3.0 RIU installation

3.1 Scope

This section details the installation of the RIU system in the stations and IBs.

3.2 Purpose

The purpose of this section is to enable field personnel to execute installation works in line with customer requirements.

3.3 Introduction

3.3.1 RIU is a part of Stationary TCAS.

3.3.2 RIU along with Stationary TCAS is a vital system and is an overlay over the existing signal, point and track circuit interlocking system, viz. Electronic Interlocking, Route Relay Interlocking, Panel Interlocking, Axle Counter, Block Proving Equipment etc.

3.3.3 Remote Interface Unit (RIU) shall be used where remote signalling functions are required to be fetched to a nearby Stationary TCAS unit. Stationary TCAS with inputs from RIU shall manage safe train movements within the block sections where RIUs are deployed.. The intended users of this manual are TCAS project team, RDSO, and user Railways.

3.4 Equipment description

The RIU is installed in between two station sections in auto section or also in block section wherein the signalling inputs are to be read and fed to nearby station TCAS.

This unit comprises of a rack, which is 19" accommodating maximum of 10 cards of 4U size. This rack interfaces with fibre optic distribution modules also called as fibre distribution module (FDM) of railways to connect the Station TCAS unit.

3.5 DOs and DON'Ts

✓ DOs

1	Check the system for a blown fuse and proper fuse contact periodically
2	Verify during the site visit that LEDs on the modules are functioning properly
3	Ensure Proper connection of RIU OFC cables to the fibre optic module.
4	Ensure that the system is firmly connected to Earth terminal
5	Clean the RIU system with soft cloth / Brush to get rid of dust
6	Ensure that all cards mounting screws are tightened properly

DOs list

✗ DON'T

1	Troubleshoot without proper system training.
2	Remove system modules / Fuse or connectors when RIU is in operation.
3	Forcibly pickup or Remove relays related to RIU.
4	Touch components on the PCBs or repair them.
5	Change configuration of the system using jumpers / Application data without approval.
6	Disturb OFC cable / connector.
7	Repair of cards. This is a highly technical job and is not possible at the site.
8	Never practice any self-made guideline which is not recommended in manual.

DON'Ts list

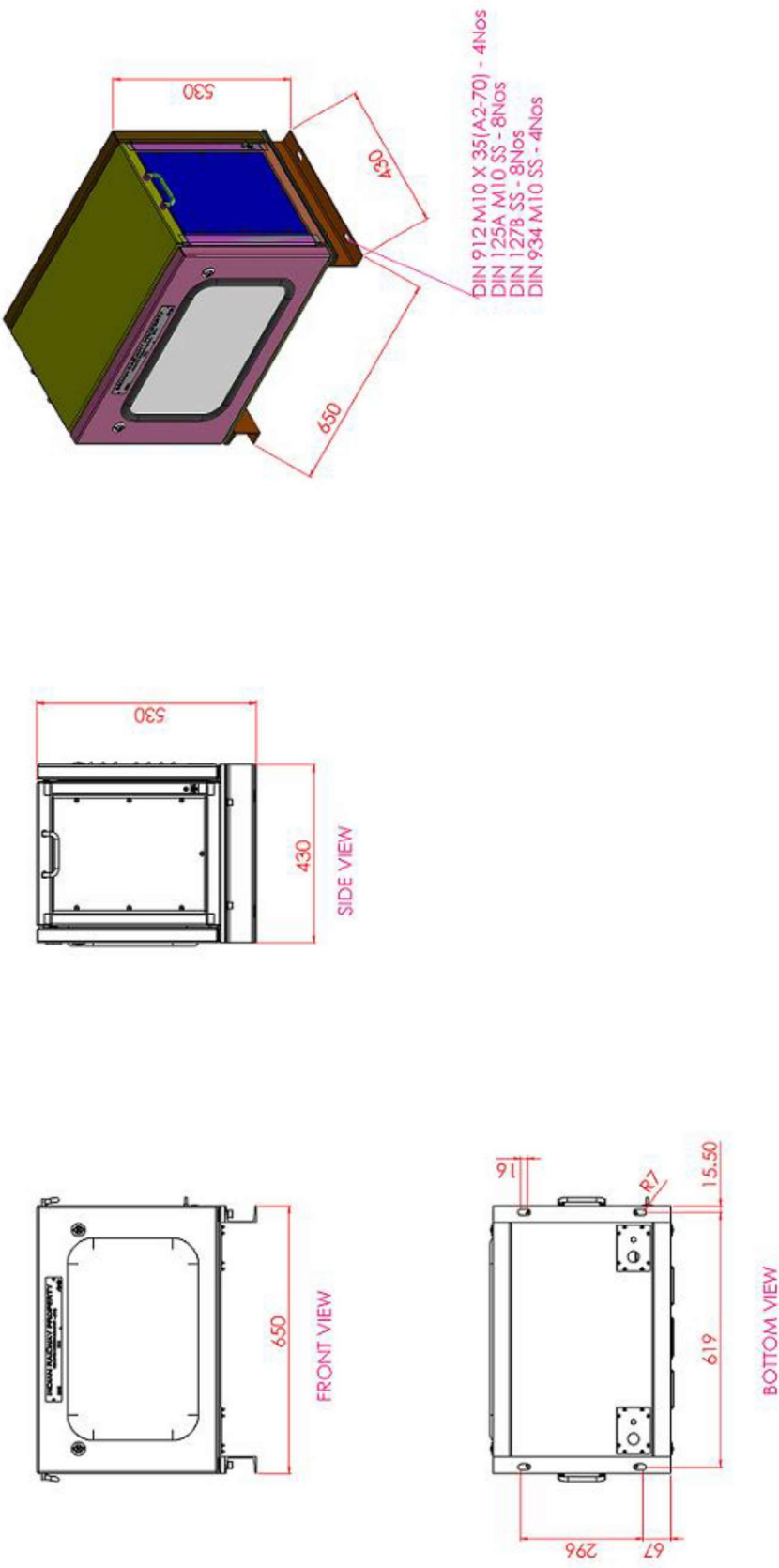### 3.6 Tools required for RIU installation

Tools required for installation of RIU are listed below:

- 3½ Digit Digital Multimeter
- 3½ Digit Clamp meter
- Screw-driver set
- Ring spanner set
- D-spanner set
- Allen key set

- Soldering station
- Hot-air gun
- Cutting Plier
- Pipe wrench
- Microchip make PIC Kit-III
- Laptop with required software for loading configuration data files into the VC modules of the stationary TCAS unit to which RIUs are connected.

