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VESA VCB
Operating Manual

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| Indicates Change

Revision History

Issue	Date	Changes	Created by	Approved by
A	16/07/2012	Initial version	M Labat	J Rocha
A1	16/07/2012	Correction made on chapter 6 (ISO replaces DIN and vice versa)	M Labat	J Rocha
B	01/08/2013	VESA 102 & 103 sections added. HVCB timing diagram added. Block diagrams added. Maintenance chapter modified to include photographs and calendar requirement. Document change request D20130805094126_375023	D Kennedy	J Dijckmans
C	10/09/2013	Task added in Chapter 4.1 New paragraph added (4.2.2) greasing of earthing arms and clips. Document change request D20130911030143_759079	D Kennedy	J Dijckmans
D	10/08/2015	Paragraph 2.4 modified as follows. Following the word packing: (5 x 50 grams or equivalent). Added Following the word warranty: (When stored properly these dehumidifier sachets are suitable for use for 18 to 24 months). Added. Document change request D20150810030714_169599	D Kennedy	J Dijckmans

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1 Introduction

1.1 Safety

Hazardous voltage can shock, burn or cause death.

Installation, removal and “on train” maintenance should be carried out in accordance with the guidelines contained in this document.

During installation, commissioning, operation and maintenance of the equipment, all local health and safety regulations should be followed.

When operating the VESA VCB, take note that certain parts are subject to dangerous voltages. Mechanical parts, some being remote-controlled, move quickly and noisily. Operators should keep hands and feet away from the machine. Failure to comply may result in death, severe personal injury or damage to equipment. It must be ensured that the overhead High Voltage (HV) supply is isolated and earthed for any activities requiring access to the vehicle roof.

The VESA VCB contains a large capacitor which will retain its charge after the supply voltage has been isolated from the unit. Under no circumstances should the enclosure cover to the VESA VCB be removed as this could result in an electrical shock or burn injury. Failure to comply shall result in the warranty being rendered null and void.

If the VESA VCB appears defective or damaged, contact TE Connectivity. Consult the troubleshooting guide within this document.

NOTE:
When the power is turned off and the VESA VCB is in a closed state, the VESA VCB will automatically open after 1 second. Mechanical parts move quickly and noisily. Operators shall keep hands and feet away from the machine to avoid accident.

1.2 List of abbreviations

Abbreviation	Meaning
APS	Actuator Power Supply
CC	Control Card
HV	High Voltage
HV1, HV2	High Voltage connection points on top of VCB
LV	Low Voltage
TCS	Train Control System
VCB	Vacuum Circuit Breaker
VI	Vacuum Interrupter

1.3 VESA Configuration table

Train Power Supply	VESA 101 HV circuit breaker with earthing mechanism compatible with 25kV AC network	VESA 102 HV circuit breaker without earthing mechanism compatible with 25kV AC network	VESA 103 HV circuit breaker with earthing mechanism compatible with 15kV AC network
110V	1-2191020-1	1-2191021-1	1-2191022-1
72V	1-2191020-2	1-2191021-2	1-2191022-2
48V	1-2191020-3	1-2191021-3	1-2191022-3
36V	1-2191020-4	1-2191021-4	1-2191022-4
24V	1-2191020-5	1-2191021-5	1-2191022-5
100V	1-2191020-6	1-2191021-6	1-2191022-6

Table 1

1.4 General Description

1.4.1 VESA 101

1.4.1.1 Main components

Figure 1 & Figure 2 shows the main VESA 101 VCB components, each item is explained in more detail on page 8 and 9.

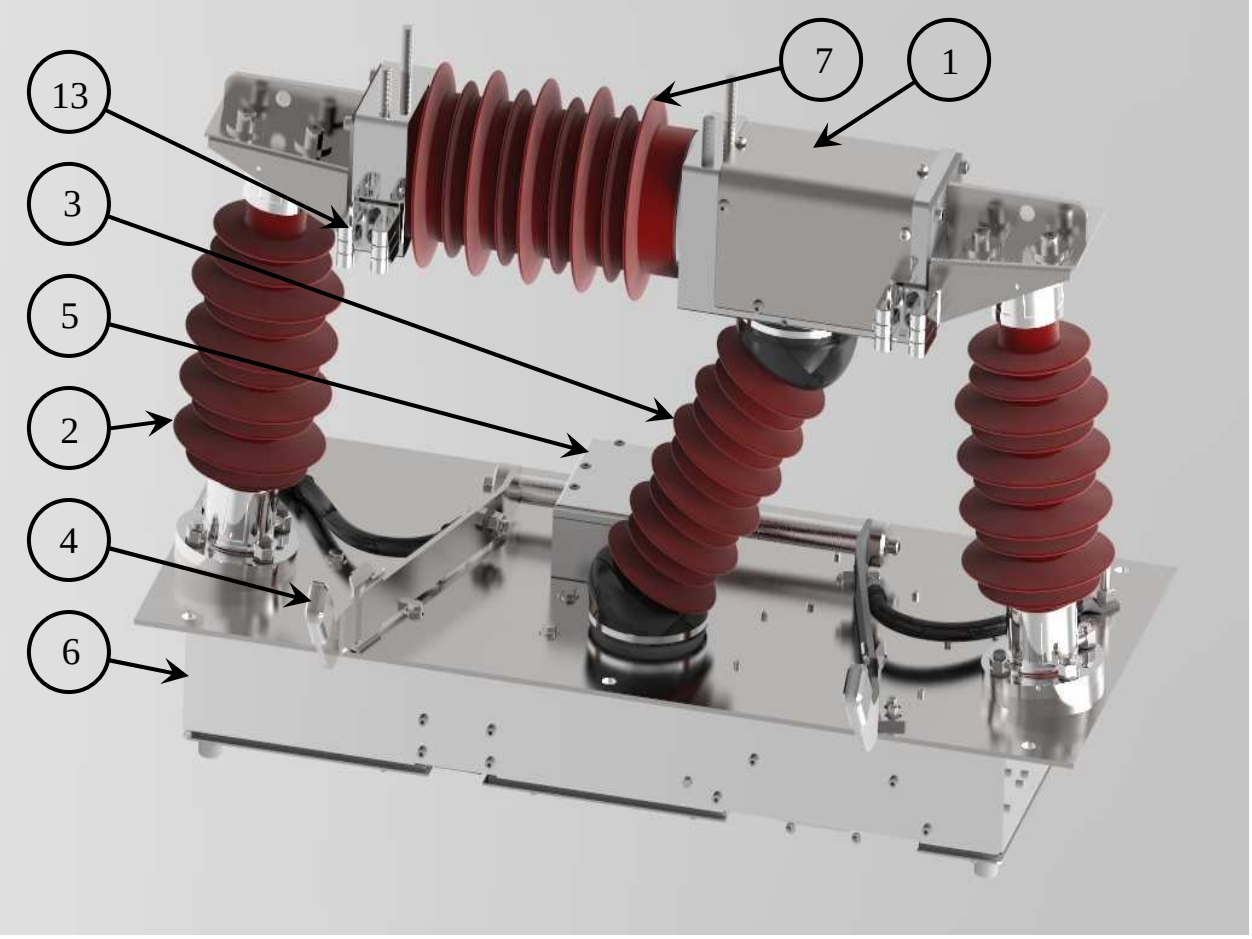


Figure 1: Main components of the VESA 101 VCB

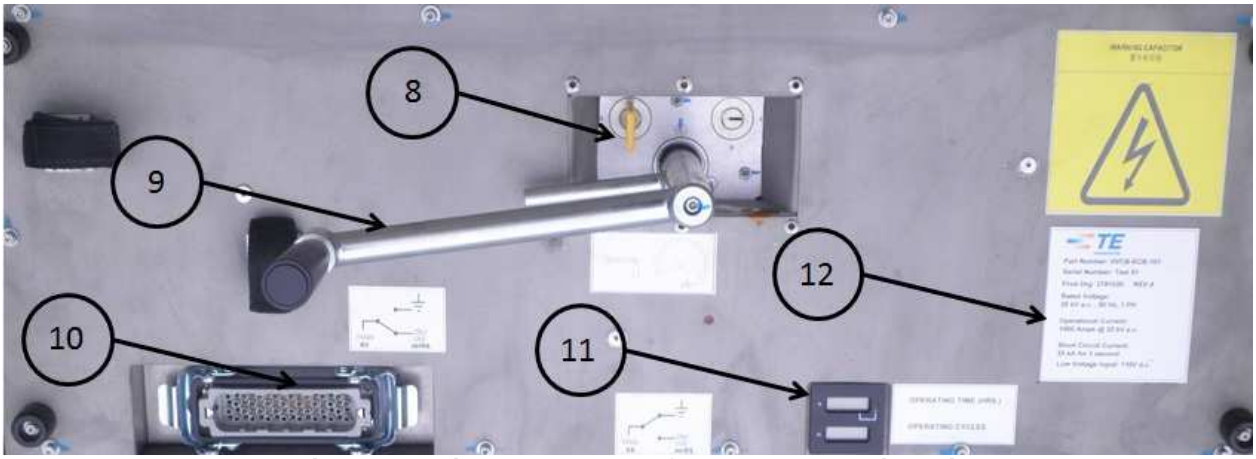


Figure 2: Main components of VESA 101 VCB (Base)

1.4.1.2 Main components description

(1) Top cover: provides access to the top drive mechanism, which is connected directly to the moving contact in the VI. When the VCB is closed, the drive mechanism provides the holding force to keep the contacts closed, reference Figure 1.

(2) Support Insulators: used to support the VI assembly and upper drive housing while providing the necessary electrical insulation, reference Figure 1.

(3) Drive rod: links the lower drive mechanism in the lower enclosure to the upper drive mechanism. It is sealed onto the housings at each end with rubber gaiters, reference Figure 1.

(4) Earthing arms: move from their open position on the base to their closed position in spring clips attached to the VI assembly. When engaged to the HV section of the VESA VCB, fault currents will be taken to earth via the earthing arms and flexible braids, reference Figure 1.

(5) Earth switch gearbox: links the interlock with the earthing switch. The mechanism is interlocked with the train key exchange system, reference Figure 1.

(6) Lower enclosure: holds the magnetic actuator and the low voltage (LV) interface between the actuator and the train control system, reference Figure 1.

(7) Vacuum Interrupter (VI) assembly: holds the VI, which includes the HV contacts. The VI is encased in a HV, environmentally sealed polymer insulation, reference Figure 1.

(8) Interlock key exchange: should form part of the train key exchange system to ensure that the earthing arms can only be operated in a safe and correct sequence, reference Figure 2.

(9) Earthing switch: is operated with a winder handle to raise or lower the earthing arms. The VCB earthing mechanism should be interlocked with the train key exchange system, reference Figure 2.

(10) Vehicle Interface connector: used to feed LV power and control signals to the VCB. Alarm, status and VCB position feedback signals to the train control system are also transmitted via this connector, reference Figure 2.

(11) Counter: keeps a record of the total number of close operations, reference Figure 2.

(12) Unit Identification label: contains the rating specifications and unique serial number of the unit, reference Figure 2.

(13) Earthing arm clips: When the earthing arms are engaged in the earthing clips and connected to the HV section of the VESA VCB, fault currents will be taken to earth via the earthing arms and flexible braids, reference Figure 1.

1.4.2 VESA 102

1.4.2.1 Main components

Figure 3 & Figure 4 shows the main VESA 102 VCB components, each item is explained in more detail on page 10.

