

2000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, ACB, 3200A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 630A, 50KA Adj 05 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

1000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 1000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 80A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

1000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1600A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 630A, 50KA Adj 03 (Terasaki/Eqv.)



Karkhano Market

PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

02Nos. 630KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 630KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 50A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

630KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical drawing.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1600A, 85KA, Adj. 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 1250A, 70KA, Adj. 01 (Terasaki/Eqv.)
- TP, MCCB, 250A, 25KA, Adj. 01 (Terasaki/Eqv.)
- TP, MCCB, 100A, 25KA, Adj. 01 (Terasaki/Eqv.)



PAK ELEKTRON LIMITED

TECHNICAL SPECIFICATIONS

1000KVA PAD MOUNTED TRANSFORMER

PEL-make, metal clad sheet steel fabricated, 1000KVA Pad Mounted Transformer, suitably protected from weather effects with separate compartments for HT Switchgear & LT Switchgear. The PMT shall be designed for 3 phase, 50Hz, AC system and finished with two coats of anti rust paint.

11KV COMPARTMENT

Incoming:

- SP, Arc Strangler Switch (Single Pole Load Break Switch), 12KV, rated 200A, with manual operating mechanism, 06 (CPS)
- 11KV, 80A, H.R.C Fuses. 03 (Bussman/Efen)

TRANSFORMER

1000KVA Transformer oil immersed, 11000/415V, 50Hz 01 (PEL)
As per attached data sheet and technical Drawings.

LV COMPARTMENT

Incoming:

- TP, MCCB, 1600A, 85KA Adj 01 (Terasaki/Eqv.)

Outgoing:

- TP, MCCB, 1600A, 85KA Adj 01 (Terasaki/Eqv.)
- TP, MCCB, 630A, 50KA Adj 02 (Terasaki/Eqv.)



Hayatabad Depot - Slow Chargers

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| Rev. No | Revision note | | Date | Check | |
| Drawing Status: | | | | | |
| FOR APPROVAL | | | | | |
| Client: | | | | | |
| MAQBOOL CALSONS | | | | | |
| Contractor: | | | | | |
|  | | Pak Elektron Ltd. | | | |
| 14-KM, FERAZEPUR ROAD-LAHORE Pakistan. | | | | | |
| Contract No./Project Title: | | | | | |
| 11000/415V, 100kVA, 3-PHASE PAD MOUNTED TRANSFORMER CHAMKANI DEPOT AREA & TUBEWELL | | | | | |
| Design: | AHMAD | Check: | MH | Sheet | 1 of 11 |
| Approve: | NS | Date | 30-01-2019 | Scale | N.T.S |
| File Ref: | Drawing No. | | REV.No. | 00 | |
| | D 396 4691. | | | | |

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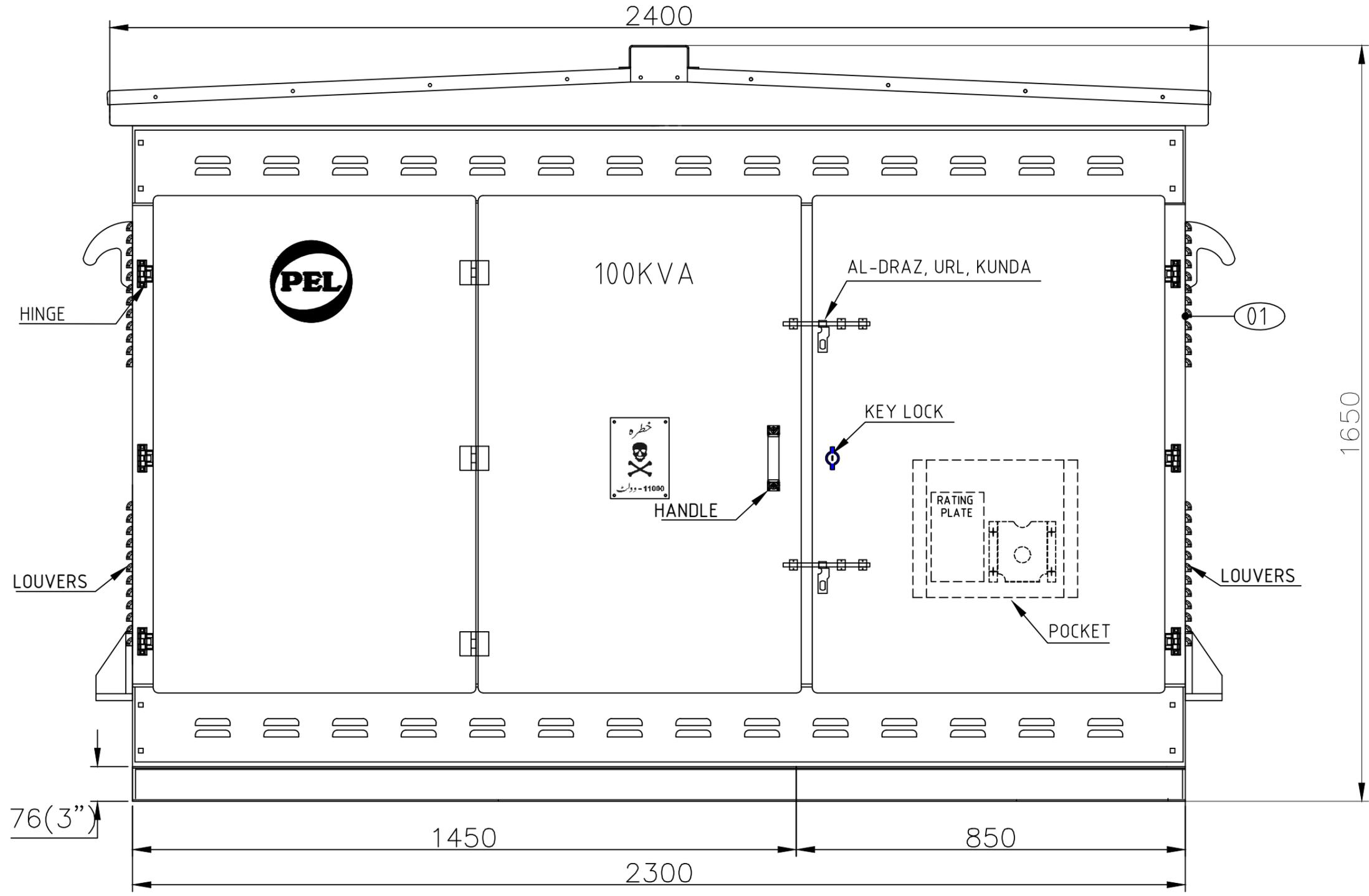
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| SERIAL NO. | ITEM DESIGNATION IN SCHEMATICS | DESCRIPTION | CIRCUIT SHEET NO. | QTY. | TYPE | MAKE | REMARKS |
|------------|--------------------------------|--|-------------------|------|--------|------------------|---------|
| (1) | | <u>TRANSFORMER COMPARTMENT</u> | | | | | |
| 1.1 | -T11 | 100KVA OIL IMMERSED TRANSFORMER, RATED VOLTAGE 11000 / 415V 50 Hz. | | 1 | | PEL | |
| (2) | | <u>H.T COMPARTMENT:</u> | | | | | |
| 2.1 | -Q8--Q13 | S.P ARC STRANGLER LOAD INTRRUPTER SWITCH, SUITABLE FOR 15.5KV, RETAD CURRENT 200A. | | 6 | FA3-B1 | C.P.S | |
| 2.2 | -F10-F12 | 11KV HRC FUSE LINK, RATED 10A, COMPLETE WITH FUSE CLAMPS. | | 3 | | EFEN/BUSMAN/Eqv. | |
| 2.3 | | CAST RESIN INSULATOR, LG-175MM, SUITABLE FOR 17.5KV SYSTEM. | | 3 | | ISORES/SPEZ/Eqv. | |
| (3) | | <u>L.T COMPARTMENT:</u> | | | | | |
| 3.1 | -Q52. | TP MCCB, 250A 36KA | | 1 | | TERASAKI/EQV. | |
| 3.2 | -Q1,-Q2. | TP MCCB, 100A 25KA | | 2 | | TERASAKI/EQV. | |
| 3.3 | | EARTHING TERMINAL. | | 1 | | LOCAL | |
| 3.4 | | NEUTRAL CONNECTOR. | | 1 | | LOCAL | |

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| | | | | | |
|-----------------|------------|----------------|--|----------------|----------------|
| Prepared | 30-01-2019 | AHMAD | 11000/415, 100KVA, 3-PHASE | FOR APPROVAL | |
| Approved | 30-01-2019 | NS | PAD MOUNTED TRANSFORMER | Department | SWITCHGEAR |
| CUSTOMER: | | | LIST OF APPARATUS | Rev. | 00 |
| MAQBOOL CALSONS | | | Pak Elektron Ltd. | DRAWING NUMBER | D 396 4691 |
| Rev. | Revision | Appd Year Week | 14-KM, FEROEZPUR ROAD-LAHORE-PAKISTAN. | File Ref: | TENDER INQUIRY |
| | | | | Sheet | 3 |
| | | | | Cont | 4 |



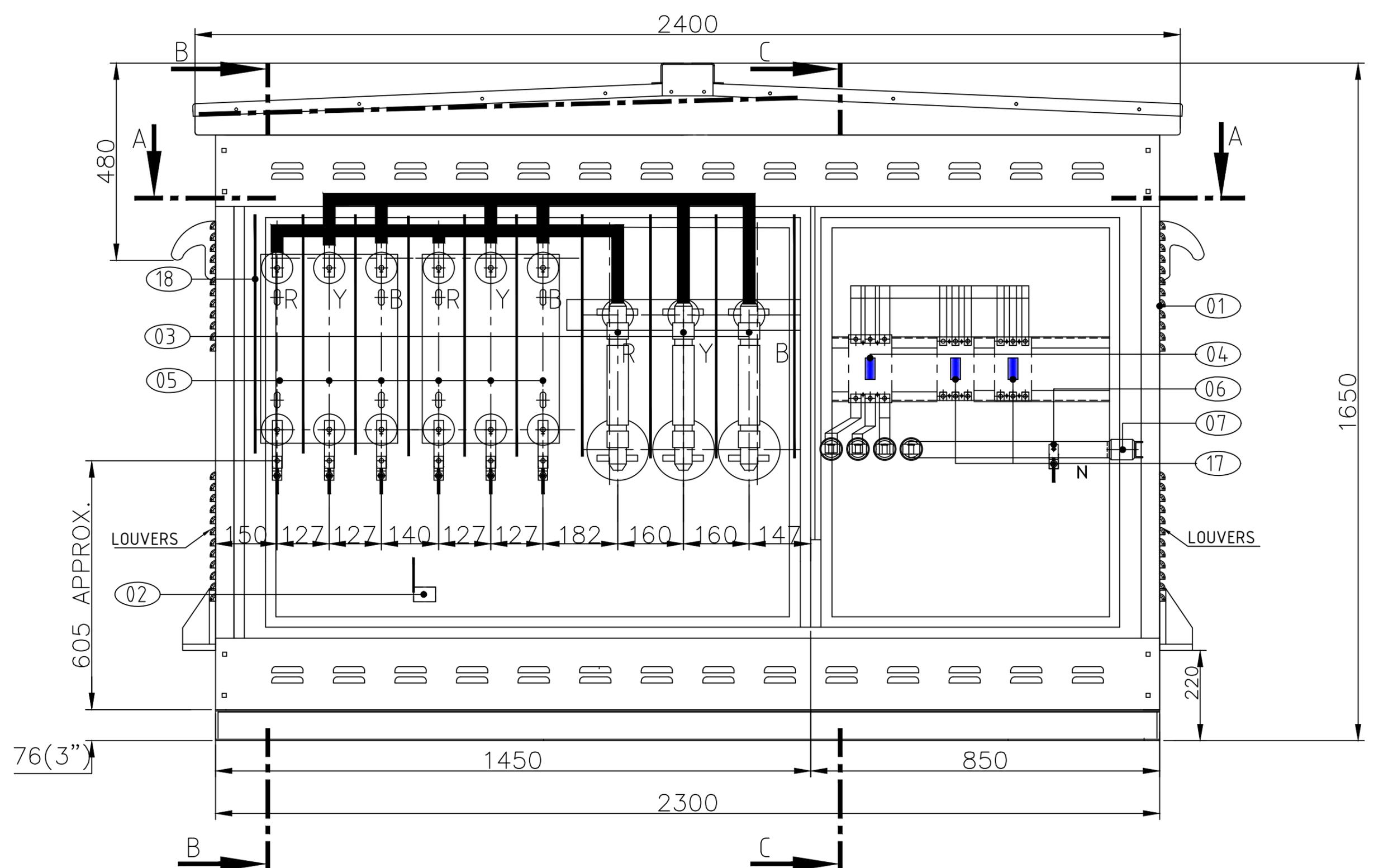
FRONT VIEW
(WITH FRONT DOORS)

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| Rev. | | Revision | | Appd | | Year Week | | Prepared 13.02.2019 IMRAN CHECKED R.K | | 11/0.415KV, 100KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | | QUANTITY : 2 | | FOR APPROVAL | |
| | | | | | | | | Approved 13.02.2019 E.H/R.K | | CUSTOMER :- MAQBBOOL CALSONS | | Department SWITCHGEAR DESIGN | | Rev. 0 | |
| | | | | | | | | PROJECT :- BRT PESHAWER (TUBE WELL) | | Pak Elektron Ltd. 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | DRAWING NUMBER | | File Ref: 100KVA PMT | |
| | | | | | | | | | | | | D 396 4691 | | Sheet 4 | |
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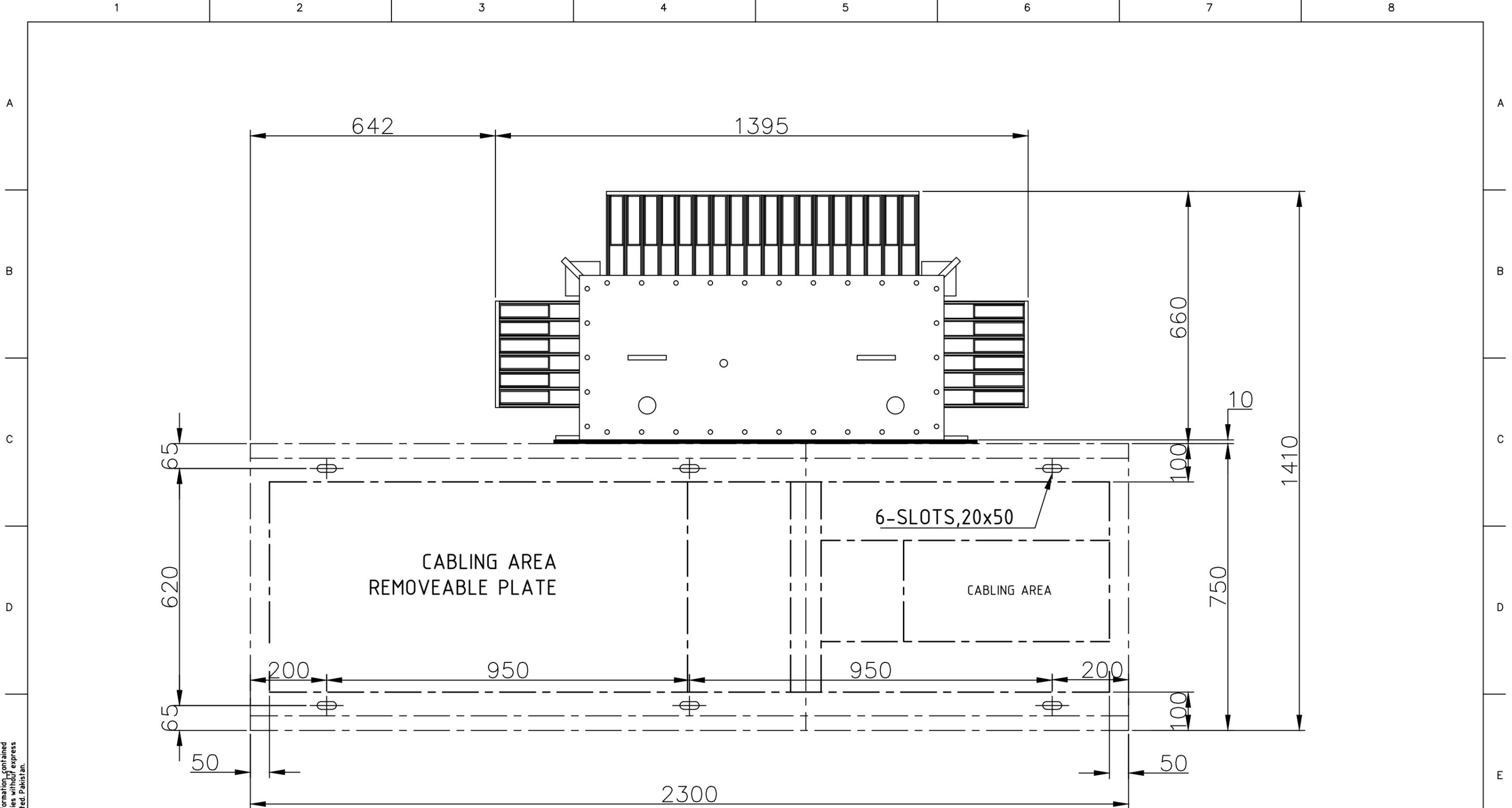
FRONT VIEW

(WITHOUT FRONT DOORS AND METERING COMPARTMENT)

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| Rev. | | Revision | | Appd | | Year | | Week | | Prepared 13.02.2019 IMRAN | | CHECKED R.K | | 11/0.415KV, 100KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | | Department SWITCHGEAR DESIGN | | Rev. 0 | | File Ref: 100KVA PMT | |
| | | | | | | | | | | CUSTOMER :- MAQBDOOL CALSONS | | PROJECT :- BRT PESHAWER (TUBE WELL) | | Pak Elektron Ltd. 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | DRAWING NUMBER D 396 4691 | | Sheet 5 | | Cont 6 | |

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FOUNDATION PLAN

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|------|----------|----------|------------|---------|---------|-----|---|--|----------------|-------------------|------|-------|-----------|------------|
| | | Prepared | 13.02.2019 | IMRAN | CHECKED | R.K | 11/0.415KV, 100KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | 100KVA PMT |
| | | Approved | 13.02.2019 | E.H/R.K | | | PROJECT :- BRT PESHAWER (TUBE WELL) | | DRAWING NUMBER | D 396 4691 | | Sheet | 6 | |
| Rev. | Revision | Appd | Year | Week | | | Pak Elektron Ltd. 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | | | Cont | 7 | | |

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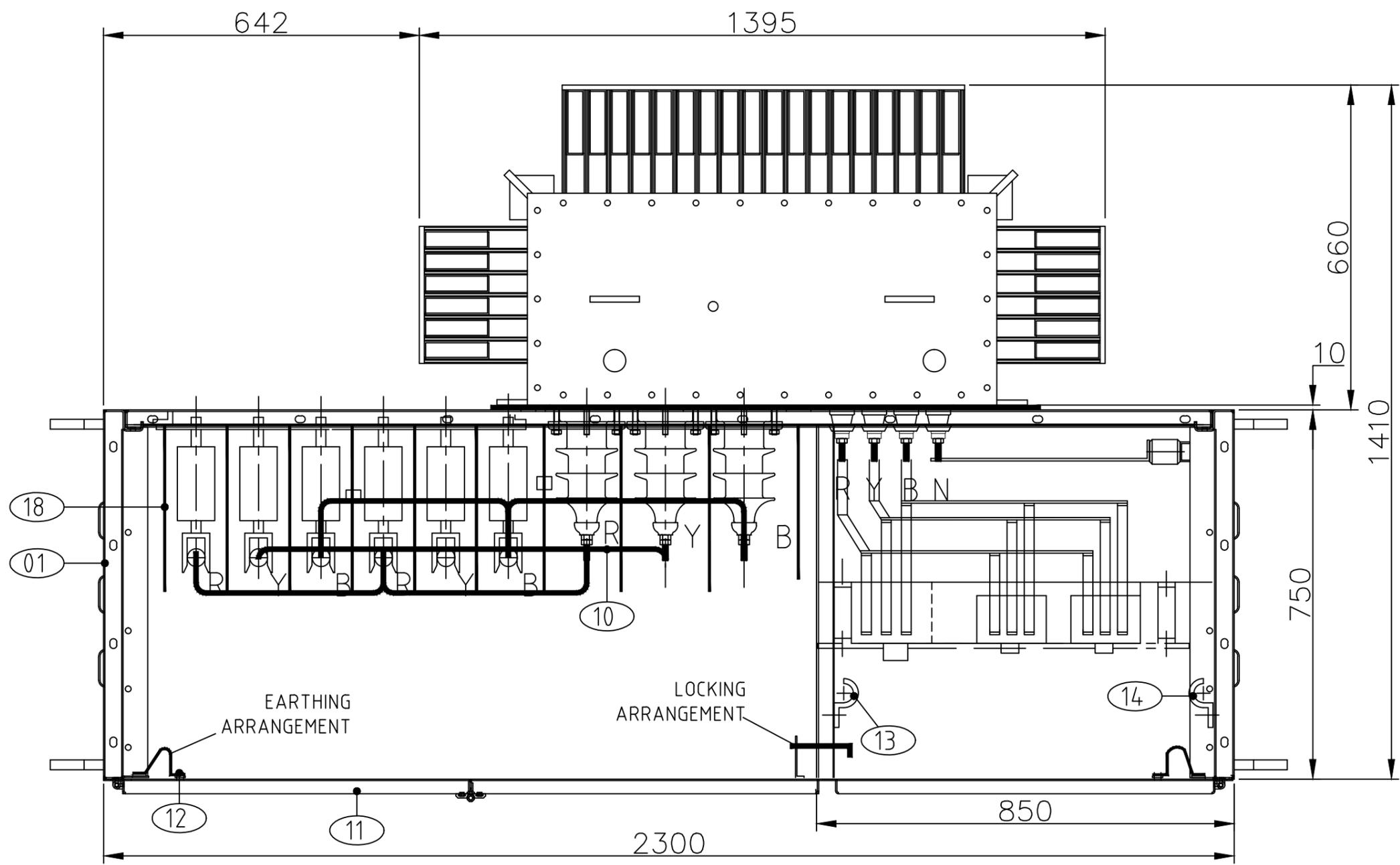
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SECTION A-A

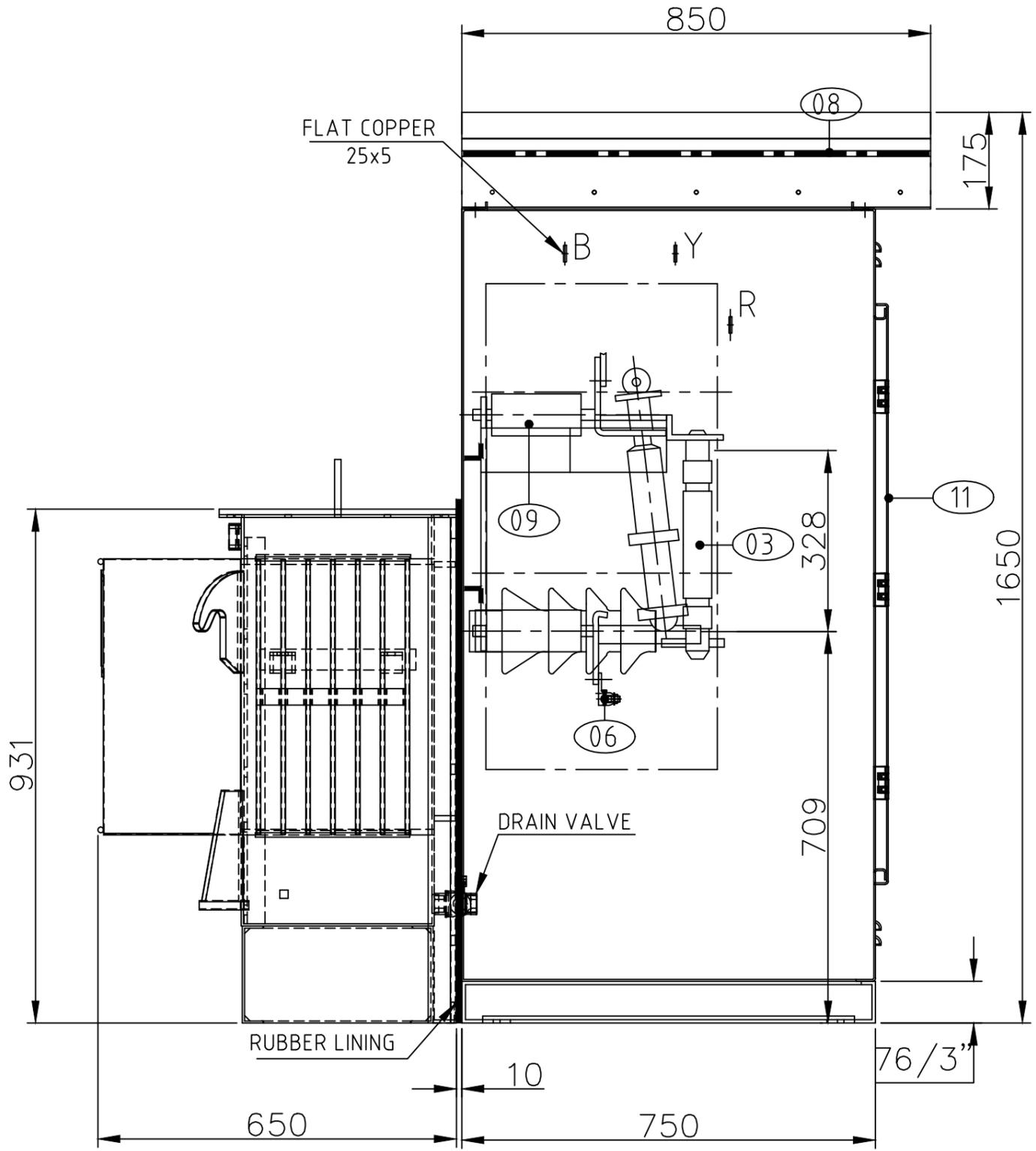
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|------|----------|---------------------------------------|------|-------------|----------------|---|--|------------------------------|--|
| | | Prepared 13.02.2019 IMRAN | | CHECKED R.K | | 11/0.415KV, 100KVA, 3-PHASE | | | |
| | | Approved 13.02.2019 E.H/R.K | | | | PAD MOUNTED TRANSFORMER | | | |
| | | CUSTOMER :- MAQBBOOL CALSONS | | | | GENERAL ARRANGEMENT | | Department SWITCHGEAR DESIGN | |
| | | PROJECT :- BRT PESHAWER (TUBE WELL) | | | | Pak Elektron Ltd. | | Rev. 0 | |
| | | | | | | 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | File Ref: 100KVA PMT | |
| Rev. | Revision | Appd | Year | Week | DRAWING NUMBER | | | Sheet 7 | |
| | | | | | D 396 4691 | | | Cont 8 | |

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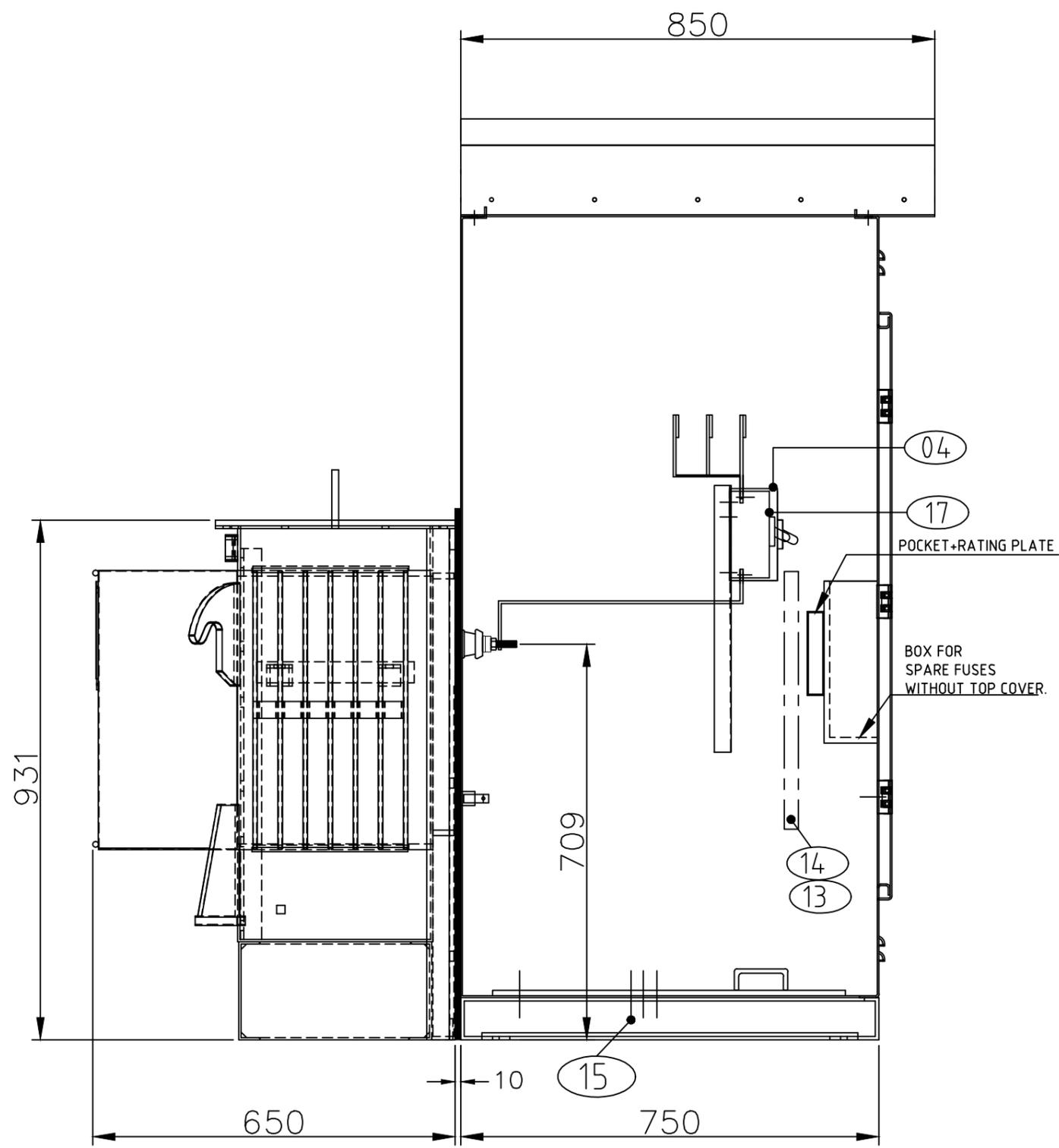
SECTION B-B (HT)

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| | | | | | | | |
|---------------------------------------|----------|------------------------------|------|---|--|--|---------|
| Prepared 13.02.2019 IMRAN | | CHECKED R.K | | 11/0.415KV, 100KVA, 3-PHASE | | | |
| Approved 13.02.2019 E.H/R.K | | | | PAD MOUNTED TRANSFORMER | | | |
| | | CUSTOMER :- MAQBBOOL CALSONS | | GENERAL ARRANGEMENT | | Department SWITCHGEAR DESIGN Rev. 0 File Ref: 100KVA PMT | |
| PROJECT :- BRT PESHAWER (TUBE WELL) | | | |  Pak Elektron Ltd. 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | DRAWING NUMBER D 396 4691 | |
| Rev. | Revision | Appd | Year | Week | | | Sheet 8 |
| | | | | | | | Cont 9 |

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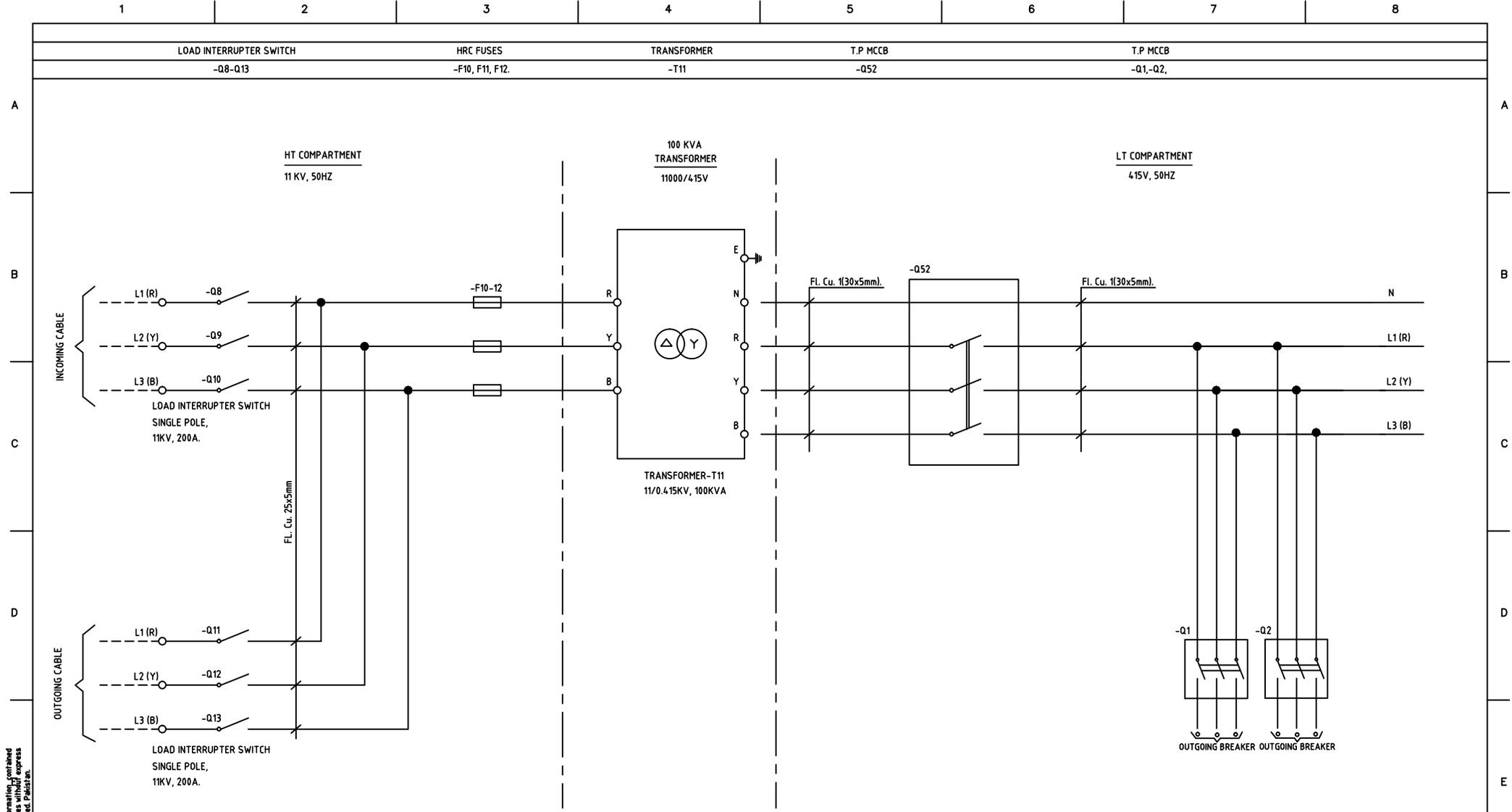
SECTION C-C (LT)

- NOTE:**
- 1-GENERAL TOLERANCE ±1.5mm UPTO 300mm & ±5mm FOR 300 AND ABOVE.
 - 2-BILL LEVEL 95KV.
 - 3-ALL BUSBAR JOINTS ARE TIN PLATED.
 - 4-CLEARANCE IN H.T COMPARTMENT.
 - 5-CLEARANCE IN L.T COMPARTMENT. } ACC. TO WAPDA SPECIFICATION.
 - 6-M.S SHEET 3mm THICK.
 - 7-PAINT THICKNESS 0.08mm to 0.12mm.
 - 8-WEIGHT OF COMPLETE PAD MOUNTED TRNASFORMER = 1550Kg (Approx.) FOR WAPDA ARR.
 - 9-FINISH = COLOR GREEN (RAL 6025) TEXTURE FOR WAPDA PMTFS AND BLUE (RAL 5012) TEXTURE FOR HOUSING SOCIETIES
 - 10-PROTECAION CLASS :IP 54
 - 11-ALL DIMENSIONS ARE IN mm

| | |
|----|---|
| 18 | H.T INSULATION BARRIER (C.P. SHEET) |
| 17 | OUTGOING TRIPLE POLE MCCB 2x(100 A) |
| 16 | TYPICAL ARR. FOR CABLE TERMINATION (IF REQUIRED) |
| 15 | CABLE STUFFING BOX (IF REQUIRED) |
| 14 | SWITCH STICK |
| 13 | FUSE PULLER |
| 12 | EARTHING ARRANGEMENT FOR DOORS |
| 11 | FRONT DOORS |
| 10 | H.T FLAT COPPER BUS BARS |
| 09 | INSULATOR FOR H.T BUSBAR SUPPORT |
| 08 | CRAFT PAPER IN(CP SHEET) H.T COMPARTMENT |
| 07 | AUXILIARY INSULATOR |
| 06 | H.T. CONNECTOR , N-CONNECTOR & L.T CONNECTOR (QTY. SEE LOM) |
| 05 | H.T. LOAD INTERRUPTER SWITCH |
| 04 | INCOMING TRIPLE POLE MCCB (250 A) |
| 03 | 11kV HRC FUSE |
| 02 | EARTHING CONNECTOR |
| 01 | ENCLOSURE FOR 100KVA PAD MOUNTED TR. |

| SR. | DESCRIPTION |
|-----|---|
| | 11/0.415KV, 100KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT |
| | Department SWITCHGEAR DESIGN Rev. 0 File Ref: 100KVA PMT |
| | DRAWING NUMBER D 396 4691 Sheet 9 |
| | Cont 10 |

| | | | | |
|---------------------------------------|------------|---------|---------|------|
| Prepared | 13.02.2019 | IMRAN | CHECKED | R.K |
| Approved | 13.02.2019 | E.H/R.K | | |
| CUSTOMER :- MAQBDOOL CALSONS | | | | |
| PROJECT :- BRT PESHAWER (TUBE WELL) | | | | |
| Rev. | Revision | Appd | Year | Week |



NOTE:
 1- FUSES (FROM LOWER SIDE) ARE DIRECTLY CONNECTED TO TRANSFORMER BUSHING.
 2- CABLE SIZE REQUIRED FOR HT AND LT CIRCUITS.

| TABLE SHOWING DETAIL FOR OUTGOING MCCB | | |
|--|-------------|--------------------|
| CKTS LOCATION | MCCB RATING | CABLE SIZE |
| -Q52, | 250A | Fl. Cu. 1(30x5mm). |
| -Q1,-Q2 | 100A | Fl. Cu. 1(15x5mm). |

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| | | | | | | | | |
|-----------------|------------|-------|--|----------------|-------------|-------|---|-----------|
| Prepared | 30.01.2019 | AHNAD | 11/0.415KV, 100KVA, 3-PHASE | Department | SWITCHGEAR | Rev. | 0 | File Ref: |
| Approved | 30.01.2019 | NS | PAD MOUNTED TRANSFORMER | DRAWING NUMBER | D 396 4691. | Sheet | 4 | |
| CUSTOMER: | | | Pak Elektron Ltd. | Cont | 5 | | | |
| MAQBODD CALSONS | | | 14-KM, FEROEZPUR ROAD-LAHORE-PAKISTAN. | | | | | |
| Rev. | Revision | Appd | Year Week | | | | | |

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| SYMBOL | DEVICE No. | DESCRIPTION | SYMBOL | DEVICE No. | DESCRIPTION | SYMBOL | DEVICE No. | DESCRIPTION |
|--------|---------------|---|--------|---------------|---|--------|-----------------------|---|
| | -Q52 | TP AC CIRCUIT BREAKER | | -F21 | LINE DISTANCE PROTECTION RELAY | | -T11..... | VOLTAGE TRANSFORMER |
| | -08-013 | TP LOAD BREAK SWITCH | | -F74 | TRIP CIRCUIT SUPERVISION RELAY | | -T1..... | CURRENT TRANSFORMER |
| | -PC | POWER CONTACT OF CIRCUIT BREAKER | | -F51 | AC TIME OVER CURRENT RELAY | | -T52 | CONTROL SUPPLY TRANSFORMER |
| | -X0 | PLUG/SOCKET FOR CIRCUIT BREAKER AUX. WIRING | | -F25 | SYNCHRO CHECK RELAY | | -C52 | CAPACITOR TRIP UNIT |
| | -M1 | CIRCUIT BREAKER CHARGING MOTOR | | -F86 | LOCKOUT RELAY | | -F10,-F11,-F12 | FUSE |
| | -Y3 | BRIDGE RECTIFIER | | -F87 | TRANSFORMER DIFFERENTIAL PROTECTION RELAY | | -H52 | AC BUZZER |
| | -R, -R1 | RESISTOR | | -F94 | TRIPPING RELAY | | -X51 | RELAY TEST BLOCK |
| | -Y1 | CIRCUIT BREAKER SHUNT TRIP COIL | | P81 | ENERGY METER | | E | GROUND |
| | -Y4 | CIRCUIT BREAKER SERIES TRIP COIL (E/F) | | -P1, -P2, -P3 | AM-METER | | -R, -Y, -B | INDICATION LAMP FOR "PHASE INDICATIONS" |
| | -Y2, -Y3 | CIRCUIT BREAKER SERIES TRIP COIL (O/C) | | -P16 | VOLT METER | | -H1 | INDICATION LAMP FOR "OFF", COLOUR GREEN |
| | -Y9 | CIRCUIT BREAKER CLOSING COIL | | -P55 | POWER FACTOR METER | | -H2 | INDICATION LAMP FOR "ON", COLOUR RED |
| | -K1, -K2..... | AUXILIARY CONTACTOR/RELAY | | -S70 | VOLT SELECTOR SWITCH | | -H3 | INDICATION LAMP FOR "TRIP", COLOUR YELLOW |
| | -K50 | FLICKER RELAY | | -S69 | AMPERE SELECTOR SWITCH | | -S1 | PUSH BUTTON FOR "OPEN C.B", COLOUR GREEN |
| | -S1, -S3 | CIRCUIT BREAKER AUXILIARY SWITCH | | -U1..... | TRANSDUCER | | -S2 | PUSH BUTTON FOR "CLOSE C.B", COLOUR RED |
| | | | | -P25 | SYNCHRO SCOPE | | -S21 | PUSH BUTTON FOR "LAMP TEST", COLOUR GREEN |
| | | | | -B23 | HUMIDITY & TEMPERATURE CONTROLLER | | -S3 | PUSH BUTTON FOR "RESET", COLOUR GREEN |
| | | | | -K60... | ON/OFF DELAY TIMER | | -SA1... | MULTIPLE POSITION SELECTOR SWITCH |
| | | | | -X1..... | NORMAL TERMINAL BLOCK | | -F100..-F200..-F300.. | CONTROL MCB |
| | | | | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -LA | LIGHTING ARRESTOR |

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|------|----------|------|------|------|---------------------------|--|----------------|-----------------------|---------|-----------|
| Rev. | Revision | Appd | Year | Week | Prepared 30-01-2019 AHMAD | 11000/415, 100KVA, 3-PHASE PAD MOUNTED TRANSFORMER SYMBOLS AND LEGENDS | FOR APPROVAL | Department SWITCHGEAR | Rev. 00 | File Ref: |
| | | | | | Approved 30-01-2019 NS | Pak Elektron Ltd. 14-KM, FERDOSPUR ROAD-LAHORE-PAKISTAN. | DRAWING NUMBER | | | Sheet 11 |
| | | | | | CUSTOMER: MAQB00L CALSONS | | D 396 4691 | | | Cont -- |

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| Rev. No | Revision note | Date | Check | | |
| Drawing Status: | | | | | |
| FOR APPROVAL | | | | | |
| Client: | | | | | |
| MAQBOOL CALSONS | | | | | |
| Contractor: | | | | | |
|  | | Pak Elektron Ltd. | | | |
| 14-KM, FERAZEPUR ROAD-LAHORE Pakistan. | | | | | |
| Contract No./Project Title: | | | | | |
| 11000/415V, 200kVA, 3-PHASE PAD MOUNTED TRANSFORMER DABGARI-PARK & RIDE-COMMERCIAL & SERVICES | | | | | |
| Design: | AHMAD AZIZ | Check: | UA | Sheet | 1 of 11 |
| Approve: | NS | Date | 23-05-2019 | Scale | N.T.S |
| File Ref: | 200KVA PMT | Drawing No. | D 396 5181 | REV.No. | |

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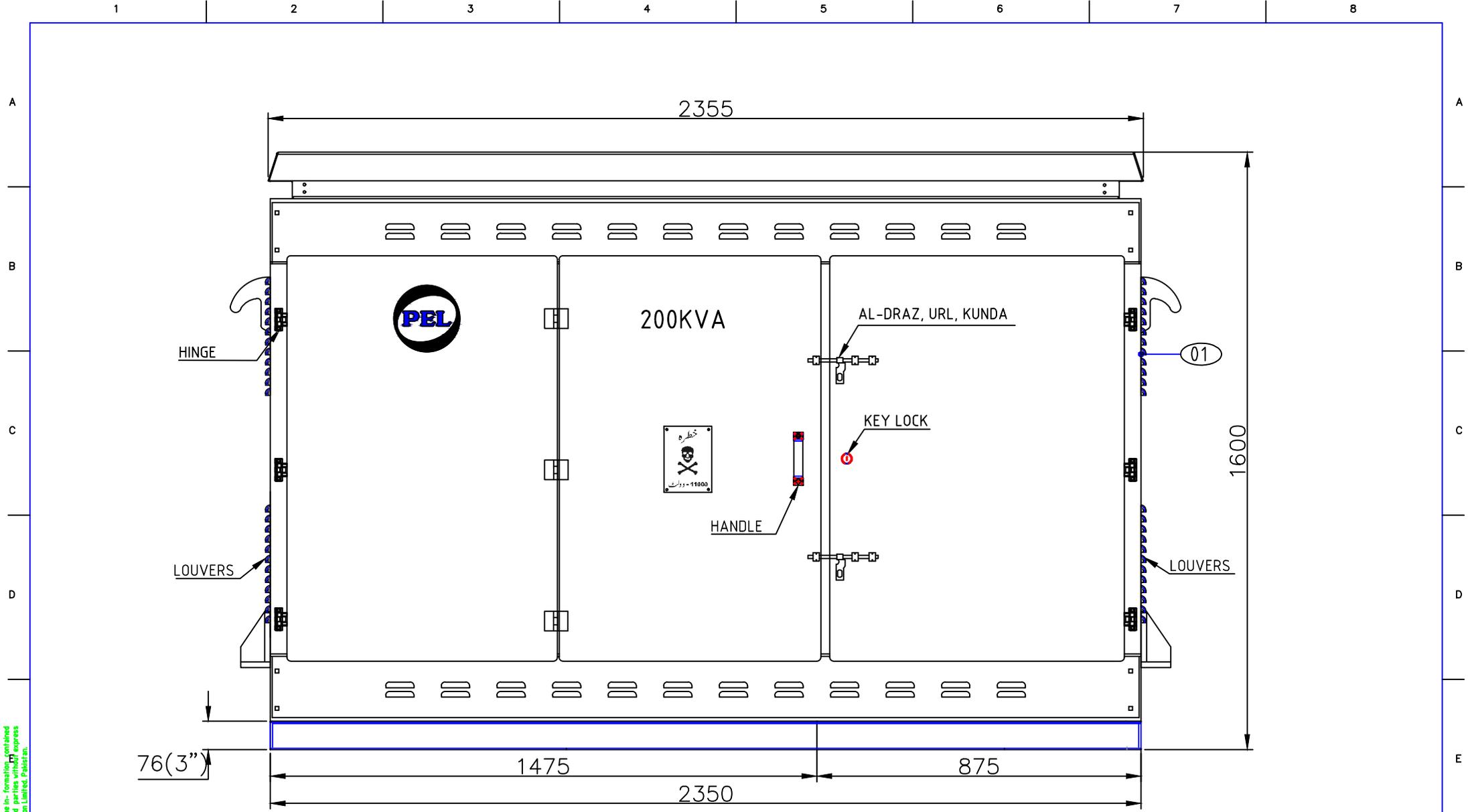
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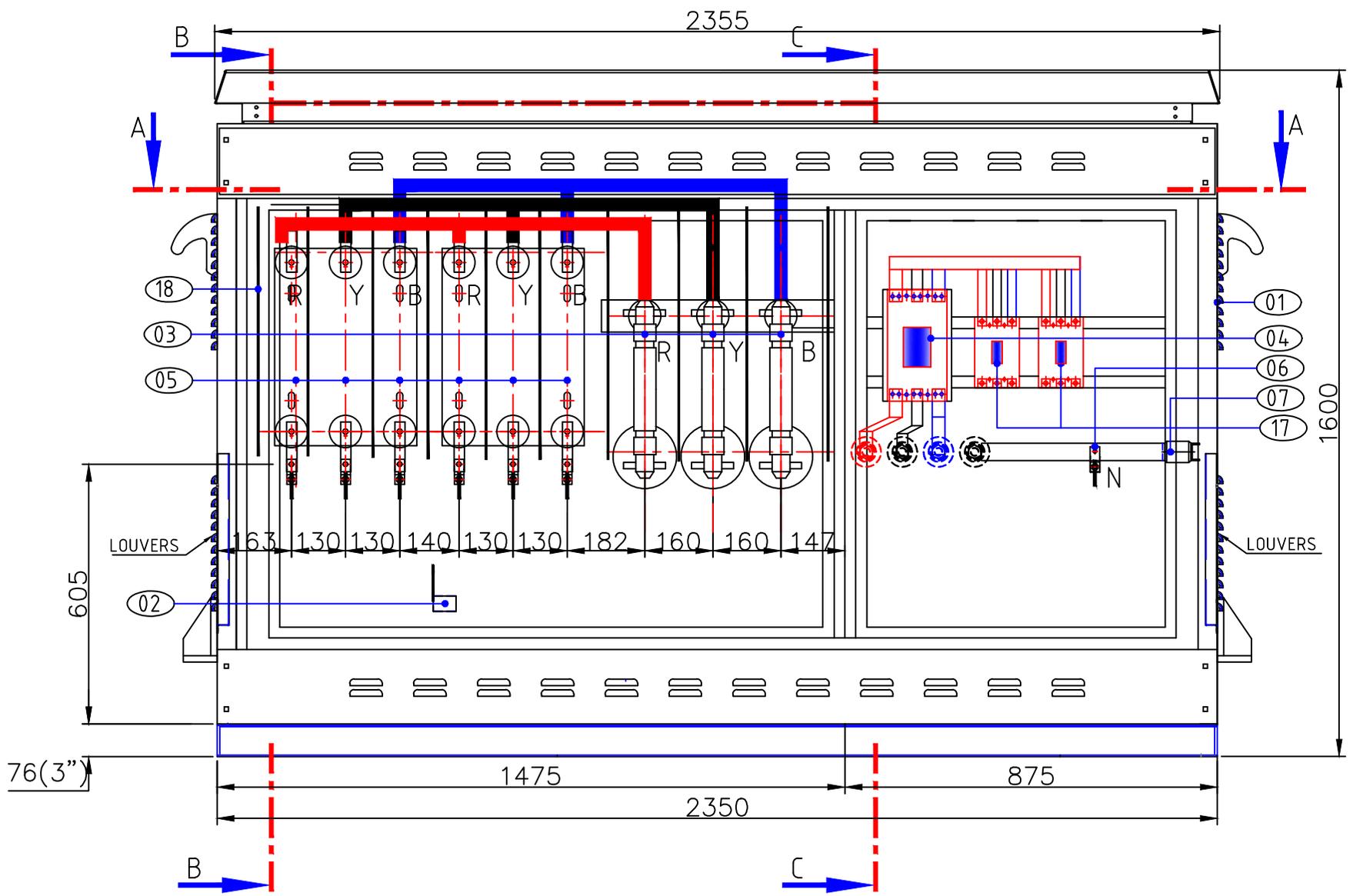
FRONT VIEW
(WITH FRONT DOORS)

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| Prepared | 23.05.2019 | IMRAN | CHECKED | R.K | 11/0.4-15KV, 200KVA, 3-PHASE | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | 200KVA PMT |
| Approved | 23.05.2019 | R.K/E.H | | | PAD MOUNTED TRANSFORMER | DRAWING NUMBER | D 396 5181 | Sheet | 4 | Conf | 5 |
| CUSTOMER: Maqbool Calsons | | | | | GENERAL ARRANGEMENT | | | | | | |
| PROJECT:- BRT Peshawar (Dabgari Park& Ride) | | | | | Pak Elektron Ltd. 14-KM, FERDZEPUR ROAD-LAHORE-PAKISTAN. | | | | | | |
| Rev. | Revision | Appd | Year | Week | | | | | | | |

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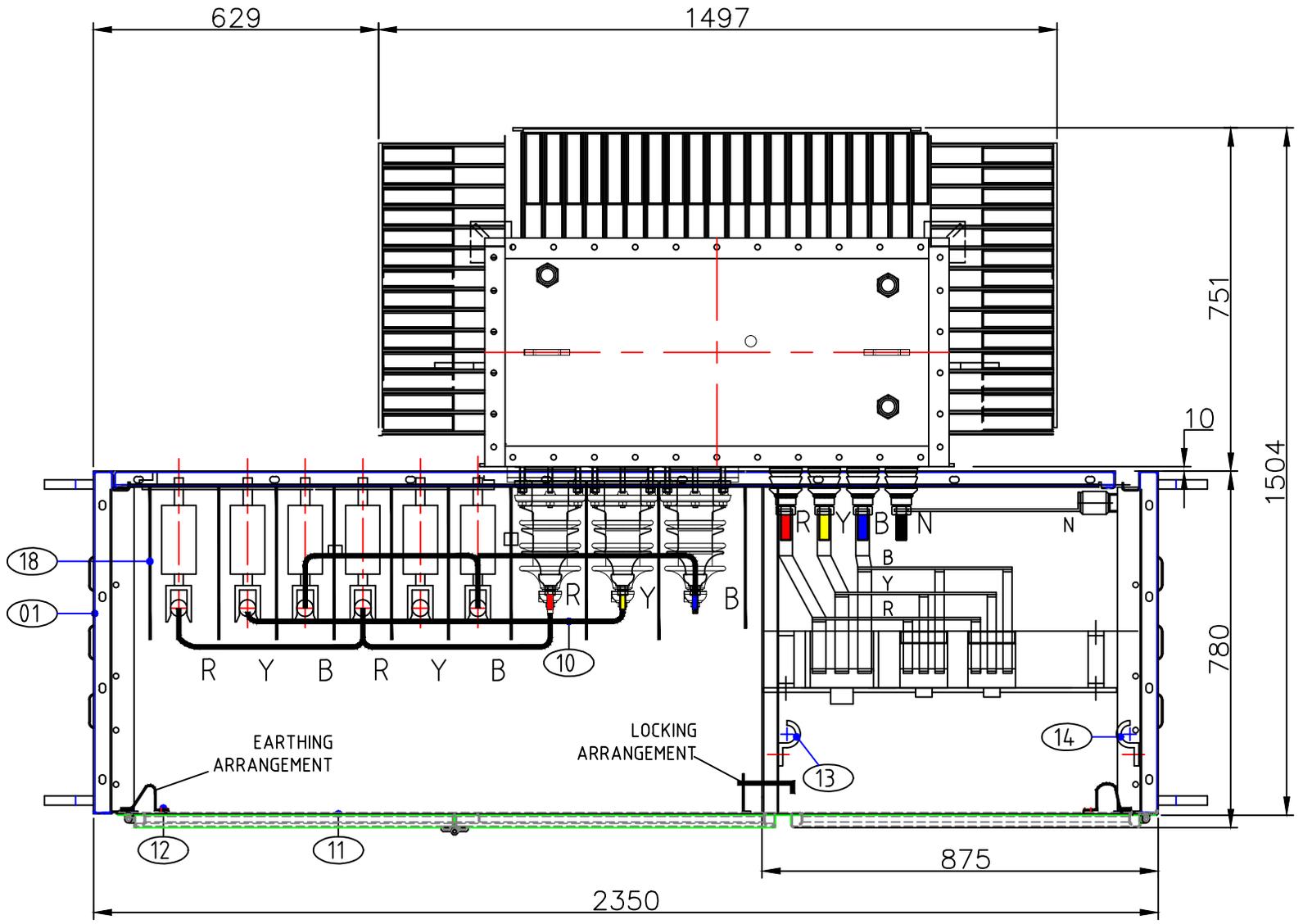
FRONT VIEW

(WITHOUT FRONT DOORS AND METERING COMPARTMENT)

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| | | | | | | | | | | | |
|---|------------|--------------|---------|------|---|----------------|-------------------|-------|---|-----------|------------|
| Prepared | 23.05.2019 | IMRAN | CHECKED | R.K | 11/0.4-15KV, 200KVA, 3-PHASE | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | 200KVA PMT |
| Approved | 23.05.2019 | R.K/E.H | | | PAD MOUNTED TRANSFORMER | DRAWING NUMBER | D 396 5181 | Sheet | 5 | Conf | 6 |
| CUSTOMER: Maqbool Calsons | | | | | GENERAL ARRANGEMENT OF FRONT VIEW WITHOUT DOORS | | | | | | |
| PROJECT:- BRT Peshawar (Dabgari Park& Ride) | | | | | Pak Elektron Ltd. 14-KM, FERDZEPUR ROAD-LAHORE-PAKISTAN. | | | | | | |
| Rev. | Revision | Appd | Year | Week | | | | | | | |

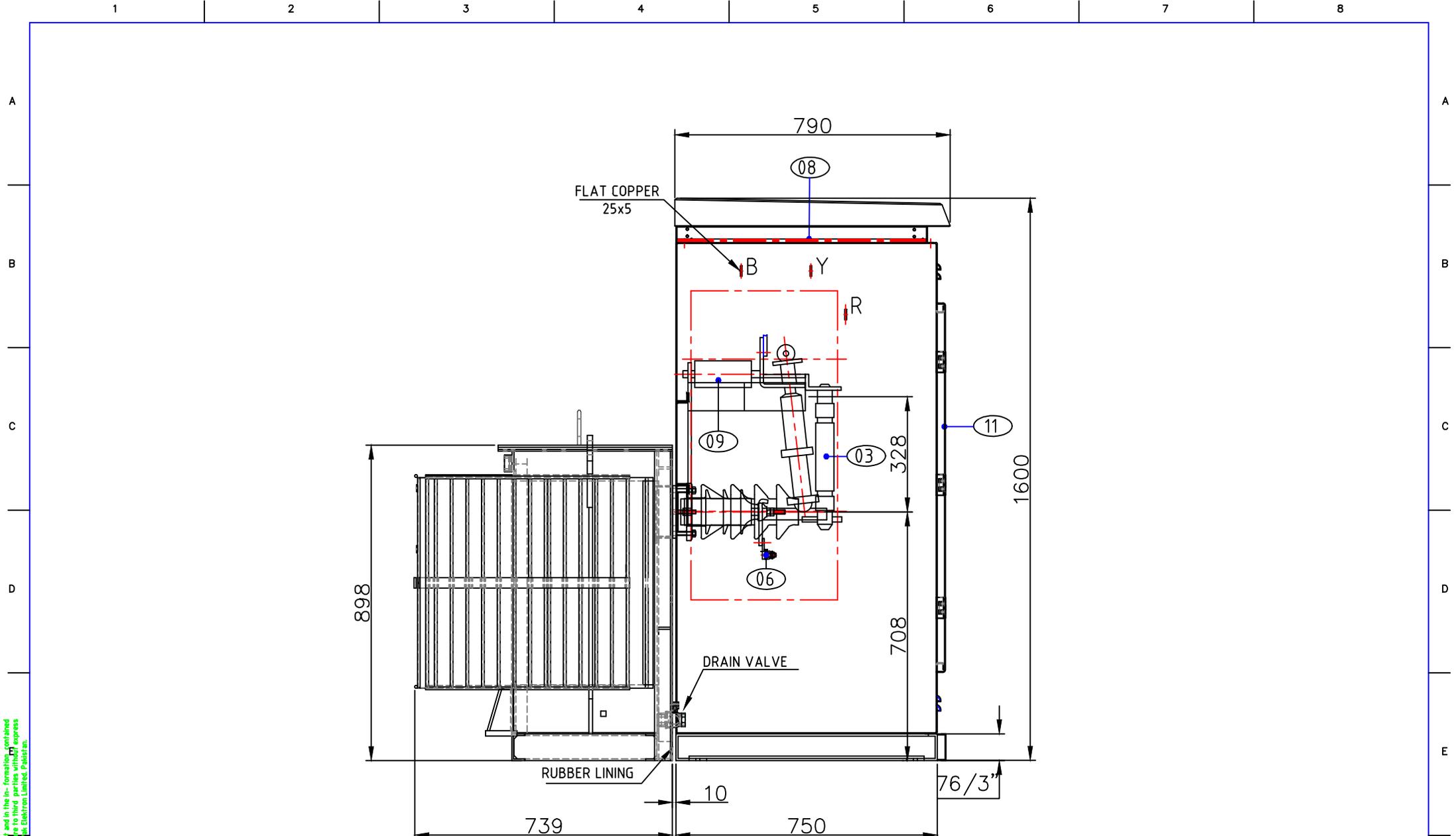
1 2 3 4 5 6 7 8



SECTION A-A

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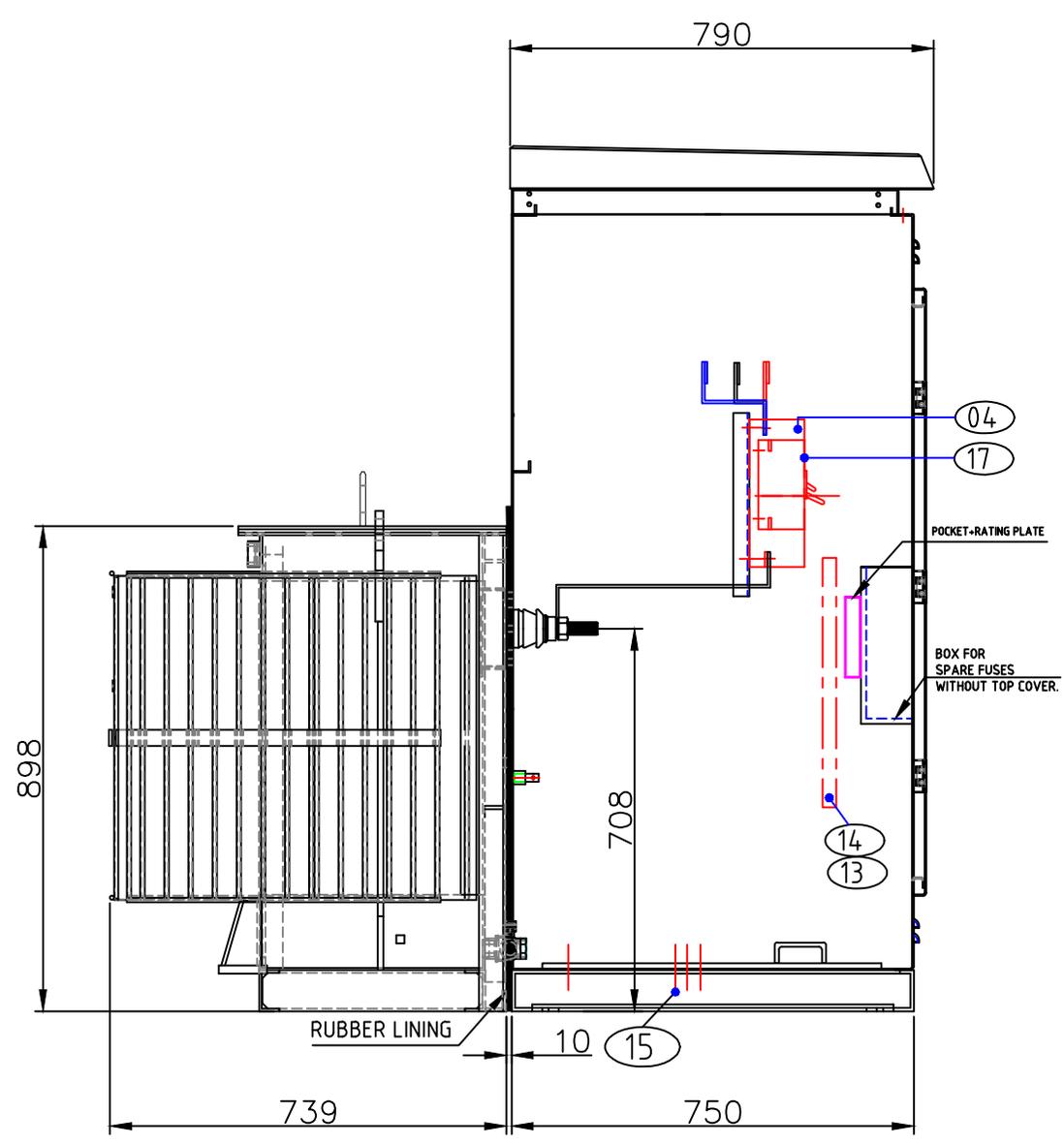
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|---|------------|---------|---------|-----|---|------------------------------|------------|----------------------|
| Prepared | 23.05.2019 | IMRAN | CHECKED | R.K | 11/0.4-15KV, 200KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT OF SECTION A-A | Department SWITCHGEAR DESIGN | Rev. 0 | File Ref: 200KVA PMT |
| Approved | 23.05.2019 | R.K/E.H | | | | | | |
| CUSTOMER: Maqbool Calsons | | | | | Pak Elektron Ltd. 14-KM, FERDZEPUR ROAD-LAHORE-PAKISTAN. | DRAWING NUMBER | D 396 5181 | Sheet |
| PROJECT:- BRT Peshawar (Dabgari Park& Ride) | | | | | | | | Conf |



SECTION B-B (HT)

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| | | | | | | | |
|-----------|-----------------------------------|---------|---------|------|---|------------|----------------------|
| Prepared | 23.05.2019 | IMRAN | CHECKED | R.K | 11/0.4-15KV, 200KVA, 3-PHASE | | |
| Approved | 23.05.2019 | R.K/E.H | | | PAD MOUNTED TRANSFORMER | | |
| CUSTOMER: | Maqbool Calsons | | | | GENERAL ARRANGEMENT OF SECTION B-B & C-C (HT & LT) | | |
| PROJECT:- | BRT Peshawar (Dabgari Park& Ride) | | | | Pak Elektron Ltd. 14-KM, FERDZEPUR ROAD-LAHORE-PAKISTAN. | | |
| Rev. | Revision | Appd | Year | Week | DRAWING NUMBER | D 396 5181 | File Ref: 200KVA PMT |
| | | | | | | | Sheet 8 |
| | | | | | | | Conf 9 |



SECTION C-C (LT)
(WITHOUT CT,S AND METERING COMPARTMENT)

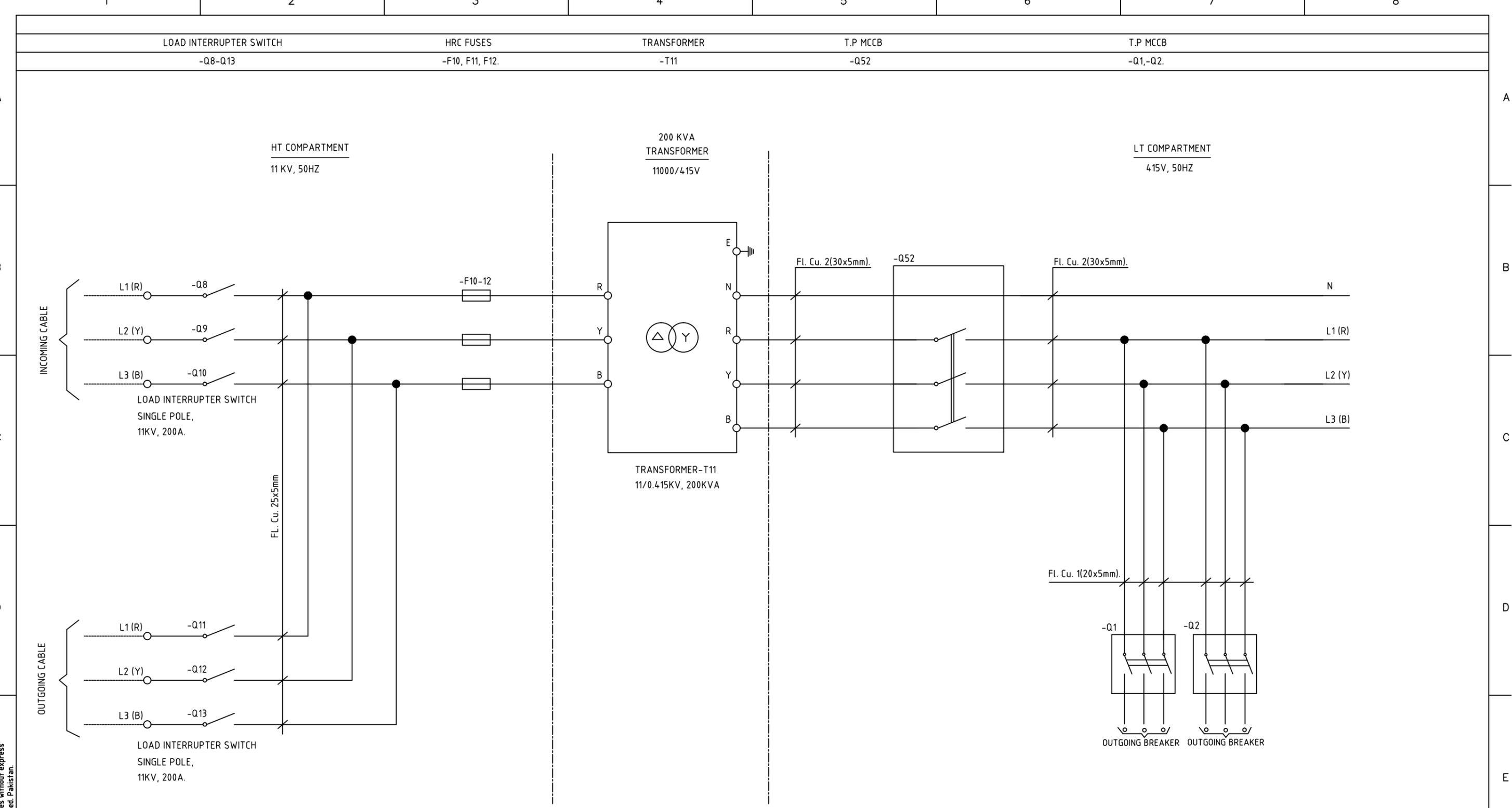
NOTE:

- 1-GENERAL TOLERANCE ±1.5mm UPTO 300mm & ±5mm FOR 300 AND ABOVE.
- 2-BILL LEVEL 95KV.
- 3-ALL BUSBAR JOINTS ARE TIN PLATED.
- 4-CLEARANCE IN H.T COMPARTMENT.
- 5-CLEARANCE IN L.T COMPARTMENT. } ACC. TO WAPDA SPECIFICATION.
- 6-M.S SHEET 3mm THICK.
- 7-PAINT THICKNESS 0.08mm to 0.12mm.
- 8-WEIGHT OF COMPLETE PAD MOUNTED TRNASFORMER = 1970Kg (Approx.) FOR WAPDA ARR.
- 9-FINISH = COLOR GREEN (RAL 6025) TEXTURE FOR WAPDA PMTFS AND BLUE (RAL 5012) TEXTURE FOR HOUSING SOCIETIES
- 10-PROTECAION CLASS :IP 54
- 11-ALL DIMENSIONS ARE IN mm

| | |
|-----|---|
| 18 | H.T INSULATION BARRIER (C.P. SHEET) |
| 17 | TRIPLE POLE MCCB 2x200A |
| 16 | TYPICAL ARR. FOR CABLE TERMINATION (IF REQUIRED) |
| 15 | CABLE STUFFING BOX (IF REQUIRED) |
| 14 | SWITCH STICK |
| 13 | FUSE PULLER |
| 12 | EARTHING ARRANGEMENT FOR DOORS |
| 11 | FRONT DOORS |
| 10 | H.T FLAT COPPER BUS BARS |
| 09 | INSULATOR FOR H.T BUSBAR SUPPORT |
| 08 | CRAFT PAPER(CP SHEET) IN H.T COMPARTMENT |
| 07 | AUXILIARY INSULATOR |
| 06 | H.T. CONNECTOR , N-CONNECTOR L.T CONNECTOR (QTY. SEE LOM) |
| 05 | H.T. LOAD INTERRUPTER SWITCH |
| 04 | TRIPLE POLE MCCB SET AT (500A) |
| 03 | 11kV HRC FUSE |
| 02 | EARTHING CONNECTOR |
| 01 | ENCLOSURE FOR 200KVA PAD MOUNTED TR. |
| SR. | DESCRIPTION |

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| | | | | | | | | | | | |
|----------|------------|--------------|----------------------------|------|--|---|-------------------|------|---|-----------|------------|
| Prepared | 23.05.2019 | IMRAN | CHECKED | R.K | 11/0.4-15KV, 200KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT OF SECTION C-C (LT) | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | 200KVA PMT |
| Approved | 23.05.2019 | R.K/E.H | CUSTOMER : Maqbool Calsons | | | | | | | | |
| Rev. | Revision | Appd | Year | Week | PROJECT:- BRT Peshawar (Dabgari Park& Ride) | Pak Elektron Ltd. 14-KM, FERDZEPUR ROAD-LAHORE-PAKISTAN. | | Conf | | 10 | |



NOTE:
 1- FUSES (FROM LOWER SIDE) ARE DIRECTLY CONNECTED TO TRANSFORMER BUSHING.
 2- CABLE SIZE REQUIRED FOR HT AND LT CIRCUITS.

| TABLE SHOWING DETAIL FOR OUTGOING MCCB | | |
|--|-------------|--------------------|
| CKTS LOCATION | MCCB RATING | CABLE SIZE |
| -Q52, | 500A | Fl. Cu. 2(30x5mm). |
| -Q1-Q2 | 200A | Fl. Cu. 1(20x5mm). |

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| | | | | | | | |
|-----------|-----------------|-------|---|---|------------|-------|-----------|
| Prepared | 23-05-2019 | AHMAD | 11/0.415KV, 200KVA, 3-PHASE PAD MOUNTED TRANSFORMER SINGLE LINE DIAGRAM | Department | SWITCHGEAR | Rev. | File Ref: |
| Approved | 23-05-2019 | NS | | DRAWING NUMBER | D 396 5181 | Sheet | 10 |
| CUSTOMER: | Maqbool Calsons | | Pak Elektron Ltd. | Cont | 11 | | |
| Rev. | Revision | Appd | Year Week | 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | | |

| SYMBOL | DEVICE No. | DESCRIPTION | SYMBOL | DEVICE No. | DESCRIPTION | SYMBOL | DEVICE No. | DESCRIPTION |
|--------|---------------|---|--------|---------------|---|--------|-----------------------|---|
| | -Q52 | TP AC CIRCUIT BREAKER | | -F21 | LINE DISTANCE PROTECTION RELAY | | -T11..... | VOLTAGE TRANSFORMER |
| | -Q8-Q13 | TP LOAD BREAK SWITCH | | -F74 | TRIP CIRCUIT SUPERVISION RELAY | | -T1..... | CURRENT TRANSFORMER |
| | -PC | POWER CONTACT OF CIRCUIT BREAKER | | -F51 | AC TIME OVER CURRENT RELAY | | -T52 | CONTROL SUPPLY TRANSFORMER |
| | -X0 | PLUG/SOCKET FOR CIRCUIT BREAKER AUX. WIRING | | -F51N | AC TIME EARTH FAULT RELAY | | -C52 | CAPACITOR TRIP UNIT |
| | -M1 | CIRCUIT BREAKER CHARGING MOTOR | | -F25 | SYNCHRO CHECK RELAY | | -F10,-F11,-F12 | FUSE |
| | -Y3 | BRIDGE RECTIFIER | | -F86 | LOCKOUT RELAY | | -X51 | RELAY TEST BLOCK |
| | -R, -R1 | RESISTOR | | -F87 | TRANSFORMER DIFFERENTIAL PROTECTION RELAY | | E | GROUND |
| | -Y1 | CIRCUIT BREAKER SHUNT TRIP COIL | | -F94 | TRIPPING RELAY | | -R, -Y, -B | INDICATION LAMP FOR "PHASE INDICATIONS" |
| | -Y4 | CIRCUIT BREAKER SERIES TRIP COIL (E/F) | | -F59 | OVER VOLTAGE RELAY | | -H1 | INDICATION LAMP FOR "OFF", COLOUR GREEN |
| | -Y2, -Y3 | CIRCUIT BREAKER SERIES TRIP COIL (O/C) | | -F27 | UNDER VOLTAGE RELAY | | -H2 | INDICATION LAMP FOR "ON", COLOUR RED |
| | -Y9 | CIRCUIT BREAKER CLOSING COIL | | -F32 | REVERSE POWER RELAY | | -H3 | INDICATION LAMP FOR "TRIP", COLOUR YELLOW |
| | -K1, -K2..... | AUXILIARY CONTACTOR/RELAY | | -F49 | THERMAL RELAY | | -S1 | PUSH BUTTON FOR "OPEN C.B", COLOUR GREEN |
| | -K50 | FLICKER RELAY | | -F55 | POWER FACTOR RELAY | | -S2 | PUSH BUTTON FOR "CLOSE C.B", COLOUR RED |
| | -S1, -S3 | CIRCUIT BREAKER AUXILIARY SWITCH | | -F94 | TRIPPING RELAY | | -S21 | PUSH BUTTON FOR "LAMP TEST", COLOUR GREEN |
| | -X1, -X3 | CIRCUIT BREAKER AUXILIARY SWITCH | | -F26 | TRANSFORMER STATUS RELAY | | -S3 | PUSH BUTTON FOR "RESET", COLOUR GREEN |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | P81 | ENERGY METER | | -SA1.... | MULTIPLE POSITION SELECTOR SWITCH |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -P1, -P2, -P3 | AM-METER | | -F100..-F200..-F300.. | CONTROL MCB |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -P16 | VOLT METER | | -LA | LIGHTING ARRESTOR |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -P55 | POWER FACTOR METER | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -S70 | VOLT SELECTOR SWITCH | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -S69 | AMPERE SELECTOR SWITCH | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -U1..... | TRANSDUCER | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -P25 | SYNCHRO SCOPE | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -B23 | HUMIDITY & TEMPERATURE CONTROLLER | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -K60... | ON/OFF DELAY TIMER | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -X1..... | NORMAL TERMINAL BLOCK | | | |
| | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | | |

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| | | | |
|-----------|-----------------|----------------|---|
| Prepared | 23-05-2019 | AHMAD | 11/0.415KV,200KVA,3-PHASE PAD MOUNTED TRANSFORMER |
| Approved | 23-05-2019 | NS | 3-PHASE,4 WIRE,415VOLT,50Hz |
| CUSTOMER: | Maqbool Calsons | | SYMBOLS AND LEGENDS |
| Rev. | Revision | Appd Year Week | Department SWITCHGEAR |
| | | | Rev. |
| | | | File Ref: |
| | | | DRAWING NUMBER |
| | | | D 396 5181 |
| | | | Sheet |
| | | | 11 |
| | | | Cont |



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|---|---------------|--------|------------|
| | | | |
| | | | |
| Rev. No | Revision note | Date | Check |
| Drawing Status: | | | |
| FOR APPROVAL | | | |
| Client: | | | |
| MAQBOOL CALSONS | | | |
| Contractor: | | | |
|  Pak Elektron Ltd. 14-KM, FERAZEPUR ROAD-LAHORE Pakistan. | | | |
| Contract No./Project Title: | | | |
| 11000/415kV, 630kVA, 3-PHASE PAD MOUNTED TRANSFORMER HAYATABAD DEPOT-1-COMMERCIAL DEPOT | | | |
| Design: | AHMAD | Check: | MH |
| Sheet | 1 of 11 | | |
| Approve: | NS | Date | 30-01-2019 |
| Scale | N.T.S | | |
| File Ref: | Drawing No. | | REV.No. |
| | D 396 4700 | | 0 |

1 2 3 4 5 6 7 8

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| SERIAL NO. | ITEM DESIGNATION IN SCHEMATICS | DESCRIPTION | QTY. PER PAD MTD. | TOTAL QTY. 1 | MAKE | REMARKS |
|------------|--------------------------------|--|-------------------|--------------|-------------------|---------|
| (1) | | <u>TRANSFORMER COMPARTMENT</u> | | | | |
| 1.1 | -T11 | 630KVA OIL IMMERSSED TRANSFORMER, RATED VOLTAGE 11000 / 415 VOLTS, 50 Hz. | 1 | 1 | PEL | |
| (2) | | <u>H.T COMPARTMENT:</u> | | | | |
| 2.1 | -Q8-Q13 | S.P ARC STRANGLER LOAD INTRRUPTER SWITCH, SUITABLE FOR 15.5KV, RETAD CURRENT 200A. | 6 | 6 | C.P.S/Eqv. | |
| 2.2 | -F10-F12 | 11KV HRC FUSE 50A, COMPLETE WITH FUSE CLAMPS. | 3 | 3 | BUSSMAN/EFEN/Eqv. | |
| 2.3 | | BRASS CONNECTOR FOR 11KV CABLE TERMINATION | 6 | 6 | PEL | |
| 2.4 | | EARTHING TERMINAL | 1 | 1 | PEL | |
| 2.5 | | CAST RESIN INSULATOR, LG-175MM, SUITABLE FOR 11KV SYSTEM. | 3 | 3 | IMPORTED/Eqv. | |
| (3) | | <u>L.T COMPARTMENT:</u> | | | | |
| 3.1 | -Q52 | TP MCCB, 1600A, 50KA | 1 | 1 | TERASAKI/Eqv. | |
| 3.2 | -Q1 | TP MCCB, 1250A, 50KA | 1 | 1 | | |
| 3.3 | -Q2 | TP MCCB, 250A, 36KA | 1 | 1 | | |
| 3.4 | -Q3 | TP MCCB, 100A, 25KA | 1 | 1 | | |
| 3.5 | | EARTHING TERMINAL. | 1 | 1 | LOCAL | |
| 3.6 | | NEUTRAL CONNECTOR. | 1 | 1 | LOCAL | |

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| | | | | | | | | | |
|----------|------------|-------|--|------------------|-------------------|---|---|-----------|---|
| Prepared | 30.01.2019 | AHMAD | 11000/415V, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER. LIST OF APPARATUS | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | |
| Approved | 30.01.2019 | NS | | CUSTOMER | DRAWING NUMBER | D 396 4700 | | Sheet | 3 |
| Rev. | Revision | Appd | Year Week | MAQB00L CALSONS. | | Pak Elektron Ltd. 14-KM, FERAZEPUR ROAD-LAHORE-PAKISTAN. | | Cont | 4 |

1 2 3 4 5 6 7 8

A

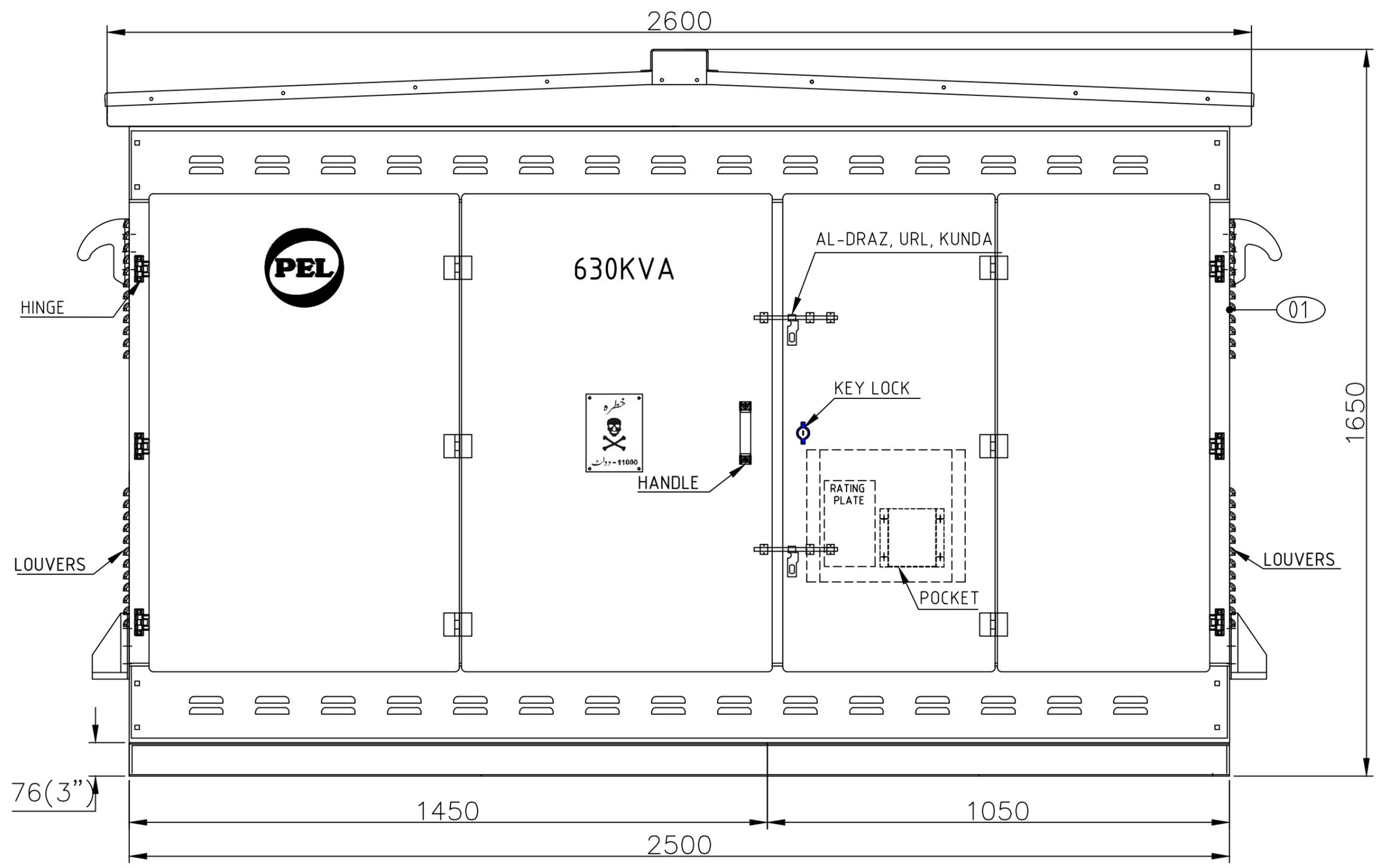
B

C

D

E

F

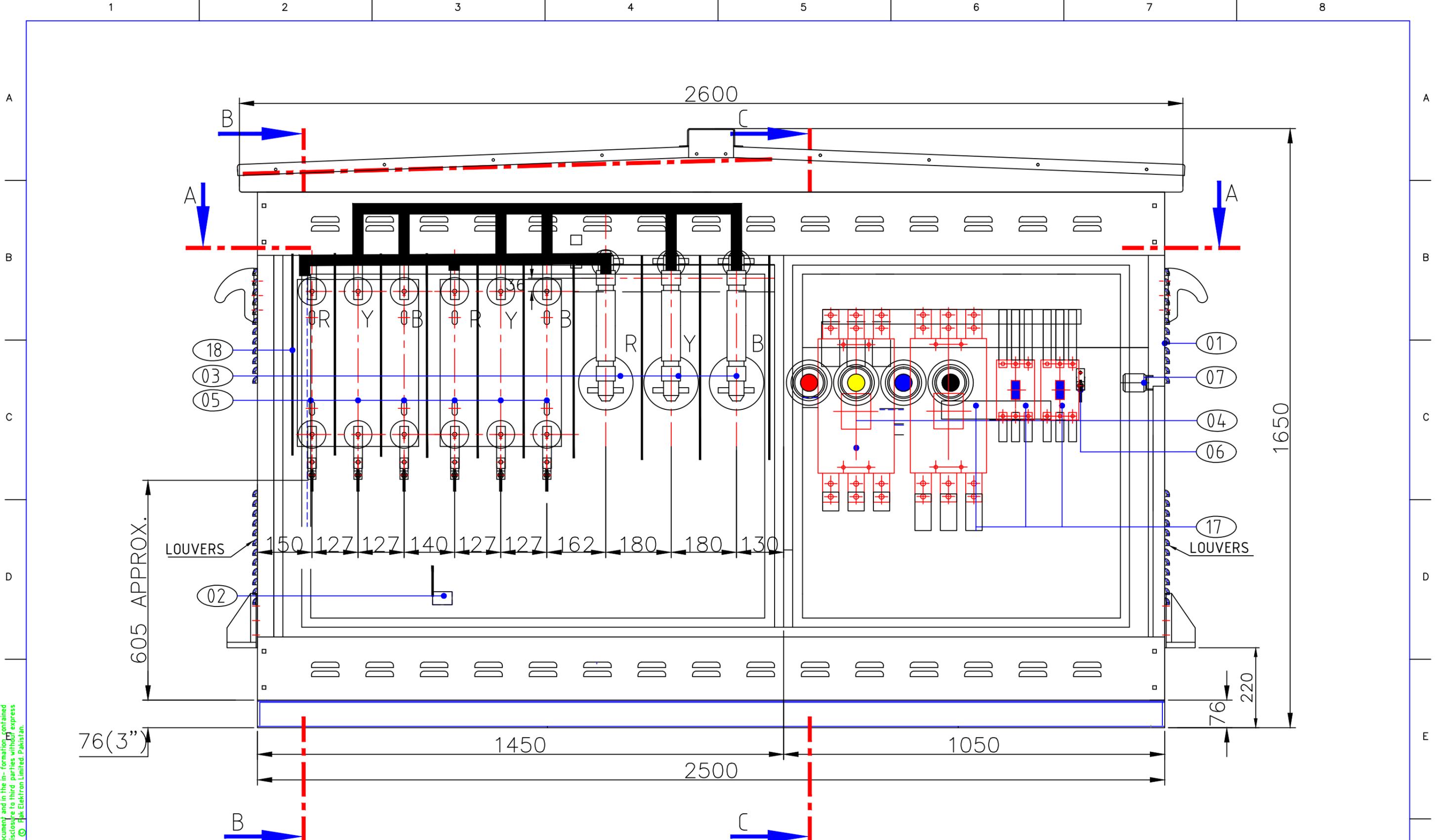


FRONT VIEW
(WITH FRONT DOORS)

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| | | | | | | | | | | | | |
|------|----------|---------------------------|------------|---------|---|-----|---|--|--------------|--------------|----------------------|---|
| | | Prepared | 13.02.2019 | IMRAN | CHECKED | R.K | 11/0.415KV, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | | QUANTITY : 2 | FOR APPROVAL | | |
| | | Approved | 13.02.2019 | E.H/R.K | | | Department SWITCHGEAR DESIGN | | Rev. | 0 | File Ref: 630KVA PMT | |
| | | CUSTOMER : MAQBUL CLASINS | | | | | DRAWING NUMBER | | D 396 4700 | | Sheet | 4 |
| Rev. | Revision | Appd | Year | Week | PROJECT :- BRT PESHAWAR (HAYATABAD DEPOT-COMERCIAL) | | | Pak Elektron Ltd. 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | | Cont | | 5 |

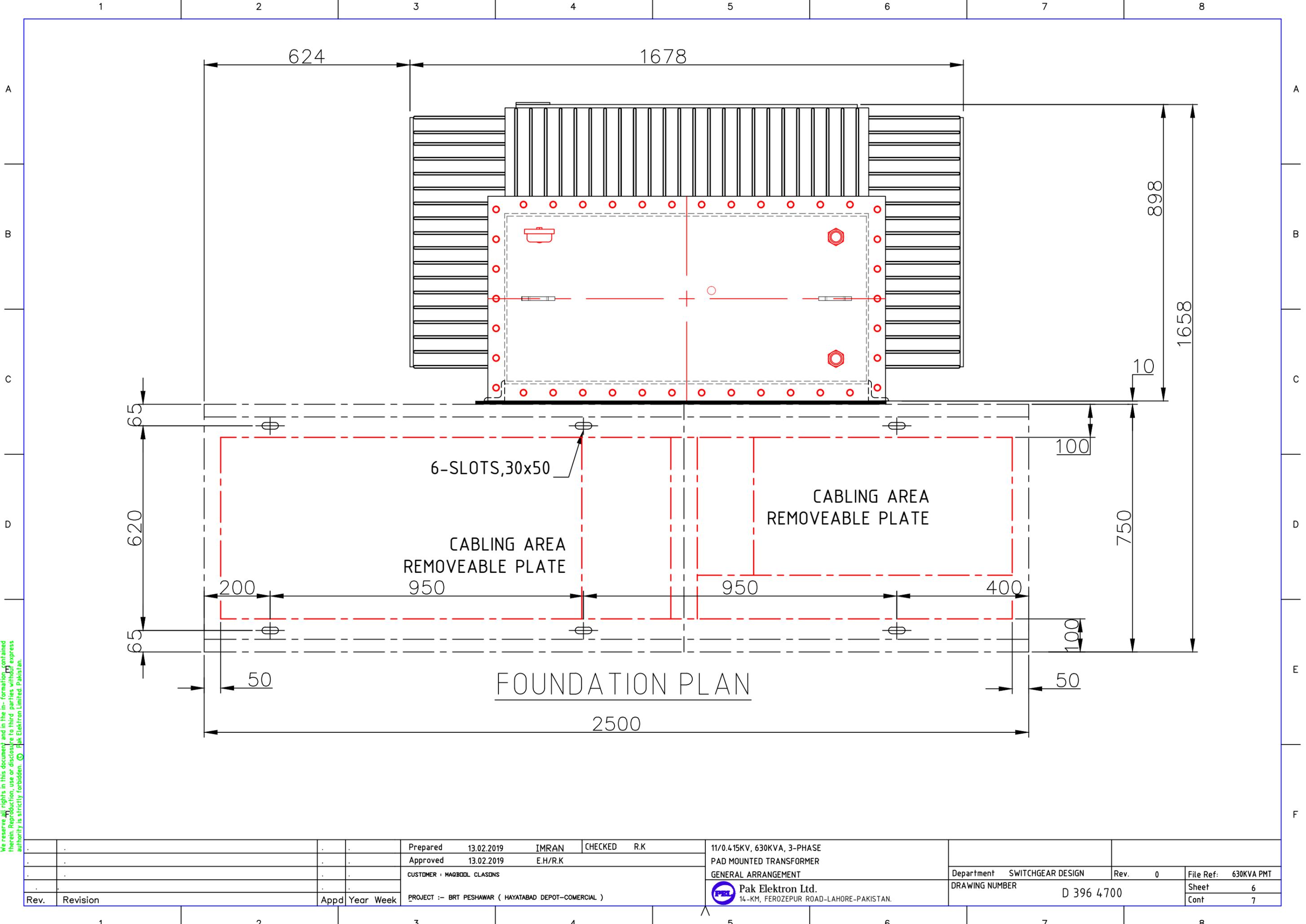
1 2 3 4 5 6 7 8



FRONT VIEW
(WITHOUT FRONT DOORS AND METERING COMPARTMENT)

