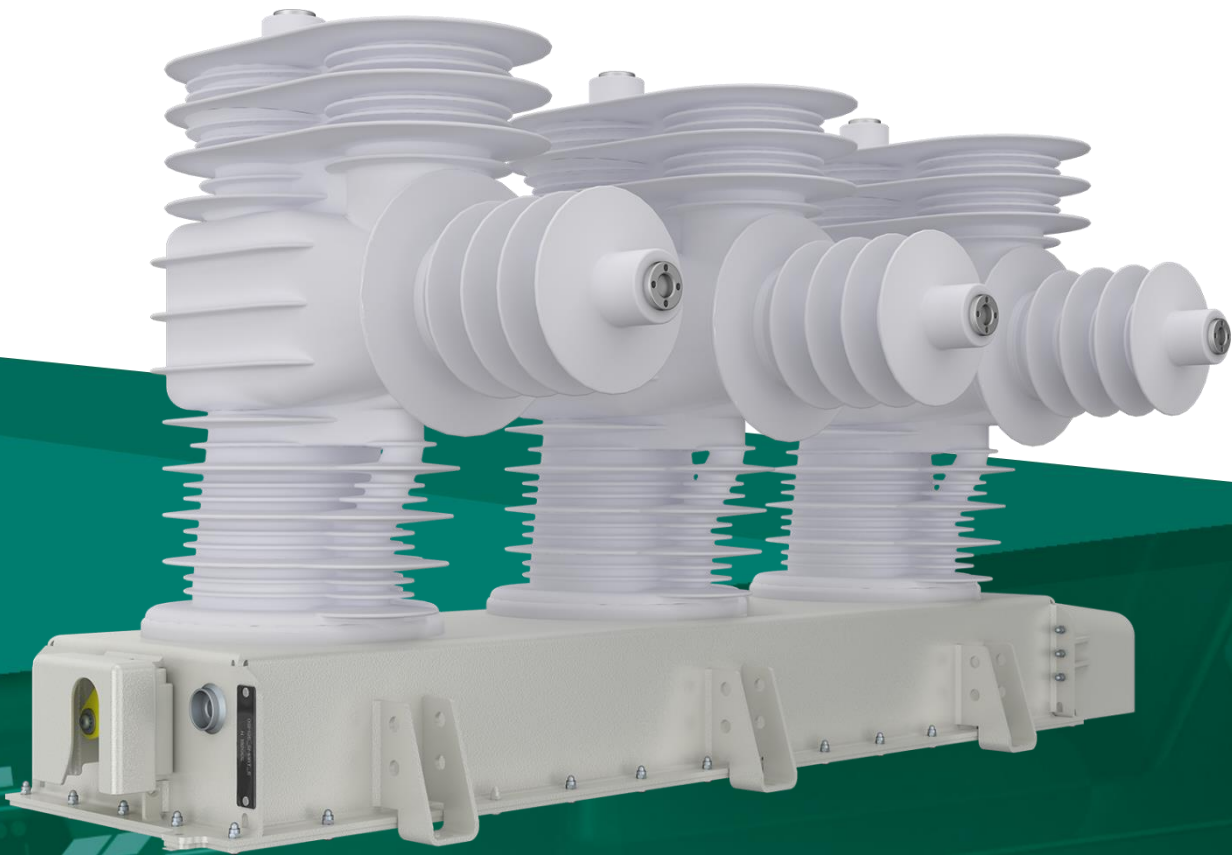


Rec35_Smart5_HDG

**AUTOMATIC
CIRCUIT
RECLOSER**

38 kV, 16 kA, 1250 A



TECHNICAL MANUAL

The present Technical Manual contains the information necessary for installation, commissioning, and operation. It is absolutely necessary for the proper and safe use of the recloser to read the Technical Manual carefully and to adhere to the instructions as well as relevant regulations.

Safety First

- Installation, operation, and maintenance shall only be carried out by trained and experienced personnel who are familiar with the equipment and electrical safety requirements;
- During installation, commissioning, operation, and maintenance of the equipment the relevant legal regulations (such as NFP70E, CEC, ANSI), accident prevention regulations, and the connecting conditions of the electric utilities shall be followed;
- Take note that during the operation of the recloser certain parts are subject to dangerous voltage. Mechanical parts, also remote-controlled, can move quickly. Failure to comply may result in death, severe personal injury, or damage to equipment;
- Pay attention to the hazard statements located throughout this manual;
- The operating conditions of the recloser shall comply with the technical data specified in this manual;
- Personnel installing, operating, and maintaining the equipment shall be familiar with this manual and its contents.

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1 Introduction

Applicability

This Technical Manual applies to the following range of products manufactured by Tavrida Electric:

Product	Description
Rec35_Smart5_HDG	38 kV three-phase Automatic Circuit Recloser
OSM35_Smart_5	38 kV, three-phase gang operated Outdoor Switching Module, with 100:1, 600:1, and 1200:1 CT ratios, and 150 V actuator coil voltage

The model number is shown on the equipment rating plates. If your equipment does not correspond to the numbers in the table above then this manual is not applicable. Please contact your nearest Tavrida Electric office or Sales Representative for the correct documents.

Every care has been taken in the preparation of this manual. However, please note that not all the details or variations in the equipment or process being described can be covered. Nor is expected to address all contingencies associated with the installation and operation of this equipment. For any further information please contact your nearest Tavrida Electric office or Sales Representative.

Hazard Statements

This manual contains three types of hazard statements, as follows:

DANGER: Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in personal injury or equipment damage.

Safety Instructions

General hazard statements applying to this equipment are described in this section. Statements relating to specific tasks or procedures are located throughout this manual.

DANGER: Contact with hazardous voltage will cause death or severe personal injury. Contact with Recloser or Control Cubicle terminals should only be undertaken when equipment is isolated from applicable sources of voltage.

WARNING: This equipment is not intended to protect human life. Follow all locally approved safety procedures when installing or operating this equipment. Failure to comply may result in death or severe personal injury.

WARNING: Before working with the equipment described in this manual carefully read and understand the contents of this manual. Improper handling, installation, operation, or maintenance can result in death, severe personal injury, or damage to equipment.

WARNING: Power distribution equipment must be properly selected for the intended operation. It must be installed, used, and understand all relevant safety procedures. Failure to comply can result in death, personal injury, or equipment damage.

2 Technical Parameters

Table 1 – Recloser technical parameters

Rated data	
Rated voltage (Ur)	38 kV
Rated continuous current (Ir)	1250 A
Rated power frequency withstand voltage (Ud), 1 min dry	70 kV
Rated power frequency withstand voltage (Ud), 10s wet	70 kV
Rated lightning impulse withstand voltage (peak) (Up)	170 kV
Rated short-circuit breaking current (Isc)	16 kA
Rated short-circuit making current, peak	41.2 kA
Rated short-time withstand current, 4s (Ik)	20 kA
Rated peak withstand current (Ip)	52 kA
Rated frequency (fr)	50/60 Hz
Switching performance	
Mechanical life (CO-cycles)	20 000
Operating cycles, rated current (CO-cycles)	20 000
Maximum number of CO-cycles per hour	Refer to recloser control manual
Electrical endurance, breaking current (O-CO cycles)	See Figure 1
Closing time, not more than ²⁾	60 ms
Opening time, not more than ²⁾	15 ms
Break time, not more than ²⁾	25 ms
Rated operating sequence	Refer to recloser control manual
Standards	
International Standard American Standard	IEC 62271-100, IEC 62271-111 IEEE C37.60
Other data	
Current sensing	3 current transformers
Voltage sensing	6 voltage sensors
Main contact resistance, not more than	< 32 $\mu\Omega$
Solar radiation	≤ 1.1 kW/m ²
Degree of protection	IP65
Weight	93 kg (205 lbs)

¹⁾ Contact company technical support for details.

²⁾ Outdoor Switching Module value only. Does not include control processing time. Refer to control manual for more information on additional time to calculate a complete fault interruption cycle.

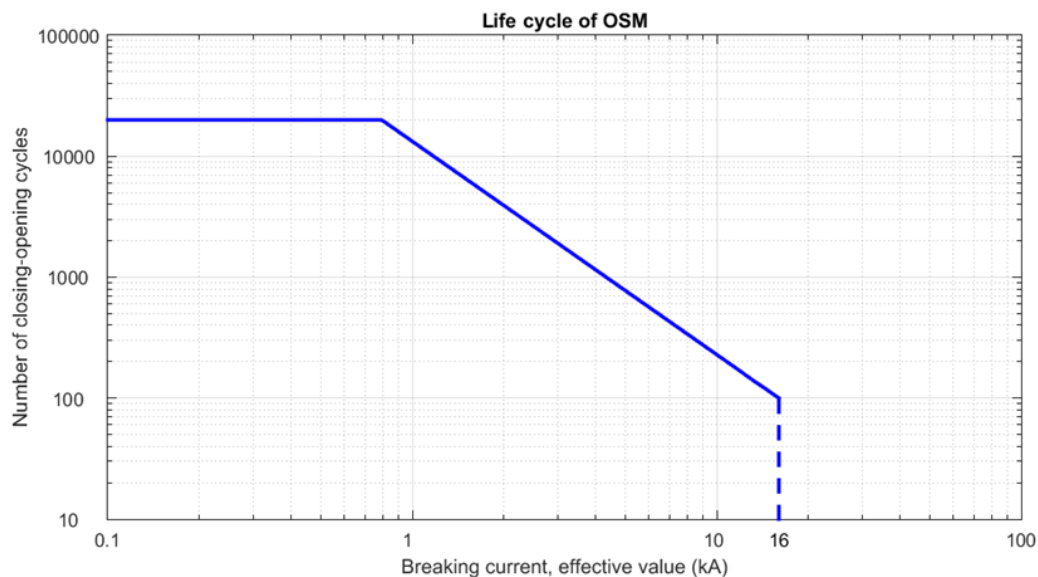


Figure 1

Outdoor Switching Module electrical endurance

Table 2 –Current Transformers and Voltage Sensors parameters

Parameter	OSM35_Smart_5(100)	OSM35_Smart_5(600)	OSM35_Smart_5(1200)
Current transformers			
Rated primary current	100 A	600 A	1200 A
Rated secondary current	1 A	1 A	1 A
Rated output, VA at PF=0.8...1	1.0	1.0	1.0
Accuracy class of protection transformers according to IEC 61869	5P20	5P20	5P20
Accuracy limit factor according to IEEE C57.13	20	20	20
Accuracy class of protection transformers according to IEEE C57.13	C20	C20	C20
Rated continuous thermal current	100 A	630 A	1250 A
Voltage Sensors			
Voltage sensor ratio range	0.153 - 0.171 V/kV	0.153 - 0.171 V/kV	0.153 - 0.171 V/kV
Basic error of voltage measurement under normal conditions	Less than 0.5 % or 0.1 kV	Less than 0.5 % or 0.1 kV	Less than 0.5 % or 0.1 kV

Table 3 – Ambient conditions

Maximum ambient temperature	+ 55 °C
Minimum ambient temperature	- 40 °C
Humidity	100% condensing
Altitude	Up to 3000 m ¹
Pollution level	Very heavy (according to IEC 60815)

¹ Derating according to ANSI C37.60 is applied for altitudes above 1000 m

3 Product Description

3.1 Overview

The Rec35_Smart5_HDG is a three-phase recloser designed for pole-mounted and substation applications with rated maximum voltage of up to 38 kV.

The Outdoor Switching Module consists of two main parts: the pole carrying primary circuits and the basement performing mounting and interface functions. The pole contains breaker contacts, supporting insulation, current, and voltage sensors, all casted into silicon rubber. The basement is made of a corrosion-resistant aluminum alloy with a paint finish and provides environment-protected housing for contained secondary circuits (IP65). Mounting and earthing provisions are represented by four holes (M12) on each side of the housing.

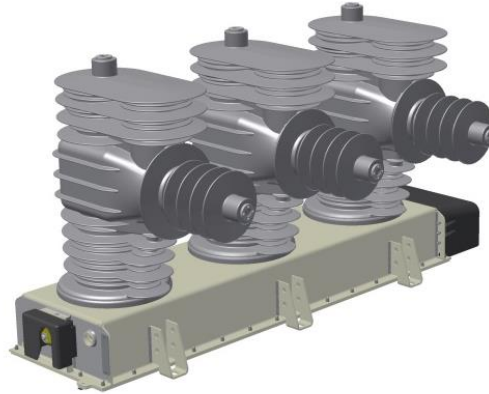


Figure 2

The general arrangement of the OSM35_Smart_5

3.2 Magnetic Actuator

Tavrda Electric has the most reliable mechanical structure of the vacuum circuit breaker. It uses single-coil magnetic actuators. All switching elements of a pole are assembled along a single axis. All mechanical movements are therefore direct and linear. The design of the magnetic actuator guarantees minimum contacts discrepancy at closing and electrical or mechanical tripping.

Due to the design, any typical failures of critical components, such as mechanical latching, gears, chains, bearings and levers, tripping and closing coils, motors to charge springs are completely avoided.

3.3 Vacuum Interrupter

Tavrda Electric vacuum interrupters are the most compact in its class and show excellent mechanical, voltage withstand, and current breaking capabilities. The use of a specially designed axial magnetic field distribution provides even current density over the contact surface and consequently substantial improvement of vacuum interrupting performance. Advanced technology and materials provide vacuum integrity in vacuum interrupter during the entire switching module lifetime (30 years).

3.4 Current and Voltage Sensing

Current sensing is performed by current transformers that are inbuilt into each pole. It ensures a precise acquisition of both phase and neutral currents at a wide range with low saturation.

Precise low power capacitive voltage sensors on source and load side terminals with accuracy as low as 0.5% are inbuilt into each pole. It allows the recloser to provide power quality monitoring and network self-healing algorithms implementation.

For details on the sensor's parameters refer to the "Technical Parameters" section of this guide.

3.5 Main Circuit Bushings

The main circuit bushings are manufactured from UV stable polymer. They are covered by light grey silicon rubber bushing boots which provide a creepage distance for a heavy polluted environment.

Each type of bushing extension has special inserts in the bull-end to withstand torques applied during mounting procedures.



Figure 3
Bushing insert

3.6 Cable Terminals

2-hole and 4-hole NEMA pads with 125 and 145-degree angles are available for installation.

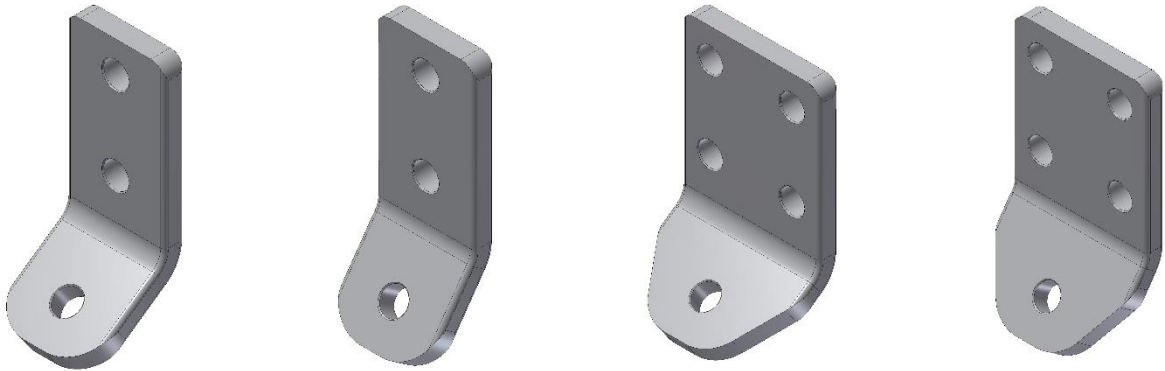


Figure 4
NEMA pads

To install the connector, align the special inserts in the bull-end of bushing with the hole at the pads and fasten with the M12 Socket head bolts as shown in Figure 6. Tighten the bolts to 40Nm.

Tools required:

- A torque wrench
- Hex key size 10 mm

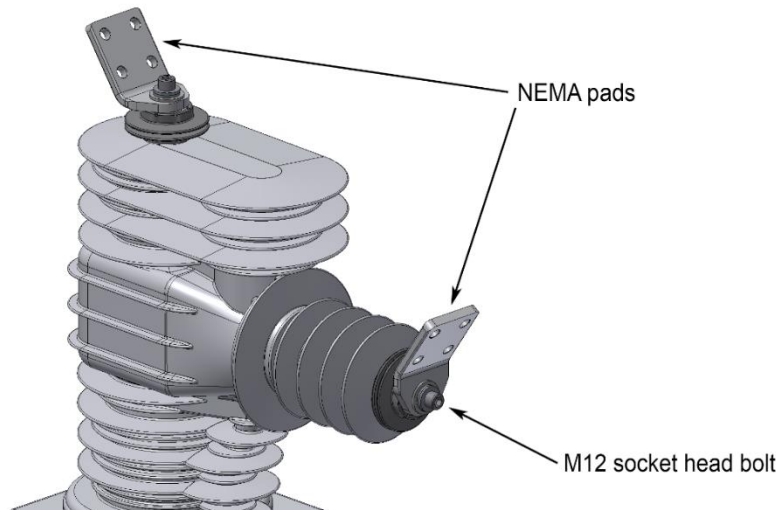


Figure 5
NEMA pads installation

3.7 Wildlife Protective Covers

Custom-designed terminal covers provide reliable protection from outages caused by animal contact.

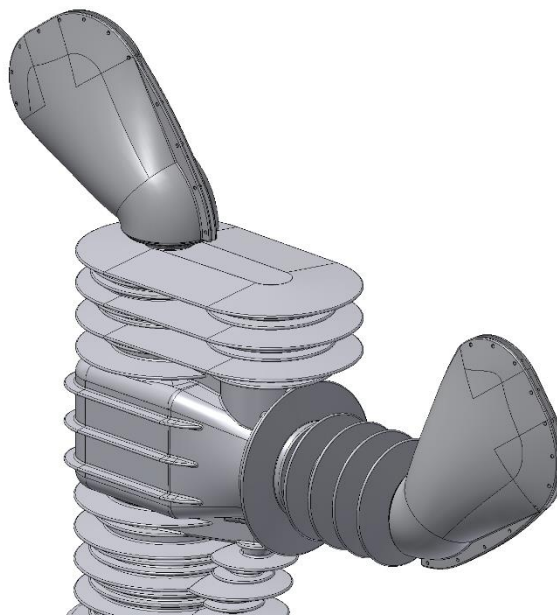


Figure 6
Wildlife protective covers

3.8 Mechanical Trip and Lockout Mechanism

A mechanical trip hook is located at the right side of the mechanism enclosure (Figure 7). When the hook is pulled down, the Outdoor Switching Module is mechanically opened, locked in the OPEN position, and electrically isolated from the driver. The Outdoor Switching Module remains locked and cannot be operated until the trip hook is pushed back into the operating position.

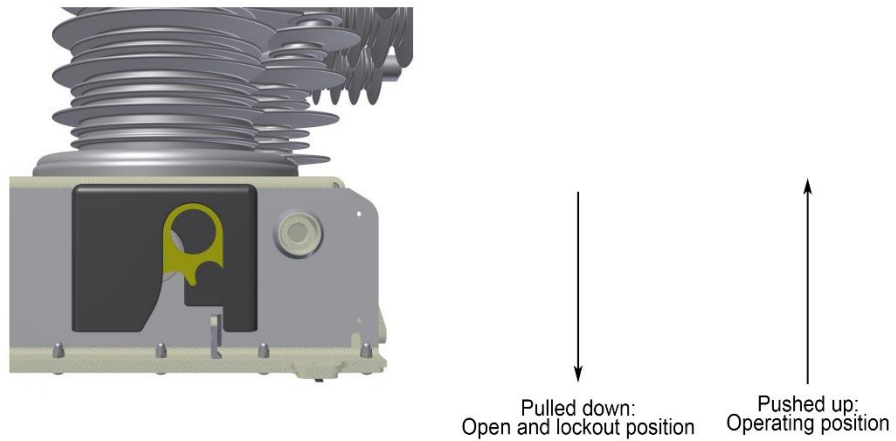


Figure 7

Mechanical trip hook operation

3.9 Main Contact Position Indicators

The position indicators are located under a protective cover at the rear and bottom sides of the enclosure and are clearly visible in any Outdoor Switching Module mounting position. The indicator color is red "I" when the main contacts are closed and green "O" when they are open.

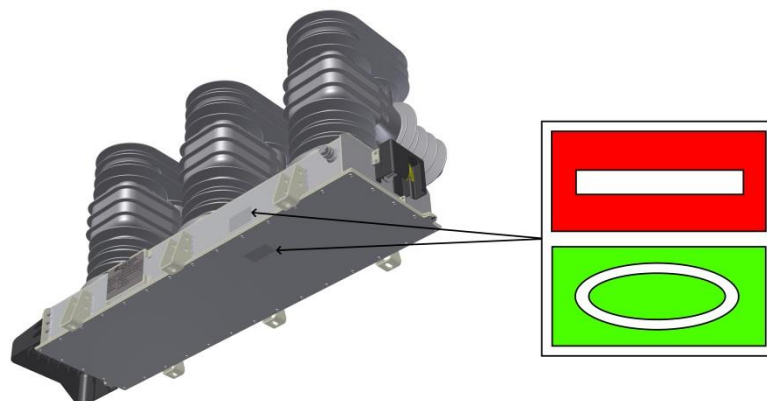



Figure 8

Main contact position indicators

3.10 Nameplates and Labels

Each Outdoor Switching Module has the following rating plates:

- Serial number plate
- Rating plate

 TAVRIDA ELECTRIC			
Model Type: OSM35_Smart_5(600)			
ANSI C37.60 / IEC 62271-111		O-0.1s-CO-2s-CO-2s-CO*	
Rated maximum voltage	38 kV	Rated frequency	50 / 60 Hz
Rated continuous current	600 A	Rated short time withstand (4s)	20 kA
Rated short circuit breaking current	16 kA	Rated peak withstand current	52 kA
Rated lightning impulse withstand voltage	170 kV	Weight	92 kg
CT ratio	600:1	Year of manufacture	
* OSM value only, varies with control type used. Consult control manual for parameters.			
Tavrída Electric North America, Delta, BC, Canada Tel: 1-866-551-8362 Made in Russia			

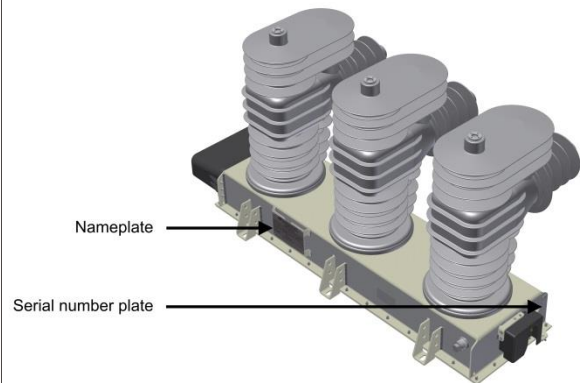


Figure 9

Outdoor Switching Module nameplates arrangement

The following information is also provided on the Outdoor Switching Module tank:

- Warning label
- Label with calibration coefficients of the delivered unit



Figure 10

Warning label


 TAVRIDA ELECTRIC	
Recloser:	
Type	OSM35_Smart_5(600_150_1)
Serial number	XXXXXX
Control:	
Type	SEL-651R
Serial number	see SEL sticker inside cabinet
Current transformer ratio settings:	
Phase (CTR)	600:1
Residual (CTRN)	600:1
Voltage sensor correction ratio settings:	
Phase AY (X1)	Z.ZZZ
Phase BY (X2)	Z.ZZZ
Phase CY (X3)	Z.ZZZ
Phase AZ (X4)	Z.ZZZ
Phase BZ (X5)	Z.ZZZ
Phase CZ (X6)	Z.ZZZ
Tavrída Electric North America 1-866-551-8362	

Figure 11

Label with calibration coefficients

4 Receiving and Inspection

4.1 Packing

The recloser is delivered in a metal crate with mounting hardware, Outdoor Switching Module, and accessories pre-assembled.

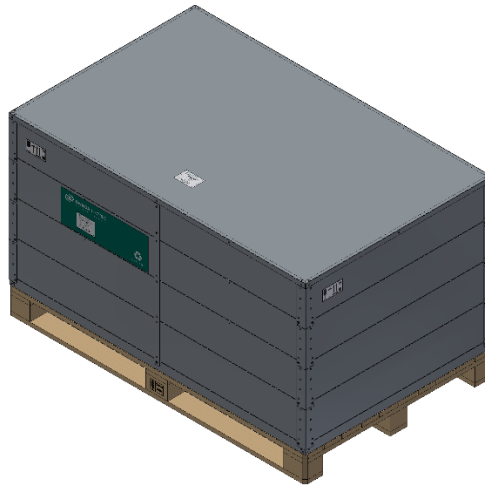


Figure 12
Recloser metal crate

4.2 Transportation

The recloser shall be transported in the original packing only. The packed goods shall be handled in accordance with the handling symbols. Loading procedures for recloser packing units shall be carried out only with forklifts or cranes.

Lifting gear must not be attached to the bushings, use only lifting lugs attached to the side mounts with suitable clearance of straps or chains. During transportation, the recloser must not be exposed to impacts or dropped.

4.3 Unpacking, Goods Received Control

Before unpacking, please check the carton for damage and dampness. Removal of the products from the original packing must be carried out with due care. Every recloser and shall be subject to a completeness control.

4.4 Storage

Should immediate installation not be possible, the recloser shall be stored in the original packing under the following conditions:

- The Outdoor Switching Module is switched off.
- Desiccants must be placed in the packing.
- Storage must be closed dry, well ventilated and the room temperature should be between - 40°C and + 40°C (IEC62271-1/ DIN VDE 0670 Part 1000).

Unpacked and assembled equipment can be stored before installation. Keep it in a clean, dry location with sufficient air circulation and temperature to prevent condensation. Insulation must be protected against dirt and moisture.