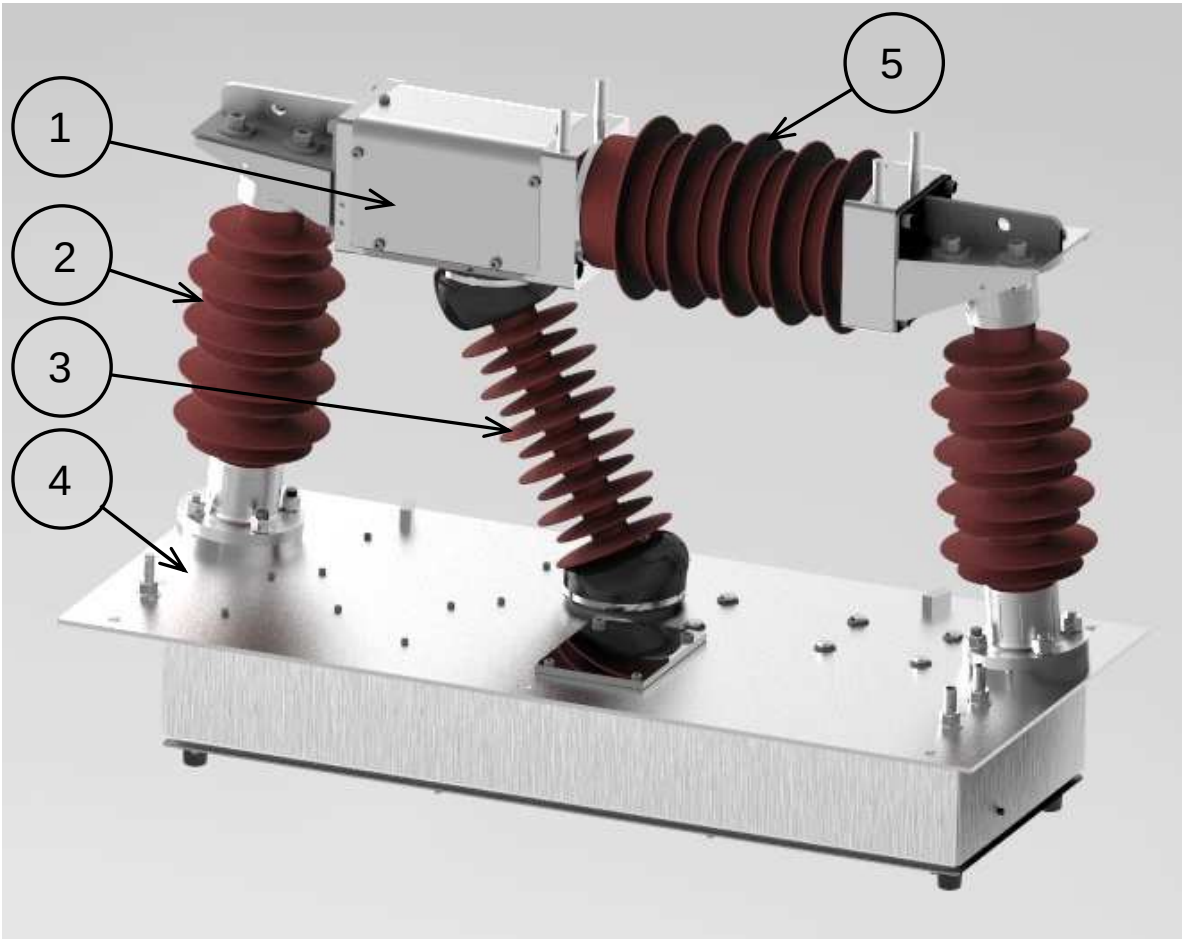


Figure 3: Main components of the VESA 102 VCB

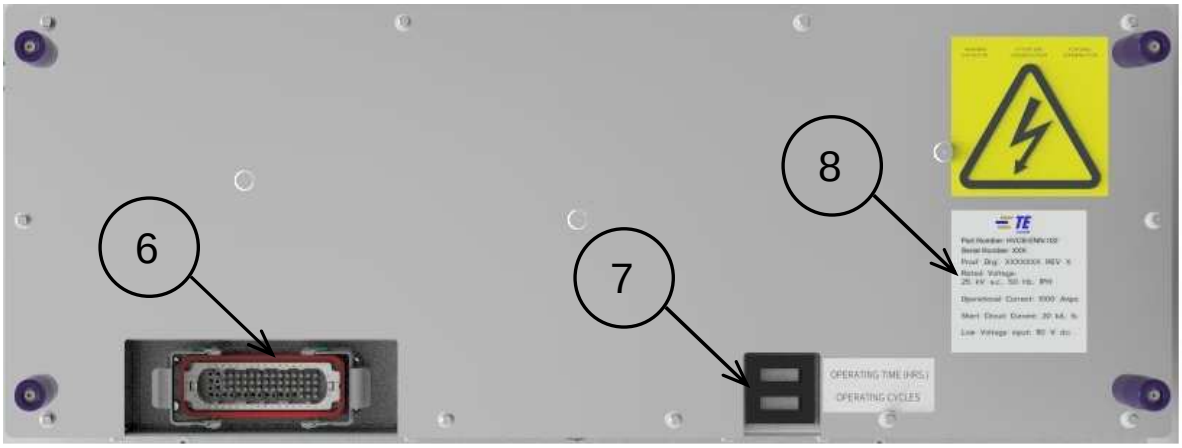


Figure 4: Main components of VESA 102 VCB (Base)

1.4.2.2 Main components description

(1) Top cover: provides access to the top drive mechanism, which is connected directly to the moving contact in the VI. When the VCB is closed, the drive mechanism provides the holding force to keep the contacts closed, reference Figure 3.

(2) Support Insulators: used to support the VI assembly and upper drive housing while providing the necessary electrical insulation, reference Figure 3.

(3) Drive rod: links the lower drive mechanism in the lower enclosure to the upper drive mechanism. It is sealed onto the housings at each end with rubber gaiters, reference Figure 3.

(4) Lower enclosure: holds the magnetic actuator and the low voltage (LV) interface between the actuator and the train control system, reference Figure 3.

(5) Vacuum Interrupter (VI) assembly: holds the VI, which includes the HV contacts. The VI is encased in a HV, environmentally sealed polymer insulation, reference Figure 3.

(6) Vehicle Interface connector: used to feed LV power and control signals to the VCB. Alarm, status and VCB position feedback signals to the train control system are also transmitted via this connector, reference Figure 4.

(7) Counter: keeps a record of the total number of close operations, reference Figure 4.

(8) Unit Identification label: contains the rating specifications and unique serial number of the unit, reference Figure 4.

1.4.3 VESA 103

1.4.3.1 Main components

Figure 5 & Figure 6 shows the main VESA 103 VCB components, each item is explained in more detail on page 12 and 13.

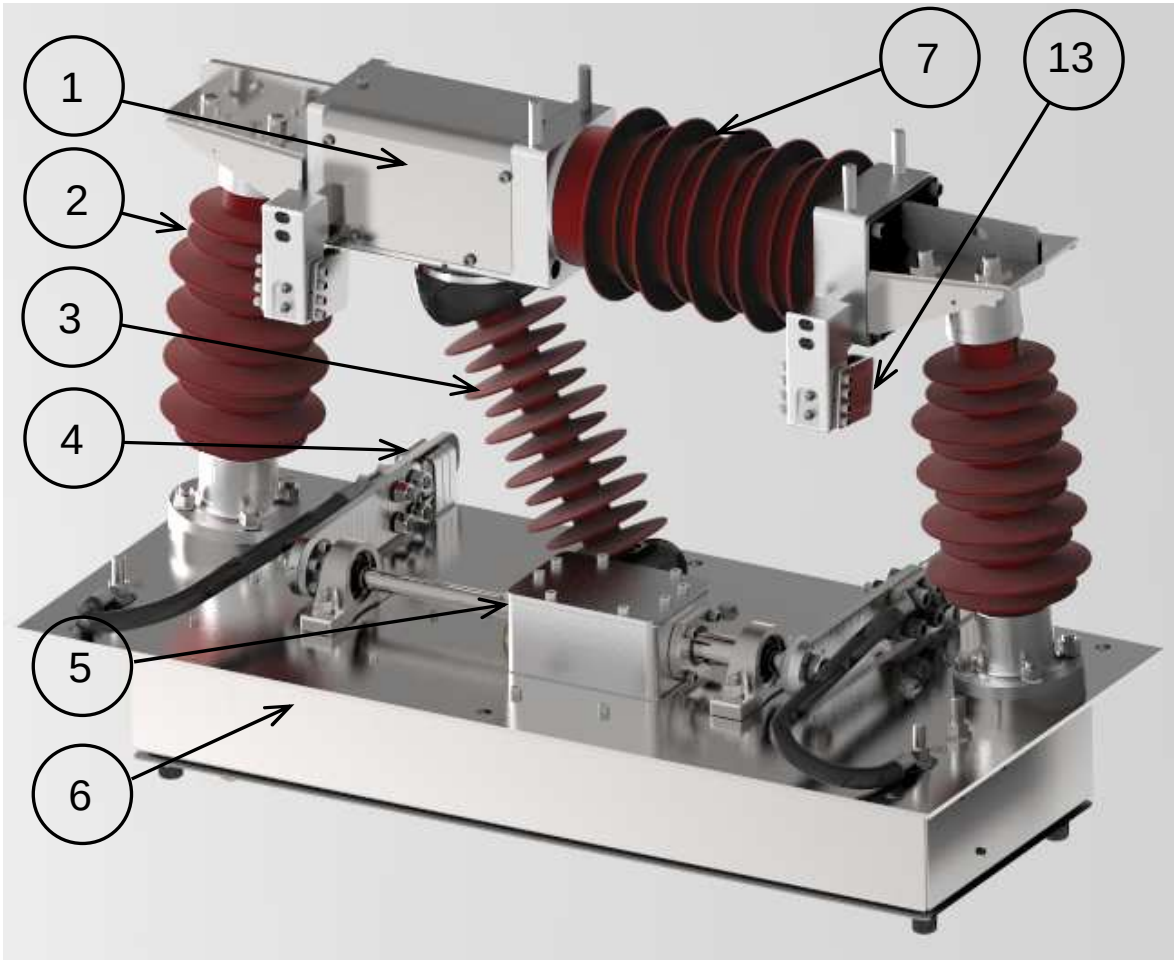


Figure 5: Main components of the VESA 103 VCB

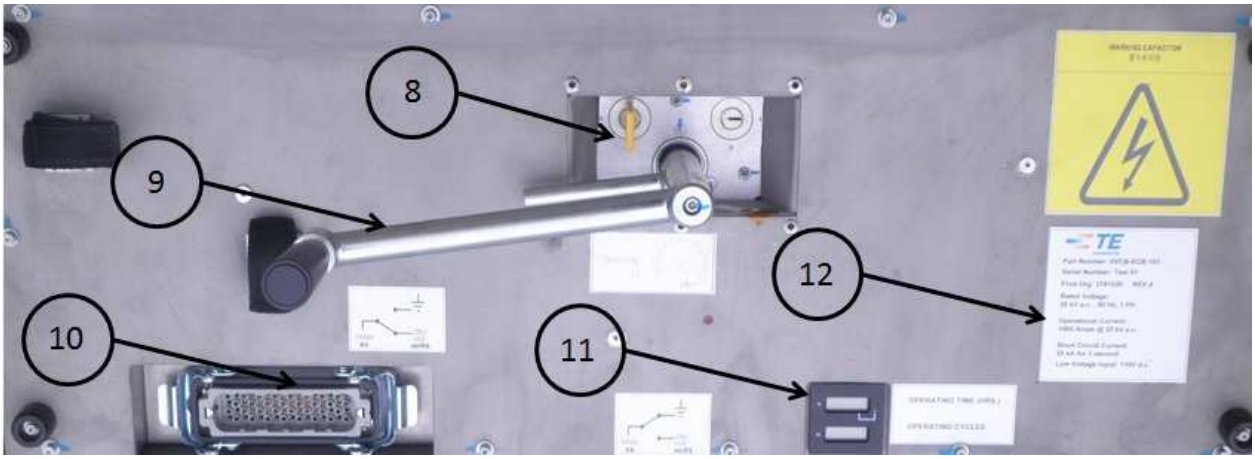


Figure 6: Main components of VESA 103 VCB (Base)

1.4.3.2 Main components description

(1) Top cover: provides access to the top drive mechanism, which is connected directly to the moving contact in the VI. When the VCB is closed, the drive mechanism provides the holding force to keep the contacts closed, reference Figure 5.

(2) Support Insulators: used to support the VI assembly and upper drive housing while providing the necessary electrical insulation, reference Figure 5.

(3) Drive rod: links the lower drive mechanism in the lower enclosure to the upper drive mechanism. It is sealed onto the housings at each end with rubber gaiters, reference Figure 5.

(4) Earthing arms: move from their open position on the base to their closed position in spring clips attached to the VI assembly. When engaged to the HV section of the VESA VCB, fault currents will be taken to earth via the earthing arms and flexible braids, reference Figure 5.

(5) Earth switch gearbox: links the interlock with the earthing switch. The mechanism is interlocked with the train key exchange system, reference Figure 5.

(6) Lower enclosure: holds the magnetic actuator and the low voltage (LV) interface between the actuator and the train control system, reference Figure 5.

(7) Vacuum Interrupter (VI) assembly: holds the VI, which includes the HV contacts. The VI is encased in a HV, environmentally sealed polymer insulation, reference Figure 5.

(8) Interlock key exchange: should form part of the train key exchange system to ensure that the earthing arms can only be operated in a safe and correct sequence, reference Figure 6.

(9) Earthing switch: is operated with a winder handle to raise or lower the earthing arms. The VCB earthing mechanism should be interlocked with the train key exchange system, reference Figure 6.

(10) Vehicle Interface connector: used to feed LV power and control signals to the VCB. Alarm, status and VCB position feedback signals to the train control system are also transmitted via this connector, reference Figure 6.

(11) Counter: keeps a record of the total number of close operations, reference Figure 6.

(12) Unit Identification label: contains the rating specifications and unique serial number of the unit, reference Figure 6.

(13) Earthing arm clips: When the earthing arms are engaged in the earthing clips and connected to the HV section of the VESA VCB, fault currents will be taken to earth via the earthing arms and flexible braids, reference Figure 5.

1.4.4 Description of operation VESA 101, VESA 102 & VESA 103

The VESA VCB is electrically actuated, using stored energy derived from the train's Low Voltage (LV) power supply to change the state of a bi-stable electro-magnetic actuator.

The VESA VCB is controlled by means of a train command signal (CLOSE or OPEN) that is sent to the VCB control card, which in turn controls switching of power to the electro-magnetic actuator. When the actuator changes state it moves a contact in the Vacuum Interrupter (VI) via an external High Voltage (HV) insulated drive rod.

A magnetic latching mechanism is incorporated within the actuator that maintains the VI contacts in a closed position without requiring power.

Sufficient energy is stored within the VESA VCB to ensure operation of the actuator in the event of loss of power to the unit, when the VCB will automatically default to the open condition after a short time delay.

The unit interfaces with the electronic control system on the train and the control logic can be customised to individual applications. The unit provides alarm signals to assist with troubleshooting activities, although the availability of this facility is dependent on specific train control system configurations.

Figure 7 illustrates the moving parts of the VESA VCB.