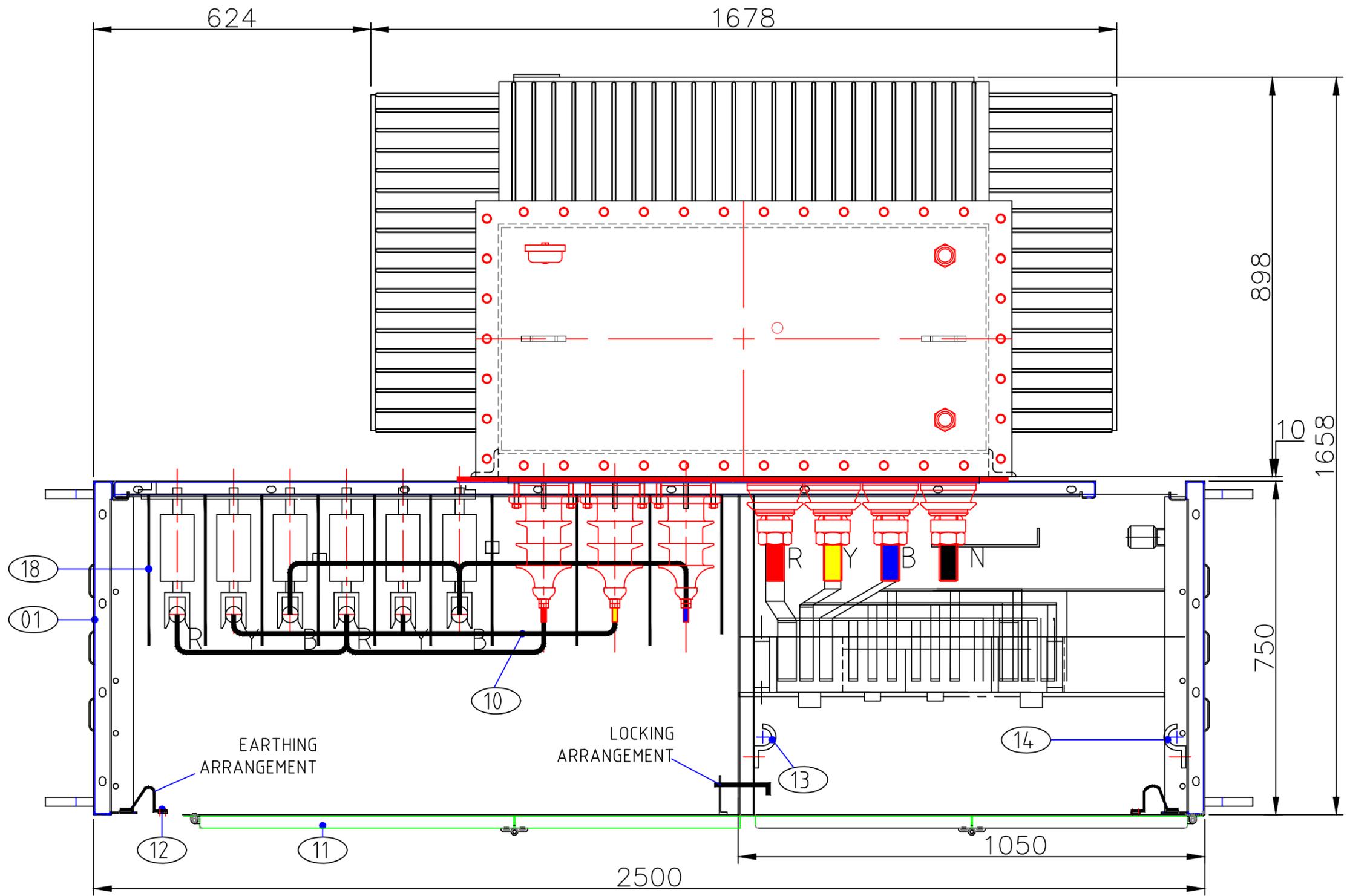
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| | | | | | | | | | | | | | | | | |
|------|----------|------|------|------|----------------------------|------------|---------|---------|-----|---|--|-------------------|------|---|-----------|------------|
| Rev. | Revision | Appd | Year | Week | Prepared | 13.02.2019 | IMRAN | CHECKED | R.K | 11/0.415KV, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | 630KVA PMT |
| | | | | | Approved | 13.02.2019 | E.H/R.K | | | | | | | | | |
| | | | | | CUSTOMER : MAQBODD CLASINS | | | | | PROJECT :- BRT PESHAWAR (HAYATABAD DEPOT-COMERCIAL) | Pak Elektron Ltd. 14-KM, FERDOSPUR ROAD-LAHORE-PAKISTAN. | Cont | 6 | | | |



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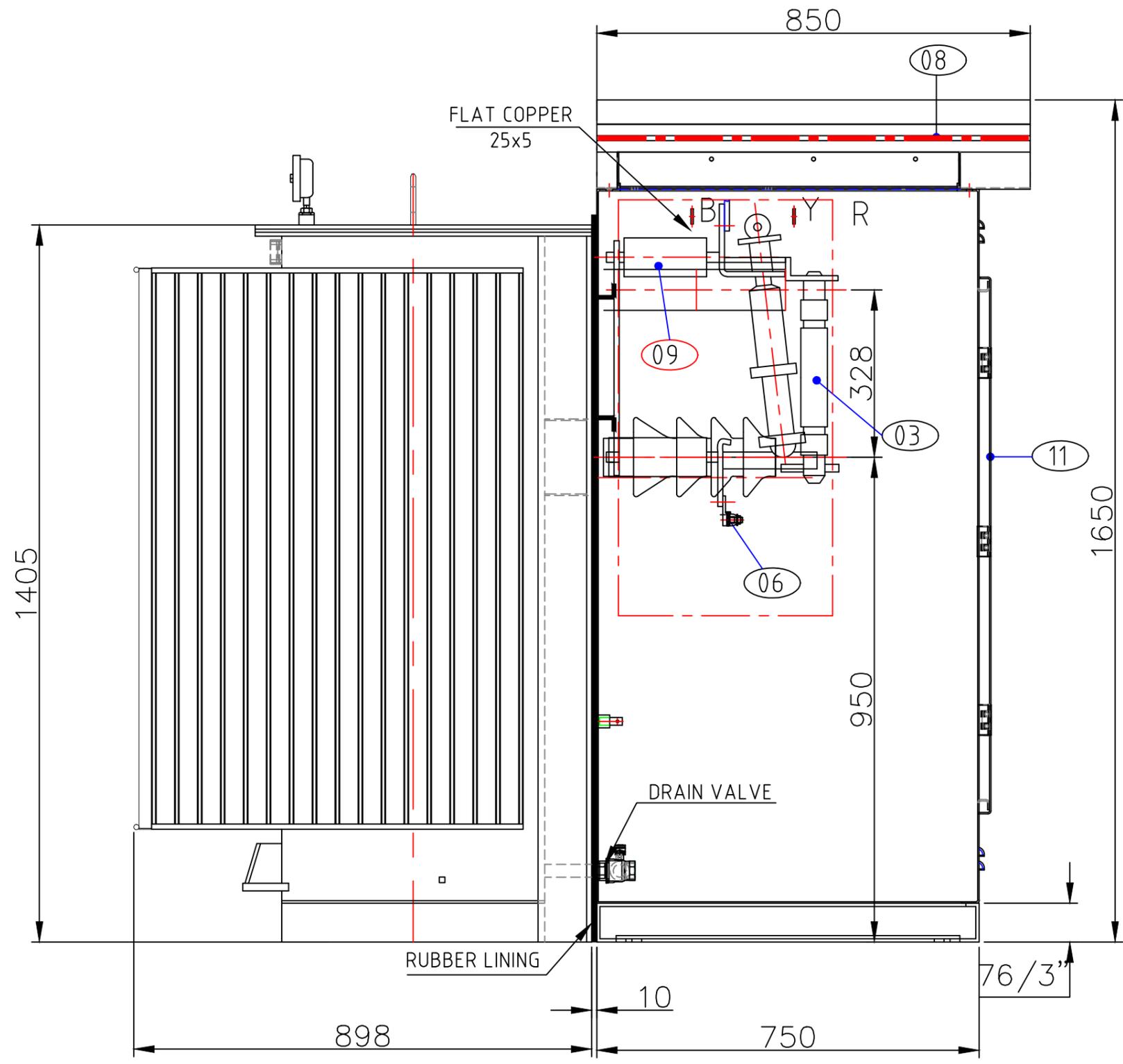
| | | | | | | | | | | | | |
|------|----------|---|------------|---------|---------|-----|--|------|-------------------|------|-----------|------------|
| | | Prepared | 13.02.2019 | IMRAN | CHECKED | R.K | 11/0.415KV, 630KVA, 3-PHASE | | | | | |
| | | Approved | 13.02.2019 | E.H/R.K | | | PAD MOUNTED TRANSFORMER | | | | | |
| | | CUSTOMER : MAQBODD CLASINS | | | | | Department | | SWITCHGEAR DESIGN | Rev. | 0 | |
| | | PROJECT :- BRT PESHAWAR (HAYATABAD DEPOT-COMERCIAL) | | | | | DRAWING NUMBER | | D 396 4700 | | File Ref: | 630KVA PMT |
| Rev. | Revision | | | | | | Appd | Year | Week | | | |
| | | | | | | | Pak Elektron Ltd. | | | | Cont | 7 |
| | | | | | | | 14-KM, FERAZEPUR ROAD-LAHORE-PAKISTAN. | | | | | |



SECTION A-A

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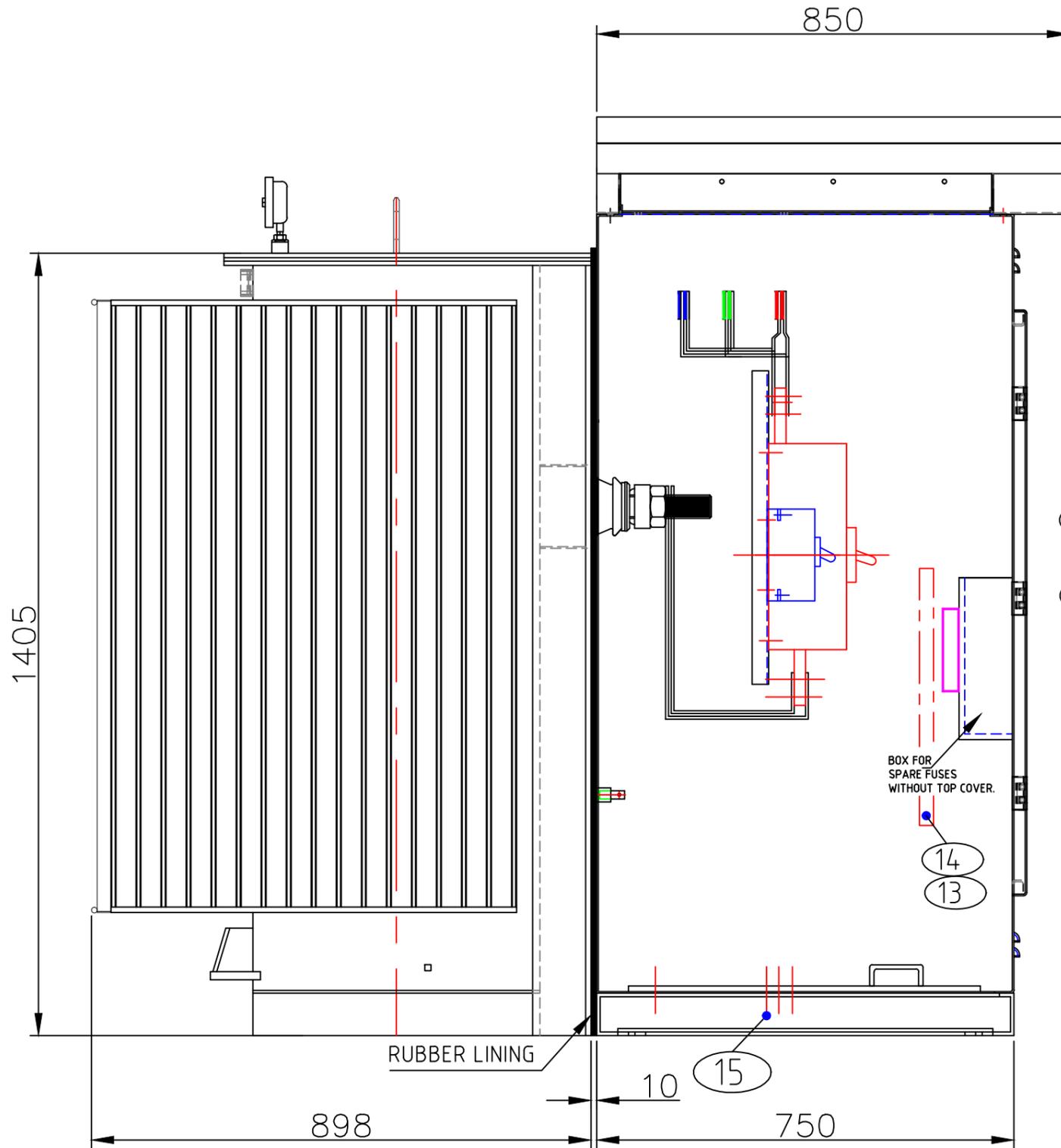
| | | | | | | | | | | | | | | | | | | | | | |
|------|--|----------|--|------|--|------|--|------|--|---|--|-------------|--|---|--|------------------------------|--|------------|--|----------------------|--|
| Rev. | | Revision | | Appd | | Year | | Week | | Prepared 13.02.2019 IMRAN | | CHECKED R.K | | 11/0.415KV, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | | Department SWITCHGEAR DESIGN | | Rev. 0 | | File Ref: 630KVA PMT | |
| | | | | | | | | | | CUSTOMER : MAQBOD CLASINS | | | | Pak Elektron Ltd. 14-KM, FERDOSPUR ROAD-LAHORE-PAKISTAN. | | DRAWING NUMBER | | D 396 4700 | | Sheet 7 | |
| | | | | | | | | | | PROJECT :- BRT PESHAWAR (HAYATABAD DEPOT-COMERCIAL) | | | | | | | | | | Cont 8 | |



SECTION B-B (HT)

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| | | | | | | | | | | | | | | | | | | | | | | |
|------|--|----------|--|------|--|------|--|------|--|---|------------|-------|---------|-----|---|----------------|------------|-------------------|------|-------|-----------|------------|
| Rev. | | Revision | | Appd | | Year | | Week | | Prepared | 13.02.2019 | IMRAN | CHECKED | R.K | 11/0.415KV, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | 630KVA PMT |
| | | | | | | | | | | CUSTOMER : MAQBOD CLASINS | | | | | | DRAWING NUMBER | | D 396 4700 | | Sheet | | 8 |
| | | | | | | | | | | PROJECT :- BRT PESHAWAR (HAYATABAD DEPOT-COMERCIAL) | | | | | | | | | | Cont | | 9 |



SECTION C-C (LT) WITH OUT METERING

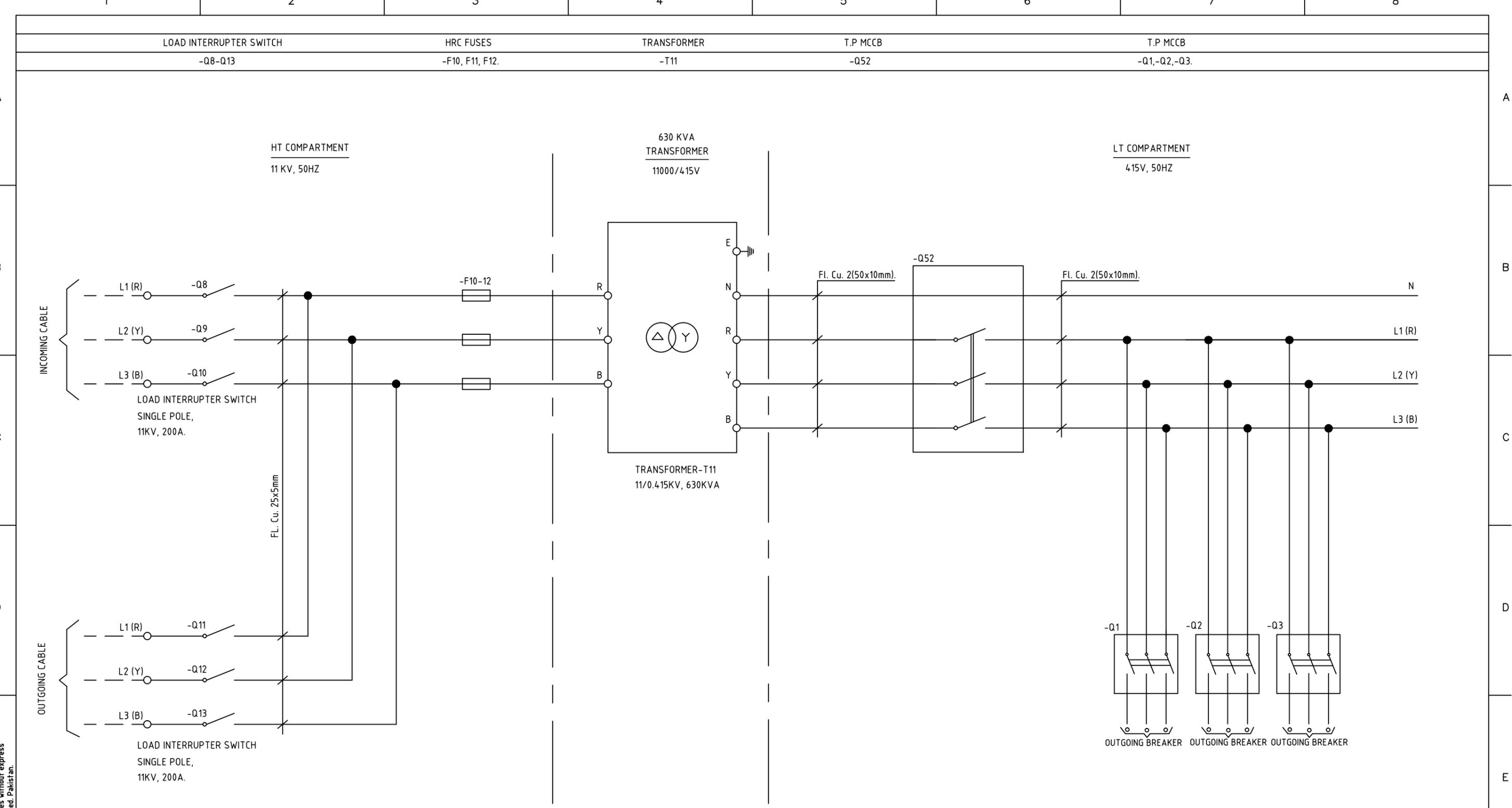
NOTE:

- 1-GENERAL TOLERANCE $\pm 1.5\text{mm}$ UPTO 300mm & $\pm 5\text{mm}$ FOR 300 AND ABOVE.
- 2-BILL LEVEL 95KV.
- 3-ALL BUSBAR JOINTS ARE TIN PLATED.
- 4-CLEARANCE IN H.T COMPARTMENT: } ACC. TO WAPDA SPECIFICATION.
- 5-CLEARANCE IN L.T COMPARTMENT. }
- 6-M.S SHEET 3mm THICK.
- 7-PAINT THICKNESS 0.08mm to 0.12mm.
- 8-WEIGHT OF COMPLETE PAD MOUNTED TRNASFORMER = 3575Kg (Approx.) FOR WAPDA ARR.
- 9-FINISH = COLOR GREEN (RAL 6025) TEXTURE FOR WAPDA PMTFS AND BLUE (RAL 5012) TEXTURE FOR HOUSING SOCIETIES
- 10-PROTECAION CLASS :IP 54
- 11-ALL DIMENSIONS ARE IN mm

| | |
|-----|---|
| 18 | H.T INSULATION BARRIER (C.P. SHEET) |
| 17 | OUTGOING TRIPLE POLE MCCB (1x1250 A),(1x250 A),(1X100 A) |
| 16 | TYPICAL ARR. FOR CABLE TERMINATION (IF REQUIRED) |
| 15 | CABLE STUFFING BOX (IF REQUIRED) |
| 14 | SWITCH STICK |
| 13 | FUSE PULLER |
| 12 | EARTHING ARRANGEMENT FOR DOORS |
| 11 | FRONT DOORS |
| 10 | H.T FLAT COPPER BUS BARS |
| 09 | INSULATOR FOR H.T BUSBAR SUPPORT |
| 08 | CRAFT PAPER(CP SHEET) IN H.T COMPARTMENT |
| 07 | AUXILIARY INSULATOR |
| 06 | H.T. CONNECTOR , N-CONNECTOR (L.T CONNECTOR IF REQUIRED) |
| 05 | H.T. LOAD INTERRUPTER SWITCH |
| 04 | INCOMING TRIPLE POLE MCCB (1600 A) |
| 03 | 11kV HRC FUSE |
| 02 | EARTHING CONNECTOR |
| 01 | ENCLOSURE FOR 630KVA PAD MOUNTED TR. |
| SR. | DESCRIPTION |

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| | | | | | | | | | |
|---|------------|---------|---------|-----|---|------------------------------|------------|----------------------|----|
| Prepared | 13.02.2019 | IMRAN | CHECKED | R.K | 11/0.415KV, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER GENERAL ARRANGEMENT | Department SWITCHGEAR DESIGN | Rev. 0 | File Ref: 630KVA PMT | |
| Approved | 13.02.2019 | E.H/R.K | | | | | | | |
| CUSTOMER : MAQBOD CLASINS | | | | | Pak Elektron Ltd. 14-KM, FERROZEPUR ROAD-LAHORE-PAKISTAN. | DRAWING NUMBER | D 396 4700 | Sheet | 9 |
| PROJECT :- BRT PESHAWAR (HAYATABAD DEPOT-COMERCIAL) | | | | | | | | Cont | 10 |



NOTE:
 1- FUSES (FROM LOWER SIDE) ARE DIRECTLY CONNECTED TO TRANSFORMER BUSHING.
 2- CABLE SIZE REQUIRED FOR HT AND LT CIRCUITS.

| TABLE SHOWING DETAIL FOR OUTGOING MCCB | | |
|--|-------------|---------------------|
| CKTS LOCATION | MCCB RATING | CABLE SIZE |
| -Q52, | 1600A | Fl. Cu. 2(50x10mm). |
| -Q1 | 1250A | Fl. Cu. 2(60x5mm). |
| -Q2 | 250A | Fl. Cu. 1(20x5mm). |
| -Q3 | 100A | Fl. Cu. 1(15x5mm). |

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| | | | | | | | | | |
|----------|------------|-------|---|------------|-------------------|----------------|------------|-----------|-------|
| Prepared | 30.01.2019 | AHMAD | 11/0.415KV, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER SINGLE LINE DIAGRAM | Department | SWITCHGEAR DESIGN | Rev. | 0 | File Ref: | |
| Approved | 30.01.2019 | NS | | Customer | MAQB00L CALSONS. | DRAWING NUMBER | D 396 4700 | | Sheet |
| Rev. | Revision | Appd | Year | Week | | | Cont | 11 | |

| SYMBOL | DEVICE No. | DESCRIPTION | SYMBOL | DEVICE No. | DESCRIPTION | SYMBOL | DEVICE No. | DESCRIPTION |
|--------|---------------|---|--------|---------------|---|--------|-----------------------|---|
| | -Q52 | TP AC CIRCUIT BREAKER | | -F21 | LINE DISTANCE PROTECTION RELAY | | -T11..... | VOLTAGE TRANSFORMER |
| | -Q8-Q13 | TP LOAD BREAK SWITCH | | -F74 | TRIP CIRCUIT SUPERVISION RELAY | | | |
| | | | | -F51 | AC TIME OVER CURRENT RELAY | | | |
| | | | | -F51N | AC TIME EARTH FAULT RELAY | | -T1..... | CURRENT TRANSFORMER |
| | -PC | POWER CONTACT OF CIRCUIT BREAKER | | -F25 | SYNCHRO CHECK RELAY | | -T52 | CONTROL SUPPLY TRANSFORMER |
| | | | | -F86 | LOCKOUT RELAY | | | |
| | | | | -F87 | TRANSFORMER DIFFERENTIAL PROTECTION RELAY | | | |
| | | | | -F94 | TRIPPING RELAY | | | |
| | -X0 | PLUG/SOCKET FOR CIRCUIT BREAKER AUX. WIRING | | -F59 | OVER VOLTAGE RELAY | | -C52 | CAPACITOR TRIP UNIT |
| | | | | -F27 | UNDER VOLTAGE RELAY | | | |
| | -M1 | CIRCUIT BREAKER CHARGING MOTOR | | -F32 | REVERSE POWER RELAY | | -F10,-F11,-F12 | FUSE |
| | | | | -F49 | THERMAL RELAY | | | |
| | -Y3 | BRIDGE RECTIFIER | | -F55 | POWER FACTOR RELAY | | -H52 | AC BUZZER |
| | | | | -F94 | TRIPPING RELAY | | | |
| | -R, -R1 | RESISTOR | | -F26 | TRANSFORMER STATUS RELAY | | -X51 | RELAY TEST BLOCK |
| | | | | P81 | ENERGY METER | | E | GROUND |
| | -Y1 | CIRCUIT BREAKER SHUNT TRIP COIL | | -P1, -P2, -P3 | AM-METER | | -R, -Y, -B | INDICATION LAMP FOR "PHASE INDICATIONS" |
| | | | | -P16 | VOLT METER | | -H1 | INDICATION LAMP FOR "OFF", COLOUR GREEN |
| | -Y4 | CIRCUIT BREAKER SERIES TRIP COIL (E/F) | | -P55 | POWER FACTOR METER | | -H2 | INDICATION LAMP FOR "ON", COLOUR RED |
| | -Y2, -Y3 | CIRCUIT BREAKER SERIES TRIP COIL (O/C) | | -S70 | VOLT SELECTOR SWITCH | | -H3 | INDICATION LAMP FOR "TRIP", COLOUR YELLOW |
| | -Y9 | CIRCUIT BREAKER CLOSING COIL | | -S69 | AMPERE SELECTOR SWITCH | | -S1 | PUSH BUTTON FOR "OPEN C.B", COLOUR GREEN |
| | | | | -U1..... | TRANSDUCER | | -S2 | PUSH BUTTON FOR "CLOSE C.B", COLOUR RED |
| | -K1, -K2..... | AUXILIARY CONTACTOR/RELAY | | -P25 | SYNCHRO SCOPE | | -S21 | PUSH BUTTON FOR "LAMP TEST", COLOUR GREEN |
| | | | | -B23 | HUMIDITY & TEMPERATURE CONTROLLER | | -S3 | PUSH BUTTON FOR "RESET", COLOUR GREEN |
| | -K50 | FLICKER RELAY | | -K60... | ON/OFF DELAY TIMER | | -SA1.... | MULTIPLE POSITION SELECTOR SWITCH |
| | | | | | | | | |
| | -S1, -S3 | CIRCUIT BREAKER AUXILIARY SWITCH | | -X1..... | NORMAL TERMINAL BLOCK | | -F100..-F200..-F300.. | CONTROL MCB |
| | | | | -X11..... | TERMINAL BLOCK FOR CURRENT CIRCUIT | | -LA | LIGHTING ARRESTOR |

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| | | | | | |
|-----------|------------------|----------------|---|-------------------|-------------------|
| Prepared | 30.01.2019 | AHMAD | 11000/415V, 630KVA, 3-PHASE PAD MOUNTED TRANSFORMER SYMBOLS AND LEGENDS | FOR APPROVAL | |
| Approved | 30.01.2019 | NS | | Department | SWITCHGEAR DESIGN |
| CUSTOMER: | MAQBOOL CALSONS. | | | Rev. | 0. |
| | | | | Pak Elektron Ltd. | File Ref: |
| | | | 14-KM, FERAZEPUR ROAD-LAHORE-PAKISTAN. | DRAWING NUMBER | D 396 4700 |
| Rev. | Revision | Appd Year Week | | Sheet | 11 |
| | | | | Cont | -- |

Corridor Entry Control Mechanism (Road Blockers + Boom Barriers) Specifications

| S.No | Specifications | Compliance | | Remarks |
|------|--|------------|----|---------|
| | | YES | NO | |
| 1 | Entry Control Systems: | | | |
| | a. Blocking segment | | | |
| | b. Supporting Components:- | | | |
| | i. Hydraulic Power Unit | | | |
| | ii. Control System | | | |
| | iii. Access Control Equipment | | | |
| | iv. Manual Pump | | | |
| | c. Boom | | | |
| | d. Inductive Loops, Electro-Optical Sensors/IR Sensors/DSCR | | | |
| | e. Traffic Lights | | | |
| | f. Warning Signs | | | |
| | g. CCTV | | | |
| | h. Uninterrupted Power Supply | | | |
| | j. Communication System | | | |
| | k. Public Address System | | | |
| | <i>And centrally a server will allow logging and remote access control</i> | | | |
| 2 | Blocking Segment: | | | |
| 2.1 | Segment Construction: | | | |
| | a. The blocking segment shall be constructed of heavy steel section with mild steel skirts and covers. | | | |
| | b. The road plate should be an anti-slip plate to withstand a calculated axle load of 20 tonnes. | | | |
| | c. The blocking segment shall be secured into a sub-surface mounting frame and will be rotated through at least 35 degrees to secure the roadway with the rotation shaft secured through self lubricating bearings. | | | |
| | d. The mounting frame should be fitted into a fully reinforced foundation with drainage points to connect to the corridor drainage and sump pump may be provided. | | | |
| 2.2 | Segment Height: | | | |
| | The height of the segment when in the closed (raised) position, as measured from the top of the mounting frame, will be a minimum of 500/800/1000 mm to minimize the possibility of site penetration and to ensure that higher chassis vehicles are restrained | | | |
| 2.3 | Segment Width: | | | |
| | The width of the blocking segment will be 2,500mm. | | | |
| 2.4 | Finish: | | | |
| | The segment and mounting frame are to be finished with an anti-corrosion paint in black with yellow diagonal stripes over-painted on the segments front skirt and road plate | | | |
| 3 | Hydraulic Power Unit: | | | |
| 3.1 | Operation: | | | |
| | a. The HPU will consist of a heavy duty motor driving a hydraulic pump which will actuate, via a manifold and set of electrically operated valves, a hydraulic ram(s). | | | |
| | b. The blocking segment will be driven both up and down by a double acting hydraulic ram(s) to ensure positive action at all times without reliance on gravity for operation. | | | |
| | c. The HPU will have a hydraulic accumulator to allow an increased raise speed in case of emergency of less than one (1) second | | | |
| 3.2 | Hydraulic Ram: | | | |
| | a. The double acting hydraulic ram(s) fitted to the blocking segment can be fitted with anti-burst valves as to maintain security if damage is sustained to the hydraulic hoses. | | | |
| | b. For safe maintenance, the hydraulic rams must be accessible from the road surface when the roadblocker is in the fully lowered position. | | | |
| 3.3 | Proximity Limit Switches: | | | |
| | Proximity limit switches will be fitted to provide raised and lowered signaling to the control system. The switches will be of the inductive type with no moving parts and have a minimum IP rating of IP68. | | | |
| 3.4 | Motor: | | | |
| | The heavy-duty motor used in the HPU will be a 3 phase, 380-415v unit with a power rating sufficiently sized to allow for continuous operation (100% duty cycling) | | | |
| 3.5 | Hydraulic Reservoir: | | | |
| | The hydraulic oil will be contained in a steel reservoir which is to be sized to allow sufficient oil cooling necessary for 100% duty cycling of the blocker | | | |
| 3.6 | Power Fail Conditions: | | | |
| | A hand pump / release will be provided to enable the manual raising and lowering of the blocking segment in the event of electrical power failure | | | |
| 3.7 | Cabinet: | | | |
| | a. The HPU is to be fitted into a steel cradle which will have lifting and bolt down points, the cradle will come complete with an outer cabinet to give protection against the elements. | | | |
| | b. The cabinet will have fully lockable and removable full length doors to both the front and rear of the cabinet for ease of access. Vents will be fitted into the cabinet to allow good air circulation maintaining the ambient temperature. | | | |
| 4 | Control System: | | | |
| 4.1 | Main Processor: | | | |
| | a. The HPU will be controlled by a central controller (PLC) which will accept inputs from the access control system, blocker monitoring equipment and hydraulic pack and output signals to the HPU control valves, back indication system and external signaling. The initial programming shall be to suit specific client and site requirements however reprogramming of the system must be easily undertaken and authenticated and protected access to the program must be provided to the client. | | | |
| 4.2 | Casing: | | | |
| | a. The control system will be housed in a general purpose IP65 rated housing with a power isolation switch mounted externally for safety. The housing will be located inside the main HPU cabinet and should give easy access to all electrical components for connection, maintenance and programming | | | |
| 5 | Access Control: | | | |
| 5.1 | Remote Control Panel: | | | |

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| | | | | |
|-----|--|--|--|--|
| | a. Each roadblocker will come with its own remote control panel which will be comprised of push buttons to raise, lower and emergency stop the equipment. The blocking segment must be able to instantly reverse on command. The Remote Control Panels shall be installed in the Operations Control Centre | | | |
| 5.2 | Local Control Panel: | | | |
| | a. A Local Control Panel comprises push buttons to raise, lower and emergency stop the equipment and is installed at the roadblocker location. The control panel shall be located on or near the HPU and allow overriding the automated operation of the roadblocker. Usage of the control panel shall be restricted to staff authenticated through unique keys, contactless cards and/or biometrics. | | | |
| 5.3 | Emergency Fast Raise: | | | |
| | a. The control panels will include a panic button which will be larger than the normal controls and will self-lock on activation (key reset required), the circuit will by-pass all safety systems and raise the blocking segment within ONE second | | | |
| 5.4 | System Interface: | | | |
| | a. The control system will be capable of accepting inputs from every major type of access control including but not limited to – Swipe card readers, proximity card readers, inductive loop systems, IR transmitters RF transmitter equipment, DSRC and biometric readers. | | | |
| 5.5 | Automated Operation of Entry to BRT Lanes: | | | |
| | a. The objective is to minimize human intervention and optimize the road blocker throughput, with a target of a roadblocker approaching and passage velocity of not less than 60 kph | | | |
| | b. The entry lane roadblockers shall be normally closed (raised) during all hours. Automated lowering of the block segment shall occur if one or more authenticated BRT vehicles are approaching the roadblocker. | | | |
| | c. The system shall be capable to detect the number of BRT vehicles bunched together and will remain open for all vehicles until the last vehicle has passed. The roadblocker shall close only when the last vehicle has passed the roadblocker completely. | | | |
| | d. The roadblocker shall under no circumstances close for an authenticated BRT vehicle if it has insufficient time to come to a standstill before the closing or closed roadblocker. | | | |
| | e. The roadblocker shall automatically perform an emergency fast-raise if an unauthenticated vehicle tails an authenticated BRT vehicle within fifteen (15) meters and after the authenticated vehicles has passed the roadblocker. | | | |
| | f. All these parameters and behaviors shall be configurable and shall be tested for suitable operation in the BRT prior to commissioning. | | | |
| 5.6 | Automated Operation of Exit from BRT Lanes: | | | |
| | a. The exit lane roadblockers shall be normally open during Operating Hours and normally closed during other hours. | | | |
| | b. During Operating Hours: the roadblocker shall close automatically only if all of the following conditions apply: - A vehicle is detected moving towards the roadblocker from the mixed traffic side of the blocker; - The vehicle is in close proximity of the roadblocker, e.g. within fifteen (15) meters; and, - No vehicle is approaching the roadblocker from the Corridor side such that it cannot be notified to stop in time using the traffic lights. | | | |
| | c. During other hours: the roadblocker shall open upon any approaching vehicle from the Corridor side. | | | |
| | d. All these parameters and behaviors shall be configurable and shall be tested for suitable operation in the BRT prior to commissioning. | | | |
| 6 | Sensor Suite: | | | |
| 6.1 | A sensor suite, integrated with the Access Control System for automated operation, shall be implemented as part of each road blocker comprising i.e. inductive loops / electro-optical sensors / IR Sensors / RF communication that is capable to: a. Detect all vehicle approaching the roadblocker from the mixed traffic side; b. Determine if vehicles have completely passed the roadblocker; c. Detect vehicles approaching the roadblocker from the Corridor side for exit lanes; d. Classify vehicles approaching the roadblocker from the mixed traffic side, at least distinguishing between BRT vehicles (12m and 18 buses) and other traffic. e. Authenticate vehicles for entry remotely using RF communications and match same vehicles against a list of authorized vehicles that is downloaded at least twice a day from the Central Server. f. Detect if authenticated vehicles have entered the "no-close" zone in which there is insufficient time to stop to prevent hitting the raised or raising barrier. g. The system shall be able to detect auto-rikshas and motorcycles. | | | |
| 7 | Traffic Lights: | | | |
| | Traffic lights shall be installed and integrated with the access control system and roadblocker. The traffic lights shall feature a three light (red, orange, green) set-up. Only when passage is permitted, and the roadblocker is fully lowered, the light shall be green. An orange light may be shown if the vehicle is authenticated and the blocker has initiated the lowering cycle. For each lane, either two traffic lights will be used or one traffic light and one boom gate: 7.1 The first light, around 40 meters from the roadblocker, indicates if the BRT vehicle has been authenticated: a. Red if no authentication b. Orange if authenticated and lowering process has initiated c. Green if authenticated and roadblocker is already in the lowered position 7.2 The second light, next to the roadblocker, indicates if the BRT vehicle may pass the roadblocker safely: a. Red if no authentication b. Orange if authenticated and lowering process has initiated c. Green if authenticated and roadblocker is already in the lowered position 7.3 The boom gate, over the roadblocker, indicates if the BRT vehicle may pass the roadblocker. | | | |
| 8 | Warning Signs: | | | |
| | There shall be clear markers and signs on and alongside the road to:- a. Signal to regular traffic that the BRT lane is off-limits and a roadblocker is in place. b. Show maximum speed to BRT vehicles that wish to enter the BRT Lanes from Mixed Traffic. | | | |
| 9 | CCTV Cameras: | | | |
| | These will be provided by the agent of the Employer | | | |
| 10 | Uninterruptible Power Supply(UPS): | | | |
| | The UPS shall support limited continued operation of the roadblocker in case of a problem with the main power supply, comprising of: a. At least 4 complete cycles of the block segment, ending in the open position; b. Continued operation of the control systems and traffic lights for four (4) hours | | | |
| 11 | Communication System: | | | |
| | The roadblocker shall be remotely monitored and operated. Network connectivity shall be realized through connection with the fiber optical network. Back-up communications shall be realized through mobile communications (3G/4G). | | | |

Handwritten signature/initials in blue ink.

The Philips logo is displayed in blue capital letters on a white background.The text "Road Lighting" is written in white on an orange background.The text "GreenVision Xceed" is written in white on a yellow background.

Make roads safer sustainably with **GreenVision Xceed**

Lighting up streets and roads enhance the comfort, security and overall safety of our rapidly growing urban environments. Our GreenVision Xceed makes an affordable LED road lighting solution that ensures sufficient light on your roads.

It is designed to achieve better light uniformity and maximum spacing between poles for both pedestrian and vehicle road applications. With its die-cast aluminum housing and Philips LED platform, it is easy to maintain, has a long lifetime and a consistency you can count on. It also offers 3 housing sizes and a range of beam optics to fully cater to different road configurations and conditions.

GreenVision Xceed offers 50% energy savings compared to conventional lamp systems, making it the perfect sustainable lighting solution for any emerging metropolis.



Benefits

- **Up to 50% energy savings.** Uses significantly less energy than conventional street lighting solutions
- **Ease of maintenance.** Tool-less opening of gear compartment & gear tray replacement.
- **Long fixture lifetime.** Solid die-cast housing design with Ingress (IP) and Surge protection.
- **Long system lifetime.** Excellent thermal management that reduces early failures.

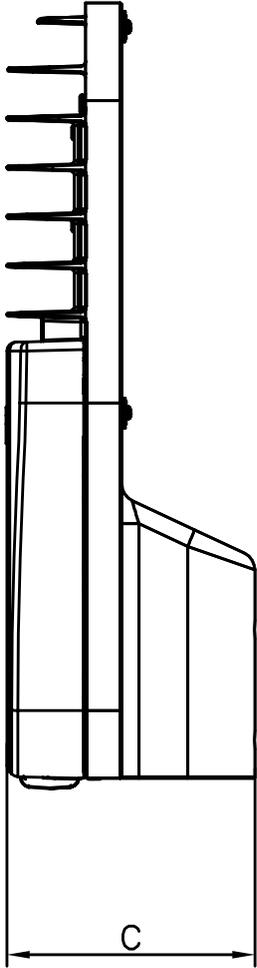
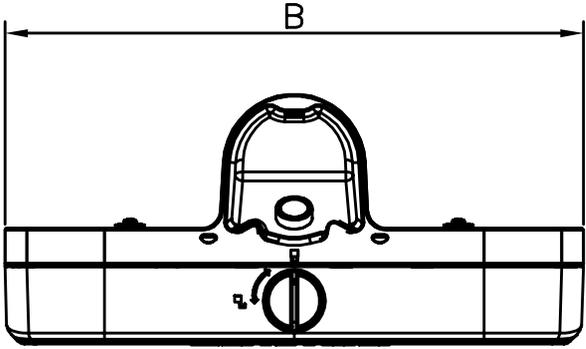
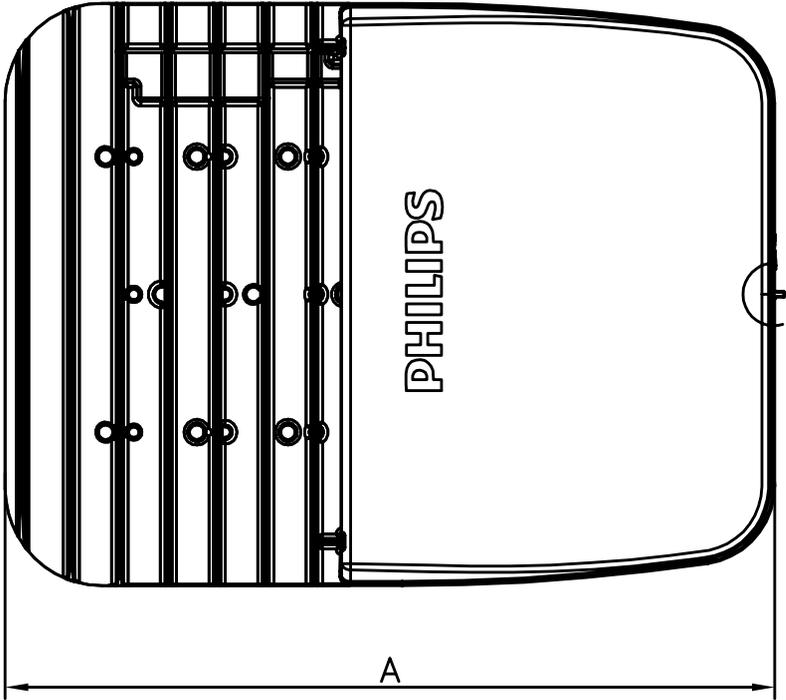
Features

- World class, approbated quality components (LEDs / Driver / etc.)
- Superior W/m² performance delivered through different optics for greater flexibility to fit different road applications
- Control options for standalone or Tele-managed controls
- High quality cool, neutral & warm white light with high color consistency

Applications

- Pedestrian category roads (P1-P6)
- Vehicle category roads (M1-M6)

Dimensions



| No. | Type | LWH= A X B X C(mm) |
|-----|----------------|--------------------|
| 1 | Small version | 422 X 318 X 136 |
| 2 | Middle version | 522 X 318 X 136 |
| 3 | Big version | 853 X 318 X 136 |

Product data

General Characteristics

| | |
|-------------------|---|
| Type | BRP371/372/373 |
| Lifetime | 50,000 hours (70% lumen maintenance @ Ta = 35°C) |
| Optics | DNE, DME, DWE, DWV, DWP, DW DM, DW1, DW2, DW2m, DW2s, DWS MP1 |
| Luminous Efficacy | 120 lm/w (Typical) up to 135 lm/w |

Light Technical Characteristics

| | |
|--------------------------|--|
| Light source | LED |
| LED driver | Constant current or programmable driver options |
| System lumen output | Up to 38,400 lumen |
| Color rendering index | Minimum 70 |
| Color Temperature | CW-5700K / NW-4000K / WW- 3000K ± 500K |

Electrical Characteristics

| | |
|-------------------|------------------------|
| Power requirement | 220-240V 50/60Hz |
| Power factor | > 0.95 (nominal power) |
| Drive current | 100mA - 700mA |

Environmental Characteristics

| | |
|---------------------|--|
| Installation | Φ48-60mm pole, side entry |
| Windage area | BRP371:0.134m ² ; BRP372:0.166m ² ; BRP373:0.271m ² |
| Mounting height | < 12 m |
| Working temperature | - 40°C < Ta < 55°C |
| Wind force | Up to 60m/s |
| Relative humidity | Up to 95%RH |

Mechanical

| | |
|------------------|---------------------------------|
| Housing material | High pressure die-cast aluminum |
| Gasket material | Heat resistant silicone rubber |
| Glass | Tempered glass |
| Finishing | Gray Paint RAL7040 |

Product Data

| | |
|----------------------|--|
| Dimensions (LxWxH) | BRP371 : 422 x 318 x 136mm BRP372 : 522 x 318 x 136mm BRP373 : 853 x 318 x 136mm |
| Weight | BRP371 : 6.5kg; BRP372 : 8kg; BRP373 : 14kg |
| Certifications | CB IEC 60598, CQC, AS/NZS 1158 |
| Classifications | IP66; IK08; Class I; CE, RoHS |
| Surge protection | 15KV/KA (10KV option on request) |
| Control options | Standalone dimming program Tele-managed CityTouch and and AmPLight compatible 7-Pin NEMA and D2 Type PE Cell |
| Maintenance | Tool-less opening of gear compartment Tool-less gear tray replacement |
| Ordering information | BRP371 LED53/NW 55W 220-240V DNE BRP371 LED70/NW 70W 220-240V DNE BRP371 LED87/NW 90W 220-240V DME BRP371 LED104/NW 105W 220-240V DME BRP372 LED122/NW 120W 220-240V DME BRP372 LED139/NW 140W 220-240V DME BRP372 LED157/NW 155W 220-240V DME BRP373 LED174/NW 175W 220-240V DME BRP373 LED192/NW 195W 220-240V DME BRP373 LED209/NW 210W 220-240V DME BRP373 LED226/NW 225W 220-240V DME BRP373 LED243/NW 240W 220-240V DME BRP373 LED260/NW 260W 220-240V DME BRP373 LED277/NW 275W 220-240V DME BRP373 LED294/NW 290W 220-240V DME BRP373 LED311/NW 305W 220-240V DME BRP371 LED63/NW 55W 220-240V DM MP1 BRP371 LED86/NW 75W 220-240V DM MP1 BRP371 LED103/NW 90W 220-240V DM MP1 BRP371 LED126/NW 110W 220-240V DM MP1 BRP372 LED150/NW 125W 220-240V DM MP1 BRP372 LED174/NW 145W 220-240V DM MP1 BRP372 LED180/NW 150W 220-240V DM MP1 BRP373 LED212/NW 185W 220-240V DM MP1 BRP373 LED230/NW 200W 220-240V DM MP1 BRP373 LED253/NW 220W 220-240V DM MP1 BRP373 LED276/NW 240W 220-240V DM MP1 BRP373 LED293/NW 255W 220-240V DM MP1 BRP373 LED324/NW 270W 220-240V DM MP1 BRP373 LED348/NW 290W 220-240V DM MP1 BRP373 LED366/NW 305W 220-240V DM MP1 |

More options listed in annex



Annex

BRP371 LED60/WW 55W 220-240V DM MP1
BRP371 LED82/WW 75W 220-240V DM MP1
BRP371 LED99/WW 90W 220-240V DM MP1
BRP371 LED121/WW 110W 220-240V DM MP1
BRP372 LED143/WW 125W 220-240V DM MP1
BRP372 LED166/WW 145W 220-240V DM MP1
BRP372 LED172/WW 150W 220-240V DM MP1
BRP373 LED203/WW 185W 220-240V DM MP1
BRP373 LED220/WW 200W 220-240V DM MP1
BRP373 LED242/WW 220W 220-240V DM MP1
BRP373 LED264/WW 240W 220-240V DM MP1
BRP373 LED280/WW 255W 220-240V DM MP1
BRP373 LED310/WW 270W 220-240V DM MP1
BRP373 LED333/WW 290W 220-240V DM MP1
BRP373 LED350/WW 305W 220-240V DM MP1

BRP371 LED63/NW 55W 220-240V DM MP1
BRP371 LED86/NW 75W 220-240V DM MP1
BRP371 LED103/NW 90W 220-240V DM MP1
BRP371 LED126/NW 110W 220-240V DM MP1
BRP372 LED150/NW 125W 220-240V DM MP1
BRP372 LED174/NW 145W 220-240V DM MP1
BRP372 LED180/NW 150W 220-240V DM MP1
BRP373 LED212/NW 185W 220-240V DM MP1
BRP373 LED230/NW 200W 220-240V DM MP1
BRP373 LED253/NW 220W 220-240V DM MP1
BRP373 LED276/NW 240W 220-240V DM MP1
BRP373 LED293/NW 255W 220-240V DM MP1
BRP373 LED324/NW 270W 220-240V DM MP1
BRP373 LED348/NW 290W 220-240V DM MP1
BRP373 LED366/NW 305W 220-240V DM MP1

BRP371 LED42/NW 37W 220-240V DM MP1
BRP371 LED63/NW 55W 220-240V DM MP1
BRP371 LED86/NW 75W 220-240V DM MP1
BRP371 LED103/NW 90W 220-240V DM MP1
BRP371 LED126/NW 110W 220-240V DM MP1
BRP372 LED150/NW 125W 220-240V DM MP1
BRP372 LED174/NW 145W 220-240V DM MP1
BRP372 LED180/NW 150W 220-240V DM MP1
BRP372 LED192/NW 160W 220-240V DM MP1
BRP373 LED212/NW 185W 220-240V DM MP1
BRP373 LED230/NW 200W 220-240V DM MP1
BRP373 LED253/NW 220W 220-240V DM MP1
BRP373 LED276/NW 240W 220-240V DM MP1
BRP373 LED293/NW 255W 220-240V DM MP1
BRP373 LED324/NW 270W 220-240V DM MP1
BRP373 LED348/NW 290W 220-240V DM MP1
BRP373 LED366/NW 305W 220-240V DM MP1
BRP373 LED384/NW 320W 220-240V DM MP1

BRP371 LED33/NW 28W 220-240V DM MP1
BRP371 LED50/NW 42W 220-240V DM MP1
BRP371 LED68/NW 55W 220-240V DM MP1
BRP371 LED81/NW 65W 220-240V DM MP1
BRP371 LED100/NW 80W 220-240V DM MP1
BRP372 LED118/NW 95W 220-240V DM MP1
BRP372 LED131/NW 105W 220-240V DM MP1
BRP372 LED156/NW 120W 220-240V DM MP1
BRP372 LED169/NW 130W 220-240V DM MP1
BRP373 LED188/NW 145W 220-240V DM MP1
BRP373 LED200/NW 160W 220-240V DM MP1
BRP373 LED218/NW 175W 220-240V DM MP1
BRP373 LED231/NW 185W 220-240V DM MP1
BRP373 LED250/NW 200W 220-240V DM MP1
BRP373 LED268/NW 215W 220-240V DM MP1
BRP373 LED281/NW 225W 220-240V DM MP1
BRP373 LED312/NW 240W 220-240V DM MP1
BRP373 LED325/NW 250W 220-240V DM MP1
BRP373 LED344/NW 265W 220-240V DM MP1

BRP371 LED25/NW 20W 220-240V DM MP1
BRP371 LED35/NW 28W 220-240V DM MP1
BRP371 LED48/NW 37W 220-240V DM MP1
BRP371 LED58/NW 45W 220-240V DM MP1
BRP371 LED71/NW 55W 220-240V DM MP1
BRP372 LED81/NW 60W 220-240V DM MP1
BRP372 LED94/NW 70W 220-240V DM MP1
BRP372 LED101/NW 75W 220-240V DM MP1
BRP372 LED114/NW 85W 220-240V DM MP1
BRP373 LED128/NW 95W 220-240V DM MP1
BRP373 LED136/NW 105W 220-240V DM MP1
BRP373 LED149/NW 115W 220-240V DM MP1
BRP373 LED162/NW 125W 220-240V DM MP1
BRP373 LED175/NW 130W 220-240V DM MP1
BRP373 LED189/NW 140W 220-240V DM MP1
BRP373 LED202/NW 150W 220-240V DM MP1
BRP373 LED209/NW 155W 220-240V DM MP1
BRP373 LED222/NW 165W 220-240V DM MP1
BRP373 LED236/NW 175W 220-240V DM MP1



Maintenance Manual

AUTOMATIC SLIDING DOOR with VISIO Op.

Read this instruction manual before use.



In this manual you will find all the necessary information for the correct maintenance of the product.

Keep this manual in a safe place for later referral.

This manual contains instructions for the maintenance of manusa automatic door Visio model:

NOTES:

- All maintenance operations, except functional tests, should be carried out in "open door" mode and with the power supply disconnected. The outside key switch should not be handled in these operations, as the engine could be triggered by the fail-safe battery mechanism.
- If the power supply cable is damaged, it should be replaced by a special cable or kit supplied by the manufacturer or by the post-sale service.
- The drive unit must be disconnected from the power supply before removing the batteries. The batteries must be destroyed safely.

1. MAINTENANCE INTERVALS

There are two types of maintenance intervals:

2.1.- By TIME LAPSED: **T** 

2.2.- By NUMBER OF CYCLES: **C**

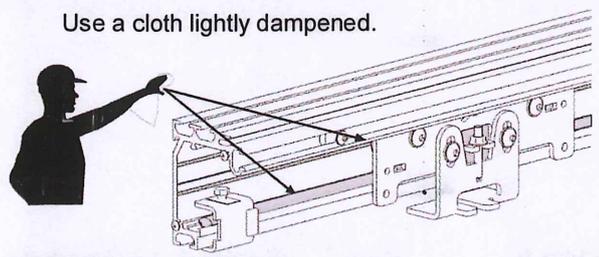
| | | | | |
|---|---|---|---|---|
| 0 | 4 | 7 | 8 | 3 |
|---|---|---|---|---|

1.1 TIME INTERVALS

T-1 EVERY 6 MONTHS

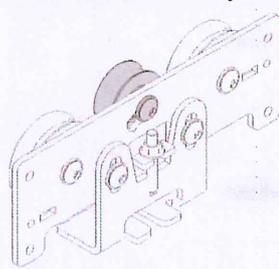
T1A **Cleaning of trolleys and rollers:**

Use a cloth lightly dampened.



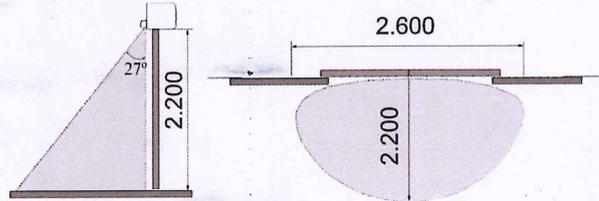
T1B **Rollers test:**

The rollers should rotate freely. Check the tightness of the rollers, and readjust if necessary.

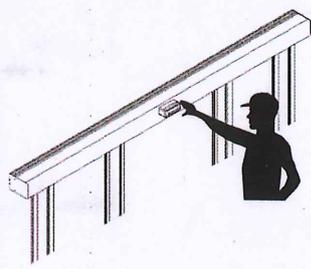


T1C **Detection elements test:**

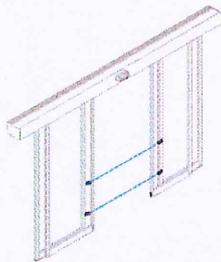
Check there are no dead angles near the sliding leaves.



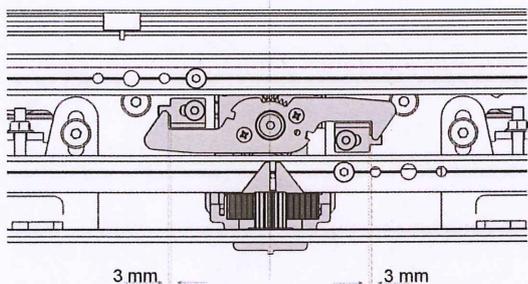
Check that the detectors are correctly fixed.



T1D Photoelectric barrier test:

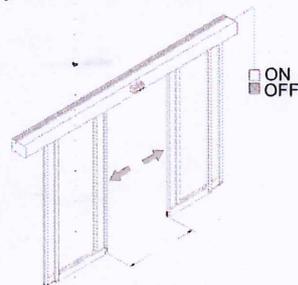


T1E Trolley hanger lock test:

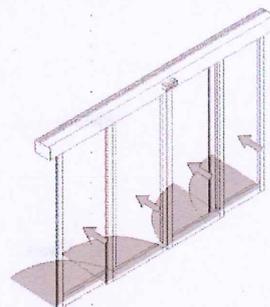


T1F Panic break-out system test:

Disconnect power supply and check that the electrical or intrinsic mechanical power panic break-out system's leaves open.

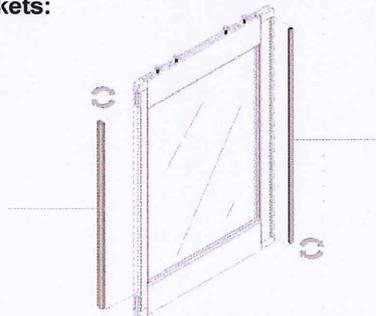


With panic break-out leaves, check that the force needed for their release is under 220N.



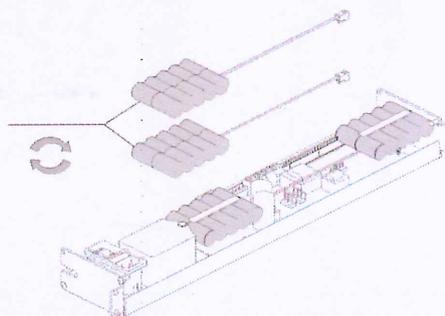
T-2 EVERY 24 MONTHS

T2A Change the brush strips and central sealing gaskets:



T2B Replace fail-safe batteries:

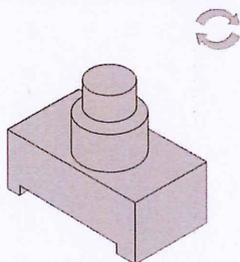
Disconnect the device from the power supply before removing the batteries. The batteries must be destroyed following safety procedures.



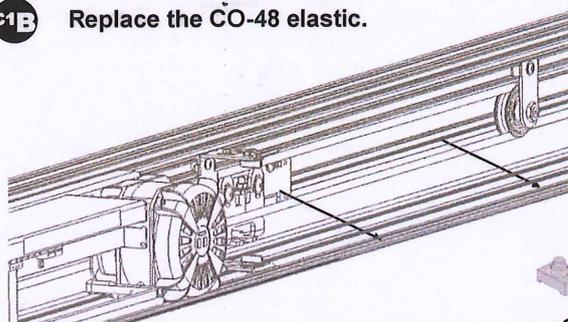
1.2 NUMBER OF CYCLES INTERVALS

0 4 7 8 3 C-1 EVERY 500.000 CYCLES

C1A Replace the panic break-out guides.

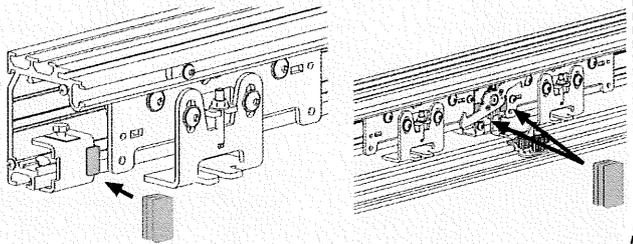


C1B Replace the CO-48 elastic.

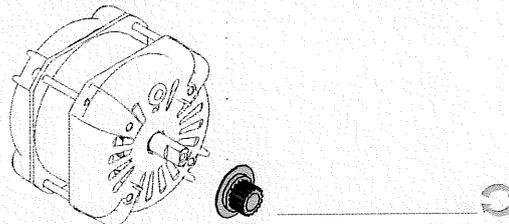


0 4 7 8 3 C-2 EVERY 1.000.000 CYCLES

C2A Replace the rubber end stops in the trolleys and lock.



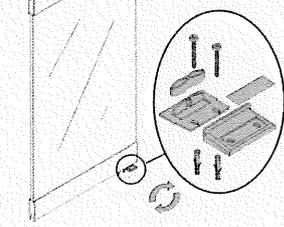
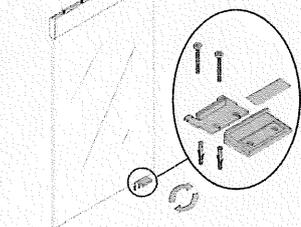
C2D Dismantle and replace the motor release pistons.



C2B Replace the guides on leaf-types T20, D20, E30, I30, D35 y S40.

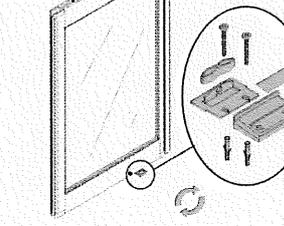
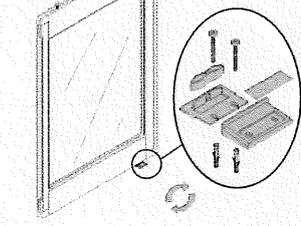
T20

D20



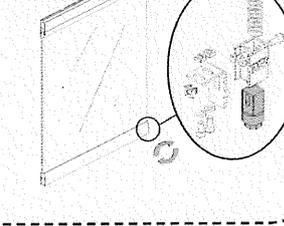
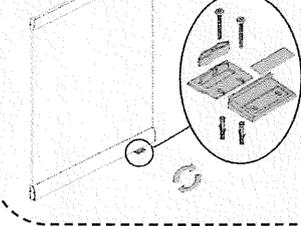
E20

I30

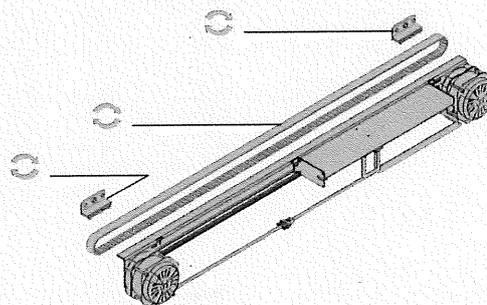


D35

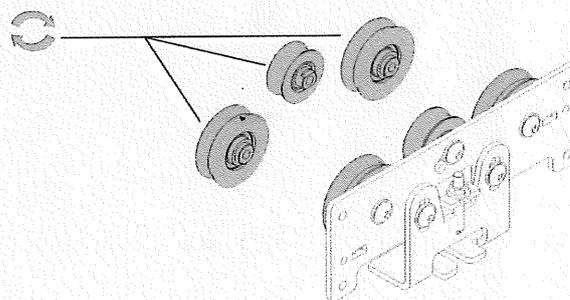
S40



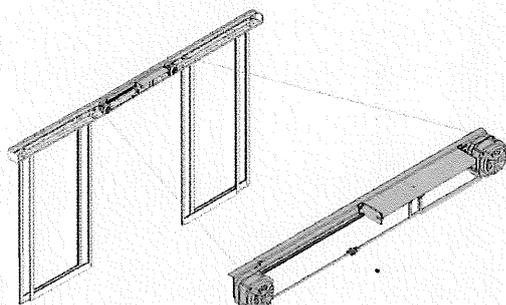
C2E Replace the belts and dragging arms.



C2F Replace the rollers.



C2C Dismantle the motor group.



Visio

Range of automatic
door operators

manusa 
Automatic doors

Visio

manusa 
Automatic doors

Range of automatic
door operators

Visio is the most comprehensive operator range available on the market:

- 100, 125 and 175 mm high cover versions to cater all construction needs.
- LD, MD and HD motor groups depending on the dynamic features required.

Visio
100

Visio
125

Also available for
telescopic doors

Visio
175

Visio LD Motor Group
Leaves up to 120 kg
One gear motor

With 2 configuration options:

Visio MD Motor Group
Leaves up to 220 kg
Two direct drive motors

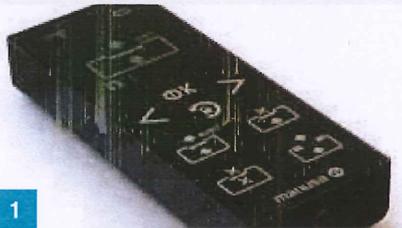
Visio HD Motor Group
Leaves up to 440 kg
Two gear motors

* The suggested maximum weights will depend on the required speed in each application.



ACCESSORIES

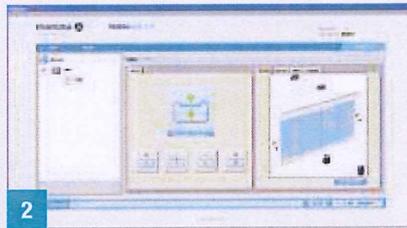
The range of automatic door operators Manusa Visio allows the incorporation of new accessories and functions.



1

Airlinx Selector

Advanced wireless selector for operating control and local door diagnosis. With keypad and LCD screen.



2

Manulink software and Ethernet adaptor

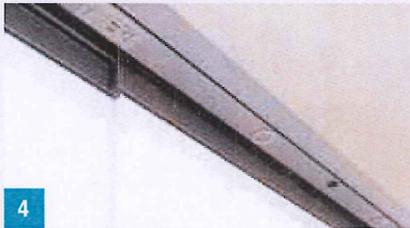
Allows remote control and time programming.



3

Openlinx

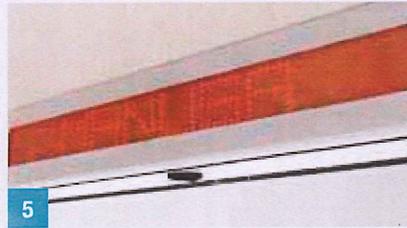
Allows remote management for automatic doors from a web navigator and its integration with industrial and immotic buses.



4

ASD audio system

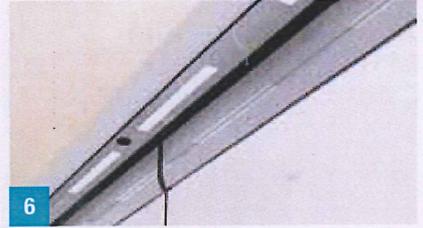
The automatic door gives users acoustic messages.



5

LED display

Integrated in the front cover, it gives users visual messages.



6

Concealed lighting

Gives the entrance aesthetic visibility, or allows a colour code to be established according to the function inside specific locations or transit areas.



7

Ledglass leaves lighting*

Creation of customised designs using LED lighting.



8

Self-dimming glass*

Allows the transparency of the leaves to be changed for specific privacy needs.



9

Glass with integrated Venetian blind*

A blind integrated in the glass.



10

People counter

Crowd measuring system in closed spaces that allows knowledge of entrance and exit traffic.

OTHER AVAILABLE ACCESSORIES

Activation

- Planar Radar
- Smart-Prox touchless switch
- Wide range of push buttons, wired and wireless
- Remote control
- Exterior key switch (wired and wireless)
- Numeric keypad (wired and wireless)
- Handsfree system
- RFID system

Safety

- Photocells
- HDS hybrid sensor
- HPS AIR lateral safety sensor
- CO48 mechanical redundant fail-safe system
- Electromechanical lock
- Cover lock
- Floor lock

Control

- Smart selector
- Optima selector
- Optima remote control
- I/O interface

* For sale out of Spain please ask export department

manusa

Automatic doors



HEADQUARTERS

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08174 Sant Cugat del Vallès, Barcelona (Spain)
Tel.: +34 902 321 400 Fax.: +34 902 321 450
E mail: export@manusa.com

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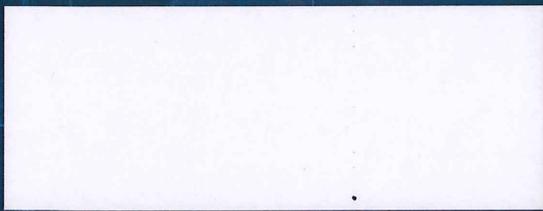
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Greece, Holland, Hungary, Ireland, Iceland, Italy,
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Czech Republic, Romania, Russia, Serbia, Slovenia,
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MIDDLE EAST

Saudi Arabia, Bahrain, United Arab Emirates, Iran,
Israel, Jordan, Kuwait, Lebanon, Qatar, Syria

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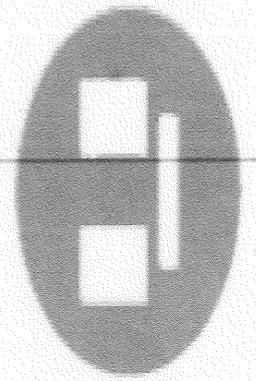
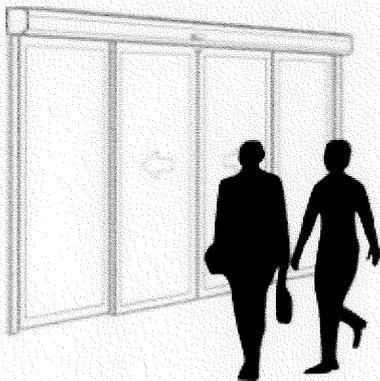
D90019-EN



Manual de instrucciones
operador Visio

Instructions manual
Visio operator

Manuel d'instructions
opérateur Visio



esaunism

Manual de instrucciones

PUERTA AUTOMÁTICA CORREDERA OP. VISIO



Lea estas instrucciones en su totalidad detenidamente antes de empezar a utilizar la unidad.

En este manual encontrará toda la información necesaria para el uso y cuidado del producto.

Guarde este manual en un lugar seguro para su posterior consulta.

0. ÍNDICE

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- 1.1 INTRODUCCIÓN
- 1.2 TABLA DE CAPACIDADES
- 1.3 COMPATIBILIDAD

2 UTILIZACIÓN: USOS PREVISTOS Y USOS QUE DEBEN EVITARSE

3 FUNCIONAMIENTO Y UTILIZACIÓN

- 3.1 EMPLAZAMIENTO. REQUISITOS FÍSICOS Y AMBIENTALES
- 3.2 PRINCIPIOS DE FUNCIONAMIENTO
 - 3.2.1 Puesta en servicio
 - 3.2.2 Paro normal y paro de emergencia
- 3.3 MODOS DE OPERACIÓN Y SELECTOR DE MANDO
- 3.4 SELECCIÓN DEL MODO DE OPERACIÓN
- 3.5 BLOQUEO DEL MODO DE OPERACIÓN
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- 3.7 PARO EMERGENCIA (opc)
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- 4.2 MEDIDAS DE SEGURIDAD QUE DEBEN SER TOMADAS POR EL USUARIO
- 4.3 RIESGOS RESIDUALES
- 4.4 INFORMACIÓN PARA SITUACIONES DE EMERGENCIA

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- 5.1 RECAMBIOS
- 5.2 ACCIONAMIENTO MANUAL - LIMPIEZA DE LA PUERTA
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6 INDICACIÓN DE ANOMALÍAS

7 ANEXOS

- 7.1 DECLARACIÓN CE DE CONFORMIDAD
- 7.2 LIBRO DE MANTENIMIENTO

1 IDENTIFICACIÓN DE LA MÁQUINA

1.1 INTRODUCCIÓN

Las puertas automáticas **manusa** han sido especialmente diseñadas para facilitar el acceso rápido, seguro y controlado de personas a instalaciones de todo tipo.

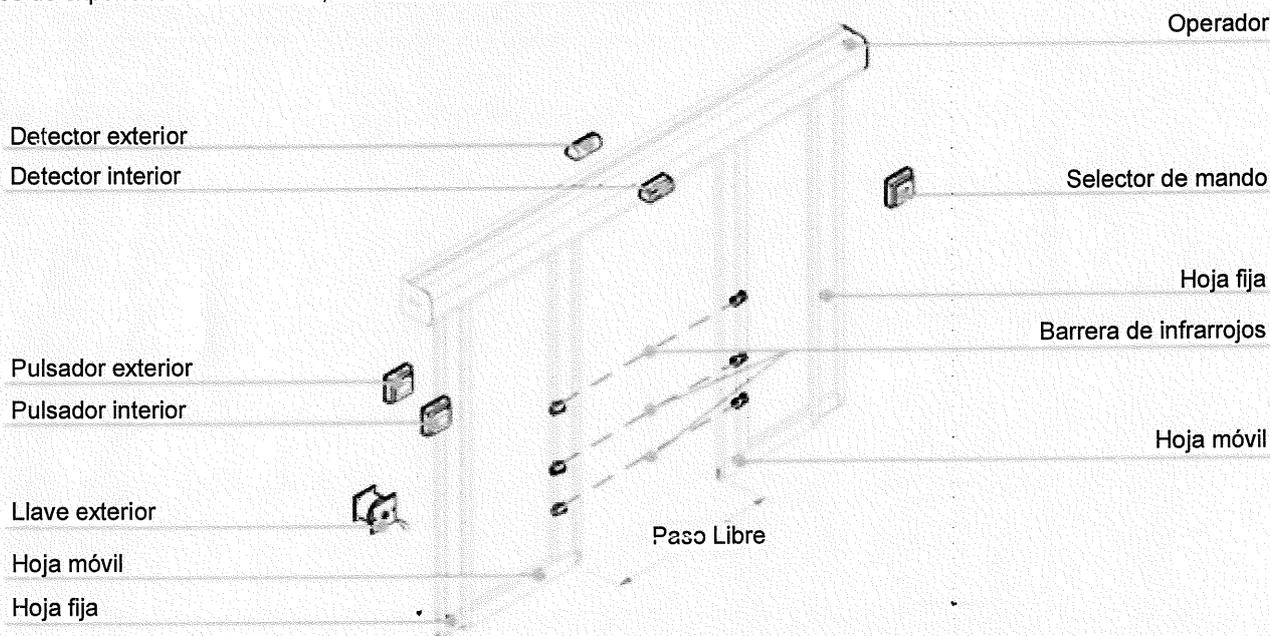
El operador VISIO ha sido concebido priorizando el diseño:

- menor impacto visual gracias a sus reducidas dimensiones.
- mayor integración con los conjuntos arquitectónicos.
- posibilidad de incorporar el selector SMART, con un panel de control digital muy intuitivo (pantalla LCD de 3").

Este manual contiene las instrucciones básicas para el uso práctico de su puerta automática. Léalo con atención y, en caso de duda, consulte a un instalador autorizado.

Por su propia seguridad respete en todo momento las instrucciones técnicas indicadas en este manual. **manusa** no se responsabiliza de los daños y averías motivadas por el incumplimiento de dichas instrucciones.

Por último, le agradecemos la confianza depositada al adquirir un producto de la gama **manusa**, empresa con más de 40 años de experiencia en el diseño, fabricación e instalación de sistemas automáticos de paso.



1.2 TABLA DE CAPACIDADES

CARACTERÍSTICAS ELÉCTRICAS GRUPO MOTOR

| | Visio LD | Visio MD | Visio HD |
|---|---------------------|---------------------|---------------------|
| Alimentación estándar | 220-240V +/-6% 50Hz | 220-240V +/-8% 50Hz | 220-240V +/-6% 50Hz |
| Alimentación bajo pedido | 100-120V +/-6% 60Hz | 100-120V +/-6% 60Hz | 100-120V +/-6% 60Hz |
| Motor | 1 x AC Trifásico | 2 x AC Trifásico | 2 x AC Trifásico |
| Potencia nominal | 95 W | 265 W | 265 W |
| Tecnología inverter (excl. Manusa) | VV-VF | VV-VF | VV-VF |
| Fusible de protección | 4 A | 4 A | 4 A |
| Temperatura de funcionamiento | -15°C a 50°C | -15°C a 50°C | -15°C a 50°C |
| Baterías antipánico (abrir/cerrar) recargable | 2x12 V DC 700mAh | 2x12 V DC 700mAh | 2x12 V DC 700mAh |

CARACTERÍSTICAS CINEMÁTICAS GRUPO MOTOR

| | Visio LD | Visio MD | Visio HD |
|---|----------------------|--------------------|--------------------|
| Velocidad de apertura regulable por hoja | ≤ 0,7 m/s | ≤ 1 m/s | ≤ 0,7 m/s |
| Velocidad de cierre regulable por hoja | 0,15 a 0,6 m/s | 0,15 a 0,6 m/s | 0,15 a 0,6 m/s |
| Fuerza de cierre ajustable entre | 40 N a 140 N | 40 N a 140 N | 40 N a 140 N |
| Aceleración máxima | 1,2 m/s ² | 2 m/s ² | 2 m/s ² |
| Regulación independiente velocidad/fuerza | Sí | Sí | Sí |
| Peso máximo hojas | 120 kg | 220 kg | 440 kg |

1.3 COMPATIBILIDAD

La puerta con operador VISIO es compatible prácticamente con toda la gama de accesorios **manusa**.

| MANDO | DETECCIÓN | CONTROL / OTROS |
|---|--|---|
| <ul style="list-style-type: none"> - Selector Smart. - Selector Óptima: <ul style="list-style-type: none"> · mando a distancia (opc). - Llave exterior: <ul style="list-style-type: none"> · empotrada. · de superficie. - Pulsador de apertura. - Pulsador de codo. - Paro de emergencia. | <ul style="list-style-type: none"> - Radar planar. - Radar infrarrojos. - Radar infrarrojos empotrable. - Detector de proximidad infr. - Fotocélula de seguridad. | <ul style="list-style-type: none"> - Adaptador Ethernet (Gateway) - Codificador numérico. - Interface: <ul style="list-style-type: none"> · básico. · esclusa. · según especificación del cliente. - Lector de proximidad codificado. - Mando a distancia de activación "Rolling code". - Antipánico mecánico, según norma CO-48. - Cerrojo electromecánico + desbloqueo. - Cerrojo cobertor. |

2 UTILIZACIÓN: USOS PREVISTOS Y USOS QUE DEBEN EVITARSE

El uso previsto de las puertas automáticas **manusa** es el de franquear el paso a los peatones sin que éstos deban accionar ningún mando ni componente.

Los usos prohibidos que deben evitarse son los que se enumeran a continuación:

- No modificar la puerta así como ninguno de sus componentes.
- No permitir que los niños jueguen con la puerta.
- No desconectar, manipular o poner fuera de servicio los componentes de seguridad de la puerta.
- No permitir intervenciones sobre la puerta por parte de técnicos no autorizados por **manusa**.
- No utilizar otros recambios que no sean los originales proporcionados por **manusa**.
- No utilizar ninguna parte de la puerta como elemento de apoyo a objetos y personas.

En este listado se han tenido en cuenta los malos usos razonablemente previsibles de la puerta. A pesar de ello, **manusa** no se hace responsable de los posibles accidentes o daños provocados por utilizaciones indebidas no contempladas anteriormente.

3 FUNCIONAMIENTO Y UTILIZACIÓN

3.1 EMPLAZAMIENTO. REQUISITOS FÍSICOS Y AMBIENTALES

Las puertas automáticas **manusa** deben instalarse en lugares que reúnan las siguientes condiciones:

- Suelo liso, uniforme y nivelado.
- Paredes estables y con suficiente capacidad de carga.
- Perfiles de tabiquería nivelados.
- Ausencia de vibraciones y choques en la zona de la puerta.
- Temperatura de servicio: de -15°C a +50°C.
- Humedad relativa del aire: Los componentes eléctricos y electrónicos de operadores fabricados para funcionar en climas tropicales reciben un tratamiento superficial que los protege de la humedad ambiental.

3.2 PRINCIPIOS DE FUNCIONAMIENTO

Las puertas automáticas **manusa** funcionan únicamente de forma automática. El funcionamiento manual sólo está previsto en caso de emergencia y para realizar las tareas de limpieza, mantenimiento y reglaje.

3.2.1 Puesta en servicio

Las comprobaciones y ajustes previos a la puesta en servicio de las puertas automáticas **manusa** sólo pueden llevarse a cabo por parte de personal técnico autorizado.

3.2.2 Paro normal y paro de emergencia

El paro normal de las puertas automáticas **manusa** así como su puesta en marcha se lleva a cabo de forma automática. Las situaciones de emergencia son gestionadas de forma automática por la propia máquina. No obstante, puede instalarse un paro de emergencia opcional (ver apartado 3.7).

3.3 MODOS DE OPERACIÓN Y SELECTOR DE MANDO

Modos de operación de la puerta:



Puerta abierta Ab



Puerta cerrada CE



Apertura reducida A1-A4



Puerta automática AU



Solo salir SS

Selector SMART:

Nos permite realizar el cambio de modo de operación y visualizar el estado de la puerta automática.



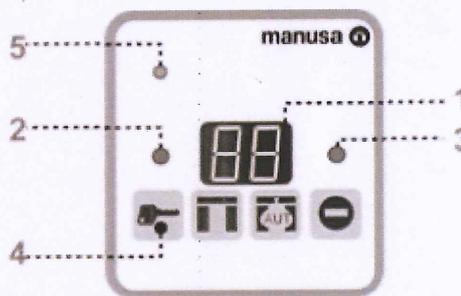
- 1. Pantalla LCD que indica el modo de operación seleccionado, en un idioma a escoger entre los siguientes: Español, Catalán, Francés e Inglés. También es posible visualizar la hora o el número de ciclos realizados. En caso de que el sistema de supervisión detecte una anomalía, visualiza mensaje y un valor numérico que indica el tipo de anomalía.

2/4. Pulsadores de selección.

3 Pulsador de confirmación.

Selector ÓPTIMA:

Nos permite realizar el cambio de modo de operación y visualizar el estado de la puerta automática.



- 1 Visualizador de 2 dígitos de 7 segmentos; indica el modo de operación seleccionado, en un idioma a escoger entre los siguientes: Español, Francés, Inglés, Alemán, Italiano, Portugués, Holandés, Catalán. En caso de que el sistema de supervisión detecte una anomalía, visualiza un valor numérico –de forma intermitente– que indica el tipo de anomalía.

2/3 Pulsadores reservados para las funciones del servicio técnico.

4 Pulsadores para selección del modo de operación.

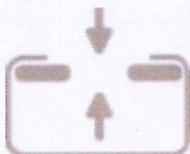
5 Receptor de infrarrojos, incorporado de serie, permite el control remoto de la puerta mediante un mando a distancia (opcional).

3.4 SELECCIÓN DEL MODO DE OPERACIÓN

Para cambiar de modo de funcionamiento, utilice el selector de mando siguiendo los pasos que se detallan a continuación.

PUERTA ABIERTA

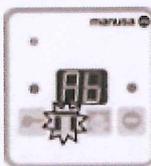
La puerta abrirá, tras lo cual, se podrán mover a mano las hojas.



Selector SMART

Pulse los botones 2 ó 4 del selector hasta que aparezca de forma intermitente el icono  y pulse el botón 3 para validar la selección.

Aparecerá en pantalla el mensaje **ABIERTO.**

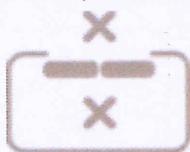


Selector OPTIMA

Pulsando el botón  del selector, aparecerá en el display **Ab.**

PUERTA CERRADA

En puertas sin cerrojo, este modo de operación cierra la puerta y libera las hojas. En puertas con cerrojo, las hojas cerrarán y quedarán bloqueadas por el mismo.



NOTA: para facilitar la salida, durante el ciclo de cierre, las hojas reabrirán si el detector o pulsador interior es activado, para luego intentar un nuevo ciclo de cierre, hasta que las hojas queden totalmente cerradas.

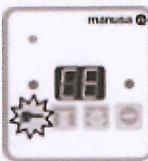
** Cuando la situación lo requiera, el Servicio Técnico puede configurar la puerta para retrasar la activación del cerrojo, dejando así un mayor margen de tiempo al usuario, para llegar a la puerta y salir del local antes de que las hojas queden bloqueadas.*



Selector SMART

Pulse los botones 2 ó 4 del selector hasta que aparezca de forma intermitente  el icono y pulse el botón 3 para validar la selección.

Aparecerá en pantalla el mensaje **CERRADO.**

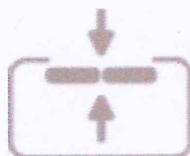


Selector OPTIMA

Pulsando el botón  del selector, aparecerá en el display **CE.**

PUERTA AUTOMÁTICA

La puerta abrirá cada vez que se active un detector, sea interior o exterior.



Selector SMART

Pulse los botones 2 ó 4 del selector hasta que aparezca de forma intermitente el icono  y pulse el botón 3 para validar la selección.

Aparecerá en pantalla el mensaje **AUTOMÁTICO.**

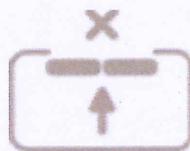


Selector OPTIMA

Pulsando el botón  del selector, aparecerá en el display **AU.**

SÓLO SALIR

La puerta abrirá, tras lo cual, se podrán mover a mano las hojas.



Selector SMART

Pulse los botones 2 ó 4 del selector hasta que aparezca de forma intermitente el icono  y pulse el botón 3 para validar la selección.

Aparecerá en pantalla el mensaje **SÓLO SALIR.**



Selector OPTIMA

Pulsando el botón  del selector, aparecerá en el display **SS.**

NOTA: si la puerta dispone de cerrojo automático, las hojas permanecerán bloqueadas mientras se encuentran en posición cerrada.

3.5- BLOQUEO DEL MODO DE OPERACIÓN

Para evitar la manipulación indeseada del modo de operación de la puerta, es posible bloquear el selector mediante el siguiente procedimiento.

BLOQUEO:

La puerta funcionará normalmente en el modo seleccionado, pero no se podrá cambiar su funcionamiento hasta que no se desbloquee el selector.

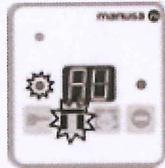
DESBLOQUEO:

La puerta funcionará normalmente en el modo seleccionado, pudiendo cambiar su funcionamiento cualquier persona que tenga acceso al selector.



Selector OPTIMA

Manteniendo pulsado el botón 2, pulsar el botón.



Selector OPTIMA

Manteniendo pulsado el botón 2, pulsar el botón.



Selector SMART

Manteniendo pulsado el botón 2 (<), pulsar el botón 4 (>).

Se visualizará en pantalla un pequeño candado.



Selector SMART

Manteniendo pulsado el botón 4 (>), pulsar el botón 2 (<). Aparecerán en pantalla cuatro dígitos. Introduzca su PIN seleccionando los dígitos con los botones 2 (<) ó 4 (>) y confirmando con el 3.

Una vez introducido el PIN correcto el desbloqueo será efectivo y desaparecerá el icono del candado de la pantalla.

3.6 APERTURA EXTERIOR MEDIANTE LLAVE (OPCIONAL)

Cuando se requiera abrir la puerta desde el exterior, incluso con la puerta en modo **CERRADO**, es necesario utilizar la llave exterior **manusa**.

La puerta abrirá automáticamente para permitir la entrada y luego cerrará para volver al modo de operación en uso.



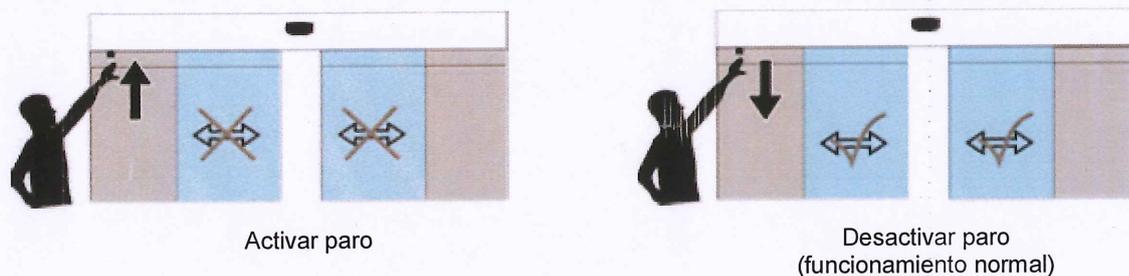
✗ Para la apertura sin alimentación de red, ver apartado 4.4

3.7 PARO DE EMERGENCIA (OPCIONAL)

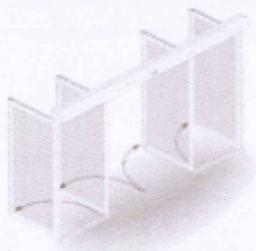
Estando seleccionado el modo **AUTOMÁTICO** o **SÓLO SALIR**, podemos provocar la detención segura de la puerta mediante la activación de un pulsador con enclavamiento (paro de emergencia).

Las hojas se detendrán en caso de que estuviesen en movimiento, y permanecerán inmóviles.

Para recuperar el estado inicial de la puerta debemos desenclavar el pulsador de paro de emergencia, tirando de él.



3.8 PUERTA CON HOJAS ANTIPÁNICO INTEGRAL (OPCIONAL)



manusa dispone de dos modelos de hoja que incorporan el sistema antipánico integral:

- SOS (S44).
- Easy SOS (S40).

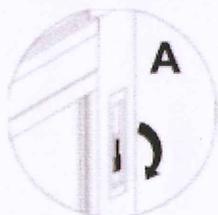
Cualquiera de estas dos carpinterías, combinadas con su operador VISIO le proporcionan una auténtica garantía de seguridad en casos de emergencia

En caso de emergencia o necesidad puntual, las hojas móviles y fijas (si las hay) son abatibles simplemente empujándolas hacia el exterior, replegándose en ambos lados y liberando una amplia área de evacuación. Para recuperar el funcionamiento normal de las puertas, basta con colocar las hojas en posición normal. En el momento de abatir las hojas, si estaban en movimiento se detendrán inmediatamente.

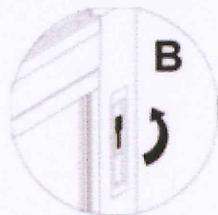
Hojas SOS S-44:

Las hojas móviles S-44 incorporan una falleba de dos posiciones.

- En la posición A, el mecanismo de antipánico integral queda bloqueado, para evitar el abatimiento de las hojas desde el exterior (puerta CERRADA).
- En la posición B, las hojas pueden abatirse libre-



BLOQUEO ABATIMIENTO



DESBLOQUEO ABATIMIENTO

ADVERTENCIA: sólo está permitido bloquear el sistema de abatimiento (falleba en posición A) si la puerta está en modo CERRADO.

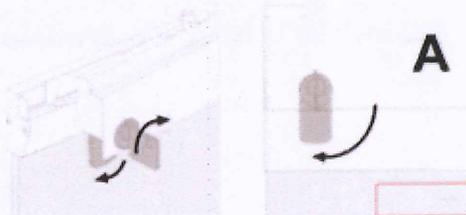
En caso de emergencia, y con las fallebas en la posición B, aplicando una fuerza sobre las hojas, éstas se abaten hacia el exterior. En el momento de abatir las hojas, si estaban en movimiento se detendrán inmediatamente.

Hojas EASY SOS S-40:

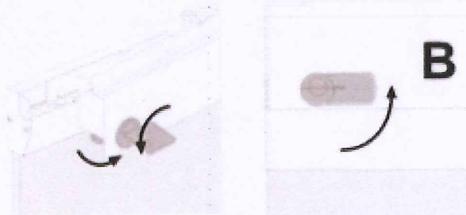
Las hojas móviles S-40 incorporan opcionalmente un pack de bombín y tapetas de seguridad para evitar el abatimiento de las hojas.

- En la posición A, el mecanismo de antipánico integral queda bloqueado, para evitar el abatimiento de las hojas desde el exterior (puerta CERRADA).
- En la posición B, las hojas pueden abatirse libre-

BLOQUEO ABATIMIENTO



DESBLOQUEO ABATIMIENTO



ADVERTENCIA: sólo está permitido bloquear el sistema de abatimiento (falleba en posición A) si la puerta está en modo CERRADO. El bombín en posición de bloqueo sólo evita el abatimiento de las hojas móviles; para bloquear además el abatimiento de las hojas fijas, las hojas móviles deben estar cerradas por completo.

En caso de emergencia, y con el bombín en la posición B, aplicando una fuerza sobre las hojas, éstas se abaten hacia el exterior. En el momento de abatir las hojas, si estaban en movimiento se detendrán inmediatamente.

4 SEGURIDAD

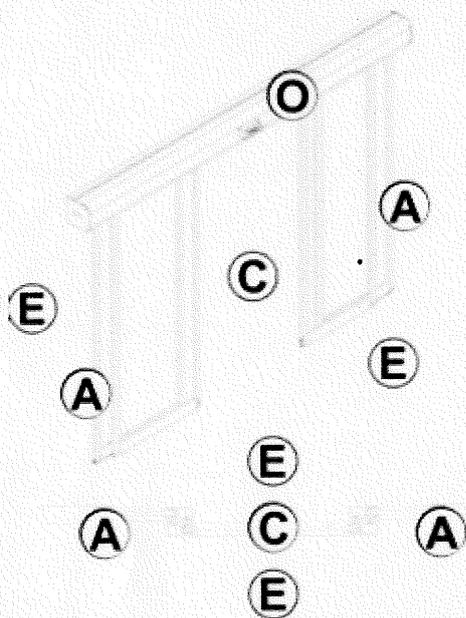


El operador VISIO dispone de múltiples funciones de seguridad auxiliares:

- Conexión para alarma de incendios: la puerta abrirá aunque esté cerrada y sin tensión de red.
- Protección del movimiento de apertura:
 - El operador está preparado para gestionar la señal de sensores de presencia en la zona de apertura.
 - Una señal acústica intermitente advierte al peatón cuando éste se encuentra en medio de la trayectoria de apertura de las hojas móviles.
 - Si la puerta está abriendo, se ralentiza la apertura.

Para otras indicaciones relativas a la seguridad de su puerta, diríjase al manual específico de seguridad de la misma.

4.1 IDENTIFICACIÓN DE LAS ZONAS PELIGROSAS DE LA MÁQUINA



La hoja u hojas móviles de una puerta automática, son partes pesadas en movimiento que presentan zonas peligrosas que es necesario conocer.

- (A)** ZONA DE APERTURA
- (C)** ZONA DE CIERRE
- (O)** ZONA DEL OPERADOR
- (E)** ENTORNO DE LA PUERTA

4.2 MEDIDAS DE SEGURIDAD QUE DEBEN SER TOMADAS POR EL USUARIO.

- 1.- Mantener el orden y la limpieza en el entorno de la puerta.
- 2.- No utilizar ninguna parte de la puerta como elemento de apoyo de objetos o personas.

4.3 RIESGOS RESIDUALES.

El diseño de la puerta **manusa** ha tenido como objetivo primordial la reducción de los posibles riesgos, en primer lugar mediante la eliminación del peligro y a continuación mediante la reducción del riesgo. Para ello se ha seguido el siguiente orden:

- Prevención intrínseca y diseño seguro.
- Medidas de protección para aquellos riesgos que no pueden ser eliminados mediante la prevención intrínseca.
- Medidas de información sobre los riesgos residuales que no pueden ser protegidos suficientemente.
- Medidas y precauciones suplementarias.

Tras este proceso de diseño, la puerta presenta un riesgo residual que no ha podido ser totalmente eliminado:

Riesgo: Impacto en la zona de apertura.

Medidas de reducción del riesgo:

- Instalar la puerta respetando las medidas de seguridad indicadas en el manual de instalación.
- Instalar resguardos fijos en la zona de apertura que impidan el acceso de personas a la zona peligrosa.

4.4 PROCEDIMIENTO ANTE UN FALLO DE ALIMENTACIÓN.

PUERTA SIN CERROJO

Para abrir la puerta desde el exterior sin alimentación, basta con accionar las hojas manualmente.

