Xiria Product Family

User manual 994.570 G01 05

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CONTENTS

1. GENERAL

The user must have authority to perform switching operations, which means being qualified in accordance with locally applicable guidelines, government legislation and in-house company regulations with respect to the operation of medium-voltage installations.
Legal and other regulations and documents pertaining to accident prevention, personal safety and environmental protection must be observed.
Operations involving the repair of the switchgear unit are to be carried out by or under the responsibility of Eaton. Information with respect to these operations is, therefore, not included in this manual.

1.1 Explanation of used warnings

The manual uses the following names and signs to highlight important (safety) information:

LIFE HAZARD
This warning indicates that non observance of the specified (safety) instructions WILL result in serious and permanent bodily injury or even death.

WARNING
This warning indicates that non observance of the specified (safety) instructions COULD result in serious bodily injury or even death.

NOTE
This note provides the user with additional information. The user's attention is drawn to possible problems.

TIP
Tips provide the user with suggestions and advice on how to make certain tasks easier or more convenient.

1.2 Safety relating to medium-voltage installations

LIFE HAZARD
Operations on medium-voltage installations can be life threatening if the necessary procedures are not observed.

Always take suitable precautions before working on a medium-voltage installation. All personnel involved in operations carried out on, with or near electrical installations require to have been instructed on the safety requirements, safety rules and instructions applicable to the operation of the installation. Personnel must wear suitable clothing which fits the body closely. The person in charge of the operations must ensure that all requirements, regulations and instructions are complied with. The Xiria unit has been designed to ensure that it exceeds applicable regulations. Furthermore, primary component enclosures are arc-resistant and interlocks have been fitted to prevent dangerous operations.

Operations when the unit has been isolated
Switching off prior to carrying out operations on an isolated system is subject to a number of essential requirements.
1. switching off;
2. complete isolation;
3. protection from reactivation;
4. checking whether the unit is dead;
5. provide short-circuit proof protective earthing and a visible work-in-progress earth when needed.
6. provide protection with respect to active components in the vicinity.

Safe layout of the work area
Ensure that access and escape routes are free at all times. Do not leave flammable materials in or near access and escape routes. Flammable materials must not be stored in areas which could be affected by arcs.

In the event of a fire
Never attempt to extinguish a fire on the switchgear unit before it is completely dead, this applies to both primary and secondary switchgear. Even if non-conducting extinguishing materials are used, electricity may pass through the extinguishing equipment. Never extinguish a fire on the unit with water. Prevent water from flowing into the unit. Keep well clear of the unit while the fire is being extinguished in the area around the unit.

1.3 Tools, aids and protection equipment

Tools, aids and protection equipment must meet the requirements of national and international standards insofar as they are applicable.

Drawings and documents
Recent documents of the electrical installation must be available in order to gain sufficient understanding of the schematic layout of the switchgear unit.

Warning signs
If necessary, suitable warning signs shall be placed on the switchgear unit during operations to highlight possible hazards. The warning signs must comply with the applicable standards, insofar as they apply.

Performing measurements safely on the unit
Suitable and safe measuring equipment must be used for measuring safely on the unit. These instruments must be checked before and after use. The instruments must also be inspected periodically in accordance with the applicable regulations.

1.4 Product standards and guidelines used

Table 1: Current product standards used

Standard	Title
IEC62271-1	Common specifications for high-voltage switchgear and control gear standards
IEC62271-100	High-voltage alternating-current circuit-breakers
IEC62271-102	Alternating current disconnectors and earthing switches
IEC62271-103	High-voltage switches
IEC62271-200	A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV
IEC62271-304	Additional requirements for enclosed switchgear and control gear from 1 kV to 72.5 kV to be used in severe climatic conditions
IEC60529	Degrees of protection provided by enclosures
IEC60044-1	Instrument transformers - Part 1: Current transformers
IEC60044-2	Instrument transformers - Part 2: Inductive voltage transformers
EN50181	Plug-in type bushings above 1 kV up to 36 kV
ISO 9001-2000	Quality
ISO 14001	Environmental management

1.5 Product information

The unit is equipped with type plates on the inside walls of the cable connection compartments (see Figure 1-1 to Figure 1-6).

The panel type plate includes:

- switch type;
- technical specifications;
- serial number and year of manufacture.

Eaton Industries (Netherlands) BV Medium Voltage P.O. box 23, 7550 AA Hengelo, The Netherlands			EATON Powering Business Worldwide
M.V. SWITCHGEAR			**IEC 62271-200**
system: **XIRIA** r2.9 **AIR INSULATED**			w.o. no.:**539660**
Serialno: 1034XIRA290850041			Year of man.: **2010**
U_r **24** kV	U_p **125** kV	U_d **50** kV	f_r **50/60** Hz
I_r **630** A	I_k **16** kA	I_p **40** kA	t_k **1** s
IAC AFL	Ua 24 VDC		
Main switching device: 16kA-1s			

Figure 1-1: Example of system type plate

CIRCUIT-BREAKER		**IEC 62271-100**
type: NVR12AA-2402 R2.9		
U_r 24 kV	U_p 125 kV	I_r 200 A
I_k 16 kA	t_k 0.6 s	I_c 31.5 A
I_{sc} 16 kA	$DC_{component}$ 35%	L_{ma} 16 kA
U_a 24 VDC		
Operating sequence O-3 min-CO-3 min-CO		
Classification E2 C2		

Figure 1-2: Example of panel type plate for circuit-breaker

GENERAL PURPOSE SWITCH		**IEC 62271-102**
type: SVR14AA-2406 R2.9		
U_r 24 kV	U_p 125 kV	I_r 630 A
I_k 16 kA	t_k 1 s	I_{ma} 16 kA
I_1 630 A	I_{2a} 630 A	I_{4a} 31.5 A
I_{6a} 240 A	I_{6b} 55 A	n 100
U_a 24 VDC		
Classification E3		
For more information refer to main nameplate		

Figure 1-3: Example of panel type plate for load-break switch

CURRENT TRANSFORMER		IEC 60044-1
type: CTB 90		Make: EATON
75/5 A		L1-L2-L3
5 VA Cl. 0,2 ext. 120%		
/ A		
VA Cl. 0,2 ext. 120%		
/ A		
VA Cl. 0,2 ext. 120%		
I_p 50 A	I_k 20 kA	t_k 3 s

Figure 1-4: Rating plate of a current transformer for metering

CURRENT TRANSFORMER		IEC 60044-1
type: WIC1-W3H1		Make: ELEQ
S1 – S2	28,8/0,075 A	L1 – L2 – L3
	0.1 VA Cl. 5P80	
C-D	28,8/0,288 A	L1 – L2 – L3
Test winding	10 A 3 s.	
For system information refer to main plate		

Figure 1-5: Rating plate of a current transformer for protection

VOLTAGE TRANSFORMER				IEC 60044-2
type: UNECAK 12 D1.E				Make: ELEQ
A-N	10000/√3			
a1-n	100/√3	7,5 V	Cl. 0,2	Sth. 400VA
da-dn	100/3	30 VA	Cl. 3P	Sth. 100VA
12-28-75 kV				1,9 U_r - 8h

Figure 1-6: Rating plate of a voltage transformer

Technical data:

General:						
Rated voltage	kV	3.6	7.2	12	17.5	24
Impulse withstand voltage	kV	40	60	75 / 95	95	125
Power frequency withstand voltage	kV-1m	10	20	28/38/42	38	50
Rated frequency	Hz	----------50-60----------				
Degree of protection in service		----------IP31D----------				
Degree of protection with doors/covers open		----------IP2X----------				
Classification according to IEC 62271-200:						
Loss of service continuity		----------LSC2B----------				
Partition class		----------PM----------				
Internal Arc Classification (IAC)		----------AFL----------				
Internal arc resistance	kA-s	20-1	20-1	20-1	20-1	20-1
Internal arc resistance with absorber	kA-s	16-1	16-1	16-1	16-1	16-1
Ambient air temperature range	^{0}C	---------- -25 +40 ----------				
Maximum altitude	m	----------1000----------				
Average Watt losses per panel	W	----------100 ----------				
Sound emission	dB(A)	----------<70----------				

Busbar system:

Rated normal current	A	----------630----------				
Rated short-time withstand current	kA-s	20-1	20-1	20-1	20-1	20-1
Rated short time withstans current alternative	kA-s	20-3	20-3	20-3	20-3	20-3
Rated peak withstand current	kA	50	50	50	50	50

Circuit-breakers:

Rated normal current	A	----------200/500/630----------				
Rated breaking current	kA	20	20	20	20	20
Rated short-circuit making current	kA	50	50	50	50	50
Rated Capacitive Switching Current Class		----------C2----------				
Rated Cable Charging Breaking Current	A	----------31.5----------				
DC Time Constant	msec	----------45----------				
DC Component	%	----------<20----------				
Mechanical Endurance Class		----------M1----------				
Mechanical Endurance Class as Earth Switch		----------M1----------				
Mechanical Endurance Class Disconnector		----------M0----------				
Electrical Endurance Class		----------E2----------				
Electrische classificatie als aardingsschakelaar		----------E2----------				
Rated short-time withstand current	kA	20-1	20-1	20-1	20-1	20-1
Rated short-time withstand current alternative	kA	20-3	20-3	20-3	20-3	20-3
Minimum tripping time	msec	----------80----------				
Mechanism type		---------- O - 3 min - CO -3 min - CO ----------				

Load break switches:

Rated normal current	A	----------630----------				
Rated active load break current	A	----------630----------				
Rated short-circuit making current	kA	50	50	50	50	50
Rated short-time withstand current	kA-s	20-1	20-1	20-1	20-1	20-1
Rated short-time withstand current alternative	kA-s	20-3	20-3	20-3	20-3	20-3
Rated Cable Charging Breaking Current	A	----------31.5----------				
Mechanical Endurance Class		----------M2 5000x----------				
Mechanical Endurance Class as Earth Switch		----------M0----------				
Mechanical Endurance Class Disconnector		----------M0----------				
Electrical Endurance Class		----------E3----------				
Electrical Endurance Class as Earth Switch		----------E2----------				

Remote control options:

Wiring diagram	----------R34S30291----------
Standard auxiliary voltage	----------24 V DC----------
Auxiliary voltage with voltage converter	---------36-72 V DC & 36-60 V AC ----------
	-------100-353 V DC & 100-240 V AC ----------
Auxiliary voltage tolerances	---------- +10% -30% ----------
Watt losses controller K7	----5 W continuous when idle ----------
Power supply for closing motor	----------55 W 15 seconds----------
Power supply for trip coil	----------40 W 100 msec.----------

Table 2: Explanation oftype plate data in accordance with IEC

Variable	Description	Unit
system		-
r.	Release	-
IEC	IEC reference	-
type	Type switching device	-
serial no.	Serial number	-
year of man.	Year of manufacturing	-
w.o.no.	Works order number	-
f_r	Rated frequency	Hz
I_1	Rated mainly active load breaking current	A
I_{2a}	Rated distribution line closed-loop breaking current	A
I_{4a}	Rated cable-charging breaking current	A
I_{6a}	Rated earth-faulth breaking current	A
I_{6b}	Rated cable- and line-charging breaking current under earth-fault conditions	A
I_c	Rated cable-charging breaking current	A
I_k	Rated short-time withstand current	kA
I_{ma}	Rated short-circuit making current	kA
I_p	Rated peak withstand current	kA
I_r	Rated normal current	A
$I_{r\ T\text{-}off}$	Rated normal current of the circuit-breaker in the transformer panel	A
I_{sc}	Rated short-circuit breaking current	kA
n	Number of operations for mainly active load breaking	-
t_k	Rated duration of short-circuit	s
U_a	Rated supply voltage of auxiliary circuits	V
U_d	Rated short-duration power-frequency withstand voltage (1 minute)	kV r.m.s.
U_p, U_w	Rated lightning impulse withstand voltage (peak)	kV
U_r	Rated voltage	kV
U_r.t	Rated voltage factor and corresponding rated time	Vs
Isolation level	Rated isolation level	kV
Class M, E, C	Classification according to IEC	-
Operating sequence	Rated operating sequence	-
VA	Rated output	VA
CL	Accuracy Class	-
IAC	Internal Arc Classification	-
AFLR	Authorised personal only F = Front L = Lateral R = Rear	-

2. XIRIA SYSTEM DESCRIPTION

2.1 Xiria System description

The Xiria switchgear panels are available for applications up to 24kV.

The system is fully metal enclosed and a highly compact and safe unit is achieved using high-quality internal insulation.

All live primary components of the unit and the main components of the drive mechanisms are housed in a fully sealed enclosure. This prevents any dust, moisture and other environmental factors from affecting the proper operation of the system.

The enclosure is also arc resistant and thus provides conditions of optimum safety for the operator. The cable compartments are available as an option in arc-proof configuration.

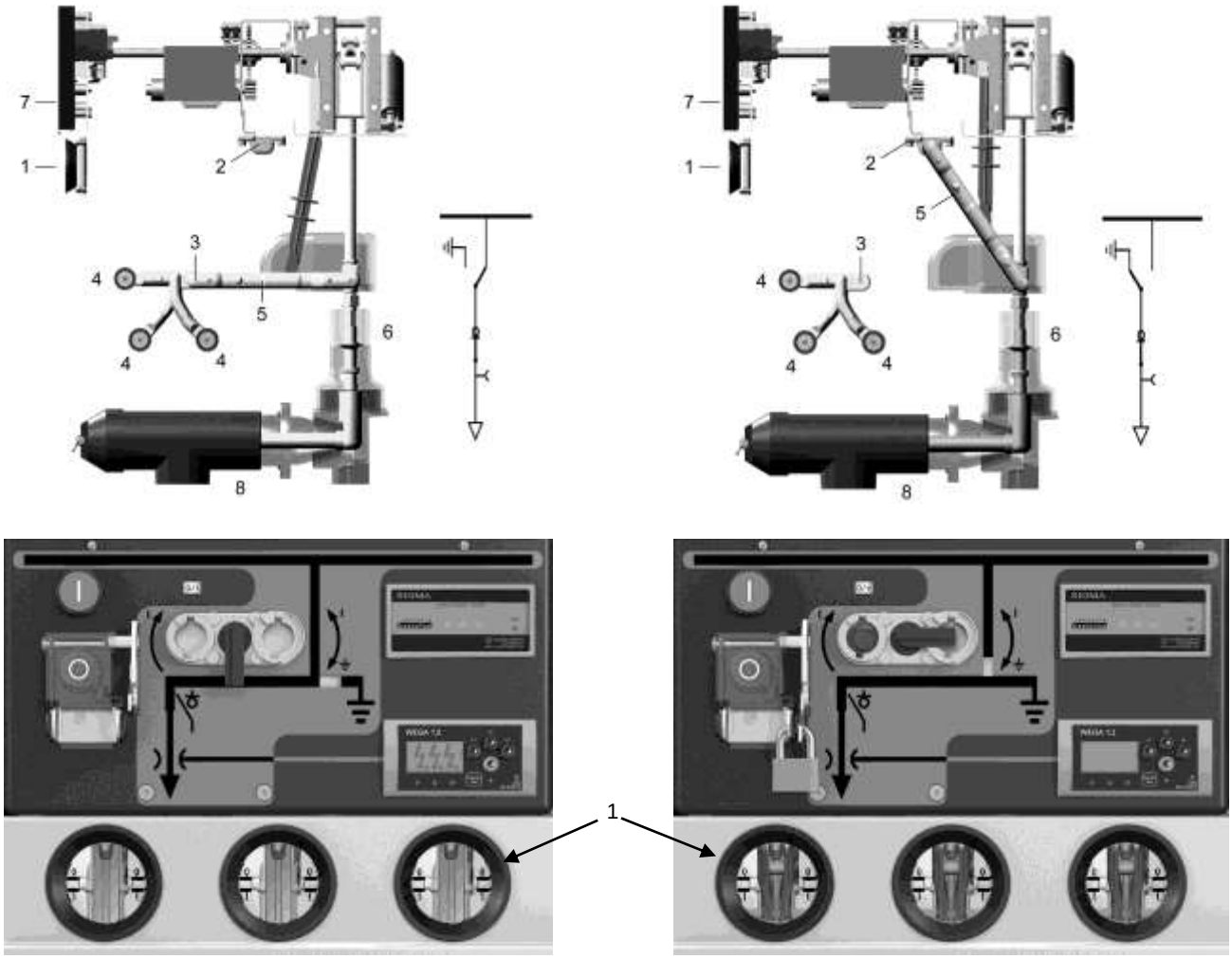
Different panel versions are available, among others:

- a vacuum load-break switch for ring cable connections;
- a vacuum circuit-breaker for the protection of mains transformers and cable connections.

The versions can be supplied in any combination and sequence.
The Xiria panels includes immediately visible position indication using viewing windows (1) on the control panel, see Figure 2-1.
The separation between cable and busbar system and the position of the vacuum interrupter are directly visible through the viewing windows. This also provides safe, visible and integrated earthing in combination with the short-circuit proof load-break switch or circuit-breaker.

Cables are connected with cable connection cones suitable for use with plugs.

2.2 Cross-section, single line diagram and list of functions



Cable connected to the busbar

Cable connected to earth

Figure 2-1: Panel cross-sections and single line diagrams

1. Viewing window
2. Earth contact change-over switch
3. Busbar contact change-over switch
4. Main busbars
5. Change-over switch
6. Vacuum interrupter
7. Control panel
8. Cable connection

The position of the disconnector can be viewed via the windows (1).

Functions, load-break switch panel

- Connect cable to busbar.
- Disconnect cable.
- Connect cable to earth.
- Test cable.

Functions, circuit-breaker panel

- Connect cable to busbar.
- Disconnect cable.
- Connect cable to earth.
- Protect outgoing feeder from overcurrents.
- Test cable.