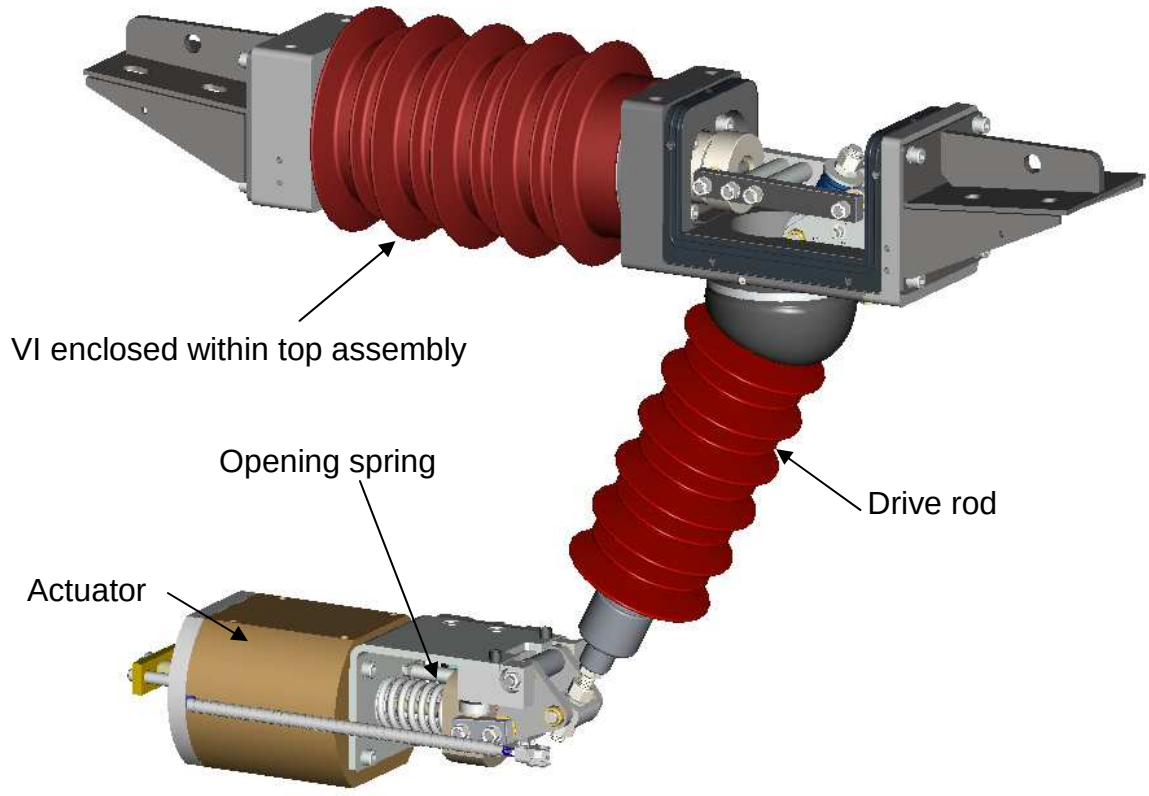


Figure 7: VCB main contact movement

1.4.5 Earthing switch operation (Applicable VESA 101 & 103 only).

The earthing switch is operated by rotating the operating handle on the base of the VCB inside the train as shown on Figure 8. Interlocking keys must be inserted to operate the handle between the marks indicated on the base cover. This will change the position of the earthing arms to allow the train key to be removed.

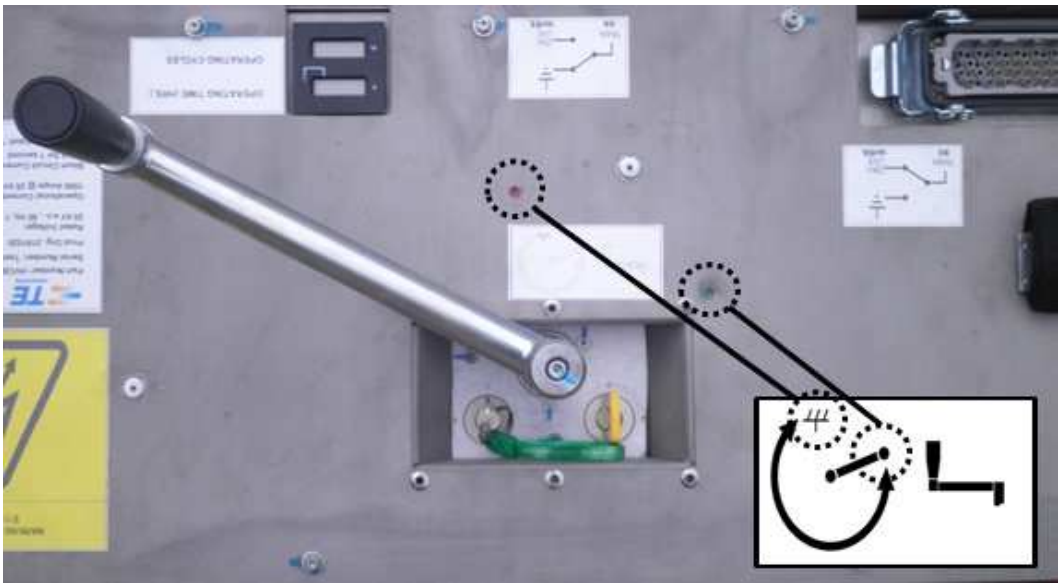
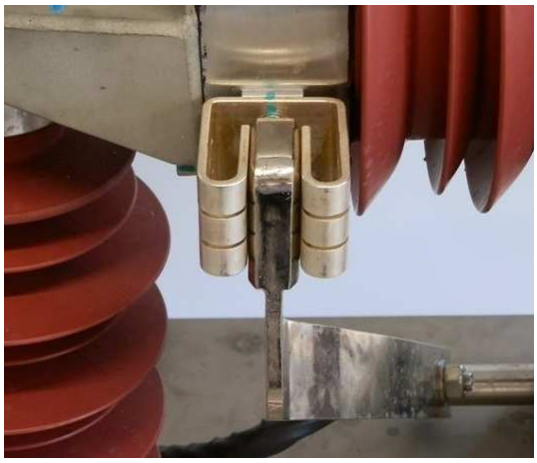
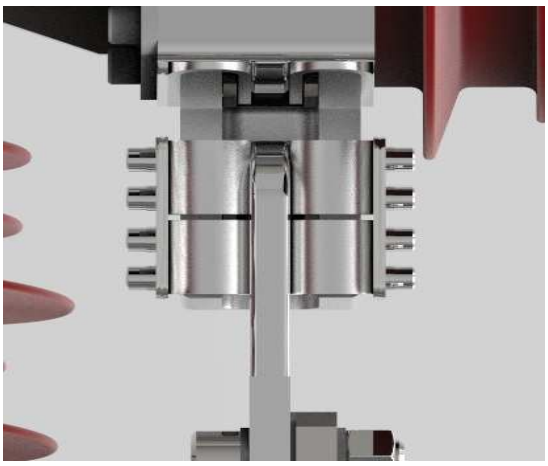


Figure 8: Earthing switch operation

When in the earthed position, earthing arms should be located centrally in earthing clip refer to Figures 9.



VESA 101



VESA 103

Figures 9: Earthing arms engaged in "Up" position

1.4.6 Electrical Specifications

	VESA 101	VESA 102	VESA 103
Nominal line supply voltage	25kV	25kV or 15kV	15kV
Maximum rated voltage	30kV	30kV or 18kV	18kV
Rated current	1000A rms	1000A rms or 500A rms	500A rms
Frequency	50Hz / 60Hz	50Hz/60Hz or 16 2/3 Hz	16 2/3 Hz
Lightning impulse withstand voltage	170kV**	170kV** or 125kV	125kV
Power Frequency withstand voltage	75kV rms		
Short-circuit making current (peak)	50kA	50kA or 62.5kA	62.5kA
Short-circuit breaking current (rms)	20kA/1s	20kA/1s or 25kA/1s	25kA/1s
Opening time	24ms (±3ms)		
Closing time	51ms (±3ms)		
Supply voltage	SEE CONFIGURATION TABLE –TABLE 1 page 6		

****** Higher Voltage options are available. Contact TE for more information.

1.4.7 Mechanical specifications

1.4.7.1 Dimensions

Above roof line	490mm
Below roof line	140mm
Base plate dimensions	940x430mm

1.4.7.2 Weight

	Unit weight	Packed unit weight
VESA 101	105kg	185kg
VESA 102	95kg	175kg
VESA 103	115kg	195kg

1.4.7.3 Operating conditions

Temperature	-40℃ to +70℃
Altitude	Up to 1000m (insulation needs to be de-rated for higher altitude)

1.4.7.4 Description of VESA 101 & 103 VCB LV Connector Signals

Pin No.	Signal Name	Description	In/Out
A1	TPS +	Train Power Supply positive/+V	I
B1	TPS –	negative/0V/return	I
C1	ENABLE +	Train Control System safety interlock VCB enable	I
D1	ENABLE -	negative/0V/return	I
A2	TCS Command +	Train Control System OPEN/CLOSE command line	I
B2	TCS Command -	negative/0V/return	I
C2	Ready	VCB Status, Ready signal (SPST)	O
D2	Ready		O
A3	Non-urgent Alarm	VCB Status, non-urgent alarm signal (SPST)	O
B3	Non-urgent Alarm		O
C3	Urgent Alarm	VCB Status, urgent alarm signal (SPST)	O
D3	Urgent Alarm		O
A4	Close 4 NC	VCB closed position sensor, micro-switch C4 (SPDT). Volt free contacts.	O
B4	Close 4 COM		O
C4	Close 4 NO		O
A5	Close 5 NC	VCB closed position sensor, micro-switch C5 (SPDT). Volt free contacts.	O
B5	Close 5 COM		O
C5	Close 5 NO		O
A6	Close 6 NC	VCB closed position sensor, micro-switch C6 (SPDT) Volt free contacts.	O
B6	Close 6 COM		O
C6	Close 6 NO		O
A7	Close 7 NC	VCB closed position sensor, micro-switch C7 (SPDT). Volt free contacts.	O
B7	Close 7 COM		O
C7	Close 7 NO		O

Pin No.	Signal Name	Description	In/Out
A8	Open 8 NC	VCB open position sensor, micro-switch O8 (SPDT). Volt free contacts.	O
B8	Open 8 COM		O
C8	Open 8 NO		O
A9	Open 9 NC	VCB open position sensor, micro-switch O9 (SPDT). Volt free contacts.	O
B9	Open 9 COM		O
C9	Open 9 NO		O
A10	Open 10 NC	VCB open position sensor, micro-switch O10 (SPDT). Volt free contacts.	O
B10	Open 10 COM		O
C10	Open 10 NO		O
A11	Open 11 NC	VCB open position sensor, micro-switch O11 (SPDT). Volt free contacts.	O
B11	Open 11 COM		O
C11	Open 11 NO		O
A12	Earth 12 NC	Earthing arms position indicator, micro-switch E12 (SPDT) Volt free contacts (Only applicable to 101).	O
B12	Earth 12 COM		O
C12	Earth 12 NO		O
A13	Earth 13 NC	Earthing arms position indicator, micro-switch E13 (SPDT) Volt free contacts (Only applicable to 101).	O
B13	Earth 13 COM		O
C13	Earth 13 NO		O
A14	Earth 14 NC	Earthing arms position indicator, micro-switch E14 (SPDT) Volt free contacts (Only applicable to 101).	O
B14	Earth 14 COM		O
C14	Earth 14 NO		O
A15	Enable Signal	Can be used in conjunction with over current devices as part of the trains “safety” system.	I
A16	No Connection		
B15-B16	No Connection		
C15-C16	No Connection		
D4-D16	No Connection		

1.4.7.5 Description of VESA 102 VCB LV Connector Signals

Pin No.	Signal Name	Description	In/Out
A1	TPS +	Train Power Supply positive/+V	I
B1	TPS –	negative/0V/return	I
C1	ENABLE +	Train Control System safety interlock VCB enable	I
D1	ENABLE -	negative/0V/return	I
A2	TCS Command +	Train Control System OPEN/CLOSE command line	I
B2	TCS Command -	negative/0V/return	I
C2	Ready	VCB Status, Ready signal (SPST)	O
D2	Ready		O
A3	Non-urgent Alarm	VCB Status, non-urgent alarm signal (SPST)	O
B3	Non-urgent Alarm		O
C3	Urgent Alarm	VCB Status, urgent alarm signal (SPST)	O
D3	Urgent Alarm		O
A4	Close 4 NC	VCB closed position sensor, micro-switch C4 (SPDT). Volt free contacts.	O
B4	Close 4 COM		O
C4	Close 4 NO		O
A5	Close 5 NC	VCB closed position sensor, micro-switch C5 (SPDT). Volt free contacts.	O
B5	Close 5 COM		O
C5	Close 5 NO		O
A6	Close 6 NC	VCB closed position sensor, micro-switch C6 (SPDT) Volt free contacts.	O
B6	Close 6 COM		O
C6	Close 6 NO		O
A7	Close 7 NC	VCB closed position sensor, micro-switch C7 (SPDT). Volt free contacts.	O
B7	Close 7 COM		O
C7	Close 7 NO		O

Pin No.	Signal Name	Description	In/Out
A8	Open 8 NC	VCB open position sensor, micro-switch O8 (SPDT). Volt free contacts.	O
B8	Open 8 COM		O
C8	Open 8 NO		O
A9	Open 9 NC	VCB open position sensor, micro-switch O9 (SPDT). Volt free contacts.	O
B9	Open 9 COM		O
C9	Open 9 NO		O
A10	Open 10 NC	VCB open position sensor, micro-switch O10 (SPDT). Volt free contacts.	O
B10	Open 10 COM		O
C10	Open 10 NO		O
A11	Open 11 NC	VCB open position sensor, micro-switch O11 (SPDT). Volt free contacts.	O
B11	Open 11 COM		O
C11	Open 11 NO		O
A15	Enable Signal	Can be used in conjunction with over current devices as part of the trains “safety” system.	I
A12-14 &16	No Connection		
B12-B16	No Connection		
C12-C16	No Connection		
D4-D16	No Connection		

2 Receiving/Handling and Storage

2.1 Unpacking the VESA VCB

When knives or sharp objects are used to remove the packaging around the VCB, extreme care must be taken as it possible to easily damage certain components.