- Tras el fallo de tensión, la puerta abrirá o cerrará automáticamente, mediante las baterías, según la configuración programada por el Servicio Técnico*, excepto cuando el fallo de alimentación se produce en modo **CERRADO**, en cuyo caso la puerta permanecerá cerrada.
- Durante la ausencia de alimentación, la puerta podrá abrirse o cerrarse manualmente.
- Al retorno de la tensión, la puerta volverá a funcionar en el último modo de operación seleccionado.

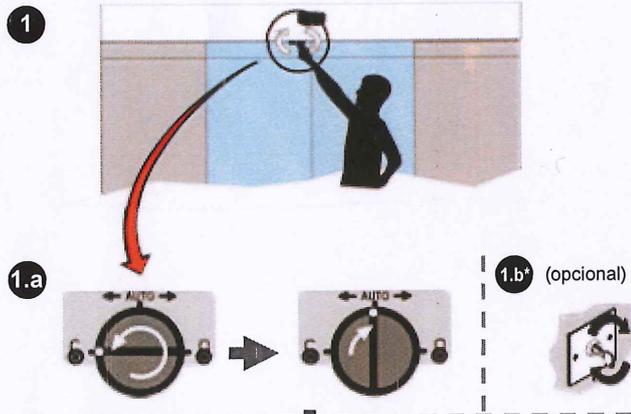
PUERTA CON CERROJO

* La configuración por defecto es abrir, para facilitar la evacuación en caso de corte de tensión.

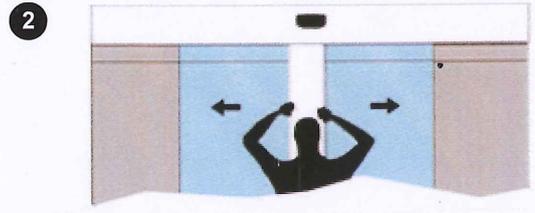
- Tras el fallo de tensión, la puerta abrirá o cerrará automáticamente, mediante las baterías, según la configuración programada por el Servicio Técnico*, excepto cuando el fallo de alimentación se produce en modo **CERRADO**, en cuyo caso la puerta permanecerá cerrada.
- Durante la ausencia de alimentación, la puerta se podrá abrir o cerrar manualmente y además, se podrán bloquear o desbloquear las hojas activando el cerrojo mediante el selector de accionamiento manual, o mediante la llave exterior (opcional). Para ello se deben seguir los siguientes pasos:

Abrir puerta

1.- Accionar el selector del cerrojo (1.a), o accionar la llave exterior (1.b*).

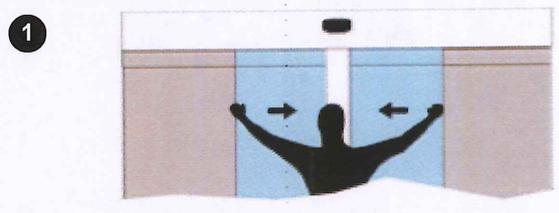


2.- Abrir manualmente la puerta separando las hojas.

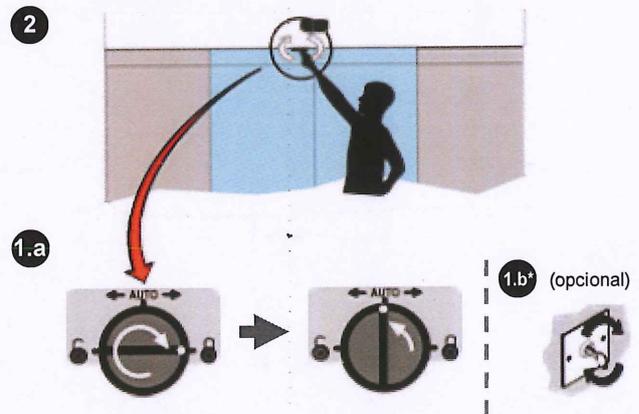


Cerrar puerta

1.- Cerrar manualmente la puerta juntando las hojas.



2.- Accionar el selector del cerrojo (2.a), o accionar la llave exterior (2.b*).



Al retorno de la tensión, la puerta detectará si el cerrojo está bloqueando las hojas:

- Con el cerrojo bloqueando las hojas, la puerta cambia a modo cerrado, indistintamente del modo en que estuviera la puerta antes de producirse el fallo de alimentación.
- Con el cerrojo sin bloquear las hojas, la puerta continuará funcionando según el último modo de operación seleccionado.

5 MANTENIMIENTO

El mantenimiento de la puerta **manusa** sólo puede llevarse a cabo por parte de personal técnico autorizado. Las tareas de mantenimiento reservadas al usuario son, exclusivamente, las de mantenimiento del orden y la limpieza en la zona de la puerta.

5.1 RECAMBIOS

Todos los recambios deben ser originales **manusa** y deben ser instalados por un técnico autorizado.

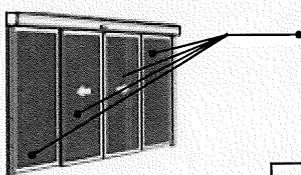
manusa no se hará responsable en ningún caso de los daños que puedan ser ocasionados por el no cumplimiento de dichas pautas.

5.2 ACCIONAMIENTO MANUAL - LIMPIEZA DE LA PUERTA

El mantenimiento periódico junto con la limpieza adecuada de los diferentes elementos de su puerta automática **manusa** le permitirán disfrutar de su producto en óptimas condiciones durante una extensa vida útil.

- Para proceder a la limpieza del producto, seleccione mediante su selector de mando el modo de operación Puerta **ABIERTO**. De esta manera podrá mover libremente las hojas de su puerta para una limpieza más cómoda y sencilla.
- Para restablecer el funcionamiento normal de la puerta seleccionar el modo de operación Puerta **AUTOMÁTICA**.

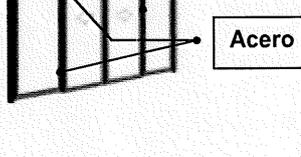
A continuación se detallan algunas indicaciones para la correcta limpieza de las distintas partes del producto.



Vidrio Limpiar con agua caliente jabonosa o con cualquier limpiacristales comercial frotándolo con un paño suave. Si está muy sucio se pueden agregar unas gotas de vinagre o de amoníaco. Tenga cuidado de no aplicar ningún producto químico a las juntas de goma que enmarcan el vidrio de las hojas.



Aluminio En el mercado se encuentran productos específicos ideales para renovar el aluminio, sea anodizado o lacado, devolviéndole el brillo sin peligro para cristales y juntas. Debe evitarse totalmente la utilización de productos ácidos o básicos, abrasivos o calientes. Para instalaciones interiores es suficiente mantener limpias las superficies con un paño limpio o con agua fría jabonosa y aclarar posteriormente secando con un paño. Para instalaciones exteriores se pueden utilizar productos sintéticos neutros aplicándolos con un paño suave y aclarando con agua fría.



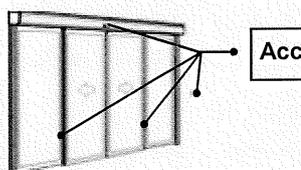
Acero Inoxidable En el caso de que alguna de las partes de su puerta (hojas y operador) esté forrada en acero inoxidable, debe tener en cuenta los siguientes requisitos de limpieza. El acero inoxidable requiere un mantenimiento mínimo. Limpiar con:

- Paño suave o una esponja humedecidos en agua jabonosa.
- Bayeta de microfibra ligeramente humedecida.
- Para manchas más difíciles, utilizar un limpiador cremoso normal.
- Secar la superficie mojada para evitar marcas de agua y cal.

- No utilizar:

- Productos abrasivos ni disolventes.
- Estropajos de lanas de acero.
- Lejías y limpiadores que contengan cloruros

En caso de utilizar algún ácido o disolvente, enjuagar muy bien con agua neutra. Existen cremas abrillantadoras que crean una capa de cera microscópica, aunque muy resistente, que facilita en gran medida la limpieza y puede llegar a durar varios meses.



Accesorios La limpieza de los diferentes elementos de mando o detección que incorpora la puerta debe realizarse siempre con un paño ligeramente humedecido. En ningún momento debe verterse líquido sobre ninguno de dichos accesorios.

5.3 PUESTA FUERA DE SERVICIO, DESMANTELAMIENTO Y RETIRADA

La máquina es fácilmente desmontable y su puesta fuera de servicio no reviste dificultades. Se procederá desmontando la máquina por elementos y realizando una correcta gestión de residuos al retirarlos.

Se debe desconectar el aparato de la red eléctrica antes de retirar las baterías.

Las baterías deben ser destruidas de forma segura.



6 INDICACIÓN DE ANOMALÍAS 

Selector OPTIMA:



En caso de que el programa supervisor detecte anomalías en el funcionamiento de la puerta, aparece intermitente en el visualizador un código numérico.

Selector SMART:



En caso de que el programa supervisor detecte anomalías en el funcionamiento de la puerta, aparece intermitente en el visualizador un código numérico.

En la mayoría de los casos, para reanudar el funcionamiento de la puerta bastará con seleccionar el modo puerta abierta y seguidamente el modo puerta automática. Si tras esta operación persiste la anomalía, será necesario recurrir al servicio técnico autorizado de manusa.

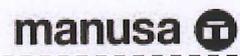
| ANOMALÍA  | CAUSA POSIBLE | CORRECCIÓN |
|--|---|---|
| EXCESO DE CORRIENTE EN EL MOTOR 0001 Exceso de corriente en motor | a. Tensión de red excesiva. b. Cortocircuito en el motor o circuito electrónico. | Reanudar cambiando a modo manual y seguidamente modo automático. |
| SOS 0002 Señal de emergencia activada | a. Hojas SOS abatidas. b. Pulsador de emergencia activado. | a. Verificar posición hojas SOS. b. Verificar pulsador emergencia. |
| OBST CERRAR 0003 Bloqueo al cerrar | Obstáculo en el ciclo de cierre. | Verificar obstáculo de cierre. Reanudar cambiando a modo manual y seguidamente modo automático. |
| LLAVE EXTERIOR 0004 Llave exterior activada | No se ha retirado la llave exterior del dispositivo. | Retirar la llave del dispositivo de llave exterior. |
| MEM PARAM PUERTA 0005 Memoria parámetros | Falla la memoria de parámetros. | Avisar al Servicio Técnico. |
| OBST. ABRIR 0006 Bloqueo al abrir | Obstáculo en el ciclo de apertura. | Verificar obstáculo al abrir. Reanudar cambiando a modo manual y seguidamente modo automático. |
| FOTOCELULA 0008 Barrera de infrarrojos | Las barreras de infrarrojos están obturadas durante un tiempo > 1'. | Verificar alineación de las barreras de infrarrojos. |
| ALARMA DE INCENDIO 0009 Alarma de incendios | Señal de alarma de incendio activada. | Verificar sistema de alarma de incendios. |
| BATERIA DESCAR 0011 Sistema de antipánico | a. Batería poco cargada. b. Tensión de red baja. | En caso de haber tenido desconectada la puerta, dejar cargar la batería. Si la indicación es permanente avisar al Servicio Técnico. |

| ANOMALÍA  | CAUSA POSIBLE | SOLUCIÓN |
|---|--|--|
| RADAR INTERIOR 0012 Anomalía en radar interior | Contacto radar permanentemente cerrado durante un tiempo > 1'. | Avisar al Servicio Técnico. |
| RADAR EXTERIOR 0013 Anomalía en radar exterior | Contacto radar permanentemente cerrado durante un tiempo > 1'. | Avisar al Servicio Técnico. |
| FOTOCEL 3 0014 Barrera de infrarrojo 3 | La tercera barrera de infrarrojos está obturada. | Avisar al Servicio Técnico. |
| CONTROL MOTOR 0015 Anomalía de control de motor | Fallo de la electrónica que controla el motor. | Reanudar cambiando de modo automático a modo manual. Si persiste el problema avisar al Servicio Técnico. |
| SENSOR LATERAL 0016 Seguridad apertura | Señal de seguridad de apertura activada. | Verificar que no haya ningún objeto en el radio de detección del sensor. |
| La pantalla LCD no se ilumina | El selector no está alimentado. | Verificar la alimentación de la puerta. |
| CARGANDO DATOS ----- El fallo de comunicación aparece cuando en la pantalla aparece por tiempo indefinido el mensaje: "cargando datos" | No hay comunicación con el operador. | Avisar al Servicio Técnico. |

NOTA: Las características reflejadas en este documento se dan a título informativo, y no tienen carácter contractual.

El fabricante se reserva el derecho a modificaciones sin previo aviso.

Última revisión: Mayo 2010



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7 ANEXOS

7.1 DECLARACIÓN CE DE CONFORMIDAD



DECLARACIÓN CE DE CONFORMIDAD

Fabricante: MANUSA DOOR SYSTEMS

Dirección: Av. Vía Augusta, 85-87, 6ª planta
08174 – Sant Cugat del Vallès
Barcelona, España
Tel 902 321 400
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Producto: Operador Visio. Operador para puertas automáticas peatonales.

Modelos: Visio
Visio Hermético
Visio 100

Mediante este documento declaramos, bajo nuestra única responsabilidad, que los productos indicados y referenciados se hallan de conformidad con las siguientes directivas europeas:

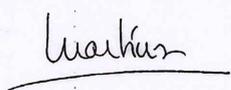
2006/42/CE Directiva máquinas.
305/2011/CE Reglamento de productos de construcción.
2004/108/CE Directiva de compatibilidad electromagnética.
2006/95/CE Directiva de equipos de baja tensión.

Asimismo, se han aplicado las siguientes normas armonizadas y normas de especificación técnica:

Código Técnico de la Edificación. Documento Básico SUA. Seguridad de Utilización y Accesibilidad
Código Técnico de la Edificación. Documento Básico SI. Seguridad contra incendios: Puertas situadas en recorridos de evacuación.
Código Técnico de la Edificación. Documento Básico HR. Protección frente al ruido
Código Técnico de la Edificación. Documento Básico SE. Seguridad Estructural
UNE-EN 16005
UNE 85121. Puertas peatonales automáticas. Instalación, uso y mantenimiento.
UNE-EN 60335-1
IEC 60335-2-103
UNE-EN 61000-3-2/3-3/6-2/6-3
UNE-EN ISO 13849-1/2
UNE EN ISO 12100-1/2
UNE-EN ISO 13857
UNE-EN ISO 14121-1/2
UNE-EN 1037

Se incluye el marcado CE en el producto para indicar su conformidad con los requisitos esenciales de las directivas que le aplican. Esta declaración de conformidad implica que la instalación y puesta en marcha de la máquina designada se ha realizado según las instrucciones de montaje, funcionamiento y mantenimiento del fabricante.


Josep Mª Guilera
Director General
Sant Cugat del Vallès, diciembre de 2013


Francesca Martínez
Normalización de producto

User Manual

AUTOMATIC SLIDING DOOR with VISIO Op.

0 INDEX



Read this instruction manual before use.

In this manual you will find all the necessary information for the correct use of the product.

Keep this manual in a safe place for later referral.

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- 1.1 INTRODUCTION
- 1.2 TECHNICAL FEATURES
- 1.3 COMPATIBILITY

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1 MACHINE IDENTIFICATION

1.1 INTRODUCTION

All **manusa** automatic doors have been designed to ease a quick, safe and controlled access for pedestrians to all type of installations.

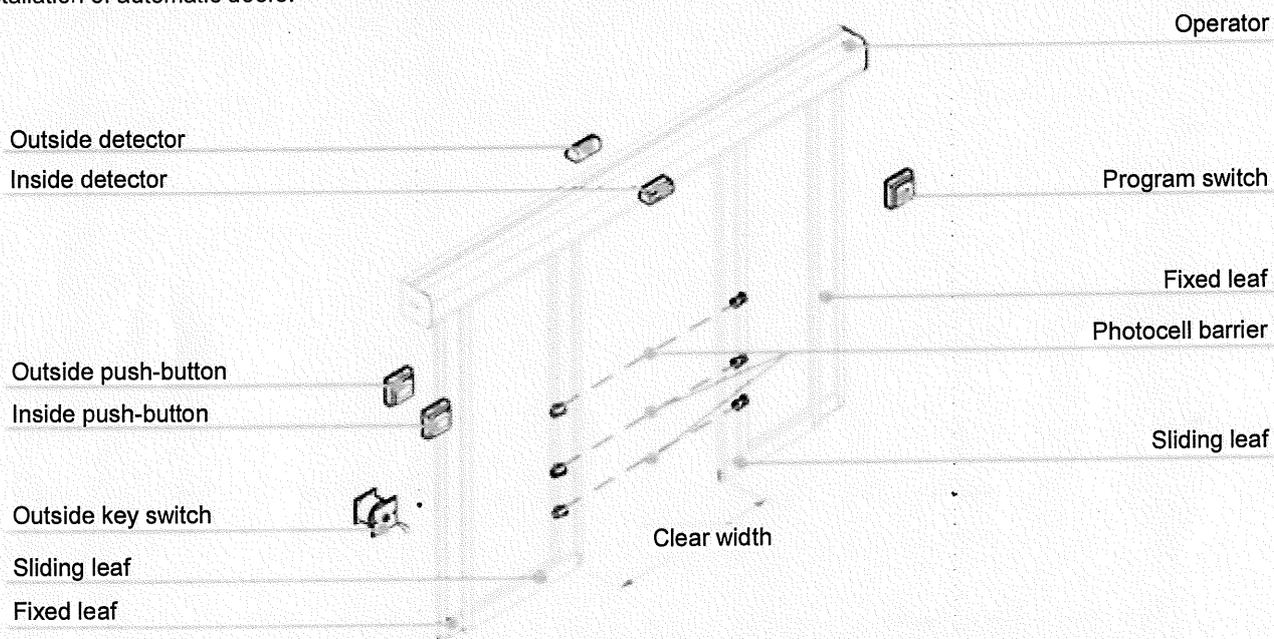
The VISIO operator has been designed paying special attention to the design:

- low visual impact thanks to its reduced dimensions.
- improved integration with other architectural elements.
- possibility to operate the door using the user-friendly SMART program switch, which incorporates a large LCD screen.

This manual contains all basic instructions for the correct use of the automatic door. Please read it with special attention, and in case of doubts or questions, please call an authorized technical service.

For your own safety, please observe the technical instructions described in this manual. **manusa** does not hold any responsibility for damages or break-downs caused by non observing instructions herein.

We thank you for your confidence in **manusa**, a company with more than 40 years of experience in the design, production and installation of automatic doors.



1.2 TECHNICAL FEATURES

ELECTRICAL FEATURES

| | Visio LD | Visio MD | Visio HD |
|----------------------------------|---------------------|---------------------|---------------------|
| Power supply | 220-240V +/-6% 50Hz | 220-240V +/-6% 50Hz | 220-240V +/-6% 50Hz |
| Optional power supply | 100-120V +/-6% 60Hz | 100-120V +/-6% 60Hz | 100-120V +/-6% 60Hz |
| Motor | 1 x AC Trifásico | 2 x AC Trifásico | 2 x AC Trifásico |
| Rated power | 95 W | 265 W | 265 W |
| Inverter technology | VV-VF | VV-VF | VV-VF |
| Fuse protection | 4 A | 4 A | 4 A |
| Operating temperature | -15°C a 50°C | -15°C a 50°C | -15°C a 50°C |
| Fail-safe batteries (open/close) | 2x12 V DC 700mAh | 2x12 V DC 700mAh | 2x12 V DC 700mAh |

MOTOR FEATURES

| | Visio LD | Visio MD | Visio HD |
|--------------------------------------|----------------------|--------------------|--------------------|
| Opening speed (adjustable), per leaf | ≤ 0,7 m/s | ≤ 1 m/s | ≤ 0,7 m/s |
| Closing speed (adjustable), per leaf | 0,15 a 0,6 m/s | 0,15 a 0,6 m/s | 0,15 a 0,6 m/s |
| Closing force adjustable from | 40 N a 140 N | 40 N a 140 N | 40 N a 140 N |
| Maximum acceleration | 1,2 m/s ² | 2 m/s ² | 2 m/s ² |
| Independent speed/force regulator | Si | Si | Si |
| Maximum leaf weight | 120 kg | 220 kg | 440 kg |

1.3 COMPATIBILITY

All doors equipped with a VISIO operator are compatible with practically the entire range of **manusa** accessories.

| ACTIVATION | DETECTION | CONTROL / OTHER |
|---|---|---|
| <ul style="list-style-type: none"> - Smart Selector. - Optima selector: <ul style="list-style-type: none"> · remote control (optional) - Outside key switch: <ul style="list-style-type: none"> · flushed mounted · surface mounted - Opening push button. - Elbow switch. - Emergency stop. | <ul style="list-style-type: none"> - Planar radar (microwave) - IR sensor - Flushed IR sensor - IR touch-less switch . - Safety photocell. | <ul style="list-style-type: none"> - Ethernet Adapter (Gateway) - Numeric key-pad - Interface: <ul style="list-style-type: none"> · Basic. · Airlock · Special, programmed to client specifications. - Proximity badge reader. - Remote control with rolling code - Mechanical fail-safe (CO-48) - Electromechanical lock with manual release. - Cover lock |

2 USE: USES INCLUDED AND USES THAT SHOULD BE AVOIDED

manusa automatic doors are designed to allow passage of pedestrians without the need for pedestrians to activate any controls or components.

Prohibited uses that should be avoided are listed below:

- Do not modify the door or any of its components.
- Do not allow children to play with the door.
- Do not disconnect, manipulate or decommission any of the door's safety components.
- Do not allow technicians not authorised by **manusa** to perform work on the door.
- Do not use spare parts that are not original and supplied by **manusa**.
- Do not use any part of the door as a support for objects or persons.

This list includes inappropriate uses of the door that are reasonably foreseeable. Despite this, **manusa** shall not be held responsible for possible accidents or damage caused by inappropriate uses that are not included in the list above.

3 OPERATION AND USE

3.1 LOCATION, PHYSICAL AND ENVIRONMENTAL REQUIREMENTS

manusa automatic doors must be installed in locations that meet the following conditions:

- Smooth, even and levelled floors.
- Stable walls with sufficient load capacity.
- Levelled partitioning.
- Absence of vibrations and impacts on the door area.
- Service temperature: from -15°C to +50°C.
- Relative air humidity: The electric and electronic components of operators manufactured to operate in tropical climates receive a surface treatment that protects them from environmental humidity.

3.2 OPERATING PRINCIPLES

manusa automatic doors operate only in automatic mode. Manual operation is only available in the event of an emergency and to perform cleaning, maintenance and adjustment tasks.

3.2.1 Commissioning

Checks and adjustments prior to the commissioning of **manusa** automatic doors can only be performed by authorised technical personnel.

3.2.2 Normal stop and emergency stop

Commissioning and normal stop of **manusa** automatic doors is performed automatically. Emergency situations are managed automatically by the equipment itself. However, an optional emergency stop can be installed (see Section 3.7).

3.3 OPERATING MODES AND COMMAND SELECTOR

Operating principles:



Open OP



Close CL



Reduction opening A1-A4



Automatic AU



Exit Only EO

SMART selector:

This device is used to change the operating mode and show the status of the automatic door.

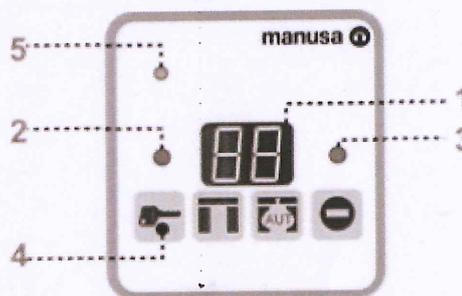


- 1** LCD screen: shows the operating mode in use, in a language which can be configured to Spanish, Catalan, French and English. It can be configured to show the actual time and number of opening cycles in a day. If the self-monitoring system detects a malfunction, a message and numeric code is shown on the display to identify the type of malfunction.

- 2/4** Menu navigation buttons.
- 3** Button to confirm selection.

OPTIMA selector:

The device is used to change the operating mode and show the status of the automatic door.

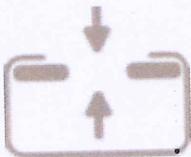
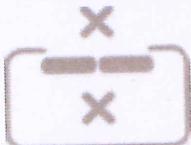
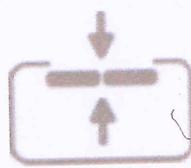
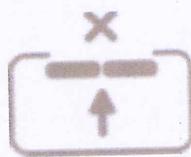


- 1** 2-digit / 7 segments display. Shows the operating mode in use in a language which can be configured to Spanish, French, English, German, Italian, Portuguese, Dutch, Catalan. If the self-monitoring system detects a malfunction, an intermittent numeric code is shown on the display to identify the type of malfunction.

- 2/3** Buttons to Access the Technical Service functions (reserved for authorized service technicians only)
- 4** Buttons to select the operating mode.
- 5** Infra-red receiver, included as standard, to control the door from a remote control (optional)

3.4 OPERATING MODE SELECTION

To change the operating mode, use a program switch and proceed as indicated below.

| | |
|---|--|
| <p>DOOR OPEN </p> <p>The door will open. With the door in open position, the leaves can be moved manually.</p>  | <p>SMART selector Press buttons 2 or 4 until you see  blinking. Then press 3 to validate your selection. Message OPEN will show on the display.</p>  |
| <p>DOOR CLOSED </p> <p>In doors without automatic lock, this operating mode will close the door and let the doors free. In doors equipped with an automatic lock, the leaves will lock and remain blocked.</p>  <p><i>REMARK: to ease the exit of people, during the closing cycle the leaves will reopen if the inside detector or push button is activated. After reaching the open position, the door will close again until they close fully.</i> * When necessary, an authorized Technical Service technician may configure the door to delay the activation of the automatic lock, to allow the user reach the door and exit before the leaves get blocked by the automatic lock.</p> | <p>SMART selector Press buttons 2 or 4 until you see  blinking. Then press 3 to validate your selection. Message CLOSE will show on the display.</p>  |
| <p>AUTOMATIC DOOR </p> <p>The door will open every time an activation device (interior or exterior) is triggered.</p>  | <p>SMART selector Press buttons 2 or 4 until you see  blinking. Then press 3 to validate your selection. Message AUTOMATIC will show on the display.</p>  |
| <p>EXIT ONLY </p> <p>The door will only open when an interior activation device is triggered..</p>  <p><i>NOTE: if the door is equipped with an automatic lock, the door leaves will remain blocked while they keep in closed position.</i></p> | <p>SMART selector Press buttons 2 or 4 until you see  blinking. Then press 3 to validate your selection. Message EXIT ONLY will show on the display.</p>  |
| | <p>OPTIMA selector Press button  on the selector. EO will show on the display.</p>  |

3.5 HOW TO BLOCK THE PROGRAM SWITCH

To prevent undesired manipulation of the operating mode, the keypad can be locked by taking the following steps:

LOCK:
The door will work normally in the selected mode but the operating mode can not be changed until the selector is unlocked.

OPTIMA selector
Hold button 2 pressed, then press the button 

SMART selector
Hold button 2 (<) pressed, then press button 4 (>).
A small lock will show in the display 

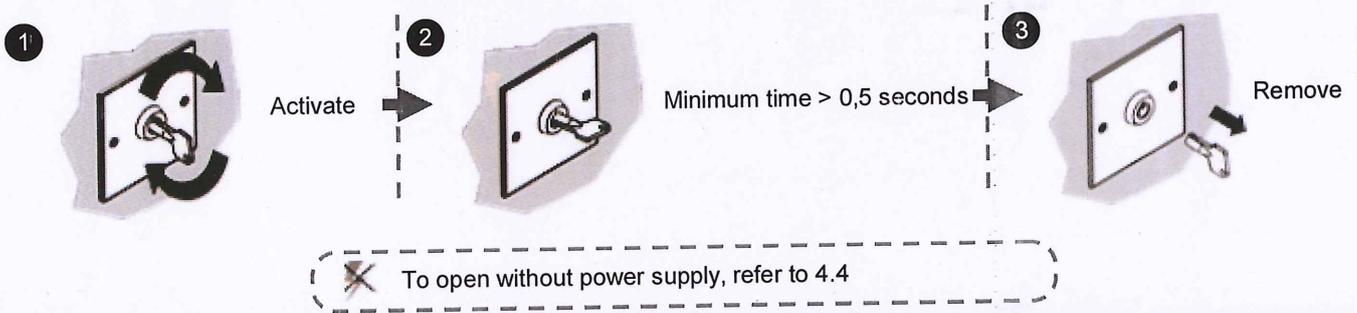
UNLOCK:
The door will work normally in the selected mode and anybody with access to the selector can change the operating mode.

OPTIMA selector
Hold button 2 pressed, then press the button 

SMART selector
Hold button 4 (>) pressed, then press button 2 (<). Four digits will appear on the screen. Enter your PIN code by selecting the digits with buttons 2 (<) or 4 (>) and confirm with button 3.
Once the correct PIN has been entered, the selector will be unlocked and the lock will disappear from the screen.

3.6 OPENING FROM THE OUTSIDE WITH A KEY SWITCH (OPTIONAL)

When the door needs to be inserted from the outside, even with it is in **CLOSED** mode, it is necessary to use the **manusa** outside key switch.
The door will open automatically to allow entry, and then close and resume previous operating mode.

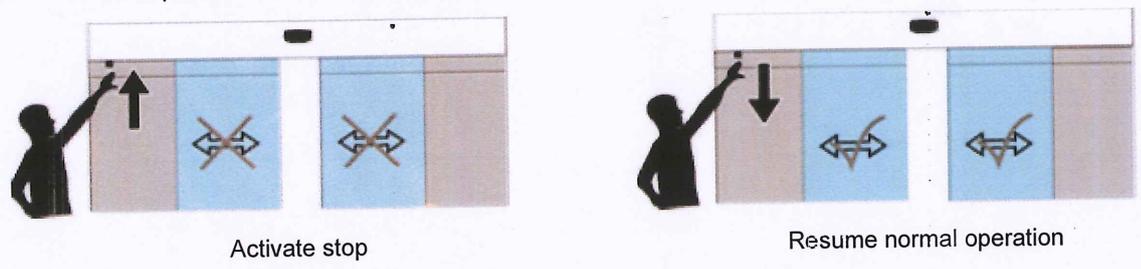


3.7 EMERGENCY STOP (OPTIONAL)

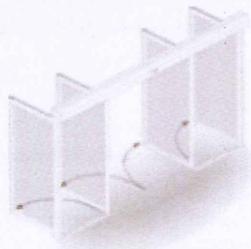
When operating in **AUTOMATIC** and **EXIT ONLY** modes, we can stop the door by activating an interlock button (emergency stop).

If they are moving, the door leaves will stop and remain still.

To resume normal operation, the emergency stop button must be unlatched by pulling the button.



3.8 DOORS EQUIPPED WITH PANIC BREAK-OUT LEAVES (OPTIONAL)



manusa has two models of panic break-out leaves:

- SOS (S44).
- Easy SOS (S40).

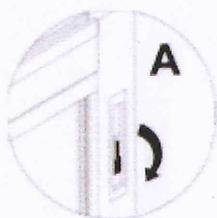
Either of these models in combination with VISIO operator provides an authentic safety guarantee in the event of emergencies.

In the event of emergency or another specific need, both the sliding and fixed (if there are any) leaves can be swung open by simply pushing them outwards and folding them to the sides to open up a large evacuation area. To restore normal door operation, simply place the panels in their normal position. If the panels are moving when they are swung open, they will stop immediately.

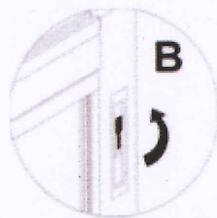
S-44 break-out leaves:

S-44 sliding leaves break-out device include a latch with two positions.

- In **position A**, the integrated panic break-out device is locked to prevent the doors from being folded from the outside (door **CLOSED**).
- In **position B**, the doors can be folded freely.



LEAF LOCKED



LEAF UNLOCKED

WARNING: The break-out system can only be locked (latch in position A) if the door is in the **CLOSED** mode.

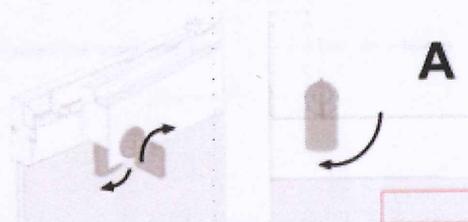
In the event of an emergency, with the latches in **position B**, the door leaves can be swung by applying force outwards. If the door leaves are moving when they are pushed outwards, they will immediately stop.

EASY SOS S-40 break-out leaves:

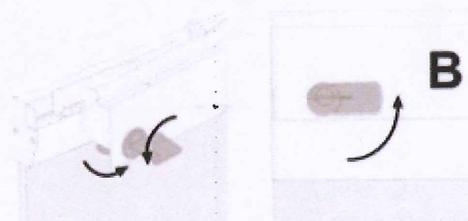
The S-40 mobile leaves can optionally include a cylinder and safety covers pack to prevent the leaves from closing.

- In **position A**, the integrated panic break-out device is locked to prevent the doors from being folded from the outside (door **CLOSED**).
- In **position B**, the doors can be folded freely.

LEAF LOCKED



LEAF UNLOCKED



WARNING: The break-out system can only be locked (key in position A) if the door is in the **CLOSED** mode.

When the cylinder is in the lock position, it only prevents the mobile leaves from opening; to also lock the fixed leaves, the mobile leaves must be completely closed.

In the event of an emergency, with the keys in **position B**, the door leaves can be swung by applying force outwards. If the door leaves are moving when they are pushed outwards, they will immediately stop.

4 SAFETY

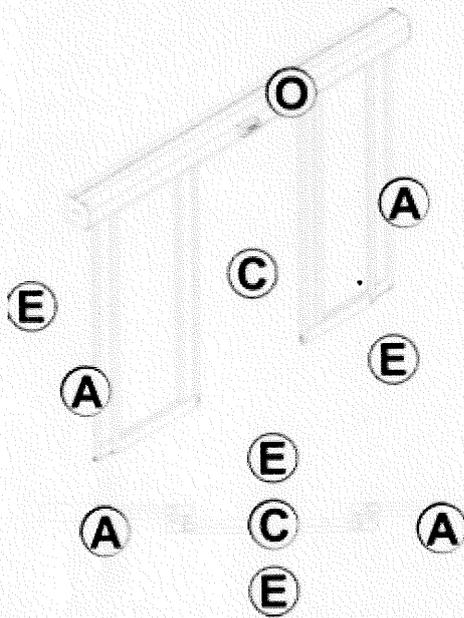


The VISIO operator has multiple auxiliary safety functions:

- Fire alarm connection: the door opens even if it is closed and without power supply.
- Opening movement protection:
 - The operator is prepared to manage the presence detector signal in the opening area.
 - An intermittent acoustic warning is activated if a pedestrian interrupts the opening path on the sliding leaves.
 - If the door is opening, it slows down.

For further information regarding the safety of your door, please refer to the specific door safety manual.

4.1 IDENTIFICATION OF RISK AREAS



The sliding leaves of automatic door are heavy moving parts that present possible hazards that should be known.

- (A) OPENING AREA
- (C) CLOSING AREA
- (O) OPERATOR AREA
- (E) DOOR AREA

4.2 SAFETY MEASURES THAT MUST BE TAKEN BY THE USER

- 1.- Keep the door area tidy and clean.
- 2.- Do not use any part of the door as a support for objects or persons.

4.3 RESIDUAL RISKS

The primary purpose of the **manusa** door design is to reduce possible risks, first by eliminating the dangers and then by reducing risks. This has been done in the following order:

- Intrinsic prevention and safe design.
- Protective measures for risks that can not be eliminated by intrinsic prevention.
- Informative measures about residual risks that can not be sufficiently protected.
- Supplementary measures and precautions.

After this design process, the door presents a residual risk that has not been completely eliminated:

Risk: Impact in the opening area.

Measures to reduce the risk:

- Install the door according to the safety measures indicated in the installation manual.
- Install guards in the opening area that impede access of persons to the danger area.

4.4 PROCEDURE IN THE EVENT OF A POWER FAILURE.



DOOR WITHOUT LOCK



To open the door from the outside without power supply, simply move the door leaves by hand to open position.

- After a power failure, the door will open or close automatically using batteries according to the settings programmed by the Technical Service*, except when the power failure occurs in **CLOSED** mode, in which case the door will remain closed.
- During power failure: the door can be opened or closed by hand.
- When the power is restored, the door will work in the most recent operating mode selected.



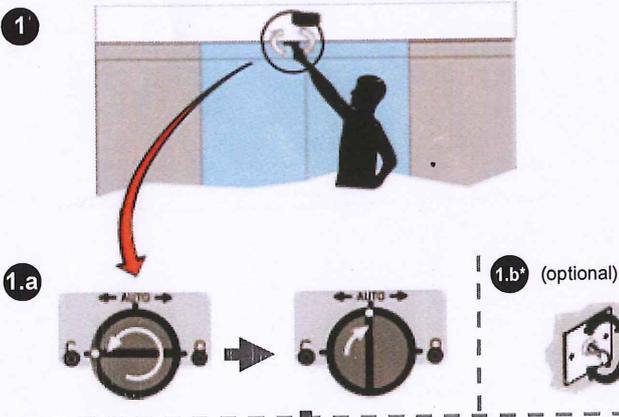
DOOR WITH LOCK

* Default configuration is to open, in order to facilitate evacuation in the event of power failure.

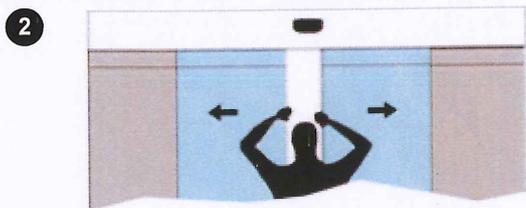
- After a power failure, the door will open or close automatically using the batteries, according to the settings programmed by the Technical Service*, except when the power failure occurs in **CLOSED** mode, in which case the door will remain closed.
- During power failure: the door can be opened or closed by hand. In addition, the door leaves can be locked or unlocked by activating the lock using the manual release switch or the exterior key switch (optional). To do so, take the following steps:

Open door.

- 1.- Activate the lock release switch (1.a), or activate the exterior key (1.b*).

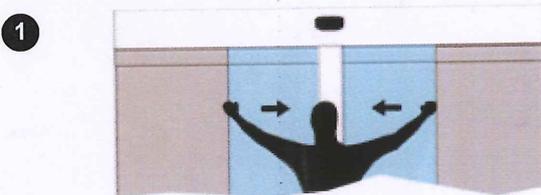


- 2.- Open the door by separating the door leaves by hand.

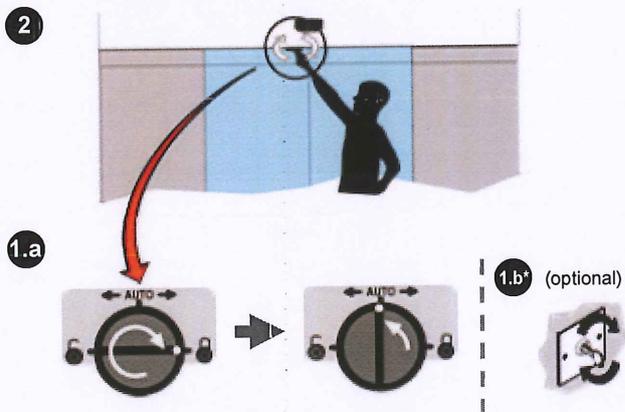


Close door

- 1.- Close the door by joining the door leaves by hand.



- 2.- Activate the lock release switch (2.a), or activate the exterior key switch (2.b*).



When the power is restored, the door will detect whether the lock is blocking the door leaves::

- If the lock is blocking the door leaves, the door changes to close mode, regardless of the Operating mode of the door prior to power failure.
- If the lock is not blocking the door leaves, the door resumes operation with last operating mode selected.

5 MAINTENANCE

Maintenance of the **manusa** door can only be carried out by authorised technical personnel.

The maintenance tasks reserved for users are exclusively restricted to keeping the door area tidy, clear and clean.

5.1 SPARE PARTS

All spare parts must be **manusa** original parts and must be installed by an authorised technician.

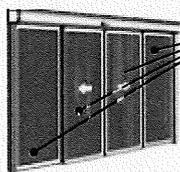
manusa is not responsible under any circumstances for damage that may be caused by non-compliance with these guidelines.

5.2 MANUAL OPERATION - DOOR CLEANING

Regular maintenance and proper cleaning of the various elements of your automatic **manusa** door will allow you to enjoy your product in top condition and with an extended service life.

- To begin cleaning the door, select the door **OPEN** operating mode on the selector. This allows you to move the door leaves freely for simpler and more convenient cleaning.
- To restore normal door operation, select the **AUTOMATIC** door operating mode.

Below we include detailed instructions for cleaning the various product components.



Glass

Clean with a soapy hot water or rub with a glass cleaning product and a soft cloth. If the glass is very dirty, add drops of vinegar or ammonium. Be careful not to apply any chemical products to the rubber sealing in the glass door frames.



Aluminium

There are plenty of suitable products on the market that are specific for restoring aluminium, whether anodised or lacquered, and giving it back its lustre without damaging the glass or sealing.

The use of acid, base, abrasive or hot products should be completely avoided. For indoor installations, simply keep the surface clean with a clean cloth or soapy cold water and rinse and dry afterwards with a cloth. For outdoor installations, use neutral synthetic products applied with a soft cloth and rinse with cold water.

Stainless steel

If any of the door components (door leaves and operator) is lined in stainless steel, take into account the following cleaning requirements.

Stainless steel requires minimum maintenance. Clean with:

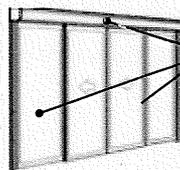
- A soft cloth and a sponge dipped in soapy water.
- A slightly wet micro-fibre dishcloth.
- For more difficult stains, use a normal cream cleaner.
- Dry the wet surface to prevent water and limescale marks.

- Do not use:

- Abrasive and solvent products.
- Steel Wood pads.
- Bleaches and cleaning products containing chloride.

If you use an acid product or solvent, rinse thoroughly with neutral water.

There are polishing creams that leave a microscopic wax film that is very resistant, lasts several months and greatly facilitates cleaning.



Accessories

Always clean the command and detection devices in the door with a slightly damp cloth. Never pour fluid of any kind on these accessories.

5.3 DOOR DECOMMISSIONING AND DISMANTLING

The operator can be easily removed, while decommissioning does not have special complications. Proceed to dismantle the operator in different elements and proceed to discard and recycle all elements after use.

The drive unit must be disconnected from the power supply before removing the batteries.

The batteries must be destroyed safely.

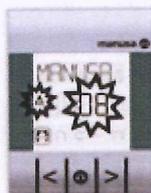
6 TROUBLESHOOTING

OPTIMA selector



If the monitoring programme detects a problem in door operation, a numerical code will flash the display.

SMART selector



If the monitoring programme detects problems in the door operation, a numerical code flashes in the display along with an icon indicating the problem.

In most cases, to restore door operation simply select the door OPEN mode and then the door AUTOMATIC mode. If the problem persists, contact an manusa authorised Technical Service.

| MALFUNCTION | POSSIBLE CAUSE | SOLUTION |
|--|--|--|
| OVERCURRENT 0001 Overcurrent in motor | a. Mains overcurrent b. Short circuit in motor or circuit. | Change to OPEN followed by AUTOMATIC mode to resume normal operation. If the problem persists, call the Technical Service. |
| SOS 0002 Emergency signal activated | a. Panic break-out leaves open. b. Emergency push button activated. | a. Check position of panic break-out leaves. b. Check the emergency push button. |
| OBST CLOSING 0003 Obstruction on closing | Obstruction within the closing cycle. | Check and remove any obstruction within the door closing cycle. Then resume by changing the door to OPEN followed by AUTOMATIC mode |
| OUTSIDE KEY SWITCH 0004 Outside key switch activated | The outside key switch has not been removed from the device. | Remove the key from the outside key switch device. |
| DOOR PARAM MEM. 0005 Parameters memory | Parameter memory is falling. | Call Technical Service. |
| OBST. OPENING 0006 Obstruction on opening | Obstruction within the opening cycle. | Check and remove any obstruction within the door opening cycle. Then resume by changing the door to OPEN followed by AUTOMATIC mode |
| PHOTOCELL 0008 IR barriers | The IR barriers are blocked for a period > 1'. | Check the alignment of the IR barriers. |
| FIRE ALARM 0009 Infrared barriers | Fire alarm signal activated. | Check fire alarm system. |
| LOW BATTERY 0011 Panic door system | a. Low battery. b. Low mains voltage. | If the door was disconnected, leave the door connected during 24 hours to charge the batteries. If the warning persists, call the Technical Service. |

| MALFUNCTION | POSSIBLE CAUSE | SOLUTION |
|---|--|--|
| INSIDE RADAR 0012 Malfunction in internal radar | Radar contact permanently closed for a period of > 1'. | Call Technical Service. |
| OUTSIDE RADAR 0013 Malfunction in external radar | Radar contact permanently closed for a period of > 1'. | Call Technical Service. |
| PHOTOCELL 3 0014 IR Barrier 3 | The third IR barrier is blocked. | Call Technical Service. |
| MOTOR CONTROL 0015 Malfunction in the motor control | Malfunction in the control board. | Change to OPEN followed by AUTOMATIC mode to resume normal operation. If the problem persists, call the Technical Service. |
| SAFETY SENSOR 0016 Malfunction on side sensors | Safety opening signal activated. | Verify that there is no object within the sensor detection area. |
| The LCD screen does not light up | The selector has no power. | Check door power supply. |
| LOADING DATA ----- Communication fault occurs when the following message appears on screen: "loading data" | No communication with the operator. | Call Technical Service. |

NOTE: The features included in this document are given for information purposes only, and are not binding.

The manufacturer reserves the right to modify its products without prior notice.

Last updated: May 2010



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7 ANNEXES

7.1 DECLARATION CE OF CONFORMITY



CE DECLARATION OF CONFORMITY

Manufacturer: MANUSA DOOR SYSTEMS

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Product: **Operator Visio.** Operator for powered pedestrian doors.

Models: **Visio**
Visio Hermético
Visio 100

By this document we declare, under our sole responsibility, that the products listed and referenced comply with the following European Directives:

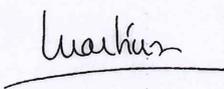
2006/42/CE: Machinery Directive.
305/2011/CE: Construction Products Regulation.
2004/108/CE: Electromagnetic Compatibility Directive.
2006/95/CE: Low Voltage Directive.*

It has also implemented the following harmonized standards and technical specifications:

EN 16005
IEC 60335-2-103
EN 60335-1
EN 61000: 3-2 / 3-3 / 6-2 / 6-3
EN ISO 13849-1 / 2
EN ISO 12100-1 / 2
EN ISO 13857
EN ISO 14121-1 / 2
EN 1037
UNE 85121 EX

CE Marking is included in the product to indicate conformity with the essential requirements of the directives that apply. This Declaration of conformity means that the installation and put in service of the machine has been made in accordance with the installation instructions, operating and maintenance manual.


Josep Mª Guilera
General Manager


Francesca Martínez
Product Standardization

Sant Cugat del Vallès, december 2013

Manuel de l'utilisateur

PORTE AUTOMATIQUE COULISSANTE OP. VISIO



Lisez attentivement et entièrement ces instructions avant de commencer à utiliser l'appareil.

Vous trouverez dans ce manuel toutes les informations nécessaires pour utiliser et entretenir l'appareil.

Conservez ce manuel dans un lieu sûr pour être en mesure de le consulter ultérieurement.

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- 1.2 TABLEAU DE CAPACITÉS
- 1.3 COMPATIBILITÉ

2 UTILISATION : UTILISATIONS PRÉVUES ET UTILISATIONS À ÉVITER

3 FONCTIONNEMENT ET UTILISATION

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- 3.2 PRINCIPES DE FONCTIONNEMENT
 - 3.2.1. Mise en service
 - 3.2.2. Arrêt normal et arrêt d'urgence
- 3.3 MODES DE FONCTIONNEMENT ET SÉLECTEUR DE MANOEUVRE
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- 4.2 MESURES DE SÉCURITÉ À ADOPTER PAR L'UTILISATEUR.
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- 5.2 ACTIONNEMENT MANUEL - NETTOYAGE DE LA PORTE.
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1 IDENTIFICATION DE LA MACHINE

1.1 INTRODUCTION

Les portes automatiques **manusa** ont été spécialement conçues pour faciliter un accès rapide, fiable et contrôlé de personnes à des installations de tous types.

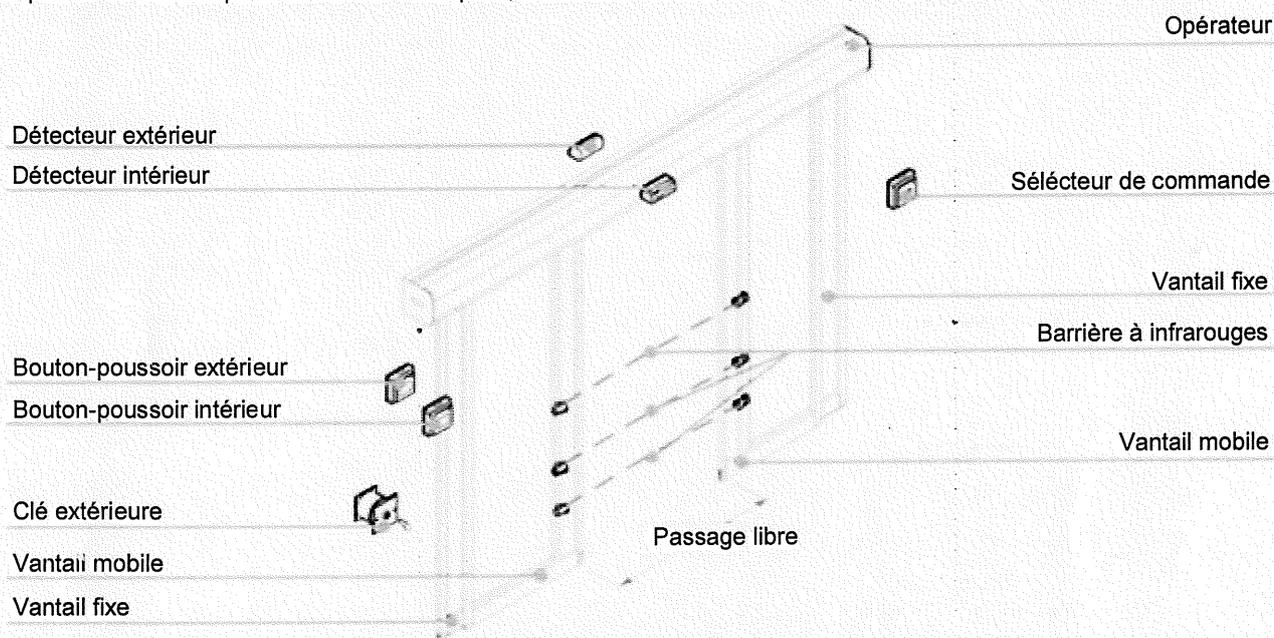
Le design de l'opérateur VISIO a été particulièrement soigné lors de sa conception:

- un moindre impact visuel grâce à sa petite taille.
- une meilleure intégration avec les ensembles architecturaux.
- la possibilité d'intégrer le sélecteur SMART, avec un panneau de contrôle numérique plus intuitif (écran LCD de 3").

Vous trouverez dans ce manuel les instructions de base pour utiliser votre porte automatique. Nous vous conseillons de le lire attentivement et de ne pas hésiter en cas de doute à consulter un installateur agréé.

Pour votre propre sécurité, veuillez appliquer à tout moment les instructions techniques indiquées dans ce manuel. **manusa** dégage toute responsabilité en cas de dommage et de panne causés par le non-respect de ces instructions.

Enfin, nous vous remercions de la confiance que vous nous témoignez en acquérant un produit de la gamme **manusa**, entreprise avec plus de 40 ans d'expérience dans la conception, la fabrication et l'installation de systèmes automatiques de passage.



1.2 TABLEAU DE CAPACITÉS

CARACTÉRISTIQUES ÉLECTRIQUES

| | Visio LD | Visio MD | Visio HD |
|--|---------------------|---------------------|---------------------|
| Alimentation standard | 220-240V +/-6% 50Hz | 220-240V +/-6% 50Hz | 220-240V +/-6% 50Hz |
| Alimentation sur commande | 100-120V +/-6% 60Hz | 100-120V +/-6% 60Hz | 100-120V +/-6% 60Hz |
| Moteur | 1 x AC Trifásico | 2 x AC Trifásico | 2 x AC Trifásico |
| Puissance nominale | 95 W | 265 W | 265 W |
| Tecnología inverter (excl. Manusa) | VV-VF | VV-VF | VV-VF |
| Fusible de protection | 4 A | 4 A | 4 A |
| Température de fonctionnement | -15°C a 50°C | -15°C a 50°C | -15°C a 50°C |
| Batteries antipaniques (ouvrir/fermer) rechargeables | 2x12 V DC 700mAh | 2x12 V DC 700mAh | 2x12 V DC 700mAh |

CARACTÉRISTIQUES MÉCANIQUES

| | Visio LD | Visio MD | Visio HD |
|---|----------------------|--------------------|--------------------|
| Vitesse d'ouverture réglable par vantail | ≤ 0,7 m/s | ≤ 1 m/s | ≤ 0,7 m/s |
| Vitesse de fermeture réglable par vantail | 0,15 a 0,6 m/s | 0,15 a 0,6 m/s | 0,15 a 0,6 m/s |
| Force de fermeture ajustable entre | 40 N a 140 N | 40 N a 140 N | 40 N a 140 N |
| Accélération maximale | 1,2 m/s ² | 2 m/s ² | 2 m/s ² |
| Réglage indépendant vitesse/force | Si | Si | Si |
| Poids maximum vantaux | 120 kg | 220 kg | 440 kg |

1.3 COMPATIBILITÉ

La porte avec opérateur VISIO est pratiquement compatible avec toute la gamme d'accessoires **manusa**.

| COMMANDE | DÉTECTION | CONTRÔLE / AUTRES |
|-----------------------|---------------------------------|--|
| - Sélecteur Smart. | - Radar planar. | - Adaptateur Ethernet (Gateway) |
| - Sélecteur Optima : | - Radar infrarouge. | - Codificateur numérique |
| · Télécommande (opt). | - Radar infrarouge encastrable. | - Interface : |
| - Clé extérieure : | - Détecteur de proximité infra. | · de base. |
| · encastrée. | - Photocellule de sécurité. | · écluse. |
| · en surface. | | · selon spécification du client. |
| - Bouton d'ouverture. | | - Lecteur de proximité codé. |
| - Bouton de coude. | | - Télécommande d'activation "Rolling code". |
| - Arrêt d'urgence. | | - Anti panique mécanique, selon norme CO-48. |
| | | - Verrou électromécanique + déblocage. |
| | | - Verrou capot. |

2 UTILISATION: UTILISATIONS PRÉVUES ET UTILISATIONS À ÉVITER

Les portes automatiques **manusa** sont conçues pour que les piétons puissent les franchir sans avoir à actionner aucune commande ni à intervenir sur aucun composant.

Toute autre utilisation est interdite. Veillez à :

- Ne pas modifier ces portes ou leurs composants, quels qu'ils soient.
- Ne pas laisser des enfants jouer avec ces portes.
- Ne pas débrancher, manipuler ou mettre hors service les composants de sécurité de ces portes.
- Ne pas confier les réparations ou autres interventions à des techniciens non agréés par **manusa**.
- Ne pas utiliser de pièces de rechange autres que celles d'origine fournies par **manusa**.
- N'utiliser aucune partie des portes comme point d'appui pour des objets ou des personnes.

Cette liste ne répertorie que les utilisations indues raisonnablement prévisibles. **manusa** décline également toute responsabilité concernant d'éventuels accidents ou dommages dérivés d'utilisations indues autres que celles indiquées précédemment.

3 FONCTIONNEMENT ET UTILISATION

3.1 EMBLACEMENT. EXIGENCES PHYSIQUES ET ENVIRONNEMENTALES

Les portes automatiques **manusa** doivent être installées dans des lieux possédant les caractéristiques suivantes :

- Sol lisse, uniforme et nivelé.
- Murs stables, dont la capacité de charge est suffisante.
- Profils de cloisonnage nivelés.
- Absence de vibrations et de chocs dans la zone des portes.
- Température de service : de -15 °C à +50 °C.
- Humidité relative de l'air : les composants électriques et électroniques des opérateurs conçus pour fonctionner dans des climats tropicaux font l'objet d'un traitement de surface qui les protège contre l'humidité ambiante.

3.2 PRINCIPES DE FONCTIONNEMENT

Les portes automatiques **manusa** fonctionnent uniquement en mode automatique. Un mode manuel est cependant prévu en cas d'urgence et pour réaliser les travaux de nettoyage, de maintenance et de réglage.

3.2.1 Mise en service

Les vérifications et réglages préalables à la mise en service des portes automatiques **manusa** doivent uniquement être effectués par des techniciens agréés.

3.2.2 Arrêt normal et arrêt d'urgence

L'arrêt normal des portes automatiques **manusa** et leur mise en marche ont lieu automatiquement. Bien que les situations d'urgence soient gérées automatiquement par le dispositif, il est possible d'installer, en option, un arrêt d'urgence (voir paragraphe 3.7).

3.3 MODES DE FONCTIONNEMENT ET SÉLECTEUR DE MANOEUVRE

Mode de fonctionnement:



Porte ouverte OU



Porte fermée FE



Ouverture limitée A1-A4



Porte automatique AU



Sortir uniquement SU

Sélecteur SMART:

Vous permet de changer de mode de fonctionnement et de visualiser l'état de la porte automatique.



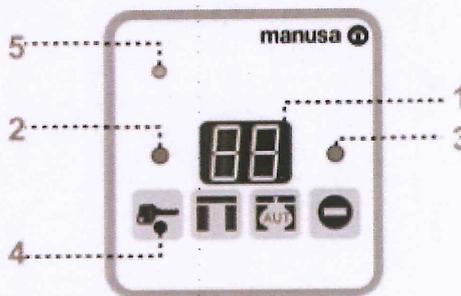
1 Écran LCD indiquant le mode de fonctionnement sélectionné, dans une langue à choisir parmi les suivantes: espagnol, catalan, français et anglais. Il est également possible d'afficher l'heure ou le nombre de cycles réalisés. Si le système de contrôle détecte une anomalie, il affiche un message et une valeur numérique indiquant le type d'anomalie.

2/4 Boutons-poussoirs de sélection.

3 Bouton-poussoir de confirmation.

Sélecteur ÓPTIMA:

Vous permet de changer de mode de fonctionnement et de visualiser l'état de la porte automatique.



1 Écran d'affichage à 2 chiffres de 7 segments; indique le mode de fonctionnement sélectionné, dans une langue à choisir parmi les suivantes: espagnol, français, anglais, allemand, italien, portugais, hollandais, catalan. Si le système de contrôle détecte une anomalie, il affiche une valeur numérique - clignotante - indiquant le type d'anomalie.

2/3 Boutons-poussoirs réservés aux fonctions utilisées par le Service Technique.

4 Boutons-poussoirs de sélection du mode de fonctionnement.

5 Récepteur d'infrarouges, intégré en série, permettant le contrôle à distance de la porte grâce à la télécommande (en option).

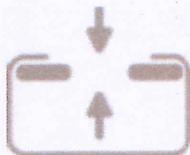
3.4 SÉLECTION DU MODE DE FONCTIONNEMENT

Pour changer de mode de fonctionnement, utilisez le sélecteur de commande en procédant comme indiqué ci-après:

PORTE OUVERTE

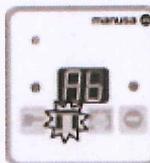


La porte s'ouvrira puis vous pourrez ensuite déplacer manuellement les vantaux.



Sélecteur SMART

Appuyez sur les touches 2 ou 4 du sélecteur jusqu'à ce qu'apparaisse une icône  clignotante et appuyez sur la touche 3 pour valider la sélection. Le message **OUVERT** s'affiche à l'écran.



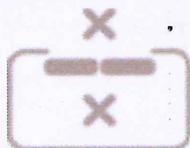
Sélecteur OPTIMA

Appuyez sur la touche  du sélecteur pour faire apparaître la mention **Ou** à l'écran.

PORTE FERMÉE



Pour les portes sans serrure, ce mode de fonctionnement ferme la porte et libère les vantaux. Pour les portes avec serrure, les vantaux se ferment et restent bloqués par celui-ci*.



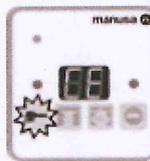
REMARQUE: pour faciliter la sortie, pendant le cycle de fermeture, les vantaux se rouvriront si le détecteur ou bouton-poussoir intérieur est activé, pour ensuite tenter un nouveau cycle de fermeture, jusqu'à ce que les vantaux soient totalement fermés.

** Lorsque la situation l'exige, le Service Technique peut configurer la porte pour retarder l'activation de la serrure et laisser ainsi une marge de temps supérieure à l'utilisateur, pour parvenir à la porte et sortir du local avant que les vantaux ne se bloquent.*



Sélecteur SMART

Appuyez sur les touches 2 ou 4 du sélecteur jusqu'à ce qu'apparaisse une icône  clignotante et appuyez sur la touche 3 pour valider la sélection. Le message **FERMÉ** s'affiche à l'écran.



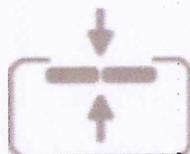
Sélecteur OPTIMA

Appuyez sur la touche  du sélecteur pour faire apparaître la mention **FE** à l'écran.

PORTE AUTOMATIQUE



La porte s'ouvrira chaque fois qu'un détecteur est activé, qu'il soit intérieur ou extérieur.



Sélecteur SMART

Appuyez sur les touches 2 ou 4 du sélecteur jusqu'à ce qu'apparaisse une icône  clignotante et appuyez sur la touche 3 pour valider la sélection. Le message **AUTOMATIQUE** s'affiche à l'écran.



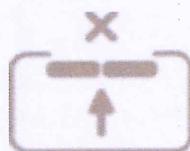
Sélecteur OPTIMA

Appuyez sur la touche  du sélecteur pour faire apparaître la mention **FE** à l'écran.

SORTIE UNIQUE



La porte ne s'ouvrira que lorsque le détecteur intérieur sera activé.



Sélecteur SMART

Appuyez sur les touches 2 ou 4 du sélecteur jusqu'à ce qu'apparaisse une icône  clignotante et appuyez sur la touche 3 pour valider la sélection. Le message **SORTIR UNIQUEMENT** s'affiche à l'écran.



Sélecteur OPTIMA

Appuyez sur la touche  du sélecteur pour faire apparaître la mention **SU** à l'écran.

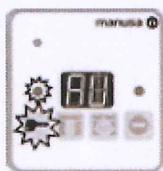
REMARQUE: si la porte dispose d'une serrure automatique, les vantaux resteront bloqués tant qu'ils se trouveront en position fermée.

3.5 BLOCAGE DU MODE DE FONCTIONNEMENT

Pour éviter la manipulation involontaire du mode fonctionnement de la porte, il est possible de bloquer le sélecteur grâce à la procédure suivante.

BLOCAGE:

La porte fonctionnera normalement dans le mode sélectionné, mais son fonctionnement ne pourra être modifié tant que le sélecteur ne sera pas débloqué.



Sélecteur OPTIMA

En laissant enfoncée la touche 2, appuyez sur la touche



Sélecteur SMART

En laissant enfoncée la touche 2 (<), appuyez sur la touche 4 (>). Vous verrez affichée à l'écran un petit verrou

DÉBLOCAGE:

La porte fonctionnera normalement dans le mode sélectionné, son fonctionnement peut être modifié par quiconque a accès au sélecteur.



Sélecteur OPTIMA

En laissant enfoncée la touche 2, appuyez sur la touche



Sélecteur SMART

En laissant enfoncée la touche 4 (>), appuyez sur la touche 2 (<). Vous verrez s'afficher à l'écran quatre chiffres. Introduisez votre code PIN en sélectionnant les chiffres avec les touches 2 (<) et 4 (>) et en confirmant avec la touche 3. Lorsque vous avez introduit le PIN correct, le déblocage sera effectif et l'icône du cadenas disparaîtra de l'écran.

3.6 OUVERTURE EXTÉRIEURE PAR CLÉ (EN OPTION)

Si vous souhaitez ouvrir la porte de l'extérieur, même avec la porte en mode **FERMÉ**, il est nécessaire d'utiliser la clé extérieure **manusa**.

La porte s'ouvrira automatiquement pour permettre l'entrée, avant de se fermer pour revenir au mode de fonctionnement en cours utilisation.



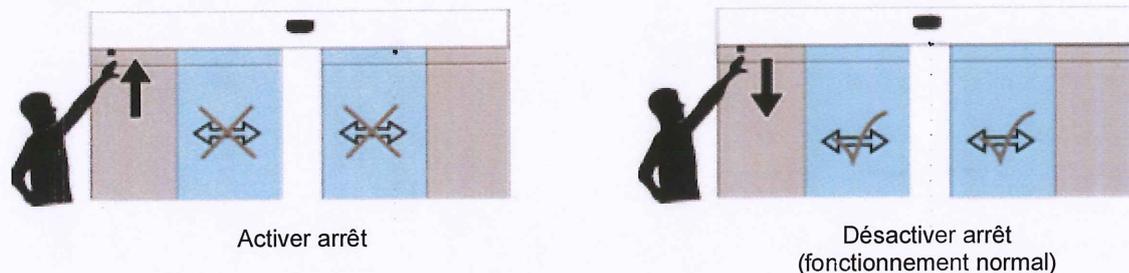
Pour l'ouverture sans alimentation électrique du réseau, voyez le chapitre 4.4

3.7 ARRÊT D'URGENCE (EN OPTION)

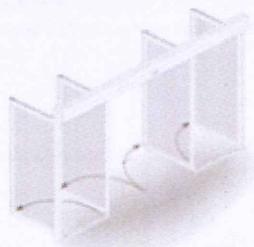
Lorsque les modes **AUTOMATIQUE** ou **SORTIR UNIQUEMENT** sont sélectionnés, vous pouvez provoquer l'arrêt sécurisé de la porte en activant un bouton-poussoir avec enclenchement (arrêt d'urgence).

Les vantaux s'arrêtent s'ils sont en mouvement et s'immobilisent.

Pour récupérer l'état initial de la porte, vous devez débloquer le bouton-poussoir d'arrêt d'urgence en tirant dessus.



3.8 PORTES AVEC VANTAUX ANTI-PANIQUE INTÉGRAUX (EN OPTION)



manusa dispose de deux modèles de vantaux équipés du système anti-panique intégral:

- SOS (S44).
- Easy SOS (S40).

N'importe laquelle de ces deux ensembles combinés avec votre opérateur VISIO vous fourniront une garantie authentique de sécurité en cas d'urgence.

En cas d'urgence ou d'impératif ponctuel, rabattez simplement les vantaux mobiles et fixes (si disponibles) en les poussant vers l'extérieur; ils se replient d'un côté et de l'autre et libèrent une large zone d'évacuation.

Pour retourner au fonctionnement normal des portes, il vous suffit de placer les vantaux en position normal. Au moment de rabattre les vantaux, s'ils étaient en mouvement, ils s'arrêteront immédiatement.

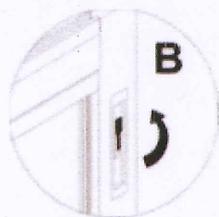
Vantaux SOS S-44:

Les vantaux mobiles S-44 sont équipés d'une espagnolette à clef à 2 positions.

- Dans la **position A**, le mécanisme anti-panique intégral est bloqué, pour éviter que les vantaux ne se rabattent depuis l'extérieur (porte **FERMÉE**).
- Dans la **position B**, les vantaux peuvent être librement rabattus.



VANTAIL BLOQUÉ



VANTAIL DÉBLOQUÉ

AVERTISSEMENT: il est uniquement permis de bloquer le système de rabat (espagnolette en position A) si la porte est en mode **FERMÉ**.

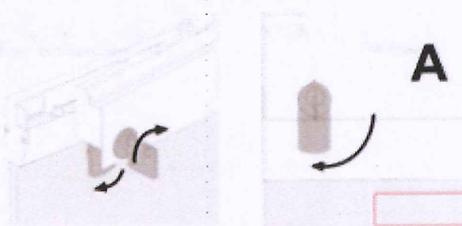
En cas d'urgence, et avec l'espagnolette en **position B**, en appliquant une force sur les vantaux, ceux-ci sont rabattus vers l'extérieur. Au moment d'abattre les vantaux, s'ils étaient en mouvement, ils s'arrêteront immédiatement.

Vantaux EASY SOS S-40:

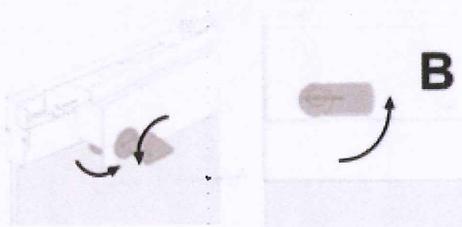
Les vantaux mobiles S-40 peuvent être équipés, en option, d'un pack composé d'un barillet de serrure et de plaques de sécurité pour éviter qu'ils puissent être forcés.

- Dans la **position A**, le mécanisme anti-panique intégral est bloqué, pour éviter que les vantaux ne se rabattent depuis l'extérieur (porte **FERMÉE**).
- Dans la **position B**, les vantaux peuvent être librement rabattus.

VANTAIL BLOQUÉ



VANTAIL DÉBLOQUÉ



AVERTISSEMENT: il est uniquement permis de bloquer le système de rabat (barillet en position A) si la porte est en mode **FERMÉ**.

En position verrouillée, le barillet permet uniquement d'éviter que les vantaux mobiles soient forcés; pour éviter que les vantaux fixes le soient, les vantaux mobiles doivent être entièrement fermés.

En cas d'urgence, et avec le barillet en **position B**, en appliquant une force sur les vantaux, ceux-ci sont rabattus vers l'extérieur. Au moment d'abattre les vantaux, s'ils étaient en mouvement, ils s'arrêteront immédiatement.

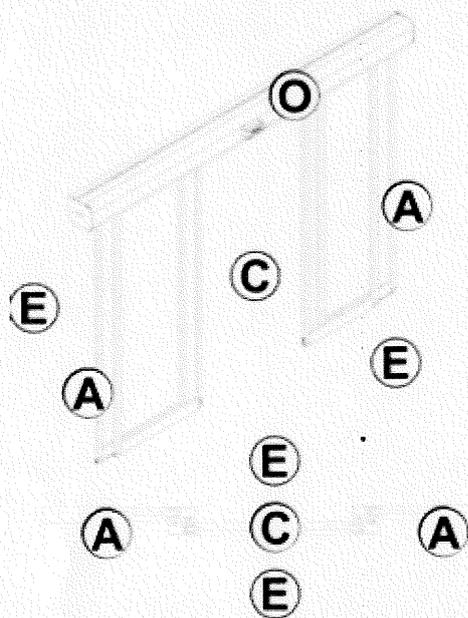
4 SÉCURITÉ

L'opérateur VISIO dispose de multiples fonctions de sécurité auxiliaires:

- Connexion pour l'alarme incendie: la porte s'ouvre même lorsqu'elle est fermée et hors tension.
- Protection du mouvement d'ouverture:
 - L'opérateur est préparé pour gérer le signal des détecteurs de présence dans la zone d'ouverture.
 - Un signal sonore intermittent avertit la personne lorsqu'elle se trouve sur la trajectoire d'ouverture des vantaux mobiles.
 - Si la porte est en cours d'ouverture, cette dernière est ralentie.

Pour d'autres indications relatives à la sécurité de votre porte, veuillez consulter le manuel concernant la sécurité de la porte.

4.1 IDENTIFICATION ZONES À RISQUE



Le vantail ou les vantaux mobiles d'une porte automatique sont des pièces lourdes en mouvement qui présentent des zones potentiellement dangereuses et qu'il est nécessaire de connaître.

- Ⓐ ZONE D'OUVERTURE
- Ⓒ ZONE DE FERMETURE
- Ⓞ ZONE DE L'OPÉRATEUR
- Ⓔ ALENTOURS DE LA PORTE

4.2 MESURES DE SÉCURITÉ À ADOPTER PAR L'UTILISATEUR

- 1.- Faites en sorte que les alentours de la porte soient toujours propres et rangés.
- 2.- N'utilisez aucune partie de la porte comme point d'appui pour des objets ou des personnes.

4.3 RISQUES RÉSIDUELS

Les portes **manusa** sont conçues de manière à optimiser la sécurité : d'une part, en éliminant d'éventuels sources de danger et d'autre part, en minimisant les risques. Pour cela, nous avons adopté, dans l'ordre :

- Des mesures de prévention intrinsèque tout en veillant à ce que la conception soit sûre.
- Des mesures de protection spécifiques pour les risques ne pouvant pas être éliminés par les mesures de protection intrinsèque.
- Des mesures d'information sur les risques résiduels ne pouvant pas faire l'objet d'une protection suffisante.
- Des mesures et précautions supplémentaires.

Malgré toutes ces mesures, les portes présentent un risque résiduel qui n'a pas pu être éliminé :

Risque : impact sur la zone d'ouverture.

Mesures de réduction de ce risque :

- Installation de la porte conformément aux mesures de sécurité figurant dans le manuel d'installation.
- Installation, dans la zone d'ouverture, de protections fixes empêchant l'accès de personnes à la zone dangereuse.

4.4 PROCÉDURE EN CAS D'ERREUR D'ALIMENTATION



PORTE SANS VERROU



Pour ouvrir la porte de l'extérieur sans alimentation, il suffit d'actionner les vantaux manuellement.

- Après une panne de tension, la porte s'ouvre ou se ferme automatiquement grâce aux batteries selon la configuration programmée par le Service Technique*, sauf si l'erreur d'alimentation se produit en mode **FERMÉ**, auquel cas la porte reste fermée.
- Pendant l'absence d'alimentation, la porte peut être ouverte ou fermée manuellement.
- Lors du retour de la tension, la porte se remet à fonctionner dans le dernier mode de fonctionnement sélectionné.



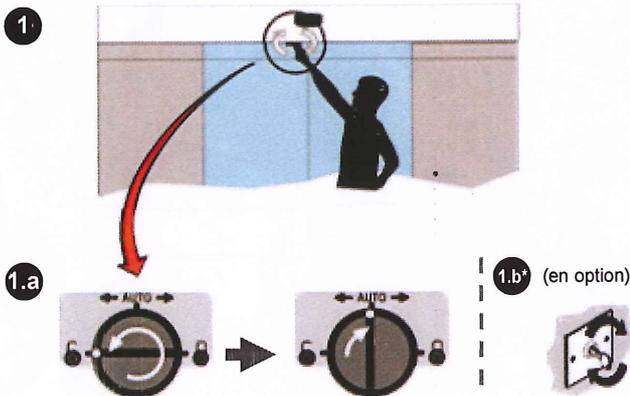
PORTE AVEC VERROU

* La configuration par défaut est ouvrir, pour faciliter l'évacuation en cas de coupure de tension.

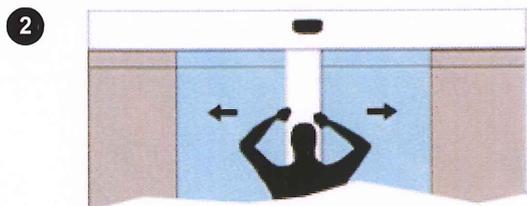
- Après une panne de tension, la porte s'ouvre ou se ferme automatiquement grâce aux batteries selon la configuration programmée par le Service Technique*, sauf si l'erreur d'alimentation se produit en mode **FERMÉ**, auquel cas la porte reste fermée.
- Pendant l'absence d'alimentation, la porte peut être ouverte ou fermée manuellement, il est en outre également possible de bloquer ou débloquer les vantaux, en activant le verrou avec le sélecteur d'actionnement manuel, ou avec la clé extérieure (en option). Pour ce faire procédez comme suit:

Ouvrir porte

- 1.- Actionnez le sélecteur du verrou (1.a), ou actionnez la clé extérieure (1.b*).

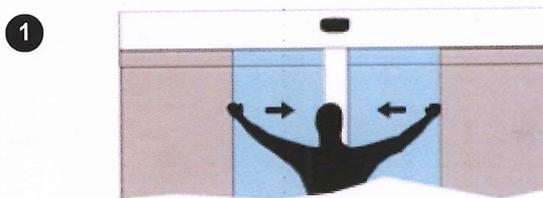


- 2.- Ouvrez manuellement la porte en écartant les vantaux.

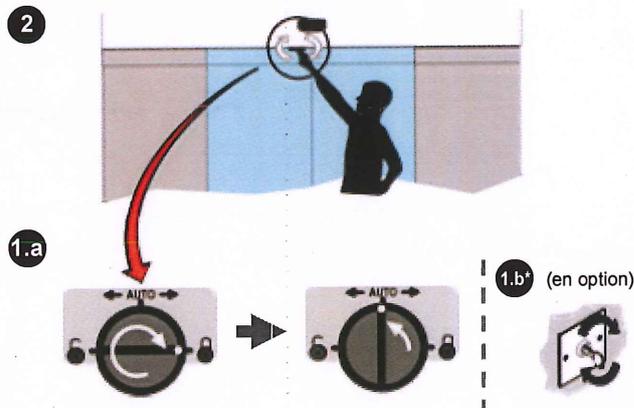


Fermer porte

- 1.- Fermez manuellement la porte en joignant les vantaux.



- 2.- Actionnez le sélecteur du verrou (2.a), ou actionnez la clé extérieure (2.b*).



Lors du retour de tension, la porte détecte si le verrou est en train de bloquer les vantaux:

- Lorsque le verrou bloque les vantaux, la porte passe en mode fermé, indépendamment du mode dans lequel se trouvait la porte avant que survienne la coupure d'alimentation.
- Lorsque le verrou ne bloque pas les vantaux, la porte continue à fonctionner selon le dernier mode de fonctionnement sélectionné.

5 MAINTENANCE

La maintenance des portes **manusa** doit impérativement être effectuée par des techniciens agréés. Les travaux de maintenance pouvant être réalisés par l'utilisateur se limitent au rangement et au nettoyage des alentours des portes.

5.1 PIÈCES DE RECHANGE

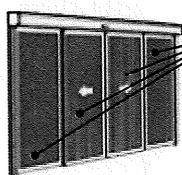
Il est impératif de n'utiliser que des pièces de rechange d'origine de **manusa** et de confier leur montage à un technicien agréé. **manusa** décline toute responsabilité en cas de dommages éventuels résultant du non-respect de ces instructions.

5.2 ACTIONNEMENT MANUEL - NETTOYAGE DE LA PORTE

La maintenance périodique et le nettoyage correct des différents éléments de votre porte automatique **manusa** vous permettront de conserver votre produit dans des conditions optimales d'utilisation pendant sa longue durée de vie.

- Pour nettoyer le produit, choisissez avec votre sélecteur de commande le mode de fonctionnement porte **OUVERTE**. De cette manière, vous pourrez déplacer librement les vantaux de votre porte pour les nettoyer plus facilement et plus confortablement.
- Pour rétablir le fonctionnement normal de la porte, sélectionnez le mode de fonctionnement porte **AUTOMATIQUE**.

Vous trouverez ci-après quelques instructions détaillées pour bien nettoyer les différents composants de l'ensemble.



Vitre

Nettoyez-les à l'eau chaude savonneuse ou avec un produit lave-vitres du commerce en les frottant avec un chiffon doux. Si les vitres sont très sales, vous pouvez ajouter quelques gouttes de vinaigre ou d'ammoniaque. Prenez soin de n'appliquer aucun produit chimique sur les joints en caoutchouc encadrant le verre des vantaux.



Aluminium

Vous trouverez dans le commerce des produits spécifiques idéaux pour nettoyer l'aluminium, qu'il soit anodisé ou laqué, et lui redonner son éclat, sans danger pour les vitres et les joints. Évitez absolument d'utiliser des produits acides ou basiques, abrasifs ou chauds. Pour les installations intérieures, il suffit de conserver propres les surfaces avec un chiffon propre ou à l'eau froide savonneuse, de les rincer et de les sécher avec un chiffon. Pour les installations extérieures, vous pouvez utiliser des produits synthétiques neutres appliqués avec un chiffon doux et les rincer à l'eau froide.

Acier Inoxydable

Si l'une des pièces de votre porte (vantaux et opérateur) possède un revêtement en acier inoxydable, prenez compte les exigences de nettoyage suivantes. L'acier inoxydable nécessite une maintenance minimale. Nettoyez-le avec:

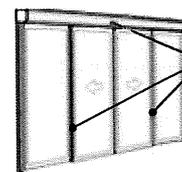
- un chiffon doux ou une éponge imbibée d'eau savonneuse.
- un chiffon en microfibres légèrement humide.
- pour les tâches plus difficiles, utilisez un produit de nettoyage normal, disponible sous forme de crème.
- séchez la surface mouillée pour éviter toute marque d'eau et de calcaire.

- N'utilisez pas:

- de produits abrasifs ou de dissolvants.
- des chiffons en laine d'acier.
- de l'eau de javel et des produits nettoyants à base de chlore.

Si vous utilisez un acide ou un dissolvant, rincez-le bien à l'eau neutre.

Il existe des crèmes de polissage qui créent une couche de cire microscopique, mais très résistante, qui facilite grandement le nettoyage et pouvant durer plusieurs mois.



Accessoires

Le nettoyage des différents éléments de commande ou de détection intégrés dans la porte doit toujours se faire avec un chiffon légèrement humide. Veillez à ne jamais verser de liquide sur ces accessoires.

5.3 MISE HORS SERVICE, DEMONTAGE ET RETRAIT

La machine est facilement démontable et sa mise hors service n'est pas difficile. Le démontage de la machine se fera par éléments tout réalisant une correcte gestion des résidus à retirer.

Tout d'abord, veuillez déconnecter l'appareil du réseau électrique avant de retirer les batteries.

Les batteries doivent être détruites de forme sur.

6 INDICATION D'ANOMALIES

Sélecteur OPTIMA:



Si le programme de contrôle détecte des anomalies dans le fonctionnement de la porte, vous verrez s'afficher à l'écran un code numérique clignotant.

Sélecteur SMART:



Si le programme de contrôle détecte des anomalies dans le fonctionnement de la porte, vous verrez s'afficher à l'écran un code numérique clignotant.

Dans la plupart des cas, pour réinitialiser le fonctionnement de la porte, il suffit de sélectionner le mode de porte ouverte puis le mode de porte automatique. Si après cette opération l'erreur persiste, vous devrez contacter au service technique agréé de manusa.

| ANOMALIE | CAUSE POSSIBLE | CORRECTION |
|---|---|--|
| SURINTENSITÉ 0001 Excès de courant dans le moteur | a. Tension de réseau. b. Court-circuit dans le moteur ou circuit électronique. | Passer du mode manuel au mode automatique. |
| SOS 0002 Signal d'urgence activé | a. Vantaux SOS tombants. b. Bouton-poussoir d'urgence activé. | a. Vérifier la position des vantaux SOS. b. Vérifier le bouton-poussoir d'urgence. |
| OBST FERMER 0003 Blocage lors de la fermeture | Obstacle dans le cycle de fermeture. | Vérifier l'obstacle de fermeture. Rétablir le fonctionnement en passant du mode manuel au mode automatique. |
| CLÉE EXTERIEURE 0004 Clé extérieure activée | La clé extérieure du dispositif n'a pas été retirée. | Enlever la clé du dispositif de clé extérieure. |
| MEM PARAM PORTE 0005 Mémoire paramètres | La mémoire des paramètres a des ratés. | Contactez le Service Technique. |
| OBST OUVRIR 0006 Blocage lors de l'ouverture | Obstacle dans le cycle d'ouverture. | Vérifier l'obstacle lors de l'ouverture. Rétablir le fonctionnement en passant du mode manuel au mode automatique. |
| PHOTOCELLULES 0008 Barrières infrarouges | Les barrières infrarouges sont obturées pendant un certain temps >1'. | Vérifier l'alignement des barrières infrarouges. |
| ALARME INCENDIE 0009 Alarme d'incendie | Signal d'alarme d'incendie activé. | Vérifier le système d'alarme d'incendies. |
| BATTERIE DECHARGÉE 0011 Système anti-panique | a. Batterie peu chargée. b. Tension de réseau faible. | Dans le cas où la porte aurait été déconnectée, charger la batterie. Si l'indication persiste, contacter le Service Technique. |

| ANOMALIE | CAUSE POSSIBLE | CORRECTION |
|--|--|--|
| RADAR INTERIEUR 0012 Anomalie sur le radar intérieur | Contact radar fermé en permanence pendant un certain temps > 1'. | Contactez le Service Technique. |
| RADAR EXTERIEUR 0013 Anomalie sur le radar extérieur | Contact radar fermé en permanence pendant un certain temps > 1'. | Contactez le Service Technique. |
| PHOTOCELL 3 0014 Barrière infrarouge 3 | La troisième barrière infrarouge est obturée. | Contactez le Service Technique. |
| CONTRÔLE MOTEUR 0015 Anomalie du contrôle de moteur | Faible de l'électronique qui contrôle le moteur. | Rétablir le fonctionnement en passant du mode manuel au mode automatique. Si le problème persiste, contactez le Service Technique. |
| CAPTEUR LATERAL 0016 Sécurité ouverture | Signal de sécurité d'ouverture activée. | Vérifier qu'il n'y a aucun objet dans le rayon de détection du capteur. |
| L'écran LCD n'éclaire pas | Le sélecteur n'est pas alimenté. | Vérifier l'alimentation de la porte. |
| CHARGEMENT DE DONNÉES ----- Le problème de communication apparaît lorsque le message suivant s'affiche sur l'écran pour une durée indéterminée: "Chargement de données" | Il n'y a pas de communication avec l'opérateur. | Contactez le Service Technique. |

NOTE: Les caractéristiques comprises dans ce manuel sont fournies à titre d'information et n'ont pas un caractère contractuel.

Le fabricant se réserve le droit de procéder à des modifications sans avis préalable.

Dernière révision: Mai 2010



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7 ANNEXES

7.1 DÉCLARATION DE CONFORMITÉ CE

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DÉCLARATION CE DE CONFORMITÉ

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Produit: **Operador Visio.** Motorisations de portes automatiques piétonnes.

Modèles: **Visio**
Visio Hermético
Visio 100

Par le document présent, nous déclarons sous notre entière responsabilité que les produits énumérés sont conformes aux directives européennes suivantes:

2006/42/CE: Directive Machines.
305/2011/CE: Règlement de Produits de la Construction.
2004/108/CE: Directive sur la Compatibilité Électromagnétique.
2006/95/CE: Directive Basse Tension.

Il a également appliqué les normes harmonisées suivantes et les normes de spécifications techniques:

EN 16005
EN 60335-2-103
EN 60335-1
EN 61000: 3-2 / 3-3 / 6-2 / 6-3
EN ISO 13849-1 / 2
EN ISO 12100-1 / 2
EN ISO 13857
EN ISO 14121-1 / 2
EN 1037
UNE 85121

Le marquage CE est incluse dans le produit pour indiquer la conformité avec les exigences essentielles des directives qui s'appliquent. Cette déclaration de conformité signifie que l'installation et la mise en service de la machine a été désigné comme instructions de montage, d'utilisation et d'entretien.

Josep M^a Guilera
Directeur Général

Francesca Martínez
Standarization de produit

Sant Cugat del Vallès, Décembre de 2013

7.2 FICHA DE MANTENIMIENTO / MAINTENANCE CALENDAR / LIVRET DE MAINTENANCE

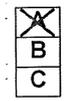
Ref. Instalación / Installation ref. / Réf. installation

Fecha Montaje / Assembly date / Date de montage

Instalador / Technician / Installateur

Intervenciones de Mantenimiento / Maintenance Work / Interventions de Maintenance

(Marcar con una X cada intervención después de realizarla)
 (Mark each maintenance operation with an X after completion)
 (Cocher avec une X chaque intervention après l'avoir réalisée)



| Fecha Date Date | Maniobras Work Manouvres | Intervenciones Maintenance operation Interventions | | | | | Firma Signature Signature | |
|----------------------------------|--------------------------------|--|--------|----|----------------------------|----|---------------------------------|--|
| | | T1 | T2 | C1 | C2 | C3 | | |
| | | A B C D E F | A B | A | A B C D E F | A | | |
| 6 meses 6 months 6 mois | | A B C D E F | A B | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |
| 12 meses 12 months 12 mois | | A B C D E F | | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |
| 18 meses 18 months 18 mois | | A B C D E F | | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |
| 24 meses 24 months 24 mois | | A B C D E F | A B | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |
| 30 meses 30 months 30 mois | | A B C D E F | | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |
| 36 meses 36 months 36 mois | | A B C D E F | | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |
| 42 meses 42 months 42 mois | | A B C D E F | | A | A B C D E F | A | Cliente Client Client | Instalador Technician Installateur |

| Fecha Date | Maniobras Work Manouvres | Intervenciones Maintenance operation Interventions | | | | | Firma Signature Signature |
|--|--------------------------------|--|--------|----|----------------------------|----|---|
| | | T1 | T2 | C1 | C2 | C3 | |
| <input type="text"/> 48 meses 48 months 48 mois | <input type="text"/> | A B C D E F | A B | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 54 meses 54 months 54 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 54 meses 54 months 54 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 60 meses 60 months 60 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 66 meses 66 months 66 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 72 meses 72 months 72 mois | <input type="text"/> | A B C D E F | A B | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 78 meses 78 months 78 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 84 meses 84 months 84 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |
| <input type="text"/> 90 meses 90 months 90 mois | <input type="text"/> | A B C D E F | | A | A B C D E F | A | Cliente Client Client Instalador Technician Installateur |

Observaciones / Comments / Observations:

NOTA: Las características reflejadas en este documento se dan a título informativo, y no tienen carácter contractual.

El fabricante se reserva el derecho a modificaciones sin previo aviso.

Última revisión: Mayo 2010

NOTE: The features included in this document are given for information purposes only, and are not binding.

The manufacturer reserves the right to modify its products without prior notice.

Last updated: May 2010

NOTE: Les caractéristiques comprises dans ce manuel sont fournies à titre d'information et n'ont pas un caractère contractuel.

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Dernière révision: Mai 2010

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INSTRUCTION, OPERATION AND MAINTENANCE MANUAL



DISTRIBUTION TRANSFORMER

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PREFACE

PEL Transformers are designed, manufactured and tested with care. With proper attention during installation and use, the user should receive from it the maximum expected service. Before installing the transformer, read this manual carefully. This manual has been prepared to provide information on assembly, installation, commissioning and regular maintenance of the transformers and shall form part of Instruction Manual.

This manual does not intend to cover operation and maintenance of the transformer under abnormal conditions.

Should further information be needed or any problem arises which is not covered by these instructions, please refer to the HV Transformer Division of Pak Elektron Limited (PEL) for further information.

During operating of the transformer, care should be taken that loading limits, as specified by the nameplate data, are strictly followed.

INTRODUCTION

Thank you for purchasing our transformer. This unit was manufactured using the most modern techniques available and has been fully tested in our Quality Control Division before it left the factory. It is possible, however, that during shipping, installation or operation the transformer could be damaged through improper handling or other unimpeded events. Thus, it is crucial that you read this manual carefully.

This instruction manual covers a brief description about the installation, energization, commissioning, operation, routine/preventive maintenance and precautionary activities for the oil immersed distribution transformer. In addition to that following useful data is also included to help the customer to operate the transformer trouble free.

- Purpose and functionality of the accessories explained with the help of pictures.
- Failure report form is included to help the customer to explain its problem to the manufacturer in detail, in case of a fault arises in the transformer.
- Routine and Preventive maintenance chart is available in the manual for performing the maintenance activities at the customer end.
- For on site trouble shooting a trouble-shooting chart is also included to help the customer to rectify the problems, which can easily be handled at the site.
- In addition to this guide, the manufacturer should be consulted for specific recommendations on special conditions.

General

This manual describes general operation / maintenance of 3-phase two winding oil immersed distribution transformers manufactured according to IEC / BS standards. Technical parameters of transformers are stated on the rating plate and in the factory routine test report.

Safety Instructions

All personnel involved in installation, commissioning, operation, maintenance or repair of the equipment must be suitably qualified and strictly observe these operating instructions. Improper operation or misuse can lead to reduction in the efficiency of the equipment, damage to equipment and property of the user, serious or fatal injury.

Safety instructions in this manual are presented in three different forms to emphasize important information.



WARNING!

This information indicates particular danger to life and health. Disregarding such a warning can lead to serious or fatal injury.



CAUTION!

This information indicates particular danger to the equipment or other property of the user. Serious or fatal injury cannot be excluded.



NOTE!

These notes give important information on a certain topic.

A safety checklist is incorporated in Annexure C, for the ready reference, and to be thoroughly implemented during installation and commissioning and before first energization.



NOTE!

The local management shall inform the labor, responsible for the operation of the transformer, about any hazards, which could affect the health and safety requirements.

Construction

The transformer is composed of core, coils, oil, tank, bushings, nameplate, tap changer & other accessories as required by the customer. Details are mentioned in the dimension drawings, provided with the transformer.

Tap Changer

Tapping switch mounted on tank cover or sidewall is used to adjust the voltages. Before changing the tapping switch (tap changer) ensure that transformer is completely isolated (denergized) from high & low voltage sides in case of off-load tap changer. In case of On-Load, tap changer (OLTC) the tapping can be adjusted with the transformers energized. For details, please refer to OLTC operation manual. For tap changer adjustment according to desired voltage, please refer nameplate of the transformer.



WARNING!

The transformer is fitted with off-load tap-changer. Be very sure to de-energize the transformer before step changing.



NOTE!

The tap changer must be operated to all its tappings once a year to ensure proper operation and safety.

Transportation & Lifting

Take special care in transportation, tie the transformer with proper rope in a place specified by the manufacturer, and maintain clearance between two transformers transported on one vehicle. During transportation, the road condition must also be taken into consideration & during transportation slope of the transformers should not be over 15°. Never try to lift the transformer other than the correct fittings (lifting lugs) provided for this purpose. The transformer is designed for road as well as railway transportation. It can be transported by means of trailer of adequate load carrying capacity. Main components have to be dismantled in order to decrease the size and weight of the transformer body.



WARNING!

Never stay under the lifted transformer or any of its parts.



NOTE!

All information can be found on the Outline drawing for transportation.

Check & Acceptance at purchasers' premises

After receiving the transformer verify immediately that the transformers is in conformity with the order contract & according to delivery documents. Also, check any external damages & position of the accessories. Any abnormality must be reported immediately to PEL or its authorized representative.



CAUTION!

Upon arrival of the transformer at the purchasers' premises, please make sure all the sealing points are intact and the product is free from any damage

Guarantee/Warranty



CAUTION!

If any of the sealing, points of the transformer are found damaged / tempered, that might void the warranty of the transformer. Please do consult the manufacturer before undertaking such activity.



CAUTION!

During the guarantee period, draying, treatment of oil and all operations that involve transformer opening, must be carried out by skilled personnel of Pak Elektron Limited, otherwise the guarantee may void.

Installation and Commissioning

Location

Transformers, as is the case with most electrical equipment, generate a substantial amount of heat during operation. This heat must be removed in order to allow the transformer to maintain its designed maximum temperature limits, if a transformer is located outdoors the heat will be removed by natural convection cooling unless the radiator airflow is restricted by surrounding objects.

Indoor installations require adequate ventilation to remove the heat of transformer operation. Inlet ventilation openings should be as low as possible, and outlet ventilation openings as high as possible.