2.3 Technical specifications, general

Item	Explanation				Specification
Weight of the heaviest transport unit			Nett (kg)	Gross (kg)	See delivery note for the exact value
	1 panel		320	350	
	2 panels		350	380	
	2 panels with plinth		410	440	
	3 panels		430	460	
	3 panels with plinth		520	550	
	4 panels		550	590	
	4 panels with plinth		670	710	
	5 panels		660	710	
	5 panels with plinth		810	860	
	Metering panel (exclusive VT's and CT's)		250	280	
	Metering panel (inclusive VT's and CT's)		400	430	
Unit dimensions	Width (mm)	Height (mm)	Height incl. plinth (mm)	Depth (mm)	Refer to the floor plan in Appendix 1
1 panel	500	1325	1575	600	
2 panels (block type)	760	1305	1555	600	
3 panels (block type)	1110	1305	1555	600	
4 panels (block type)	1460	1305	1555	600	
5 panels (block type)	1810	1305	1555	600	
Metering panel	850	1325	1575	750	
Unit dimensions incl. packing					
1 panel	500	1600	1850	800	
2 panels (block type)	1200	1600	1850	800	
3 panels (block type)	1200	1600	1850	770	
4 panels (block type)	1555	1600	1850	770	
5 panels (block type)	1860	1600	1850	800	
Metering panel	1200	1600	1850	800	
Lifting and transport facilities	The unit is fitted with special lifting fixtures. The unit may only be lifted by these fixtures, see section 3.2.1				
Facilities to secure the Xiria	The base of the unit has openings to secure the unit to the floor, see section 3.2.5				

3. INSTALLING THE UNIT

3.1 Environmental requirements

3.1.1 Transport, assembly and storage conditions

If the temperature and humidity conditions specified in the order cannot be guaranteed during the transport, assembly and storage of the unit, preventive measures must be taken in consultation with Eaton.
Care should be taken not to damage the unit, even if the packaging has not been removed. The packaging is only intended to prevent minor damage.

During shipment all switches are to be switched to the earthed position (switch closed and change-over switch in earthed position).

Special preventive measures may be required to avoid:
- moisture absorption in the packaging as a result of rain, snow or condensation;
- vibrations during transport;
- damage to the pressure relief valves. If the unit is shipped by air, it should be carried in a cargo bay in which the air pressure is maintained at 1 atmosphere ±10% throughout the entire flight.

3.1.2 Ambient conditions

Item	Condition
Requirements for the floor and wall of the building.	• Minimum permissible floor loading 500 kg/m^2. • The floor must be level and have a smooth finish to ensure that the carrier frame of the unit is evenly supported • Provide cable recesses according to the floor plan (see Appendix 1). • The cable recesses in the floor can be sealed to prevent rising damp. Polyurethane with a compact cellular structure can be used for this.
Requirements for clearances around the Xiria:	• At least 60 mm at the top. This is equivalent to a minimum height of 1365 mm for the operating area. • Left and right hand side minimum 50 mm. • Sufficient space should be available at the front and along the entire length of the unit for operational purposes and to be able to work safely with the normal test equipment. • When the IAC classification is applied according to IEC62271-200 an arc channel shall be taken into consideration, see section 3.2.4.
Requirements for escape routes	• When the unit is installed in an accessible area, escape routes shall be provided according to the local requirements.
Ambient conditions (IEC 62271-1)	Class –25 °C indoor.

3.2 Installing the unit

The unit is supplied packaged on a wooden pallet.
Provision for lifting is fitted to the top of the unit, see Figure 3-1. The unit is secured to the pallet with bolts.
Leave the unit on the pallet as long as possible, preferably until it reaches the assembly location.
The unit can be handled simply and safely providing the pallet and standard lifting equipment are used.

The installation of the unit includes the following actions:
1. Lifting.
2. Travelling.
3. Preparation prior to installation.
4. Installing the unit.
5. Securing to the floor.

3.2.1 Lifting

WARNING
The person in charge of lifting the Xiria unit must hold a certificate issued by the relevant authorities to certify that he/she is authorised to carry out these operations.

After installation the lifting equipment (1) must not be removed.

3.2.2 Travelling

The unit is supplied packaged on a wooden pallet. This means that it can be moved simply and safely on a pallet truck. Leave the unit on the pallet as long as possible and carry it on the pallet right up to the assembly location.

Figure 3-1: Fitting the lifting equipment

Figure 3-2: Single panel

Figure 3-3: Metering panel

3.2.3 Preparation prior to installation

The location of the unit is required to meet the conditions stated in par. 3.1.2.

1. Remove the packaging and check the contents.
2. Remove the doors of the left- and right-hand panels, see Figure 3-4.

> **TIP**
> **The door can only be removed if the panel is in the 'Cable earthed' position. See procedure in section 4.2.2.**

3. Remove the 4 fixing bolts (1) (2 either side), see Figure 3-5 and then remove the pallet.
4. When positioning the unit check that:
   - the cable openings in the floor are in the correct position;
   - the floor is clean and level;
   - the unit is not damaged.
5. Slide the unit across the floor to its final location, if necessary. Apply a lever to the base plinths only. Take care not to damage the unit.

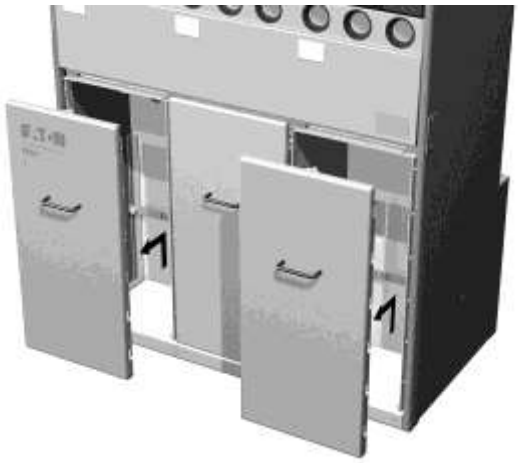


Figure 3-4: Opening the cable access door

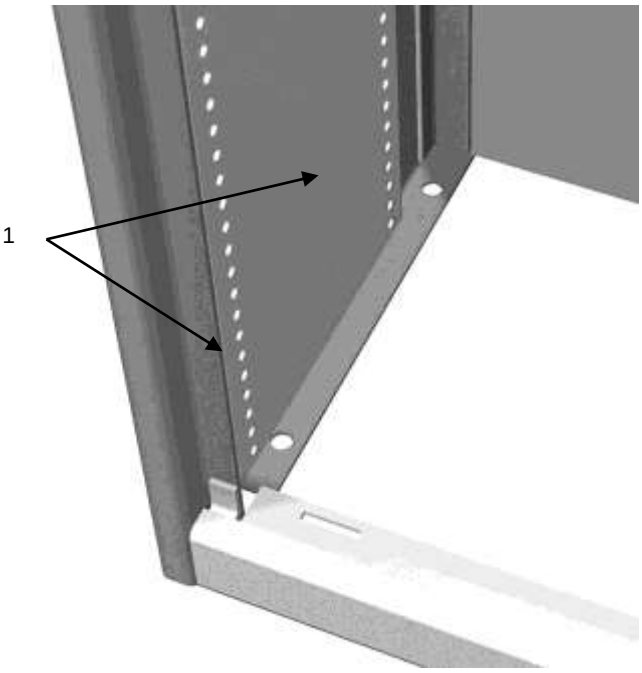


Figure 3-5: Location of fixing bolts

3.2.4 Setting up the unit

The Xiria system has been designed in accordance with the recommendations set out in IEC 62271-200 which theoretically prevents internal faults from occurring. Moreover, when set up correctly, a Xiria unit will comply with this IEC standard for setting up with an arc channel.
The pressure relief flaps in the Xiria enclosure are located at the rear and bottom of the unit, and they can be connected to the arc channel of the building.
The pressure relief flaps at the rear can be sealed off using a cover plate available separately as an option.
For further information see also the floor plan drawings in Appendix 1.

The following rules apply to a set-up with an arc channel:

- The channel is to be connected to a location where no danger can occur to personnel.
- The bore of the channel is to be a minimum of 0.15 m^2 and the channel itself requires to be capable of withstanding overpressure of at least 0.5 bar.
- The area the arc channel is connected to must be capable of withstanding the overpressure also.

3.2.5 Securing to the floor

- The Xiria unit must be fixed to the floor in four locations.
- The drilling pattern for fixing and cable holes is included in Appendix 1, 'Floor plan'.
- Use washers under bolt heads/nuts.

3.3 Connecting the cables

3.3.1 Types of cables

Single-core cables can be connected to the unit.
Three-core cables can be connected, if the dimensions of the associated splitting point fit into the cable compartment.
See for the available space for cable connection plugs Table 3.

Table 3: Maximum dimensions for cable connectors inside the Xiria cable compartment

Panel type			Cable compartment type		Door lock	
			Arc resistant	Non arc resistant		
			A (mm)	A (mm)	B (mm)	C (mm)
Circuit-breaker	200 A	Elbow plug connector type A	238	240	36	37
Circuit-breaker	500 A	Bolted T connector type C	195	197	36	37
Circuit-breaker	630 A	Bolted T connector type C	195	197	36	37
Load break switch	630 A	Bolted T connector type C	277	279	36	37

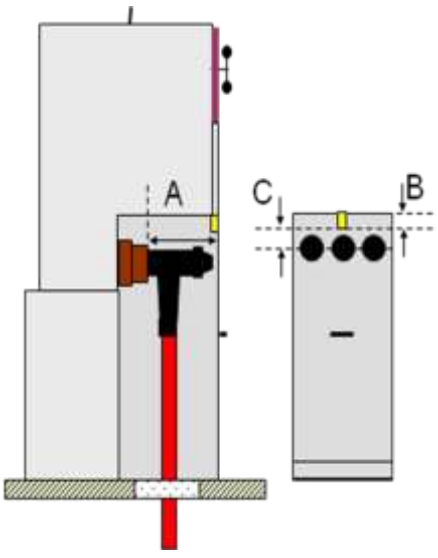


Figure 3-6: Xiria cable compartment

Table 4: Short-circuit capacity in relation to cable cones used

	Cone type EN 50181	I [A]	Maximum short-circuit current	Plug type	Cable type
Load-break switch	C	630	17.5-24kV 16kA-1s 3.6-12kV 20kA-1s	bolted T-plug M16	Cu/Al XLPE Cu/Al XLPE
Circuit-breaker	A	200	17.5-24kV 16kA-0.6s 3.6-12kV 20kA-0.4s	plug type L plug	Cu/Al XLPE Cu/Al XLPE
Circuit-breaker	C	500	17.5-24kV 16kA-1s 3.6-12kV 20kA-1s	bolted T-plug M16	Cu/Al XLPE Cu/Al XLPE

3.3.2 Cable assembly instructions

Strain relief

Strain relief prevents mechanical forces from being transmitted to other parts of the unit via the cable connection point.
Each panel is provided with three single phase plastic cable clamps or one three phase plastic cable clamp (Figure 3-7).

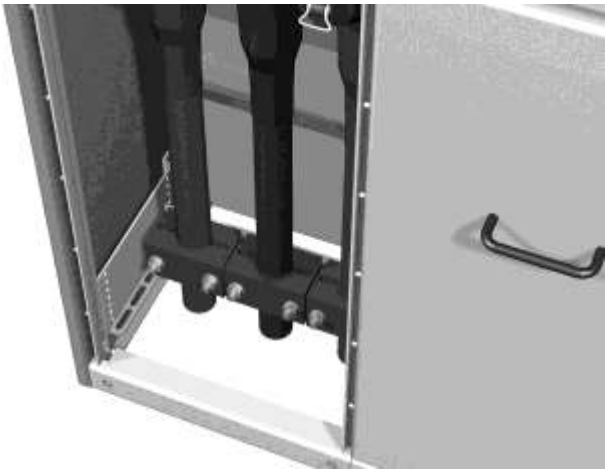


Figure 3-7: Cables with plastic cable clamps

Assembly (standard)

WARNING
At delivery each cable cone type C is provided with a "temporarily" mounted allen key transport bolt M16 x 30.

These bolts must be removed before connecting the cable.

- Plinths can be removed for each panel when fitting the cables if so desired.
- Connect the cables to ensure that no mechanical forces are created at the cable connection point.
  The maximum torque for a C-type cone is 70 Nm.
  The weight of the cable and tensile forces originating from the cable must be absorbed by the cable clamp blocks on the cable support.
- Secure all cables using cable clamp blocks. This is in order to enable the short-circuit forces to be absorbed in the event of any short-circuit occurring.
- Seal all cable recesses in the floor properly. Use polyurethane with a compact cellular structure, for instance. This will protect the cable connection compartment from rising damp and vermin.
- The cable clamp blocks are mounted on an adjustable frame in the cable connection compartment. The bolts through the plastic cable clamps must be tightened to a torque of 20 Nm.

Assembly steps if current transformers are installed around the primary cable

The same steps should be followed as described at the standard assembly. For easy connection of the primary cables the current transformers in the cable compartment can be removed and remounted. For this the following steps should be taken:

1. Open the cable compartment according to the standard instructions.
2. Remove the current transformers for protection (A) by removing the two bolts on the front (B). The secondary wiring does not need to be disconnected.
3. Behind these current transformers a mounting plate fixed with bolts (C) becomes visible.
   Remove these bolts and remove the mounting plate.
4. The current transformers for metering (D) can now be lifted and removed, also remove the tywrap from the secondary wiring. The secondary wiring does not need to be disconnected.
5. Lead the primary cables through the current transformers and remount the current transformers as described above.

REMARK
After remounting the current transformers the earth screen connections of the primary cables must be connected to earth via the premounted earth wires (F). In this case any earth current through these connections will not influence the metering results.

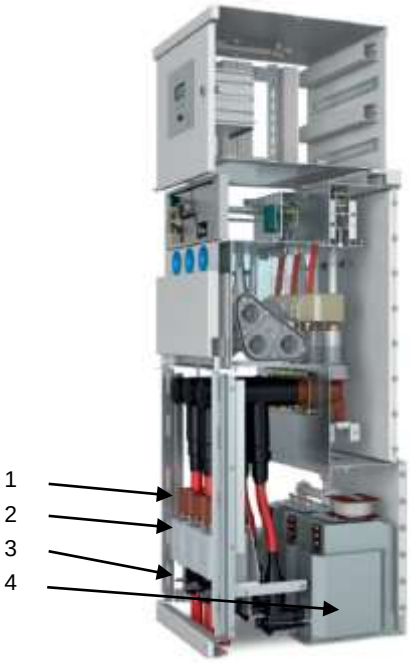


Figure 3-8

1. Current transformers for protection
2. Current transformers for metering
3. Cable clamps
4. Cable side voltage transformers

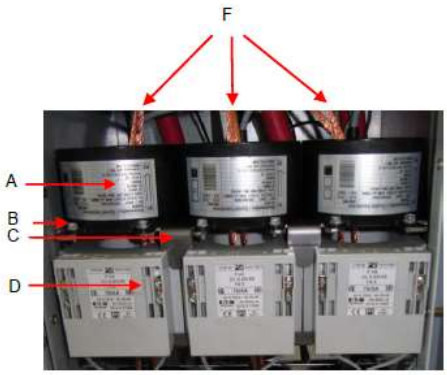


Figure 3-9

Connection of the primary cables when cable side voltage transformers are installed

Due to the limited mounting space inside the cable compartment the primary cables and the voltage transformers are connected with connectors make Tyco type RSTI 58. The connectors and cables for the voltage transformers are pretested and preassembled on the cable cones of the circuit-breaker. Parallel on these preassembled connectors the connectors (type RSTI CC58) for the primary main cables can be mounted at site.

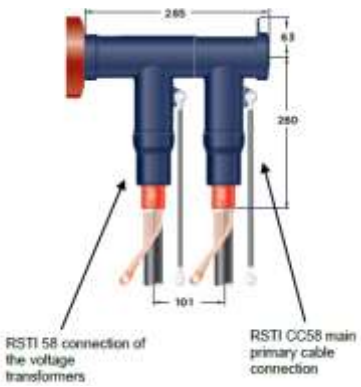


Figure 3-10: Cable connector

3.3.3 Replacing the cable connection cone

Damaged cable connection cones can be easily replaced by our service department. A different type of cone can also be fitted in the circuit-breaker panel at a later stage. Two types are available, A and C in accordance with EN 50181. Contact Eaton for further details.

3.3.4 Applying test current and test voltage to the cable

If cable side voltage transformers are installed in the panel make sure the primary cables are disconnected from the pre-assembled connectors for the cable side voltage transformers.
The unit is suitable as standard for the following test voltages, for a maximum of 10 minutes per phase:

System voltage	Test voltage (DC or AC-peak value)
24 kV	60 kV
17.5 kV	45 kV
12 kV	30 kV
7.2 kV	30 kV

WARNING
Test accessories are needed to apply test current and test voltage to the connected cables.

1. Earth the unit in accordance with section 4.2.2.
2. Install the specified test accessories in accordance with the instructions of the plug and test accessory suppliers.
3. The switch must not be activated until you and the person responsible for the unit are satisfied that the earthed connection can be opened safely with the switch.
4. The unit requires to be earthed again in accordance with section 4.2.2 before the test accessories are removed on completion of the work.
5. Safety precautions:
   - The unit must be isolated from any possible normal source of supply, other than the test device.
   - Under no circumstances must it be possible for the unit to be powered up again by any source other than the external supply used for voltage testing.
   - The applicable safety measures must be applied with respect to all personnel present during voltage testing.

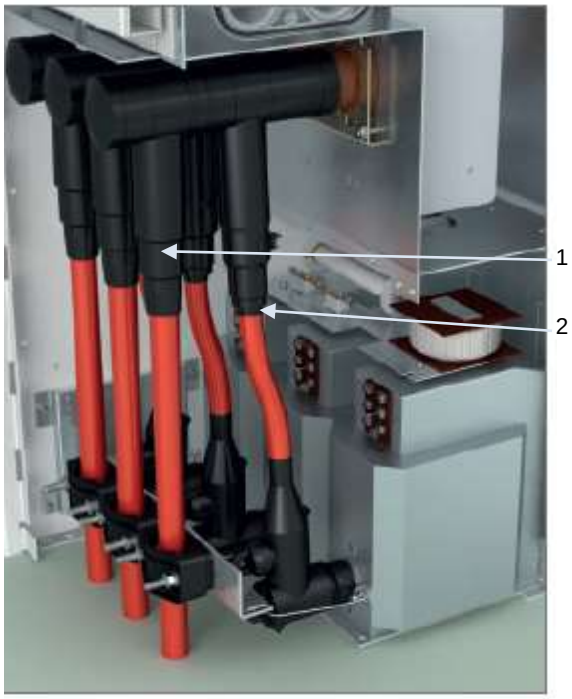


Figure 3-11

1. Primary cable
2. Pre-assembled connectors

3.4 Connection of station earthing

The Xiria unit can be connected either to the left or to the right of the station earthing. An earth bar, to which the earth screens of the power cables and the system earth can be connected, is located at the rear of every cable connection compartment.
See Figure 3-12.
The earth bar is provided with 10 mm holes on both ends outside the unit for the connection of the system earth.
Three M8 nuts are mounted on the earth bar in each cable compartment for the connection of the earth screens of the power cables.

