Insulation monitoring

Catalogue

Vigilohm Merlin Gerin

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Modicon
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We do more with electricity

Vigilohm

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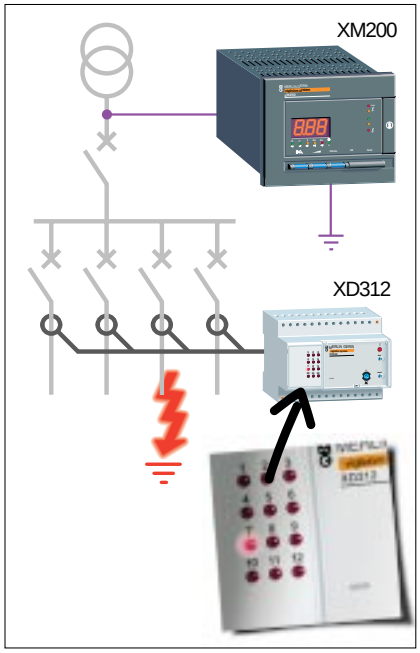
continuity of supply

Continuity of supply is a need that must always be satisfied by electrical installations, along with the protection of life and property. The IT system provides the best guarantee in terms of continuity of supply. Even when a first insulation fault is present, the installation can continue to supply power without endangering human life. The first fault must however be detected and repaired before a second fault occurs.

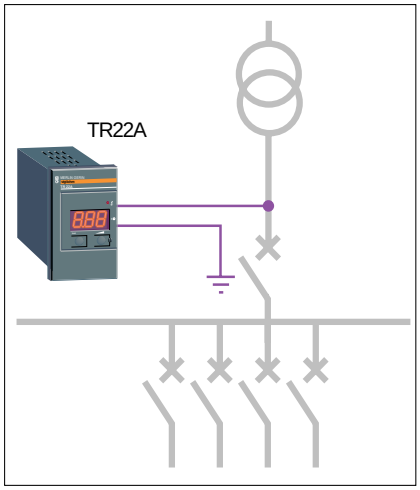
measuring, indicating and locating insulation faults

The insulation monitoring devices of the Vigilohm range are designed to:
■ **measure** the insulation level of the installation;
■ **indicate** drops in the insulation level below a user-defined threshold.
In addition to these basic functions, the Vigilohm System can automatically **locate** the faulty circuit.



insulation monitoring

Insulation monitoring devices inject a DC or low-frequency AC voltage between the installation and earth. The insulation resistance is determined by measuring the resulting leakage current.
■ Vigilohm EM9 devices use an indicator light to signal the presence of an insulation fault within the installation. They are modular devices (Multi 9 format) designed for small installations or sub-systems isolated from earth;
■ the TR22A and TR22AH (for hospitals) devices detect insulation faults and, in addition, continuously indicate the value of the insulation resistance on a digital display;
■ the XM200 is part of the Vigilohm System range and can be associated with automatic fault locating devices.

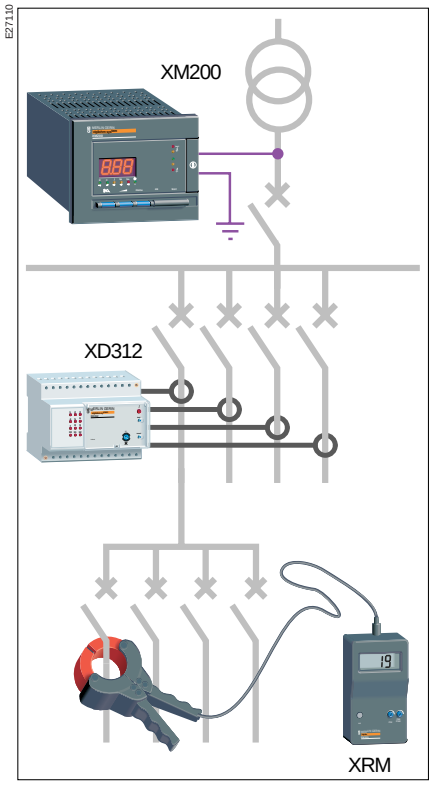


fault locating

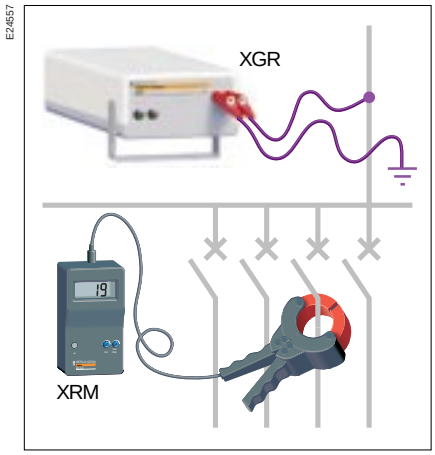
Once detected, an insulation fault must be located and eliminated in order to guarantee maximum continuity of supply.

Automatic locating:
For easy locating of insulation faults, the Vigilohm System makes it possible to combine the XM200 insulation monitoring device with:
■ XD301/XD312 fault detectors to monitor the different circuits of the installation;
■ XRM receivers for mobile fault locating.

Automatic fault locating

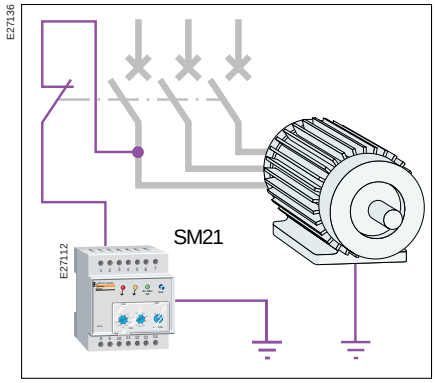


Manual fault locating



off-line insulation monitoring

The failure of a motor to start can have serious consequences. This is especially true in the following applications:
■ safety equipment (fire pumps, smoke extractors, etc.);
■ production (glass works, cement plants, etc.);
■ manufacturing processes (rolling mills, etc.).
Motors often fail to start due to insulation problems caused by the humidity that accumulates in the microscopic cracks of the insulation during periods when the motor is not running.
The SM21 device monitors the insulation of critical motors while they are off-line. Insulation faults give rise to an alarm or motor starting lock-out.



Vigilohm

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Vigilohm	
TR22A and TR22AH insulation monitoring devices	16
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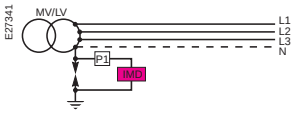
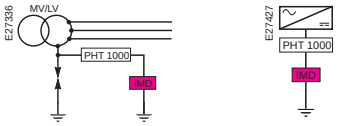
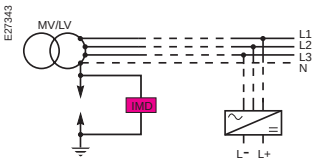
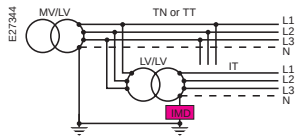
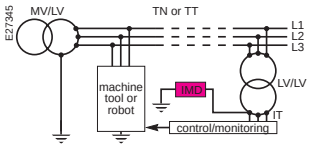
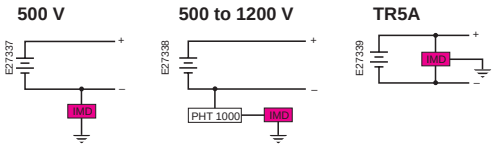
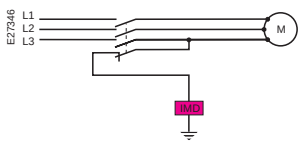
choosing an insulation monitoring device for different types of installations

installation characteristics (1)		device	XM200	XM300C
IT system for the entire installation				
Continuity of supply is the requirement that most often leads designers to chose the IT system for an electrical installation. This requirement may apply to the entire installation (e.g. chemical process plant, steel plant, etc.). Such an installation requires continuous monitoring of the insulation level.				
				440 to 1000 V AC* 500 to 1200 V DC* *with PHT 1000 subassembly
			⩽ 440 V AC ⩽ 500 V DC	⩽ 440 V AC ⩽ 500 V DC
IT system for part of an installation				
The requirement for continuity of supply may apply to only a part of an installation, for example a single shop or plant, or a circuit subject to special conditions (safety lighting). In this case, it is recommended to use the IT system for this part of the installation, whatever the system used for general distribution.			⩽ 440 V AC	⩽ 440 V AC
				
IT system for DC installations				
In many cases, the use of direct current corresponds to a need for continuity of supply. The use of an IT system and insulation monitoring is therefore consistent with this choice.			⩽ 500 V DC	⩽ 500 V DC 500 to 1200 V DC* *with PHT 1000 subassembly
off-line insulation monitoring				
The use of motors in industrial processes creates a further need for insulation monitoring. By checking the insulation with power off, the presence of insulation faults can be determined before starting motors (fire pumps, smoke extractors, etc.). It is also possible to prevent motor starting automatically if the insulation resistance is below a certain threshold.				

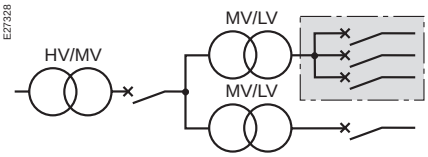
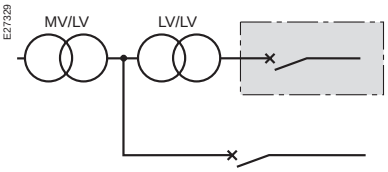
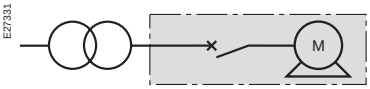
(1) Phase-to-phase voltage, IMD connected to phase. If IMD connected to neutral multiply these values by $\sqrt{3}$.

	TR22A	TR22AH	EM9	EM9B	EM9BV	EM9T	TR5A	SM21
	041850 	043274 	042578 	042580 	042580  042581 	042582 	017422 	051346 
	⩽ 1 000 V AC with P1 subassembly							
	⩽ 440 V AC	⩽ 440 V AC						
	⩽ 440 V AC	⩽ 440 V AC	⩽ 440 V AC	⩽ 440 V AC	⩽ 440 V AC			
						⩽ 220 V AC		
							⩽ 500 V DC	
								⩽ 690 V AC

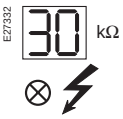
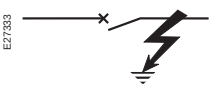
Vigilohm: functions and characteristics

choosing an insulation monitoring device and associated functions

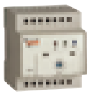
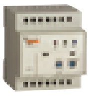
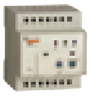
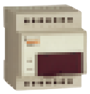
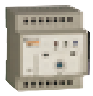
installation characteristics

device		XM200	XM300C
injected signal		2.5 Hz	2.5 Hz
IT system for the entire installation			
	**voltage** (1)	440 to 1000 V AC	(2)
		⩽ 400 V AC	
	with rectifiers	440 to 1000 V AC	(2)
		⩽ 440 V AC	
	for hospitals	⩽ 440 V AC	
IT system for part of an installation			
	**high insulation level**	⩽ 440 V AC	
	low insulation level	⩽ 440 V AC	
	control and monitoring of machines	⩽ 220 V AC	
DC installation			
		24 to 420 V DC	
		⩽ 500 V DC	
		500 to 1200 V DC	(2)
off-line monitoring (LV motors)			
		⩽ 690 V AC	

communication functions

insulation resistance measurement			
	**measurement display**		
	prevention indication		
	insulation fault indication		
fault locating			
	**manual**	(4)	(4)
	automatic	(6)	(6)

(*) Can be used.
(1) Phase-to-phase voltage, IMD connected to phase. If IMD connected to neutral multiply these values by e.
(2) With PHT 1000 subassembly.
(3) With P1 subassembly.
(4) With XRM mobile receiver.
(5) With XRM mobile receiver + XGR signal generator
(6) With XD301/312 detector.