3.7   The mechanical dimensions of RIU

Each RIU unit is housed in external enclosure figure below shows the dimensions of the RIU enclosure.
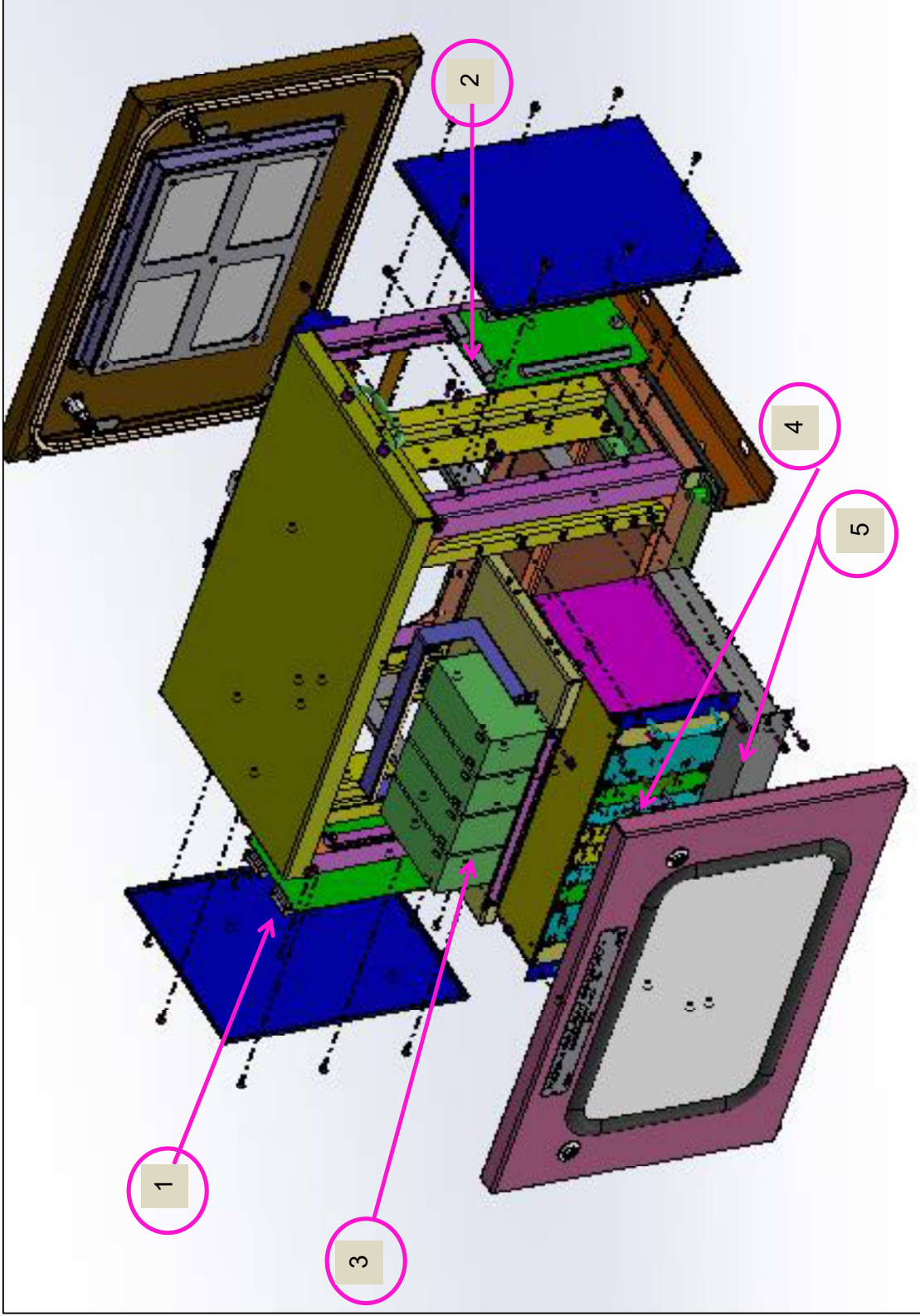
SECTION 3

DIN 912 M10 X 35(A2-70) - 4Nos
DIN 125A M10 SS - 8Nos
DIN 127B SS - 8Nos
DIN 934 M10 SS - 4Nos

530
430
650

SIDE VIEW

FRONT VIEW

BOTTOM VIEW

91
R7
15.50
619
296
67

Remote Interface Unit mechanical dimensions

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3.8   Mounting arrangement for RIU
Figure below shows the details of mounting bolts and accessories used for fixing the RIU unit in location box.