2.2 Scope of supply

- VCB unit (fully packaged)
- VCB packing crate
- VCB Connector Kit.
- VCB Roof mounting gasket and compression limiters.
- VCB Earth switch operating handle (VESA 101 & 103 only).
- VCB Routine Test Certificates (RTC).

- VCB Certificate of Conformity

2.3 Inspection at delivery

Upon delivery, the product and packing shall be checked for the following:

- Damage to product & packaging.
- Product I.D. Label corresponds to order confirmation and shipping note.
- All items listed on the shipping note are included with the product.

Should any damage or irregularity be noted in the product on unpacking, a local TE Connectivity sales representative shall be notified as soon as possible and no later than five working days from receipt.

2.4 Transport and Storage

If the product is not to be immediately installed on the train, it should be repacked in the original packing materials. Insert at least one standard packet of hygroscopic substance per product within the packing (5 x 50 grams or equivalent). It should be stored indoors in a well-ventilated, dry, dust-free, non-corrosive environment, away from any flammable materials. Failure to store the equipment in accordance with these guidelines may affect the operation of the equipment and impact the warranty. When stored properly these dehumidifier sachets are suitable for use for 18 to 24 months.

2.5 Handling and Packaging

2.5.1 Handling of the equipment for storage

The package crates must not be double stacked. The package crates can be handled with a fork lift and/or pallet truck. All handling equipment and storage facilities should be capable of carrying the weight of the packaged VESA VCB as defined in 1.4.7.2.

2.5.2 Handling for installation/removal

For installation and removal of the product, the following equipment should be used:

- Lift/Hoist.
- Chain/slings and shackles capable of lifting the weight of the equipment (as defined in 1.4.7.2).

Note: Only the specified lifting points as indicated in Figure 10 or Figure 11 and Figure 12 shall be used. Failure to comply with this may affect the warranty.

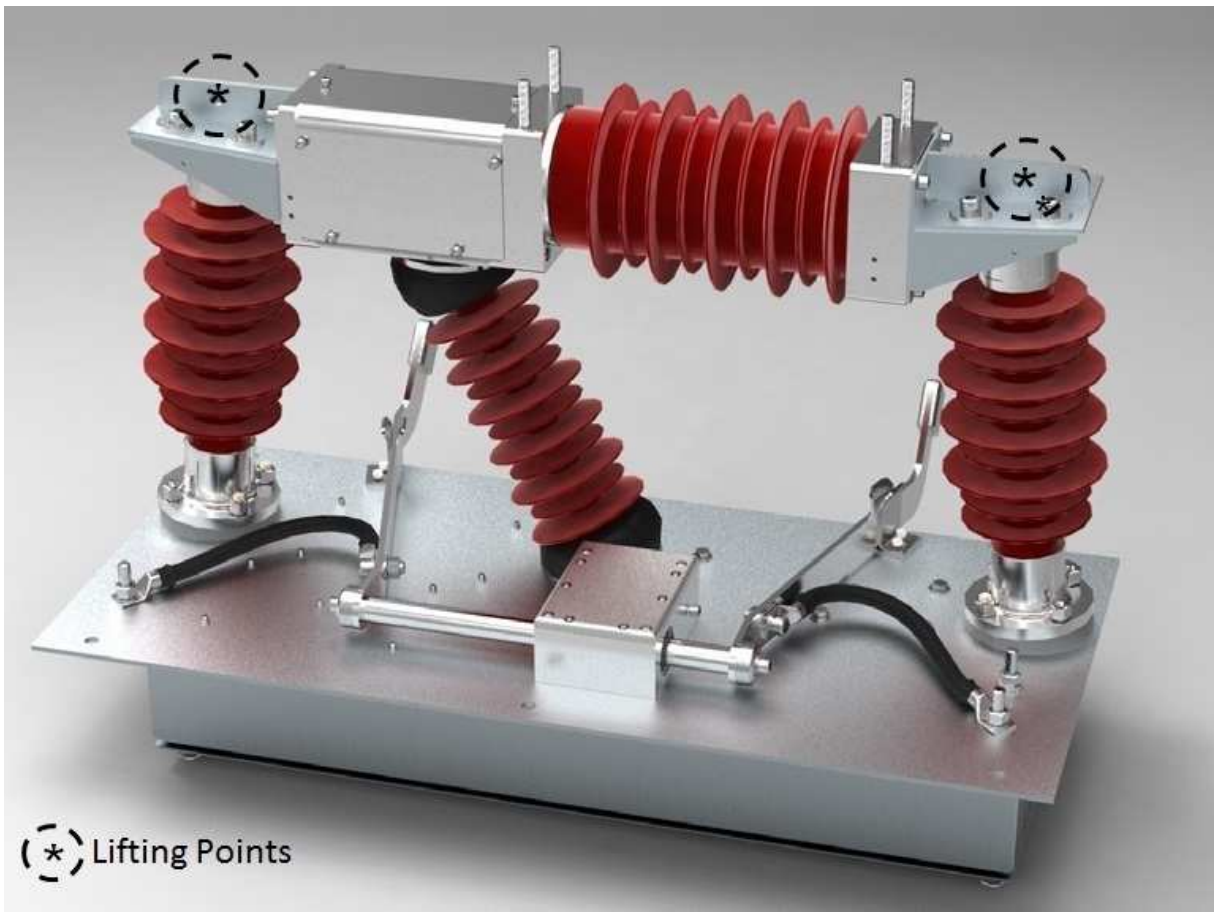


Figure 10: VESA 101 Lifting points

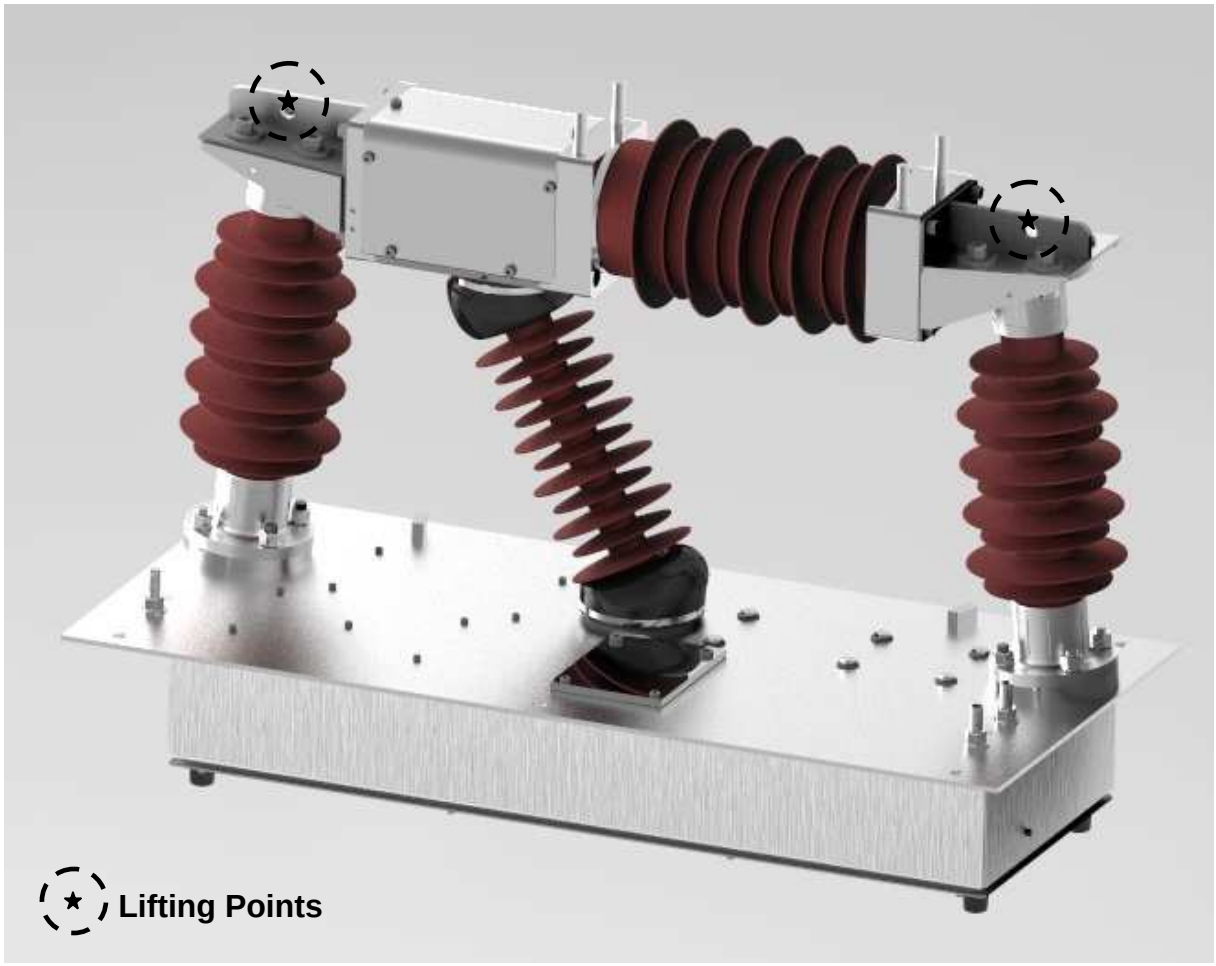


Figure 11: VESA 102 Lifting points

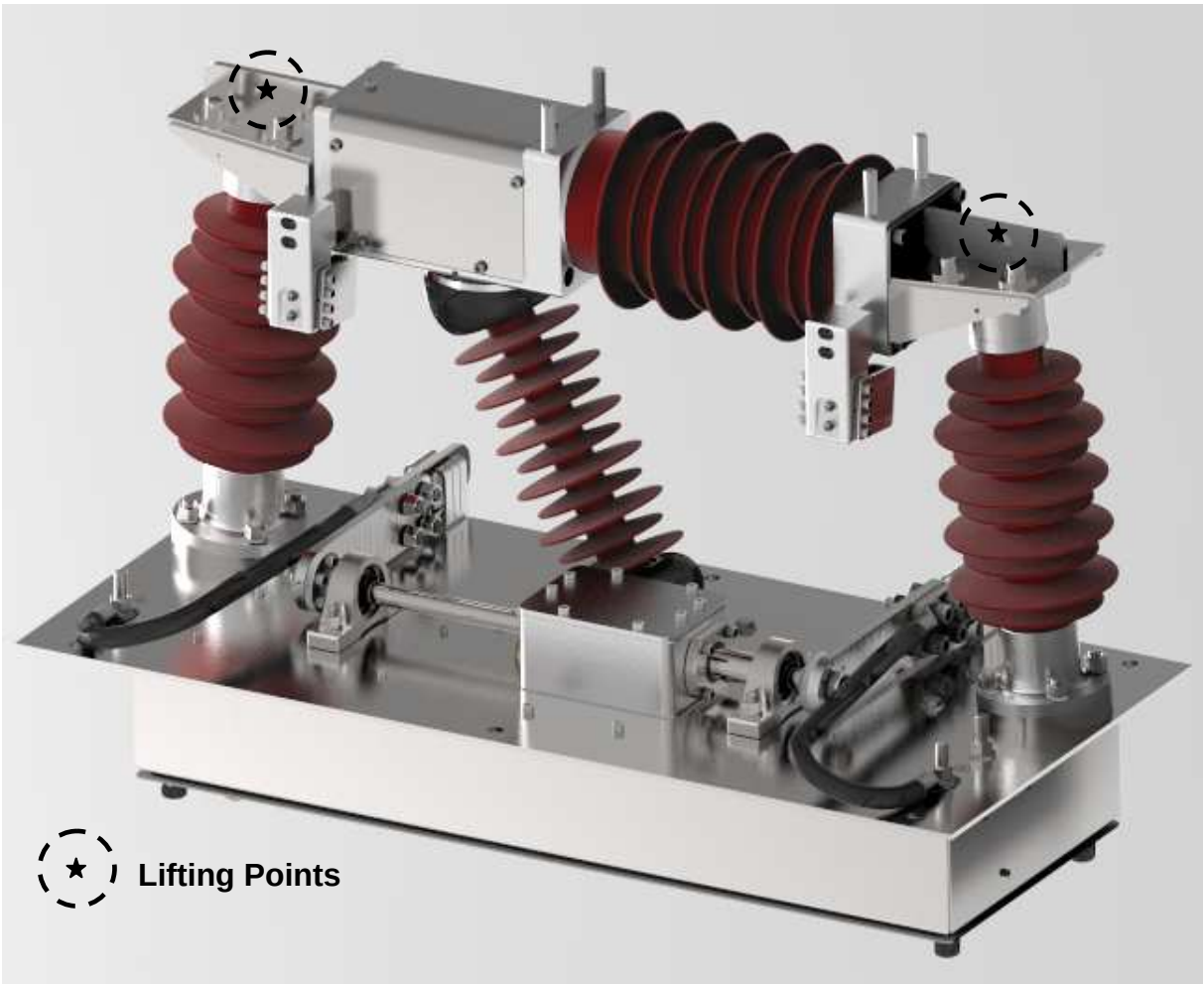


Figure 12: VESA 103 Lifting points

2.5.3 Packaging for sending to TE maintenance centre

When returning the product to a TE Connectivity maintenance centre, it is required to pack the product in its original packaging. Due care and attention must be taken when securing the product for transit. The return documentation as provided by TE Connectivity (refer to 2.2) must be included within the product packaging. Where original packaging is not available, contact the local TE Connectivity sales representative to discuss alternative packaging options.

Note: TE Connectivity will not be liable for any damage due to inadequate packaging or transportation means.