Average temperature over 24 hours must not exceed 30°C and the temperature of the room should not exceed 40°C. Care should also be taken to prevent restriction of air circulation. Adequate space must be maintained between transformers, or between transformers and nearby equipment or walls. Separation is especially important near the transformer radiators, with spacing equal to the radiator panel depth being recommended. During installation, the following rules must be followed in order to ensure that the transformer operates correctly

- a. The local regulations for installing liquid-filled transformer is buildings on a pole, in a cabinet or in the open air must be followed to the letter in relation to, among others, fire safety, protection against leaking (sump or oil-catchments tank), accessibility, electrical regulations.
- b. The place where the transformer is set up must be adequately ventilated in order to enable dissipation of the heat given off by the transformer. We are at the disposal to do relevant calculations and to explain the precautions to be taken. For distribution transformer set up in buildings or steel sheet substations this means that there must be a regular supply of fresh air from outside, that there is adequate ventilation and enough free space above the transformer.
- c. Oil sample plug, tap changer and any other operating and protection equipment must be easily accessible. Monitoring apparatus such as thermometers must be clearly visible and/or readable.
- d. Setting up the transformer parallel with a wall is not advisable as this can increase the noise. Anti-vibration pads under the wheels can reduce the transfer of the noise vibrations to the ground.
- e. The area in which the transformer is placed must be inaccessible to pets, birds, rodents



CAUTION!

We once again remind you that lifting the transformer by taking it under the cooling fins is absolutely forbidden. This will create leaks

After installation & before putting into operation it is recommended to perform the following checks / tests on transformers.

- Visual Inspection
- Oil level checks
- Connections of Cables, Bus Bars or Overhead Conductors to Bushings
- Earthings
- Measurement of Insulation Resistance of the Windings (Megger Test)
- Measurement of Voltage (Turns) ratio
- Measurement of Winding Resistance
- Measurement of dielectric strength of oil
- Open Circuit Test & Short Circuit Test (If possible, to be performed)
- Functionality test and Physical check of all accessories, parts and components.

Spark Gaps of Arcing Horns

Adjust the spark gaps of the arcing horns (if available) to comply with the dimension drawing, the locally applicable regulations or the instructions of the customer. Please find below the maximum gap width.

| Rated Voltage (kV) | Gap width (mm) |
|-----------------------|-------------------|
| 10 | 70 |
| 20 | 85-120 |
| 30 | 200 |
| 60 | 400 |
| 110 | 750 |
| 150 | 1000 |
| 220 | 1450 |

Energization

When a transformer is energized for the first time the tap changer position should be set at nominal voltage & transformer to be run at no-load condition for few hours, check for abnormal sound (noise) if any, if no abnormality is observed then gradually increase the load.



CAUTION!

We cannot accept any liability and cannot include any guarantees for damage to equipment, which is due to the improper operation of the transformer!



NOTE!

For any abnormality, please contact qualified service personal.



NOTE!

Repair & service of transformer is a highly skilled job and might cause damage / injury to man and equipment if not carried out by professionally skilled persons

Operation

The transformer is designed for the continuous operation at rated voltage and current assigned to each tapping position as specified in the data sheets in normal service conditions. Wave shape of the supply voltage has to be practically sinusoid, its frequency 50 Hz. The three phases has to be practically symmetrical.

Ambient conditions and temperature rise

Transformers are designed for normal operation in the following ambient conditions:

- The highest altitude for installation and operation of transformer is 1000m above sea level
- Air ambient temperature may not exceed value given in technical characteristics of transformer.

Under these conditions, guaranteed temperature rise (maximal temperature rise of oil and average temperature rise of windings) above the ambient temperature will not exceed values given in technical characteristics of transformer. If the ambient temperature exceeds value given in technical characteristics of the transformer it will endanger the life time of the transformer even if the transformer operate with rated load (IEC 354). In that case allowable temperature, rises need to be reduced to the some degree by means of reducing the transformer power.

Operation above the rated voltage

The permitted maximum continuous operation voltage is 105% of the rated voltage referring to the actual tap-position.

Operation above the rated current

The general limitations and effects of loading beyond the nameplate rating shall be considered as specified in the Loading Guide for Oil-immersed Transformers issued by IEC 60076-7.

Voltage Regulation

The voltage regulation of the transformer is realized by means of a hand-driven off-load tap changer installed in the tank. The off-load tap changer has the function to change the transformation ratio by adding the turns of the regulation winding to the turns of the high voltage winding while maintaining the load conditions of the transformer unchanged.

The hand wheel control complies with the step-by-step switching. After de-energizing the transformer, rotate the hand-wheel of the off-load tap-changer to the desired position. Then re-energize the transformer again.

Parallel Operation

Two or more transformer in case of parallel operation, each transformer has to be in equal voltage value and vector group.

The circuits of the auxiliaries (cooling, protections & CTs)

The circuits of auxiliaries and the terminal strips are shown in the Documentation. Description about the devices can be found in the coming chapters, the adjusting values are too described in detail.

Signals

Alarm and trip signals are given according to the control drawing.



NOTE!

Connect the trip signal of the devices to the transformer main circuit breaker or to the protection system!

Storage

If the intention is to keep the transformer in storage for some time, prior to its energization, then make sure storage is done properly. For this purpose, the main body of the transformer must be covered, to protect it from dust. When a transformer is received from the manufacturer, it should be preferably placed (stored) at its final installation place in order to minimize handling. All the parts that are not fitted should be unharmed, too. These are to be stored on wooden pillows in covered store protected against humidity. The components can be stored in transport packing provided it is considered in good condition. Check all parts of the transformer also for mechanical damages. If the transformer is out of operation for more than a month, the heater of the marshalling kiosk / terminal box must be connected and put in service in order to prevent condensed moisture inside the cabinet. If this is not possible, bags with at least 0.6 kg silicagel must be put into the cabinet.

Storage with oil

For longer storage period, it is highly recommended to fill the transformer with oil and the conservator is fitted. In the course of longer storage, check the transformer on monthly basis, whether the oil level is corresponding to the level relating to the ambient temperature.



CAUTION!

Make sure breathing mechanism (where applicable) is intact with the transformer with the help of temporary or permanent breather provided with the transformer.

Storage without oil

For shorter storage period, the transformer can be stored without oil but filled with nitrogen. Not more than four weeks, it can be stored without any special action. Only the pressure of the nitrogen must be will be checked and maintained effectively.

Accessories (purpose and functionality)

Buchholz Relay

Purpose:

Buchholz Relay is the main protection device of the transformer. It is used to detect, Gas formation in the transformer tank up to the level 200cm³, (First Alarm and then tripping (if the gas formation is continued)), sudden flow of oil @ 1 m/s from tank body towards the conservator (normally internal flashovers are the causes of oil flow) causing direct tripping.

Functional Check:

Mostly all of the Buchholz relays are equipped with two Normally Open (NO) Contacts (see Figure 1). The functional test (continuity) of these contacts can be performed via a push button available on the relay (see figure 3).

- Half press of this button will change the state of Alarm contact from Normally open (NO) to Normally Close (NC)
- Full press of this button will change the state of Trip contact from Normally open (NO) to Normally Close (NC) too

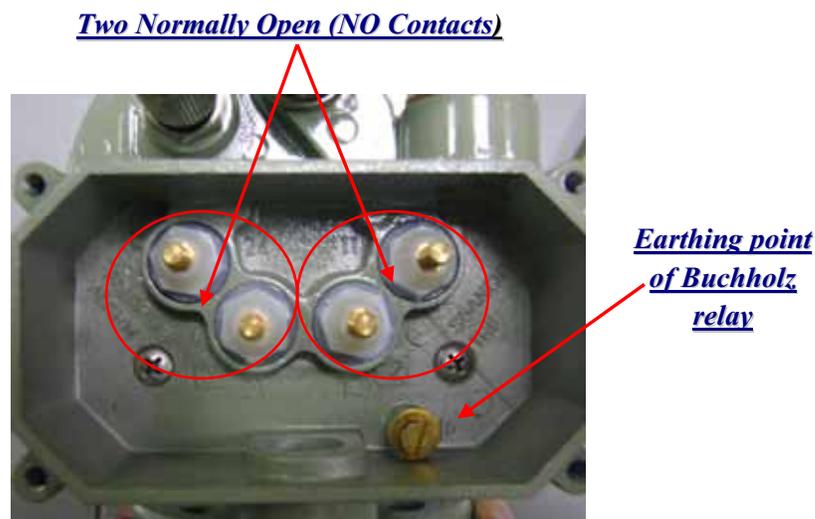


Figure 1 : Buchholz relays are equipped with two Normally Open (NO) Contacts

Before the energization of the transformer buchholz relay must be subjected to bleeding (removal of trapped air), possible via a bleeding point (see Figure 2)

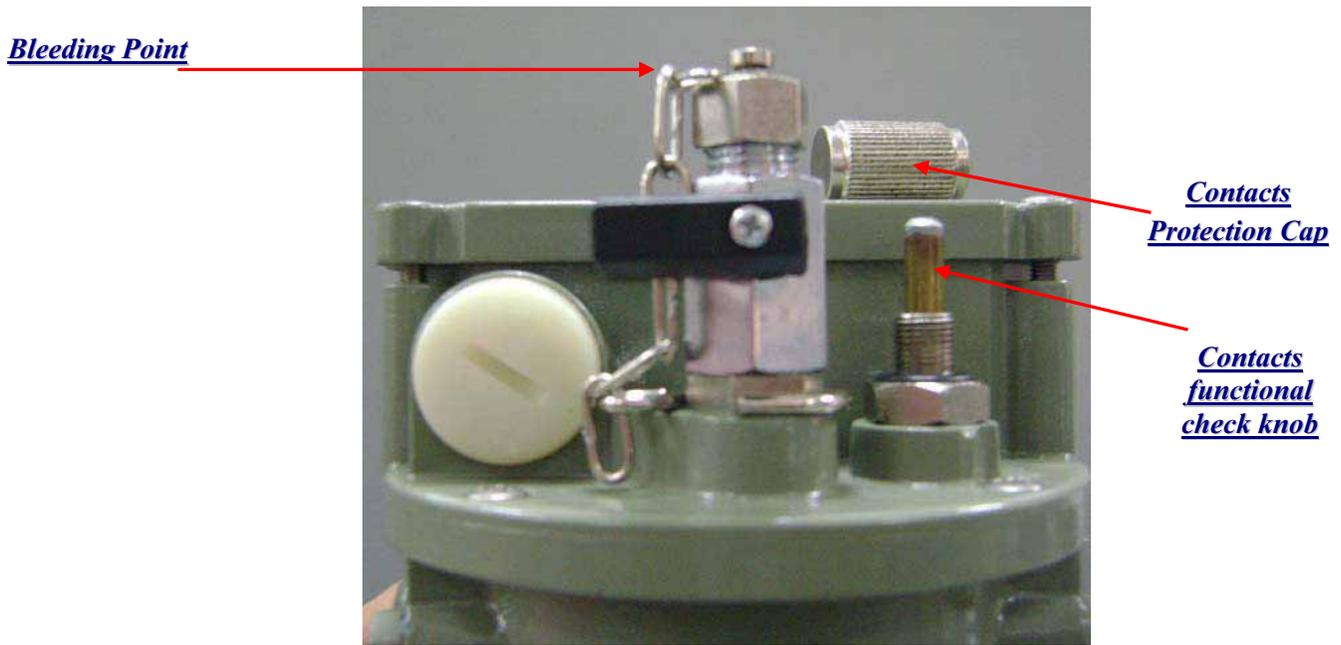


Figure 2 : Bleeding Point, Contacts Protection Cap & Contacts functional check point

Transportation and Protection of Contacts:

For the protection of contacts during transportation of the transformer, a red (or black) colored small rubber piece is provided in the cap over the functional test push button (see Figure 3). This rubber piece must be removed before energization of the transformer.

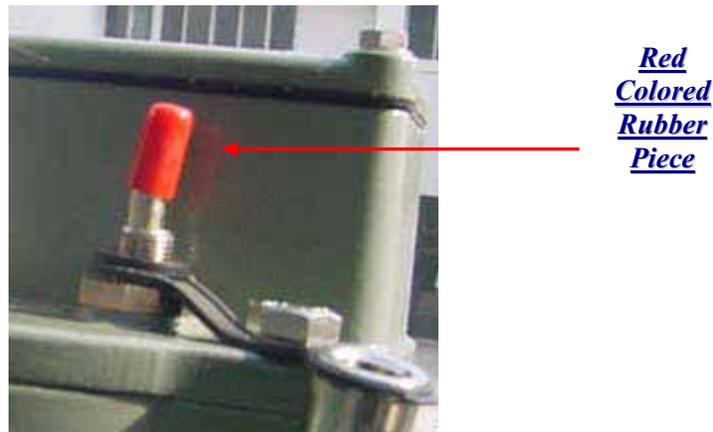


Figure 3 : Red colored rubber piece installed for the protection of contacts

Oil Temperature Indicator

Purpose:

Oil Temperature Indicator is used to monitor the top oil temperature of the transformer. Mostly all of the temperature indicators are located on the top plate. Usually three types of temperature indicators are used.

- Without contacts
- With 2 contacts (First Alarm and then tripping) (See Figure 5)
- With 4 contacts (First Fan OFF, Second Fan ON, Third Alarm & Fourth Trip)

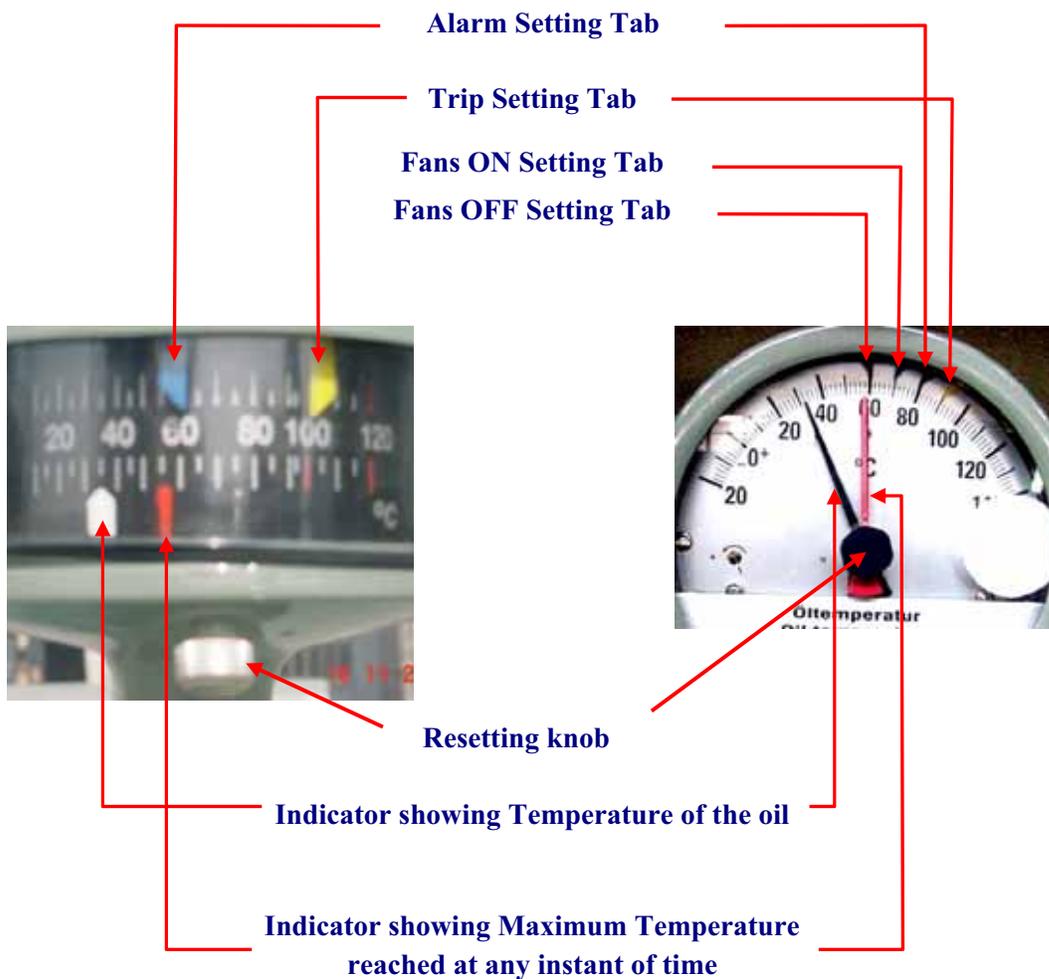


Figure 4 : Different types of Oil Temperature Indicators

Functional Check:

Temperature indicators can be checked for the proper functionality of their contacts (see Figure 4). Mostly all of the contacts are Normally Open (NO) contacts.

- Sliding the alarm tab below the oil temperature indicator will change the state of Alarm contact from Normally open (NO) to Normally Close (NC)
- Sliding the trip tab below the oil temperature indicator will change the state of Trip contact from Normally open (NO) to Normally Close (NC)
- For the settings of Alarm and Trip contacts please refer nameplate data.
- Settings of Fan OFF and Fan ON contacts are on customer's own will.

However typical settings are:

- i. For Fans OFF 60 °C for hot areas and 70 °C for cold areas
- ii. For Fans ON 70 °C for hot areas and 80 °C for cold areas

- The maximum temperature knob can be rest at any time via a knob available on the indicator (see Figure 4)

Example:

Ambient Temperature : 50 °C (From Name Plate)

Oil Temperature : 40 °C (From Name Plate)

i. Alarm Setting:

$$= \text{Ambient Temperature (}^\circ\text{C)} + \text{Oil Temperature (}^\circ\text{C)} - 10(^\circ\text{C)}$$

$$= 50 + 40 - 10 = 80 (^\circ\text{C})$$

ii. Trip Setting:

$$= \text{Ambient Temperature (}^\circ\text{C)} + \text{Oil Temperature (}^\circ\text{C)}$$

$$= 50 + 40 = 90 (^\circ\text{C})$$

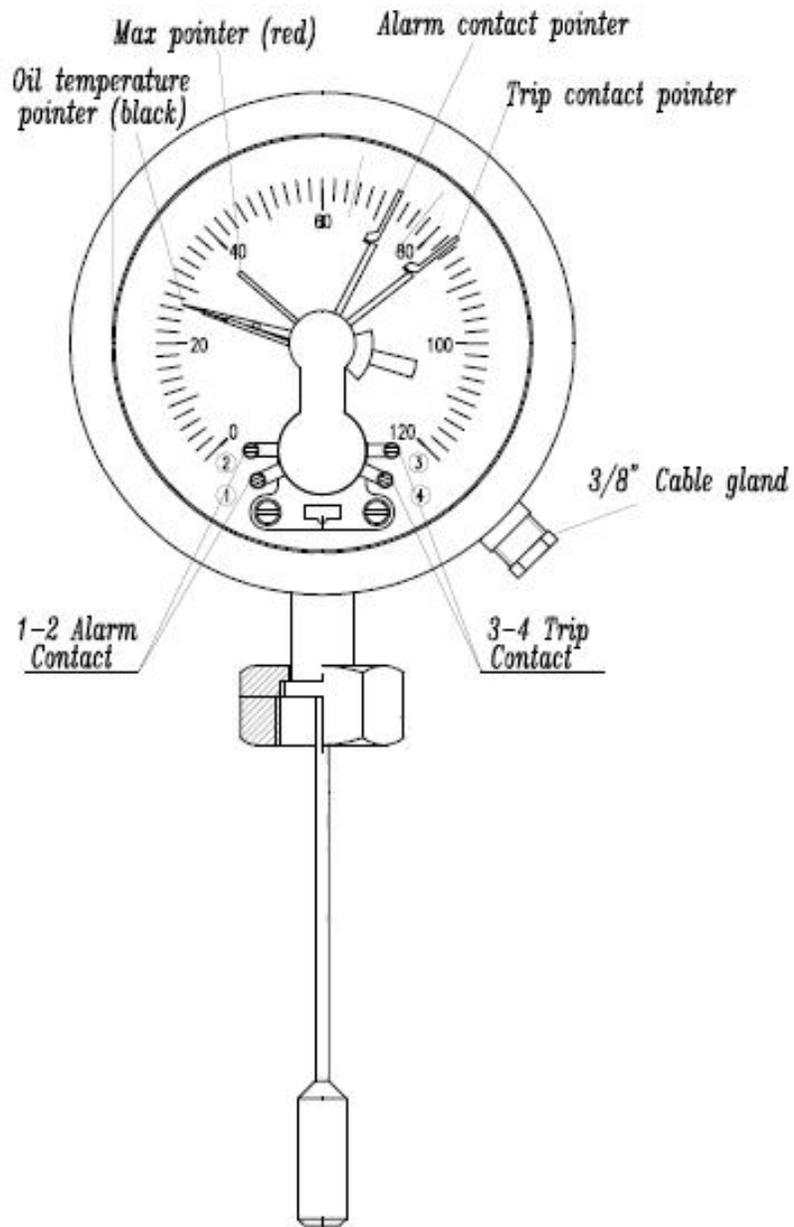


Figure 5 : Oil Temperature indicator widely used

Oil Level Indicator

Purpose:

Oil level indicator is used to monitor the oil level in the conservator. Mostly all of the oil level indicators are located on the sidewalls of the conservator. Usually two types of oil level indicators are used.

Without contacts, (see figure 6)



Figure 6 : Oil level indicators (without contacts)

- With contacts (see Figure 7)
 - i. Maximum level (MAX) having two contacts (1 NO and 1 NC)
 - ii. Minimum level (MIN) having two contacts (1 NO and 1 NC)

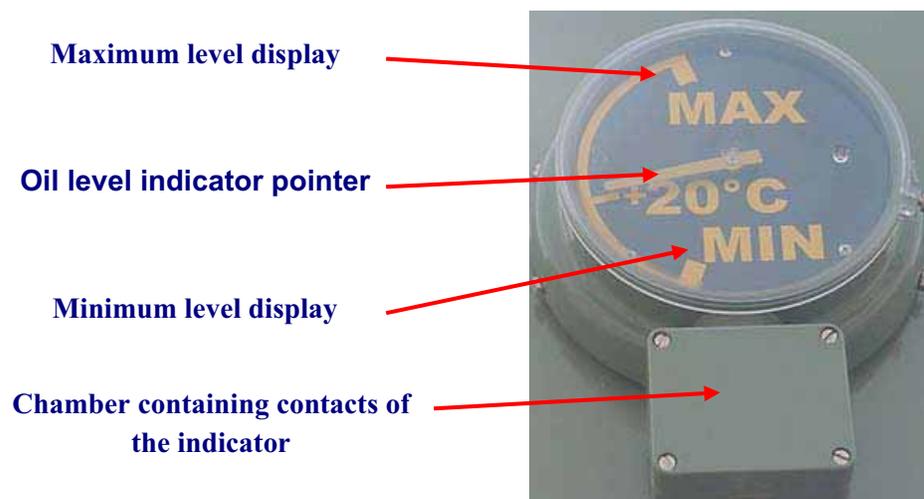


Figure 7 : Different parts of Oil Level Indicator

Functional Check:

The display is typically labeled with MAX, +20 °C & MIN values. If the oil level reaches to the maximum level the two contacts (1 NO and 1 NC) change their state. The same procedure repeats when the oil is lowered until minimum level. The functionality of the contacts can be electrically checked by checking the continuity and discontinuity of the contacts when their state changes.

The level indicator pointer could be moved manually to make/break these contacts. The display is graded in terms of temperature, because the oil expansion and contraction is the temperature dependent phenomena, since during the operation of transformer, oil quantity doesn't changes only the temperature variations changes its volume (level)

Pressure Relief Device (PRD)

Purpose:

Pressure relief device is used to give a relief to the oil pressure built up in case of a short circuit is developed inside the transformer. In the absence of this device the dangers of explosion or tank deformation exists. Mostly the pressure relief device is used on top plate. The spring type construction enables the PRD to automatically reset itself as soon as the oil pressure is released. Usually two types of PRD are used.

- Without contacts, (see Figure 8).
- With contacts (1 NO contact and 1 NC contact) (see figure9).



Figure 8 : Pressure Relief Device (PRD) without contacts

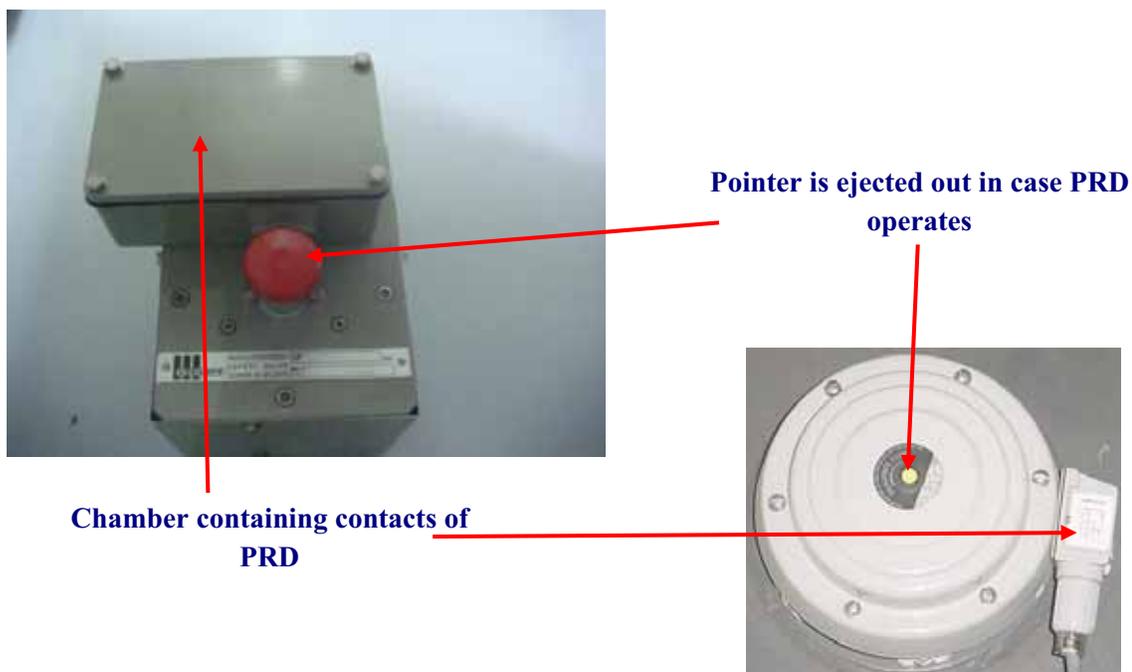


Figure 9 : Different parts of PRD

The yellow pointer as shown in the picture needs to be reset manually.

Functional Check:

The functionality of the contacts can be electrically checked by checking the continuity and discontinuity of the contacts when their state changes. A lever as shown in the picture sets the PRD and another lever resets its contacts to their initial state (see Figure 10).



Figure 10 : Set and Reset levers of PRD

Tap Changer

Purpose:

Voltage variations occurred at high voltage side is regulated by the tap changer and a constant output voltage is available at the output of the transformer. There are mainly two types of tap changers.

- OFF Load tap changers
- ON Load tap changers

OPERATION OF TAPCHANGER:

For OFF-Load tap changers, proper placement and tap selection is very important for trouble free operation of the transformer. For the tap selection, first check the incoming voltage to the transformer and then for exact matching with transformer tapping refer nameplate of the transformer. Before tap changing activity, it must be insured that the transformer is isolated (denergized) from both incoming and outgoing sides.

Almost all of the tap changers are operated in the same manner (see Figure 11)



Figure 11 : Different parts of tap changer

See Figure 12 & Figure for pictorial demonstration of different types of tap changers

- First rotate the lever clockwise / anticlockwise,
- Second rotate it to the desired tap position,
- Third place (push) the lever downwards to its final resting position

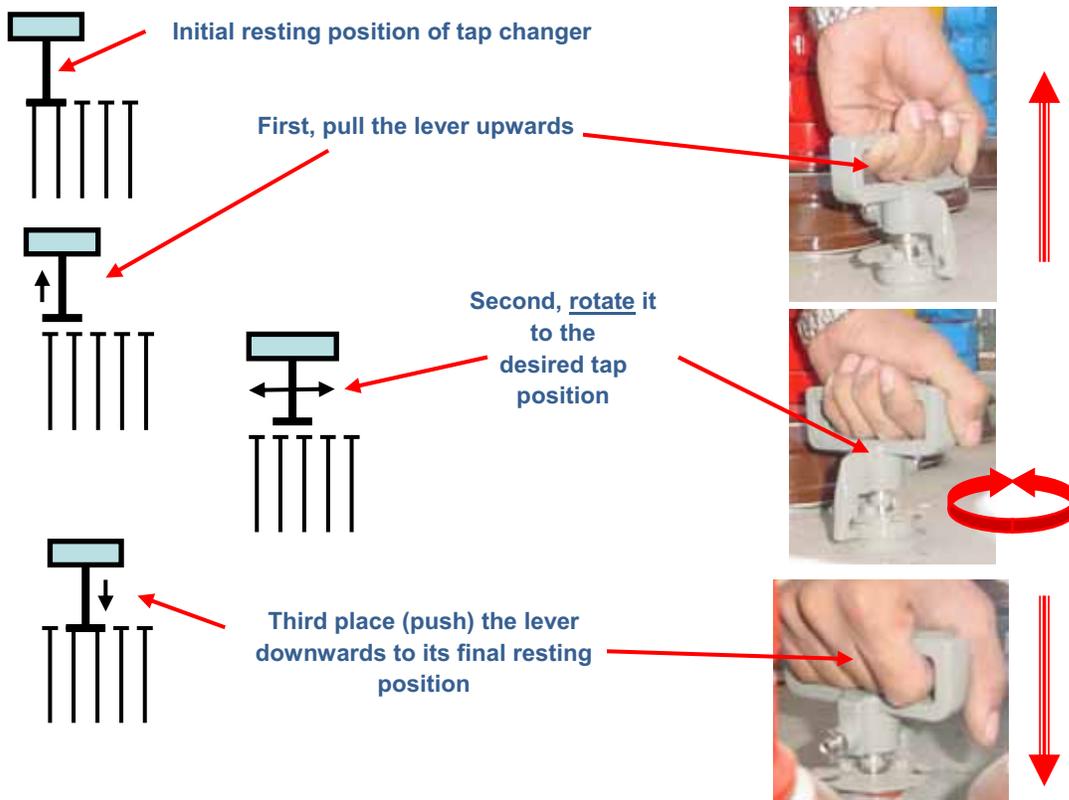


Figure 12 : Proper operation of Tap Changer (large transformers)

First rotate the lever clockwise / anticlockwise,

- Second rotate it to the desired tap position,
- Third place (push) the lever downwards to its final resting position

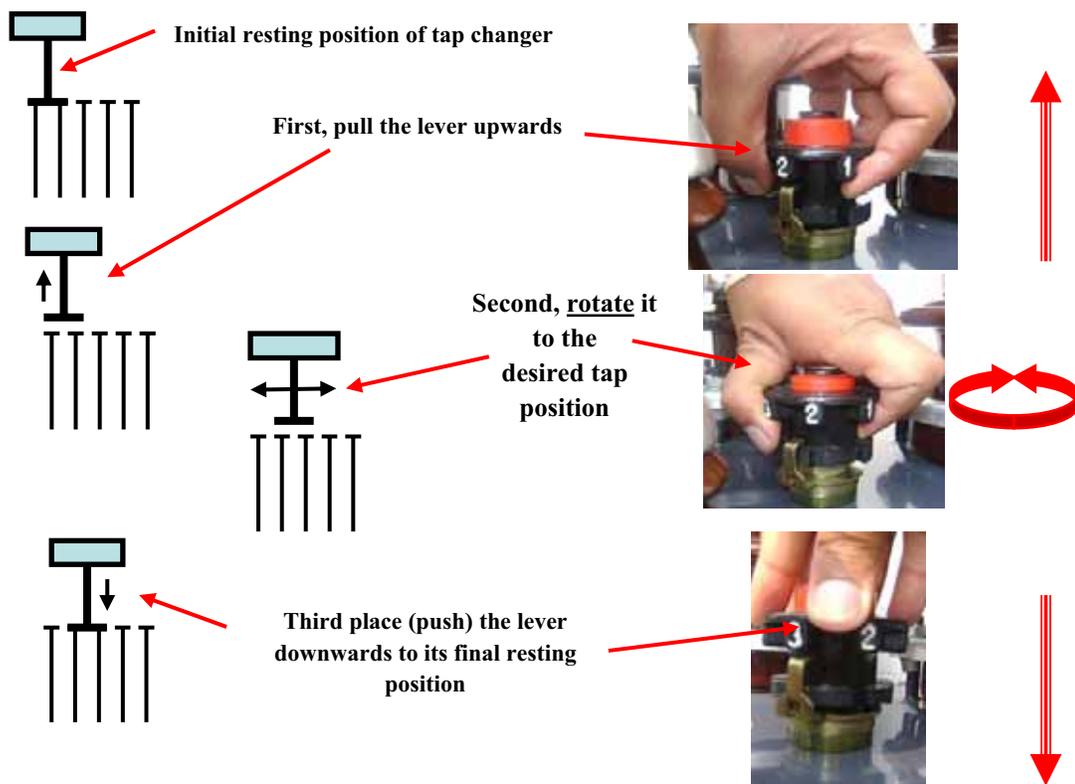


Figure 12: Proper operation of Tap Changer (small transformers)

NOTE!

For proper operation of ON-load Tap changer, please refer operating manual of the tap changer

SAFETY OF TAP CHANGER:

To keep the contacts of the tap changer in healthy condition it is recommended to operate the tap changer on all of its tap positions at least once a year. Any prolonged operation on a particular tap may cause carbonization or hot spot formation at the contact.

For ON load tap changers before energization, bleeding of tap changer is must (see Figure 13). Secondly On load tap changers need preventive maintenance after a certain number of operations or after a certain length of time depending upon the manufacturer and type of the tap changer (please refer ON load tap changer manual for the details of preventive maintenance of the tap changer)

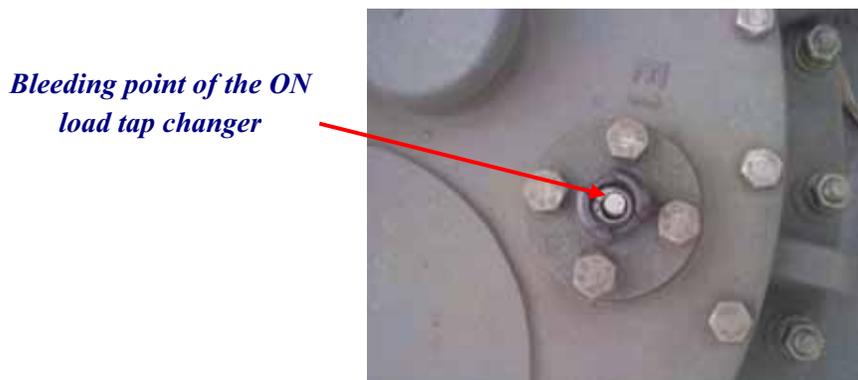


Figure 13 : Bleeding Point of ON load Tap changer

Current Transformer (CT) and Bushings

Purpose:

For some particular application, for example transformers with Automatic Voltage Regulators (AVR) or Winding Temperature Indicator (WTI), current transformers are installed in distribution transformers.

Connection and Safety of CT:

Either the secondary circuit of CT, in every case, in use or when not in use, must be complete. Opening the CT secondary circuit, during operation of the transformer, is hazardous to the person operating the device and might damage the CT as well.

When intended to use, the CT secondary circuit must be thoroughly checked and verified by electrical testing, recommended is to check the CT circuit by secondary current injection sets. For the secondary circuit one terminal of the CT must be earthed for the safety of the CT.

In case when the CT is not used, all the terminals of the CT must be shorted together and earthed. The same practice should be adopted for the CT in case of transportation of the transformer (see Figure 14).

There are few types of Bushings, which are provided with the bleeding point. Such bushings must be subject to bleeding prior to the energization of the transformer (see Figure 14).



CAUTION!

Make sure that the bushings are not in tension due to its termination

When not in use the CT secondary terminals must be properly shorted and earthed



Bushings with provision of bleeding, must be subject to bleeding before energization of the transformer

Figure 14 : CT termination and bleeding point of Bushing

Silicagel Breather

Purpose:

The purpose of silicagel is to absorb the moisture during the contraction of the oil in the transformer. During this process, transformers inhales air from the atmosphere. The air intake must be moisture free. Absorption of moisture by the oil will affect (decrease) the dielectric strength, will increase the moisture content in oil and will ultimately cause flashover in the transformer. Majority of the breathers are without any contact. See Figure 15 for example.

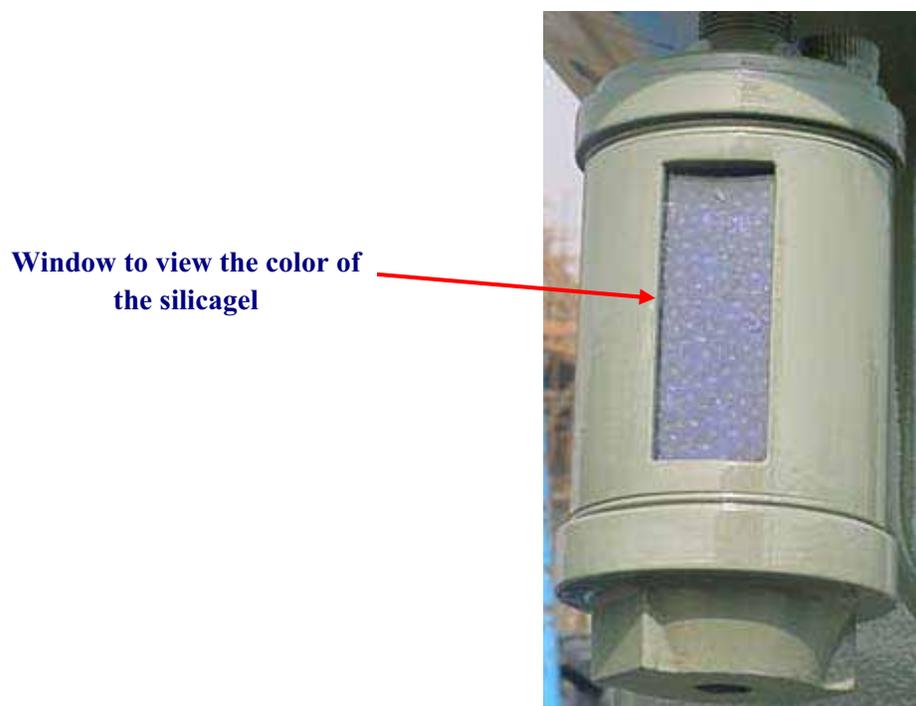


Figure 15 : Silicagel breather

Condition of Silicagel:

Usually blue color shows the healthiness of the silicagel (see Figure 15). With the passage of time, after moisture absorption, the color of the silicagel will turn to pink. This shows that the silicagel is exhausted, either it has to be regenerated or should be replaced.

Thermometers

Purpose:

The purpose of this instrument is to measure the temperature in oil filled transformers and is suitable for indoor installations. Temperature sensing system is of expansion type. See Figure 16 of typical thermometers used in transformers.



Figure 16 : Thermometers

Bushing Termination, Earthing and Ventilation

Bushing Termination:

Termination of HV terminals (bushings) is very important and if proper and suitable procedures are not adopted then it causes oil leakages from bushings gasket / sealing. Normally either cable terminations are used or for heavy currents bus bar arrangements are implied. For both arrangements, no tension whatsoever (axial or radial) should affect the bushings. The bushings must be absolutely tension free. For bus bars arrangements one additional care must be taken regarding thermal expansion of the bus bars. AT the time of energization, the temperature of the bus bars coincides with the ambient temperature. However, when the transformer is loaded and temperature of its oil increases so the bus bar temperature normally rises too. This causes thermal expansion of the bus bars and ultimately exerts tension on the bushings gasket.

Suitable measures should be taken to avoid the effects of thermal expansion. For that reason, usually bus bar is cut into two halves and in-between flexible conducting joints are provided. Sometimes depending on the weight, length and size (area) of the bus bar additional insulators are also provided along the length to support the bus bars so that weight and thermal expansion effects do not travel to wards the bushings.

Earthing:

For the safety of equipment itself, the load connected to the transformer and the personnel, earthing is very important. The transformer must be earthed at the point where the manufacturer has provided the earthing termination. Earth resistance must be checked periodically for the healthiness of the earthing. Except live parts, no other part of the transformer should be at any floating potential.

Ventilation:

Provide suitable ventilation system for the heat exhaust of the transformers, installed indoor.

Transformer Maintenance

The scope of routine and preventive maintenance covers following activities,

- Routine Inspection and Maintenance
- Preventive Maintenance & Chart
- Trouble Shooting



NOTE!

During operation, transformer is exposed to atmospheric conditions and electrical and mechanical stresses. In order to ensure uninterrupted operation, it is necessary to inspect and maintain the transformer carefully. Inspection and maintenance can be categorized into routine and periodic inspection and maintenance.

Routine Inspection and Maintenance

Routine inspection and maintenance can be carried out while the transformer is On-line. Pay attention to the following parameters:

- Abnormal noises, irregular vibrations, external damages, silicagel condition and deterioration of paint
- A record of the readings/recordings, from the meters/gauges provided on the transformer, should be maintained and compared with the past values. In case of abnormalities suitable measures should be taken

Routine inspection and maintenance should include, but not limited to the followings:

| | | |
|-------------------------|---|---|
| Transformer Temperature | : | Take and record the reading of oil/winding temperature indicator |
| Oil Level | : | Take and record the reading of oil level indicator |
| Noise | : | Check for abnormal sound/noise |
| Oil Leakages | : | Check oil leaks especially on location of valves, Indicators, packing and welded parts |
| Breather | : | Pay attention to the color of silicagel. Regenerate or replace if color has changed, (from healthy condition to the exhausted condition, the color change depends on the type of the silicagel being used) |
| Bushings | : | Check for excessive bushing contamination |

Preventive Inspection and Maintenance

The period for the inspection is not absolute and is dependent on atmospheric and operating conditions of each transformer. The recommended period under normal conditions is one year.

Preventive maintenance and inspection should include but not limited to the following (Many of these require the transformer to be shut down).

| | | |
|--|---|--|
| Tank | : | Check for oil leaks and paint finish |
| Radiators contaminations | : | Check for oil leaks, paint finish and |
| Bushing contamination and oil leaks | : | Check for local heating, damages, |
| Insulating oil offensive odor and | : | Check for dielectric strength, carbon sludge, discoloration |
| Dehydrating breather | : | Check for discoloration of silicagel breather |
| Indicators ¹ | : | Check for proper functioning |
| Physical Checks level checks, Conductors | : | Visual Inspection of complete transformer, Oil Connections of Cables, Bus Bars or Overhead to Bushings & Earthings |

Recommended Electrical Tests :

- Measurement of Insulation Resistance of the Windings (Megger Test)
- Measurement of Voltage (Turns) ratio (TTR)
- Measurement of Winding Resistance
- Measurement of dielectric strength of oil
- Open Circuit Test & Short Circuit Test (If possible, to be performed)
- Functionality test and physical check of all accessories, parts and components
- Complete Chemical Analysis of Transformer Oil (once after every five years, please consult PEL for the details regarding the chemical analysis of the oil)
- Measurement of capacitance and dissipation factor of insulation system of bushings (if applicable) and transformer.



Any Abnormality / Malfunctioning / Deterioration, if noticed should be rectified immediately. Do not delay in any corrective action

¹ meters, gauges, relays and other devices

Preventive Maintenance Chart

| S. No. | Work to be carried out | Duration of work | Time Interval | | | |
|-----------|---|------------------|----------------|----------------|----------------|----------------|
| | | hour | w ² | m ³ | y ⁴ | v ⁵ |
| 1- | Tank and conservator | | | | | |
| 1.1 | Checking the oil temperature | <1 | 1 | | | |
| 1.2 | Checking the dehydrating breather | <1 | 1 ⁶ | | | |
| 1.3 | Checking the oil levels | <1 | 1 | | | |
| 1.4 | Checking the flanged joints and welds for oil leakage | <1 | | 1 | | |
| 1.5 | Checking the paint finish and declining the surface | 3 | | 6 | | |
| 1.6 | Checking the earthing systems (protective earthing) | 2 | | | 1 | |
| 1.7 | Oil sampling (for oil analysis) | <1 | | | 4 | |
| 3- | Cooling system | | | | | |
| 3.1 | Checking the oil temperature | <1 | 1 | | | |
| 3.2 | Checking the butterfly valves | <1 | | 6 | | |
| 3.4 | Checking the oil sight pot | <1 | | 6 | | |
| 3.5 | Checking the fans | 2 | | 1 | | |
| 3.6 | Checking the coolers (radiators) | 8 | | | 1 | |
| 4- | Control cubicle and terminal box | | | | | |
| 4.1 | Checking the heating of the control cubicle. | <1 | | 6 | | |
| 4.2 | Checking the enclosure for water tightness | <1 | | | 1 | |
| 5- | Bushing | | | | | |
| 5.1 | Checking for oil leaks | <1 | | 1 | | |
| 5.2 | Checking the porcelain | 8 | | 6 | | |
| 5.3 | Cleaning the protective spark gaps. | <1 | | | 2 | |
| 6- | Current Transformers | | | | | |
| 6.1 | Checking the terminal connections | <1 | | | 1 | |
| 6.2 | Cleaning the terminal earthing | <1 | | | 1 | |
| 7- | Monitoring devices | | | | | |
| 7.1 | Checking the Buchholz Relay | <1 | | 6 | | |
| 7.2 | Checking the diverter switch relay and Pressure relief diaphragm/device | <1 | | 6 | | |
| 7.3 | Checking the thermometers | <1 | | | 1 | |
| 7.4 | Checking the temperature monitors | <1 | | | 1 | |
| 7.7 | Checking the oil level indicators | <1 | | | 1 | |
| 7.8 | Checking the pressure relief device on the transformer tank | <1 | | | 1 | |
| 7.9 | Checking for gas in the Buchholz relay | ~1 | | 6 | | |

² w= week

³ m= month

⁴ y= year

⁵ v= variable

⁶ Maximum 2 hours, if the desiccant is to be replaced

Trouble Shooting

| <i>Protective, monitoring devices and various components</i> | <i>Fault</i> | <i>Possible Cause</i> | <i>Remedial Measures</i> |
|--|--------------------------------------|---|---|
| Buchholz relay | Buchholz relay-alarm | <ul style="list-style-type: none"> ○ Oil loss. ○ Accumulation of air. ○ Gas generation due to inside failure. ○ Violent vibration ○ False tripping. | <p>Operation can be continued. However, following tests and examination for fault analysis should be made as soon as possible.</p> <ol style="list-style-type: none"> 1- Check oil level, pipes, position of valves 2- Check the electrical connections 3- Check the tripping mechanism of the Buchholz relay 4- Pass part of the gas through the gas analyzer 5- Take oil sample (1liter) from tank bottom and check for dielectric strength 6- Undo all bushing connections and make the following measurements <ol style="list-style-type: none"> 6.1.Measure the insulation resistance between the winding and tank wall and between the winding themselves. (<i>Rough guide value: 1 M ohm per kV rated voltage</i>) 6.2.Ratio measurement either by Ratio meter or by applying low voltage to the HV side 6.3.Measure the DC winding resistance DC 6.4.Measure the no-load current by applying low voltage 6.5.Compare the result with the factory test results of transformer 7- Vent the transformer and put it back into operation when it is a false tripping (confirmed) or faults have been eliminated |
| Buchholz relay | Buchholz relay-tripping | <ul style="list-style-type: none"> ○ Oil loss. ○ Violent oil surge due to inside flasher. ○ Violent gas generation due to inside failure. ○ Violent vibration. ○ False tripping. | <ul style="list-style-type: none"> ○ Maintain shutdown status. ○ Carry out tests and measurements described under point (1-) to (7-) ○ Vent the transformer and put it back into operation when it is a false tripping (confirmed) or faults have been eliminated |
| Thermal Replica | Winding or oil temperature too high. | <ul style="list-style-type: none"> ○ Transformer overload or inadequate cooling. ○ Incorrect temperature adjustment. <p>Faulty temperature gauge</p> | <ul style="list-style-type: none"> ○ Reduce load of the transformer. ○ Put fans or cooling equipment in service. ○ Clean the cooling equipment. ○ Check position of butterfly valves. ○ Adjust incorrect temperature setting ○ Check the proper functioning of thermometer, do comparative measurement. ○ Check the electrical connection and the tripping mechanism. ○ Check control device for cooling equipment. <p>Check the current transformer and thermal replica calibration</p> |

| | | | |
|---|--|---|---|
| Thermal Replica | Winding or oil temperature too high. | <ul style="list-style-type: none"> ○ Transformer overload or inadequate cooling. ○ Incorrect temperature adjustment. Faulty temperature gauge | <ul style="list-style-type: none"> ○ Reduce load of the transformer. ○ Put fans or cooling equipment in service. ○ Clean the cooling equipment. ○ Check position of butterfly valves. ○ Adjust incorrect temperature setting ○ Check the proper functioning of thermometer, do comparative measurement. ○ Check the electrical connection and the tripping mechanism. ○ Check control device for cooling equipment. Check the current transformer and thermal replica calibration |
| Magnetic oil level Indicator | Oil level too low. | Not enough oil. (low temperature or oil loss) | <ul style="list-style-type: none"> ○ Check for tightness, leaks and oil level ○ Top up oil. |
| Dehydrating breather | The drying crystals turn from blue to pink (depending on the type of the silicagel being used. From below towards the top | <ul style="list-style-type: none"> ○ High atmospheric humidity ○ Moisture penetrating in transformer through other parts (usually leaks or gasket failures) rather through breather ○ Damaged breather (usually glass of the breather) | <ul style="list-style-type: none"> ○ Replacement of dehydrating agent (silicagel) ○ Seal leaks and gasket failures; check the oil for moisture content ○ Flush the conservator with dry air or nitrogen. |
| Electrical break-down of voltage in oil | Usually in the form of earth fault or short circuit | <ul style="list-style-type: none"> ○ Breather inoperable or transformer in service since very long and silicagel exhausted ○ Moisture contents in oil too high and weak dielectric strength of oil | <ul style="list-style-type: none"> ○ Put breather into operation ○ Seal or repair leaks and gaskets ○ Centrifuging/dehydration of oil to be performed till the required dielectric strength of oil is reached and moisture contents are reduced to the required levels (refer IEC 60422 for details) |
| Protective spark gap on bushing | Frequent operation | <ul style="list-style-type: none"> ○ Electric arcing distance no longer correct Incoming voltage at the terminals of the transformer is far greater than the rated terminal voltage | <ul style="list-style-type: none"> ○ Adjust the clearance between the arcing horns and screw them tight ○ Check the incoming voltage and compare with the rated terminal voltage, try to adjust with the help of tap changer (if possible), if not then get the adjustment at the incoming from the source (usually grid station) |

| | | | |
|---------------------------------|---|---|--|
| Terminal/cable lugs on bushings | Discoloration of connecting parts | Poor contact making causing hot spot formation | <ul style="list-style-type: none"> ○ Clear and clean, the contact faces. ○ Tighten the screws. |
| Control cabinet | <ul style="list-style-type: none"> ○ Electrical Apparatus does not operate properly. ○ Contacts corroded or contaminated ○ Apparatus housing bent. | <ul style="list-style-type: none"> ○ Excessive humidity in control cabinet ○ Water or dust inside the cabinet ○ Excessive high temperature in the cabinet. | <ul style="list-style-type: none"> ○ Set the cabinet heater to a higher temperature to eliminated the moisture ○ Seal the cabinet door; fit a dust filter if necessary ○ Protect the cabinet against solar irradiation, provide for better ventilation and check whether the thermostat settings are too high |
| Earthing connection | Earthing line interrupted | <ul style="list-style-type: none"> ○ Excessive currents due to external flashovers ○ Impermissible current loops through multiple earthing. | <ul style="list-style-type: none"> ○ Clean the contacts tighten the screws and check the electrical distances ○ Open up close current loops. Provide adequate earthings at specified paths with a sufficient cross section. ○ Check earth resistance with the help of earth tester, earth resistance should be within the specified limits |
| Dial Type thermometer | Oil temperature too high | <ul style="list-style-type: none"> ○ Transformer overload or inadequate cooling. ○ Incorrect temperature adjustment. ○ Faulty temperature gauge | <ul style="list-style-type: none"> ○ Reduce load of the transformer. ○ Put fans or cooling equipment in service. ○ Clean the cooling equipment. ○ Check position of butterfly valves. ○ Adjust incorrect temperature setting ○ Check the proper functioning of thermometer, do comparative measurement. ○ Check the electrical connection and the tripping mechanism. ○ Check control device for cooling equipment. ○ Check the current transformer and thermal replica calibration |

Annexure A Transformer Failure Report Form

Customer Information:

Company : _____
 Site/Location : _____
 Contact Person : _____
 Department : _____
 Address : _____

 Phone : _____ Fax : _____ E-Mail : _____

Test Object Information:

Manufacturer: PEL Non PEL (If Yes, then specify) _____
 Generator transformer Network transformer Other (Specify Type) _____
 Distribution Transformer Indoor Installation Outdoor Installation _____
 Auto Transformer Two Winding Transformer Three Winding Transformer _____
 1 - phase 3 - phase _____
 Step-up Transformer Step-down Transformer _____
 Serial / LPK No.: _____ Year of Manufacturer: _____
 Rated Power (ONAN/ONAF): _____ / _____ (kVA / MVA)
 Voltage Ratio: _____ Vector Group: _____

A) Fault Description:

B) Fault Details:

1- ALARM :

| | |
|---|---|
| <input type="checkbox"/> Oil level Indicator (Tank) | <input type="checkbox"/> Oil level Indicator (OLTC) |
| <input type="checkbox"/> Oil Temp Indicator | <input type="checkbox"/> Buchholz Relay (Tank) |

2- TRIPPING :

| | |
|---|---|
| <input type="checkbox"/> Buchholz Relay (Tank) | <input type="checkbox"/> Protective Relay (OLTC) |
| <input type="checkbox"/> Oil level Indicator (Tank) | <input type="checkbox"/> Oil level Indicator (OLTC) |
| <input type="checkbox"/> Oil Temperature Indicator | <input type="checkbox"/> Differential |
| <input type="checkbox"/> Pressure Relief Device | <input type="checkbox"/> Earth fault |
| <input type="checkbox"/> Over load | <input type="checkbox"/> Short circuit |

3- CONDITIONS OF ACCESSORIES & COMPONENTS AT THE TIME OF FAULT:

a) Silica gel (Tank & OLTC) : Pink, Blue, _____

b) Oil Temp (°C) : _____

- c) Tap changer Tap Position / No. of operations : _____ / _____
- d) Gas found : NO YES (state the details below)
- Buchholz : YES NO
- LV Bushings : YES NO
- HV Bushings : YES NO
- e) Gas color : Combustable Non-combustable
- f) Oil colour / Appearance : _____

C) On Site Tests details (if performed):*

| S. No. | Test Description | Test Performed | | Test Results | |
|--------|--|------------------------------|-----------------------------|-------------------------------|-------------------------------|
| 1 | Megger (Insulation Resistance) | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |
| 2 | Ratio (TTR) & vector group confirmation | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |
| 3 | Winding Resistance | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |
| 4 | No Load Test (Open circuit test) low voltage | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |
| 5 | Load Test (Short circuit test) low voltage | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |
| 6 | Dielectric Strength of oil | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |
| 7 | Other | <input type="checkbox"/> YES | <input type="checkbox"/> NO | <input type="checkbox"/> PASS | <input type="checkbox"/> FAIL |

*** Note:** Reference for the post fault test results are manufacturer's factory test results and pre-commissioning test results of the transformer. Please provide a copy of the performed test results separately for the fault analysis of the transformer

D) Additional Information:

1- Tap Changer & Motor Drive :

Make (OLTC) : _____ Type : _____

Make (MDU) : _____ Type : _____

OLTC (Sr. No.) : _____ MDU (Sr. No.) : _____

Tap Changer operations : _____

Tap Changer Servicing History (please specify details) : _____

2- Fans :

Quantity :

| Operational Details | | OFF (°C) | ON (°C) |
|---------------------|------------------------------------|----------|---------|
| 1 | Oil Temperature Indicator Settings | | |

3- CT Connection Details :

- HV CTs : Connected to external circuit
- Short circuited
- Terminal grounded : S1 S2
- LV CTs : Connected to external circuit
- Short circuited
- Terminal grounded : S1 S2

4- Neutral Grounding Details :

- | | | | |
|--|-----------------------------|-----------------------------|--|
| <input type="checkbox"/> Solidly grounded | | | |
| <input type="checkbox"/> Grounded by earth-fault neutralizer | <input type="checkbox"/> HV | <input type="checkbox"/> LV | |
| <input type="checkbox"/> Neutral ungrounded | | | |

5- Over Voltage Protection :

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> Spark Gaps | <input type="checkbox"/> Surge Arresters |
| <input type="checkbox"/> Both | <input type="checkbox"/> None |

6- Oil Conservator System :

- Free Breathing via silica gel breather
 Other (to be specified)
-

E) Operational History:

1- Service age to failure :

- | | |
|--|--|
| <input type="checkbox"/> < 1 year | <input type="checkbox"/> 1 - 5 years |
| <input type="checkbox"/> 5 - 10 years | <input type="checkbox"/> 10 - 25 years |
| <input type="checkbox"/> 25 - 40 years | <input type="checkbox"/> > 40 years |

2- Typical loading :

- | | |
|------------------------------------|---------------------------------------|
| <input type="checkbox"/> < 0.5 pu | <input type="checkbox"/> 0.5 - 0.8 pu |
| <input type="checkbox"/> > 0.8 pu | <input type="checkbox"/> Variable |
| <input type="checkbox"/> Not Known | |

3- Loading immediately prior to failure :

- | | |
|------------------------------------|---------------------------------------|
| <input type="checkbox"/> < 0.5 pu | <input type="checkbox"/> 0.5 - 0.8 pu |
| <input type="checkbox"/> > 0.8 pu | <input type="checkbox"/> Variable |
| <input type="checkbox"/> Not Known | |
-

F) Remarks (If any):

Stamp (Name / Designation / Department)

Signature / Date

Thank you for completing this form. It will assist us in specifying the most appropriate solution/recommendation for your problem. If any additional information is available please send in with this form.

Annexure B Test Reports

Enclosed please find test report of the transformer

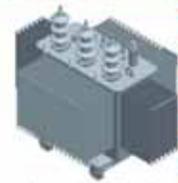
Annexure C Safety Checklist before Commissioning



SAFETY CHECK LIST BEFORE COMMISSIONING

DEAR CUSTOMER,

In order to operate the supplied equipment properly,
Please make sure the compliance of the below mentioned points.



- Please make sure all the sealing points are sealed and intact, when the transformer reaches its final installation site.
- Energization should be carried out by authorized personal and the locally applicable safety instructions must be followed strictly.
- During installation operators should be careful that oil sample plug, tap changer and any other operating and protection equipments are easily accessible. Monitoring equipments such as thermometer must be clearly visible and readable.
- Setting up the transformer completely parallel with a wall is not advisable as this will increase the noise. Suitable provision for natural air circulation must be provided in order to avoid overheating of transformer.
- The area in which the transformer is placed must be inaccessible to pets.
- The first energization of the transformer should be done without load.
- Before applying any supply voltage (for power, motor control & auxiliaries etc.) check whether the voltage and the output of the supply are in accordance with the required values.
- For the parallel operations of two Transformers, the parallel operation requirements must be met strictly.
- Check the Rating Plate before HT/LT connection.
- Keep the connection surface clean. A flexible connection is recommended in all cases. In this way the expansion of the conductors due to temperature can't lead to leak or cracks. Make sure that all the Bushings are not in tension due to their cable / busbar terminations.
- For tap changer adjustment according to the desired voltage, please refer Rating Plate or Guide Ring. Secondly make sure that the tap changer is placed properly on the required tapping, and locked as well.
- Before operating the tap changer, ensure that the transformer is completely switched off from high and low voltage sides. In case of an ON-Load tap changer, please refer its operating manual.
- Transformer must be operated at all taps at least once a year.
- Check the earthing terminals, before making earthing connections, make sure that the earthing points are free from rust, paint and grease. Transformer should be earthed from its specified earthing points. Secondly earth resistance must be checked periodically for the healthiness of the earthing.
- Install the original breather before energization by replacing the temporary transport breather.
- Check the color of silicagel, incase it is exhausted, replace it.
- All the bleeding points must be subjected to bleeding before first energization.
- Functionality of all the accessories must be ensured before energization.
- CT should be either shorted & grounded (if intent not to be put in to operation), if intent to use then CT circuit should be complete and grounded either through S1 or S2 terminals.
- In order to ensure uninterrupted operation, transformer routine, periodic and preventive maintenance must be thoroughly under taken.
- Valves should be in correct operating positions.
- Thermometer pockets should be filled with Oil.
- Oil should be at the correct level in the conservator, check oil level gauges,
- Arcing horn gaps should be properly adjusted, as per their corresponding voltage rating requirements,
- There should be no leakage or seepage of oil from any part of the transformer including gaskets, joints and terminals.
- Regarding explosion vent (where applicable), for the safety of Diaphragm (Aluminum Foil), during transportation a piece of M.S. sheet is provided for the safety of Diaphragm at the end of explosion vent. Please remove this M.S. sheet and keep Diaphragm in place before energization.
- In case of any abnormality, please inform Pak Elektron Limited (PEL) instead of taking any further actions.
- Damaging of the Transformer due to violation / ignorance of the above mention safety points may void the warranty of Transformer.

PEL

معزز کسٹمرز



برائے مہربانی فراہم کردہ ٹرانسفارمر کو صحیح طور پر کام میں لانے کیلئے
مندرجہ ذیل ہدایات کی تکمیل کی یقین دہانی ضرور کر لیں

- 1- جب ٹرانسفارمر نصب کرنیوالی جگہ پر پہنچ جائے تو اس کے سارے سیل بندھے اچھی طرح سیل بند اور محفوظ ہونے چاہیں۔
- 2- صرف متعلقہ شخص ہی عملی اقدام (Energization) انرجائزیشن کے عمل کو انجام دے۔ اور مقامی حفاظتی ہدایات کو مد نظر رکھے۔
- 3- نصب کرنے کے عمل کے دوران کارکن اس بات کا خیال رکھے کہ تیل کی جانچ کرنے والا کاک ٹیپ چھینر اور دوسرے عملی اور حفاظتی آلات آسانی سے قابل رسائی ہوں۔ آلات مشاہدہ جیسا کہ تھرمامیٹر وغیرہ واضح اور صاف نظر آ رہے ہوں۔
- 4- ٹرانسفارمر کو بالکل دیوار کے متوازی رکھنا موزوں نہیں ہے۔ کیونکہ اس سے آواز میں اضافہ ہوتا ہے۔ ٹرانسفارمر کو بالائی حرارت سے بچانے کے لیے قدرتی ہوا کی آمدورفت کیلئے مناسب جگہ فراہم کی جائے۔
- 5- جس جگہ ٹرانسفارمر رکھا جائے وہاں جانوروں کی رسائی نہ ہو۔
- 6- ٹرانسفارمر کو پہلی بار عمل میں لانے کے لیے اسے بغیر لوڈ کے چلایا جانا چاہیے۔
- 7- پہلی دفعہ وولٹیج سپلائی دینے سے پہلے (Power) پاور اور (Motor Control) موٹر کنٹرول اور (Auxiliaries) اوگنرلیز وغیرہ کے لیے چیک کر لیں کہ آیا یہ وولٹیج اور سپلائی ان آلات کی حاصل مطلوبہ وولٹیج کے مطابق ہے یا نہیں۔
- 8- 2 ٹرانسفارمرز کے متوازی عمل کیلئے متوازی عمل کے اصولوں کو سختی سے پورا کیا جائے۔
- 9- ہائی اور لو وولٹیج کے (Connection) کنکشن سے پہلے (Rating Plate) ریٹنگ پلیٹ کو چیک کر لیں۔
- 10- (Connections) کنکشنز کی سطح کو صاف رکھیں تمام صورتوں میں لچکدار کنکشن کو موزوں قرار دیا جاتا ہے۔ کیونکہ حرارت کی وجہ سے کنڈکٹرز کا پھیلاؤ، ٹیکاؤ، یا شکاف کا سبب بن سکتا ہے۔ اس بات کا یقین کر لیں کہ (Bushing) بشنگ، کیبلز اور (Busbar) بس بار کی حد بندی کسی وجہ سے کھچاؤ، یا تناؤ میں تو نہیں ہیں۔
- 11- (Tap Changer) ٹیپ چھینر کی ترتیب کو مطلوبہ وولٹیج کے مطابق کرنے کیلئے براہ کرم ریٹنگ پلیٹ یا گائیڈ رنگ سے رہنمائی حاصل کریں۔ نیز یہ یقین کر لیں کہ ٹیپ چھینر مطلوبہ ٹپنگ پر صحیح طریقے سے بیٹھا ہوا ہے۔ اور (Lock) بند بھی ہو چکا ہے۔
- 12- (Tap Canger) ٹیپ چھینر کو اپریٹ کرنے سے پہلے اس بات کی تصدیق کر لیں کہ ٹرانسفارمر ہائی اور لو وولٹیج کی طرف سے مکمل طور پر بند ہو چکا ہے۔
- 13- ٹرانسفارمر کو سال میں ایک دفعہ ہر (Tapping) ٹپنگ پر استعمال کرنا چاہیے۔
- 14- (Earthing) ارتھنگ کنکشن کرنے سے پہلے (Earthing Terminals) ارتھنگ ٹرمینلز کو چیک کر لیں اس بات کا بھی یقین کر لیں کہ ارتھنگ کے مقامات زنگ، گریس اور رنگ سے محفوظ ہیں۔ ٹرانسفارمر کو صرف اس کے مخصوص ارتھنگ مقامات سے (Earth) ارتھنگ کیا جائے۔ وقتاً فوقتاً ارتھنگ (Earthing Resistance) ارتھنگ ریزٹنس کو ارتھنگ کی موزوں حالت کیلئے معیاری طور پر چیک کیا جائے۔

- 15- عملی حالت سے پہلے عارضی (Transport Breather) ٹرانسپورٹ بریڈر کو نئے (Breather) بریڈر سے تبدیل کریں۔
- 16- (Silicagel) سیلیکا جیل کے رنگ کو جانچ لیں اور پھیکا پڑنے کی صورت میں تبدیل کریں۔
- 17- پہلی دفعہ ٹرانسفارمر کو آن کرنے سے پہلے تمام (Bleeding) بلیڈنگ کے مقامات کو بلیڈ کر لیا جائے۔
- 18- عملی حالت سے پہلے تمام آلات کی عملی کارکردگی کی تصدیق کر لی جائے۔
- 19- کرنٹ ٹرانسفارمر کو یا تو تھارٹ کر کے گراؤ سنڈ کیا جائے (اگر عمل میں لانے کا ارادہ نہ ہو تو) اگر عمل میں لانے کا ارادہ ہو تو کرنٹ ٹرانسفارمر کے سرکٹ کو مکمل کر کے S1 یا S2 ٹرمینل سے گراؤ سنڈ کیا جائے۔
- 20- بلا توقف آپریشن کیلئے ٹرانسفارمر کی معمول کے مطابق دیکھ بھال کی جانی چاہیے۔
- 21- (Valves) والو اپنے صحیح عملی مقامات پر ہونے چاہیں۔
- 22- تھرمامیٹر کا خانہ تیل سے بھرا ہونا چاہیے۔
- 23- تیل (Conservation) کنزرویژن کے موزوں درجے پر ہونا چاہیے۔ تیل کے آلات پیمائش کو جانچ لیں۔
- 24- ٹرانسفارمر کے کسی بھی حصے (Gasket) گیسٹ کنکشنز یا اورٹرمینلز وغیرہ سے تیل کا ٹپکاؤ یا رساؤ نہیں ہونا چاہیے۔
- 25- (Explosion Vent) ایکسپلوژن وینٹ کے متعلق (جہاں موجود ہو) ڈایا فرام کے بچاؤ، کیلئے (Transportation) ٹرانسپورٹیشن کے دوران (M.S.Sheet) ایم۔ ایس۔ شیٹ کا ٹکراؤ ایکسپلوژن وینٹ کے ساتھ فراہم کیا گیا ہے۔ ٹرانسپورٹ کو ان کرنے سے پہلے اس ایم۔ ایس۔ شیٹ کو الگ کر لیں اور ڈایا فرام کو اس کی جگہ پر واپس رکھ دیں۔
- 26- (Arching Horns) آرکنگ ہورن کے درمیان کا فاصلہ ان کے مطلوبہ پوزیشن کے مطابق رکھا جانا چاہیے۔
- 27- کسی قسم کی خرابی کی صورت میں مزید کارروائی سے پہلے (PEL) پاک الیکٹرون لمیٹڈ کو مطلع کریں۔
- 28- مندرجہ بالا حفاظتی ہدایات کو نظر انداز کرنے کی صورت میں ٹرانسفارمر کو نقصان ہو سکتا ہے جو ٹرانسفارمر کی وارنٹی کو تینخ کرنے کا باعث بن سکتا ہے۔

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www.pel.com.pk



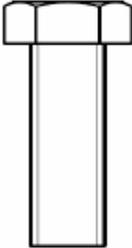
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Annexure D Recommended Torque Chart

|  | Bolt Tensile Strength as per DIN 267 | | | | | |  mm |
|---|---|------|------|------|------|------|---|
| | 4.6 | 5.6 | 6.9 | 8.8 | 10.9 | 12.9 | |
| | Recommended Torque Setting (Nm) | | | | | | |
| M 4 | 1.0 | 1.3 | 2.6 | 3.0 | 4.3 | 5.1 | 7 |
| M 5 | 2.0 | 2.6 | 5.1 | 6.0 | 8.5 | 10.2 | 8 |
| M 6 | 3.4 | 4.5 | 8.7 | 10.3 | 14.7 | 17.6 | 10 |
| (M 7) | 5.6 | 7.4 | 14.2 | 17.1 | 24.5 | 28.4 | 11 |
| M 8 | 8.2 | 10.8 | 21.6 | 25.5 | 35.3 | 42.2 | 13 |
| M 10 | 16.7 | 21.6 | 42.2 | 50.0 | 10.6 | 85.3 | 15 |
| M 12 | 28.4 | 38.2 | 73.5 | 87.3 | 122 | 147 | 18 |
| (M 14) | 45.1 | 60.8 | 116 | 138 | 194 | 235 | 22 |
| M 16 | 69.6 | 93.2 | 178 | 211 | 299 | 358 | 24 |
| (M 18) | 95.1 | 127 | 245 | 289 | 412 | 490 | 27 |
| M 20 | 135 | 180 | 384 | 412 | 579 | 696 | 30 |
| (M 22) | 182 | 245 | 471 | 559 | 784 | 941 | 32 |
| M 24 | 230 | 309 | 598 | 711 | 1000 | 1196 | 36 |
| (M 27) | 343 | 461 | 887 | 1049 | 1481 | 1775 | 41 |
| M 30 | 466 | 623 | 1206 | 1422 | 2010 | 2403 | 46 |
| (M 33) | 632 | 848 | 1628 | 1932 | 2716 | 3266 | 50 |

Annexure E Standards

For more information on transformers, in general you can have a look at the following IEC and CENELEC standards:

- IEC 60076 : Power Transformers
- IEC 60076-1 : General
- IEC 60076-2 : Temperature rise
- IEC 60076-3 : Insulation levels, dielectric tests and external clearances in air
- IEC 60076-5 : Ability to withstand short-circuit
- IEC 60076-8 : Application guide (used to be IEC 606)
- IEC 60076-10 : Determination of sound levels (used to be IEC 551)
- IEC 60076-7 : Loading guide for oil-immersed power transformers
- IEC 60616 : Terminal & tapping markings for power transformers
- IEC 60296 : Specification for unused mineral insulating oils for transformers and switchgear
- IEC 60422 : Supervision and maintenance guide for mineral insulating oils in electrical equipment
- IEC 60475 : Method of sampling liquid dielectrics
- IEC 60567 : Guide for the sampling of gases and of oil from oil-filled electrical equipment and for the analysis of free and dissolved gases
- IEC 60599 : Mineral oil-impregnated electrical equipment in service—Guide to the interpretation of dissolved and free gases analysis
- EN 50180 : Bushings above 1kV up to 36kV and from 250A to 3150A for liquid-filled transformers
- HD 428 : Three-phase oil-immersed distribution transformers 50Hz, from 50 to 2500kVA with highest voltage for equipment not exceeding 36kV
- HD 596 : Bushings up to 1kV and from 250A to 5kA for liquid-filled transformers

PEL

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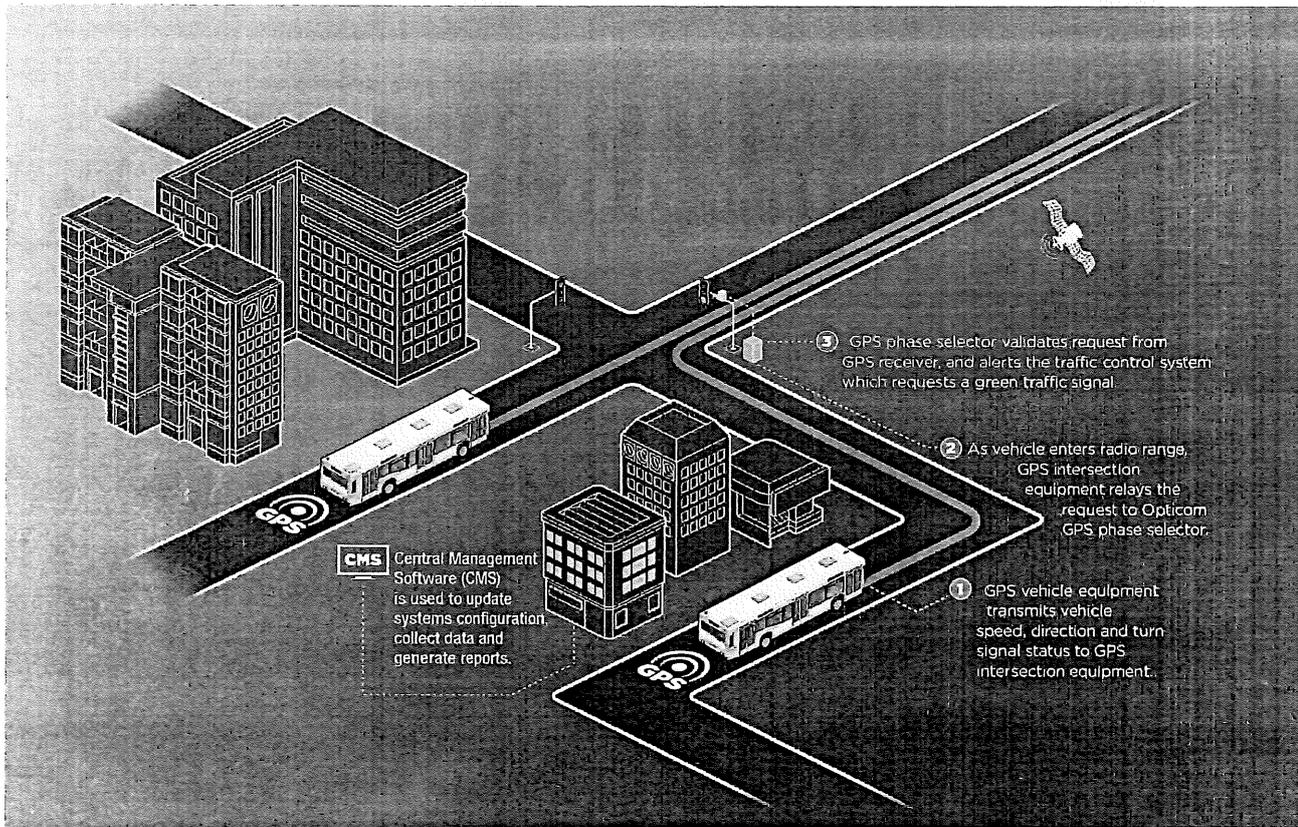
Operations and Maintenance (O&M) Manuals



PROPOSAL FOR:

BUS RAPID TRANSIT PRIORITY (BRTP) SYSTEM

For: Peshawar BRT Project.



From: **Engr. Awais Sohail**
General Manager

Company Name: **Pak German Engineers**

Email: awais.pge@gmail.com

Email: pdm@pgepakistan.com

Web: www.pgepakistan.com

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PAK GERMAN ENGINEERS

PGE TRAFFIC SOLUTIONS
PGE AUTOMATIONS
PGE ELECTRONICS
PGE CONSULTANCIES

| | |
|--|----|
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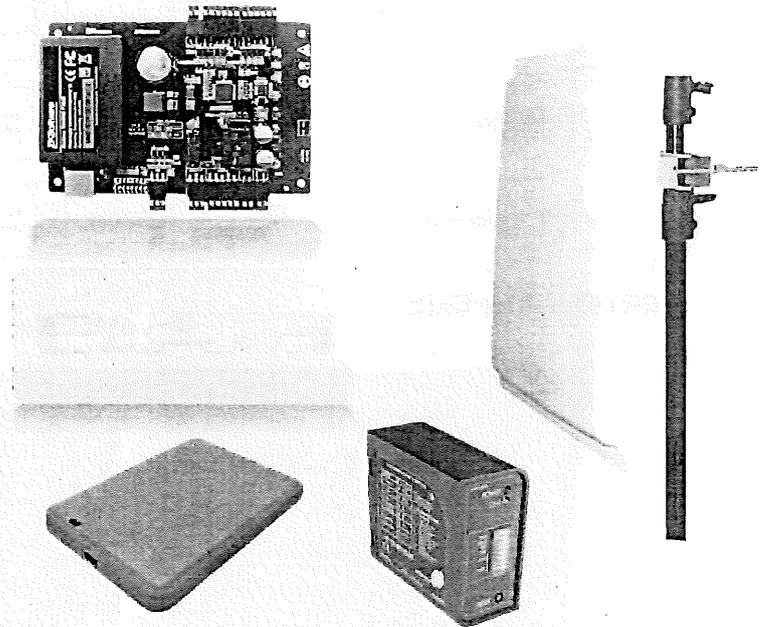
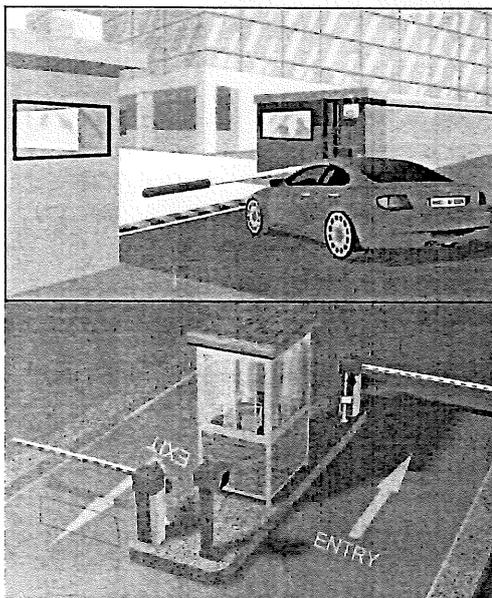
performance and durability, the EVACS is an ideal product to control the vehicular traffic using innovative RFID technology.

Features:

1. Customizable to Road Width.
2. Compatible with any access control system.
3. Manually Over-rideable.
4. Controls in a separate housing.
5. Designed for intensive use.
6. Intelligent control unit.
7. Manufactured from heavy gauge materials Assembled, tested and adjusted in factory according to client configuration Tailor made software solution.

Benefits:

1. Vehicle Access Management.
2. Visitor Management System.
3. Record keeping of vehicles.
4. Simple to install and maintain.
5. Reliable and dependable.
6. Operational under power failure conditions.
7. Strength and durability.
8. Confidence in proven performance.



CONSTRUCTION

UHF Reader and Control Unit housings are made up of ABS plastic material.

OPTIONS

We strongly recommend the fitting of Traffic Light, Inductive Loop and CCTV Systems wherever the barrier control point is remote from installation location.

Pedestrians, Cyclists and Motorcycles are advised not to use an EVACS controlled roadway for safety reasons, additional safety measures can be incorporated into the system if required.

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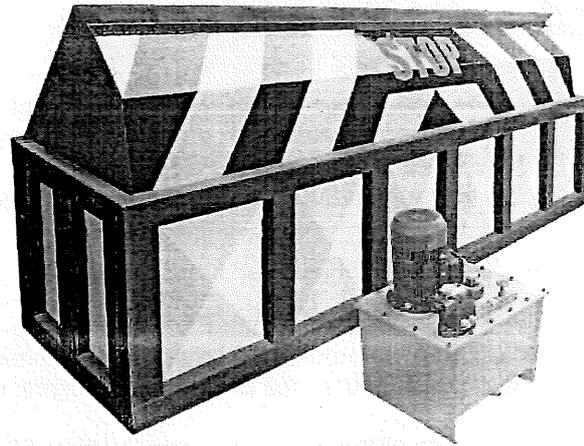
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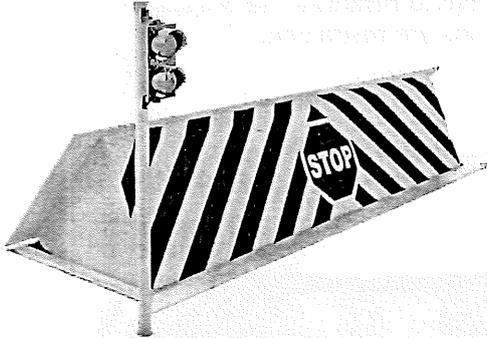
System Equipment:

I. Road Blockers:

The VEHICLE ROAD BLOCKER is a solid metal barrier unit; when not in use, lies hidden in the ground. When activated, it rises up from the road surface making it impossible for any vehicle to gain access. Its restraining platform will rise to 1200mm; and is available in options of 2M, 3M and 5M.



"RELIABLE, PRACTICAL AND COST-EFFECTIVE SOLUTION TO PROVIDE 100% SECURITY OF YOUR TERRITORY".



As per our systems requirements we will install road blockers on entry / exit points of the Bus transit corridor for selective access to only authenticated BRT vehicles. On a distance our system will get a request from RFID based

B RTP system to grant access to the vehicle. If the access is permitted then the Road blocker will be lowered for safe and smooth access of BRT Vehicle.

Local Fabricated Road Blocker:

Used for controlling the entry/exit of vehicles to sensitive security buildings, which is threaten of terrorism or crime by vehicle attack.

- Security buildings and police stations.
- Military and air bases.
- Ministries and governmental buildings.
- Stores, factories and warehouses.
- Airports, ports and land customs.
- Embassies and international organizations centers.
- Banks, Commercial centers and shopping malls.



Hydraulic Road Blocker Construction:

Hydraulic Road Blocker is constructed of heavy steel section with mild steel skirts and covers. The road plate is an anti-slip plate to withstand a calculated axle load of 20 Tons. The blocking segment is secured into a sub-surface mounting frame and rotated through approx. 35 degrees to secure the roadway with the rotation shaft secured through oiled pins.

The mounting frame is fitted into a fully reinforced foundation with drainage points to connect to the corridor drainage. Sump pump may be provided. Easy to Install due to box type design.

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Electric Motor:

The heavy-duty motor used in the HPU will be a 3 phase, 380- 415v unit with a power rating sufficiently sized to allow for continuous operation (100% duty cycling).

Hydraulic Reservoir:

The hydraulic oil will be contained in a steel reservoir which is to be sized to allow sufficient oil cooling necessary for 100% duty cycling of the blocker.

Power fail conditions:

Release valve is fixed in HPU to enable the manual lowering of the blocking segment in the event of electrical power failure. Also, there is a hand Pump installed to raise the lowered road blocker in case of power failure or breakdown.

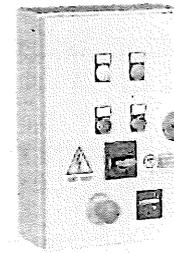
Road Blocker Access Control Panels:

1. Remote Control Panel Software:

Our Road blocker come with its own wired remote-control panel Software which will be comprised of GUI based buttons to raise, lower and emergency stop the equipment. The blocking segment is able to instantly reverse on command. The Remote-Control Panel software shall be installed in the Operations Control Centre.

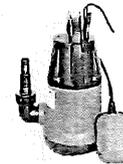
2. Local Control Panel:

A Local Control Panel comprises push buttons to raise, lower and emergency stop the equipment and is installed at the road blocker location. The control panel is located on or near the HPU and allow overriding the automated operation of the road blocker. Usage of the control panel is restricted to staff authenticated.

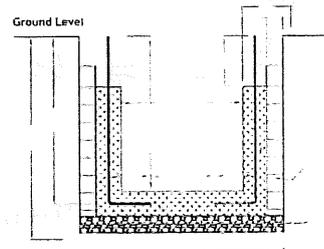
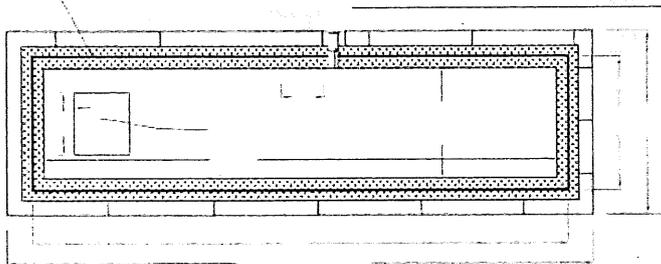


Submersible Drainage Pump:

For automatic water drainage in case of rain water accumulated in the pit.



Civil work for reference: (For heavy duty traffic):



Hydraulic Road Blocker Interface:

Can interface with most access systems. (RFID / E-Tag).

Normal Operating Speed: 4-6 seconds.

Typical System Installation

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2. 30,000 Card Holders Data
3. Log Events Capacity 100,000
4. TCP/IP, RS-485 Communication

RFID 125Khz Card

E-Tag, EPC Class1, Gen2, 3M Adhesive. (300 Pcs).

Management Software:

Installation, testing & commissioning as per requirement of access control system with customized access control time and management software.

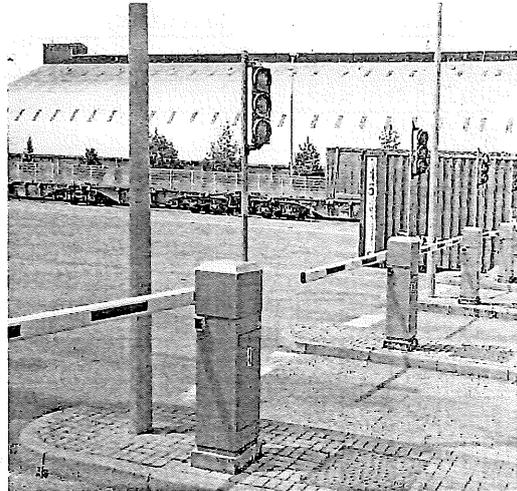
III. Boom Barrier:

Our Automatic boom barriers are designed to offer long-term reliability, efficient operation and durability, providing a smooth consistent operation. Designed for use in residential and commercial applications, these barriers have the ultimate flexibility to suit your needs. Our car park barriers are ideal solution in controlling access to unauthorized areas.

In this BRT Project our system performs detection of BRT and Start operation of BOOM Barrier 1-2 sec and indicate clearance status on traffic signal light. It lowered down immediately after the passage of Each BRT bus in quick time of 1-2 Sec.

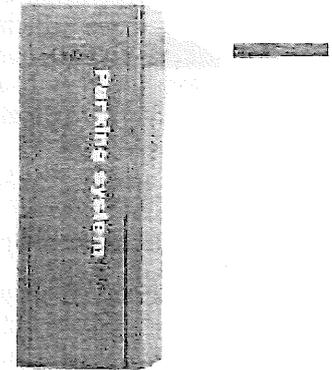
MOVE DS3 Road Barrier:

Fast Speed and Bi -Directional Barrier Gate



Features:

1. Hand wheel device to operate the barrier when power failure.
2. Machine core with strong and double springs, making the machine core work more steadily.
3. Motor cooling fan to avoid the over-heating possibility
4. Auto-reverse when the boom meets obstruction
5. Well-integrated with car parking system equipment, with wire control (push button)
6. Interface for traffic light
7. Offering dry contact signal for car parking system (COM, NC, NO)
8. Auto-delay when closing (adjustable)
9. Integrative machine core: all part is made by mold, so all parts can be more accurate. so, the barrier gate can be much more stable.
10. Left or right installed can be amendable. Customer can amend install direction by himself.
11. Accurate link mechanism: link mechanism can release arm shake and motor load, so the barrier gate can move more stable and barrier gate working life can be longer.
12. 80W turbine worm transmission deceleration induction motor: Drive Steady, Noise Lower, Structures Compact, can realize self-locking.



Technical Parameters

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Specifications

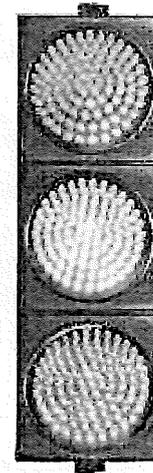
| | |
|-------------------|---|
| Size | 200mm |
| Color | Red /yellow/Green |
| LED Qty | R/Y/G:90Pcs |
| Light Intensity | R≥400cd Y/G≥600cd |
| View Distance | ≥300m |
| Wave length | R:615nm~630nm Y:583nm~595nm G:500nm~505nm |
| IP Grade | IP54 |
| Viewing Angle | L/R-30° U/D-30° |
| Working Temp | -40°C ~ + 80°C |
| Working Voltage | AC 85V-265V , 50/60HZ , DC 12V,DC24V |
| Housing Material | Polycarbonate – UV Resistant |
| Life Span | ≥80,000hrs |
| Power Consumption | R/Y/G: ≤9W |
| Warranty | 3 years |

Note:

- o 120 vac, 12 vdc or 24 vdc are available.
- o Lens are clear of High-quality Polycarbonate material.

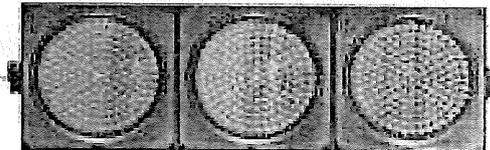
300mm HI-Intensity Traffic Light with Clear Lens:

1. **Application** – urban light signalling.
2. 1-way, 2-way, 3-way Traffic Signal Lights.
3. Input voltage – AC85V ~ 265V, DC12V/ DC24V.
4. Transparent polycarbonate optical lens – impact resistant.
5. Anti-phantom effect minimized, optimal viewing angle.
6. High intensity LED light source – low energy consumption.
7. 5mm LED (DIP) by EPISTAR.
8. Long life cycle – more than 80,000 working hours.
9. Highly durable polycarbonate housing; UV-light resistant.
10. Modular design – easy installation and maintenance.
11. Fixation system either with polycarbonate or aluminium mounting brackets.
12. Compliance with CE, RoHS, EN12368, ISO9001.



Technical Specifications:

This 300mm is Hi-Intensity traffic signal head is using latest hi-power LEDs as light sources. It has low power consumption and long-life time. This traffic head is 3 sections. They are red lamp, yellow lamp and green lamp. The housing uses polycarbonate material, it can be open and be maintained without other special tools. It is characterized with high impact strength,



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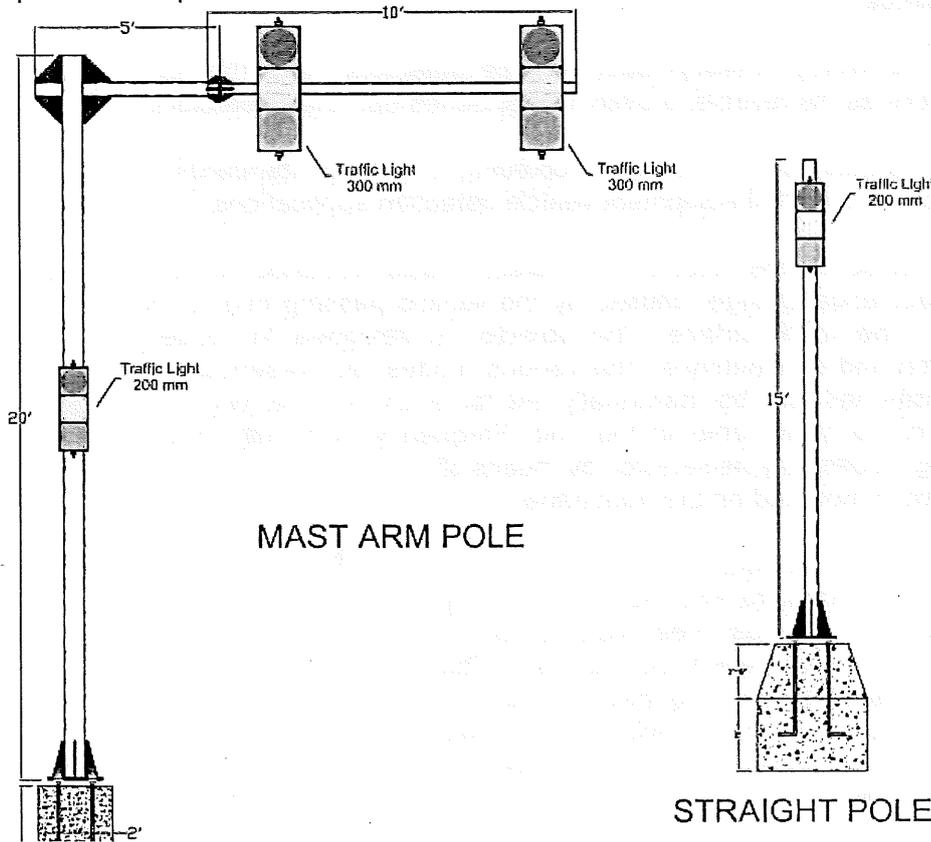
We are a trusted resource for Department of Transportation in traffic and signal lighting poles built to the exact specifications of individual departments and municipalities. Poles can be

supplied with a galvanized finish, paint over galvanized finish, or a factory finish paint coat in a decorative urban application.



Design is not just what it looks and feels like; design is how it works. We also construct custom decorative signal poles built to match the designer's vision. From decorative cast bases to custom colors, the only limit is your imagination. Decorative signal poles are available with round, octagonal, or fluted shafts & mast-arms.

Whether your needs include an attractive, decorative design or a more traditional traffic signal light structure, the PGE technical team integrates quality, functionality and visual appeal to craft traffic control structures which meet or exceed specified local, provincial or federal departments requirements.