DIN 912 M10 X 35(A2-70) - 4Nos
DIN 125A M10 SS - 8Nos
DIN 127B SS - 8Nos
DIN 934 M10 SS - 4Nos
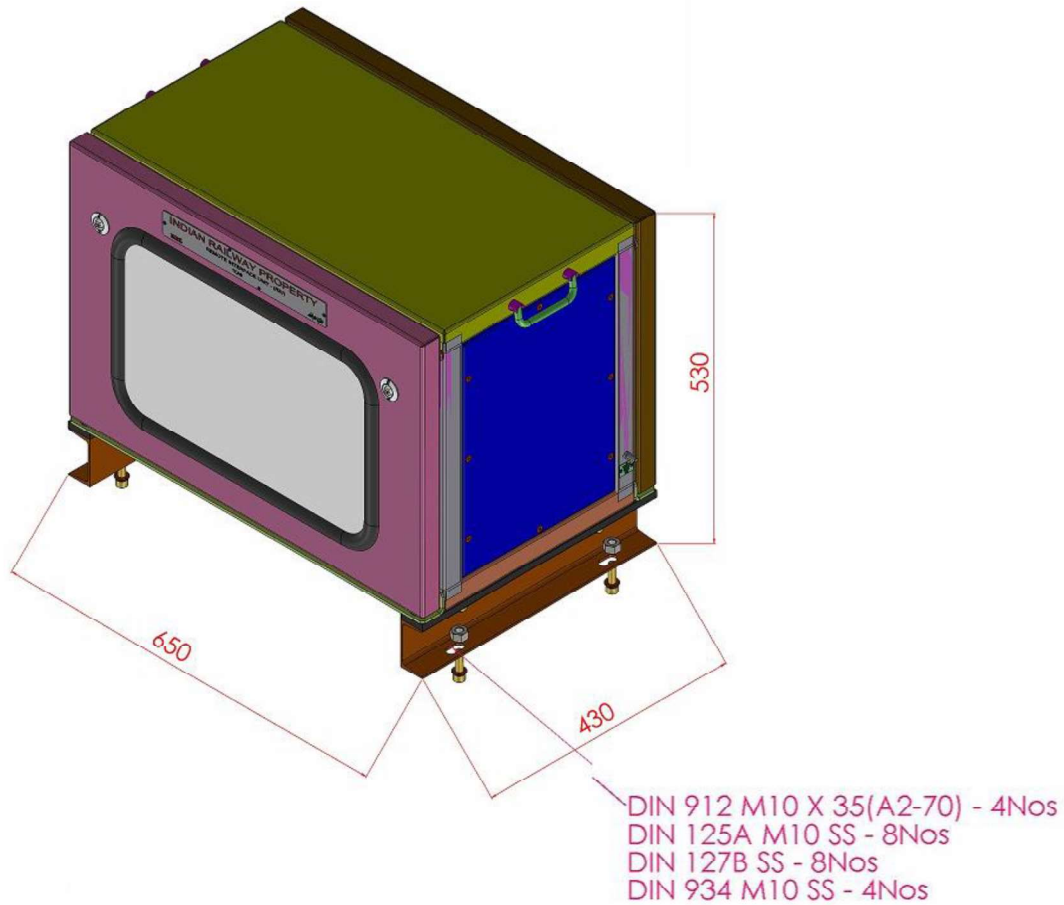
3.9   RIU equipment, view of internal components
Figures below show the front and rear side exploded view of RIU internal components.

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1 & 2 --- FIU Termination cards.

3 ---Battery bank

4 --- RIU modules

5 --- Fibre distribution module

RIU front side exploded view

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1 & 5 --- MCB.

2 & 6 -----Surge protection devices (SPDs)

3 & 7 ---- Relays for A/C input monitoring

4 & 8 ---- HRC fuses

Document #: 5 16 53 0079 Ver 1.0
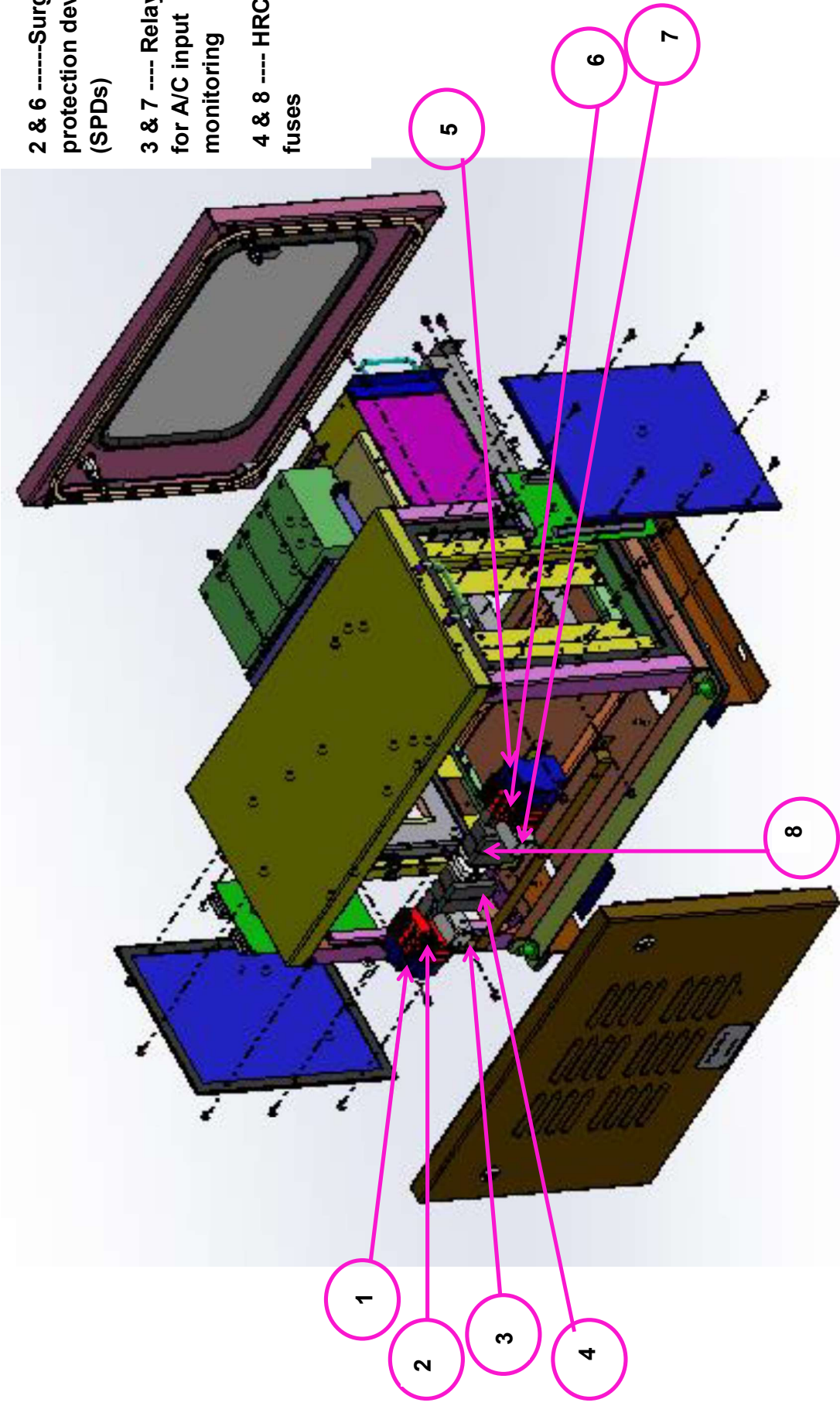
3.10   Equipment Deployment Details