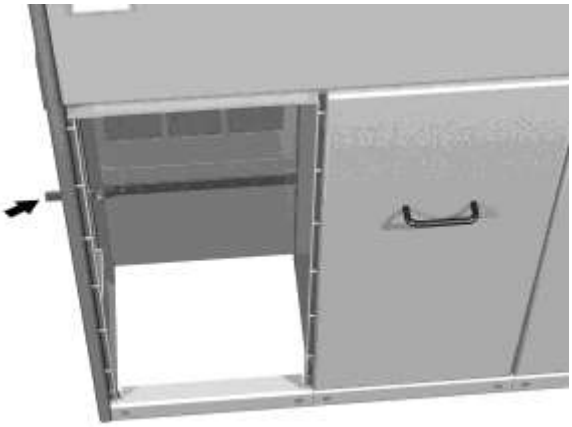


Figure 3-12: Earth bar

3.5 Access to secondary compartment

The front plate requires to be removed in order to gain access to the secondary compartment.

Procedure (standard)

1. Remove the screws at the bottom of the front plate, see Figure 3-13.
2. Move the bottom of the front plate forward, lower it and remove it, see Figure 3-14.
3. The secondary compartment is now accessible.

Figure 3-13: Position of front plate fixing screws

Figure 3-14: Removing the front plate

Procedure (Xiria E with top-unit)

1. Open top-unit with key.
2. The secondary compartment is now accessible, see Figure 3-15.

Figure 3-15

Procedure (Xiria Metering panel)

1. Open integrated low voltage compartment, see Figure 3-16.
2. The secondary compartment is now accessible.

Figure 3-16

4. OPERATION

4.1 Details of control panel

The Xiria unit is equipped with two types of control panel, one for the load-break switch panel and one for the circuit-breaker panel.

Figure 4-1 provides a summary of the control units on the control panels.

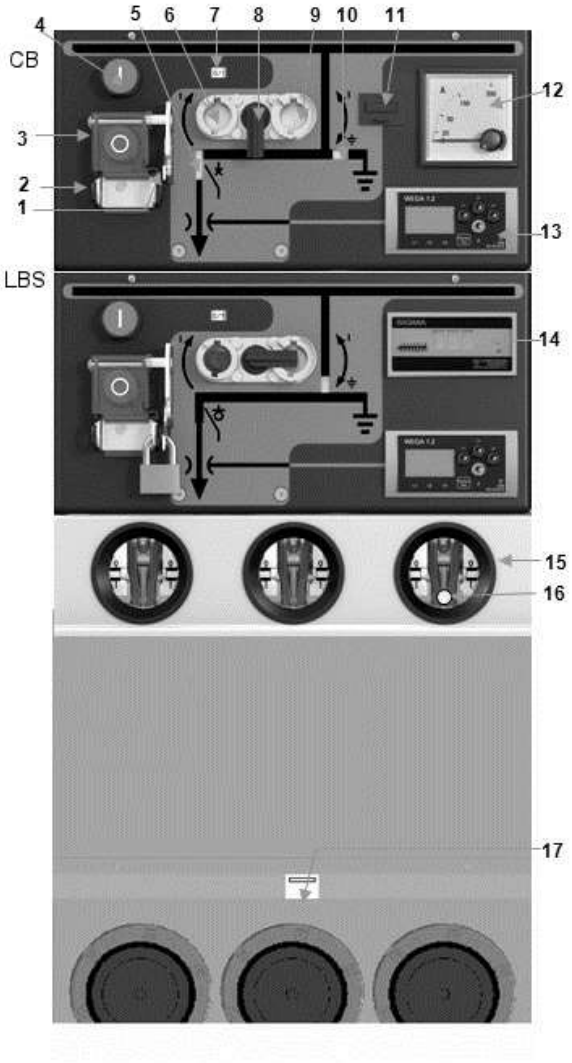


Figure 4-1: Control panels

1. Earthed position interlock for padlock max. 12 mm.
2. Padlock facility for off pushbutton
3. Off pushbutton with anti-reflex flap
4. Electrical closing pushbutton for motor control (option)
5. Switch position indicator
6. Switch control point
7. Switch function indicator
8. Selector control knob
9. Change-over switch control point
10. Change-over switch position indicator
11. Trip indicator CB (option)
12. Ammeter CB (option)
13. Cable side voltage detector
14. Short-circuit indicator LBS (option)
15. Inspection window
16. Moisture indicator
17. Door interlock

4.2 Manual switching

4.2.1 Switching operating position on/off

In the operating position the cable is connected to the main busbar of the unit. Here, the switch (5) is ON and the change-over switch (8) is in the busbar position.
Initial position:
In the neutral position (see Figure 4-2):

- the switch is OFF, see switch (4) position indicator;
- the change-over switch is in earthed position, see change-over switch (9) position indicator;
- The selector (7) is in the central position.

This initial position has been selected to ensure that all switching operations are described. If the change-over switch is already in the busbar position, for instance during switching on, switching with this change-over switch is omitted.

Procedure for switching on the operating position

1. Turn the selector (7) clockwise until the control point of the change-over switch (8) is revealed.
2. Place the operating handle with the arrow pointing down in the control point of the change-over switch (8). Switch the change-over switch to the busbar position by turning the handle anti-clockwise as far as it will go, i.e. to approximately 190^0. Additional resistance will be noticeable towards the end of this rotation. The handle cannot be removed until busbar position of the change-over switch has been reached.

3. Remove the handle and check that the position indicator (9) of the change-over switch indicates the busbar position.
4. Turn the selector anti-clockwise until the switch control point (5) is revealed.
5. Place the operating handle with the arrow pointing up in the switch control point (5). Switch the cable to busbar by turning the handle clockwise as far as it will go, i.e. to approximately 190^0. The mechanism will switch audibly at that point.
6. Remove the handle and check that the position indicator (4) of the switch indicates the ON position. In the viewing window the closed operating position is also visible (see Figure 4-3).
7. Turn the selector (7) back to the central position, both openings (5) and (8) will then be covered.

NOTE
On performing wrong switching operations the operation handle will bend to avoid damaging the mechanism.

Procedure for switching off the operating position

1. Press the opening button (3).
2. Check that the position indicator (4) of the switch indicates the OFF position.
   In the viewing window the opened operating position is also visible, see Figure 4-4.
3. Turn the selector (7) back to the central position, both openings (5) and (8) will then be covered.

Procedure for switching the operating position to the neutral position

1. Turn the switch off with the opening button (3). Check that the position indicator on the switch (4) indicates the OFF position.
2. Turn the selector (7) clockwise so that the control point for the change-over switch (8) is revealed.
3. Place the operating handle with the arrow pointing up in the control point of the change-over switch (8). Turn the change-over switch in earthed position by rotating the handle190^0 clockwise until you start to feel some resistance. Additional resistance will be noticeable towards the end of this rotation. The handle cannot be removed until earthing position of the change-over switch has been reached.
4. Remove the handle and check that the position indicator (9) of the change-over switch indicates the earthed position.
5. Turn the selector (7) back to the central position, both openings (5) and (8) will then be covered.

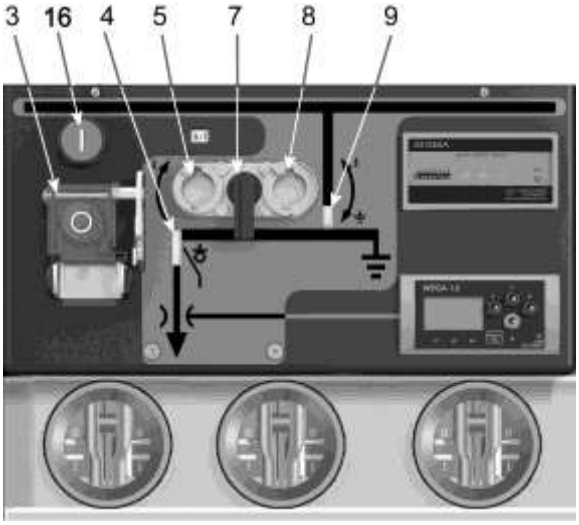


Figure 4-2:Neutral position

Figure 4-3: Closed operating position

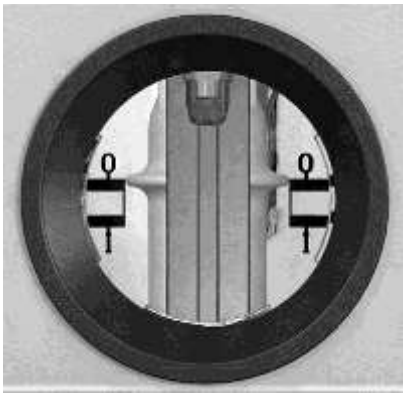


Figure 4-4: Opened operating position

4.2.2 Switch cable earthing on/off

In the operating position, the cable is connected to the main busbar of the unit; the switch is ON and the change-over switch is in the busbar position.

Initial position:

In the neutral position (see Figure 4-5):

- the switch is OFF, see switch (4) position indicator;
- the change-over switch is in earthed position, see position indicator of change-over switch (9);
- selector (7) is in the central position.

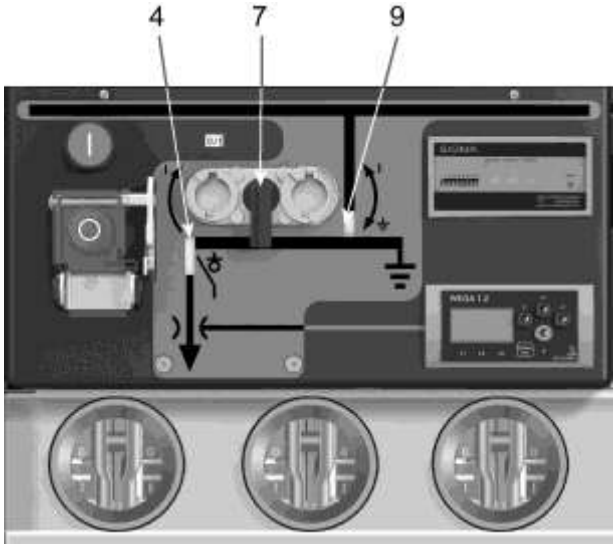


Figure 4-5: Panel in neutral position

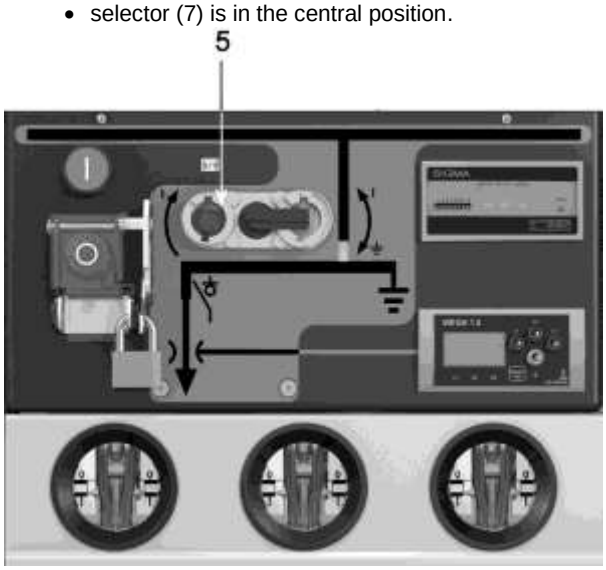


Figure 4-6: Panel in earthed position

Procedure for switching cable earthing on

1. Check the position indication to verify that the change-over switch is in the earthed position. An additional option is available to inspect the position of the change-over switch through windows (14) at the front , see Figure 4-5. Check the position of all three phases: use a torch to provide additional light through an adjacent window;
   check the position of the change-over switch;
   Figure 4-7 shows the change-over switch in the earthed position;
   Figure 4-8 shows the busbar position;
   repeat this procedure for the other two phases.
2. If the panel is not in neutral position, put it in this position now, see section 4.2.1.
3. Turn the selector anti-clockwise, the control point of the switch (5) is revealed.
4. Use the built-in voltage detector to check that the cable is dead.
   Arrows and dots visible:
   Detector is functioning correctly and the cable is live;
   Arrows and dots not visible: cable is dead.

Figure 4-7: Change-over switch in the earthed position

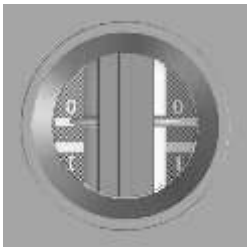


Figure 4-8: Change-over switch in the busbar position

NOTE

The visible dot shows that the detector is functioning correctly in accordance with the demands for voltage detecting systems as described in VDE 0682 art. 415.

This is a continuous internal function check.

5. When the arrows and dots are not visible then check the operation of the voltage detection using the voltage detection tester (18) see Figure 4-9:
   a. insert the tester plugs in the contact sockets “earth” and L1. Test the detector by pressing the tester button.
      The tested phase arrow and dot should now be present;
   b. repeat the test for L2 and L3.
   c. if one or more arrows and dots do not appear, this might be the result of a faulty voltage detector. Should this be the case contact Eaton. Ensure by other means that the cable is dead before carrying out any further switching operations.
6. When the arrows and dots are visible then the functionality of the voltage detector can be tested as follows:
   a. Connect a wire from the tester between the contact sockets “earth” and L1. The arrow and dot indication from this phase must disappear.
   b. Repeat this test with the phases L2 and L3.

NOTE
The detector also has a piezo test button on the front for testing the LCD screen only.

7. Earth the cable by turning the switch ON. Insert the operating handle with the arrow pointing up in the switch control point. Turn the handle 190^0 clockwise. You will hear the mechanism switch. Remove the operating handle. The cable is now connected to earth.
8. Put the selector in the central position so that both control openings are covered.

The integrated earthing of the Xiria panel is now ON; the cable is earthed to be short-circuit proof through the switch. The earthed position can now be locked as described in par. 4.3.2.

Procedure for switching cable earthing off

1. Check whether the cable earthing can be switched off.
2. Remove the padlock from the earthed position interlock (if it is still in place), as described in par. 4.3.2.
3. Switch OFF the switch of the relevant panel with push button (3).
4. Check that the position indicator on the switch (4) indicates the OFF position.
5. Rotate the selector (7) back to the central position; both openings will be covered.

The panel is back in the neutral state:

- switch OFF;
- change-over switch to earth.

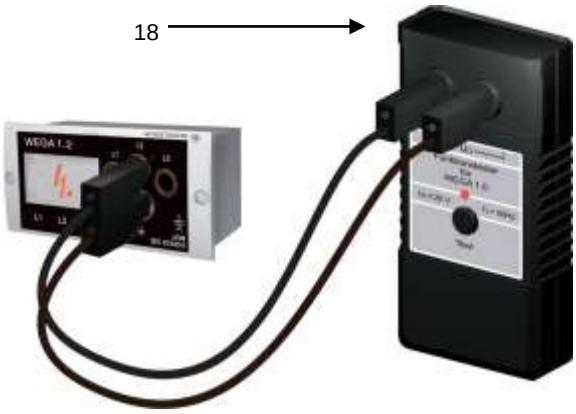


Figure 4-9: Using the tester

4.2.3 Gaining access to cable

NOTE
When gaining access to the cable, the following basic rules apply at all times:

- **Disconnect the cable at both ends.**
- **The panel must be in the closed earthed position.**
- **Secure this internal earthing by locking it with a personal padlock.**
- **Verify that the cable can never be made live from the other end.**
- **On request a visible back-up earth can be installed in accordance with the cable plug supplier's instructions.**

Procedure

1. Switch on the integrated cable earthing in accordance with the instructions in section 4.2.2.
2. To open the cable connection compartment:
   - check, using the single line diagram and position indicators, whether the cable on the panel to be opened is earthed;
   - open the cable connection compartment by lifting the door and moving it forward
     Figure 4-10.
3. Put up a “cable earthed” warning sign.
4. Use a high voltage tester to verify that the cable is dead. Follow the cable connection supplier's instructions.

NOTE
The cable compartments are available as an option in arc-proof design. The cable access doors of this optional version are not interchangeable with the standard doors.

5. Now if requested a visible back-up earth can be installed by:
   - connecting the earth terminal on the back-up earth to the earth bar in the cable connection compartment, see Figure 4-12;
   - fit the earthing equipment, according to the plug supplier's instructions, to all three phases of the cable connection, see Figure 4-11.

TIP
It is still possible, however, to open the switch or circuit-breaker in this situation. This may be necessary in order to measure the cable. If the switch requires to be interlocked against being closed on in this situation, the scissor-type interlock (section 4.3.4) can be used for this purpose.

6. The panel requires to be returned to the neutral position on completion of the operations.
   Proceed as follows:
   - remove the back-up earthing equipment when this is mounted;
   - connect the cable connection plugs according to the supplier's instructions;
   - close the cable access door;
   - remove any earthing interlocks fitted;
   - open the switch.
   - check the position indicator.

TIP
The above switching operations are summarised for experienced users in tables shown in section 4.5.