	041850	043274	042578	042580	042580 / 042581	042582	017422	051346
					 			
	TR22A	**TR22AH**	**EM9**	**EM9B**	**EM9BV**	**EM9T**	**TR5A**	**SM21**
	DC	**DC**	**DC**	**DC**	**DC**	**DC**	**NONE**	**DC**
	(3)							
		(*)						
	(5)	(5)	(5)	(5)	(5)	(5)	(5)	

Vigilohm System
XM200 insulation monitoring device

basic function: overall insulation monitoring

The XM200 provides overall insulation monitoring of electrical installations by injecting a low-frequency AC voltage between the installation and earth.

main functions

■ **measurement:**
□ insulation resistance,
□ earth leakage capacitance;
■ **indications:**
□ satisfactory insulation resistance (green light),
□ drop in insulation resistance:
– below prevention threshold (orange light and failsafe relay actuated),
– below fault threshold (red light and relay actuated),
□ transient faults (orange light);
■ **display:**
□ measurements accessible locally on the display unit of the device,
□ value of the last transient fault.

additional functions with other devices

Identification of faulty circuits
This function is obtained by using the XM200 together with XD301/XD312 automatic insulation fault detectors.
In addition, an XRM mobile receiver and a current probe can be used to determine the exact location of the fault on the faulty circuit.

standards

The XM200 insulation monitoring device complies with the following standards:
■ IEC 364, parts 4 and 5;
■ class CPI/XA of UTE C 63-080.
It is implemented in accordance with standard NF C 15-100 paragraph 413.4;
■ IEC 1557-8.

operating voltage

■ AC IT systems up to:
□ 440 V with neutral not distributed,
□ 760 V with neutral distributed;
■ DC systems up to 500 V.
The XM200 cannot be adapted to installations with higher voltages by connecting it to a PHT1000 subassembly.
For higher voltage, use an XM300C.

installation

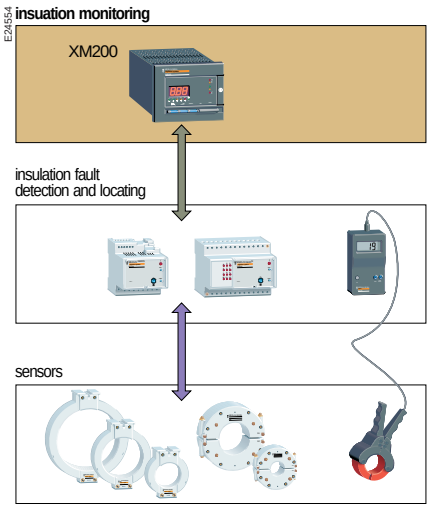
■ horizontal flush mounting on the front face of a cubicle or enclosure;
■ easy mounting in Prisma enclosures using the corresponding mounting plates and front plates that come with the appropriate cut-outs.

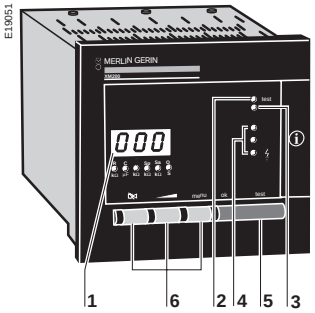
auxiliaries

Cardew surge limiter: page 24.
ZX impedance: page 25.

restrictions for use

The XM200 operates by injecting low-frequency signals (2.5 Hz) and therefore should not be used in the presence of variable speed drives that can produce similar frequencies (≤ 5 Hz).





1. display indicating:
■ the value of the overall insulation resistance R;
■ other information as selected via function keys.

2. red self-test light, indicating internal XM200 faults.

3. light indicating that a transient fault has occurred.

4. 3 lights indicating the insulation level.

5. sealable cover ensuring tamperproof settings.

6. function keys for:
■ accessing earth leakage capacitance readings;
■ setting thresholds;
■ displaying the value of the last transient insulation fault;
■ setting time delays.

type of installation to be monitored

AC or mixed AC/DC IT systems	phase-to phase voltage	
	with XM200 connected to neutral	< 760 V AC
	with XM200 connected to phase	< 440 V AC
	frequency	45-400 Hz
	size of installation	0 to 30 km of cable
DC or rectified IT systems	line voltage	< 500 V DC

electrical characteristics

ohmmeter			digital
range for insulation resistance readings			0.1 to 999 kΩ
signalling	number of thresholds		2 (sealable settings)
	threshold settings	1st threshold (prevent)	10 to 100 kΩ
		2nd threshold (fault)	0.1 to 20 kΩ
time delay for signalling		3 settings	0 s,15 s, 30 s
dielectric strength			2500 V
auxiliary supply voltage tolerances			- 15 % to +10 %
maximum device consumption			30 VA
measurement voltage			25 V
measurement current			3 mA max.
50 Hz/DC impedance			33 kΩ
device test		self-test and manual test	
failsafe feature **(1)**			as standard
output contacts	changeover	quantity	2 (1 failsafe)
breaking capacity of output contacts		AC 380 V p.f. = 0.7	3 A
		220 V p.f. = 0.7	5 A
		DC 220 V L/R = 0	0.45 A
		120 V L/R = 0	0.65 A
		48 V L/R = 0	2.5 A
		24 V L/R = 0	10 A
connection cross-sections		rigid conductors	1 to 1.5 mm^2
		flexible conductors	0.75 to 1.5 mm^2

mechanical characteristics

weight		2.5 kg
sheet-metal case (horizontal mounting)	disconnectable screw terminal block	
degree of protection	flush mounting	IP 30

other characteristics

tamperproof settings	behind sealable cover	
temperature range	operating	- 5 °C to + 55 °C
	storage	- 25 °C to + 70 °C

fault locating with other devices

automatic	detectors XD301/312
manual	mobile receiver XRM + probes

(1) Failsafe feature: a failsafe relay operates in the event of an accidental interruption of auxiliary power or a fault.

Vigilohm System
XM300C insulation monitoring device

044148

basic function: overall insulation monitoring

The XM300C provides overall insulation monitoring of electrical installations by injecting a low-frequency AC voltage between the installation and earth.

main functions

■ **measurement**:
□ insulation resistance,
□ earth leakage capacitance;
■ **indications:**
□ satisfactory insulation resistance (green light on bargraph),
□ drop in insulation resistance:
– below prevention threshold (orange light on bargraph and relay actuated),
– below fault threshold (red light on bargraph and two relays actuated, including one with a failsafe feature),
□ transient faults (orange light);
■ **display:**
□ measurements accessible locally on the LCD screen of the insulating monitoring device.

additional functions with other devices

Locating of faulty circuits
This function is obtained by using the XM300C together with:
■ XD301 and XD312 detectors connected to the toroids placed on the circuits to be monitored;
■ an XRM mobile receiver and a current probe to fine-tune the automatic locating results.
All these devices can be combined on a given installation.

standards

The XM300C insulation monitoring device complies with the following standards:
■ IEC 364, parts 4 and 5;
■ class CPI/XA of UTE C 63-080.
It is implemented in accordance with standard NF C 15-100 paragraph 413.4;
■ IEC 1557-8.

installation and connection

■ horizontal flush mounting on the front face of a cubicle or enclosure;
■ easy mounting in Prisma enclosures using the corresponding mounting plates and front plates that come with the appropriate cut-outs;
■ the devices are interconnected by shielded cables (double 0.75 mm^2 twisted pairs).
The resistance between the two most distant points must not exceed 12 Ω.
The leakage capacitance between pairs must not exceed 250 nF.

auxiliaries

Cardew surge limiter: page 24.
ZX limiting impedance to create an impedance-earthed neutral: page 25.
PHT1000 subassembly if the device is to be used on 1000-1700 V installations: page 25.

restrictions for use

The XM300C operates by injecting low-frequency signals (2.5 Hz) and therefore should not be used in the presence of variable speed drives that can produce similar frequencies (≤ 5 Hz).

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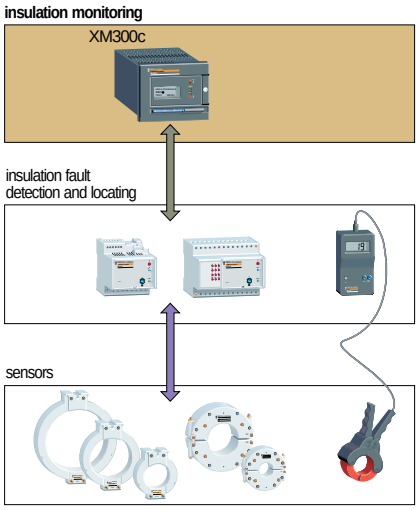
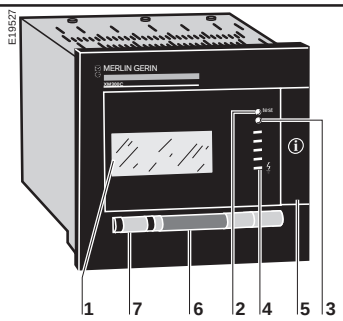




1. display indicating:
■ the value of the overall insulation resistance R;
■ other information as selected via function keys.

2. red self-test light, indicating internal XM300C faults.

3. light indicating that a transient fault has occurred.

4. 5 lights indicating the insulation level.

5. instruction manual stored in a drawer on the front face

6. sealable cover ensuring tamperproof settings.

7. function keys for:
■ accessing earth leakage capacitance readings
■ setting thresholds;
■ accessing three last values of transient insulation faults;
■ choice of language.

type of installation to be monitored

AC or mixed AC/DC IT systems	phase-to phase voltage	
	with XM300C connected to neutral	< 760 or 1700 V AC (1)
	with XM300C connected to phase	< 440 or 1000 V AC (1)
	frequency	45-400 Hz
	size of installation	0 to 30 km of cable
DC or rectified IT systems	line voltage	< 500 or1200 V DC (1)

electrical characteristics

ohmmeter			digital
range for insulation resistance readings			0.1 to 999 kΩ
signalling	number of thresholds		2 (sealable settings)
	threshold settings	1st threshold (prevent.)	1 to 299 kΩ
		2nd threshold (fault)	0.2 to 99.9 kΩ
dielectric strength			2500 V
auxiliary supply voltage tolerances			- 15 % to + 10 %
maximum device consumption			30 VA
measurement voltage			5 V
measurement current			5 mA max
50 Hz/DC impedance			22 kΩ
device test		self-test and manual test	
failsafe feature (2)		as standard	
changeover output contact		quantity	3 (1 failsafe)
breaking capacity of output contacts		AC 380 V p. f. = 0.7	3 A
		220 V p. f. = 0.7	5 A
		DC 220 V L/R = 0	0.45 A
		120 V L/R = 0	0.65 A
		48 V L/R = 0	2.5 A
		24 V L/R = 0	10 A
circuit breaker position indication contacts (3) :		voltage supplied	38 V
(voltage and current supplied by the XM300C)		max. current supplied	10 mA (short-circuit)
connection cross-sections		rigid conductors	1 to 1.5 mm^2
		flexible conductors	0.75 to 1.5 mm^2

mechanical characteristics

weight		3.5 kg
sheet-metal case (horizontal mounting)	disconnectable scew terminal block	
degree of protection	flush mounting	IP 30

other characteristics

interfacing possible with	supervisor	
multi-language display	English/French	
tamperproof settings	protected by access code or sealable cover	
temperature range	operating	- 5 °C to + 55 °C
	storage	- 25 °C to + 70 °C

(1) The upper limit is extended to the second value by adding a PHT1000 subassembly.
(2) Failsafe feature: a failsafe relay operates in the event of an accidental interruption of auxiliary power or a fault.
(3) This contact is an auxiliary switch mounted on the circuit breaker and used to indicate its operating status.