The RIU installation consist of two single full size RDSO approved type location boxes (Location box is also called as apparatus case) for housing the following

- The Relay rack and external battery backed up 24V supply for wiring field input from the railway circuits to RIU field input relays.
- RIU equipment.

3.11   Installation of location boxes

The installation of location boxes for RIU equipment as well as for housing field input relays shall be done using services of a Railway approved contractor. However, the procedure that HBL's installation team should be aware for carrying out this work is given below

3.11.1   The guidelines for installing a single full size location box with proper foundation shall be followed as per figure below.
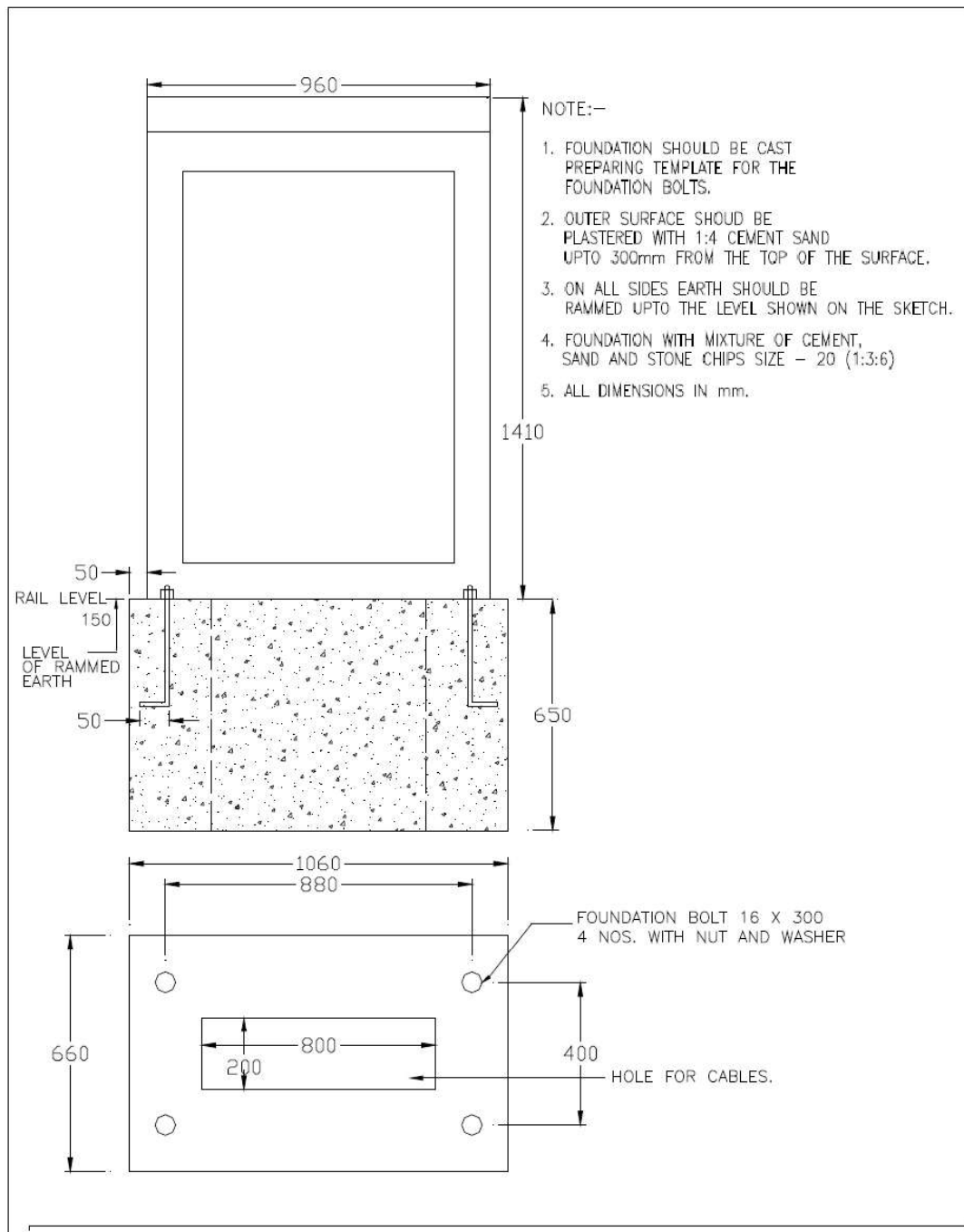
3.11.2 The foundation of Location boxes / Apparatus cases (single full size) shall be cast as per above figure

3.11.3 . The foundation work should not be done on loose earth. It should be installed on concrete foundation.