3 Installation and Commissioning

3.1 Installation Procedure

The unit is delivered ready for direct mounting onto the train as detailed in Figure 13 (VESA 101), Figure 11 (VESA 102) and Figure 12 (VESA 103). There is no assembly, calibration or set-up work to carry out before installation. The use of a torque wrench is required when installing the product on the train.

a) Mount the gasket and compression limiters to the roof opening of the train. Note: the gasket fixing holes hold the compression limiting spacers.

b) Attach suitable hooks from an overhead hoist (ensure that it is capable to lift the weight of the equipment as defined in 1.4.7.2) to the Ø15mm lifting holes as shown in Figure 10 (VESA 101), Figure 11 (VESA 102) and Figure 12 (VESA 103).

c) Lift the VESA VCB and gently lower it towards the opening in the roof. Ensure the unit, gasket and fixing holes are aligned.

d) Secure using 6 x M12 bolts. Torque setting should be to local recommendations dependant on fixing material and fasteners used.

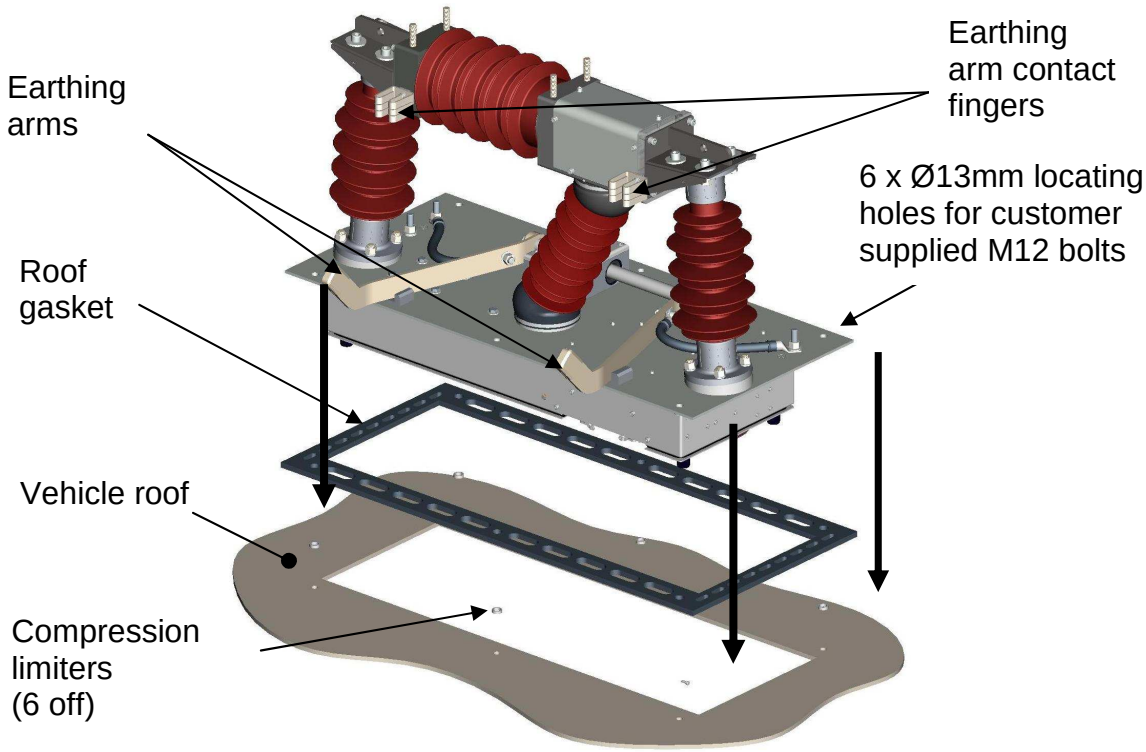


Figure 13: VESA 101 Installation onto vehicle

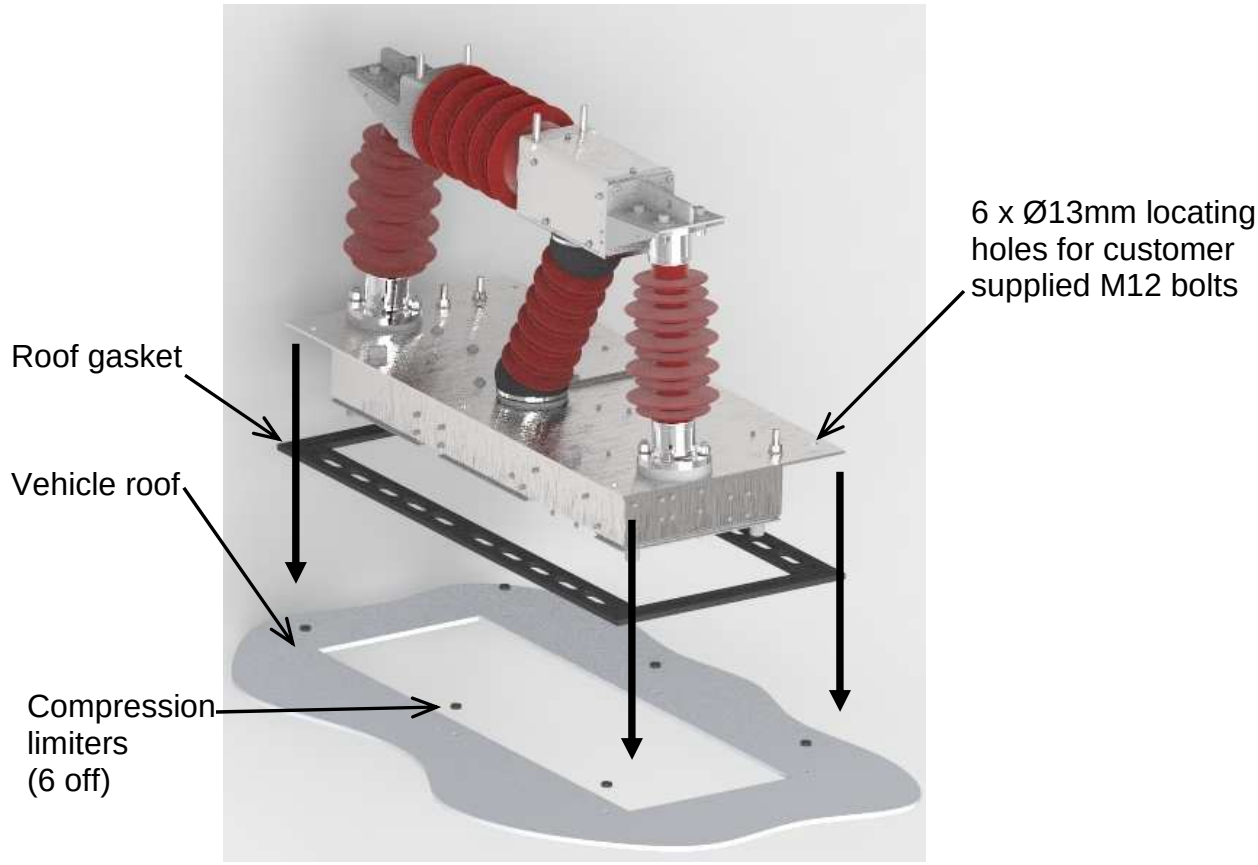


Figure 14: VESA 102 Installation onto vehicle

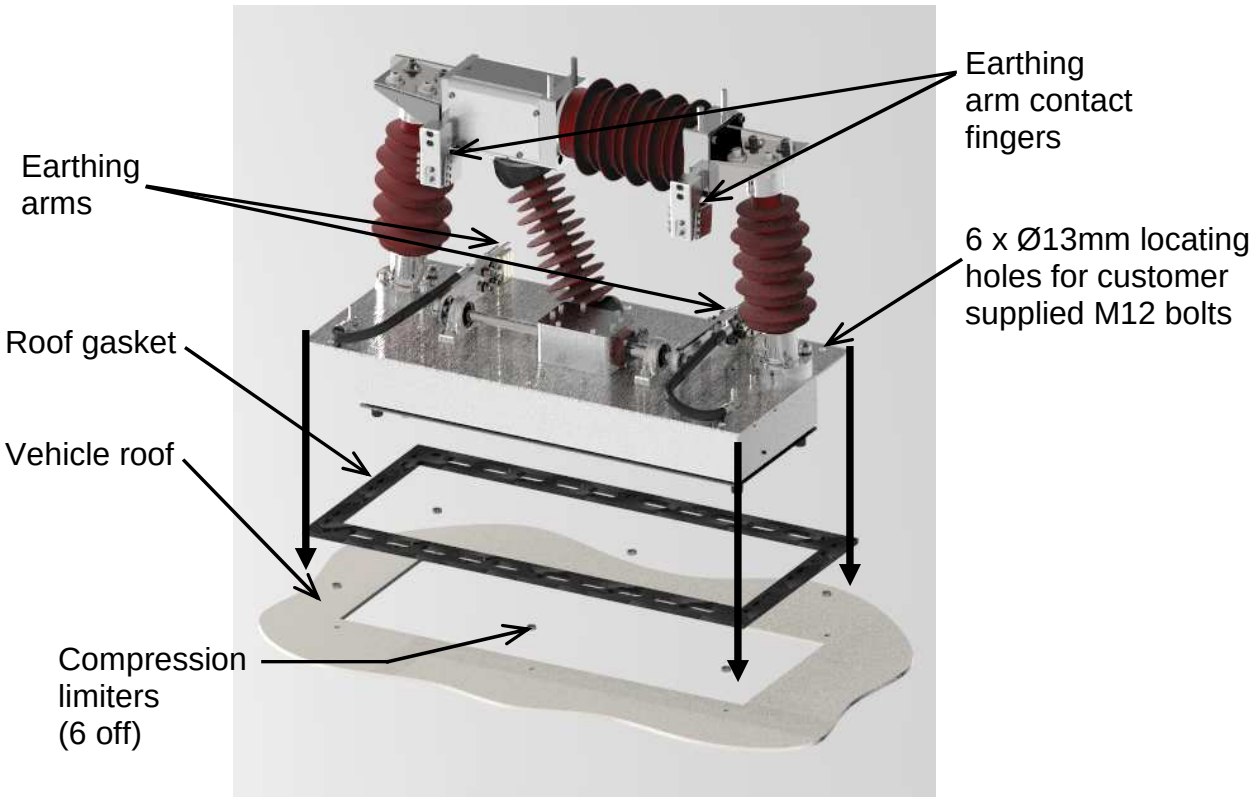


Figure 15: VESA 103 Installation onto vehicle

e) Clean the contact area around the HV connections marked HV1 and HV2 (see Figure 16 VESA 101, Figure 17 VESA 102 and Figure 18 VESA 103). Contact grease must be applied to the HV1 and HV2 connections faces before fitting the HV connections. TE Connectivity recommends the use of ENERTAL grease TE PN 717542-1.

f) Fit bus bars or cables as required onto the M12 studs. One or both studs can be used at each end. It is recommended that nuts are tightened to a torque of 56Nm in conjunction with stainless steel Nord-Lock washers (NL12SPSS) and thread lubrication using Nord-Lock graphite grease GTP600.

g) Attach earth conductors from the train chassis to the earthing point shown in Figure 16 (torque value 67Nm used in conjunction with lubrication).

h) On the inside of the train, attach the LV connector. Ensure that the plug is securely locked into position.