Vigilohm System
XD301 and XD312 automatic insulation fault detectors

basic function
local fault detection

XD301 and XD312 insulation fault detectors have two functions:
- fault detection (with respect to the fault threshold);
- automatic locating of the faulty circuit.

operation

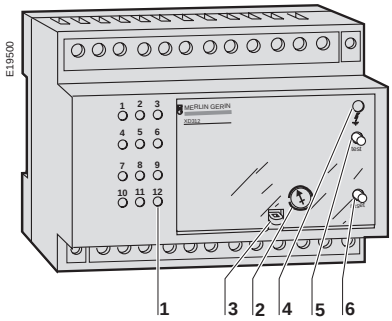
- XD301 and XD312 insulation fault detectors are fixed receivers used with (but not connected to) XM300C and XM200 insulation monitoring devices. Via measurement toroids, they detect and automatically locate insulation faults
- the XD312 detector, with 12 channels connected to a maximum of 12 toroids installed on different circuits of the installation, includes the following features on its front face:
  - 12 fault indicator lights corresponding to the 12 channels,
  - a selector to enable or disable latching of transient fault indications until reset;
- detector XD301 is a single-channel version designed for use with one measurement toroid.

installation and connection

- live parts in an insulated case with a sealable transparent cover. Width equal to 8 (XD301) or 12 (XD312) 9 mm width modules;
- horizontal flush or surface mounting on DIN rail;
- tunnel terminals for 1.5 mm² wires.

toroids

XD301 and XD312 insulation fault detectors operate with type A and OA toroids. They are also compatible with the older type N and O toroids.



1. lights indicating the faulty circuit.
2. selector to enable or disable transient fault indication latching
3. sealable cover.
4. general fault indicator light.
5. test button for indicator lights and output relay.
6. reset button (to clear fault indications).

insulation fault detectors		XD301	XD312
electrical characteristics			
type of installation to be monitored		low voltage AC 45-400 Hz / DC	
operating threshold		2.5 mA at 2.5 Hz **(1)**	
polling time		20 s	20 s per channel
fault indications		1 indicator light	12 channel indicator lights (+ 1 general)
local tests		for indicator lights and output relay	
clearing of indications		reset button on device	
latching of transient fault indications		on/off via selector	
output relay	number of contacts	1 failsafe	
breaking capacity of output contacts	AC 380 V p.f. = 0.7	3 A	
	220 V p.f. = 0.7	5 A	
	DC 220 V L/R = 0	0.45 A	
	120 V L/R = 0	0.65 A	
	48 V L/R = 0	2.5 A	
	24 V L/R = 0	10 A	
auxiliary supply voltage tolerances		- 15 % to + 10 %	
consumption		6 VA	
dielectric strength		2500 V	
connection with insulation monitoring device		none	
mechanical characteristics			
weight		0.3 kg	0.6 kg
plastic case		horizontal mounting	
degree of protection flush/surface mounting		IP 30 / IP 20	
other characteristics			
temperature range	storage	- 25 °C to + 70 °C	
	operating	- 5 °C to + 55 °C	
types of toroid to be used		A, OA (N and O compatible)	
toroid for direct connection to case		30 and 50 mm type A toroid	none

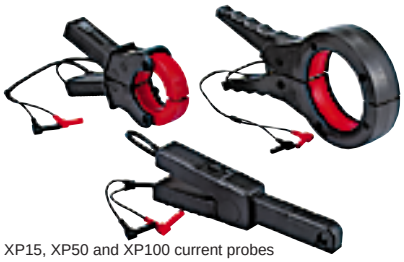
(1) The operating threshold of the XD301/312 detectors is not adjustable. These devices are designed to detect low-impedance faults. The detection threshold varies between 100 Ω and 2 kΩ depending on the characteristics of the installation.

XRM mobile fault locating receiver and current probes

051350

XRM receiver

053129



XP15, XP50 and XP100 current probes

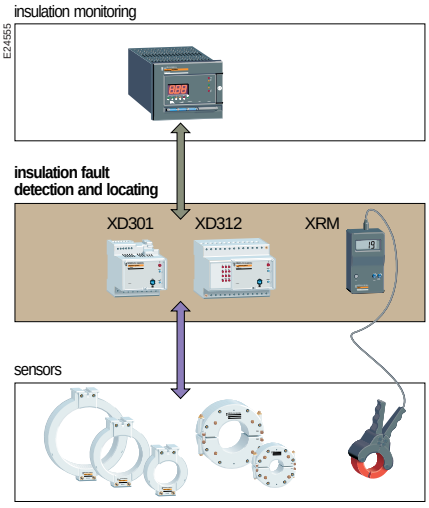
operation

The XRM mobile receiver, used with a current probe, is mainly intended as an enhancement to automatic fault locating systems. It can be placed at various points along a faulty circuit, capturing the signal emitted by an XM300C or XM200 insulation monitoring device to determine the exact location of the fault.
Three current probes are available, the XP15, XP50 and the XP100, for cables with diameters up to 12, 50 and 100 mm respectively.

display

The XRM receiver displays a number from 0 to 19, corresponding to the insulation level:
- 0: no fault;
- 19: solid fault (no insulation).

E24555



Vigilohm TR22A and TR22AH insulation monitoring devices

use

IT systems:
■ LV AC installations up to:
□ neutral distributed: 760 V,
□ neutral not distributed: 440 V;
■ isolated from earth or connected to earth through a capacitive impedance.

TR22H (hospitals)
■ high fault threshold up to 251 kΩ;
■ class MC, according to UTE C 63-080 standard specific to hospital environment.

One device only for each separate installation.

operation

■ injection of DC voltage;
■ insulation measurement: using a microprocessor device, from the leakage current created by the voltage injected between the installation and earth. Earth leakage capacitances do not affect insulation measurement;
■ insulation reading: digital display;
■ 1 alarm threshold pre-set by the user.

installation and connection

■ live part in disconnectable metal case;
■ vertical flush mounting on front plate (supplied);
■ connection:
□ disconnectable tunnel terminal block for 2.5 mm^2 wiring.
□ lug for earthing of exposed conductive parts (supplied).

type of installation to be monitored

LV AC IT systems	phase-to-phase voltage		
	with TR22A/AH connected to neutral		⩽ 760 V (⩽ 1700 V (1))
	with TR22A/AH connected to phase		⩽ 440 V (⩽ 1000 V (1))
	frequency		20 to 1000 Hz
	size		0 to 50 km of cables

electrical characteristics

ohmmeter	type		digital
	reading range		0 to 511 kΩ
fault signalling	number thresholds		1 (sealable)
	threshold setting	TR22A	0.7 to 100 kΩ
		TR22AH	1 to 251 kΩ
response time			3 s
device test	operation		yes
	thresholds		yes
failsafe feature (2)			yes
output changeover	quantity		1
contact	breaking capacity	AC 220 V p.f. = 0.7	5 A
		DC 220 V L/R = 0	0.45 A
		120 V L/R = 0	0.65 A
		48 V L/R = 0	2.5 A
		24 V L/R = 0	10 A
impedance			100 kΩ
maximum current injected			240 µA
maximum consumption			5 VA
auxiliary supply voltage tolerances			- 20 % to + 10 %
locating signal changeover switch (3)			yes
front panel insulation			class 2

mechanical characteristics

weight			0.8 kg
metal case	disconnectable	mounting	vertical
degree of protection	flush mounted		IP 40
	surface mounted		IP 40

other characteristics

temperature range	for operation	- 5 °C to + 55 °C
	for storage	- 40 °C to + 70 °C
climatic conditions	tropicalisation	T2 type (4)

fault locating with other devices

mobile	XGR portable generator and XRM receiver + probes

(1) For the TR22A, the upper limit is extended to this value by adding a P1 subassembly. This is not possible for the TR22AH.
(2) Failsafe: the relay is disactivated either on occurrence of a fault or if the auxiliary supply voltage accidentally fails.
(3) Locating signal changeover switch: this device identifies the faulty feeder during locating by opening each feeder in turn. When the faulty feeder is opened, the alarm sounds.
(4) T2 type tropicalisation:
■ damp heat: 55 °C, 95 % relative humidity, 28 cycles (as in standard IEC 68-2-30);
■ salt spray: 5 % NaCl, 48 hours, 3 months storage (as in standard IEC 68-2-11).

standards

TR22A
■ IEC 364, chapters 4 and 5;
■ NF C 15-100, paragraphs 413 and 532;
■ UTE C 63-080 (class CPI/C);
■ IEC 1557-8.

TR22AH
■ UTE C 83-080 (class CPI/MC);
■ IEC 364, chapters 4 and 5;
■ NF C 15-100, paragraphs 413 and 532;
■ NF C 15-211;
■ IEC 1557-8.

auxiliaries

■ Cardew C surge limiter. Compulsary downstream of an MV/LV transformer;
■ ZX impedance;
■ S3 inductive neutral point;
■ P1 additional subassembly for installations with voltages from 440 V to 1000 V AC. Can be used with TR22A only.