3.11.4   As far as possible, location box/apparatus case should be installed perpendicular to the track. Marking of the foundation shall be done at a place where minimum prescribed clearance

from track is available when the location box has been installed and doors are open.

3.11.5 It should be preferably outside the track and close ahead of the signal post to facilitate maintenance, so that the aspect of the signal can be visible to the maintainer.

3.11.6 *The wiring and earthing required for use in the location box shall be drawn through the foundation using DWC pipes.*

3.11.7   Proper curing of the foundation shall be done and adequate setting time shall be permitted before installing the location box / apparatus case on the foundation.

3.11.8 The depth of the foundation below the ground level shall be 50 (fifty) mm minimum and foundation bolt shall invariably be used.

3.11.9 Location boxes shall be erected vertically and plumb.

3.11.10 Location Boxes should be installed after applying bitumen at the bottom surface to avoid corrosion. The bitumen compound should be poured over bolts to achieve this purpose.

3.12   Internal arrangements in location box for routing the armored signalling/power/OFC cables and cable for equipment earthing

3.12.1 The Bakelite hylum sheet of size as per the drawings shall be fixed on angle iron piece inside the Apparatus Cases for fixing the ARA terminals.

3.12.2 The size of the angle iron frame should be 25mm x 25mm x 3mm conforming to Specification no. IS:2062 or similar.

3.12.3   Angle iron frame shall be secured by nuts and bolts. Square bars shall be fixed inside the Apparatus Cases for fixing the fuses, relays.

3.12.4 The wires shall be connected to the PBT (Polybutylene Terephthalate) terminals using thimbles (lugs) and sleeves.

3.12.5 50mm thick Hylum sheet shall be provided at the bottom in two halves as per below figure
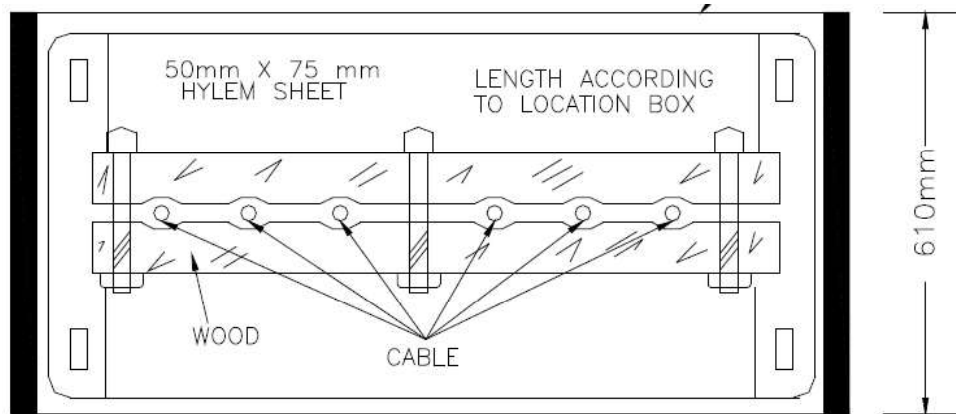
CABLE HOLDING CLAMP

Cable holding clamp
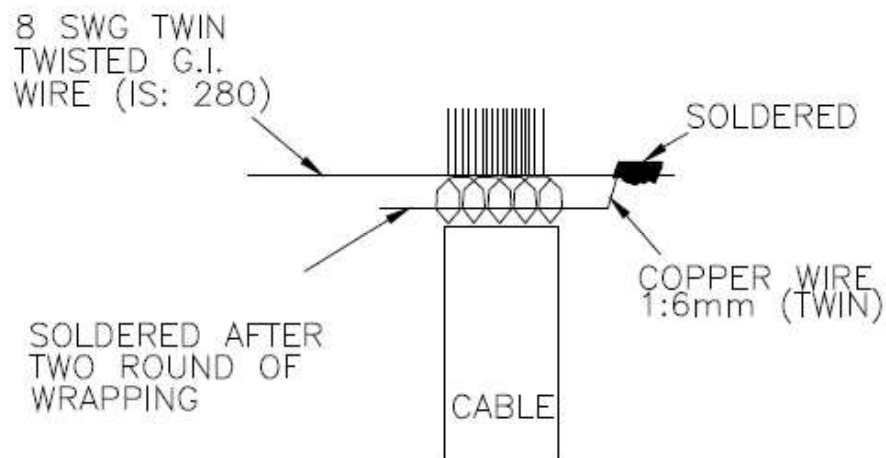
Earthing and jamming of amour inside the location box

3.12.6   Holes shall be cut in the Hylum sheet separately for each cable. Armor of the cable shall be opened and jammed after passing the cable through the hole and earthed as shown above drawing.

3.12.7   Earthing arrangement of the cable armour shall be done conforming to Section-N, Para no.19.88 to 19.105 of the Signalling Engineering Manual, Part-II..

3.12.8   Cable entry points in the location boxes shall be filled with sand and plastered with cement

3.12.9   The wires used for internal wiring inside the location boxes shall be of proper size and specifications as specified by user railways.

3.12.10 The cables of adequate lengths not less than 5 mts. should be kept in a circle of suitable diameter at 1m depth minimum before being taken into the Apparatus case.

3.12.11 Description of the terminals shall be written neatly on the hylum board. Drawing of the circuits shall be provided on the inside surface of the door of the location box.

