

Vigirex RH10M, RH21M, RH99M

Residual-current relays with separate toroid



RH10M



RH21M



RH99M

Earth-fault protection is achieved by measuring the earth-leakage current of an electrical installation and interrupting the supply of power if an insulation fault becomes dangerous to life or property.

Vigirex is a complete range providing earth-fault protection for all types of AC installations, including power distribution, sub-distribution and industrial control systems. Vigirex devices operate on TT, TNS and IT (for protection of persons against direct contact) systems. The relays are type A and type AC as defined by standard IEC/EN 60947-2.

Presentation

Vigirex relays can be used to:

- indicate insulation drops
- protect:
 - people against indirect contact and provide complementary protection against direct contact
 - property against the risk of fire
 - motors
 - earthing conductors.

The relays can be installed on DIN rails or mounting plates. 72 x 72 mm front-panel mount versions are also available.

Operation

Used together with a toroid (type A or OA) or rectangular sensor:

- the monitoring relays trip an alarm if the earth-leakage current exceeds the alarm threshold "I alarm" for a time greater than the delay "t alarm"
- the protection relays trip the installation protection circuit breaker via an MN or MX release if the earth-leakage current exceeds the fault threshold "I Δ n" for a time greater than the delay "t Δ t".

Standards

Vigirex relays comply with the following standards:

- IEC/EN 60755
- IEC/EN 60947-2 annex M
- IEC/EN 61000-4-2 to 4-6 and EN 61000-6-2
- EN 50081-1 and CISPR11
- IEC/EN 60664-1
- IEC/EN 60364 and NF C 15100
- EN 50102
- UL 1053 up to 220/240 V.

The Vigirex range is also certified by the independent KEMA laboratories. It has successfully passed test sequences MI/MII/MIII/MIV of standard IEC 60947-2 (annex M).

Maximum safety

Display of measurements and events:

- a threshold overrun is signalled by a red LED.

Protection of persons:

- Set to 30 mA and combined with a Compact NSX/NS circuit breaker, the relays open the power circuit in less than 40 ms (in compliance with standards IEC 60947-2 and IEC 60755).

Test function in compliance with standards IEC 60364, IEC 60755 and NF C 15100:

Whether initiated on the front of the relay or via a push button installed on the door of the electrical switchboard (tests on a number of relays may be centralised), the test checks:

- operation of the display and internal electronics
- alarm tripping or opening of the protection circuit breaker connected to the relay.

The relay can also be tested without activating the output relays.

Overvoltage category 4 (the most severe):

- makes direct connection possible at the head of the installation or on the upstream busbars without any additional galvanic isolation.

Continuous monitoring:

- toroid/relay connections, power supply and internal electronics are tested automatically
- the monitoring relay makes it possible to carry out preventive maintenance to eliminate insulation faults before they become dangerous
- the voltage-presence contact indicates the presence of power. It is wired in series with the fault contact for failsafe operation in the event of a power failure.

Class 2 front insulation as defined by IEC 60664-1.

Settings protected by a lead-sealable cover.

Standard relays

These relays are designed for installation at all installation levels. The offer:

- fixed instantaneous thresholds from 0.03 A to 1 A (RH10M)
- 2 fixed instantaneous thresholds (0.03 A or 0.3 A) or a 0.3 A threshold with a 0.06 s time delay (RH21M)
- settings that can be user-selected over a wide range of currents and time delays (RH99M)
- several installation modes.

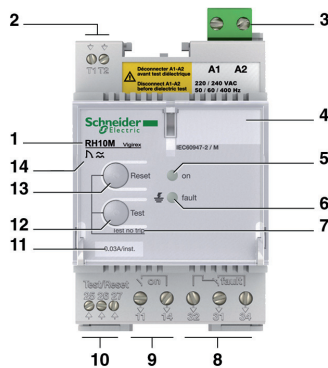
Optimised continuity of service

Elimination of nuisance tripping:

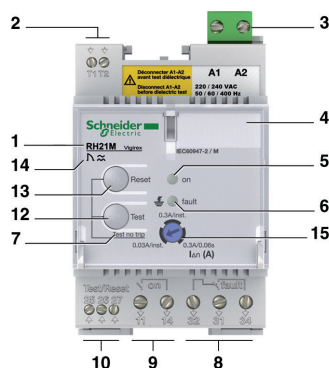
- reduced tripping tolerances for the Δn protection threshold
- rms measurement of earth-leakage currents
- frequency filtering
- inverse-time tripping curve.