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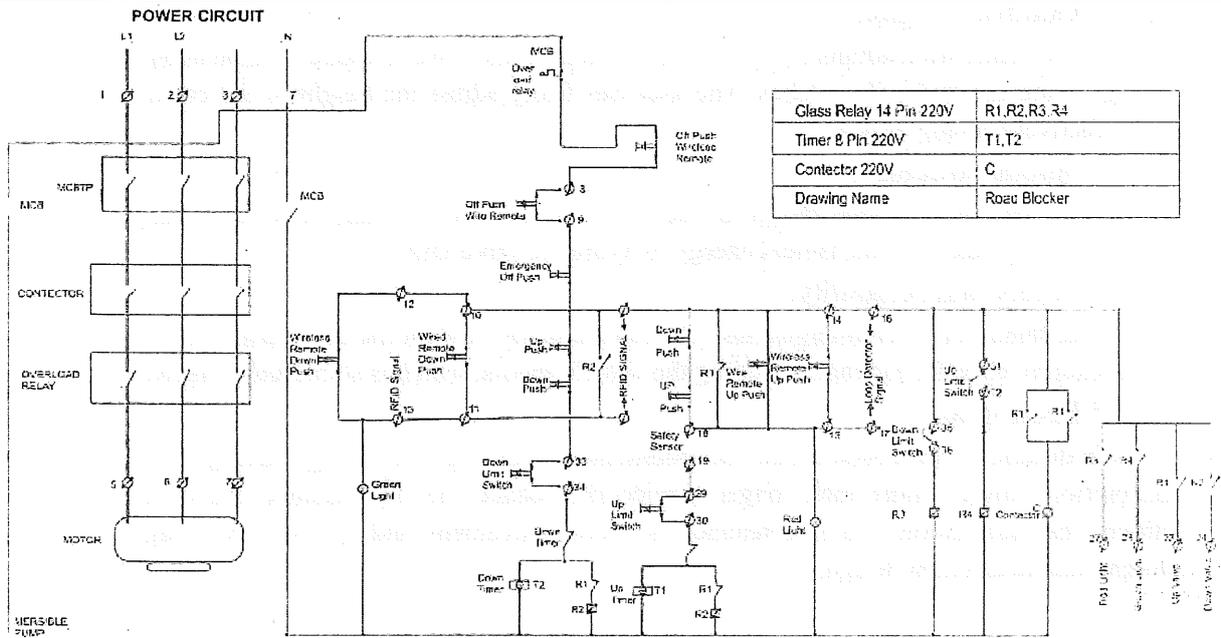
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Website: www.pgepakistan.com



5. Electric wiring diagram:

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----|----|----|---|---|---|---|----------------|----------------|----------------|--------------------|---------------|---------------|-------------------------|----|----|----|-------------|---------------|---------------|---------------------|-----------------------|--------------|-------------|-------------|---------------|---------------|----|----|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| L1 | L2 | L3 | N | U | V | W | REMOTE WIRE NC | REMOTE WIRE NO | REMOTE WIRE NO | LOOP SENSOR FOR UP | TAG CARD DOWN | SAFETY SENSOR | 220V OUT FOR DRAIN PUMP | N | L | N | SOLENOID UP | SOLENOID DOWN | 220 V NEUTRAL | INDICATION LIGHT UP | INDICATION LIGHT DOWN | 220V NEUTRAL | LIMIT UP NC | LIMIT UP NO | LIMIT DOWN NC | LIMIT DOWN NO | | | | | | | | | |





2) Drainage system.

At the bottom of the groove, filled in concrete 240mm high. High accuracy requirement of horizontal (The bottom of the road blocker machine can fully touch the surface of the concrete, so it can force the barrier body): Leaving a small ditch(W150mm*D240mm) in the intermediate position of the lower part of the groove. Then embedded a PVC pipe to drain.

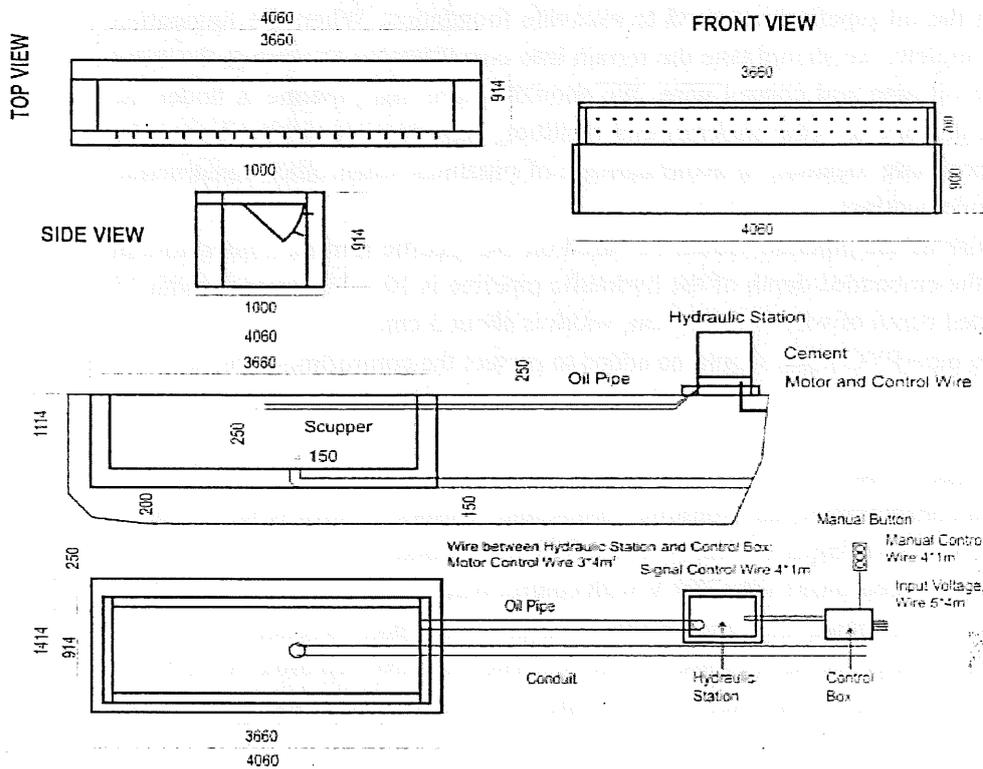
3) Drainage methods.

A- Adopting artificial drainage or electric pumping mode: Dig a little pool near the road blocker to manual and electric discharge waters on a regular basis.

B- Adopting the natural drainage mode: Direct connection with sewers

4) Construction diagram (standard size road blocker):

Hydraulic Road Blocker



4. Hydraulic Road blocker reinforcement.

4.1 If the road blocker machine worked well, re-casting cement and concrete around the housing to reinforce the road blocker.

6 Road blocker work with parking barrier gate.

1) Vehicle entry.

When there is a vehicle needs to enter, the security in the office needs to press the release button. The parking barrier gate will open (lift) and then road blocker will open (drop) to let the vehicle access. The vehicle go through the parking barrier, road blocker and vehicle loop detector (system with loop processor) to the parking lot. After the detector signal, the parking barrier gate closed and the road blocker comes back up. If the system is without a loop processor, after the vehicle passes the parking barrier and the road blocker, the security in the office needs to press the button to close the parking barrier and then rise up the road blocker.

2) Vehicle exit.

When there is a vehicle needs to exit, the security in the office needs to press the release button. The parking barrier will then open (lift) and then blocker will open (drop) to let the vehicle access. Once the vehicle has passed the parking barrier will close and the road blocker up if a loop is present. If the system is without loop processor, after the vehicle passes the parking barrier, road blocker, the security in the office will have to press the button to close the parking barrier and then rise up the road blocker.

7. Road Blocker used alone.

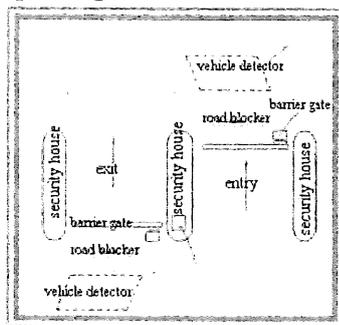
1) Vehicle entry.

When there is a vehicle needs to entry, the security in the office will press the release button to drop the road blocker down and let the vehicle access. Once the vehicle passes through the road blocker, the road blocker will rise up automatically (system with loop processor). If the system is without loop processor, after the vehicle passes through, the security in the office should press to button to rise up the road blocker.

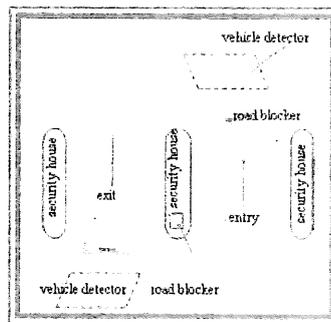
2) Vehicle exit.

When there is a vehicle needs to exit, the security in the office will press the button to drop the road blocker down and let the vehicle access. Once the vehicle passes through the road blocker and loop detector (system with loop processor), blocker will rise up automatically.

Road blocker with parking barrier



Road blocker without Barr





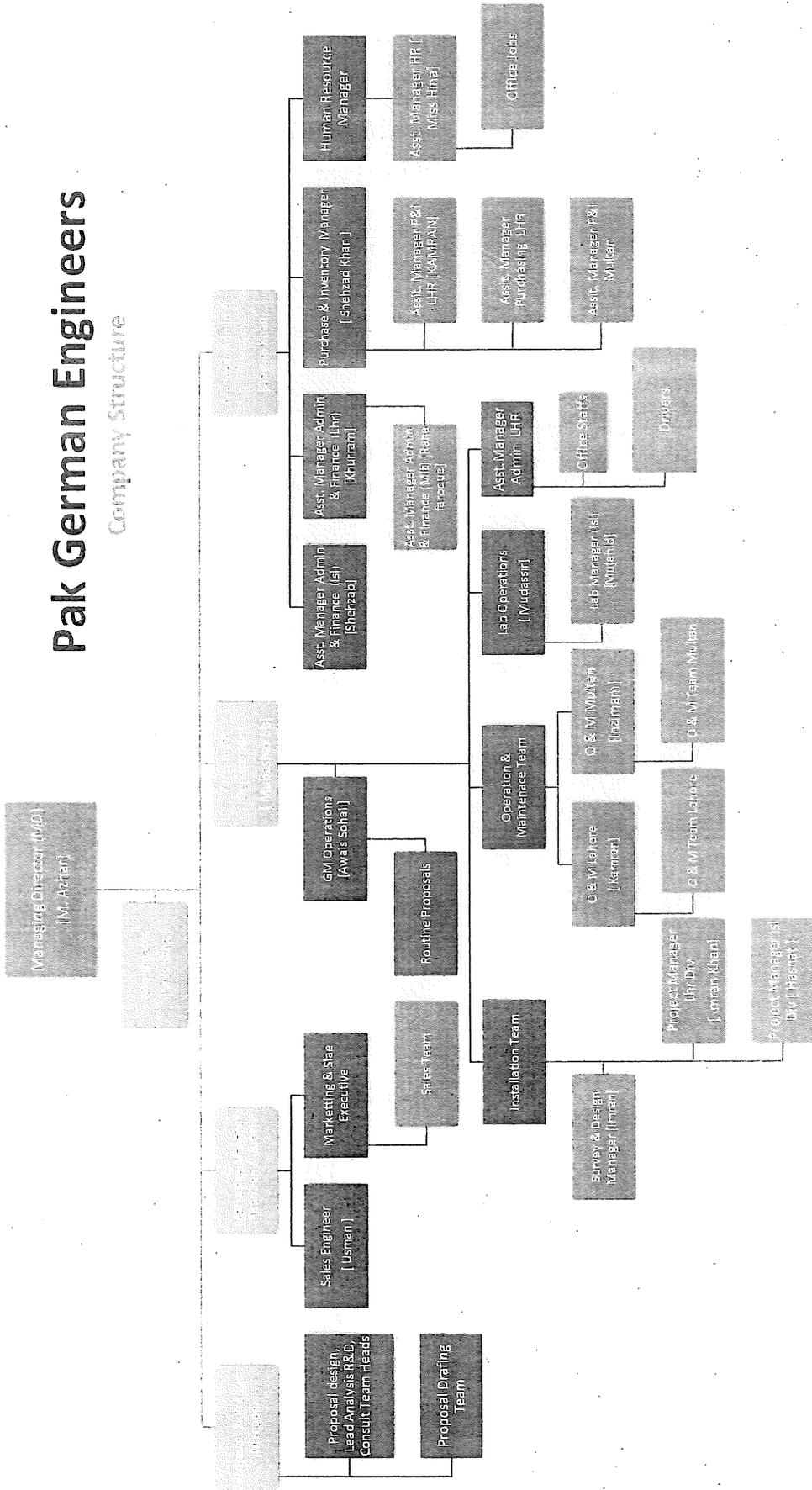
9. Common Fault and Troubleshooting.

For the fault that the users cannot rule out, you should immediately contact our after-sales service department to troubleshoot under the correct guidance. You cannot disassemble without authorization, so as to avoid unnecessary loss.

| Fault Feature | Reasons | | Solutions | |
|---------------------------------|---------|-------------------------------------|-----------|--|
| Start Failure | 1 | Power supply disconnect | 1 | Check power supply and connect |
| | 2 | Emergency stop button | 2 | Release |
| | 3 | Controller output bad contact | 3 | Check output contact |
| Blocker Stuck | 1 | Check closed position whether stuck | 1 | Clean retentate |
| | 2 | Whether the drop time is normal | 2 | Check limit switches |
| Cylinder Dead After Starting | 1 | Motor ,Solenoid valve dead | 1 | Repair or replace |
| | 2 | Sealing Parts broken | 2 | Repair or replace |
| | 3 | Lack of pressures or oil leakage | 3 | Check oil pressure whether reach standard level or oil leakage |
| Blocker Up & down Slowly | 1 | Hydraulic Solenoid valve | 1 | Check the input voltage |
| | 2 | Cylinder internal leakage | 2 | Repair or replace |
| | 3 | Oil pipe connector loose | 3 | Tighten/Check oil level |

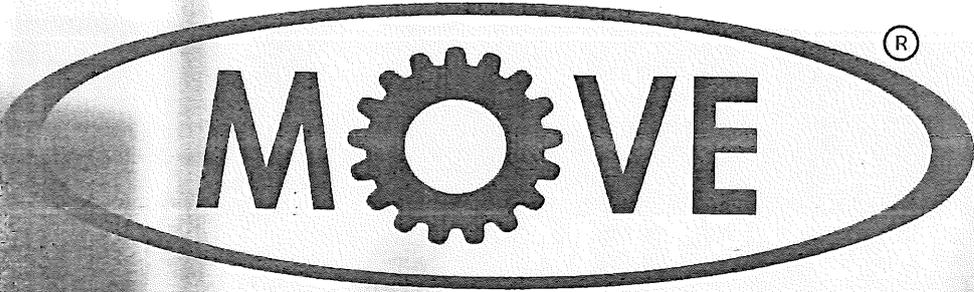
Pak German Engineers

Company Structure



3

Technical Literature/ Brochures/ Booklets



MOVE[®]

Residential and Commercial

**ENTRANCE
SYSTEMS**



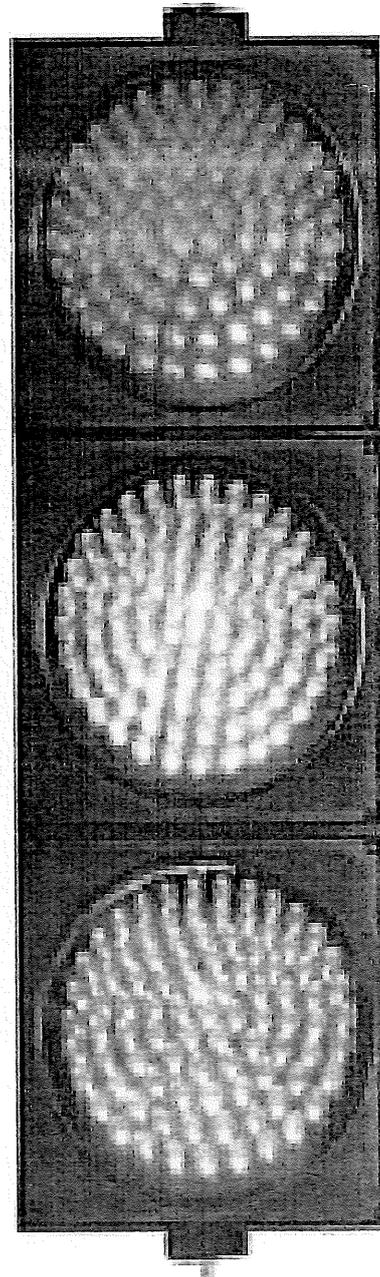
NG Series Hi-Intensity 300mm LED Traffic Light

Developed over the past few decades by ZAMTAS International's engineering teams in Australia, Pakistan and China, ZAMTAS' NG Series Hi-In 300 mm LED Universal Traffic Light combines the functionality of the standard traffic light with the enhanced power savings of the latest technologies of LED lighting.

The NG Series traffic lights can be provided in a variety of arrangements and sizes, subject to legislative requirements and the clients' needs.

- Highly efficient LEDs enhance power savings
- Dimming function allows even further power savings
- Architecturally robust design
- The separate system controller is fully-SCATS compatible
- Available in 12 / 24V DC & 110 / 230V AC working voltages
- Modular, Vandal-proof design
- Suitable for inductive loop sensors
- Dust-proof, IP65 rated
- Also available in 100 and 200mm diameter specification

- EN 12368 : 2006 - Traffic control equipment - Signal heads
- EN 50293 : 2000 Electromagnetic compatibility - Road traffic signal systems
- EN 55022 : 1998 + A1 : 2000 + A2 : 2003, CISPR 22 : 2005 - Conducted and Radiated Emissions
- EN 50293 : 2000 - Road traffic signal systems. Electromagnetic compatibility



TRAFFIC SYSTEMS

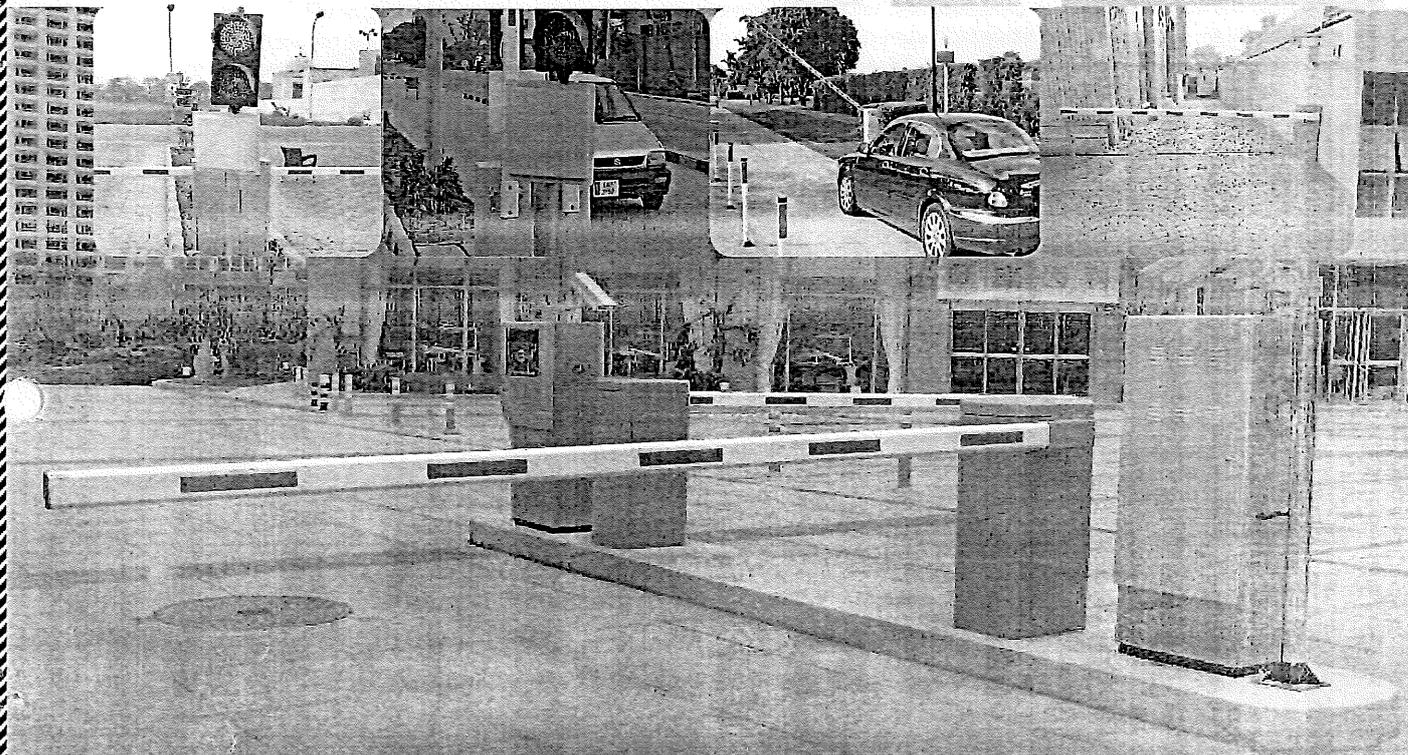
www.zamta.com.au
www.zamtastraffic.com.au

RFID TECHNOLOGY



E-TAG

VEHICLE ACCESS CONTROL



Intelligent - Reliable - New Technology

**Access Automation for Vehicles at Parking Places,
Residential Buildings, Housing Societies, Toll Plazas using
Active and Passive RFID technology**

Features

- Customizable to Road Width
- Compatible with any access control system
- Manually Over-rid able
- Controls in a separate housing
- Designed for intensive use
- Intelligent control unit
- Manufactured from heavy gauge materials
- Assembled, tested and adjusted in factory according to client configuration
- Tailor made software solution

Benefits

- Vehicle Access Management
- Visitor Management System
- Record keeping of vehicles
- Simple to install and maintain
- Reliable and dependable
- Operational under power failure conditions
- Strength and durability
- Confidence in proven performance



TECHNICAL PARAMETERS:

| | |
|-------------------------------------|--|
| Dimensions | Standard BOOM Length 4m, Customizable to Road Width |
| Impact resistance | Minimum. Aluminum Boom Arm damages the vehicle in case of impact. |
| Power supply | 220 VAC @ 50 Hz |
| Power consumption | 500 W Max. Per Lane |
| Standard | ISO 18000-6C, EPC Gen II |
| Operating temperature | -35°C to + 75°C Control unit to be kept in a room between 0°C and +40°C, within 5 m of Barrier and UHF Reader |
| Boom weight | 4kg |
| Operating time | 1.5-3 seconds |
| Duty Cycle | 100 %, Intensive use |
| MCBF (Mean Cycles Between Failures) | 1,500,000 cycles, when respecting recommended maintenance. |
| IP | IP44, Weather proof |

CONSTRUCTION

The Road Barrier framework is constructed from fully welded, heavy gauge, high strength, structural steels completely encased with steel sheets to provide a self-shuttered module. Sub-surface fixing points ensure the barrier is completely secured to its foundation. UHF Reader and Control Unit housings are made up of ABS plastic material.

OPTIONS

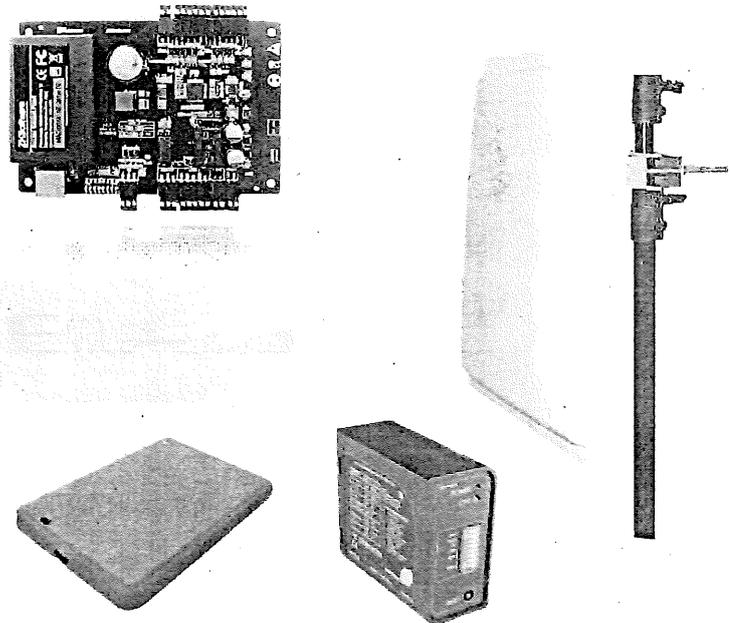
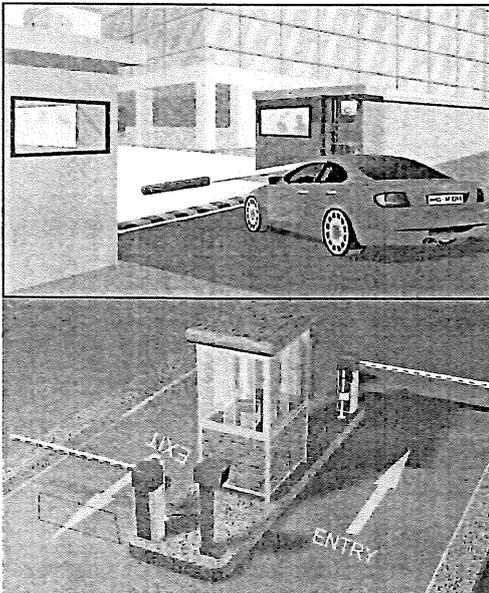
We strongly recommend the fitting of Traffic Light, Inductive Loop and CCTV Systems wherever the barrier control point is remote from installation location.

Pedestrians, Cyclists and Motorcycles are advised not to use a eVACS controlled roadway for safety reasons, additional safety measures can be incorporated into the system if required.

- ❖ Additional LED traffic light.
- ❖ Longer control cables.
- ❖ UPS (emergency power supply for the control unit).
- ❖ Post to install traffic light(s) (standard AS model)
- ❖ Vehicle presence detector with inductive loop.
- ❖ Database Centralization.
- ❖ Push button box (open - stop - close).
- ❖ Safety cell Transmitter / Receiver on post.

CUSTOMER'S RESPONSIBILITIES

- Power supply to the control unit.
- Electrical connection wiring (not provided) between the control unit, the traffic light(s) and the position sensors.
- Reinforced concrete base to fix the barrier and mounting pole.
- Any modification in the installation structure.



With a constant view of adopting the latest technological developments, we reserve the right to amend the information above, at any time.

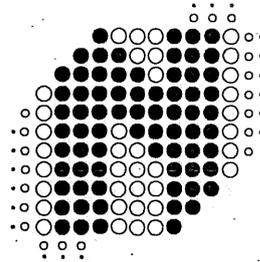
NORTECH

PO Box 4099
Willowton Hub
Pietermaritzburg
3200 South Africa

32A Wiganthorpe Road
Pietermaritzburg
3201 South Africa

Tel: (033) 345 3456
Fax: (033) 394 6449
E-mail: mkt@nortech.co.za

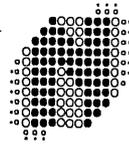
Int. Tel: +27 33 345 3456
Int Fax: +27 33 394 6449
Reg. No. 98/1095



TD450L USER MANUAL

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Document No.: 879UM0002-03
Date of issue: September 2002

This document is for information only and unless otherwise indicated it is not to form part of any contract. In accordance with the manufacturer's policy of continually updating and improving design, specifications contained herein are subject to alterations without notice.

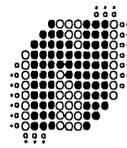


WARNING: 1. THIS UNIT MUST BE EARTHED !

WARNING: 2. DISCONNECT POWER BEFORE WORKING ON THIS UNIT!

WARNING: 3. INSTALLATION AND OPERATION BY QUALIFIED SERVICE PERSONNEL ONLY !

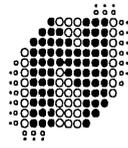
WARNING: 4. NO USER SERVICEABLE PARTS INSIDE. WARRANTY VOID IF COVER REMOVED!



2. TECHNICAL DATA

2.1 Functional Data

| | |
|-------------------------|---|
| Self-tuning range | 15 to 2000 (μ H) micro-Henries |
| Sensitivity | Four step selectable High 0.02 % Δ L/L Medium-High 0.05 % Δ L/L Medium-Low 0.1 % Δ L/L Low 0.5 % Δ L/L |
| Frequency | Four step selectable High, Medium-High, Medium Low, and Low Minimum operating frequency 24 kHz Maximum operating frequency 150 kHz Frequency dependent on loop geometry |
| Presence Time | Four step selectable: 1 Second 4 Minutes 40 Minutes Infinity – no fixed time-out |
| Pulse Output | Approximately 150 ms |
| Response Times | Turn-on 30 ms \pm 5 ms Turn-off 40 ms |
| Drift Compensation Rate | Approximately 1 % Δ L/L per minute |
| Indications | 1 x Run Indicator - Red 1 x Green LED per channel On – Detect On – Fault Off – Undetect |
| Output Relay Mode | Switch selectable (Presence relays are fail-safe and will close on a vehicle detect or in the event of power failure or loop fault) |



2.3 Environmental Data

| | |
|-----------------------|--|
| Storage Temperature | -40° C to +85° C |
| Operating Temperature | -40° C to +70° C |
| Humidity | Up to 95% relative humidity without condensation |
| IP Rating | IP30 |



2.5 Approvals

| | | |
|------------------|------------------------|---|
| C.E. Regulations | EN 50293:2000 | |
| | EN 301 489 Parts 1 &-3 | Equipment Type III Equipment Class: 2 with Performance Criteria B as per EN 50293 |
| Safety | EN 60950 | |



1. TECHNICAL DATA

1.1 Functional Data

Self-tuning range 15 to 2000 (μ H) micro-Henries

Sensitivity Four step selectable

- High 0.02 % \square L/L
- Medium-High 0.05 % \square L/L
- Medium-Low 0.1 % \square L/L
- Low 0.5 % \square L/L

Frequency Four step selectable:

High, Medium-High, Medium Low, and Low

Minimum operating frequency 24 kHz Maximum operating frequency 150 kHz Frequency dependent on loop geometry.

Presence Time Four step selectable:

- 1 Second
- 4 Minutes
- 40 Minutes
- Infinity – no fixed time-out

Pulse Output Approximately 150 ms

Response Times Turn-on 30 ms \square 5 ms Turn-off 40 ms

Drift Compensation Rate

Approximately 1 % \square L/L per minute

Indications

1 x Run Indicator - Red
1 x Green LED per channel On – Detect
On – Fault
Off – Undetect

1.2 Electrical Data

Power requirements: 230 VAC \pm 10% 48 to 62 Hz (TD452 models)
TD452 models: 4 VA Maximum at 230 V 12 V -10% to 24 V $+10\%$ DC/AC 48 to 62 Hz
(TD454 models)

Relay Contact Rating Using wiring harness supplied with the units
Maximum 1 A @ SELV voltages
(less than 60 V dc or less than 42 VAC)

Maximum 1 A @230 VAC

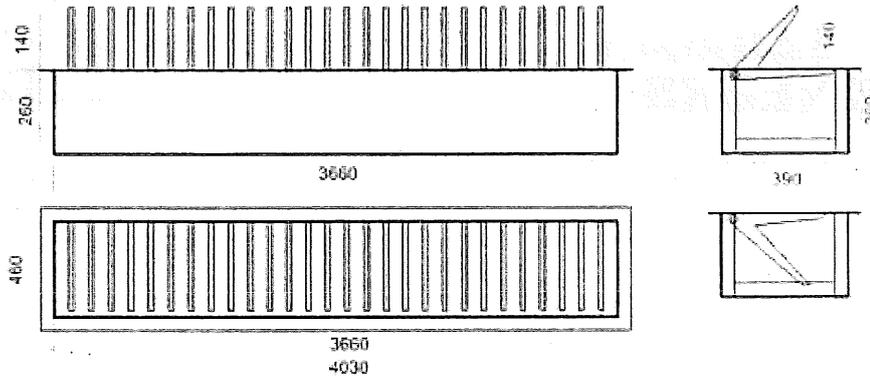
Using user supplied CE Approved 11 PIN sockets
Maximum 1A @ 230 VAC

Page 17

Islamabad Head Office:
2155, St. F-1/A-1, Block-A, National Police Foundation, Sector
O-9, Islamabad.
Tel: +92-51-5708384 & 5708385, Fax: +92-51-5708386
Email: azhar.pge@gmail.com

Lahore Office:-
146-C, Faisal Town, Lahore
Phone: +92-42-35162556, Fax: +92-42-35162556.
Engr. Awaiz Sohail (Marketing & Sales Manager)
Mob: 0321-5370486; awais.pge@gmail.com

Multan Office:-
31, Block E, Shah Rukn-e-Alam,
Tel: +92-61-6778681,
Multan.
Website: www.pgepakistan.com



Finish:

The segment and mounting frame are to be finished with an anti-corrosion paint in black with Red paint on spikes the segments front skirt and road plate. Raised part is venial coated with yellow paint.

Islamabad Head Office:

2155, St. F-1/A-1, Block-A, National Police Foundation, Sector
O-9, Islamabad.
Tel: +92-51-5708384 & 5708385, Fax: +92-51-5708386
Email: azhar.pge@gmail.com

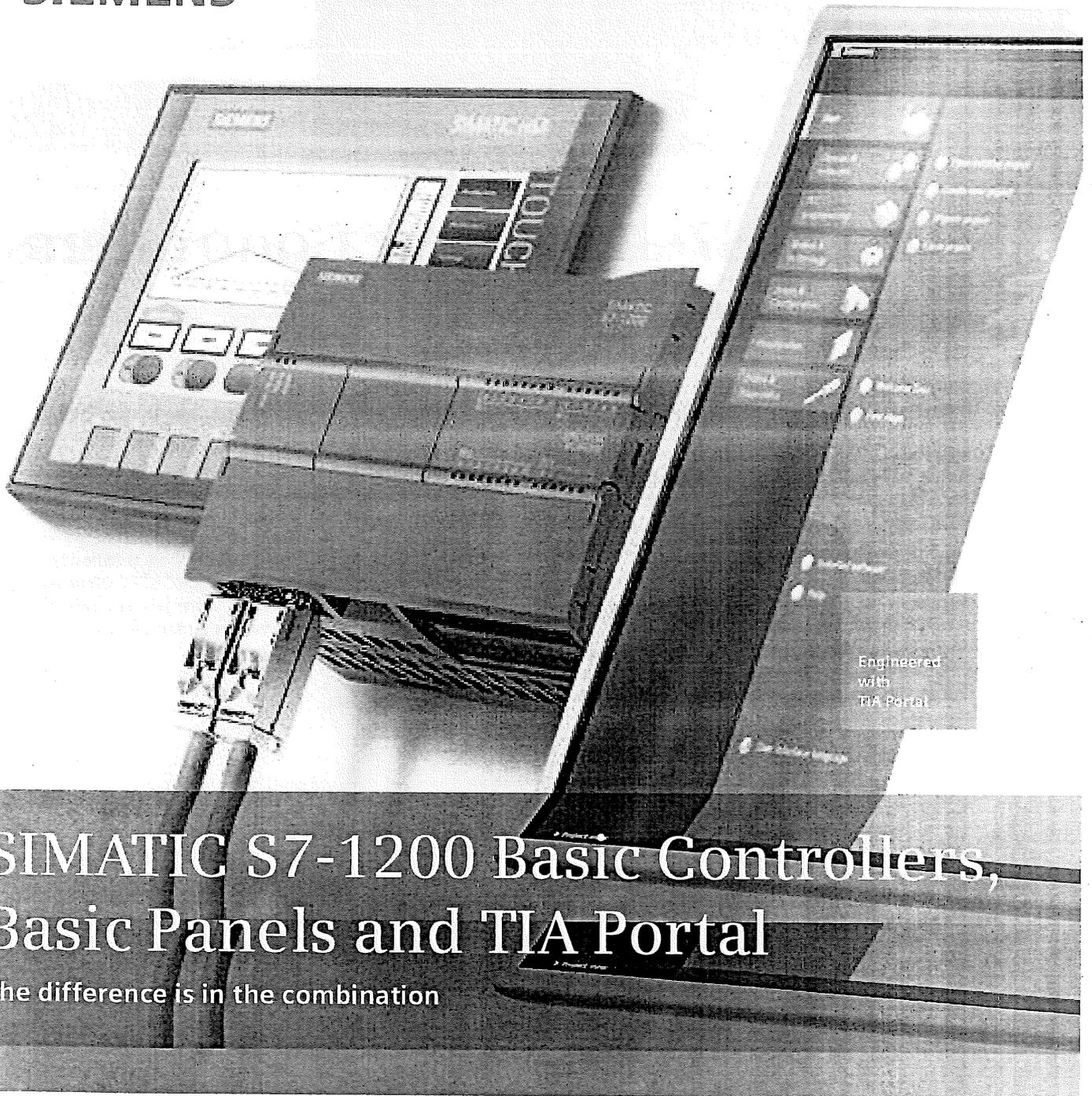
Lahore Office: -

146-C, Faisal Town, Lahore
Phone: +92-42-35162556, Fax: +92-42-35162556.
Engr. Awais Sohail (Marketing & Sales Manager)
Mob: 0321-5370486; awais.pge@gmail.com

Multan Office: -

31, Block E, Shah Rukn-e-Alam,
Tel: +92-61-6778681,
Multan.
Website: www.pgepakistan.com

SIEMENS



SIMATIC S7-1200 Basic Controllers, Basic Panels and TIA Portal

The difference is in the combination



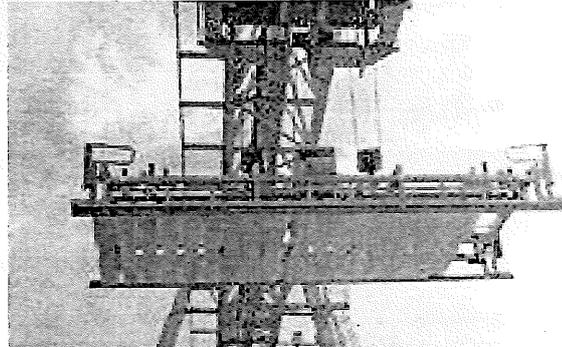
Intuitive, efficient, proven:
TIA Portal redefines engineering.

siemens.com/s7-1200

SIMATIC S7-1200 Basic Controllers are the ideal choice for simple and autonomous tasks in the low to mid performance ranges. These compact devices are characterized by minimal space requirements, telecontrol capability and integrated technology modules for measuring, weighing and counting, so that no other special modules are required.

SIMATIC S7-1200 controllers offer you the following

- **High flexibility and modular design**
CPU can be expanded with further I/O without additional space requirements
- **Integrated technology**
Optimized for loop control, weighing, high-speed counting, telecontrol and identification
- **High level of operator convenience in engineering**
- **Networking**
The integrated PROFINET interface ensures scalability and flexibility
- **Security Integrated**
Comprehensive access, copy and manipulation protection
- **Integrated diagnostics**
Diagnostics messages are displayed in plaintext in the TIA Portal, on the CPU Web server, in the SIMATIC app, and on the HMI
- **Safety Integrated**
Fail-safe CPUs can execute both standard and safety related programs



Block libraries – a secure investment

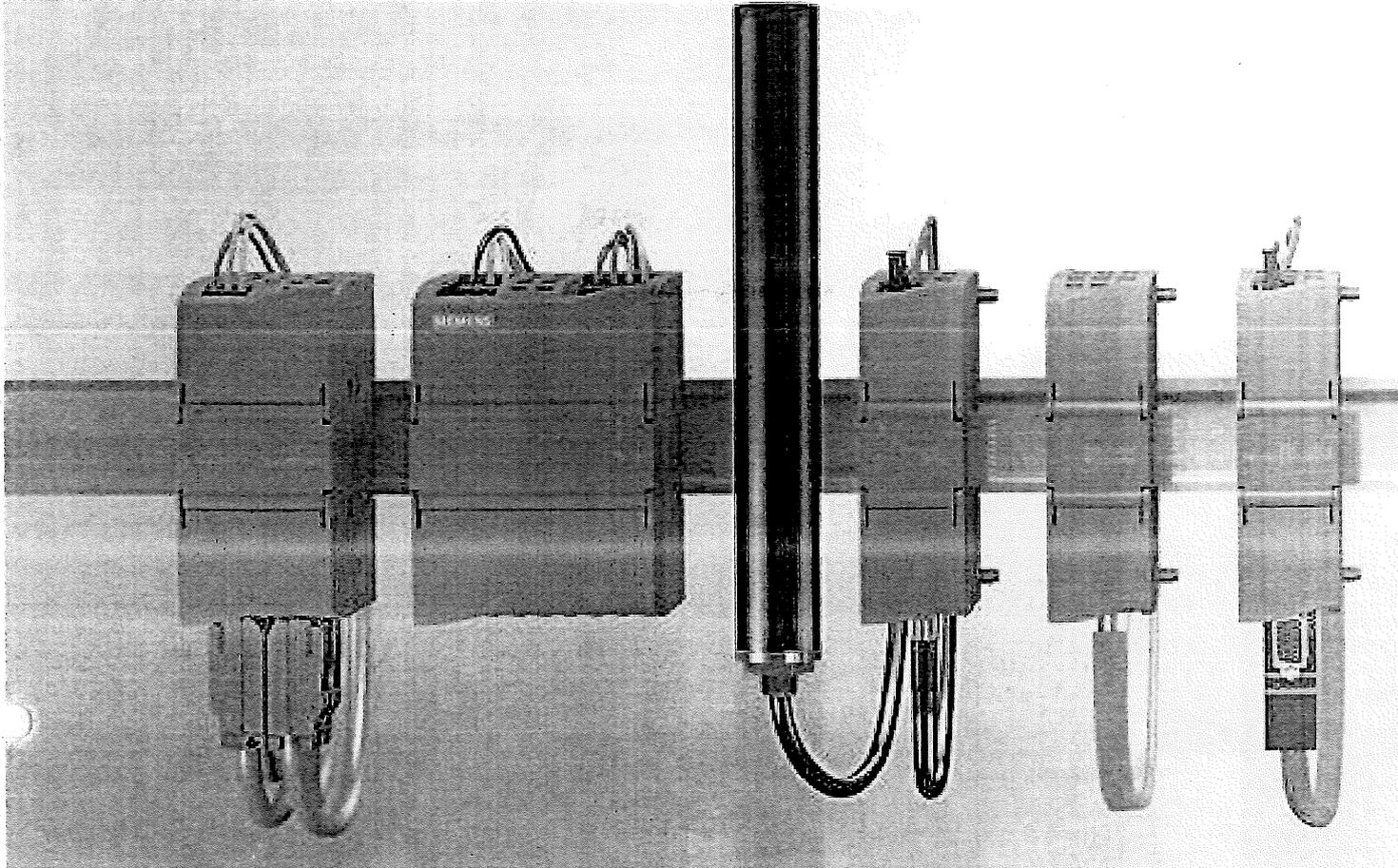
“I can take program blocks for technological functions that I created for the SIMATIC S7-1200, and also use them for larger projects on the SIMATIC S7-300/400, or in future on the S7-1500. Block libraries are our most important investment today.”

Claus Niedermann,
Software specialist at Zebra Elektrotechnik

Compact grab control and intuitive programming in the TIA Portal

“I’ve had very little space on the control panel and I had to position it directly on the grab. That’s one of the reasons why the SIMATIC S7-1200 compact controller with CPU 1214C and three input and output modules was the perfect choice for this task, especially when combined with a SITOP power supply, SIRIUS switching devices, and fuses from Siemens.”

Jürgen Schäfer, HSE



Signaling modules

Signal modules – digital

| | Article No. |
|---|---|
| SM 1221 DC DI 8x24 V DC DO 16x24 V DC | 6ES7 221-1BF32-0XB0 6ES7 221-1BH32-0XB0 |
| SM 1222 DC DO 8x24 V DC 0.5 A DO 16x24 V DC 0.5 A | 6ES7 222-1BF32-0XB0 6ES7 222-1BH32-0XB0 |
| SM 1222 RLY DO 8xRLY 30 V DC/250 V AC 2 A DO 16xRLY 30 V DC/250 V AC 2 A DO 8xRLY switchover 30 V DC/250 V AC 2 A | 6ES7 222-1HF32-0XB0 6ES7 222-1HH32-0XB0 6ES7 222-1XF32-0XB0 |
| SM 1223 DC/DC DI 8x24 V DC, DO 8x24 V DC 0.5 A DI 16x24 V DC, DO 16x24 V DC 0.5 A | 6ES7 223-1BH32-0XB0 6ES7 223-1BL32-0XB0 |
| SM 1223 DC/RLY DI 8x24 V DC, DO 8xRLY 30 V DC/250 V AC 2 A DI 16x24 V DC, DO 16xRLY 30 V DC/250 V AC 2 A | 6ES7 223-1PH32-0XB0 6ES7 223-1PL32-0XB0 |
| SM 1223 AC/RLY DI 8x120/250 V AC, DO 8xRLY 30 V DC/250 V AC 2 A | 6ES7 223-1QH32-0XB0 |

Signal modules – analog

| | Article No. |
|---|---|
| SM 1231 AI AI 4x13 bits ± 10 V DC, ± 5 V DC, ± 2.5 V DC or 4–20 mA AI 8x13 bits ± 10 V DC, ± 5 V DC, ± 2.5 V DC or 4–20 mA AI 4x16 bits ± 10 V DC, ± 5 V DC, ± 2.5 V DC, ± 1.25 V DC or 4–20 mA | 6ES7 231-4HD32-0XB0 6ES7 231-4HF32-0XB0 6ES7 231-5ND32-0XB0 |
| SM 1231 RTD AI 4xRTD x 16 bits AI 8xRTD x 16 bits Types: Platinum (Pt), copper (Cu), nickel (Ni) or resistance element | 6ES7 231-5PD32-0XB0 6ES7 231-5PF32-0XB0 |
| SM 1231 TC AI 4xTCx 16 bits AI 8xTCx 16 bits Types: J, K, T, E, R, S, N, C, TXK/XK(L); voltage range: ± 80 mV | 6ES7 231-5QD32-0XB0 6ES7 231-5QF32-0XB0 |
| SM 1232 AO AO 2x14 bits ± 10 V DC or 4–20 mA AO 4x14 bits ± 10 V DC or 4–20 mA | 6ES7 232-4HB32-0XB0 6ES7 232-4HD32-0XB0 |
| SM 1234 AI/AO AI 4x13 bits ± 10 V DC, ± 5 V DC, ± 2.5 V DC or 4–20 mA, AO 2x14 bits ± 10 V DC or 4–20 mA | 6ES7 234-4HE32-0XB0 |

Accessories

| | Article No. |
|---|---------------------|
| BB 1297 Battery board (long-term backup of the real-time clock (RTC)) | 6ES7 297-0AX30-0XA0 |
| SIMATIC memory card | |
| 4 MB (optional) | 6ES7 954-8LC02-0AA0 |
| 12 MB (optional) | 6ES7 954-8LE02-0AA0 |
| 24 MB (optional) | 6ES7 954-8LF02-0AA0 |
| 256 MB (optional) | 6ES7 954-8LL02-0AA0 |
| 2 GB (optional) | 6ES7 954-8LP01-0AA0 |
| Digital input simulators | |
| Simulator (8 positions for CPU 1211C/1212C) | 6ES7 274-1XF30-0XA0 |
| Simulator (14 positions for CPU 1214C/1215C) | 6ES7 274-1XH30-0XA0 |
| Simulator (14 positions for CPU 1217C) | 6ES7 274-1XK30-0XA0 |
| Analog input simulators | |
| Potentiometer: for all CPUs | 6ES7 274-1XA30-0XA0 |
| Expansion cable for signal module | |
| 2.0 m | 6ES7 290-6AA30-0XA0 |
| CSM 1277 | |
| 4-port unmanaged switch, 4 x RJ45 sockets, 10/100 Mbit/s | 6GK7 277-1AA10-0AA0 |

Technology

| | Article No. |
|------------------------------------|---------------------|
| ink SM 1278 IO-Link master | 6ES7 278-4BD32-0XB0 |
| SIWAREX weigh beams WP 231 SIWAREX | |
| WP 231 SIWAREX, static scales | 7MH4 960-2AA01 |
| WP 241 SIWAREX, conveyor scale | 7MH4 960-4AA01 |

Power modules

| | Article No. |
|--|----------------|
| PM 1207 | |
| Input: 120/230 V AC, 50/60 Hz, 1.2 A/0.67 A, output: 24 V DC/2.5 A | 6EP1 332-1SH71 |

HMI

| | Article No. |
|--|--|
| KP300 Basic mono PN | |
| Operation using keys, 3" FSTN display, monochrome, modifiable backlighting color (white, red, green, yellow) | 6AV6 647-0AH11-3AX0 |
| KP400 Basic color PN | |
| Operation using touch screen + keys, 4" TFT LCD display, 65536 colors | 6AV6 647-0AJ11-3AX0 |
| KTP400 Basic | |
| Operation using touch screen + keys, 9" TFT LCD display, 65536 colors | 6AV2 123-2DB03-0AX0 |
| KTP700 Basic | |
| Operation using touch screen + keys, 7" TFT LCD display, 65536 colors, PROFINET or PROFIBUS | PROFINET 6AV2 123-2GB03-0AX0 PROFIBUS 6AV2 123-2GA03-0AX0 |
| KTP900 Basic | |
| Operation using touch screen + keys, 9" TFT LCD display, 65536 colors | 6AV2 123-2JB03-0AX0 |
| KTP1200 Basic | |
| Operation using touch screen + keys, 12" TFT LCD display, 65536 colors, PROFINET or PROFIBUS | PROFINET 6AV2 123-2MB03-0AX0 PROFIBUS 6AV2 123-2MA03-0AX0 |

Current information can be found at: siemens.com/basic-panels

Identification

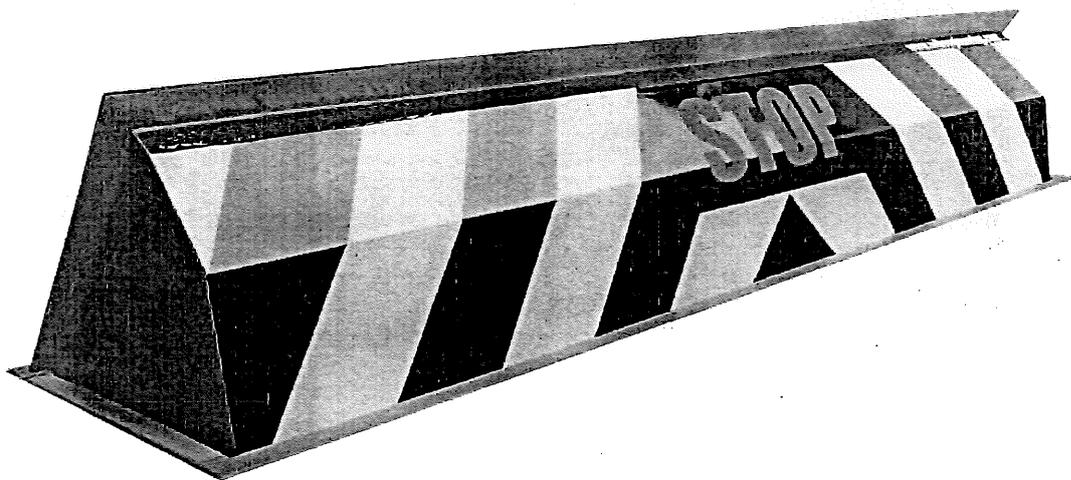
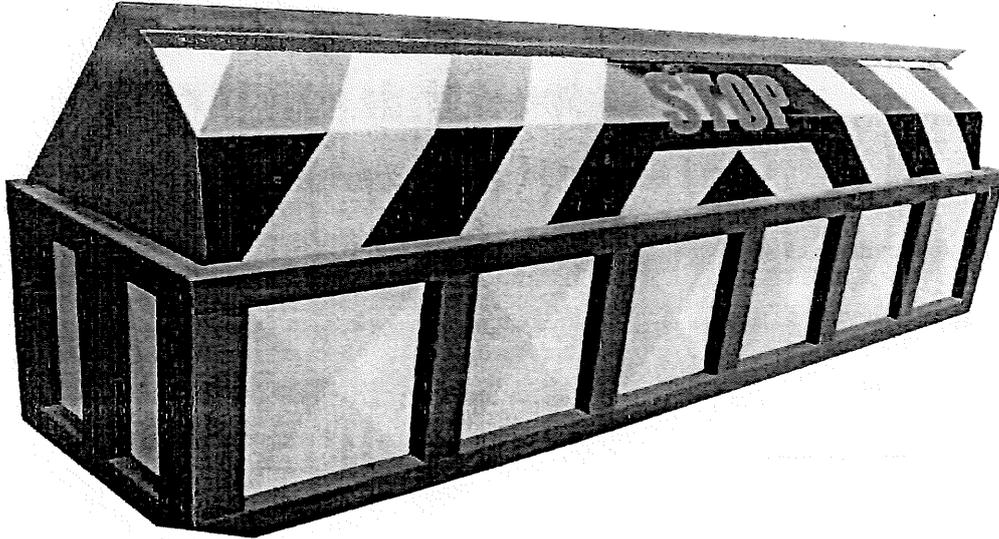
| | Article No. |
|---|-------------|
| SIMATIC RF200 | |
| RFID system in the HF range, compact and cost-effective, simple connection to automation system | 6GT2821- |
| More product information available at www.siemens.com/rf200 | |
| SIMATIC RF300 | |
| RFID system in the HF range, large data memory and fast acquisition, simple connection to automation system | 6GT2801- |
| More product information available at www.siemens.com/rf300 | |
| SIMATIC RF600 | |
| RFID system in the UHF range, reliable and flexible SIMATIC integration and connection to PC/IT | 6GT2811- |
| More product information available at www.siemens.com/rf600 | |



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ENGINEERS**

PGE TRAFFIC SOLUTIONS
PGE AUTOMATIONS
PGE ELECTRONICS
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Hydraulic Road Blocker Installation / Operation & Maintenance Manual





5. Installation.
 - 1) Installation Location.
 - 2) Pipeline connection.
 - 3) Machine running test.
 - 4) Road blocker reinforcement.
 - 5) Civil Drawing.
6. Road blocker work with parking barrier gate.
 - 1) Vehicle entry.
 - 2) Vehicle exit.
7. Road blocker used alone.
 - 1) Vehicle entry.
 - 2) Vehicle exit.
8. The use and maintenance.
 - 1) Daily use and maintenance.
 - 2) 500 hours maintenance.
 - 3) One year maintenance.
9. Common Fault and Troubleshooting.



1.3 Electric control system.

-Automatic electric control system parts: Power supply board, , no exposure to noise high life contactor and other precise time-starting device (prevent the impact of the oil cylinder in place after movement and increase the service life of it)

-Automatic controller: control box, remote controller, manual button. Those are controlled by the personnel on duty.

2) Dimension.

Road Blocker is for two kinds: with spike or without spike. And dimensions is customized, standard dimension is 3000*915*975mm, length is customized from 2000mm to 6000mm; rising height is 650mm, it's customized from 450mm to 800mm.

3) Technical Parameter.

3.1 Control system: electric hydraulic control

3.2 Voltage: 380V(control voltage:24V)

3.3 System Power: 1.5KW/2.2KW3.7KW

3.4 Passing Pressure: 70T Container Truck

3.5 Rising Time : 3~5S

3.6 Dropping time: 3~5S(adjustable)

3.7 Communication: RS485≤1200M(access control system)(OPTIONAL)

3.8 Rising height: 350-800mm

3.9 Working temperature: -20°C---75°C

3.10 Storage environment: 0°C--- 55°C, water-proof, damp-proof and dust-proof.



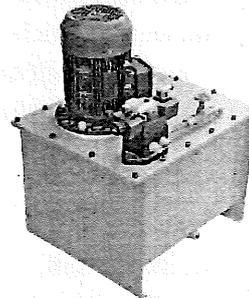
2. Working principle.

1) Road blocker machine.

Road blocker machine is composed of frame, drop-leaf, hydraulic cylinder and transmit mechanism. The drop-leaf connects with the housing through five sets of rotating heavy duty hinges. Respectively, the lower and upper of the hydraulic cylinder are connected together through an axis of rotation between the frame and the drop-leaf.

2) Hydraulic system.

Hydraulic system is composed of drive motor, hydraulic oil pump, combination solenoids, manual control valve, pressure gauge, air breathing cap.



3) Rising and falling.

- The input of rising and falling: road blocker machine up and down command control input interface.
- Ascending, descending in precise time is adjustable: according the precise in place time, it can avoid the impact of the oil cylinder stroke after in place, which increases the service life of the oil cylinder.
- Rising relay, falling solenoid: the switch between the road blocker solenoid of hydraulic pump and motor realize the up, stop and down function of the road blocker. The regulating valve adjust the speed of rising and falling.

4) Function Introduction.

- 4.1 Strong and durable structure, high load bearing, movement smooth, low noise, fast speed, long service life.
- 4.2- Adopting electric control, system operation is stable and performance is reliable, easy to integrate.
- 4.3- Supporting the gang control with parking barrier or other equipment. It can also work with other access control system to make it automatic control
- 4.4 -Adopting the advanced hydraulic drive technology. The whole system has high security, reliability, and stability.

Aux. Input Connection

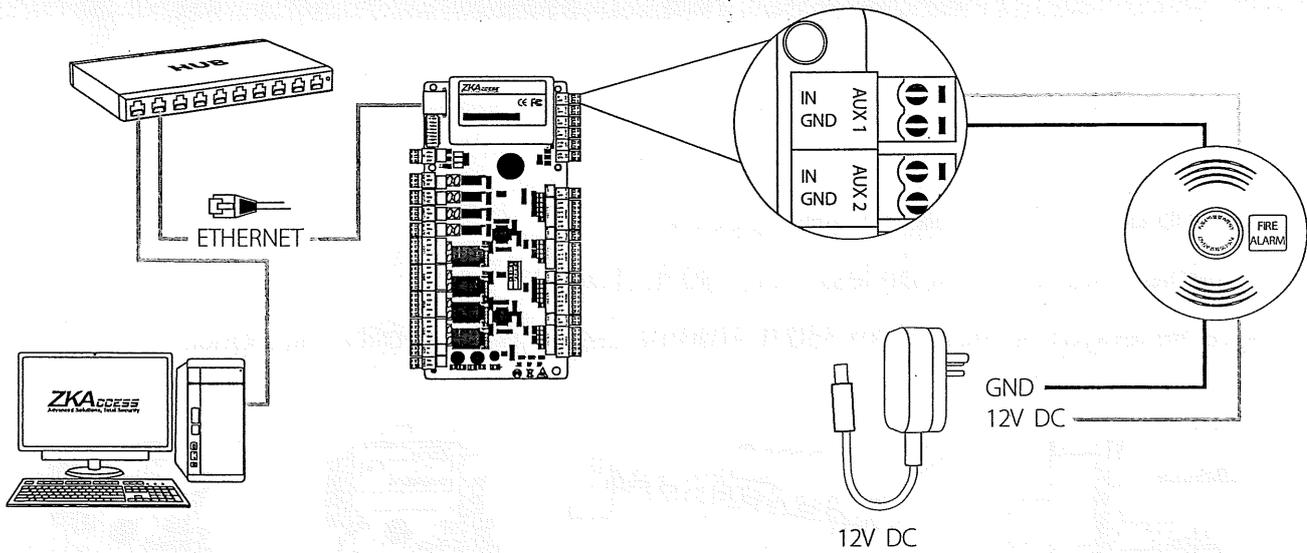


Figure 22

Aux. Output Connection

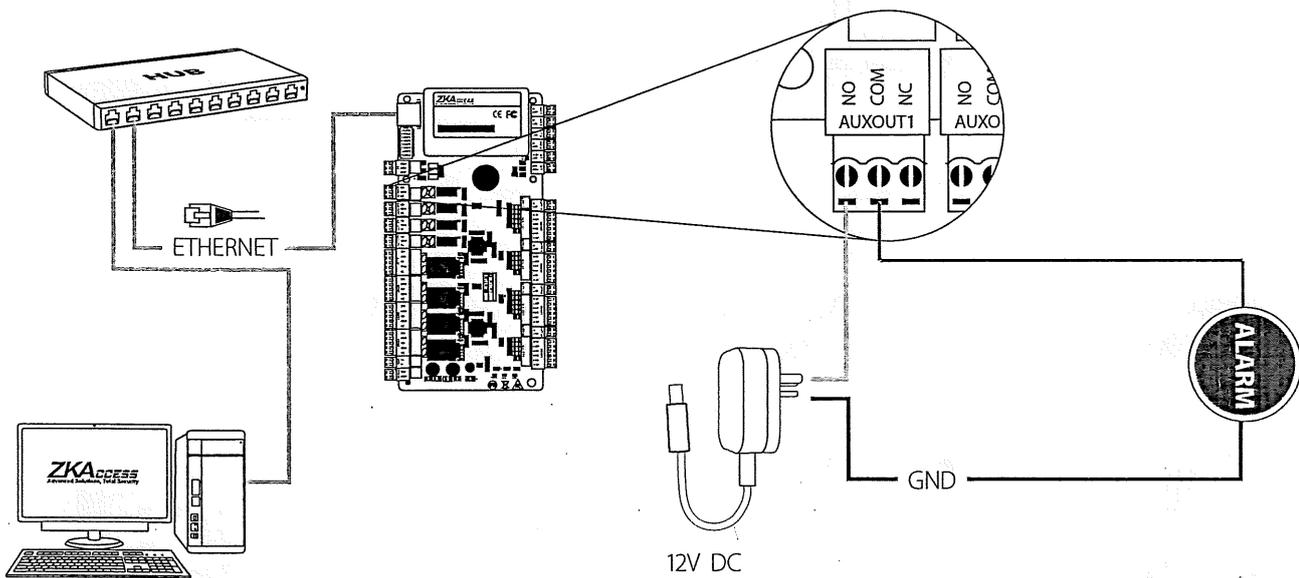
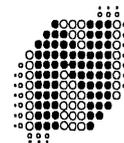


Figure 23



3.2.1 Reset Switch

The detector automatically tunes to the inductive loops connected to it within 4 seconds after applying power. Should it be necessary to retune the detector, as may be required after changing the position of any of the switches, momentary operation of the RESET switch will initiate the tuning cycle.

3.2.2 Presence Time Settings

(SW1 - S5, S6 AND S1, S2) – CH1 and CH2

(SW2 – S5, S6 AND S1, S2) – CH3 and CH4

| Presence Time | SW1 | | |
|------------------------------|-----|-----|-----|
| | S5 | S6 | CH1 |
| 1 second | On | On | |
| 4 minutes | On | Off | |
| 40 minutes | Off | On | |
| Infinity - no fixed time-out | Off | Off | |

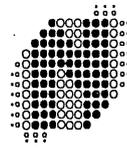
| Presence Time | SW2 | | |
|------------------------------|-----|-----|-----|
| | S5 | S6 | CH3 |
| 1 second | On | On | |
| 4 minutes | On | Off | |
| 40 minutes | Off | On | |
| Infinity - no fixed time-out | Off | Off | |

The Presence time as shown above may be altered according to the requirements.

The 1 second setting will give a pulse on detection of a vehicle with a duration of 1 second. The detector will immediately re-adjust to the normal operating point and will give another detect in the event of a further change in the loop inductance, i.e. the detector may be used as a passage detector in this mode.

The 4 minute and 40 minute settings work in the same way as the 1 second setting, however the detector will now give outputs of 4 minutes or 40 minutes. If the vehicle which caused the inductance change moves off the loop then the detector will go out of detect and the time will be reset to zero for the next detect cycle. The detector may undetect before the expired time period if the change in inductance for the vehicle is small.

The "infinite" setting does not have a fixed time out and the detect period is dependent on the magnitude of the inductance change caused by the vehicle over the loop.



3.2.5 Detector Mode Settings (SW3 – S7, S8)

These two switches are used to select the various mode of operation of the detector and are as follows:-

NORMAL MODE (SW3 – S7 (OFF), S8 (OFF)):

This is the normal mode and the detector will operate as a vehicle detector with no additional features. Each channel will operate independent of the other and will detect the presence of a vehicle.

AB LOGIC MODE (SW3 – S7 (OFF), S8 (ON)):

In this mode the detector is used as a direction sensor and the primary task is to indicate the direction of travel over the loops.

If a vehicle enters Loop A (channel 1) and then proceeds to Loop B, a presence output will be issued on Loop A relay output and remain until the vehicles leaves Loop B.

If a vehicle now enters Loop B (channel 2) and then proceeds to Loop A, a presence output will be issued on Loop B relay output and remain until the vehicle leaves Loop A.

In this way the direction of a vehicle can be determined.

SPEED LOGIC MODE (SW3 – S7 (ON), S8 (OFF))

In this mode channel 2 output relay is configured to provide a pulse output when a pre-set speed threshold has been exceeded. The input to this mode is provided by both channel 1 and channel 2 sensor loops, which are required to be spaced at exactly one metre between adjacent edges. See figure 3.2.

The speed threshold can be in the range 0 – 150 kph, with 10 kph steps selectable. It should be emphasised that this output is intended to be utilised in the switching of variable warning signs, for traffic analysis purposes or for extending phases in a traffic control application, and is not suitable for speed prosecution applications.

Channel 1 output relay is configured to provide a presence output in this mode, with the actual presence time determined by the position of SW1, S6 and S5. An application for this relay could be to drive a counter which would give you a total vehicle count figure, whilst channel 2 output could be used to establish the number of vehicles exceeding the pre-set threshold. Channel 3 and Channel 4 operate as normal presence detectors.

HEADWAY LOGIC MODE (SW3 – S7 (ON), S8 (ON))

Headway can be defined as the following interval between vehicles, and is taken from the point of departure of the first vehicle to the arrival of the following vehicle, and is measured in seconds. In this mode both channels 1 and 2 are configured to provide pulse outputs in the event of the vehicle headway being less than the pre-set threshold, with these two outputs operating entirely independent of each other. See figure 3.3

The Headway threshold can be in the range 0 – 3 seconds, and can be set in the steps of 0.2 seconds. It is intended that the pulse output, which is of 150 milliseconds duration, be used to switch a variable warning sign should the vehicle headway be less than the pre-set threshold, or alternatively for traffic analysis surveys. This list should not be considered to be exhaustive as other applications for these logic modes are possible. Channel 3 and Channel 4 operate as normal presence detectors.

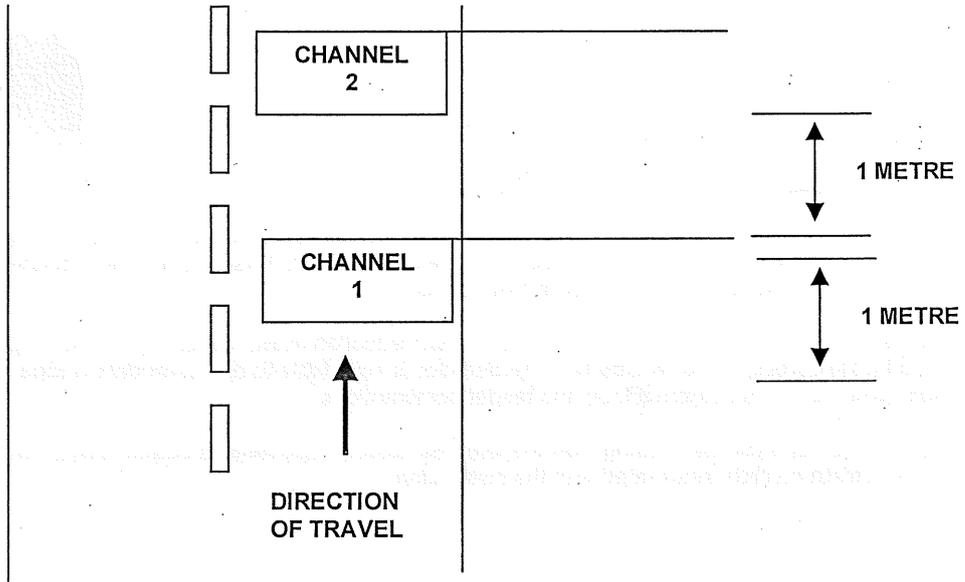
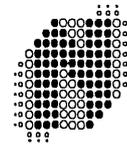


Figure 3.2 Speed Logic Loop Layout

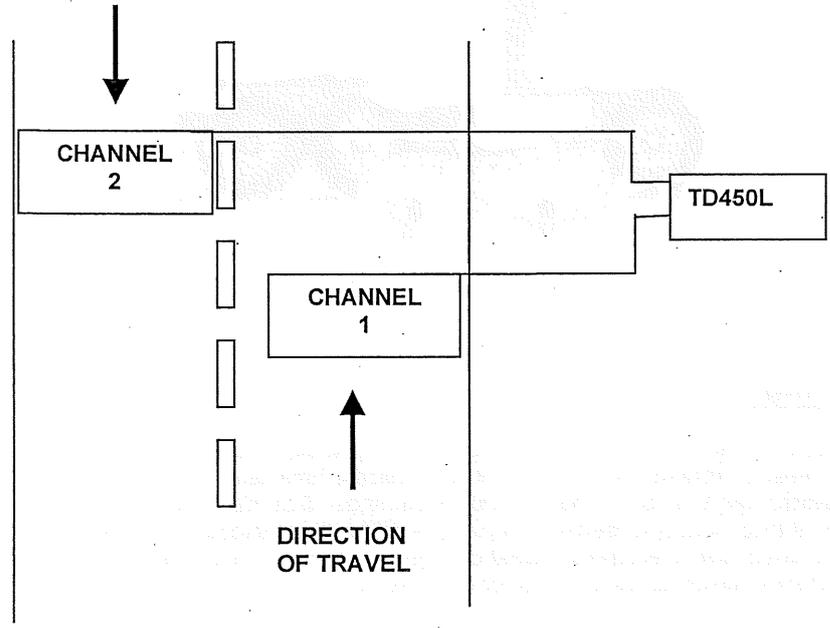
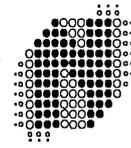


Figure 3.3: Typical Headway Logic Loop Layout

* Distance will vary according to average vehicle speed and the required time of warning sign illumination.

$$D \text{ (Distance in Metres)} = S \text{ (Speed in metres per second)} \times T \text{ (Time in seconds)}$$

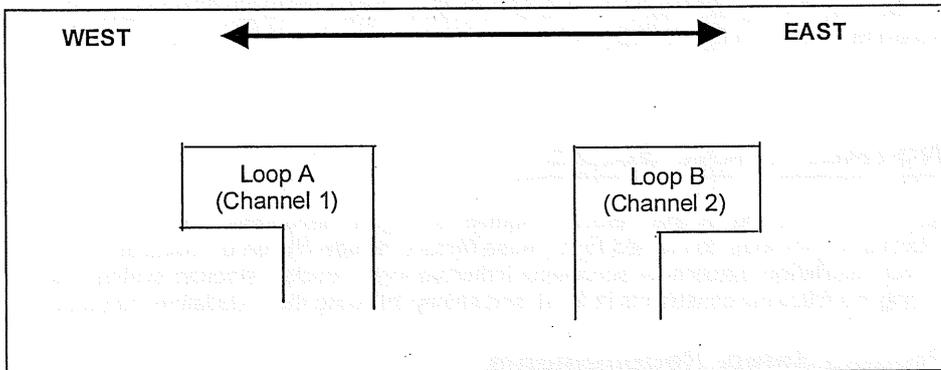


4.3 Modes of Operation

The TD450L can operate in four different modes:

In the NORMAL mode the detector provides a continuous output during the presence of a vehicle over the inductive loop. The maximum possible duration of output is determined by the presence time setting. The various presence time modes are covered in section 3.2.2

AB LOGIC is a direction logic mode, and is capable of determining direction of travel of a vehicle. Two loops are laid in the direction of travel to provide the input for this mode.



A vehicle travelling from West to East will provide an output "A to B" on the channel 1 output relay. Conversely, a vehicle travelling from East to West will produce an output "B to A" on the channel 2 output relay. This mode is used to activate equipment requiring vehicle direction inputs such as automatic fee collection equipment, vehicle counters, or warning devices in one-way systems.

SPEED LOGIC MODE allows for the speed of a vehicle to be determined when a pre-set speed threshold has been exceeded an output will result and can be utilised for traffic control applications.

HEADWAY LOGIC MODE can be used to determine the following interval between vehicles. Outputs resulting from vehicles whose headway is too short can be used for traffic analysis and traffic management applications.

4.4 Response Times

The response time of the detector is the time taken from when a vehicle moves over the loop to when the detector gives an output on that channel. The response times of the TD450L have been adjusted to prevent false operation in electrically noisy environments, but retains adequate response to vehicles travelling at very high speeds.

4.5 Sequential Polling

The TD450L four-channel detector employs scanning techniques which positively eliminate crosstalk between loops connected to the same module. This is due to the fact that only one channel is energised at a time. Advantage should be taken of this by allocating adjacent loops, or loops sharing close proximity feeder runs, to the same detector unit.



5.2 Operational Constraints

5.2.1 Crosstalk

When two loop configurations are in close proximity, the magnetic fields of one can overlap and disturb the field of the other. This phenomena, known as crosstalk, can cause false detects and detector lock-up. Should the loops be connected to the same four channel detector crosstalk will not occur, due to the fact that sequential polling of the loops takes place, resulting in only one loop being energised at a given time.

Crosstalk between adjacent loops operating from different detector modules can be eliminated by:

1. Careful choice of operating frequency. The closer together the two loops, the further apart the frequencies of operation must be.
2. Separation between adjacent loops. Where possible a minimum spacing of 2 metres between loops should be adhered to.
3. Careful screening of feeder cables if they are routed together with other electrical cables. The screen must be earthed at the detector end only.

5.2.2 Reinforcing

The existence of reinforced steel below the road surface has the effect of reducing the inductance, and therefore the sensitivity, of the loop detection system. Hence, where reinforcing exists 2 additional turns should be added to the normal loop, as referred to in section 5.4.

The spacing between the loop and the cable should be greater than 150 mm, although this is not always practically possible. The slot depth should be kept as shallow as possible, taking care that no part of the loop or the feeder remains exposed after the sealing compound has been applied.

5.3 Loop and Feeder Specification

The loop and feeder should preferably constitute a single unjoined length of insulated copper conductor, with a minimum rating of 1.5 mm² cross sectional area.

Joints in the loop or feeder are not recommended. Where this is not possible, joints are to be soldered and terminated in a waterproof junction box. This is extremely important for reliable detector performance.

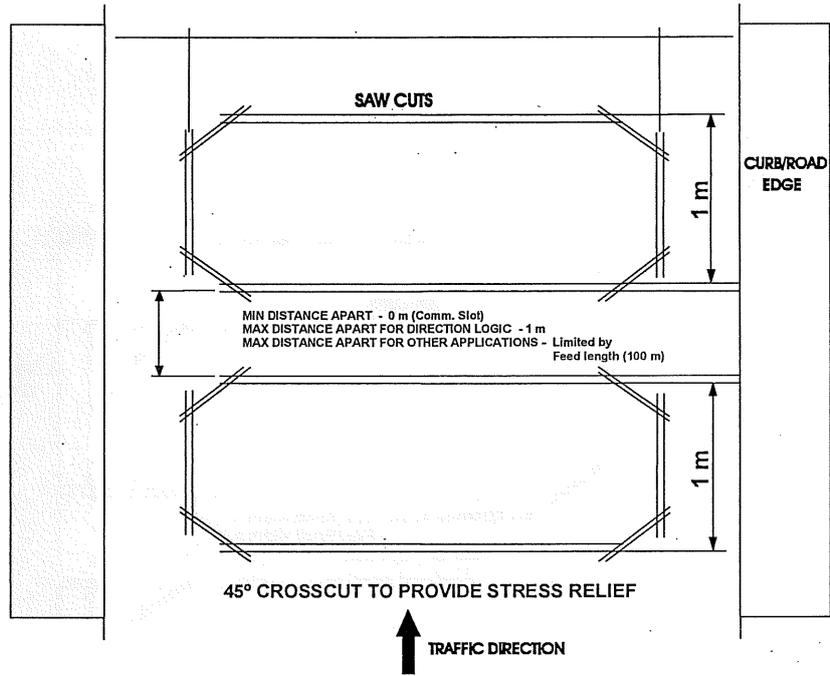
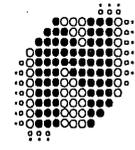


Figure 5.1 Adjacent loops connected to a TD450LS detector

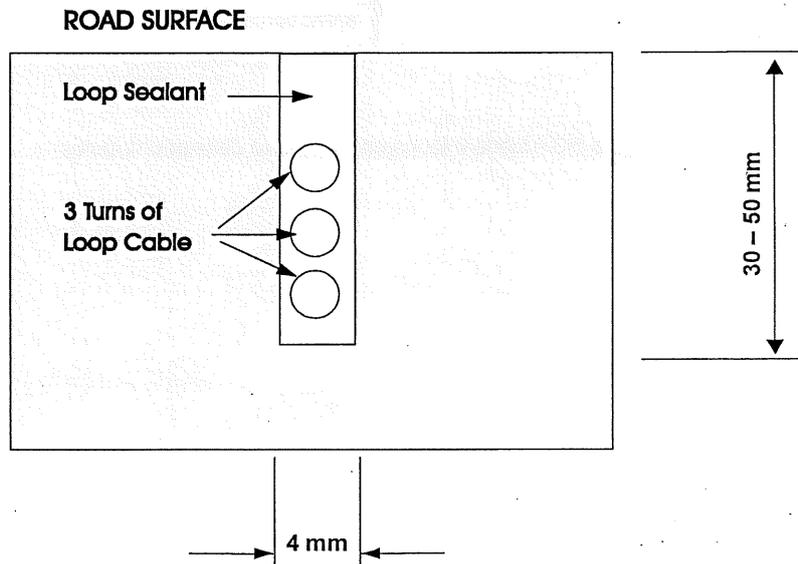


Figure 5.2 Slot details



6. CONFIGURATION

WARNING 5: The connector PIN assignments vary from model to model

Refer to the label on the side of the unit for connector PIN assignment

Note 1:

The tables below show the PIN assignments for Nortech's standard TD450 Models the pin assignments may change.

WARNING 6: Wiring harnesses supplied with the units i.e. 879CM0039, 879CM0037 and 879CM0039 are only rated for SELV voltages (less than 60V dc or less than 42 V ac)

If the relays are to switch higher voltages use CE approved 11 PIN sockets or use Nortech's TD450 socket mounting plate Part No. 879FT0038 (See appendix B of this manual)

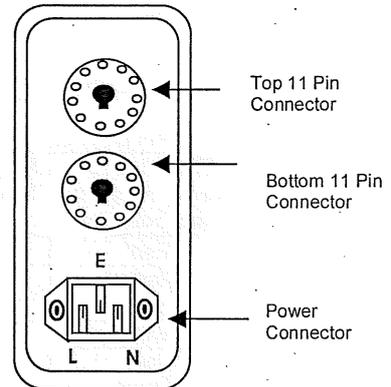


6.2 TD452L Detector – Order number 879FT0022

Wiring for TD452L DETECTOR – Order number 879FT0035

Top 11 Pin Connector

| 879CM0036 Wiring Harness wire colours | Pin Number | Top 11 Pin Connector Function | |
|---|---------------|----------------------------------|-----------------|
| | 1 | - | |
| | 2 | - | |
| White | 3 | CH1 Loop | Twist this pair |
| White | 4 | CH1 Loop | |
| Yellow | 5 | CH2 Loop | Twist this pair |
| Yellow | 6 | CH2 Loop | |
| Grey | 7 | CH2 N/O Contact | |
| Grey | 8 | CH2 Common | |
| | 9 | - | |
| Green | 10 | CH1 N/O Contact | |
| Green | 11 | CH1 Common | |



Back View

Bottom 11 Pin Connector

| 879CM0037 Wiring Harness Wire Colours | Pin Number | Bottom 11 Pin Connector Function | |
|---|---------------|-------------------------------------|-----------------|
| Mauve | 1 | N/O Fault Contact | |
| Mauve | 2 | Common Fault | |
| Orange | 3 | CH3 Loop | Twist this pair |
| Orange | 4 | CH3 Loop | |
| Pink | 5 | CH4 Loop | Twist this pair |
| Pink | 6 | CH4 Loop | |
| White/Blue | 7 | CH4 N/O Contact | |
| White/Blue | 8 | CH4 Common | |
| | 9 | - | |
| White/Black | 10 | CH3 N/O Contact | |
| White/Black | 11 | CH3 Common | |

3 Pin connector wiring code

| Power Harness Wire Colour | Pin Number | 3 Pin Power Connector Function | |
|------------------------------|------------|--------------------------------|-----------------------------------|
| Yellow / Green | E | Earth | Power supply 230V ±10% 50/60Hz |
| Blue | N | Neutral | |
| Brown | L | Live | |



6.4 TD454L 25 Way "D" – 879FT0031

Wiring for TD454L 25 Way 'D' DETECTOR – Order number 879FT0031

Top 11 Pin Connector

| Optional Wiring Harness 879CM00?? wire colours | Pin Number | Top 11 Pin Connector Function |
|--|------------|-----------------------------------|
| | 1 | AC Live |
| | 2 | Not Used |
| | 3 | Chassis Ground |
| | 4 | Loop input CH4 |
| | 5 | Loop input CH3 |
| | 6 | Loop input CH2 |
| | 7 | Loop input CH1 |
| | 8 | Output CH4 Relay N/C |
| | 9 | Output CH4 Relay N/O Opto (+)* |
| | 10 | Output CH3 Relay N/O Opto (+)* |
| | 11 | Output CH2 Relay N/O Opto (+) |
| | 12 | Output CH1 Relay N/O Opto (+) |
| | 13 | Output CH3 Relay N/C |
| | 14 | - |
| | 15 | AC Neutral |
| | 16 | Loop input CH4 |
| | 17 | Loop input CH2 |
| | 18 | Loop input CH2 |
| | 19 | Loop input CH1 |
| | 20 | Output CH2 Relay N/C |
| | 21 | Output CH4 Relay Common/Opto (-)* |
| | 22 | Output CH3 Relay Common/Opto (-)* |
| | 23 | Output CH2 Relay Common/Opto (-)* |
| | 24 | Output CH1 Relay Common/Opto (-) |
| | 25 | Output CH1 Relay N/C |

WARNING 7:

The wiring harness wire colour to PIN No. assignment only applies to the stated wiring harness Part No.

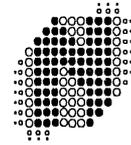
Other wiring harness will have different wire colour to PIN No. assignments.



8. CUSTOMER FAULT ANALYSIS

8.1 Fault Finding

| FAULT | CAUSED BY | REMEDY |
|---|---|--|
| Red LED does not glow on power up. | If the indicator is off then there is a fault on the power connection to the unit. | Check power feed to the unit. |
| After the initial tuning period one of the channel indicators is still green. | Unit cannot tune to the loop due to faulty loop or feeder connection. Loop may be too small or too large. Faulty detector unit. | Check loop installation and connections. Recut as per installation instructions. Replace unit. |
| After tuning, the loop output indicator flashes green <i>intermittently</i> and the relay chatters. | The loop is getting spurious detects due to: a) Crosstalk with adjacent detector. b) Faulty loop or feeder connection. | a) Change frequency setting. b) Check that the feeders are adequately twisted. |
| On detect one channel indicator turns green but the relay is not activated. | The detector is operating in the AB logic mode. | Change the operating mode to normal. |



APPENDIX A –REQUEST FOR TECHNICAL SUPPORT FORM

For Technical support please fill in the form below and send it to your supplier. Its is recommended that at installation you complete this form as a record of the Installation. If there is a problem later on you can identify what has changed.

Contact Details:- Your Name: _____

Your company: _____

Telephone No. _____ Mobile/Cellphone No. _____

FAX No. _____

Postal address: _____

Product Model (i.e. TD452L) _____ Product FT No. 879FT _____

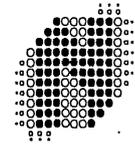
Product Serial Number: _____

Site Name: _____ Detector No. (at the site): _____

What are the settings of the switches on the front of the unit ON or OFF

DIP Switch SW1

| | | | |
|----------|-------|-------|-------------------|
| Switch 1 | _____ | (PRES | Presence Ch 1) |
| Switch 2 | _____ | (PRES | Presence Ch 2) |
| Switch 3 | _____ | (SENS | Sensitivity Ch 2) |
| Switch 4 | _____ | (SENS | Sensitivity Ch 2) |
| Switch 5 | _____ | (PRES | Presence Ch 1) |
| Switch 6 | _____ | (PRES | Presence Ch 1) |
| Switch 7 | _____ | (SENS | Sensitivity Ch 1) |
| Switch 8 | _____ | (SENS | Sensitivity Ch 1) |



LOOP DETAILS

Loop 1

Size of loop: ___ m by ___ m Shape of loop: _____

Number of Turns: _____

Size of wire used (mm² or AWG) _____

Type of wire insulation and thickness of insulation: _____

How far below the surface is the loop: _____ mm

Loop 2

Size of loop: ___ m by ___ m Shape of loop: _____

Number of Turns: _____

Size of wire used (mm² or AWG) _____

Type of wire insulation and thickness of insulation: _____

How far below the surface is the loop: _____ mm

Loop 3

Size of loop: ___ m by ___ m Shape of loop: _____

Number of Turns: _____

Size of wire used (mm² or AWG) _____

Type of wire insulation and thickness of insulation: _____

How far below the surface is the loop: _____ mm

Loop 4

Size of loop: ___ m by ___ m Shape of loop: _____

Number of Turns: _____

Size of wire used (mm² or AWG) _____

Type of wire insulation and thickness of insulation: _____

How far below the surface is the loop: _____ mm

Are there any metal objects below any of the loops such as concrete reinforcing, water pipes etc if yes please give details:



Are there any other cables close to this feeder cable? If so please give details:

FEEDER CABLE and LOOP DETAILS

Loop 1 and Feeder Cable

DC resistance of Feeder plus Loop: _____ ohms

Inductance of Feeder plus Loop: _____ Micro Henries

Loop and feeder resistance to earth (with detector unplugged) using a 500V Megger: _____ Ohms (should be greater than 10 Mega Ohms)

Loop 2 and Feeder Cable

DC resistance of Feeder plus Loop: _____ ohms

Inductance of Feeder plus Loop: _____ Micro Henries

Loop and feeder resistance to earth (with detector unplugged) using a 500V Megger: _____ Ohms (should be greater than 10 Mega Ohms)

Loop 3 and Feeder Cable

DC resistance of Feeder plus Loop: _____ ohms

Inductance of Feeder plus Loop: _____ Micro Henries

Loop and feeder resistance to earth (with detector unplugged) using a 500V Megger: _____ Ohms (should be greater than 10 Mega Ohms)

Loop 4 and Feeder Cable

DC resistance of Feeder plus Loop: _____ ohms

Inductance of Feeder plus Loop: _____ Micro Henries

Loop and feeder resistance to earth (with detector unplugged) using a 500V Megger: _____ Ohms (should be greater than 10 Mega Ohms)

Instructions for Installation and Use of the C3-100/200/400 Control Panel

Version: 1.0.1

Date: Oct. 2010

About This Manual

This manual is a guide to installation and connection of the C3-100/200/400 access control operator panel. For how to use the software of the product, see *ZKAccess4.0 User Manual*.

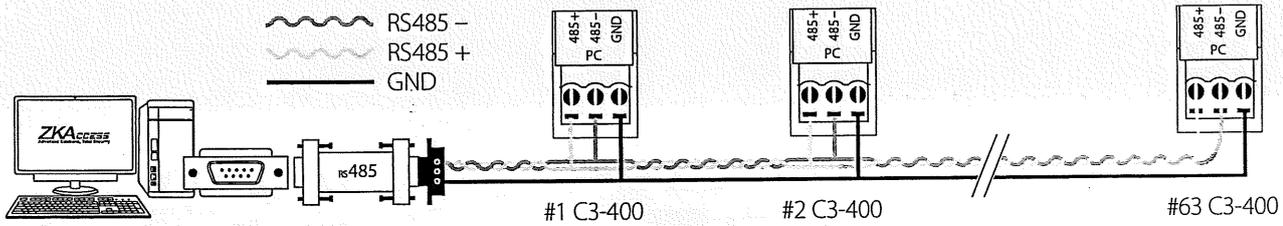


Figure 26

Important Notes:

1. RS485 communication wires should be a shielded twisted pair cable. RS485 communication wires should be connected in a bus cascade topology instead of a star topology, to achieve a better shielding effect by reducing signal reflection during communications.
2. A single RS485 bus can connect up to 63 access control panels, but preferably 32 is recommended maximum.
3. To eliminate signal attenuation in communication cables and suppress interference, if the bus is longer than 200 meters, set the number 8 DIP switch to the ON position. This is equivalent to a parallel connection of one 120ohm resistance between the 485+ and 485- lines.

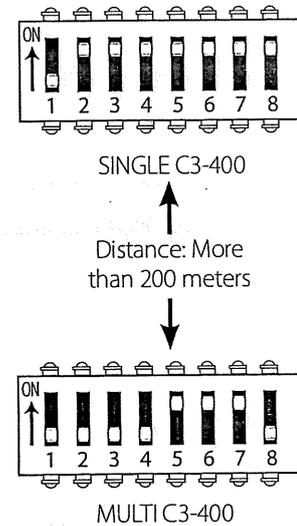


Figure 27

Incorrect RS 485 connections

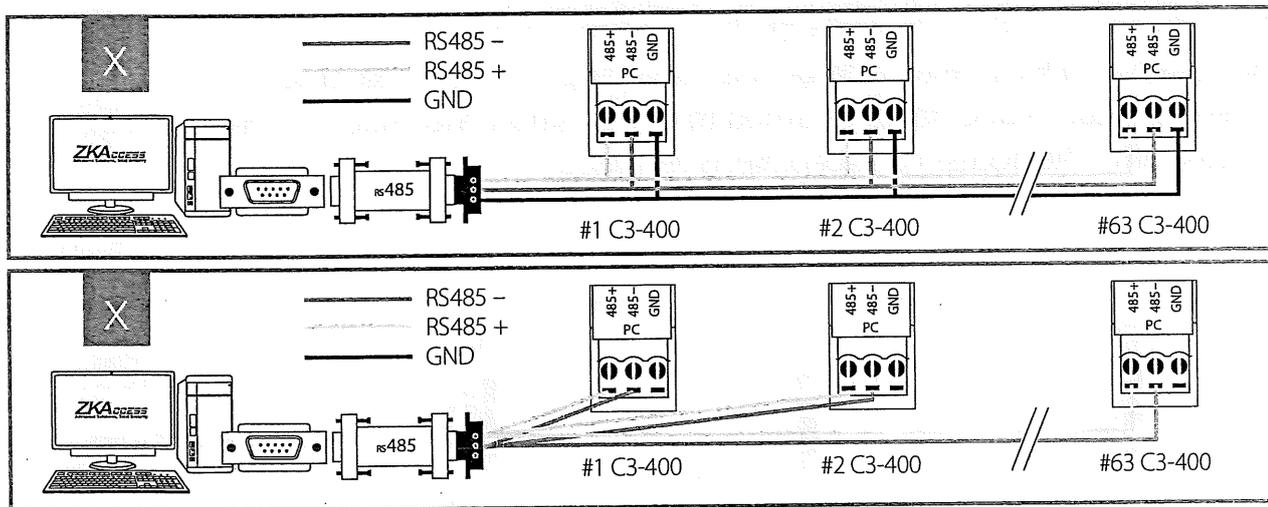


Figure 28

RS485 Address

1. Number 1-6 are reserved to set the device number for RS485 communication. The code is binary, and the numbering starts from left to right. When the switch is set to ON position, it indicates 1 (on); when the switch is set downwards, it indicates 0 (off). For example, to set a device number 39=1+2+4+32, which corresponds to the binary code 111001, put number 1, 2, 3, and 6 to ON position, as illustrated below.



Figure 31

2. For more details, please check the table at the end of this document.

Terminal Resistance

1. Number 8 is for setting the RS485 termination resistance. Putting the switch to ON position is equivalent to parallel connection of a 120 ohm termination resistance between 485+ and 485- lines.

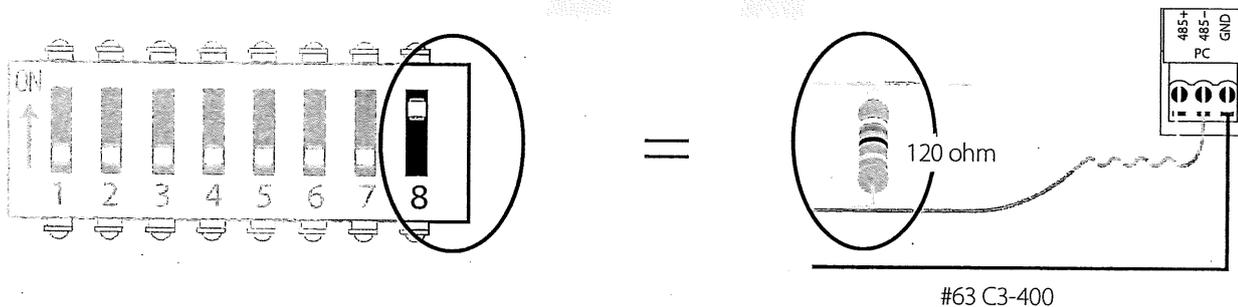


Figure 32

1. How to switch four door one way to two door two way?

- › Connect four readers from reader 1 to reader 4.
- › Connect two door locks, one connected to LOCK1, another connected to LOCK3.
- › In the software configure reader 1-Indoor, and reader 2-Outdoor.

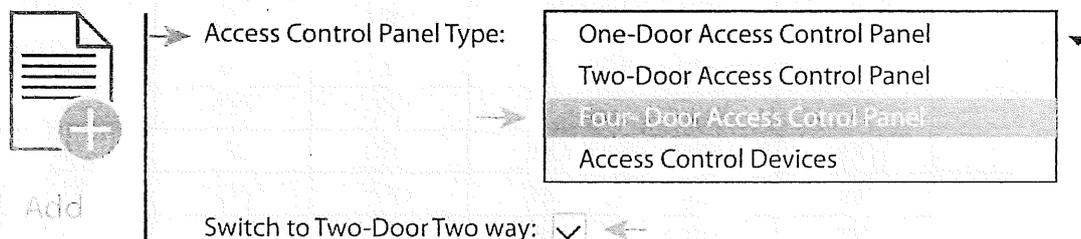


Figure 34

2. Can we integrate IP Camera and NVR?

- › Currently ZKACCESS software supports ZKAccess' IP Cameras and NVR
- › You can associate a camera to the door and setup a linkage for the same.

3. What does it mean when I get a "Wiegand Format Error"?

- › Your WD0 and WD1 wiring is reversed.

4. How do I connect a third party reader or a stand-alone reader to a C3 panel?

- › Connect the wiegand output to the WD0 and WD1 of the stand-alone readers on the panel's reader port.

Note: The board can only supply 12V DC, 300mA power so an external power supply may be required.

5. What is the SD card slot used for?

- › SD card, stores transactions from the panel and creates a back up in addition to internal memory.

6. What kind of wire is recommended for the panel?

- › 16 or 18 AWG twisted shielded wire is recommended.