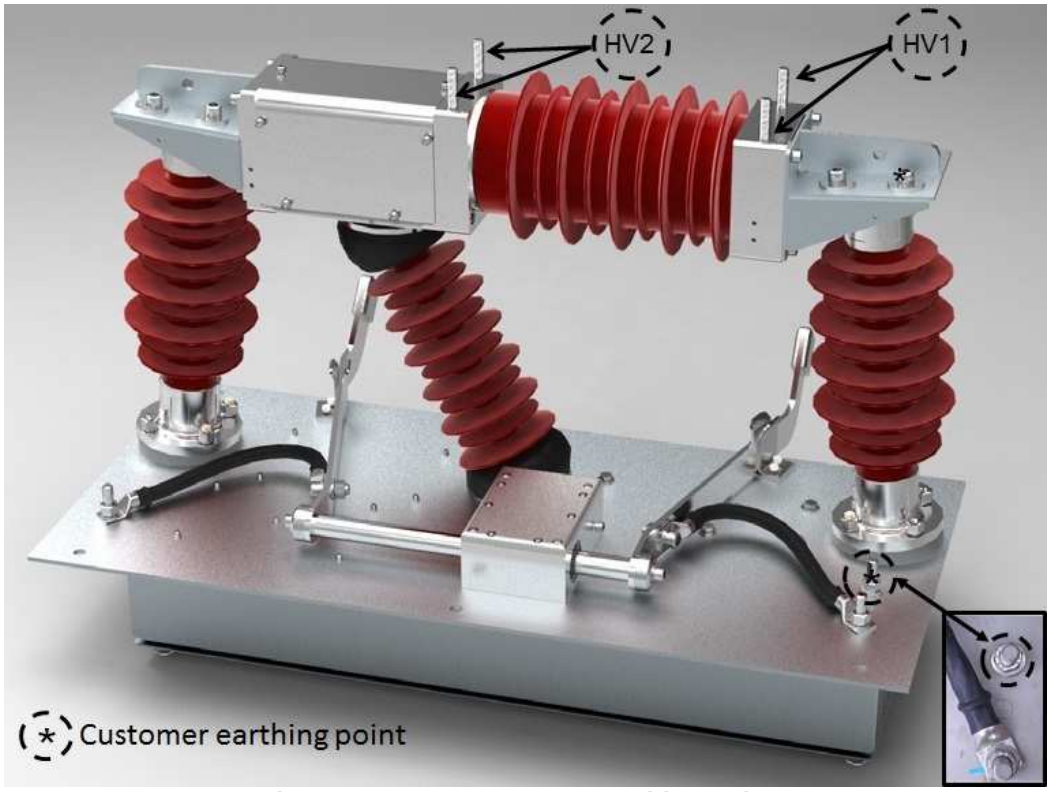


Figure 16: VESA 101 HV & earthing points

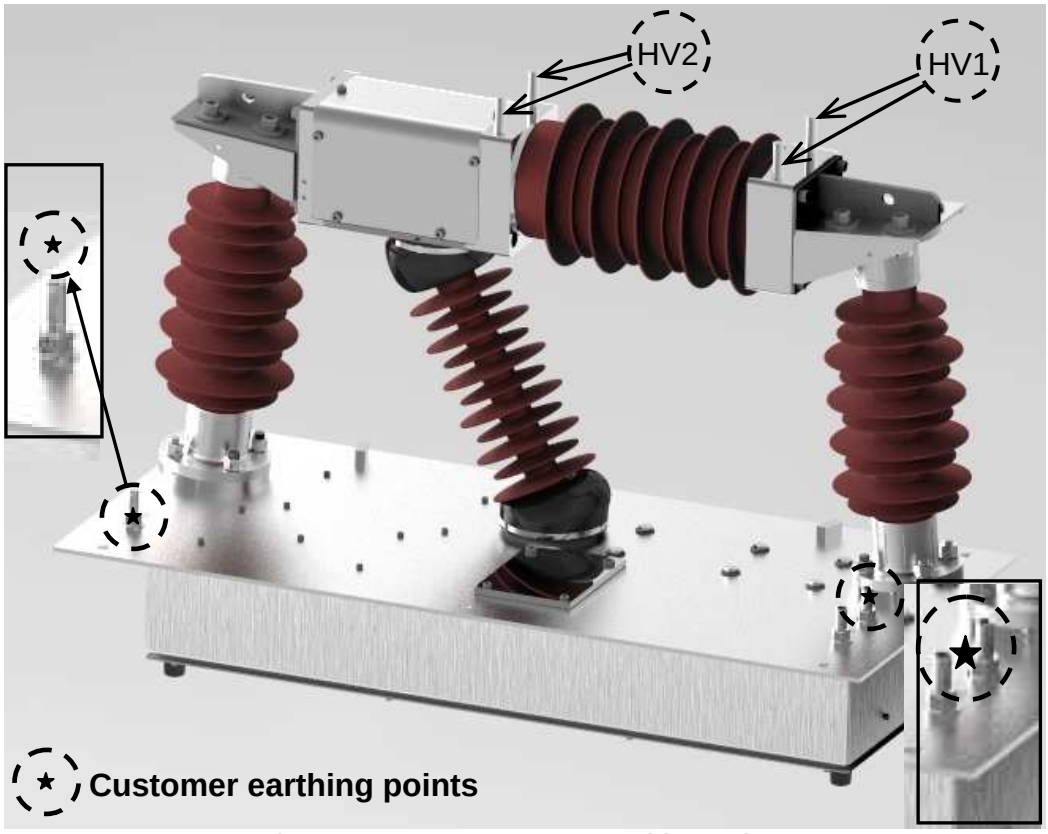


Figure 17: VESA 102 HV & earthing points

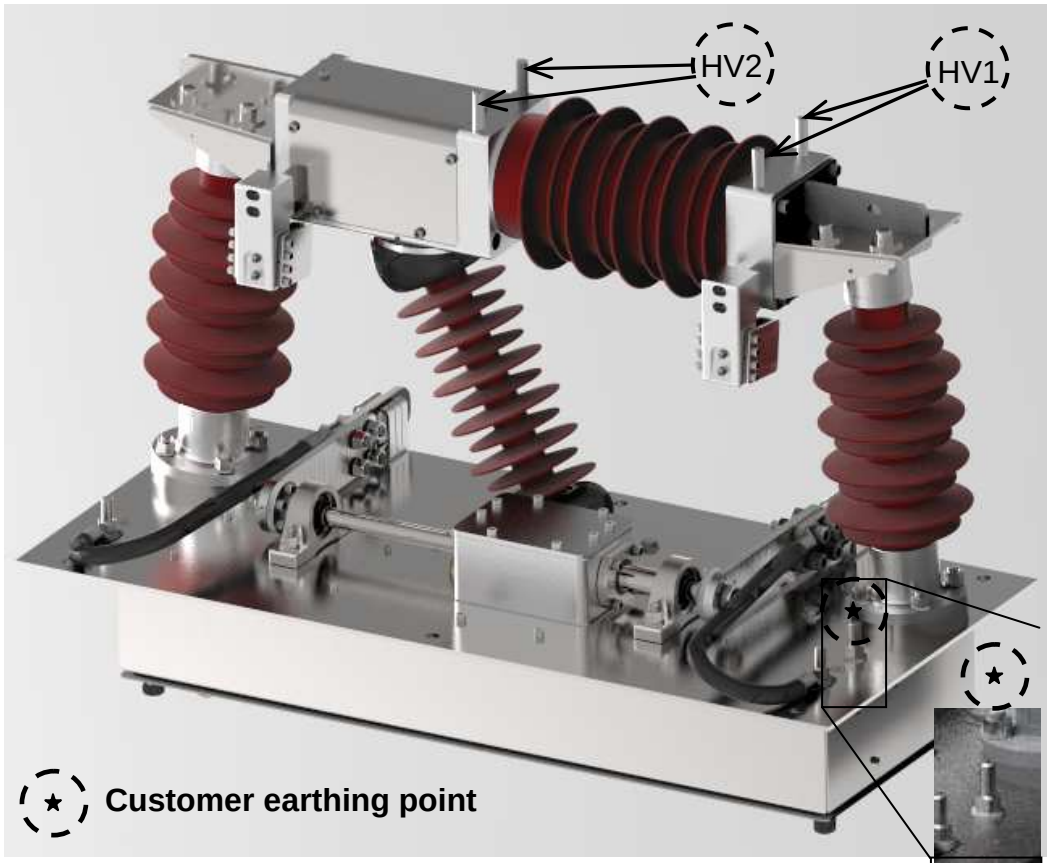
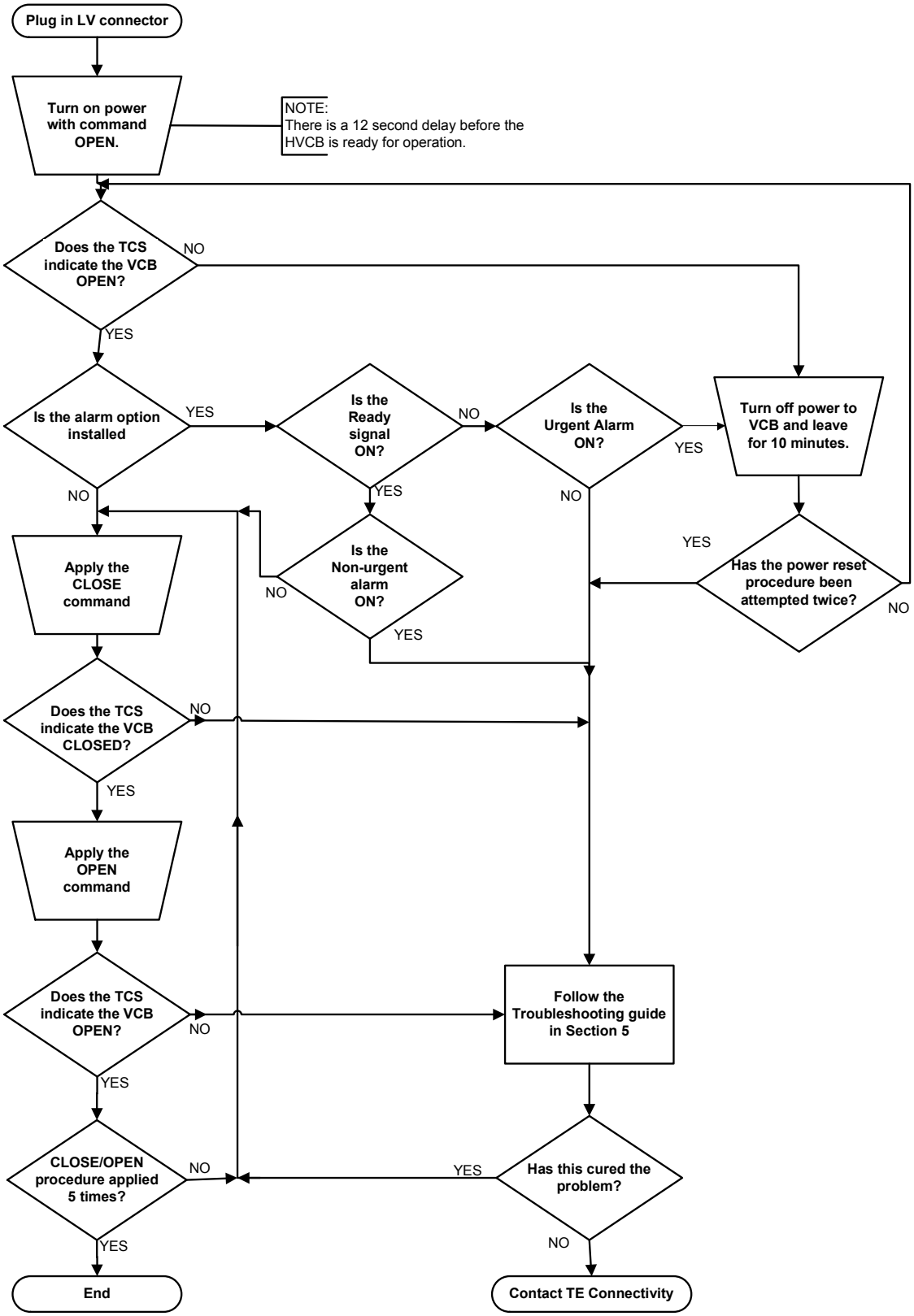


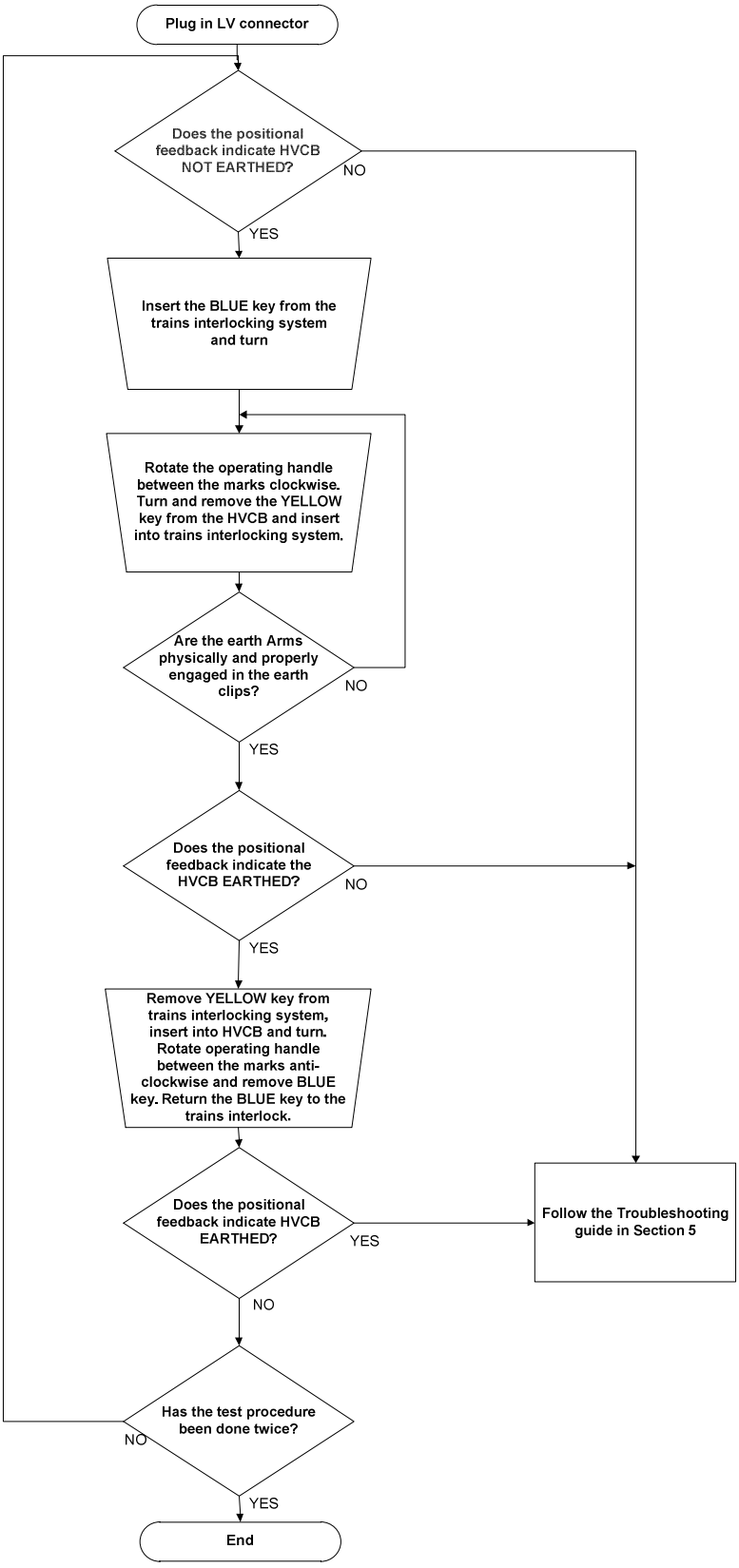
Figure 18: VESA 103 HV & earthing point

3.2 Commissioning

3.2.1 VESA VCB installation test



3.2.2 Testing of earth switch (VESA 101 & 103 only)



4 Maintenance Section

4.1 Maintenance Schedules

Task description	Threshold	Interval	Applicability	Task type
Visual Inspection of external components	75 000 cycles or 1 year *	75 000 cycles or 1 year *	VESA 101 VESA 102 VESA 103	On train
Greasing of earthing arms and clips	75 000 cycles or 1 year *	75 000 cycles or 1 year *	VESA 101 VESA 103	On train
Overhaul	150 000 cycles or 4 years	150 000 cycles or 4 years.	VESA 101 VESA 102 VESA 103	TE approved maintenance centre

*: Whatever comes first

Notes:

1. The above maintenance schedule is valid for operating the VESA VCB in normal environmental conditions as defined in EN 50155 and usage in accordance with Section 1.4.6.
2. The VESA VCB does not require periodic cleaning, but if it is found to have an excessive build-up of pollutants, then refer to section 4.3.
3. All red insulators will blacken in service – this is normal and does not indicate damage or that cleaning is necessary.
4. In the event of the HV connections being removed, contact grease must be applied as indicated in bullet e) of section 3.1.
5. For the interlock key cleaning (VESA 101 and 103 only), follow the manufactures recommendations for cleaning and lubrication. Under no circumstances apply any other form of lubricant to the locks and keys.