Discrimination with the other earth-fault protection systems: Vigirex, VigiCompact, Vigi Acti 9.

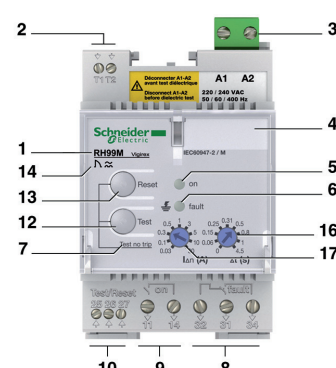
Test with or without tripping.



RH10M



RH21M



RH99M

Relay marking

- 1 Type of relay.
- 4 Customer marking zone (circuit identification).
- 11 Sensitivity (RH10M): Δn (A) / Δt (s).
- 14 Relay class.

Controls

- 7 Press and hold the Reset button, then press the Test button to test the device without actuating the output contacts.
- 12 Test button.
- 13 Reset button.

Indications

- 5 Green voltage-presence LED (on).
- 6 Red insulation-fault LED (fault).

LED status		Meaning
on	fault	
●	●	Normal operation
●	●	Fault current detected
●	● ●	Relay/sensor link fault
●	●	No voltage or device not in service
●	●	Malfunction detected

Key:

- off
- (●) green (or red)
- ● ● flashing.

Settings

15 Threshold and time-delay selectors (RH21M): Δn (A) / Δt (s)

Three possible settings:

- 0.03 A sensitivity, instantaneous
- 0.3 A sensitivity, instantaneous
- 0.3 A sensitivity, 0.06 s delay

16 Time-delay selector (RH99M): Δt (s). Nine possible settings (instantaneous - 0.06 s - 0.15 s - 0.25 s - 0.31 s - 0.5 s - 0.8 s - 1 s - 4.5 s).

17 Threshold selector (RH99M): Δn (A). Nine possible settings (0.03 A - 0.1 A - 0.3 A - 0.5 A - 1 A - 3 A - 5 A - 10 A - 30 A).

Connection

- 2 Sensor.
- 3 Plug-in supply.
- 8 Fault contact.
- 9 Voltage-presence contact.
- 10 Remote reset/test.

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Well-designed front

- Easy and effective access to settings.
- Lead sealing.

MONITORED SYSTEMS

Low-voltage AC - System Voltage	50/60/400 Hz ≤ 1000 V
System earthing arrangements	TT, TNS, IT

CHARACTERISTICS

Electrical characteristics

		RH10M - RH21M - RH99M	
Power supply: rated operational voltage Ue V CA 50/60 Hz		12-24, 48, 110-130, 220-240 (50/60/400 Hz), 380-415, 440-525	
Supply voltage V DC		12-48	
Operational voltage tolerance		Ue: 12-24 V AC - 12-48 V DC - 55 % to 120 % Ue ⁽¹⁾ 48 V ≤ Ue ≤ 415 V - 55 % to 110 % Ue Ue > 415 V - 70 % to 110 % Ue	
Max. Consumption		4 VA / 4 W	
Operating temperature		-35 °C / +70 °C	
Storage temperature		-55 °C / +85 °C	
Fault or alarm	RH10	Threshold "IΔn" (A)	1 fixed threshold: 0.03 - 0.05 - 0.1 - 0.15 - 0.25 - 0.3 - 0.5 - 1
		Time delay "Δt" (s)	Instantaneous
	RH21	Threshold "IΔn" (A)	User-selectable: 2 thresholds (0.03 A or 0.3 A)
		Time delay "Δt" (s)	Instantaneous for IΔn = 0.03 A, 1 user-selectable time delay, instantaneous or 0.06 s for IΔn = 0.3 A
	RH99	Threshold "IΔn" (A)	User-selectable: 0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 - 10 - 30
		Time delay "Δt" (s)	Instantaneous for IΔn = 0.03 A, 9 user-selectable time delays, instantaneous to 4.5 s
Accuracy		+0 / -20 %	
Changeover type output contact with latching			
Test	Relay	Local or remote (max. 10 meters) (with or without activation of the output contact)	
	Toroid-relay connection	Continuous	
Reset	Local or remotd (max. 10 meters)		