7. What is the default IP of the panel?

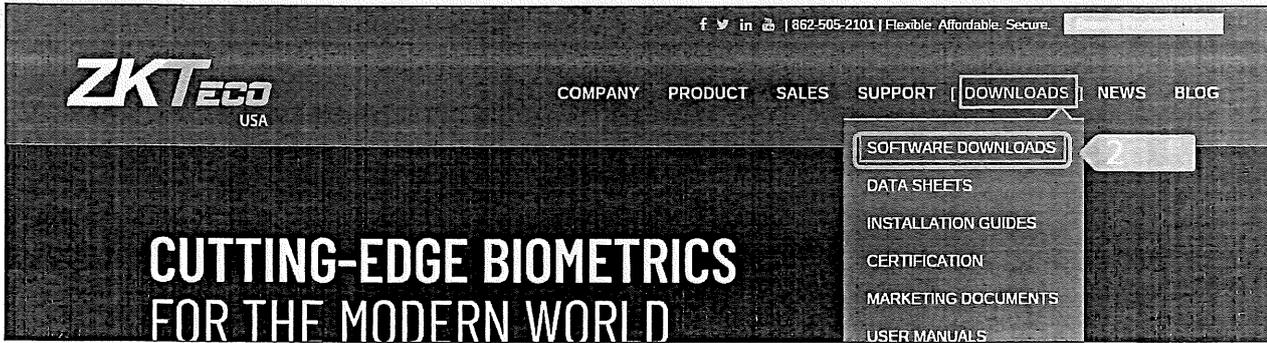
- › 192.168.1.201

8. How long is the device under warranty?

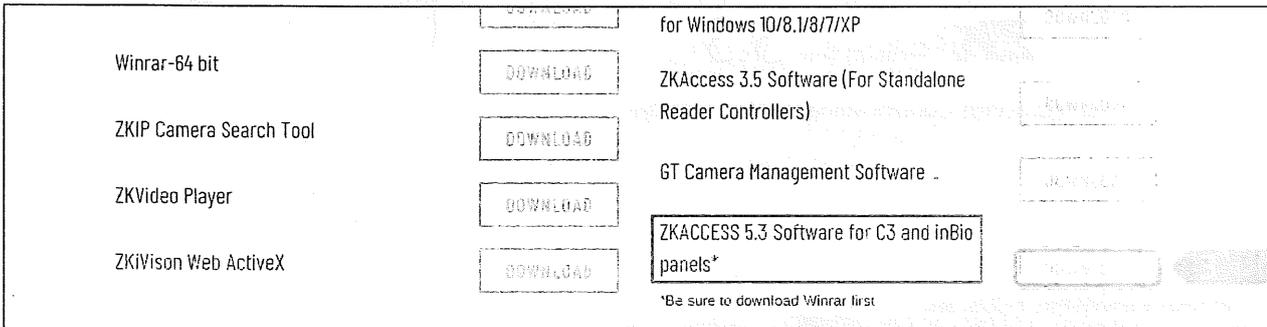
- › 2 Years from original purchase date, replacement/repair of hardware under ZK standard warranty requires an evaluation of the failed system by a ZK Technical Support specialist, and the issuance of a Technical Support RMA number.

| Address No. | Switch Setting | | | | | |
|-------------|----------------|-----|-----|-----|-----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| | 1 | 2 | 4 | 8 | 16 | 32 |
| 33 | ON | OFF | OFF | OFF | OFF | ON |
| 34 | OFF | ON | OFF | OFF | OFF | ON |
| 35 | ON | ON | OFF | OFF | OFF | ON |
| 36 | OFF | OFF | ON | OFF | OFF | ON |
| 37 | ON | OFF | ON | OFF | OFF | ON |
| 38 | OFF | ON | ON | OFF | OFF | ON |
| 39 | ON | ON | ON | OFF | OFF | ON |
| 40 | OFF | OFF | OFF | ON | OFF | ON |
| 41 | ON | OFF | OFF | ON | OFF | ON |
| 42 | OFF | ON | OFF | ON | OFF | ON |
| 43 | ON | ON | OFF | ON | OFF | ON |
| 44 | OFF | OFF | ON | ON | OFF | ON |
| 45 | ON | OFF | ON | ON | OFF | ON |
| 46 | OFF | ON | ON | ON | OFF | ON |
| 47 | ON | ON | ON | ON | OFF | ON |
| 48 | OFF | OFF | OFF | OFF | ON | ON |
| 49 | ON | OFF | OFF | OFF | ON | ON |
| 50 | OFF | ON | OFF | OFF | ON | ON |
| 51 | ON | ON | OFF | OFF | ON | ON |
| 52 | OFF | OFF | ON | OFF | ON | ON |
| 53 | ON | OFF | ON | OFF | ON | ON |
| 54 | OFF | ON | ON | OFF | ON | ON |
| 55 | ON | ON | ON | OFF | ON | ON |
| 56 | OFF | OFF | OFF | ON | ON | ON |
| 57 | ON | OFF | OFF | ON | ON | ON |
| 58 | OFF | ON | OFF | ON | ON | ON |
| 59 | ON | ON | OFF | ON | ON | ON |
| 60 | OFF | OFF | ON | ON | ON | ON |
| 61 | ON | OFF | ON | ON | ON | ON |
| 62 | OFF | ON | ON | ON | ON | ON |
| 63 | ON | ON | ON | ON | ON | ON |

| | |
|-----------------------------|---|
| Communication | RS485, TCP/IP |
| Baud Rate for RS485 | 9600-15200 |
| Power Supply | 12V DC, 2A |
| Card Holders Capacity | 30,000 |
| Log Events Capacity | 100,000 |
| LED Indicator | Indicator for communication, power, status and prox card |
| Environment | 32-113 °F (0-45°C) |
| Operating Humidity | 20% to 80% |
| Number of doors controlled | Four Door (four door one way and two door two way) |
| Number of readers supported | 4 |
| Types of readers supported | 26-bits WIEGAND, others upon request |
| Number of Inputs | 12 (4 Exit Device, 4 Door Status, 4 AUX) |
| Number of Outputs | 8 (4- Form C relay for lock and 4- Form C relay for Aux output) |
| Weight | 7.8lbs (3.55kg) |
| Enclosure | Stainless Steel |
| Mounting | Wall Mount |
| Dimensions (Bundle Only) | 15.7in. x 3.56in. x 13.0in 400mm(L) x 90.5mm(W) x 330mm(H) |
| Dimensions (Board Only) | 8.0in. x 4.17in. 203.2mm(L) x 106mm(W) |
| CPU | 32 bit 400MHz |
| RAM | 32MB |
| Flash | 128MB |
| Certified |  |



1. Go to zktecousa.com.
2. Click **Download** and then **Software Download** in the dropdown menu.

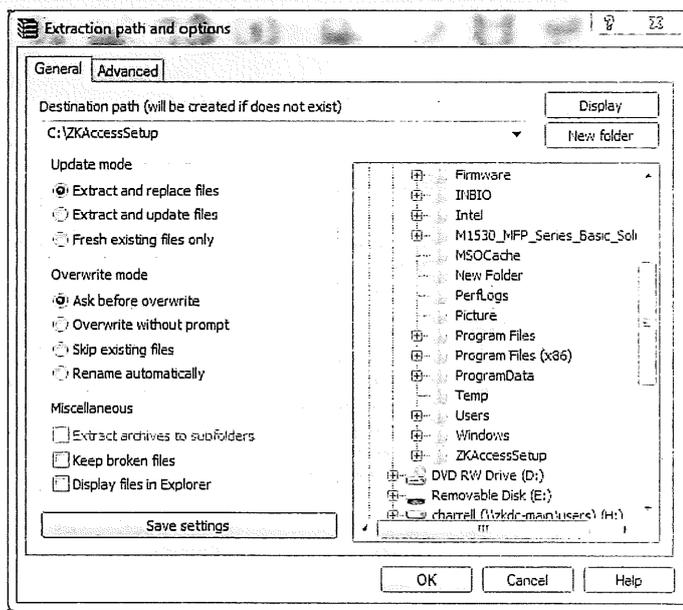
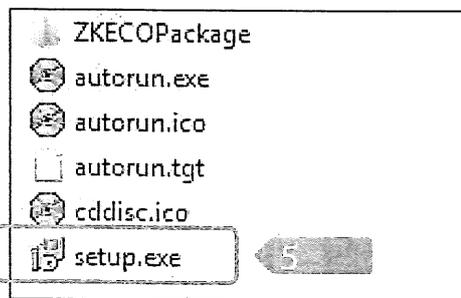


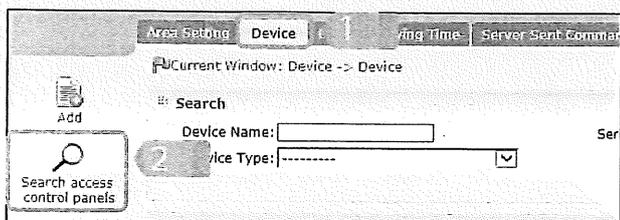
3. Scroll to the bottom of the page and click **ZKACCESS 5.3** to download.



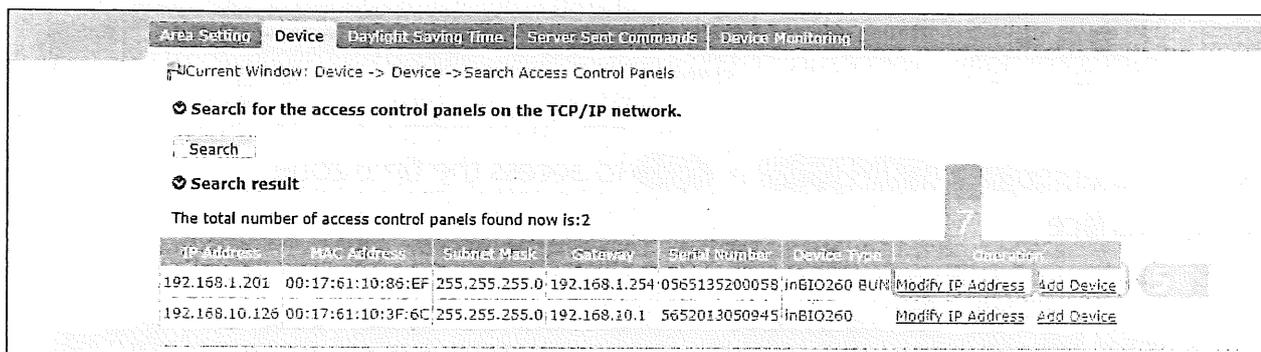
If you do not have software to extract compressed files, Scroll up on the same page to find **Winrar 32** or **Winrar 64** to download.

4. Extract the downloaded files to a new folder named "ZKAccessSetup"
5. Click **setup.exe** to begin installation.





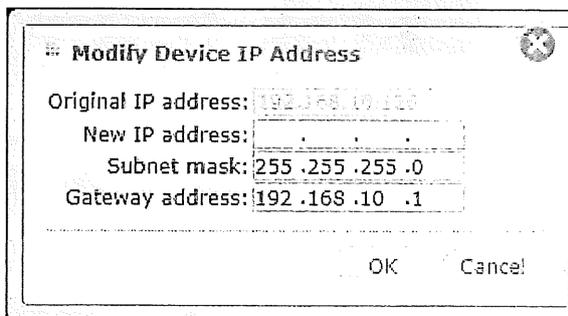
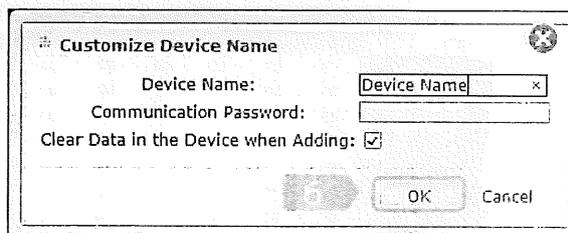
1. Click **Device**
2. Click **Search Panel** , to show the Search interface;
3. Click **Search** , and it will prompt [searching.....];

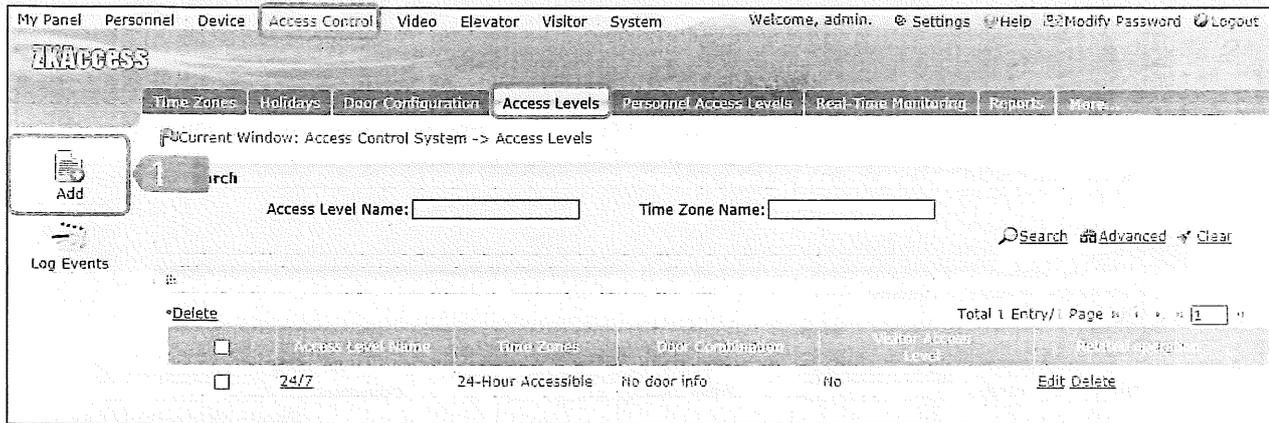


4. After searching, the list of all access control panels on the network will be displayed.
5. Click **Add Device** on the right side of the listed device, and a dialog box will open.
6. Enter self-defined device name, and click **OK** to complete the process.
7. The default IP address of the access control panel may conflict with the IP of another device on the network.

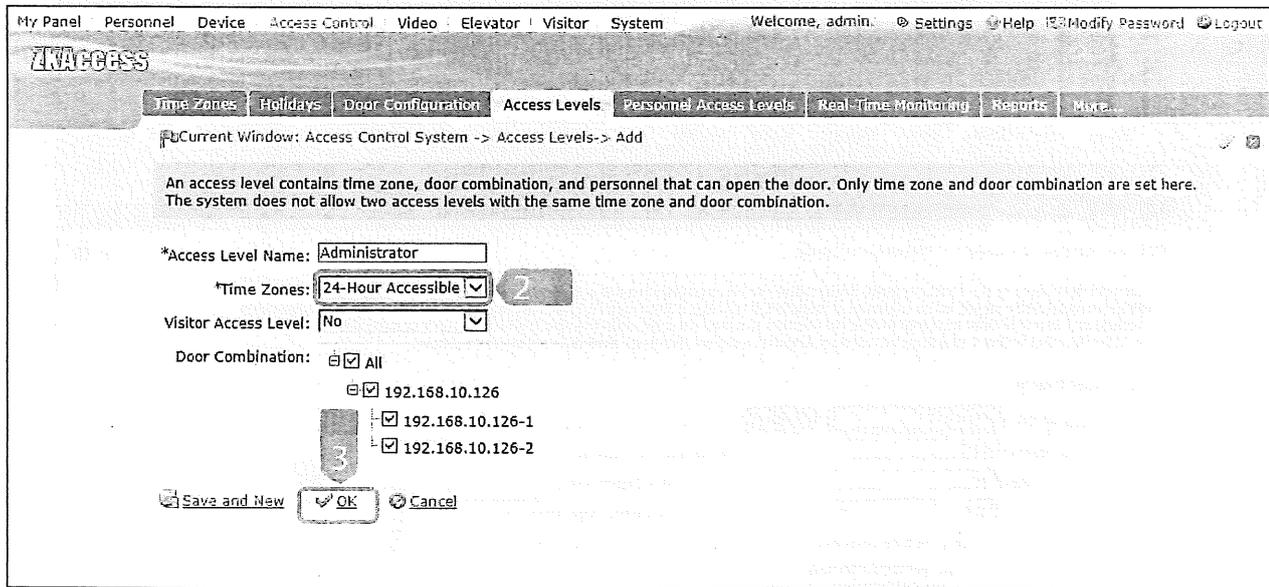
You can modify the IP address: Click **Modify IP Address** to the right of the device and a dialog box will open. Enter the new IP address and other parameters.

Note: Must configure the gateway and IP address in the same network segment.





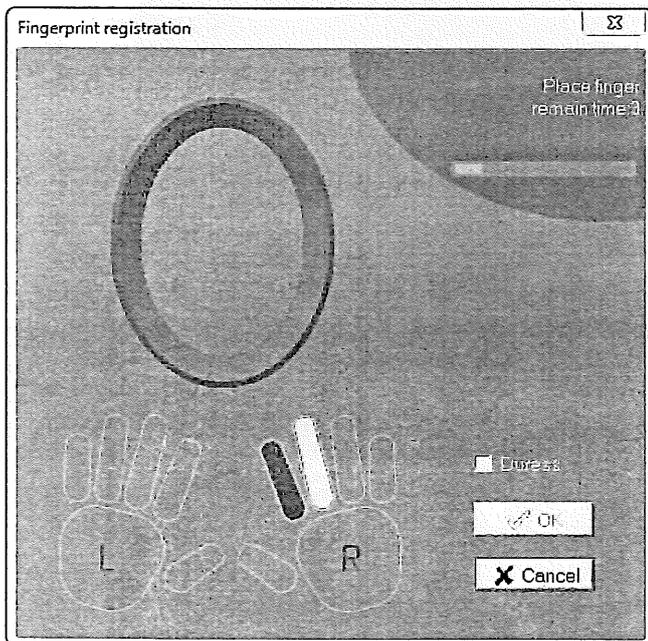
1. Click **Access Control** > **Access Levels** > **Add** to add an access level.



2. Set parameters: access level name (no repetition), access control time zone, door combination

3. Click **OK** to complete setting and quit, and added access levels will appear in the list.

2. **Personnel No.:** By default, the length can not exceed 9 digits. A number with a length of less than 9 digits will be preceded with 0 automatically to complete 9 digits. Numbers can not be duplicated.
3. **Card number:** You can add a card number through manual entry or a card issuer. In Actual Card Number mode (by default), you must enter both the actual card number and the site code, then the software converts the numbers to the internal card number for access control system verification. In Internal Card Number mode, enter the numbers directly.
4. **Password:** Set personnel password to use on a keypad reader. Password must be 4 to 6 numbers long.
5. **Department:** Select from the pull-down menu and click **OK**. If the department was not set previously, you can only select the default **Company Name** department.



6. **Register Fingerprint:** Enroll the Personnel Fingerprint or Duress Fingerprint. If the person presses the Duress Fingerprint, it will trigger the alarm and send the signal to the system.
7. **Access Level:** Click the box next to the access level you would like to add the personnel to. (Optional)

My Panel Personnel Device **Access Control** Video Elevator Visitor System Welcome, Delmiara. Settings Help Modify Password Logout

Time Zones Holidays Door Configuration Access Levels Personnel Access Levels **Real-Time Monitoring** Reports More...

Current Window: Access Control System -> Real-Time Monitoring -> Monitor All

Door Status Monitoring

Monitor All

Area All Access Control Panel Door

Open all current doors Close all current doors

192.168.10... 192.168.10... Auxiliary ... Auxiliary ...

Events Monitoring

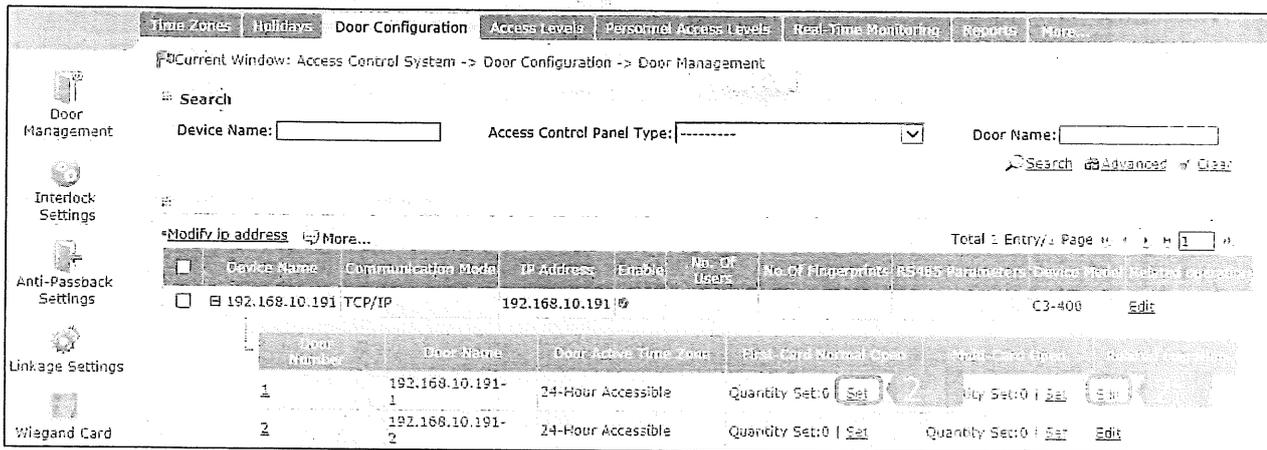
| Time | Device | Event point | Event Description | Card Number (No.) | Personnel Username | Status | Event Type |
|------|--------|-------------|-------------------|-------------------|--------------------|--------|------------|
|------|--------|-------------|-------------------|-------------------|--------------------|--------|------------|

1. Click **Access Control** > **Real-Time Monitoring** to watch a live log of device transactions.
2. Click the **Filters** to limit which device transactions show up or view all devices at once.

| | |
|---------------|------------------|
| Device: | 192.168.10.126 |
| Door Number: | 2 |
| Door Name: | 192.168.10.126-2 |
| Door Status: | No Door Sensor |
| Relay Status: | Locked |
| Alarm Type: | None |

Remote Opening **Remote Closing** **Cancel Alarm**

3. Hover over a **Door Icon** to open pop up menu and click **Remote Close**, **Remote Open**, or **Cancel Alarm**.



The Passage Mode feature will keep a door unlocked during a specified time zone. It will automatically unlock at the beginning of the time zone and will lock automatically at the end of the specified time zone.

1. Create a new time zone with the hours you want the door to be unlocked.
2. In Door Configuration, Click **Edit** to the right of the door you want to change settings on.
3. Click the dropdown menu titled "Door Passage Mode Time Zone" and select your new time zone. Click **OK**.

The First Card Normal Open feature will keep a door unlocked during a specified time zone when triggered by specified personnel. After a specified personnel swipe unlock at the beginning of the time zone and will lock automatically at the end of the specified time zone

1. Create a new time zone with the hours you want the door to be unlocked.
2. In Door Configuration, under First-Card Normal Open, click **Set**.
3. Under First-Card Normal Open Settings, click **Add**.
4. Click the drop down menu titled Time Zones and choose your new time zone. Click **OK**.
5. To add the personnel that will trigger the door to stay normal open, click **Add an opening person**.
6. Click the check box next to the personnel and they will be added to the Selected Personnel list. Click **OK**.

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4.4 DIP Switch Setting (485 Address Setting, Factory Setting, and Terminal Resistance Setting).....31

- If the equipment cannot work normally even though operated as instructed, please be sure to adjust only the control components specified in the operation instructions. Incorrect adjustment of other control components may cause damage to the equipment, and add to troubleshooting workload of the qualified technicians.
 - The equipment falls down or its performance changes obviously.
8. Replacing components: If it is necessary to replace a component, the repair personnel must use only the substitutes specified by the manufacturer.
 9. Security inspection: After the equipment is repaired, the repair personnel are supposed to conduct security inspection to ensure the equipment can work normally.
 10. Power supply: Operate the equipment with only the type of power supply indicated on the label. Contact the operator for any uncertainty about the type of power supply.

i

Violation of any of the following cautions is likely to lead to personal injury or equipment failure, and any resulting damage will not be covered by our routine maintenance.

- Before installation, switch off the external circuit (that supplies power to the system), including locks.
- Before connecting the equipment to power supply, ensure the output voltage is within the specified range.
- Never connect power before completion of installation.

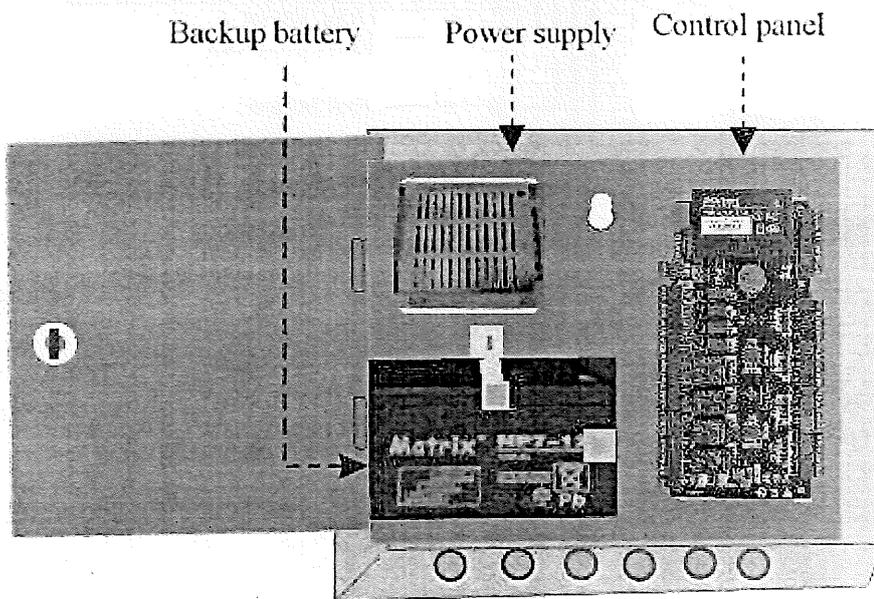
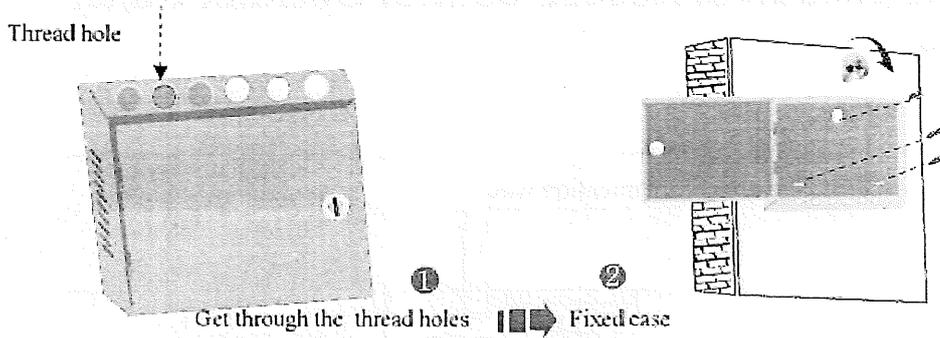
1.2 Installation Cautions

1. All wires must run through casing pipes, for example PVC or galvanized pipes, to prevent failure caused by rodent damage. Although a control panel is designed with good antistatic, lightning-proof, and leakage-proof functions, ensure its chassis and the AC ground wire are connected properly and the AC ground wire is grounded physically.

13. To protect the access control system against the self-induced electromotive force generated by an electronic lock at the instant of switching off/on, it is necessary to **connect a diode in parallel** (please use the FR107 delivered with the system) with the electronic lock to release the self-induced electromotive force during onsite connection for application of the access control system.
14. It is recommended that an electronic lock and a control panel should **use respective power supplies**.
15. It is recommended to use the power supply delivered with the system as the control panel power supply.
16. In a place with strong magnetic interference, galvanized steel pipes or shielded cables are recommended, and proper grounding is required.

3 Connection and Installation

3.1 Case Installation



3.3 Control Operator Panel System Installation

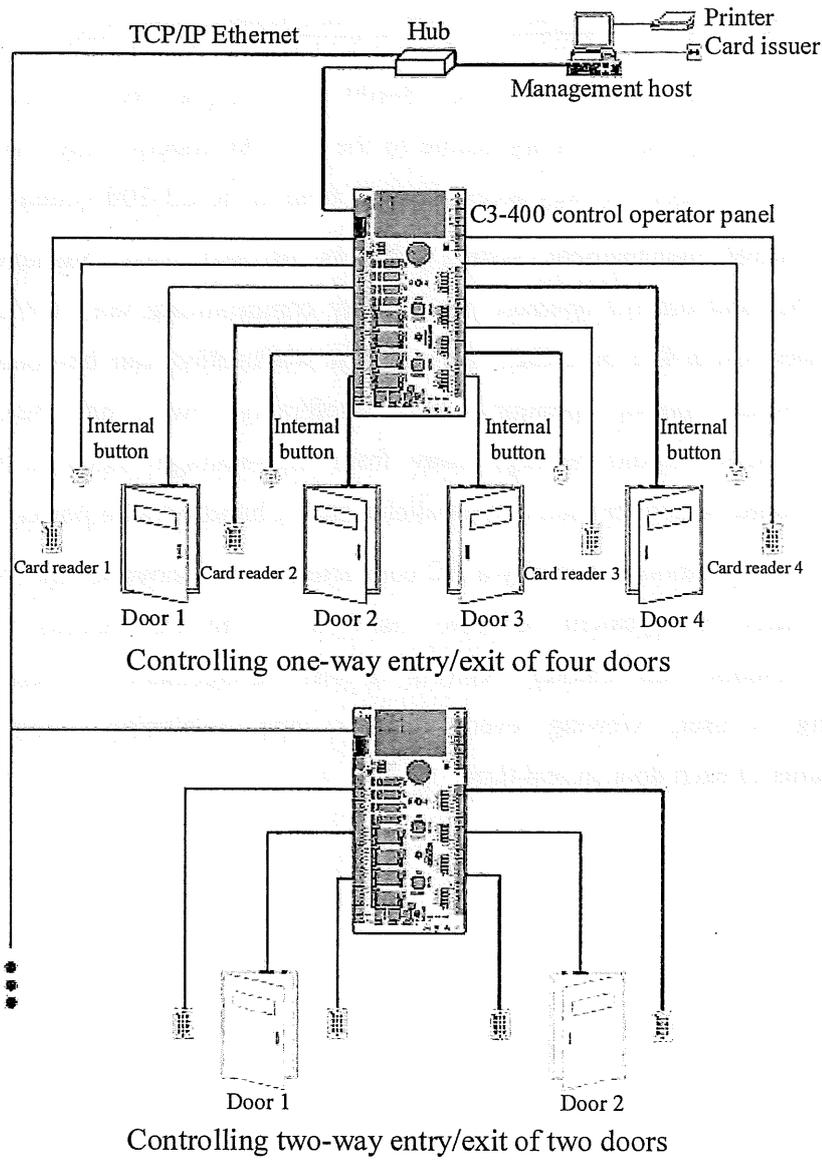
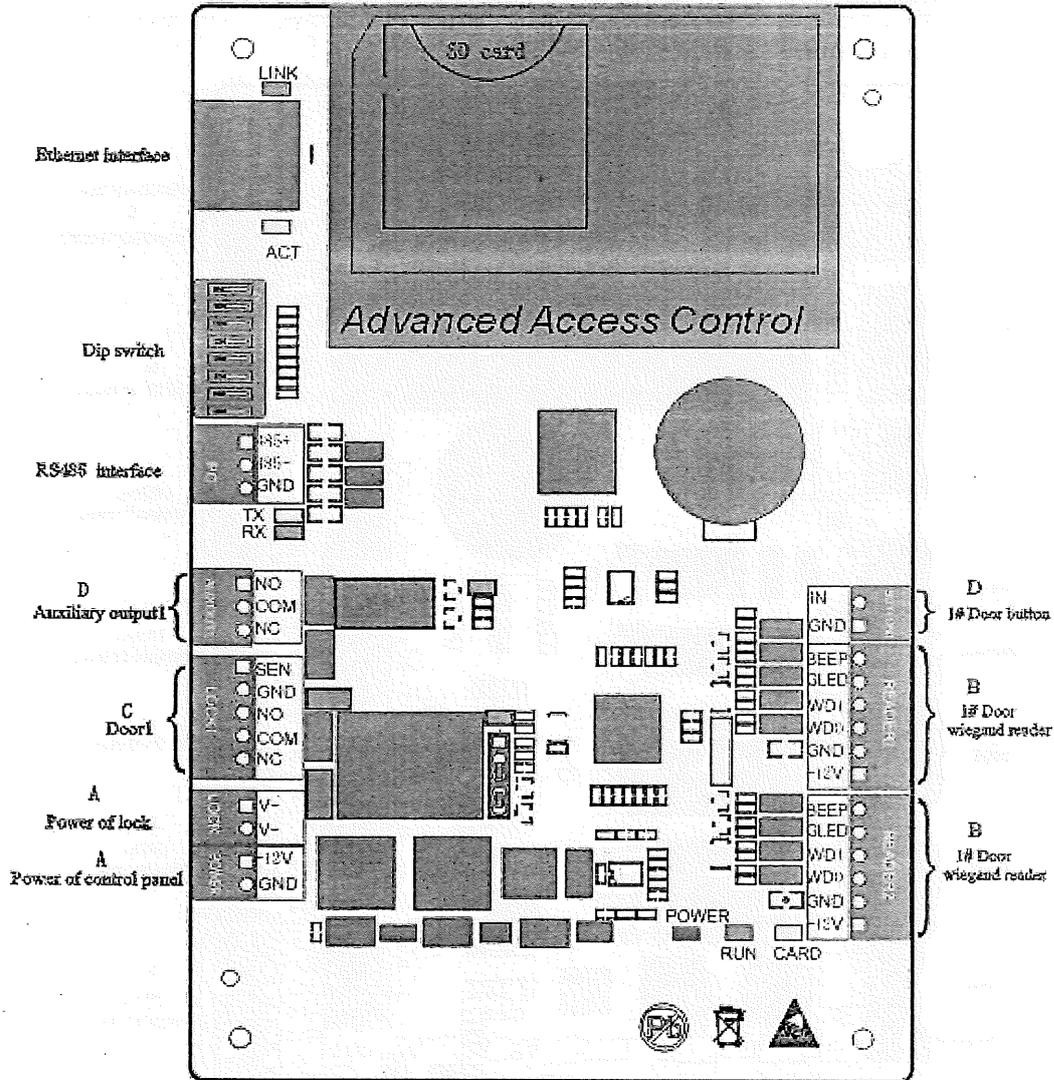


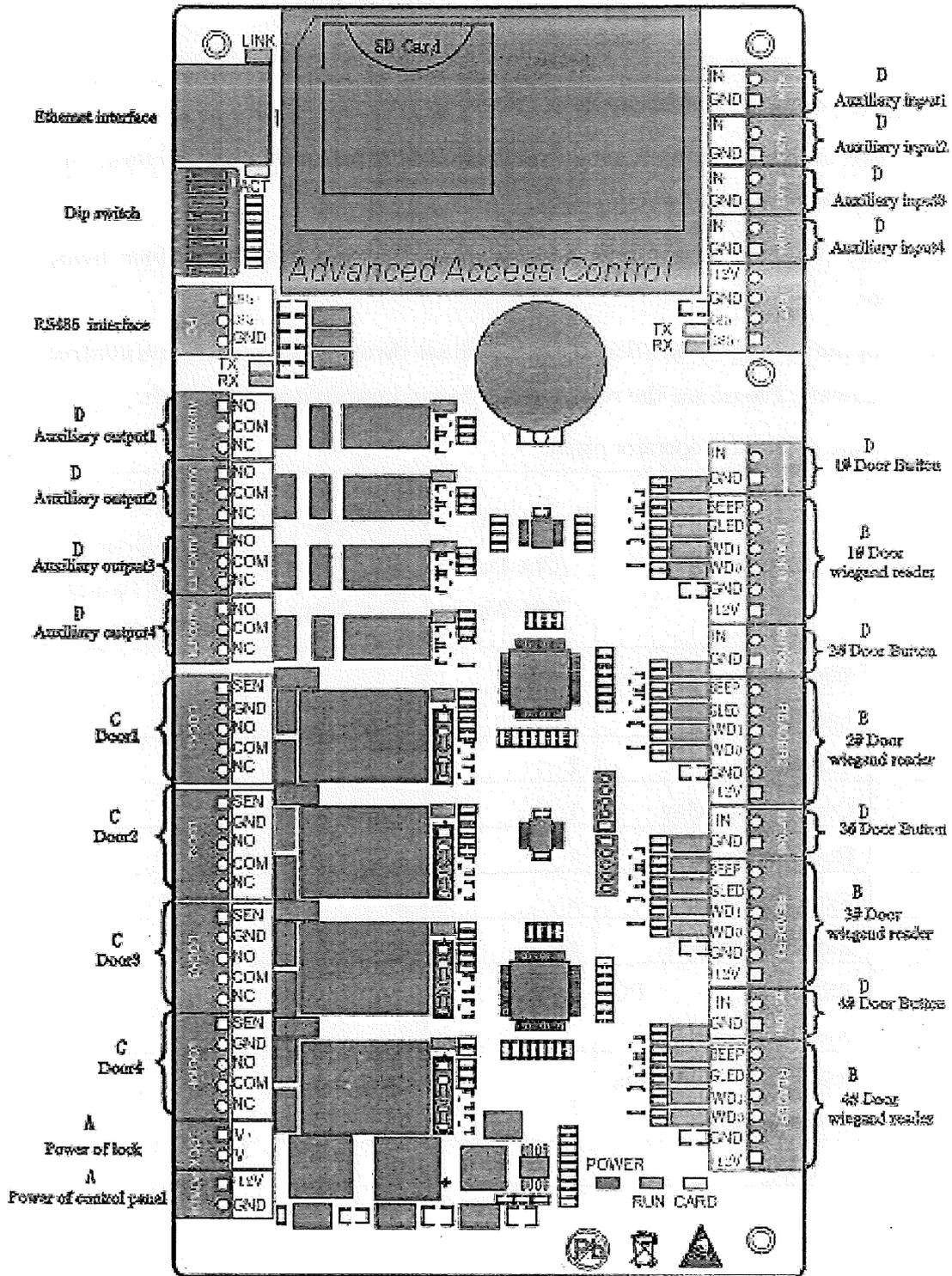
Figure 3-2 Schematic Diagram of C3-400 System Installation

3.4 Control Operator Panel Connection Terminals

C3-100 terminal connection diagram



C3-400 terminal connection diagram



3.5 Connection with Door Sensors, Exit Switches, and Auxiliary Input Devices

Door sensor

A door sensor is used to sense the open/closed status of a door. With a door sensor switch, an access control panel can detect illegal opening of a door, and will trigger an output of alarm. Moreover, if a door is not closed within a specified period of time after it is opened, the door control panel will also prompt an alarm. It is recommended to select two-core wires with a gauge over 0.22 mm^2 . A door sensor may be omitted if it is unnecessary to monitor online the open/closed status of a door, give out an alarm when the door is not closed for a long time or there is illegal access, and use the interlock function.

Exit switch

An exit switch is a switch installed indoors to open a door. When it is switched on, the door will be opened. An exit button is fixed at a height of about 1.4m above the ground. Ensure it is located in the right position without slant, and its connection is correct and secure. (Cut off the exposed end of any unused wire and wrap it with insulating tape.) Note to guard against electromagnetic interference (such as light switches and computers). It is recommended to use two-core wires with a gauge over 0.3mm^2 as the connection wire between an exit switch and a control panel.

Auxiliary input

C3-100 provides no auxiliary input interface; C3-200 provides two, and C3-400 provides four, which are connected to infrared body detectors, smoke detectors, gas detectors, window magnetic alarms, wireless exit switches, etc. Auxiliary inputs are set through relevant access control software. For details, please see *ZKAccess4.0 User Manual*.

 Note: The diagram above takes C3-400 for example. By contrast, C3-100 provides no auxiliary input interface; C3-200 provides two, and C3-400 provides four.

3.6 Connection with Wiegand Readers

C3-100 can connect two Wiegand readers in the one-door two-way mode. C3-200 provides four readers, which can be connected in the two-door two-way mode. C3-400 provides four readers, which can be connected in the two-door two-way or four-door one-way mode.

The Wiegand interfaces provided by the C3 series can be connected to different types of readers. If your card reader does not use the voltage of DC 12V, an external power supply is needed. A reader should be installed at a height of about 1.4m above the ground and at a distance of 30-50mm away from a door frame.

3.7 Relay Output Connection

C3-100 has two relays (one used as a control lock by default, and the other used as an auxiliary output); C3-200 has four relays (two used as control locks by default, and the other two used as auxiliary outputs); C3-400 has eight relays (four used as control locks by default, and the other four used as auxiliary outputs).

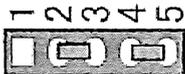
The relays for auxiliary outputs may be connected to monitors, alarms, door bells, etc. Auxiliary outputs are set through relevant access control software. For details, please see *ZKAccess4.0 User Manual*.

A lock relay can be connected in the dry and wet modes, while an auxiliary output relay cannot. The following illustrates relay output connection with an example of door connection.

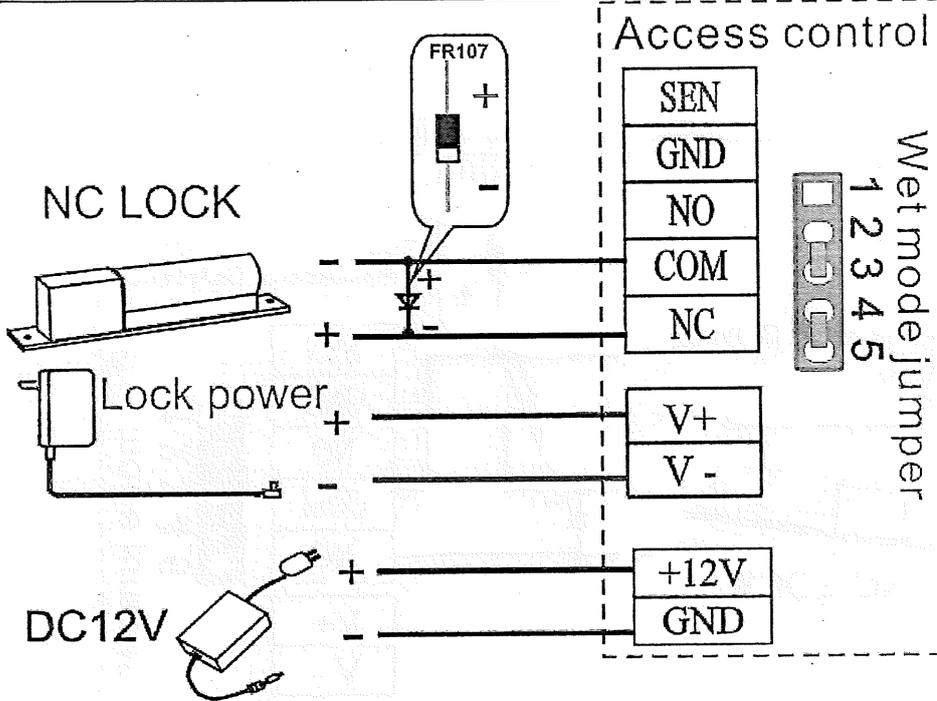
1. An access control operator panel provides multiple electronic lock outputs. The COM and NO terminals are applicable to the locks that are unlocked when power is connected and locked when power is disconnected. The COM and NC terminals are applicable to the locks that are locked when power is connected and unlocked when power is disconnected.
2. By setting the jumper terminal beside the lock relay, you can select the device power supply or lock power supply for the lock (that is, the wet mode or dry mode). We recommend to use the wet mode for your convenience of connection.
 Dry mode jumper setting: short 1-2 and 3-4, , and the device power supply will be used for the relay output.



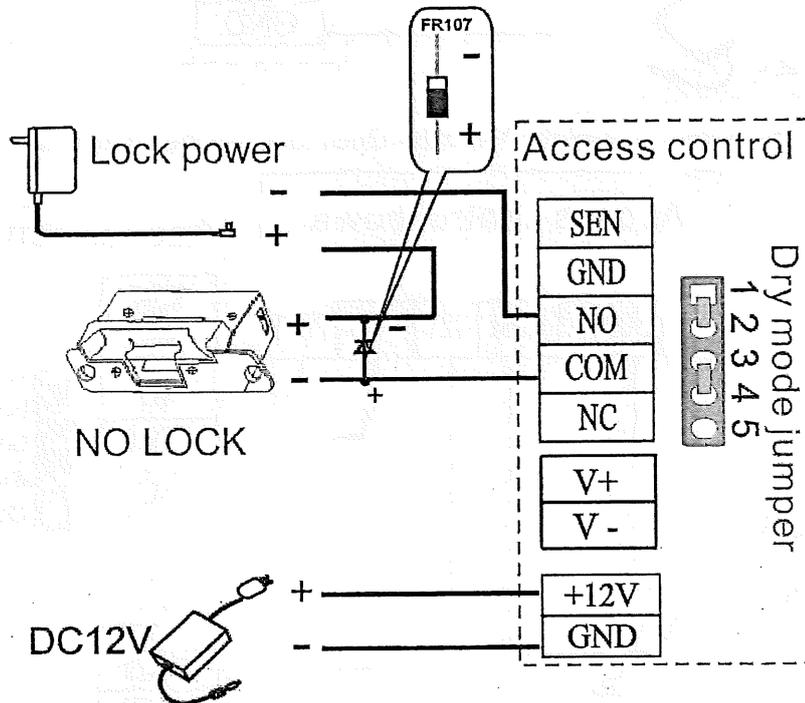
Wet mode jumper setting: short 2-3 and 4-5, and the lock power supply will be used for the relay output.



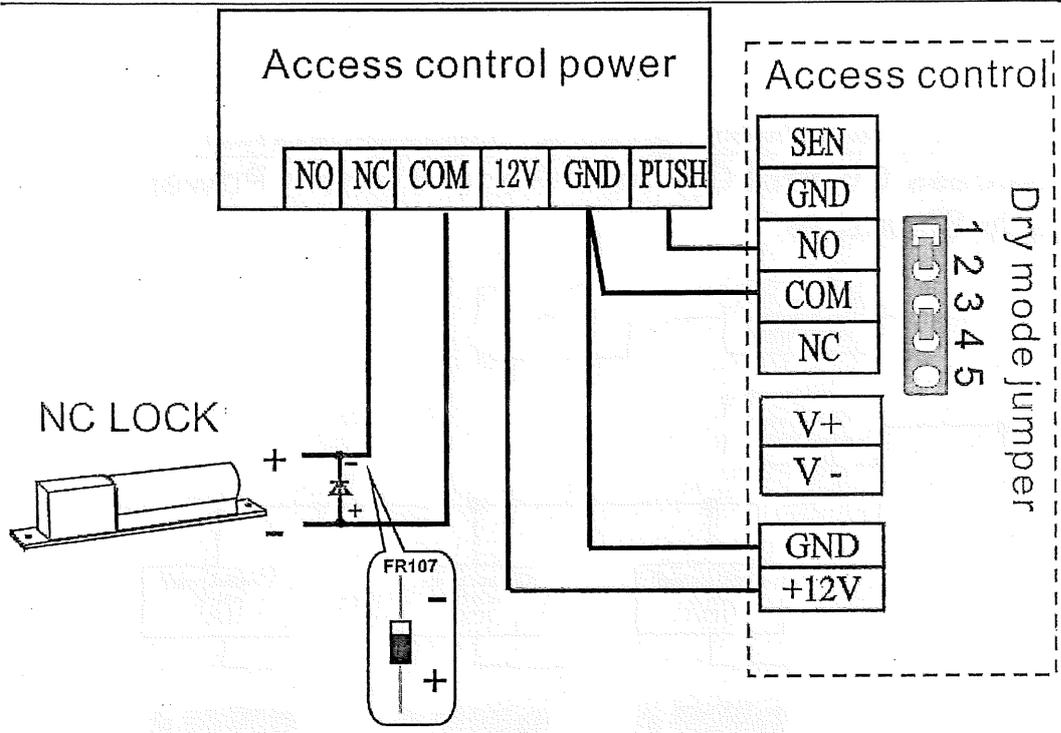
 **Note:** The factory default jumping is set as dry mode.



3. Dry mode: External power supply for NO Lock



4. Dry mode: External power supply for NC Lock



An access control operator panel is powered by +12V DC. Generally, to reduce power interference between control panels, each control operator panel should be powered separately. When high reliability is required, control panels and electronic locks should be powered respectively.

To prevent power failure of a control operator panel from making the whole system unable to work normally, the access control management system is usually required to have one UPS at least, and access control locks are powered externally to guarantee the access control management system can still work normally during power failure.

distribution). Metal hoses are applicable to ceiling wiring, but must be secure and good-looking.

- Shielding measures and shielding connection: If the electromagnetic interference in the wiring environment is found strong in the survey before construction, it is necessary to consider shielding protection for data cables when designing a construction scheme. Overall shielding protection is required if there is a large radioactive interference source or wiring has to be parallel with a large-current power supply on the construction site. Generally, shielding measures include: keeping a maximum distance from any interference source, and using metal wiring troughs or galvanized metal water pipes to ensure reliable grounding of the connection between the shielding layers of data cables and the metal troughs or pipes. Note that a shielding enclosure can have a shielding effect only when it is grounded reliably.
- Ground wire connection method: Reliable large-diameter ground wires in compliance with applicable national standards are needed on the wiring site, and should be connected in a tree form to avoid DC loop. These ground wires must be kept far away from lightning fields. No lightning conductor can serve as a ground wire, and ensure there is no lightning current through any ground wire when there is lightning. Metal wiring troughs and pipes must be connected continuously and reliably, and linked to ground wires through large-diameter wires. The impedance of this section of wire cannot exceed 2ohm. The shielding layer also must be connected reliably, and grounded at one end to guarantee uniform current direction. The ground wire of the shielding layer must be connected through a large-diameter (not smaller than 2.5mm²) wire.

2. A single 485 bus can be connected with 63 access control operator panels at most, but preferably should be connected with less than 32.
3. To eliminate signal attenuation in communication cables and suppress interference, if the bus is longer than 300 meters, one 120ohm resistance is usually inserted between the first and last access control operator panels on the RS485 bus.
4. For this access control operator panel, putting place 8 of the DIP switch to the ON position is equivalent to parallel connection of one 120ohm resistance between the 485+ and 485- lines.

As shown in the figure below, put place 8 of the DIP switches of the first and last control operator panels to the ON position.

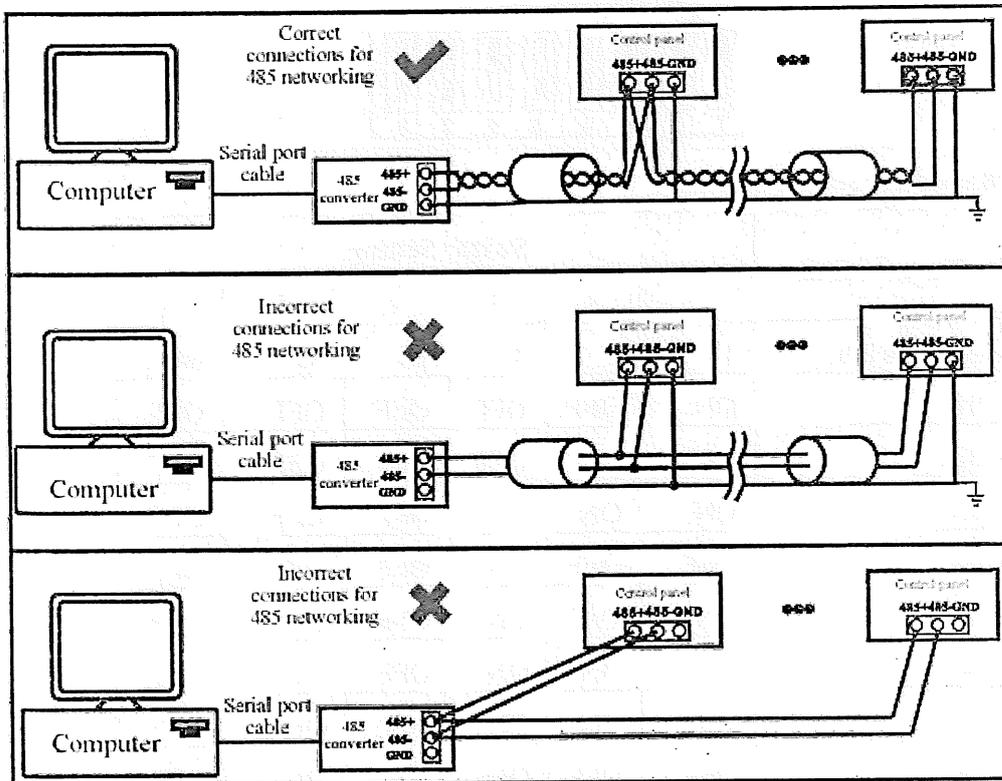


Figure 4-2 RS485 Communication System Networking

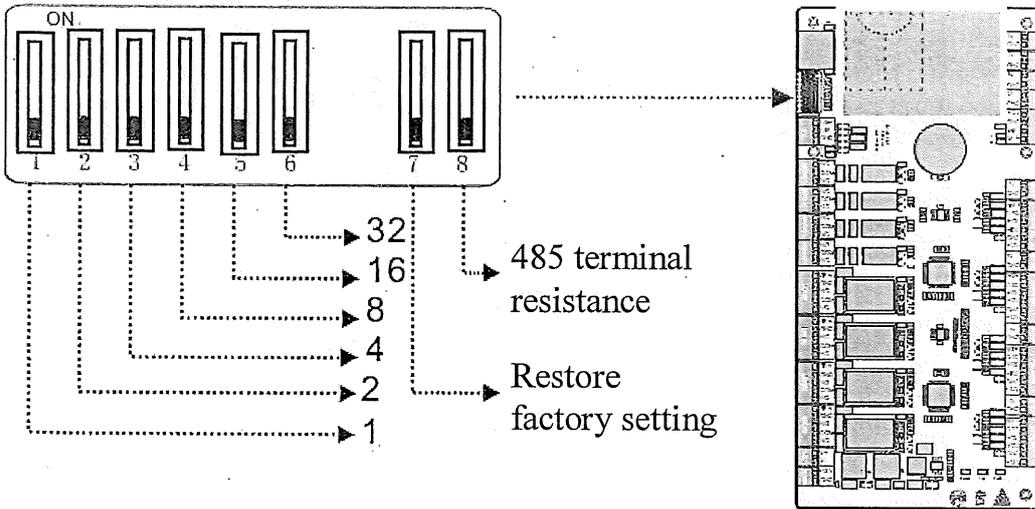
Instructions for Installation and Use of the C3-100/200/400 Control Panel

| Place Address | Switch Setting | | | | | |
|---------------|----------------|-----|-----|-----|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 13 | ON | OFF | ON | ON | OFF | OFF |
| 14 | OFF | ON | ON | ON | OFF | OFF |
| 15 | ON | ON | ON | ON | OFF | OFF |
| 16 | OFF | OFF | OFF | OFF | ON | OFF |
| 17 | ON | OFF | OFF | OFF | ON | OFF |
| 18 | OFF | ON | OFF | OFF | ON | OFF |
| 19 | ON | ON | OFF | OFF | ON | OFF |
| 20 | OFF | OFF | ON | OFF | ON | OFF |
| 21 | ON | OFF | ON | OFF | ON | OFF |
| 22 | OFF | ON | ON | OFF | ON | OFF |
| 23 | ON | ON | ON | OFF | ON | OFF |
| 24 | OFF | OFF | OFF | ON | ON | OFF |
| 25 | ON | OFF | OFF | ON | ON | OFF |
| 26 | OFF | ON | OFF | ON | ON | OFF |
| 27 | ON | ON | OFF | ON | ON | OFF |
| 28 | OFF | OFF | ON | ON | ON | OFF |
| 29 | ON | OFF | ON | ON | ON | OFF |
| 30 | OFF | ON | ON | ON | ON | OFF |
| 31 | ON | ON | ON | ON | ON | OFF |
| 32 | OFF | OFF | OFF | OFF | OFF | ON |
| 33 | ON | OFF | OFF | OFF | OFF | ON |
| 34 | OFF | ON | OFF | OFF | OFF | ON |
| 35 | ON | ON | OFF | OFF | OFF | ON |
| 36 | OFF | OFF | ON | OFF | OFF | ON |
| 37 | ON | OFF | ON | OFF | OFF | ON |
| 38 | OFF | ON | ON | OFF | OFF | ON |
| 39 | ON | ON | ON | OFF | OFF | ON |

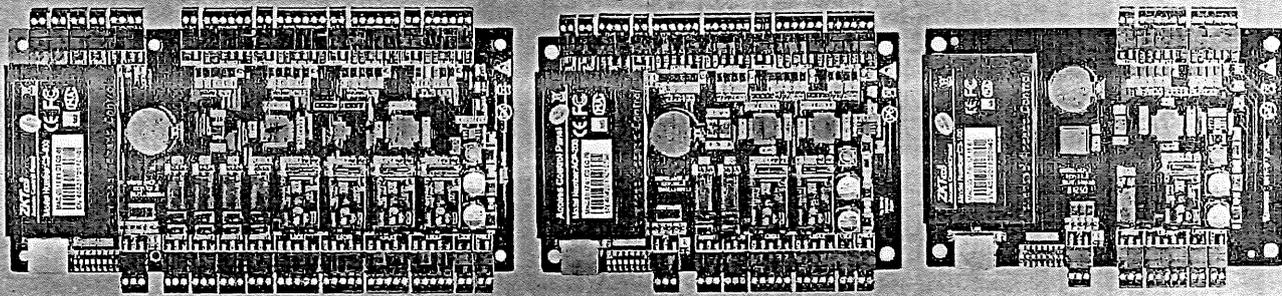
upwards and downwards for three times within 10 seconds and finally returned to the **OFF** position, the factory settings will be restored after the access control operator panel is restarted.

● **Terminal resistance setting**

Place 8 is for setting the RS485 termination resistance. Putting the switch to the **ON** position is equivalent to parallel connection of a 120ohm termination resistance between 485+ and 485-.



C3-series IP-based Door Access Control Panel



C3-400

C3-200

C3-100



Choice of Readers

Support full range of card readers. ZK KR-Series readers are stylish and waterproof. C3 supports any wiegand-output reader, including HID Prox, iClass, and XceedID Multi-Technology.



Communication

C3 controllers can be installed easily on your network and support both TCP/IP and RS-485 communications. Auto-discovery tool allows setting and modification of network parameters directly and easily.



Lowest Total Cost of Ownership

Save cost. C3 controller firmwares can be upgraded without any advanced tools. New features can extend and expand the value of your investment.



Capacity

Support up to 30,000 badge users and store up to 100,000 events and transactions. Data is preserved if power is lost. Controller continues to operate if network connection is interrupted.



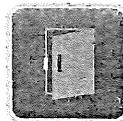
More than Door Control

Access additional control and interface. After programming, auxiliary relays can be functioned as lights, alarms and intrusion detection panels. Extra locking devices or gate controllers can be accessed.



Options

C3 controllers come in 3 sizes to suit project needs and reduce the cost of unused capacity. 1-door, 2-door, and 4-door models can be mixed and matched in an optimized system architecture, devices or gate controllers.



Built-In Advanced Access Control

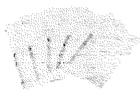
Anti-Passback, First-Card Opening, Multi-Card Opening, Duress Password Entry, and Auxiliary Input/ Output linkages are built into controller firmware.



For Software Developer:

SDK is available for integrators and OEM's to integrate the C3 controller with their or existing security or personnel management applications. Upon request, ZK can customize C3 firmware to meet any customer requirements.

Optional Accessories



Prox Card



Key Fob



CR20E/M



RFID Reader



Exit Button



Power Supply



Electric Lock



RS232 485

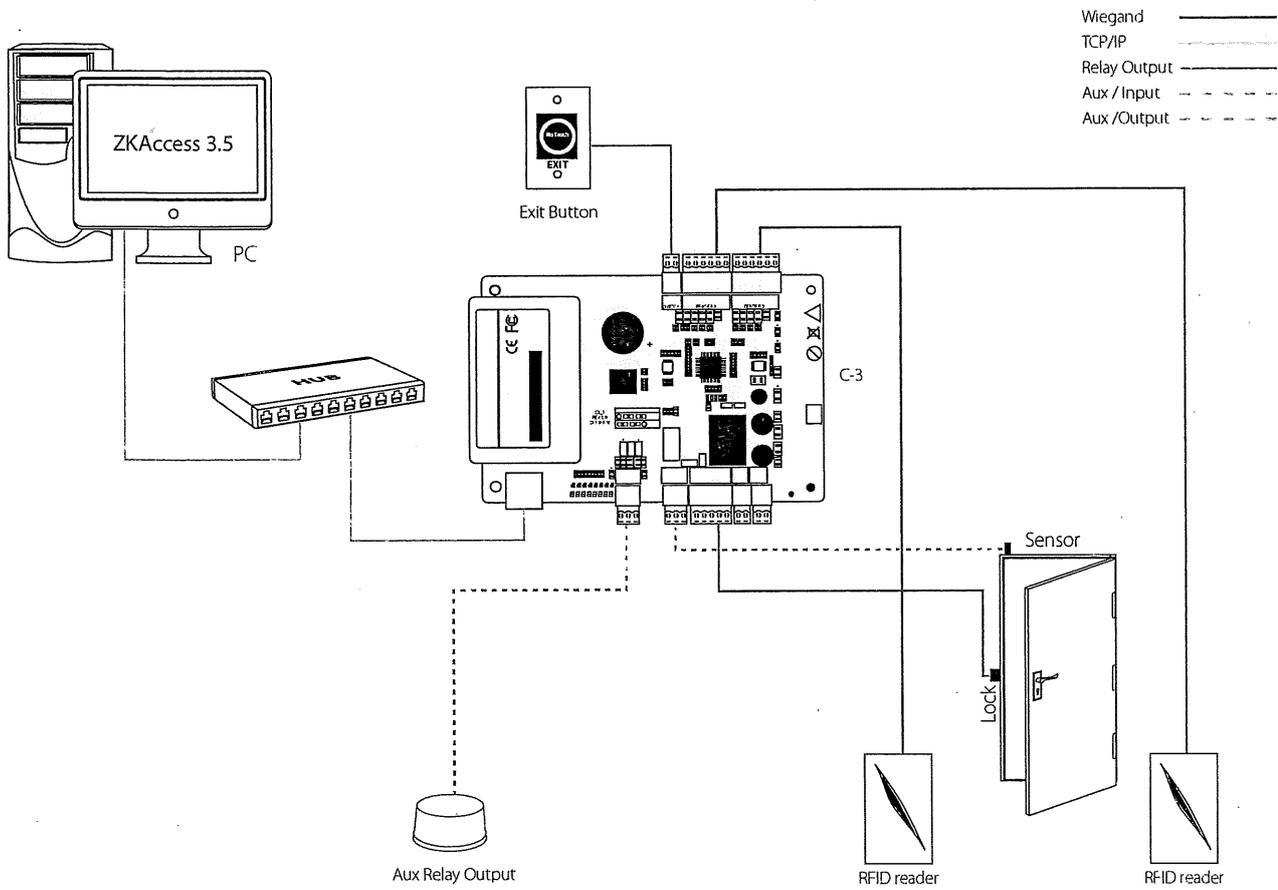


Alarm

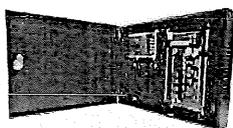


Sensor

Typical Installation



C3-100/200/400
Package B



| Item | Description | Quantity |
|----------------|---|----------|
| C3-100/200/400 | Control Panel | 1 ea |
| Case01 | Metal Case | 1 ea |
| ZKPSM030B | Power Supply, DC12V/3A, Available to Charge for BAttery Back-Up | 1 ea |
| FR107 | Diode for Lock | 1 ea |
| Key | Key for Metal Case | 2 ea |
| ZKAccess CD | Access Software for Control Panel, User Manual | 1 ea |
| Gross Weight | 3.35-3.55kg | |
| Dimensions | 345(L)×70(H)×280(W)mm | |

Specifications

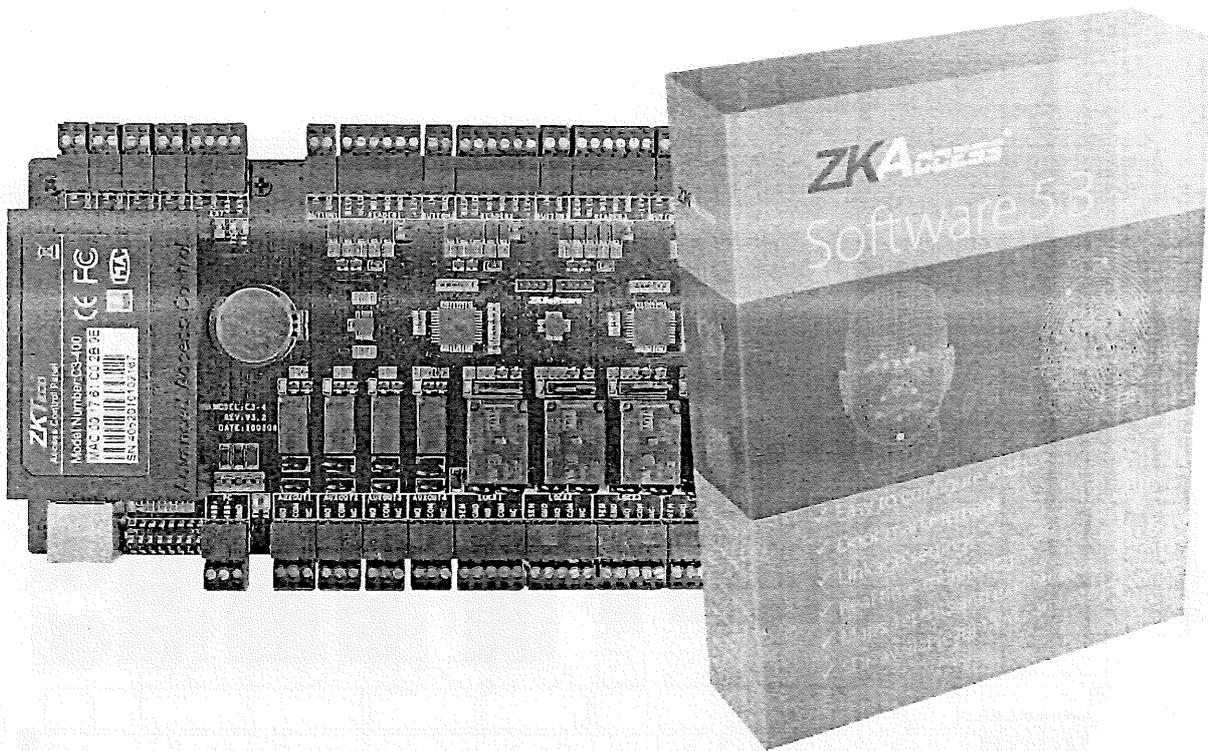
| | C3-100 | C3-200 | C3-400 |
|-----------------------------|---|---|---|
| Number of Doors Controlled | 1 Door | 2 Door | 4 Door |
| Number of Readers Supported | 2 | 4 | 4 |
| Types of Readers Supported | 26-bit Wiegand, others upon request | 26-bit Wiegand, others upon request | 26-bit Wiegand, others upon request |
| Number of Inputs | 2 (Exit Device and Door Status, AUX) | 6 (2 Exit Device, 2 Door Status, 2 AUX) | 12 (4 Exit Device, 4 Door Status, 4 AUX) |
| Number of Outputs | 2 (1-From C Relay for Lock and 1-Form C Relay for Aux Output) | 4 (2-From C Relay for Lock and 2-Form C Relay for Aux Output) | 8 (4-Form C Relay for Lock and 4-Form C Relay for Aux Output) |
| Card Holders Capacity | 30,000 | 30,000 | 30,000 |
| Log Events Capacity | 100,000 | 100,000 | 100,000 |
| Weight | 7.4lbs (3.35kg) | 7.5lbs (3.4kg) | 7.8lbs (3.55kg) |
| Communication | TCP/IP and RS-485 | TCP/IP and RS-485 | TCP/IP and RS-485 |
| Enclosure | Powder Coated Aluminium | Powder Coated Aluminium | Powder Coated Aluminium |
| Mounting | Wall Mount | Wall Mount | Wall Mount |
| Recommended Power Supply | 12V DC, 1.5A | 12V DC, 1.5A | 12V DC, 1.5A |
| Dimensions (Bundle Only) | 15in.×3.15in.×11in. 380mm(L) X 80mm(W) X 280mm(H) | 15in.×3.15in.×11in. 380mm(L)×80mm(W)×280mm(H) | 15in.×3.15in.×11in. 380mm(L)×80mm(W)×280mm(H) |
| Dimensions (Board Only) | 5.7in.×4.17in. (145mm×106mm) | 6.3in.×4.17in. (160mm×106mm) | 8.58in.×4.17in. (218mm×106mm) |

ZKTeco Europe,
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28108 Alcobendas. Madrid, SPAIN
Tel: +34 916 532 891 E-mail: sales@zkteco.eu
www.zkteco.eu

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Installation Guide



C3-Series Access Control Panels

&

ZKAccess 5.3 software

ZKAccess[®]

ZKTecousa.com

| | |
|--|----|
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ZKAccess 5.3 software

Installation and Setup starts at page 28

The following precautions are to keep user's safe and prevent any damage.
Please read carefully before installation



Do not install the device in a place subject to direct sun light, humidity, dust or soot



Do not place a magnet near the product. Magnetic objects such as magnet, CRT, TV, monitor or speaker may damage the device.



Do not place the device next to heating equipment



Be careful not to let liquid like water, drinks or chemicals leak inside the device.



Do not let children touch the device without supervision



Do not drop or damage the device



Do not disassemble, repair or alter the device.



Do not use the device for any other purpose than specified.



Clean the device often to remove dust on it. In cleaning, do not splash water on the device but wipe it out with smooth cloth or towel.

Contact your supplier in case of a problem.

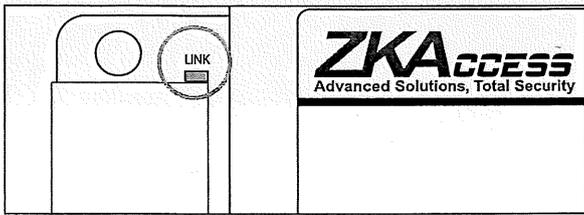


Figure 2

LINK Solid Green LED indicates TCP/IP communication is normal

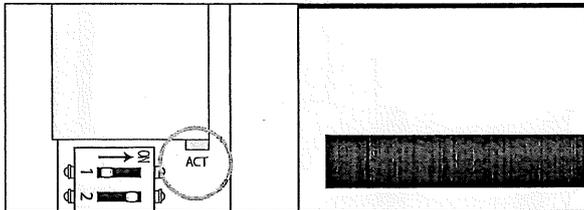


Figure 3

Flashing (ACT) Yellow LED indicates data communication is in progress

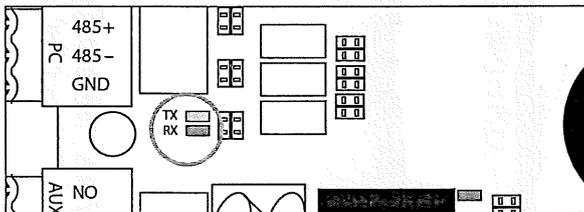


Figure 4

PC RS485 (TX/RX) Flashing Yellow & Green LED indicates communication is in progress

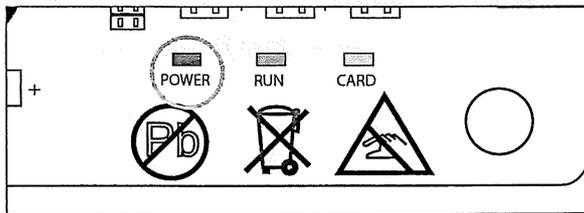


Figure 5

Flashing (POWER) Red LED indicates the panel is powered on

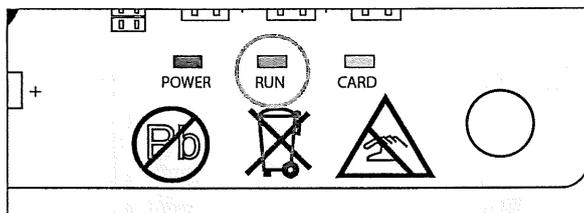


Figure 6

Flashing (RUN) Green LED indicated that panel is in normal working state

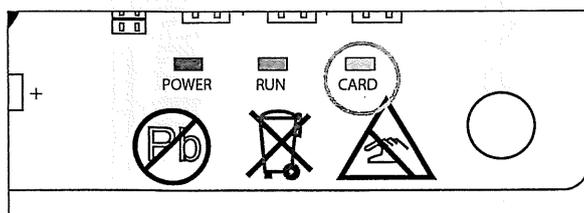


Figure 7

Flashing (CARD) Yellow LED indicates that the card is read by the panel

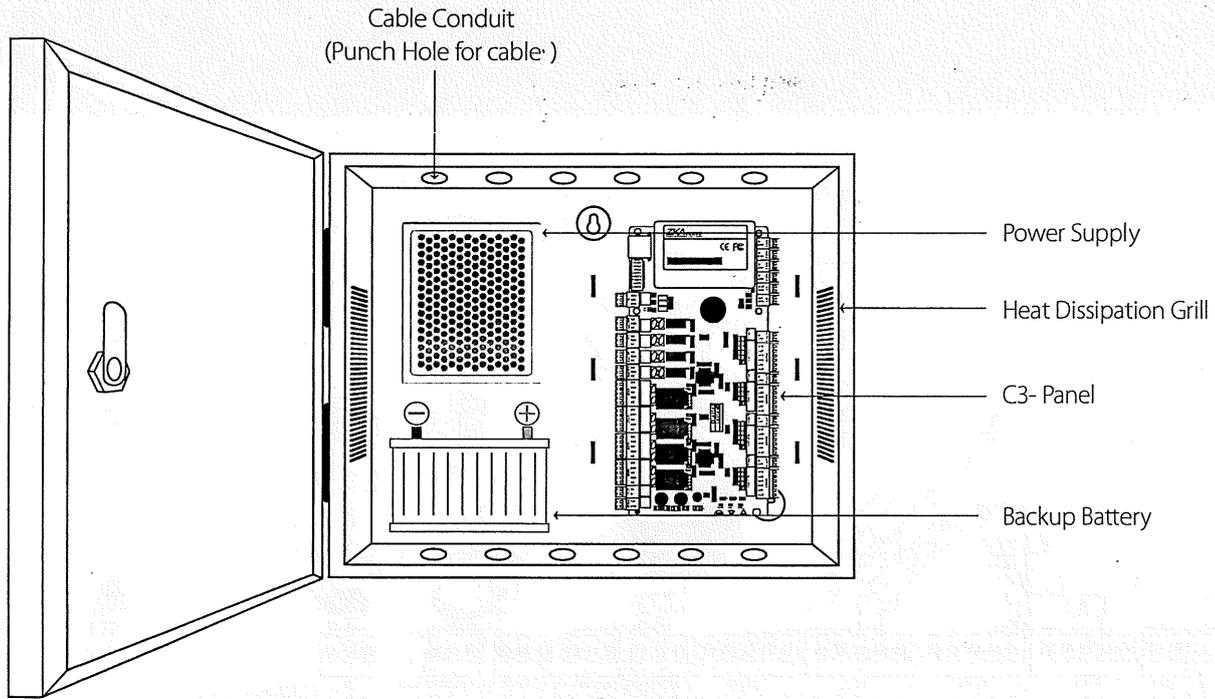


Figure 10

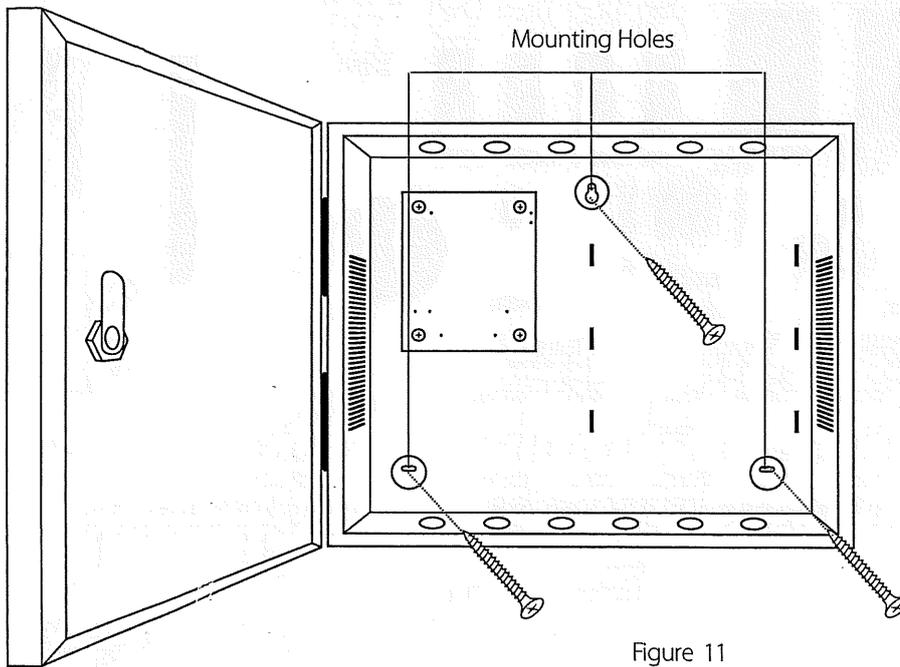


Figure 11

We recommend drilling the mounting plate screws into solid wood (i.e. stud/beam). If a stud/beam cannot be found, then use the supplied drywall plastic mollies (anchors).

Without Backup Battery

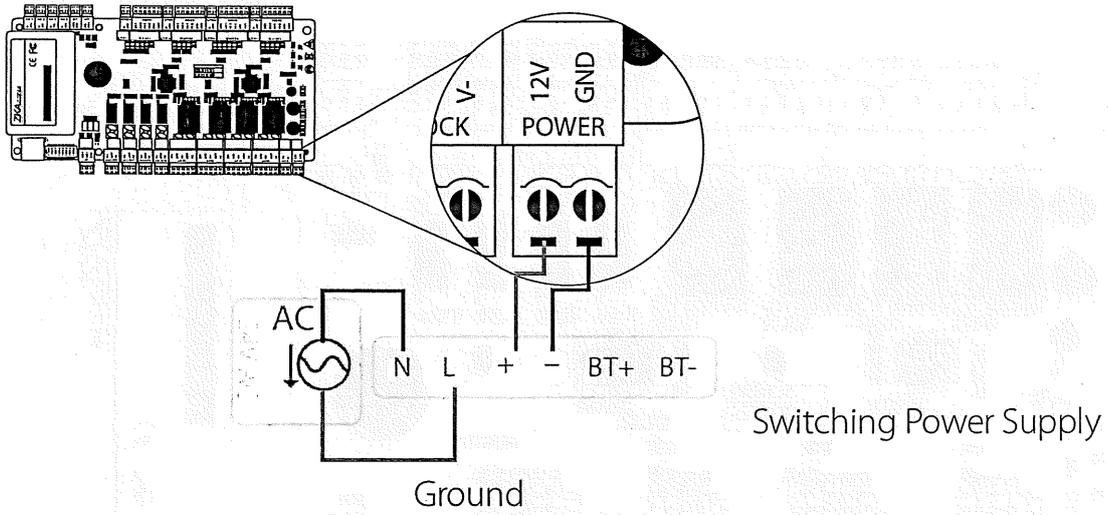


Figure 13

With Backup Battery

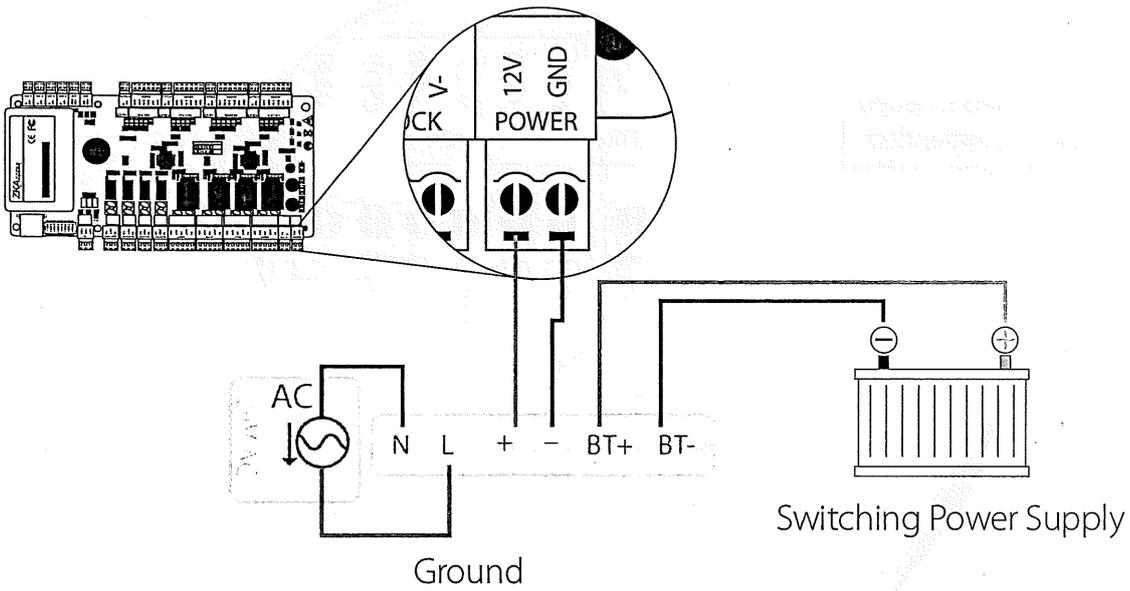


Figure 14

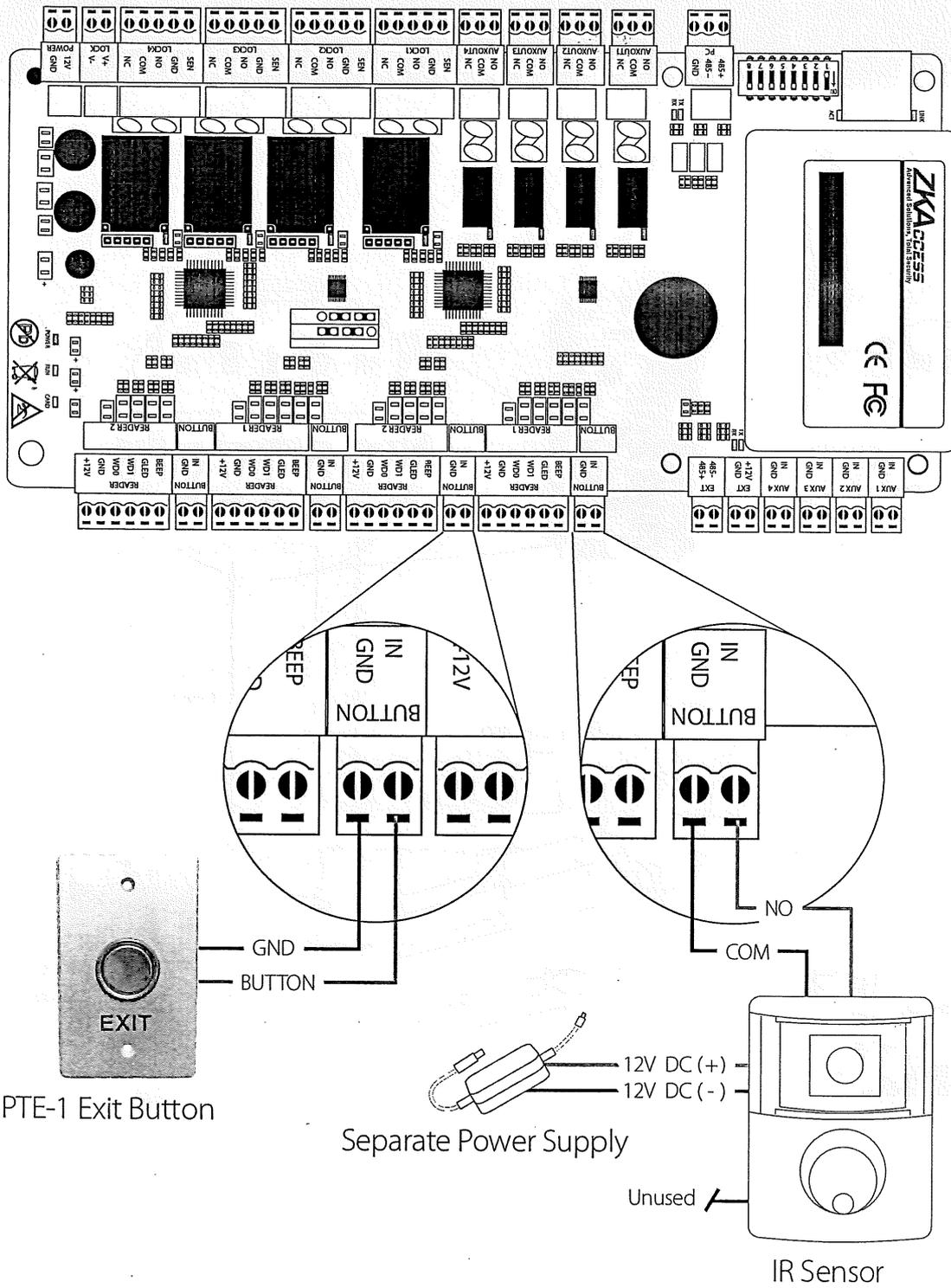
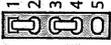
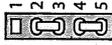


Figure 16

Switching from Dry Contact to Wet Contact

Important Notes:

C3-Panels are set to supply lock power by default from the lock power terminal. If you want to connect the lock directly to the power supply, you must take the following steps: Select the appropriate lock relay and find its jumpers

1. Take off the jumpers and change  to 
2. Connect the lock as show in the diagram, (see figure 18)

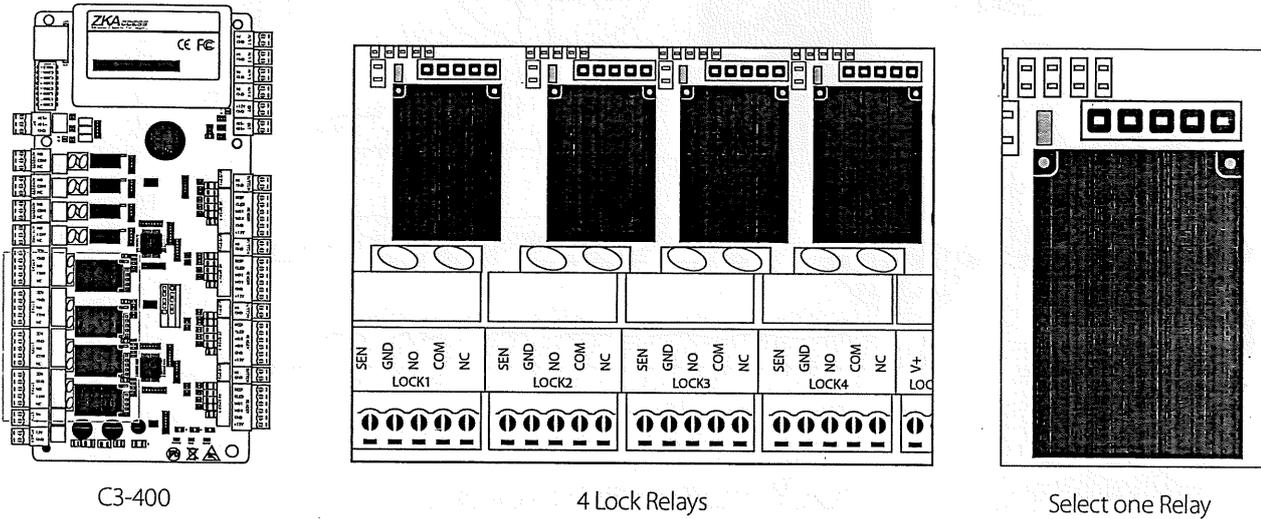


Figure 19

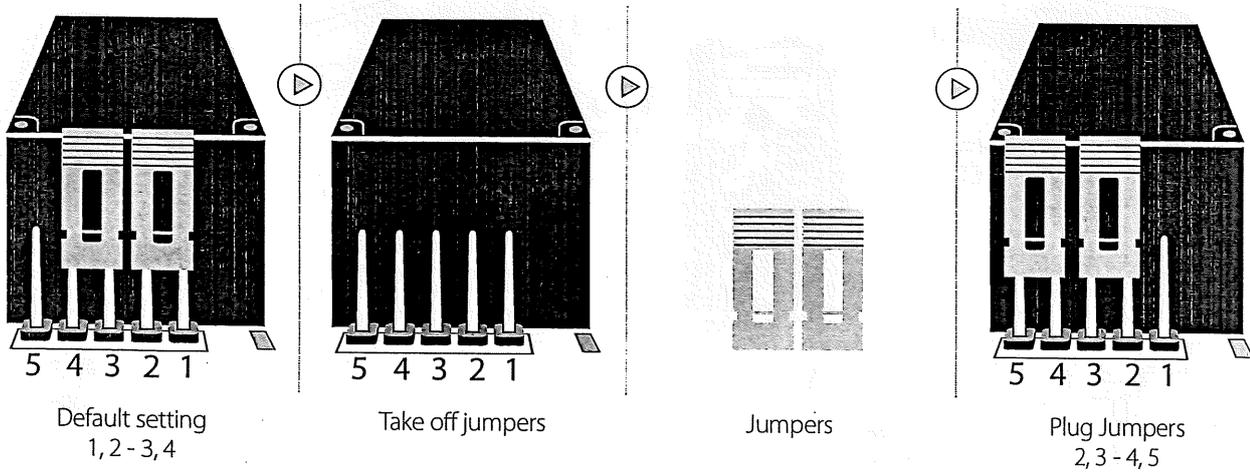


Figure 20



TRANSFOCURE

TRANSFORMER MANAGEMENT SYSTEM

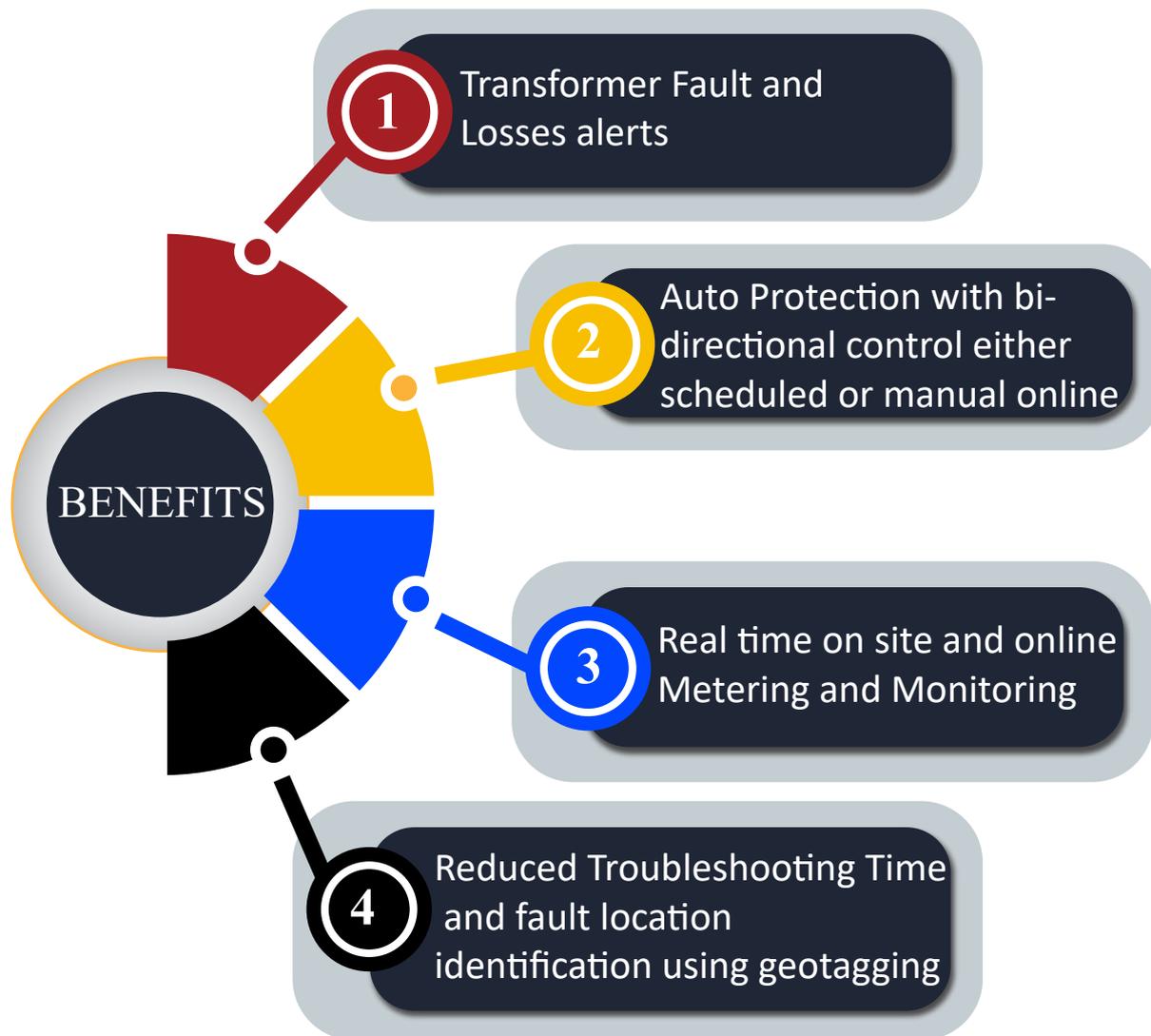


Company of Intelligent Systems and Network Research

ABOUT

Transfocure manages the performance parameters of Transformer by monitoring its Electrical consumption, Currents (I), Voltages (V), KVA, PF (Power Factors), KWH (Units Consumption). Transfocure alerts the concerned personnel to deal with the Transformer abnormalities/anomalies.

This system comprises of Hardware, Software, Firmware, Website and Mobile Application with an onsite energy analyzer. It provides a holistic view of the overall Transformer, its health and performance in real-time.



FEATURES

24/7 Monitoring
V, I, PF, KVA,
KVAR, KWh
Load Profiles

1

Metering
On Site
Online

2

Line to Neutral faults
Line to Line faults

3

PF Calculation
Over/ Under Voltage
Over/Under Current

4

Transformer
Fault Detection
and Reporting

5

Built in GPRS for
Secure and Fast
Communication

6

Imbalance identification
Losses Identification
Theft Alerts

7

Customized Meter
Reading i.e. Daily,
Weekly, Monthly

8

Auto Protection
Schedule Switching
Manual Online
Control

9

Fault and abnormalities
alerts to Authorities
and Consumers

10

Efficient Asset
Management and
Control

11

Localization of
faults using
geotagging

12

STANDARDS

IEC-60529
IP CODE
PROTECTION
IP 54

IEC-60387
Marking of Meter
IEC-60721-3-3
Temp Range

IEC-62053-21
Static Meter for
Active Energy
ISO-75-2

IEC-60038
Voltage Limit
IEC-60044-1
Current Limit

Advance FEATURES

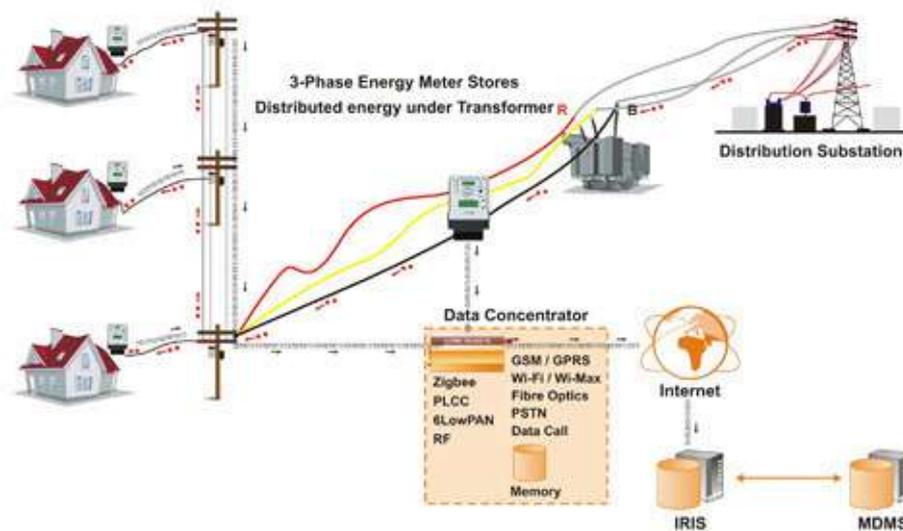
- ★ Web-based, wireless capable - No dedicated computers or software required.
- ★ Complete Infrastructure on a computer/mobile Screen
- ★ Secure web-portal requiring user name and password.
- ★ Battery Backup keeps system up during power outages.
- ★ Auto and Scheduled control for remote starting/stopping or turning devices On/Off.
- ★ Continuous diagnostics, 24 hours a day, 7 days a week.
- ★ Immediate alerts and alarms for faults, losses and theft
- ★ Daily status updates of each site by email and/or text.
- ★ Active geomapping feature shows location and current status of all sites on one map.
- ★ Log is maintained on website for all events and alarms with date and time stamped and alarms, date and time stamped.
- ★ Web-based configuration and description for each alarm/event.
- ★ Alarms/alerts sent by text message to pagers, cell phones and email.
- ★ Records all events in an event statistics logs.
- ★ Intime and preliminarily information of faults to catch problems before equipment damage.
- ★ Advance auto protection to restrain faults to specific transformers risk of unscheduled outages.
- ★ Lower maintenance costs due to condition-oriented maintenance.
- ★ Optimization of maintenance intervals and maintenance measures as well as operating services life of monitored components.