Vigilohm EM9 and EM9B insulation monitoring devices

042578

use

IT systems:
■ LV AC installations up to:
□ neutral distributed: 760 V,
□ neutral not distributed: 440 V;
■ one device only for each separate installation;
■ isolated from earth or connected to earth through a capacitive impedance;
■ EM9: for installations with a high insulation level;
■ EM9B: for installations with a low insulation level and capacitive installations.

operation

■ injection of DC voltage;
■ an electronic device measures insulation from the leakage current created in the installation by the voltage injected between the installation and earth and trips the alarm threshold pre-set by the user.
Earth leakage capacitances do not affect insulation measurement.

installation and connection

■ live part in moulded, insulating, disconnectable, modular case, eight 9 mm modules wide, with transparent sealable cover;
■ horizontal or vertical mounting on symmetrical rail;
■ connection by tunnel terminals for 2.5 mm^2 wiring, terminals 1 to 14.

standards

■ UTE C 63-080;
■ IEC 364, chapters 4 and 5;
■ NF C 15-100 paragraphs 413 and 532;
■ NF C 15-211;
■ IEC 1557-8.

auxiliaries

■ Cardew C surge limiter (only downstream of MV/LV transformer);
■ ZX impedance;
■ S3 inductive neutral point.

type of installation to be monitored

LV AC IT systems	phase-to-phase voltage		
	with EM9/EM9B connected to neutral		⩽ 760 V
	with EM9/EM9B connected to phase		⩽ 440 V
	frequency		50-60-400-1000 Hz
	size		0 to 50 km of cables

electrical characteristics

fault signalling	number of thresholds		1 (sealable)
	threshold setting	EM9: 10-20-40-60-80-100-120-150 kΩ	
		EM9B: 1-2,5-5-10-25-50-75-100 kΩ	
response time			⩽ 5 s
device operating test			local
failsafe feature (1)		as an option	
output contact	number	1 (standard or failsafe)	
	type of contact		changeover
	breaking capacity	AC 380 V p.f. = 0.7	3 A
		220 V p.f. = 0,7	5 A
		DC 220 V L/R = 0 s	0.45 A
		120 V L/R = 0 s	0.65 A
		48 V L/R = 0 s	2.5 A
		24 V L/R = 0 s	10 A
maximum consumption			5 VA
impedance			100 kΩ
maximum current injected			240 µA
auxiliary supply voltage range			- 15 % + 10 %

mechanical characteristics

weight			0.4 kg
thermoplastic case	disconnectable	mounting	horizontal
			or vertical
degree of protection		front panel	IP 30
		case	IP 20

other characteristics

temperature range	for operation	- 5 °C to + 55 °C
	for storage	- 40 °C to + 70 °C
climatic conditions	tropicalisation	T2 type (2)

fault locating with other device

mobile	XGR portable generator and XRM receiver + probes

(1) failsafe: the relay is disactivated either on occurrence of a fault or if the auxiliary supply voltage accidentally fails.
(2) T2 type tropicalisation:
■ damp heat: 55 °C, 95 % relative humidity, 28 cycles (as in standard IEC 68-2-30);
■ salt spray: 5 % NaCl, 48 hours, 3 months storage (as in standard IEC 68-2-11).

Vigilohm EM9BV insulation monitoring devices

042580

042581

use

IT systems:
■ LV AC installations up to:
□ neutral distributed: 760 V,
□ neutral not distributed: 440 V;
■ one device only for each separate installation;
■ isolated from earth or connected to earth through a capacitive impedance.

operation

■ injection of DC voltage;
■ an electronic device measures insulation from the leakage current created in the installation by the voltage injected and trips the alarm when insulation drops below the alarm threshold pre-set by the user.
Earth leakage capacitances do not affect insulation measurement;
■ display of insulation resistance.

installation and connection

■ live part in moulded, insulating, disconnectable, modular case, eight 9 mm modules wide, with transparent sealable cover;
■ mounting on symmetrical rail:
□ measurement module: horizontal or vertical,
□ display module: horizontal;
■ connection by tunnel terminals for 2.5 mm^2 wiring, terminals 1 to 14.

standards

■ UTE C 63-080;
■ IEC 364, chapters 4 and 5;
■ NF C 15-100 paragraphs 413 and 532;
■ NF C 15-211;
■ VDE 107;
■ VDE 413-2;
■ IEC 1557-8.

type of installation to be monitored

LV AC IT systems	phase-to-phase voltage		
	with EM9BV connected to neutral		< 760 V
	with EM9BV connected to phase		⩽ 440 V
	frequency		50-60-400-1000 Hz
	size		0 to 50 km of cables

electrical characteristics

ohmmeter	type		digital
	range		0 to 511 kΩ
impedance			100 kΩ
maximum current injected			240 µA
fault signalling	number of thresholds		1 (sealable)
	threshold setting		1-2.5-5-10-25-50-75-100 kΩ
response time			⩽ 5 s
device operating test			local
fail safe device **(1)**			optional
output contact	number		1 (stand. or fail safe)
	type of contact		changeover
	breaking capacity	AC 380 V p.f. = 0.7	3 A
		220 V p.f. = 0.7	5 A
		DC 220 V L/R = 0 s	0.45 A
		120 V L/R = 0 s	0.65 A
		48 V L/R = 0 s	2.5 A
		24 V L/R = 0 s	10 A
maximum consumption			5 VA
auxiliary power supply operating range			- 15 % to + 10 %

mechanical characteristics

weight	measuring module		0.4 kg
	display module		0.4 kg
thermoplastic case			disconnectable
	mounting	measurement module	horizontal or vertical
		display module	horizontal
degree of protection		front panel	IP 30
		case	IP 20

other characteristics

temperature range	for operation	- 5 °C to + 55 °C
	for storage	- 40 °C to + 70 °C
climatic conditions	tropicalisation	T2 type **(2)**
link between display module and measurement module		shielded cable, 1 m max. length

fault locating with other devices

mobile	XRG portable generator and XRM receiver + probes

(1) fail safe: the relay is de-energized by occurrence of a fault or accidental failure of the auxiliary power supply voltage.
(2) type T2 tropicalisation:
■ humid heat: 55 °C, 95 % relative humidity, 28 cycles (as per IEC 68-2-30);
■ salt spray 5 % NaCl, 48 hours, 3 months' storage (as per IEC 68-2-11).

auxiliaries

■ ZX impedance;
■ S3 inductive neutral point;
■ Cardew C surge limiter.

Vigilohm EM9T insulation monitoring devices

042582

use

IT systems:
■ LV AC installations up to:
□ neutral distributed: 380 V,
□ neutral not distributed: 220 V;
■ one device only for each separate installation;
■ isolated from earth or connected to earth through a capacitive impedance;
■ specially designed for machine control and monitoring installations.

operation

■ injection of DC voltage;
■ an electronic device measures insulation, from the leakage current created in the installation by the voltage injected and trips the alarm when insulation drops below the alarm threshold pre-set by the user. Earth leakage capacitances do not affect insulation measurement.

installation and connection

■ live part in moulded, insulating, disconnectable, modular case, eight 9 mm modules wide, with transparent sealable cover;
■ horizontal or vertical mounting on symmetrical rail;
■ connection by tunnel terminals for 2.5 mm^2 wiring, terminals 1 to 14.

standards

■ UTE C 63-080;
■ IEC 364, chapters 4 and 5;
■ NF C 15-100, paragraphs 413 and 532;
■ NF C 15-211;
■ IEC 1557-8.

auxiliaries

■ ZX impedance;
■ S3 inductive neutral point.

type of installation to be monitored

LV AC IT systems	phase-to-phase voltage with EM9T connected to neutral	⩽ 380 V
	with EM9T connected to phase	⩽ 220 V
	frequency	50-60-400-1000 Hz
	size	0 to 50 km of cables

electrical characteristics

impedance			100 kΩ
maximum current injected			240 µA
fault signalling	number of threshold		1 (sealable)
	threshold setting		10-20-40-60-80-100-120-150 kΩ
response time			⩽ 5 s
device operating test			local and remote
output contact	number		1
	type of contact		changeover
	breaking de coupure	CA 380 V p.f. = 0.7	3 A
		220 V p.f. = 0.7	5 A
		CC 220 V p.f. = 0 s	0.45 A
		120 V L/R = 0 s	0.65 A
		48 V L/R = 0 s	2.5 A
		24 V L/R = 0 s	10 A
maximum consumption			5 VA
auxiliary supply voltage tolerances			- 15 % to + 10 %

mechanical characteristics

weight			0.4 kg
thermoplastic case	disconnectable	mounting	horizontal or vertical
degree of protection		front panel	IP 30
		case	IP 20

other caractéristiques

temperature range	for operation	- 5 °C to + 55 °C
	for storage	- 40 °C to + 70 °C
climatic conditions	tropicalisation	T2 type **(1)**

fault locating with other devices

mobile	XRG portable generator and XRM receiver + probes

(1) type T2 tropicalisation:
■ humid heat: 55 °C, 95 % relative humidity, 28 cycles (as per IEC 68-2-30);
■ salt spray 5 % NaCl, 48 hours, 3 months' storage (as per IEC 68-2-11).

Vigilohm TR5A insulation monitoring device

use

IT systems:
- LV DC installations up to 420 V;
- isolated from earth.

operation

- a device with a high input impedance measures the variation in potential of the two polarities of the installation compared with earth. These variations are transformed into insulation signals;
- auxiliary power comes from the monitored installation;
- if monitoring and signalling are required, for an insulation fault evenly divided between both polarities, use the VigilohIm System XM200.

installation and connection

- live part in moulded, insulating disconnectable, modular case eleven 9 mm modules wide, with transparent sealable cover;
- horizontal flush or surface mounting on symmetrical rail;
- connection by 6.35 mm tab connectors for 2.5 mm^2 wiring.

standards

- UTE C 63-080;
- IEC 364, chapters 4 and 5;
- NF C 15-100, paragraphs 413.4-3;
- IEC 1557-8.

type of installation to be monitored

LV DC	voltage between polarities		24-42-48-120-220 260-420 V
	size of installation		0 to 50 km of cables

electrical characteristics

fault signalling	number of thresholds		1 (sealable)
	threshold setting	DC 24 to 48 V installat.	5 to 25 kΩ
		DC 120 V installat.	10 to 50 kΩ
		DC 220 V installat.	30 to 150 kΩ
		DC 260 to 420 V installat.	30 to 150 kΩ
response time on solid fault			⩽ 1 s
device operating test			yes
failsafe feature **(1)**			yes as an option
changeover output contact	number		1
	breaking capacity	AC 220 V p.f. = 0.7	5 A
		DC 120 V L/R = 0 ms	0.65 A
supply voltage range (installation)			- 20 % to + 20 %
internal impedance	between + or – polarity and earth	DC 24 to 48 V installat.	24 kΩ
		DC 120 V installat.	46 kΩ
		DC 220 V installat.	154 kΩ
		DC 260 to 420 V installat.	166 kΩ
	between polarity	DC 24 to 48 V installat.	38 kΩ
		DC 120 V installat.	55 kΩ
		DC 220 V installat.	82 kΩ
		DC 260 to 420 V installat.	132 kΩ

mechanical characteristics

weight			0.5 kg
plastic case	disconnectable	mounting	horizontal
degree of protection		flush mounting	IP 30
		surface mounting	IP 20

other characteristics

temperature range	for operation	- 5 °C to + 55 °C
	for storage	- 40 °C to + 70 °C
climatic conditions	tropicalisation	type T2 **(2)**

fault locating with other devices

mobile	XGR portable generator and XRM receiver + probes

(1) failsafe: the relay is disactivated either on occurrence of a fault or if network voltage fails.
(2) T2 type tropicalisation:
- damp heat: 55 °C, 95 % relative humidity, 28 cycles (as in standard IEC 68-2-30);
- salt spray: 5 % NaCl, 48 hours, 3 months storage (as in standard IEC 68-2-11).