Characteristics of output contacts as defined by IEC 60947-5-1

Rated thermal current (A)		8					
Minimum load		10 mA at 12 V					
Utilisation category		AC				DC	
		AC12	AC13	AC14	AC15	DC12	DC13
Rated operational current (A)	24 V	6	6	5	5	6	2
	48 V	6	6	5	5	2	-
	110-130 V	6	6	4	4	0,6	-
	220-240 V	6	6	4	4	-	-
	250 V	-	-	-	-	0,4	-
	380-415 V	5	-	-	-	-	-
	440 V	-	-	-	-	-	-
	660-690 V	-	-	-	-	-	-

(1) 80 % to 120 % Ue if Ue < 20 V.

MECHANICAL CHARACTERISTICS

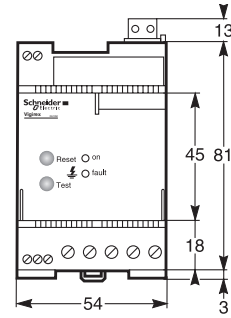
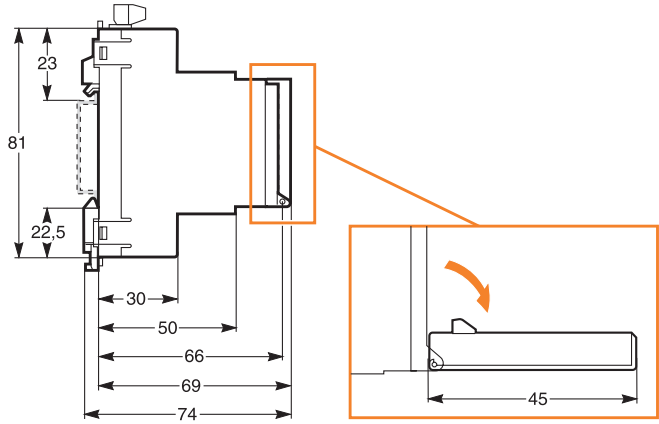
Dimensions		DIN 6 modules x 9 mm - Front-panel mount 72 x 72 mm	
Weight		0.3 kg	
Degree of protection (IEC 60529)	Front face	IP40	
	Other faces	IP30	
	Connections	IP20	
Front face impact resistance (EN 50102)		IK07 (2 joules)	
Vibrations (Sinus Lloyd's and Veritas)		2 to 13.2 Hz ±1 mm and 13.2 to 100 Hz - 0.7 g	

ENVIRONMENT

Damp heat, equipment not in service (IEC 60068-2-30)		28 cycles +25 °C / +55 °C / HR 95 %	
Damp heat, equipment in service (IEC 60068-2-56)		48 hours, Environment category C2	
Salt mist (IEC 60068-2-52)		KB test, severity 2	
Degree of pollution (IEC 60664-1)		3	
Electromagnetic compatibility for both relay and sensor:			
■ electrostatic discharges (IEC 61000-4-2)	Level 4		
■ radiated susceptibility (IEC 61000-4-3)	Level 3		
■ low-energy conducted susceptibility (IEC 61000-4-4)	Level 4		
■ high-energy conducted susceptibility (IEC 61000-4-5)	Level 4		
■ radio-frequency interference (IEC 61000-4-6)	Level 3		
■ conducted and radiated emissions (CISPR11)	Class B		