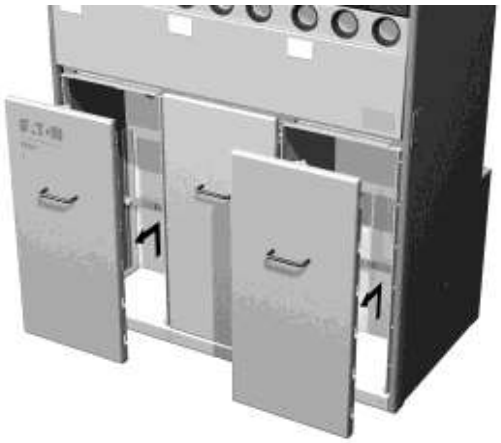


Figure 4-10: Opening the cable connection compartment

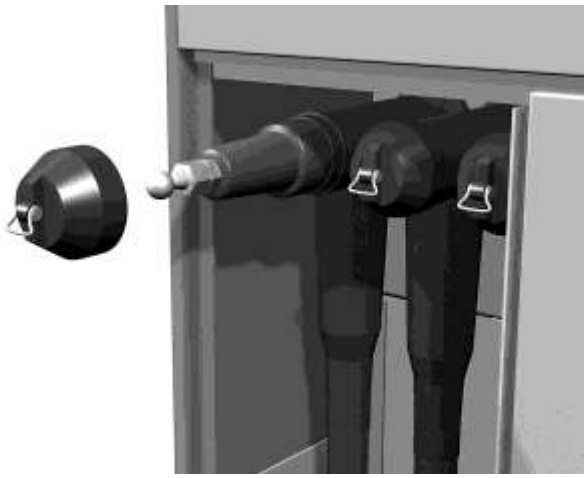


Figure 4-11: Example of an isolated plug with an earthing point

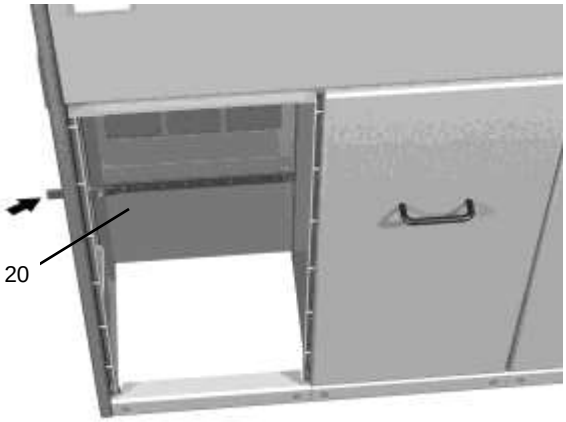


Figure 4-12: Earth bar in the cable connection compartment

4.3 Interlocks

The Xiria unit is equipped as standard with built-in interlocks to prevent accidental switching operations. These interlocks are mechanical interlocks.

LIFE HAZARD
Undesirable switching operations could result in the following:

- **danger to personnel (operating and service personnel);**
- **failure of power supply;**
- **damage to the unit.**

WARNING
If a (switching) action cannot be achieved with normal operating force:

- **Check against section 4 whether the action to be carried out is permissible;**
- **Notify Eaton-ESS if the action is permissible according to the switching tables but cannot be accomplished with normal operating force.**

4.3.1 Built-in interlocks

The following interlocks have been applied:

- Interlock to prevent cable access from being opened if cable is not earthed. Note: Once the cable access has been opened, the panel can be switched off to carry out cable tests; this interrupts the cable-earth link.
- Interlock to prevent operation of the change-over switch when the circuit-breaker or load-break switch is active.
- In order prevent reflex attempts to switch off a short-circuit after switching on, the opening button is equipped with an anti-reflex flap (1).

A number of switching positions can also be interlocked with padlocks.

WARNING
After any temporary absence, check that the necessary interlocks and eventually mounted back-up earths are still in place.

4.3.2 Earthed position interlock

The earthed position interlock is intended to prevent the cable earthing from being interrupted unintentionally. Cable earthing is achieved via the load-break/circuit breaker switch; it therefore requires to be locked against opening to be sure that the cable is earthed.
Once this interlock has been installed, the following operations are no longer possible:

- Turning off the switch with the opening button.
- Electrical disconnection of the switch by the protective relay.
- Opening the door of the cable compartment.

The earthed position interlock can be installed if (see section 4.2.2):

- the change-over switch is in the earthed position;
- the switch is ON;
- the cable access door is closed;
- the flap in front of the opening button is fully placed in front of this button.

The interlock is used as follows, see Figure 4-13

1. Turn the selector (7) anti clockwise.
2. Place the cover flap fully in front of the opening button (A)
3. Pull part B to the front, part C will automatically move downward and part B stays in position (Figure 4-13 C).
4. Put the hasp of the padlock (D) through the hole on the right (Figure 4-13 D).
   The hasp diameter can be 1-12 mm.
5. The earth position is now interlocked, including the cable access door and the opening button.
6. Put up a “cable earthed” warning sign if needed.

Remove the interlock as follows:

1. Remove the padlock D (Figure 4-13 D).
2. Push part C upwards, part B will automatically move backwards (Figure 4-13 C).
3. The earth position interlock is removed.

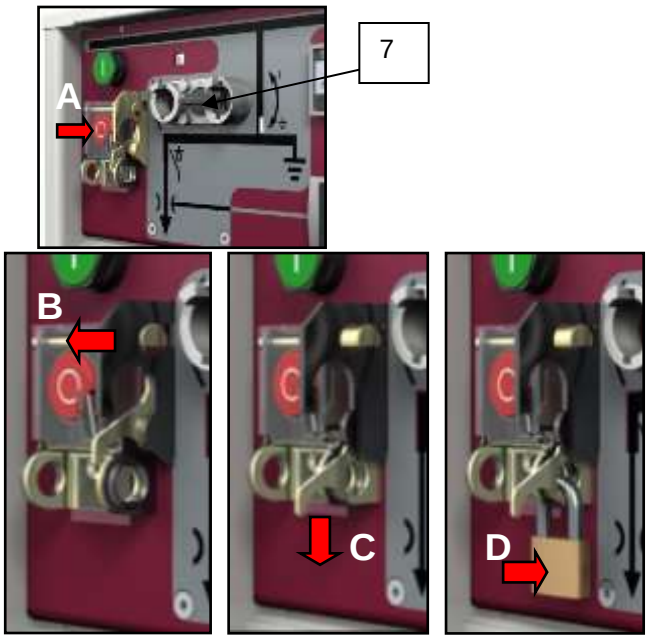


Figure 4-13

4.3.3 Interlock for circuit-breaker/load-break switch opening button

The interlock on the opening button is to prevent the switch from being unintentionally opened. Once this interlock is in place, the flap in front of the opening button can no longer be lifted. The switch can no longer be switched off manually. However, switching off by the protective relay, if fitted, or the optional remote control remains possible. This interlock can be applied in every position of the panel.

Installation is as follows:
Hook a padlock (19) through the hole below the opening button, see Figure 4-14.
A paslock with a hasp of 1 – 12 mm can be applied.

Figure 4-14: Padlock on opening button

4.3.4 Interlock for end position

This interlock is intended to prevent the unintentional closing of the switch and operation of the change-over switch.
When the interlock is in place, the operating handle cannot be inserted in the control points. However, turning off via the opening button and by the protective relay of the circuit-breaker remain possible.

Installation is as follows:

1. Turn the selector (7) anticlockwise until the switch control point is revealed.
2. Fit the scissor-type interlock (21) in control aperture, see Figure 4-15.
3. Engage the scissors so that the openings are aligned. Pass a padlock (19) through both holes, see Figure 4-16.

Figure 4-15: Installing the scissor-type interlock

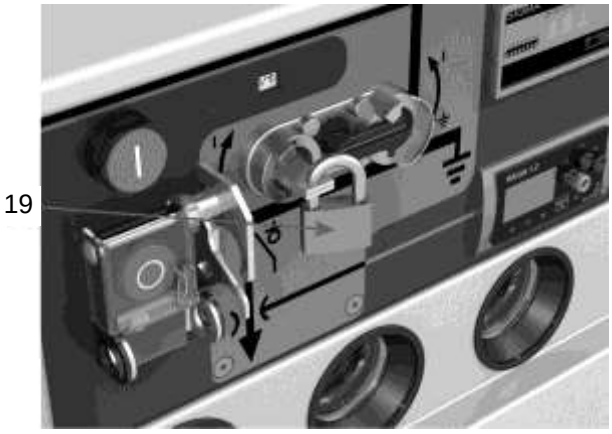


Figure 4-16: Padlock on scissor

4.4 Signals

The Xiria unit features voltage detectors on the cable side and can be fitted with overcurrent indicators and trip indicators as options.

4.4.1 Voltage detectors

The Xiria unit features voltage detectors in the control panel (12) conform IEC 61243-5 with LRM interface.

The voltage detector includes an LCD screen with indication arrows and dots, one for each phase, see Figure 4-17. These arrows and dots are present when the cable is live.
The voltage detector detects wheather the operating voltage is present at the cable connection of the panel concerned.

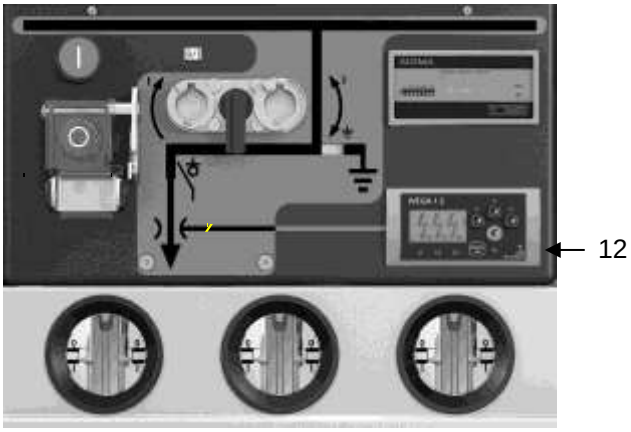


Figure 4-17: Voltage detectors

NOTE
The visible dot shows that the detector is functioning correctly in accordance with the demands for voltage detecting systems as described in VDE 0682 art. 415.

This is a continuous internal function check.

In combination with the ORION 3 tester the voltage detectors can also be used for phase comparison between two adjacent live cables.
See appendix 4 for further information.

4.4.2 Overcurrent indicator

The overcurrent indicator (13), see Figure 4-18 is activated by an overcurrent.
See Appendix 5 for further information.

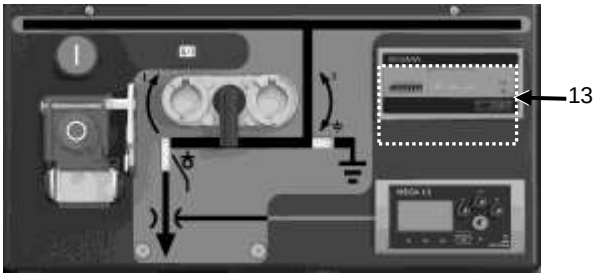


Figure 4-18: Overcurrent indicator

4.4.3 Trip indicator

The trip indicator (10), see Figure 4-19, indicates whether the switch has been switched off by the protection relay. Resetting can be done by hand via the reset button on the front.

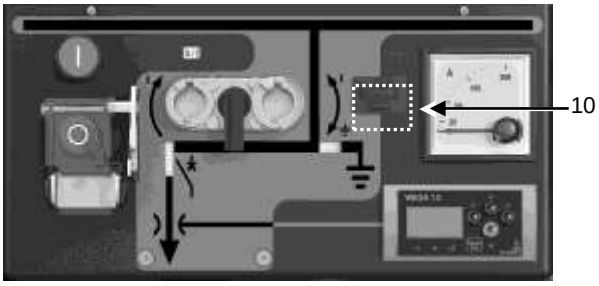


Figure 4-19: Trip indicator

4.5 Short-form instructions

In these short-form instructions the following procedures are described:

- From closed service position to closed and locked earthed position.
- From closed and locked earthed position to closed service position.

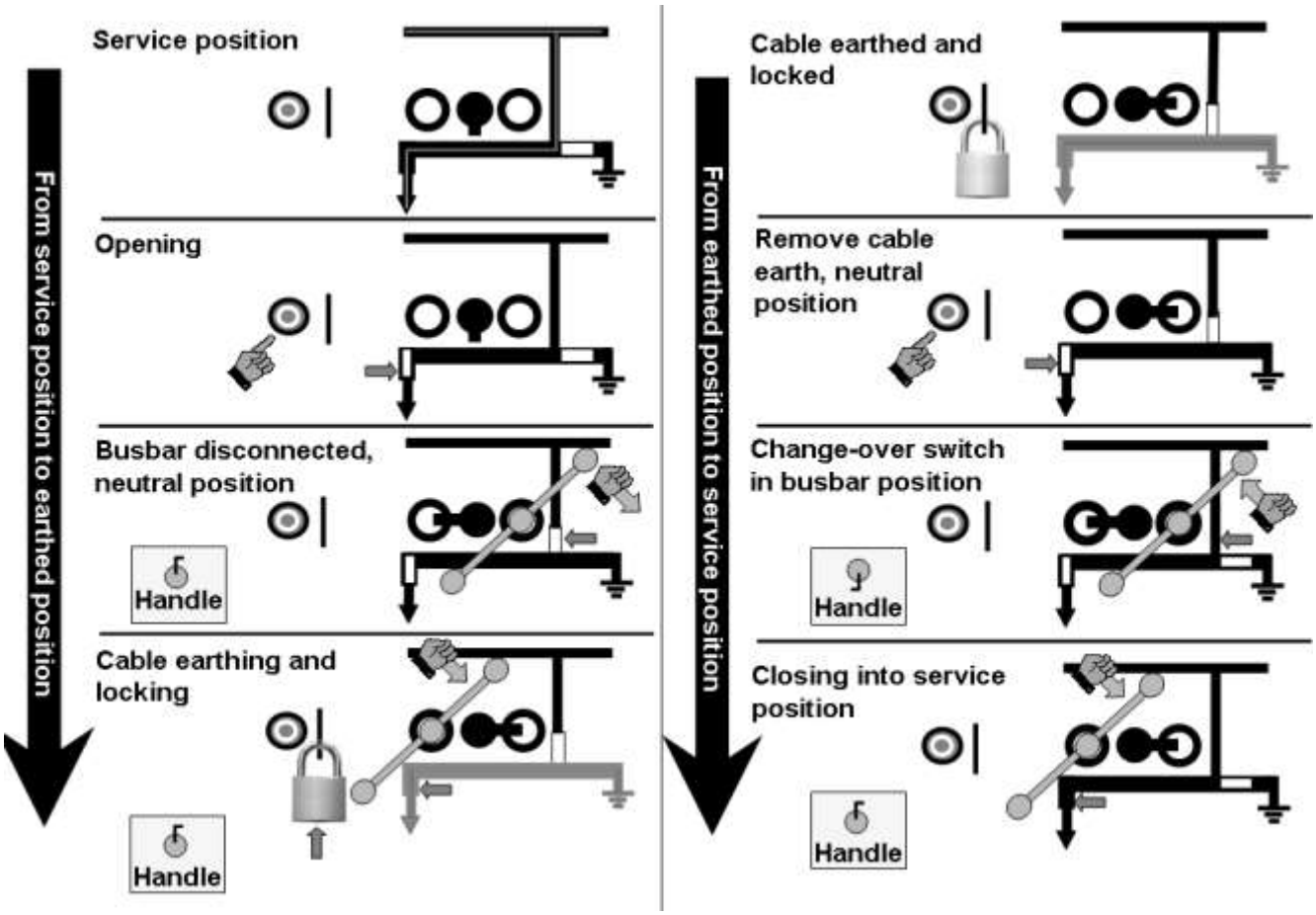


Figure 4-20: Short-form instructions

5. REMOTE SIGNALLING AND REMOTE CONTROL

TIP
For correct connection and operating voltages see the circuit diagrams delivered with the unit.

Remote signalling and electric remote control are available as options for Xiria switchgear units.

NOTE
Remote control is suitable for a maximum switching frequency of once a minute.

5.1 Connection

The unit concerned is fitted in the secondary space behind the front plate or in the top-unit with a cable duct (2) and secondary terminal strip (1).
The wiring to be connected to the terminal strip can be brought in through the side wall either from the left or the right-hand side or via the flexible plate (3) in the top plate of the top-unit.

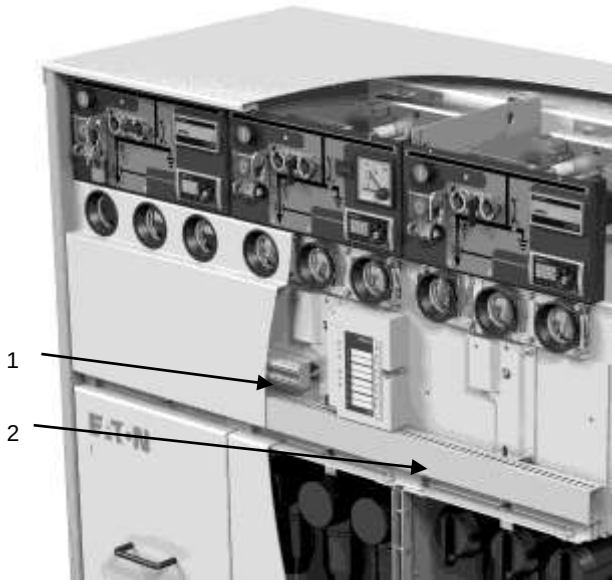


Figure 5-1: Secondary space with cable duct and terminal strips

5.2 Remote signalling (option)

The positions of the:
- load-break switch or circuit-breaker;
- change-over switch;
- (optional) trip indicator;
- (optional) overcurrent indicator;

are connected to the terminal strip using auxiliary contacts.

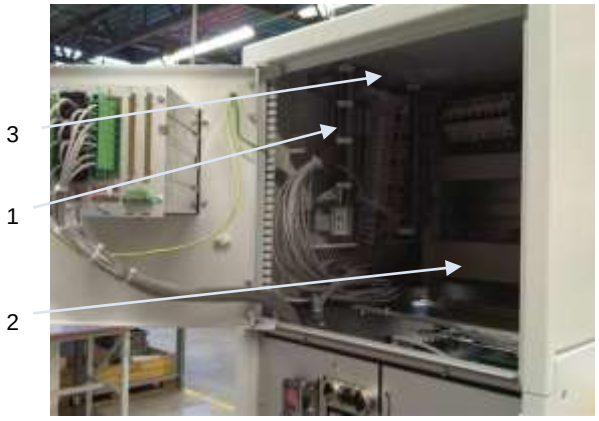


Figure 5-2

5.3 Remote control

5.3.1 24 V DC Remote tripping (option)

The panels concerned are provided with:
- auxiliary contacts as described under remote signalling;
- a controller;
- a trip coil.