Vigilohm SM21 off-line insulation monitoring device

051346

use

monitors de-energised equipment (e.g. motors, fire pumps,...) whatever the earthing system.
De-energised installations:
■ AC (up to 690 V) or DC (up to 690 V);
■ when associated with a circuit breaker possessing an MN or MX release or with a contactor, the SM21 protects motors against insulation faults that may be produced during operating shutdowns (e.g. due to condensation), by initiating an alarm or startup lock-out.

operation

■ injection of DC voltage.
Voltage is applied, with the motor de-energised, between the stator and earth, thereby creating a leakage current in the motor insulation resistances;
■ 2 pre-set thresholds:
□ 1 prealarm threshold, adjustable in 8 steps from 0.5 to 10 MΩ,
□ 1 alarm threshold, adjustable in 8 steps from 0.25 to 2 MΩ.
An electronic device measures insulation from the leakage current created by the voltage injected and activates the alarm or prevents starting when insulation drops below the corresponding threshold.

installation and connection

■ live part in moulded, insulating, disconnectable, modular case, eight 9 mm modules wide, with transparent sealable cover;
■ horizontal or vertical mounting on symmetrical rail;
■ connection: wires up to 2.5 mm^2;
■ the SM21 is used with a contact that opens to disconnect the device from the installation when the installation is energised.

standards

■ IEC 1557-8.

type of de-energised installation to be monitored

LV AC IT (de-energised)	phase-to-phase voltage		⩽ 690 V (1)
	frequency		50-60-400-1000 Hz
DC (de-energised)	voltage between polarities		⩽ 690 V (1)

electrical characteristics

fault signalling	number of thresholds		2
	threshold values ± 15 %	prealarm	0.5-1-1.5-2-3-5-7,5-10 MΩ
		alarm	0.25-0.5-0.75-1-1.25-1.5-1.75-2 MΩ
response time			⩽ 1 s
device operating test			yes
alarm inoperative		yes	by selector switch
failsafe device (2)			as standard (3)
impedance interne		DC	1.6 MΩ
		AC 50-60 Hz	350 kΩ
changeover output contact	number	alarm	1 standard
		prealarm	1 failsafe
	breaking capacity	AC 220 V p.f. = 0.7	5 A
		DC 120 V L/R = 0 ms	0.65 A

mechanical characteristics

weight			0.3 kg
plastic case	disconnectable	mounting	horizontal/vertical
degree of protection		flush mounting	IP 30
		surface mounting	IP 20

other characteristics

temperature withstand	for operation	- 5 °C to + 55 °C
	for storage	- 40 °C to + 70 °C
climatic conditions	tropicalisation	type T2 (4)

(1) depends on rated voltage withstand of the contact used to disconnect the SM21 when the network is energised.
(2) failsafe: the relay is disactivated on occurrence of a fault or if the auxiliary supply voltage accidentally fails.
(3) only the first alarm contact.
(4) T2 type tropicalisation:
■ damp heat: 55 °C, 95 % relative humidity, 28 cycles (as in standard IEC 68-2-30);
■ salt spray: 5 % NaCl, 48 hours, 3 months storage (as in standard IEC 68-2-11).

Vigilohm mobile fault locating kit XGR + XRM + probes

053130

presentation

The mobile fault locating kit comes in the form of a case containing:
■ a locating signal generator, XGR, supplied with 220 - 240 V AC;
■ a locating signal receiver XRM;
■ three tong-type current probes: XP15, XP50 and XP100.
The devices making up the kit and the XGR for other voltages are all available individually.
See catalogue number tables.

use

The kit is used on LV IT systems (i.e. installations with an unearthed or impedance-earthed neutral). It enables fault locating on:
■ AC installations 50 to 400 Hz;
■ DC installations.
It is used mainly with insulation monitoring devices that inject DC currents (TR22A, EM9B or EM9BV, etc.).

operation

■ the XGR generator injects a 2.5 Hz AC voltage between the installation and the earth, thereby creating a leakage current which passes through the installation insulation impedance;
■ the XRM mobile receiver is associated with one of the three tong-type probes, XP15, XP50 or XP100, and detects this leakage current at 2.5 Hz. It displays a value between 1 and 19 according to the current passing through the probe, thus detecting the leakage current;
■ three current probes are available, the XP15, XP50 and the XP100, for cables with diameters up to 12, 50 and 100 mm respectively. Older probe models are not compatible with the XRM.

type of installation to be monitored

LV AC or mixed AC/DC IT systems	phase-to-phase voltage		
	with XGR connected to neutral		760 V
	with XGR connected to phase		440 V
	frequency		45 to 400 Hz
DC or rectified IT systems	voltage between polarities		500 V

electrical characteristics

auxiliary supply	XGR	voltage	115 to 525 V AC
		maximum consumption	15 VA
	XRM	IEC alkaline 9 V cell	PP3 or 6 LR61 type not supplied
display	XRM	type	digital
		scale	0 to 19
calibration	XRM		by potentiometer
impedance	XGR		40 kΩ
maximum current injected	XGR		2.5 mA

mechanical characteristics

weight	XGR		0.85 kg
	XRM		0.2 kg
case	XGR	plastic	portable
	XRM	plastic	portable

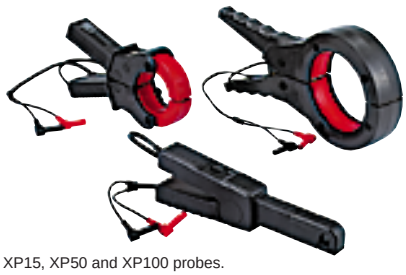
associated equipment

probes	XP15	for cables up to	ø 12 mm
	XP50	for cables up to	ø 50 mm
	XP100	for cables up to	ø 100 mm

047166

Locating signal generator XGR

053129



XP15, XP50 and XP100 probes.

051350

Locating signal receiver XRM

toroids

051352

Closed toroids (type A)

042589

Split toroids (type OA)

use

The toroids are used to detect the earth leakage currents.
They are used with the Vigilohm System for the detection, locating and measurement of earth fault currents on IT systems.
Closed toroids (type A) are suitable for new installations and extensions.
Split toroids (type OA) are suitable for renovated installations and extensions.

functions

These toroids detect leakage current and transmit a proportional signal to the associated receiver.

compatibility

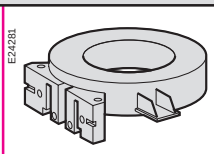
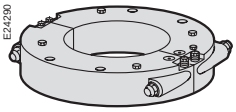
All type A and OA toroids are compatible with XD301 and XD312.

installation and connection

Closed toroids (type A)
■ enclosed in an insulated casing;
■ 2 possibilities for mounting:
□ diam. 30-50-80 mm on symmetrical rail,
□ all diameters on plate and cables;
■ connection:
□ diam. 30 to 200 mm by tunnel terminals for 0.22 mm² wires (minimum),
□ diam. 300 mm by 6.35 mm tab connectors.

Split toroids (type OA)
■ enclosed in an insulated casing;
■ mounting on plate and cable;
■ connection by 5 mm diam. screws for 0.22 mm² wires.

characteristics

toroids		type A	type OA
		E24281 	E24290 
electrical characteristics			
transformation ratio		1/1000	1/1000
maximum permissible current: 1 kA continuous - 5 kA/1.5 s - 100 kA/0.05 s		■	■
mechanical characteristics			
weight (kg)	ø 30	0.120	
	ø 50	0.200	
	ø 80	0.420	
	ø 120	0.590	
	ø 200	1.320	
	ø 300	2.230	
	ø 46		1.300
	ø 110		3.200
other characteristics			
temperature range	for storage	– 55 °C to + 85 °C	– 55 °C to + 85 °C
	for operation	– 5 °C to + 70 °C	– 5 °C to + 70 °C
degree of protection		IP 20	IP 20

installation precautions

Immunity to line overcurrents
Line overcurrents, due to motor starting or transformer energising, may result in unnecessary fault detection by the detector.
A number of simple precautions can help prevent this from happening: when used together they are even more effective:
■ place the toroid on a straight part of the cable;
■ carefully centre the cable in the toroid;
■ use a toroid with a diameter far larger than the diameter of the cable (2 x diameter), (figure 1).
For severe operating conditions, use of a mild steel sleeve placed around the cable, in the toroid, considerably increases immunity.

Recommended characteristics
■ mild steel foil, 1/10 mm thick, to be wound several times around the cable in the toroid (at least 1 mm thick);
■ internal diameter of toroid > 1.4 x external diameter of the cable bundle (figure 2);
■ toroid-detector link:
□ resistance ⩽ 3 Ω,
□ cross-sectional area of wires: 0.75 mm² to 1.5 mm²,
□ maximum length: 50 m.

E13856A

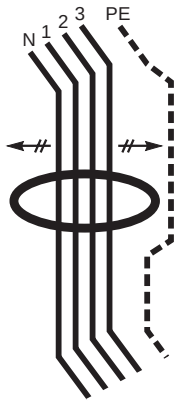


Figure 1.

E13856B

Figure 2.

auxiliaries

section of auxiliaries

A number of accessories are required for Vigilohm installations; other optional accessories can be provided:
■ essential auxiliary;
■ optional auxiliary.

Vigilohm	XM200 XM300C		XGR	TR22A	TR22AH	EM9 EM9B EM9T	réf
	U < 760 VAC **(4)** U < 440 VAC **(5)** U < 500 VDC **(6)**	760 à 1700 VAC **(4)** 440 à 1000 VAC **(5)** 500 à 1200 VDC **(6)**					
"250 V " Cardew C **(1)** or	■			■	■	■ **(2)**	**50170**
"440 V" Cardew C **(1)** or	■			■	■	■ **(2)**	**50171**
"660 V" Cardew C **(1)** or	■			■	■	■ **(2)**	**50172**
"1000 V" Cardew C **(1)** or		■		■	■	■ **(2)**	**50183**
Cardew C base	□	□		□	□	□	**50169**
P1 subassembly				■ **(3)**			**50211**
ZX limiting impedance	□		□	□	□	□	**50159**
S3 inductive neutral point ⩽ 380V				□	□	□	**50113**
PHT 1000 additional subassembly		■ except XM200	□				**50248**

(1) See choice of the type of Cardew C (250, 440, 600 or 1000 V) below.
(2) The use of a Cardew C is unnecessary with the EM9T.
(3) Necessary for TR22A or XGR used on installations with U > 440 V.
(4) Neutral distributed.
(5) Neutral not distributed.
(6) DC installation.

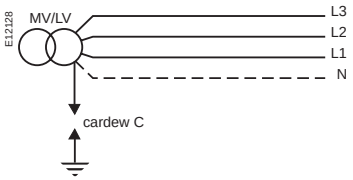
auxiliary characteristics

Cardew C surge limiter

041857

■ on LV network with isolated or impedance-earthed neutral;
■ connected to the secondary of the MV/LV transformer to discharge overvoltages to earth;
■ capable of withstanding the short-circuit current of the transformer;
■ its operation causes continuous indication on the insulation monitor.

E12128



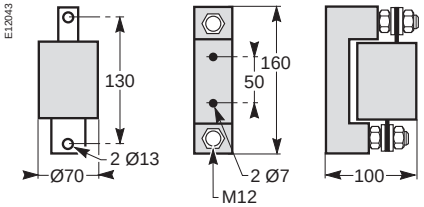
connection

Characteristics
■ non-arcing voltage at 50 Hz
⩽ 1.6 x nominal U;
■ certain arcing voltage at 50 Hz
⩾ 2.5 x nominal U (3 x nominal U for 220 V);
■ maximum current after arcing:
40 kA/0.2 sec;
■ insulation resistance > 10^{10} ohms;
■ cartridge not reusable;
■ temperature range:
□ operating: - 5 °C to + 40 °C,
□ storage: - 25 °C to + 70 °C.

Standards
NF C 63-150, NF C 15-100.
Weight: 1 kg.