Dimensions

Mounting on a DIN rail



Mounting on a mounting plate

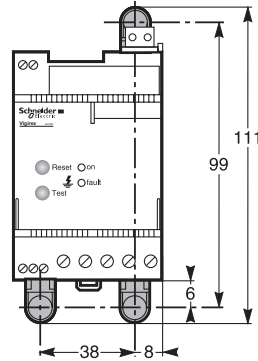
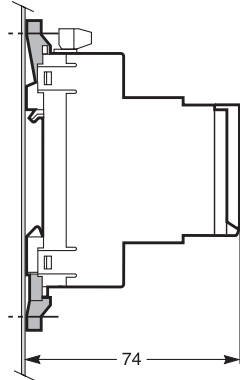
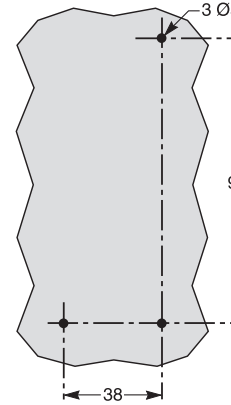
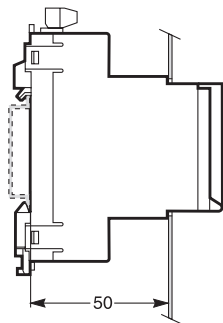


Plate drilling layout

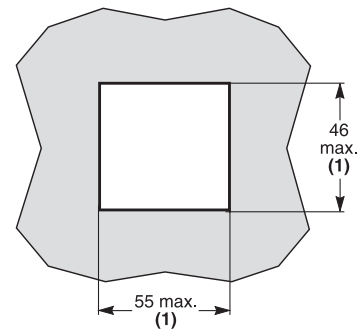
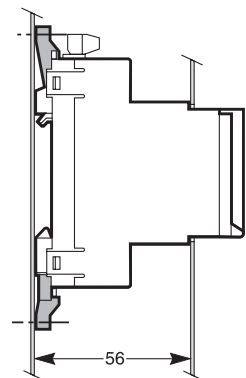


Door cutout

Mounting on DIN rail



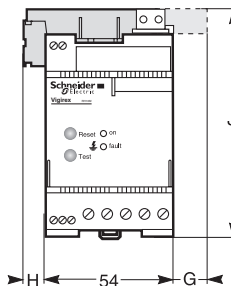
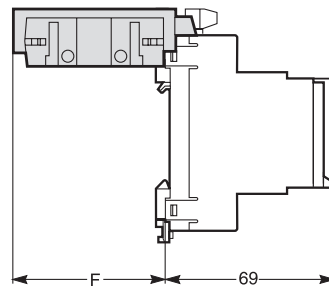
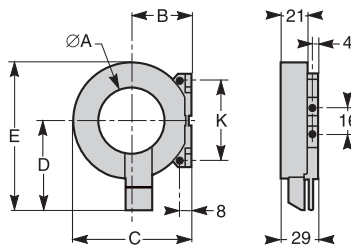
Mounting on a mounting plate



(1) For IP4 requirements.

TA30 and PA50 clip in toroids

Secured to the back of the relay



Type	ØA	B	C	D	E	F	G	H	J	K
TA30	30	31	60	53	82	59	-	13	97	50
PA50	50	45	88	66	108	86	20	14	98	60

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Connections

Connection of test and remote reset functions

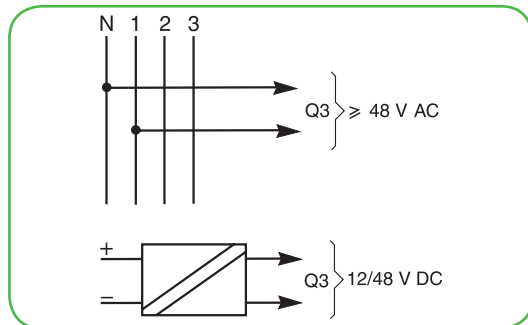
● **Cable**

The cable must not exceed 10 m in length.
Use a cable with 3 twisted wires.