If the supply voltage < > 24 V DC, then an optional universal voltage converter is mounted.

For on-site commissioning:
1. Check that the power supply is live.
2. Use the position indicator (9) to check whether the change-over switch is fully in the busbar position or in the earthed position.
3. Use the position indicator (4) to check whether the load-break switch or circuit-breaker is closed.
4. The control knob for the selector (7) should be in the central position.
5. Tripping will follow once the closing contact on the relevant terminals of the terminal strip is closed.

5.3.2 24 V DC Remote closing (option)

The panels concerned are provided with:

- auxiliary contacts as described under remote signalling;
- a controller;
- a trip coil;
- a closing motor;
- a closing pushbutton on the frontside of the panel.

If the supply voltage < > 24 V DC, then an optional universal voltage converter is mounted.

For on-site commissioning:

1. Check that the power supply is live.
2. Use the position indicator (9) to check that the change-over switch is fully in the busbar position.
3. The control knob for the selector (7) should be in the central position.
4. Closing will follow once the load-break switch or circuit-breaker is opened and the closing contact on the relevant terminals of the terminal strip is closed. The closing procedure starts with the spring being tensioned, the actual closing takes place after approx. 12 seconds.

5.4 24 V DC Tripping for external protection

(option only for circuit-breaker)
The panels concerned are provided with a trip coil only for 24 V DC. An optional universal voltage converter is not possible in this design.

For on-site commissioning:

1. Check that the supply voltage is live.
2. Use the position indicator (9) to check whether the change-over switch is fully in the busbar position.
3. Tripping will follow once the circuit-breaker is closed and the tripping contact on the relevant terminals of the terminal strip is closed.

5.5 Local closing

The panels concerned can also be switched on locally using the local electrical closing pushbutton. This is subject to the same conditions as the remote closing cycle.
Press the electrical closing pushbutton in order to close (1).

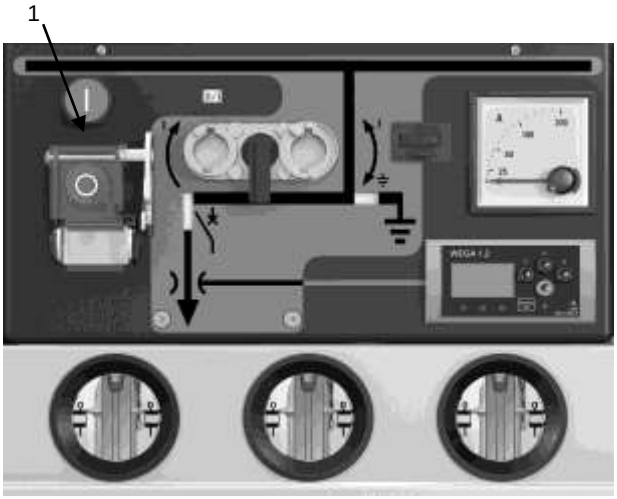


Figure 5-3: Control elements

6. INSPECTION AND MAINTENANCE

6.1 Introduction

The XIRIA unit is theoretically a maintenance-free system. No specific components need to be maintained. All primary, live components are maintenance-free and are housed in a sealed gas-tight enclosure. All other components have also been designed to be maintenance free.

The following components can be inspected:

- correct fixing of cable and earth connections;
- enclosure for damage and contamination;
- protection relay;
- switching functions;
- voltage detection;
- the overcurrent indicator.

6.2 Inspections

6.2.1 Inspecting cable connections

Inspect the cable connection in accordance with the following procedure:

1. Open the cable connection compartment in accordance with the procedure described in section 4.2.3.
2. Clean the compartment with a dry cloth.
3. Check the cable plug connection according to the plug supplier's instructions. Ensure that the cable does not impart any mechanical strain on the plug. The cable forces are to be absorbed by the cable support, see 'Strain relief' in section 3.3.2.
4. Check the cable support. The cables must be secure in the cable clamp blocks. Check that the bolts are still tightened to a torque of 20 Nm, see Cable assembly instructions in section 3.3.2.
5. Check the earth connections:
   - between cables and earth strip;
   - between earth strip and enclosure;
   - between earth strip and system earth;
6. Close the cable connection compartment.

6.2.2 Inspecting switching functions

Inspect the switching functions in accordance with the following procedure:

1. Check with the person responsible for the unit whether the relevant unit is disconnected and ready for inspection.
2. Verify, in consultation with the person responsible for operations, that the relevant panel is disconnected so that the inspection can be carried out safely. Satisfy yourself at the same time that the cable connected is and will remain dead.
3. Place the switch in the OFF position and the change-over switch in the earthed position, see section 4.2.
4. Complete all switching operations described in section 4.5 Short-form instructions. Always carefully check that the operation produces the desired result. Check the position indicators on the control panel and the actual position of the change-over switch and the vacuum interrupter through the viewing windows. See section 4.2.2.
5. If an operation has not produced the required result according to the position indicators or when the actual position of the change-over switch is checked, shut down the unit and inform Eaton-ESS.

6.2.3 Inspection of the moisture absorbing agent

Check the operation of the moisture absorbing agent in the unit with a colour indicator. This is located behind the centre viewing window of the right-hand panel (see Figure 6-1).
The indicator should be pale blue in colour.

Under normal operating conditions the moisture level inside the Xiria unit is <15% due to the Silica Gel bag placed inside before the enclosure is sealed.
When the moisture indicator turns to pink instead of blue the moisture level inside the switchgear unit is more than 40%.
The type testing of the Xiria unit has been carried out with the enclosure flaps open under normal atmospheric humidity conditions of > 50-60%.
When a too high level of humidity is detected by a pink coloured indicator (e.g. at annual inspection), then the unit can still be safely switched but arrangements should be made for the unit to be taken out of service.
A first visual inspection can be made to check for damages to the outside of the enclosure, but where there is no visible damage detected, Eaton can assist in a further investigation into the loss of integrety of the enclosure and possible rectification.

6.2.4 Testing voltage detection

Refer to Appendix 2 of this manual for inspection and maintenance of the voltage detection system.

6.2.5 Inspecting the protection relay

Refer to the manual provided by the relay manufacturer for inspection and maintenance of the protection relay.

6.2.6 Inspecting the overcurrent indicator

Refer to Appendix 4 of this manual for inspection and maintenance of the overcurrent indicator system.

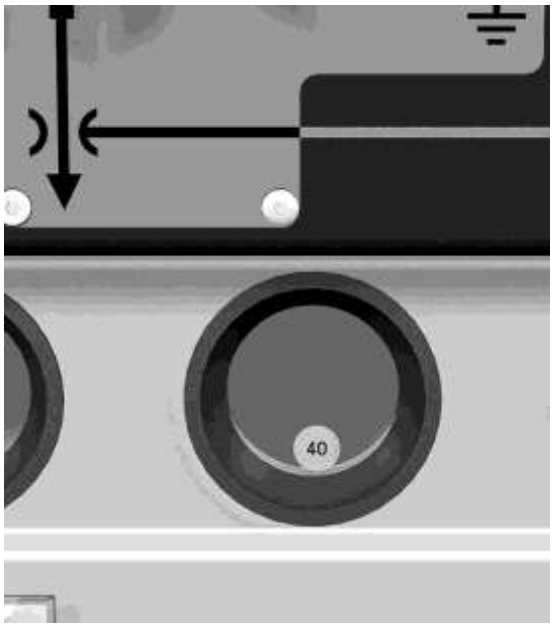


Figure 6-1: Moisture indicator

6.3 Decommissioning the unit

6.3.1 Material processing after dismantling

Eaton pays a great deal of attention to the environmentally-friendly design aspects of its units and installations. Eaton designs and manufactures in accordance with the ISO 14001 environmental standard. As far as we are currently aware, Xiria designs do not include any raw materials or other materials that pose a threat to the environment. It is reasonable, therefore, not to expect any problems when Xiria products are processed as waste products at the end of their service life. The materials used in Xiria units are suitable for re-use. At the end of the service life of a unit, specialised companies will be able to dismantle a unit which has been disposed of. All materials used are suitable for recycling.
An 'Environmental declaration', stating which materials and material quantities are used in Xiria installations, is available upon request.

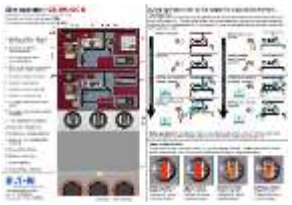
Check out local regulations prior to dismantling your old installation.

TIP
Eaton can deal with dismantling the unit, as well disposing of and processing materials.

7. ACCESSORIES AND OPTIONS

7.1 Supplied accessories

Accessories

668251	Operating handle 135 mm for ON-OFF switching of the circuit-breaker and the load break switch and for busbar-earth position selection of the change-over switch.	
668270	Operating handle 510 mm needed for operation of a Xiria unit inside a compact transformer station with limited access in the front area.	
688644	Document holder on the side to store documents and the short operating handle.	
	Quick reference card, showing the basic operations for ON-OFF switching, earthing and testing. Available in multiple languages.	
	Operating and maintenance manual, available in multiple languages.	

Options

665417	Scissor type interlock, used in combination with a padlock inserted in the access hole for the vacuum Interrupter. It prevents switching ON and it prevents the operation of the change-over switch.	
107926	Padlock, used in combination with the scissor type interlock and for padlocking the earth interlock on the front.	
107079	Warning sign, used when a panel is switched ON in earthed position and any further manual operation is not allowed.	
	Rear cover, used when the switch room has no rear internal arc exhaust channel.	
E6055889	Adapter WIC1-PC3. Used to connect the WIC1-1PE protection relay to a computer (laptop) via a USB connection for setting the protection parameters or retrieving the data stored in the relay memory. Including connection cables and software.	
E6055901	Tester type WIC1-TU. Used for on site diagnostic test of the WIC1 protection relay.	
E6046006	Phase sequence indicator type Orion 3.0. Used for voltage test, phase sequence test and interface test of the voltage detecting unit type WEGA. The WEGA units are used on Xiria switchgear since December 2009.	
E6046005	Phase sequence indicator type Orion Compare. Simplified version of the Orion 3.0. Used for voltage test and phase sequence test of the voltage detecting unit type WEGA. These voltage indication units are used on Xiria switchgear since December 2009.	
E6046007	Functional tester for WEGA voltage detecting units. The WEGA units are used on Xiria switchgear since December 2009.	

Options

E6042323	Short circuit indicator type SIGMA. It detects short-circuit currents in medium-voltage distribution networks. It consists of a display unit accommodated in a plug-in housing for panel mounting and three current transformers for short circuit sensing.	
668002	Short circuit indicator type ALPHA-M. It detects short-circuit currents in medium-voltage distribution networks. It consists of a display unit accommodated in a plug-in housing for panel mounting and three current transformers for short circuit sensing. The ALPHA-M unit is provided with a small mechanical generator on the front to reset and test the short circuit indication.	
665868 665997 665867	Cable fixing clamps for primary cables. 36-52 mm single phase cables. 26-38 mm single phase cables. 75-100 mm three phase cables.	
E6015230 E6015231 E6015232 E6015233	Voltage detector with LCD screen make Horstmann type WEGA 1.2 3-4.15 kV 6-7.2 kV 10-15 kV 17.5-24 kV	
	Voltage detector with LCD screen make Horstmann type WEGA 2.2. Equal to the 1.2 version, however including aux.voltage connection and signalling contacts.	
6038501	Mounting plate for mounting a WEGA detector in existing front panel with legacy LED indication.	
	Ammeter make ELEQ with current transformer in phase L2 in cable compartment (on circuit-breaker only).	
E665245 E665246	Trip indicator (for circuit-breaker only). SZ4H without aux. contact. SZ5H with aux. contact.	
E665258	Protection relay make Woodward SEG type WIC1-1PE Setting via adapter for computer connection.	

Options

E569882	Protection relay make Woodward SEG type WIC1-2PE Setting via DIP switches on the front.

E569884	Protection relay make Woodward SEG type WIC1-3PE Setting via HEX switches on the front.

E6056904	Protection relay make Woodward SEG type WIB1-2PE Setting via DIP switches on the front.

E6031210	Protection device type TLF (Time Limit Fuse protection) Setting via LV fuses on the front. Fuses are make GE Power Controls type XF.

Current transformers for protection with WIC1 and WIB1 protection relays

E6056903	WE1H1	8-32 A	Around primary cable	WIC1/WIB1

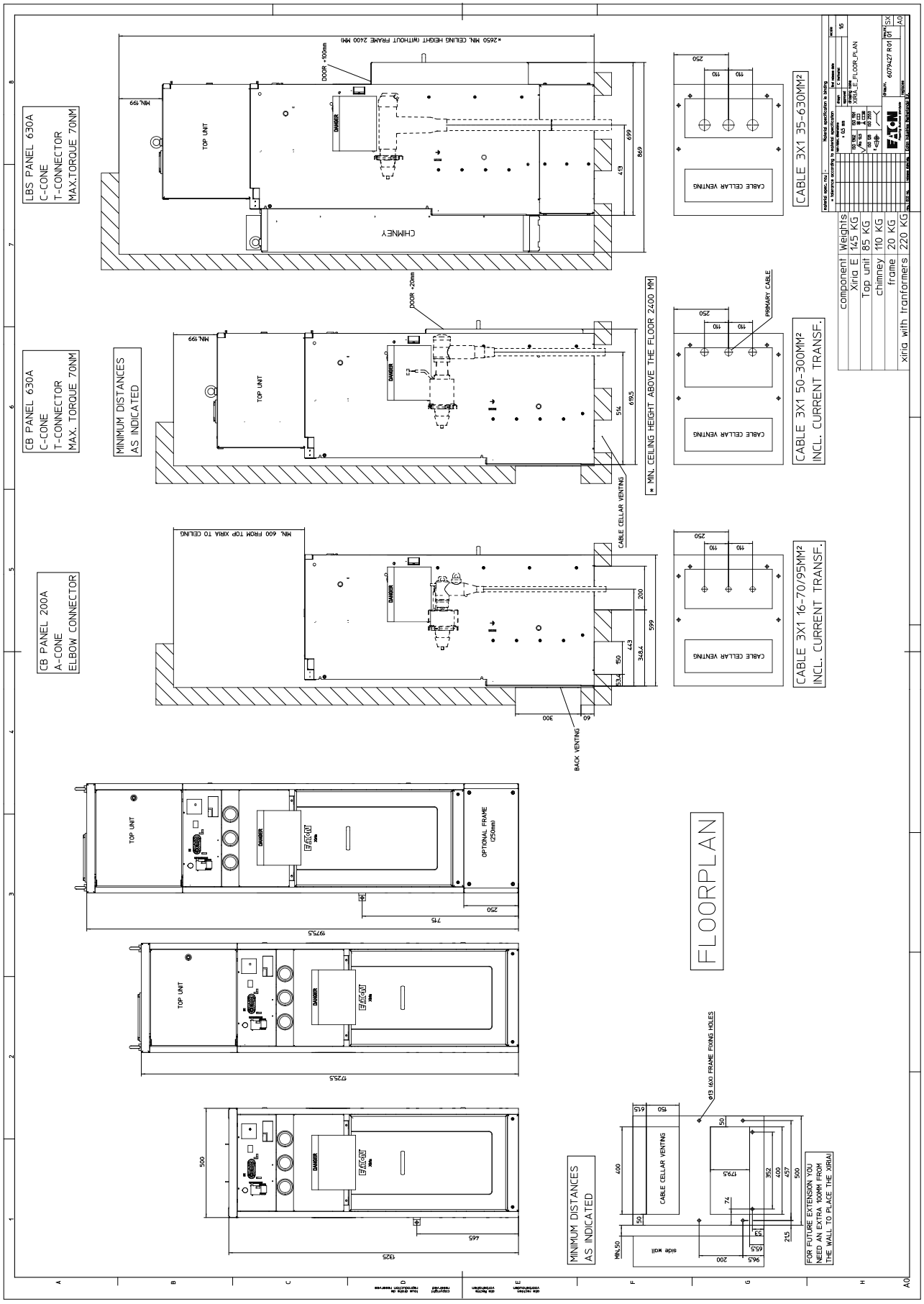
E665267	WE2H1	16-56 A	Cone A	WIC1/WIB1
E665251	W3H1	32-112 A	Cone A	WIC1/WIB1
E665252	W4H1	64-224 A	Cone A	WIC1/WIB1
E665253	W5H1	128-448 A	Cone A	WIC1/WIB1
E6014721	WE2H3	16-56 A	Cone C	WIC1/WIB1
E6014719	W3H3	32-112 A	Cone C	WIC1/WIB1
E6014720	W4H3	64-224 A	Cone C	WIC1/WIB1
E6015274	W5H3	128-448 A	Cone C	WIC1/WIB1