## 3.13   Fixing and mounting of relay frames in location box.

3.13.1   The relay frames shall be provided for full size location box, the frame should be made out of MS angle of 25mm X 25mm X 3mm and approximate size of 940mm X 150mm. Picture below shows the relay frame.

Holes for fixing relay base

Relay frame

Bolts (M10X15) for fixing relay frame

3.13.2 The relay frames shall be fixed in the location box using 4 nos M10 x 15 mm bolts, nuts, and washers. The relay bases shall be fixed on relay frames using screws of M6 X 25 mm with nuts and washers.

3.13.3 Each relay frame shall have provision for fixing upto 12 relays.
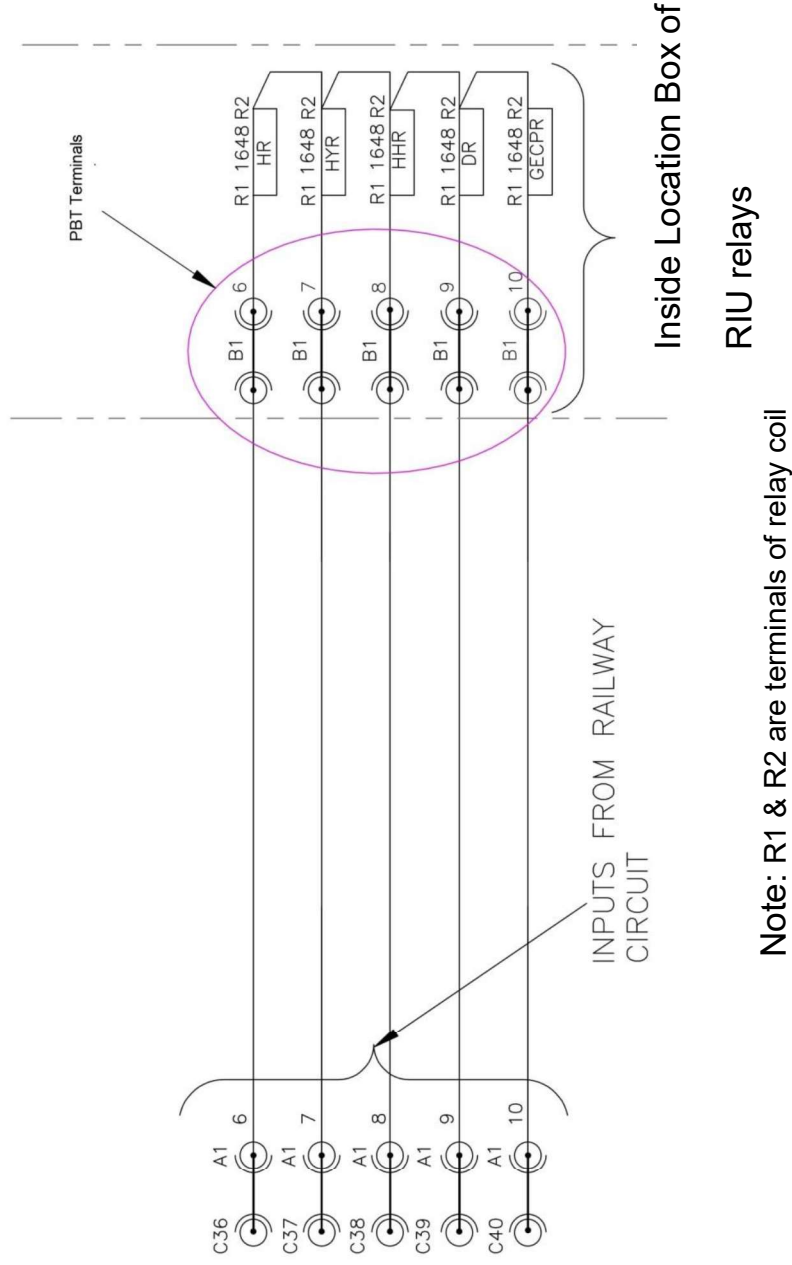
3.14 Wiring of relays

3.14.1 Relay circuit wiring shall be carried out using 16/0.2 mm diameter single core, multi-strand flexible annealed tinned copper wire.

3.14.2 Each of the field inputs shall be wired through a repeater relay in RIU relay location box.

3.14.3 The coil of each repeater relay shall be wired to the respective filed input from the Railway circuit in double cutting arrangement.

3.14.4 It is

3.14.5 The relay contacts of 6 to 8 shall be grouped through a HRC fuse of 5Amps rating as shown in figure below.

3.14.6 The connection to RIU relay coils is given through links.

3.14.7 The PBT terminal has a link which can be disconnected to isolate feed from railway circuit to the corresponding relay of RIU. The parts of PBT terminal are shown in figure below
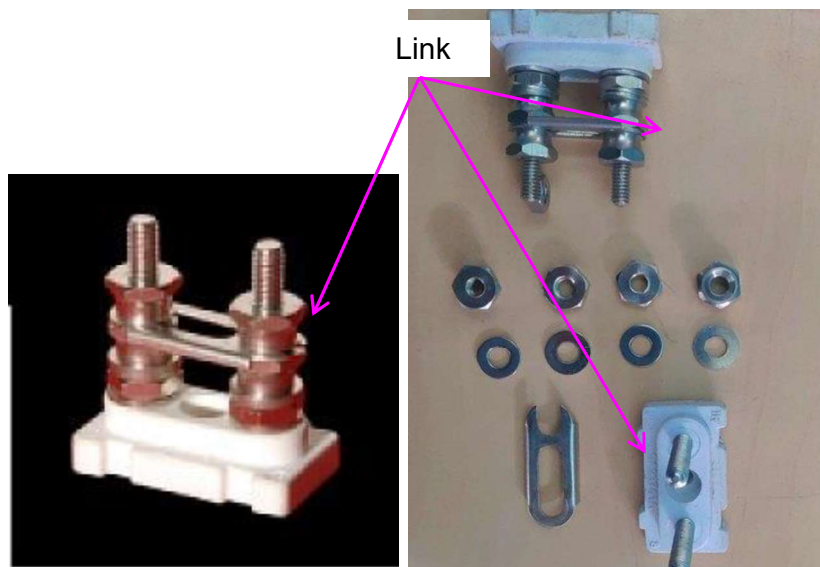
3.14.8 The example of relay wiring circuit for coil and contacts are shown in figures below.