4.2 Maintenance task description

4.2.1 Visual inspection

The visual inspection of the equipment aims to find signs of damage related to accidental damage, wear, corrosion and possible water ingress through damaged components.

Attention should be given to inspect with care the following components:

- Alignment of all torque stripes on threaded fasteners.

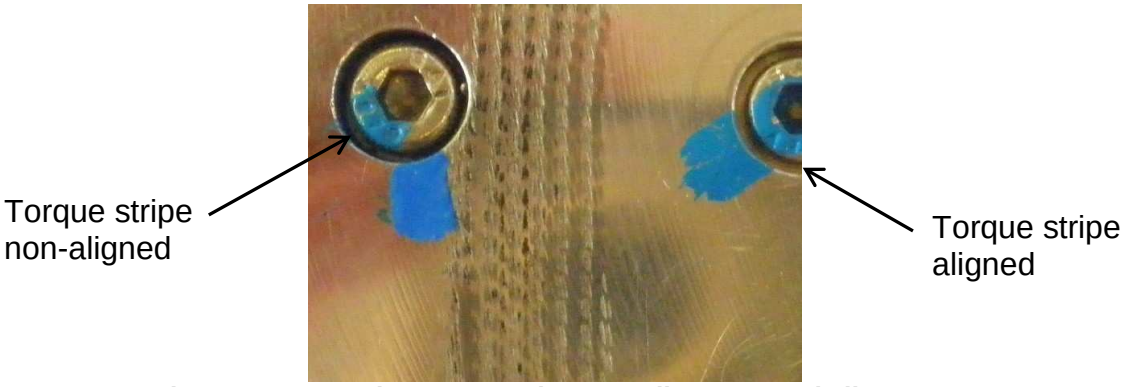


Figure 19: Example Torque stripe non-alignment and alignment

- Integrity of rubber gaiters.

Figure 20: Example undamaged rubber gaiter

Figure 21: Example rubber gaiter damage

- All insulated parts for damage and pollution build up.

Figure 22: Example undamaged insulator

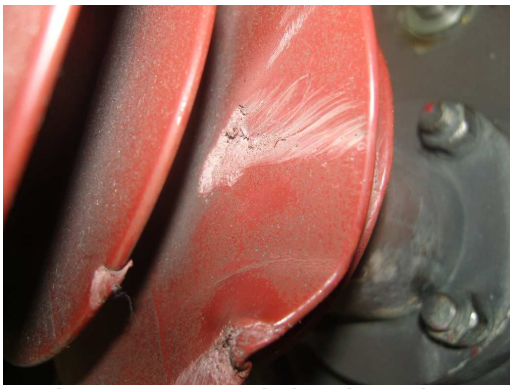


Figure 23: Example insulator damage

- Earth braids for integrity (VESA 101 & 103 only). Pay attention to splits in the braid and in particular any fraying of the braid or damage to the lugs.

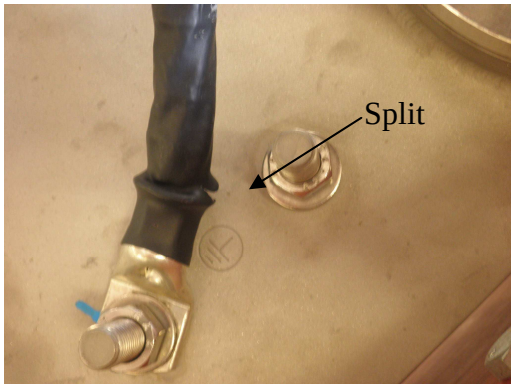
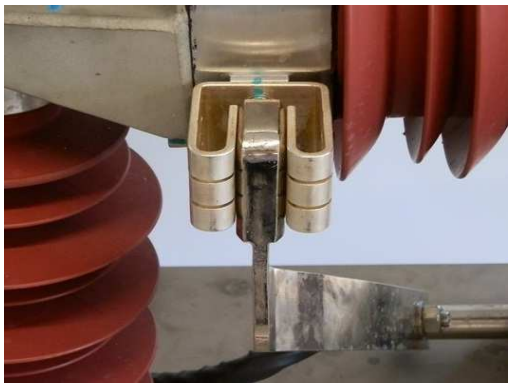


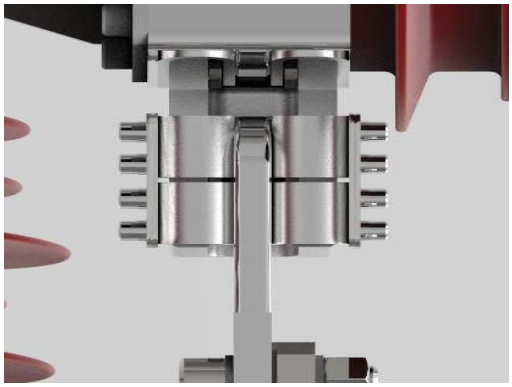
Figure 17: Example VESA 101 braid damage

Figure 18 Example of VESA 103 braid

- Earthing arms/ clips (if fitted). (VESA 101 and 103 only).



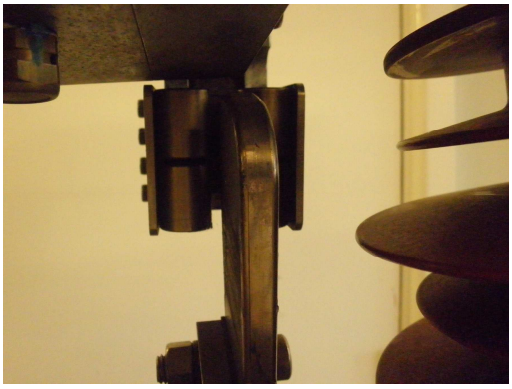
VESA 101



VESA 103

Figure 19: Example of earth clip correct alignment with earthing arm

VESA 101



VESA 103

Figure 20: Example of earth clip damage showing non-alignment with earthing arm

Any findings should be reported to TE Connectivity through the local sales representative for analysis and instructions on corrective action to be taken.

4.2.2 Greasing of earthing arms and clips

Grease as specified below must be present on the contact areas in order to avoid damage to the mating surfaces.

TE recommends the operator to perform the greasing of the earthing arms and clips at a minimum of one year or 75,000 cycles.

The greasing should be done more frequently if the operator observes that the grease layer is degraded or reduced due to operating conditions. The operator shall include any adjustment in the frequency of the task in their local maintenance instructions.

Before applying grease, the areas shall be cleaned using acetone or IPA.

The following quantities shall be applied:

- 1ml of Metalon grease on each side of the earthing clips
- 1ml of Metalon grease on each side of the earthing arms contact faces.
- 0.5ml of Copper slip on each side of the earthing arms where it enters the earthing arm rests VESA 101 only, for VESA 103 use Metalon grease.

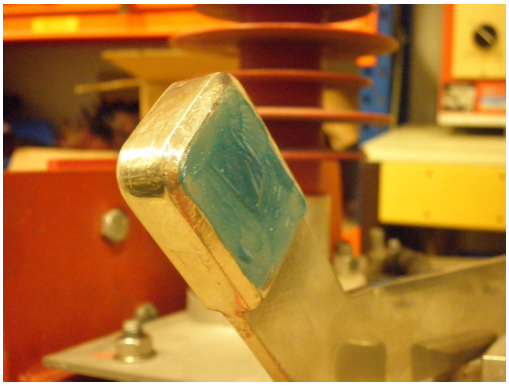


Figure 21: Example of Metalon grease applied to the contact faces of the VESA 101 earthing arms.

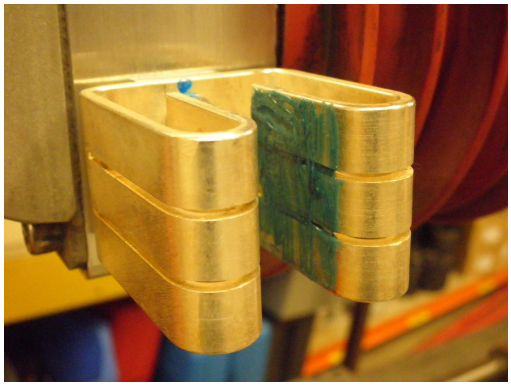


Figure 22: Example of Metalon grease applied to earthing arm clip contact faces on VESA 101

Figure 23: Example of copper slip grease applied to earthing arms on VESA 101 where it enters the earth rest clips.

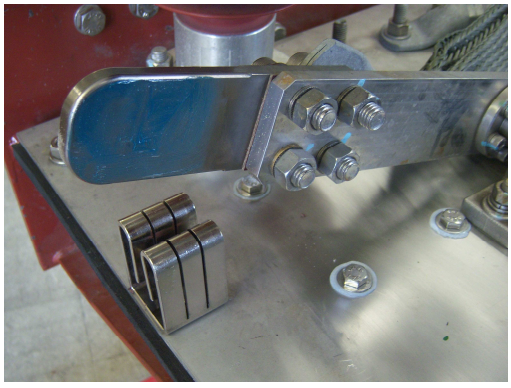


Figure 24: Example of Metalon grease applied to the contact faces of the VESA 103 earthing arms. N.B. the grease extends beyond the back point of the earthing arm rest as shown above.

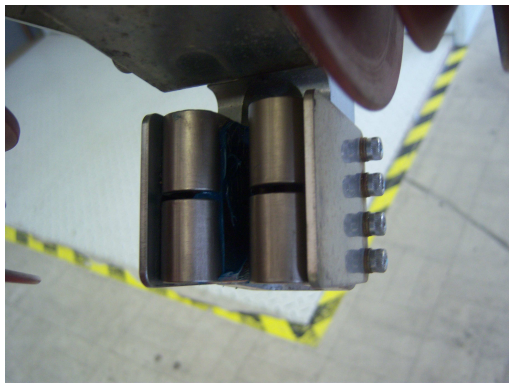


Figure 25: Example of Metalon grease applied to earthing arm clip contact faces on VESA 103

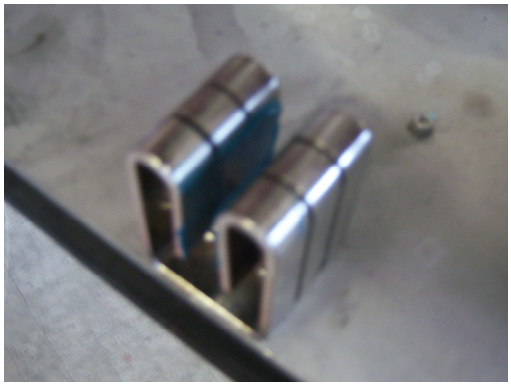


Figure 26: Example of Metalon grease applied to earthing arm rest clips on a VESA 103 where the earthing arms enter the clips.

4.3 Cleaning

4.3.1 Recommendations

- HV parts of the VESA VCB do not normally require cleaning.
- If the VESA VCB is to be cleaned due to a build-up of pollutants, then use warm water and a sponge. If adding any cleaning agent use only soap, always rinse the product with clean water after application. This also applies to the VESA VCB gaiters. Insulated parts can be cleaned with isopropyl alcohol or a citrus based cleaning agent, used with a soft fabric to remove sticky pollutants.

4.3.2 Prohibited tasks

- Do not use abrasive tools or harsh bristled brushes.
- Do not use degreasing agents near or on the insulation and rubber gaiters.
- Do not use a high pressure water jet on any part of the VESA VCB.
- Do not use any alkaline cleaning agents or organic solvents on or near the VESA VCB.

5 Troubleshooting

	Fault description	Causes	Remedy
1	LV connector cannot be plugged in	Connection fault	Refer to “Connection Fault”(14)
		Plug inserted the wrong way round	Plug is polarised – insert with correct orientation
2	Incorrect VCB open or close position status	Connection fault	Refer to “Connection Fault”(14)
3	Failure to power up	Connection fault	Refer to “Connection Fault”(14)
4	No ready signal *	Connection fault	Refer to “Connection Fault”(14)
		VCB is in self-test mode	Wait for 12 seconds and check if ready signal is available
5	Non-urgent signal on *	Connection fault	Refer to “Connection Fault”(14)
6	Ready and Non-urgent signals both on *	There is no power coming from the train	Check voltages at LV connector plug
		Power supply from train incorrect	Check voltages at LV connector plug
7	Urgent signal on *	There is no power coming from the train	Check voltages at LV connector plug
		Power supply from train incorrect	Check voltages at LV connector plug.
8	There are no status indications *	Connection fault	Refer to “Connection Fault”(14)
9	VCB fails to close	Connection fault	Refer to “Connection Fault”(14)
		No ready signal	Refer to "No ready signal" fault
10	VCB fails to open	Connection fault	Refer to “Connection Fault”(14)
11	No earth switch status feedback	Connection fault	Refer to “Connection Fault”(14)
12	Cannot insert, turn or remove keys	Earth switch not fully engaged	Try to re-engage
		Wrong keys used	Use right keys

	Fault description	Causes	Remedy
13	Cannot rotate handle	Earth switch not fully engaged	Re-set winder handle and try to re-engage.
		Wrong keys used	Use correct keys
14	Connection fault	Damaged socket	Contact TE Connectivity
		Damaged plug	Replace plug
		Incorrect connector wiring	Refer to table for LV connector signal description
		Train wiring fault	Check voltages at LV connector plug
		No operating signal from train	Check that train control system is issuing open/close command signals

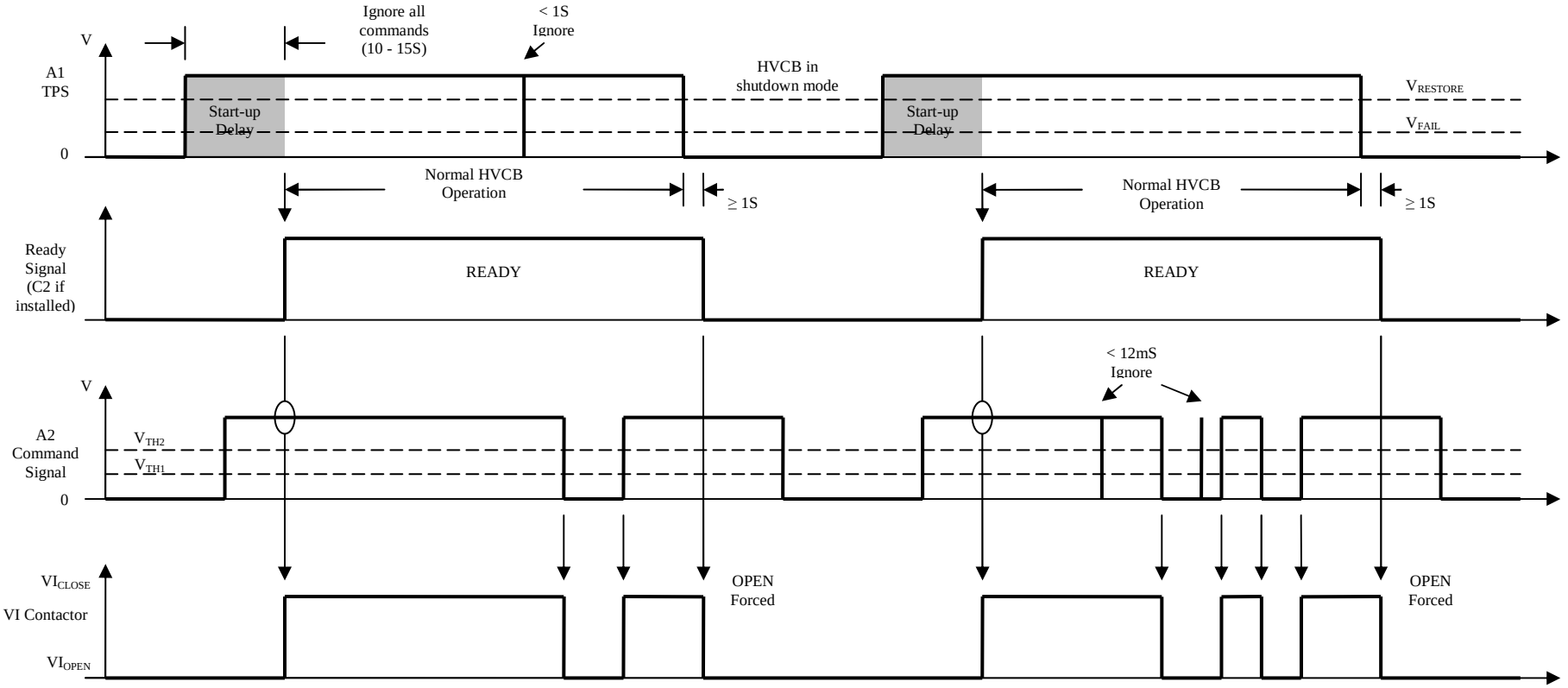
**Where alarm option is installed.*

In the event a fault remains following the steps defined in this manual or where the trouble shooting guide does not resolve the fault, contact a local TE Connectivity sales representative for further assistance.

6 Recommended installation tools

Tool type	Qty req'd
18mm double depth socket for ISO fasteners	1
19mm double depth socket for DIN fasteners	1
18mm open ended spanner for ISO fasteners	1
19mm open ended spanner for DIN fasteners	1
Torque wrench – range 20Nm to 90Nm	1

7 HVCB Timing Diagram



Train Power Supply Operational Ranges			
***Un*/TPS(V)**	**0.7*Un*(V)**	**1.25*Un*(V)**	**1.4*Un*(V)**
24	16.8	30.0	33.6
36	25.2	45.0	50.4
48	33.6	60.0	67.2
72	50.4	90.0	100.8
100	70.0	125.0	140.0
110	77.0	137.5	154.0

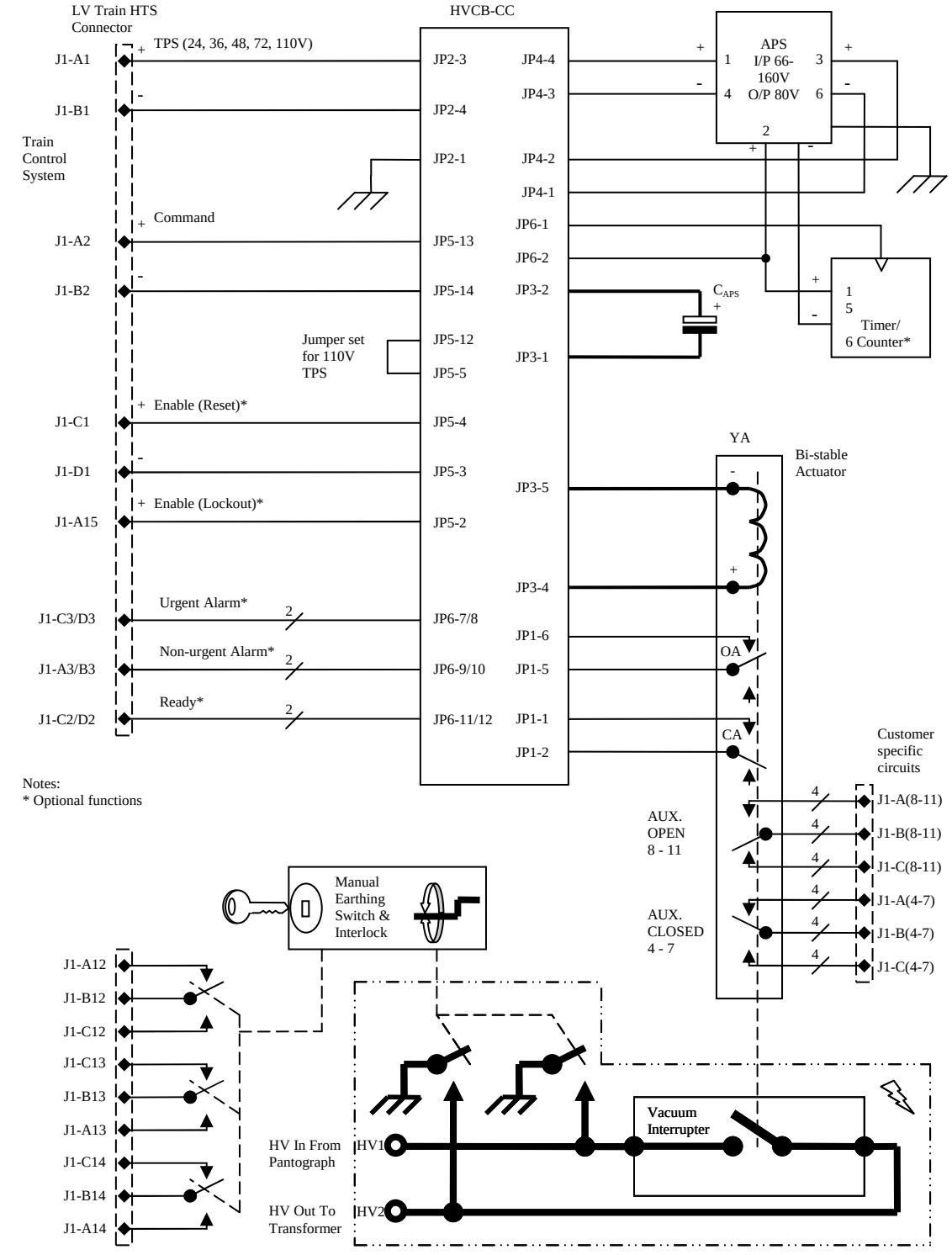
TPS/Enable Thresholds ± 1V		
TPS (V)	**V_{FAIL}**	**$V_{RESTORE}$**
24	18.0	22.0
36	21.0	27.0
48	36.0	44.0
72	55.0	66.0
110/110	55.0	72.0

Command		
CLOSE	≥ TH2	≥ TH1
OPEN	< TH2	< TH1

TPS (V)	**TH1(V) ± 1**	**TH2(V) ± 1**
24	7.0	11.0
36	11.0	17.0
48	14.0	22.4
72	22.0	33.0
110	33.0	50.0

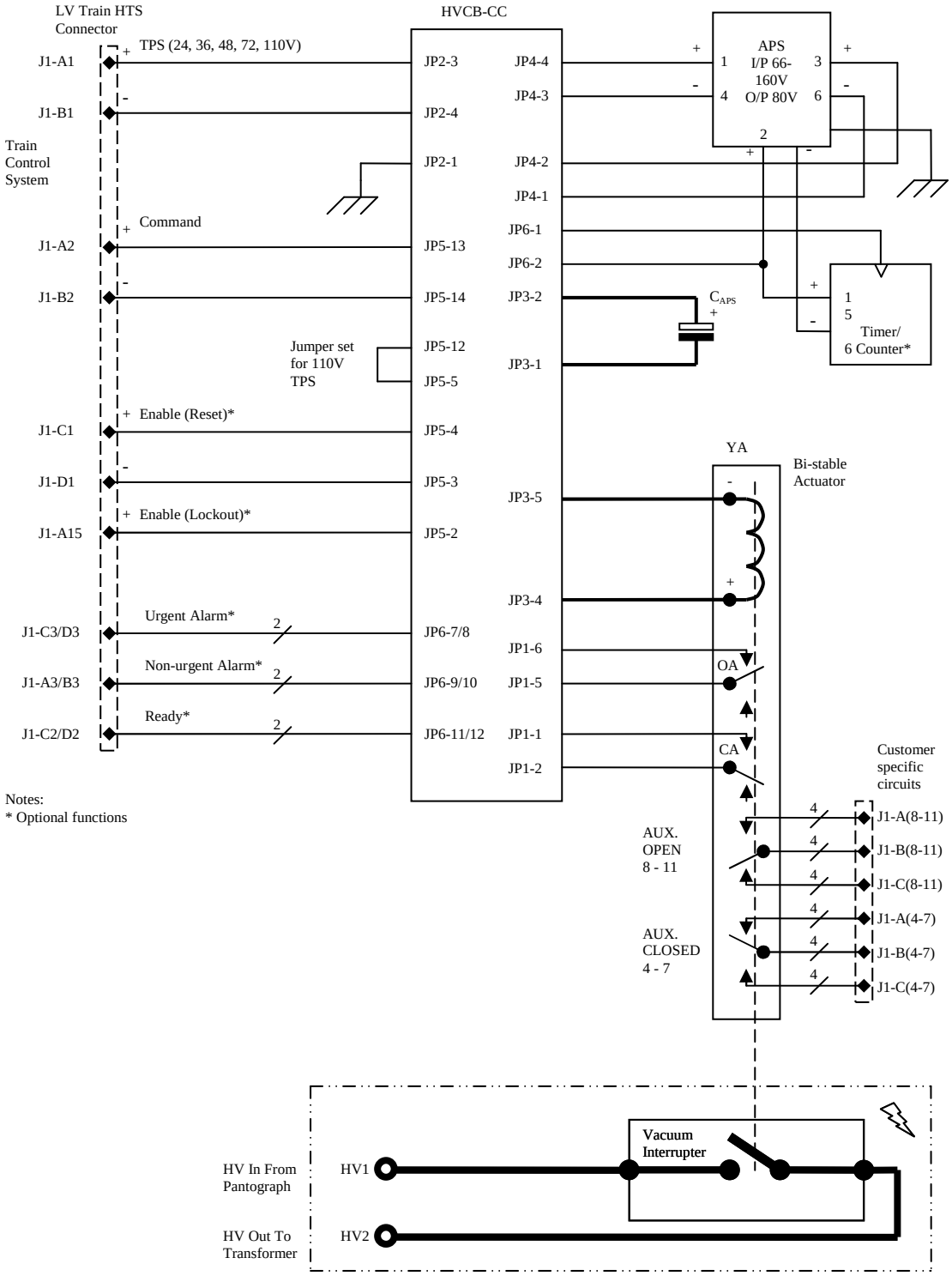
8 Block Diagrams

8.1 HVCB 101 & 103 Block Diagram



HVCB 101/103 Block Diagram Model/Format 6

8.2 HVCB 102 Block Diagram



HVCB 102 Block Diagram Model/Format 6