Cardew selection table
The selection depends on:
■ the operating voltage Un of the installation;
■ the installation insulation level;
■ the connection point (neutral-earth or phase-earth).

E12043



Un: ph.-ph. operat. voltage of the AC instal.		Ui arcing voltage	Cardew C
neutral distributed	neutral not distributed		"type"
U ⩽ 380 V	U ⩽ 220 V	400 V < Ui ⩽ 750 V	"250 V"
380 V < U ⩽ 660 V	220 V < U ⩽ 380 V	700 V < Ui ⩽ 1100 V	"440 V"
660 V < U ⩽ 1000 V	380 V < U ⩽ 660 V	1100 V < Ui ⩽ 1600 V	"660 V"
1000 V < U ⩽ 1560 V	660 V < U ⩽ 1000 V	1600 V < Ui ⩽ 2400 V	"1000 V"

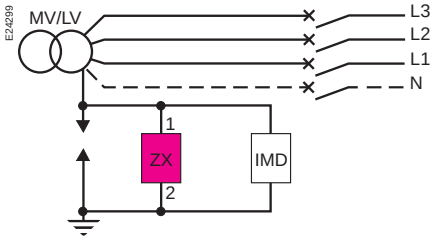
Connecting conductor size
■ cable or bar with a size adapted to the transformer rating
■ cable size in mm^2 for a 20 kV/400 V transformer.
■ the connecting conductor should be considered to be a protective conductor (PE) and the calculation of its cross-sectional area must satisfy applicable installation standards, considering that this part of the installation is protected by protective devices located upstream of the MV/LV transformer;
■ according to standard IEC 364, the formula for the calculation of the of the size of the PE conductor is: $S = \sqrt{I^2t}/k$
where S is the cross-sectional area of the PE conductor in mm^2,
I is the fault current, t is the operating time of the protective device and k is a coefficient that depends on the metal and insulation material used for the conductor.
■ recommendation: if insulation monitoring is provided using the Vigilohm System, install a type A toroid on the Cardew earthing circuit in order to monitor operation of the Cardew. The toroid can be connected to an XD301/312 detector.

ZX limiting impedance subassembly

019303

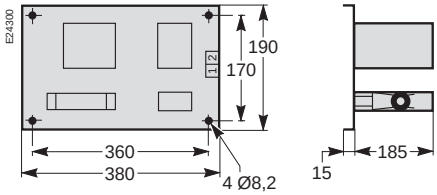
Connection

■ creates an installation with an impedance-earthed neutral;
■ remains connected during fault locating at 2.5 Hz:
□ 1500 Ω at 50 Hz,
□ 1M Ω at 2.5 Hz;
■ U ⩽ 500 V AC.



Dimensions, mounting

Weight: 3.500 kg

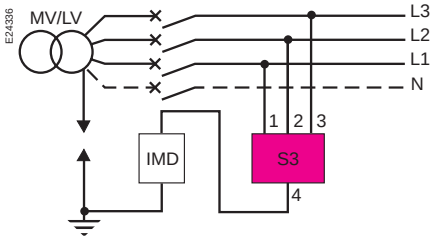


S3 inductive neutral point subassembly

019301

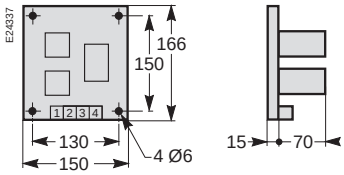
Connection

■ creates an artifical neutral point for insulation monitoring, with the main circuit-breaker open;
■ U ⩽ 380 V AC.



Dimensions, mounting

Weight: 1.750 kg

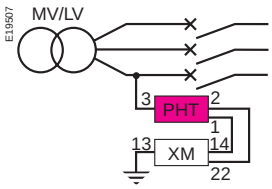


PHT1000 additional subassembly

044139

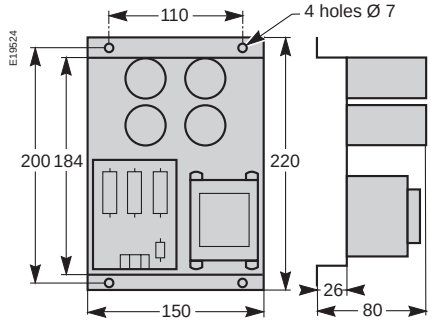
Connection

■ for use with the Vigilohm System XM300C on the following installations:
□ 440 V AC ⩽ U ⩽ 1000 V AC, neutral not distributed,
□ 760 V AC ⩽ U ⩽ 1200 V AC, neutral distributed,
□ 500 V DC ⩽ U ⩽ 1200 V DC: installation.



Dimensions, mounting

Weight: 2 kg

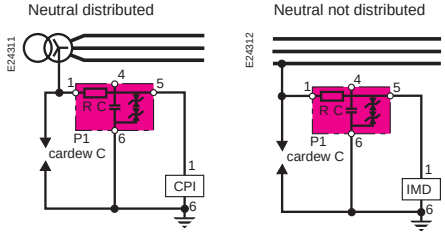


P1 subassembly

019302

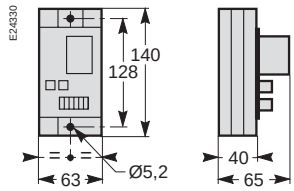
Connection

■ lowers the voltage applied to the TR22A/AH insulation-monitoring device or XGR generator for mobile locating:
□ 440 V AC ⩽ U ⩽ 1000 V AC, neutral not distributed,
□ 760 V AC ⩽ U ⩽ 1200 V AC, neutral distributed;
■ lowers the voltage applied to the THR insulation-monitoring device.



Dimensions, mounting

Weight: 0.400 kg



Vigilohm

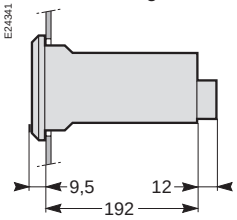
3/ installation and connection

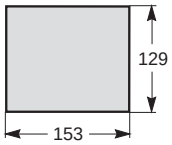
	page
dimensions	28
connection	30

dimensions

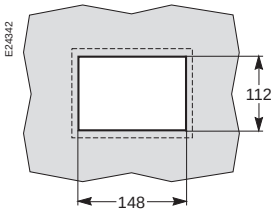
XM200, XM300C

Flush mounting



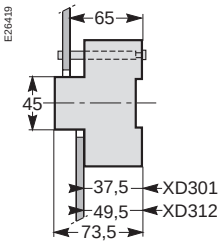


Cutout

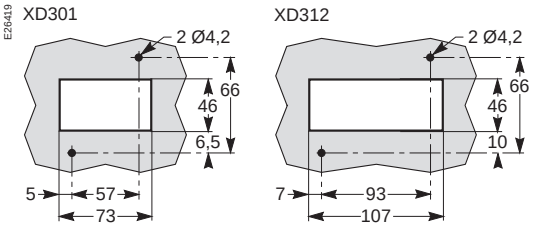


XD301, XD312

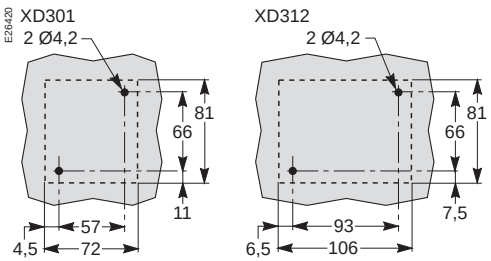
Flush mounting



Cutout

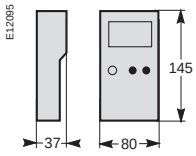


Surface mounting

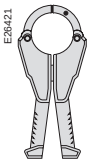


XRM + probes

XRM manual receiver



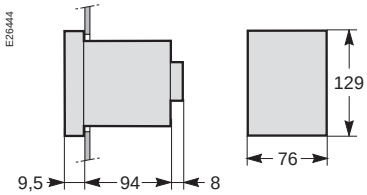
XP15, XP50 and XP100 probes



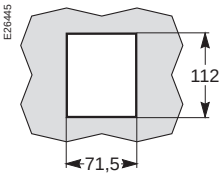
cable dimensions
XP15: ø 12 mm.
XP50: ø 50 mm.
XP100: ø 100 mm.

TR22A, TR22AH

Flush mounting IP 40

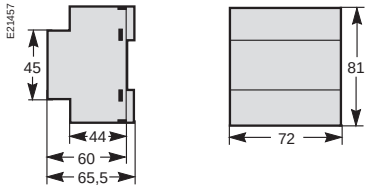


Cutout

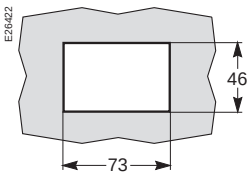


EM9, EM9B, EM9BV, EM9T, SM21

Mounting on symmetrical rail IP 20



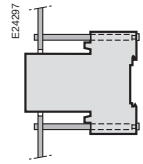
Cutout



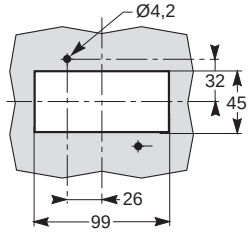
Mounting on panel: use fixing lugs **20269**.

TR5A

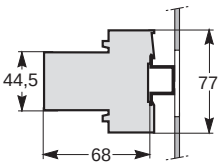
Flush mounting IP 30 (behind panel)



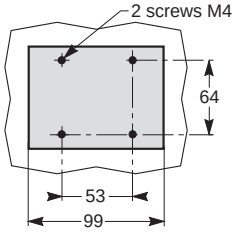
Door cutout and holes



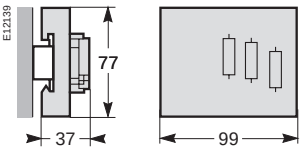
Mounting on symm. rail IP 20



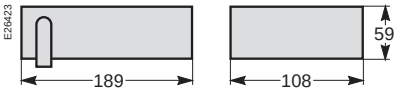
Mounting on panel IP 20



Auxiliary subassembly aa > 220 V

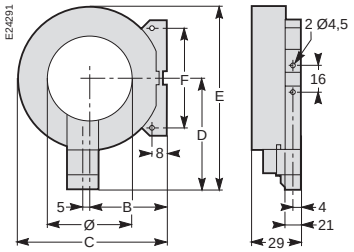


XGR



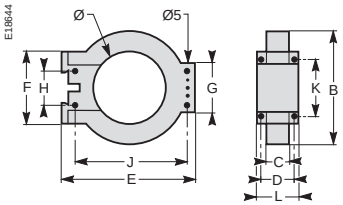
toroids (type A and OA)

type **A**
ø 30 and 50



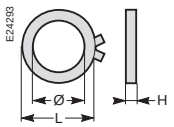
type	ø	B	C	D	E	F
TA30	30	31	60	53	82	50
PA50	52	45	87	66	108	60

types **A**
ø 80 to 200



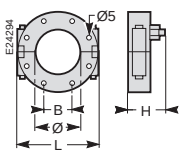
type	ø	B	C	D	E	F	G	H	J	K	L
IA80, IE80	80	122	26.5	35	150	80	55	40	126	65	44
MA120, ME120	120	164	26.5	35	190	80	55	40	166	65	44
SA200, SE200	196	256	29	37	274	120	90	60	255	104	46

type **A**
ø 300



type	ø	H	L
GA300	299	29	344

type **OA**
ø 46 and 110



type	ø	H	L	B	C
POA	46	68	148	57	38
GOA	110	68	224	76	44

connection

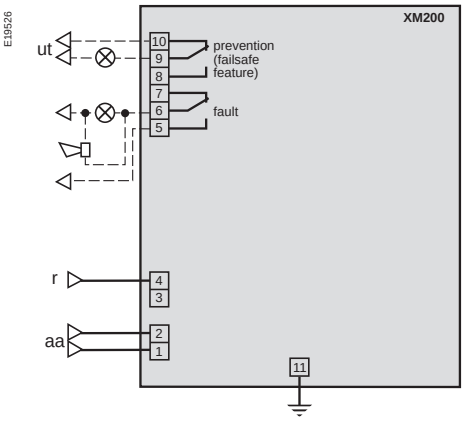
XM200

E25115

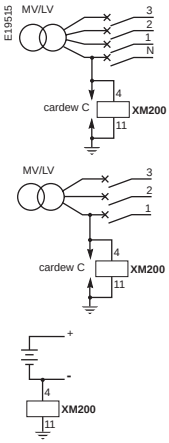
Tunnel terminals for 1.5 mm² wiring

Legend
aa: AC auxiliary supply ± 10 %, 50-60 Hz
ut: application
r: installation
terminal 11: earth connection by round lug (4 mm diameter) to be crimped.