3.14.9 In the figure below set of PBT terminals in RIU location box are labeled as "B1" the numbers 6,7,8,9 and 10 are terminal numbers.
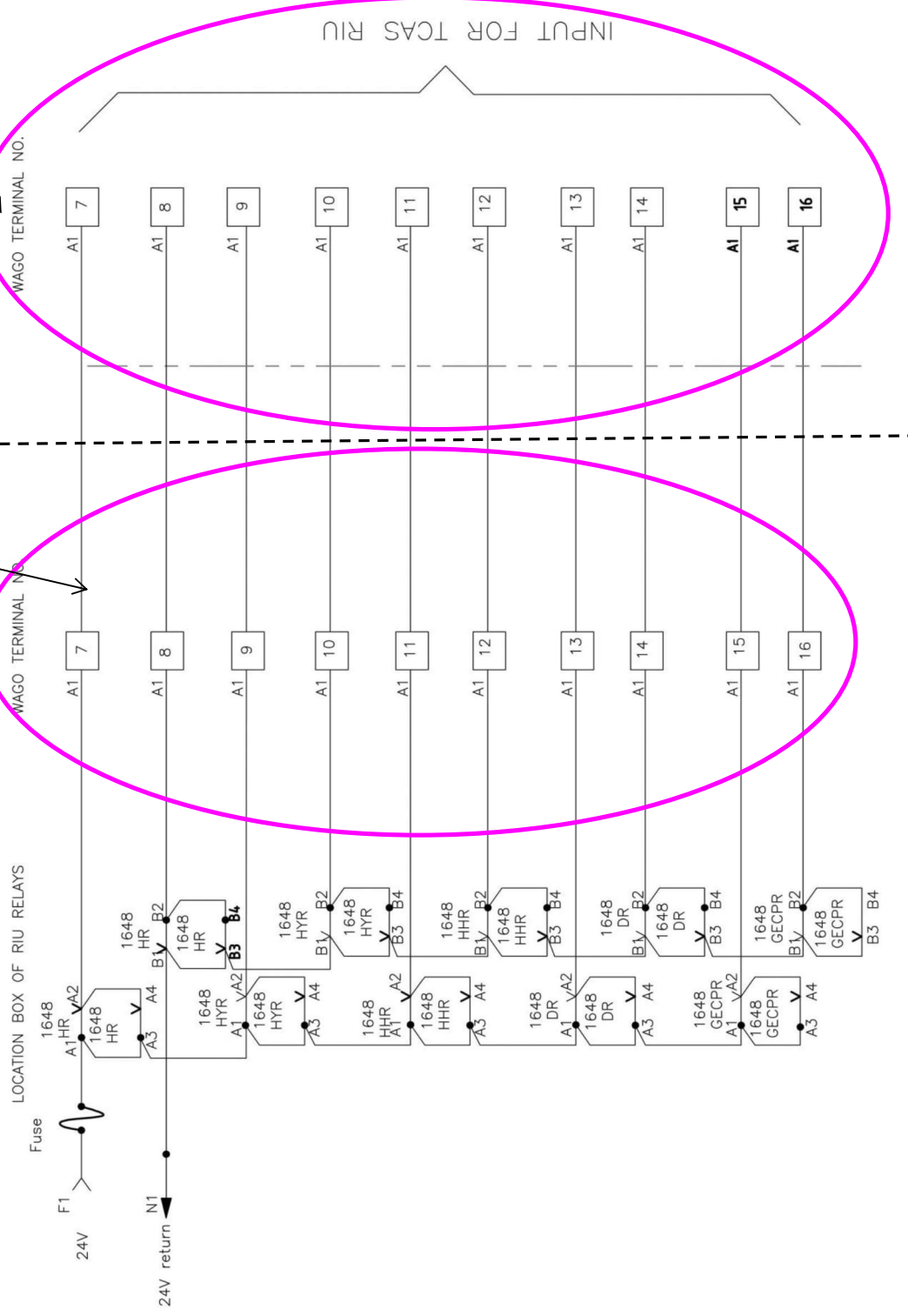
Inside Location Box of

RIU relays

Note: R1 & R2 are terminals of relay coil

Wiring of relay coils in relay location box

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In coming wires in RIU equipment location box

Outgoing wires in Relay location box

RIU Installation Manual
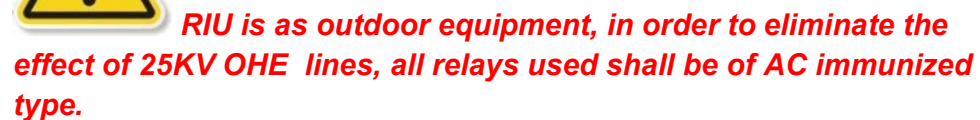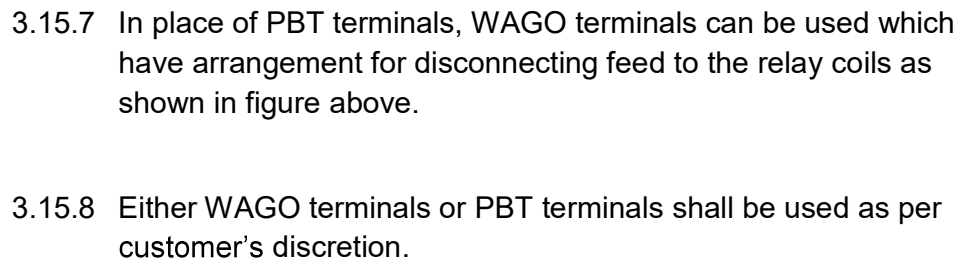
3.15 Wiring of Relay Contacts in Relay location box