Field Installation

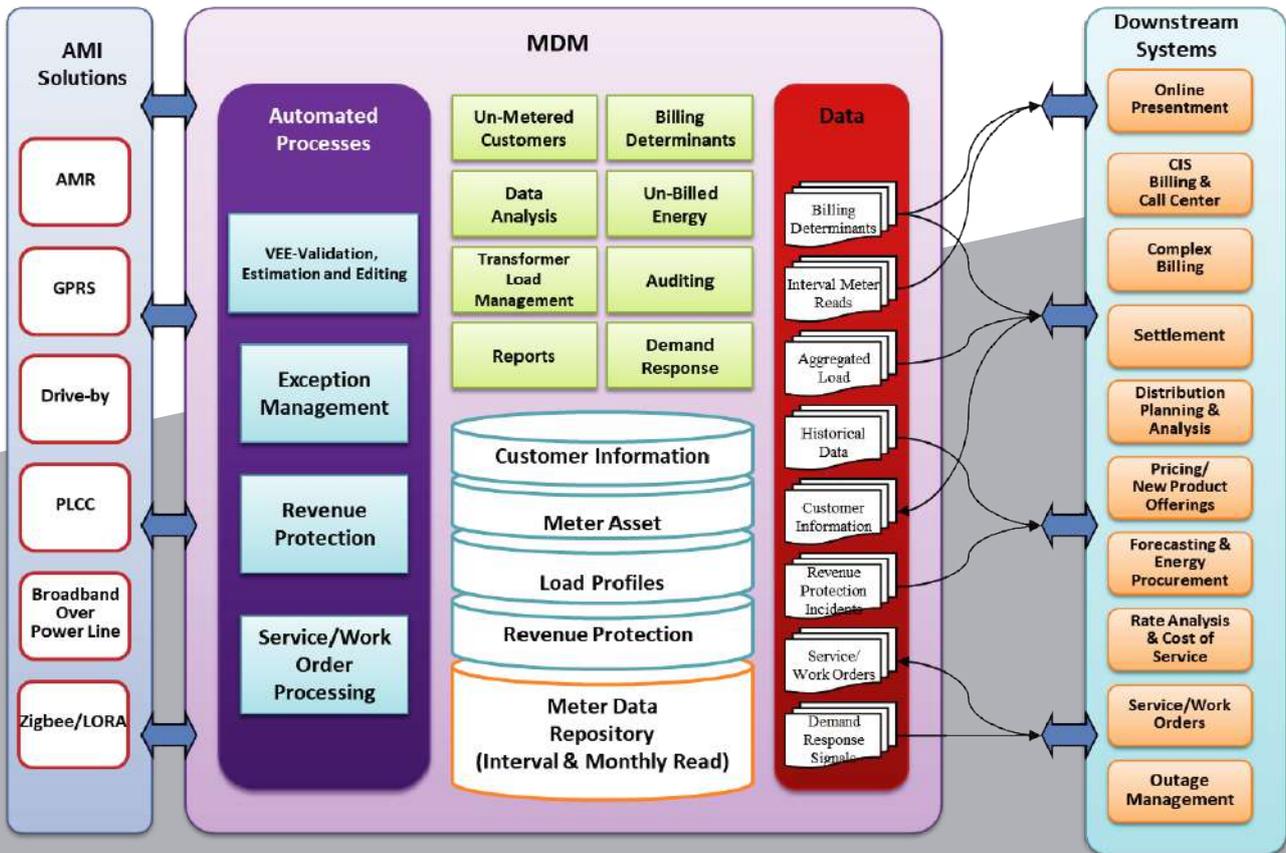


HOW IT WORKS?

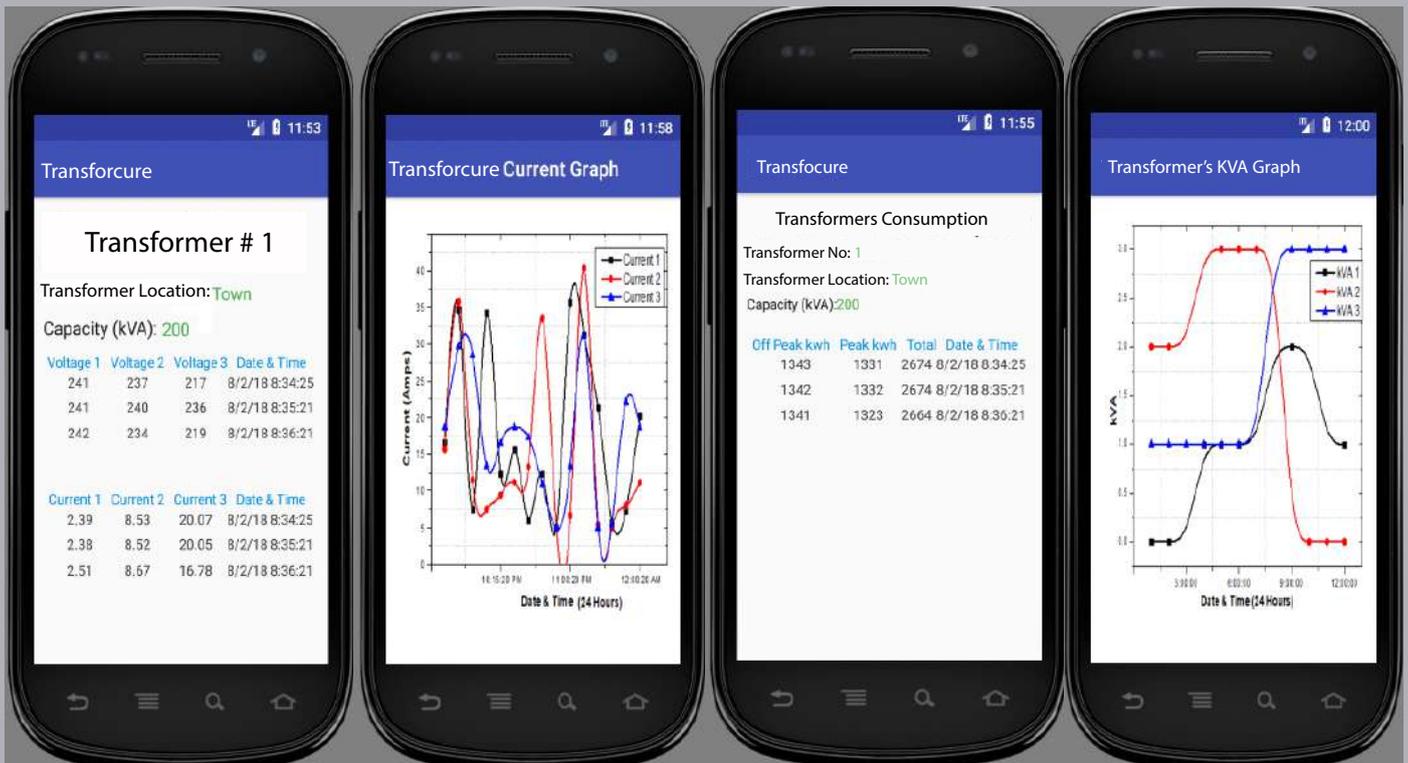
TRANSFOCURE WORKING



TRANSFOCURE DATA MANAGEMENT

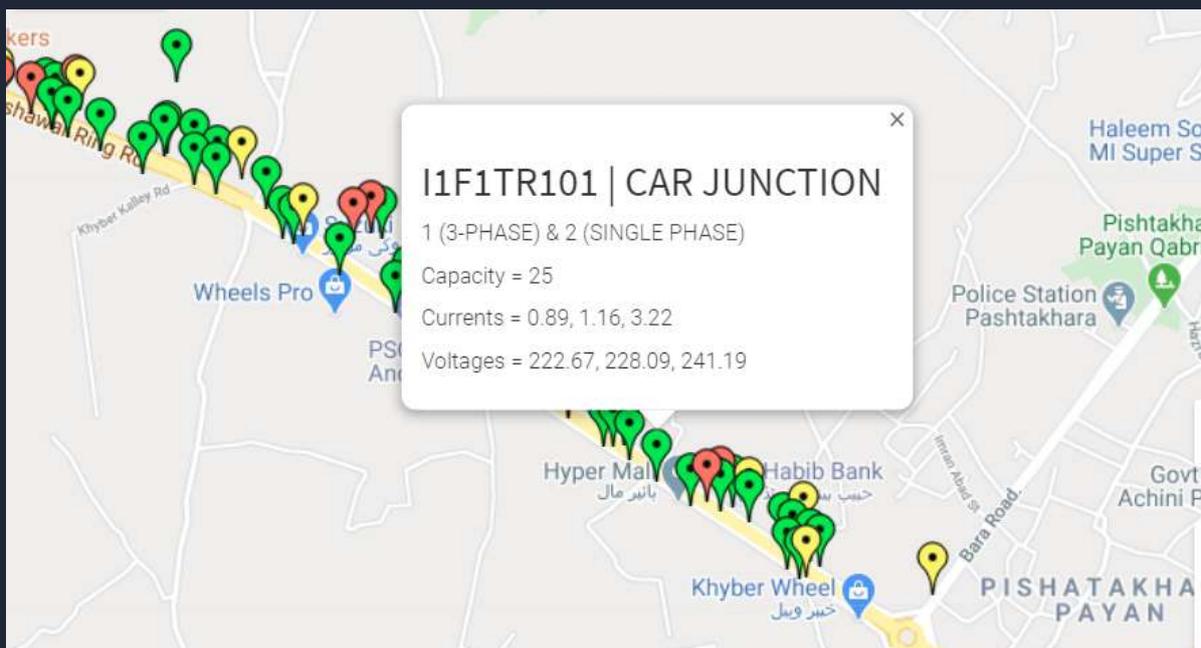
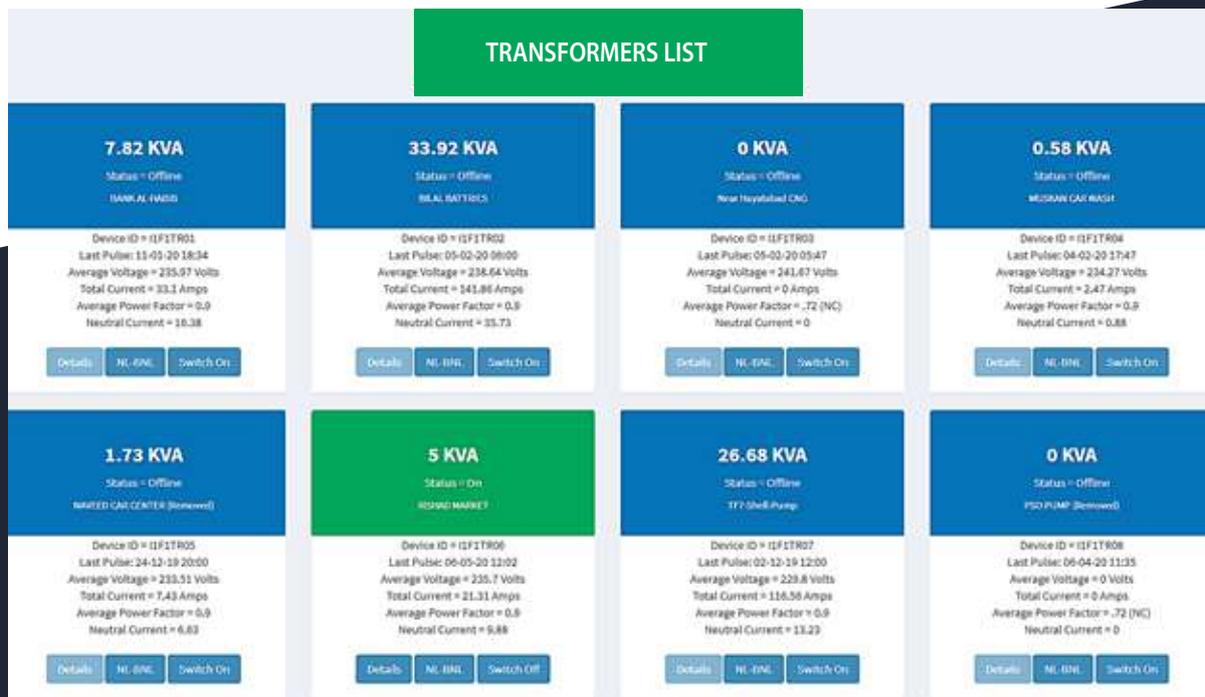


Mobile Application



WEB PORTAL

Transformers Management System, Web Portal is designed to facilitate the end user by showing the Real Time Data of all Electrical Parameters on individual Transformer & overall infrastructure.



WEBSITE DASHBOARD

Transformers » Current Logs » Distribution Boxes » Customers » Configurations »

Voltage logs PF Logs KVA Logs KVAR logs Current logs

Details found: 2306 [1 2 3 4 5 6 7 8 9 10] Next: Last Page 1 of 77 Records Per Page: 30

| Transformer | V-1 | V-2 | V-3 | PF-1 | PF-2 | PF-3 | KVA-1 | KVA-2 | KVA-3 | Total KVA | KVAR-1 | KVAR-2 | KVAR-3 | C-1 | C-2 | C-3 | Datetime |
|------------------|-----|-----|-----|------|------|------|-------|-------|-------|-----------|--------|--------|--------|-------|-------|-------|---------------------|
| Transformer # 03 | 249 | 225 | 241 | 0.64 | 0.74 | 0.71 | 14 | 4 | 6 | 24 | 11 | 2 | 4 | 67.93 | 15.68 | 26.22 | 26-08-2015 18:47:52 |
| Transformer # 03 | 249 | 225 | 241 | 0.61 | 0.74 | 0.68 | 15 | 4 | 6 | 25 | 12 | 2 | 5 | 68.66 | 15.72 | 26.35 | 26-08-2015 18:46:48 |
| Transformer # 03 | 248 | 225 | 240 | 0.63 | 0.77 | 0.66 | 15 | 4 | 6 | 25 | 11 | 2 | 5 | 68.86 | 15.68 | 26.24 | 26-08-2015 18:45:43 |
| Transformer # 03 | 247 | 224 | 239 | 0.63 | 0.78 | 0.53 | 15 | 4 | 6 | 25 | 11 | 2 | 5 | 69.08 | 15.65 | 26.11 | 26-08-2015 18:44:39 |
| Transformer # 03 | 248 | 224 | 239 | 0.66 | 0.78 | 0.73 | 13 | 3 | 6 | 22 | 9 | 2 | 4 | 60.57 | 15.53 | 26.14 | 26-08-2015 18:43:34 |

Filter by feeder and transformer

Transformers » Current Graph » Distribution Boxes » Customers » Configurations »

Transformer Clear Transformer # 02

Advanced search

Today's Transformer current graph

Current (Amps)

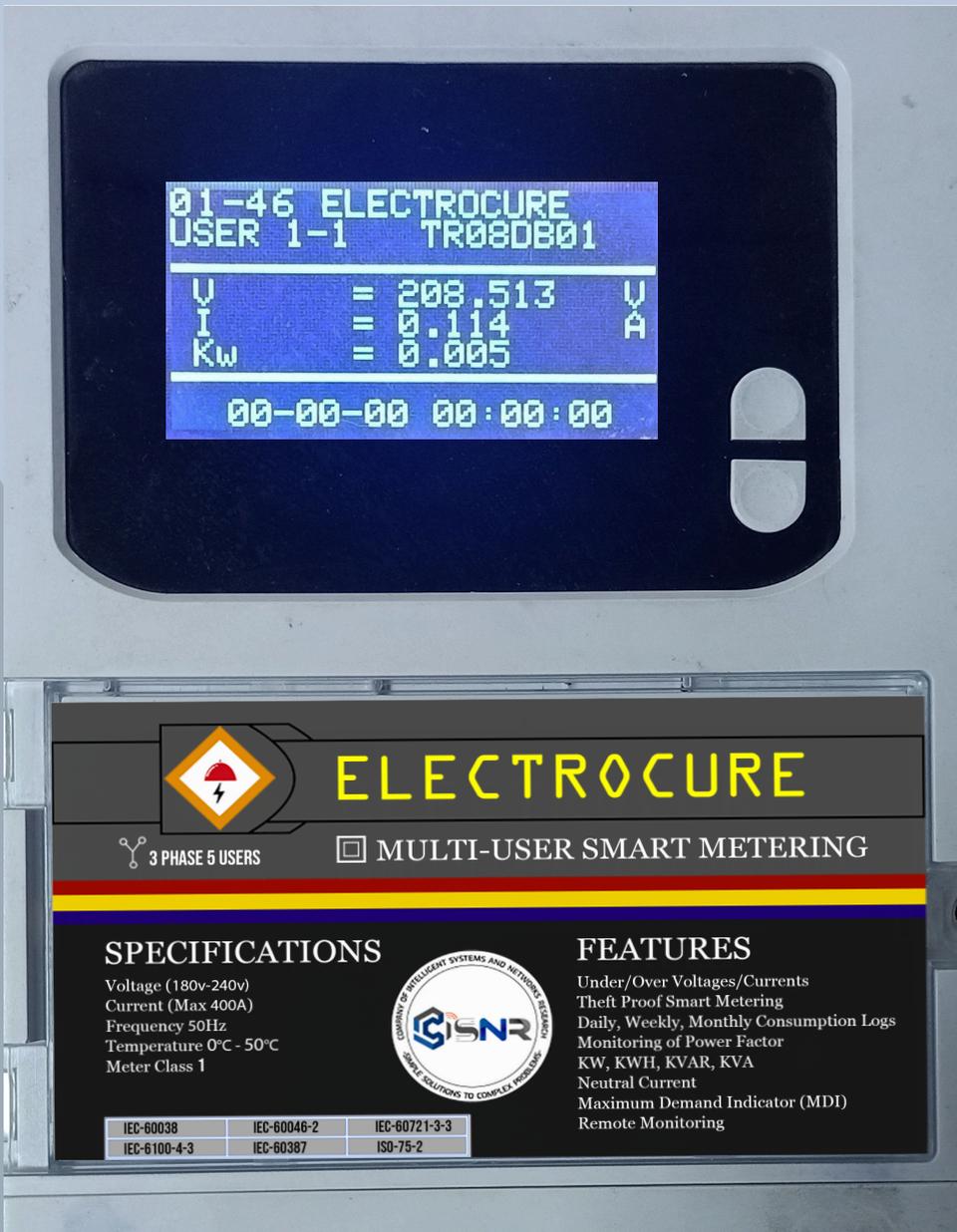
Datetime

TR Current Log Chart

- Current 3
- Current 1
- Current 2

Selected transformer

Currents (Amps) of all three phases along time (past 24 hrs)



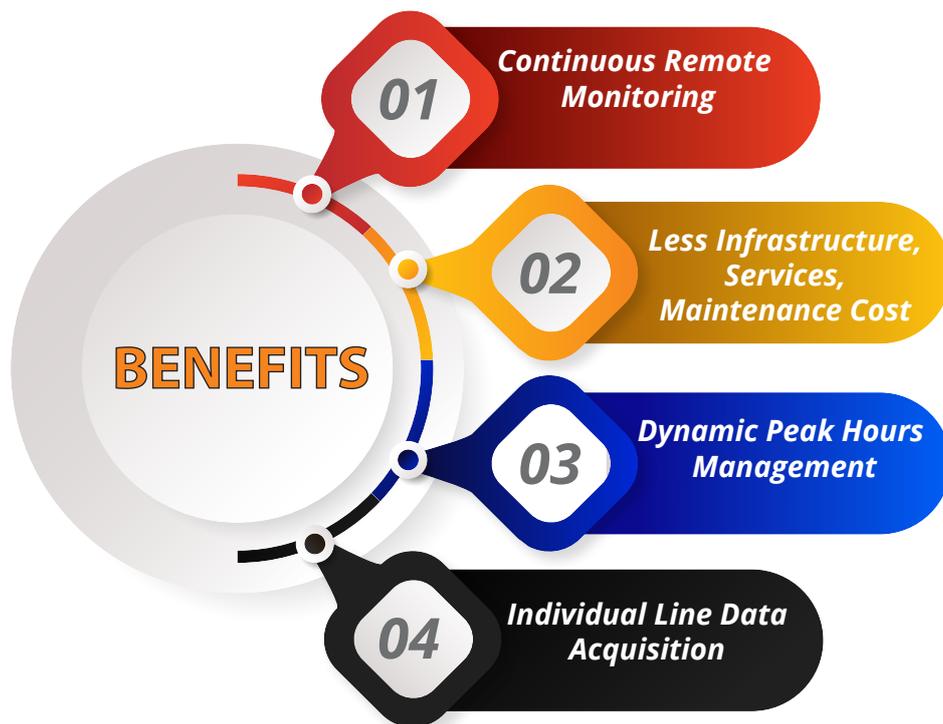
ELECTROCURE

Smart Metering Solution

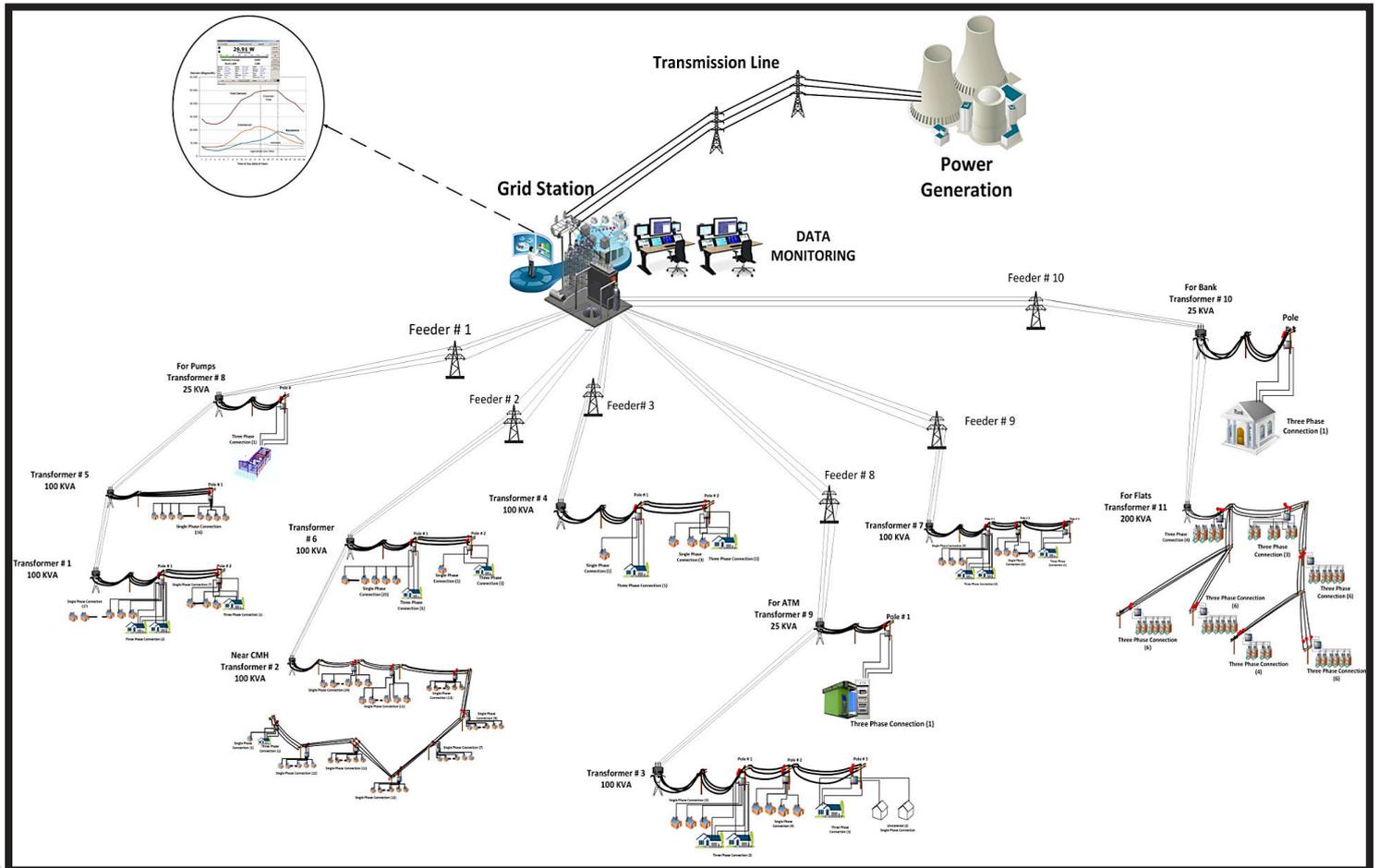
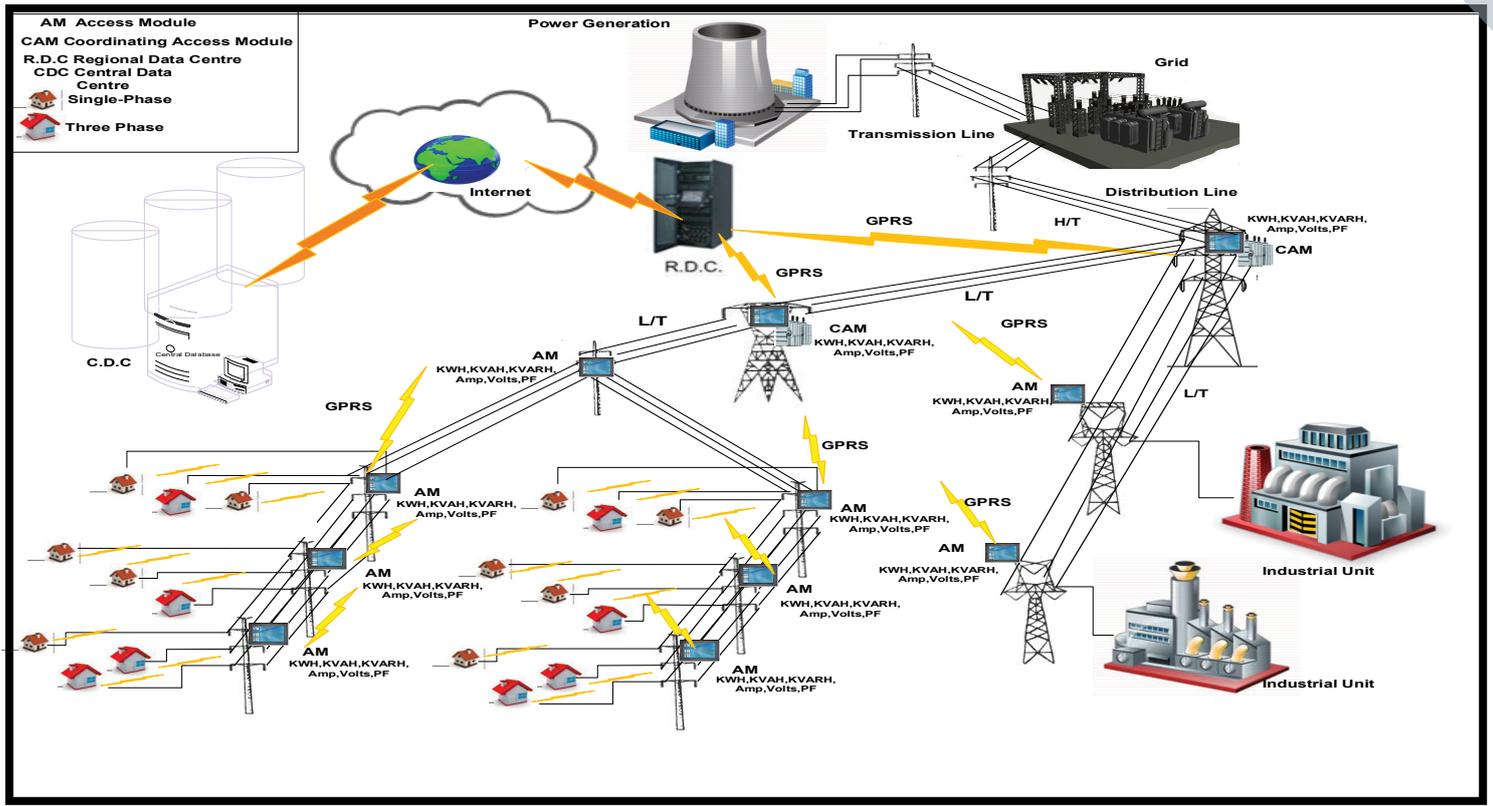
COMPANY OF INTELLIGENT SYSTEMS AND NETWORKS RESEARCH

ABOUT

Electrocure solution provides a Meter-less Smart metering architecture for data acquisition and control of the electricity distribution infrastructure, thus giving real time metering and monitoring with control from feeder, transformer to ultimately consumer level. This enables to have both pre-paid and postpaid metering with dynamic tariff ability. The system is capable of real-time electricity theft detection and isolation control reducing theft and AT & C losses to almost zero. This system also helps in reducing technical losses to minimal by identifying various administrative losses due to unbalanced loads and substandard conductors and connectivity. The system is supposed to ensure providing reliable electricity to the legitimate consumers.



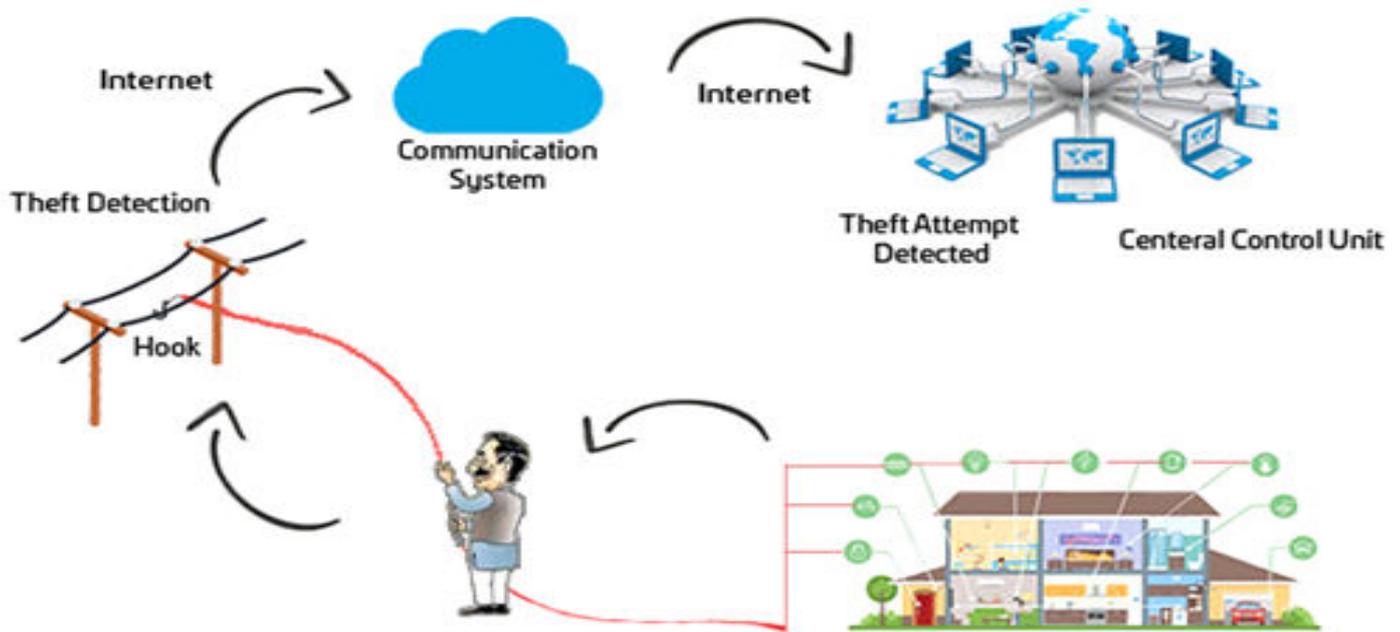
HOW IT WORKS



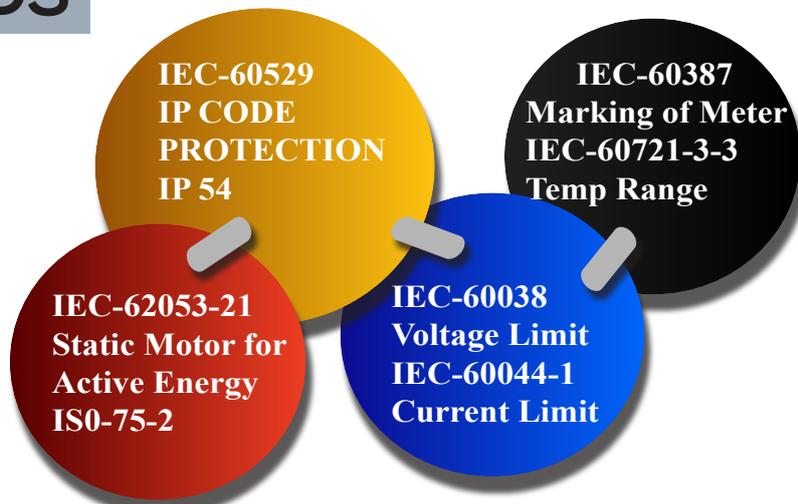
THEFT DETECTION ARCHITECTURE

ElectroCure provide a meter-less architecture for the consumer's metering and continuous surveillance of the distribution lines, thus taking care of all forms of Electricity theft including:

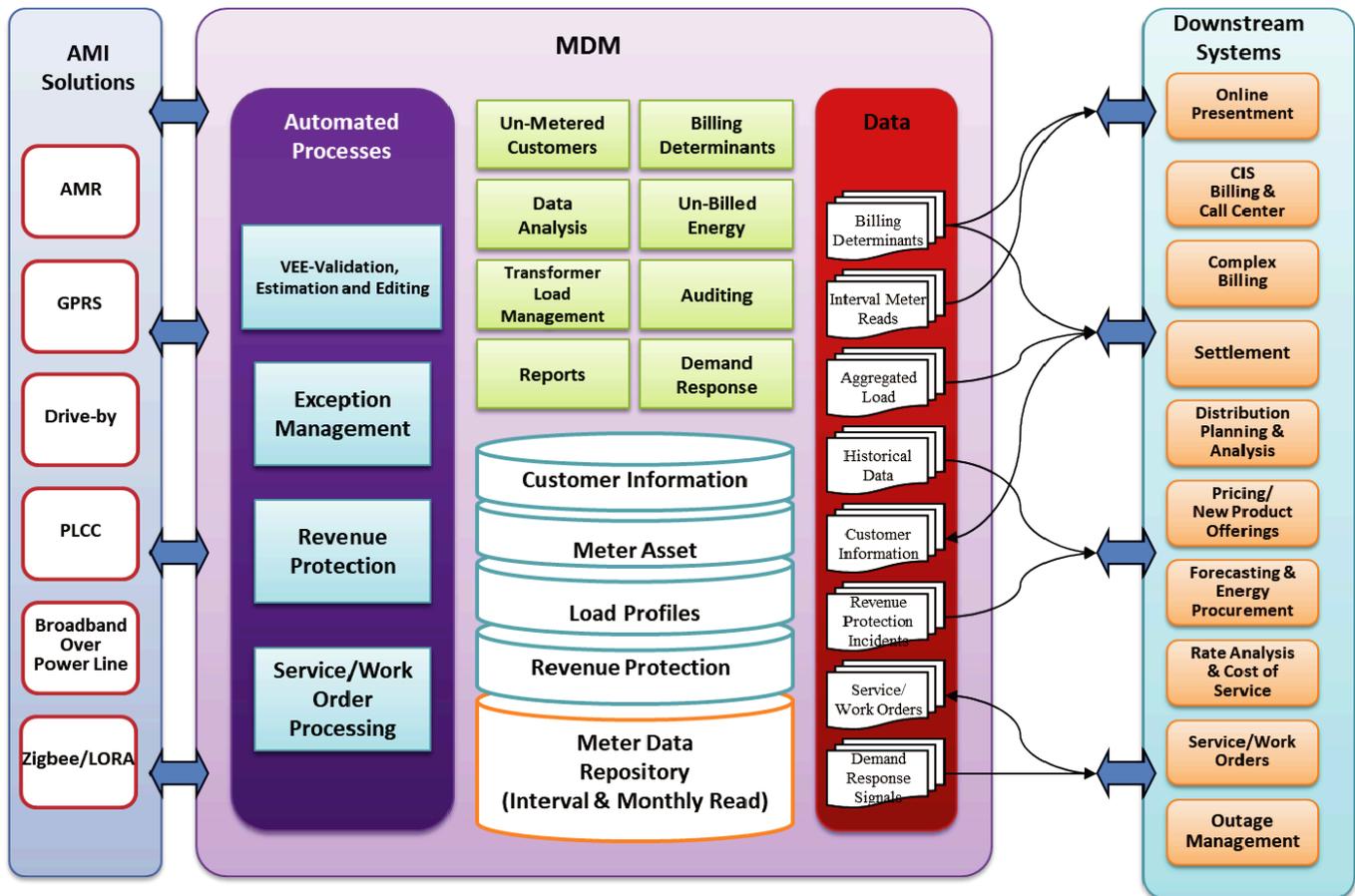
- Kunda system
- Meter Bypassing
- Meter Tampering
- Meter Reader Handling



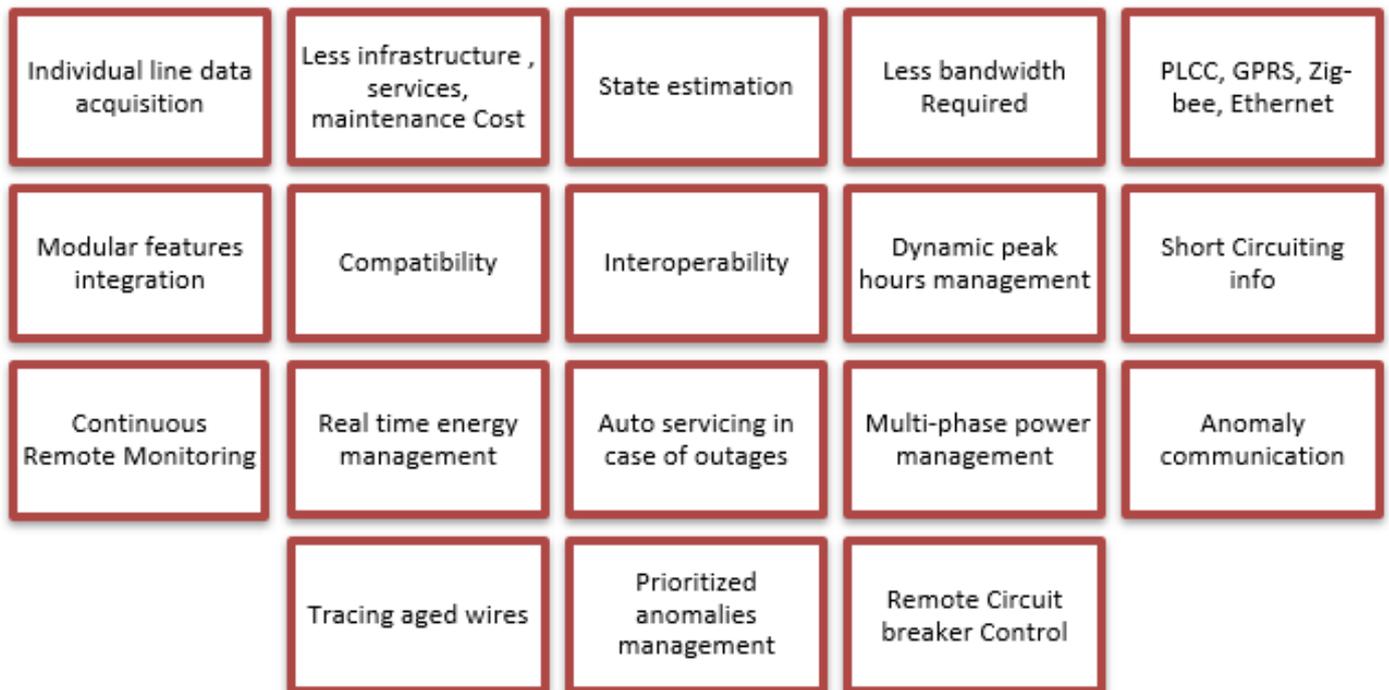
STANDARDS



ELECTROCURE DATA MANGEMENT



Detailed Competative Advantages



Website Dashboard

KVA

Status = Link Down
TF5-N-Molty-Foam

Device ID = I1F1TR05DB01
Last Value received at 2020-05-23
15:09:51
Average Voltage = 155.23 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.28(NC)
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

[Details](#)

KVA

Status = On
TF6-workshop

Device ID = I1F1TR06DB01
Last Value received at 2020-05-23
15:09:06
Average Voltage = 227.7 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.59(NC)
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

[Details](#)

KVA

Status = On
TF105-Hyper-Mall

Device ID = I1F1TR105DB01
Last Value received at 2020-05-23
15:09:11
Average Voltage = 227.64 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.86
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

[Details](#)

KVA

Status = On
TF106-Pesh-car-wash

Device ID = I1F1TR106DB01
Last Value received at 2020-05-23
15:09:17
Average Voltage = 223.45 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.87
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

[Details](#)

KVA

Status = Under Voltage
TF107-Madina-Market

Device ID = I1F1TR107DB01
Last Value received at 2020-05-23
15:09:55
Average Voltage = 208.54 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.4(NC)
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

KVA

Status = On
TF113-Pakistan-motors

Device ID = I1F1TR113DB01
Last Value received at 2020-05-23
15:09:40
Average Voltage = 224.14 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.26(NC)
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

KVA

Status = On
TF118-Best-Car-S

Device ID = I1F1TR118DB01
Last Value received at 2020-05-23
15:10:01
Average Voltage = 229.01 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.2(NC)
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

KVA

Status = On
TF124-Kamran-Plaza

Device ID = I1F1TR124DB01
Last Value received at 2020-05-23
15:09:48
Average Voltage = 231.7 Volts
Total Current Line 1 = Amps
Total Current Line 2 = Amps
Total Current Line 3 = Amps
Average Power Factor Line 1 = 0.85
Average Power Factor Line 2 = 0(NC)
Average Power Factor Line 3 = 0(NC)
Total KVA Line 1=
Total KVA Line 2=
Total KVA Line 3=

WEBSITE DASHBOARD

Transformers » Current Logs » Distribution Boxes » Customers » Configurations »

Feeder: 11 KV Mall Road Feeder

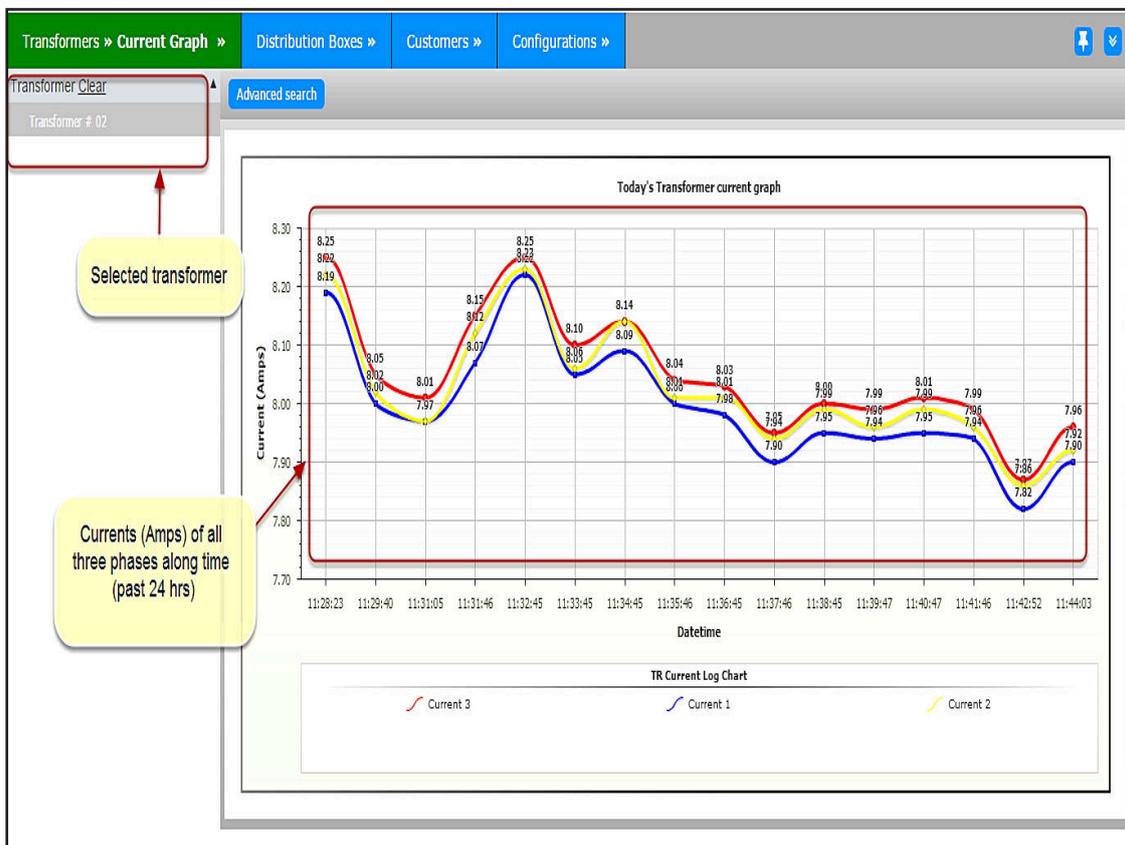
Transformer: Transformer # 02, Transformer # 03, Transformer # 12, Transformer # 22

Details found: 2306 [1 2 3 4 5 6 7 8 9 10] Next: Last Page 1 of 77 Records Per Page: 30

Voltage logs PF Logs KVA Logs KVAR logs Current logs

| Transformer | V-1 | V-2 | V-3 | PF-1 | PF-2 | PF-3 | KVA-1 | KVA-2 | KVA-3 | Total KVA | KVAR-1 | KVAR-2 | KVAR-3 | C-1 | C-2 | C-3 | Datetime |
|------------------|-----|-----|-----|------|------|------|-------|-------|-------|-----------|--------|--------|--------|-------|-------|-------|---------------------|
| Transformer # 03 | 249 | 225 | 241 | 0.64 | 0.74 | 0.71 | 14 | 4 | 6 | 24 | 11 | 2 | 4 | 57.93 | 15.68 | 26.22 | 26-08-2015 18:47:52 |
| Transformer # 03 | 249 | 225 | 241 | 0.61 | 0.74 | 0.68 | 15 | 4 | 6 | 25 | 12 | 2 | 5 | 58.66 | 15.72 | 26.35 | 26-08-2015 18:46:48 |
| Transformer # 03 | 248 | 225 | 240 | 0.63 | 0.77 | 0.66 | 15 | 4 | 6 | 25 | 11 | 2 | 5 | 58.86 | 15.68 | 26.24 | 26-08-2015 18:45:43 |
| Transformer # 03 | 247 | 224 | 239 | 0.63 | 0.78 | 0.63 | 15 | 4 | 6 | 25 | 11 | 2 | 5 | 59.08 | 15.65 | 26.11 | 26-08-2015 18:44:39 |
| Transformer # 03 | 248 | 224 | 239 | 0.66 | 0.78 | 0.73 | 13 | 3 | 6 | 22 | 9 | 2 | 4 | 50.57 | 15.53 | 26.14 | 26-08-2015 18:43:34 |

Filter by feeder and transformer



FEATURES

- ★ Under and Over Voltages/Currents control.
- ★ On Demand and Scheduled Meter Reading.
- ★ Measures Active and Reactive Energy and Power.
- ★ Monitoring of Power Factor KW, KWH, KVAR, KVA.
- ★ Transformer Fault detection and Reporting.
- ★ Theft Proof Smart Metering.
- ★ Daily, weekly and Monthly Consumption Logs.
- ★ Neutral Current Calculation.
- ★ Remote Monitoring on Website.
- ★ Records all events and an event statistics logs.
- ★ Controlled outputs for remote starting/stopping or turning devices On/Off.
- ★ Access to site/equipment from anywhere: home, office, hotel, etc.
- ★ Web-based, hardwired and wireless capable - No dedicated computers or software required.
- ★ Continuous diagnostics, 24 hours a day, 7 days a week.
- ★ Active mapping feature shows location and current status of all sites on one map.
- ★ History file captures all events and alarms, date and time stamped.
- ★ Web-based configuration and description for each alarm/event.
- ★ Customized Automatic Meter Reading Options i.e Hourly, Daily, Monthly.
- ★ Maximum Demand Indicator (MDI) Measurement.

BENEFITS

- ☒ Efficient management of the infrastructure will eliminate the need to secure electrical appliances through stabilizers since the system will no more be subjected to voltage fluctuation.
- ☒ Integration of dynamic pricing and in-house energy management model will allow each household to manage its own energy consumption and improve the electricity usage patterns.
- ☒ Distributed energy management; efficient management of energy at demand side will considerably reduce the infrastructure losses.
- ☒ Local generation; the use of small-scale generators at user premises will allow consumers (small communities-sub franchise plants for load shedding hours) to generate their own electricity and sell it back to the grid when supply exceeds consumption.
- ☒ Real time demand management based on real time monitoring of electricity usage patterns at user premises.
- ☒ Improved industrialization, leading to an improved social structure.
- ☒ The process will lead to the development of new housing schemes and construction planning.
- ☒ The need to store power during peak hours through UPS will be removed, reducing demand as well as reducing losses by 50%.
- ☒ Reduction in demand during peak hours will consequently lead to the elimination of load shedding.

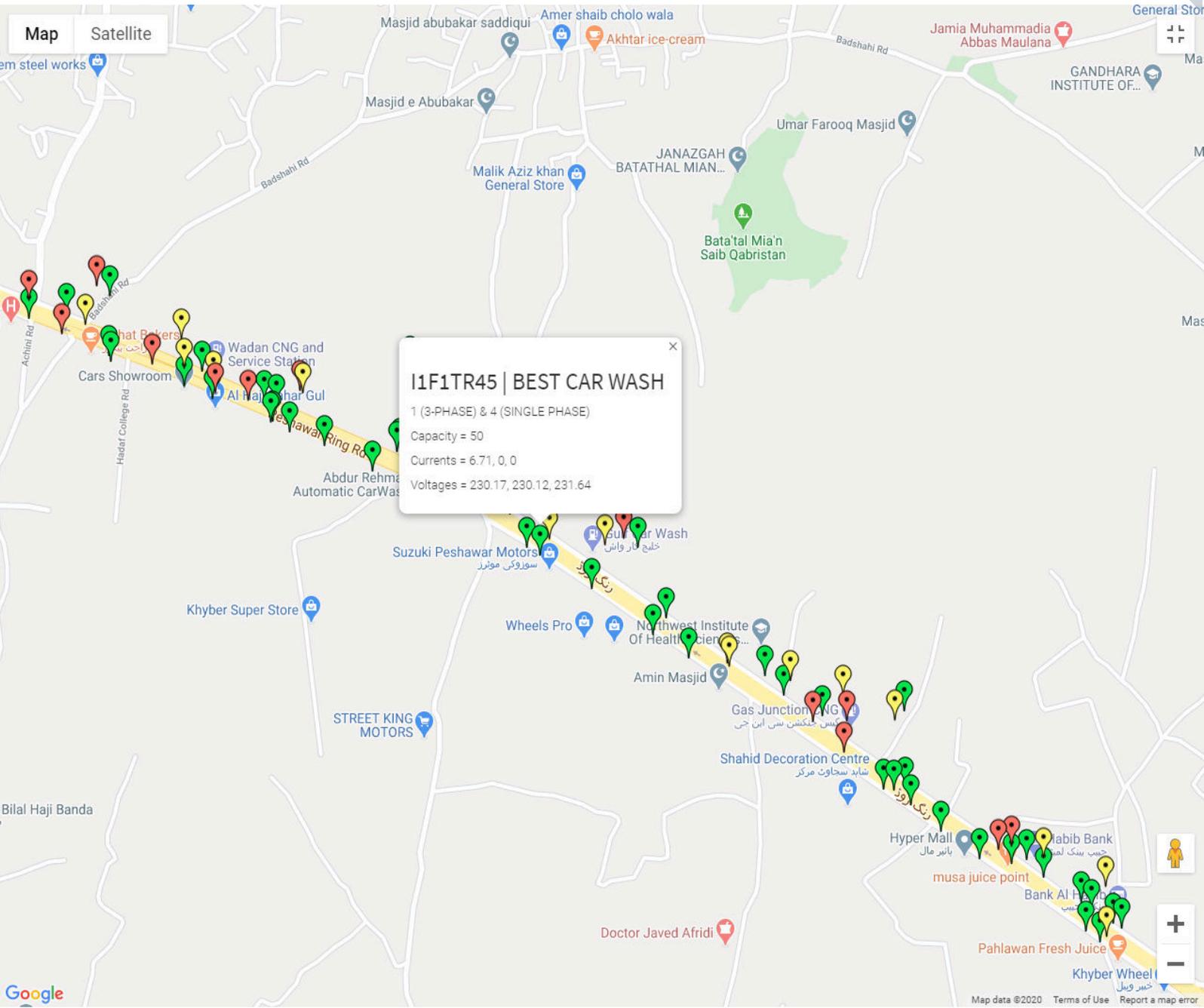
FUTURE PROSPECTS

We are committed to working towards a safer, brighter and more prosperous future for the people. We have therefore initiated efforts to achieve sustainable development by providing accountability, affordable energy, improved infrastructure, security of energy, enhanced power quality and a corruption free society.

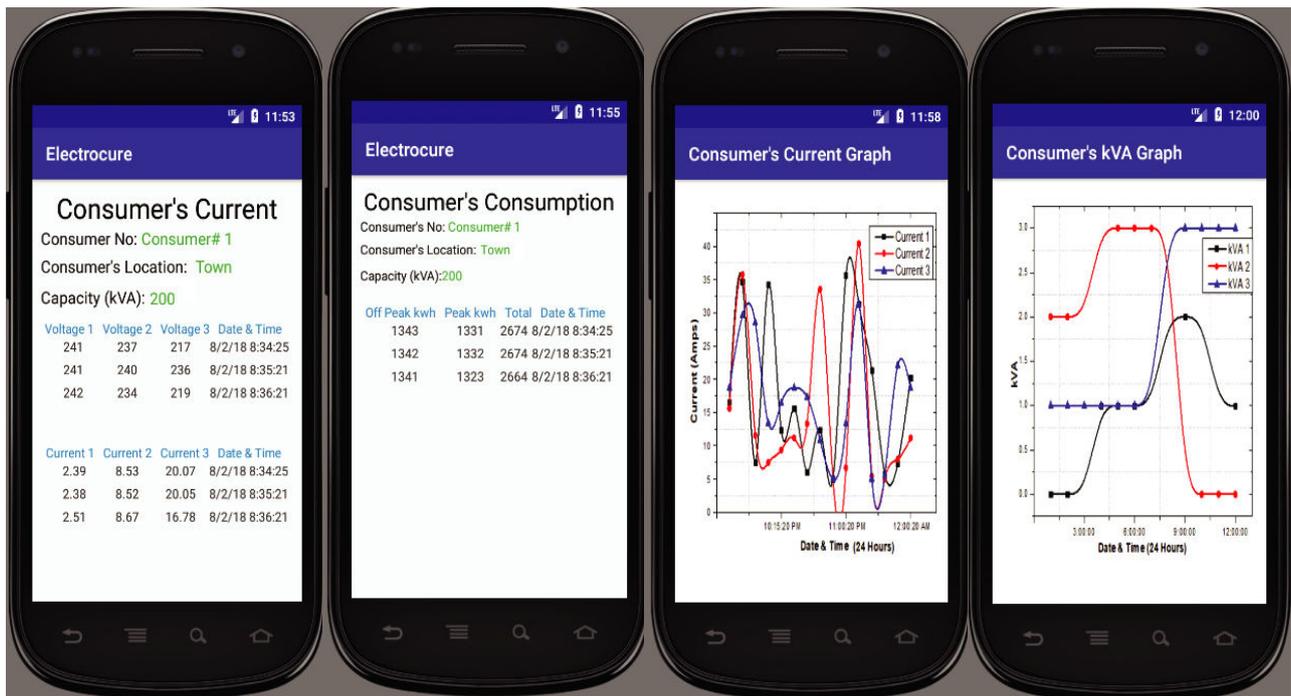
INNOVATION

Metering without meter is a unique idea, that not only stop the meter theft but it also provide a low cost smart metering solution, since a single module will be shared by multi-consumers thus reducing the cost per consumer for the smart metering implementation. This solution can be integrated easily with the current electricity infrastructure without completely revamping the whole set up. It is inspired by the smart metering solutions that exist across the globe, with an added factor of integration and real time data acquisition of the whole infrastructure for theft and other malicious activities apart from metering. It is an ideal solution for the third world countries facing huge loss through electricity theft, and to the technologically advanced countries denying smart metering because of the huge capital and runtime costs. Once we have the system in place, it can provide us with several other benefits, due to the flexibility and the scalability that it offers.

INSTALLED DEVICES MAP



MOBILE APPLICATION



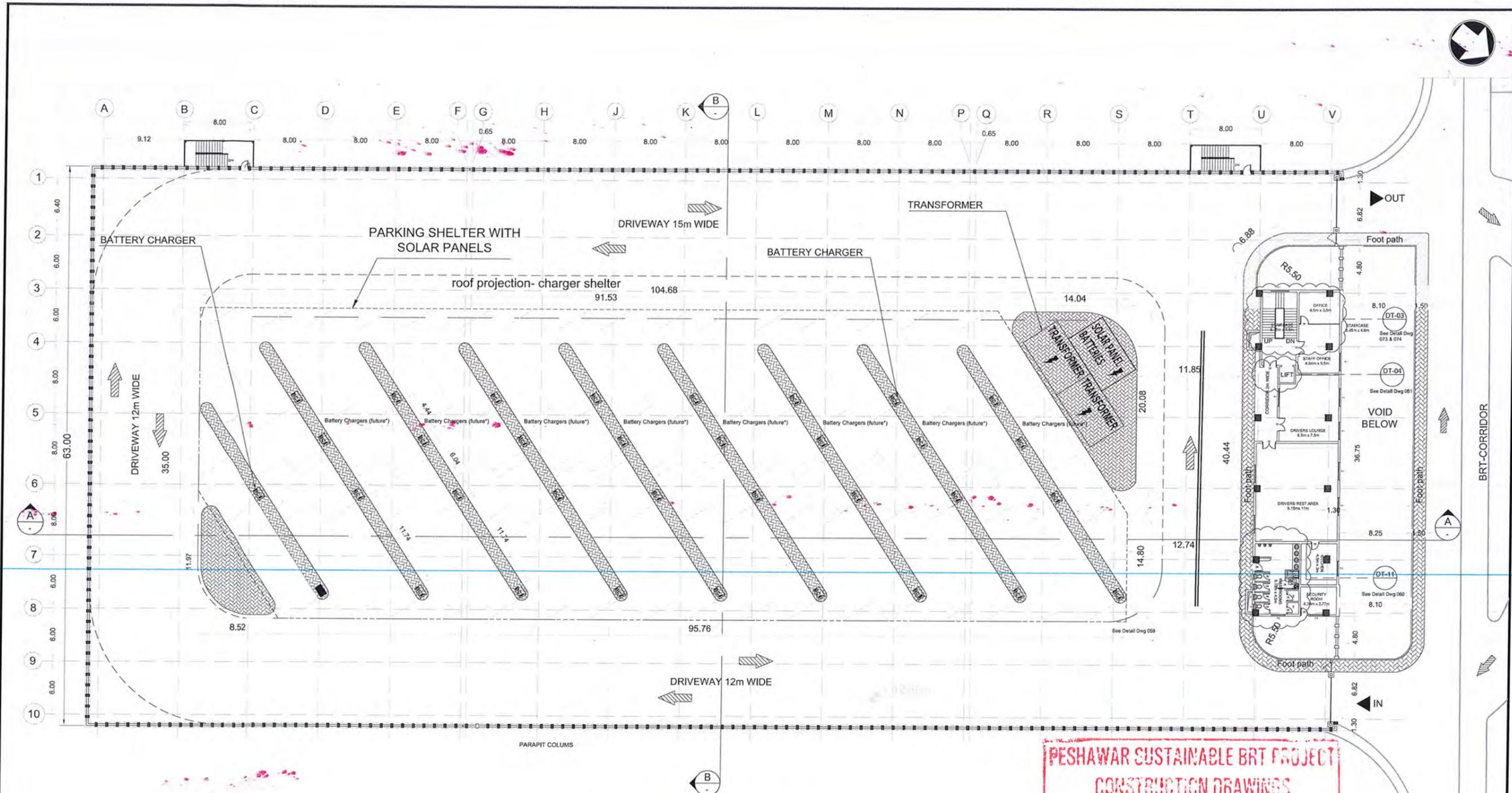
COMPANY OF INTELLIGENT SYSTEMS AND NETWORK RESEARCH

Bunglow No. 61(c), University Town, Peshawar

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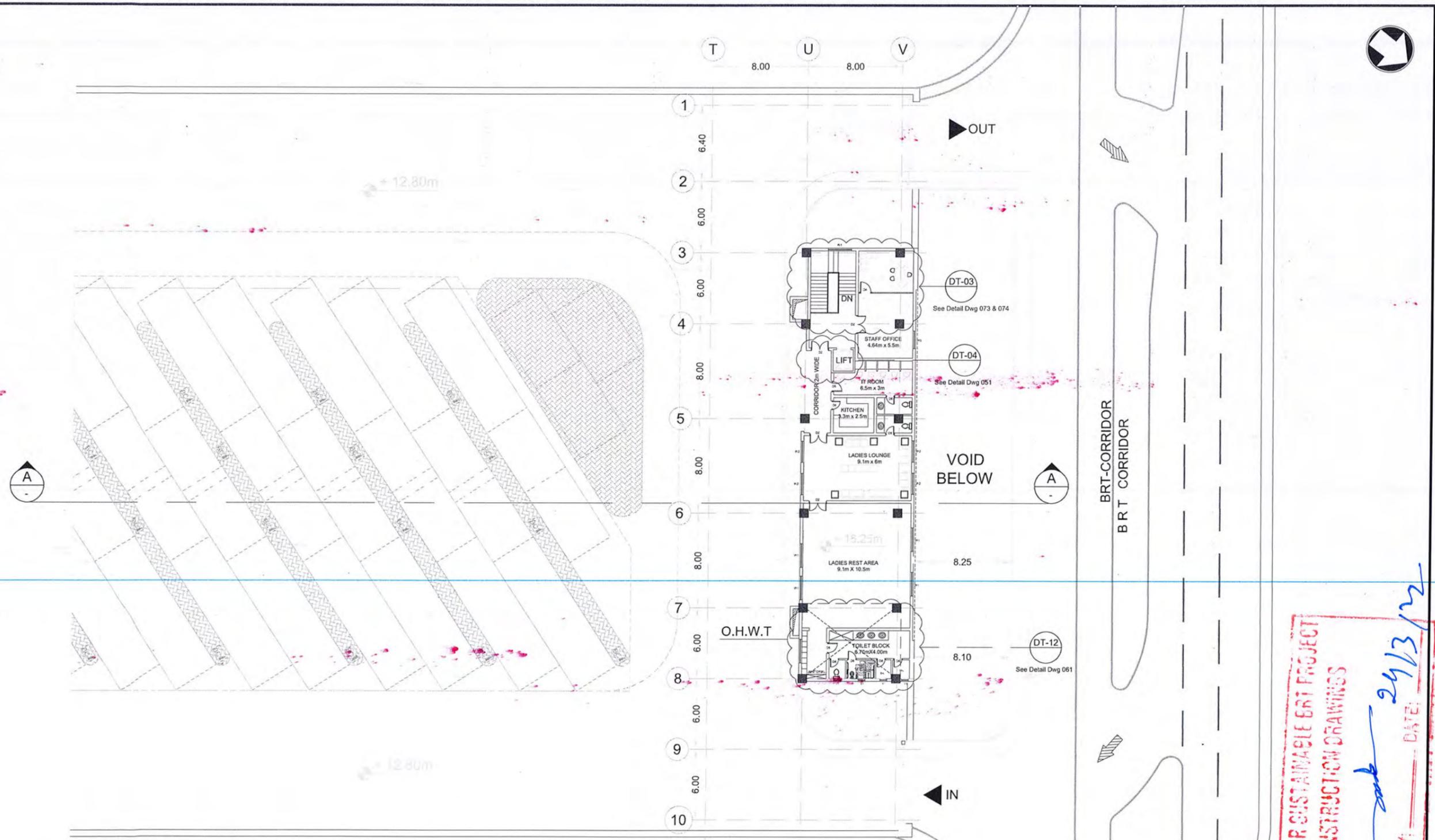
THIRD FLOOR PLAN

PESHAWAR SUSTAINABLE BRT PROJECT
CONSTRUCTION DRAWINGS
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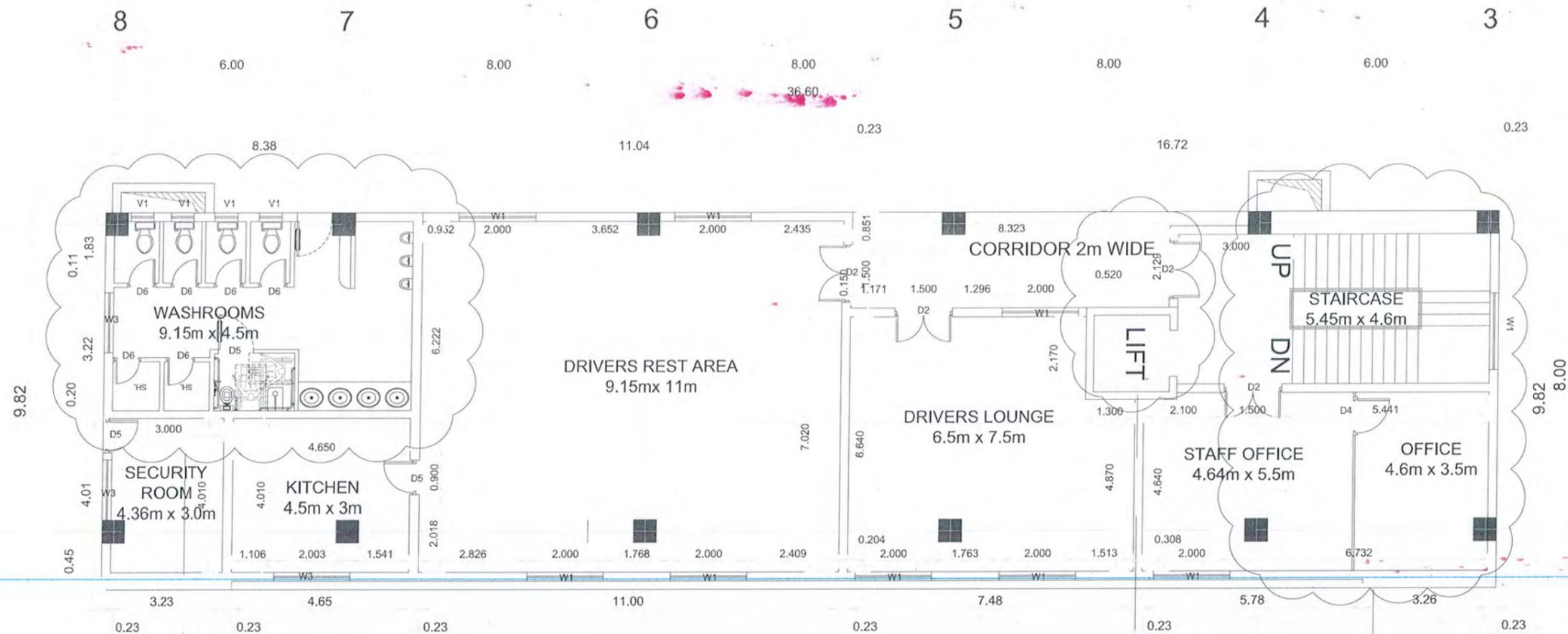
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Rashid M Qureshi
LOT-III PSBRT



FOURTH FLOOR PLAN
DRIVE REST AREA

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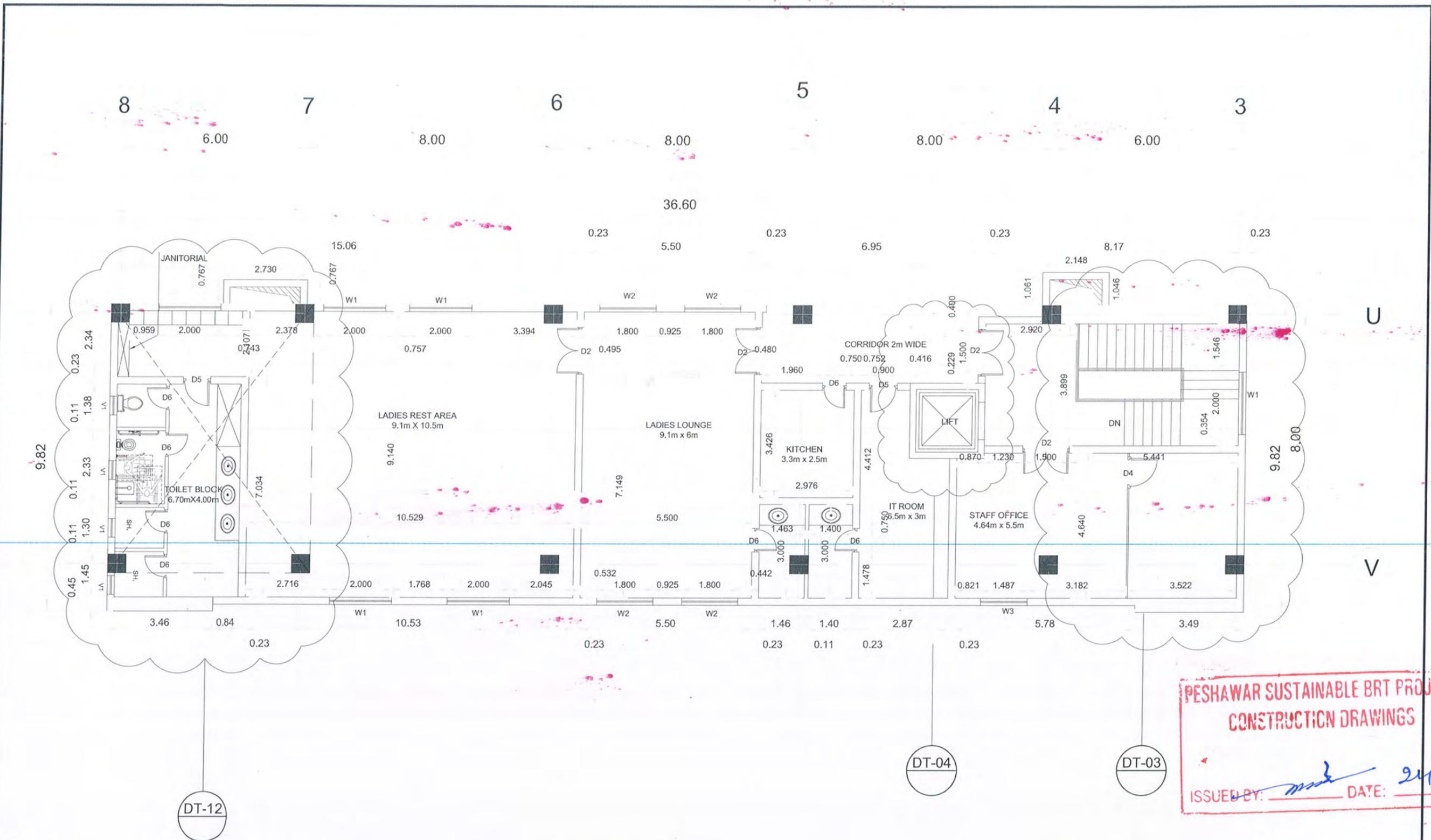
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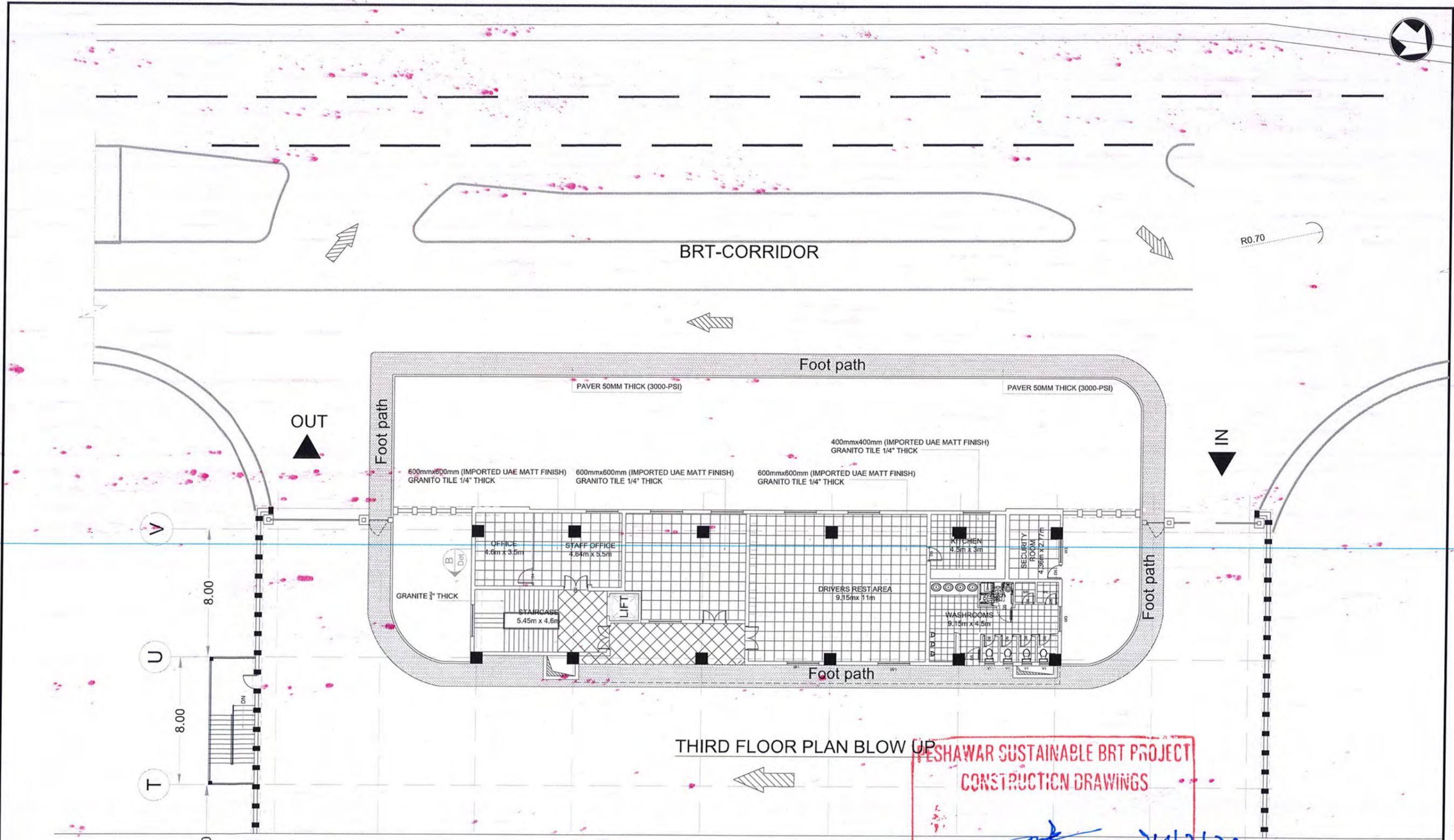
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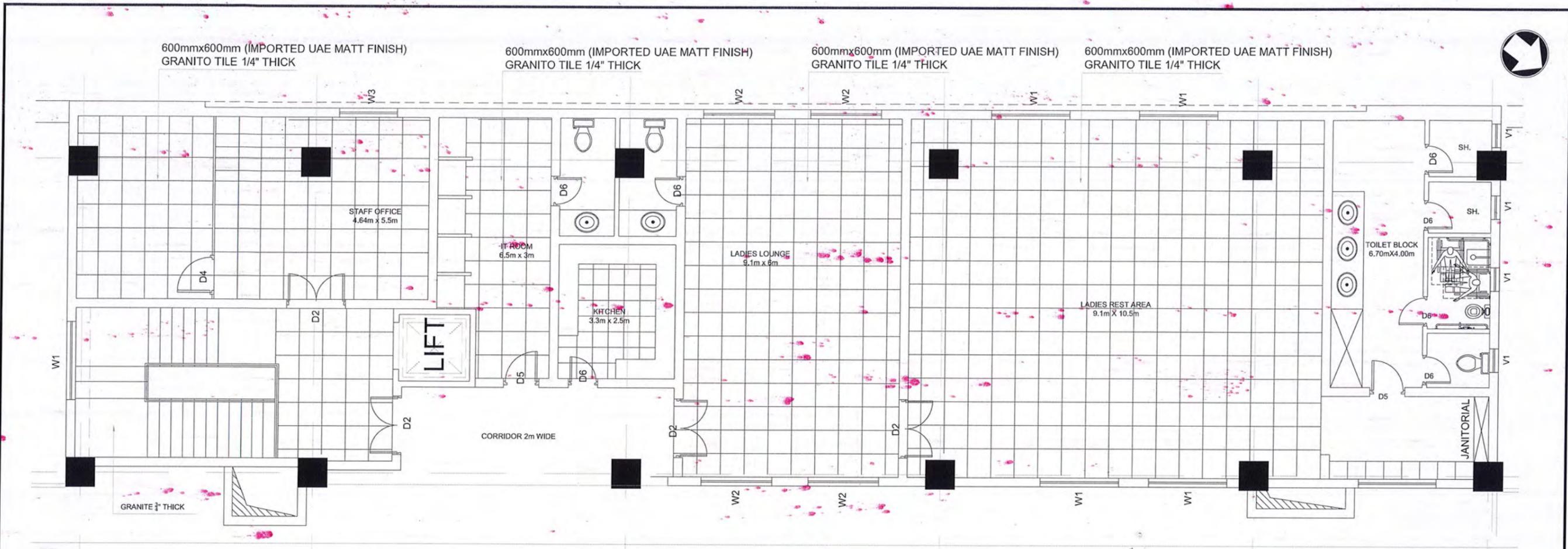


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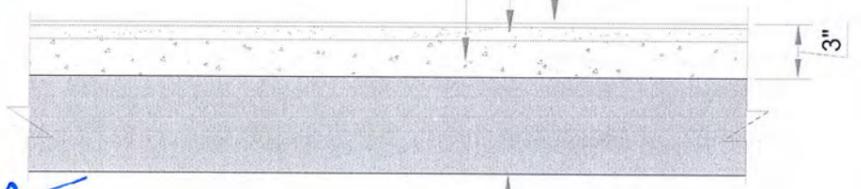
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Resident Engineer
 Rashid M. Qureshi
 LOT-III PSBRT



FOURTH FLOOR PLAN

GRANITO TILE 1/4" Thk. (IMPORTED UAE MATT FINISH)
 3/4" THICK C/S MORTAR (1:2)
 2" THICK PCC (1:2:4)



**PESHAWAR SUSTAINABLE BRT PROJECT
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SECTION-B
 TYPICAL FLOOR TREATMENT

R.C.C SLAB

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 Pakistan
 Peshawar Development Authority (PDA)
 Government of Khyber Pakhtunkhwa
 Pakistan

Financing Agency
ADB ASIAN DEVELOPMENT BANK
 Project
 Peshawar Sustainable Bus Rapid Transit
 Corridor Project - Project Design Advance

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 Rashid M. Qureshi
 LOT-III PSBRT

| | |
|-------------|---------------------------|
| Designed | M.A |
| Drawn | M.F |
| Checked | M.A |
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| Scale at A3 | 1:325 |
| Drawing No. | MMP-001020-A-DR-SF-DW-161 |
| Rev | 0 |
| Status | CON |

| Traffic Signals Details OFF Corridor | | | |
|---|----------------|------------------------------|------------|
| Sr No | Station | Detail | QYT |
| 1 | BS 03 | R,Y,G module (03 lights set) | 2 |
| 2 | BS 09 | R,Y,G module (03 lights set) | 1 |
| | | R,G module (02 lights set) | 2 |
| 3 | BS 12 | R,G module (02 lights set) | 4 |
| | | R,G module (02 lights set) | 1 |
| 4 | BS 15 | R,Y,G module (03 lights set) | 4 |
| | | R,G module (02 lights set) | 1 |
| 5 | BS 16 | R,Y,G module (03 lights set) | 4 |
| | | R,G module (02 lights set) | 1 |
| 6 | BS 27 | R,Y,G module (03 lights set) | 2 |

AGREEMENT

(General Condition of Contract)

FOR

**OPERATION AND MAINTENANCE SERVICES OF
PLATFORM SCREEN DOORS (PSD) AND ALLIED
SERVICES IN PESHAWAR BRT SYSTEM**

between

TransPeshawar Company

and

[SERVICE PROVIDER]

Date: XX.XX. 2026

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| PAYMENT CALCULATION SCHEDULE | Error! Bookmark not defined. |

THIS OPERATION AND MAINTENANCE SERVICES OF PLATFORM SCREEN DOORS (PSD) AND ALLIED SERVICES IN PESHAWAR BRT SYSTEM AGREEMENT (the “Agreement”) is made on [.....] 2026

BETWEEN

1. **TRANSPESHAWAR (THE URBAN MOBILITY COMPANY)**, a company incorporated with Security Exchange Commission of Pakistan on February 09, 2017 with company registration no.0105691 and whose registered address is at KPUMA Building, Chamkani, GT Road, Peshawar, KPK, Pakistan (“**TPC**”); and
2. *<Insert name of the Company>*, a company incorporated in [.....], with company registration no. [.....] and whose registered address is at [.....] (the “**Service Provider**”).

TPC and the Service Provider are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

- A. TPC is a corporate entity established by the Government of Khyber Pakhtunkhwa, Pakistan responsible for design, procurement, implementation and ongoing BRT operations in the Peshawar BRT System.
- B. TPC intends to enter into long-term agreements based on output based or performance-based parameter with suitable Service Provider (selected through a competitive bidding process) who will provide operation and maintenance services for Platform Screen Doors (PSD) and Allied Services in Peshawar BRT as part of the Project.
- C. The Service Provider is a special purpose company which has been set up for the purpose of entering into and performing this Agreement.
- D. TPC wishes to appoint the Service Provider on a non-exclusive basis to provide the Services and the Service Provider wishes to accept such appointment and carry out the Services, in accordance with the terms and conditions of this Agreement.

NOW THE AGREEMENT PROVIDES THE FOLLOWING GENERAL CONDITIONS OF CONTRACT:

PART A - GENERAL

1. Preliminary Matters

1.1 Definitions and Interpretation

1.1.1 The defined words and expressions set out in Clause 1 of Annex A [*Definitions and Interpretation*] hereof and the provisions relating to the construction and interpretation of the Agreement set out in Clause 2 of Annex A [*Definitions and Interpretation*] hereof shall apply to the Agreement.

1.1.2 In the event of any inconsistency between the provisions of the body of this Agreement and the Annexes, or between any of the Annexes, the conflict shall be resolved according to the following descending order of priority:

- a) the body of this Agreement, including Annex A and Particular Condition;
- b) Annex B [Letter of Award];
- c) Annex C [Schedule of Requirements];
- d) Annex D [Performance Guarantee];
- e) Annex E [Request for Proposal and Proposal of Service Provider],
- f) Annex F [Parent Company Guarantee];
- g) Annex G [Integrity Pact]

- 1.2 Effect of this Agreement
 - 1.3 The Parties hereby agree that this Agreement shall immediately be binding on them as of the Effective Date.
 - 1.4 Conditions Precedent
 - 1.5 TPC shall issue a Service Notice to Service Provider indicating the date upon which the Services are to commence subject to the following conditions precedent are met: -
 - 1.5.1 Incorporation of Special purpose Vehicle;
 - 1.5.2 Performance Guarantee;
 - 1.5.3 Parent Company Guarantee; and
 - 1.5.4 Signing of Agreement.
- 2. Appointment of Service Provider**
- 2.1 Appointment
 - 2.1.1 TPC's signing this Agreement shall indicate its appointment of the Service Provider to provide the Services. Such appointment shall only be effective as of the Effective Date.
 - 2.1.2 The Service Provider hereby accepts the appointment by TPC and agrees to provide the Services in accordance with the terms and conditions of this Agreement.
 - 2.2 Commencement of the Services and Term
 - 2.2.1 The Service Provider shall provide the Services from the Commencement Date until the Termination Date.
 - 2.2.2 Unless this Agreement is earlier terminated, the Service Provider shall continuously provide the Services contemplated under this Agreement (as may be amended pursuant to its terms) for a term as mentioned in Particular Condition **(PC)** commencing from the Commencement Date. After initial term, Agreement may be extended subject to satisfactory performance and approval of TPC for a period as mentioned in **PC**.
- 3. Performance Guarantee**
- 3.1 The Service Provider shall ensure that it maintains with TPC a valid and enforceable Performance Guarantee until the Service Provider has fulfilled all its obligations under the Agreement. The Service Provider shall have delivered to TPC as a Condition Precedent the duly executed Performance Guarantee in the specified form and in the amount as mentioned as **PC**. The Performance Guarantee shall have a term of one (01) year and shall be renewed or replaced and delivered to TPC no later than thirty (30) days before its expiry. TPC shall return the previously provided Performance Guarantee to the Service Provider within fourteen (14) days of the receipt of the replacement of Performance Guarantee.
 - 3.2 Subsequent to the delivery of the initial Performance Guarantee, the Service Provider shall thereafter ensure that the amount of the renewed or replacement Performance Guarantee is of amount mentioned in **PC and the last Performance Guarantee shall remain valid for four (4) months after Termination Date.**
 - 3.3 The Performance Guaranteed shall be issued in format as mentioned in **PC**.
 - 3.4 If the Service Provider fails to provide TPC with a replacement Performance Guarantee as required under this Agreement, TPC may (without prejudice to its other remedies) immediately liquidate all or part of the Performance Guarantee.

- 3.5 If the Performance Guarantee is partially liquidated, the Service Provider is obliged to replenish the Performance Guarantee in full within seven (7) days of the date of any liquidation thereof. If the Service Provider fails to replenish the Performance Guarantee in accordance with this clause, this shall constitute a material breach of this Agreement and TPC shall be entitled to liquidate the remainder of the Performance Guarantee and terminate this Agreement pursuant to clause 29.
- 3.6 Subject to the fulfillment by the Service Provider of all of its obligations under this Agreement, the Performance Guarantee shall be released by TPC within thirty (30) days ~~after the Termination Date~~ **after validity of Performance Guarantee or fulfilment of obligations under this agreement, whichever is earlier.**
- 3.7 All fees, taxes and expenses associated with preparing, providing, issuing, extending, replacing, replenishing or stamping (if applicable) of the Performance Guarantee shall be borne by the Service Provider.

4. Parent Company Guarantee

- 4.1 In the event that the Service Provider is a branch, subsidiary, affiliate or otherwise of a Parent Company, then the Service Provider shall, at its own expense, procure a Parent Company Guarantee for the benefit of TPC from its Parent Company as given in **PC**.
- 4.2 In the event that the Service Provider is a joint venture, partnership, consortium or other association of two or more entities or persons and any member of the Service Provider is a branch, subsidiary, affiliate or otherwise of a Parent Company, then each such member shall, at its own expense, procure a Parent Company Guarantee for the benefit of the Authority from its Parent Company.

5. Payment for Services

- 5.1 Payment to the Service Provider for the provision of the Services shall be made in accordance with procedure mentioned in **PC**.
- 5.2 TPC shall be entitled to adjust any amount in upcoming payment which are due to either Party.
- 4.3 Any payment to the Service Provider shall not constitute a waiver of any right held by TPC in respect of a breach of this Agreement by the Service Provider.

6. Tax

- 6.1 To the extent that the Services or any additional activities and/or services offered by the Service Provider pursuant to this Agreement are taxable, the Service Provider agrees to bear all Applicable taxes, charges, duties and/or tariffs by itself and, upon request from TPC, provide proof that such obligations have been satisfied in full. Sales Tax on Services, if any, shall be paid by Party as mentioned in **PC**.
- 6.2 Withholding of all taxes will be made as per applicable law. Services exempt from withholding of taxes, the Service Provider shall at all times be in possession of a valid tax exemption certificate and shall provide the same to TPC along with each invoice / bill for payment. In case the services are exempt from sales tax, the service provider shall furnish a valid reference of exemption from the applicable tax law.
- 6.3 TPC may cease all payments to the Service Provider in respect of any period during which the Service Provider is not in compliance with the provisions of clauses 6.1 and 6.2 above. Upon such compliance by the Service Provider, TPC shall effect payment of all amounts that had been withheld pursuant to this clause.

PART B - THE EQUIPMENTS

7. The Equipment/ Systems

- 7.1 TPC shall hand over Equipment as mentioned in SOR to Service Provider for Operation and Maintenance. Equipment is defined in SOR and **PC**.

- 7.2 The Equipment shall be handed over to the Service Provider at locations with details given in Schedule of Requirement (SOR) within duration as mentioned in **PC** from date of Commencement.
- 7.3 For the duration of this Agreement, unless agreed otherwise in writing by the Parties, the Service Provider shall use the Equipment solely for the provision of the Services in accordance with this Agreement.
- 7.4 Legal title to and ownership of the Equipment (including all associated tools and equipment) shall remain with TPC.
- 7.5 The Service Provider shall not create or allow the creation of any Encumbrance in any manner of any or all of the Equipment without the prior written consent of TPC.
- 7.6 TPC shall not hold Service Provider responsible to provide services outside the capability of the Equipment furnished, installed and commissioned unless mentioned in SOR.

8. Delivery, Care and Ownership of the Equipment

- 8.1 TPC shall handover the Equipment allocated to the Service Provider on the relevant Dates as mentioned in **PC** and the Service Provider shall be obliged to accept such handover in accordance with this Agreement.
- 8.2 The Equipment shall be properly maintained by the Service Provider in accordance with the manufacturer's standards and/or requirements.
- 8.3 TPC shall be entitled to conduct unscheduled inspections of each Equipment to ensure that it continues to be in compliance with the Schedule of Requirements and in satisfactory operational condition (fair wear and tear excluded). If any Equipment is found not to be in compliance with the SOR or in unsatisfactory condition, TPC shall immediately inform the Service Provider and the Service Provider shall, within a reasonable time or a time determined by TPC, effect the required repairs/replacement at its own cost.
- 8.4 If an Equipment requires repair/replacement and is not so repaired/replaced by the Service Provider within a reasonable time or the time determined by TPC, TPC shall be entitled to either liquidate a part or all of the Performance Guarantee for purposes of effecting such repairs/replacement for purposes of effecting such repairs/replacement or deduct from Reserve Fund.

PART C - SERVICE PROVIDER RESPONSIBILITIES

9. General Obligations – Equipment and Operations

- 9.1 The Service Provider shall abide by all the terms, rules and regulations in accordance with this Agreement (including the SOR) and the Applicable Law.
- 9.2 The Service Provider shall employ and engage trained and skilled staff (within 07 days of the award of contract) reasonably required to complete the duties of this contract to the satisfaction of TPC.
- 9.3 The Service Provider shall provide the list of Service provider's personnel working on stations/TPC office, along with their basic information, to TPC for issuance of permit to the BRT Corridor with sufficient details, if required. The list to be shared on monthly basis or at time when changes occurs. Furthermore, the Service provider shall provide registration details of vehicles, used for delivery and otherwise essential for the execution of services, requiring access to BRT corridor for maintenance of Equipment or Allied Services.
- 9.4 The Service provider shall maintain vigilant supervision over its staff at all times. Dress code is to be applied with their service I.D for their distinct recognition. Apart from generally applied moral code, the personnel of the service provider shall avoid to use any kind of toxic and narcotics, even BRT premises is a smoke free zone.
- 9.5 The Service Provider be responsible, at all times, for the conduct of its personnel and take prompt and strict disciplinary action against any conduct not in compliance with TPC's rules, regulations and instructions issued from time to time.

- 9.6 The Service Provider staff shall communicate with passengers and members of public in a customer friendly, professional and helpful manner.
- 9.7 The Service Provider shall ensure presence of its authorized representative(s) at any BRT site or TPC office at short but reasonable notice when so required by TPC and respond to queries of TPC in a timely manner.
- 9.8 The Service Provider shall be responsible for the medical and accidental insurance of its staff, payment of all dues like Social Security, EOBI in accordance with the Applicable Law. The Service Provider shall not engage staff below minimum wage as notified under Applicable Law. TPC shall not accept any responsibility of the designated personnel in the event of death, injury, disability or illness that may take place while performing/executing services required under the scope of this contract. Any compensation or expenditure towards the treatment of such injury/disability or loss of life shall be the sole responsibility of the Service provider.
- 9.9 The Service Provider shall be responsible that it does not engage or continue to engage any person having a criminal record/ conviction or otherwise undesirable persons.
- 9.10 TPC requires all Employees who are required to fulfil their duties in view of the public to wear uniforms at all relevant times during the rendering of the Services. The Service Provider shall ensure that its Employees are appropriately attired in the prescribed Uniforms. The Service Provider shall comply with the specification and/or design provided by TPC from time to time.
- 9.11 The Service Provider shall take prompt and reasonable action for resolution of each complaint and maintain a Log book, containing details regarding Turnaround Time (TAT), parts repaired/replaced, Service person etc., of each complaint received and resolved. TPC may prescribe a format of the Log book or established an electronic system, which shall be mandatory for the Service Provider to adopt. This includes resolution of complaints received from passengers as well as technical nature from TPC.
- 9.12 Agree to remove from the site, whenever required to do so by the TPC, any personnel considered by TPC to be unsatisfactory or undesirable.
- 9.13 Be liable to the penalty and Liquidated Damages for any loss incurred or suffered/any damage caused to movable or immovable property of TPC, on account of delayed, deficient or inadequate Services, or any actions adversely affecting warranty of the Equipment, or interruption in the smooth operations of BRT Bus Service for reasons directly and solely attributable to the Service provider.
- 9.14 Report immediately to TPC any kind of material incident (to the extent of scope of Service Provider required as per this Contract) including but not limited to damage to TPC property and provide photographs of the incident.
- 9.15 The Service Provider shall ensure their personnel do not enter into the BRT Corridor without valid entry cards/permit issued by the TPC.
- 9.16 The Service Provider shall ensure that the Equipment at all times are in compliance with the SOR, the requirements of any applicable specifications and the Applicable Law.
- 9.17 The Service Provider shall maintain detailed Equipment maintenance and repair records for the duration of this Agreement. TPC shall be entitled to audit such records upon giving the Service Provider no less than twenty-four (24) hours' notice. The Service Provider shall also provide these records (or any portions thereof) as may be reasonably requested by TPC.
- 9.18 Unless expressly specified in this Agreement, the Service Provider shall solely be responsible for all cost and/or expenses associated with the fit-out, furnishing, administration, office space and/or any and all operational costs associated with its operations until the Termination Date.