E19526



E19515



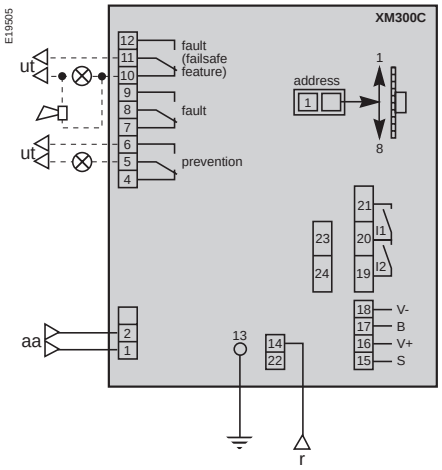
XM300C

E27116

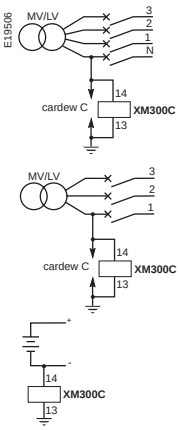
Tunnel terminals for 1.5 mm² wiring

Legend
aa: AC auxiliary supply ± 10 %, 50-60 Hz
ut: application
r: installation
terminal 13: earth connection by round lug (4 mm diameter) to be crimped.
*connection supplied with PHT1000.

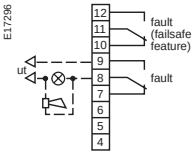
E19505



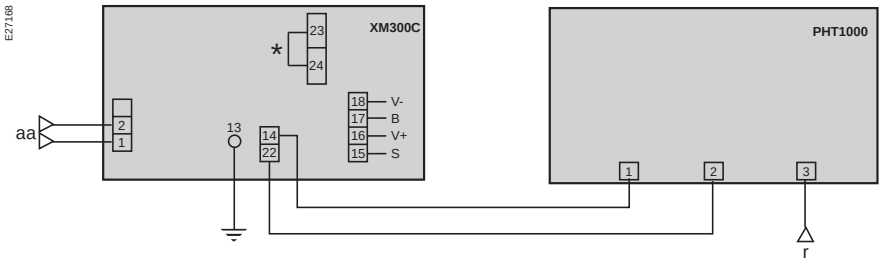
E19506



E17296

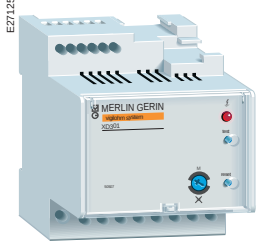


E27168



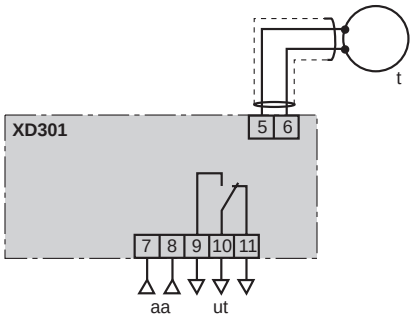
XD301

E27125



Tunnel terminals for 1.5 mm² wiring

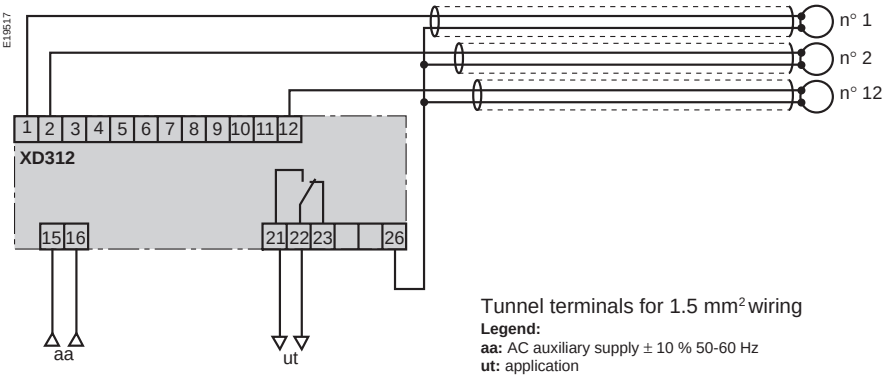
Legend:
aa: AC auxiliary supply ± 10 %, 50-60 Hz
ut: application
t: toroid A or OA



XD312

E19520

E19517



Tunnel terminals for 1.5 mm² wiring

Legend:
aa: AC auxiliary supply ± 10 % 50-60 Hz
ut: application
t: toroid A or OA

Mounting examples for type A toroids

On XD301**detector**, ø 30 to 50

044866

044865

On rail, ø 30 to 80 mm

042593

042592

On plate or section, type **A**, ø 30 to 200 mm

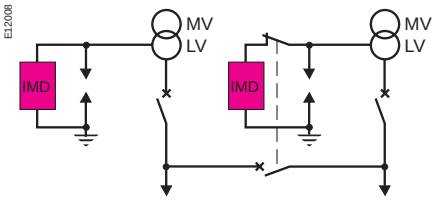
042591

On cable, ø 120 to 300 mm

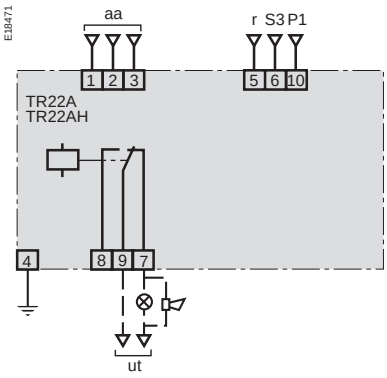
042590

connection (cont.)

When coupling two installations, one of the two Vigilohm insulation monitors must be disconnected momentarily.



TR22A/TR22AH



2.5 mm² wiring

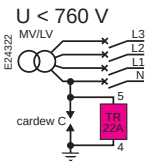
Legend:
aa: AC auxiliary supply, 50-60 Hz

+10 %, -15 %	1 2	1 3
110-127 V ∿	110-127 V	
220/415 V ∿	220-240 V	380-415 V
440/525 V ∿	440-480 V	500-525 V

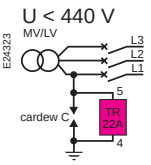
r:installation
S3: S3 subassembly (optional)
ut: application
P1: P1 subassembly (optional)

Use with failsafe feature: the normally excited output relay is de-energised in the event of an auxiliary voltage failure (of internal or external origin) or an insulation fault.

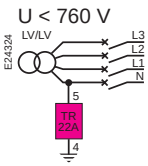
U < 760 V



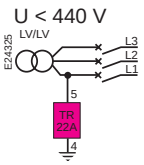
U < 440 V



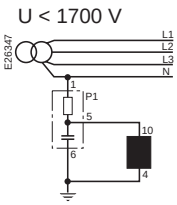
U < 760 V



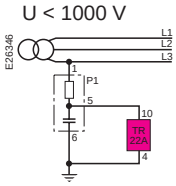
U < 440 V



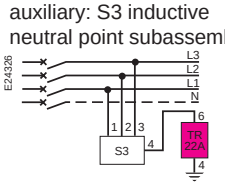
U < 1700 V



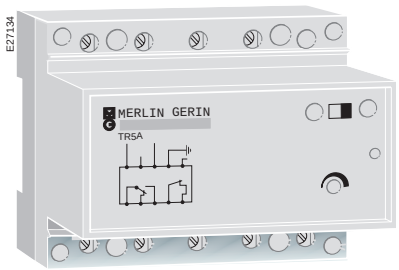
U < 1000 V

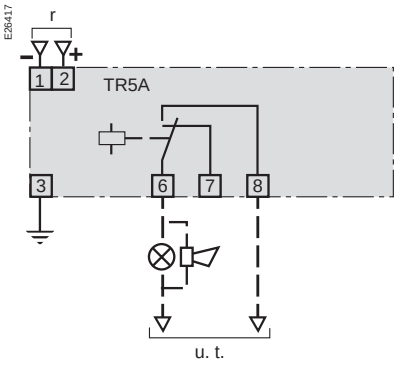


auxiliary: S3 inductive neutral point subassembly



TR5A

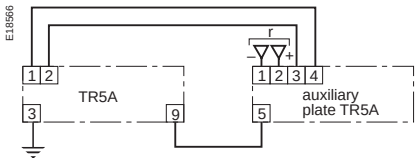


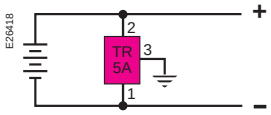


Note: for a TR5A with failsafe feature, use terminals 6 and 7.

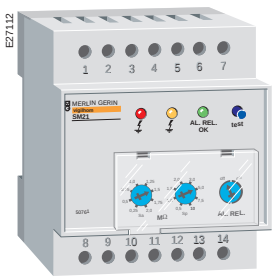
2.5 mm² wiring
6.35 mm tab connector

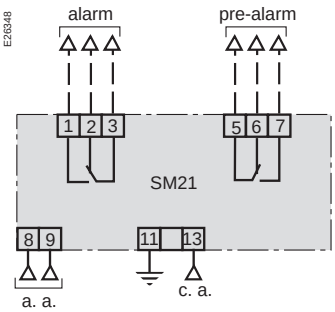
Legend:
r.: installation DC power supply, + 20 %, - 20 %
ut: application
r > 220 V





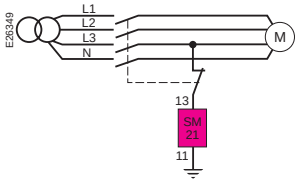
SM21





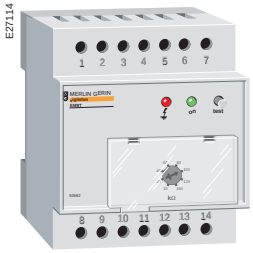
2.5 mm² wiring

Legend:
aa: supply



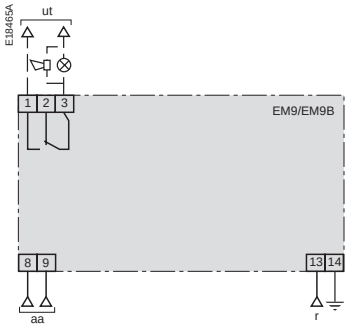
Note: make sure that the auxiliary contact of the motor control system can withstand the rated voltage when the contact is open.