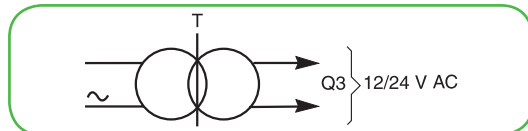
● **Contacts**

Use pushbuttons with low-level contacts suitable for the minimum load of 1 mA at 4 V.

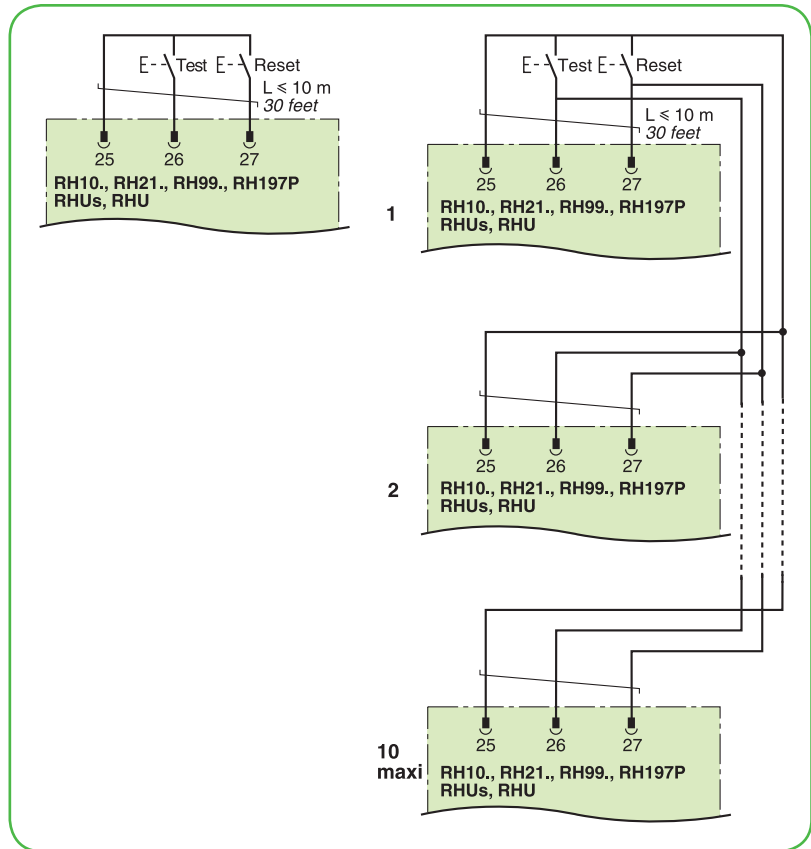
Connection of relay power supply



The DC power supply must be galvanically isolated from the AC power system.



T: class 2 isolation transformer mandatory for $V_{A1, A2} \leq 24 \text{ V CA}$.



Typical electrical diagrams

Wiring diagram with MX release

L₁: lamp

MX: shunt release

Q₁: circuit breaker protecting the main circuit

Q₂: DPN circuit breaker

Q₃: 1 A DPN circuit breaker, curve C or D.

RH10M, RH21M, RH99M:

A₁-A₂: auxiliary power supply

T₁-T₂: A or OA type toroids or rectangular sensor (if $I_{\Delta n} \geq 500 \text{ mA}$)