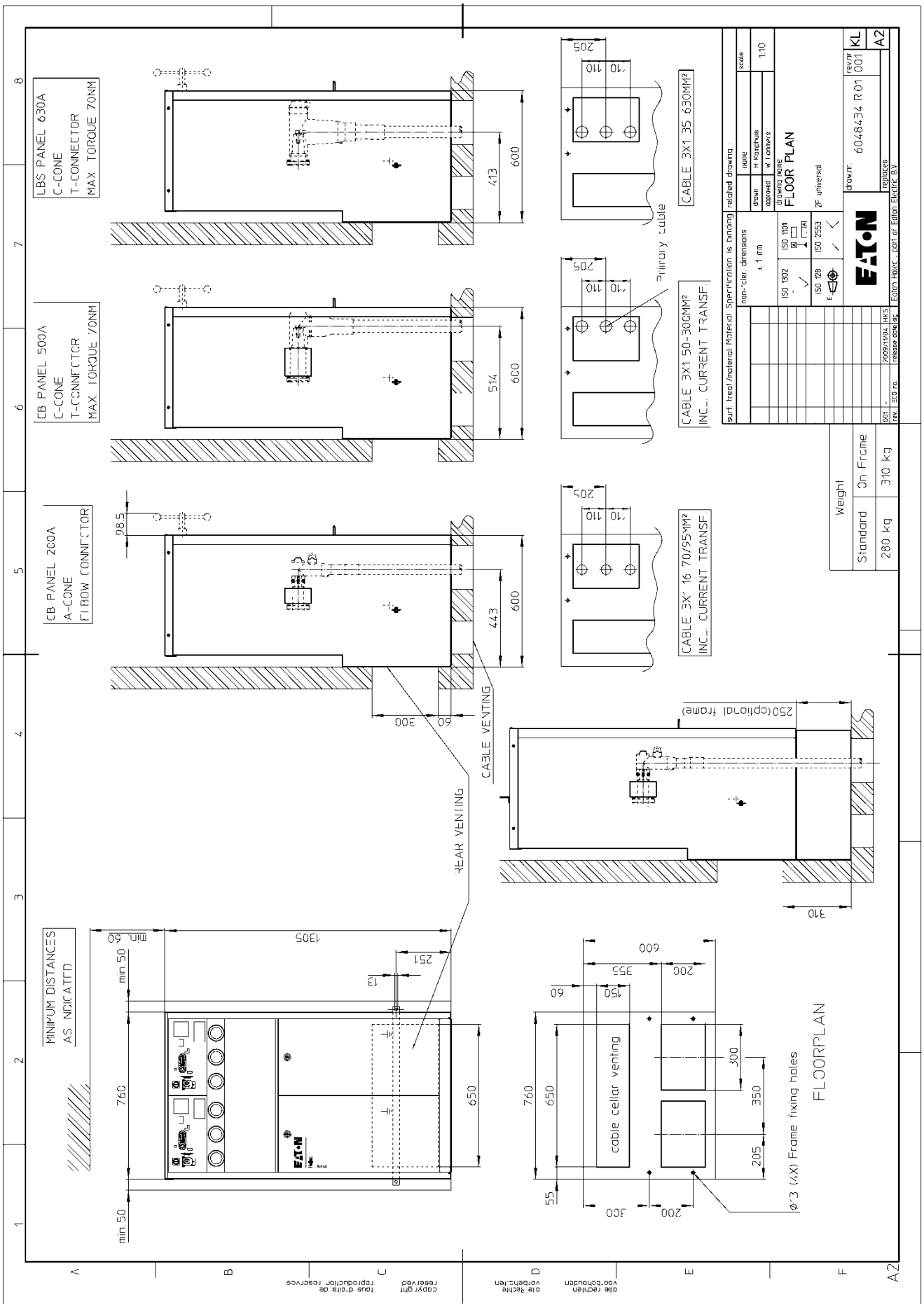
Legacy options (still available)

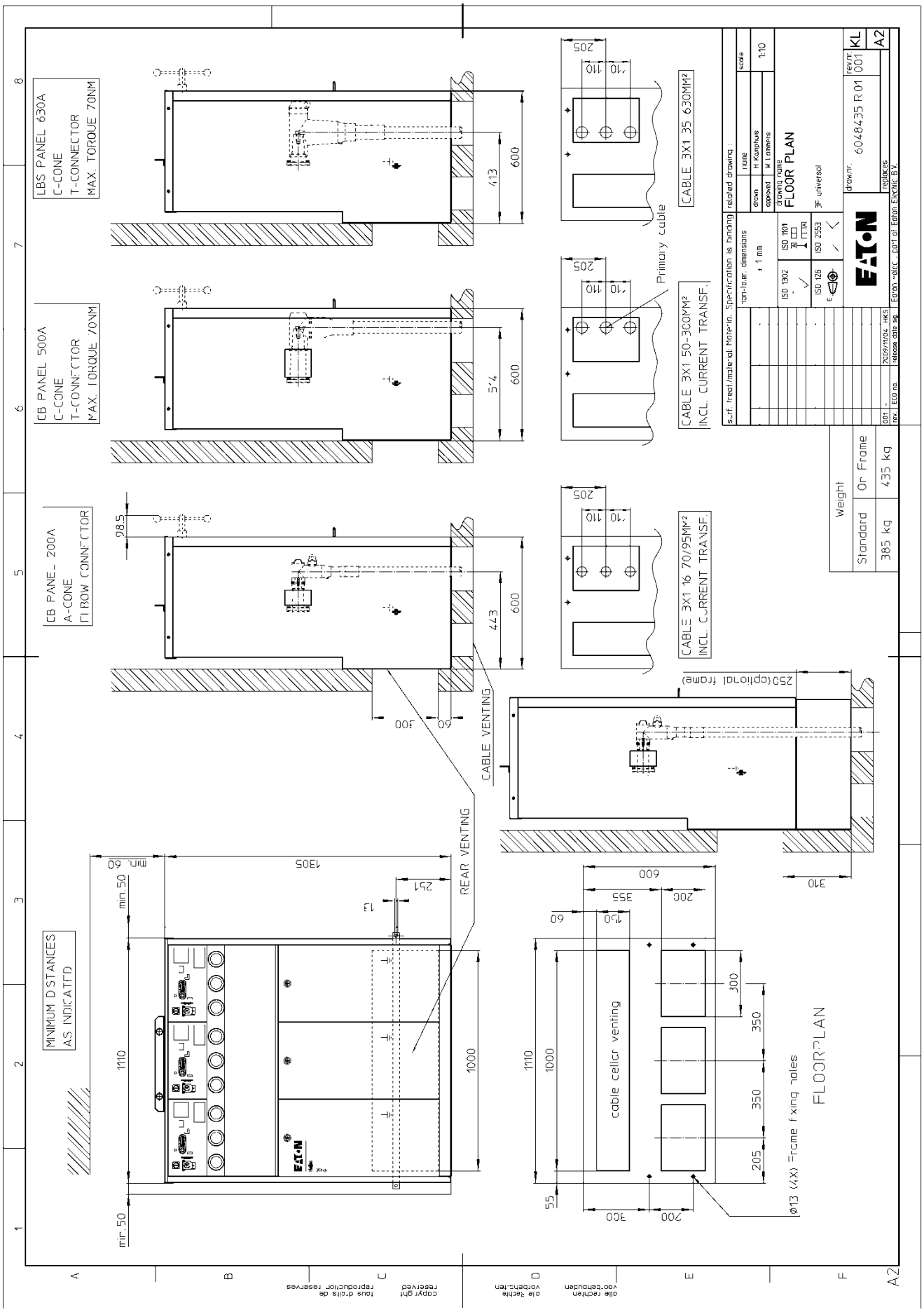
612441	Piezo tester type CL. Used for legacy voltage detection units with LED type voltage detection type JB. Production of these voltage detectors has been stopped end 2009.

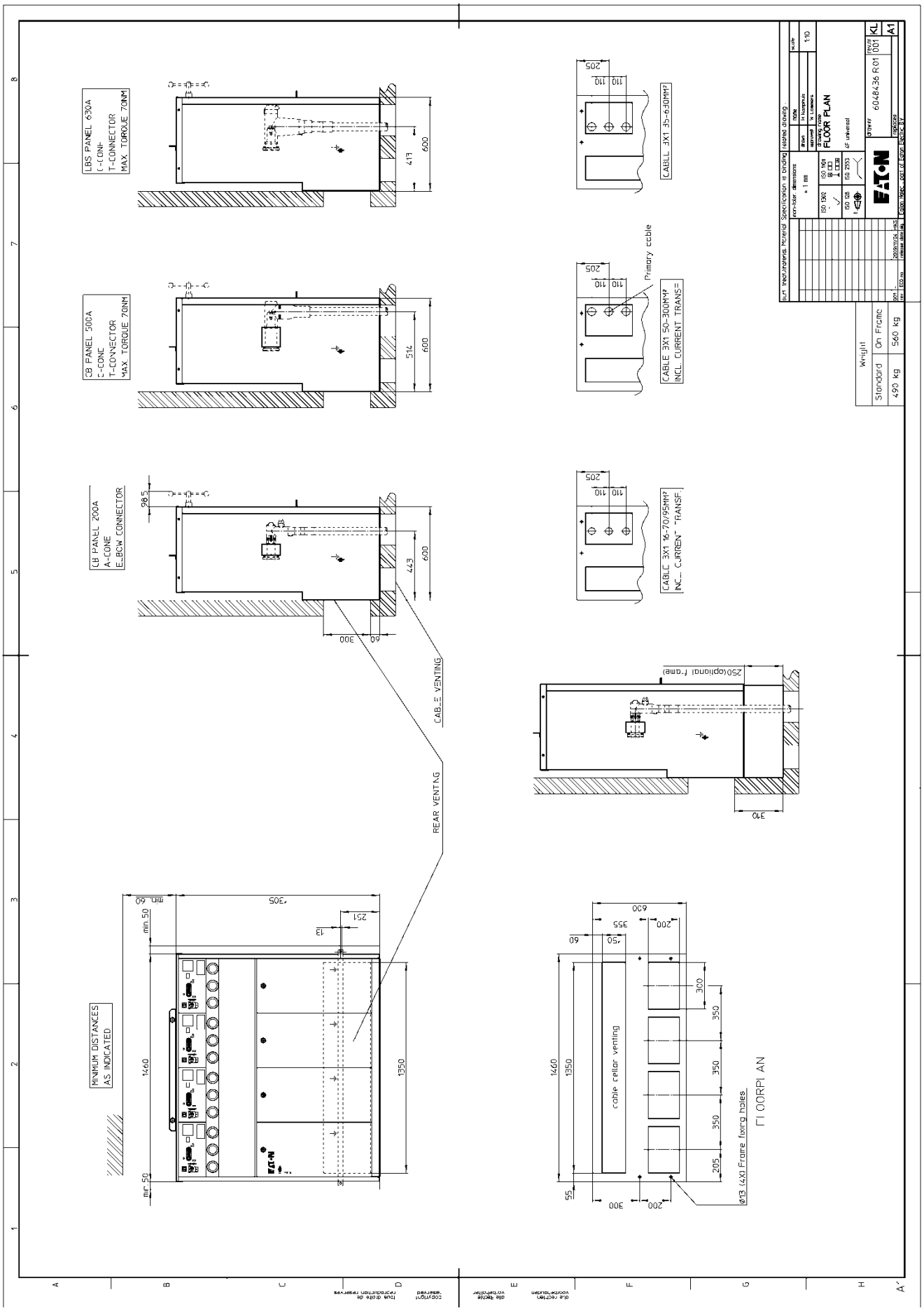
E569987	Phase sequence indicator type SPC6000 Used for legacy voltage detection units with LED type voltage detection type JB. Production of these voltage detectors has been stopped end 2009.

APPENDIX 1 – FLOOR PLANS




LBS PANEL 630A
C-CONE
T-CONNECTOR
MAX. TORQUE 70NM
CB PANEL 500A
C-CONE
T-CONNECTOR
MAX. TORQUE 70NM
CB PANEL 200A
A-CONE
ELBOW CONNECTOR
CABLE 3X1 35 630MM²
CABLE 3X1 50-300MM²
INCL. CURRENT TRANSF.
CABLE 3X 16 70/95MM²
INCL. CURRENT TRANSF.
Primary cable
CABLE VENTING
REAR VENTING
250(optional frame)
MINIMUM DISTANCES
AS INDICATED
cable cellar venting
Ø13 (4X) Frame fixing holes
FLOORPLAN
FLOOR PLAN
Weight
Standard
On Frame
280 kg
310 kg
EATON
drawn nr. 6048434 R01 001
rev.nr
KL
A2
scale 1:10
2F universal
Eaton Holec part of Eaton Electric BV


LBS PANEL 630A
C-CONE
T-CONNECTOR
MAX. TORQUE 70NM
CB PANEL 500A
C-CONE
T-CONNECTOR
MAX. TORQUE 70NM
CB PANEL 200A
A-CONE
ELBOW CONNECTOR
CABLE 3X1 35 630MM²
CABLE 3X1 50-300MM²
INCL. CURRENT TRANSF.
CABLE 3X1 16 70/95MM²
INCL. CURRENT TRANSF.
Primary cable
CABLE VENTING
REAR VENTING
MINIMUM DISTANCES
AS INDICATED
cable cellar venting
Ø13 (4X) Frame fixing holes
FLOORPLAN
250(optional frame)
Weight
Standard 385 kg
Or Frame 435 kg
FLOOR PLAN
drawing nr. 6048435 R01
rev.nr 001
KL
A2
scale 1:10
EATON


LBS PANEL 630A
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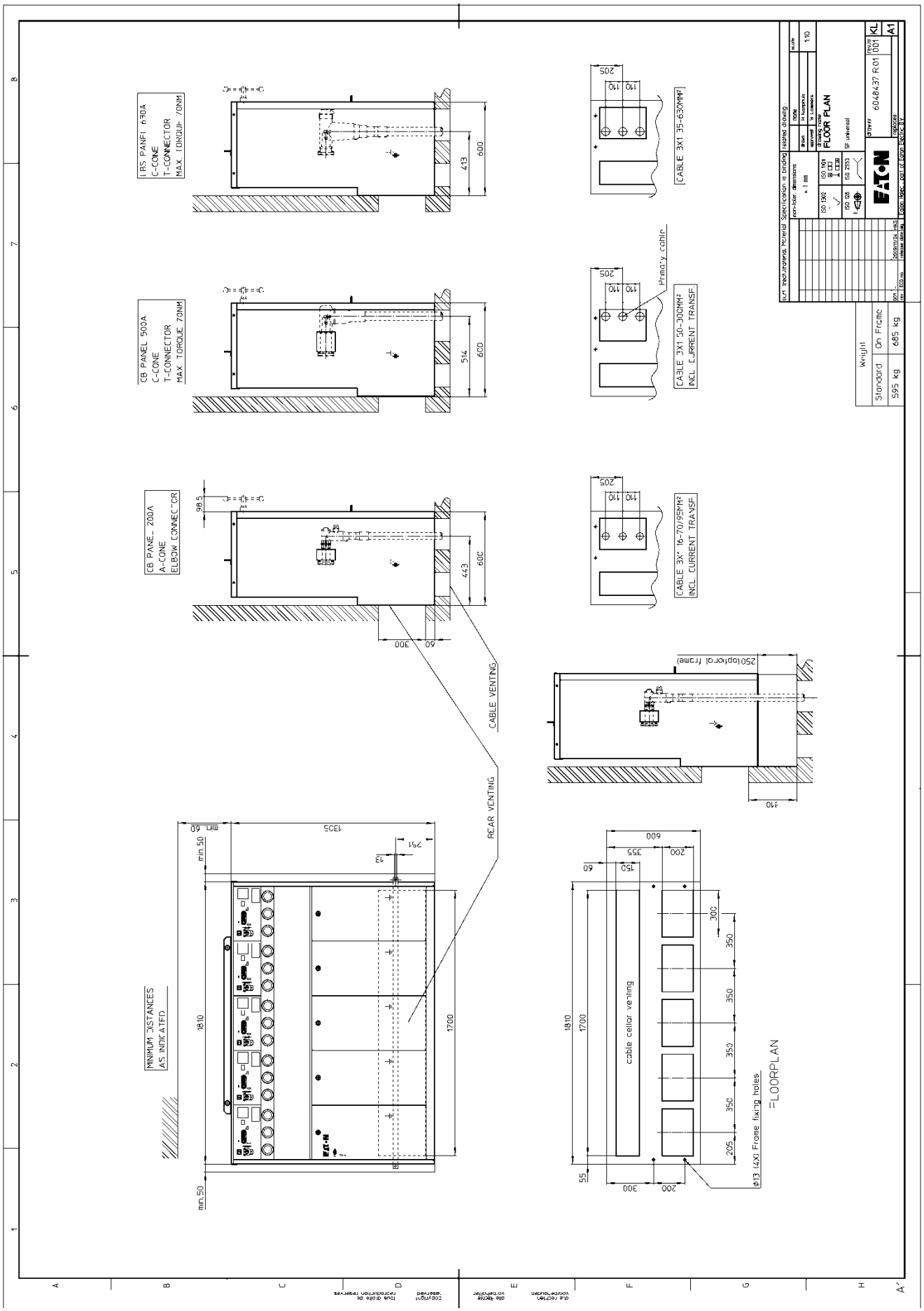
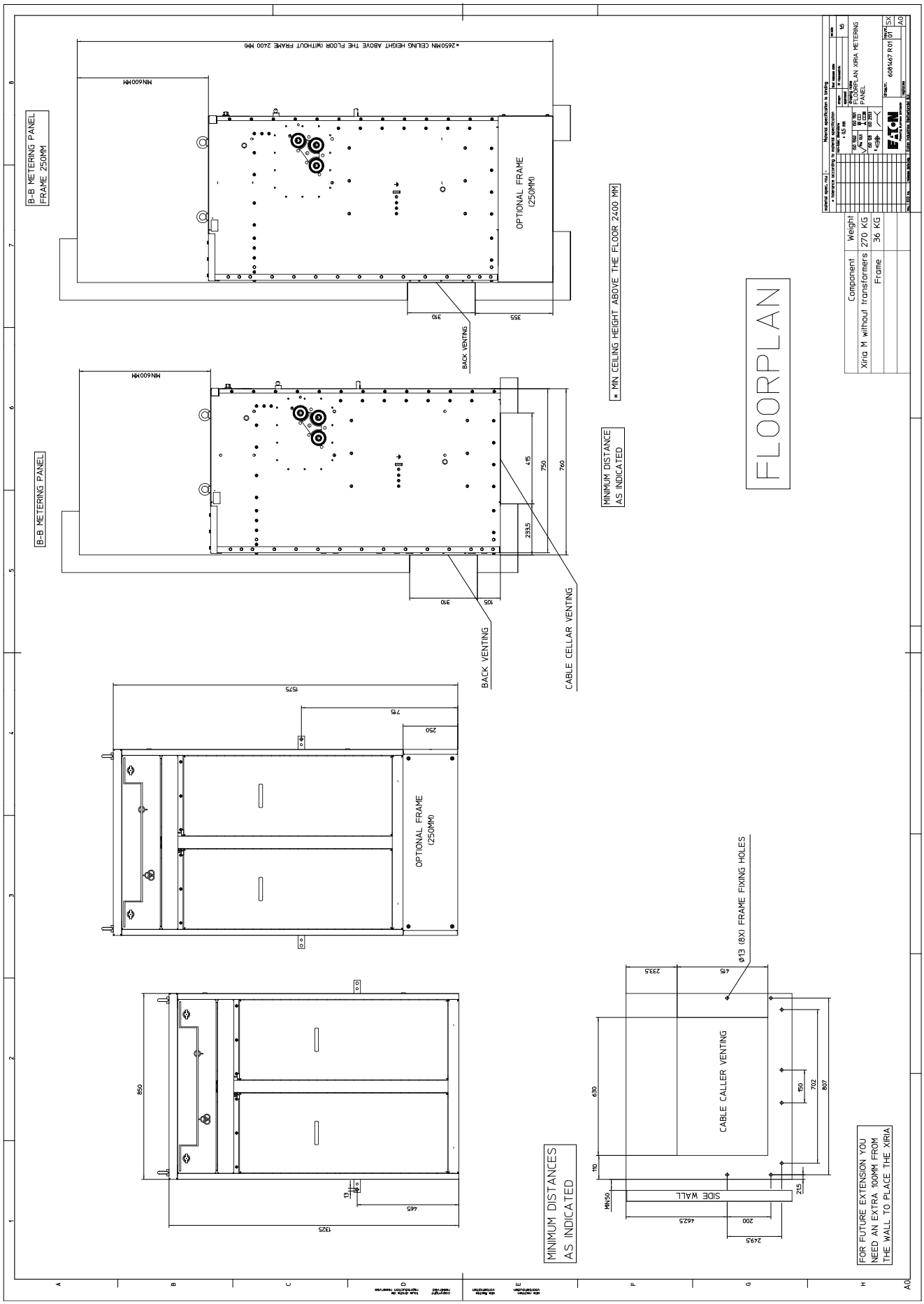
T-CONNECTOR
MAX. TORQUE 70NM
CB PANEL 500A
C-CONE
T-CONNECTOR
MAX. TORQUE 70NM
CB PANEL 200A
A-CONE
E-BOW CONNECTOR
CABLE 3X1 35-630MM²
CABLE 3X1 50-300MM²
INCL. CURRENT TRANSF.
Primary cable
CABLE 3X1 16-70/95MM²
INCL. CURRENT TRANSF.
CABLE VENTING
REAR VENTING
MINIMUM DISTANCES
AS INDICATED
cable cellar venting
Ø13 (4X) Frame fixing holes
FLOOR PLAN
Knight
Standard
On Frame
490 kg
560 kg
6048436.R01
001