3.15.1 The relay contact terminal and coil contact terminal numbers are as shown in figures below. QNA1 type relay shall be used which has 8 front and 8 back contacts. The terminals of the front contacts are (i).A1 & A2, (ii).A3& A4, (iii) B1 &B2, (iv) B3
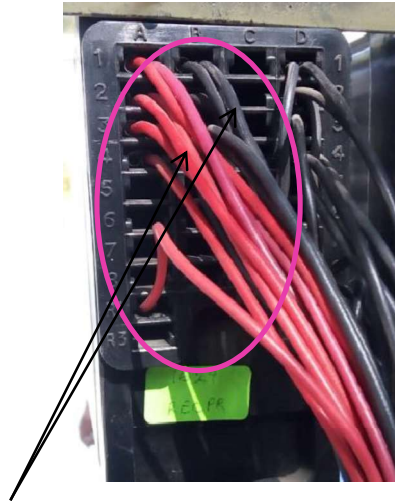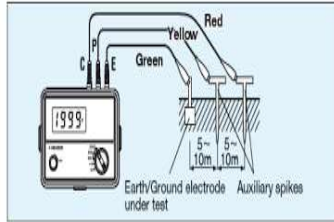

Red coloured wires shall be used in 24V feed path. Black coloured wires shall be used in 24V return path
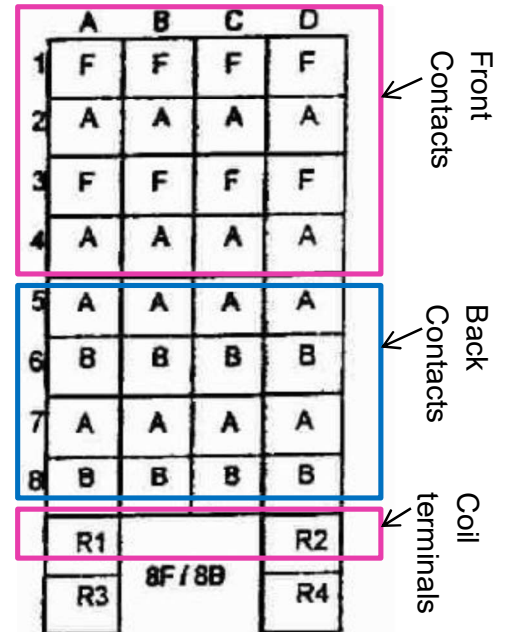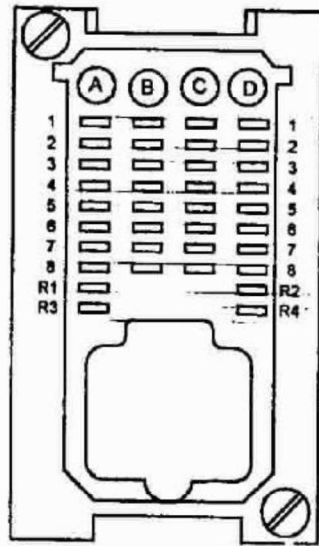
& B4 (v) C1 &C2, (vi) C3 & C4 ,(vii) (vii) D1 &D2, (vii) D3 & D4 , The relay coil connections are between R1 and R2.

3.15.2 Similarly the terminals of back contact are (i).A5 & A6, (ii).A7& A8 and son on.

3.15.3 The relay wiring of contacts is done in double cutting arrangement, with inputs wired through front contacts in 24V supply path and in 24V return path.

3.15.4 The wiring of contacts in the 24V supply path shall be carried out using RED coloured wires. The wiring of contacts in the 24V return path shall be carried out using black coloured wires(As shown in above picture)

3.15.5 Two contacts shall be connected in parallel in supply and ground path of 24V for increasing availability.

3.15.6 The WAGO terminals shall be used in relay location box as well as in RIU equipment location box for terminating the incoming and outgoing wiring in the location box as shown in picture below.

3.15.7 In place of PBT terminals, WAGO terminals can be used which have arrangement for disconnecting feed to the relay coils as shown in figure above.

3.15.8 Either WAGO terminals or PBT terminals shall be used as per customer's discretion.

⚠️ *RIU is as outdoor equipment, in order to eliminate the effect of 25KV OHE lines, all relays used shall be of AC immunized type.*

3.16   Earthing of location box

3.16.1   The Earth Electrode and its details of installation shall be as per clause no 8.1 of RDSO/SPN/197/2008.

3.16.2   Earth electrode shall normally consist of one or more galvanized iron pipes of not less than 38 mm internal diameter and not less than 2.5 Meters. in length with the spike at one end and a lug at the other end for connecting with earth lead.

3.16.3   The pipe is embedded vertically, leaving the portion above the ground. The earthing to the equipment is done using 35 sqmm copper wire.

3.17   Internal Cabling details of RIU

RIU is supplied from factory with complete internal wiring to all the RIU modules as shown in the figure below
.

SECTION 3

TCAS REMOTE INTERFACE UNIT
(REAR VIEW)

Termination card is mounted on the sidewall of RIU enclosure

These are DIN rail mounted components located on the top rear side, inside RIU enclosure

Termination card is mounted on the side wall of RIU enclosure