11-14: "voltage-presence" contact

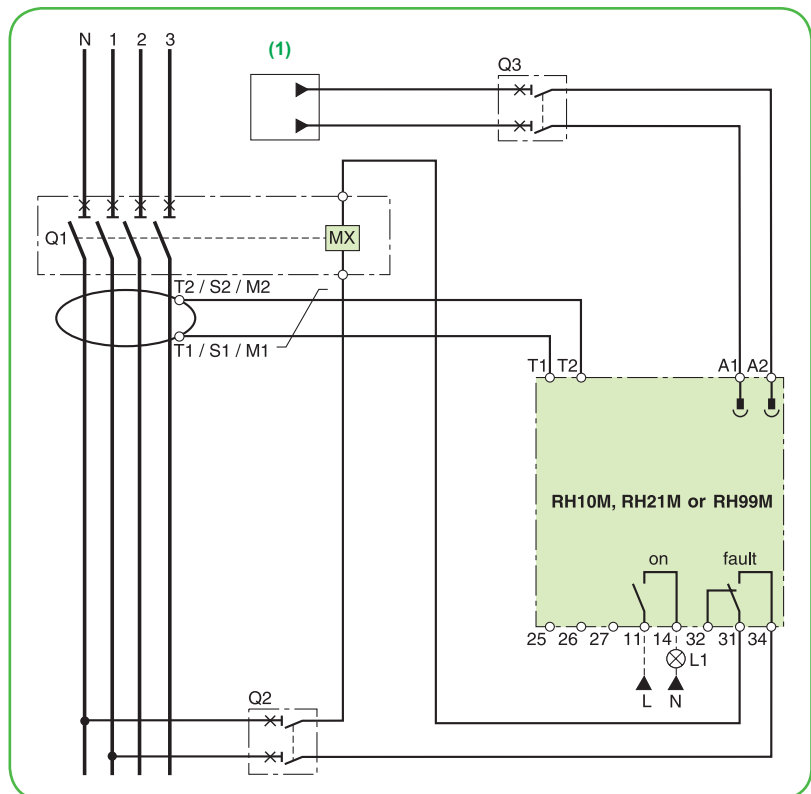
26-25: relay test

27-25: relay reset

31-32-34: "fault" contact.

Note: for the RH99 earth leakage monitor use the "fault" contact 31, 32, 34.

(1) Connection of relay power supply, see above.



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Typical electrical diagrams

Wiring diagram with MN undervoltage relay

MN: shunt release

Q₁: circuit breaker protecting the main circuit

Q₂: DPN circuit breaker

Q₃: 1 A DPN circuit breaker, curve C or D.

RH10M, RH21M, RH99M:

A₁-A₂: auxiliary power supply

T₁-T₂: A or OA type toroids or rectangular sensor (if $I_{\Delta n} \geq 500$ mA)

11-14: "voltage-presence" contact

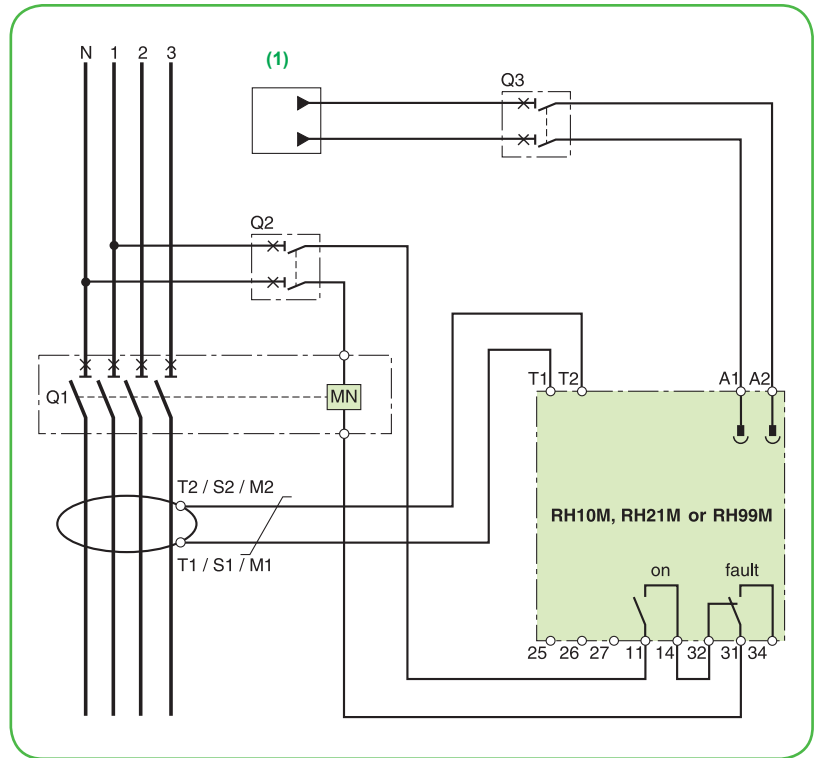
26-25: relay test

27-25: relay reset

31-32-34: "fault" contact.