LBS PANEL 630A
C-CONE
T-CONNECTOR
MAX TORQUE 70NM
CB PANEL 500A
C-CONE
T-CONNECTOR
MAX TORQUE 70NM
CB PANEL 200A
A-CONE
ELBOW CONNECTOR
CABLE 3X1 35-630MM²
CABLE 3X1 50-300MM²
INCL CURRENT TRANSF
CABLE 3X* 16-70/95MM²
INCL CURRENT TRANSF
Primary cable
CABLE VENTING
REAR VENTING
MINIMUM DISTANCES
AS INDICATED
250 (optional frame)
cable cellar venting
FLOORPLAN
Ø13 (4X) Frame fixing holes
FLOOR PLAN
Knight
Standard
On Frame
595 kg
685 kg
6048437 R01


FLOORPLAN
B-B METERING PANEL
FRAME 250MM
B-B METERING PANEL
OPTIONAL FRAME
(250MM)
BACK VENTING
CABLE CELLAR VENTING
* MIN CEILING HEIGHT ABOVE THE FLOOR 2400 MM
MINIMUM DISTANCE
AS INDICATED
MIN600MM
OPTIONAL FRAME
(250MM)
CABLE CALLER VENTING
SIDE WALL
Ø13 (8X) FRAME FIXING HOLES
MINIMUM DISTANCES
AS INDICATED
FOR FUTURE EXTENSION YOU
NEED AN EXTRA 100MM FROM
THE WALL TO PLACE THE XIRIA
Component
Weight
Xiria M without transformers
270 KG
Frame
36 KG

Instructions for Use

Integrated voltage detecting system Typ WEGA 1.2

Dipl.-Ing. H. Horstmann GmbH
Humboldtstraße 2
42579 Heiligenhaus
www.horstmanngmbh.com

1. General

The integrated voltage detecting system WEGA 1.2 is in compliance with the requirements for voltage detecting systems of the valid VDE 0682 part 415 (IEC 61243-5), which are capacitively connected to single pole with live parts.
The WEGA 1.2 is designed for fitting into switch-gears. It serves for determination and indication of the operating status of medium voltage systems according to VDE 0105 part 1 and 100 and includes a LRM interface for all three phases.
The display can be verified by using the integrated display test function in installed state or if the voltage is not present.

2. Specification for application

WEGA 1.2 may only be used for determination of operating status and for taking a phase comparison of high voltage systems in accordance with VDE 0105 part 1 and 100.
Special care should be taken in observing the following:

- Integrated voltage detecting systems WEGA 1.2 may only be implemented by an electrician or by electrically trained persons.
- Integrated voltage detecting systems WEGA 1.2 may only be used in accordance with the permitted rated voltage (rated voltage of the medium voltage system) and rated frequency. Adaptation to the prevailing operating voltage can be made with capacitors by manufacturer.
- The equipment has to be handled exactly as specified in the operating instruction (5).
- The positive display "Voltage present" according to VDE 0682 part 415 is granted, if WEGA 1.2 is operated according to its rated voltage and rated frequency and the adaption with capacitors was done accordingly.
- Indication appears in three-phase networks in the range from 45% to 120% of the rated voltage, but not less than 10% of the rated voltage.
- Integrated voltage detecting systems WEGA 1.2 may only be used indoor.
- It has to be ensured that voltage is not present (all-pole) before entering a medium voltage area.
- At unfavourable lighting conditions it may be useful to shadow the LCD-display or to illuminate it additional.
- Integrated voltage detecting systems WEGA 1.2 is designed for continuous operation.
- Phase comparison is possible by using a phase comparator in accordance to VDE 0682 part 415 (LRM Systems) which has to be plugged into the earth point and one of the three test points.

3. Design

The integrated voltage detecting system WEGA 1.2 is located in a panel-mounted housing containing the PCB with the electronic circuits and the rated brake points for over voltage. The display is designed as an LCD in the front (symbols shown in red). Arranged on the front panel are also an earth point and three test points for connecting a phase comparator for LRM-interfaces. On the back the rectangular connectors for the four unshielded cables are located.

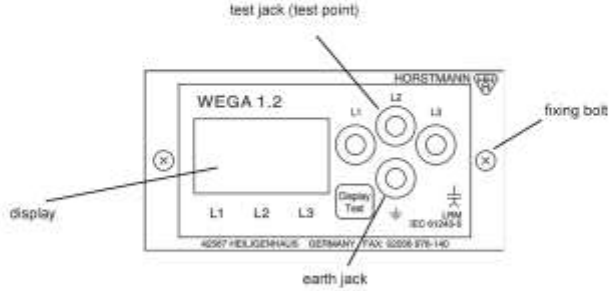


Figure 1: Integrated voltage detecting system WEGA 1.2 (front)

4. Technical data

4.1 Electrical details:

Rated voltage	: 3kV...36kV (rated voltage of the switch gear)
Rated frequency	: 50Hz
Operating temperature	: -25°C...+55°C (according to the operating temperature of switchgear)
Power supply	: generated by the voltage to be tested
Interface	: LRM-System for every phase
Indication:	
Arrow	: Means „Voltage present". The display appears in the range of 0.1...0,45*UN.
Dot	: Means that the current flowing through the detecting system fulfills the requirements for integrated voltage detecting systems (VDS) of VDE 0682 part 415. This constant monitoring makes a maintenance test not necessary.
No indication	: All the symbols are turned off in the switchgear condition with all-poles switched off/ disconnected.

4.2 Mechanical details:

Dimensions	: 96mm x 48mm x 26 mm, panel-mounted housing for panel cut-out A 96 x 48 according to DIN 43700
Panel opening	: $92^{+0.8}$ x $45^{+0.6}$ mm
Protection class	: IP 54
Housing	: polycarbonate
Weight	: 130 g
Earth-/test point	: LRM-System - distance of sockets 14 mm, diameter of pole 4 mm

4.3 Matching capacitors:

For an adaption to couple capacity, cables and rated voltages it is possible to insert matching capacitors by the manufacturer.

4.4 Connection diagram

In figure 2 the back view is shown.

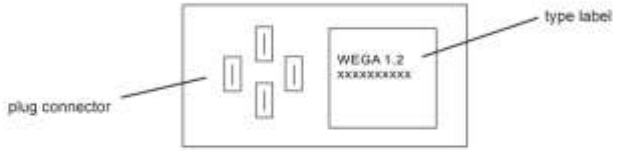


Figure 2: Connection diagram and contact configuration

5. Operating instructions

Functional control:
The function test can be done in installed and active state (arrow or arrow and dot are displayed) or in the non-installed condition as well.

Testing in the active state:
This is carried out by short-circuiting the earth and one of the three test points on the front. The display of the corresponding phase must disappear.

Testing in the inactive state:
There are two different test methods available:

1. By pushing the key "Display Test" all symbols of the display will be activated for a short time to verify the function. This key can be pushed also in an active state (i.e. at least at one phase the voltage is present). All symbols will be activated in that case.

2. Using the functional tester for WEGA:
   - Connect both lines of the function tester with one of the three test points of WEGA 1.2 and the earth terminal.
   - Switch on the function tester.
   - On the display of the WEGA 1.2 the related symbols (arrow and dot) will appear.

Functional tester, Horstmann
Order-No: 52-0211-010

Voltage testing:
Integrated voltage detecting system WEGA 1.2 can be use for continuous operation. Voltage detection is permanently done. The condition "voltage present" is displayed by arrows and respectively arrows and dots. For detailed meaning of symbols during voltage testing see point 4 Technical Data.

Attention:
If the WEGA displays *voltage not present* on all three phases the device must be tested! During this test it must display in the way specified above, otherwise it may be damaged and mustn't be used any longer for voltage detection.

Phase comparison:
Phase comparison is possible by using an external phase comparator in accordance to VDE 0682 part 415, for example the ORION 3.0 (product Horstmann) which has to be plugged in the earth and test point (LRM system). These test points are accessible after removing the protective cap.
While using an external phase comparator the display of WEGA 1.2 may lapse. Display returns immediately after unplugging the external phase comparator. After finalisation of the phase comparison protective caps have to be closed again.

6. Storage, care and transport

Integrated voltage detecting systems WEGA 1.2 must be stored and transported under dry and dust-free conditions. Any damage must be avoided.
Damaged units, i. e. those, of which the functional capacity and reliability is no longer ensured, or whose lettering is illegible, mustn't be used.
The user must always check that the unit is in perfect operating conditions.

Attention:
In case of claims which result in disregarding the operation instructions the warranty will expire and we are not liable for consequential damages.

7. Maintenance

Please check to ensure that the integrated voltage detecting system WEGA 1.2 is in a clean and dry condition; otherwise the unit is maintenance-free. After using the test points the protective cap has to be closed again. Integrated voltage detecting systems WEGA 1.2 don't contain any batteries or other parts, changeable or replaceable by customer.

8. Maintenance test

Appearance of the dot means that the current flowing through the detecting system fulfills the requirements for integrated voltage detecting systems (VDS) of VDE 0682 part 415. This constant monitoring makes a maintenance test not necessary.

Order.-No: 51-1200-001

Equipment:

Functional tester WEGA	**Order- No: 52-0211-010**
Orion 3.0	**Order- No: 51-0206-006**
Measuring module NO-M (for measuring the current of the measuring socket)	**Order- No: 51-0207-010**

Integrated voltage detecting system
Type WEGA 2.2

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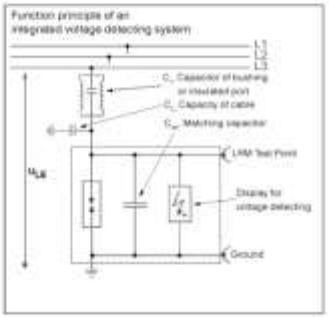

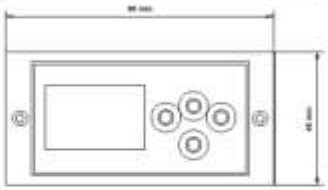

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1. General

The integrated voltage detecting system WEGA 2.2 is a three-phase indication device which is designed to display the operating voltage of medium-voltage switchgear installations. The device complies with the requirements of the IEC 61243-5 standard (VDE 0682 Part 415) for capacitive voltage detecting systems.

The following states of a medium voltage network are shown:

Voltage present:	Arrow indication per phase
Voltage present and maintenance test is passed:	Additional dot per phase
No voltage present:	No dot and arrow indication
Errors in the system / active zero voltage :	Indication of flashing wrench per phase

The voltage detecting systems can be adapted by the manufacturer to different switchgears by matching capacitors.

Additional functions:

- Relay signal when at least one of all three phases indicates „voltage present" (arrow).
- Relay signal when at least one of all three phases indicates „no voltage present" (no arrow).
- Active „voltage not present" indication by means of three flashing tool symbols on the display.
- Three-phase LRM interface for the connection of a phase comparator, e.g. the „Orion 3.0" type, made by Horstmann GmbH.
- Display test via button on the front panel.
- Permanently backlit symbols for improved identification of the voltage indication also in case of bad visibility conditions.
- Universal voltage supply (auxiliary voltage): 24 to 230V AC or DC

2. Design

Housing:

The integrated voltage detecting system WEGA 2.2 is located in a plug-in housing for panel mount (for dimensions see drawing) suitable for a panel cut-out size of 92 x 45 mm. The LCD display, the display test button and the three-phase LRM interface are located on the front panel. A removable plug serves to protect the jacks against dust and corrosion. On the rear of the housing there are the connections for the measuring signals, relays and auxiliary voltage.

Display:

The voltage conditions are indicated on the LC display. The individual symbols (arrow, dot and wrench) appear in red colour. Pushing the button on the front panel, a display test can be carried out activating all symbols on the display for a short time.

The indications of the arrow and dot symbols on the display do not require any auxiliary energy because it is fed from the measuring signal. Even if the auxiliary voltage supply fails, the indication functions will remain active. The additional functions (relay control, illumination of symbols and active zero indication) require auxiliary voltage supply.

Connections:

The following connections are located on rear side:

4-pole flat connector:

L1, L2, L3	-	Connections for the capacitive taps of the switchgear unit
Earth symbol	-	Connection of the earth socket to the frame and to the shield in case of coax cable

6-pole plug-in connector element:

U ≠ 0	-	NO or NC of the relay „Voltage Present"
U = 0	-	NO or NC of the relay „No Voltage Present"

2-pole plug-in connector element

Auxiliary voltage	-	24...230V (AC or DC)

3. Displays (LCD symbols)

Arrow: This indication means „voltage present" according to IEC 61243-5 (VDE 0682, Part 415).
It appears in the range of 0.10...0.45 * U_n.

Dot: This indication means that the current through the indication device at a value of $Un/\sqrt{3}$ corresponds to its respective setpoint. Due to this permanent monitoring of current it is not necessary to perform a maintenance test.

Flashing wrench:

The occurrence of the following errors lead to darkening of the arrow and dot symbols and the tool symbol appears on the respective phase indication:

- Earth fault
- Interruption of the connection cable
- Short-circuit of the connection line

If the overall system is in voltage-free condition (U < 0.10 * U_n), all of the three wrenches (active zero-voltage indication) start flashing.

4. Display Test

This test can be carried out with the switchgear unit in voltage-free condition. The arrow and dot symbols are not indicated. When the auxiliary voltage is switched on, the LCD display will be illuminated and the three tool symbols start flashing. By gently pushing the „Display Test" button all symbols of the LCD display will be illuminated for a short time.

5. Relay signals

Each of the two relays has a change-over contact with a common connection (C - Common), a normally closed contact (NC - normally closed) and a normally open contact (NO - normally open). The relays contacts are electrically isolated from the measuring voltage and auxiliary voltage. Depending on the value of the measuring signal the following relay functions will be tripped:

Voltage applied to phase:			Auxiliary voltage	Relay „Voltage Present"	Relay „No Voltage Present"
L1	L2	L3			
U > 0.45 * U_n	U > 0.45 * U_n	U > 0.45 * U_n	ON	ON	OFF
U > 0.45 * U_n	U > 0.45 * U_n	U < 0.10 * U_n	ON	ON	ON
U > 0.45 * U_n	U < 0.10 * U_n	U < 0.10 * U_n	ON	ON	ON
U < 0.10 * U_n	U < 0.10 * U_n	U < 0.10 * U_n	ON	OFF	ON
ANY	ANY	ANY	OFF	OFF	OFF

Characteristics of the switching contacts of the relay: 250 V AC, 5 A

6. Ordering information

When ordering the following values should be supplied:

- operating voltage U_n
- capacity of bushing or insulated post
- cable length
- connector (4.8 or 6.3 mm flat connector)

	Order No.
WEGA 2.2 with display illumination and display test button	51-2200-001

Phase Monitor / Voltage Tester / Interface Monitor

Type ORION 3.0

(according to VDE 0682, Section 415 and IEC 61243-5)

The phase monitor/voltage tester/interface monitor, Type ORION 3.0, is a microcontrolled display unit for capacitive test points with LRM interface according to the standards stated above. It is a combined display unit with which the following tests can be carried out:
– voltage of two phases
– phase position of these voltages relative to each other
– repeat tests on coupling parts (interface monitoring).
Mechanical and electrical adaptation to HR interfaces can be made with HR- LRM adapter attachment (2 pieces Order No. 52-0206-001).