WARNING! It is not permitted to stack more than two packages during storage.

5 Installation: Primary Part

5.1 General Information

All local and national electrical codes, standards, and practices must be adhered to during the installation and commissioning of this device. Only licensed and qualified personnel shall perform installation, commissioning and operation.

5.2 Mounting Kit

The Rec35_Smart5_HDG recloser mounting kit is equipped with provisions for surge arrestors, power transformers, and protective earthing. An example of a pole mounting kit assembly is shown on Figure 13.

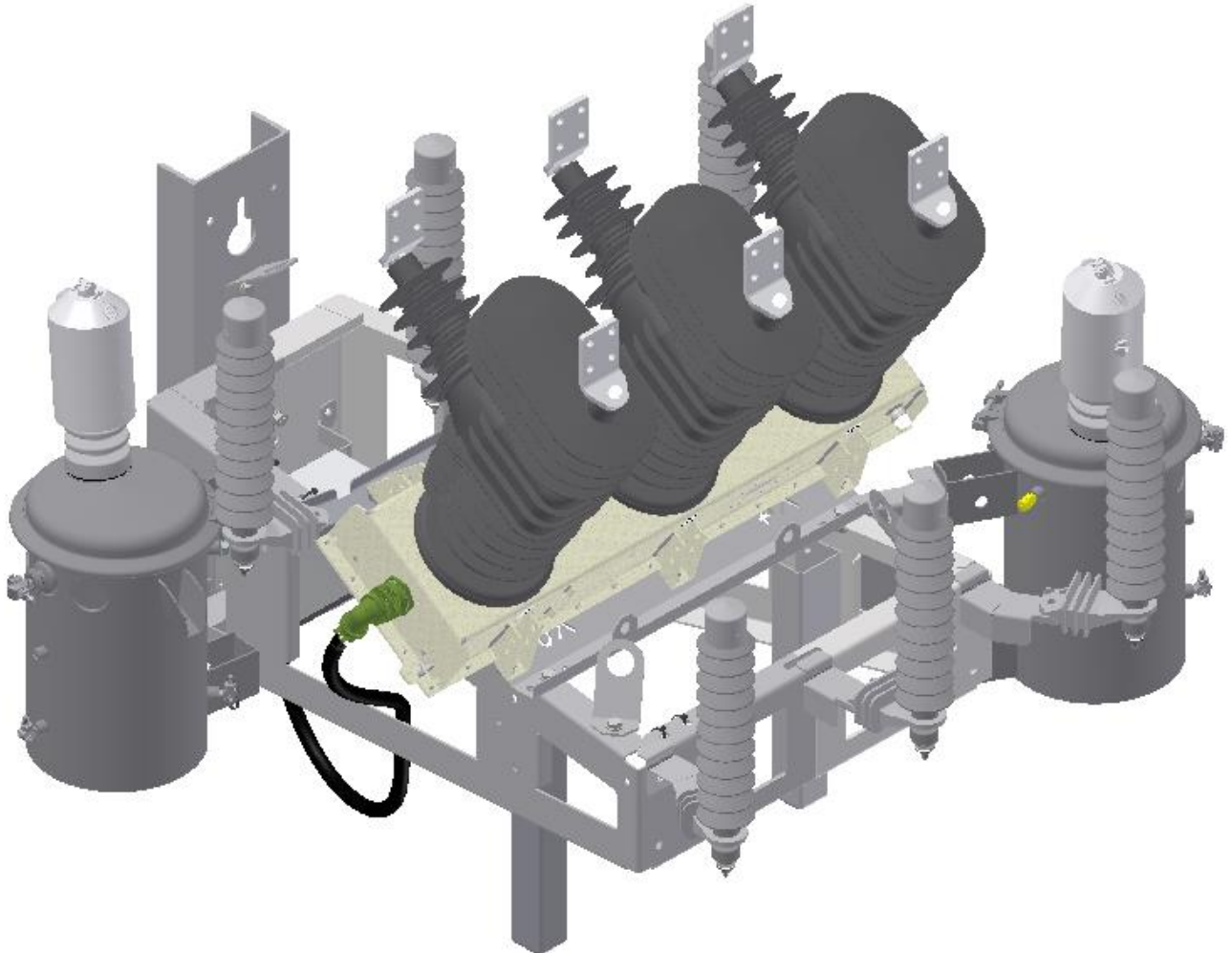


Figure 13
Pole mounting kit

5.3 Lifting the Recloser

The Rec35_Smart5_HDG recloser is equipped with lifting lugs intended for vertical lifting. When lifting the recloser for mounting or any other purpose, follow general safety practices, lift the load smoothly, and do not allow it to shift. It is recommended to make a single-lift assembly on the ground before mounting the recloser to the pole.

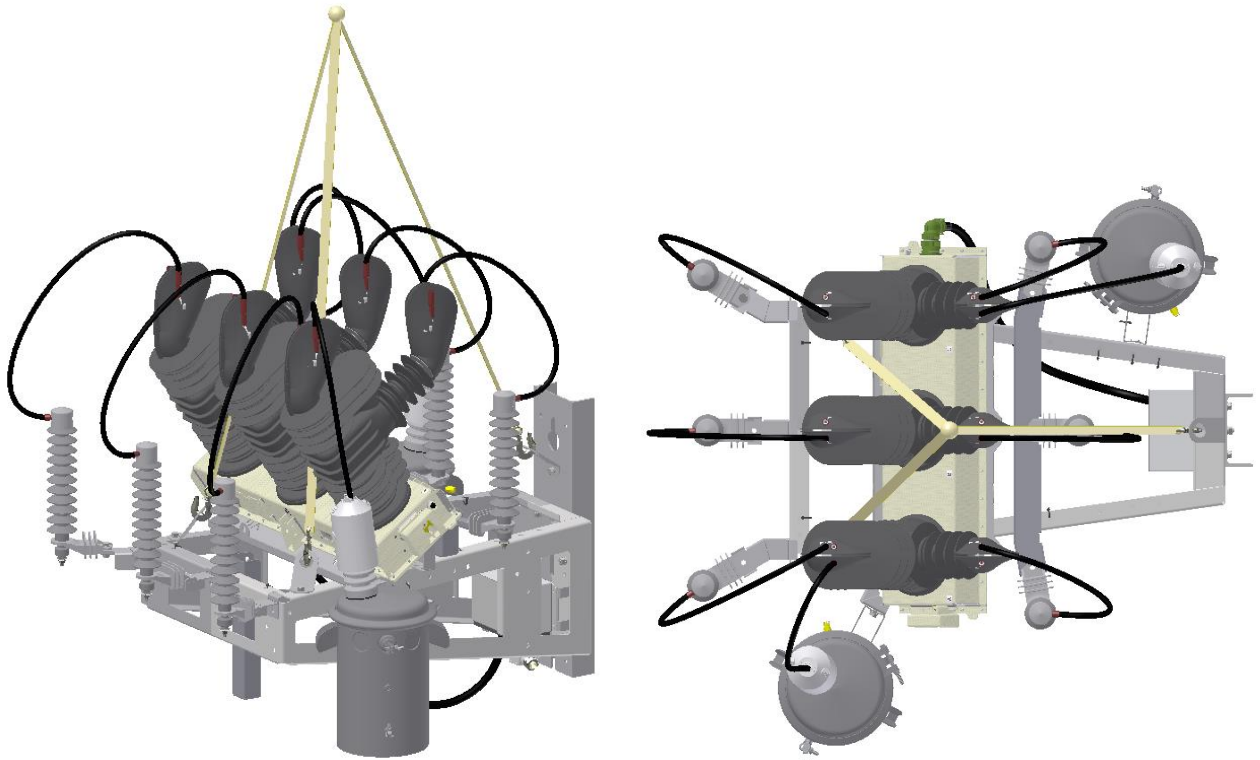


Figure 14
Lifting the recloser

5.4 Main Terminal Connection

Connection to the NEMA terminals:

- Crimp NEMA terminal lug to a cable according to manufacturer's recommendations.
- Contact surfaces shall be preliminarily smoothed out with a steel file card or metallic brush and the abrasive dust shall be removed with rags.
- Connect cable lug to NEMA terminal using M12 bolts and nuts.
- Fix the lugs to the NEMA terminals tighten the nuts hard to 20 Nm
- Use corresponding protective covers to protect the connections from an environment

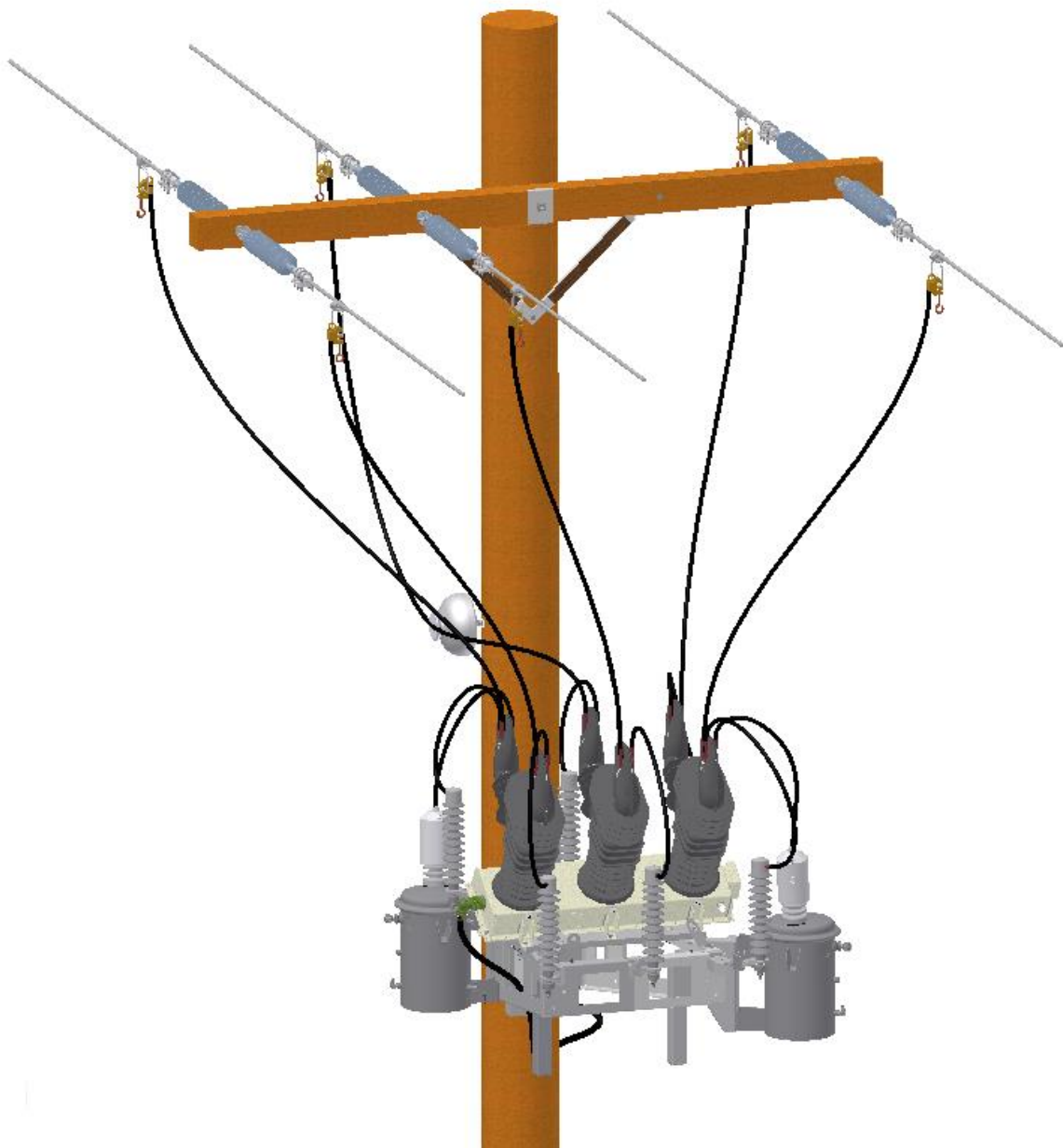


Figure 15
Complete recloser assembly on the pole

6 Installation: Secondary Part

6.1 Connection to Recloser Control

The OSM35_Smart_5 secondary connection is made by Amphenol GTS07R-28-21S connector (37 pin) which is located on the side of the enclosure.

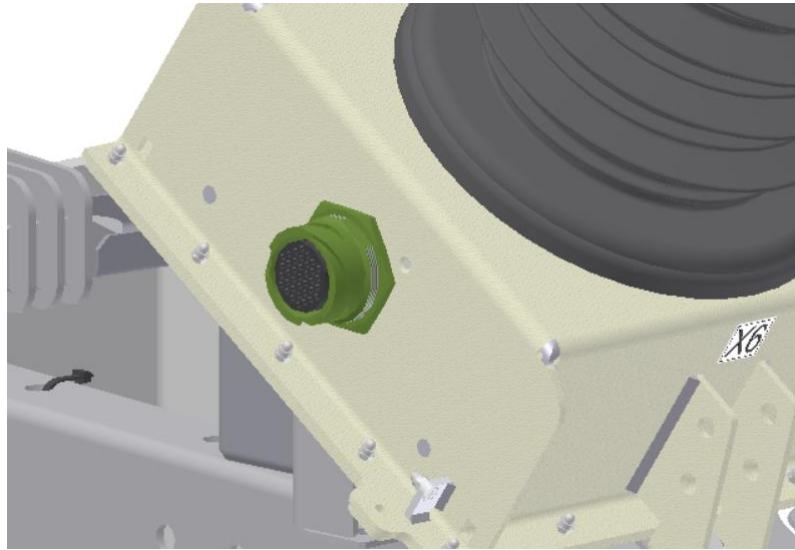
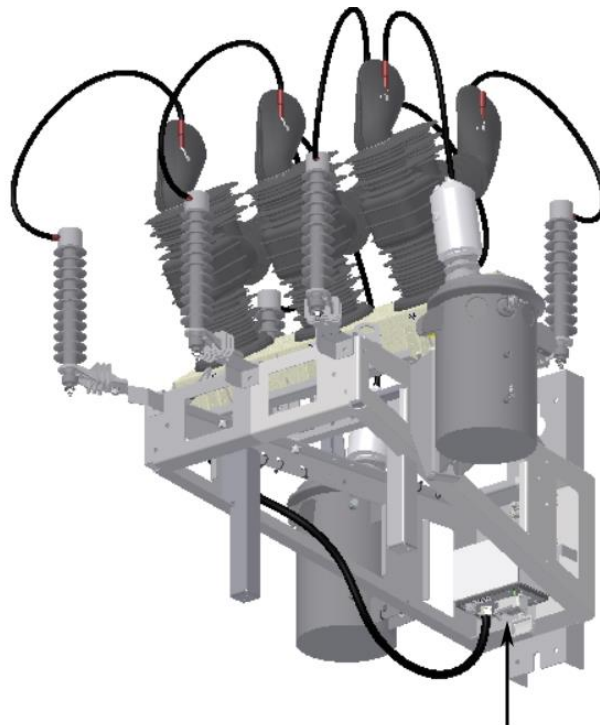


Figure 16

Switching module connector arrangement

6.2 Junction Box

In case the scope of your recloser supply contains a junction box the connection between Outdoor Switching Module and Recloser Control has to be made through this junction box. The junction box secondary connection is made by Harting 42 pin Han-DD type terminal which is placed on the bottom of the Junction Box.



Connect the Control Cable
from the Recloser Control here

Figure 17

Control cable connection through the junction box

6.3 Auxiliary Circuit Terminations

Pin arrangement of GTS07R-28-21S terminal is as follows:

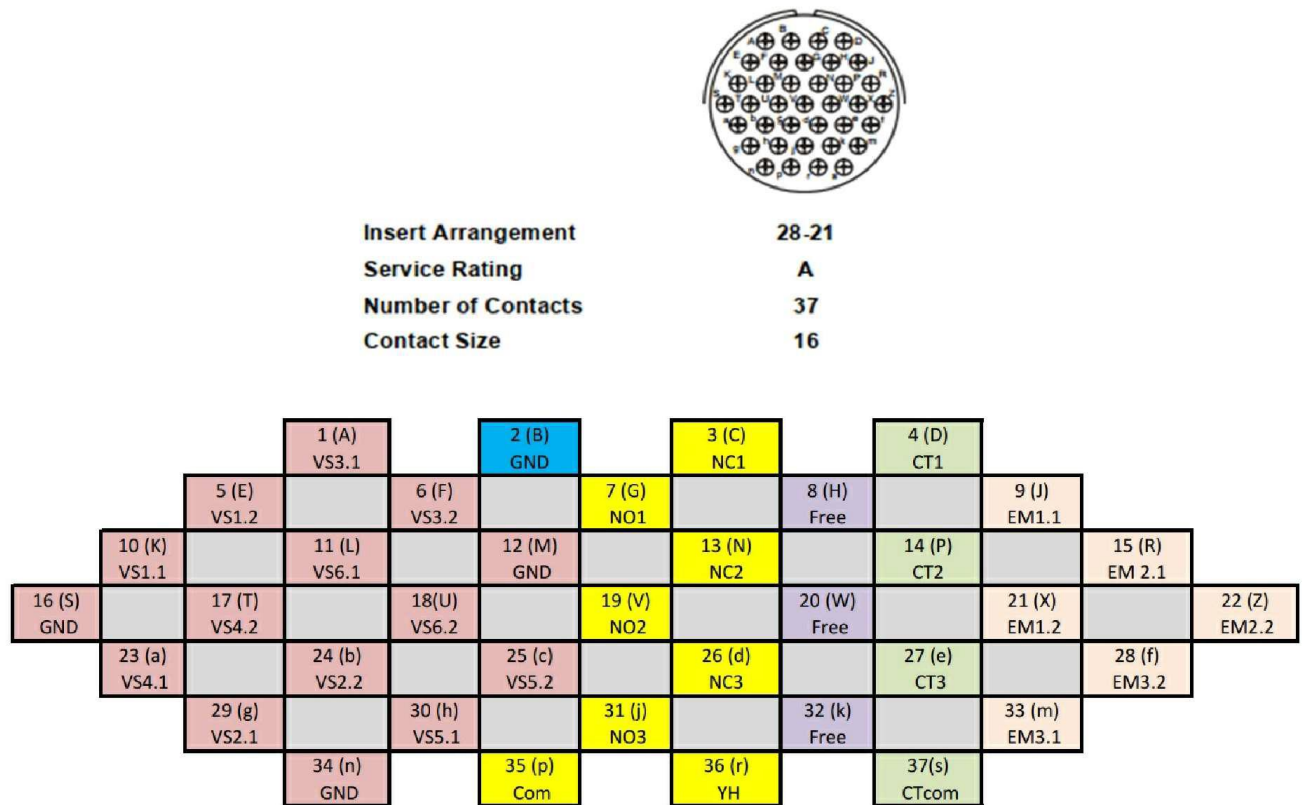


Figure 18

GTS07R-28-21S terminal pin arrangement

Table 4 – Harting Han-42 DD terminal pinout

Pin (Number)	Pin (Letter)	Designation	Note
3	C	NC1	NC1 auxiliary contact
13	N	NC2	NC2 auxiliary contact
26	d	NC3	NC3 auxiliary contact
7	G	NO1	NO1 auxiliary contact
19	V	NO2	NO2 auxiliary contact
31	j	NO3	NO3 auxiliary contact
35	p	COM	Auxiliary contacts common point
36	r	YH	Yellow handle contact
9	J	EM1.1	Actuator coil A (1)
15	R	EM2.1	Actuator coil B (1)
33	m	EM3.1	Actuator coil C (1)
21	X	EM1.2	Actuator coil A (2)
22	Z	EM2.2	Actuator coil B (2)
28	f	EM3.2	Actuator coil C (2)
23	a	VS4.1	X4-1 voltage sensor
17	T	VS4.2	X4-2 voltage sensor
30	h	VS5.1	X5-1 voltage sensor
25	c	VS5.2	X5-2 voltage sensor
11	L	VS6.1	X6-1 voltage sensor
18	U	VS6.2	X6-2 voltage sensor
10	K	VS1.1	X1-1 voltage sensor
5	E	VS1.2	X1-2 voltage sensor

Pin (Number)	Pin (Letter)	Designation	Note
29	g	VS2.1	X2-1 voltage sensor
24	b	VS2.2	X2-2 voltage sensor
1	A	VS3.1	X3-1 voltage sensor
6	F	VS3.2	X3-2 voltage sensor
2	B	GND	Ground
12	M	GND	Ground
16	S	GND	Ground
34	n	GND	Ground
8	H	Free	
20	W	Free	
32	k	Free	
37	s	CTcom	CTs common point
4	D	CT1	Phase A CT
14	P	CT2	Phase B CT
27	e	CT3	Phase C CT

6.4 Protective Earthing

The metal enclosures of the Outdoor Switching Module must be connected according to the applicable regulations (DIN VDE 0141) via the marked screw to earthing arrangement of the pole. Components such as power transformers, surge arresters, mounting hardware, and recloser control should also be connected to the earthing arrangement.

The earthing connections can be carried out with cables or a bus bar (zinc-coated steel or copper). The cross-section must be dimensioned such that a worst-case fault current (short circuit) does not cause a weakening of the earthing connection. The earthing bolts should be tightened to 30 ± 2 Nm torque.

Reference values for cross-sections of earthing connection (copper):

Duration of fault current (1 s)	Max. temperature of earthing connection	Cross-section earthing connection
<10 kA/10 kA	300 °C	35-70 mm ² (1...3/0 AWG)
16 kA	300 °C	70-95 mm ² (3/0...4/0 AWG)

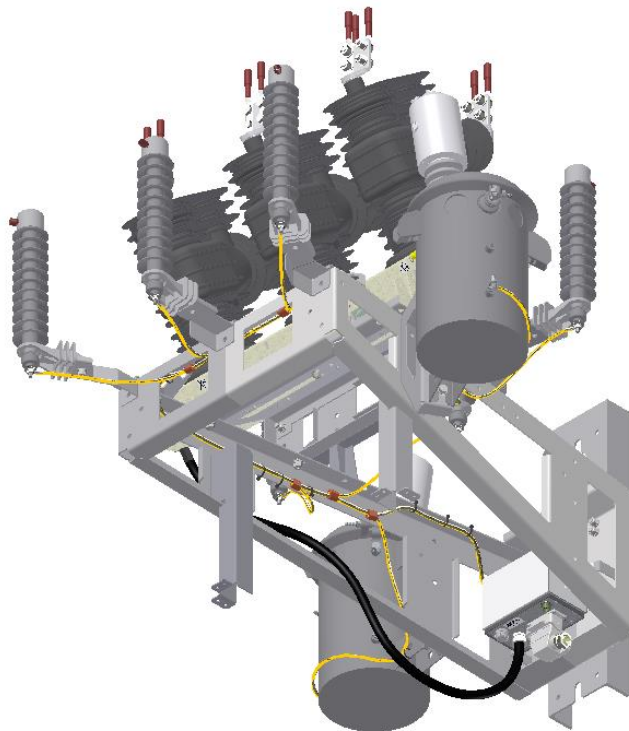


Figure 19

Rec35_Smart5_HDG earthing arrangement

7 Commissioning and Maintenance

7.1 General

Commissioning, operation and maintenance are only permitted for qualified and trained personnel.

Danger Insofar as installation, commissioning or retrofit is carried out on energized equipment, the relevant safety regulations, including all national and local standards, must be adhered to.

Caution The Outdoor Switching Module must always be tested and operated together with the appropriate recloser control. Individual testing is not possible and may lead to the destruction of the Outdoor Switching Module.

7.2 Commissioning Primary Part

Commissioning tests should include:

- Operating conditions of the Outdoor Switching Module comply with the requirements of the rating plate.
- Check for damage, remove dirt.
- Check bolted connections for fixing points and main terminals (also torques).
- Protective earthing.
- Check the manual trip mechanism as follows:

Pull down the manual trip hook when the module is in the closed position. The manual trip hook shall remain in the lowered position and the module shall open. Initiate "Close" instruction. It shall be ignored, as in this position of the manual trip hook the actuator coils are isolated. Push the hook upward. It shall remain in the upper position. Initiate "Close" instruction again. This time it shall be executed.

7.3 Commissioning Secondary Part

Please consult the Recloser Control manual for commissioning procedures with the control.

7.4 Maintenance

Under normal operating conditions (see chapter "Ambient conditions") the Outdoor Switching Module is maintenance-free for a period of at least 30 years or until it has reached the permissible number of operating cycles.

7.5 Non-conformity

If during installation, commissioning, operation, or maintenance any non-conformity occurs, contact your local Tavrida Electric representative or use the technical or warranty support request form on our website www.tavrida.com/tena/.

8 Legal Information

8.1 Warranty

Unless otherwise stated in the contract, the warranty period is 5 years from the date of invoice. If agreed to otherwise, the contract conditions apply. No warranty is given in the case of:

- a) the warranty period run out during a period of storage;
- b) operating conditions, ambient conditions, transport, and storage conditions do not correspond to those described in the technical manual;
- c) unauthorized manipulation of the device has been carried out, such as opening the housing or damaging the seal;
- d) the device has not been properly installed, such as incorrect connection voltages.

8.2 Quality Regulations



All manufacturing facilities of the company have been certified and comply with (DIN EN) ISO 9001:2015, ISO 14001:2015, and BS OHSAS 18001:2007.

All technical data of the vacuum circuit breaker are stored in an electronic database for each step of the manufacturing process. Testing of the circuit breakers is carried out in accordance with the relevant standards and beyond that, the following routine tests are carried out:

- Visual check and functionality tests
- Mechanical operation test (1000 C-O cycles)
- Dielectric withstand test
- Partial discharge test
- Measurement of the resistance of the main circuit
- Sensors calibration

8.3 Complaints and Transport Damage

All products are shipped exclusively with original packing to ensure safe transport and avoid transport damage (see Packing, Goods Received Control).

Tavrida Electric will not accept any claims for damages caused by improper transport, storage as well as unpacking. Transport damage must be reported in writing to the supplier as soon as it is discovered. A period of a maximum of 3 weeks after receipt is allowed for this.

For legitimate claims, Tavrida Electric will supply replacement equipment free of charge according to our warranty regulations. Tavrida Electric reserves the right to verify any claim.

8.4 Environmental Friendliness

The modules are manufactured from environmentally friendly materials. Therefore, special disposal is not required.

8.5 Liability

Damages and demands for reimbursement of expenses incurred by the customer (in the following: compensation) for whatever legal reasons, especially due to non-compliance of obligations of the contractual obligations and for unauthorized actions, are excluded. This does not apply, insofar as there is a compulsory liability such as according to the product liability law in cases of malice, gross negligence, because of damage to life, the body, or health, because of damage to important contractual obligations.

Compensation for damage to important contractual obligations, however, is limited to the damage which can be predicted as typical of the contract insofar as there is no malice or gross negligence, because of damage to life, the body, or health. A change of the obligation to provide proof to the disadvantage of the customer is not connected with these regulations.

8.6 Copyright

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9 Appendices

9.1 Dimensions and Weights

Dimensions and weights	
Creepage distance (from upper terminal to base)	1201 mm
Creepage distance (from lower terminal to base)	1297 mm
OSM35_Smart_5 switching module weight	93 kg (205 lbs)

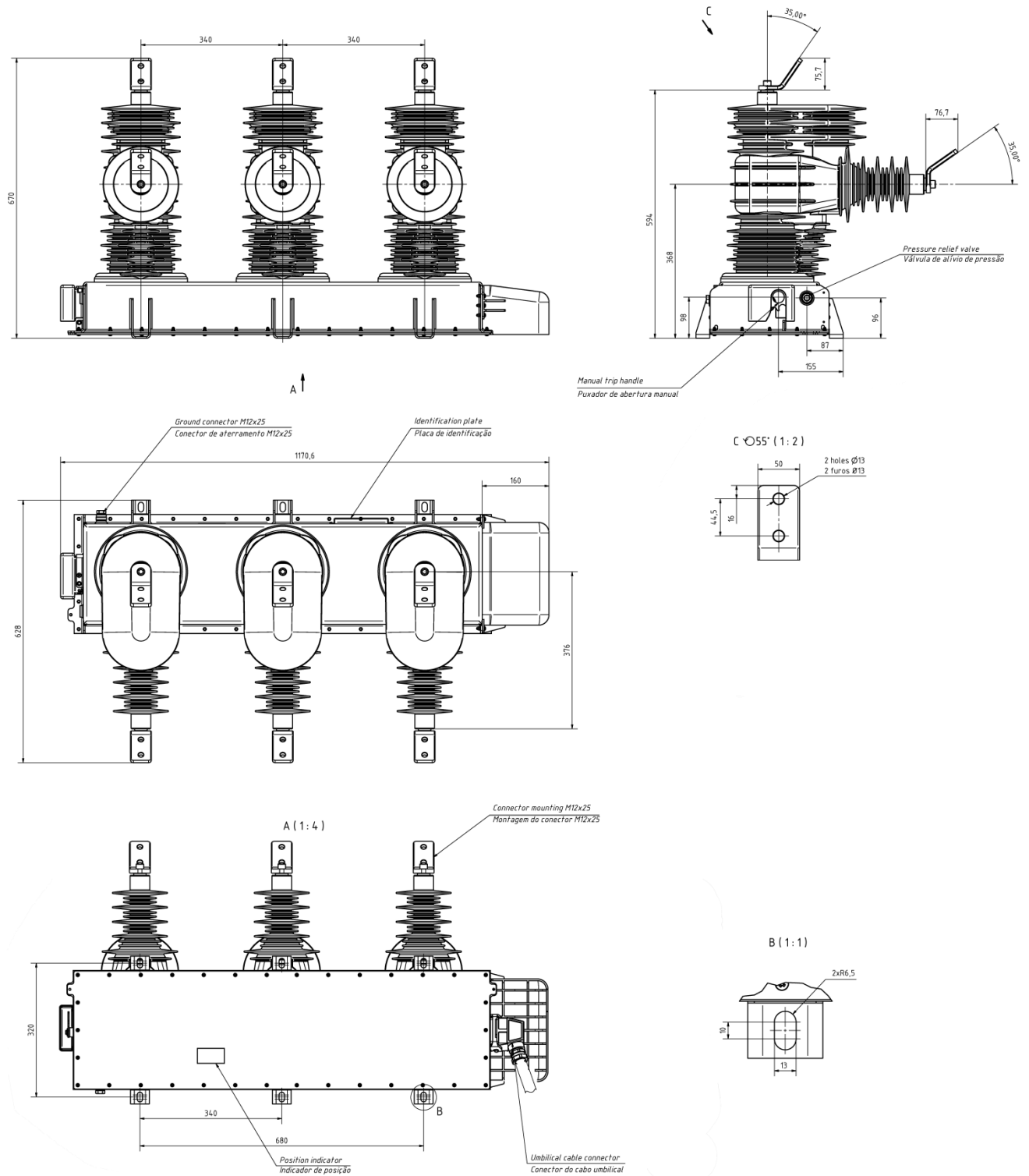


Figure 20
OSM35_Smart_5 drawing

9.2 Circuit Diagrams

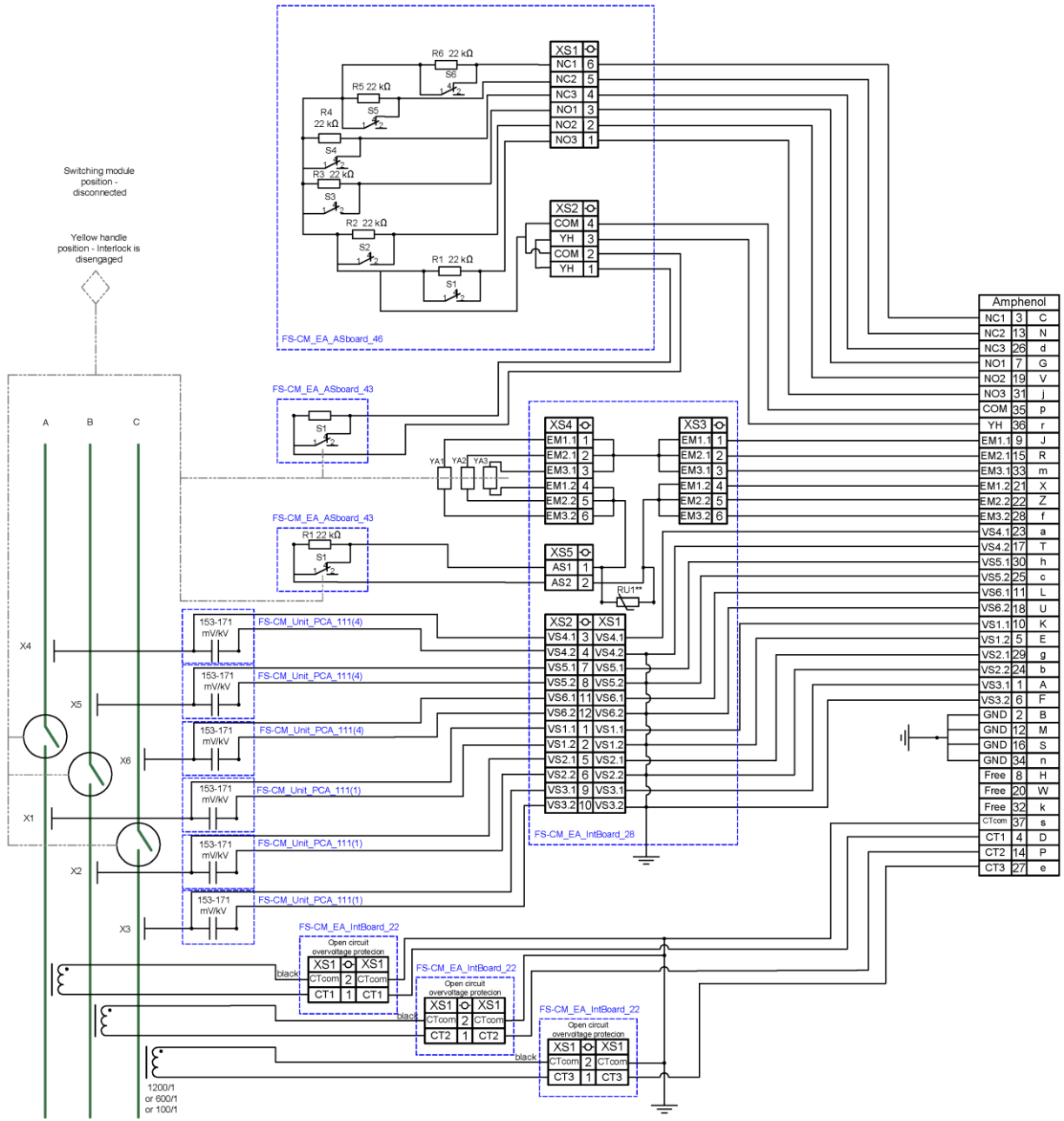


Figure 21
OSM35_Smart_5 circuit diagram

9.3 Safe Trip Device

The safe trip junction box works with SEL-651R 42-pin Tavrida Electric recloser interface with power supply 120VAC or 230VAC. It does not work with any type of SEL-651R with DC power supply.

The SEL-651R shall have output 201 programmed for Relay Malfunction event.

The safe trip junction box provides recloser tripping in the following cases:

- Malfunction of SEL-651R relay if it happens not later than 12 hours after AC power supply loss.
- Disconnection of connection cable TNA_RecUnit_Umbilical_22(12) from junction box or SEL if it happens not later than 12 hours after AC power supply loss.
- Two previous cases will work even if main umbilical cable is disconnected, so, to provide safe trip option when umbilical is disconnected it is recommended to add one more output 201 activation event: the event of yellow handle locked-open (ask SEL for more details).

NOTE: It is not recommended to use junction boxes that are exposed to temperatures below -40 °C.

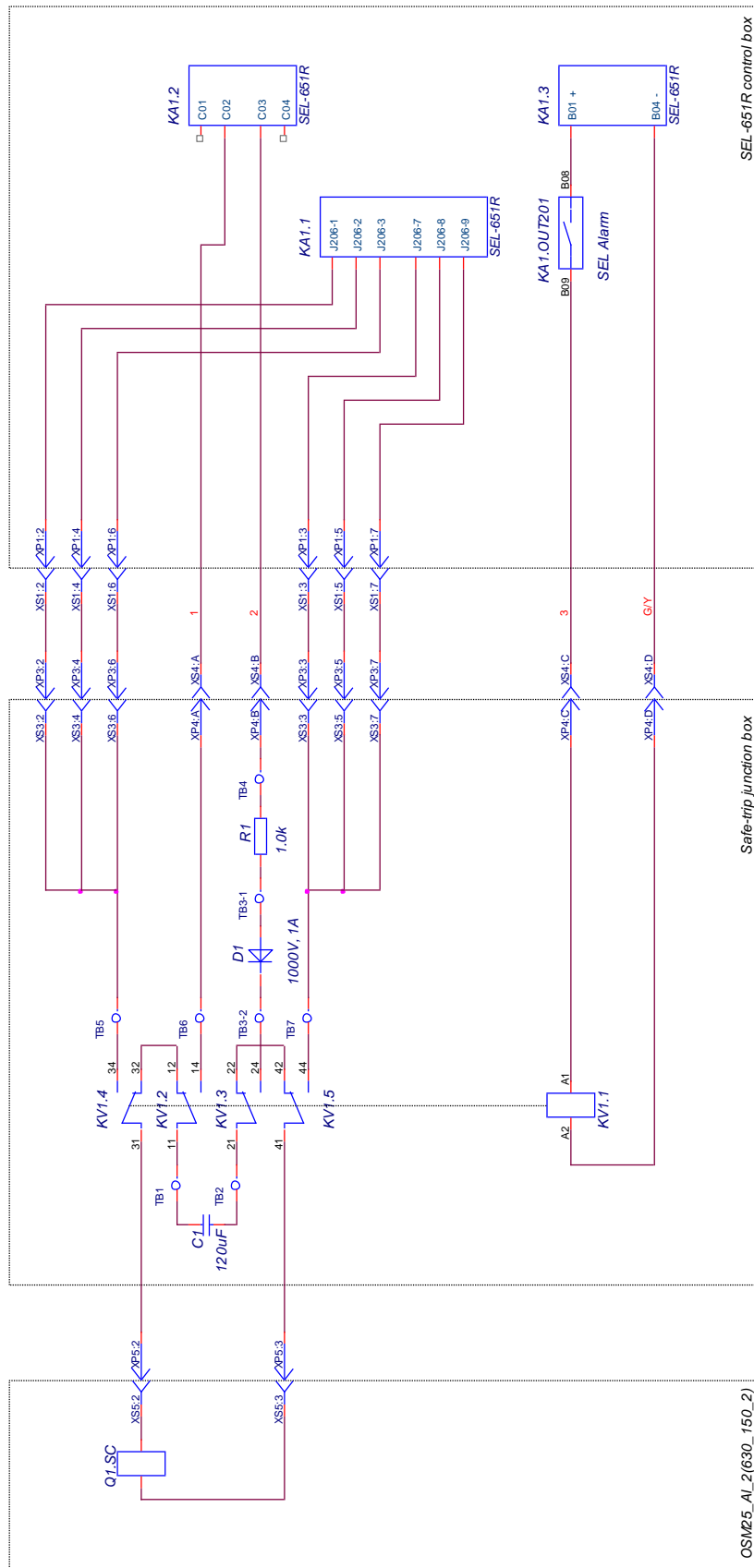
The trip function is provided by 120uF capacitor installed inside the junction box. The stored energy of capacitor is enough to trip the recloser within 12 hours after AC power lost in case of ambient temperature is 20C. For lower temperature the storing time expecting to go down about 30% under -40C. So, it is recommended to set battery malfunction assigned to OUT201 not more than 8h after AC power loss. It is not mandatory as the SEL-651R can provide safe trip in case of low battery without actuation of safe trip junction box. However if the SEL-651R fails during battery back-up powering then safe trip junction box is able to trip within 8 hours after AC loss in worst case conditions.

The safe trip package contains:

1. TNA_RecUnit_Umbilical_27 (junction box with built-in safe trip function)
2. TNA_RecUnit_Umbilical_22(12) (cable for extra circuits connection between SEL and junction box, 12m long before gland + 2m for wiring inside SEL cabinet)
3. Cable gland LTCG ½ NPT with nut ½ NPT
4. Pan Head Machine Screw ¼ - 20 x ¾, carbon steel, zinc plated with nut, plain washer and spring washer, 4 sets.

Field installation procedure for pole mounted Outdoor Switching Module:

1. Connect umbilical TNA_RecUnit_Umbilical_26(11) to the junction box
2. Connect connection cable TNA_RecUnit_Umbilical_22(12) to the junction box with 4-pin Amphenol plug
3. Choose any of holes on SEL-651R bottom plate and fix cable gland in the hole.
4. Pass the other end of the connection cable TNA_RecUnit_Umbilical_22(12) through cable gland into SEL cabinet
5. Strip the cable and wires of the connection cable TNA_RecUnit_Umbilical_22(12) and crimp proper cable lugs to fit connection inside SEL-651R cabinet
6. Connect the cable to SEL-651R terminals according to the schematic below.
7. Ensure output 201 of SEL-651R is programmed for relay malfunction.



C1 - capacitor 120uF, 400V, EKXG401ELL121MMP1S, United Chemi-Con
 D1, TB3 - WAGO terminal block 280-673281-411 with diode 1N1007, 1000V, 1A, built-in
 KA1.1, KA1.2, KA1.3, KA.OUT201 - microprocessor control SEL-651R, Schweitzer Engineering Laboratories
 KV1.1 - KV1.5 - Pilot relay 12VDC coil, F55.34.9.012.0040, Finder
 Q1 - outdoor switching module OSM25_AL_2(630_150_2), Tavrida Electric
 R1 - resistor 1kOhm, 2W, ERG-2SJ102, Panasonic
 TB1, TB2, TB4 - TB7 - connection terminals 870-831, WAGO
 XP1.1 - XP1.42 - Connection Plug Male, panel mounted, Harting (SEL control box).
 XP3.1 - XP3.42; XP5.1 - XP5.42 - Connection Plug Male, cable mounted, Harting (umbilical cable).
 XP4.1 - XP4.4 - Connection Plug Male, panel mounted, PT02E12-4P, Amphenol (junction box).
 XS1.1 - XS1.42 - Connection Plug Female, cable mounted, Harting (umbilical cable).
 XS3.1 - XS3.42; XS5.1 - XS5.42 - Connection Plug Female, panel mounted, Harting (OSM25 & Junction box).
 XS4.1 - XS4.4 - Connection Plug Female, cable mounted, PT06CGMSA-12-4S, Amphenol (connection cable).

Figure 22
Safe Trip device connection diagram

List of changes

Document version	Change date	Scope of change	Reason of change
1.0	16.02.2022	Initial version of the document	Product introduction
2.0	25.02.2022	Circuit diagram added. Connection terminations added. Earthing arrangement picture added. Safe Trip junction box description added.	Document improvement

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