Note: for the RH99 earth leakage monitor use the "fault" contact 31, 32, 34.

(1) Connection of relay power supply, see page 05.



RH99M monitor wiring diagram with ATM auto-reclosing controller

ATm3: auto-reclosing controller

H: red light

MT: motor mechanism module

MX: shunt release

Q₁: circuit breaker protecting the main circuit

Q₂: 1 A DPN circuit breaker, curve C or D

Q₃ to Q₅: DPN circuit breaker.

RH99M :

A₁-A₂: auxiliary power supply

T₁-T₂: A or OA type toroids or rectangular sensor (if $I_{\Delta n} \geq 500$ mA)

11-14: "voltage-presence" contact

26-25: relay test

27-25: relay reset

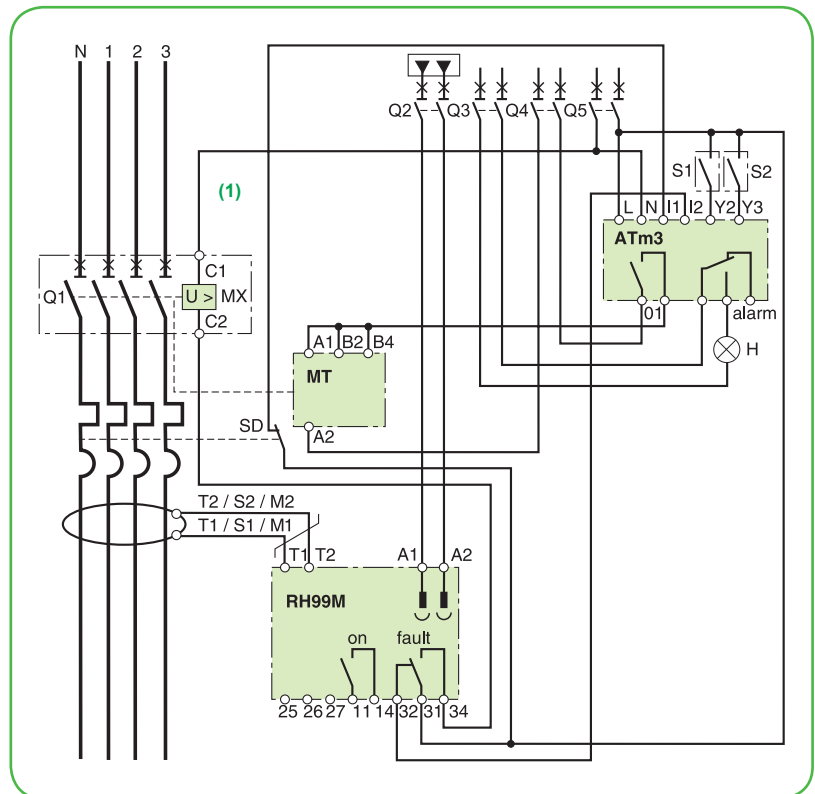
31-32-34: "fault" contact

S₁ and S₂: single-pole switch

SD: auxiliary fault indication contact

T: sensor.

(1) Connection of relay power supply, see page 05.



Associated sensor

Type	Type A or OA toroids without any restrictions. Rectangular sensors (threshold $I_{\Delta n} \geq 0.5$ A compulsory)
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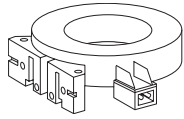
Toroid-relay connection	Twisted pair
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Compatibility with type E toroids in existing installations:

- TE (Ø30 mm); PE (Ø50 mm): total compatibility
- IE (Ø80 mm); ME (Ø120 mm) and SE (Ø200 mm): **fault threshold $I_{\Delta n}$ must never be set to less than 300 mA.**

Sensors and toroids

Closed toroids, A-type



Type	Rated operational current I_e (A)	Ø Inside diameter (mm)	
TA30	65	30	50437
PA50	85	50	50438
IA80	160	80	50439
MA120	250	120	50440
SA200	400	200	50441
GA300	630	300	50442

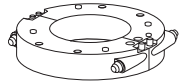
Accessory for closed toroids

Magnetic ring



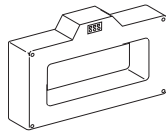
For TA30 toroid	56055
For PA50 toroid	56056
For IA80 toroid	56057
For MA120 toroid	56058

Split toroids, OA-type



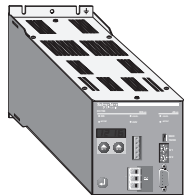
Type	Rated operational current I_e (A)	Ø Inside diameter (mm)	
POA	85	46	50485
GOA	250	110	50486

Rectangular sensors



Inside diameter (mm)		
280 x 115	1600	56053
470 x 160	3200	56054

Communication module



DC150 data concentrator 110-240 V AC / 115-125 V DC	50823
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Note: sensor-relay link: twisted cable not supplied.

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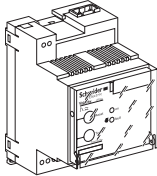
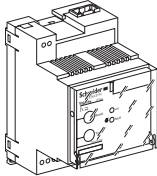
Catalogue numbers

RH10M, RH21M, RH99M with local manual fault reset.

System to be monitored LV ≤ 1000 V.

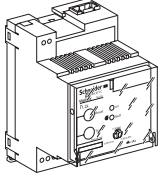
INSTANTANEOUS RH10M

Sensitivity

Power supply		0,03 A	0,05 A	0,1 A		
	12-24 V AC -12-48 V DC	50/60 Hz	56100	-	56102	
	48 V AC	50/60 Hz	56110	-	56112	
	110-130 V AC	50/60 Hz	56120	56121	56122	
	220-240 V AC	50/60/400 Hz	56130	56131	56132	
	380-415 V AC	50/60 Hz	56140	-	56142	
	440-525 V AC	50/60 Hz	56150	-	-	
		0,25 A	0,3 A	0,5 A	1 A	
	12-24 V AC -12-48 V DC	50/60 Hz	-	56105	56106	56107
	48 V AC	50/60 Hz	-	56115	56116	56117
	110-130 V AC	50/60 Hz	-	56125	56126	56127
	220-240 V AC	50/60/400 Hz	56134	56135	56136	56137
	380-415 V AC	50/60 Hz	-	56145	56146	56147
	440-525 V AC	50/60 Hz	-	-	56156	56157

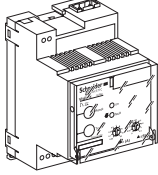
RH21M

Sensitivity: 0.03 A instantaneous and 0.3 A instantaneous or with 0.06 s time delay

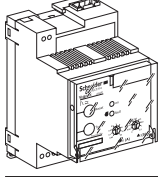
Power supply			
	12-24 V AC -12-48 V DC	50/60 Hz	56160
	48 V AC	50/60 Hz	56161
	110-130 V AC	50/60 Hz	56162
	220-240 V AC	50/60/400 Hz	56163
	380-415 V AC	50/60 Hz	56164
	440-525 V AC	50/60 Hz	56165

RH99M

Sensitivity: 0.03 A to 30 A instantaneous or with 0 to 4.5 s time delay

Power supply			
	12-24 V AC -12-48 V DC	50/60 Hz	56170
	48 V AC	50/60 Hz	56171
	110-130 V AC	50/60 Hz	56172
	220-240 V AC	50/60/400 Hz	56173
	380-415 V AC	50/60 Hz	56174
	440-525 V AC	50/60 Hz	56175

RH99M with automatic fault reset

Power supply			
	12-24 V AC -12-48 V DC	50/60 Hz	56190
	48 V AC	50/60 Hz	56191
	110-130 V AC	50/60 Hz	56192
	220-240 V AC	50/60/400 Hz	56193
	380-415 V AC	50/60 Hz	56194
	440-525 V AC	50/60 Hz	56195

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COM-POWER Vigirex RH10M, RH21M, RH99M - TDS14

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