10. Operations and Maintenance of the Equipment

- 10.1.1 The Service Provider shall provide the Services strictly in accordance with the SOR and any further instructions of TPC given pursuant to this Agreement.
 - 10.1.2 The Service Provider shall be obliged to log a report with TPC within fifteen (15) minutes of the occurrence (or as soon as practicable thereafter) of any incident/accident, detailing the nature and location of the incident and where applicable, details of the parties involved. Service Provide shall report any incident to TPC at station or in corridor which are even not related to Service Provider scope of work.
 - 10.1.3 From the Commencement Date and for the duration of the Agreement, the Service Provider shall be entitled to operate the Equipment and provide services in accordance with SOR.
- 10.2 Temporary interruptions, delays or deviation from Services
- 10.2.1 The cancellation of Services by the Service Provider shall only be permitted if such cancellation is due to:
 - (a) weather conditions (subject to prior agreement with TPC), or any Event of Force Majeure; or
 - (b) immediate danger to life and/or personal injury and/or serious damage to property,in which event, TPC and the Service Provider shall meet in good faith on an urgent basis, to agree upon the deviation from the Services to be allowed and the expected date and/or time of recommencement of the Services, or if the Parties fail to reach agreement within one (1) hour after having met for the first time, TPC's decision shall be final and binding on the Parties.
 - 10.2.2 Where the Service Provider is of the opinion that Services should be cancelled due to boycott action, intimidation, violence, strike action or any threats of the foregoing, either against the Service Provider or generally, the Service Provider shall refer the matter to TPC for its decision, which shall be final and binding and not be subject to the provisions of clause 30. Should TPC decide that such cancellation is justified, no Liquidated Damages shall apply. However, should TPC decide that such cancellation is not justified and the Service Provider nevertheless fails to render the Services for any period of time whilst the action or threats contemplated above continue, the Service Provider shall be penalized in accordance with clause 26 and the SOR and no payment shall be made in respect of such canceled Services.
 - 10.2.3 The Service Provider shall inform TPC immediately of any proposed cancellation of any Services pursuant to clause 10.2.1(a) and/or clause 10.2.1(b) and the Parties shall meet on an urgent basis to agree upon the deviation to be allowed and the recommencement of the Services, or if they fail to reach agreement within a reasonable time as determined by TPC, TPC's decision shall be final and binding on the Parties and clause 30 shall not apply in relation to TPC's decision.
- 10.3 Skill and care in rendering uninterrupted Services
- 10.3.1 The Service Provider shall exercise the highest degree of skill, care and diligence in the provision of the Services to the reasonable satisfaction of TPC.
 - 10.3.2 Without limiting the generality of the foregoing, the Service Provider shall provide the Services at a standard which would reasonably avoid the incurring of Liquidated Damages as contemplated in the SOR.

- 10.3.3 The Service Provider acknowledges and accepts that it is imperative for the success of the System that the Services are rendered without interruption or delay and undertakes to do all things reasonably necessary to ensure such uninterrupted, prompt and efficient service.
- 10.4 Compliance with standard operating and control procedures and requirements
 - 10.4.1 The Service Provider shall at all times comply with any standard operating and control procedures and requirements for the day to day administration, monitoring, control and performance of this Agreement as may be reasonably determined by TPC from time to time and the specific circumstances under which the System operates from time to time, which shall include the SOR.

11. Operating Licenses

- 11.1 The Service Provider shall maintain the validity of all Operating Licenses required for the business, if required under Applicable Law, for the duration of this Agreement and shall ensure that the terms or conditions of such Operating Licenses are not contravened.

12. Technical Staff

- 12.1 No later than 30 days before the Commencement Date, the Service Provider shall employ one or more Project Manager for coordination with TPC and dealing of day to day matters. They shall be fluent in the language for day to day communications. His name, duty, authority and any changes therein shall be communicated in writing to TPC.
- 12.2 The Service Provider shall hire Technical Staff who are suitably qualified and shall ensure that all Technical Staff for duration of the Services remain suitably qualified, trained and meet the requirements set out in the SOR and any Applicable Laws. TPC may implement their attendance system in their biometric system for monitoring.
- 12.3 Notwithstanding any Liquidated Damages that may be applied pursuant to this Agreement, in relation hereto, where a Technical Staff operates an Equipment in contravention of any Applicable Law and/or the requirements of the SOR, TPC shall be entitled to demand (and the Service Provider shall be obliged to promptly comply with such demand) that such Technical Staff is immediately removed from the System and replaced with another Technical Staff who is suitably qualified.

13. Co-operation with Other Contractors

- 13.1 Where interaction between the Service Provider and any Other Contractors/Service Providers is required in accordance with this Agreement, in practice or in accordance with a Service Notice or Protocol, for the efficient and effective operation of the BRT system, the Service Provider shall co-operate with Other Contractors/Service Providers and shall take such reasonable steps as may be required to formulate the necessary operating procedures and practices by agreement with Other Contractors, in accordance with the Service Notice or Protocol, as the case may be.
- 13.2 Should the Service Provider and Other Contractors fail to reach an agreement as contemplated in clause 13.1, TPC shall be entitled to issue a Protocol to regulate their interaction or make a final determination in the event of a dispute between them, as the case may be.
- 13.3 In any event, notwithstanding the provisions above, TPC shall at all times be entitled to issue Protocols regulating the interaction between the Service Provider and Other Contractors/Service Providers.
- 13.4 The Service Provider shall be obliged to follow such Protocols, which, in the event of a conflict, shall supersede any agreement between the Service Provider and Other Contractors in accordance with clause 13.1 above.

14. Uniforms

- 14.1 The Service Provider shall ensure that its Employees are appropriately attired in the Uniforms prescribed in the Schedule of Requirements (as may be amended from time to time).

15. Monitoring of the Services

- 15.1 TPC shall be entitled to require regular written reports from the Service Provider in such reasonable form, detail and frequency as may be determined by TPC or to call meetings with the Authorized Representative of the Service Provider on reasonable notice, for any purposes regarding the performance of the Services and/or the implementation of this Agreement.
- 15.2 An Authorized Representative of TPC shall at all reasonable times be given access to the Equipment, Employees and any place where the Services (or any portion thereof) are being performed to satisfy itself as to the Service Provider's compliance with its obligations under this Agreement and for purposes of assessing the Service Provider's performance against agreed Key Performance Indicators (KPI's). TPC shall be entitled to conduct random or schedule inspections of any Equipment, its component or its subsystems.

16. Provision of Financial Information

- 16.1 For the duration of this Agreement, the Service Provider shall deliver to TPC:
- 16.1.1 audited annual financial statements of the Service Provider within ninety (90) days after each relevant Financial Year-end; and
 - 16.1.2 unaudited management accounts of the Service Provider (comprising a profit and loss account, balance sheet and cash flow statement), copies of which shall be delivered to TPC within thirty (30) days after the end of each Quarter of a Financial Year. Without detracting from TPC's rights under this Agreement, and in order to assist the Service Provider in taking proactive steps to ensure the sustainability of its operations and identify any negative trends which may likely impact the Services, TPC may provide the Service Provider with such feedback as it may consider appropriate from time to time arising from its consideration of the Service Provider's management accounts submitted in accordance with this clause 16.1.2.
- 16.2 The Service Provider shall provide TPC with all information as TPC may be required to provide to any Regulatory Bodies, from time to time.
- 16.3 The Service Provider's financial statements shall be prepared in accordance with IFRS (international financial reporting standards within the meaning of Companies Act 2017 as applicable in Pakistan) and fairly reflect the financial position of the Service Provider as at the date and for the period for which such statements are prepared.
- 16.4 The Service Provider shall furnish to TPC, within three (03) Business Days of receipt by it of written demand from TPC, all such additional information as may be reasonably required by TPC from time to time.
- 16.5 The Service Provider shall notify TPC in writing, immediately (but in all events within seven (7) days) upon the occurrence of any of the following events:
- 16.5.1 if at any time the Service Provider becomes Financially Distressed; or
 - 16.5.2 if the Service Provider considers or resolves to seek any insolvency, bankruptcy or similar protection under Applicable Law.
- 16.6 If the Service Provider notifies TPC pursuant to clause 16.5, such notice shall set out the full details of the Financial Distress or the actual or proposed action, and TPC shall be entitled, without derogating from and/or diminishing any rights and/or entitlements it may have under this Agreement, under Applicable Law or otherwise, to do all things it deems necessary in order prevent any potential disruption to the Services

17. Incident Reporting

- 17.1 Should the Service Provider become aware of events or circumstances which have prevented, are preventing or will prevent the Service Provider from providing the Services, the Service Provider shall immediately after becoming so aware, advise TPC of such events or circumstances and also indicate the manner in which the provision of the Services were, are or are going to be impacted.
- 17.2 In addition to any obligations under Applicable Law, the Service Provider shall immediately after its occurrence notify TPC or its Authorized Representative of any accident relating to the Services (whether or not a Equipment has been involved) in which persons have been injured or killed.
- 17.3 The Service Provider shall be required to report all other incidents as may be further defined by a Protocol, excluding such incidents as described in clause 17.2 above, to TPC in writing within two (2) Business Days of the Service Provider becoming aware or where a prudent Service Provider should have reasonably become aware of the incident.
- 17.4 The Service Provider shall report any acts of vandalism or damage to Equipment to TPC within one (1) day of becoming aware of their occurrence.

18. Other responsibilities

- 18.1 The Service Provider shall be responsible for the safe disposal of waste, oil, lubricant or water containing any variation of such lubricant in accordance with the Applicable Law.
- 18.2 The Service Provider shall at its own cost comply with all labor, employment, occupational health and safety regulations and standards applicable to the Services.
- 18.3 The Service Provider shall be liable to compensate, replace, repair (whatever the case may be) as per original specification or as per work order issued by TPC for any damage caused to the property of TPC.

PART D - MAINTENANCE OF EQUIPMENT

19. General Obligations

- 19.1 The Service Provider shall, at all times during the term of this Agreement, ensure that all Equipment utilized in rendering of the Services are kept in a state of good repair and maintained in accordance with the Equipment Supplier requirements and/or recommendations and the provisions of this Agreement. Notwithstanding anything to the contrary contained in this Agreement, the Service Provider shall:
- 19.1.1 be liable for any damage caused to the Equipment in accordance with its obligations under this Agreement; and
- 19.1.2 at all times, unless expressly stated otherwise in this Agreement, be responsible for the service, maintenance and upkeep of the Equipment.

20. Maintenance

- 20.1 The Service Provider shall at all times be required to service, maintain and repair the Equipment at its own cost and in strict accordance with the specifications, requirement and/or recommendations of the Equipment Supplier as notified to the Service Provider from time to time. The Service Provider shall not do anything which has the effect of voiding any warranty provided by an Equipment Supplier in respect of any of the Equipment. The Service Provider shall do all things required to ensure that TPC does not in any way breach its obligations under the Equipment Sale Agreement.
- 20.2 The Service Provider shall, at its own cost, ensure that each Equipment undergoes an Equipment Inspection Test according to Applicable Law and the results and other records relating to such tests shall be maintained and made available to TPC at its request. TPC may, in its discretion, request that the results of each such test be forwarded to TPC within seven (7) days of the completion of each such test.

- 20.3 If at any time Equipment is in need of service, maintenance and/or repair and the Service Provider fails to make such repair within a reasonable time, TPC shall notify the Service Provider of such failure and shall indicate in that notice the type of service, maintenance and/or repair that is required and the period within which such service, maintenance and/or repair must be completed. If such service, maintenance and/or repair is not completed within the time specified in TPC's notice, TPC shall be entitled to effect such service, maintenance and/or repair at the cost and expense of the Service Provider in which case TPC may, in its discretion, liquidate partially or fully the Performance Guarantee or deduct amount from Reserve Fund.
- 20.4 The Service Provider shall maintain a complete and detailed record of all service, maintenance and/or repairs (including the cost of any such service) for each Equipment and shall, upon reasonable notice, make such records available to TPC for audit and/or inspection.

21. Reserve Fund

- 21.1 The Service Provider shall establish the Reserve Fund which shall be maintained by TPC as security against amounts which may become due and payable to TPC during the term of this Agreement, if so mentioned in **PC**.
- 21.2 The Reserve Fund shall be built up from amounts retained by TPC from payments to be made to the Service Provider. TPC shall retain no more than three percent (3%) of each payment due to the Service Provider, up to the amount mentioned in **PC**. The Service Provider shall not withdraw from the account/ Reserve Fund without written permission of TPC.
- 21.3 Subject to clause 21.4, TPC shall be entitled to, in accordance with the express terms of this Agreement, make withdrawals from the Reserve Fund at any time after the Commencement Date.
- 21.4 The Service Provider shall name TPC as a co-beneficiary on the Reserve Fund account and execute all documents and do all things necessary to ensure that the bank or other financial institution with whom the Reserve Fund is established is authorized and empowered to, upon first written demand from TPC, immediately withdraw and/or transfer the demanded amounts to TPC with or without objection from the Service Provider.
- 21.5 Prior to making any withdrawal from the Reserve Fund, TPC shall have notified the Service Provider of the Service Provider's breach of a specific obligation under the Agreement, and shall also provide relevant details in respect of the breach (including the details of the Service Provider's failure to remedy the breach within the time agreed and/or specified by TPC).
- 21.6 TPC shall, prior to making a withdrawal or as soon as practicable following a withdrawal from the Reserve Fund, provide details of the amount to be withdrawn or the amount that has been withdrawn, and purpose of use. Following a withdrawal, the Service Provider shall, within the period specified by TPC or agreed between the Parties, replenish the Reserve Fund in a manner prescribed in clause 21.2. Failure of the Service Provider to replenish the Reserve Fund following a withdrawal pursuant to this clause shall constitute a material breach of this Agreement. TPC has the right to withdraw from Reserve Fund, if the Equipment are not made operational by Service Provider in a time specified by TPC or in case of loss of passenger revenue. The procedure for work or services executed at cost and risk of the Service Provider is mentioned in **PC**.
- 21.7 If, upon the expiry of the term of the Agreement or its earlier termination or the termination of the Service Provider's employment under the Agreement, no amounts are due and/or payable to TPC under this Agreement, then the Service Provider shall (within fourteen (14) days of such expiry or termination), be entitled to liquidate the Reserve Fund and retain any and all amounts remaining therein.

22. Spare Parts

- 22.1 The Service Provider is required to stock and secure spare parts store (at his own cost) as well as provide suitably qualified staff members to manage such store in accordance with the SOR.
- 22.2 To the extent any spare part is required for the performance of the Services, the Service Provider shall be responsible for providing the same at its own cost and expense.

23. Tools and equipment

- 23.1 The Service Provider is required to provide the required tools and equipment to maintain the Equipment and/or otherwise to provide the Services in accordance with the SOR.

PART E - AUTHORISED REPRESENTATIVES, PROTOCOLS AND SERVICES NOTICES

24. Authorized Representative

- 24.1 TPC and the Service Provider shall notify each other, by no later than five (5) days after the Effective Date, of the identity and contact details of their Authorized Representatives. Each Party shall be entitled to replace such Authorized Representative by notice to the other Party.
- 24.2 In addition to TPC's Authorized Representative, TPC shall, by written notice to the Service Provider, be entitled to engage a System Controls Service Provider and/or otherwise delegate from time to time certain of its obligations under this Agreement. TPC shall clearly specify the responsibility(ies) and/or authority(ies) of such delegate in the notice to the Service Provider. The Service Provider agrees to cooperate fully with any such delegate as a representative of TPC.
- 24.3 Unless it is stated otherwise in the notice of a Party, a Party's Authorized Representative shall be entitled to bind such Party for any and all purposes connected with this Agreement.
- 24.4 All Service Notices and other notices required under or pursuant to this Agreement, unless expressly stated otherwise in this Agreement (or instructed in writing by the Party to whom notice is to be given) shall be directed to the Authorized Representative of such Party.
- 24.5 Without derogating from the generality of this clause 24, TPC and the Service Provider, as the case may be, shall be entitled to appoint further Authorized Representatives for specific matters as detailed in its notification of such Authorized Representative.

25. Service Notices, Protocols and Amendments

- 25.1 TPC shall be entitled to issue Protocols under this Agreement or for interaction with other Services Provider/Contractors or use of common facilities within BRT system or use of corridor etc.
- 25.2 TPC shall be entitled to issue reasonable Protocols or amend previously issued Protocols on twenty-four (24) hours' notice to the Service Provider in the case of urgent matters and on seven (7) days' notice in respect of all other matters.

PART F – LIQUIDATED DAMAGES

26. Liquidated Damages

- 26.1 TPC shall be entitled to impose Liquidated Damages on the Service Provider in accordance with the provisions of this clause 26 and the Schedule of Requirements for the Service Provider's failure to achieve certain KPIs as indicated in the SOR.
- 26.2 The Parties agree that the amounts specified in this clause 26.2 and the SOR for the Service Provider's failure to achieve certain KPIs represent the likely loss to TPC as a result of any failure of the Service Provider to meet the KPIs and are reasonable and constitute liquidated damages and not a penalty. The Service Provider further waives, to the extent permitted by Applicable Law, any defence as to the validity and quantum of Liquidated Damages set out in this Agreement on the grounds that such Liquidated Damages are void as penalties or otherwise.

- 26.3 TPC shall be entitled to conduct audits of the Service Provider's operations at any time without notice in order to ensure the continued compliance with this Agreement and that the Service Provider continues to achieve the various indicated KPIs. Such audits may be conducted in relation to the Equipment, the Services, Service Provider's staff, Service Provider's offices (including service and performance records) and any other place where any element of the Service is being performed.
- 26.4 To the extent that TPC discovered an instance of the Service Provider's failure to achieve a particular KPI, TPC shall notify the Service Provider with details of the particular KPI, the details of the failure and the applicable Liquidated Damages as indicated in the SOR. TPC may at its discretion specify period and type of certain failure which should be cured/rectified in specific period.
- 26.5 If Liquidated Damages are imposed, then TPC shall be entitled to withhold and/or deduct the imposed amounts from the Service Provider's next payable invoice, any subsequent invoice or in increments from several subsequent invoices.
- 26.6 The maximum amount of Liquidated Damages that may be imposed on the Service Provider in any given month is as indicated in the SOR.

PART G – WARRANTIES AND CHANGE IN OWNERSHIP

27. Warranties, Undertakings and Indemnities

27.1 Service Provider Warranties

- 27.1.1 The Service Provider acknowledges that TPC has entered into this Agreement relying on the strength of the warranties given to TPC by the Service Provider and that the warranties are given with the intention of inducing TPC (which has been so induced) to enter into this Agreement on the basis that such warranties are and shall be correct for the duration of this Agreement.
- 27.1.2 Each Service Provider Warranty shall be a separate Warranty and in no way limited or restricted by any reference to, or inference from, the terms of any other Warranty or by any other provision in this Agreement.
- 27.1.3 The Service Provider accordingly warrants and undertakes that:
- (a) it is properly constituted and incorporated in accordance with the Applicable Law;
 - (b) it has conducted site inspection and examined the functionality and condition of all Equipment and requirements of Allied Services;
 - (c) it has thorough knowledge of the Equipment, brand, model, performance and its quality and have did site inspection of all Equipment;
 - (d) It has examined the specification of Equipment, required Allied Services and made all due diligence in estimation of all operation and maintenance costs of Equipment and services under the Agreement;
 - (e) Satisfied himself with all the economic, financial and legal variables including but not limited to foreign exchange rates, inflation rates, minimum wage rates, customs and tax rates and all related labor and legal obligations;
 - (f) Satisfied himself of all conditions and circumstances affecting Contract price;
 - (g) it is a special purpose company established in connection with this Agreement and it has not carried out any activity since the date of its incorporation as a company, other than in connection with this Agreement;

- (h) it has the power, authority and legal capacity to enter into and exercise its rights and perform its obligations under this Agreement;
- (i) it has taken all necessary action to authorise the execution, delivery and performance of this Agreement;
- (j) the obligations expressed to be assumed by the Service Provider under this Agreement are legal, valid, binding and enforceable to the extent permitted by Applicable Law;
- (k) it will on operation date hold, in cash, an amount equivalent to the acquisition cost of all required tools, equipment, furniture and other basic business materials required for the operating of its business, plus the necessary working capital required during the pre-operational and initial operational period;
- (l) it is and will be in compliance with all Applicable Laws;
- (m) no claim is presently being assessed and no litigation, arbitration or administrative proceedings are presently in progress or, to the best of the knowledge of the Service Provider, pending or threatened against it (including its shareholders) or any of its assets which will or might have a material adverse effect on the ability of the Service Provider to perform its obligations under this Agreement;
- (n) it is not the subject of any other obligation, compliance with which will or is likely to have a material adverse effect on the ability of the Service Provider to perform its obligations under this Agreement;
- (o) no proceedings or other steps have been taken and not discharged (nor threatened) for its winding-up or dissolution or for the appointment of a receiver, administrative receiver, administrator, liquidator, trustee or similar officer in relation to any of its assets or revenues;
- (p) all information disclosed by or on behalf of the Service Provider to TPC is true, complete and accurate in all material respects and the Service Provider is not aware of any material facts or circumstances not disclosed to TPC which would, if disclosed, be likely to have an adverse effect on TPC's decision (acting reasonably) to award this Agreement to the Service Provider;
- (q) all insurance premiums in respect of insurance obligations placed on the Service Provider in accordance with this Agreement have been timely paid and none are in arrears.

27.2 Service Provider Undertakings

The Service Provider undertakes with TPC that:

- 27.2.1 it will give TPC immediate notice upon becoming aware that any judicial or court proceedings, mediation, litigation, arbitration, administrative or adjudication by or against the Service Provider before any court or Regulatory Authority may be threatened or pending;
- 27.2.2 it will not without the prior written consent of TPC (and whether by a single transaction or by a series of transactions whether related or not) sell, transfer, lend, encumber or otherwise dispose of the whole or any part of its business;
- 27.2.3 it shall not without the written consent of TPC incorporate any company or purchase or acquire or subscribe for any shares in any company save where such company is involved in the provision of the Services;

- 27.2.4 it shall not without the prior written consent of TPC make any loans or grant any credit or give any guarantee or indemnity to or for the benefit of any person or otherwise voluntarily or for consideration assume any liability (whether actual or contingent) in respect of any obligation of any other person except as contemplated by this Agreement;
 - 27.2.5 it shall not change or cease its business or start any other business under this Agreement;
 - 27.2.6 it shall immediately notify TPC of any discussions and/or negotiations that may result in a change in the ownership structure of the Service Provider or its ultimate parent company (if applicable).
- 27.3 TPC and Service Provider Indemnities
- 27.3.1 The Service Provider shall take steps to ensure the safety of property and all persons while they are being conveyed on the BRT System or while they are in, entering or leaving premises under the control of the Service Provider.
 - 27.3.2 The Service Provider shall be liable for any loss or damages resulting from damage to property including TPC property, or the death of or injury to any person which is caused directly or indirectly by an intentional or negligent act or omission of the Service Provider, its agents, Employees or sub-contractors.
 - 27.3.3 The Service Provider indemnifies and agrees to hold TPC harmless against all claims, demands, suits, proceedings, judgments, damages, loss, costs, charges, fines, penalties, taxes and expenses, of whatsoever nature incurred by either of the Parties, or by any third party, in consequence of a failure by the Service Provider to comply with the terms of this Agreement or any Applicable Law.
 - 27.3.4 Nothing contained in this clause 27.3 shall be deemed to render the Service Provider liable for, or require it to indemnify TPC against, any compensation or damages with respect to injuries or damage to persons or property resulting from any negligent act or omission of TPC or its agents or employees in respect of any claims, demands, lawsuits, damages, costs, charges and expenses in respect thereof or pertaining thereto and each Party hereby indemnifies the other against any claims, demands, lawsuits, damages, costs, charges and expenses incurred by such other Party in consequence of the negligent acts or omissions of the other Party's agents or employees.
- 27.4 All warranties, representations, undertakings, indemnities and other obligations made, given or undertaken by the Service Provider in this Agreement are cumulative and none shall be given a limited construction by reference to any other.

PART H - FORCE MAJEURE, NECESSARY ACTION, BREACH, TERMINATION AND DISPUTE RESOLUTION

28. Force Majeure

- 28.1 If either Party is prevented in whole or in part from discharging its obligations pursuant to this Agreement as a result of an Event of Force Majeure, such Party shall, as soon as reasonably practicable, notify the other Party accordingly. The aforementioned notice shall contain the following information:
 - 28.1.1 the obligations which are affected and the extent to which the relevant Party cannot perform those obligations;
 - 28.1.2 a detailed description of the Event of Force Majeure;
 - 28.1.3 an estimate of the time period which the Event of Force Majeure is envisaged to continue; and

- 28.1.4 the measures proposed to be adopted to remedy or minimise the effects of and costs arising from the Event of Force Majeure. If the Service Provider is the Party prevented from discharging its obligations as a result of the Event of Force Majeure and TPC is of the opinion that the measures proposed are not adequate, it shall advise the Service Provider by Service Notice. Such Service Notice may propose alternate or additional measures which in the opinion of TPC may curtail the Event of Force Majeure and/or the costs arising therefrom. Notwithstanding the provisions of this clause 28.1.4, the Service Provider shall be obliged to take all proactive steps as may be reasonably possible in anticipation of Events of Force Majeure so as to enable the Service Provider to mitigate the financial effects thereof, including but not limited to, the entering into of appropriate contractual arrangements with its Employees.
- 28.2 The Party prevented from discharging its obligations pursuant to this Agreement as a result of an Event of Force Majeure shall:
- 28.2.1 use all reasonable endeavours to remedy or minimise the effects of the Event of Force Majeure; and
- 28.2.2 take all reasonable and necessary steps available to it as contemplated in clause 28.1.4 to mitigate any loss suffered by such Party or the other Party or any passengers as a result of that Party's failure to discharge its obligations pursuant to this Agreement.
- 28.3 In the event that an Event of Force Majeure affects the Service Provider's ability to perform any of its obligations under this Agreement and to the extent that the Services, or any part thereof, are suspended, the Service Provider shall not be entitled to claim payment from TPC for such suspended Services, or any additional costs incurred by the Service Provider as a result of the Event of Force Majeure or in relation to any steps taken by the Service Provider in mitigating the effects of the Event of Force Majeure.
- 28.4 In the event that the Service Provider is the Party affected by an Event of Force Majeure, TPC may, in response to the notice issued by the Service Provider in accordance with clause 28.1, issue a Service Notice to the Service Provider indicating any part of the Services which should nonetheless be performed by the Service Provider for the period during which the Event of Force Majeure subsists. TPC shall in such event make payment to the Service Provider for such Services in accordance with the Payment Calculation Schedule.
- 28.5 If an Event of Force Majeure no longer prevents the Service Provider from performing its obligations under this Agreement, the Service Provider shall be entitled to a reasonable period, taking into account the extent to which it has wound down its operations during the period of Force Majeure, to re-establish the Services in compliance with its obligations under this Agreement.
- 28.6 If an Event of Force Majeure continues uninterrupted for more than one hundred eighty (180) days and continues to prevent a Party from performing all of its obligations under this Agreement, either Party shall be entitled to terminate this Agreement upon fourteen (14) days' notice to the other Party, provided that before doing so the Parties shall first have met to find a mutually satisfactory solution for remedying such Event of Force Majeure and no Party shall terminate this Agreement unless the Parties are unable to agree on a solution.
- 28.7 Neither Party shall have any liability to the other in respect of the termination of this Agreement as a consequence of an Event of Force Majeure or as a result of any failure to carry out any of its obligations hereunder resulting from an Event of Force Majeure.

29. Breach and Termination

- 29.1 If the Service Provider commits a material breach of this Agreement and fails to remedy the breach within ten (10) Business Days after receipt from TPC of a notice calling upon it to do so or such other time as specified by TPC then TPC shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or in accordance with this Agreement, to seek specific performance of this Agreement or to terminate this Agreement forthwith on notice to the Service Provider and in either event, to recover such damages as it may have sustained.
- 29.2 For purposes of this Agreement, a material breach shall include but not be limited to the foregoing if the Service Provider:
- 29.2.1 fails to provide or maintain the Performance Guarantee; or
 - 29.2.2 fails to provide or maintain the Parent Company Guarantee; or
 - 29.2.3 fails to provide or maintain the Reserve Fund; or
 - 29.2.4 at any time, is Financially Distressed; or
 - 29.2.5 in the opinion of TPC, commits a Prohibited Act; or
 - 29.2.6 sells, transfers or otherwise disposes of all or a substantial portion of its shares, assets or business, without the prior written consent of TPC; or
 - 29.2.7 goes into liquidation, whether provisionally or finally (other than a voluntary liquidation for the purpose of amalgamation or reconstruction to which TPC has given its prior written consent); or
 - 29.2.8 has judgment of a material nature taken against it likely to affect the Service Provider's status as a going concern and fails to satisfy or apply to have the same set aside within seven (7) days of becoming aware thereof; or
 - 29.2.9 delegates, cedes or sub-contracts this Agreement or part thereof in contravention of the provisions hereof without having obtained TPC's prior written consent; or
 - 29.2.10 contravenes the provisions of SOR; or
 - 29.2.11 fails to obtain or maintain as required any of the necessary Operating Licenses/permits to be used in the rendering of the Services or has such necessary Operating Licenses withdrawn, canceled, suspended or revoked; or
 - 29.2.12 acts or attempts to act in a fraudulent or otherwise illegal manner in obtaining or executing a contract with any government department, provincial administration, municipality, public body, company or person; or
 - 29.2.13 violates or attempts to violate any Applicable Law or otherwise commits any criminal act; or
 - 29.2.14 enters into any agreement or arrangement, whether legally binding or not, with any other person, firm or company to refrain from formally responding to TPC's calls for proposals or the entering into of any negotiations with TPC in relation to this Agreement; or
 - 29.2.15 Abandons, suspend services or otherwise repudiates the Services or any of its obligations under this Agreement; or
 - 29.2.16 consistently fails to observe any provision of this Agreement or the Schedule of Requirements (despite being given notice in relation thereto), whether or not Liquidated Damages have been imposed, with the result that the Services may be regarded by TPC as being materially defective; or
 - 29.2.17 incurs Liquidated Damages equal to or exceeding the maximum amount of Liquidated Damages as indicated in the SOR consecutively for months as mentioned in **PC**.

- 29.3 If TPC:
- 29.3.1 commits a material breach of this Agreement (other than a breach of payment obligations) and fails to remedy the breach within ten (10) Business Days after receipt from the Service Provider calling upon it to do so; or
 - 29.3.2 commits a breach of any payment obligation in accordance with this Agreement and fails without justification to make payment within thirty (30) Business Days after receipt from the Service Provider of a notice calling upon it to do so,
- then the Service Provider shall be entitled, in addition to and without prejudice to any other right it may have under Applicable Law or under the terms of this Agreement, to seek specific performance of the terms of this Agreement or to terminate this Agreement upon sixty (60) days' notice to TPC and in either event, to recover such costs, losses and damages as it may have sustained.
- 29.4 In the event of termination of this Agreement:
- 29.4.1 TPC shall be entitled to immediately take possession of all Equipment and Service Provider shall transfer other assets required for the performance of the Services to TPC; and
 - 29.4.2 TPC may immediately appoint auditors to check and verify all relevant books, records and other data of the Service Provider and the Service Provider shall give full cooperation in that regard and make all such information available to TPC on request.
 - 29.4.3 Permanence Guarantee shall be forfeited in full;

30. Dispute resolution

30.1 Disputes

- 30.1.1 For the purposes of this clause 30, the term "dispute" shall be interpreted in its widest sense and shall include any dispute or difference in connection with or in respect of the conclusion or existence of this Agreement, the carrying into effect of this Agreement, the interpretation or application of the provisions of this Agreement, the Parties' respective rights and obligations in accordance with and arising out of this Agreement or the validity, enforceability, rectification, termination or cancellation, whether in whole or in part, of this Agreement.
- 30.1.2 Save as otherwise provided for in this Agreement, any dispute between the Parties arising in connection with this Agreement shall be resolved in accordance with the provisions of this clause 30.

30.2 Resolution by Chief Executives

- 30.2.1 Any dispute arising in connection with this Agreement may be referred by either Party to the Chief Executive of the Service Provider and the Chief Executive of TPC (or such other senior executives as the relevant Parties may determine) who shall attempt to resolve the matter within ten (10) Business Days of the dispute being so referred to them or within such other time as may be agreed between the Parties.

30.3 Arbitration

- 30.3.1 If the Parties are unable to resolve the dispute pursuant to clause 30.2, either Party shall be entitled to refer a dispute to arbitration in accordance with this clause 30 by notifying the other Party in writing of its intention to do so.
- 30.3.2 The arbitration proceedings shall be carried out under the procedures, rules and regulations of Arbitration Act, 1940 and its successors, and such procedures, rules and regulations shall be deemed to be incorporated into this clause 30.3 by reference. Any such arbitration shall be subject to the Applicable Law.

- 30.3.3 The seat of the arbitration shall be Pakistan and all arbitration hearings shall be held in Peshawar unless otherwise agreed in writing by the Parties.
- 30.3.4 Unless otherwise required by TPC, such arbitration shall be conducted in the English language and the award of any arbitrator or arbitral panel, together with the reasons for the determination, shall be written in the English language.
- 30.3.5 Unless otherwise required by TPC, all evidence, submissions or documents presented at the arbitration in a language other than in the English language shall be accompanied by a simultaneous English language translation thereof, if oral, or if written, a certified English language translation.
- 30.3.6 The arbitrator or arbitral panel shall have full power to open up, review and revise any determinations, decisions or findings in relation to the dispute.
- 30.3.7 The obligations of the Parties shall not be altered by reason of the arbitration being conducted during the term of the Agreement.
- 30.3.8 Any monetary award in any arbitration shall be denominated and payable in PKR.
- 30.3.9 The Parties agree that all interim or final decisions and/or awards of the arbitrator or arbitral panel shall:
- a) be binding on the Parties and shall be given effect and implemented forthwith by them; and
 - b) be subject to the confidentiality restrictions in this Agreement and except as provided by agreement between the Parties, may not be publicised or otherwise disclosed provided always that nothing in this clause shall prevent either Party from applying to any court of competent jurisdiction to enforce the award.
- 30.3.10 The Parties hereby expressly agree irrevocably to waive all rights and recourse to appeal or challenge, and neither Party shall request the local courts to open up, revise or review, the final award of the arbitrator or arbitral panel save and except in the specific instances set out in Arbitration Act, 1940.
- 30.3.11 Reference of a dispute to arbitration shall not in any way vitiate nor invalidate the Agreement neither shall it be grounds for the Service Provider to cease performing its obligations nor for TPC to terminate the engagement of the Service Provider under the Agreement and the Service Provider shall proceed with its obligations with all due diligence.

PART I - MISCELLANEOUS MATTERS

31. Hazardous Substances

- 31.1 The Service Provider shall ensure that any hazardous materials or equipment used or intended to be used in the provision of the Services are stored safely and in safe keeping in accordance with all Applicable Law, ensure that all such materials are properly and clearly labelled on their containers, promptly inform TPC of all such materials being used or stored and comply with any other reasonable requirement of TPC in respect of such materials and equipment.

32. Intellectual Property

- 32.1 The Service Provider acknowledges that it shall not acquire any right, title or interest in or to the Intellectual Property of TPC and that all Intellectual Property developed pursuant to this Agreement (other than Intellectual Property belonging to the Service Provider or any third party) shall vest exclusively in TPC, save to the extent that the Parties otherwise agree in writing.

32.2 Should the Service Provider acquire title to any Intellectual Property of TPC or which is developed pursuant to this Agreement by operation of law (thus, where TPC in effect pays for its development) such Intellectual Property (other than Intellectual Property belonging to the Service Provider or any third party) shall be deemed to have been assigned by the Service Provider to TPC.

33. Insurance

33.1 The Service Provider agree to, at their own costs, establish and maintain no less than the minimum types and levels of insurances that are required by Applicable Law. It is mandatory that the insurance with respect to public properties shall be effected only through the National Insurance Company Limited (NICL) of Pakistan.

33.2 The Service Provider shall arrange for all kinds of insurance of Spare Parts/E&M Equipment/Maintenance Equipment/Monitoring Tools according to this Contract. Any amounts related to Spare Parts/E&M Equipment/Maintenance Equipment/Monitoring not insured or not recovered from the insurers shall be borne by the Service Provider.

33.3 The Service Provider shall also effect and maintain passenger and public liability insurance in relation to the operation of the Equipment. Such insurance shall, among other things, provide cover in respect of loss or damage suffered by reason of damage to property or death of or injury to any person resulting from any act or omission by Service Provider, the Drivers or their agents or Employees in connection with the operation of the Equipment in the provision of the Services. The TPC shall be a co-insured party under such insurance and the Service Provider shall be liable for and payment of all premiums in respect of such insurance.

33.4 The Service Provider shall effect and maintain full comprehensive Equipment insurance (including passenger and public liability) in respect of the Equipment from insurance company having a minimum rating of AA in long term (Public property shall be through NICL) on behalf of TPC within 30 days from acceptance of Equipment, on terms and conditions to TPC's reasonable satisfaction. The Service Provider shall be liable for and pay all premiums in respect of such insurance which includes theft, damage, faults, burglary etc. The Service Provider shall ensure that TPC is registered as co-insured under such insurance policy and provide proof of the insurance to TPC on demand.

33.5 The Service Provider shall procure and submit evidence of insurance cover within twenty-eight (28) days from the effectiveness of the Contract. The effective date of the coverage shall be the Commencement Date of this Contract. Failure to procure Insurance for Equipment from NICL, TPC shall procure shall insurance from NICL at the cost and risk of Service Provider.

33.6 The Service Provider shall be liable for any claims for passenger liability or public liability which are repudiated by TPC's insurer's due to any act or omission of the Service Provider, its directors, agents or Employees in providing the Services.

34. Restricted Companies

34.1 Restricted Companies and/or their shareholders shall not:

34.1.1 be a shareholder in the Bus Operator or subcontractors of the Bus Operator, or

34.1.2 be a party to a partnership, joint venture, subcontractor, consortium, arrangement with the ITS Contractor regarding any other work relating to services provided by the System Control Service Provider.

PART J - FINAL PROVISIONS

35. Addresses and notices

35.1 The Parties choose for the purposes of this Agreement the following addresses:

TPC: Chief Executive Officer, TransPeshawar (The Urban Mobility Company), KPUMA Building, Chamkani GT Road, Peshawar, Pakistan. E-mail: ceo@transpeshawar.pk

The Service Provider: [•].

- 35.2 Any legal process to be served on any of the Parties may be served on it at the physical address specified for it in clause 35.1 and it chooses that address for all purposes under this Agreement.
- 35.3 Any notice required by this Agreement to be given in writing shall, if given by email or cell phone-based short message service (“sms”), be regarded as having been given in writing for purposes of this Agreement, provided that the Parties may only utilise sms notification for operational authorizations in circumstances where operational action is required immediately and other changes to operations contemplated in this Agreement due to an emergency or such similar urgent operational matters.
- 35.4 Where operational authorizations are required, TPC will issue and log an authorization number and any relevant notice in accordance with this clause 35 shall quote such authorization number.
- 35.5 A notice to any of the Parties which is sent by registered post in a correctly addressed envelope to the address specified for it in clause 35.1 shall be deemed to have been received (unless the contrary is proved) within fourteen (14) days from the date it was posted, or which is delivered to the Party by hand at the physical address specified for it in clause 35.1, shall be deemed to have been received on the day of delivery, provided it was delivered to a responsible person during ordinary business hours.
- 35.6 Any notice by email to a Party at the email addresses of its Authorized Representatives shall be deemed to have been received (unless the contrary is proved) within twenty (20) minutes of transmission if transmitted at any time during which the Services are ordinarily rendered and if transmitted outside such time, within ten (10) minutes of recommencement of the rendering of the Services.
- 35.7 Any notice by sms to a Party at the mobile numbers of its Authorized Representatives shall be deemed to have been received (unless the contrary is proved) within twenty (20) minutes of transmission if transmitted at any time during which the Services are ordinarily rendered and if transmitted outside such time, within twenty (20) minutes of recommencement of the rendering of the Services.
- 35.8 Any notice in accordance with this clause 35 given by sms shall be followed by email confirming the contents and date of transmission of such sms.
- 35.9 Notwithstanding anything to the contrary in this clause 35, a notice or other communication actually received by any of the Parties (and for which written receipt has been obtained) shall be adequate notice or communication to it notwithstanding that the notice was not sent to or delivered at its chosen address.
- 35.10 Any Party may by a notice to the other Parties change its physical or postal address, email address or mobile number for the purposes of this clause 35 to any other physical or postal address, email address or mobile number provided that the change shall become effective on the seventh (7th) day after the receipt of the notice.

36. Change in Law

- 36.1 The Service Provider acknowledges and agrees that it shall take full risk and responsibility for a Change in Law occurring. Notwithstanding the foregoing, if a Change in Law occurs or is imminent that affects the rights and obligations of the Service Provider under this Agreement, the Service Provider shall notify TPC within fourteen (14) days of the date of such Change in Law occurring or (if earlier) coming to the attention of the Service Provider.

37. Remedies

37.1 No remedy conferred by this Agreement is intended to be exclusive of any other remedy which is otherwise available at law, by statute or otherwise. Each remedy shall be cumulative and in addition to every other remedy given hereunder or now or hereafter existing at law, by statute or otherwise. The selection of any one or more remedy by any of the Parties shall not constitute a waiver by such Party of the right to pursue any other remedy.

38. Confidentiality

38.1 Each Party shall at all times keep in confidence the Confidential Information of the other Party which it may acquire for the purposes of or in connection with this Agreement (whether prior to or after the Commencement Date) and shall not use or permit the use of such Confidential Information and shall procure that its employees shall not use the Confidential Information, for any other purpose and shall not disclose such Confidential Information to any third party.

38.2 Notwithstanding clause 38.1, a Party may disclose the Confidential Information of the other Party to such former Party's employees or Authorized Representatives to the extent that such employees or Authorized Representatives need to know the Confidential Information and shall ensure that such employees or Authorized Representatives are aware of and comply with, the confidentiality obligations contained in this clause 38.2.

38.3 Each Party shall take all such steps as may be reasonably necessary to prevent the Confidential Information of the other Party from falling into the hands of an unauthorized third party.

38.4 The Service Provider shall not make any comments to the media relating to this Agreement and any related matter nor shall it respond to any queries from the media without the prior written approval of TPC.

39. Severance

39.1 In the event that any provision of the Agreement is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Agreement enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Agreement.

40. No agency

40.1 No provision of this Agreement shall be construed as constituting an agency, partnership, or joint venture between the Parties and neither Party shall have any express or implied TPC to bind the other Party in any way or to represent the other Party unless specifically provided to the contrary in this Agreement, and, for the avoidance of doubt, this clause 40.1 shall not affect or otherwise derogate from the obligations and powers of the Service Provider in relation to handing over of the Equipment to other authorised parties as contemplated in this Agreement.

40.2 The Service Provider is an independent contractor performing the Agreement. The Service Provider is not an employee or agent of TPC.

41. Corruption and Fraud

41.1 The Service Provider warrants that in entering into the Agreement it has not committed any Prohibited Act.

41.2 In the event that the Service Provider is contacted by a Public Official requesting or suggesting that the Service Provider act in a manner which would constitute a Prohibited Act, the Service Provider shall immediately provide TPC in writing with full details of the request (including the identity of the Public Official making the request).

- 41.3 Without prejudice to clause 41.2, the Service Provider shall ensure that its staff undertaking activities in connection with the Agreement are subject to similar obligations to those set out in this clause 41 and the Service Provider shall enforce such obligations.
- 41.4 In the event that the Service Provider fails to comply with the requirements of this clause 41 TPC shall be entitled to terminate the Agreement pursuant to clause 29.
- 41.5 The Service Provider shall sign affidavit of Integrity Pact attached as Schedule 8 in Request for Proposal.

42. Entire Agreement

- 42.1 This Agreement constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the Effective Date. None of the Parties shall have any claim or right of action arising from any undertaking, representation or warranty not included in this Agreement.

43. No stipulation for the benefit of a third person

- 43.1 Save as is expressly provided for in this Agreement, no provision of this Agreement constitutes a stipulation for the benefit of a third person which, if accepted by the person, would bind any Party in favour of that person.

44. No representations

- 44.1 A Party may not rely on any representation which allegedly induced that Party to enter into this Agreement, unless the representation is provided in this Agreement.

45. Amendment

- 45.1 Except as set out elsewhere in this Agreement, no modification, amendment, addendum or variation to the Agreement shall be effective or binding, unless it:
- 45.1.1 is made in writing; and
 - 45.1.2 expressly sets out the modification, amendment, addendum or variation to the accordance with the Agreement; and
 - 45.1.3 refers to the Agreement; and
 - 45.1.4 is signed and dated by a representative of each Party.

46. Indulgences

- 46.1 The grant of any indulgence, extension of time or relaxation of any provision by a Party under this Agreement shall not constitute a waiver of any right by the grantor or prevent or adversely affect the exercise by the grantor of any existing or future right of the grantor.

47. General co-operation

- 47.1 The Parties shall co-operate with each other and shall each execute and deliver to the other Party such other instruments and documents and take such other actions as may be reasonably requested from time to time in order to carry out, evidence and confirm their rights and the intended purpose of this Agreement.
- 47.2 Each of the Parties undertake at all times to do all such things, perform all such acts and take all such steps within its power and control, as may be necessary for and incidental to the putting into effect or maintenance of the terms, conditions and import of this Agreement and ensuring that the Services are rendered consistently at the highest possible standard expected by TPC.
- 47.3 Each Party agrees to provide all information reasonably requested by the other in the exercise of their respective rights and performance of their obligations under this Agreement, subject to the confidentiality provisions of clause 38 of this Agreement.

48. Governing law

48.1 This Agreement is to be governed, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan.

49. Language

49.1 Unless expressly notified in advance by TPC, the primary language of the Agreement shall be English. All documents and communications issued between the Parties shall be in English. Unless expressly notified in advance by TPC, all minutes of meetings shall be issued in English.

50. Independent advice

50.1 Each of the Parties hereby respectively agrees and acknowledges that:

50.1.1 it has been free to secure independent legal advice as to the nature and effect of each provision of this Agreement and that it has either taken such independent legal advice or has dispensed with the necessity of doing so; and

50.1.2 each provision of this Agreement (and each provision of the Annexes) is fair and reasonable in all the circumstances and is part of the overall intention of the Parties in connection with this Agreement.

51. Good faith

51.1 The Parties shall, at all times, act in good faith towards each other and shall not bring the other Party into disrepute.

52. Survival of rights, duties and obligations

52.1 The Surviving Provisions will survive termination or completion of the Agreement.

52.2 In the event that the Agreement is terminated or completed, neither Party shall be liable to the other Party except:

52.2.1 under the Surviving Provisions; or

52.2.2 in respect of any breach of the Agreement occurring before such termination or completion; or

52.2.3 any rights or liabilities between the Parties that were pre-existing as at the date of termination or completion.

53. Assignment

53.1 The Service Provider shall not cede, assign, delegate or transfer any of its rights or obligations under the Agreement, or any part of it, or any benefit or interest therein, to any third party or Entity without the prior written consent of TPC.

53.2 Notwithstanding anything to the contrary stated in this Agreement, TPC shall be entitled, without requiring the consent of the Service Provider, to cede, assign, delegate or transfer any rights and/or obligations under this Agreement to any third party.

54. Waiver

54.1 Subject to clause 54.2, no relaxation, forbearance or delay by a Party in enforcing the Agreement will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Agreement, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Agreement.

54.2 Any waiver of a Party's rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Agreement shall be in writing, dated and signed by the representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Agreement operates as a waiver of any other breach of that term, or of a breach of any other term, of the Agreement.

55. Costs

55.1 Any costs, including all legal costs of an attorney and own client basis and taxes, incurred by a Party arising out of or in connection with a breach by another Party shall be borne by the Party in breach.

IN WITNESS WHEREOF the TPC and the Service Provider have caused this Agreement to be duly executed by their duly authorized representatives the day and year first above written.

For and on behalf of the TransPeshawar

For and on behalf of the Service Provider

• Signature: _____

• Signature: _____

CNIC: _____

CNIC: _____

Name: _____

Name: _____

Designation: Chief Executive Officer

Designation: _____

Company: TransPeshawar (The Urban
Mobility Company)

Company: _____

Witnessed by:

Witnessed by:

• Signature: _____

• Signature: _____

CNIC: _____

CNIC: _____

Name: _____

Name: _____

Designation: _____

Designation: _____

ANNEX A
DEFINITIONS AND INTERPRETATION

1. Definitions

1.1 In the Agreement, the following words and expressions shall have the meanings set out below:

- 1.1.1 “**Abandon**” means wholly or substantially cease to carry out the Services for ten (10) consecutive days or during thirty (30) days (whether consecutive or not) in any year, except when relieved of the obligation to do so by the express provisions of this Agreement;
- 1.1.2 “**Agreement**” means this agreement as amended from time to time and including the Annexes;
- 1.1.3 “**Allied Facilities/ Services**” means subsystems or subcomponent or other Equipment for which operation and maintenance are required or services which are required to operate Equipment for its intended purposes or mandatory works which are part of the SOR;
- 1.1.4 “**Annexes**” means the annexes attached to this Agreement;
- 1.1.5 “**Applicable Law**” means any constitution, statute, ordinance, treaty, decree, proclamation, rules, regulations or subordinated legislation or other legislative measure, as amended from time to time, including all national and provincial statutes and legislation and all municipal by-laws, as well as the common law and customary law and any judgment, decision, order or rule of any court or tribunal with relevant jurisdiction and any decision made by judicial or administrative bodies in accordance with any of the foregoing;
- 1.1.6 “**Authorized Representatives**” means persons authorized in writing by TPC and the Service Provider respectively, as contemplated in accordance with clause 24;
- 1.1.7 “**BRT System**” means the bus rapid transit system in Peshawar known as Peshawar Sustainable BRT Corridor System or any other name that should be assigned to the Peshawar bus/transit system and includes associated systems;
- 1.1.8 “**Bus Operator**” means any BRT vehicle operator appointed by TPC to operate public transport services as a part of the BRT System;
- 1.1.9 “**Business Day**” means any day other than weekend or public holiday in Pakistan as notified by Government of KPK;
- 1.1.10 “**Commencement Date**” means the date on which the Services shall commence as notified by TPC by way of a Service Notice referred to in clause 2;
- 1.1.11 “**Confidential Information**” means all information, without limitation, of whatsoever nature:
- (a) relating to the Disclosing Party’s business, operations, processes, drawings, sketches, plans, models, product information, know-how, market opportunities, customers and business affairs;
 - (b) relating to the relationship of the Disclosing Party with its customers and suppliers; or
 - (c) relating to the contents of this Agreement and any other information received pursuant to this Agreement,

but excludes information which:

- (a) constitutes an Operational Data; or
 - (b) is required to be disclosed under any law or regulation, or by any Regulatory Body, including any stock exchange on which a Receiving Party may be listed, provided that the Receiving Party in question shall first consult with the Disclosing Party before making any such disclosure, statement or announcement; or
 - (c) is in the public domain or enters into the public domain in any way, provided that the entry of such information into the public domain did not entail a breach of this Agreement by the Receiving Party; or
 - (d) the Receiving Party can show it was within its possession or knowledge, such information being in its use or having been recorded in its files, computers or other recording media, prior to receipt thereof from the Disclosing Party and which information was not previously acquired by the Receiving Party under any obligations of confidence or unlawfully; or
 - (e) is disclosed by the Receiving Party with the prior written approval of the Disclosing Party; or
 - (f) was disclosed by the Disclosing Party to a third party without restriction on disclosure or use, including without limitation, by way of a patent specification; or
 - (g) is hereafter disclosed or made available in good faith to the Receiving Party from a source other than the Disclosing Party, without breach by the Receiving Party of any obligation of confidentiality or non-use owed to the Disclosing Party or without breach by such other source who, to the knowledge of the Disclosing Party, is not subject to an obligation of confidentiality or non-use owed to the Disclosing Party; or
 - (h) is developed independently by the Receiving Party without reference to the Confidential Information;
- 1.1.12 **“Corridor”** means dedicated lanes from Chamkani Station to Karkhano station which includes stations, roads turning points, terminals, feeder route ramp etc.;
- 1.1.13 **“Disclosing Party”** means the Party disclosing Confidential Information to the Receiving Party;
- 1.1.14 **“Effective Date”** means when this Agreement has been signed by each Party, the latest of the dates upon which this Agreement was signed by any Party;
- 1.1.15 **“Employees”** means the employees of the Service Provider, or of any subcontractor contracted by the Service Provider to perform a part of the Service and include Technical Staff who maintain and operate equipment;
- 1.1.16 **“Encumbrance”** means:
- (a) any mortgage, pledge, lien, assignment or cession conferring security, hypothecation, security interest, preferential right or trust arrangement or other encumbrance securing any obligation of any person or any other charge (whether equitable or otherwise) of whatsoever nature or howsoever described; or

- (b) any arrangement under which money or claims to, or for the benefit of, a bank or other account may be applied, set off or made subject to a combination of accounts so as to effect discharge of any sum owed or payable to any person; or
 - (c) any other type of preferential agreement or arrangement (including any title transfer and retention arrangement), the effect of which is the creation of a security interest;
- 1.1.17 **“Entity”** means association, business, close corporation, company, concern, enterprise, joint venture, trust, undertaking, voluntary association, body corporate and any similar entity;
- 1.1.18 **“Event of Force Majeure”** means an act of God or public enemy, fire, explosion, earthquake, perils of the sea, flood, storm or other adverse weather conditions, war declared or undeclared, act of terrorism, civil war, revolution, civil commotion or other civil disorder, sabotage, riot, blockade, embargo, strikes (excluding strikes by Service Provider staff), lock-outs or other labour disputes, sanctions, epidemics, act of any Government, compliance with law, regulations or lawful demands of any Government or Governmental agency;
- 1.1.19 **“Equipment Sale Agreement”** means the agreement of sale and/or supply entered into, or to be entered into, between Peshawar Development Authority, on the one hand, and an Equipment Supplier/manufacturer/Civil Work Contractor, on the other hand, in relation to Equipment;
- 1.1.20 **“Equipment Supplier”** means such entity which sells or otherwise supplies Equipment to TPC or supplied to Peshawar Development Authority (PDA) in accordance with an Equipment Sale Agreement;
- 1.1.21 **“Financially Distressed”** means that:
 - (a) it appears to be reasonably unlikely that the Service Provider will be able to pay all of its debts as they become due and payable within the immediately ensuing 6 Months; or
 - (b) the Service Provider’s liabilities exceed its assets by more than fifteen percent (15%) at any time, and **“Financial Distress”** shall have a corresponding meaning;
- 1.1.22 **“Financial Year”** means, at any time, the financial year of the Service Provider starting on January and ending on 31 December;
- 1.1.23 **“ITS Contractors”** means the contractor (or any member of the consortium making up the System Control Service Provider) who shall be responsible for designing, implementing, maintaining and operating the Intelligent Transport System (ITS) equipment on the BRT Vehicles and at the Stations, as well as management, maintenance and control of the Stations in accordance with the System Control Service Provider Agreement signed with TPC;

- 1.1.24 “**Intellectual Property**” means any and all intellectual property rights of any nature anywhere in the world whether registered, registerable or otherwise, including patents, utility models, trademarks, registered designs and domain names, applications for any of the foregoing, trade or business names, goodwill, copyright and rights in the nature of copyright, design rights, rights in databases, moral rights, know-how, trade secrets and any other intellectual property rights which subsist in computer software, computer programs, websites, documents, information, techniques, business methods, drawings, logos, instruction manuals, lists and procedures and particulars of customers, marketing methods and procedures and advertising literature, including the “look and feel” of any websites;
- 1.1.25 “**Invoice**” means a valid tax invoice as contemplated in clause 4;
- 1.1.26 “**KPI**” means the key performance indicator;
- 1.1.27 “**Liquidated Damages**” means the amounts to be deducted from the monthly payments for the Service Provider pursuant to particular service level failures as set out in the Schedule of Requirements and in accordance with clause 26 or otherwise paid by the Service Provider to TPC;
- 1.1.28 “**Month**” or “**Monthly**” means a calendar month;
- 1.1.29 “**Operating Licence**” means any licence, consent or permit required by the Service Provider to enable it to provide the Services under this Agreement;
- 1.1.30 “**Operational Data**” means any operational data defined as such in the SOR or identified as “Operational Data” by TPC, which shall include, among others, location of Equipment, running hours, and which will be available to the Service Provider, Other Service Providers and the System Control Service Provider;
- 1.1.31 “**Schedule of Requirements**” means the schedule annexed hereto explaining scope of services or “services”;
- 1.1.32 “**Other Contractors**” means collectively, the System Control Service Provider or any subcontractor of the System Control Service Provider (or any member of the consortium making up the System Control Service Provider) and/or Service Provider of PSDs, Generator, Elevator, Escalator and Allied Services (excluding Other Service Providers) appointed by TPC in connection with the BRT System;
- 1.1.33 “**Other Service Provider**” means any other Equipment Service Provider appointed by PDA to install Equipment or appointed by TPC to operate public transport services as a part of the BRT System or Service Provider of TPC;
- 1.1.34 “**Other System**” means system as mentioned in SOR;
- 1.1.35 “**Party**” means a party to this Agreement;
- 1.1.36 “**Payment Calculation Schedule**” means the payment calculation schedule detailed in **PC**;
- 1.1.37 “**Parent Company**” means an entity (excluding any individual persons who are Employees of the Service Provider):
- (a) of which the Service Provider (or any member if the Service Provider is joint venture, partnership, consortium or other association of two or more entities or persons) is a branch, subsidiary or other similar related entity; or

- (b) which directly or indirectly exercises management control over the Service Provider (or any member if the Service Provider is joint venture, partnership, consortium or other association of two or more entities or persons);
- 1.1.38 **“Parent Company Guarantee”** means the guarantee to be provided to TPC by the Parent Company of the Service Provider pursuant to clause 3 and the specimen form provided in **Annex F**;
- 1.1.39 **“Performance Guarantee”** means the unconditional, irrevocable on-demand performance guarantee in the specimen form attached as explained in **PC** also interchangeably used as Performance Security;
- 1.1.40 **“PKR”** means Pakistani rupee;
- 1.1.41 **“Prohibited Act”** means:
- (a) offering, giving or agreeing to give to a Public Official a gift or consideration of any kind as an inducement or reward for:
 - (i) doing or not doing (or for having done or not having done) any act; or
 - (ii) showing or not showing (or for having shown or not shown) favour or disfavour to any person,
- in relation to the award or performance of the Agreement or any other agreement with TPC; or
- (b) entering into an agreement for which commission has been paid or has been agreed to be paid by the Service Provider or on its behalf, or to its knowledge, unless before the relevant agreement is entered into, particulars of any such commission and of the terms of any such agreement for the payment thereof have been disclosed in writing to TPC; or
 - (c) committing any offence under the Applicable Law creating offences in respect of fraudulent acts; or
 - (d) defrauding, attempting to defraud or conspiring to defraud TPC;
- 1.1.42 **“Project”** means the Peshawar Sustainable BRT Corridor System project carried out by TPC;
- 1.1.43 **“Protocol”** means a protocol and/or a standard operating procedure issued from time to time by TPC indicating how, among other things, Services are to be rendered, the manner in which the Service Provider and Other Service Providers should work together, the exact procedures to be followed in order to comply with service level requirements set out in the Schedule of Requirements and any other ancillary matters;
- 1.1.44 **“Public Official”** means an official or employee of a government owned or controlled enterprise or any Regulatory Body and shall include any individual defined as a public official in an Applicable Law;
- 1.1.45 **“Quarter”** or **“Quarterly”** means a consecutive period of three (3) Months commencing from the start of a Financial Year or calendar year, as the case may be;
- 1.1.46 **“Receiving Party”** means the Party receiving Confidential Information from the Disclosing Party;

- 1.1.47 **“Reserve Fund”** means the fund to be established as a security in accordance with clause 21;
- 1.1.48 **“Restricted Companies”** means Bus Operators and/or ITS Contractor;
- 1.1.49 **“Regulatory Body”** means any governmental, semi-governmental, administrative, fiscal or judicial ministry, department, commission, authority, tribunal, agency, municipality or body, and shall include the provider of electricity, gas, water, wastewater, telecoms and other such public services, and anybody with a regulatory function under the Applicable Law;
- 1.1.50 **“Service Notice”** means a notice given to the Service Provider by TPC in accordance with this Agreement;
- 1.1.51 **“Staging Facility”** means the staging area used by the Bus Operator or the Service Provider in the provision of the Services as described in respective contract, or as otherwise authorized by TPC for temporary parking of BRT Vehicles / emergency vehicles in day and/or night time at Dabgari Garden and is top floor of Dabgari Commercial Centre which includes two level building;
- 1.1.52 **“Stations”** means the stations described in the Schedule of Requirements; and which are intended as passenger embarkation and disembarkation points and Station means any one of them;
- 1.1.53 **“Surviving Provisions”** means clauses 1 (Preliminary Matters); 29 (*Breach and Termination*); 30 (*Dispute resolution*); 32 (*Intellectual Property*); 35 - 55 (*Part J - Final Provisions*) and this Annex A;
- 1.1.54 **“Termination Date”** means the fifth (5th) anniversary of the Commencement Date or the date on which an earlier termination pursuant to the terms of the Agreement takes effect;
- 1.1.55 **“Uniform”** means the uniform to be worn by those Employees of the Service Provider required to fulfil their duties in view of members of the public, as prescribed in the Schedule of Requirements and includes the name tag issued to each Employee by Service Provider;
- 1.1.56 **“Warranty”** means the warranties and undertakings given to TPC by the Service Provider, set out in clause 27;
- 1.1.57 **“Week”** or **“Weekly”** means the period commencing at 00h00 on Monday and ending at 24h00 on Sunday each calendar week;

2. Interpretation

2.1 In the Agreement:

- 2.1.1 in the event of conflict between the Annexes and the provisions of this Agreement (excluding the Annexes), the provisions of the Agreement shall prevail;
- 2.1.2 any definition in this Agreement, shall bear the same meaning and apply throughout this Agreement including Annexes hereto, unless otherwise stated or inconsistent with the context in which it appears;
- 2.1.3 the singular includes the plural and vice versa;
- 2.1.4 a reference to a statutory provision includes any subordinate legislation made from time to time under that provision and includes those provisions as amended, consolidated, re-enacted or replaced from time to time;

- 2.1.5 a reference to a document includes the document as modified from time to time and any document replacing it, in each case in the manner permitted by the Agreement;
- 2.1.6 a reference to a gender includes the other genders;
- 2.1.7 a reference to any government agency or body, if that agency or body ceases to exist or is reconstituted, renamed or replaced or has its powers or functions removed (“defunct body”), means the agency or body that performs most closely the functions of the defunct body;
- 2.1.8 a reference to an “agent” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;
- 2.1.9 a reference to a “subsidiary” shall be a reference to a subsidiary as defined in the Companies Act, 2017;
- 2.1.10 references in this Agreement to “clauses” or to “Annexes”, are to clauses of and Annexes to this Agreement;
- 2.1.11 references to notices or requests made or received by any of the Parties shall, unless expressly provided otherwise in this Agreement, refer to notices or requests in writing;
- 2.1.12 references to “agree” or “agreed” shall require the agreement to be recorded in writing and signed by the authorised representatives of the Parties;
- 2.1.13 no rule of construction shall be applied to the disadvantage of a Party to this Agreement because that Party was responsible for or participated in the preparation of this Agreement or any part of it;
- 2.1.14 unless otherwise provided, any number of days prescribed shall be determined by excluding the first and including the last day or, where the last day falls on a day that is not a Business Day, the next succeeding Business Day;
- 2.1.15 references to day/s, month/s or year/s shall be construed as Gregorian calendar day/s, month/s or year/s, as the case may be;
- 2.1.16 if a definition imposes substantive rights and obligations on a Party, such rights and obligations shall be given effect to and shall be enforceable, notwithstanding that they are contained in a definition;
- 2.1.17 a reference to a Party includes that Party’s successors and permitted assigns;
- 2.1.18 the use of the word “including” followed by a specific example/s shall not be construed as limiting the meaning of the general wording preceding it and it shall be construed as if it were followed by “without being limited to”.

Annex-F

PARENT COMPANY GUARANTEE

<Insert name of Parent Company>

(To be printed on Judicial Stamp Paper of Prescribed Fee)

(GUARANTOR)

IN FAVOUR OF

TRANSPESHAWAR (THE URBAN MOBILITY COMPANY)

(TPC)

PARENT COMPANY GUARANTEE

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THIS PARENT COMPANY GUARANTEE (the “**Guarantee**”) is made on <Insert date> 2025

BETWEEN:

- (1) **TRANSPESHAWAR (THE URBAN MOBILITY COMPANY)**, a company incorporated in February 09, 2017 with Security Exchange Commission of Pakistan, with company registration no.010569 and whose registered address is at KPUMA Building, Chamkani, GT Road, Peshawar, KPK, Pakistan (“**TPC**”); and
- (2) <Insert name of the Parent Company>, a company incorporated in [•], with company registration no. [•] and whose registered address is at [•] (the “**Guarantor**”).

The TPC and the Guarantor are individually referred to herein as a “**Party**” and collectively as the “**Parties**”.

WHEREAS:

- A. <Insert name of the BRT Company> (the “**Service Provider**”) has been awarded by TPC an agreement relating to operation and maintenance services for Platform Screen Doors (PSD) and Allied Services in Peshawar BRT (the “**Agreement**”).
- B. The Service Provider is a <State relationship with the Guarantor (branch, subsidiary, affiliate or other relationship)> of the Guarantor] / [The Service Provider is an Association of Persons and <Insert name of member of Service Provider > (the “**Member**”) is a <State relationship with the Guarantor (branch, subsidiary, affiliate or other relationship)> of the Guarantor.]
- C. Under the Agreement, the Service Provider is required to procure a parent company guarantee from its parent company to guarantee the Service Providers’ performance of its duties and obligations arising under, out of or in connection with the Agreement.
- D. The Guarantee is being delivered by the Service Provider to TPC in fulfilment of the Service Provider’s obligation to deliver a parent company guarantee to TPC under the Agreement.
- E. The Agreement is entered into by TPC in reliance upon the undertakings of the Guarantor to TPC contained in the Guarantee.

NOW THE GUARANTEE PROVIDES:

1. PRELIMINARY MATTERS

1.1 Definitions and Interpretation

- 1.1.1 The defined words and expressions set out in Clause 1 of Appendix 1 [*Definitions and Interpretation*] and the provisions relating to the construction and interpretation of the Guarantee set out in Clause 2 of Appendix 1 [*Definitions and Interpretation*] shall apply to the Guarantee.

2. GUARANTEES AND INDEMNITIES

2.1 Guaranteed Obligations

- 2.1.1 The Guarantor irrevocably and unconditionally guarantees the performance and discharge by the Service Provider of the Guaranteed Obligations at the times and in the manner provided or contemplated in the Agreement.
- 2.1.2 Except as otherwise expressly provided in the Guarantee, the Guarantee shall not impose on the Guarantor any duties, obligations or liabilities greater than those assumed by the Service Provider under the Agreement.
- 2.1.3 The Guarantee shall be binding upon the successors and assignees of the Guarantor and shall extend to and ensure for the benefit of the successors or assignees of TPC.

2.2 Indemnity by Guarantor

- 2.2.1 If the Guaranteed Obligations are, or become, unenforceable, invalid or illegal (in whole or

in part), the Guarantor indemnifies and holds harmless TPC, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of, under or in relation to any failure of the Service Provider to perform or discharge any or all of the Guaranteed Obligations.

2.2.2 The Guarantor, as separate and independent obligation from its duties, obligations and liabilities under Sub-clause 2.2.1, indemnifies and holds harmless TPC, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which arise out of, under or in relation to, any failure of the Service Provider to perform or discharge any or all of the Guaranteed Obligations.

2.3 **Additional Security**

2.3.1 The Guarantee shall be in addition to, and independent of, any other security which TPC may hold from time to time in respect of the discharge and performance by the Service Provider of its duties, obligations and liabilities (including the Guaranteed Obligations) arising out of, under or in relation to with the Agreement.

2.4 **Payment**

2.4.1 The Guarantor agrees to make any payment due hereunder upon first written demand without set-off, deduction or counterclaim and without any legal formality such as protest or notice being necessary and waives all privileges or rights which it may have as a guarantor, including any right to require TPC to claim payment or to exhaust remedies against the Service Provider or any other person.

2.4.2 Any payment made under the Guarantee shall be made free and clear of, and without deduction for or on account of, any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

3. **RIGHTS AND OBLIGATIONS**

3.1 **Waiver of Defences**

3.1.1 The duties, obligations and liabilities of the Guarantor under the Guarantee shall not be reduced, discharged or otherwise adversely affected by:

- (a) any act, omission, matter or thing which would have discharged or affected the liability of the Guarantor had it been a principal debtor and obligor instead of a Guarantor or indemnifier; or
- (b) anything done or omitted to be done by any person which, but for this provision, might operate to exonerate or discharge the Guarantor or otherwise reduce or extinguish its liability under the Guarantee.

3.2 **Rights and Obligations of the Guarantor**

3.2.1 The Guarantor agrees that TPC shall not be obliged and the Guarantor waives any right it may have to require TPC (or any agent on its behalf) to:

- (a) take court, arbitral or other dispute resolution proceedings or to enforce any judgment or award against the Service Provider; or
- (b) pursue any other right or claim (including the enforcement of any other security held by TPC) against any person,

before claiming from the Guarantor under the Guarantee.

3.2.2 Subject to the limits of liability set out in the Agreement, if any, the Guarantor indemnifies and holds harmless TPC, its personnel and agents, in full against and from any and all liabilities, claims, damages, loss, expenses and costs (including legal fees and expenses) which TPC incurs in connection with:

- (a) the preservation, exercise and/or enforcement of any rights arising out of, under

or in relation to the Guarantee or any attempt so to do; and

(b) any discharge or release of the Guarantee.

3.2.3 Until all amounts which are or may become due from the Service Provider under the Agreement have been irrevocably paid in full, or unless TPC directs otherwise in writing, the Guarantor shall not exercise any security or other rights which it may have against the Service Provider by reason of performance by it of its obligations under the Guarantee, whether such rights arise by way of set-off, counterclaim, subrogation, indemnity or otherwise.

3.3 **No Reduction of Obligation**

3.3.1 The duties, obligations and liabilities of the Guarantor under the Guarantee shall not be reduced or discharged by any:

(a) alteration in the relationship between the Guarantor and the Service Provider; or

(b) arrangements between the Service Provider and TPC; or

(c) amendments to the provisions of the Agreement; or

(d) alteration, with or without the knowledge or consent of the Guarantor:

(i) in the extent or nature of the services to be performed under the Agreement; and/or

(ii) to the time for performance of the Service Provider's duties and obligations; and/or

(iii) to any other duties, obligations or liabilities of the Service Provider arising under, out of or in connection with the Agreement; or

(e) forbearance or indulgence by TPC towards the Service Provider or the Guarantor, whether as to payment, time, performance or otherwise; or

(f) other act or omission which, but for this provision, might exonerate or discharge the Guarantor from liability under the Guarantee; or

(g) invalidity or unenforceability of the Agreement or the insolvency, bankruptcy, winding up or reorganisation of the Service Provider or any other person.

3.3.2 The Guarantor agrees that the Service Provider and TPC may do or agree to any of the matters referred to in Sub-clause 3.3.1(b), Sub-clause 3.3.1(c), Sub-clause 3.3.1(d) or Sub-clause 3.3.1(e), all of which shall be likewise guaranteed by the Guarantor in accordance with the provisions of the Guarantee.

4. **COMMENCEMENT AND EXPIRY**

4.1 **Commencement and Operation of the Guarantee**

4.1.1 The Guarantee shall come into effect when the Agreement comes into effect.

4.1.2 Without prejudice to Sub-clause 4.1.1, the Guarantee shall come into effect in favour of TPC as soon as it has been executed by the Guarantor, notwithstanding that TPC may not have executed the Guarantee and in such case the Guarantee shall take effect as a unilateral declaration by the Guarantor in favour of TPC and shall be deemed accepted by TPC.

4.2 **Expiry**

4.2.1 The Guarantee shall continue in full force and effect until all duties, obligations and liabilities of the Service Provider arising under, out of or in connection with the Agreement have been fully performed and discharged in accordance with the provisions thereof, at which time the Guarantee shall expire and be returned to the Guarantor.

5. **NOTICES, DEMANDS OR OTHER COMMUNICATIONS**

5.1 **Form of Notice**

- 5.1.1 Any notice, demand or other communication under or pursuant to the Guarantee shall be:
- (a) in English; and
 - (b) in writing; and
 - (c) state the Clause or Sub-clause under or pursuant to which the notice, demand or other communication is given, issued or made.
- 5.1.2 Subject to Sub-clause 5.2.4, and except as otherwise expressly provided in the Guarantee, all notices, demands or other communications shall be delivered or transmitted by hand, registered courier or electronic transmission (being either facsimile or email) to the Contact Details of the addressee.

5.2 **Delivery and Receipt**

- 5.2.1 Where a notice, demand or other communication is delivered by electronic transmission, the sender shall, within seven (7) Days after the electronic transmission is delivered, deliver a copy of the electronic transmission by hand or registered courier to the Contact Details of the addressee.
- 5.2.2 Subject to Sub-clause 5.2.3, a notice, demand or other communication shall be deemed to be duly given to the addressee:
- (a) in the case of facsimile transmission, on the date and at the time shown on the transmission report by the machine from which the facsimile was sent, subject to the machine producing a report that the facsimile was sent in its entirety to the Contact Details of the addressee; and
 - (b) in the case of email:
 - (i) at the time of receipt by the sender of an email acknowledgement from the intended addressee's information system showing that the email has been delivered to the email address of that addressee; or
 - (ii) if no email acknowledgement is received, then at the time the email enters an information system which is under the control of the intended addressee (and the addressee shall make available at the request of the sender, evidence of such time); and
 - (c) in the case of delivery by hand or registered courier, at the time of and on the date of delivery.
- 5.2.3 In the event that a notice, demand or other communication is received after 3:00 pm at the physical address of the addressee stated in its Contact Details, it shall be taken to have been received by the addressee at 8:00 am on the next Day.
- 5.2.4 The Parties may each change their respective Contact Details for the purposes of Sub-clause 5.1 [*Form of Notice*] by giving notice to each other in accordance with the procedures for the giving, issuing or making of communications set forth in Sub-clause 5.1 [*Form of Notice*] not less than fourteen (14) Days before such change is to take effect. Any notice of such new Contact Details shall only be effective for the purposes of Sub-clause 5.1 [*Form of Notice*] after it is deemed received pursuant to Sub-clause 5.2.2 and Sub-clause 5.2.3.

6. **DISPUTE RESOLUTION**

6.1 **Disputes under the Agreement**

- 6.1.1 The settlement or resolution of any dispute arising under, out of or in connection with the Agreement shall be final and binding on the Parties and the Parties shall not reopen, revisit or otherwise dispute that settlement or resolution and the subject matter of that settlement or resolution.

6.2 **Dispute Resolution**

- 6.2.1 A Party may refer any dispute arising out of, under or in connection with the Guarantee to the Pakistani court of competent jurisdiction.
- 6.2.2 Without prejudice to Sub-clause 6.2.1, nothing in the Guarantee shall prevent the Parties from referring a dispute to arbitration by mutual written agreement.

7. **GENERAL PROVISIONS**

7.1 **Governing Law and Language**

- 7.1.1 The Guarantee shall be governed by, interpreted and construed in accordance with the Laws of the Islamic Republic of Pakistan.
- 7.1.2 Unless expressly notified in advance by TPC, the primary language of the Guarantee shall be English. All communications issued between the Parties shall be in English. Unless expressly notified in advance by TPC, all meetings shall be conducted in English, and minutes of meetings shall be issued in English.

7.2 **Entire Agreement**

- 7.2.1 The Guarantee constitutes the entire agreement between the Parties in relation to all matters contained herein, including all understandings, rights, responsibilities, duties and obligations and supersedes all prior arrangements, representations, communications, negotiations, agreements and contracts (whether written or oral) made between or entered into by the Parties with respect thereto prior to the date hereof.

7.3 **Severability**

- 7.3.1 In the event that any provision of the Guarantee is held by any judicial or other competent authority to be illegal, invalid or unenforceable that provision shall be severed to the extent necessary to make the Guarantee enforceable, and it shall not affect or impair the validity, legality or enforceability of any of the other provisions of the Guarantee.

7.4 **Amendment**

- 7.4.1 No modification, amendment, addendum or variation to the provisions of the Guarantee shall be effective or binding, unless it:
- (a) is made in writing; and
 - (b) expressly sets out the modification, amendment, addendum or variation to the provisions of the Guarantee; and
 - (c) refers to the Guarantee; and
 - (d) is signed and dated by a representative of each Party.

7.5 **Waiver**

- 7.5.1 Subject to Sub-clause 7.5.2, no relaxation, forbearance or delay by a Party in enforcing the Guarantee will prejudice, affect or restrict the rights, responsibilities, obligations, powers or remedies of that Party nor shall any waiver by either Party of any such rights, responsibilities, obligations, powers or remedies, or of any breach of the Guarantee, be deemed to be a waiver of any other right, responsibility, obligation, power or remedy, or of any later or continuing breach of, the Guarantee.
- 7.5.2 Any waiver of a Party's rights, responsibilities, obligations, power or remedies arising out of, under or in connection with the Guarantee shall be in writing, dated and signed by the Representative of the Party granting such waiver, and shall specify the right, responsibility, obligation, power or remedy and the extent to which it is being waived. No waiver of a breach of a term of the Guarantee operates as a waiver of any other breach of that term, or of a breach of any other term, of the Guarantee.

7.6 **Assignment**

7.6.1 The Guarantor shall not assign or transfer any of its rights or obligations under the Guarantee or any part of it.

7.6.2 Subject to giving the Guarantor seven (7) Days' prior written notice, TPC may assign or transfer the Guarantee or any part of it or any benefit or interest in or under the Guarantee.

7.7 General Representations and Warranties

7.7.1 The Guarantor represents and warrants to TPC that:

- (a) it has full power and authority to enter into and perform its obligations under the Guarantee;
- (b) it has taken all necessary action to authorise the signing, delivery and performance of the Guarantee in accordance with its provisions; and
- (c) the Guarantee constitutes the Guarantor's legal, valid and binding obligations and is enforceable in accordance with its provisions.

7.8 Limit on Reliance

7.8.1 No Party has entered into the Guarantee relying on any representation, warranty, promise or statement made by another Party, or any other person acting on behalf of a Party, other than the representations, warranties, promises and statements set out in the Guarantee.

7.9 Counterparts

The Guarantee may be executed in any number of counterparts, each of which, when executed, shall constitute a duplicate original, but all the counterparts shall together constitute one Guarantee.

SIGNED for and on behalf
of TPC

<Insert name and position of signatory>

Witness: _____

<Insert name and position of witness>

SIGNED for and on behalf
of the Guarantor

<Insert name and position of signatory>

Witness: _____

<Insert name and position of witness>

APPENDIX 1
DEFINITIONS AND INTERPRETATION

1. Definitions

- 1.1 In this Guarantee the following words and expressions shall have the meanings set out below:
- 1.1.1 “**Agreement**” has the meaning given to it in recital A.
- 1.1.2 “**Association of Persons**” means an unincorporated joint venture, partnership, consortium or other association of two (2) or more persons.
- 1.1.3 “**Clause**” or “**Sub-clause**” means a clause or sub-clause of this Guarantee.
- 1.1.4 “**Contact Details**” means the contact details of a Party stated in Appendix 2 [*Agreement Particulars*] or such other contact details as may be notified pursuant to Sub-clause 5.2.4.
- 1.1.5 “**Guarantee**” means this parent company guarantee, including the recitals and Appendix 1 [*Definitions and Interpretation*] and Appendix 2 [*Agreement Particulars*].
- 1.1.6 “**Guaranteed Obligations**” means the duties and obligations of the Service Provider arising under, out of or in connection with the Agreement, including the discharge of any indebtedness, monies and/or liabilities due, owing or incurred by the Service Provider to TPC arising under, out of or in connection with the Agreement.
- 1.1.7 “**Law**” means all national or public legislation, decrees, ordinances, rules and regulations relevant to this Guarantee as issued and in force within the Islamic Republic of Pakistan.
- 1.1.8 “**Member**” has the meaning given to it in recital B.¹
- 1.1.9 “**Service Provider**” has the meaning given to it in recital A.

2. Interpretation

- 2.1 In this Guarantee:
- 2.1.1 Clause and Sub-clause headings are for convenience only and shall not be taken into consideration in the interpretation of this Guarantee.
- 2.1.2 The following rules shall apply to the interpretation of this Guarantee:
- (a) the singular shall include the plural and vice versa;
 - (b) a reference to a gender shall include the other genders;
 - (c) a reference to a law shall include that law as amended, consolidated, re enacted or replaced from time to time;
 - (d) a reference to “**Days**” means calendar days;
 - (e) the word “**person**” shall include a natural person and any body or entity whether incorporated or not;
 - (f) the words “**written**” or “**in writing**” shall include any communication sent by letter, facsimile transmission or email;
 - (g) wherever “**include**” or any form of that word is used, it shall be construed as if it were followed by “**without being limited to**”; and
 - (h) a reference to an “**agent**” shall mean any person with a contractual relationship with a Party and carrying out activities or obligations on behalf of that Party;
 - (i) a reference to “**time**” shall be a reference to time in Peshawar, Islamic Republic of Pakistan.

¹ Delete if the Service Provider is a single entity.

APPENDIX 2
CONTRACT PARTICULARS

| Contact Details |
|--|
| For the TPC: CEO TransPeshawar (The Urban Mobility Company), First Floor KPUMA Building Near Main BRT Depot, Chamkani, GT Road, Peshawar, KPK, Pakistan Tel: 0092-91-2621393-5 Email: ceo@transpeshawar.pk For the Attention of Chief Executive Officer, TransPeshawar (The Urban Mobility Company) |
| For the Guarantor: <Insert Guarantor's Name> <Address line1> <Address line2> <Address line3> Tel: <Insert Guarantor's telephone number> Fax:<Insert Guarantor's fax number> Email:<Insert Guarantor's email address> For the Attention of <_____> |

PARTICULAR CONDITION OF THE CONTRACT

| | |
|--------------------|---|
| Definitions | "Equipment" means as defined in Schedule of Requirements; |
| 2.2.2 | The Term of initial Agreement is five (05) years. Further extension for three years or any other term subject to mutual agreement. |
| 3.1 | Rs. 30,000,000.00 (Thirty Million Pakistan Rupees) issued by the Scheduled Bank of Pakistan having minimum Credit Rating of AA in long run. |
| 3.2 | Rs. 30,000,000.00 (Thirty Million Pakistan Rupees) issued by the Scheduled Bank of Pakistan having minimum Credit Rating of AA in long run. |
| 3.3 | Format as attached in Bidding documents |
| 4 | Parent Company Guarantee attached as Annex-F to the Agreement |
| 5.1 | Payment Calculation Schedule attached as Appendix-I to Particular Condition of the Contract |
| 6.1 | The Sales Tax on Services shall be paid by TPC and added to invoice in monthly service payments/ performance payments. |
| 7.2 | The handover of Equipment is within 7 days from the Date of Commencement. |
| 8.1 | Same as Clause 7.2 |
| 21.1 | The Reserve Fund shall be deducted. |
| 21.2 | The maximum amount of Reserve Fund is PKR. 15,000,000 (Fifteen Million Rupees). |
| 21.6 | TPC, if decided to execute the Works/ Services at the cost and risk of Service Provider, shall get three quotation/ bid through email from potential bidders with seven (07) days response time and award to the lowest bidder. |
| 29.2.17 | Five months in one year. The year for the purpose of this clause shall be counted from date of commencement and end at subsequent anniversary. |

**APPENDIX-I TO PARTICULAR CONDITION OF THE CONTRACT
PAYMENT CALCULATION SCHEDULE**

1. Monthly Payment

- 1.1 For each Month (m), the Service Provider shall be entitled to a payment (**Monthly Payment**) calculated in accordance with the following formula:

Monthly Payment_m (MP_m)

$$= \text{Monthly Service Payment} \times (1 - \text{PP}\%) - \text{RF}$$

where:

Monthly Service Payment means Monthly Service Payments in Pakistani Rupees (PKR [•]) offered in Financial Offer and updated as result of adjustments in accordance with Article 1.3 of Payment Calculation Schedule.

PP% means the Performance Payout Percentage, which shall be ten percent (10%).

RF means any amount to be retained in relation to the provisioning of the Reserve Fund.

- 1.2 The Service Provider shall raise an invoice to TPC for an amount equivalent to the Monthly Payment for Month (m) (plus any applicable Sales Tax on Services) after completion of the month. The Monthly Payment for Month (m) shall be made by the TPC within ten (10) days after receipt of invoice by TPC.

1.3 Adjustment to Monthly Service Payment

The relative weighting within the cost structure of the Monthly Service Payment is described in the table and shall be used to calculate the variation of cost for Monthly Service Payment. Calculation of adjustments is subjected to variation in base values, which for various categories shall be taken as follows: -

- For adjustments in Operation and Maintenance costs, base price shall be taken as of July, 2026. Monthly Payment will change with increase or decrease in base price.
- For adjustments in Salaries, base price considered shall be the minimum wage of PKR.40,000/month.

The adjustments in the Monthly Service Payment will be subject to subsequent variations in the base values and procedures laid down in the coming sections.

- a) The parameters established for calculating the cost basket are estimates and therefore, failure to actually meet the same will not entitle any party to request adjustments in the calculation procedure of Monthly Service Payment nor in the economic compensation of any kind.
- b) The Adjusted Monthly Service Payment for monthly payment shall govern irrespective of whether it is higher or lower than the original Financial Offer.

| Categories | Factor in Monthly Charge |
|--------------------------------------|--------------------------|
| Operation and Maintenance Costs = OM | 55 |
| Salaries = S | 45 |

Percent increase or decrease applicable to all categories = PI

Where,

$$PI = [(New\ Value - Previous\ Value) / Previous\ Value] \times 100$$

| | |
|-------------|--|
| ΔOM | $\Delta OM = (PI_{CPI} \times OM \times Original\ Monthly\ Service\ Payment) / 10,000$ <p>The Operation and Maintenance Cost will be adjusted Annually (year-on-year) on the basis of General Consumer Price Index (CPI) variation mentioned in Price Statistics published by Pakistan Bureau of Statistics, Government of Pakistan.</p> |
| ΔCS | <p>The Salaries will be adjusted from the date as and when change are notified by Government of Khyber Pakhtunkhwa in Minimum Wage.</p> $\Delta CS = (PI_S \times S \times Original\ Monthly\ Service\ Payment) / 10,000$ |

Adjusted Monthly Service Payment = Previously Adjusted Monthly Service Payment + C_{TN}

Where,

$$C_{TN} = \Delta OM + \Delta CS$$

ΔOM = Increase / Decrease in Operation and Maintenance Cost in Monthly Service Payment

ΔCS = Increase / Decrease in Salaries cost in Monthly Service Payments

2. Monthly Performance Payment

2.1 For each Month (m), the Service Provider shall be entitled to a payment (**Monthly Performance Payment**) calculated in accordance with the following formula:

$$\begin{aligned}
 & \text{Monthly Performance Payment}_m \\
 & = (1 - PD\%_m) \times MP_m \times \frac{PP\%}{(1 - PP\%)} - RF
 \end{aligned}$$

where:

MP_m means the Monthly Payment which the Service Provider is entitled to for Month (m) excluding Reserve Fund.

PD_m means the Performance Deduction Percentage applicable to the Service Provider for Month (m). **The sum of Performance Deduction percentages applicable for all events of non-compliance with KPIs occurred during that month subject to a maximum of hundred percent (100%).**

PP% means the Performance Payout Percentage, which shall be ten percent (10%).

RF means any amount to be retained in relation to the provisioning of the Reserve Fund.

- 2.2 Within fifteen (15) days from start of the month, TPC shall notify the amount of the Monthly Performance Payment. The Service Provider shall raise an invoice to TPC for an amount equivalent to the Monthly Performance Payment for Month (m) (plus any applicable Sales Tax on Services). The Monthly Performance Payment for Month (m) shall be made by the TPC within ten (10) Business Days of TPC receiving such invoice.

Section 8 - Contract Forms

This section contains forms which, once completed, will form part of the Contract. The forms for Performance Security, when required, shall only be completed by the successful Service Provider after contract award.

Table of Forms

| | |
|------------------------------------|---------------------------------------|
| Notification of Award | 8-Error! Bookmark not defined. |
| Performance Security | 8-3 |

Notification of Award

[on letterhead paper of the Procuring Entity]

[date]

To: [Name and address of the Service Provider]

Subject: [Notification of Award for the name of the Contract.]

This is to notify you that your proposal dated ----- for [name of the contract and identification number, as given in the Data Sheet] for a contract price of [amount in words and figures and name of currency] is hereby accepted by TransPeshawar (The Urban Mobility Company) as per breakup provided in the proposal on terms and conditions mentioned in the Agreement.

2. Under Clause ITB 35.3 of RFP and 27.1.3 (h) of the Agreement, you are required to establish a special purpose company in connection with the Project and ensure that it has not carried out any activity since the date of its incorporation as a company, other than in connection with or for the purposes of the Project.

3. Further, as per Clause 37 of the RFP and Clause 3 of the Agreement, the Service Provider/ Special Purpose Company shall maintain with TransPeshawar a valid and enforceable Performance Security to the amount of PKR..... (in words) in shape of Bank Guarantee issued by a Schedule Bank of Pakistan having minimum Credit Rating of AA in long run on a prescribed format (**attached as Annex-A**) or submit a Demand Draft or Call Deposit Receipt in favor of Chief Executive Officer TransPeshawar as per terms and conditions of the Service Agreement.

4. In accordance with Clause 35.5 of RFP and Clause 4 of the Agreement, you are also required to submit Parent Company Guarantees as per the format provided in the RFP.

5. You are therefore, required to deliver to TransPeshawar, within twenty-eight (28) working days of issuance of this Notification of Award, the duly executed Performance Security to the amount of PKR ----- , duly signed Parent Company Guarantee in favor of newly established special purpose company.

Authorized Signature:

Name and Title of Signatory:

Name of Procuring Entity:

Performance Security

[TO BE ISSUED ON JUDICIAL PAPER OF PRESCRIBED FEE BY SCHEDULE BANK OF THE ISLAMIC REPUBLIC OF PAKISTAN]

This **Performance Guarantee No.** <Insert No.> is made on <Insert date> (the “**Guarantee**”)

Ref: RFP for Operation and Maintenance Services of Platform Screen Doors (PSD) and Allied Services in Peshawar BRT System advertised on dated <Insert date> and Notification of Award No.dated <Insert date>

Beneficiary: TRANSPESHAWAR (THE URBAN MOBILITY COMPANY), a Public Limited Company incorporated with Security Exchange Commission of Pakistan in February 09, 2017, with company registration No.0105691 and whose registered address is at TransPeshawar Building, Chamkani, GT Road, Peshawar, KPK. (“the **TPC**”)

1. GUARANTEE

- 1.1 We <Insert name of Bank> Bank (the “Guarantor”) have been informed that <Insert name of the Successful Bidder> has been declared Successful Bidder relating to reference tender of Operation and Maintenance Services of Platform Screen Doors (PSD) and Allied Services in Peshawar BRT System (the “Services”).
- 1.2 The <Insert name of the Successful Bidder> has established a special purpose vehicle <Insert new BRT company name.> hereinafter called (the “Service Provider”) relating to the Operation and Maintenance Services of Platform Screen Doors (PSD) and Allied Services in Peshawar BRT System. The <Insert new BRT company name.> is obligated to sign agreement (the “Agreement”) with TPC relating to the operation and maintenance services.
- 1.3 The Guarantor hereby irrevocably and unconditionally undertakes to pay to the TPC on its first demand for payment, without regard to any objections or defences to TPC’s demand from the Service Provider or any other person, an amount or amounts not exceeding in total **PKR ----- (in words).**

2. TIME FOR PAYMENT

- 2.1 Any amount demanded by the TPC shall be paid by Guarantor to the TPC within seven (07) days of receipt of the TPC’s demand for payment stating that the Service Provider is in breach of its obligations arising under, out of or in connection with the Agreement and the Guarantor shall have neither the right nor the duty or obligation to challenge the accuracy or sufficiency of such statement or the amount specified in the demand.

3. VALIDITY OF GUARANTEE

- 3.1 This Guarantee shall come into force on the date hereof and shall remain valid until <insert date> whereupon this Guarantee shall expire and be returned to the Guarantor.

4. PAYMENT FREE OF DEDUCTIONS AND WITHHOLDINGS

- 4.1 Any payment under this Guarantee shall be made free and clear of, and without deduction

for or on account of, any present or future taxes, levies, imposts, duties, charges, fees, deductions or withholdings of any nature whatsoever and by whomsoever imposed.

5 Notices and Demands for Payment

5.1 Any demand for payment made under this Guarantee shall be delivered by hand or registered courier and be deemed to be duly made at the time of, and on the date of, delivery.

5.2 Any notice given under this Guarantee shall be deemed to be duly given:

- A. in the case of facsimile transmission, on the date and at the time shown on the transmission report by the machine from which the facsimile was sent, subject to the machine producing a report that the facsimile was sent in its entirety to the contact details of the addressee stated in Schedule 1 (the “**Contact Details**”); and
- B. in the case of email:
 - (A) at the time of receipt by the sender of an email acknowledgement from the intended addressee’s information system showing that the email has been delivered to the email address of that addressee; or
 - (B) if no email acknowledgement is received, then at the time the email enters an information system which is under the control of the intended addressee (and the addressee shall make available at the request of the sender, evidence of such time); and
- C. in the case of delivery by hand or registered courier, at the time of and on the date of delivery.

5.3 Any notice or demand given or made by TPC or the Guarantor relating to this Guarantee shall be in English.

6 DISPUTE RESOLUTION

6.1 This Guarantee shall be governed by, interpreted and construed in accordance with the laws of the Islamic Republic of Pakistan. Each Party consents to the jurisdiction of the courts in the Islamic Republic of Pakistan.

EXECUTED for and on behalf of
[**GUARANTOR**]

.....

(signed)

.....

Name

SCHEDULE TO THE PERFORMANCE GUARANTEE

For the TPC:

CEO TransPeshawar (The Urban Mobility Company),
First Floor KPUMA Building Near Main BRT Depot, Chamkani, GT Road,
Peshawar, KPK, Pakistan

Tel: 0092-91-2621393-5

Email: ceo@transpeshawar.pk

For the Attention of Chief Executive Officer, TransPeshawar (The Urban
Mobility Company)

For the Guarantor:

<Insert Guarantor's Name>

<Address line1>

<Address line2>

<Address line3>

Tel: <Insert Guarantor's telephone number>

Fax: <Insert Guarantor's fax number>

Email: <Insert Guarantor's email address>

For the Attention of <_____>