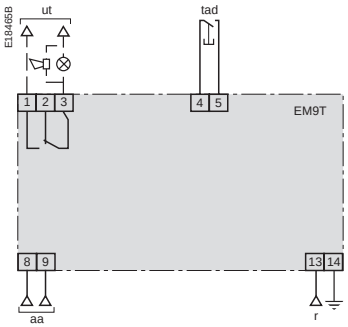
EM9, EM9B, EM9T

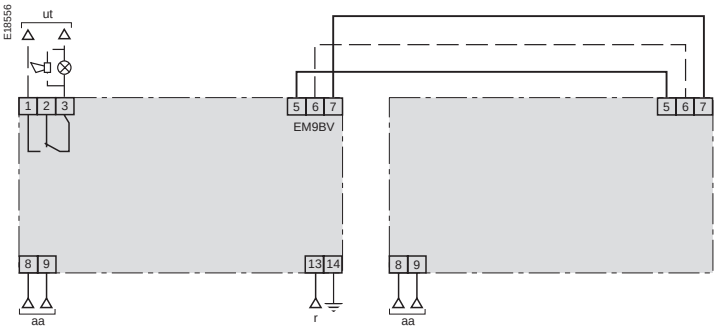


EM9BV

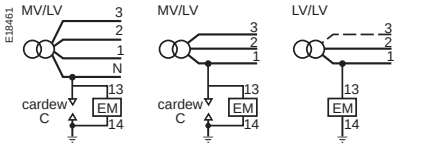
Legend:
aa: auxiliary supply, + 10 %, - 15 %
ut: application
r: installation
tad: remote test

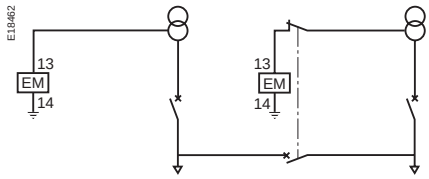






2.5 mm² wiring

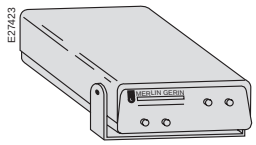


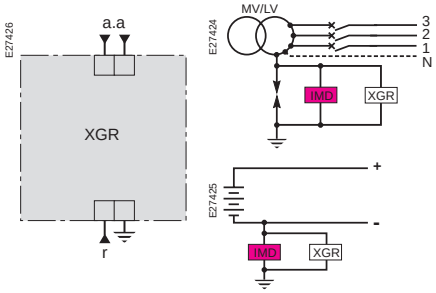


EM9, EM9B
Use with failsafe feature: the normally excited output relay is de- energised in the event of an auxiliary voltage failure (of internal or external origin) or an insulation fault.

EM9T
- remote test: terminals 4 and 5;
- compliance with standard UTE C63-080.

XGR





a. a. : auxiliary supply
r.: installation

Vigilohm

4/ catalogue numbers

permanent insulation monitoring

Vigilohm TR22A/TR22AH

network voltage (neutral unavailable) ≤ 440 V AC		
with rectifiers : balanced fault detection		
TR22AH : special hospital version		
single phase auxiliary power supply (V)		
TR22A	115/127 V AC 50/60 Hz	**50395**
	220/240 V AC 50/60 Hz 380/415 V AC 50/60 Hz	**50396**
	440/480 V AC 50/60 Hz 500/525 V AC 50/60 Hz	**50397**
TR22AH	115/127 V AC 50/60 Hz	**50398**
	220/240 V AC 50/60 Hz 380/415 V AC 50/60 Hz	**50399**
	440/480 V AC 50/60 Hz 500-525 V AC 50/60 Hz	**50391**
TR22AH (threshold mini 50 kΩ)	220/240 V AC 50/60 Hz 380/415 V AC 50/60 Hz	**50404**

Vigilohm EM9

network voltage (neutral unavailable) ≤ 440 V AC		
high insulation (adjustable threshold 10-150 kΩ)		
single phase auxiliary power supply (V)	**standard model**	**fail safe model**
115/127 V AC 50/60 Hz	**50595**	**50596**
220/240 V AC 50/60 Hz	**50597**	**50598**
380/415 V AC 50/60 Hz	**50599**	**50600**
440/480 V AC 50/60 Hz	**50601**	**50602**

Vigilohm EM9B

network voltage (neutral unavailable) ≤ 440 V AC		
low or capacitive insulation (adjustable threshold 1-100 kΩ)		
single phase auxiliary power supply (V)	**standard model**	**fail safe model**
115/127 V AC 50/60 Hz	**50555**	**50556**
220/240 V AC 50/60 Hz	**50557**	**50558**
380/415 V AC 50/60 Hz	**50559**	**50560**
440/480 V AC 50/60 Hz	**50561**	**50562**

Vigilohm EM9BV

network voltage (neutral unavailable) ≤ 440 V AC		
digital insulation readout (adjustable threshold 1-100 kΩ)		
single phase auxiliary power supply (V)	**standard model**	**fail safe model**
115/127 V AC 50/60 Hz	**50568**	**50569**
220/240 V AC 50/60 Hz	**50570**	**50571**
380/415 V AC 50/60 Hz	**50572**	**50573**
440/480 V AC 50/60 Hz	**50574**	**50575**

Vigilohm EM9T

network voltage (neutral unavailable) ≤ 220 V AC	
machine control and display (adjustable threshold 10-150 kΩ)	
single phase auxiliary power supply (V)	
24 V AC 50/60 Hz	**50581**
48 V AC 50/60 Hz	**50582**
115/127 V AC 50/60 Hz	**50583**
220/240 V AC 50/60 Hz	**50584**

Vigilohm TR5A

network voltage (neutral unavailable) (adjustable threshold 5-150 kΩ)	≤ 420 V DC	
power supply from network monitored (V)	**standard model**	**fail safe model**
24 V DC	**50340**	**50344**
42/48 V DC	**50341**	**50345**
120 V DC	**50342**	**50346**
220 V DC	**50343**	**50347**
260 V DC	**50350** *	
420 V DC	**50351** *	

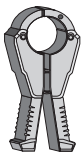
* with external plate supplied

Vigilohm SM21

network voltage	≤ 690 V *	
single phase auxiliary power supply (V)		
115/127 V AC 50/60 Hz		**50760**
220/240 V AC 50/60 Hz		**50761**
380/415 V AC 50/60 Hz		**50762**
440/480 V AC 50/60 Hz		**50763**
500/525 V AC 50/60 Hz		**50764**

* this voltage is governed by the rated voltage stability performance of the open auxiliary contact used to isolate the SM21 from the network.

mobile 2.5 Hz generator



single phase auxiliary power supply (V)		
mobile fault tracking kit case containing: XGR (220/240 V) + XRM + XP15, XP50 and XP100 probes		**50310**
empty case for mobile fault tracking kit		**50285**
mobile XGR generator	115/127 V CA 50/60 Hz	**50281**
	220/240 V AC 50/60 Hz	**50282**
	380/415 V AC 50/60 Hz	**50283**
	500/525 V AC 50/60 Hz	**50284**
mobile detector and probes	XRM and XP15 probe	**50277**
	XRM and XP50 probe	**50287**
	XRM and XP100 probe	**50288**
	XRM and XP50 + XP100 probes	**50289**
	probe XP15	**50494**

auxiliaries

Vigilohm	**TR22A TR22AH**	**EM9 EM9B EM9BV EM9T**	**TR5A**	**SM21**	
"250 V" Cardew C or	■	■ (1)			**50170**
"440 V" Cardew C or	■	■ (1)			**50171**
"660 V" Cardew C or	■	■ (1)			**50172**
"1 000 V" Cardew C	■	■ (1)			**50183**
Cardew C base	❑	❑			**50169**
plate P1	■				**50211**
limiting impedance ZX	❑	❑			**50159**
inductive neutral point S3	❑	❑			**50113**

■ compulsory auxiliary
❑ optional auxiliary
(1) Use the Cardew C is not compulsory with EM9T

Vigilohm System

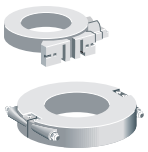
monitors

type of network to be monitored:		alternating or mixed IT	accessible neutral	voltage < 760 V AC (45/400 Hz)	
			non accessible neutral	voltage < 440 V AC (45/400 Hz)	
		direct or rectified	line voltage	< 500 V DC	
XM300C	single phase auxiliary power supply (V)		115/127 V AC 50/60 Hz		**50540**
			220/240 V AC 50/60 Hz		**50541**
			380/415 V AC 50/60 Hz		**50542**
			500/525 V AC 50/60 Hz		**50543**
XM200	single phase auxiliary power supply (V)		115/127 V AC 50/60 Hz		**50727**
			220/240 V AC 50/60 Hz		**50728**
			380/415 V AC 50/60 Hz		**50729**
			500/525 V AC 50/60 Hz		**50730**

detectors

type of network to be monitored:		see CPI XM200		
XD301	single phase auxiliary power supply (V)	115/127 V AC 50/60 Hz		**50506**
		220/240 V AC 50/60 Hz		**50507**
		380/415 V AC 50/60 Hz		**50508**
		500/525 V AC 50/60 Hz		**50509**
XD312	single phase auxiliary power supply (V)	115/127 V AC 50/60 Hz		**50535**
		220/240 V AC 50/60 Hz		**50536**
		380/415 V AC 50/60 Hz		**50537**
		500/525 V AC 50/60 Hz		**50538**

toroids



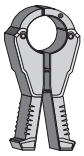
closed toroid	TA30		**50437**
	PA50		**50438**
	IA80		**50439**
	MA120		**50440**
	SA200		**50441**
	GA300		**50442**
opening toroid	POA		**50485**
	GOA		**50486**

accessories

	shielded pair coil	20 m	**50137**
		100 m	**50136**

interfaces

mobile detector and probes



	XRM mobile detector and XP15 probe		**50277**
	XRM mobile detector and XP50 probe		**50287**
	XRM mobile detector and XP100 probe		**50288**
	XRM mobile detector and XP50 + XP100 probes		**50289**
	empty case for mobile fault tracking kit		**50285**
	probe XP15		**50494**

Cardew surge limitor

	Cardew base		**50169**
	Cardew cartridge	250 V	**50170**
		440 V	**50171**
		660 V	**50172**
		1000 V	**50183**

adaptation plate

	used with CPI XM300c or XML308/316			
	type of network to be monitored:	alternating or mixed IT	accessible neutral	760 V AC < U < 1700 V AC (45/400 Hz)
			non accessible neutral	440 V AC < U < 1000 V AC (45/400 Hz)
		direct or rectified	line voltage	500 V DC < U < 1200 V DC
	PHT1000			**50248**

auxiliaries

	"250 V" Cardew C or	**50170**
	"440 V" Cardew C or	**50171**
	"660 V" Cardew C or	**50172**
	"1 000 V" Cardew C	**50183**
	Cardew C base	**50169**
	limiting impedance ZX	**50159**

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Fax:+33 (0)1 47 51 80 20

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