Technical data:

Design:	LRM system
Response voltage LRM:	(4 to 5) V
Response voltage HR:	(70 to 90) V with adapter
Response value with repeat tests on coupling parts:	3.2 µA with rated voltage
Display phase balance:	For phase angle <15° according to VDE 0682, Section 415
Display phase unbalance:	For phase angle >60° according to VDE 0682, Section 415
Temperature range	- 25 °C to + 55 °C
Rated frequency:	50 Hz
Direct impedance:	2 MOhm
Degree of protection:	IP 40
Power supply:	2 BR 2/3A lithium batteries, each 1.2 Ah, 2 x 3 V
Battery service life:	6 years, at 8 to 10 operating cycles/day and 230 days/year
Battery check:	constantly effective in operating mode
Unit's self-testing:	activated every time unit is turned on
Sound level of audible indicator:	>57 dB
Total weight:	approx. 340 g
Dimensions:	157 x 84 x 30 mm
Length of measuring lines:	1.5 m each

Operating modes:

Off mode:
all 6 LEDs are off
Ready mode:
2 green LEDs on the voltage display light up (constant display), all the others are off. The duration of the ready mode is about 60 s.
Voltage display:
The voltage display's red LED allocated to the measuring line comes on (constant display), the allocated green LED is off.
Phase display:
Both measuring lines are plugged in, both voltage displays are red, the display „phase balance" (constant green display) or „phase unbalance" (flashing red display) must be shown. As long as none or only one voltage display is red e.g. only one measuring line is plugged in, no phase display will be shown.
Display during interface monitoring:

- The voltage display's red LED allocated to the measuring line comes on (constant display), the allocated green LED is off; Interface conditions fulfilled (I > 3.2 µA)
- The red flashes and at the same intervals an audible signal is emitted, the green LED is off: Interface conditions not fulfilled (2.5 µA < I < 3.2 µA)

Operating instructions:

1. Turning on the unit and checking its functions:
Unit in off mode, no measuring lines plugged in

- Depress the button until all 6 LEDs come on (max. 15 s)
- Release the button; the unit carries out its self-test – subsequent to correct conclusion of the test, the unit goes into ready mode

2. Voltage monitoring:
Unit in ready mode, one measuring line plugged in

- allocated green LED still displayed:
  No voltage at test point
- allocated red LED displayed:
  Voltage available at test point

3. Phase monitoring:

- Unit in ready mode, both measuring lines plugged in
  both or one test point display "no voltage" – no phase display
- both test points display "voltage available":
  phase display's green LED on – both phases balancd
  phase display's red LED flashing – both phases unbalanced

Please note: The phase display is switched normally with a phase difference between 15° and 60°.

4. Interface monitoring:
Monitoring is executed automatically (within 2 s) when a measuring line is plugged in. Unit in ready mode, one measuring line plugged in:

- allocated green LED still on:
  No voltage at test point, interface monitoring will not be carried out
- allocated red LED on (constant display):
  Voltage available at test point and interface conditions fulfilled – repeated test passed
- allocated red LED flashing and audible signal emitted:
  Voltage available at test point but interface conditions not fulfilled – repeated test failed

5. Extending the switched-on period in the ready mode:
The duration of the ready mode can be re-started by briefly depressing the button (approx. 0.5 s). The self-test will not be repeated.

6. Turning off the unit:

- automatically 60 s after leaving the ready mode or
- by prolonged depression of the button (approx. 2 s) after leaving the ready mode or
- 15 s after the button has been depressed when the unit is switched on or
- when the battery is dead

Please note: As soon as at least one voltage display is red, the unit will not be switched off automatically.

Ordering information:	Order No.
ORION incl. HR-LRM adapter and case	51-0206-006

Special adapters
LR-LRM adapter (for jack connectors)
Order No. 52-0206-002

ALSTOM (AEG)-IVIS adapter
Order No. 52-0206-003

WEFA adapter, 10kV
Order No. 52-0206-004

WEFA adapter, 20kV
Order No. 52-0206-005

Special adapter HR1-LRM (U_a<U_n)
Order No. 52-0206-006

Short-Circuit Indicator
SIGMA

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Germany
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Fax +49 2056 976-140
Internet: www.horstmanngmbh. com
e-mail: info@horstmanngmbh.com

- **Ultra bright LED with 180° viewing angle**
- **Detection of short-circuit currents with trip level ≥ 200 A**
- **Response value either as fixed factory setting or with self-adjusting feature**
- **Double-flashing upon second excitation**

The SIGMA type Short-Circuit Indicator serves to detect short-circuits in medium-voltage networks.
The short-circuit indicator consitsts of one display unit in a plug-in housing and three current transformers, which are connected by measurement connection with the device.
If the phase current exceeds either the preset trip current for the duration of the programmed response time or the previously flowing operating current by a defined factor (self-adjustment), the fault-affected phase will be indicated by a brightly flashing LED, consequently activating the remote indication contact. If a second tripping occurs within the reset time, for example when automatic re-closing is in process, a signal will be given by a double flashing LED. The device is arranged to be reset automatically in accordance with a pre-fixed time, by closing of an externally connected relay contact, or manually via push-button. Moreover, a function test can be carried out either by means of this button or by an external relay contact.
The current transformer type is provided with factory setting. The trip current, the response time, the reset time, and the kind of remote indication contact (permanent or momentary contact) can be selected via front switches.

Technical Data	
Trip current (I_s)	(100 A), 200 A, 300 A, 400 A, 600 A, 800 A, 1000 A either fixed setting or self-adjusting. Self-adjustment in relation to the operating current (I_b): I_s < 100 A: I_s = 400 A, I_s > 100 A: I_s = 4 x I_b, $I_{s\,max}$ = 1000 A
Response time	40 ms or 80 ms delay time
Time reset	1, 2, 4 or 8 h
Remote reset and remote setting	via external momentary contact
Temperature range	-30 °C to +70 °C
Power supply	Longlife lithium cell battery, shelf life ≥ 20 Jahre, 1000 flash hours
Relay contact	Permanent of momentary contact (1s) 230 V AC / 1,0 A / 62,5 VA 220 V DC / 1,0 A / 30 W (max)
Order No.	**37-1111-002** SIGMA
	37-1121-002 SIGMA, AC/DC connection

April 2008
2023711-003

Short-circuit current transformers for mounting on bushings

Order No.	for RMU make	Type
49-6012-009	ABB	SAFERING, RGC, SAFEPLUS (3 m cable length)
49-6012-015	ABB	SAFERING, RGC, SAFEPLUS set consisting of 3 cts with cable length of 0,89 , 0,99 and 1,09 m
49-6010-030	AREVA	FBA, GLA, GMA (92 mm Ø)
49-6012-004	AREVA	FBX plug type (for pole plate 3 mm)
49-6012-007	Driescher	MINEX, G.I.S.E.L.A. ct plug type
49-6010-032	EATON Holec	SVS (44 mm Ø) set consisting of 3 cts
49-6010-048	EATON Holec	XIRIA (70 mm Ø) set consisting of 3 cts
49-6010-011	Ormazabal / F&G	GA + GE (96 x 96 mm)
49-6010-044	Schneider Electric	RM6 (80 mm Ø)
49-6010-038	Siemens	8 DJ + 8 DH, SIMOSEC (95 mm Ø)

Special transformers after consulation.

Short-circuit current transformer for mounting on insulated cables

Order No.	Ø mm	Type
49-6011-040	15-52	3 m connecting cable
49-6011-043	15-52	6 m connecting cable

Accessories

Order No.	
040401-0008	Disassembly clip for housing removal
040804-0009	Housing spring for 2 mm front cover plate
040804-0010	Housing spring for 3 mm front cover plate

APPENDIX 5 – TARIFF METERING 12KV

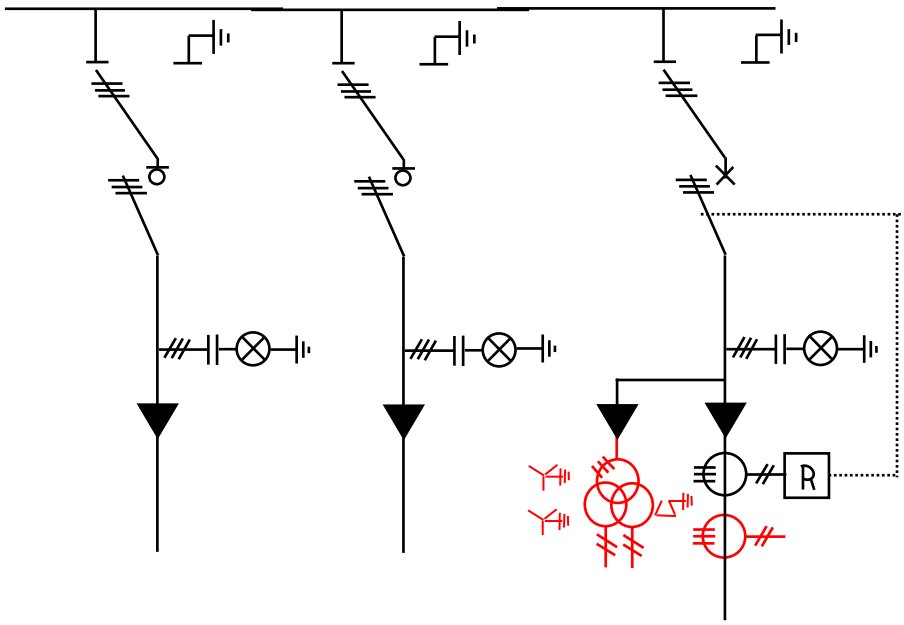
A5.1 The system

A5.1 Standard system description

The Xiria system with tariff metering type MA consists of a three- or four panel switchboard with a circuit-breaker in the right panel. This circuit-breaker is provided with built-in cable side current- and voltage transformers for tariff metering.
The other panels can be in any design. All panels can be hand operated or provided with the standard Xiria options.

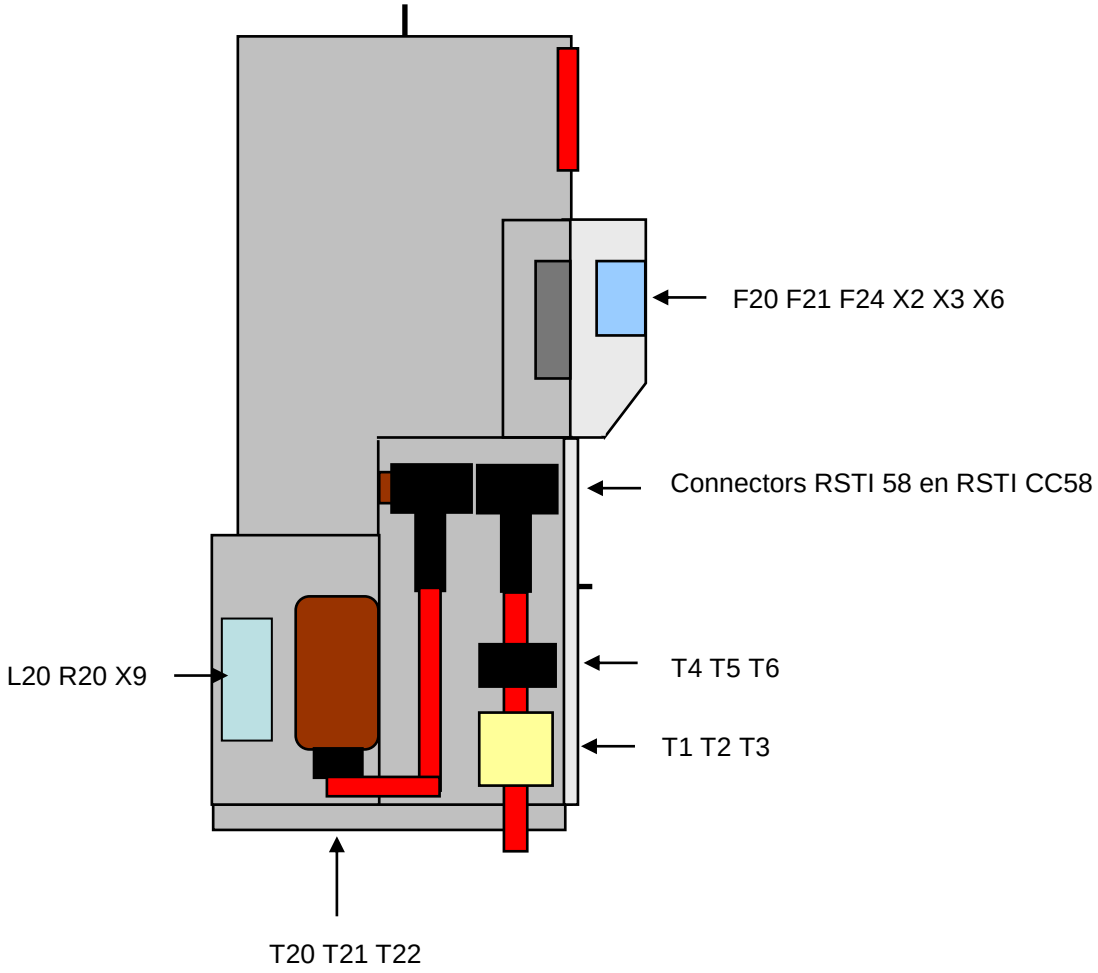
A5.1.2 Single line diagram of a three panel unit with tariff metering (example):

Load break switch Load break switch Circuit-breaker with tariff metering



A5.1.3 Design specification of a switchboard with tariff metering with cable side current- and voltage transformers in the right panel:

Choke coil and resistor for the anti- ferro resonance filter (L20-R20)
Current transformers for metering phase L1, L2 and L3 (T1-T2-T3)
Current transformers for protection phase L1, L2 and L3 (T4-T5-T6)
Voltage transformers for metering phase L1, L2 and L3 (T20-T21-T22)
Earth connectors X9, X6
DIN00 knife-type fuses for secondary connection of the voltage transformers (F20 en F21)
MCB for the tertiary windings of the voltage transformers (F24)
Terminal strip for external metering equipment (X2 and X3)
Primary connectors for internal connection of the voltage transformers (RSTI 58)
Front primary connectors for the main primary cables (RSTI CC58)

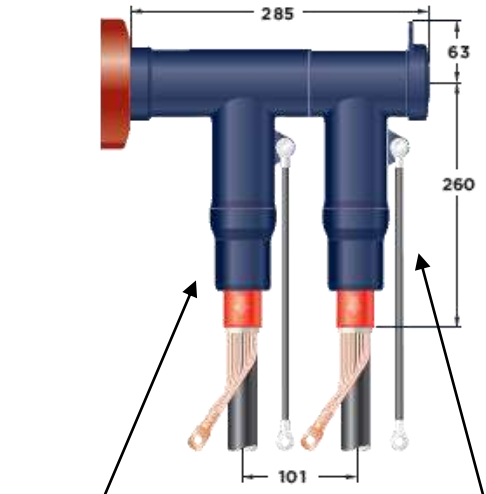


Voltage transformers:
The voltage transformers are mounted inside the switchgear at the rear. They are connected with preassembled internal primary cables to the circuit-breaker in the most right panel (number 3). Also the choke coil and the resistor for the anti ferro resonance filter connected to the tertiary windings are mounted in this part of the switchgear. The connections on the voltage transformers are made with earth screened connectors type A. The connections on the cable cones of the circuit-breaker (panel 3) are made with earth screened connectors type C, mounted in parallel with the connectors for the primary cables. Due to the limited mounting space inside the cable compartment these connectors are make Tyco type RSTI 58 and RSTI CC58.

Current transformers:
The current transformers for metering and protection of the circuit-breaker (panel 3) are mounted inside the cable compartment around the primary cables. They are mounted on a metal sub frame for easy removing/remounting without disconnecting the secondary wiring when the primary cables are mounted.

A5.1.4 Connection of the primary main cables and the voltage transformers:

Due to the limited mounting space inside the cable compartment the primary cables and the voltage transformers are connected with connectors make Tyco type RSTI 58. The connectors and cables for the voltage transformers are pretested and preassembled on the cable cones of the circuit-breaker. (panel 3).
Parallel on these preassembled connectors the connectors type RSTI CC58 for the primary main cables can be mounted at site.



RSTI 58 connection of the voltage transformers

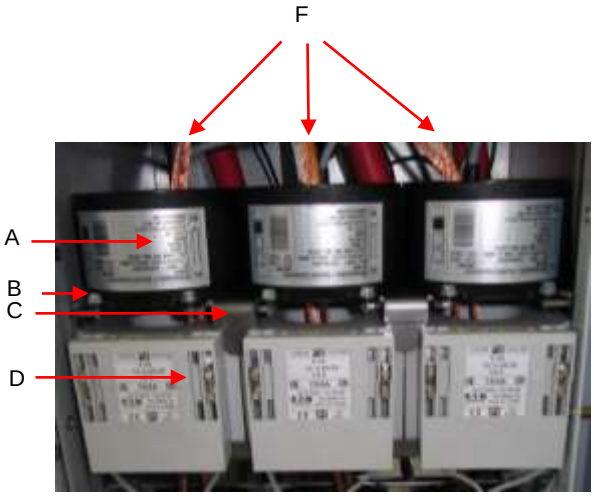
RSTI CC58 main primary cable connection

A5.1.5 Removing/remounting the current transformers

For easy connection of the primary cables the current transformers in the cable compartment can be removed and remounted.

Removing when the primary cables are mounted:

1. Open the cable compartment according to the standard instructions.
2. Remove the current transformers for protection (A) by removing the two bolts on the front (B). The secondary wiring does not need to be disconnected.
3. Behind these current transformers a mounting plate fixed with bolts (C) becomes visible. Remove these bolts and remove the mounting plate.
4. The current transformers for metering (D) can now be lifted and removed, also remove the tywrap from the secondary wiring. The secondary wiring does not need to be disconnected.



Remounting:

Lead the primary cables through the current transformers and remount the current transformers as described above.

REMARK

After remounting the current transformers the earth screen connections of the primary cables must be connected to earth via the premounted earth wires (F). In this case any earth current through these connections will not influence the metering results

A5.1.6 Allocation of the secondary connections for metering:

The switchboard is provided with a secondary front compartment. Two thumb screws (A) are used to secure the cover in closed position. When opened the cover turns to the front and the secondary components can be accesssed. The wiring for the connection of external metering equipment can be connected through the holes in both side posts (B). The rectangular metal cover plates (B) must be removed to get access.

Terminal strip (lead sealable) for the connection of metering equipment

Dimensions of the secondary front compartment: