



## EARTH LEAKAGE RELAY ELR series

RELAY FOR PERMANENT CONTROL  
OF THE MCCB'S TRIPPING CIRCUIT  
AND ACTUATOR FOR SAFETY CIRCUITS

## TCS series

STATIC RELAY FOR  
MOTOR RE-START  
AND REACCELERATION

## RSR series





### **ELR**

Multi-range Earth Leakage Relays for DIN rail or Flush mounting.

### **ELRC**

Compact ELR with Built-in Toroid Transformer, for DIN rail or surface mounting.

### **CT-1 / CTA-1**

Toroidal current transformers

### **TCS**

Relay for permanent control of the MCCB'S tripping circuit and actuator for safety circuits

### **RSR**

Static relay for motor re-start



**Certified Quality**

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# ELR-3C

## EARTH LEAKAGE RELAY DIN RAIL MOUNTING VERSION

### GENERALITY



The **ELR-3C**, maintain all the basic characteristics of the DIN 96x96 mm series, although its reduced dimensions. It is one of the relays series, built in a modular enclosure, according with DIN 43880 Standard, with a three modules module base 17.5 mm.

Its wide setting ranges allows to select the tripping current, in order that the contact voltage values are maintained below 50V as required by the CEI 64-8 Standard.

This is also the suitable answer for a proper selectivity, whenever there are other ELR's or/and RCD's downstream or upstream in the line to be protected.

### MODELS

<b>ELR-3C</b>	110Vac/dc - 230 - 400 Vac
<b>ELR-3C</b>	24 - 48 Vac/dc
<b>ELR-3C</b>	12 Vac/dc

### OPTIONS

<b>T</b>	tropicalisation
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An outstanding characteristic of the present relays, is the permanent control of the Toroidal - ELR circuit.

Its interruption brings along the immediate trip of the protection. This allows to identify the anomaly, without waiting to the periodical control, made with the Test push button.

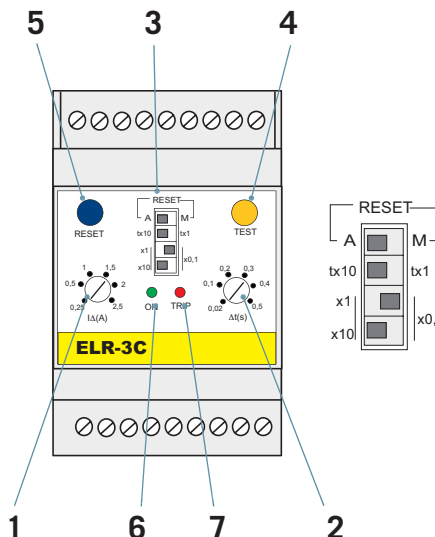
The instrument, fitted with filters at the input circuits, is practically immune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards.

The ELR-3C has the possibility of an automatic or manual reset, selectable by a micro switch and to protect the settings by its sealable transparent front cover.

This relay accepts also the possibility of a remote test.

It may also be coupled to any of our CT-1 Toroidal Transformers.

### LEGEND



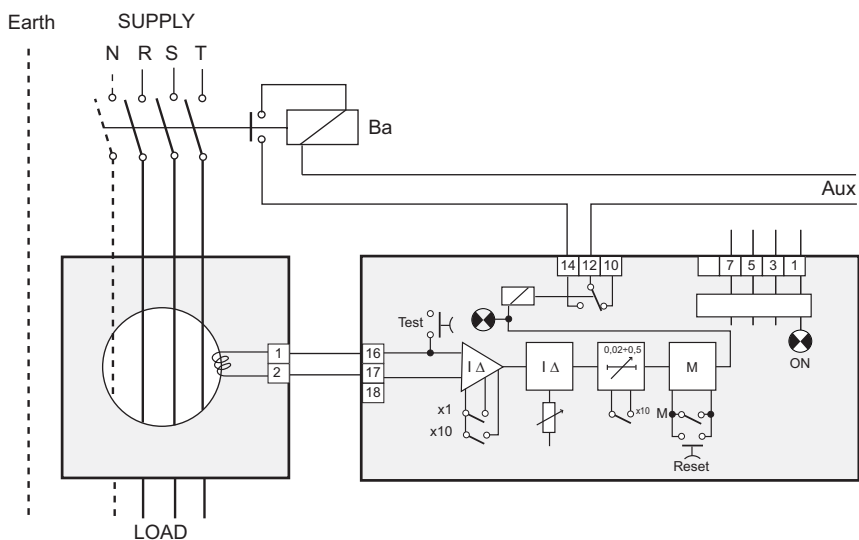
<b>1</b>	Current tripping setting potentiometer
<b>2</b>	Tripping time setting potentiometer
<b>3</b>	Micro switches for programming: a In position 1 automatic reset; In position 0 manual reset b Selection of the multiplying constant Tripping time, in position 1 K=10; in position 0 K=1 c,d Selection of the multiplying constant of tripping current: With c, d in position 0 K=0.1 With c in position 1, d in position 0 K=1 . With c, d in position 1 K=10
<b>4</b>	Push button for Test
<b>5</b>	Push button for manual reset
<b>6</b>	Signalling green LED for Aux. Supply presence
<b>7</b>	Signalling red LED for relay tripped

**ELECTRICAL CHARACTERISTICS**

models and value	<b>ELR - 3C</b>	
Auxiliary Voltage supply	24÷48 Vac/dc	110 Vac/dc 230 - 400 Vac ± 20% ( standard)
Frequency	50 ÷ 60 Hz	
Maximum consumption	3 VA	
Current tripping adjustment range IΔN	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10 25÷250A*	
Tripping time adjustment range t	0,02 ÷ 0,5 sec. K=1 - 0,2 ÷ 5 sec. K=10	
Output: 1 changeover contact	5A 250V	
Working Temperature	-10 + 60°C	
Storing Temperature	-20 + 80°C	
Relative humidity	<90%	
Insulation Test	2,5 kV 60 seg.	
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M	
Wiring method	Screw terminals for cross section wires 2,5 mm2	
Mounting according DIN 50022	Snap on DIN rail 35 mm	
Protection degree according DIN 40050	IP 20	

\* By means of external multiplier ( see page 40 )

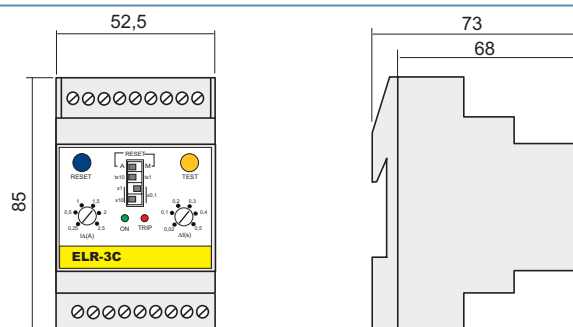
**WIRING DIAGRAM**



**LEGEND**

- 7-5 = 12 V ca/cc
- 7-1 = 380 V ca/cc
- 7-3 = 220 V ca/cc
- 7-5 = 110 V ca/cc - ac/dc
- 7-3 = 48 V ca/cc - ac/dc
- 7-5 = 24 V ca/cc - ac/dc

**DIMENSIONS**



# ELR-3F

## EARTH LEAKAGE RELAY DIN RAIL MOUNTING VERSION

### GENERALITY



The **ELR-3F**, maintains all the basic characteristics of the ELR-3C type relay, with its reduced dimensions even. It is the most simple of a series of relays, built in a modular enclosure, according with DIN 43880 Standard, with a three modules width (module base 17.5 mm) Its two setting ranges (current 0,03 or 0,5A / time 0,02 or 0,5 seconds) allow to select the tripping current, in order that the contact voltage values are maintained below 50V as required by the CEI 64-8Standard. This is also the suitable answer in many of the industrial requirements for a proper selectivity, whenever there are other ELR's or/and RCD's down-

#### MODELS

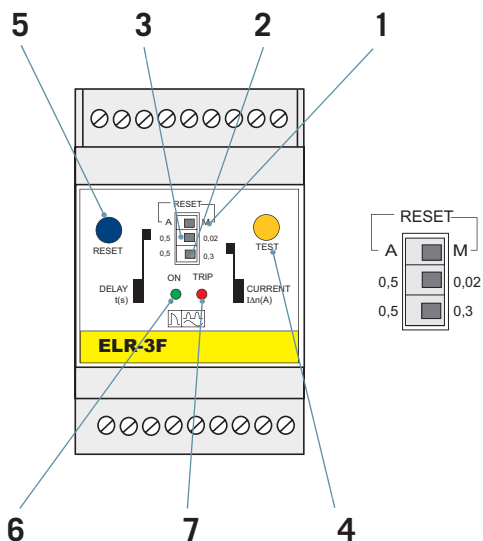
<b>ELR-3F</b>	110Vca/cc-230-400Vca I $\Delta$ 0,03- 0,5A $\Delta$ t 0,02 - 5 sec.
<b>ELR-3F</b>	24-48Vca/cc I $\Delta$ 0,03- 0,5A $\Delta$ t 0,02 - 5 sec.

#### OPTIONS

<b>T</b>	tropicalisation
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stream or upstream in the line to be protected. An outstanding characteristic of the present relays, is the permanent control of the Toroidal - ELR circuit. Its interruption brings along the immediate trip of the protection. This allows to identify the anomaly, without waiting to the periodical control, made with the Test push button. The instrument, fitted with filters at the input circuits, is practically immune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards. The ELR-3F has the possibility of an automatic or manual reset, selectable by a micro switch and to protect the settings by its sealable transparent front cover.

### LEGEND

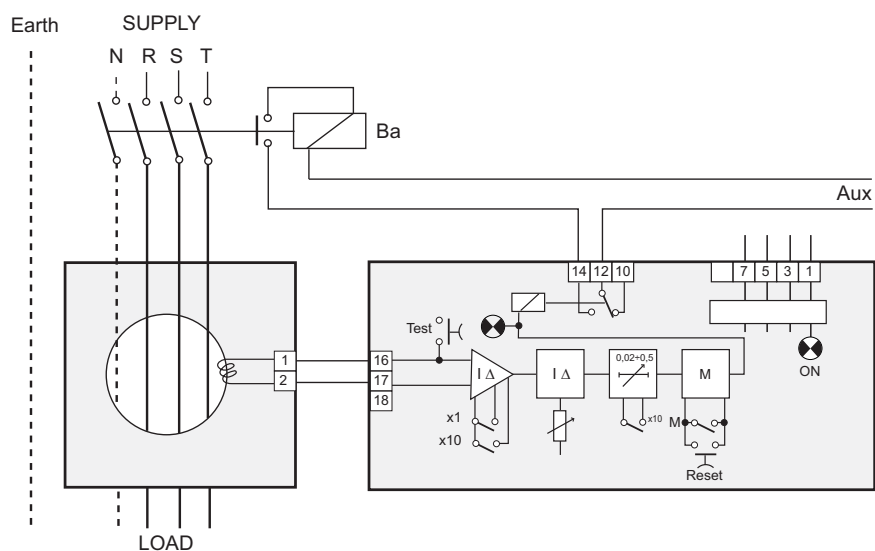


<b>1</b>	Manual or automatic reset selection dipswitch.
<b>2</b>	Tripping current selection dipswitch.
<b>3</b>	Tripping time selection dipswitch
<b>4</b>	Push button for Test
<b>5</b>	Push button for manual reset
<b>6</b>	Signalling green LED for Aux. Supply presence
<b>7</b>	Signalling red LED for relay tripped

**ELECTRICAL CHARACTERISTICS**

models and value	ELR - 3F	
Auxiliary Voltage supply	24÷48 Vac/dc	110 Vac/dc 230 - 400 Vac ± 20% ( standard)
Frequency	50 ÷ 60 Hz	
Maximum consumption	3 VA	
Current tripping ajustment	0,3 or 0,5A	
Tripping time adjustment range t	0,02 or 0,5 sec.	
Output: 1 changeover contact	5A 250V	
Working Temperature	-10 + 60°C	
Storing Temperature	-20 + 80°C	
Relative humidity	<90%	
Insulation Test	2,5 kV 60 seg.	
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M	
Wiring method	Screw terminals for cross section wires 2,5 mm <sup>2</sup>	
Mounting according DIN 50022	Snap on DIN rail 35 mm	
Protection degree according DIN 40050	IP 20	

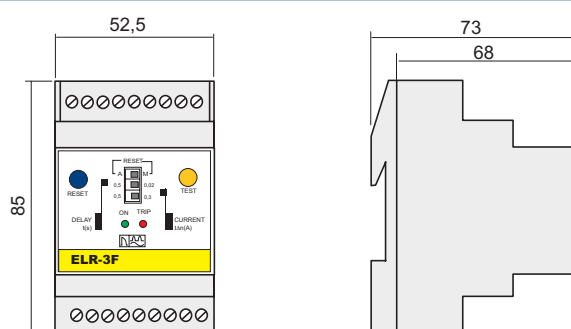
**WIRING DIAGRAM**



**LEGEND**

- 7-1 = 380 V ca/ac
- 7-3 = 220 V ca/ac
- 7-5 = 110 V ca/ac - ac/dc
- 7-3 = 48 V ca/ac - ac/dc
- 7-3 = 24 V ca/ac - ac/dc

**DIMENSIONS**



# ELR-3E

## EARTH LEAKAGE RELAY DIN RAIL MOUNTING VERSION

### GENERALITY



The **ELR-3E**, maintain all the basic characteristics of ELR-3C type, with reduced dimensions. It comes to complete the range of relays, built in a modular enclosure, according with DIN 43880 Standard, with a three modules width (module base 17.5 mm).

It has a wide setting ranges and the accurate tripping current selection (by means of dip switches), in order that the contact voltage values are maintained below 50V as required by the CEI 64-8Standard

This is also the suitable answer for a proper selectivity, whenever there are other ELR's or/and RCD's downstream or upstream in the line to be protected.

### MODELS

**ELR-3E** 110Vac/dc-230-400Vac  $I_{\Delta n}$  0,03-0,1-0,3-0,5-1  
 $\Delta t$  0,02-0,2-0,5-1-5 sec.

**ELR-3E** 24-48Vac/dc  $I_{\Delta n}$  0,03-0,1-0,3-0,5-1  $\Delta t$  0,02-0,2-0,5-1-5 sec.

### OPTIONS

**T** tropicalisation

An outstanding characteristic of the present relays, is the permanent control of the Toroidal - ELR circuit.

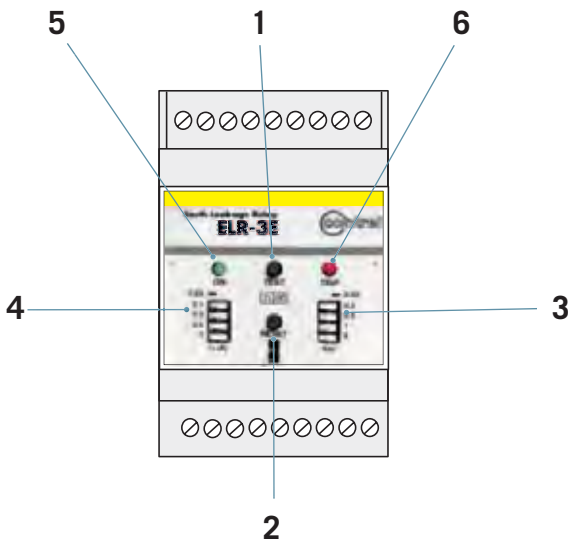
Its interruption brings along the immediate trip of the protection. This allows to identify the anomaly, without waiting to the periodical control, made with the Test push button. The instrument, fitted with filters at the input circuits, is practically immune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards.

The ELR-3E has a manual reset option only, in order to avoid unexpected reset, whilst undergoing repairs and maintenance works.

Its sealable front transparent cover may be used to avoid access to the settings to unauthorised persons.

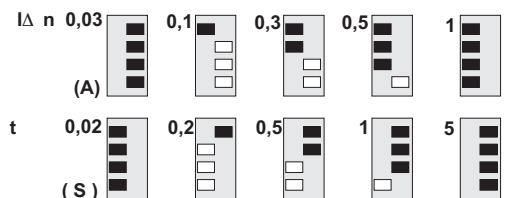
It may also be coupled to any of our CT-1 Toroidal Transformers.

### LEGEND



1	Test push button
2	Reset push button
3	Dipswitches for tripping time setting.
4	Dipswitches for current tripping setting
5	Green LED ON - U aux
6	Red LED trip

### SETTING TRIP AND DELAY

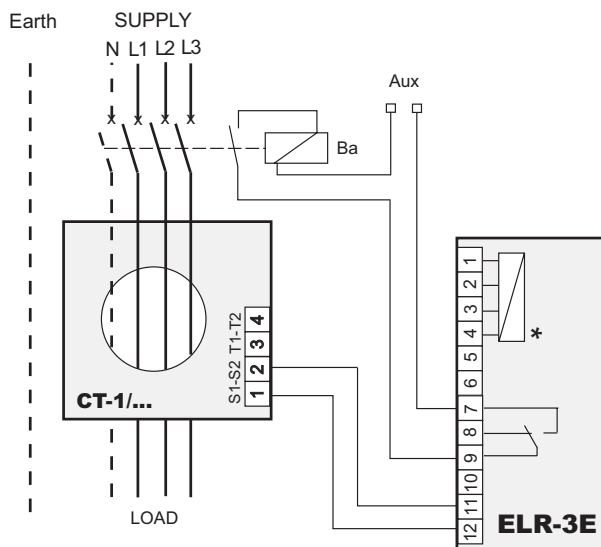




**ELECTRICAL CHARACTERISTICS**

models and value	ELR - 3E	
Auxiliary Voltage supply	24÷48 Vac/dc	110 Vac/dc 230 - 400 Vac ± 20% (standard)
Frequency	50 ÷ 60 Hz	
Maximum consumption	3 VA	
Current tripping adjustment range IΔN	0,03 - 0,1 - 0,3 - 0,5 - 1A	
Tripping time adjustment range t	0,02 - 0,2 - 0,5 - 1 - 5 sec.	
Output: 1 changeover contact	5A 250V	
Working Temperature	-10 + 60°C	
Storing Temperature	-20 + 80°C	
Relative humidity	<90%	
Insulation Test	2,5 kV 60 seg.	
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M	
Wiring method	Terminals for cross section cable of 2,5 mm <sup>2</sup>	
Mounting according DIN 50022	Quick mountin on a DIN rail of 35 mm	
Protection degree according DIN 40050	IP 20	

**WIRING DIAGRAM**



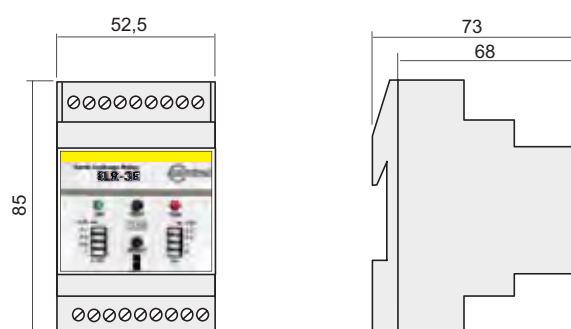
**LEGEND**

1-4 = 380-415 V ac  
1-3 = 220-240 V ac  
1-2 = 110-125 V ac / dc

1-3 = 48 V ac/dc  
1-2 = 24 V ac/dc

\* Auxiliary supply Uaux:

**DIMENSIONS**



# ELR-61 / ELR-M61 ELR-62 / ELR-M62

EARTH LEAKAGE RELAY  
DIN RAIL MOUNTING VERSION

## GENERALITY



The **ELR-61 -ELRm-61 -ELR-62 -ELRm-62** are serie of Earth Leakage Relays manufactured within a modular enclosure, according with DIN 43800 Standard, with 6 modules width (module base 17,5mm.).

An outstanding characteristic of the present relays, is the permanent control of the Toroidal - ELR circuit.

Its interruption brings along the immediate trip of the protection. This allows to identify the anomaly, without waiting to the periodical control, made with the Test push button.

The instrument, fitted with filters at the input circuits, is practically im-

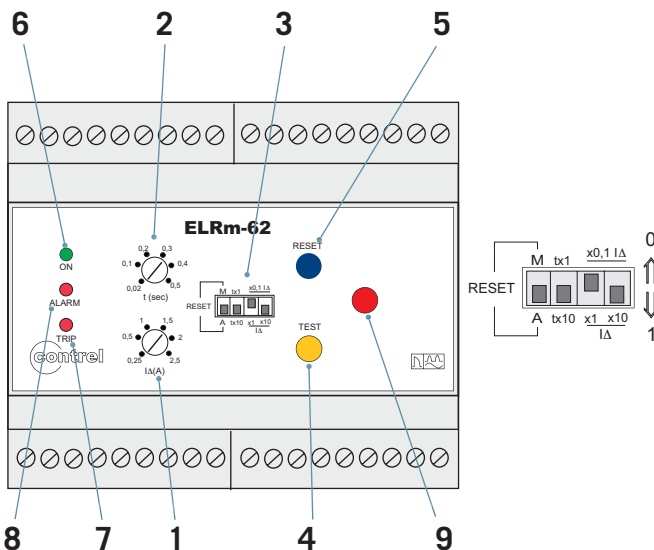
MODELS	
<b>ELR-61 / ELR-m61</b> <b>ELR-62 / ELR-m62</b>	110-230-400 Vac
<b>ELR-61 / ELR-m61</b> <b>ELR-62 / ELR-m62</b>	24-48 Vac/dc
<b>ELR-61 / 10</b> setting trip current 10mA	110-230-400 Vac

OPTIONS	
<b>F</b>	built-in filter for 3rd harmonic
<b>SP</b>	fail safe
<b>T</b>	tropicalisation

mune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards.

The optional alarm feature (ELR-62) tripping at 70% of the adjusted tripping current, may advise in advance about a lack of isolation situation.

## LEGEND



<b>1</b>	Tripping time delay setting potentiometer
<b>2</b>	Tripping current setting potentiometer.
<b>3</b>	Constant selection microswitch: Constant selection for time settings: K = 1 for micro(b) in position 0; K=10 for micro (b) in position 1; Constant selection for current settings: K=0,1 for micros (c-d) in position 0; K= 1 for micro (c) in position 1 and (din position 0); K=10 for micro (c) in position 1 and micro (d) in position 1.
<b>4</b>	Test push button.
<b>5</b>	Manual reset push button.
<b>6</b>	Signallig lamp for Aux.Supply presence (green LED).
<b>7</b>	Signalling lamp for relay tripped (red LED)
<b>8</b>	Signalling lamp for alarm threshold over come (Red LED) at 70% of the I <sub>ΔN</sub> (only for ELR-62 and ELR-m62)
<b>9</b>	Mechanical Signalling (only for ELR-m61 and ELR-m62)

**ELECTRICAL CHARACTERISTICS**

models and value	ELR- 61**	ELRm-61	ELR-62	ELRm-62
Auxiliary Voltage supply	24-48 Vac/dc		110-230-400 Vac (standard) ± 20%	
Frequency	50 ÷ 60 Hz			
Maximum consumption	4 VA			
Current tripping adjustment range IΔN	0,025÷0,25 A K=0,1 - 0,25÷2,5 A K=1 - 2,5÷25 A K=10 25÷250 A*			
Allarm current range	-		70%	
Tripping time setting range	0,02 ÷ 0,5 sec. K=1 - 0,2 ÷ 5 sec. K=10			
Mechanical Signalisation	-	•	-	•
Output: 2 changeover contacts	5A 250V			
Working Temperature	-10 + 60 °C			
Storing Temperature	-20 + 80 °C			
Relative humidity	90%			
Insulation Test	2,5 kV 60 sec.			
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M			
Wiring method	Screw terminals for cross section wires 2,5 mm <sup>2</sup>			
Protection degree according DIN 40050	IP 20			

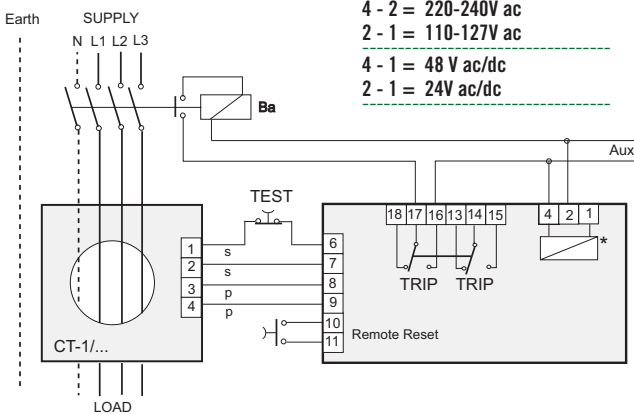
\*By means of external multiplier ( see pag. 40 ) - \*\* Available with current tripping adjustment range 0,01÷10A

**WIRING DIAGRAM - LEGEND**

**ELR-61 / ELR-m61**

\* Auxiliary supply Uaux:

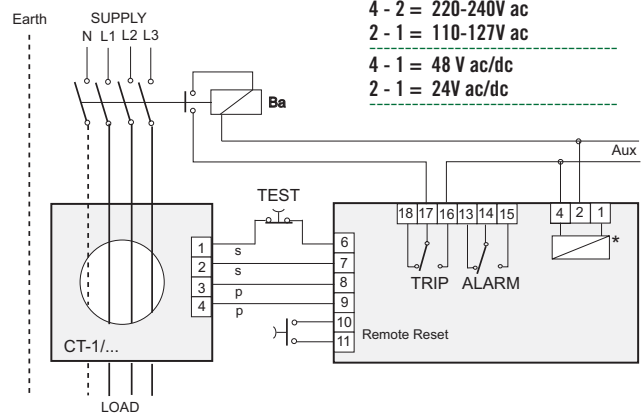
- 4 - 1 = 380-415 V ac
- 4 - 2 = 220-240V ac
- 2 - 1 = 110-127V ac
- 4 - 1 = 48 V ac/dc
- 2 - 1 = 24V ac/dc



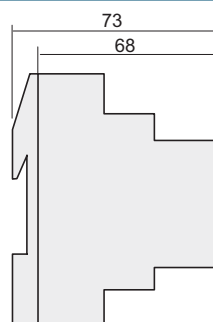
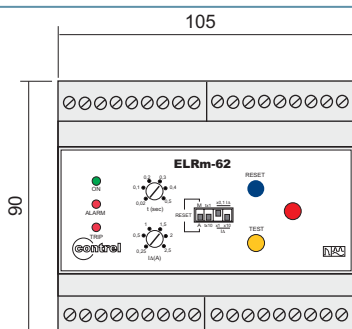
**ELR-62 / ELR-m62**

\* Auxiliary supply Uaux:

- 4 - 1 = 380-415 V ac
- 4 - 2 = 220-240V ac
- 2 - 1 = 110-127V ac
- 4 - 1 = 48 V ac/dc
- 2 - 1 = 24V ac/dc



**DIMENSIONS**



# ELRC-B

## EARTH LEAKAGE RELAY

### "COMPACT" VERSION WITH BUILT-IN TOROIDAL TRANSFORMER FOR DIN RAIL MOUNTING

#### GENERALITY



The **ELRC-B**, with all features and wide tripping current and time setting ranges of the ELR's family, has been manufactured in a compact design of 6 modules DIN (17.5 mm) with a built-in Toroidal Transformer of 28 mm inner diameter for the passage of the cables.

All this allows to reduce to the very minimum the wiring, the overall dimensions and to avoid the disturbances, due to the possible electromagnetic fields which could be coupled to the wiring between the T/T and the ELR.

#### MODELS

<b>ELRC-B</b>	110 Vac/dc - 230 - 400 Vac
<b>ELRC-B</b>	24-48 V ac/dc

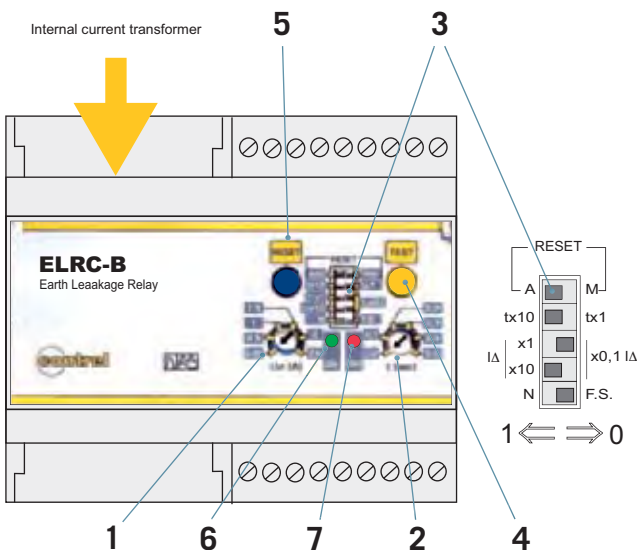
#### OPTIONS

<b>F</b>	built-in filter for 3rd harmonic
<b>T</b>	tropicalisation

It also has a micro switch, which allows the selection of the working method of the end relay. This could be as normally de-energized (non tripped) or normally energized (fail safe).

So as for the rest of the ELR's range, the preset ELR is fitted with the appropriated filters at the input circuits to make it immune to external disturbances and the electronically control of the internal circuits and the T/T.

#### LEGEND

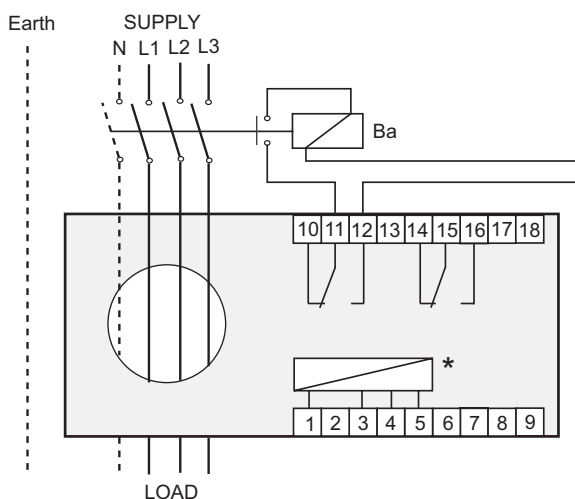


<b>1</b>	Current tripping setting potentiometer.
<b>2</b>	Tripping time setting potentiometer.
<b>3</b>	Micro switches for programming: <ul style="list-style-type: none"> <li><b>a</b> In position 1 automatic reset; In position 0 manual reset</li> <li><b>b</b> Selection of the multiplying constant Tripping time, in position 1 K=10 in position 0 K=1</li> <li><b>c,d</b> Selection of the multiplying constant of tripping current: With c d in position 0 K=0.1 With c in position 1, d in position 0 K=1 . With c, d in position 1 K=10</li> <li><b>e</b> In position 1 the output relays will be de-energized at rest, in position 0 the output relays will be energized at rest (fail safe).</li> </ul>
<b>4</b>	Push button for Test
<b>5</b>	Push button for manual reset
<b>6</b>	Signalling green LED for Aux. Supply presence
<b>7</b>	Signalling red LED for relay tripped

**ELECTRICAL CHARACTERISTICS**

models and value	ELRC-B	
Auxiliary Voltage supply	24-48Vac/dc	110 - 230 - 400 Vac (standard)
Frequency	50 ÷ 60 Hz	
Maximum consumption	3 VA	
Current tripping adjustment range IΔN	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10	
Tripping time setting range t	0,02 ÷ 0,5 sec. K=1 - 0,2 ÷ 5 sec. K=10	
Built in toroidal transformer's diameter	28 mm	
Output: 2 changeover contacts	5A 250V carico resistivo	
Working Temperature	-10 + 60°C	
Storing Temperature	-20 + 80°C	
Relative humidity	< 90%	
Insulation Test	2,5 kV 60 sec.	
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M	
Wiring method	Terminals for cross section wires 2,5 mm <sup>2</sup>	
Mounting DIN 50022	Snap on DIN rail 35 mm	
Protection degree	IP 40 front with closed cover - IP 20 enclosure	

**WIRING DIAGRAM**



Wiring diagram with shunt trip of the MCCB and excited end relay (N) for fail safe (F.S.)  
 Connect terminals 10 -11 to BA (NO contact under non tripped condition)

**LEGEND**

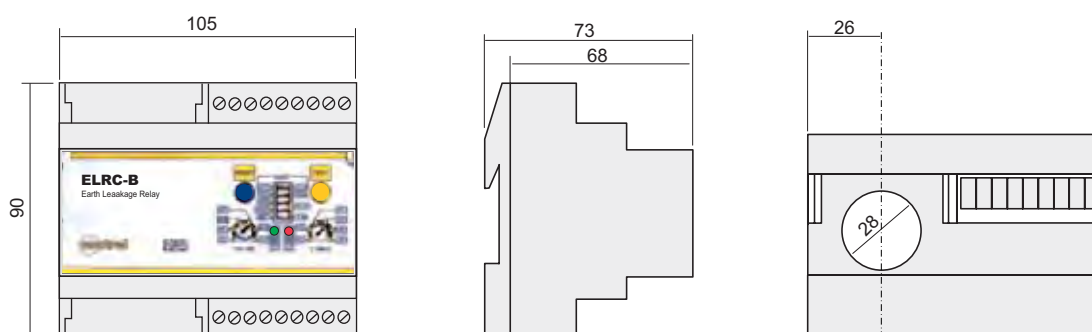
- 5 - 1 = 400 Vac
- 5 - 3 = 220 Vac
- 5 - 4 = 110 Vac/dc

---

- 5 - 4 = 24 Vac/dc
- 5 - 3 = 48 Vac/dc

\* Auxiliary supply Uaux:

**DIMENSIONS**



# ELRD-L / ELRD-L2m ELRC-BL EARTH LEAKAGE RELAY

DIN RAIL MOUNTING. WITH AUTOMATIC TRIP AND RECLOSING FOR CONTROLLING THE EARTH LEAKAGE IN PUBLIC LIGHTING, REFRIGERATION ROOMS, TRAFFIC LIGHTS AND SIMILAR UNATTENDED INSTALLATIONS.

## GENERALITY



### MODELS

ELRC-BL	230 Vac
ELRD-L	230 Vac
ELRD-L2m	230 Vac

### OPTIONS

T	tropicalisation
---	-----------------

The **ELRC-BL**, **ELRD-L** and **ELRD-L2M** are devices, which maintain the wide range of current and time settings of the ELR series, being in a 6 modules DIN enclosures for single and three phase installations. They are fitted with special filters at the input for avoiding external disturbance, with following alternatives:

ELRD-L2M: With pre-alarm at 70% of the rated current.

ELRC-BL: With built-in toroidal (inner diameter of 28mm).

The logical working principles of these relays controls the earth leakage of electrical installations, discriminating between transitory and permanent leakages and allowing, therefore, the reclosing or definitive disconnection of the line under control, depending on the type of leakage.

Their most common application is on the Public Lighting Installations and generally unattended installations as Refrigerated Rooms. Sometimes the reason of a section being out of order is due to a lightning which has influenced in a defined area, rebounding to their sections of the line, through the earthing connections.

These devices will react as an earth leakage, but in the next control, 40 seconds later approximately, will verify the disappearance of the leakage and if so they'll proceed to the reclosing of the lighting system, under control. It will avoid that the system remains out of order, with the corresponding intervention of labour hand for the manual reclosing.

As far as its operation is concerned, we can study two leakage types, as follows:

As far as its operation is concerned, we can study two leakage types, as follows:

A) The first leakage situation is occurring between the relays and the contactor, commanded by the first output relay (R1). A typical case for such anomaly, always within the Public Lighting, can be the photo-cell which is earthen through its column.

Under these conditions, if the leakage current (ID) is over the set value, the R1 relay will be energized and the (B1) contactor de-energized, after the elapsing of the time delay (t) programmed, disconnecting the supply to the line.

B) The second leakage situation and the most common, is the one happening at the contactor's end. Under such given situation, the R1 relay will be energized and the (B1) contactor de-energized, after the elapsing of the time delay (t) programmed, disconnecting the supply to the line.

Simultaneously, with the option ELRD-L2M, the mechanical signalisation will come on, even in case of definitive disconnection, due to a permanent earth leakage situation, which might imply the total switch off in the Distribution Board.

In this particular case, as the leakage disappears when the contactor is de-energized, the device is not blocked but it starts an automatic reclosing cycle, 40 seconds after approximately, the R1 is de-energized and the contactor reclosed, supplying to the load again.

The relay will remain blocked, memorizing the intervention, until the manual reset of the unit by the personnel in charge, either directly on the relay or by remote control system. The ELRD-L2M option, with the mechanical signalling, can only be reset manually with the push button at the front plate of the relay. This allows to maintain the earth leakage tripping information although the remote reset of the unit.

After 30 seconds of correctly working time of the line under control, after an automatic reclosing cycle, the device will reset itself the interventions memory and the full cycle may start again.

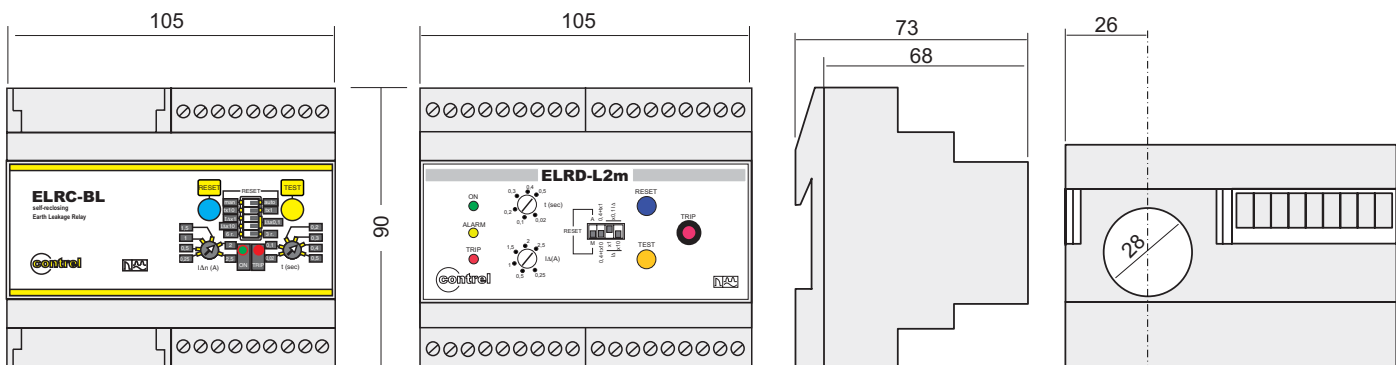
On top of the above the ELRD-L2M is fitted with an alarm threshold of 70% the tripping current set. It is a very useful information to prevent the tripping due to the cables lack of insulation or at the setting operations of the device.

**DIN RAIL MOUNTING. WITH AUTOMATIC TRIP AND RECLOSING FOR CONTROLLING THE EARTH LEAKAGE IN PUBLIC LIGHTING, REFRIGERATION ROOMS, TRAFFIC LIGHTS AND SIMILAR UNATTENDED INSTALLATIONS.**

**ELECTRICAL CHARACTERISTICS**

models and value	ELRC-BL	ELRD-L	ELRD-L2m
Auxiliary Voltage supply	230 Vac		
Frequency	50 ÷ 60 Hz		
Maximum consumption	4 VA		
Setting range for current tripping I $\Delta$ N	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10		
Setting range for current alarm	-	-	70% I $\Delta$ N
Setting range for time delay R1	0,02 ÷ 0,5 sec. K=1 - 0,2 ÷ 5 sec. K=10		
Setting range for time delay R2	Delay for R1 + 0,4 sec.		
Self-closing	With micro switch in position AUT		
Number of self-closing attempts	3 or 6 consecutive	max 3 consecutive	
Time elapsed between self-closings	25÷35 sec.	50÷70 sec.	
Memory reset	30 seconds after operating without any current leakage		
Mechanical tripping signal	-	-	It comes with the definitive blocking
Output relays	R1 NO-C-NC contact 5A 250V resistive load - R2 NO contact 5A 250V resistive load		
Hole's diameter for passing the cables	28 mm	-	
Working Temperature	-10 + 60°C		
Storing Temperature	-20 + 80°C		
Relative humidity	<90%		
Insulation Test	2,5 kV 60 sec.		
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M		
Wiring method	By terminal block with cross section cable of 2,5 mm <sup>2</sup>		
Mounting according with DIN 50022	Mounting on DIN rail 35 mm		
Protection degree	IP 40 front with closed cover - IP 20 enclosure		

**DIMENSIONS**

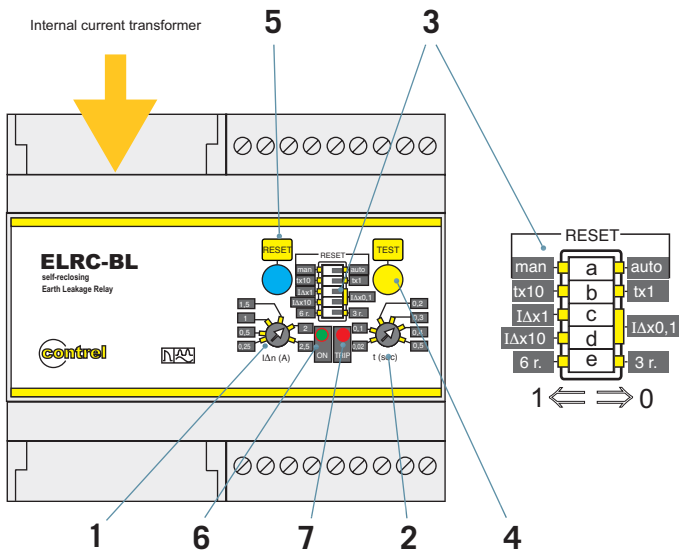


# ELRD-L / ELRD-L2m / ELRC-BL

## EARTH LEAKAGE RELAY

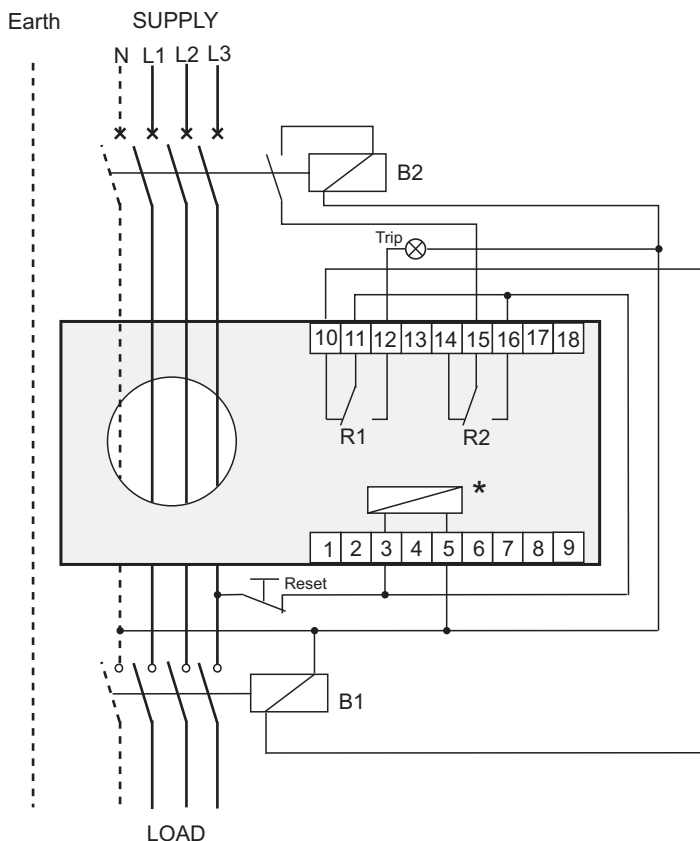
DIN RAIL MOUNTING. WITH AUTOMATIC TRIP AND RECLOSING FOR CONTROLLING THE EARTH LEAKAGE IN PUBLIC LIGHTING, REFRIGERATION ROOMS, TRAFFIC LIGHTS AND SIMILAR UNATTENDED INSTALLATIONS.

### LEGEND - ELRC-BL



1	Current tripping setting potentiometer.
2	Tripping time setting potentiometer.
3	Micro switches for programming: <ul style="list-style-type: none"> <li>• a. In position 1: manual reset, In position 0: automatic reset,</li> <li>• b. Selection of the multiplying constant for tripping time In position 1: <math>K=10</math> In position 0: <math>K=1</math></li> <li>• c,d. Selection of the multiplying constant of tripping current: with c and d in position 0: <math>K=0,1</math> with c in position 1 and d in position 0: <math>K=1</math> with c and d in position 1: <math>K=10</math></li> <li>• e. In position 1: 6 re-closings In position 0: 3 re-closings</li> </ul>
4	Push button for Test
5	Push button for manual reset
6	Signalling green LED for Aux. Supply presence
7	Signalling red LED for relay tripped

### WIRING DIAGRAM - ELRC-BL



#### LEGEND

**B1**  
First intervention coil (for de-energising the contactor's coil etc.)

**B2**  
Second intervention coil (for energising the shunt trip coil of the MCCB, etc.)

**RESET**  
Remote reset push button (in serie with the relay's power supply)

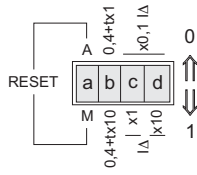
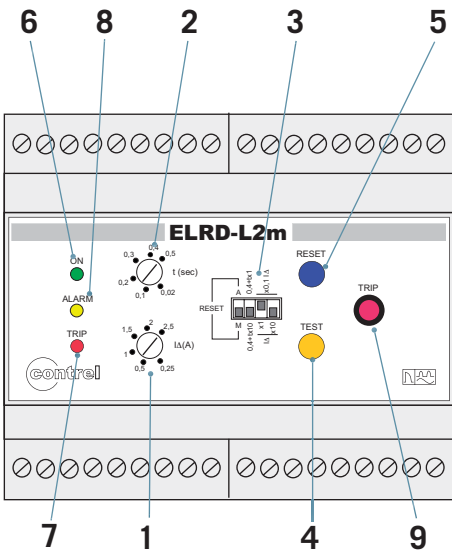
**TRIP**  
Eventual remote optical signal of tripped relay

\* Auxiliary supply  $U_{aux}$ :  
**terminals [3-5] 220-240V 50-60Hz**



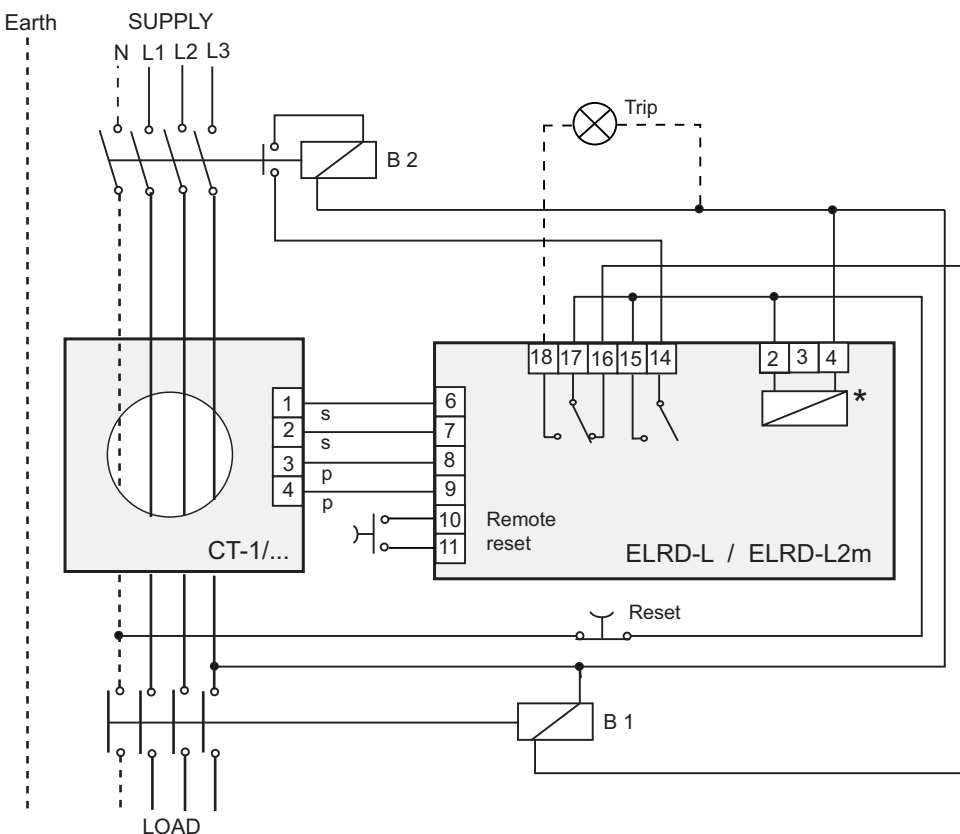
**DIN RAIL MOUNTING. WITH AUTOMATIC TRIP AND RECLOSING FOR CONTROLLING THE EARTH LEAKAGE IN PUBLIC LIGHTING, REFRIGERATION ROOMS, TRAFFIC LIGHTS AND SIMILAR UNATTENDED INSTALLATIONS.**

**LEGEND - ELRD-L / ELRD-L2m**



1	Tripping time setting potentiometer.
2	Earth leakage current setting potentiometer.
3	Micro switch for constants (K) choice: <ul style="list-style-type: none"> <li>• a. automatic re-closing with micro switch in position 1</li> <li>• b. constant selection for tripping time setting: K=1 micro switch in position 1</li> <li>• c,d. constant selection for current tripping setting: K = 0,1 for micro switches in position 1</li> <li>• K = 1 for micro switch (c) in position 0 and micro switch (d) in position 1.</li> <li>• K = 10 for micro switch (c) in position 1 and micro switch (d) in position 0.</li> </ul>
4	Push button for Test
5	Manual reset push button
6	Signalling lamp for aux. supply presence (green LED)
7	Signalling lamp for relay tripped or in re-closing cycle (red LED)
8	Alarm signalling LED (only for ELRD-L2m)
9	Mechanical signal (only for ELRD-L2m)

**WIRING DIAGRAM - ELRD-L / ELRD-L2m**



**LEGEND**

**B1**  
First intervention coil (for de-energising the contactor's coil etc.)

**B2**  
Second intervention coil (for energising the shunt trip coil of the MCCB, etc.)

**RESET**  
Remote reset push button (in serie with the relay's power supply)

**TRIP**  
Eventual remote optical signal of tripped relay

**s-s**  
measuring signal connection (use screened or twisted cable)

**p-p**  
test signal connection (use screened or twisted cable)

\* Auxiliary supply Uaux:  
**terminals [2-4] 220-240V 50-60Hz**

# ELRC-1

## EARTH LEAKAGE RELAY

### "COMPACT" VERSION WITH BUILT-IN TOROIDAL TRANSFORMER

#### GENERALITY



The **ELRC-1** have the particularity that they are manufactured with the built-in Toroidal Transformers.

They are specially conceived for those applications, in which the space saving is an advantage (for example, in **MOTOR CONTROL CENTERS, BATTERIES OF DISTRIBUTION**, etc.).

Although its reduced dimensions, the relay has as wide setting ranges as the other ELR's series.

#### MODELS

<b>ELRC-1/35</b> <b>ELRC-1/60</b> <b>ELRC-1/80</b> <b>ELRC-1/110</b>	110Vac/dc-230-400 Vac
<b>ELRC-1/35</b> <b>ELRC-1/60</b> <b>ELRC-1/80</b> <b>ELRC-1/110</b>	24 - 48 Vac/dc

#### OPTIONS

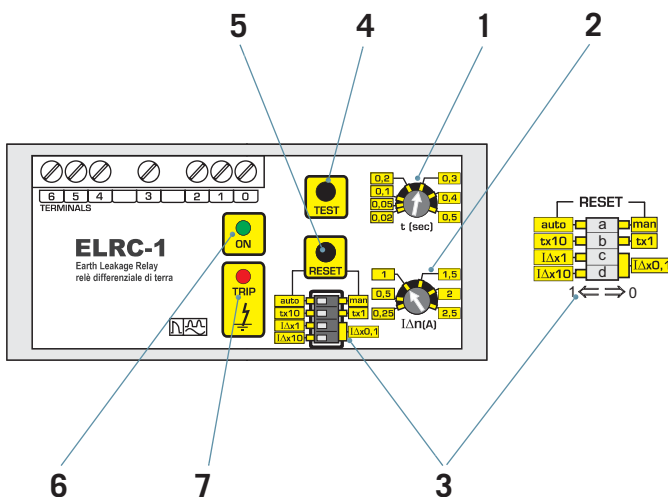
<b>F</b>	built-in filter for 3rd harmonic
<b>2</b>	Double output contact NO-C-NC (in such a case the relay is renamed as <b>ELRC-2/...</b> )
<b>T</b>	tropicalisation

Such a feature allows to easily choose the tripping current value, in the way that the voltage values are maintained below 50V, in compliance with the CEI Standards.

It allows also to perform a tripping selectivity, whenever there are more ELR's or RCD's in the same line.

Other important feature is its insensitivity to external disturbances and pulse currents with dc components (presents in the line), due to the filters built on the input circuits, as per the VDE Standards.

#### LEGEND

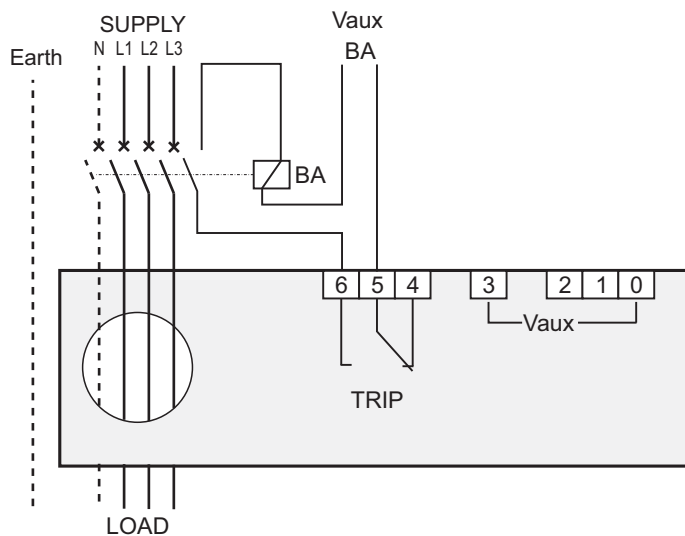


<b>1</b>	Potentiometer for tripping time setting.
<b>2</b>	Potentiometer for tripping current setting.
<b>3</b>	Microswitches for constant selection: <ul style="list-style-type: none"> <li>• <b>time:</b> K = 1 with micro (a) in position 0; K = 10 with micro (a) in position 1;</li> <li>• <b>current:</b> K = 0,1 with micros (b-c) in position 0; K = 1 with micro(b) in position 1 and (c) in position 0; K = 10 with micros (c-b) in position 1</li> </ul>
<b>4</b>	Test push button.
<b>5</b>	Manual reset push button.
<b>6</b>	Signalling lamp for Aux. Supply presence (green LED).
<b>7</b>	Signalling lamp for relay tripped (red LED).

**ELECTRICAL CHARACTERISTICS**

models and value	<b>ELRC-1</b>
Auxiliary Voltage supply	24-48V ac/dc / 110 Vac/dc - 230 - 400 Vac ± 20% (standard)
Frequency	50 ÷ 60 Hz
Maximum consumption	3 VA
Current tripping adjustment range IΔN	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10
Tripping time setting range	0,02 ÷ 0,5 sec. K=1 - 0,2 ÷ 5 sec. K=10
Output: 2 change over contacts	5A 250V
Working Temperature	-10 + 60°C
Storing Temperature	-20 + 80°C
Relative Humidity	90%
Insulation Test	2,5 kV 60 sec.
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M
Wiring method	Screw terminals for cross section wire 2,5 mm <sup>2</sup>
Terminals protection according with DIN 40050	IP20

**WIRING DIAGRAM**

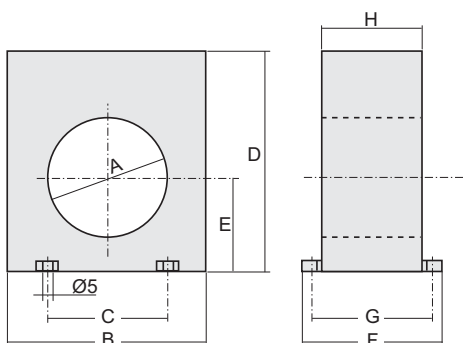


**LEGEND**

0-1 = 110 V ac/dc  
 0-3 = 230 V ac  
 0-5 = 400 V ac

0-1 = 24 V ac/dc  
 0-2 = 48 V ac/dc

**DIMENSIONS**



type	DIMENSIONS (mm)							
	A	B	C	D	E	F	G	H
ELRC-1/35	35	100	60	110	47	70	60	50
ELRC-1/60	60	100	60	110	47	70	60	50
ELRC-1/80	80	150	110	160	70	70	60	50
ELRC-1/110	110	150	110	160	70	70	60	50

# ELR-7

**EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 48X48 mm**

## GENERALITY



MODELS	
<b>ELR-7</b>	110Vac/dc-230Vac 50-60Hz
<b>ELR-7</b>	24-48Vac/dc 50-60Hz

OPTIONS	
<b>F</b>	built-in filter for the third harmonic
<b>T</b>	tropicalisation

ACCESSORIES	
	front cover could be supplied to achieve an IP55 protection degree.

The **ELR-7** is an earth leakage protection device, which maintaining its ample scope of settings, both for current and time delay, it has been built in a flush mounting enclosure DIN 48x48mm with a reduced depth of 72mm, including wiring terminals.

This allows to reduce the overall dimensions to a minimum, in those applications in which the space is critical, like in MCC's.

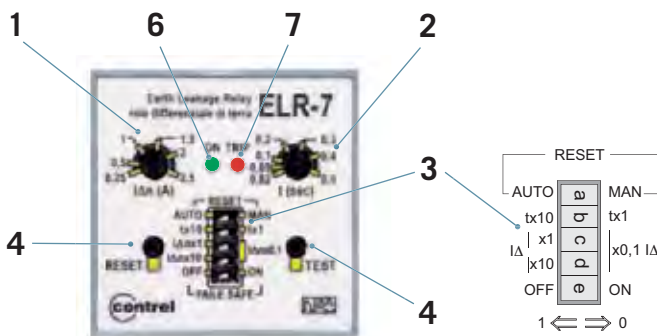
The present ELR, so as the others of the ELR's families, has a built-in filter, at the input circuits, which brings it practically immune to external distortions.

It is possible to program the tripping current (25mA ÷ 25 A), the tripping time delay (0,02 ÷ 5 sec.) and the working mode of the reset (automatic or manual), at its front plate.

The ELR-7 has a micro switch to select the working mode of the end relay, normally de-energized, whilst at rest (no tripped condition) or normally energized (fail safe).

On top of the above, it also has 2 change-over separated contacts and a transparent front cover for protection. Its draw-out wiring terminals rends it very easy to install.

## LEGEND



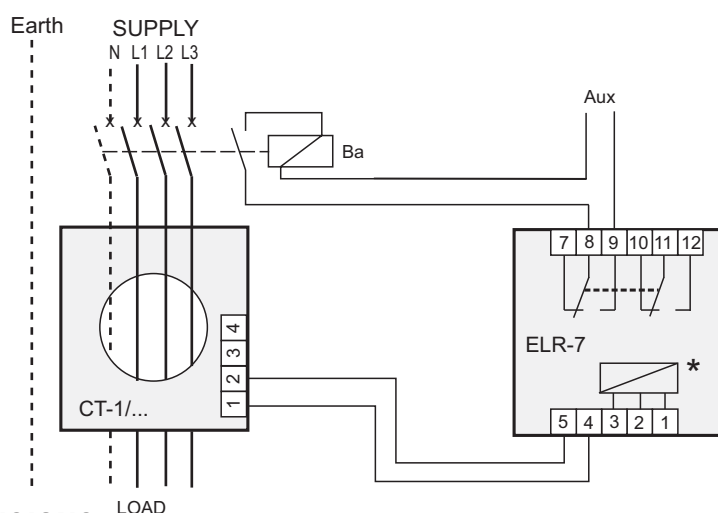
<b>1</b>	Current tripping setting potentiometer
<b>2</b>	Tripping time setting potentiometer
<b>3</b>	Microswitches for programming: <ul style="list-style-type: none"> <li>• a In position 1 automatic reset, In position 0 manual reset</li> <li>• b Selection of the multiplying constant Tripping time, in position 1 K=10 in position 0 K=1</li> <li>• c,d Selection of the multiplying constant of tripping current: With c d in position 0 K=0.1 With c in position 1, d in position 0 K=1 . With c,d in position 1 K=10</li> <li>• e In position 1 the output relays will be de-energized at rest, in position 0 the output relays will be energized at rest (fail safe)</li> </ul>
<b>4</b>	Push button for Test
<b>5</b>	Push button for manual reset
<b>6</b>	Signalling green LED for Aux. Supply presence
<b>7</b>	Signalling red LED for relay tripped

**ELECTRICAL CHARACTERISTICS**

models and value	ELR-7
Auxiliary Voltage supply	24 - 48 Vac/dc / 110 Vac/dc - 230 Vac ± 20% (standard)
Frequency	50 ÷ 60 Hz
Maximum consumption	3 VA
Current tripping setting range IΔN	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10 25÷250A*
Tripping time setting range t	0,02÷0,5 sec K=1 - 0,2÷5 sec K=10
External Toroidal Transformers and accessories	Ct1/...serie - setting multiplier, adaptor CT
Output: 2 voltage free contacts	2 changeover contacts NO-C-NC 5A 250V resistive load
Working Temperature	-10 + 60°C
Storing Temperature	-20 + 80°C
Relative humidity	< 90%
Insulation Test	2,5 kV 60 sec.
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M
Protection degree according DIN 40050	IP40 front with cover (opt. Ip55) - IP 20 enclosure
Mounting according DIN 43700	Flush mounting DIN 48x48mm, depth 72mm
Wiring method	Draw out terminals for cross section wires 2,5 mm <sup>2</sup>

\* By means of an external multiplier ( see pag. 40 )

**WIRING DIAGRAM**



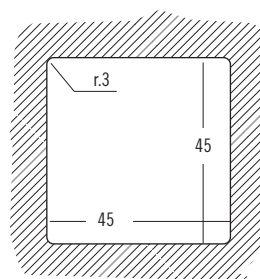
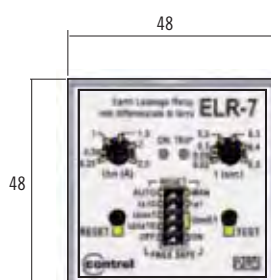
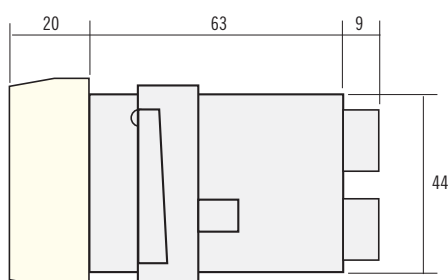
Wiring diagram for MCCB with shunt trip and energized end relay to the trip (FAIL SAFE OFF) for using de-energized (FAIL SAFE ON) connect to the BA the terminals 7 - 8 (contact NO in no tripped condition)

**LEGEND**

- 1 - 3 = 220 - 240 Vac
- 2 - 3 = 110 - 125 Vac/dc
- 1 - 3 = 48 Vac/dc
- 2 - 3 = 24 Vac/dc

\* Auxiliary supply Uaux

**DIMENSIONS**



# ELR-4o / ELR-m4o ELR-4v / ELR-m4v

EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSIONS DIN 48X96 mm

## GENERALITY



The ELR-4 and ELRm-4 series, maintain all the basic characteristics of the DIN 96x96 mm. series, although their reduced dimensions.

An outstanding characteristic of the present relays, is the permanent control of the Toroidal - ELR circuit.

Its interruption brings along the immediate trip of the protection. This allows to identify the anomaly, without waiting to the periodical control, made with the Test push button.

The instrument, fitted with filters at the input circuits, is practically immune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards.

### MODELS

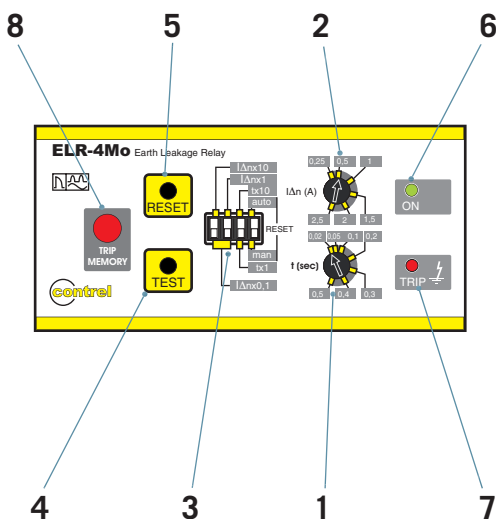
ELR-4v / ELR-m4v ELR-4o / ELR-m4o	110Vac/dc - 230 - 400 Vac
ELR-4v / ELR-m4v ELR-4o / ELR-m4o	24-48 Vac/dc

### OPTIONS

F	built - in filter for 3rd harmonic
T	tropicalisation

Following versions available:  
DIN 96x48 mm ELR-40 and ELR-m40  
DIN 48x96 mm ELR-4V and ELR-m4V  
With reduced depth of 75 mm.

## LEGEND



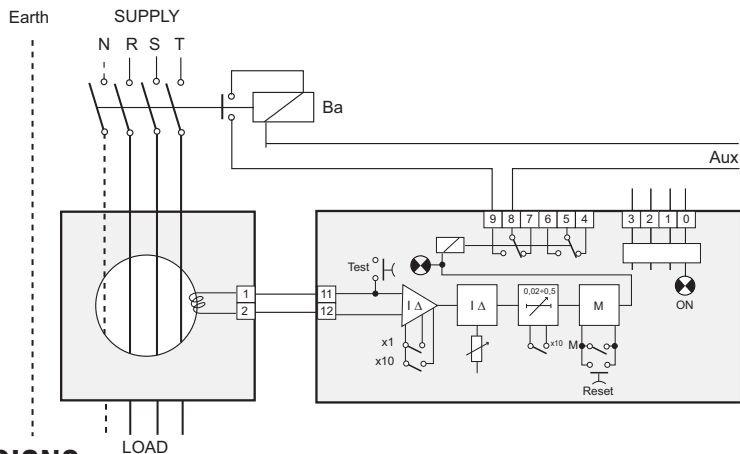
1	Tripping time delay setting potentiometer
2	Tripping current setting potentiometer
3	Constant selection micro switch: <ul style="list-style-type: none"> <li>• a Automatic reset with micro (a) in position 1</li> <li>• b Constant selection for time settings: K= 1 for micro(b) in position 0; K=10 for micro (b) in position 1;</li> <li>• c Constant selection for current settings: K=0,1 for micros (c-d) in position 0; K= 1 for micro (c) in position 1 and (d) in position 0; K=10 for micro (c) in position 1 and micro (d) in position 1.</li> </ul>
4	Test push button.
5	Manual reset push button.
6	Signalling lamp for Aux. Supply presence (green LED)
7	Signalling lamp for relay tripped (red LED)
8	Mechanical Signalling (only for ELRm)

**ELECTRICAL CHARACTERISTICS**

models and value	ELR- 40	ELR-m40	ELR-4V	ELR-mV
Auxiliary Voltage supply	24-48V ac/dc 110Vac/dc - 230 - 400 Vac ±20% (standard)			
Frequency	50 ÷ 60 Hz			
Maximum consumption	4 VA			
Current tripping setting range IΔN	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10 25÷250A*			
Tripping time setting range t	0,02÷0,5 sec K=1 - 0,2÷5 sec K=10			
Mechanical Signalisation	-	•	-	•
Output: 2 changeover contacts	5A 250V			
Working Temperature	-10 + 60°C			
Storing Temperature	-20 + 80°C			
Relative humidity	90%			
Insulation Test	2,5 kV 60 sec.			
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M			
Wiring method	Screw terminals for cross section wires 2,5 mm <sup>2</sup>			
Protection degree according DIN 40050	IP 20			
Frontal protection degree	Ip52 (opt. IP54)			

\* By means of an external multiplier ( see pag. 40 )

**WIRING DIAGRAM - LEGEND**



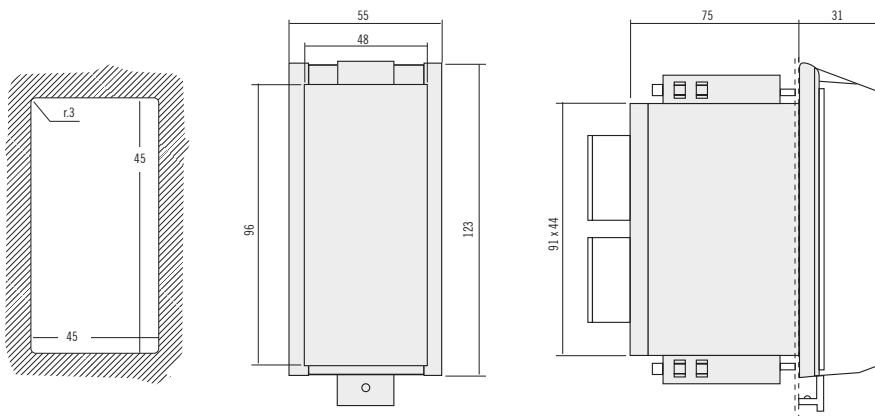
**LEGENDA**

- 0-3 = 400 V ac
- 0-2 = 230 V ac
- 0-1 = 110 V ac/dc

---

- 0-2 = 48 V ac/dc
- 0-1 = 24 V ac/dc

**DIMENSIONS**



# ELR-91 / ELR-92

EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 72X72 mm

## GENERALITY



### MODELS

ELR-91	110 Vac/dc - 230 Vac
ELR-91 / ELR-92	24-48 Vac/dc
ELR-92	110 Vdc
ELR-92	110 - 230 - 400 Vac

### OPTIONS

F	built - in filter for 3rd harmonic (only for ELR-92)
T	tropicalisation

This new series of relays, for flush mounting according to DIN 72x72 mm, on top of granting a high reliability level, like the previous models, have evolved the technical and mechanical characteristics.

### ELR-91

This is the basic unit of the new series, is particularly advised in those cases, in which it's required to use a reduced flush mounting ELR's option, without other particular options. One of its main novelties is the reduced depth (60mm including terminals).

It may be coupled to any of our Toroidal Transformers of the CT-1(close core) and CTA-1 (split core) families.

There are various versions, in order to meet different auxiliary supply requirements. Their wide time and current setting ranges, allows to easily select the tripping characteristics, in order to maintain the contact values below 50 V, as required by the IEC standards.

This is also the suitable answer for a proper selectivity, whenever there are other ELR's or/and RCD's downstream or upstream in the line to be protected.

The instrument, fitted with filters at the input circuits, is practically immune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards.

### ELR-92

The present model, on top of the previous basic unit characteristics, it's fitted with following features:

- A double output changeover contact, one can be used for disconnection and the other for an alarm function at 70% of the set current (the selection of the working type of the second contact is being made by means of a dipswitch)
- selectable negative or positive safety (fail safe) by means of a dipswitch

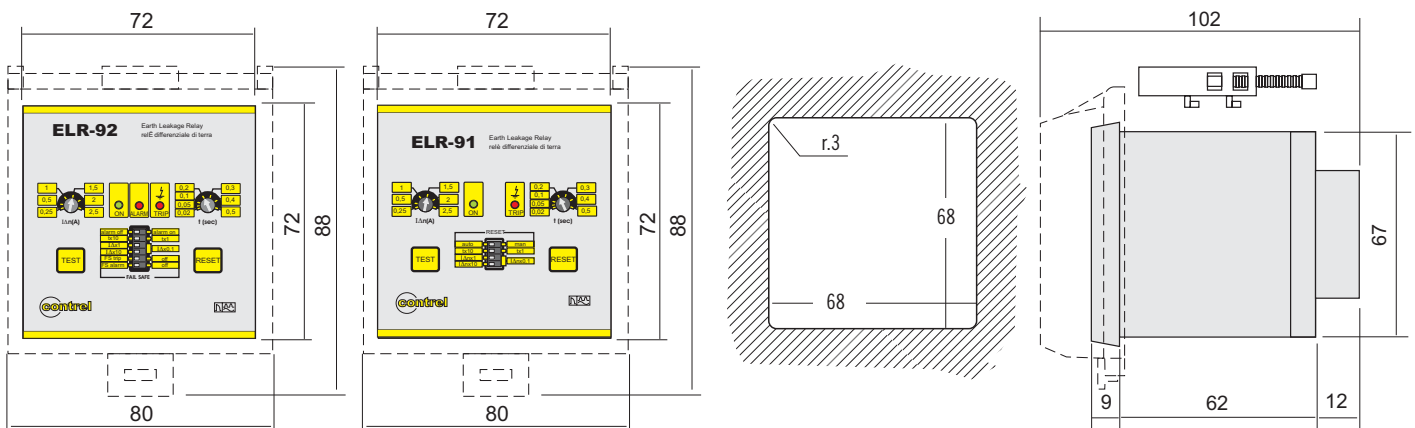


**ELECTRICAL CHARACTERISTICS**

models and value	ELR - 91	ELR - 92
Auxiliary voltage supply	110 Vac/dc-230 Vac $\pm$ 20% (standard) or 24-48 Vac/dc	110 - 230 - 400 Vac $\pm$ 20% (standard) or 110 Vdc or 24-48 Vac/dc
Frequency	50 $\div$ 60 Hz	
Maximum consumption	4 VA	
Tripping current setting range $I\Delta N$	0,025 $\div$ 0,25A K=0,1 - 0,25 $\div$ 2,5A K=1 - 2,5 $\div$ 25A K=10 - 25 $\div$ 250A*	
Alarm current setting range	-	70% ID N
Tripping time setting range	0,02 $\div$ 0,5 sec. K=1 - 0,2 $\div$ 5 sec. K=10	
Output: changeover contacts	Nr.1 5A 250V	Nr.2 5A 250V
Working temperature	-10 + 60°C	
Storing temperature	-20 + 80°C	
Relative humidity	90%	
Insulation test	2,5 kV 60 sec.	
Standards of reference	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M	
Wiring type	Screw terminals / cross section cables 2,5 mm <sup>2</sup>	
Terminal protection degree according with DIN 40050	IP20	
Frontal protection degree	IP52 (optional IP65)	
Selectable fail safe for each output relay	-	•

\* By means of external multiplier ( see pag. 40 )

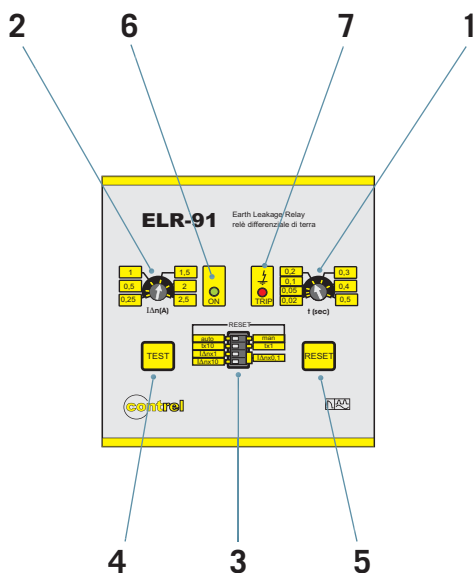
**DIMENSIONS**



# ELR-91 / ELR-92

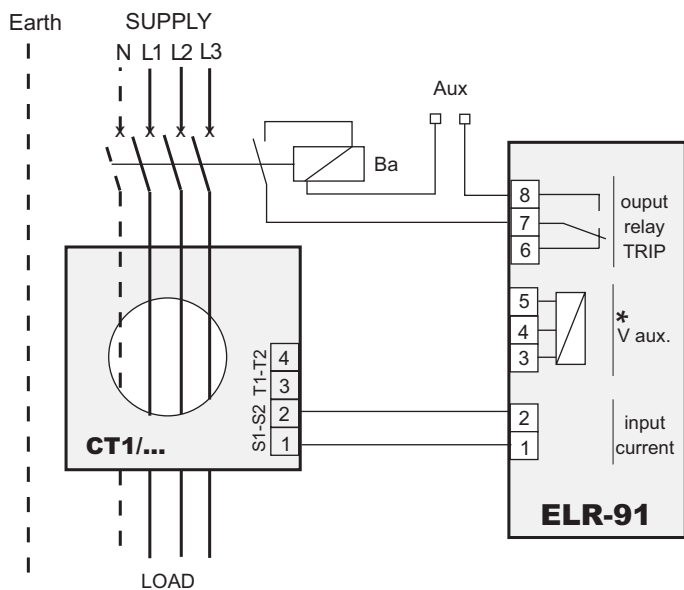
EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 72X72 mm

## LEGEND - ELR-91



1	Potentiometer for tripping time setting.
2	Potentiometer for tripping current setting
3	4 ways of dip-switches: <ul style="list-style-type: none"> <li>• On/Off the automatic reset .</li> <li>• Constant selection for time setting.</li> <li>• Constant selection for current setting</li> </ul>
4	Push button for test.
5	Push button for manual reset.
6	Green Led for auxiliary supply signalling.
7	Red Led for tripped relay signalling.

## WIRING DIAGRAM - ELR-91



\* Auxiliary supply  $U_{aux}$

### LEGEND

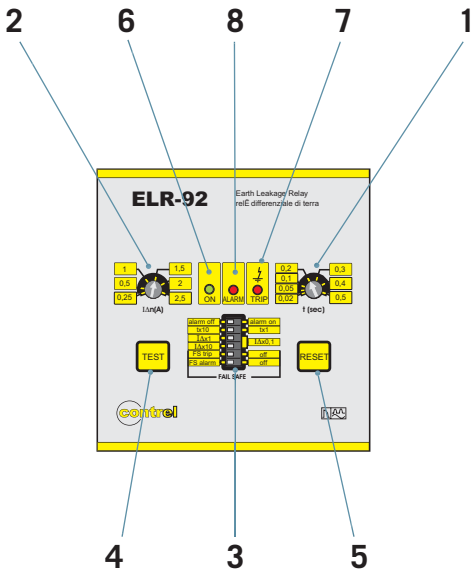
**110-230 V**  
 3 - 4 = 115 Vac / Vdc  
 3 - 5 = 230 Vac

**24/48 V**  
 3 - 4 = 48 Vac / Vdc  
 3 - 5 = 24 Vac / Vdc

# ELR-91 / ELR-92

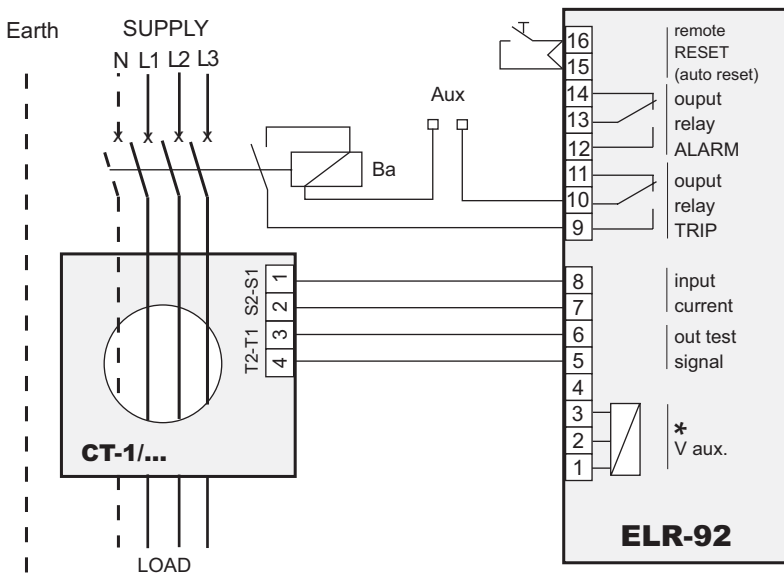
EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 72X72 mm

## LEGEND - ELR-92



1	Potentiometer for tripping time setting.
2	Potentiometer for tripping current setting
3	ways of dip-switches: <ul style="list-style-type: none"> <li>• On/Off the alarm feature .</li> <li>• Constant selection for time setting.</li> <li>• Constant selection for current setting.</li> <li>• On/Off the fail safe of the tripped relay.</li> <li>• On/Off the fail safe of the tripped alarm.</li> </ul>
4	Push button for test.
5	Push button for manual reset.
6	Green Led for auxiliary supply signalling.
7	Red Led for tripped relay signalling.
8	Red Led for tripped alarm signalling

## WIRING DIAGRAM - ELR-92



\* Auxiliary supply  $U_{aux}$

### LEGEND

#### 230 Vca

2 - 3 = 115 Vac

1 - 2 = 230 Vac

1 - 3 = 400 Vac

#### 115 V

2 - 3 = 100-125 Vdc

#### 24 V

2 - 3 = 24 Vac/dc

1 - 3 = 48 Vac/dc

# ELR-1E / ELR-2 / ELR-2M

## EARTH LEAKAGE RELAY

FLUSH MOUNTING VERSION DIN 96X96 mm WITH REDUCED DEPTH ENCLOSURES.

### GENERALITY



#### MODELS

ELR-1E	110 Vac/dc - 230 - 400 Vac
ELR-1E	12 Vac/dc
ELR-1E / ELR-2 / ELR-2M	24-48 Vac/dc
ELR-2 / ELR-2M	110 - 230 - 400 Vac
ELR-2 / ELR-2M	110 Vdc

#### OPTIONS

F	built - in filter for 3rd harmonic (only for ELR-2 ELR- 2M)
T	tropicalisation

This new series of relays, for flush mounting according to DIN 96x96 mm, on top of granting a high reliability level, like the previous models, have evolved the technical and mechanical characteristics.

#### ELR-1E

This is the basic unit of the new series, is particularly advised in those cases, in which it's required to use a reduced flush mounting ELR's option, without other particular options. One of its main novelties is the reduced depth (60mm including terminals). It may be coupled to any of our Toroidal Transformers of the CT-1(close core) and CTA-1 (split core) families.

There are various versions, in order to meet different auxiliary supply requirements. Their wide time and current setting ranges, allows to easily select the tripping characteristics, in order to maintain the contact values below 50 V, as required by the IEC standards.

This is also the suitable answer for a proper selectivity, whenever there are other ELR's or/and RCD's downstream or upstream in the line to be protected.

The instrument, fitted with filters at the input circuits, is practically immune to external disturbances, so as the pulse currents with dc components, complying with the requirements of VDE 0664 and project IEC 23 Standards.

#### ELR-2

The present model, on top of the previous basic unit characteristics, it's fitted with following features:

- a. a double output changeover contact, one can be used for disconnection and the other for an alarm function at 70% of the set current (the selection of the working type of the second contact is being made by means of a dipswitch);
- b. selectable negative or positive safety (fail safe) by means of a dip-switch

#### ELR-2M

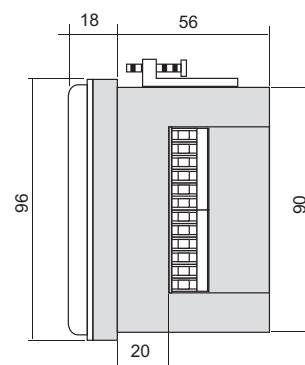
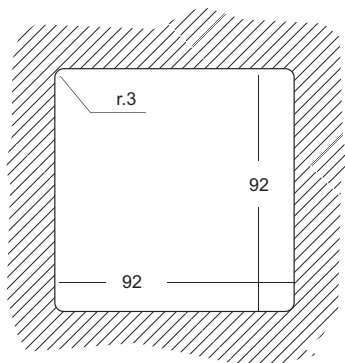
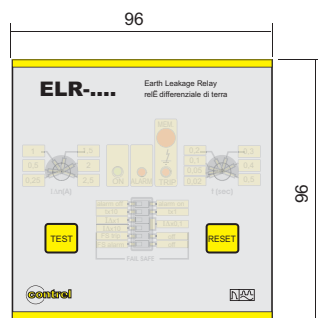
In this case the ELR is also fitted with the mechanical signalisation, which enables to keep the information of a tripped relay, without auxiliary supply even. This avoids the dangerous inconvenience of having an energised panel with the door open.

## ELECTRICAL CHARACTERISTICS

models and value	ELR-1E	ELR-2	ELR-2M
Auxiliary voltage supply	110Vac/dc-230-400Vac (standard) or 24-48Vac/dc or 12Vac/dc	110 - 230 - 400 Vac $\pm$ 20% (standard) or 110 Vdc or 24-48 Vac/dc	
Frequency	50 $\div$ 60 Hz		
Maximum consumption	4 VA		
Tripping current setting range $I_{\Delta N}$	0,025 $\div$ 0,25A K=0,1 - 0,25 $\div$ 2,5A K=1 - 2,5 $\div$ 25A K=10 25 $\div$ 250A*		
Alarm current setting range	-	70% $I_{\Delta N}$	
Tripping time setting range	0,02 $\div$ 0,5 sec. K=1 - 0,2 $\div$ 5 sec. K=10		
Mechanical signalisation	-	-	•
Output: changeover contacts	Nr.1 5A 250V	Nr.2 5A 250V	Nr.2 5A 250V
Working temperature	-10 + 60°C		
Storing temperature	-20 + 80°C		
Relative humidity	90%		
Insulation test	2,5 kV 60 sec.		
Standards of reference	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M		
Wiring type	Screw terminals / cross section cables 2,5 mm <sup>2</sup>		
Terminal protection degree according with DIN 40050	IP20		
Frontal protection degree	IP52 (optional IP65)		
Selectable fail safe for each output relay	-	•	•

\* By means of external multiplier( see pag. 40 )

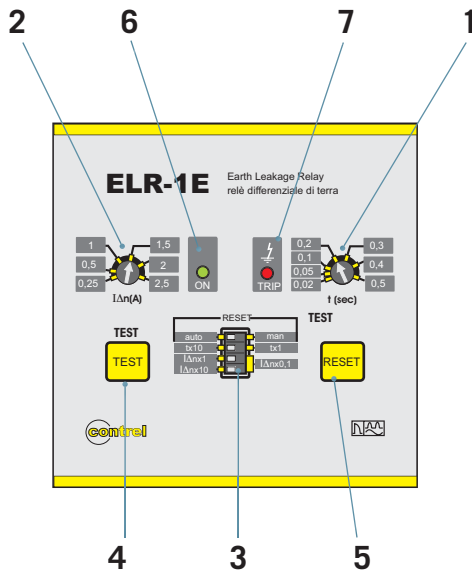
## DIMENSIONS



# ELR-1E / ELR-2 / ELR-2M

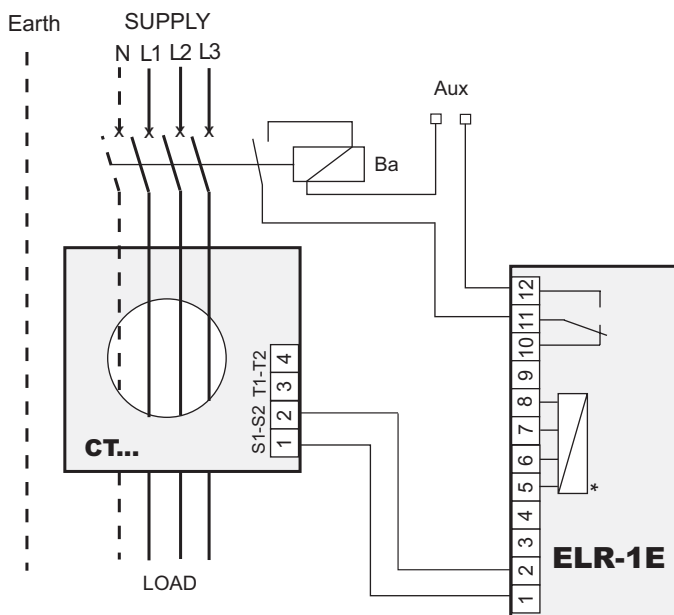
EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 96X96 mm WITH REDUCED DEPTH ENCLOSURES.

## LEGEND - ELR-1E



1	Potentiometer for tripping time setting.
2	Potentiometer for tripping current setting.
3	4 ways of dipswitches: <ul style="list-style-type: none"> <li>• On/Off the automatic reset.</li> <li>• Konstant selection for time setting.</li> <li>• Konstant selection for current setting.</li> </ul>
4	Push button for test.
5	Push button for manual reset.
6	Green Led for auxiliary supply signalling.
7	Red Led for tripped relay signalling.

## WIRING DIAGRAM - ELR-1E



\* Auxiliary supply  $U_{aux}$

**110-400 V**  
 5 - 6 = 115 Vac/dc  
 5 - 7 = 230 Vac  
 5 - 8 = 400 Vac

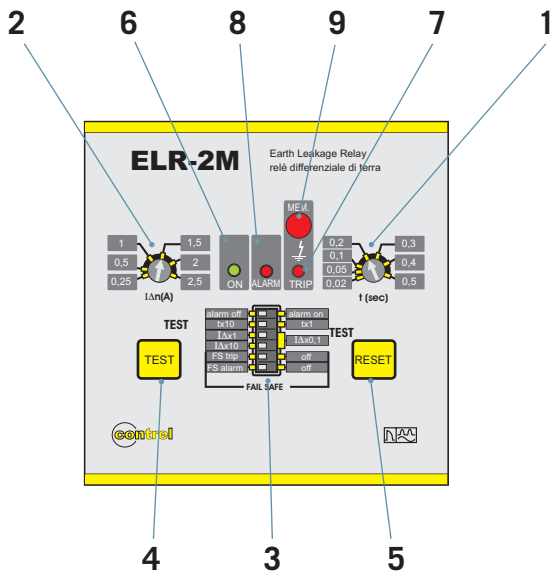
**24/48 V**  
 5 - 7 = 48 Vac / Vdc  
 5 - 6 = 24 Vac / Vdc

**12 V**  
 5 - 6 = 12 Vac / Vdc

# ELR-1E / ELR-2 / ELR-2M

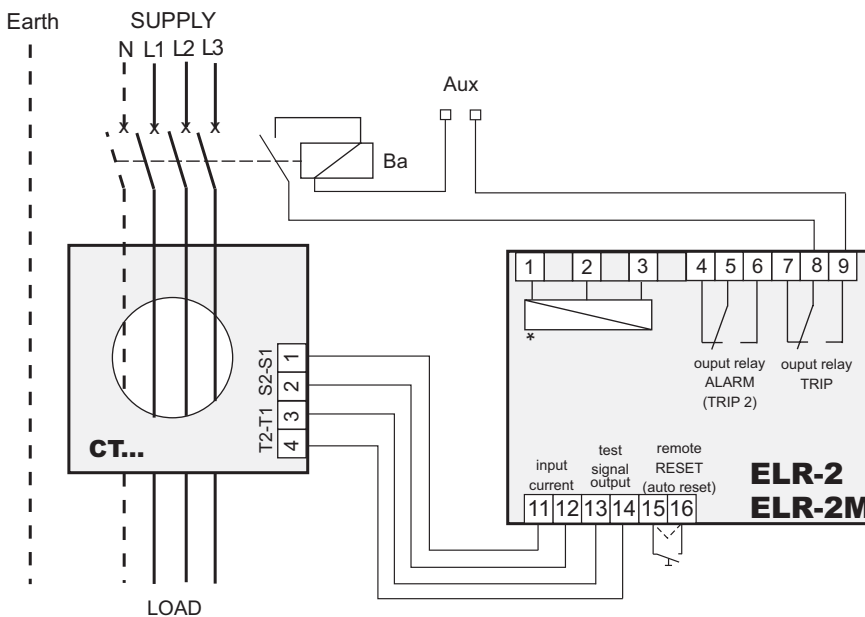
EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 96X96 mm WITH REDUCED DEPTH ENCLOSURES.

## LEGEND - ELR-2 / ELR-2M



1	Potentiometer for tripping time setting.
2	Potentiometer for tripping current setting.
3	6 ways of dipswitches: <ul style="list-style-type: none"> <li>• On/Off the automatic reset .</li> <li>• Konstant selection for time setting.</li> <li>• Konstant selection for current setting.</li> <li>• On/Off the fail safe of the tripped relay.</li> <li>• On/Off the fail safe of the tripped alarm.</li> </ul>
4	Push button for test.
5	Push button for manual reset.
6	Green Led for auxiliary supply signalling.
7	Red Led for tripped relay signalling.
8	Red Led for tripped alarm signalling.
9	Mechanical signalling of tripped relay (only per ELR-2M)

## WIRING DIAGRAM - ELR-2 / ELR-2M



\* Auxiliary supply U<sub>aux</sub>

### LEGEND

#### 230 Vca

- 1 - 2 = 100-125 Vac
- 2 - 3 = 220-240 Vac
- 1 - 3 = 380-415 Vac

#### 115 V

- 1 - 2 = 100-125 Vdc

#### 24 V

- 1 - 2 = 24 Vac/dc
- 1 - 3 = 48 Vac/dc

# ELR-8V ELR-8tcs / ELR-8MVtcs

EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 96X96 mm WITH ADVANCED FUNCTIONS

## GENERALITY



### MODELS

ELR-8V / ELR-8tcs / ELR-8MV-tcs	110 - 230 - 400 Vac
ELR-8V / ELR-8tcs / ELR-8MV-tcs	110 Vdc
ELR-8V / ELR-8tcs / ELR-8MV-tcs	24-48 Vac/dc

### OPTIONS

T	tropicalisation
---	-----------------

### ELR-8V

The ELR-8V, is being manufactured in a DIN 96x96mm enclosure for flush mounting, It can be connected to any of our toroidal transformers of the CT-1 (closed core) and CTA-1 (split core) series.

The relay has a wide adjusting range, either in current sensitivity as in time delay. The mentioned setting range allows an easy selection of the tripping value, in order to maintain the voltage contact values below 50V, as required by IEC standard. This will also allow to conduct a tripping selectivity, when there are other ELR's and/or RCD's installed in the same line. There are various versions with different power supplies, in order to meet the end user's requirements. Other important feature is the instrument's insensitivity of the external disturbances, due to the filters installed at the input circuits, so as the insensitivity to the existing direct currents in the line under control, as required by the VDE standards (built harmonic filter is standard).

Nevertheless, its most outstanding feature is the frontal display, which is permanently visualising the actual leakage value, with the possibility of selecting the full scale value, between 20 or 200A, so as the possibility of blocking the reading of the tripping leakage values ("hold" function).

On top of the previous basic characteristics, it's fitted with following features:

- A double output changeover contact, one can be used for disconnection and the other for an alarm function at 70% of the set current (the selection of the working type of the second contact is being made by means of a dip-switch);
- It is possible to select the output relay's contacts position. Fail safe (relay excited at rest) or negative safety (the relay is unexcited at rest). The fail safe offers a notorious advantage, since the relay will open in case of a failure, in order to avoid leaving the installation operative without protection.

### ELR-8 tcs

The present type, without the frontal display, has the possibility of controlling the opening coil and the disconnection circuit. Should there be a failure, the relay would signal same with a LED and a changeover relay (on top of the other 2 contacts) would be activated.

### ELR-8MV-tcs

The ELR-8MV-tcs incorporates all the above functions and features in one, plus the mechanical signal, becomes the most complete flush mounting relay DIN 96 x96 mm.

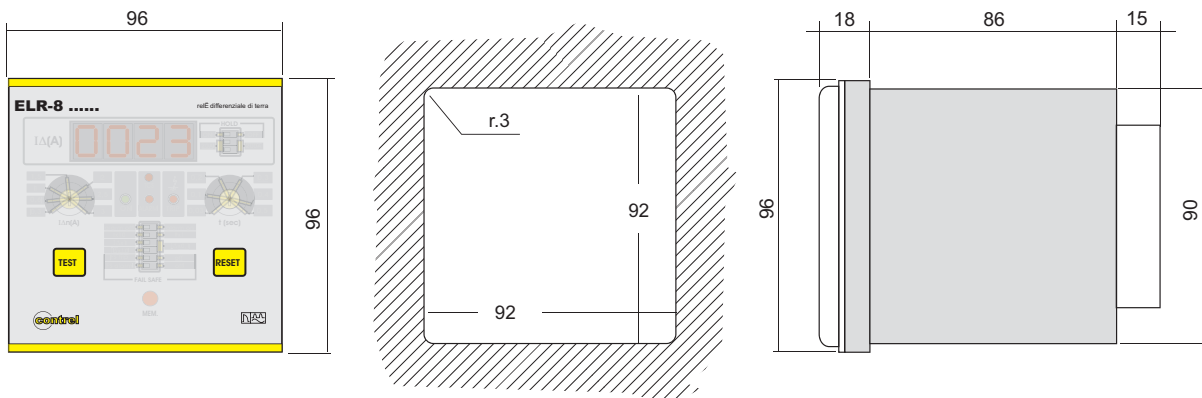


**ELECTRICAL CHARACTERISTICS**

models and value	ELR-8V	ELR-8 tcs	ELR-8MV tcs
Auxiliary voltage supply	110 - 230 - 400 Vac ± 20% (standard) - 110Vdc - 24-48Vac/dc		
Frequency	50 ÷ 60 Hz		
Maximum consumption	4 VA		
Tripping current setting range I $\Delta$ N	0,025÷0,25A K=0,1 - 0,25÷2,5A K=1 - 2,5÷25A K=10 25÷250A*		
Alarm current setting range	70% I $\Delta$ N		
Tripping time setting range	0,02 ÷ 0,5 sec. K=1 - 0,2 ÷ 5 sec. K=10		
Mechanical signalisation	-	-	•
Output: changeover contacts	Nr.1 5A 250V	Nr.2 5A 250V	Nr.2 5A 250V
Working temperature	-10 + 60°C		
Storing temperature	-20 + 80°C		
Relative humidity	90%		
Insulation test	2,5 kV 60 sec.		
Standards of reference	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M		
Wiring type	Screw terminals / cross section cables 2,5 mm <sup>2</sup>		
Terminal protection degree according with DIN 40050	IP20		
Frontal protection degree	IP52 (optional Ip65)		
Shunt coil and disconnecting circuit functionality (TCS function)	-	•	•
Frontal display with 4 digits / f.s. 20A o 200A	•	-	•
Selectable fail safe for each output relay	•	•	•

\* By means of external multiplier ( see pag. 40 )

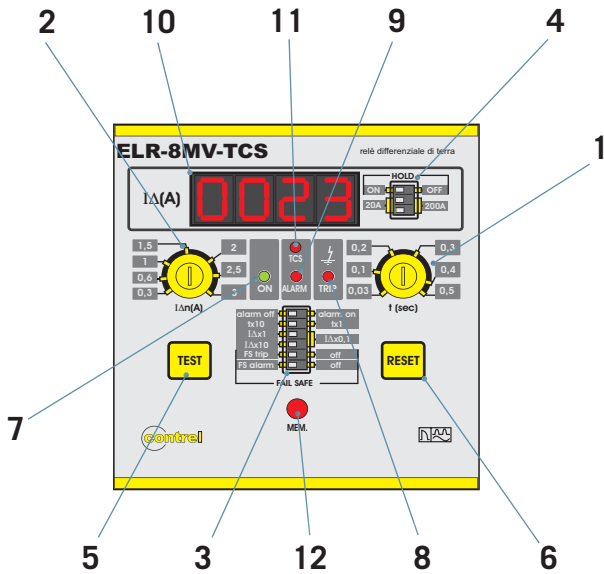
**DIMENSIONS**



# ELR-8V / ELR-8-TCS / ELR-8MV-TCS

EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 96X96 mm WITH ADVANCED FUNCTIONS

## LEGEND - ELR-8V / ELR-8MV-TCS



1	Potentiometer for tripping time setting.
2	Potentiometer for tripping current setting.
3	6 ways of dip-switches: <ul style="list-style-type: none"> <li>• On/Off the alarm feature .</li> <li>• Constant selection for time setting.</li> <li>• Constant selection for current setting.</li> <li>• On/Off the fail safe of the tripped relay.</li> <li>• On/Off the fail safe of the tripped alarm.</li> </ul>
4	3 ways of dip-switches: <ul style="list-style-type: none"> <li>• On/Off leakage current reading on display.</li> <li>• Full scale selection on display.</li> </ul>
5	Push button for test.
6	Push button for manual reset.
7	Green Led for auxiliary supply signalling.
8	Red Led for tripped relay signalling.
9	Red Led for tripped alarm signalling.
10	4 digits display for current leakage visualisation.
11	Red Led for TCS alarm signalling (only for ELR/8MV-tcs)
12	Mechanical signalling of tripped relay (only for ELR/8MV-tcs)

## WIRING DIAGRAM - ELR-8V / ELR-8MV-TCS - LEGEND

\* Auxiliary supply Uaux

**110-400 V**  
 1 - 2 = 115 Vac  
 2 - 3 = 230 Vac  
 1 - 3 = 400 Vac

**24/48 V**  
 1 - 2 = 24 Vac / Vdc  
 1 - 3 = 48 Vac / Vdc

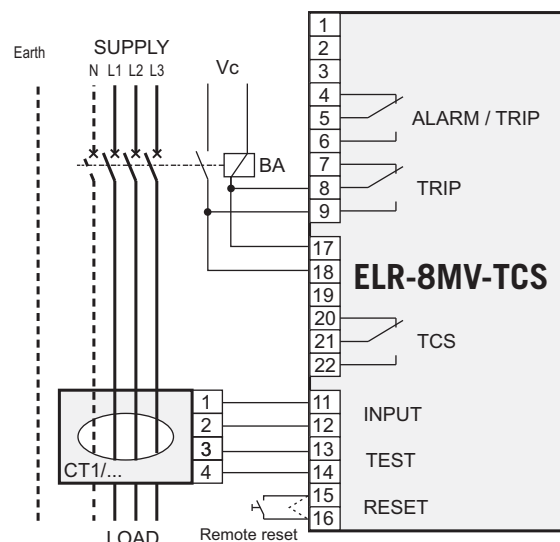
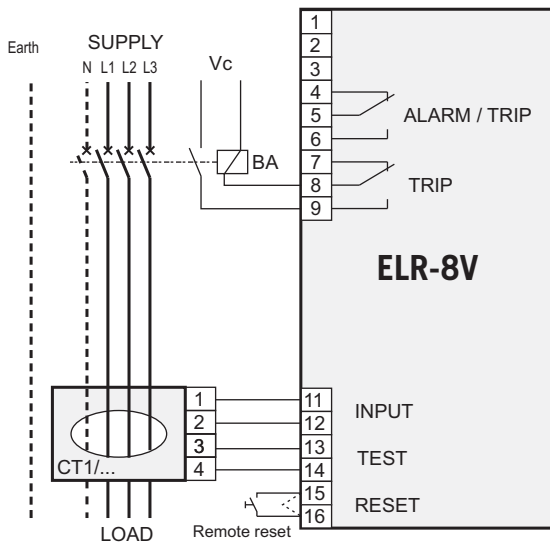
**110 V**  
 1 - 3 = 110 Vdc

**110-400 V**  
 1 - 2 = 115 Vac  
 2 - 3 = 230 Vac  
 1 - 3 = 400 Vac

**24/48 V**  
 1 - 2 = 24 Vac / Vdc  
 1 - 3 = 48 Vac / Vdc

**110 V**  
 1 - 3 = 110 Vdc

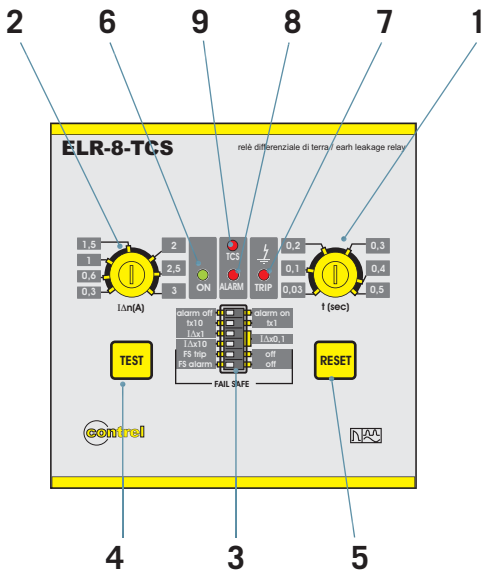
**Vc**  
 17-18=110-240 Vac/dc or 24 Vac/dc  
 17-19=380-415 Vac or 48 Vac/dc



# ELR-8V / ELR-8-TCS / ELR-8MV-TCS

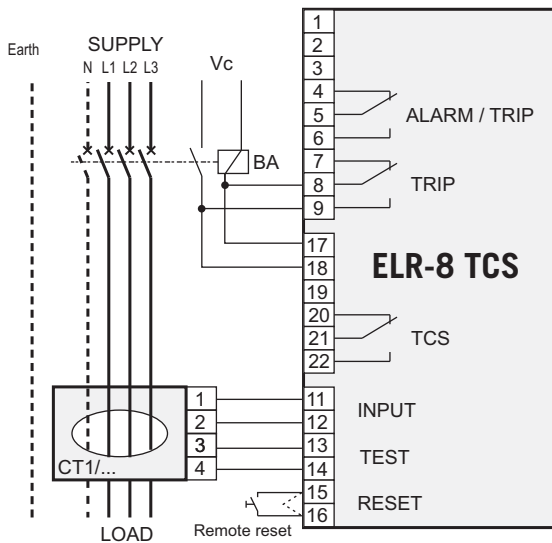
EARTH LEAKAGE RELAY  
FLUSH MOUNTING VERSION DIN 96X96 mm WITH ADVANCED FUNCTIONS

## LEGEND - ELR-8 TCS



1	Potentiometer for tripping time setting.
2	Potentiometer for tripping current setting.
3	6 ways of dip-switches: <ul style="list-style-type: none"> <li>• On/Off the alarm feature .</li> <li>• Constant selection for time setting.</li> <li>• Constant selection for current setting.</li> <li>• On/Off the fail safe of the tripped relay.</li> <li>• On/Off the fail safe of the tripped alarm.</li> </ul>
4	Push button for test.
5	Push button for manual reset.
6	Green Led for auxiliary supply signalling.
7	Red Led for tripped relay signalling.
8	Red Led for tripped alarm signalling.
9	Red Led for TCS alarm signalling.

## WIRING DIAGRAM - ELR-8 TCS - LEGEND



\* alimentazione ausiliaria Uaux

### 110-400 V

1 - 2 = 115 Vac

2 - 3 = 230 Vac

1 - 3 = 400 Vac

### 24/48 V

1 - 2 = 24 Vac/ Vdc

1 - 3 = 48 Vac / Vdc

### 110 V

1 - 3 = 110 Vac / Vdc

### Vc

17-18= 110-240 Vac/cc or 24 Vac/dc

17-19= 380-415 Vac or 48 Vac/dc

# ELR-51 / ELR-m51 ELR-52 / ELR-m52

EARTH LEAKAGE RELAY - FLUSH MOUNTING VERSION DIN 96x96 mm  
WITH SELF-POWER FOR SMALL NETWORKS INTERRUPTION, FAIL SAFE, ETC.

## GENERALITY



The **ELR-5** are new series, which comes to enlarge the range of ELR's. Mentioned relays bring some interesting variables, regarding to the normal characteristics, already available in the precedent families.

**a.** Working with Fail Safe. This is to say, the end relay is de-energized by leakage or lack of supply, but due to a particular time circuit on the end relays, it avoids the tripping of the MCCB, when returning of the Aux. Supply, working with shunt trip coils.

**b.** Self- supply during 2 sec., In case of a lack of supply. This is an important characteristic, since the relay is capable to overcome the problems related to the classic Voltage holes, whilst the automatic re-closing operations of the lines.

**c.** Trial current during Test, depending on the tripping current set at the relay. The trial current value is automatically set, between 100 and 160% of the  $I_{\Delta N}$  set on the relay. This allows a real simulation of the leakage current, to which the relay should trip, permitting the individualisation of eventual anomalies of internal circuits or connections.

### MODELS

<b>ELR-51 / ELR-m51</b>	110 - 230 - 400 Vac
<b>ELR-52 / ELR-m52</b>	

### OPTIONS

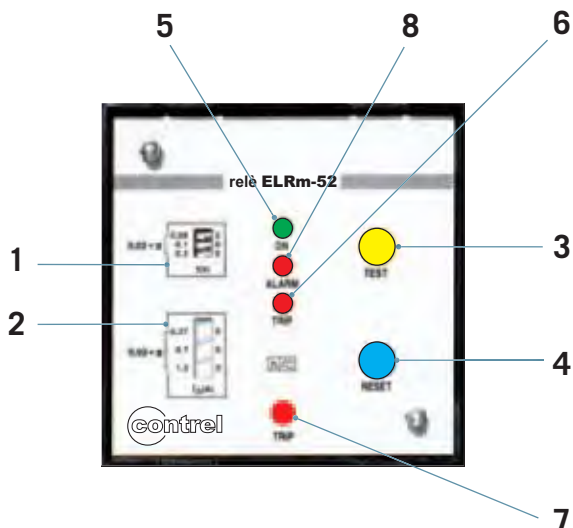
<b>F</b>	built-in filter of third harmonic
<b>T</b>	tropicalisation

**d.** Continuous control of the efficiency on the internal circuits, by tripping when whatever anomaly of the electrical parameters is detected.

**e.** Continuous control on the Toroidal-Relay circuit. The interruption of the circuit makes the ELR to trip, since there is no longer protection on the line.

**f.** Insensitivity to the pulse currents with dc component.

## LEGEND



<b>1</b>	Micro switch for time delay setting.
<b>2</b>	Micro switch for tripping current setting.
<b>3</b>	Push button for Test.
<b>4</b>	Push button for manual reset.
<b>5</b>	Signalling lamp for Aux. Supply presence (Green LED)
<b>6</b>	Signalling lamp for relay tripped (Red LED)
<b>7</b>	Mechanical Signalling for relay tripped, (only for ELR-m51 ELR-m52)
<b>8</b>	Signalling lamp for overcoming the alarm threshold (Red LED), (only for ELR-52 ELR-m52)

# ELR-51 / ELR-m51 / ELR-52 / ELR-m52

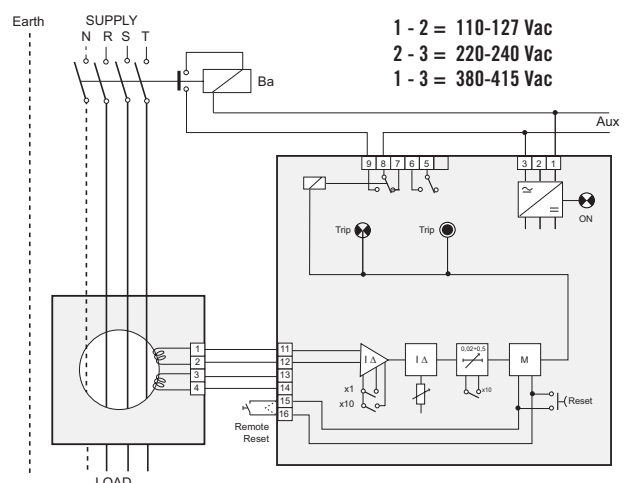
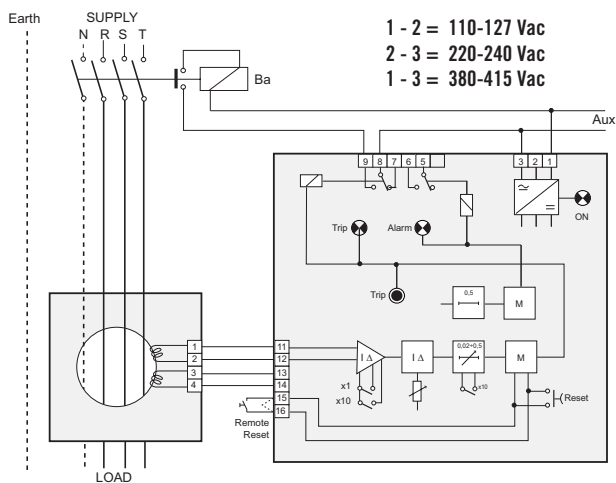
**EARTH LEAKAGE RELAY**  
**FLUSH MOUNTING VERSION DIN 96x96 mm**  
**WITH SELF-POWER FOR SMALL NETWORKS INTERRUPTION, FAIL SAFE, ETC.**

## ELECTRICAL CHARACTERISTICS

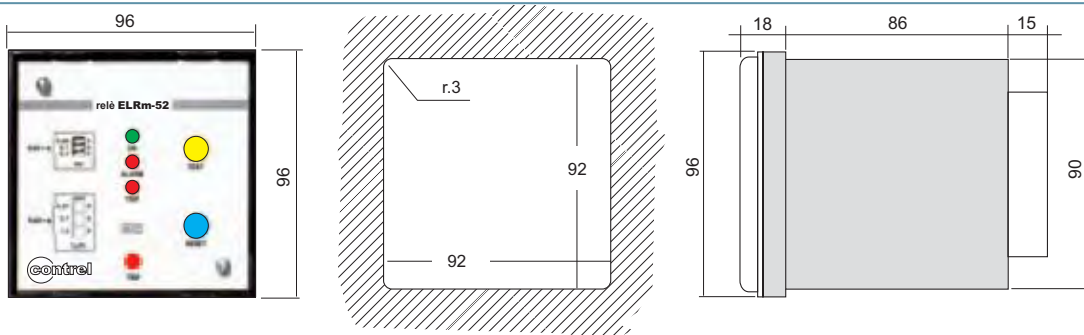
models and value	ELR- 51	ELRm-51	ELR-52	ELRm-52
Auxiliary voltage supply	110-230-400 V ac. $\pm$ 20%			
Frequency	50 $\div$ 60 Hz			
Maximum consumption	4 VA			
Tripping current setting range $I\Delta N$	0,03 $\div$ 2,5 0,3 $\div$ 25A*			
Alarm current setting range	-		70%	
Time tripping setting range	0,02 $\div$ 0,5 sec.			
Mechanical signalisation	-	•	-	•
Output: 2 change-over contacts	5A 250V			
Working temperature	-10 + 60°C			
Storing temperature	-20 + 80°C			
Relative humidity	90%			
Insulation Test	2,5 kV 60 sec.			
Standards	CEI 41-1/IEC 255/VDE 0664/IEC 755/CEI 64.8/ EN 61008-1(1999-11)/EN 62020 (1999-09) / EN 61543 (1996-09) /EN61326-1(1998-04) / EN 61326/A1 (1999-05)-IEC 60947-2 ANNEX M / AS 2081-1 / AS 2081-3			
Wiring method	Screw terminals for cross section wire 2,5 mm <sup>2</sup>			
Protection degree at terminals according with DIN 40050	IP 20			
Frontal protection degree	Ip52 (optional IP54)			

\* By means of external multiplier ( see pag. 40 )

## WIRING DIAGRAM - LEGEND



## DIMENSIONS





## MULTIFUNCTIONAL AMMETER MEASURING FOR NETWORK DIFFERENTIAL CURRENT

**FLUSH MOUNTING DIN 96X96 mm**

These could be used for measuring differential or residual currents (up to 4 simultaneously) with an external toroidal current transformer **CT-1 series**

### GENERAL



#### Environmental working characteristics

**Working T** -5 ÷ +50°C  
**Storage T** -15 ÷ +60°C  
**Humidity** ≤90%

ELM-4  
 ELM-4-485

#### Standards/ Regulation

**Safety** 61010-1:2001  
**EMC:** EN61000-6-2 / EN61000-6-4  
 CISPR22-EN55022

#### Electrical compatibility CE

models and value	ELM 4	ELM 4-485
<b>Mechanical characteristics</b>	Flush mounting DIN 96 x 96 mm   Depth 56 mm   Panel cut out 92x92 mm   Weight: 0,5 kg	
<b>Auxiliary supply</b>	110-230-400 V   50-60 Hz	
<b>OPTION C1</b>	20÷60 Vca/dc	
<b>OPTION C2</b>	90÷250 Vca/dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)	
<b>Current inputs</b>	4 inputs 0,05÷5A rms from external toroidal reducer series CT-1	
<b>OPTION 1A Δ</b>	4 inputs 0,01÷1A rms (from external toroidal reducer series CT-1..)	
<b>OPTION 50 A Δ</b>	4 inputs 0,05÷50A (from external toroidal reducer series CT-1)	
<b>Measured parameters</b>	AΔ1   AΔ2   AΔ3   AΔ4	
<b>Measuring accuracy</b>	Current:<0,5%	
<b>Frequency measure</b>	40 ÷ 100 Hz	
<b>Serial outputs</b>	-	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps
<b>Digital outputs</b>	2 photomos - 10÷300 Vcc/150 mA or 10÷250 Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500 m Sec.)	
<b>Analog outputs</b>	-	3 outputs 0-20/4-20 mA, completely programmable 16 bit definition (by external toroidal converter serial/analog Z3A0) *
<b>Display</b>	4 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)	

\* in this case serial output RS485 can not be used.

# CT-1

## TOROIDAL CURRENT TRANSFORMERS

### GENERALITY



The CT series toroidal transformers allow to sense the leaking currents to earth. These transformers have been designed to be coupled to the maximum earth leakage current relays of the ELR series.

The T/T's should be installed upstream of the lines or loads to be protected and/or supervised. All active wires (phase and neutral) of the three phase or single phase lines should pass through the internal core of the transformers. It senses, in this way, the currents vectorial addition, in order to transmit the earth leakage current to the secondary.

For further applications of the CT toroidal transformers, please refer to the specific documentation (i.e. The sensing of the earth leakage current on the distribution transformers).

The current T/T's are made of an optimum quality magnetic core, which allows to detect leakage currents of a very low value even. There are two windings coupled in the core, one to detect the signal of a leakage in the line (to be sent to the relay), and the other for performing the Test. The eventual Test which uses this second winding is performed through various specific ELR's types. A signal from the ELR is sent to the Test winding. This signal generates a flow equivalent to a leakage, which is detected by the other winding and resent to the relay and makes it to trip.

The selection of the transformer should be made on basis of the dimensions of the wires or bars that should pass through its inner hole. There are split core types available, which allow their installation without disconnecting the actual wiring.



## INSTALLATION

All phases should pass through the inner part of the T/T, even the neutral if same is distributed. The earthing wire shouldn't pass through the T/T.

The passage direction of all wires has to be the same, but in those applications which do not use Current Transformers in parallel, it is not necessary to respect the introduction direction(P1).

The output signal should be taken from terminals 1 (S1) and 2 (S2) and then connected to the ELR for its measure. Terminals 3-4 should be connected to the output test of those relays that have this feature available, otherwise they would be left without connection. For this wiring it is suggested to use shielded or twisted cables, placing them as far as possible from power cables. The minimum cross section of the wiring cable should allow to have a maximum resistance of 3 W; as indication it could be said 0,5 mm<sup>2</sup> max 20 metres, and 2,5 mm<sup>2</sup> max 100 metres.

The fixing of the transformers could be made on base plate DIN rail or on cables.

Should the case be of using the split core transformers, it is necessary to supervise that the contact faces of the half-cores are properly clean, so as the tightening of the fixing side screws and the right electrical wire connections between both half-cores.

In the case that the cables are shielded or they have metal protection, these should be earthen downstream of the toroidal transformer. If the shielding of the cable passes through the inner hole, the shielding connection to earth should pass again in the inverse direction by the inner hole (see image).

In presence of specific line over currents, which may happen when starting big motors, giving voltage to transformers etc., they could cause nuisance tripping of the relays. Following guidelines could be of help:

Install the T/T in a right piece of cable, centre the position of the cable at the inner hole of the T/T and use T/T's with bigger diameter of the cables (2 times the cables diameter even).

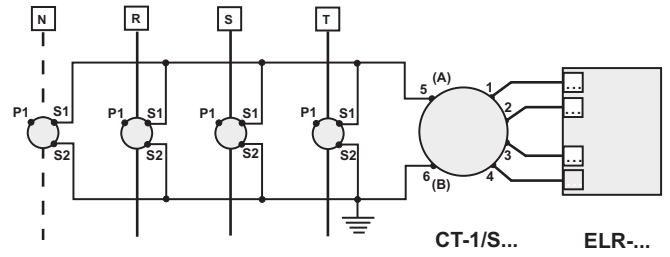
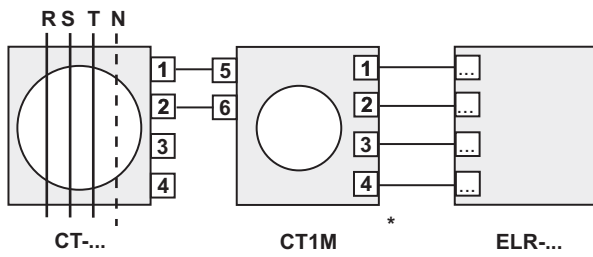
## CHARACTERISTICS

type	CTD-1/28	CT-1/35	CT-1/60	CT-1/80	CT-1/110	CTA-1/110	CT-1/160	CTA-1/160	CT-1/210	CTA-1/210	CT-1/415
Core	closed	closed	closed	closed	closed	split core	closed	split core	closed	split core	closed
Inner diameter	28 mm	35 mm	60 mm	80 mm	110 mm	110mm	160 mm	160 mm	210 mm	210 mm	400 x 150 mm
Weight	0,20 Kg	0,22 Kg	0,28 Kg	0,45 Kg	0,52 Kg	0,60 Kg	1,35 Kg	1,60 Kg	1,45 Kg	1,85 Kg	8,3 Kg
Min. Meas. current	25 mA	25 mA	25 mA	100 mA	250 mA	250 mA	250 mA	500 mA	250 mA	500mA	500mA
Mounting position	Any one										
Application	For using with ELR series										
Working temperature	-10 ÷ 70°C										
Stocking temperature	-20 ÷ 80°C										
Transformation ratio	500/1										
Isolation	2,5 kV per 60 sec										
Permanent overload	1000 A										
Thermal overload	40 kA per 1 sec										
Terminals	screws with maximum cross section 2,5 mm <sup>2</sup>										
Protection degree	IP20										
Standard of reference	EMC CEI-EN 50081-2 CEI-EN50082-2 SAFETY CEI 41.1 CEI-EN 60255										

# CT-1

## TOROIDAL CURRENT TRANSFORMERS

### CT1M - CT1S - SPECIAL TOROIDAL TRANSFORMERS



**CT1M:** It's a multiplier for the current setting of those ELR's up to 250 A. It's placed between the ELR and the measuring T/T (It isn't a wire passing through transformer)

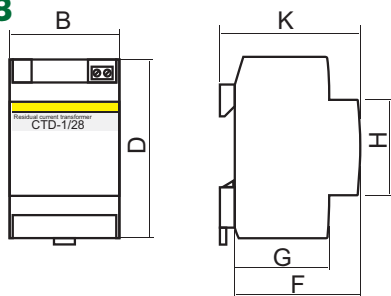
**CT1S:** It's a summation T/T, which should be used, in those cases when the cables of the system to be protected are bigger than the inner diameter of the T/T's. In such a case Ct's should be used and installed in the line. The CT's are connected to the summation T/T's and these to the ELR. (For more information, please refer to the applications notes described hereinafter).

### DIMENSIONS TABLE

type	DIMENSIONS (mm)								
	A	B	C	D	E	F	G	H	K
CTD-1/28	28	52,5	-	85,5	-	58	44	45	54
CT-1/35	35	100	60	100	47	50	43	30	-
CT-1/60	60	100	60	100	47	50	43	30	-
CT-1/80	80	150	110	160	70	50	43	30	-
CT-1/110	110	150	110	160	70	50	43	30	-
CTA-1/110	110	145	110	150	75	45	38	25	180
CT-1/160	160	220	156	236	110	64	50	34	-
CTA-1/160	160	220	156	236	110	64	50	34	-
CT-1/210	210	310	240	290	145	260	280	36	55
CTA-1/210	210	310	240	290	145	260	280	36	55
CT-1/415	400	150	500	497	240	-	-	50	-
CT-1M	-	100	60	110	47	50	43	30	-
CT1-1S	-	100	60	110	47	50	43	30	-

### DIMENSIONS

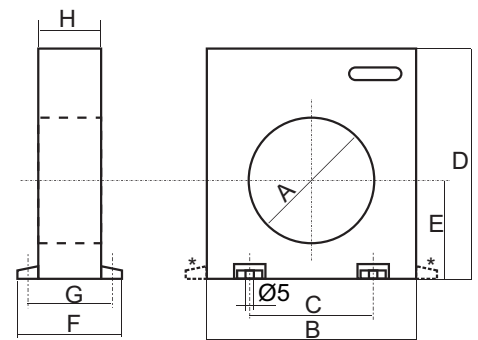
#### CTD-1/28



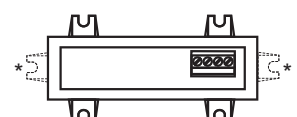
Mounting on rail 35mm according with DIN 50022  
3 modules of 17,5 mm

### DIMENSIONS

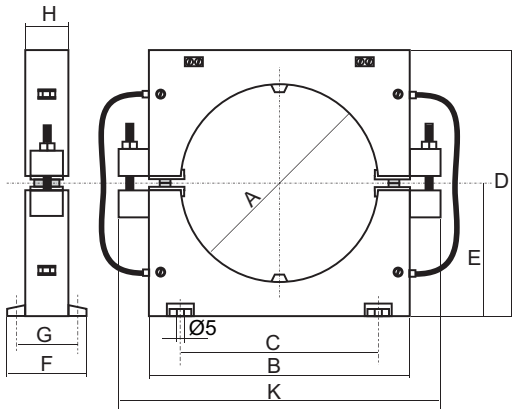
#### CT-1/35, CT-1/60, CT-1/80, CT-1/110, CT-1/160, CTA-1/160



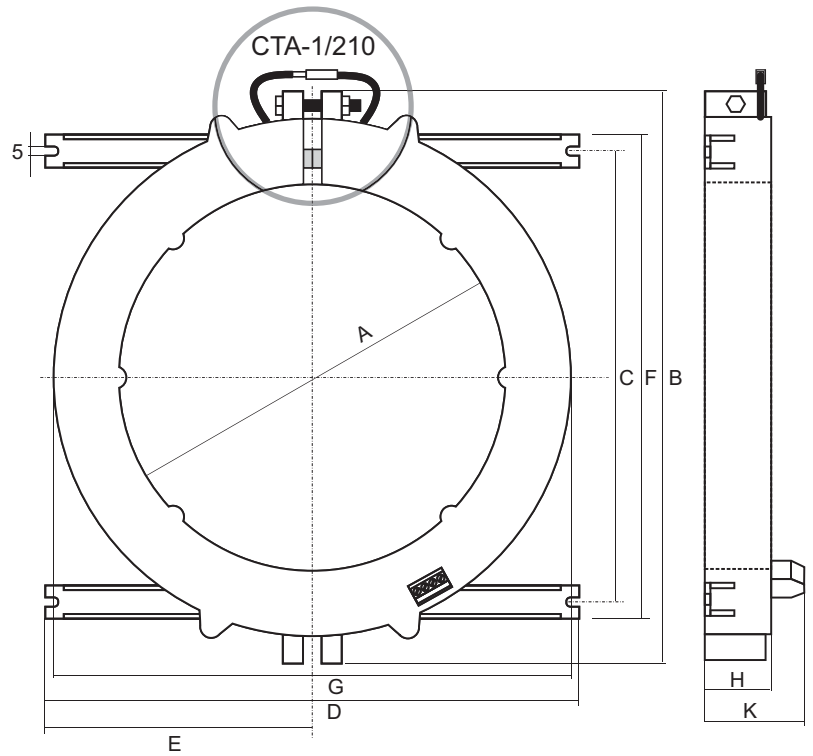
\* Fixing grooves only available on CT-1/160 and CTA-1/160 types  
The CT-1/160 and CTA-1/160 type dimensions are identical  
The CT-1/210 and CTA-1/210 type dimensions are identical



**DIMENSIONS - CTA-1/110**



**DIMENSIONS - CT-1/210, CTA-1/210**



**DIMENSIONS - CT-1/415**



APPLICATION NOTE FOR EARTH LEAKAGE RELAYS ELR SERIES

1. EARTH LEAKAGE RELAYS APPLICATION WITH CT-1/S

1.1. APPLICATION

This application is particularly useful in those cases, in which it is impossible to embrace all conductors (supply bars) of the system, with only one transformer.

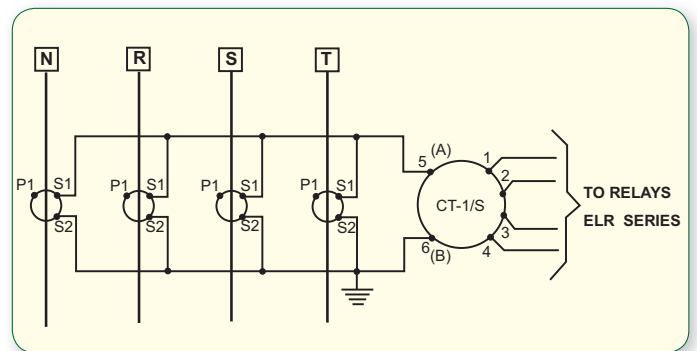
In this case, it is possible to have Earth Leakage Protection, by using Ct's and one of our special toroid transformers (exclusively made by us, based on the winding rate of the Ct's), complying with the wiring diagram, described below. For this application the Ct's should have: the same transformation ratio (5A secondary), same power (10 VA at least) and class 0,5. On the other hand, it is important that the Ct's are mounted, in such a way that the script P1 is orientated upstream, towards the line to be protected, and the various secondaries exactly as per the diagram.

1.2. WORKING PRINCIPLES

When there is no earth leakage, the vectorial addition of the currents sensed by the Ct's, is equal to zero. Thence, there is no current flowing in the windings related to our terminals 5 and 6 (in our special toroid). There isn't any voltage generated in our terminals 1 and 2 therefore, which should make the ELR to trip.

When there is a leakage, otherwise, the vectorial addition of the currents sensed by the Ct's is different to zero. Thence, a voltage is generated through the terminals 1 and 2, making the ELR to trip.

For this application, it is advisable to have a tripping threshold of the ELR, not lower than a 1/100 of the rated current of the system to be protected.



2. ELR'S APPLICATION WITH GROUND WIRE OF TRANSFORMERS

2.1. APPLICATION

This application is particularly indicated when the system is supplied through Transformers, working in parallel.

In fact, it could be impossible to protect the line with ELR's sited immediately downstream of the transformers. Since it wouldn't be possible to establish which part of the Current Leakage to Ground (clg) is borne by one or the other transformer. This brings us to a point, in which is practically impossible to establish exactly the threshold of the tripping value of the relays.

EXAMPLE:

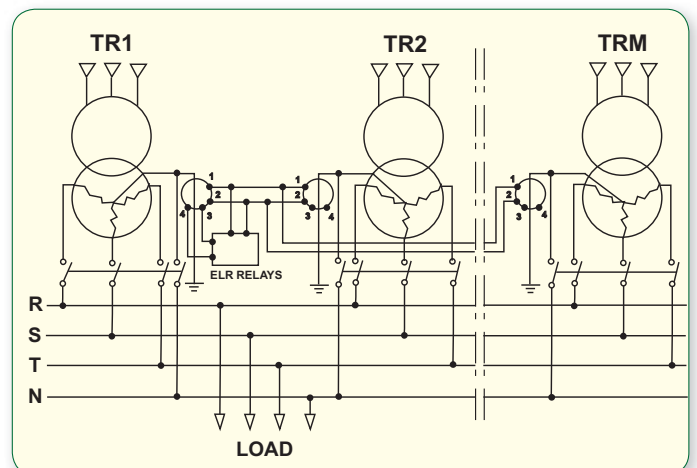
Suppose that we wish to protect an installation, which requires that the ELR should trip when the clg is equal to 5A. Should we install 2 ELR's with 5A threshold, it would certainly be required a higher value of clg, in order to make the ELR to trip. On top of the above, in case of an equal distribution of the current leakage between both transformers, it should be required a  $clg = 10A$ , in order to make the ELR's to trip. Otherwise, if we adjust the tripping threshold to 2.5A, it could be the case that one transformer is bearing fl of the clg and the other/only. Thence the ELR of the first transformer would trip before the 5A of clg are reached. Other factor to be considered, is the eventual separation of a transformer from the parallel, during low load demand periods. In this case the eventual clg is totally re-closed through the earth of an unique transformer and the tripping threshold should be establish exactly as 5A, under these conditions. The solution of the problem is given in our diagram.

2.2. WORKING PRINCIPLES

Our diagram here below shows the solution, based in connecting the star centres of both transformers together to earth with an unique wire, which has passed through our toroidal transformer before.

It is based in the fact that any current leakage to ground can't be re-closed but through the star centres of the transformers. With the toroidal, positioned as per our diagram, it is measured therefore the total current leakage to ground.

Back to the above mentioned example, we should establish as 5A the tripping threshold value, with the assurance that the ELR will trip, when the clg goes above the 5A threshold.



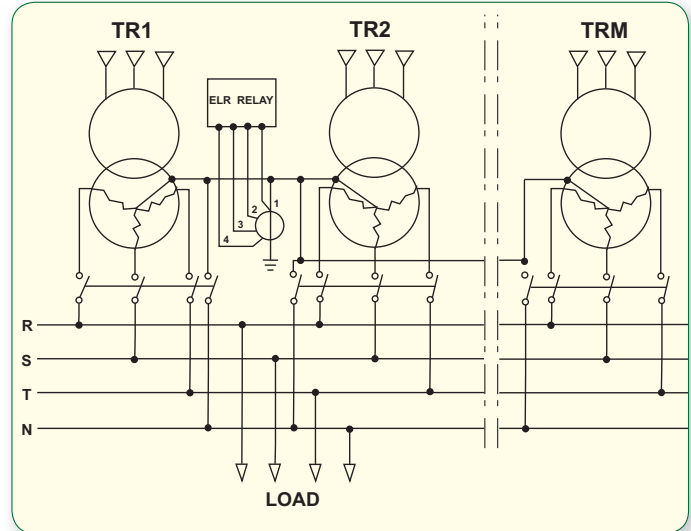
### 3. APPLICATION OF ELR's ON VARIOUS LINES IN PARALLEL

#### 3.1. APPLICATION

This application can be used whenever there are various connecting lines through two bar systems OMNIBUS.

In this case, the use of ELR's with their corresponding T/T's ,per each connecting line, it could give operation inconveniences; since the vectorial addition of the currents , on each connecting line, might not necessarily be equal to zero. It could be the case that, with 2 perfectly equal lines, there could be a difference of current distribution, due to a contact resistance difference (in phase R, for example), whilst the adsorbed current by the load might be equally distributed, in the other lines.

All this brings along that, there might be a leakage signal, at the toroidals terminals 1-2, which could be sufficient to make the ELR's to trip, without any earth leakage. With this kind of distribution, it is advisable to go to the wiring diagram, in which there are used as many T/T's as connecting lines, all of them orientated towards the 1 and 2 terminals of our ELR.



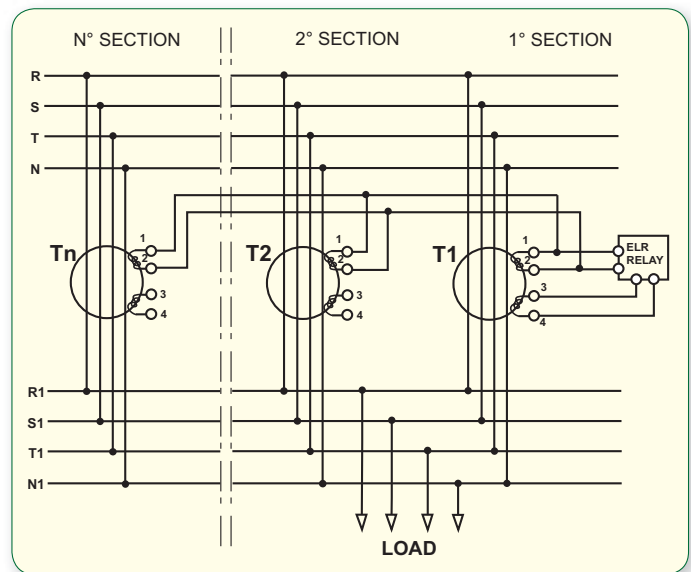
#### 3.2. WORKING PRINCIPLES

when there is no leakage, although with a non uniform current distribution, as mentioned in the above paragraph 3.1, the originated signal at the first toroidal, is totally void by the leakage signal originated at the second toroidal, since the signal can't be but in opposition, and the ELR's terminals won't receive any signal and the ELR won't trip therefore.

Otherwise, when there is an earth leakage, independently of whatever it might be the current distribution, the signals summation, being measured by the various Tt's, meet at the 1 and 2 terminals of the ELR, which will trip therefore. This application is valid for a maximum of 6 Tt's connected in parallel.

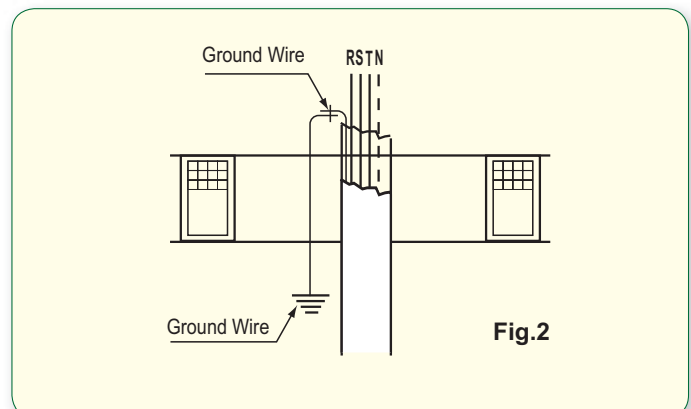
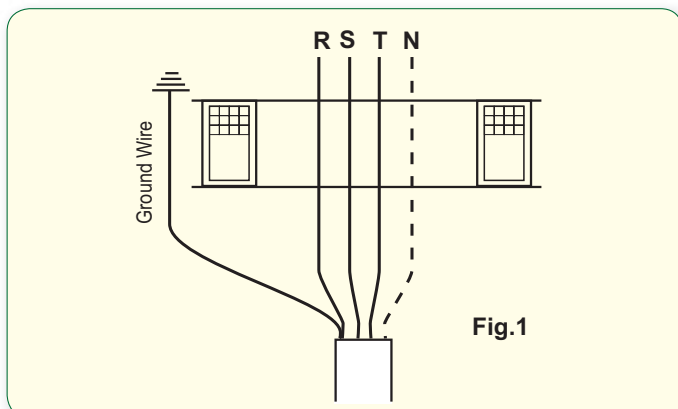
In those cases, in which a higher number might be required,, it is advised to contact us.

For this application, it is advisable to have a tripping threshold not below 1/1000 of the nominal current of the system to be protected.



### 4. MEDIUM VOLTAGE LINES APPLICATION

Should an ELR be used in MV lines, it is advisable to use the built-in filter for third harmonic version.



**Nota:** If there is an earthing circuit , it should be placed outside of the T/T (fig1).

When the cable is fitted with a metallic screen and it gets through the T/T, the earthing connection should be as (fig. 2)

# TCS

## RELAY FOR PERMANENT CONTROL OF THE MCCB'S TRIPPING CIRCUIT

### GENERALITY



TCS-1 / TCS-2

TCS-3 / TCS-4

MODELS	
<b>TCS1</b>	circuits 24-48Vac/dc / esec. DIN rail 3 modules
<b>TCS2</b>	circuits 110-230-400Vac/dc / esec. DIN rail 3 modules

OPTIONS	
<b>T</b>	tropicalization

MODELS	
<b>TCS3</b>	circuits 24-48Vac/dc / esec. flush mounting DIN 96x96mm
<b>TCS4</b>	circuits 110-230-400Vac/dc / esec. flush mounting DIN 96x96mm

OPTIONS	
<b>T</b>	tropicalization

The **TCS** is devoted to control the MCCB's disconnection circuits (trip) or the safety circuits. In fact, whenever there is an interruption in a circuit (Output relay of any given protection MCCB's shunt trip coil and the connection between the relay and the coil), and it is required that the MCCB trips due to any anomaly in the line, such MCCB will be unable to trip.

Provided that the system has been installed with other protections, some other Circuit Breaker will trip and the result will be the loss of service of other sections of the system, which might be most important.

Should the MCCB be the sole protection, the use of the TCS is most important, because the working guarantee of the tripping circuit becomes critical, in this particular case.

An important application is with the safety or emergency circuits, according with the CEI 64-8/537.4.3 Standard, when using shunt trip coils for emergency reactions, as the starting of a fire fighting

system, por example.

The relay has an auxiliary supply electrically separated from the Control Voltage.

In normal conditions, with auxiliary supply to the TCS relay, the OK green LED will glow. If there is any anomaly on the disconnection or safety circuit, the "ALARM" red LED will glow and the OK green LED will be switched off. The double changeover end relay will be de-energized enabling a possible acoustic signal and a remote repetition. Same signal is shown with tripped breaker.

On top of the above it is possible to detect the loss of supply on the auxiliary circuits, by supplying the TCS with same auxiliary voltage.

If the end relay is normally energized (fail safe), when there is a lack of supply, the end relay will be de-energized, as per anomaly situations, but in this case the LED's at the front will be switched off.

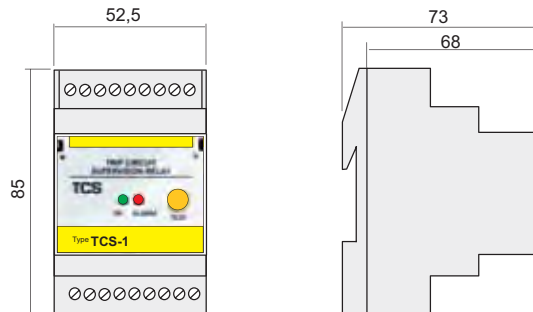
## ELECTRICAL CHARACTERISTICS

models and value	TCS-1	TCS-2	TCS-3	TCS-4
Auxiliary Voltage supply	24÷48 Vac/dc ± 20%	110-230-400Vac/dc ± 20%	24÷48 Vac/dc ± 20%	110-230-400Vac/dc ± 20%
Frequency	50 ÷ 60 Hz			
Maximum consumption	1,5÷3,5VA depending on Vaux			
Current of circuit under control	6 mA	2 mA 110-380V 4mA 220V	6 mA	2 mA 110-380V 4mA 220V
Voltage of circuit under control	13÷30V ac/dc 8-9 terminals 24÷60V ac/dc 7-9 terminals	50÷260V ac/dc 8-9 terminals 250÷440V ac/dc 7-9 terminals	13÷30V ac/dc 8-9 terminals 24÷60V ac/dc 7-9 terminals	50÷260Vac/dc 8-9 terminals 250÷440Vac/dc 7-9 terminals
Tripping Time delay	0,4÷1 seg. Depending on input Voltage	0,2÷0,5 seg. Depending on input Voltage	0,4÷1 seg. Depending on input Voltage	0,2÷0,5 seg. Depending on input Voltage
Reset Time	0,6÷1seg. Depending on input Voltage	1,5÷2 seg. Depending on input Voltage	0,6÷1seg. Depending on input Voltage	1,5÷2 seg. Depending on input Voltage
Output.. 2 change-over contacts	5A 250V			
Working Temperature	-10 + 60°C			
Storing Temperature	-20 + 80°C			
Relative humidity	< 90%			
Insulation Test	2,5 kV 60 sec.			
Pulse Test	5 kV 1,2/50 microsec.			
Standards	CEI 41-1 - IEC 255-801			
Wiring method	Drawing out screw terminals for cross section wires 2,5 mmq			
Protection degree according DIN 40050	IP 20		Ip52	
Mounting according DIN 50022	Snap on DIN rail 35 mm - 3 modules		Flush mounting 96x96mm	
Optional resistance (R) to be used for the monitoring of the circuit also when the switch board is open. The value of the resistance change for the voltage of the circuit.	24 Vac/dc R=0,8÷1kohm 5W 48 Vac/dc R=2,2÷3,3kohm 5w	110 Vac/dc R=8,2÷12kohm 7W 230 Vac/dc R=15÷22kohm 10W 400 Vac/dc R=39÷57kohm 15W	24 Vac/dc R=0,8÷1kohm 5W 48 Vac/dc R=2,2÷3,3kohm 5w	110 Vac/dc R=8,2÷12kohm 7W 230 Vac/dc R=15÷22kohm 10W 400 Vac/dc R=39÷57kohm 15W

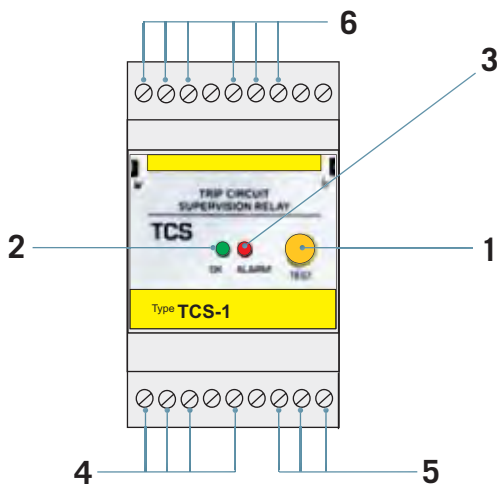
# TCS

RELAY FOR PERMANENT CONTROL OF THE MCCB'S TRIPPING CIRCUIT

## DIMENSIONS - TSC-1, TSC-2

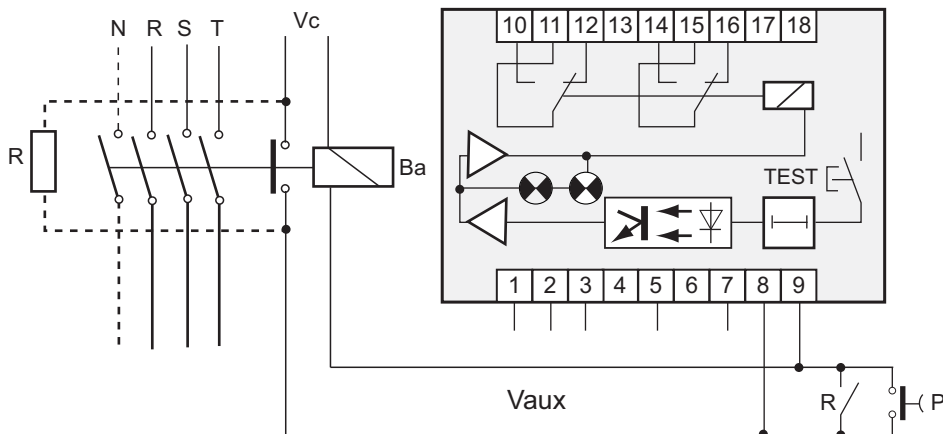


## LEGEND - TCS-1, TCS-2



1	Test push button
2	Signalling lamp of OK circuit (green LED)
3	Signalling lamp of anomaly in the circuit (red LED)
4	Terminals for auxiliary supply
5	Connecting terminals to the circuit under control
6	Output terminals of the end relay with double changeover

## WIRING DIAGRAM - TCS-1, TCS-2



### TCS-1

**Vaux**  
 1 - 2 = 24 Vac/dc  
 1 - 3 = 48 Vac/dc

**Vc**  
 9 - 8 = 24 Vac/dc  
 9 - 7 = 48 Vac/dc

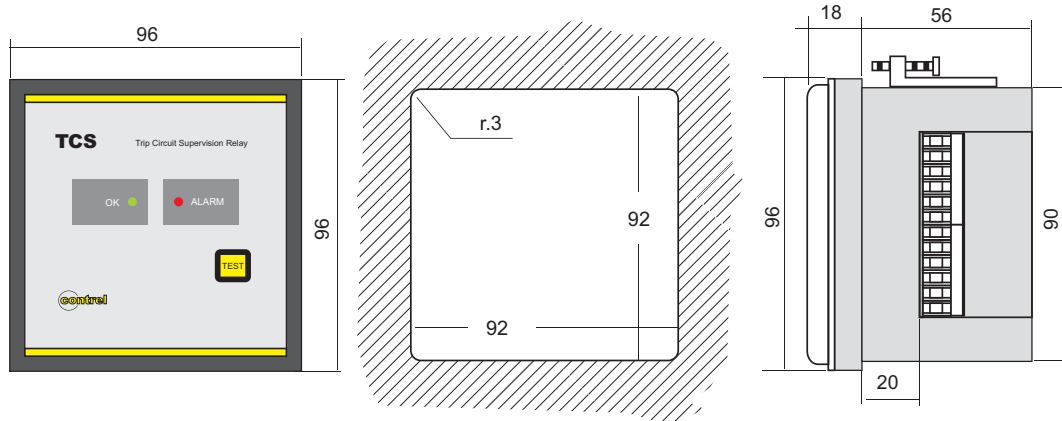
### TCS-2

**Vaux**  
 1 - 2 = 110 Vac/dc  
 1 - 3 = 220-240 Vac/dc  
 1 - 5 = 380-415 Vac/dc

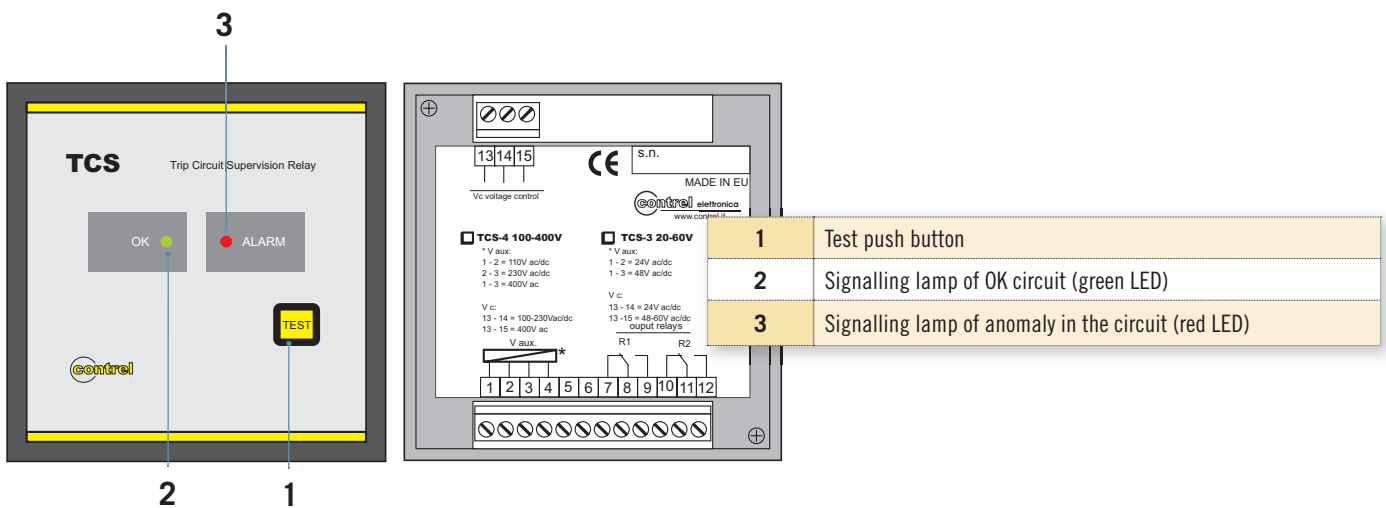
**Vc**  
 9 - 8 = 110-240 Vac/dc  
 9 - 7 = 380-415 Vac/dc



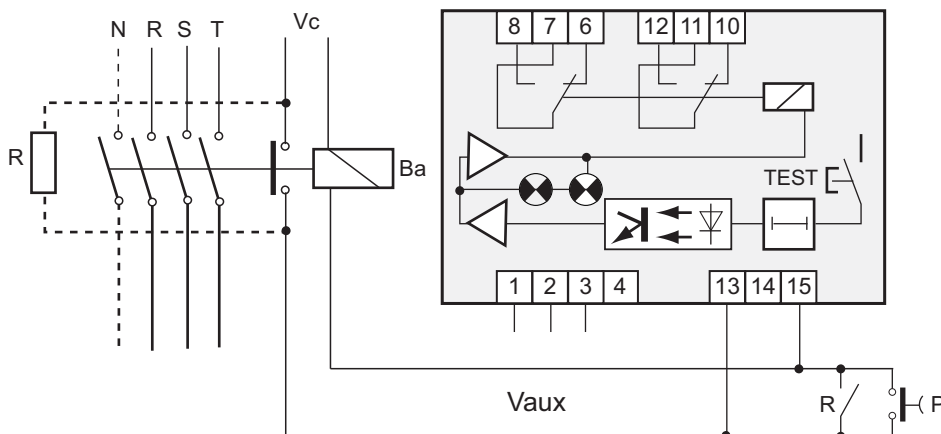
**DIMENSIONS - TCS-3, TCS-4**



**LEGEND - TCS-3, TCS-4**



**WIRING DIAGRAM - TCS-3, TCS-4**



**TCS-3**

**Vaux**  
 1 - 2 = 24 Vac/dc  
 1 - 3 = 48 Vac/dc

**Vc**  
 13 - 14 = 24 Vac/dc  
 13 - 15 = 48 Vac/dc

**TCS-4**

**Vaux**  
 1 - 2 = 110 Vac/dc  
 1 - 3 = 230 Vac/dc  
 1 - 5 = 400 Vac/dc

**Vc**  
 13 - 14 = 110-230 Vac/dc  
 13 - 15 = 400 Vac/dc

# TCS-A5

## ACTUATOR FOR SAFETY CIRCUIT

### GENERALITY



As required by CEI 64/8, the condition of maximum safety in the opening of the switches is obtained with the use of buttons with normally closed contacts associated to an opening coil at minimum voltage.

This solution is critical because any voltage interruption (even short) creates an out of service with the relative consequences.

The TCS-A5 device has the benefits to have the command (button, relay, etc.) with normally closed contacts and at the same time those of the shunt trip opening coil (immune from defect of opening on voltage brake) instead of that a minimum voltage.

This device, as the TCS classical, control the efficiency of the safety network or the opening circuit of the switch associated.

### FUNCTIONING

The classic application of the device is to command a switch with shunt trip opening coil (BA) using a series connection of safety buttons.

When the device is connected as showed in the picture, with Vc present but without Vaux, the relays are de-energized, the BA don't receive energy and the relay RA is in alarm status.

When the Vaux is supplied the led ON turn ON, the Alarm Relay (RA) is energized, the device is in condition of normal functioning, the Trip Relay (RT) after 80 ms is energizing, after others 80 ms the Safety Relay (RS) is energizing and the Led Ready turn ON.

In this condition the device is ready to receive the command to trip from the normally closed safety button (NC).

After 150 ms from the trip request (NC button pressed) the RT relay is de-energized while the BA actuator is energized, opening the associated switch. The trip status is signalled on the device with the TRIP led turned ON and the READY led turned off and with a remote lamp in parallel to the BA coil. This condition can be stored. In this way it's possible to use safety buttons with instantaneous opening (without mechanical retain).

The memory can be resetted using the button on the device or using the

### MODELS

<b>TCS-A5</b>	circuits 115-230 Vca
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### OPTIONS

<b>T</b>	tropicalisation
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remote button (free of voltages).

Short-circuiting the terminal 8 and 9 the device will be resetted after the trip request. With the TEST button of the device is possible perform a test without to use the safety buttons. The 5 safety button are checked in the perfect condition of functioning (without short-circuit on terminals or on connection). These buttons should contain a resistance of  $1000\Omega$  1/2W or 1W 1% after the connection terminals (see wiring connection).

This presence allows at the device to detect when there are short-circuit on the terminals or on connection.

In application with more of 5 buttons, the button that exceed the limit of 5 should not be of the self-control type.

The number of the self-control buttons should be exactly balanced setting the number on the dip-switches on the device.

It's important to set the number correct because an error could create some problem to the device that don't recognize the number and the condition of the connected button.

When on one or more of the self-control buttons there is an abnormal connection, the Push button Alarm Led, on the device, turn on and the Alarm relay is de-energized, the exchange 16-17-18 commute for the remote signalling; This condition is only of alarm and don't cause the system Trip. In addition to the fail safe, on the power supply, the device also contain TCS function (control open circuit). The device can also control the efficiency of the source of control voltage (Vc) and the circuit connection to the BA. For a fault on a BA circuit, it's possible to have the two following situation:

1. With Trip-BA switch set to OFF, the BA Alarm led is turning ON and the RA relay is de-energized with the signalling of remote Alarm. When the fault disappears the BA Alarm led is turning off and the RA relay energized, the remote signalling disappears. The Trip relay (RT) doesn't change his status.
2. With Trip-BA switch set to ON it's possible to have one of the following cases:
  - 2.1. With Auto-Reset (Remote Reset) not inserted the Trip memory will be activated, the Trip Led will turn on, the led READY will turn OFF and the Trip relay (RT) will be de-energized, the same way of the BA trip.

This condition is hold up to the RESET that turn off the memory. If in the meantime the fault was removed, everything come back to the normal, otherwise, even if the TCS-A5 is come back in the READY condition, the ALARM BA led remain ON and the RA relay is still in alarm.

It's obvious that this is an emergency condition and the power switch should not be closed because it would be not able to open by electricity.

**2.2** With Auto-Reset (Remote Reset) inserted (short-circuit between 8 and 9 terminals) the Trip Relay (RT) is de-energized for 50÷100 ms and after it come back energized. This caused the momentary closing of the contacts of the 11 and 12 terminals. With this contacts and with the RA contacts it's possible to create a specific remote signalling of fault of the BA circuit, with priority greater than the alarm signalling for button in short-circuit.

If in the condition of normal functioning the Vaux is missing, the device has a duration of about 1 second. Exceeded this time there are the following conditions:

1. With the Trip switch set to OFF, the Safety Relay (RS) will be de-energized before of the Trip Relay (RT), without the BA tripping.
2. With the Trip switch set to ON, the Trip Relay (RT) will be de-energized before of the Safety Relay (RS) causing the BA tripping.

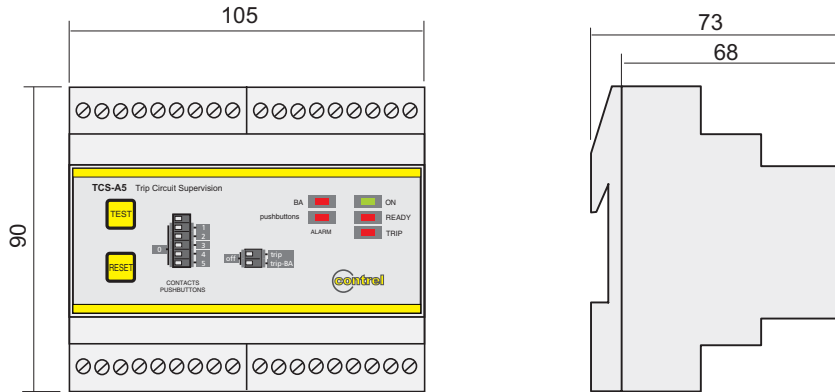
## ELECTRICAL CHARACTERISTICS

models and value	TCS-A5
Auxiliary power voltage Vaux	115÷230Vca 50÷60Hz
Max Consumption	5VA (4W)
Line voltage BA	110÷230Vca/cc
Functioning Voltage NC contacts	max 30Vcc
Current of NC contacts	Min. 0,4mAcc Max 0,7mAcc
BA command output	1 contact 5A 250Vca free of voltage (fail safe)
Alarm output	1 change 5A 250Vca free of voltage (fail safe)
Input NC contacts	n°5 monitored (selectable using dip-switches)+ number unlimited and uncontrolled
Signalling on device (led)	<b>ON:</b> presence of power supply. <b>READY:</b> device ready to work. <b>TRIP:</b> Tripping. <b>BA:</b> BA fault. <b>Pushbuttons:</b> NC contact fault
Dip-switch	n°5: for monitored contacts n°1 Trip: ON/OFFOFF (for possible trip in case of lack Vaux) n°1 Trip BA: ON/OFF (for any request for trip in case of BA fault circuit)
Push-buttons	<b>TEST</b> (test of the device except the NC buttons). <b>RESET</b> (to reset the Trip memory) <b>REMOTE RESET</b> using a free voltage NO contact (short-circuiting the terminals 8 and 9 is performed the auto-reset of the Trip memory)
NC command buttons	MAX n°5 monitored (it's important to place the number of dip-switches correct, corresponding to the amount of controlled external buttons). Resistance to be inserted in the button = 10000hm 1W.
Box	6 DIN modules
Working temperature	-10°C ÷ +60°C.
Storing temperature	-25°C ÷ +85°C
Relative Humidity	90% without condensing
Trip from NC	150ms
Ready from Vaux	about 160ms
Trip impulse when missing Vaux	about 100ms
Trip when missing Vc	(control voltage) or fault on BA
Duration without Vaux	about 1 second
Norme di riferimento	CEI 64-8/537.4.3 - CEI 64-8 - CEI EN 61010-1 (safety) - CEI EN 61551-1 (safety) - CEI EN 61236-1 (EMC compatibility) - CEI EN 61236-2-4 (EMC compatibility)

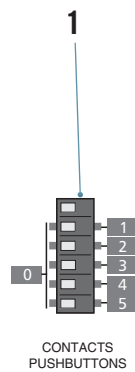
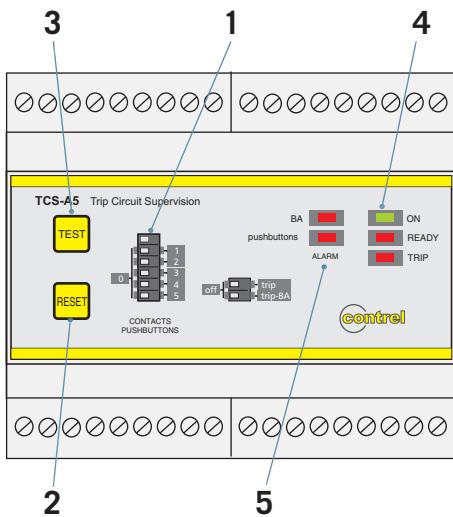
# TCS-A5

ACTUATOR FOR SAFETY CIRCUIT

## DIMENSIONS

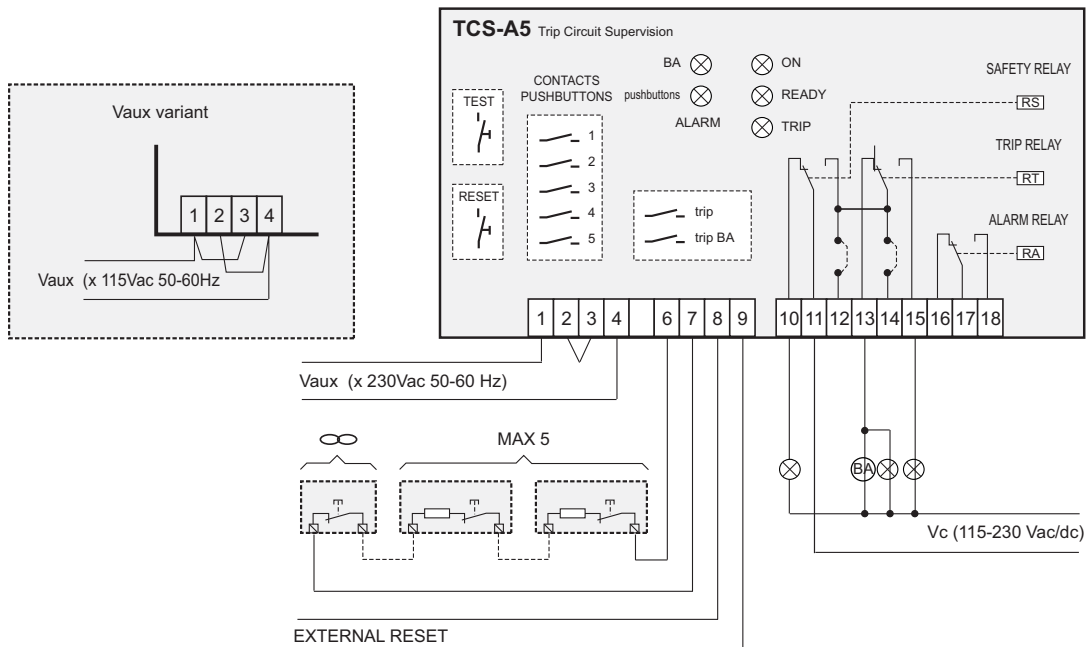


## LEGEND



1	Micro-switches for setting
2	Test push-button
3	Reset push-button
4	GREEN LED for network presence RED LED for relay ready to trip
5	RED LED to signalling coil and push button status

## WIRING DIAGRAM



## STATIC RELAY FOR MOTOR RE-START AND REACCELERATION

### GENERALITY



UNDECAL SOCKET

#### MODELS

<b>RSR-72</b>	circuits 230V 50÷60Hz
<b>RSR-72</b>	circuits 115V 50÷60Hz

#### OPTION

<b>Z</b>	Undecal support
<b>M</b>	Restraint spring for fixing Undecal support

### FUNCTIONALITY

The RSR-72 relay is used in association with an holding position contact. On the relay is possible to set a memory time from 0.4 to 60 seconds and a delay time from 0.4 to 1000 seconds.

Anytime a voltage lack (or with a value less of 65% of the rated voltage) and subsequently the voltage restores (at least the 90% of the rated voltage) within the memory time set the re-start motor output will be activated after the delay set.

If the voltage restores after the memory time, the automatic re-start will not happen, while the voltage restores in a time less than 0.4 seconds (the minimum memory time), the motor will reaccelerate.

If the reacceleration function is activated and the voltage go back in a time less than 0.2 seconds (maximum time for reacceleration) the motor will reaccelerate immediately, if the reacceleration function is not activated after the delay time the motor will restart automatically.

The main circuits are:

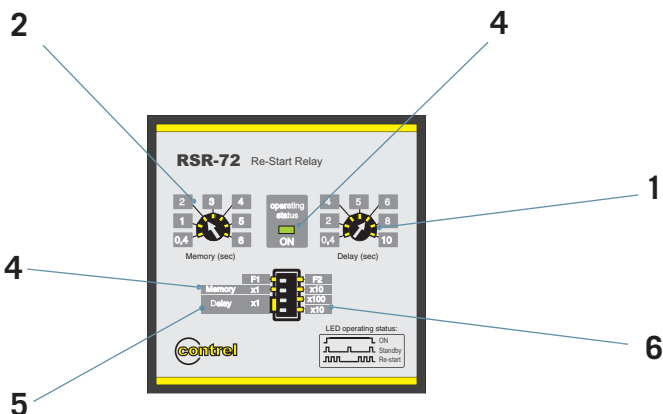
- supply circuit and voltage control
- circuit of contactor control and of memory activation with separation by photo-coupler
- circuit of motor stop control by PA pushbutton (stop) and quick memory shutdown separated by photo-coupler.
- circuit for final relay closing and control circuit are managed by microprocessor

The **RSR-72** type relay for re-start and reacceleration is deigned to perform the automatic motor restarting, after control and protection device opening, as a consequence of a momentary line voltage interruption or drop-out.

The RSR-72 relays allow, after the stop of the motors, the automatic re-start with a correct sequence depending of the working process.

The RSR-72 relays are housed in a case for flush mounting or panel mounting or on DIN rail 35 mm on extractible undecal socket type. On front panel there are potentiometers and micro-switches for settings and one LED to indicate the functional status.

### LEGEND



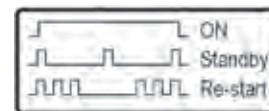
1	Delay adjustment trimmer
2	Memory adjustment trimmer
3	Green led to indicate the relay status ON - STANDBY-RE-START
4	Sliding contact switch for memory rating
5	Sliding contact switch for delay rating
6	Sliding contact for reaccelerate function

### SIGNALLING FUNCTION LED OPERATING STATUS

The LED of signalling of the relay status has the following means:

- **LED off:** power supply and measure voltage are not present
- **LED on, fixed light:** relay at rest with measure voltage within the range set
- **LED with 1/1 rate (about 1 Hz) blinking light:** relay in STAND-BY, the voltage lack has been for a time less than memory time, the re-start is not performed even if the power supply is present
- **LED lamp. rapporto 1/3 (3 lampeggi veloci):** relay in RE-START, the voltage lack has been for a time less than memory time, after the delay time set the re-start will be done

LED OPERATING STATUS



### Multiplier factors with MEMORY and DELAY switches

Slide F1-F2 position	Reaccelerate Function	Slide MEMORY position	MEMORY trimmer setting range
F1	Not activated	X1	0,4÷6 second
F1	Activated	X10	4÷60 second

Slide DELAY Position	DELAY trimmer setting range
X1	0,4÷10 sec.
X1	
X10	4÷100 sec.
X100	40÷1000 sec.
X1	
X10	NOT PREVIEWED (0,4÷10 sec.)
X100	

### ELECTRICAL CHARACTERISTICS

models and value	RSR-72
Auxiliary supply and control voltage	<ul style="list-style-type: none"> <li>• 230V 50-60Hz or 115V 50-60Hz</li> <li>• others supply voltages on request</li> </ul>
Consumption	max 3 VA
Front panel controls	memory and delay times regulation – LED signalling
Threshold voltage lack	65% of rated voltage
Threshold voltage restore	90% of rated voltage
Minimum time for detecting the voltage lack	10 ms
Maximum reacceleration time	Max 0,2 seconds
MEMORY time	0.4÷60 seconds
DELAY time to restart	0.4÷1000 seconds
Pulse duration to restart	0.7 second (other on request)
Outputs	relay NO - 5A 250 Vac / 0,4A 110 Vdc
Connections	screw terminals max 4 mm <sup>2</sup> on extractible socket
Mounting	flush mounting DIN 72x72 mm or panel mounting or on DIN rail 35 mm on extractible socket with optional accessory (detection spring), depth 110 mm
Mechanics	self-extinguishing plastic case, dimensions 72x72x110mm, weight 0,2 kg
Protection degree	IP20 – front side IP40 (IP52 with optional protection cover)
Working temperature	-10 ÷ +60°C (storing -25 ÷ +75°C)
Humidity	95% not condensing
Insulation	2,5 kV 60 seconds
Tropicalization	On request
Standards	CEI 41.1 CEI EN60255-6 electromagnetic compatibility EN 50081-2 / EN 50082-2

## WORKING PRINCIPLES

### Premised:

when the voltage is under the threshold of the 65% of the rated voltage, for the RSR-72 relay is a voltage lack

when the voltage restores over the threshold of the 90% of the rated voltage, for the RSR-72 the voltage is ok

1. With power supply, the RSR-72 relay is in STAND-BY way and the LED blink with rate 1/1. In this way if the voltage go under the threshold value, no operation of restart is performed.
2. Pressing the PM button (START)
  - the contactor is energized and self-retained by its auxiliary contact;
  - the motor starts, the "R" contact is open
  - the memory circuit inside the RSR-72 relay is activated;
  - RSR 72 go in ON position, signalled by the led also fixed in ON position.
3. In case of temporary voltage lack:
  - 3a. if voltage is OFF for a time longer of the MEMORY time set:
    - the motor remain out of service and the contactor is de-energized;
    - the "R" contact is open;
    - the RSR 72 go in STANDBY mode, and the led blink at rate 1/1.
  - 3b. if voltage is OFF for a time in the range from 0.2 seconds and the MEMORY time fixed:
    - the contactor is de-energized, the RSR-72 relay is in RE-START mode and the LED blink with rate 1/3 beginning the count of the DELAY time set;
    - elapsed the delay time, the "R" contact switch in closed giving the pulse to restart, in this way the contactor is energized and the motor restart;
    - next the RSR 72 go in ON mode, signalled by the led fixed to ON;

3c. if the voltage is OFF for a time smaller of 0.2 sec. with reaccelerate function not activated (F1)

- the functioning is the same of the b) item

3d. if the voltage is OFF for a time smaller of 0.2 sec. with reaccelerate function activated (F2)

- the contactor is de-energized, when the voltage restores the RSR-72 relay active immediately the reaccelerate of the motor, the "R" contact switch in closed giving the pulse to reaccelerate.

4. Pressing the "PA" push-button (stop)

4a. the contactor-switch is de-energized, the motor stops;

4b. the memory circuit inside the RSR-72 relay is deactivated;

4c. the "R" contact is open and the motor automatic restart does not occur.

4d. the RSR-72 go in STANDBY mode, and the LED blink at rate 1/1.

5. After operation of item 4 in case of lack and recovery of the supply voltage, the motor automatic restart doesn't occur.

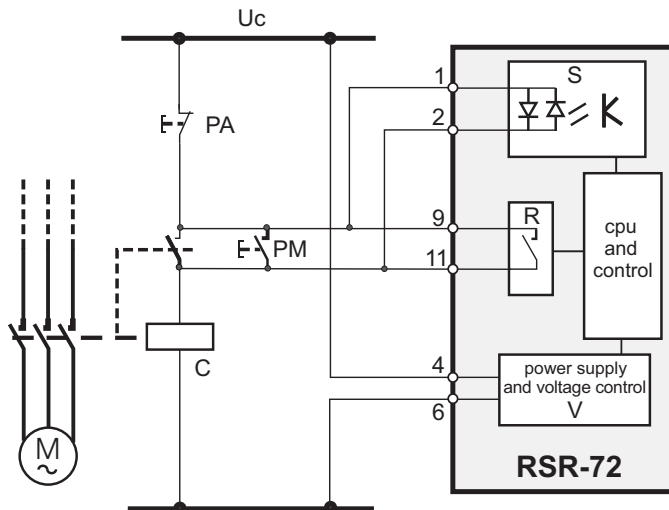
6. In case of pushing of the "PA" push-button (stop) during the count of re-start time (operation of item 3b)

- the memory is deactivated;
- the "R" contact does not close and the motor automatic restart does not occur;
- the RSR 72 go in STANDBY mode, and the led blink at rate 1/1.

7. Each "NO" contact placed directly in series to "PA" push-button carries out the same function of "PA" push-button.

8. Each "NO" contact placed directly in parallel to "PM" push-button carries out the same function of "PM" push-button

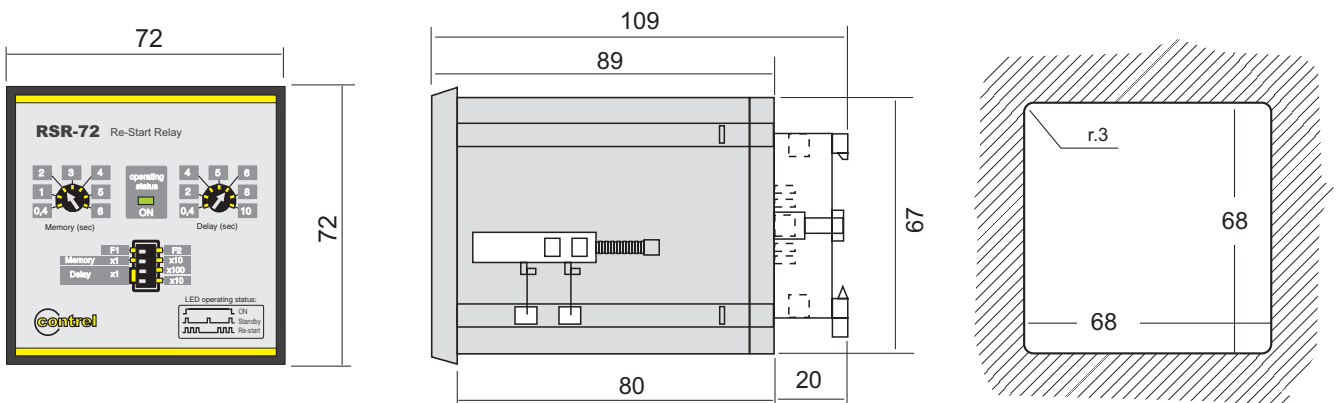
## WIRING DIAGRAM



### LEGENDA

- Uc: power supply line of the contactor and power supply and control voltage
- PA: stop motor button (STOP)
- PM: start motor button (START)
- C: contactor of command motor
- M: motor
- V: power supply and control voltage section
- S: command button and contactor control section
- R: output relay for re-start an reaccelerate command

## DIMENSIONS



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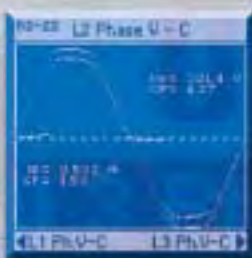
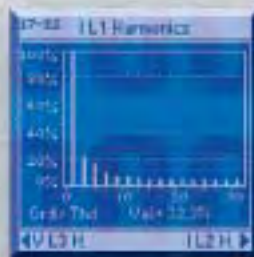
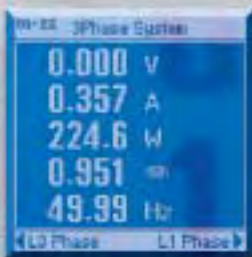


# MULTIFUNCTION MULTIMETERS AND ENERGY METER EMM-ELM-EMC-EMT

## ELECTRICAL MULTIFUNCTION ANALYSERS EMA

### ACCESSORIES EMI

### SOFTWARE NRG





## Certified Quality

### EMM

Wide and complete range of electrical multimeters for measure of main electrical parameters in single-phase (with internal CT) and three-phase line with reading of the clear and immediate measure.

Wide availability of products from low cost basic version (for measure of voltage, current and frequency) up to version complete of digital outputs, serial outputs and ethernet outputs.

### ELM

range of multifunction ammeter for measure of line or residual current with possibility of digital and serial outputs.

### EMC

Range of active and reactive energy counter usable for single phase and three phase lines with possibility of remote data with digital and serial outputs.

### EMT

Range of electrical transducers for measure conversion with digital, serial and analog outputs.

### EMA

Wide range of network analysers for measuring, monitoring, management and analysis of the electrical parameters of electrical network.

### NRG

Complete software for PC monitoring and data management usable with all the range of instruments.

### EMI

Complete range of multifunction converter interface available for serial conversion RS485/RS232, modem GSM, protocol conversion MODBUS-RTU/PROFIBUS-DP, RS485/ETHERNET.



## PRODUCT

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EMM- $\mu$ D3VA	Voltmeter - Ammeter	
EMM- $\mu$ D3h	Multifunction multimeter basic version	
EMM- $\mu$ D3hp	Additional digital output	
EMM- $\mu$ D3h-485	Additional serial output RS485 MODBUS-RTU	
<hr/>		
EMM-D4h (t)	Multifunction multimeter basic version	
EMM-D4hp (t)	Additional digital outputs	
EMM-D4hp485 (t)	Additional digital outputs and serial output RS485 MODBUS-RTU (or LONWORK)	
EMM-D4hp-485-A (t)	Additional digital outputs, serial output RS485 MODBUS-RTU (or LONWORK) and analog output 0-4÷20 mA	
EMM-D4hp-ETH (t)	Additional digital outputs and ethernet output	

#### FLUSH MOUNTING DIN 72x72 mm

EMM- $\mu$ 3VA (t)	Voltmeter - Ammeter	
EMM- $\mu$ 4h (t)	Multifunction multimeter basic version	
EMM- $\mu$ 4hp (t)	Additional digital output	
EMM- $\mu$ 4h-485 (t)	Additional serial output RS485 MODBUS-RTU	

#### FLUSH MOUNTING 96x96 mm WITH REDUCED DEPTH

EMM-R3VA (t)	Voltmeter - Ammeter	
EMM-R4h (t)	Multifunctional multimeter basic version in reduced depth's container	
EMM-R4hp (t)	Additional digital outputs	
EMM-R4h-485 (t)	Additional serial output RS485 MODBUS-RTU	

#### FLUSH MOUNTING DIN 96x96 mm

EMM-4h (t)	Multifunctional multimeter basic version	
EMM-4hp (t)	Additional digital output	
EMM-4hp485 (t)	Additional digital outputs and serial output RS485 MODBUS-RTU (or LONWORK)	
EMM-4hp-PF (t)	Additional digital outputs and serial output PROFIBUS-DP	
EMM-4hp-485-A (t)	Additional digital outputs, serial output RS 485 MODBUS-RTU (or LONWORK) and analog output 0-4÷20mA	
EMM-4hp-ETH (t)	Additional digital outputs, ethernet output	

ELM-4	Multifunctional ammeter basic version	
ELM-4-485	Additional serial output RS 485 MODBUS-RTU (or LONWORK)	
ELM-4-PF	Additional serial output PROFIBUS-DP	

EMC-3B (t)	Energy counter basic version (with energy counters with double tariff and digital outputs)	
EMC-3B485 (t)	Additional serial output RS485 MODBUS-RTU	

#### DIN RAIL MOUNTING 6 MODULES

EMC-D3B (t)	Energy counter basic version (with energy counters with double tariff and digital outputs)	
EMC-D3B485 (t)	Additional serial output RS485 MODBUS-RTU	

EMT-3S	Measure transducer basic version (with serial output and digital output)	
EMT-3I	Additional digital input	
EMT-3A	Additional analog output	

EMT-4S	Multifunction transducer high accuracy	
EMT-4S-TT	Multifunction transducer high accuracy	
EMT-1SC	Multifunction transducer high accuracy base plate mounting	
EMT-4DI+2DO	Accessory	

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#### FLUSH MOUNTING DIN 96x96 mm

##### RED LED DISPLAY

EMA-96	Analyser basic version with red LED alphanumeric display	
EMA-96H	Additional harmonic analysis and energy counters subdivided in time bands	

##### LCD DISPLAY

EMA-90	Analyser basic version, LCD graphic display 50x50 mm	
EMM-90H	Additional harmonic analysis and energy counters subdivided in time bands	

#### FLUSH MOUNTING DIN 144x144 mm

##### RED LED DISPLAY

EMA-14	Analyser basic version with red LED alphanumeric display	
EMA-14H	Additional harmonic analysis and energy counters subdivided in time bands	

##### GRAPHIC LCD DISPLAY

EMA-10	Analyser basic version, LCD 50x50 mm graphic display	
EMA-10H	Additional harmonic analysis and energy counters subdivided in time bands	

##### WIDE GRAPHIC LCD DISPLAY

EMA-11	Analyser basic version, LCD 70x70 mm graphic display	
EMM-11H	Additional harmonic analysis and energy counters subdivided in time bands	

#### DIN RAIL MOUNTING 9 MODULES

EMA-D9	Analyser basic version, LCD alphanumeric display	
EMA-D9H	Additional harmonic analysis and energy counters subdivided in time bands	

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## MULTIFUNCTION MULTIMETER AND ENERGY METER



### GENERAL INFORMATIONS

The digital multifunction meters of the EMM series allow the measure of the main electrical parameters of the electrical energy distribution networks. The local visualisation of more than 30 measured parameters is made with the usage of 4 red LED displays, in order to guarantee a reading clear and simultaneous of different measures. Intuitive selection of measures, that have to be visualised with a LED signal, completes a very simple frontal panel, but also supplies a lot of information. These instruments visualise not only instantaneous parameters, but also show maximum peak of current and active power's value, either as instantaneous or average and bi-directional energy counters. Optionally, there are the availability of digital outputs (for pulse or alarm emissions), a serial RS 485 output (with MODBUS-RTU, LONWORK, PROFIBUS/DP protocol), an analog output  $0/4 \div 20\text{mA}$ , a current input for measuring neutral current or residual differen-

tial current (using a suitable external toroidal divider) and a digital input for synchronisation. EMM multimeter replace in a unique device all the functions of voltmeters, ammeters, cosphimeters, wattmeters, varmeters, frequency meters, thermometers, energy meters with a great economic saving of time, of overall dimensions and wiring. It is a simplification for the instrumentation's management suitable for all local measuring needs in electrical panel, devices and so on. Suitable range is very large in order to satisfy all technical and economic needs. There are simplified versions for measuring only currents and voltage (voltmeters, ammeters) and, going on, there are complete devices with all the functions described before. Instrumentation may be supplied in different models, either for flush mounting at the front of a panel DIN 96x96 mm (also with a reduced depth versions) and DIN 72x72, or for DIN rail mounting with 3 or 6 modules versions of 17.5 mm.

### UTILIZZO - APPLICAZIONI

Use of digital EMM multimeters is suggested in all those applications that foresee local visualisation of electrical parameters (and eventually in remote too).

Also for only voltage and currents measure on electrical network one-phase or three-phase, EMM use is an advantageous solution, even if compared at an economic level. Therefore typical applica-

tions will be those of the energy distribution boards, either in the industrial fields or either for machines, motors, generators and so on. Immediate and simple reading in clear displays of 8 segment LED, dot-form LED for the identification of visualised parameter and only three button of intuitive functionality, do not exclude that this device could be used in most simple applications.

### INGRESSI

The EMMs have measuring inputs for three (or four) currents and three voltages in order to be adapted for their use in one-phase networks, on three-phase networks in devices with 4 and 3 wires without neutral or neutral not distributed. There is also an inter-

nal sensor for measuring temperature placed in posterior part of devices duly compensated for visualising the temperature inside the electrical panel.

Current inputs are foreseeing for the use of external transformers

MULTIFUNCTION MULTIMETER AND ENERGY METER

ampere metric with 5A as secondary or **direct inputs for current max 16A,32A,63A, with appropriate TA (see below)**; the transformation ratio of used trasducer is easily programmable using frontal button with the possibility of regulating primary current from 5 to 10.000 A.

As already said, it's optionally available a fourth input for measuring residual neutral current or residual/differential current and differential currents (in this case, it's necessary using an external toroidal divider).

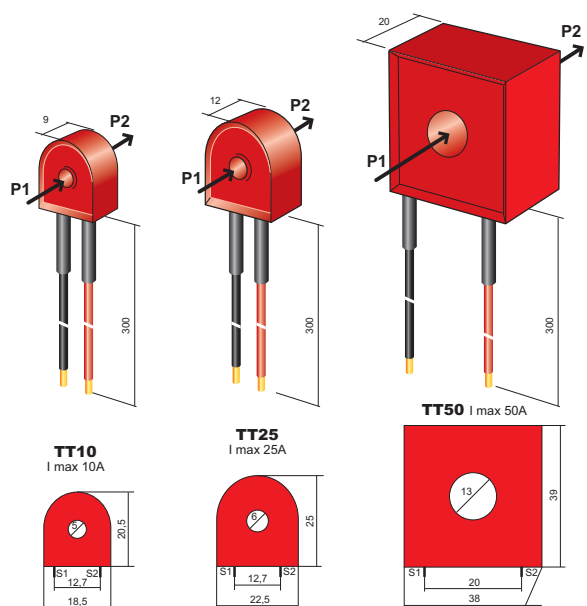
The voltage inputs may accept up to direct 500 V or, in specific and optional versions, it's possible to program the transformation ratio of eventual voltage transformer for its application in MT

(programmable transformation's ratio from 1 to 400). The instruments are fully auto-range with the measuring unit indication in Kilo or Mega by corresponding indicative LED.

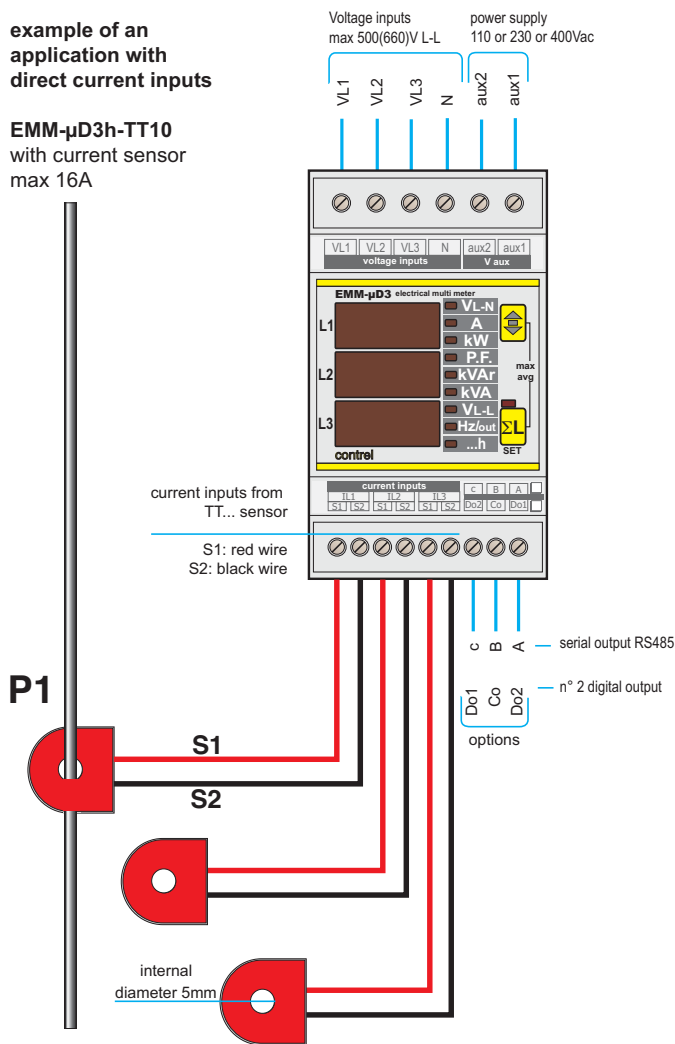
Beyond measuring inputs, some EMM versions have terminals for the auxiliary voltage supply, separated from inputs of measuring tension, in order to be freer in the use also with the possibility of using measuring voltage also for auxiliary supply.

example of an application with direct current inputs

EMM-μD3h-TT10 with current sensor max 16A



TYPE	NOMINAL CURRENT	RANGE	MAX CURRENT	INTERNAL DIAMETER
TT10	10 Amp	0,07 to 10A	16Amps	5 mm
TT25	25 Amp	0,15 to 25A	32Amps	6 mm
TT50	50 Amp	0,30 to 50A	63Amps	13 mm



MEASURES - VISUALISATION

Measures are carried out in a real effective value of voltage. Current, frequency, temperature and all the other calculated parameters are visualised on 3 digit displays. On displays it's possible to read at the same time every single phase of selected parameter's value: three phase voltage, three phase-to-phase voltage, three currents, three power factors, three active, reactive and apparent powers and also active and reactive energy meters (these have to be read consecutively on three displays in order to get a total amount of 9 digits).

On fourth display it's possible to visualise parameters that are not foreseen to be subdivided in individual phase (frequency and temperature) and in visualisation of three-phase value of tension of phase and phase-to phase tension (only for versions with 4 displays).

Pushing button [ ΣL ], it will be possible to visualise on central display three-phase measure (the sum of phase value or the average of phase value) of selected parameter. By keeping this button pressed for minimum 2 seconds it will show peak's values (see tables in following pages).

Adopted solutions allow to visualise simultaneously a voltage, phase-to-phase or per phase, and three currents (or the frequency and three currents, and so on). This will substitute the typical installation of three ammeters and a voltmeter with a commuter, but with evident functional and economic advantages: only one component with a consequent reduction in wiring and space, but with an amount of parameter very complete.

Anyway settings of different outputs (digital, serial and analogical) are carried out with 3 frontal buttons.

## MULTIFUNCTION MULTIMETERS DIN RAIL 3 MODULES

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23

EMM- $\mu$ D3VA



EMM- $\mu$ D3h  
EMM- $\mu$ D3h-p  
EMM- $\mu$ D3h-485



	EMM $\mu$ D3VA	EMM $\mu$ D3h	EMM $\mu$ D3hp	EMM $\mu$ D3h-485
<b>Mechanical characteristics</b>		DIN rail mounting 3 modules of 17,5 mm   Weight 0,4 kg		
<b>Auxiliary supply</b>		230 Vac   50-60 Hz		
<b>OPTION C1</b>		400 Vac		
<b>OPTION C2</b>		110 Vac		
<b>Protection degree</b>		Frontal IP 42   Box IP 20		
<b>Voltage inputs</b>		3 inputs 500 V max		
<b>Current inputs</b>		3 inputs 0,05÷5A rms with external CT ratio TA programmable 1÷400		
<b>OPTION 1A</b>		3 inputs 0,01÷1A rms		
<b>OPZION TT 10</b>		Direct inputs for current max 16 A		
<b>OPZION TT 25</b>		Direct inputs for current max 32 A		
<b>OPZION TT 50</b>		Direct inputs for current max 63 A		
<b>OPZION M</b>		3 inputs 0,05 ÷ 5A rms for measure in 3 single-phase line		
<b>Measured parameters</b>	V I-I, V I-n, A f h	V I-I, V I-n, A cosfi, f, ° T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh	V I-I, V I-n, A cosfi, f, ° T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh	V I-I, V I-n, A cosfi, f, ° T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: < 1% class 1   EN 62053-21 62053-23			
<b>Frequency measure</b>	40 ÷ 100 Hz			
<b>Communication port</b>	-	-	-	1Rs485 Communication protocol MODBUS-RTU baud rate 9600-19200 bps
<b>Digital Outputs</b>	-	-	2 Photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500 msec.).	-
<b>OPTION P</b>	2 photomos 10 ÷ 300 Vcc / 150 mA o 10÷250Vca / 150mA max for alarms	-	-	-
<b>Analog outputs</b>	-	-	-	3 outputs 0-20/4-20mA completely programmable - definition16 bit (by external serial/analog converter Z3AO) *
<b>OPTION Z3AO</b>	-	-	-	-
<b>Display</b>	3 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)			

\* in this case serial output RS485 can not be used.

## MULTIFUNCTION MULTIMETERS DIN RAIL 6 MODULES

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMM-D4h  
EMM-D4hp  
EMM-D4hp-485  
EMM-D4hp-485-A  
EMM-D4hp-ETH

	EMM D4h	EMM D4hp	EMM D4hp-485	EMM D4hp-485-A	EMM D4hp-ETH
<b>Mechanical characteristics</b>	DIN rail mounting 6 modules of 17,5 mm   Weight 0,5 kg				
<b>Auxiliary supply</b>	110-230-400 Vac   50-60 Hz				
OPTION C1	20÷60 Vac/dc				
OPTION C2	90÷250 Vac/dc				
<b>Protection degree</b>	IP 42 frontal   IP 20 box				
<b>Voltage inputs</b>	3 inputs 500 V max (possible external VT ratio programmable 01÷400)				
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable 1÷2000				
OPTION 1A	3 inputs 0,01÷1A rms				
OPZION T	Isolated inputs with internal CT (for use in M.V.)				
OPZION TT 10	Direct inputs for current max 16 A				
OPZION TT 25	Direct inputs for current max 32 A				
OPZION TT 50	Direct inputs for current max 63 A				
OPZION N	4° ingresso per misura corrente di neutro o corrente residua				
<b>Measured parameters</b>	VI-I, VI-n, A   cosfi, f, °T, h   W, Var, VA   + kWh, - kWh, + KVarh, - KVarh				
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: < 1% class I   EN 62053-21 62053-23				
<b>Frequency measure</b>	40 ÷ 100 Hz				
<b>Communication port</b>	-	-	1Rs485 Communication protocol MODBUS-RTU baud rate 9600-19200 bps	1Rs485 Communication protocol MODBUS-RTU baud rate 9600-19200 bps	-
OPZION LON	-	-	Communication protocol LON-WORKS	Communication protocol LON-WORKS	-
<b>Ethernet outputs</b>	-	-	-	-	1 ethernet connector RJ45 Communication protocol MODBUS-TCP FTP / HTTP / SMTP / SNMP
<b>Digital outputs</b>	-	2 photomos 10÷300Vcc / 150 mA or 10÷250Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10÷300Vcc / 150 mA or 10÷250Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10÷300Vcc / 150 mA or 10÷250Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10÷300Vcc / 150 mA or 10÷250Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).
<b>Digital inputs</b>	OPZION	1 optoisolated 90÷250Vca/cc for changing band of energy meters or status signalling	1 optoisolated 90÷250Vca/cc for changing band of energy meters or status signalling	1 optoisolated 90÷250Vca/cc for changing band of energy meters or status signalling	1 optoisolated 90÷250Vca/cc for changing band of energy meters or status signalling
<b>Analog outputs</b>	-	-	-	1 output 0÷20 / 4÷20mA programmable definition10 bit	-
OPZION Z3AO	-	-	3 outputs 0-20/4-20mA completely programmable - definition16 bit (by external serial/analog converter Z3AO )*	3 outputs 0-20/4-20mA completely programmable - definition16 bit (by external serial/analog converter Z3AO )*	-
<b>Display</b>	4 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)				

\* in this case serial output RS485 can not be used.

## MULTIFUNCTION MULTIMETERS FLUSH MOUNTING DIN 72 x 72



### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23

EMM-μ3VA

EMM μ4h  
EMM μ4hp  
EMM μ4h-485

	EMM μ3VA	EMM μ4h	EMM μ4hp	EMM μ4h-485
<b>Mechanical characteristics</b>	Flush mounting DIN 72 x 72 mm   Depth 80 mm   Panel cut out 68x68 mm   Weight: 0,5 kg			
<b>Auxiliary supply</b>	400 Vac L-L   50-60 Hz (directly from voltage inputs)			
<b>OPTION C1</b>	230 Vac L-L			
<b>OPTION C2</b>	110 Vac L-L			
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)			
<b>Voltage inputs</b>	3 inputs 500 V max (possible external VT ratio programmable 01÷400)			
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable 1÷2000			
<b>OPZION 1A</b>	3 inputs 0,01÷1A rms			
<b>OPZION T</b>	Isolated inputs with internal TA (for use in M.V.)			
<b>OPZION TT 10</b>	Direct inputs for current max 16 A			
<b>OPZION TT 25</b>	Direct inputs for current max 32 A			
<b>OPZION TT 50</b>	Direct inputs for current max 63 A			
<b>Measured parameters</b>	V I-I, V I-n, A A f h	V I-I, V I-n, A cosfi, f, °T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh	V I-I, V I-n, A cosfi, f, °T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh	V I-I, V I-n, A cosfi, f, °T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh
<b>Measuring accuracy</b>	Voltage: < 0.5%	Voltage: < 0.5%	Voltage: < 0.5%	Voltage: < 0.5%
EN62053-21 62053-23	Current: < 0.5%	Current: < 0.5%	Current: < 0.5%	Current: < 0.5%
	-	Powers: < 1%	Powers: < 1%	Powers: < 1%
	-	Energies: < 1% class 1	Energies: < 1% class 1	Energies: < 1% class 1
<b>Frequency measure</b>	40 ÷ 100 Hz			
<b>Communication port</b>	-	-	-	1 Rs485 Protocollo comunicazione MODBUS-RTU Baud rate 9600-19200 bps
<b>Digital outputs</b>	-	-	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max per allarmi o riemissione impulsi (durata impulso pro- grammabile 100-500msec.).	-
<b>OPTION P</b>	2 photomos 10 ÷ 300 Vcc / 150 mA o 10÷250Vca / 150mA max per allarmi	-	-	-
<b>Analog outputs</b>	-	-	-	3 uscite 0-20 / 4-20 mA Completamente programmabile Risoluzione 15 bit (tramite convertitore seriale/analogico esterno Z3A0) *
<b>OPTION Z3A0</b>	-	-	-	-
<b>Display</b>	3 display with 10 mm red LED (3 digit of 10 mm - 7 segments)	4 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)		

\* in this case serial output RS485 can not be used.



## MULTIFUNCTION MULTIMETERS FLUSH MOUNTING DIN 96 x 96 WITH REDUCED DEPTH



EMM-R3VA



EMM-R4h  
EMM-R4hp  
EMM-R4h-485

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23

	EMM R3VA	EMM R4h	EMM R4hp	EMM R4h-485
<b>Mechanical characteristics</b>	Flush mounting DIN 96 x 96 mm   Depth 56 mm   Panel cut out 92x92 mm   Weight: 0,5 kg			
<b>Auxiliary supply</b>	400 Vac L-L   50-60 Hz (directly from voltage inputs)			
<b>OPTION C1</b>	230 Vac L-L			
<b>OPTION C2</b>	110 Vac L-L			
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)			
<b>Voltage inputs</b>	3 inputs 500 V max (possible external VT ratio programmable 01÷400)			
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable 1÷2000			
<b>OPZION 1A</b>	3 inputs 0,01÷1A rms			
<b>OPZION T</b>	Isolated inputs with internal TA (for use in M.V.)			
<b>OPZION TT 10</b>	Direct inputs for current max 16 A			
<b>OPZION TT 25</b>	Direct inputs for current max 32 A			
<b>OPZION TT 50</b>	Direct inputs for current max 63 A			
<b>Measured parameters</b>	V I-I, V I-n, A A f h	V I-I, V I-n, A cosfi, f, °T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh	V I-I, V I-n, A cosfi, f, °T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh	V I-I, V I-n, A cosfi, f, °T, h W, Var, VA + kWh, - kWh, + KVarh, - KVarh
<b>Measuring accuracy</b>	Voltage: < 0.5%	Voltage: < 0.5%	Voltage: < 0.5%	Voltage: < 0.5%
EN62053-21 62053-23	Current: < 0.5%	Current: < 0.5%	Current: < 0.5%	Current: < 0.5%
	-	Powers: < 1%	Powers: < 1%	Powers: < 1%
	-	Energies: < 1% class 1	Energies: < 1% class 1	Energies: < 1% class 1
<b>Frequency measure</b>	40 ÷ 100 Hz			
<b>Communication port</b>	-	-	-	1Rs485 Communication protocol MODBUS-RTU baud rate 9600-19200 bps
<b>Digital outputs</b>	-	-	2 photomos 10÷300Vcc / 150 mA or 10÷250Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500 m Sec.).	-
<b>OPTION P</b>	2 photomos 10÷300Vcc / 150 mA or 10÷250Vca/150 mA max for alarms			
<b>Analog outputs</b>	-	-	-	3 outputs 0-20/4-20mA comple- tely programmable - defini- tion16 bit (by external serial/analog converter Z3A0) *
<b>OPTION Z3A0</b>				
<b>Display</b>	3 display with 10 mm red LED (3 digit of 10 mm - 7 segments)	4 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)		

\* in this case serial output RS485 can not be used.

## MULTIFUNCTION MULTIMETERS - FLUSH MOUNTING DIN 96 x 96

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
 Storage T:  $-15 \div +60^{\circ}\text{C}$   
 Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
 EMC: EN61000-6-2 / EN61000-6-4  
 CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
 EN62053-23



EMM-4h  
 EMM-4hp  
 EMM-4h-485  
 EMM-4hp-PF  
 EMM-4h-485-A  
 EMM-4hp-ETH

	EMM 4h	EMM 4hp	EMM 4hp-485	EMM 4hp-PF	EMM 4hp-485-A	EMM 4hp-ETH
<b>Mechanical characteristics</b>	Flush mounting DIN 96 x 96 mm   Depth 56 mm   Panel cut out 92x92 mm   Weight: 0,5 kg					
<b>Auxiliary supply</b>	110-230-400Vac   50-60Hz (directly from voltage inputs)					
OPTION C1	20÷60Vac/dc					
OPTION C2	90÷250Vac/dc					
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)					
<b>Voltage inputs</b>	3 inputs 500 V max (possible external VT ratio programmable 01÷400)					
OPTION 600	3 inputs 600 V max					
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable 1÷ 2000					
OPTION 1A	3 inputs 0,01÷1A rms					
OPTION T	Isolated inputs with internal TA (for use in M.V.)					
OPZION TT 10	Direct inputs for current max 16 A					
OPZION TT 25	Direct inputs for current max 32 A					
OPZION TT 50	Direct inputs for current max 63 A					
OPZIONE N	4th input for measuring neutral current or residual/differential current					
<b>Measured parameters</b>	V, I-n, A   cosφ, f, T, h   W, Var, VA   + kWh, - kWh, + KVarh, - KVarh					
<b>Measuring accuracy</b>	Tensione: < 0.5%   Corrente: < 0.5%   Potenze: < 1%   Energie: < 1% class 1   EN62053-21 62053-23					
<b>Frequency measure</b>	40 ÷ 100 Hz					
<b>Communication port</b>	-	-	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps	Communication protocol PROFIBUS-DP Baud rate 3M bps MAX	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps	-
OPTION LON	-	-	Communication protocol LON-WORKS	-	Communication protocol LON-WORKS	-
<b>Ethernet Output</b>	-	-	-	-	-	1 ethernet connectos RJ45 Communication protocol MODBUS-TCP FTP/HTTP/SMTP/SNMP
<b>Digital outputs</b>	-	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).
<b>Digital inputs</b>	OPTION	1 optoisolated 90÷250 Vca/cc for changing band energy meters or status signalling	1 optoisolated 90÷250 Vca/cc for changing band energy meters or status signalling	1 optoisolated 90÷250 Vca/cc for changing band energy meters or status signalling	1 optoisolated 90÷250 Vca/cc for changing band energy meters or status signalling	1 optoisolated 90÷250 Vca/cc for changing band energy meters or status signalling
<b>Analog outputs</b>	-	-	-	-	1 output 0÷20 / 4÷20 mA programmable 10 bit resolution	-
OPTION Z3AO	-	-	3 outputs 0-20 / 4-20 mA programmable16 bit definition(by external serial/analog converter) *	-	3 outputs 0-20 / 4-20 mA programmable16 bit definition(by external serial/analogl converter) *	-
<b>Display</b>	4 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)					

\* in this case serial output RS485 can not be used.

## MULTIFUNCTIONAL AMMETER MEASURING NETWORK'S CURRENT OR DIFFERENTIALS FLUSH MOUNTING **DIN 96 x 96**

These could be used for measuring differential or residual currents (up to 4 simultaneously) with an external toroidal reducer or for measuring networks current (eventually also networks divided each other, up to 4 simultaneously) with external CT.

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022



ELM-4  
ELM-4-485  
ELM-4-PF



	ELM 4	ELM 4-485	ELM 4-PF
<b>Mechanical characteristics</b>	Montaggio ad incasso DIN 96 x 96 mm   Profondità 80 mm   Foratura 92x92 mm   Peso: 0,5 kg		
<b>Auxiliary supply</b>	110-230-400 V   50-60 Hz		
<b>OPTION C1</b>	20÷60 Vca/cc		
<b>OPTION C2</b>	90÷250 Vca/cc		
<b>Protection degree</b>	IP 52 frontale   IP 20 contenitore (IP65 con calotta frontale esterna)		
<b>Current inputs</b>	4 ingressi 0,05÷5 Arms (da riduttore toroidale esterno serie CT-1...)		
<b>OPTION 1 AΔ</b>	4 ingressi 0,01÷1 Arms (da riduttore toroidale esterno serie CT-1...)		
<b>OPTION 50 AΔ</b>	4 ingressi 0,05÷50 Arms (da riduttore toroidale esterno serie CT-1...)		
<b>OPTION 5 AL</b>	4 ingressi 0,05÷5 Arms (da TA esterno .../5A)		
<b>OPTION 1 AL</b>	4 ingressi 0,01÷1 Arms (da TA esterno .../1A)		
<b>OPTION T</b>	ingressi isolati con TA interni		
<b>Measured parameters</b>	A1   A2   A3   AN   AΔ1   AΔ2   AΔ3   AΔ4		
<b>Measuring accuracy</b>	Corrente: < 0,5%		
<b>Frequency measure</b>	40 ÷ 100 Hz		
<b>Communication port</b>	-	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps	Communication protocol PROFIBUS-DP baud rate 3M bps MAX
<b>Digital outputs</b>	2 photomos 10÷300 Vcc/150 mA or 10÷250 Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500 m Sec.)	2 photomos 10÷300 Vcc/150 mA or 10÷250 Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500 m Sec.)	2 photomos 10÷300 Vcc/150 mA or 10÷250 Vca/150 mA max for alarms or re-emission pulses (programmable time of pulse 100÷500 m Sec.)
<b>Analog outputs</b>	-	3 outputs 0-20/4-20 mA completely programmable 16 bit definition (by external toroidal converter serial/analog Z3A0 ) *	-
<b>OPTION Z3A0</b>			
<b>Display</b>	4 displays with 10 mm red LED (3 digit of 10 mm - 7 segments)		

\* in this case serial output RS485 can not be used.

# EMC

## ENERGY METER FLUSH MOUNTING DIN 96 x 96 DIN RAIL 6 MODULES



### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMC-3B  
EMC-3B-485



EMC-D3B  
EMC-D3B-485

	EMC 3B	EMC 3B-485	EMC D3B	EMC D3B-485
<b>Mechanical characteristics</b>	Flush mounting DIN 96 x 96 mm   Depth 80 mm Panel cut out 92x92 mm   Weight: 0,5 kg		DIN rail mounting 6 modules of 17,5 mm Weight: 0.4 kg	
<b>Auxiliary supply</b>	110-230-400 V   50-60 Hz		400 Vac L.L.   50-60 Hz	
<b>OPTION C1</b>	20÷60 Vac/dc			
<b>OPTION C2</b>	90÷250 Vac/dc			
<b>OPTION C3</b>			230 Vac L.L.	
<b>OPTION C4</b>			110 Vac L.L.	
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)		Frontal IP 42   Box IP 20	
<b>Voltage inputs</b>	3 inputs 500 V max (possible external VT ratio programmable 01÷400)			
<b>OPTION 600</b>	3 inputs 600 V max			
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable 1÷ 2000			
<b>OPTION 1A</b>	3 inputs 0,01÷1A rms			
<b>OPTION T</b>	Isolated inputs with internal CT			
<b>OPZIONE TT 10</b>	Direct inputs for current max 16 A			
<b>OPZIONE TT 25</b>	Direct inputs for current max 32 A			
<b>OPZIONE TT 50</b>	Direct inputs for current max 63 A			
<b>Measured parameters</b>	kWh, kVarh, KVAh			
<b>Measuring accuracy</b>	Energie: < 1% classe 1   EN62053-21 62053-23			
<b>Frequency measure</b>	40 ÷ 100 Hz			
<b>Communication port</b>	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps		1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps	
<b>Digital outputs</b>	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).
<b>Digital inputs</b>	1 Optoisolated 90÷250 Vca/cc for changing band energy meters	1 Optoisolated 90÷250 Vca/cc for changing band energy meters	1 Optoisolated 90÷250 Vca/cc for changing band energy meters	1 Optoisolated 90÷250 Vca/cc for changing band energy meters
<b>Display</b>	1 display with 10 mm red LED (3 digit of 10 mm - 7 segments) 8 digit + 1 decimal			

## MULTIFUNCTIONAL TRANSDUCER DIN RAIL WITHOUT VISUALIZATION

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMT-3S  
EMT-3SI  
EMT-3SA

	EMT 3S	EMT 3SI	EMT 3SA
<b>Mechanical characteristics</b>	DIN rail mounting 6 modules of 17,5 mm   Weight: 0,5 kg		
<b>Auxiliary supply</b>	110-230-400 V   50-60 Hz		
<b>OPTION C1</b>	20÷60 Vca/cc		
<b>OPTION C2</b>	90÷250 Vca/cc		
<b>Protection degree</b>	Frontal IP 42 Box IP 20		
<b>Voltage inputs</b>	3 inputs 500 V max		
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable 1÷2000		
<b>OPTION 1A</b>	3 inputs 0,01÷1A rms		
<b>OPTION T</b>	Isolated inputs with internal TA		
<b>OPZIONE TT 10</b>	Direct inputs for current max 16 A		
<b>OPZIONE TT 25</b>	Direct inputs for current max 32 A		
<b>OPZIONE TT 50</b>	Direct inputs for current max 63 A		
<b>OPZIONE N</b>	4th input for measuring neutral current or residual current		
<b>Measured parameters</b>	V, I-n, A   cosfi, f   W, Var, VA   kWh, kVarh, KVAh		
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: < 1% classe 1   EN62053-21 62053-23		
<b>Frequency measure</b>	40 ÷ 100 Hz		
<b>Communication port</b>	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps	1 Rs485 Communication protocol MODBUS-RTU Baud rate 9600-19200 bps
<b>Digital outputs</b>	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).	2 photomos 10 ÷ 300Vcc / 150mA o 10÷250Vca / 150mA max for alarms or re-emission pulses (programmable time of pulse 100÷500msec.).
<b>Digital inputs</b>	-	1 optoisolated 90÷250 Vca/cc for changing band energy meters or status signalling	-
<b>Analog outputs</b>	-	-	1 output 0÷20/4÷20 mA programmable 10 bit resolution

## MULTIFUNCTION TRANSDUCER HIGH ACCURACY

EMT-4S  
EMT-4STT  
EMT-1SC

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



accessorie  
EMT-4DI+2DO

	EMT 4S	EMT 4S-TT	EMT 1SC
<b>Mechanical characteristics</b>	Din rail mounting e modules of 17,5 mm		Base plate mounting
<b>Auxiliary supply</b>	110-230-400 V   50-60 Hz		
<b>OPTION C1</b>	20÷60 Vac/dc		
<b>OPTION C2</b>	90÷250 Vac/dc		
<b>Protection degree</b>	frontal IP 42   IP 20 box		
<b>Voltage inputs</b>	3 inputs 500 Vmax		
<b>Current inputs</b>	3 inputs 0,05÷5A rms with external CT ratio programmable (max line current 10.000A)	4 direct current inputs max 32A	1 inputs 0,05÷5A rms with external TA CT ratio programmable (max line current 10.000A) + 2 optional inputs with 2 other 2 EMT-1SC
<b>OPZION 1A</b>	3 inputs 0,01÷1A rms	-	-
<b>OPZION T</b>	insulated inputs with internal CT	-	-
<b>OPZION N</b>	4° input for neutral current	-	-
<b>Measured parameters</b>	V, I-I, V, I-n, A   cosfi, f   W, Var, VA   +KWH, -KWH, +KVARH, -KVARH		
<b>Measuring accuracy</b>	Voltage: < 0.2%   Current: < 0.2%   Powers: < 0,5%   Energies: < 0,5%		
<b>OPZION 0,1</b>	Voltage: < 0.05%   Current: < 0.05%   Powers: < 0,01%   Energies: < 0,1%		
<b>MID</b>	MID Omologation		
<b>Communication port</b>	1 Rs485   comunication protocol MODBUS-RTU   Baud rate 9600-19200 bps		
<b>Digital outputs</b>	2 photomos 10 ÷ 300Vdc   150mA o 10÷250Vac   150mA for alarm or re emission pulse (programmable time of pulse 100÷300 msec.)		
<b>OPZION 4DI+2DO</b>	2 additional with external module		
<b>Digital inputs</b>	2 optoisolated 90 ÷ 250Vac/dc for changing band or status signalling		
<b>OPZION 4DI+2DO</b>	4 additional with external module		
<b>Analog outputs</b>	3 outputs 0-20/4-20 mA completely programmable 16 bit definition(by external toroidal converter serial/analog Z3AO )		
<b>OPZION Z3AO</b>	*		

\* in this case serial output RS485 can not be used.

SELECTION TABLE OF FUNCTION AND TECHNICAL CHARACTERISTICS

MEASURED PARAMETERS TECHNICAL CHARACTERISTICS	VERSION FOR 3/6 MODUL DIN RAIL																
	EMM- $\mu$ D3VA	EMM- $\mu$ D3h	EMM- $\mu$ D3hp	EMM- $\mu$ D3h-485	EMM-D4h	EMM-D4hp	EMM-D4hp-485	EMM-D4hp-485-A	EMM-D4hp-ETH	EMC-D3B	EMC-D3B-485	EMT-3S	EMT-3SI	EMT-3SA	EMT-4S	EMT-4STT	EMT-1SC
Voltage V ( $\Sigma$ , L1, L2, L3, L12, L23, L31)	•	•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Current I ( $\Sigma$ , L1, L2, L3)	•	•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Neutral current or residual current						▲	▲	▲	▲			▲	▲	▲	▲		
Isolated current inputs T	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		
Direct current inputs max 16A/32A/63A	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲		•	
Power factor P.F. ( $\Sigma$ , L1, L2, L3)		•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Active power W ( $\Sigma$ , L1, L2, L3)		•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Reactive power Q ( $\Sigma$ , L1, L2, L3)		•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Apparent power S ( $\Sigma$ , L1, L2, L3)		•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Frequency	•	•	•	•	•	•	•	•	•			•	•	•	•	•	• <sub>L</sub>
Temperature		•	•	•	•	•	•	•	•			•	•	•	•	•	
Active energy + Kwh, -Kwh		•	•	•	•	•	•	•	•	•*	•*	•*	•*	•	•	•	•
Reactive energy + Kvarh, - Kvarh		•	•	•	•	•	•	•	•	•*	•*	•*	•*	•	•	•	•
Apparent energy +Kvah						▲	▲		▲	•	•				•	•	•
Active energy +Kwh 2 time bands						▲	▲		▲	•	•				•	•	•
Reactive energy +Kvarh 2 time bands		•	•	•	•	•	•	•	•	•	•				•	•	•
Active energy +Kwh total/partial		•	•	•	•	•	•	•	•	•	•				•	•	•
Hours counter	•	•	•	•	•	•	•	•	•								
Maximum instantaneous values (I, $\Sigma$ P, $\Sigma$ S)		•	•	•	•	•	•	•	•			•	•	•	•	•	•
Maximum instantaneous values (I, V)	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•
Average values maximum (maximum demand) I1avg, I2avg, I3avg	•	•	•	•	•	•	•	•	•			•	•	•	•	•	•
Average values I1, I2, I3, $\Sigma$ P, $\Sigma$ Q, $\Sigma$ S S		•	•	•	•	•	•	•	•			•	•	•	•	•	•
Average values maximum (maximum demand) $\Sigma$ Pavg, $\Sigma$ Qavg, $\Sigma$ Savg		•	•	•	•	•	•	•	•			•	•	•	•	•	•
Digital input						▲	▲		▲	•	•				• <sub>2</sub>	• <sub>2</sub>	•
2 digital outputs (alarms or pulses' emission back)	▲		•		•	•	•	•	•			•	•	•	•	•	•
Serial output Rs485 prot. MODBUS-RTU				•		•	•					•	•	•	•	•	•
Serial output Rs485 prot. LON/WORKS						▲	▲					▲					
Ethernet output (prot. MODBUS-FTP-TCP, HTTP, SMTP, SNMP)								•									
1 Analog output 0/4 ÷ 20 mA								•									
3 Analog output 0/4 ÷ 20 mA (with external module Z3A0)				▲		▲	▲								▲	▲	
Password (for SETUP and reset)	•	•	•	•	•	•	•	•	•	•	•						
Insertion error signalization	•	•	•	•	•	•	•	•	•								
Single-phase network, three-phase network 3 wires or 4 wires insertion (programmable by SETUP)	•	•	•	•	•	•	•	•	•						•	•	• <sub>single phase</sub>
Phase sequency	•																
Insertion on 3 separated single phase line		▲	▲	▲													

• STANDARD ▲ OPZION \* ONLY + Kwh, + KVarh

**SELECTION TABLE OF FUNCTION AND TECHNICAL CHARACTERISTICS**

VERSION FOR FLUSH MOUNTING DIN 96x96 mm DIN 72x72 mm	EMM-μ3VA	EMM-μ4h	EMM-μ4hp	EMM-μ4h-485	EMM-R3VA	EMM-R4h	EMM-R4hp	EMM-R4h-485	EMM-4h	EMM-4hp	EMM-4hp-485	EMM-4hp-PF	EMM-4hp-485-A	EMM-4hp-ETH	ELIM-4	ELIM-4-485	ELIM-4-PF	EMC-3B-4	EMC-3B-485
MEASURED PARAMETERS TECHNICAL CHARACTERISTICS																			
Voltage V (S, L1, L2, L3, L12, L23, L31)	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
Current I (S, L1, L2, L3)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	▲	▲	▲		
Neutral current or residual current									▲	▲	▲	▲	▲	▲	•	•	•		
Earth leakage current IΔ (L1, L2, L3)									•	•	•	•	•	•	•	•	•		
Isolated current inputs T	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
Ingresso amperometrici diretti (correnti max) 16A/32A/63A	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲				▲	▲
Power factor P.F. (S, L1, L2, L3)		•	•	•		•	•	•	•	•	•	•	•	•					
Active power W (S, L1, L2, L3)		•	•	•		•	•	•	•	•	•	•	•	•					
Reactive power Q (S, L1, L2, L3)		•	•	•		•	•	•	•	•	•	•	•	•					
Apparent power S (S, L1, L2, L3)		•	•	•		•	•	•	•	•	•	•	•	•					
Frequency	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
Temperature		•	•	•		•	•	•	•	•	•	•	•	•					
Active energy + Kwh, -Kwh		•	•	•		•	•	•	•	•	•	•	•	•				•*	•*
Reactive energy + Kvarh, -Kvarh		•	•	•		•	•	•	•	•	•	•	•	•				•*	•*
Active energy +Kwh 2 time bands										▲	▲	▲		▲				•	•
Reactive energy +Kvarh 2 time bands										▲	▲	▲		▲				•	•
Active energy +Kwh total/partial		•	•	•		•	•	•	•	•	•	•	•	•				•	•
Reactive energy +Kvarh total/partial		•	•	•		•	•	•	•	•	•	•	•	•				•	•
Apparent energy +Kvah total/partial		•	•	•		•	•	•	•	•	•	•	•	•				•	•
Hours counter	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
Maximum instantaneous values (I, ΣP, ΣS)		•	•	•		•	•	•	•	•	•	•	•	•					
Maximum instantaneous values (I, V)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
Average values maximum (maximum demand) I1avg, I2avg, I3avg	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
Average values I1, I2, I3, ΣP, ΣQ, ΣS		•	•	•		•	•	•	•	•	•	•	•	•	•	•	•		
Average values maximum (maximum demand) SPavg, SQavg, SSavg		•	•	•		•	•	•	•	•	•	•	•	•					
Digital input										▲	▲	▲		▲				•	•
2 digital outputs (alarms or pulses' emission)	▲		•		▲		•			•	•	•	•	•				•	•
Serial output Rs485 prot. MODBUS-RTU				•				•					•						•
Serial output prot. LON/WORKS											▲		▲						
Serial output PROFIBUS-DP baud rate 3 M bps												•					•		
Ethernet output (prot. MODBUS-FTP-TCP, HTTP, SMTP, SNMP)														•					
1 Analog output 0/4 ÷ 20 mA													•						
3 Analog output 0/4 ÷ 20 mA (with external module Z3A0)				▲				▲			▲		▲				▲		
Password (for SETUP and reset)	•	•	•	•	•	•	•	•	•	•	•	•	•	•				•	•
Insertion error signalization		•	•	•	•	•	•	•	•	•	•	•	•	•					
Single-phase network, three-phase network 3 wires or 4 wires insertion (programmable by SETUP)	•	•	•	•	•	•	•	•	•	•	•	•	•	•					
Fase sequency	•				•														

• STANDARD ▲ OPZION \* ONLY + Kwh, + KVarh



ELECTRICAL MULTIFUNCTION ANALYSERS



GENERAL INFORMATIONS

MULTIFUNCTIONAL ANALYSER OF ELECTRICAL NETWORK

Beside the previously mentioned instruments, Contrel Elettronica offers also a complete range of electrical parameters analysers EMA series. These instruments guarantee all the functions previously mentioned in multimeter range and have also characteristics and functionalities that allow a real analysis of parameters

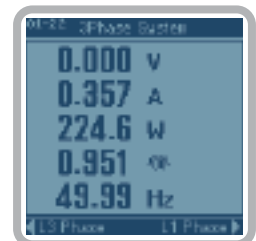
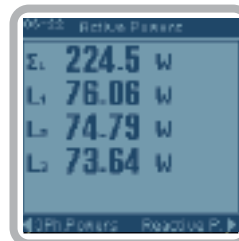
of electrical network.

Devices are suitable for monitoring and managing of all the parameters of energy distribution network, with advanced functions, as well maintaining its practical and simple use.

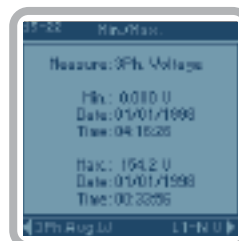
Their main characteristics are detailed below:

DISPLAY SCREENSHOTS

- Real and effective measures with a high precision of all the electrical parameters with a 0.5 or 0.2 class for voltage and current and 1.0 or 0.5 for energy counters (according to regulation IEC 1036).



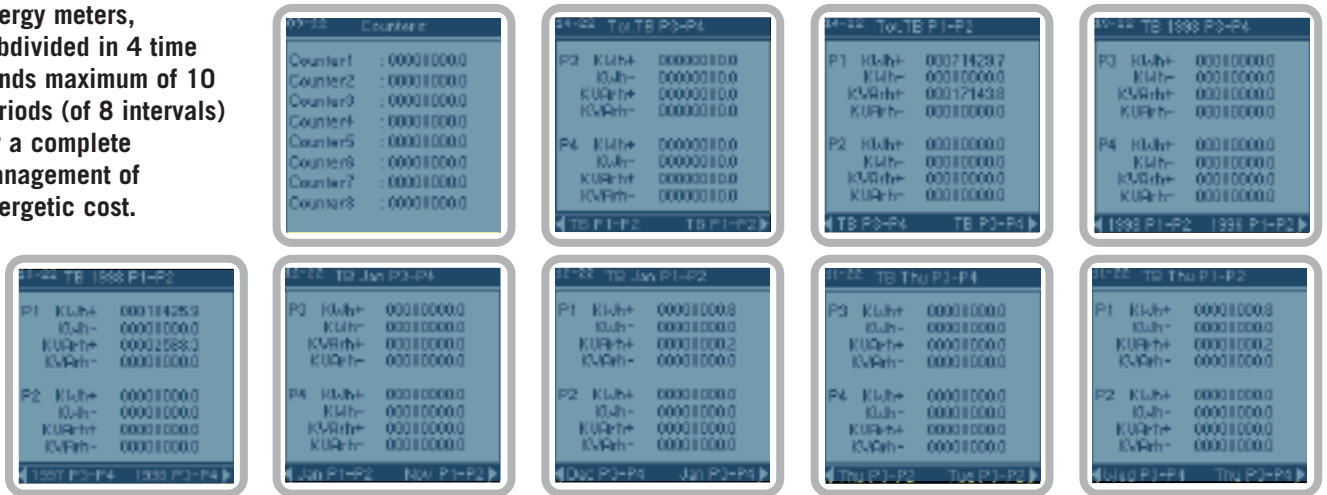
- Measures and parameters of average, maximum and minimum values (related to a period or absolute) of different parameters, for a complete and precise analysis of distribution network.



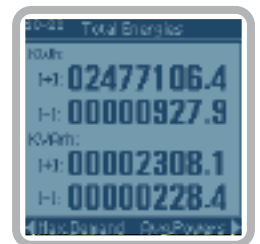
■ Extremely high performances with an outstanding price /quality relation.

■ Convenient application, as well as simple multimeter for electrical board.

■ Energy meters, subdivided in 4 time bands maximum of 10 periods (of 8 intervals) for a complete management of energetic cost.



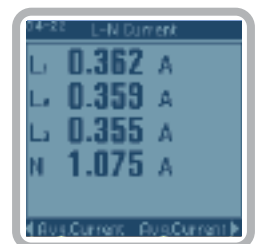
■ Bidirectional counters of active and reactive energy for energetic balance or absorbed energy (co-generation).



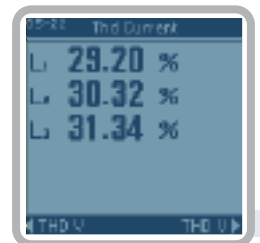
■ General information regarding the instrument, its firmware version, serial number, configuration inputs and outputs, options, communication protocol, and so on.



■ Measure of neutral currents.

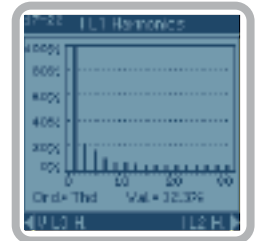


■ Reading of Total Harmonic Distortion (THD) of current and voltage for each individual phase.

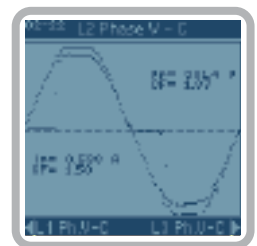


- Possibility of field measuring by memorising time after time parameters, average values, maximum and minimum, and harmonic components.

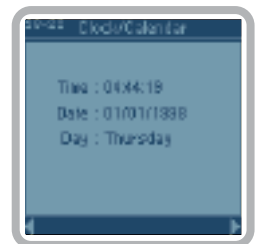
- Analysis of the harmonic components for voltage and current up to the 31st in order with fundamental 50 Hz.



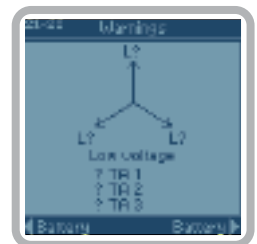
- Visualisation of the voltage and current wave forms.



- Internal clock and calendar.



- Test of correct connection of instrument (external CT connection for current inputs and phase sequence for voltage inputs).

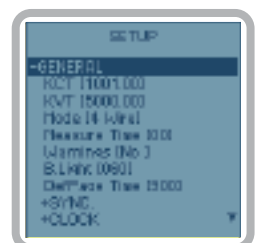


- Management of optional parameters even non electrical from additional inputs in order to carry out a complete measure's acquisition.

- Very simple and intuitive setting and use with a friendly menu which allows an easy visualisation of scrolling pages.



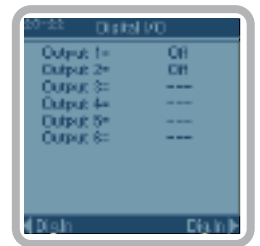
- Complete programming of working parameters (setup, CT and VT transformation ratios, average times, alarms, hysteresis, peripheral connections, printing and so on).



- Fully programmable alarm outputs, with selection of parameters, time delay, hysteresis of maximum/minimum and so on.



- Status of output/input contacts in order to check the situation of status or drives.



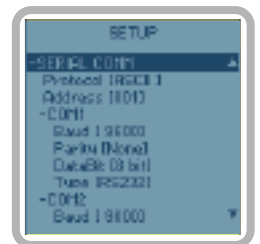
- Programmable communication protocol ASCII or Modbus-RTU or PROFIBUS-DP or MODBUS-TCP/FTP/HTTP/SMTP/SNMP

- Recording and graphic visualising of measures, with possibility of local printing.

- Possibility of functions updating, by connecting to a serial port, which allows successive upgrading without instrument substitution.

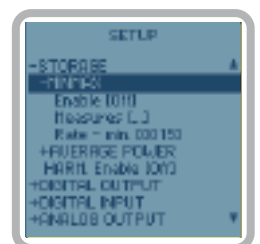
- Extremely complete “NRG” software in the context of Windows environment, for instrument management from a PC (up to 128 nodes network) through a serial network.

- RS 485 / RS 232 serial output commutable.

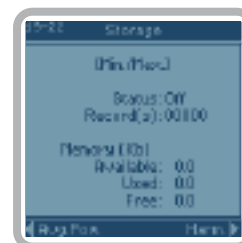


- Additional serial outputs for connecting a local printer or for connecting a modem for a remote data transmission .

- Internal memory of 128 Kb, which up to 1 Mb for recording purpose.



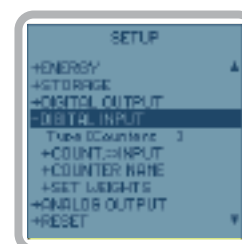
- Verifying status of internal memory used and available for records.



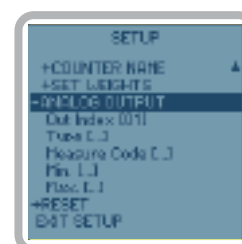
- Digital outputs (up to 6) for alarms signalling (maximum and minimum, with time delay, hysteresis and so on) and loads management or programmable energy pulse re-emission



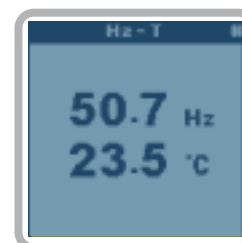
- Digital output (up to 8) for pulse counting, synchronisation, time bands definition, connection to external meters and so on.



- Analog outputs (up to 4) 0÷20 mA, 4÷20Ma and so on fully programmable, apt for being associated to whatever parameter, bi-directional.



- Programmable synchronisation mode of instrument.



- Internal compensated temperature sensor.

- Reliable and strong section of supply 19÷60 Vca/dc or 90÷260 Vca/dc

- Optional plug-in modules for memory expansion (connectable in the back of instrument), number of digital inputs, number of digital and analogical outputs, additional serial ETHERNET output, PROFIBUS-DP output, without substitution of instrument (see pag. 28,29,30).

- Various local visualisation modes of the parameters (by LCD graphic back lighted displays of high definition, available in different dimensions, or by LCD alphanumeric back lighted displays or by LED red big dimensions alphanumeric displays).

- DIN 96x96 mm or DIN 144x144 mm enclosures for flush mounting onto a panel or for 9 modules DIN rail mounting.

- High frontal protection degree (IP55) and reduced depth of flush mounting (60 mm for EMA 14/14H - EMA 10/10H - EMA 11/11H versions).

- Functional screw draw out terminals with safety latching.

## ELECTRICAL MULTIFUNCTION ANALYSERS FLUSH MOUNTING DIN 96 x 96 - RED LED DISPLAY

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMA-96  
EMA-96 H

	EMA 96	EMA 96 H
<b>Mechanical characteristics</b>	Flush mounting DIN 96x96 mm   Depth 120 mm   Panel cut out 92x92mm   Weight 0,5 kg	
<b>Auxiliary supply</b>	85±265 V   50-60 Hz / dc	
<b>OPTION C1</b>	20±60 V   50-60 Hz / dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)	
<b>Voltage inputs</b>	3 inputs 750 V max (programmable transformer ratio with external VT 0,01÷5000)	
<b>Current inputs</b>	3 isolated inputs (TA) 0,005÷5A rms (10A f.s.) with external CT ratio programmable 0,01÷5000	
<b>OPTION 1A</b>	0,001÷1 Arms TA ratio external programmable	
<b>Measured parameters</b>	V I-I V I-n A   cosφ P.F. F °T   W Var VA +kWh -kWh   +kVarh -Kvarh   +kVAh -kVAh THD	V I-I V I-n A   cosφ P.F. F °T   W Var VA +kWh -kWh   +kVarh -Kvarh   +kVAh -kVAh (subdivided in 4 time bands of 10 programmable periods) THD   HVL1 HVL2 HVL3 HA1 HA2 HA3
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: <1% class 1   EN62053-21 62053-23	
<b>Frequency measure</b>	30 ÷ 900 Hz	
<b>Serial outputs</b>	1RS485/RS232 additional   selection of communication protocol ASCII or MODBUS-RTU   baud rate progr. 1200÷19200 bps	
<b>OPTION S485/232</b>	1RS485 or RS232 additional   selection of communication protocol ASCII or MODBUS-RTU   baud rate progr. 1200÷19200 bps	
<b>OPTION PF/S</b>	Communication protocol PROFIBUS-DP baud rate   3 Mbps MAX	
<b>OPTION ETH</b>	Ethernet output RJ45 (MODBUS-TCP   FTP   HTTP   SMTP   SNMP)	
<b>Recording memory</b>	Ram 128 kb	Ram 128 kb
<b>OPTION MEM 1</b>	Ram 1 Mb	Ram 1 Mb
<b>Clock Calendar</b>	Format: day/month/year   Hour/min/sec   precision: ± 1 min./month with 25°C	
<b>Harmonic analysis</b>	-	Up to 31st harmonic of voltage and current with numeric format (graphic format with "NRG" software)
<b>Digital outputs</b>	2 photomos 10-50 Vcc-500mA or 260 Vca -100 mA max	
<b>OPTION 2DO/R</b>	2 relays outputs (5A-250V resistive load)	
<b>Digital inputs</b>	2 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>OPTION 4DI</b>	4 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>Analog outputs OPT.1A0</b>	1 output 0-20 / 4-20 mA fully programmable – 8 bit definition	
<b>OPTION Z3A0</b>	3 outputs 0-20 / 4-20 mA fully programmable – 16 bit definition (by external serial/ analog converter Z3A0)	
<b>Display</b>	alphanumeric red LED displays- 3 rows	

## ELECTRICAL MULTIFUNCTION ANALYSERS FLUSH MOUNTING DIN 96 x 96 - LCD DISPLAY

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMA-90

EMA-90 H

	EMA 90	EMA 90 H
<b>Mechanical characteristics</b>	Flush mounting DIN 96x96 mm   Depth 120 mm   Panel cut out 92x92mm   Weight 0,5 kg	
<b>Auxiliary supply</b>	85÷265 V   50-60 Hz / dc	
<b>OPTION C1</b>	20÷60 V   50-60 Hz / dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20 (IP65 with external cover)	
<b>Voltage inputs</b>	3 inputs 750 V max (programmable transformer ratio with external VT 0,01÷5000)	
<b>Current inputs</b>	3 isolated inputs (TA) 0,005÷5A rms (10A f.s.) with external CT ratio programmable 0,01÷5000	
<b>OPTION 1A</b>	0,001÷1 Arms TA ratio external programmable	
<b>Measured parameters</b>	V-I   V-I-n   A   cosφ   P.F.   F   °T   W   Var   VA +kWh -kWh   +kVarh -kvarh   +kVAh -kVAh THD	V-I   V-I-n   A   cosφ   P.F.   F   °T   W   Var   VA +kWh -kWh   +kVarh -kvarh   +kVAh -kVAh (subdivided in 4 time bands of 10 programmable periods) THD   HVL1   HVL2   HVL3   HA1   HA2   HA3
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: <1% class 1   EN62053-21 62053-23	
<b>OPZION 0,5</b>	Voltage: < 0.25%   Current: < 0.25%   Powers: < 0,5%   Energies: < 0,5% class 0,5   CEI-EN62052-11 / CEI-EN62053-22	
<b>Frequency measure</b>	30 ÷ 900 Hz	30 ÷ 900 Hz (harmonic analysis with fundamental 40÷70 Hz)
<b>Serial outputs</b>	1RS485/RS232 additional   selection of communication protocol ASCII or MODBUS-RTU   baud rate progr. 1200÷19200 bps	
<b>OPTION S485/232</b>	1RS485 or RS232 additional   selection of communication protocol ASCII or MODBUS-RTU   baud rate progr. 1200÷19200 bps	
<b>OPTION PF/S</b>	Communication protocol PROFIBUS-DP baud rate   3 Mbps MAX	
<b>OPTION ETH</b>	Ethernet output RJ45 (MODBUS-TCP   FTP   HTTP   SMTP   SNMP)	
<b>Recording memory</b>	Ram 128 kb	Ram 128 kb
<b>OPTION MEM 1</b>	Ram 1 Mb	Ram 1 Mb
<b>Clock Calendar</b>	Format: day/month/year   Hour/min/sec   precision: ± 1 min./month with 25°C	
<b>Harmonic analysis</b>	-	Up to 31st harmonic of voltage and current with numeric format
<b>Digital outputs</b>	2 photomos 1 -50 Vdc   500 mA o 260 Vac   100 mA max	
<b>OPTION 2DO/R</b>	Relay's output (5A-250V resistive load)	
<b>Digital inputs</b>	2 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>OPTION 4DI</b>	4 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>Analog outputs OPT.1A0</b>	1 output 0-20 / 4-20 mA fully programmable – 8 bit definition	
<b>OPTION Z3A0</b>	3 outputs 0-20 / 4-20 mA fully programmable – 16 bit definition (by external serial/ analog converter Z3A0)	
<b>Display</b>	Graphic back lighted LCD   128x128 depth 50x50 mm	

## ELECTRICAL MULTIFUNCTION ANALYSERS FLUSH MOUNTING DIN 144 x 144 - RED LED DISPLAY

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMA-14  
EMA-14 H

	EMA 14	EMA 14 H
<b>Mechanical characteristics</b>	Flush mounting DIN 144x144 mm   Depth 66 mm   Panel cut out 138x138 mm   Weight 0,5 kg	
<b>Auxiliary supply</b>	85÷265 V   50-60 Hz / dc	
<b>OPTION C1</b>	20÷60 V   50-60 Hz / dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20	
<b>Voltage inputs</b>	3 inputs 750 V max (programmable transformer ratio with external VT 0,01÷ 5000,00)	
<b>Current inputs</b>	3 isolated inputs (TA) 0,005÷5A rms (10A f.s.) with external CT ratio programmable 0,01÷5000	
<b>OPTION 1A</b>	0,001÷1 Arms TA ratio external programmable	
<b>Measured parameters</b>	V I-I V I-n A   cosfi P.F. °T   W Var VA V I-I V I-n A   cosfi P.F. °T   W Var VA +kWh -kWh   +kVarh -kVarh   +kVAh -kVAh +kWh -kWh   +kVarh -kVarh   +kVAh -kVAh THD (subdivided in 4 time bands of 10 programmable periods) THD   HVL1 HVL2 HVL3 HA1 HA2 HA3	
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: <1% class 1   EN62053-21 62053-23	
<b>Frequency measure</b>	30 ÷ 900 Hz 30 ÷ 900 Hz (harmonic analysis with fundamental 40÷70 Hz)	
<b>Serial outputs</b>	1 RS485/RS232 configurabile   Communication protocol ASCII o MODBUS-RTU selectable   baud rate progr. 1200÷19200 bps	
<b>OPTION S485/232</b>	1RS485 o RS232 selectable Communication protocol ASCII o MODBUS RTU baud rate progr.1200÷19200 bps (by plug-in card)	
<b>OPTION PF/S</b>	Communication protocol PROFIBUS-DP baud rate   3 Mbps MAX (with plug-in card)	
<b>OPTION ETH</b>	Ethernet output RJ45 (MODBUS-TCP   FTP   HTTP   SMTP   SNMP) with plug-in card	
<b>Recording memory</b>	Ram 128 kb	Ram 128 kb
<b>OPTION MEM 1</b>	Ram 1 Mb	Ram 1 Mb (by plug-in card)
<b>Clock Calendar</b>	Format: day/month/year   Hour/min/sec   precision: ± 1 min./month with 25°C	
<b>Harmonic analysis</b>	Up to 31st harmonic of voltage and current with numeric format (graphic format with "NRG" software)	
<b>Digital outputs</b>	2 photomos 10-50 Vdc-500mA o 260 Vac -100 mA max	
<b>OPTION 2DO/R</b>	2 additional outputs photomos 10-50Vdc/500mA o 260Vac/100mA max (by plug-in card)	
<b>OPTION 4DO</b>	4 additional outputs photomos 10-50Vdc/500mA o 260Vac/100mA max (by plug-in card)	
<b>Digital inputs</b>	2 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>OPTION 2DI+2DO</b>	2 additional passive optoisolated inputs (500V) for pulse counting and synchronisation (by plug-in card)	
<b>OPTION 6DI</b>	6 additional passive optoisolated inputs (500V) for pulse counting and synchronisation (by plug-in card)	
<b>Analog outputs OPT. 2AO</b>	2 outputs 0-20 / 4-20 mA fully programmable   8 bit definition (by plug-in card)	
<b>OPTION 4AO</b>	4 outputs 0-20 / 4-20 mA fully programmable   8 bit definition (by plug-in card)	
<b>OPTION Z3AO</b>	3 outputs 0-20 / 4-20 mA fully programmable – 16 bit definition (by external serial/ analog converter Z3AO)	
<b>Display</b>	alphanumeric red LED displays - 3 rows	



## ELECTRICAL MULTIFUNCTION ANALYSERS FLUSH MOUNTING DIN 144 x 144 - LCD DISPLAY

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T: -5 ÷ +50°C  
Storage T: -15 ÷ +60°C  
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMA-10

EMA-10H

	EMA 10	EMA 10 H
<b>Mechanical characteristics</b>	Flush mounting DIN 144x144 mm   Depth 66 mm   Panel cut out 138x138 mm   Weight 0,5 kg	
<b>Auxiliary supply</b>	85÷265 V   50-60 Hz / dc	
<b>OPTION C1</b>	20÷60 V   50-60 Hz / dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20	
<b>Voltage inputs</b>	3 inputs 750 V max (programmable transformer ratio with external VT 0,01÷ 5000,00)	
<b>Current inputs</b>	3 isolated inputs (TA) 0,005÷5A rms (10A f.s.) with external CT ratio programmable 0,01÷5000	
<b>OPTION 1A</b>	0,001÷1 Arms TA ratio external programmable	
<b>Measured parameters</b>	V I-I V I-n A   cosfi P.F. F °T   W Var VA V I-I V I-n A   cosfi P.F. F °T   W Var VA +kWh -kWh I + kVarh -kVarh I + kVAh -kVAh +kWh -kWh I + kVarh -kVarh I + kVAh -kVAh THD (subdivided in 4 time bands of 10 programmable periods) THD   HVL1 HVL2 HVL3 HA1 HA2 HA3	
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: <1% class 1   EN62053-21 62053-23	
<b>Frequency measure</b>	30 ÷ 900 Hz 30 ÷ 900 Hz (harmonic analysis with fundamental 40÷70 Hz)	
<b>Serial outputs</b>	1 RS485/RS232 selectable   Communication protocol ASCII o MODBUS-RTU selectable   baud rate progr. 1200÷19200 bps	
<b>OPTION S485/232</b>	Additional 1RS485 o RS232   Communication protocol ASCII o MODBUS-RTU selectable baud rate progr.1200÷19200 bps (by plug-in card)	
<b>OPTION PF/S</b>	Communication protocol PROFIBUS-DP baud rate   3 Mbps MAX (with plug-in card)	
<b>OPTION ETH</b>	Ethernet output RJ45 (MODBUS-TCP   FTP   HTTP   SMTP   SNMP) with plug-in card	
<b>Recording memory</b>	Ram 128 kb	Ram 128 kb
<b>OPTION MEM 1</b>	Ram 1 Mb	Ram 1 Mb (by plug-in card)
<b>Clock Calendar</b>	Format: day/month/year   Hour/min/sec   precision: ± 1 min./month with 25°C	
<b>Harmonic analysis</b>	Up to 31st harmonic of voltage and current with numeric format	
<b>Digital outputs</b>	2 photomos 10-50 Vdc-500mA or 260 Vac -100 mA max	
<b>OPTION 2DO/R</b>	2 additional outputs photomos 10-50Vdc/500mA o 260Vac/100mA max (by plug-in card)	
<b>OPTION 4DO</b>	4 additional outputs photomos 10-50Vdc/500mA o 260Vac/100mA max (by plug-in card)	
<b>Digital inputs</b>	2 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>OPTION 2DI+2DO</b>	2 additional passive optoisolated inputs (500V) for pulse counting and synchronisation (by plug-in card)	
<b>OPTION 6DI</b>	6 additional passive optoisolated inputs (500V) for pulse counting and synchronisation (by plug-in card)	
<b>Analog outputs OPT. 2AO</b>	2 outputs 0-20 / 4-20 mA fully programmable   8 bit definition (by plug-in card)	
<b>OPTION 4AO</b>	4 outputs 0-20 / 4-20 mA fully programmable   8 bit definition (by plug-in card)	
<b>OPTION Z3AO</b>	3 outputs 0-20 / 4-20 mA fully programmable – 16 bit definition (by external serial/ analog converter Z3AO)	
<b>Display</b>	Graphic back lighted LCD   128x128 d. 50x50 mm	

## ELECTRICAL MULTIFUNCTION ANALYSERS FLUSH MOUNTING DIN 144 x 144 - WIDE LCD DISPLAY

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T: -5 ÷ +50°C  
Storage T: -15 ÷ +60°C  
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMA-11

EMA-11 H

	EMA 11	EMA 11 H
<b>Mechanical characteristics</b>	Flush mounting DIN 144x144 mm   Depth 66 mm   Panel cut out 138x138 mm   Weight 0,5 kg	
<b>Auxiliary supply</b>	85÷265 V   50-60 Hz / dc	
<b>OPTION C1</b>	20÷60 V   50-60 Hz / dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20	
<b>voltage inputs</b>	3 inputs 750 V max (programmable transformer ratio with external VT 0,01÷ 5000,00)	
<b>Current inputs</b>	3 isolated inputs (TA) 0,005÷5A rms (10A f.s.) with external CT ratio programmable 0,01÷5000	
<b>OPTION 1A</b>	0,001÷1 Arms TA ratio external programmable	
<b>Measured parameters</b>	V I-I V I-n A   cosfi P.F. F °T   W Var VA V I-I V I-n A   cosfi P.F. F °T   W Var VA +kWh -kWh   + kVarh -kvarh   + kVAh -kVAh +kWh -kWh   + kVarh -kvarh   + kVAh -kVAh THD (subdivided in 4 time bands of 10 programmable periods) THD   HVL1 HVL2 HVL3 HA1 HA2 HA3	
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: <1% class 1   EN62053-21 62053-23	
<b>OPTION 0,5</b>	Voltage: < 0.25%   Current: < 0.25%   Powers: < 0,5%   Energies: < 0,5% class 0,5   CEI-EN62052-11 / CEI-EN62053-22	
<b>Frequency measure</b>	30 ÷ 900 Hz 30 ÷ 900 Hz (harmonic analysis with fundamental 40÷70 Hz)	
<b>Serial outputs</b>	1 RS485/RS232 selectable   Communication protocol ASCII o MODBUS-RTU selectable   baud rate progr. 1200÷19200 bps	
<b>OPTION S485/232</b>	Additional 1RS485 o RS232   Communication protocol ASCII o MODBUS-RTU selectable baud rate progr.1200÷19200 bps (by plug-in card)	
<b>OPTION PF/S</b>	Communication protocol PROFIBUS-DP baud rate   3 Mbps MAX (with plug-in card)	
<b>OPTION ETH</b>	Ethernet outpot RJ45 (MODBUS-TCP   FTP   HTTP   SMTP   SNMP) with plug-in card	
<b>Recording memory</b>	Ram 128 kb	Ram 128 kb
<b>OPTION MEM 1</b>	Ram 1 Mb	Ram 1 Mb (by plug-in card)
<b>Clock Calendar</b>	Format: day/month/year   Hour/min/sec   precision: ± 1 min./month with 25°C	
<b>Harmonic analysis</b>	Up to 31st harmonic of voltage and current with numeric format	
<b>Digital outputs</b>	2 photomos 10-50 Vdc-500mA or 260 Vac -100 mA max	
<b>OPTION 2DI + 2DO</b>	2 additional outputs photomos 10-50Vdc/500mA o 260Vac/100mA max (by plug-in card)	
<b>OPTION 4DO</b>	4 additional outputs photomos 10-50Vdc/500mA o 260Vac/100mA max (by plug-in card)	
<b>Digital inputs</b>	2 passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>OPTION 2DI+2DO</b>	2 additional passive optoisolated inputs (500V) for pulse counting and synchronisation (by plug-in card)	
<b>OPTION 6DI</b>	6 additional passive optoisolated inputs (500V) for pulse counting and synchronisation (by plug-in card)	
<b>Analog outputs OPT. 2AO</b>	2 outputs 0-20 / 4-20 mA fully programmable   8 bit definition(by plug-in card)	
<b>OPTION 4AO</b>	4 outputs 0-20 / 4-20 mA fully programmable   8 bit definition(by plug-in card)	
<b>OPTION Z3AO</b>	3 outputs 0-20 / 4-20 mA fully programmable – 16 bit definition (by external serial/ analog al converter Z3AO)	
<b>Display</b>	Graphic back lighted LCD   128x128 d. 70x70 mm	

## ELECTRICAL MULTIFUNCTION ANALYSERS FLUSH MOUNTING DIN RAIL 9 MODULES

### ENVIRONMENTAL WORKING CHARACTERISTICS

Working T:  $-5 \div +50^{\circ}\text{C}$   
Storage T:  $-15 \div +60^{\circ}\text{C}$   
Humidity: 90%

### STANDARDS/ REGULATION

Safety: 61010-1:2001  
EMC: EN61000-6-2 / EN61000-6-4  
CISPR22-EN55022

### ELECTRICAL COMPATIBILITY CE

Energy: EN62053-21  
EN62053-23



EMA-D9  
EMA-D9H

	EMA D9	EMA D9 H
<b>Mechanical characteristics</b>	Flush mounting DIN 144x144 mm   Depth 66 mm   Panel cut out 138x138 mm   Weight 0,5 kg	
<b>Auxiliary supply</b>	85÷265 V   50-60 Hz / dc	
<b>OPTION C1</b>	20÷60 V   50-60 Hz / dc	
<b>Protection degree</b>	Frontal IP 52   Box IP 20	
<b>voltage inputs</b>	3 inputs 750 V max (programmable transformer ratio with external VT)	
<b>Current inputs</b>	3 isolated inputs (TA) 0,005÷5A rms (10A f.s.) with external CT ratio programmable	
<b>OPTION 1A</b>	0,001÷1 Arms TA ratio external programmable	
<b>Measured parameters</b>	V-I   V-I-n   A   cosfi   P.F.   F   °T   W   Var   VA +kWh -kWh   + kVarh -Kvarh   + kVAh -kVAh THD	V-I   V-I-n   A   cosfi   P.F.   F   °T   W   Var   VA +kWh -kWh   + kVarh -Kvarh   + kVAh -kVAh (subdivisibili in 4 fasce orarie di 10 periodi programmabili) THD   HVL1   HVL2   HVL3   HA1   HA2   HA3
<b>Measuring accuracy</b>	Voltage: < 0.5%   Current: < 0.5%   Powers: < 1%   Energies: <1% class 1   EN62053-21 62053-23	
<b>Frequency measure</b>	30 ÷ 900 Hz	30 ÷ 900 Hz (harmonic analysis with fundamental 40÷70 Hz)
<b>Serial outputs</b>	1 RS485/RS232 configurabile   Protocollo di comunicazione ASCII o MODBUS-RTU selezionabile   baud rate progr. 1200÷19200 bps	
<b>OPTION S485/232</b>	1 RS485/RS232 configurabile   Protocollo di comunicazione ASCII o MODBUS-RTU selezionabile   baud rate progr. 1200÷19200 bps	
<b>OPTION PF/S</b>	Communication protocol PROFIBUS-DP   baud rate 3 Mbps MAX (by external converter type EMI-5)	
<b>OPTION ETH</b>	Ethernet outpot RJ45 (MODBUS-TCP   FTP   HTTP   SMTP   SNMP) with plug-in card (by external converter type EMI-10L)	
<b>Recording memory</b>	Ram 128 kb	Ram 128 kb
<b>OPTION MEM 1</b>	Ram 1 Mb	Ram 1 Mb
<b>Clock Calendar</b>	Format: day/month/year   Hour/min/sec   precision: ± 1 min./month with 25°C	
<b>Harmonic analysis</b>	-	Up to 31st harmonic of voltage and current with numeric format
<b>Digital outputs</b>	2 photomos 10-50Vdc-500 mA o 260 Vac-100 mA max	
<b>OPTION 2DO/R</b>	2 Relay output (5A-250V resistive load)	
<b>Digital inputs</b>	2 optoisolated passive inputs (500 V) for pulse counting and synchronisation	
<b>OPTION 4DI</b>	4 additional passive optoisolated inputs (500V) for pulse counting and synchronisation	
<b>Analog</b>	3 outputs 0-20 / 4-20 mA fully programmable   16 bit definition (by external serial/ analog converter Z3A0)	
<b>OPTION Z3A0</b>	3 outputs 0-20 / 4-20 mA fully programmable   16 bit definition (by external serial/ analog converter Z3A0)	
<b>Display</b>	Alphanumeric LCD with 2 lines of 20 characters (every line)	

SELECTION TABLE OF FUNCTION AND TECHNICAL CHARACTERISTICS

MEASURED PARAMETERS TECHNICAL CHARACTERISTICS	BASIC VERSIONS					
	EMA-96	EMA-90	EMA-14	EMA-10	EMA-11	EMA-D9
Voltage V ( $\Sigma$ , L1, L2, L3, L12, L23, L31)	●	●	●	●	●	●
Current I ( $\Sigma$ , L1, L2, L3)	●	●	●	●	●	●
Neutral current I (N)	●	●	●	●	●	●
Isolated current inputs T	●	●	●	●	●	●
Power factor P.F. ( $\Sigma$ , L1, L2, L3)	●	●	●	●	●	●
Active power W ( $\Sigma$ , L1, L2, L3, med.-max)	●	●	●	●	●	●
Reactive power Q ( $\Sigma$ , L1, L2, L3, med.-max)	●	●	●	●	●	●
Apparent power S (S, L1, L2, L3, med.-max)	●	●	●	●	●	●
Positive active and reactive energy +Wh, +Varh (S,L1,L2,L3)	●	●	●	●	●	●
Negative active and reactive energy -Wh, -Varh (S,L1,L2,L3)	●	●	●	●	●	●
Accuracy measuring 0,5% voltage/current and 1% power/energy	●	●	●	●	●	●
Accuracy measuring 0,25% voltage/current and 0,5% power/energy	●	▲	●	●	▲	●
Frequency	●	●	●	●	●	●
Total harmonic distortion THD V, I (L1,L2,L3)	●	●	●	●	●	●
Temperature and phase sequence	●	●	●	●	●	●
Additional inputs parameters	●	●	●	●	●	●
Clock and internal calendar	●	●	●	●	●	●
Graphic visualisation	●	●	●	●	●	●
Istantaneous max values (I , $\Sigma P$ , $\Sigma S$ )	●	●	●	●	●	●
Average values I1,I2,I3, $\Sigma P$ , $\Sigma Q$ , $\Sigma S$ ,P.F.	●	●	●	●	●	●
Maximum average values (maximum demand) I1avg,I2avg,I3avg	●	●	●	●	●	●
Maximum average values forecast (maximum demand forecast) $\Sigma P$ avg, $\Sigma Q$ avg, $\Sigma P.F$ .avg	●	●	●	●	●	●
Serial output Rs485/RS232	●	●	●	●	●	●
Additional serial output Rs485/RS232	▲	▲	▲	▲	▲	▲
Communication protocol ASCII	●	●	●	●	●	●
Communication protocol MODBUS/RTU	●	●	●	●	●	●
Communication protocol PROFIBUS/DP (by external module or plug-in card)	▲	▲	▲	▲	▲	▲
Communication protocol MODBUS-TCP/FTP/HTTP/SMTP/SNMP	▲	▲	▲	▲	▲	▲
2 digital outputs (for max. and min. alarm, re-emission energy pulse)	●	●	●	●	●	●
2 digital relays outputs (for max. and min. alarm, re-emission energy pulse)	▲	▲	●	●	●	●
4 digital outputs (for max. and min. alarm, re-emission energy pulse)	●	●	▲	▲	▲	●
6 digital outputs (for max. and min. alarm, re-emission energy pulse)	●	●	▲	▲	▲	●
2 digital inputs (for pulse counting or synchronisation)	●	●	●	●	●	●
4 digital inputs (for pulse counting or synchronisation)	●	●	▲	▲	▲	●
6 digital inputs (for pulse counting or synchronisation)	▲	▲	●	●	●	▲
8 digital inputs (for pulse counting or synchronisation)	●	●	▲	▲	▲	●
1 analog output 0/4÷20 mA	▲	▲	●	●	●	●
2 analog output 0/4÷20 mA	●	●	▲	▲	▲	●
4 analog output 0/4÷20 mA	●	●	▲	▲	▲	●
3 analog outputs 0/4÷20 mA (with external module Z3AO or more modules in order to have more analogical outputs)	▲	▲	▲	▲	▲	▲
Internal memory 128 Kb	●	●	●	●	●	●
Internal memory 1 Mb	▲	▲	▲	▲	▲	▲

● STANDARD ▲ OPTION

## SELECTION TABLE OF FUNCTION AND TECHNICAL CHARACTERISTICS

MEASURED PARAMETERS TECHNICAL CHARACTERISTICS	"H" VERSIONS					
	EMA-96H	EMA-90H	EMA-14H	EMA-10H	EMA-11H	EMA-D9H
Voltage V ( $\Sigma$ , L1, L2, L3, L12, L23, L31)	●	●	●	●	●	●
Current I ( $\Sigma$ , L1, L2, L3)	●	●	●	●	●	●
Neutral current I (N)	●	●	●	●	●	●
Isolated current inputs T	●	●	●	●	●	●
Power factor P.F. ( $\Sigma$ , L1, L2, L3)	●	●	●	●	●	●
Active power W ( $\Sigma$ , L1, L2, L3, med.-max)	●	●	●	●	●	●
Reactive power Q ( $\Sigma$ , L1, L2, L3, med.-max)	●	●	●	●	●	●
Apparent power S (S, L1, L2, L3, med.-max)	●	●	●	●	●	●
Positive active and reactive energy +Wh, +Varh (S,L1,L2,L3)	●	●	●	●	●	●
Negative active and reactive energy -Wh, -Varh (S,L1,L2,L3)	●	●	●	●	●	●
Active and reactive energy subdivided in 4 dime bands of 10 programmable periods	■	●	■	●	●	●
Accuracy measuring 0,5% voltage/current and 1% power/energy	●	●	●	●	●	●
Accuracy measuring 0,25% voltage/current and 0,5% power/energy	●	▲	●	●	▲	●
Frequency	●	●	●	●	●	●
Total harmonic distortion THD V, I (L1,L2,L3)*	●	●	●	●	●	●
Harmonic analysis numeric format	●	●	●	●	●	●
Harmonic graphic format (directly on display)	●	●	●	●	●	●
Temperature and phase sequence	●	●	●	●	●	●
Additional inputs parameters	●	●	●	●	●	●
Clock and internal calendar	●	●	●	●	●	●
Graphic visualisation	●	●	●	●	●	●
Istantaneous max values (I, $\Sigma$ P, $\Sigma$ S)	●	●	●	●	●	●
Average values I1,I2,I3, $\Sigma$ P, $\Sigma$ Q, $\Sigma$ S, $\Sigma$ P.F.	●	●	●	●	●	●
Maximum average values (maximum demand) I1avg,I2avg,I3avg	●	●	●	●	●	●
Maximum average values forecast (maximum demand forecast) $\Sigma$ Pavg, $\Sigma$ Qavg, $\Sigma$ P.F.avg	●	●	●	●	●	●
Serial output Rs485/RS232	●	●	●	●	●	●
Additional serial output Rs485/RS232	▲	▲	▲	▲	▲	▲
Communication protocol ASCII	●	●	●	●	●	●
Communication protocol MODBUS/RTU	●	●	●	●	●	●
Communication protocol PROFIBUS/DP (by external module or plug-in card)	▲	▲	▲	▲	▲	▲
Communication protocol MODBUS-TCP/FTP/HTTP/SMTP/SNMP	▲	▲	▲	▲	▲	▲
2 digital outputs (for max. and min. alarm, re-emission energy pulse)	●	●	●	●	●	●
2 digital relays outputs (for max. and min. alarm, re-emission energy pulse)	▲	▲	●	●	●	●
4 digital outputs (for max. and min. alarm, re-emission energy pulse)	●	●	▲	▲	▲	●
6 digital outputs (for max. and min. alarm, re-emission energy pulse)	●	●	▲	▲	▲	●
2 digital inputs (for pulse counting or synchronisation)	●	●	●	●	●	●
4 digital inputs (for pulse counting or synchronisation)	●	●	▲	▲	▲	●
6 digital inputs (for pulse counting or synchronisation)	▲	▲	●	●	●	▲
8 digital inputs (for pulse counting or synchronisation)	●	●	▲	▲	▲	●
1 analog output 0/4÷20 mA	▲	▲	●	●	●	●
2 analog output 0/4÷20 mA	●	●	▲	▲	▲	●
4 analog output 0/4÷20 mA	●	●	▲	▲	▲	●
3 analog outputs 0/4÷20 mA (with external module Z3A0 or more modules in order to have more analog outputs)	▲	▲	▲	▲	▲	▲
Internal memory 128 Kb	●	●	●	●	●	●
Internal memory 1 Mb	▲	▲	▲	▲	▲	▲

● STANDARD ▲ OPTION ■ POSSIBLE WITH "NRG" SW

# OPTIONS

## FUNCTION EXPANSION CARDS FOR ANALYSERS EMA96... - EMA90... - EMAD9... DIN 96 x 96 FORMAT AND DIN RAIL 9 MODULES

### GENERAL INFORMATIONS

The expansion cards for analysers DIN 96x96 mm and DIN rail mounting formats can be fitted into instruments in the factory. Cards have to be requested in the same time of placing order or instrument have to be sent back to the company in order to modify it. These are the available cards: related to digital inputs, analogical outputs, analog outputs, serial outputs and additional memory. Below there is the description of optional available cards with their own functions:

#### ■ PLUG-IN TYPE MEM 1

For expansion of instrument's internal memory up to 1 Mbyte in order to record events (instantaneous values, average values, maximum and minimum values, alarms and so on...).



#### ■ PLUG-IN TYPE 4DI

For adding 4 digital inputs to digital standard inputs already available. Totally there are 6 digital inputs useful for external synchronisation or pulse/status acquisition.



#### ■ PLUG-IN TYPE 1AO (ONLY FOR EMA96/96H AND EMA90/90H)

In order to have the availability of 1 analog output 0÷20 mA or 4÷20 mA galvanically isolated (selection of one or either mode is programmable by instrument's setup), to connect to other peripherals, as ammeters, recorders, remote indicators and so on. Whatever parameter measured by instrument can be associated to analog output.



#### ■ PLUG-IN TYPE S232/485

For adding 4 digital inputs to digital standard inputs already available. Totally there are 6 digital inputs useful for external synchronisation or pulse/status acquisition.



#### ■ PLUG-IN TYPE 2DO

In order to have the availability (adding to digital standard outputs already in) of 2 more outputs for a total amount of 4 digital outputs that can be used for energy pulse re-emission (both active and reactive) or for alarms that can be associated to every parameter (maximum, minimum, maximum for average values, hysteresis, harmonic components and so on).



#### ■ PLUG-IN TYPE PF/S

In order to have the availability of PROFIBUS-DP protocol port, baud rate max 3 Mbps



#### ■ PLUG-IN TYPE 2DO/R (ONLY FOR EMA96/96H AND EMA90/90H)

In order to have the availability of 2 digital relays output (250V-5A resistive load) that can be used for energy pulse re-emission (both active and reactive) or for alarms that can be associated to every parameter (maximum, minimum, maximum for average values, hysteresis, harmonic components and so on), load tripping and so on.



#### ■ PLUG-IN TYPE ETH

In order to have the availability of ETHERNET RJ45 port, protocol MODBUS-TCP / HTTP / FTP / SMTP / SNMP



## FUNCTION EXPANSION CARDS FOR ANALYSER EMA 14... - EMA 10... - EMA 11... DIN 144 x 144 FORMAT

### GENERAL INFORMATIONS

Expansions card for DIN 144x144 mm type analysers can be inserted through the back side of instrument by opening the small door and inserting them into their corresponding slots placed in the internal part of instrument. This operation can be carried out by the user also with installed instrument, and so without sending back it to the factory.

First slot is useful for inserting optional card related to digital inputs, digital outputs, analog outputs and serial outputs. Second slot is apt for optional card of additional memory.

Below there are all the available cards with their corresponding functions:



### PLUG-IN TYPE CARD MEM 1

For expansion of internal memory of instrument up to 1 Mbyte in order to record events (instantaneous values, average values, maximum and minimum values, alarms and so on)



### PLUG-IN TYPE CARD 2A0

In order to have the availability of 2 analog and bidirectional outputs 0÷20 mA or 4÷20 mA, galvanically isolated (selection of one or either mode is programmable by instrument's setup), for connections to other peripherals, as ammeters, recorders, remote indicators and so on. Whatever parameter measured by instrument can be associated to analog outputs.



### PLUG-IN TYPE CARD 4A0

In order to have the availability of 4 analog and bidirectional outputs 0÷20 mA or 4÷20 mA, galvanically isolated (selection of one or either mode is programmable by instrument's setup). Every parameter measured by the instrument can be associated to analog outputs.



### PLUG-IN TYPE CARD 2DI+2DO

For adding 2 digital inputs and 2 digital outputs to those already available. Totally there are 4 digital inputs and 4 digital outputs. Inputs can be used for external synchronisation or for pulse/status acquisition. Outputs can be used for re-emission of energy pulse (active or reactive) or for alarms that can be associated to every parameter (maximum, minimum, maximum average values, hysteresis, harmonic components and so on...), for loads tripping and so on.



**FUNCTION EXPANSION CARDS FOR ANALYSER EMA 14... - EMA 10... - EMA 11...**  
**DIN 144 x 144 FORMAT**

■ **PLUG-IN TYPE CARD 4DO**

For adding 4 digital outputs to those 2, already available as standard, for a total amount of 6 digital outputs. They are useful for re-emission of energy pulse (active or reactive) or for alarms that can be associated to every parameter (maximum, minimum, maximum average values, hysteresis, harmonic components and so on).



■ **PLUG-IN TYPE CARD 6DI**

For adding 6 digital inputs, to those 2 already available as standard. Totally there are 8 digital inputs useful for external synchronisation or for pulse/status acquisition.



■ **PLUG-IN TYPE CARD S232/485**

For an additional serial output, to the existing one that works as standard, programmable by setup of instrument for connection to a local printer, a modem and so on.



■ **PLUG-IN TYPE CARD PF-S PROFIBUS**

Protocol port, baud rate max 3 Mps for PROFIBUS-DP



■ **PLUG-IN TYPE CARD ETH**

Protocol port, baud rate max 3 Mps for PROFIBUS-DP





## SUPERVISION AND CONTROL SOFTWARE

DEVELOPED FOR WINDOWS ENVIRONMENT AND COMPATIBLE WITH WINDOWS 95/98/ME/2000/XP/VISTA

### DESCRIPTION

Supervision and control software type NRG for managing from a PC, of the data generated from the analyser EMA series, and insulation monitors HRI-R40 series. The software is very intuitive and simple to use.

Its main characteristics and sample of visualisation ae show in table below.



### OPERATIONS

For proper utilization, its requires onto your hard-drive. Before installing, be sure 10 Mbytes of free memory.

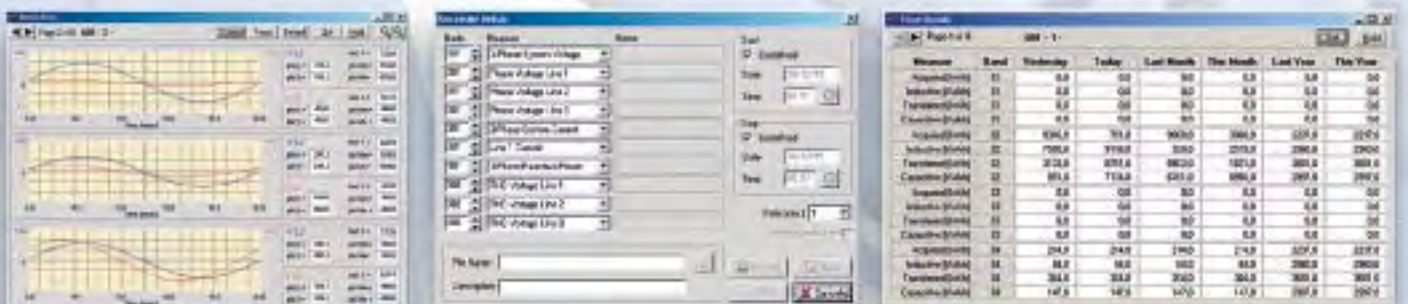
For proper utilization, it requires Excel 97 or upper installed on your Pc. If Excel 97 is not installed, user have to save data only in TXT.

### SCREENSHOTS



Management of the connected instrument's SETUP

Numeric and graphic visualisation of the various line parameters



Visualisation of the wave form and trends of the various measures

Memorising of the various line parameters

View of the harmonic components of the voltage and the current up to the 31st

## INFORMATIONS FOR ORDERS

NRG Software	2 Instruments	NRG-2
	4 Instruments	NRG-4
	8 Instruments	NRG-8
	16 Instruments	NRG-16
	32 Instruments	NRG-32
	64 Instruments	NRG-64
	128 Instruments	NRG-128

## CHARACTERISTICS

Application	NRG Software package is a 32-bit application
Compability	Windows 95 / 98 / ME / 2000 / XP
Instruments managing	EMA series, EMM and EMC series, HRI-R40 series, ELM series, EMT series
Format of save data	CSV file, Excel file o TXT file
Setup the instruments	Possibility of management of the connected instrument's SETUP
Instruments programming	Complete programming of registers
Alarms	Alarm management and registering of alarm
Maximum and minimum value	View and savethe maximum and minimum values of measures
Logger	Event data logger
Visualization	Numeric and visualisation of the variousline parameters
<b>Wave forms</b>	Visualisation of the wave forms of the various line parameters
Line parameter managing	Voltage, current, frequency, power factor, active power, reactive power, apparent power, positive and negative energies, active and reactive energies, eventual evidence of the alarm values.
Trends	Visualisation of the trends of the various measures
Harmonic component	Numeric and graphics viuw of the harmonic components of voltage and current up to the 31st
<b>Records</b>	Graphics records
Energy consumption	Visualisation and the energy consumption subdivided in time bands
Memorising	Memorising of the varius parameters (voltage, current, frequency, power factor, active , reactive, and apparent powers, positive and negative, active and reactive energies
<b>Digital Inputs</b>	Visualisation of the status of the digital inputs
<b>Digital Outputs</b>	Visualisation of the status of the digital outputs (useable for alarms control and management of loads, pulse re-emission, etc.)
Download	Download of the measures data from the memory
Network connection	Network connection tools
Data conversion	Data conversion of the electronic sheets
<b>Timeout instruments</b>	Setting up the value (msec) of the timeout
Auto-recognized of instruments	Set automatically the type of instruments

# NRG Software - OPTION

## DEVELOPED FOR WINDOWS ENVIRONMENT

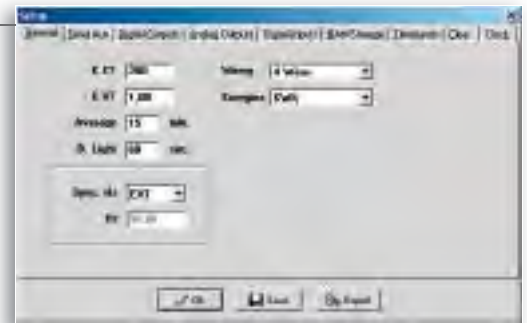
WINDOWS 95/98/ME/2000/XP/VISTA COMPATIBLE

### GENERAL INFORMATIONS AND SCREENSHOTS

Supervision and control software type NRG for managing, from PC, of data generated from EMA series analysers, EMM series multimeter and EMC series energy counters ELM multi-function ammeter, EMT measure transducer. The software is very intuitive and easy to use. Its main characteristics and visualisation's examples are shown below:



■ Capability of SETUP management of connected instruments



■ Complete programming, recording and alarms management

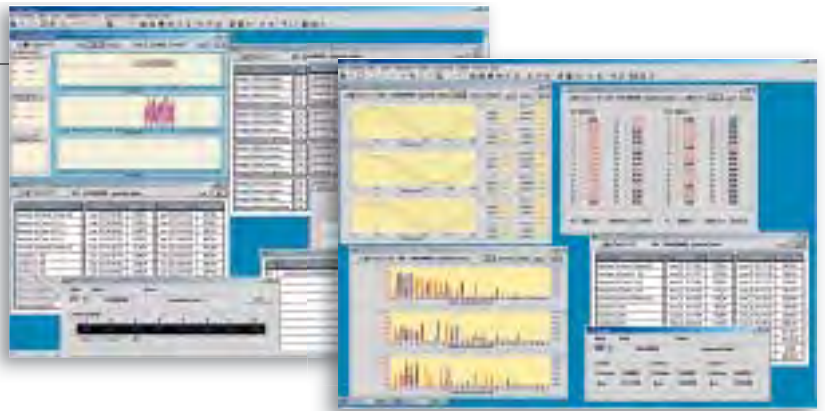
■ Minimum and maximum alarm recording and events data logger



■ Numeric and graphic visualisation (for analogical and digital instruments and graphic bar) of various line parameters (voltage, current, frequency; power factor; active, reactive, apparent, positive and negative power) with eventual evidence of alarm values.



**SOFTWARE DEVELOPMENT IN WINDOWS ENVIROMENT**  
COMPATIBLE WITH WINDOWS 95/98/ME/2000/XP/VISTA



- Visualisation of wave forms and trends of various measured parameters
- Numeric and graphic visualisation of the harmonic components of voltage and current up to 31st
- Graphic records

- Graphic visualisation of voltage and current wave forms

- Visualisation of energy consumption subdivided in time bands



- Memorising of different network's parameters (voltage, current, frequency, factor of power, active, reactive and apparent power, active, reactive, positive and negative energy).

- Download of measure's data from instrument's memory



- Visualisation of digital outputs status (useable for alarms, loads managing and control, re-emission pulses and so on)
- Network connection tool
- Data conversion for electronics sheets



### SERIAL MULTIFUNCTIONAL INTERFACE EMI-1

Serial multifunctional interface for using as serial converter and/or serial amplifier with following characteristics:

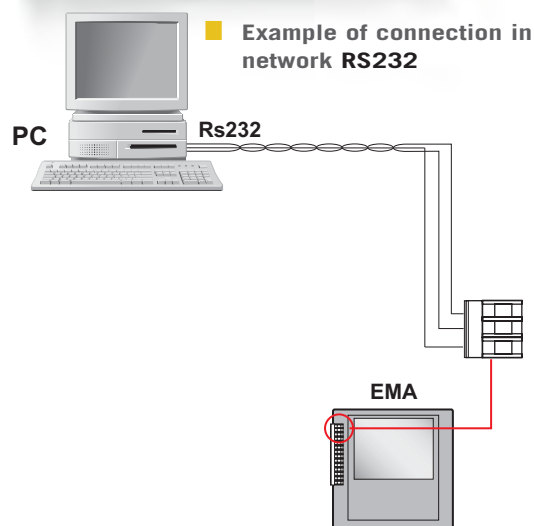
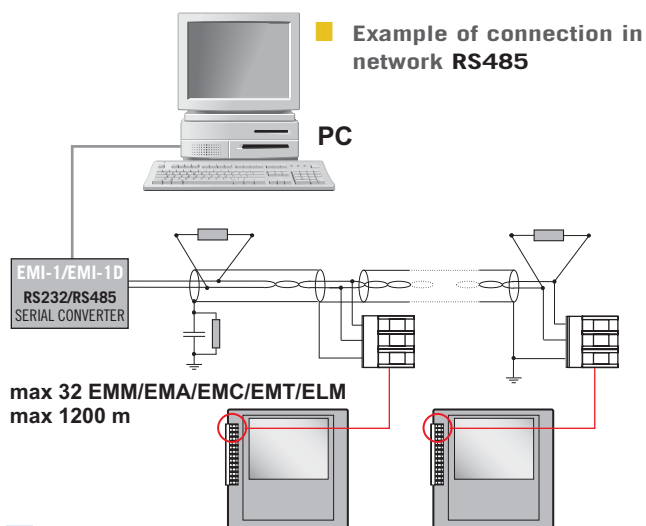
- lab top format, dimensions 140x35x110 mm
- auxiliary supply 115-230 Vca 50-60 Hz
- 1 serial port Rs232 connector Db9
- 2 serial ports Rs485
- connection in network up to 64 units
- selectable communication speed
- frontal led for network signalling
- frontal led for status signalling



### SERIAL MULTIFUNCTIONAL INTERFACE EMI-1D

Serial multifunctional interface for using as serial converter and/or serial amplifier with following characteristics:

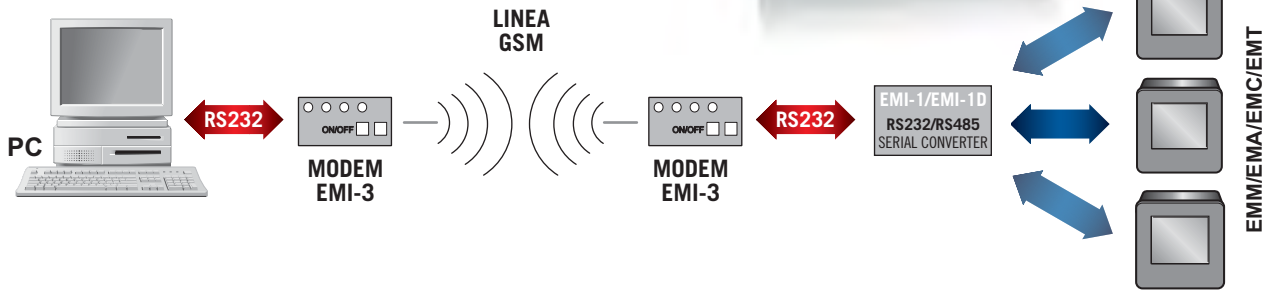
- DIN rail mounting of 6 modules of 17,5 mm
- auxiliary supply 115-230 Vca 50-60 Hz
- 1 serial port Rs232 connector 9 PIN
- 2 serial ports Rs 485
- connection in network up to 64 units
- selectable communication speed by micro-switches
- frontal led for network signalling
- frontal led for status signalling



**MULTIFUNCTION INTERFACE EMI-3-GSM**

GSM modem setted for data transferring, SMS and fax by GSM network with characteristics described below:

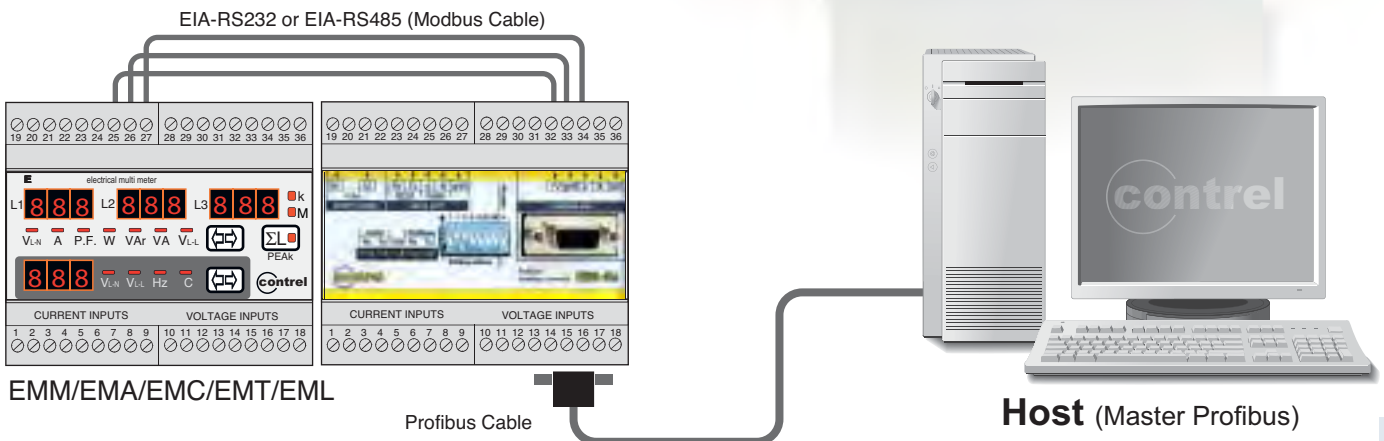
- DIN rail mounting of 4 modules of 17,5 mm
- auxiliary supply = 8-38 Vca/cc
- external or internal antenna
- dual band EGSM900 and GSM 1800
- serial input RS232 connector 9 PIN
- socket for SIM card
- frontal led for status signalling



**SERIAL INTERFACE EMI-5S PROFIBUS**

Multifunctional serial interface for conversion from MODBUS-RTU in PROFIBUS-DP protocol with following characteristics:

- DIN rail mounting of 6 modules of 17,5 mm
- Auxiliary supply 80÷240 Vac/dc oppure 20÷60 Vac/dc
- 1 serial input RS232 or RS485 MODBUS-RTU
- 1 output PROFIBUS-DP, 9 PIN connector
- micro-switches for setting (address, baud rate and so on)
- frontal led of status signalling
- baud rate max 3 Mbps



## SERIAL / ANALOG INTERFACE Z3AO

Serial/analog interface that allow to have (trough serial output RS485 Modbus-RTU) 3 analog outputs 0/4-20mA to associate any measured parameters, with the following features:



- Execution for DIN rail mounting-1 module of 17,5mm
- auxiliary supply 10-40Vdc 12-28Vac
- 1 serial port RS485 Modbus-RTU
- 3 analog outputs 0/4-20mA (definition 12 bit – 500 ohm max load)
- led for indication of auxiliary presence ,error, reception and data transmission
- possibility of expansion modules in order to get more analog outputs

## MULTIFUNCTION INDICATOR DISPLAY

Indicator with OLED display and serial interface RS485 Modbus-RTU that allows the remote visualizations of electrical parameters derived from instruments series EMM/EMC/ELM/EMT/EMA, with the following features:



- Flush mounting execution DIN 96x48mm
- Auxiliary supply 80÷265Vac or 10÷40Vdc 19÷28Vac
- 1 serial port RS485 Modbus-RTU master baud rate 1200÷115200 bps
- 1 serial port RS485 Modbus-RTU slave baud rate 1200÷115200 bps
- OLED brightness display 2,7" 128x64 pixel
- 3 navigation menu buttons
- up to 20 measure (max 3 for page)
- set of language, brightness, contrast, communication parameters, offset, scale, measure unit
- data measure storage

**MULTIFUNCTION SERIAL INTERFACE EMI-10C-ETHERNET**

Multifunction serial interface for conversion of RS485 or RS232 communication port in ethernet bus with TCP/IP protocol using ethernet network with applications and equipment with RS485 or RS232 serial communication ports with following characteristics:

- DIN rail mounting of 3 modules of 17,5 mm
- Auxiliary supply 115-230 Vac 50-60 Hz o 24 ac/dc
- 2 serial input RS485
- 1 RJ45 output for connection ethernet network
- frontal led for status signalling



**USE AND APPLICATIONS**

- EMI-10L converter is a bridge between MODBUS/TCP/IP and MODBUS/ASCII/RTU. The serial port is connected to MODBUS/ ASCII MODBUS/RTU devices or a network of devices, while Ethernet port is connected to SERVER/PC or PLC. The comments are sent from the Server in ethernet line to EMI-10L converter and the slave device receives them after they have been converted.
- Serial-Over IP: RS232 port may not be on the PC, but serial interface continue to be widespread in many sectors like such as security, automation and IT. EMI-10L converter offer the solution serial-over IP wich combine the simplicity of serial communication with networking TCP/IP protocol.

There are two basic way to use EMI-10L Serial-overIP described below:

**1. Virtual Serial Ports**

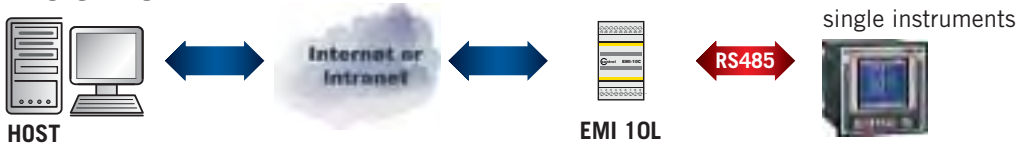
The virtual Serial Port Driver for windows allows to enter to ethernet port of the dispositive like a real COM port of Yo'ur Pc.

**2. Direct Tep link**

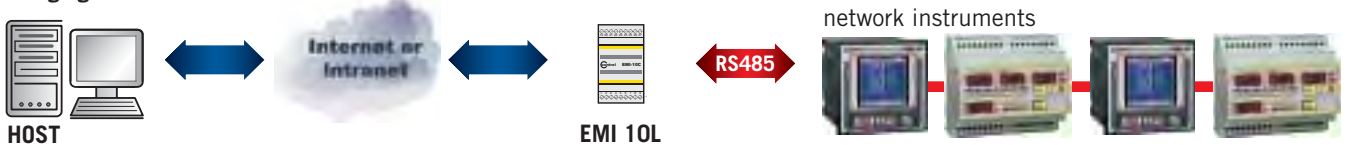
EMI-10L device support the standard protocol TCP/IP. The communication is by opening a socket and data exchange with serial port of devices is properly. EMI-10L devices may be used in a different mode as follows:

**1. EXAMPLE CONFIGURATION**

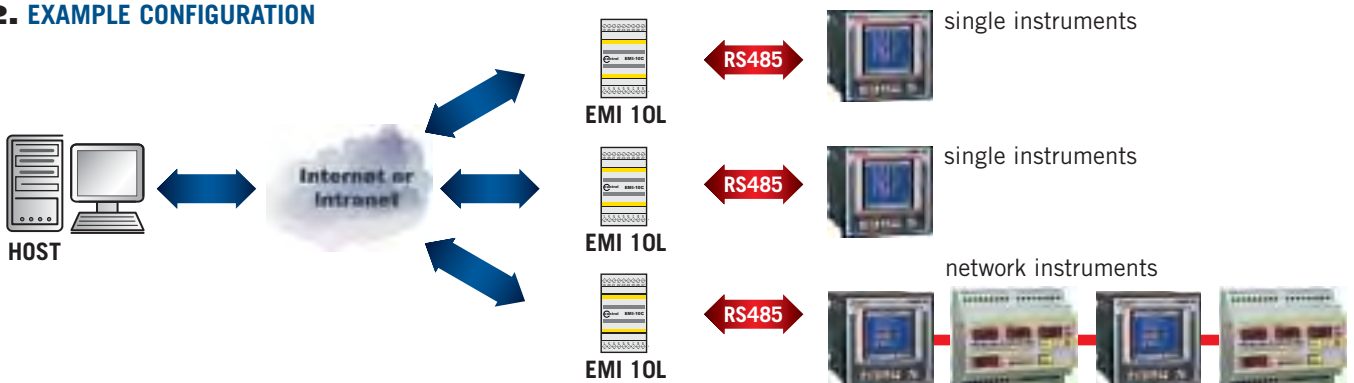
- Managing a single instrument



- Managing a network of instruments connected to the same Modbus network



**2. EXAMPLE CONFIGURATION**





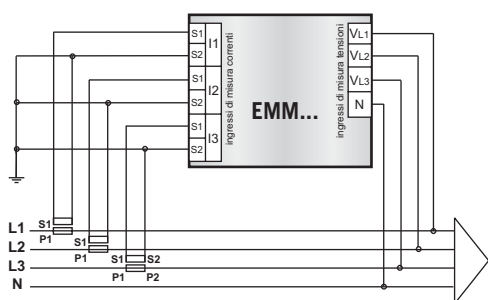
**CONCENTRATOR FOR PULSE ACQUISITION EML-16**



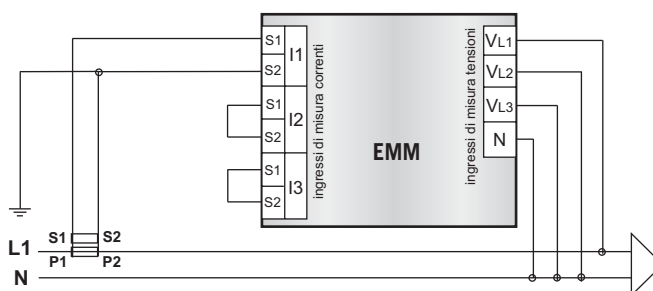
Concentrator for acquisition of proportional pulses, with electrical energy absorbed, equipped of a serial output RS485 Modbus-RTU in order to interface with NRG type software used for managing analysers, multimeters or counters

- DIN rail mounting 6 modules
- Auxiliary supply 24 Vca/cc
- 16 digital inputs for pulses
- 1 serial output Rs485 for connection with PC
- LCD digital display 4 lines x 16 digits for visualising counters and inputs status

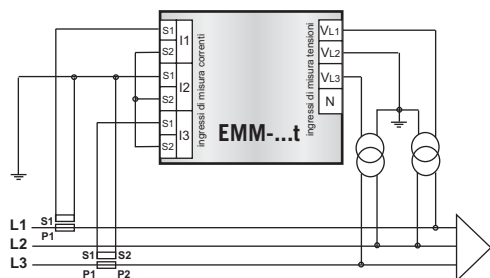
**TYPICAL WIRING DIAGRAMS EMM-4... EMM-D4... EMC... EMT...**



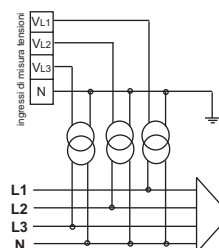
THREE-PHASE NETWORK 4 WIRES



SINGLE-PHASE NETWORK

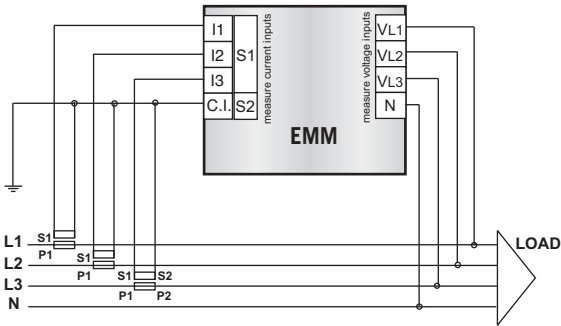


THREE-PHASE NETWORK 3 WIRES WITH 2 T.V. AND 2 C.T. (ONLY FOR EMM-...T)

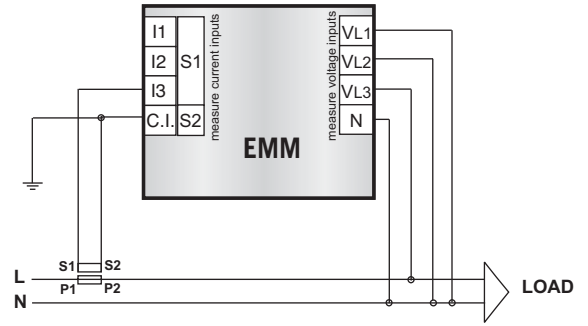


VOLTAGE WIRING WITH 3 T.V. (ONLY FOR EMM-...T)

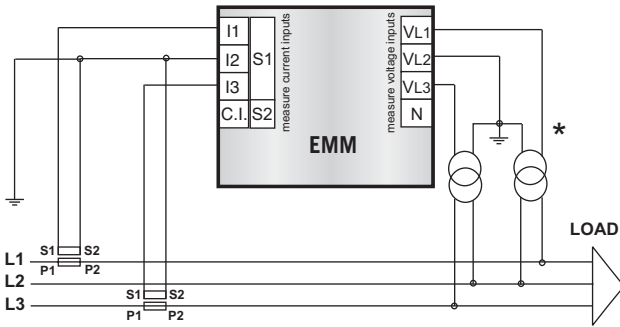
**TYPICAL WIRING DIAGRAMS EMM-R... EMM-μ...**



THREE-PHASE NETWORK 4 WIRES

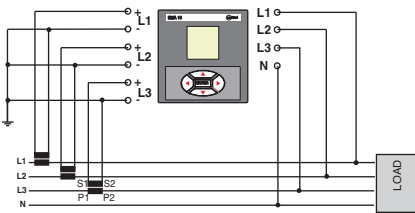


SINGLE-PHASE NETWORK

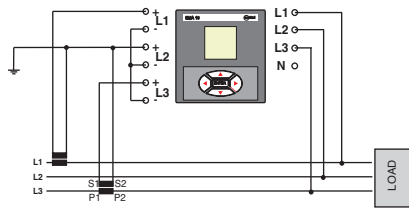


THREE-PHASE NETWORK 3 WIRES WITH 2 T.V. AND 2 C.T. (ONLY FOR EMM-...T)

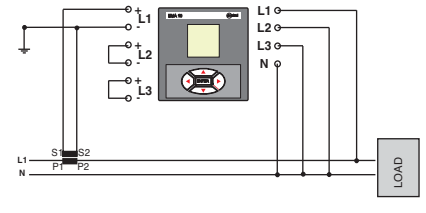
**TYPICAL WIRING DIAGRAMS EMA**



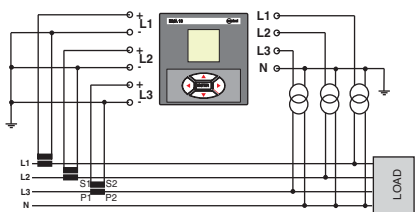
THREE-PHASE NETWORK 4 WIRES



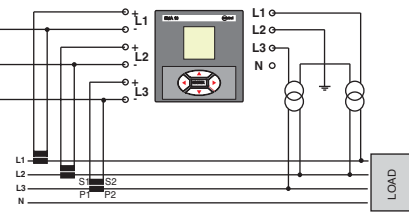
THREE-PHASE NETWORK 3 WIRES WITH 2 C.T.



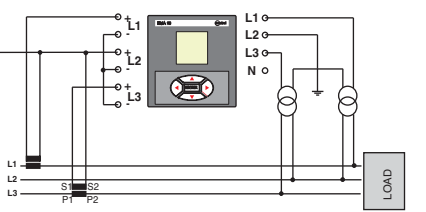
SINGLE-PHASE NETWORK



THREE-PHASE NETWORK 4 WIRES WITH 3 V.T. AND 3 C.T.



THREE-PHASE NETWORK 4 WIRES WITH 2 V.T. AND 3 C.T.



THREE-PHASE NETWORK 3 WIRES WITH 2 V.T. AND 2 C.T.

Attention: for detailed information about connection's diagram, see manual for use and installation of specific product.



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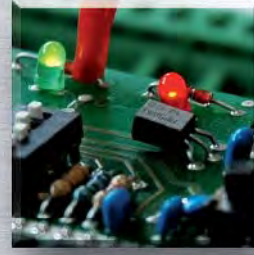
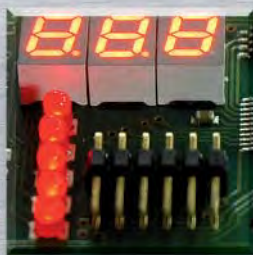
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Tel. +39 0371 30207 - Fax +39 0371 32819  
e-mail: [control@control.it](mailto:control@control.it) - [www.control.it](http://www.control.it)

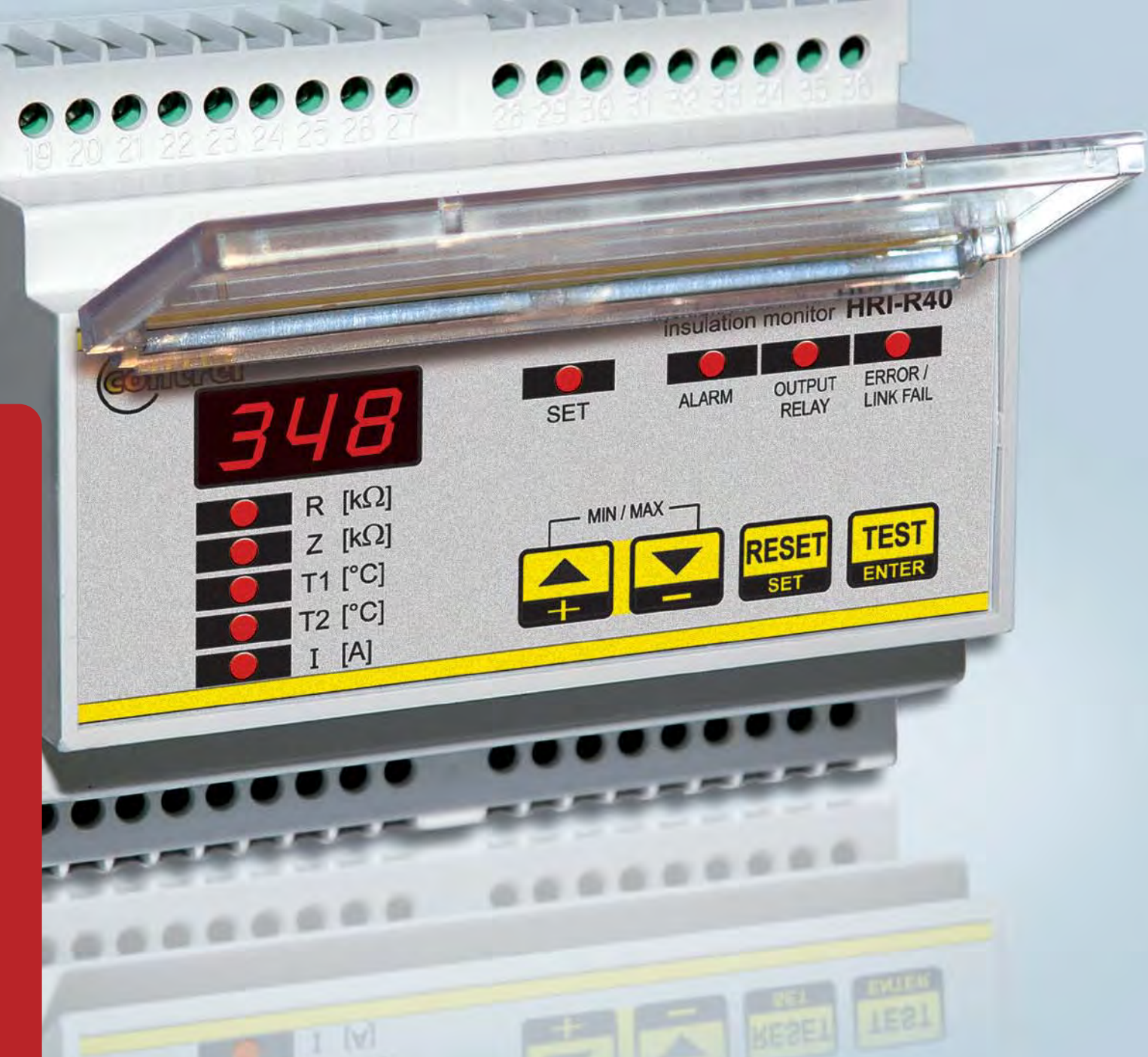


## INSULATION MONITORING RELAIS

serie RI  
industrial applications

serie HRI  
for use in medical rooms





## RI series

The RI isolation monitor series, are designed to permanently monitor the isolation to earth, in single and three phase networks with isolated neutral or without neutral (IT systems ) up to 1.000 Vac and dc networks up to 1.000 Vdc.

In the isolated neutral systems, in case of first leakage to earth, the tripping of the protection is not required, but according with the IEC 61557.8 Standard, the leakage should be signalled by optical and acoustic means.

The device generates internally a measure signal, which is applied between the controlled circuit and earth.

## HRI series

The working principle of the isolation monitor for use in medical room is based on applying a dc voltage or a codified signal, between the secondary of the isolation transformer and the equipotential node of the installation, pointing out therefore, in a case of an earth leakage, the current flowing in the relay and its corresponding isolation resistance of the installation.



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Insulation monitoring relay for networks 24 - 48 Vac/dc

4

#### RI-R11 | RI-R11D

Insulation monitoring relay for networks 110 - 220 Vdc

6

#### RI-R15

Insulation monitoring relay for networks 300 / 500 / 1000 Vdc

9

#### RI-F22 | RI-R22 | RI-R38

Insulation monitoring relay for networks max 440 Vac

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#### INSULATION MONITORING

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16



20



22



25



29



32



34



36

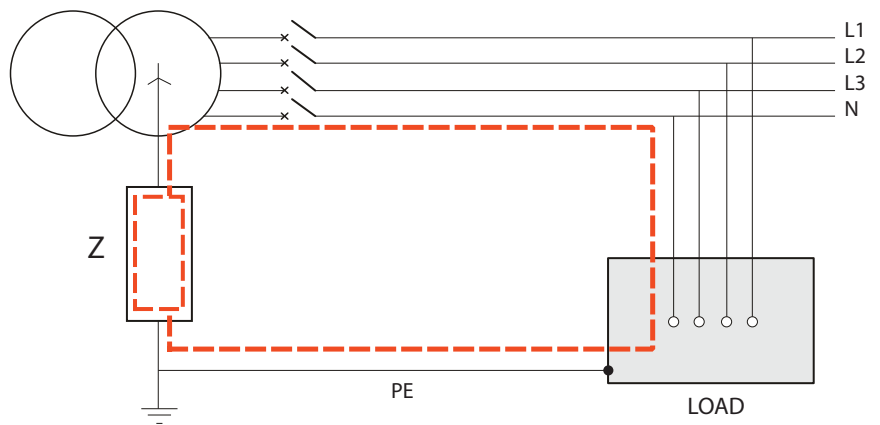
# RI series

INSULATION MONITORING

## FOR ISOLATED NEUTRAL NETWORKS (IT)

The RI isolation monitor series are designed to monitor isolated neutral networks (IT) level.

First of all, IT networks are used where the continuity of service is important. For this kind of networks, insulation impedance is very high, so in case of leakage to earth, electric currents caused by a failure are very weak. This works in order to avoid the masses reaching a dangerous potential. If, in case of insulation leakage, it's necessary stop the supply for isolated neutral networks to earth, for IT networks, this is not necessary, but the failure has to be pointed out, individuated and eliminated. The RI series, in their different versions, constantly verify the insulation level and report failure's condition.



## GENERAL

### APPLICATIONS

IT networks are used where the continuity of service is a priority. For example, in these cases:

- Chemical and metallurgical industries, where a voltage's interruption implies serious economic loss
- Transmission systems and radio links
- Places at explosion and fire's risk
- Mines
- Networks of emergency's supply
- Generators or direct-current group
- networks of auxiliary supply and control
- railways
- Naval applications
- Rooms for medical use

### PRODUCT SERIES

There are different versions of RI devices, in order to have specific functionalities available for every networks that has to be monitored. There are also accessories functions: for example, pre-alarm threshold and display for visualising insulation, very useful as supply for failure's search.

Measuring techniques are different for every model, in order to have the right insulation available according to the network.

• **Versions that measures the variation** of two polarities' potential to earth. Models **RI-F48, RI-R48, RI-R11, RI-R11D, RI-R15** belong to this category. These versions are apt for use in direct-current networks, in auxiliary supply's networks and in direct-current or alternate single phase networks.

• **Versions that apply a measure's signal in direct-current** between network and earth sensing leakage current to earth so that insulation level could be measured. For every independent network, only one monitor could be used. Models **RI-F22, RI-R22, RI-R38, RI-R60** belong to this category. These versions are right to

be used in auxiliary networks and in generic networks of distribution in alternate single and three phase, anyway without direct-current components.

• **Versions that apply a measure signal codified and varying** in order to allow a correct insulation measure independently from under-control network that has to be monitored. Strong distortion with high harmonic components (sub harmonic) and direct-current components can cause measure' problems to others techniques. Model **RI-R50** belong to this category. This solution let use monitoring devices in generic applications for networks in direct-current and alternating single and three phase, with rectifiers, power's electronics and variable-speed drive.

• **Versions useful for testing insulation in out-voltage networks** which use the same measuring technique -already cited- of direct-current signal applied in network, but in this case the net is out-voltage. This works in order to do a preventing monitoring of insulation's level. It is very useful for equipments not permanently used, as well as motors, fire-engines and so on where insulation level could decrease because of humidity (condensation). This decreasing doesn't let a normal functioning when they will be used. Model **RI-SM** belongs to this category.

• **Versions for use in medical rooms**

Models **HRI-R24** (typically used for scalytic lamps) **HRI-R22** **HRI-R40** **HRI-R40W** belong to this category and got different measuring techniques depending on the model either applying a direct-current signal and surveying electric leakage to earth or applying a measuring signal codified and varying.

Panels of remote signalling repeater PR and remote serial concentrator EML for network's monitoring are available as accessories of this product. In the next page, there is a table with the description of technical features for every kind of monitor with specific criterions of choosing in order to turn the user to the model more useful for his needs.



## FUNCTIONS TABLE

MODEL	NETWORK UNDER CONTROL	AUXILIARY SUPPLY	TRIPPING THRESHOLD	MEASUREMENT TECHNOLOGY	SIGNALS	OUTPUT	TEST	RESET
RI-F48	24 - 48 Vac/dc	read from under control network	TRIP 10 kohm fixed	Potential variation of polarities	Fault	1 relais NO-C-NC	Local	Automatic
RI-R48	24 - 48 Vac/dc	read from under control network	TRIP 10 ÷ 50 kohm	Potential variation of polarities	Fault	1 relais NO-C-NC	Local	Manual local
RI-R48N	24 - 48 Vac/dc	read from under control network	TRIP 10 ÷ 60 kohm	Potential variation of polarities	Fault on +/L Fault on -/N	1 relais NO-C-NC	Local	Manual local
RI-R11 110 RI-R11 220	80 ÷ 110 Vdc 185 ÷ 275 Vdc	read from under control network	TRIP 10 ÷ 100 kohm ALARM 30 ÷ 100 kohm	Potential variation of polarities	Fault on +/L Fault on -/N Alarm on +/L Alarm on -/N	Alarm 2 relais NO-C-NC fail safe function Fault 2 relais NO-C-NC fail safe function	Local and remote	Automatic Manual local and remote
RI-R11D 110 RI-R11D 220	80 ÷ 110 Vdc 185 ÷ 275 Vdc	read from under control network	TRIP 10 ÷ 100 kohm ALARM 30 ÷ 100 kohm	Potential variation of polarities	Fault on +/L Fault on -/N Alarm on +/L Alarm on -/N Insulation level (by LED bar)	Alarm 2 relais NO-C-NC fail safe function Fault 2 relais NO-C-NC fail safe function	Local and remote	Automatic Manual local and remote
RI-R15	300 Vdc 500 Vdc 1.000 Vdc with adapter ARI-R15	read from under control network	TRIP=30÷300 kohm	Potential variation of polarities	Fault on +/L Fault on -/N Alarm on +/L Alarm on -/N	1 relais NO-C-NC fail safe function	Local polo + polo -	Automatic Manual local and remote
RI-F22	max 230 Vac max 500 Vac (with adapter)	230 Vac 115 Vac opt	TRIP 100 kohm fixed	dc signal	Fault	1 relais NO-C-NC	Local	Automatic
RI-R22	max 230 Vac max 500 Vac (with adapter)	230 Vac 115 Vac opt	TRIP 25 ÷ 100 kohm	dc signal	Fault	1 relais NO-C-NC	Local	Manual local and remote
RI-R38	max 440 Vac max 1000 Vac (with adapter)	115-230 Vac	TRIP 10 ÷ 100 kohm	dc signal	Fault	1 relais NO-C-NC	Local	Manual local and remote
ARI-R100	Upper limit 1000 Vac with RI-R38	230 Vac 115 Vac opt	-	-	-	-	-	-
RI-R60	max 760 Vac max 1000 Vac with adapter ARI-R60	230 Vac 115 Vac		dc signal	Alarm fault insulation level	Alarm 1 relais NO-C-NC Foult 1 relais NO-C-NC	Local and remote	Local and remote
RI-SM	Out of voltage	read from under control network	TRIP 0.1 ÷ 10 Mohm	dc signal	Fault	1 relais NO-C-NC	Local	Automatic
HRI-R24	max 24 Vac	read from under control network	TRIP 10 ÷ 50 kohm	Potential variation of polarities	Fault	1 relais NO-C-NC	Local and remote, with appropriate remote panels	Manual local
HRI-R24t	max 230 Vac	230 Vac 115 Vac	TRIP 50 ÷ 250 kohm	dc signal	Fault for visualization insulation level by led bar	1 relais NO-C-NC	Local and remote, with appropriate remote panels	Manual local
HRI-R40	max 230 Vac	230 Vac 115 Vac	TRIP 50 ÷ 500 kohm	dc signal	Fault alarm display 3 led digit, min. value memorized	1 relais NO-C-NC	Local and remote, with appropriate remote panels	Manual local
HRI-R40W	max 230 Vac	230 Vac 115 Vac	TRIP 50 ÷ 500 kohm	Codified and variable signal	Fault alarm display 3 led digit, min. value memorized	1 relais NO-C-NC	Local and remote, with appropriate remote panels	Manual local

# RI-F48 series RI-R48 series RI-R48N series

INSULATION MONITORING  
VERSIONS FOR NETWORKS ac/dc MAX 48 V

## GENERAL



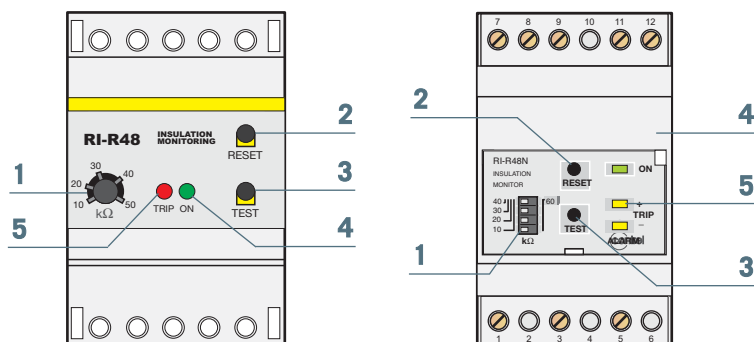
The devices allow the insulation monitoring to earth of electric networks in alternate and direct-current till 48 V isolated (IT systems). They measure potential's variation of two polarities on earth so that provide for a signal of insulation decreasing under a fixed level. Monitoring is carried out measuring potential's variation of two polarities on earth.

Auxiliary supply is taken from under-control network. There are different versions available: some, very cheap, with a fixed tripping threshold, others with possibility of adjustable calibration of tripping threshold and versions with indication of polarity (positive or negative, phase or neutral) on which the failure took place. Devices have on frontal panel signal for activity ON, for tripping TRIP (low insulation), a test bottom, a reset bottom and a potentiometer (or micro switches) for setting the threshold of tripping (only for versions with adjustable threshold).

## MODELS

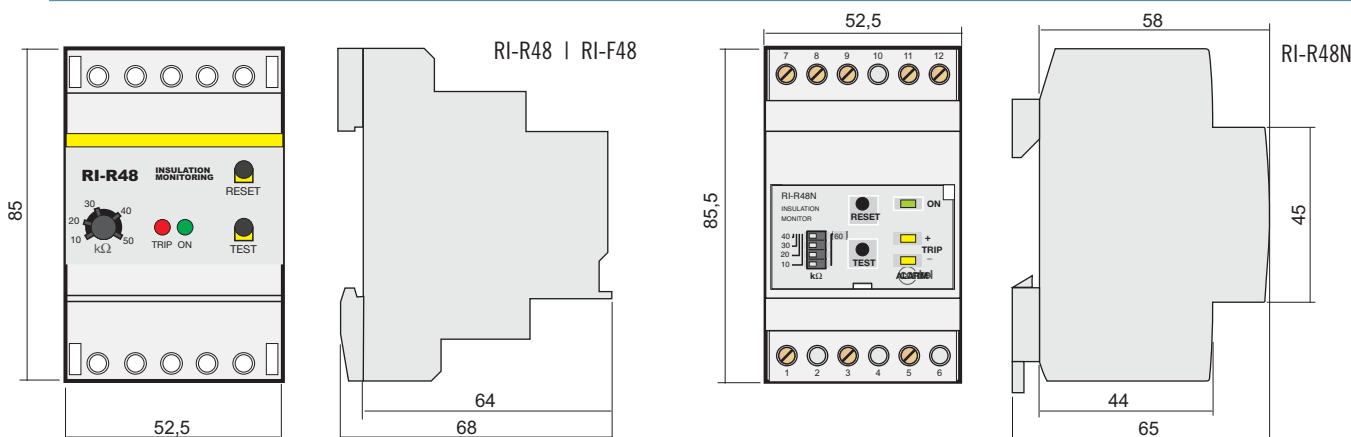
RI-F48	fixed threshold
RI-R48	adjustable threshold
RI-R48N	adjustable threshold, indication of broken down polarity

## FUNCTIONS AND OPERATORS - LEGEND



- 1 Potentiometer/micro switches for insulation tripping setting (only for models RI-R48 and RI-R48N)
- 2 Manual reset button (only for models RI-R48 and RI-R48N)
- 3 Test button
- 4 Signal of supplied relay ON (green LED)
- 5 Signal for insulation's threshold set reached (indication of broken down polarity for RI-R48N)

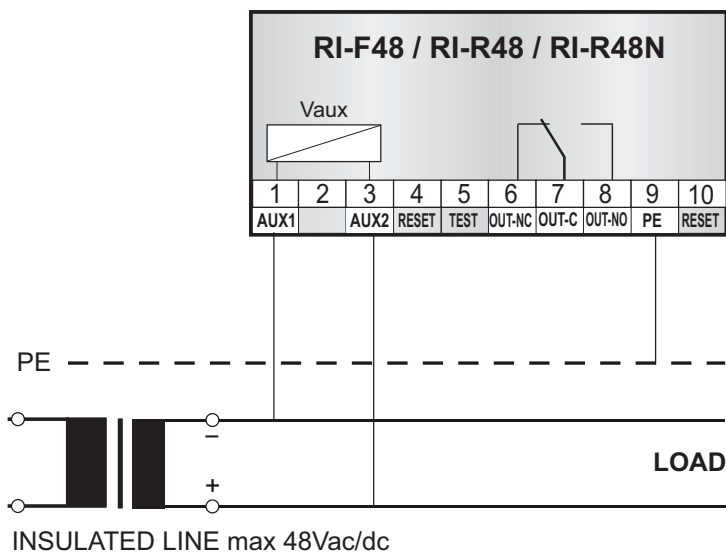
## DIMENSIONS



## ELECTRIC CHARACTERISTICS

Auxiliary supply voltage	24 V or 48 V 50-60 Hz $\pm 20\%$ or dc $\pm 20\%$
Self-consumption	3 VA MAX
Network voltage	24 $\div$ 48 Vac/dc $+10\%$
Measuring voltage	24 V MAX
Measuring current	0.5 mA MAX
Internal impedance	100 kohm
Tripping threshold	RI-R48 adjustable 10 $\div$ 50 kohm by potentiometer RI-R48N adjustable 10 $\div$ 60 kohm by micro switches RI-F48 fixed 10 kohm
Tripping late	about 1 second
Signalling and operators	led ON - led TRIP buttons TEST and RESET (only model RI-R48 / RI-R48N)
Output	relay switch contact NO-C-NC MAX 5 A 250 Vac
Working temperature	- 10 ... + 60 °C
Storing temperature	- 20 ... + 70 °C
Relative humidity	< 90 %
Insulation test	3 kV 60 sec / 4 kv imp. 1,2 / 50 $\mu$ s
Assembling position	indifferent
Connection type	by screw terminals - wire section MAX 4 mm <sup>2</sup>
Protection's degree	IP 40 frontal with cap - IP 20 case
Mounting according with DIN 50022	easy connection snap on DIN rail 35 mm / 3 modules of 17.5 mm
Weight	approximately 300 g
Standard reference	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE0413 part.8 / CEI-EN 61326-1

## WIRING DIAGRAMS - LEGEND



### AUXILIARY SUPPLY - TERMINALS 1-3

Auxiliary supply could be taken from under-control network.

### INSULATION MONITORING - TERMINALS 1-9

Terminals have to be connected between under-control network and measure's referring earth.

Maximum voltage applicable between these terminals is 48 V

### CONNECTION OUTPUT RELAY - TERMINALS 6-7-8

Connection for remote signal by relays with switch free from voltage, max 5 A 250 V on resistive load.

Eventual connection for automatic or remote **RESET** (only for models RI-R48 and RI-R48N), connect a button NC between terminals 4 and 10.

Eventual connection for remote **TEST** (only for models RI-R48 and RI-R48N), connect a button NO between terminal 5 and earth's conductor PE

# RI-R11 series RI-R11D series

INSULATION MONITORING

VERSIONS FOR NETWORKS dc MAX 250 V

## GENERAL



### MODELS

**RI-R11 110 V**  
**RI-R11D 110 V**

Main supply and auxiliary voltage 110 Vdc / -15% +25% (80 ÷ 180 Vdc)

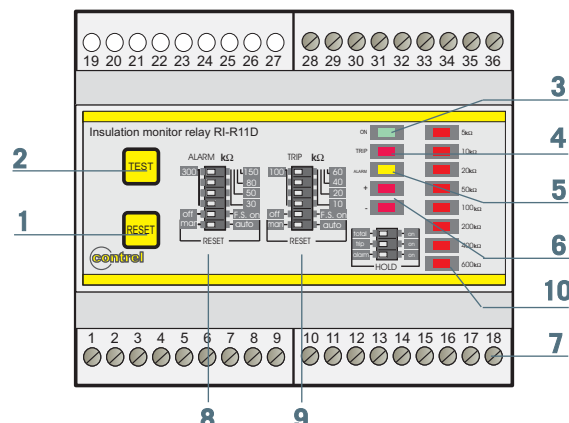
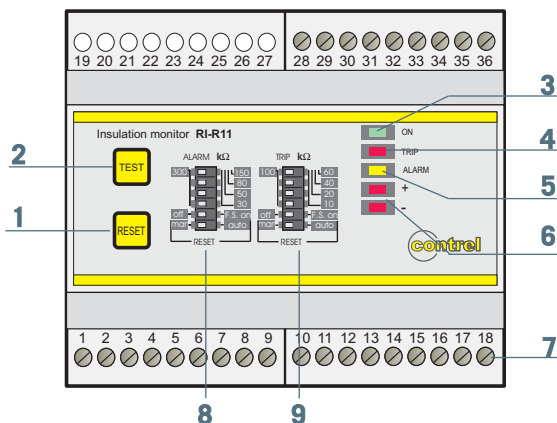
**RI-R11 220 V**

Main supply and auxiliary voltage 220 Vdc / -15% +25% (185 ÷ 275 Vdc)

The devices allow permanent monitoring of insulation of electrical networks in direct-current current isolated on earth (IT networks). Monitoring is carried out measuring potential's variation of two polarities of network on earth. Auxiliary supply is taken from under-control network.

These devices have two trip thresholds, which are adjustable by frontal micro switches, called ALARM and TRIP. This works in order to signal that insulation's level decreased under the threshold. Trip is signalled by frontal LED with indication of polarity (+ or -) that show low insulation. Remote trip threshold is carried out by double switch two relays with contacts voltage-free. Relays could be programmed in positive safe too (FAIL-SAFE function, normally excited). On the front, there are TEST and RESET buttons; test could be activated locally or by an external button; push button could be set manually or automatically, either with local button or with external push button. Model RI-R11D has a monitor of insulation's level of the device by a bar.

## FUNCTIONS AND OPERATORS - LEGEND



1 RESET button. This works only if RESET functioning is set manually.

2 TEST button. Pushing TEST button cause either alarm activation or trip activation with output relays' switching.

3 LED ON for active device signalling

4 LED TRIP for trip threshold TRIP signalling

5 LED ALARM for alarm threshold ALARM signalling

6 LED+ and LED- signalling which under-control network's polarity has low insulation. Ignition of one of these LED will be connected with ALARM LED and TRIP ignition.

7 Screw terminals for connections

8 Micro switches for alarm threshold setting

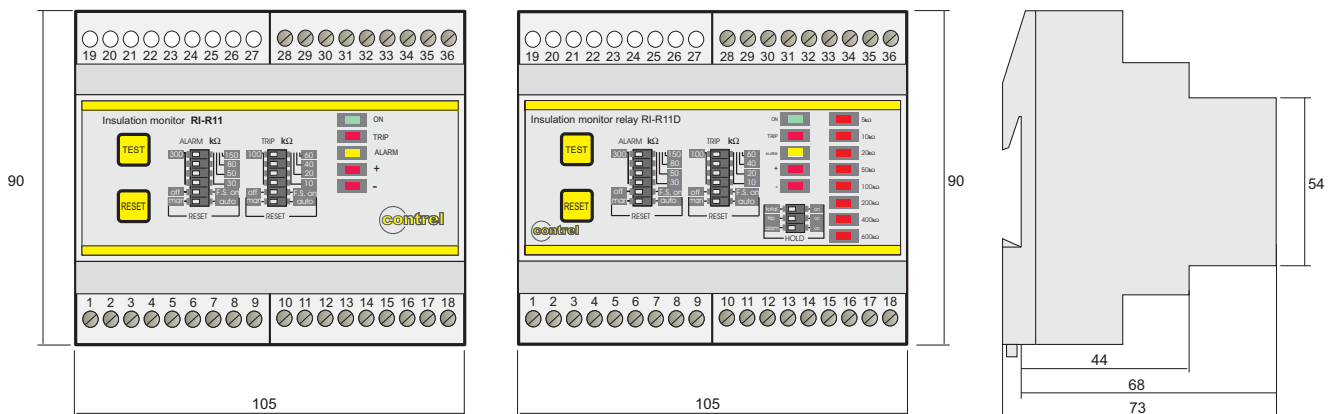
9 Micro switches for trip threshold setting

10 Led bar for insulation level visualising (only for RI-R11D)

## ELECTRIC CHARACTERISTICS

Network voltage and auxiliary supply	RI-R11 110 V RI-R11D 110 V RI-R11 220 V	110 Vdc $-15/+25$ % (80 ÷ 180 Vdc) 110 Vdc $-15/+25$ % (80 ÷ 180 Vdc) 220 Vdc $-15/+25$ % (185 ÷ 275 Vdc)
Self-consumption	5 W MAX	
Alternating residual load	5 %	
ALARM threshold setting	300 ÷ 30 kohm (5 levels adjustable by micro switches)	
TRIP threshold setting	100 ÷ 10 kohm (5 levels adjustable by micro switches)	
Signalling	led ON, led ALARM, led TRIP, led +, led - signalling insulation led bar (only for RI-R11D)	
Tripping delay	about 1 second	
Measure's current	MAX 1.8 mA	
Internal impedance	RI-R11 / RI-R11D 110 V RI-R11 220 V	200 kohm L+/L- 100 kohm L/earth 400 kohm L+/L- 200 kohm L/earth
Output relay free from voltage contacts	ALARM : 2 contacts switched NO-C-NC TRIP : 2 contacts switched NO-C-NC	
Capacity relay contacts	5 A 250 Vac – 0.3 A 130 Vdc – 0.2 A 280 Vdc resistive load 0.15 A 130 Vdc – 0.05 A 280 Vdc inductive load L/R < 40 ms with 2 serial contacts: 0.7 A 130 Vdc – 0.5 A 280 Vdc resistive load	
Adjustable functions	output alarm function - fail safe function for both outputs manual or automatic reset (external reset)	
Working temperature	- 10 ... + 60 °C	
Storing temperature	- 20 ... + 70 °C	
Relative humidity	< 90 %	
Insulation test	2.5 kV 60 sec / 4 kV set 1.2 / 50 µs	
Assembling position	indifferent	
Connection type	by screw terminals - wire section MAX 2.5 mm <sup>2</sup>	
Protection's degree	IP 40 frontal with cap - IP 20 case	
Mounting according with DIN 50022	easy connection snap on DIN rail 35 mm / 6 modules of 17.5 mm	
Weight	approximately 400 g	
Standard reference	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 / CEI-EN 61326-1	

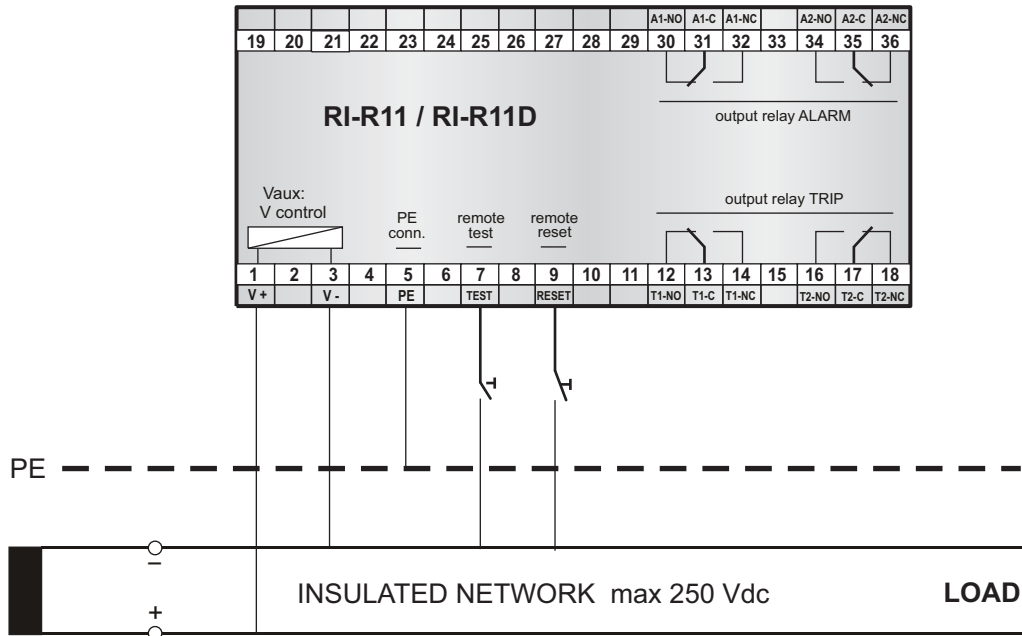
## DIMENSIONS



RI-R11

RI-R11D

## WIRING DIAGRAMS - LEGENDA



### AUXILIARY SUPPLY AND UNDER-CONTROL NETWORK CONNECTION - TERMINALS 1-3.

Positive and negative polarities of under-control network have to be connected to these terminals. Network's voltage is used for device's supply. If positive and negative has been inverted, the device would not be damaged but (+) and (-) indications of frontal LED would be inverted too. The advice is that of making sure about the model with right functioning voltage.

### CONNECTION TO EARTH - TERMINAL 5.

Terminal has to be connected with protection conductor PE (earth) in order to allow insulation's measure.

### CONNECTION FOR REMOTE TEST - TERMINAL 7.

In case of willing to foresee TEST function also from an external push button, it's possible to connect a pushbutton with normally open contact NO between this terminal and under-control network. If it's connected to (+) polarity, test will cause ALARM LED, TRIP LED and (+) lighting; but if it's connected to (-) polarity, LED - will light.

### CONNECTION FOR REMOTE RESET - TERMINAL 9.

In case of willing to foresee RESET function also from an external push button, it's possible to connect a pushbutton with normally open contact NO between this terminal and (-) polarity of under-control network.

### OUTPUT TERMINAL FOR TRIP RELAY - TERMINALS 12-13-14 16-17-18.

In order to signal to exterior threshold TRIP activation, it's available a relay with double change over contact voltage-free. The diagram shows contacts' condition either with not supplied device or supplied at rest with FAIL SAFE function not active (relay normally not excited). If FAIL SAFE function is set, relay will be normally excited when there is not tripping (supplied device) and it will be back at rest in case of tripping, not supplied device or failure.

### OUTPUT TERMINAL FOR ALARM RELAY - TERMINALS 30-31-32 34-35-36

In order to signal trip threshold ALARM activation, it's available a relay with double switch voltage-free. The diagram shows contacts' condition either with not supplied device or supplied at rest with FAIL SAFE function not active (relay normally not excited). If FAIL SAFE function is set, relay will be normally excited when there is not tripping (supplied device) and it will be back at rest in case of tripping, not supplied device or failure.



# RI-R15 Series

DEVICE FOR PERMANENT INSULATION CONTROL

VERSION FOR NEUTRAL NETWORKS (IT) UP TO 1000VDC

## GENERAL



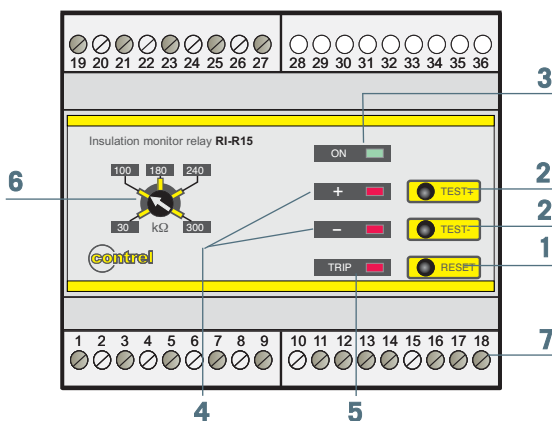
The RI-R15 device allows the permanent insulation monitoring to earth of electric networks in direct current isolated (IT systems). Insulation resistance monitoring is carried out measuring the potential variation of two polarity on ground reference. Auxiliary supply is taken from under-control network.

The threshold of trip is regulated by a frontal potentiometer. On the frontal panel there is the signalling of device ON, and three red LED to signal the tripping (TRIP) and to indicate the polarity of the line under control that has low insulation. It's available a changeover contact relay to use the low insulation signalling in a remote panel. The relay can be set as FAIL SAFE function. On front panel there are a TEST and a RESET push-buttons. The test can be activated locally while the reset can be set in automatic or manual, with local or external push-button.

## MODELS

- RI-R15 300V** power supply and network to control 300 Vdc (network 280÷340 Vdc)
- RI-R15 500V** power supply and network to control 500 Vdc (network 400÷600 Vdc)
- RI-R15 1000V** power supply and network to control 1000 Vdc (network 600÷1000 Vdc) including ARI-R15 external adapter

## FUNCTIONS AND OPERATORS - LEGEND



- 1** RESET push-button: this button is enabled to function only if is set the manual RESET. In this mode the instrument can come back in no alarm condition only when the RESET push-button is pressed or in absence of the power supply.
- 2** TEST push-buttons: the trip relay commute when these buttons is pressed. The TEST+ button will simulate a low insulation on the positive pole: the LED TRIP and + will turn on. The TEST- button will simulate a low insulation on the negative pole: the LED TRIP and - will turn on.
- 3** LED ON: device ON.
- 4** LED + and LED-: to signal the polarity that has the low insulation of the network under control. The lighting on of one of these LED is linked to the TRIP LED.
- 5** LED TRIP: to signal the trip insulation level under the set threshold value
- 6** Potentiometer to set the trip threshold
- 7** Terminal boards for the connections

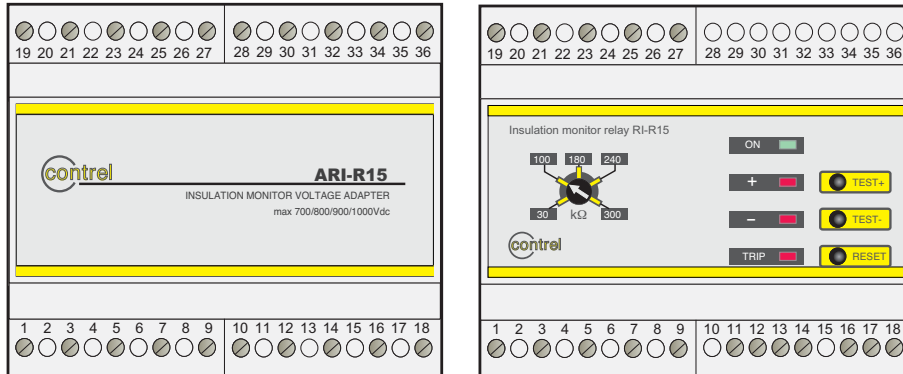
## RI-R15 Series

DEVICE FOR PERMANENT INSULATION CONTROL  
**VERSION FOR NEUTRAL NETWORKS (IT) UP TO 1000VDC**

### ARI-R15 VOLTAGE ADAPTER FOR RI-R15 1000V

The RI-R15 1000V version for network from 600 to 1000V must be used only with the ARI-R15 external adapter. This adapter must be positioned between the network to control and the control device RI-R15 1000V. The

ARI-R15 adapter do not function with RI-R15 300 and 500V. The ARI-R15 adapter is in a box for connection snap on DIN rail, 6 modules:

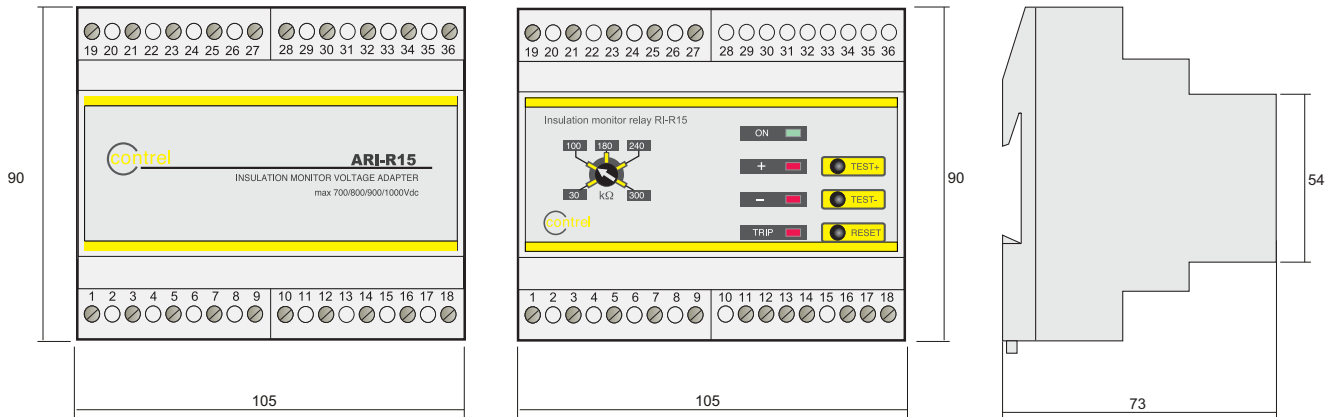


### ELECTRIC CHARACTERISTICS

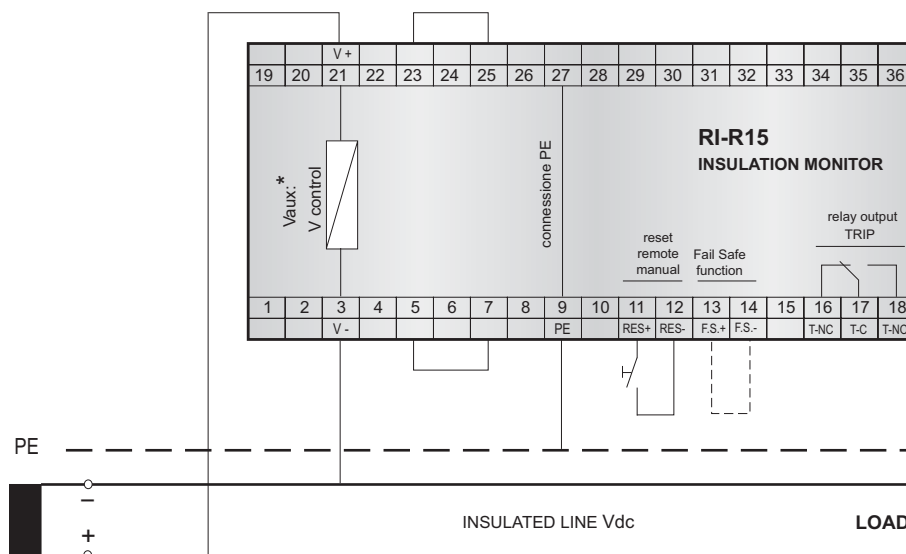
TIPO	RI-R15 300V	RI-R15 500V	RI-R15 1000V (with ARI-R15)
Auxiliary voltage supply and voltage network	300 Vdc network 280÷340 Vdc	500 Vdc network 400÷600 Vdc	Max 1000Vdc network 600÷1000Vdc
Maximum consumption	3W	5.5W	10W
Measure current	max 1 mA	max 1.5 mA	max 2.5 mA
Residual alternate	5 %		
Internal impedance	800 kΩ L+/L- 450 kΩ L/ground		
Tripping delay	1.5÷2.5 seconds		
Signalling	led ON, led TRIP, led +, led -		
Setting TRIP threshold	30 ÷ 300 kohm (using a potentiometer)		
Relay outputs	TRIP: changeover contacts NO-C-NC		
Relay contacts	5 A 250Vac – 0,3 A 130Vdc – 0,2 A 280Vdc resistive load 0,15 A 130Vdc – 0,05 A 280 Vdc inductive load L/R < 40 ms		
programmable functions	fail safe function, manual or automatic reset (external reset)		
Working temperature	-10 ÷ 60°C		
storing temperature	-20 ÷ 70°C		
Relative humidity	≤ 95 %		
Insulation test	2,5 kV 60 sec. / 6 kV imp. 1,2/50µs		
Mounting position	any		
Connection type	By screw terminals – wire section max 2.5 mm <sup>2</sup>		
Protection degree	IP 40 frontal with cover - IP 20 case		
Mounting according DIN 50022	Connection snap on DIN rail 35mm / 6 modules of 17.5 mm		
Weight	about 0,4 kg for RI-R15 / about 0.2 kg for ARI-R15		
Standards	safety EN 61010-1 / CEI 64.8 / electromagnetic compatibility EN 61326-1-2-4		



## DIMENSIONS



## RI-R15 300V / RI-R15 500V WIRING CONNECTION - LEGEND



**POWER SUPPLY AND NETWORK UNDER CONTROL CONNECTION / terminals 21-3** - At these terminals must be connected the negative and positive pole of the network to control. The same voltage must be used to supply the instrument. If the negative and positive pole are inverted, the instrument will not be damaged but the indication of LED+ and LED- will be inverted. It's necessary to verify the use of the instrument with correct supply voltage.

**GROUND REFERENCE CONNECTION / terminals 27-9** - The terminals must be connected to the PE protection conductor (earth referring) to allow the insulation measuring.

**REMOTE TEST CONNECTION / AUTOMATIC RESET / terminal 11-12** - For RESET function from external push-button it's necessary to connect an external N.O. contact push-button between these terminals. If these terminals are short-circuited the functioning of the reset will be automatic when the low insulation condition finishes.

**FAIL SAFE FUNCTION (NORMALLY EXCITED RELAY) / TERMINALS 13-14** - The fail safe function (normally excited relay) will be activated thanks to a short-circuit between these terminals. With fail safe function enabled the relay will be normally excited in not trip condition (with device supplied) and it will come back at rest with the device off or damaged and in case of tripping. With the fail safe the output relay switch for the low insulation, lack of auxiliary power supply or device failure.

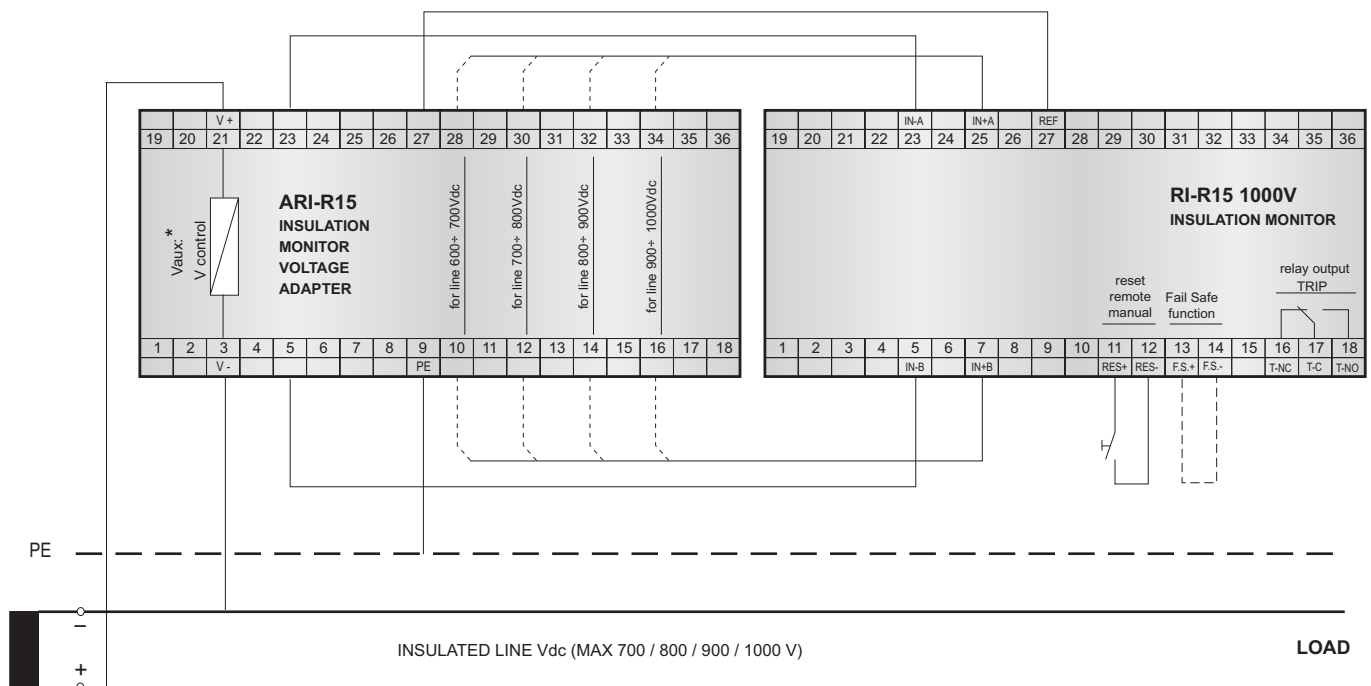
## RI-R15 Series

DEVICE FOR PERMANENT INSULATION CONTROL  
**VERSION FOR NEUTRAL NETWORKS (IT) UP TO 1000VDC**

**TRIP RELAY OUTPUT / terminals 16-17-18** - To signal externally the TRIP threshold intervention it's available a voltage changeover contact relay. The wiring connection shows the contacts with the device off or on in rest condition with FAIL SAFE function disable (relay normally not excited). With FAIL SAFE function enabled the relay will be normally excited in not trip condition (with device supplied) and it will come back at rest with the device off or damage and in case of tripping.

**CONNEXION TO THE EXTERNAL ADAPTERS** - To activate the instrument it's necessary to make the short-circuit between the following terminals 23-25 and 5-7. This terminals are used to connect the external adapters when they are used (see specific manual).

### RI-R15 1000V WIRING CONNECTION - LEGEND



In this version is present obligatory the ARI-R15 adapter.

The connections of the relay output, remote reset and fail safe function remain the same while the connections to the network under control and the earth reference has been changed.

#### POWER SUPPLY AND NETWORK UNDER CONTROL CONNECTION - terminals 21-3 of the ARI-R15 adapter

At these terminals must be connected the negative and positive pole of the network to control.

#### GROUND REFERENCE CONNECTION - terminal 9 of the ARI-R15 adapter

#### ARI-R15 AND RI-R15 1000V CONNECTIONS - Terminals 5-23-27 to connect between the control device and the adapter

Terminals to connect depending the network under control:

tensione di rete	ARI-R15	RI-R15 1000V
600÷700V dc	terminals 28- 10	terminals 25- 7
700÷800V dc	terminals 30- 12	terminals 25- 7
800÷900V dc	terminals 32- 14	terminals 25- 7
900÷1000V dc	terminals 34- 16	terminals 25- 7

If the network voltage is exactly an expected value for two outputs (700 / 800 / 900V) it's better to use the output with the upper nominal values.

For example for a network at 800V is better to use the output with the terminals 32-14.

# RI-F22 series RI-R22 series RI-R38 series

INSULATION MONITORING - VERSIONS FOR NETWORKS ac MAX 400 V

## GENERAL



### MODELS

**RI-F22 fixed threshold**  
**RI-F22 fixed threshold**

Vaux: 230 V 50-60 Hz (standard version)  
Vaux: 110 V 50-60 Hz (optional version)

**RI-R22 adjustable threshold**  
**RI-R22 adjustable threshold**

Vaux: 230 V 50-60 Hz (standard version)  
Vaux: 110 V 50-60 Hz (optional version)

**RI-R38 adjustable threshold**  
**RI-R38 adjustable threshold**

Vaux: 230 V 50-60 Hz (standard version)  
Vaux: 110 V 50-60 Hz (optional version)

These devices allow insulation monitoring on earth of electric networks in alternating 230 V and isolated 400 V (IT systems).

Insulation resistance monitoring is carried out applying a measure's signalling in direct-current between isolated network and earth.

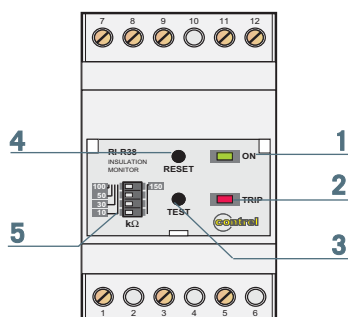
Surveying electric leakage set up on earth it's possible to measure insulation level.

Versions with fixed trip threshold are available and they are very cheap.

There are also versions with possibility of adjustable calibration of trip threshold.

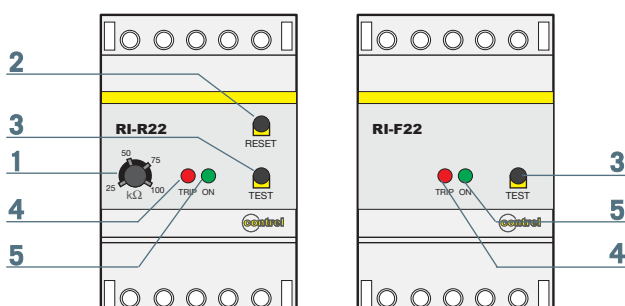
On frontal panel, devices have signal for activity ON, for TRIP (low insulation), a test button, a reset button (only for versions with adjustable threshold) and a potentiometer for setting the threshold of tripping (model RI-R22) or micro switches (model RI-R38).

## FUNCTIONS AND OPERATORS - LEGEND



### RI-R38

- 1 LED ON green active device's indication
- 2 LED TRIP red signal of trip for low insulation
- 3 TEST button device functioning testing
- 4 RESET button trip signalling reset (manual reset functions)
- 5 micro switches for trip threshold adjusting



### RI-F22 / RI-R22

- 1 Potentiometer for adjusting insulation's resistance (only for model RI-R22)
- 2 Manual resetting button (only for model RI-R22)
- 3 Test button
- 4 Signalling lamp of auxiliary supply (green LED)
- 5 Signalling lamp for relay tripped (red LED)

**RI-F22** series  
**RI-R22** series  
**RI-R38** series

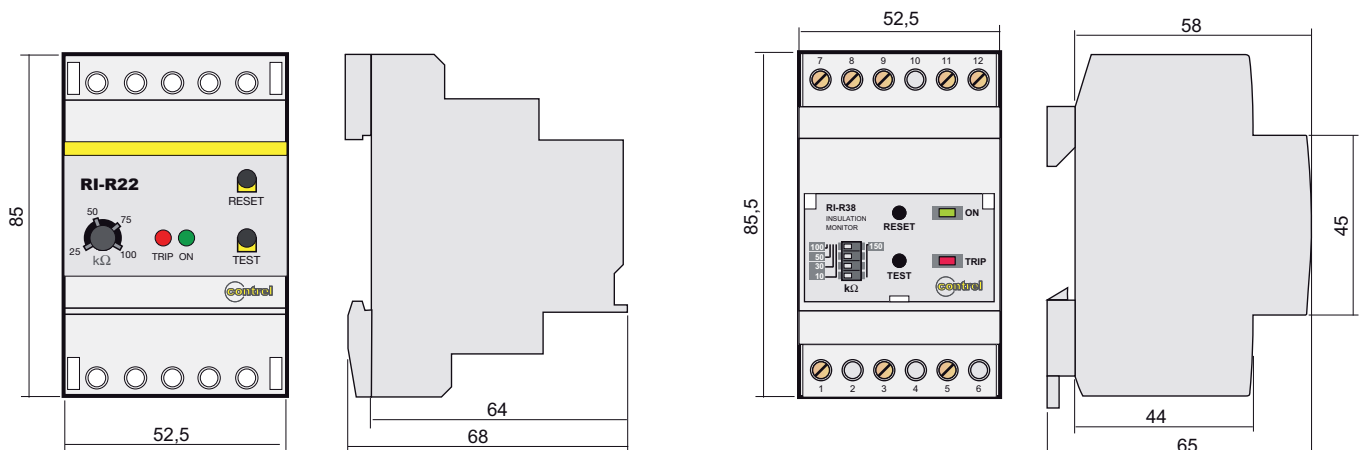
INSULATION MONITORING

VERSIONS FOR NETWORKS ac MAX 400 V

## ELECTRIC CHARACTERISTICS

Auxiliary supply voltage	230 V 50-60 Hz $\pm$ 20 % standard 110 V 50-60 Hz $\pm$ 20 % optional
Self-consumption	3 VA MAX
Network voltage	RI-F22 / RI-R22 24 $\div$ 230 Vac $\pm$ 10 % (400 V on 3 phase network with neutral) RI-R38 24 $\div$ 440 Vac $\pm$ 10 % (760 V on 3 phase network with neutral)
Measure's voltage	RI-F22 / RI-R22 12 V MAX RI-R38 24 V MAX
Measure's current	RI-F22 / RI-R22 0.1 mA MAX RI-R38 0.5 mA MAX
Internal impedance	RI-F22 / RI-R22 100 kohm RI-R38 250 kohm
Tripping threshold setting	RI-F22 fixed 100 kohm RI-R22 adjustable 25 $\div$ 100 kohm (by potentiometer) RI-R38 adjustable 10 $\div$ 150 kohm (4 levels by micro switches)
Tripping late	about 1 second
Signals and operators	led ON - led TRIP buttons TEST and RESET (RESET is not available for RI-F22)
Output	relay switch contact NO-C-NC MAX 5 A 250 Vac
Working temperature	- 10 ... + 60 °C
Storing temperature	- 20 ... + 70 °C
Relative humidity	< 90 %
Insulation test	3 kV 60 sec / 4 kV set 1.2 / 50 $\mu$ s
Assembling position	indifferent
Connection type	by screw terminals - wire section MAX 4 mm <sup>2</sup>
Protection's degree	IP 40 frontal with cap - IP 20 case
Mounting according with DIN 50022	easy connection snap on DIN rail 35 mm / 3 modules of 17.5 mm
Weight	approximately 300 g
Standard reference	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 / CEI-EN 61326-1

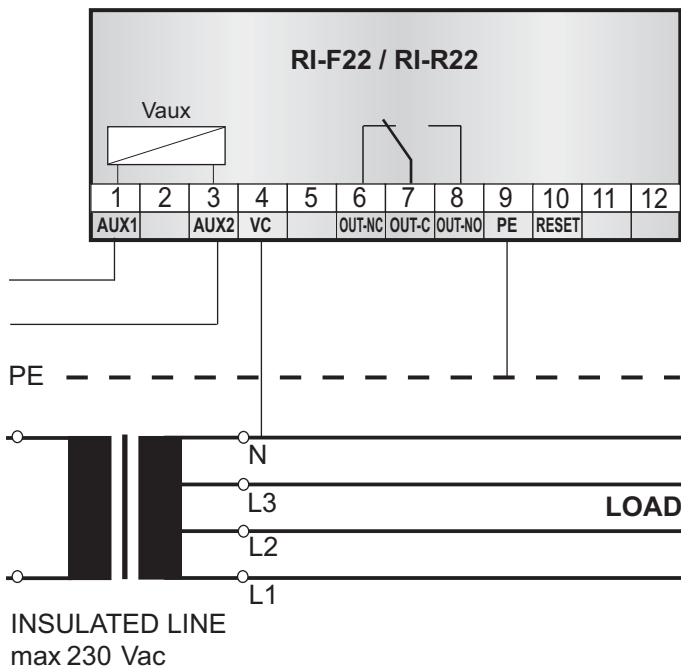
## DIMENSIONS



RI-F22 | RI-R22

RI-R38

## WIRING DIAGRAMS - LEGEND



### RI-F22 / RI-R22

#### AUXILIARY SUPPLY - terminals 1-3

auxiliary supply available from under-control network

#### INSULATION MONITORING - terminals 4-9

the two terminals have to be connected between under-control network and measure's referring earth (max. applicable voltage between these terminals is 230 V, so it's possible apply insulation monitoring on single phase networks till 230 V, three phase networks three-wires without neutral till 230 V and three phase networks with neutral till 400 V)

#### RELAYS' OUTPUT CONNECTIONS - terminals 6-7-8

#### CONNECTIONS FOR REMOTE SIGNALLING

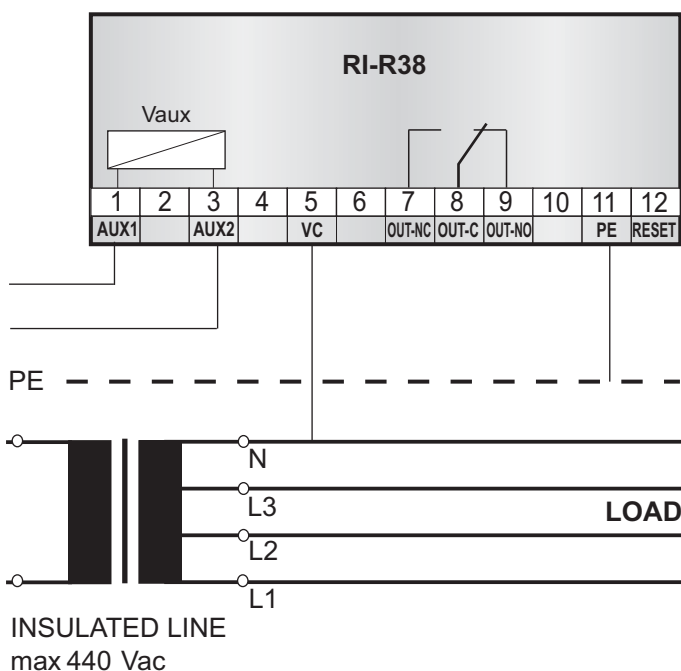
by relays in switch voltage-free max 5 A 250 V on resistive load

#### EVENTUAL CONNECTION FOR AUTOMATIC OR REMOTE RESET

(only for RI-R22) it is required to connect a NC button between terminal 10 and earth's conductor PE and to link with a bond terminals 9 and 10 themselves

#### EVENTUAL CONNECTION FOR REMOTE TEST

(only for version RI-R22) it is required to connect a NO button between terminal 5 and earth's conductor PE



### RI-R38

#### AUXILIARY SUPPLY - terminals 1-3

auxiliary supply available from under-control network

#### INSULATION MONITORING - terminals 5-11

the two terminals have to be connected between under-control network and measure's referring earth. Terminal 5 has to be connected between under-control network single phase or three phase and neutral conductor. If three phase network is three-wire, the terminal has to be connected to a phase. max. applicable voltage between these terminals is 230 V, so it's possible apply insulation monitoring on single phase networks up to 440 V, three phase networks three-wire without neutral up to 440 V and three phase networks with neutral up to 760 V

#### RELAYS' OUTPUT CONNECTIONS - terminals 7-8-9

#### CONNECTIONS FOR REMOTE SIGNALLING

by relays in switch voltage-free max 5 A 250 V on resistive load

#### CONNECTION FOR AUTOMATIC OR REMOTE RESET - terminal 12

# ARI-R100 series

ADAPTER FOR NETWORKS TILL 1000 Vac

## VOLTAGE ADAPTER FOR INSULATION MONITORING RI-R38

### GENERAL



**ARI-R100** is an adapter which allow the use of insulation monitors RI-R38 on single phase and three phase up to 1000 V 50-60 Hz.

the adapter have to be connected between RI-R38 insulation relay and under-control network.

Under-control network could be three phase network with neutral, three phase without neutral and single phase network.

Maximum voltage has not to outweigh 1000 V 50-60 Hz (application of adapter for networks in direct-current or with strong presence of direct-current components is not possible).

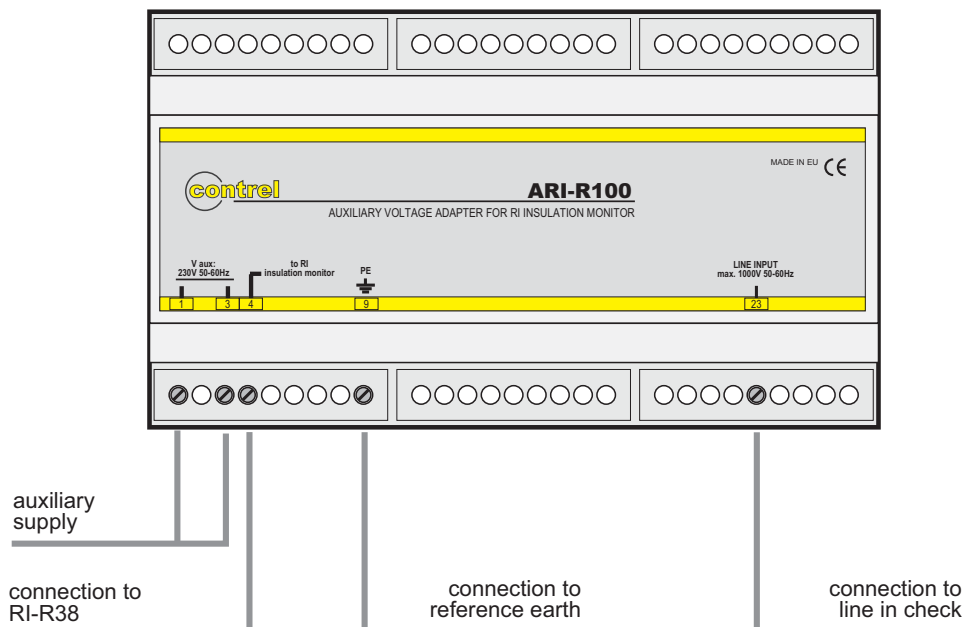
ARI-R100 needs an auxiliary supply (normally the same of RI-R38 relay).

### MODELS

**ARI-R100** Vaux: **230 V** 50-60 Hz (standard version)

**ARI-R100** Vaux: **110 V** 50-60 Hz (optional version)

### FUNCTIONS AND OPERATORS - LEGENDA

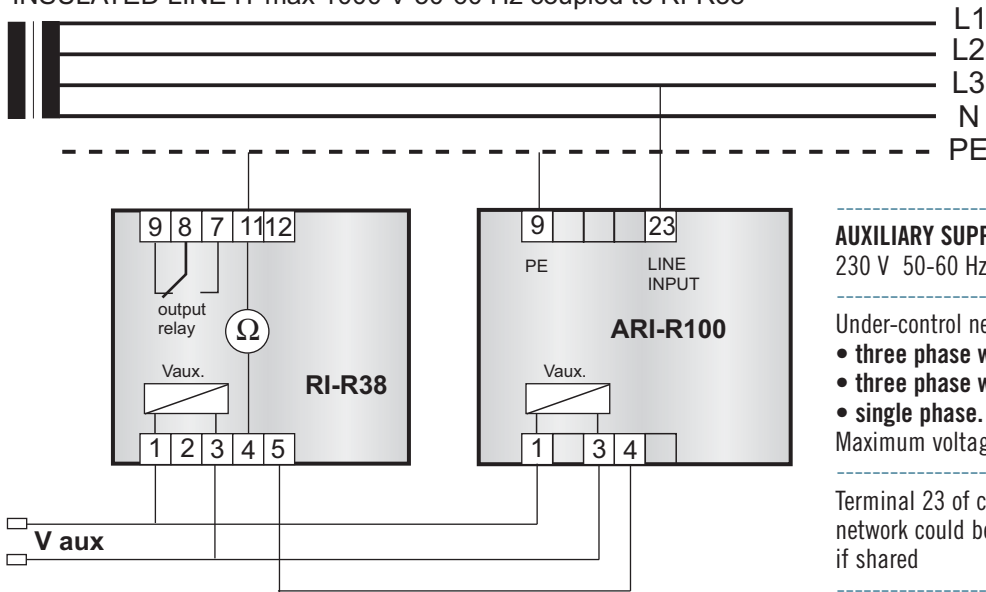


## ELECTRIC CHARACTERISTICS

Input voltage of under-control network	MAX 1000 V +20 % 50-600 Hz
Auxiliary supply	230 V 50-60 Hz ± 20 % standard or 110 V 50-60 Hz ± 20 % optional
Output voltage for RI-R22	MAX 230 V 50-60 Hz
Working temperature	- 10 ... + 60 °C
Storing temperature	- 20 ... + 70 °C
Relative humidity	< 90 %
Insulation test	6 kV 60 sec
Assembling position	indifferent
Connection type	by screw terminals - wire section MAX 2.5 mm <sup>2</sup>
Protection's degree	IP 40 frontal with cap - IP 20 case
Mounting according with DIN 50022	easy connection snap on DIN rail 35 mm / 3 modules of 17.5 mm
Standard reference	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 / CEI-EN 61326-1

## WIRING DIAGRAMS

INSULATED LINE IT max 1000 V 50-60 Hz coupled to RI-R38



### AUXILIARY SUPPLY - terminals 1-3

230 V 50-60 Hz standard - optional 110 V 50-60 Hz

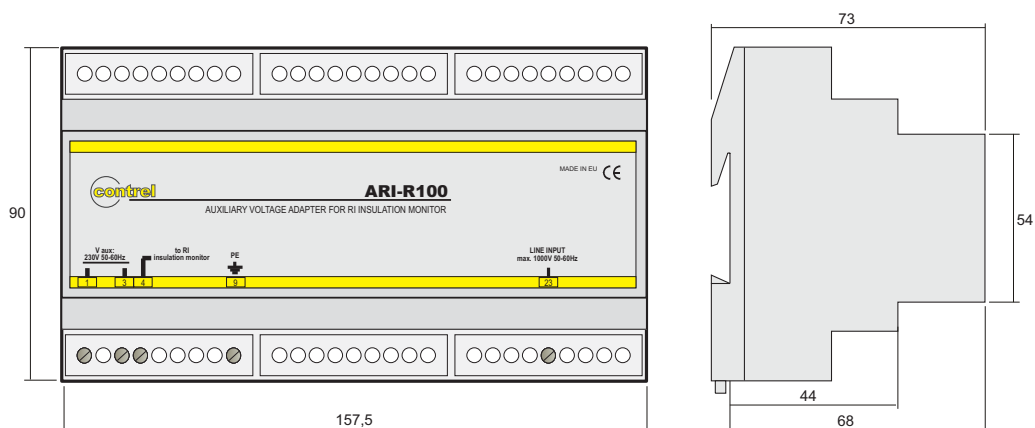
Under-control network could be:

- three phase with neutral,
- three phase without neutral shared or without neutral,
- single phase.

Maximum voltage has not to outweigh 1000 V 50-60 Hz.

Terminal 23 of connection between ARI-R100 and network could be connected single-phase or with neutral, if shared

## DIMENSIONS



# RI-R60 Series

DEVICE FOR INSULATION PERMANENT CONTROL

VERSION FOR NEUTRAL NETWORKS (IT) UP TO 1000VAC

## GENERAL



**RI-R60** is a device that allows to control the insulation to earth in alternating neutral networks up to 760 V (IT systems) in direct insertion and in network up to 1000V with ARI-R60 adapter.

Putting a continuous component measure signal between the insulated line and earth it's possible to control the insulation resistance reading the dispersion current generated to earth.

These devices have two trip thresholds (ALARM and TRIP) adjustable using the frontal micro-switches to signal when the insulation go under the threshold level. The frontal LED signalling the trip. Two free voltage changeover contacts relays allow the remote trip signalling. The relays can be programmed with the fail safe (normally excited). The device is supplied on the front panel of a TEST and a RESET push-buttons. The test can be activated thanks to the push-button on the device or to external push-button while the reset that can be set in manual or in automatic and activated, as the test, with the local or remote push-button.

The level of the insulation resistance is displayed on the bar LED on the front panel with scale 5-500 kohm at 8 point.

## MODELS

**RI-R60-760** network voltage 760Vac max , Uaux 110-230V 50-60 Hz (100÷130 / 220÷240V ± 10%)

**RI-R60-1000** network voltage 1000Vac max (with ARI-R60 adapter), Uaux 110-230V 50-60 Hz (100÷130 / 220÷240V ± 10%)

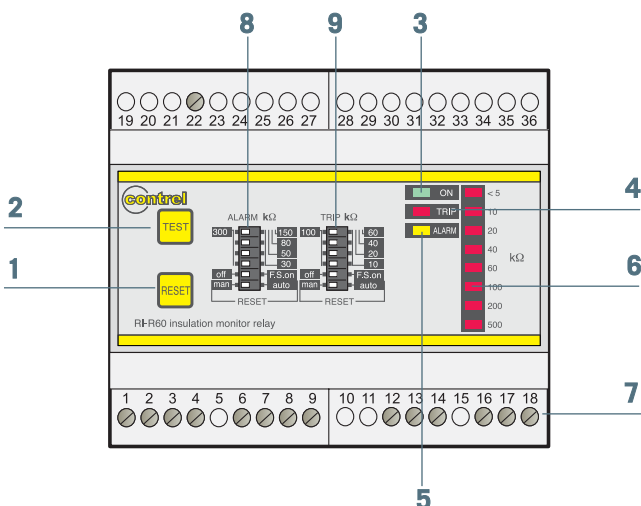
## INSTALLATION

The installation must be carried out by qualified and authorized personnel and in absence of voltage. Make sure that the instrument is O.K. and it has not suffered any damage during transport. Make sure that the voltage supply are compatible with the operating voltage of instrument.

The device is a 6 modules (17.5mm) DIN version with snap on 35mm DIN rail. It has a sealable transparent frontal protection cover.

The green LED ON will bright after the connections are set and the instrument is power on.

## FUNCTIONS AND OPERATORS - LEGEND



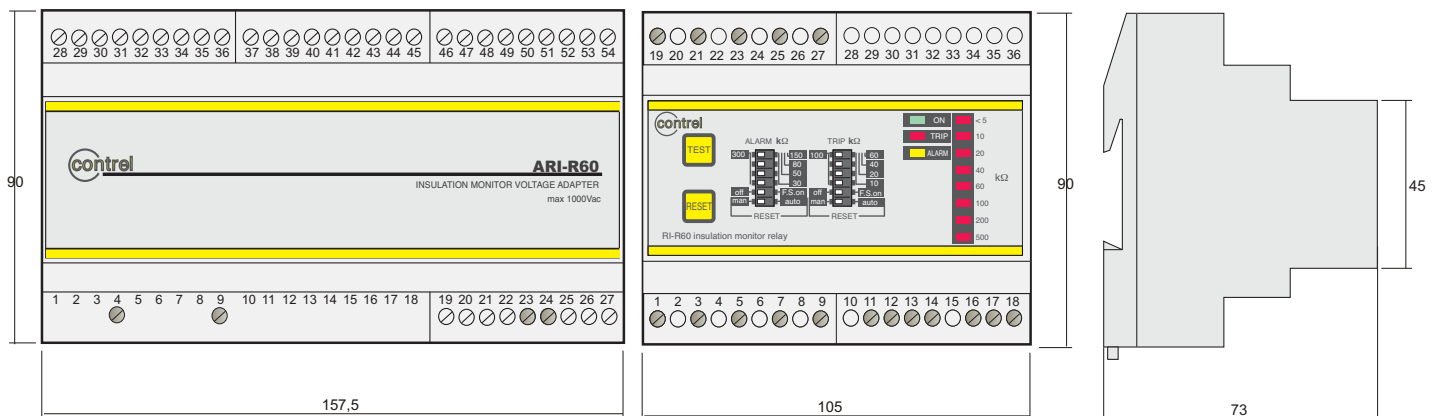
- 1 Pulsante di RESET. Questo pulsante ha effettiva funzionalità solo se impostato il funzionamento in RESET manuale.
- 2 RESET push-button. Only when it's set the manual reset functioning this push-button is enable.
- 3 TEST push-button. Pressing the TEST push-button cause the tripping of the ALARM and the TRIP and the output relay commute.
- 4 LED ON to signal the device turned ON.
- 5 LED TRIP for the signalling overcoming the TRIP threshold.
- 6 LED ALARM for the signalling overcoming the ALARM threshold.
- 7 LED bar to indicate the measured insulation resistance level. With all LED on the insulation level is lower than 5 kohm, with all led off the insulation level upper is than 500 kohm.
- 8 terminals board
- 9 micro-switches to set the alarm threshold
- 10 micro-switches to set the trip threshold



## ELECTRIC CHARACTERISTICS

TYPE	RI-R60
Auxiliary power supply	110-230Vac (100÷130V / 220÷240V +10%) 50-60Hz
Maximum consumption	max 5 VA
Network to control	50-760Vac (50÷1000Vac with ARI-R60 adapter)
Measure voltage	max 48Vdc
Measure current	max 240 µA dc
Internal impedance	200 kΩ
Tripping delay	max 5 seconds
Signalling	led ON, led ALARM, led TRIP, measuring LED bar 5-500kohm
Setting threshold tripping ALARM	300 ÷ 30 kohm (5 levels selectable with micro-switches)
Setting threshold tripping TRIP	100 ÷ 10 kohm (5 levels selectable with micro-switches)
Relay output	ALARM: changeover contact NA-C-NC TRIP: changeover contact NA-C-NC
Relay contacts functions	5 A 250Vac . Fail safe function for both outputs, manual or automatic reset, local and remote test and reset push-button
Working temperature	-10 ÷ 60°C
Storing temperature	-20 ÷ 70°C
Relative humidity	≤ 95 %
Insulation test	3 kV 60 sec. / 4 kV imp. 1,2/50µs
Mounting position	Any
Wiring type	Screw terminals / cross section cables 4 mm <sup>2</sup>
Protection degree	Frontal with cover: IP 40 – Enclosure: IP 20
Mounting according DIN 50022	Snap on DIN rail 35mm / 6 modules 17,5 mm
Weight	About 0,5 kg
Standards	Safety CEI-EN 61010-1 / Product CEI-EN 61557-8 / Electromagnetic compatibility CEI-EN 61326-1 CEI-EN 61326-2-4 CEI 64-8

## DIMENSIONS



# RI-R60 Series

DEVICE FOR PERMANENT INSULATION CONTROL  
**VERSION FOR NEUTRAL NETWORKS (IT) UP TO 1000VDC**

## WIRING CONNECTION LINE 760 Vca MAX - LEGEND

### AUXILIARY POWER SUPPLY

#### Terminals 1-2-3-4

The supply section is a double input at 115V (100÷130V 50-60Hz).

To supply the instrument at 230V (220÷240V 50-60Hz) connect the two section in series.

To supply the instrument at 115V connect the two section in parallel.

### INSULATION CONTROL

#### Terminals (6/7) -22

The two terminals must be connected between the line under control and the earth of measure reference. The double terminal 6/7 (connected internal) must be connected to the earth reference while the terminal 22 must be connected to the single-phase line to control or to the neutral conductor in a three-phase line. On this terminals is possible to connect voltage up to 760Vac. For this reason it's possible to use this device on single phase line up to 760V, on three-phase line at 3 wires without neutral up to 760V and on three-phase line at 4 wires with neutral up to 1100V.

### ALARM RELAY OUTPUT CONNECTIONS (ALARM)

#### Terminals 16-17-18

Connections to remote signalling thanks to free voltage changeover contact, max 5A 250V on resistive load.

### TRIP RELAY OUTPUT CONNECTIONS (TRIP)

#### Terminals 12-13-14

Connections to remote signalling thanks to free voltage changeover contact, max 5A 250V on resistive load.

### REMOTE TEST CONNECTION

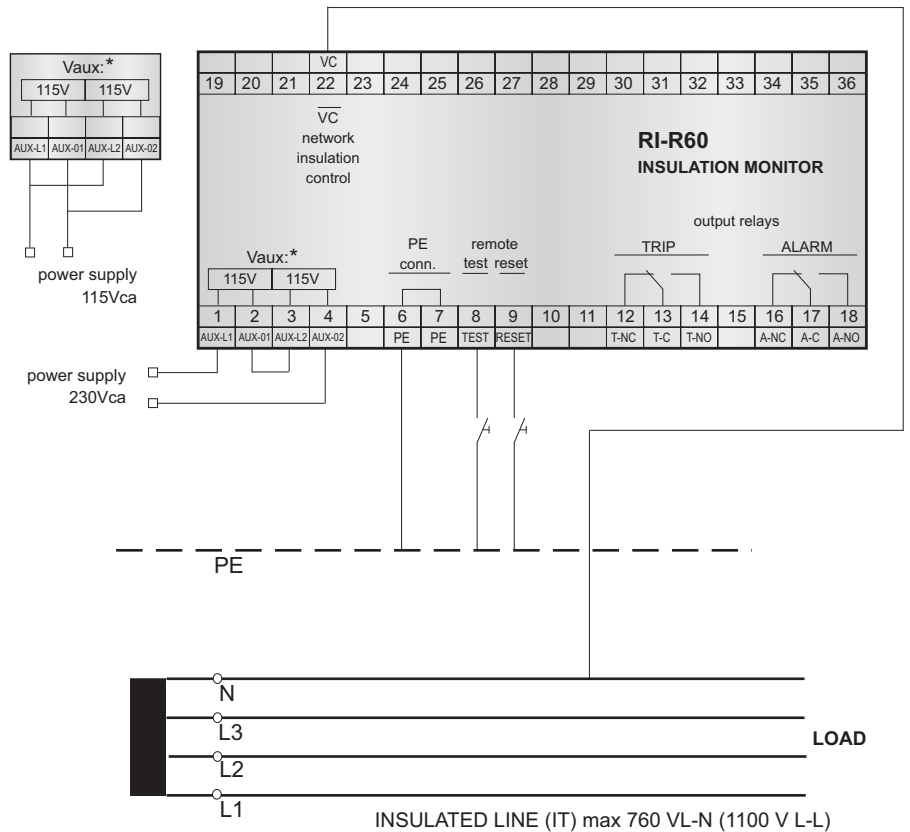
#### Terminal 8

It's possible to connect a remote push-button with a normally open contact between the control device and the earth reference.

### REMOTE RESET CONNECTION

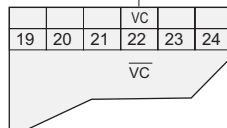
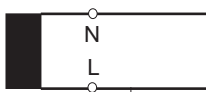
#### Terminal 9

For the RESET function from external signal it's possible to connect a push-button with normally open contact on the connection between the control device and the earth reference.



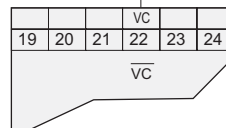
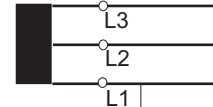
#### Single-phase line

Max 760V L-N



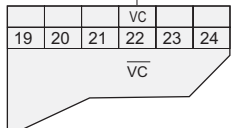
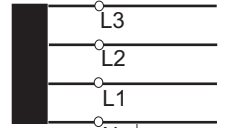
#### Three phase line without neutral

Max 760V L-L



#### Three phase line with neutral

Max 1100V L-L



## WIRING CONNECTION LINE 1.000 Vca MAX - LEGEND

### AUXILIARY POWER SUPPLY - TERMINALS 1-2-3-4

The supply section is a double input at 115V (100÷130V 50-60Hz). To supply the instrument at 230V (220÷240V 50-60Hz) connect the two section in series.

To supply the instrument at 115V connect the two section in parallel.

### INSULATION CONTROL - TERMINALS (6/7) -22

The two terminals must be connected between the line under control and the earth of measure reference.

The double terminal 6/7 (connected internal) must be connected to the earth reference while the terminal 22 must be connected to the ARI-R60 adapter

### ALARM RELAY OUTPUT CONNECTIONS (ALARM) - TERMINALS 16-17-18

Connections to remote signalling thanks to free voltage changeover contact, max 5A 250V on resistive load.

### TRIP RELAY OUTPUT CONNECTIONS (TRIP) - TERMINALS 12-13-14

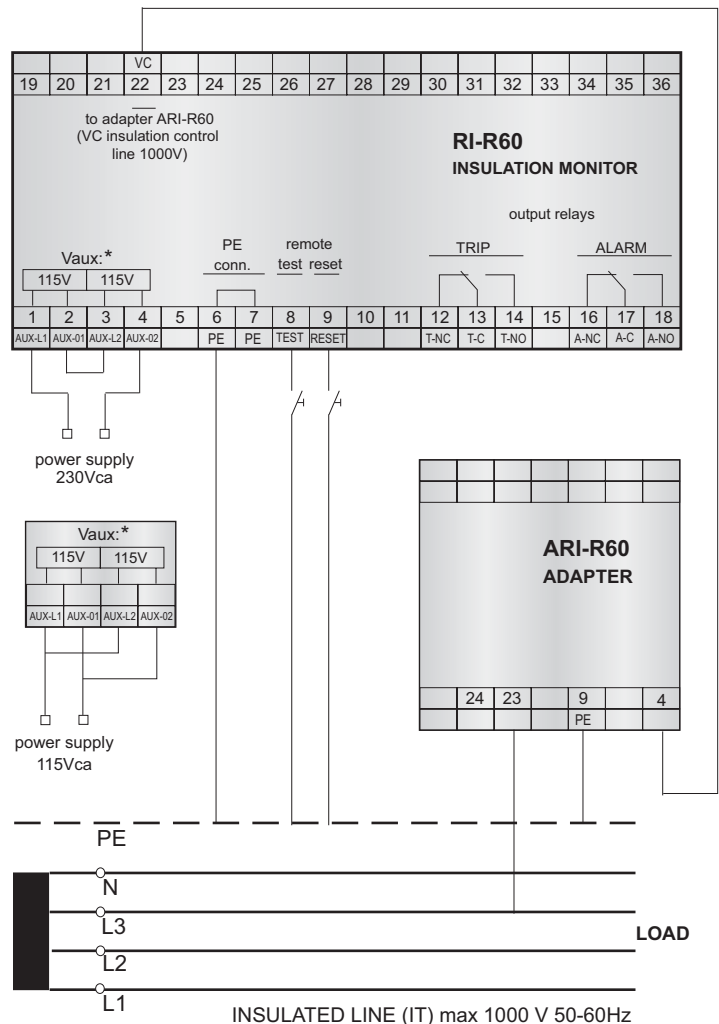
Connections to remote signalling thanks to free voltage changeover contact, max 5A 250V on resistive load.

### REMOTE TEST CONNECTION - TERMINAL 8

It's possible to connect a remote push-button with a normally open contact between the control device and the earth reference.

### REMOTE RESET CONNECTION - TERMINAL 9

For the RESET function from external signal it's possible to connect a push-button with normally open contact on the connection between the control device and the earth reference.



## FUNZIONALITÀ

In normally condition with the insulation value upper than alarm and trip thresholds the green LED of the device is turned on and the status of the bar led depending of the insulation resistance level measured (with all led off the insulation value is upper than 500 kohm, with all LED on the measured LED lower than 5 kohm).

By pressing the TEST push-button at least 5 seconds (delay time) the alarm and trip signalling with relative LED will be activated, the output relays commute and the LED bar turn on (simulated value lower than 5 kohm).

**NOTES** - It's not possible to use more than one instrument on a line because the measure of the resistance could be not correct for the overlap of the signal.

The presence of strong continuous component on the network under control could create some problems for the correct functioning of the device.

Depending the set of the micro-switches the RESET can be automatic when the TEST push-button is released or manual with the local or remote RESET push-button.

In case of low insulation on the line (insulation resistance value lower than threshold set) the ALARM and possibly the TRIP signalling will be activated as the correspondent output relays. The Signalling will disappear only after that on the line come back an insulation level upper than the threshold set.

# RI-SM series

INSULATION MONITORING  
VERSIONS FOR OUT-VOLTAGE NETWORK

## GENERAL



The devices allow insulation monitoring to earth of out-voltage networks in order to carry out a preventive monitoring on insulation level of device. Preventive monitoring is really important in case of applications which are not used permanently (for example: motors, fire-engines, and so on). In these applications, humidity and condensate can cause a serious decrease in insulation's level and obstruct correct functioning at the moment of applications' activation.

Insulation resistance's monitoring is carried out applying a measure's signalling in direct-current component between isolated network and earth. Surveying leakage current to earth it's possible to measure insulation's level.

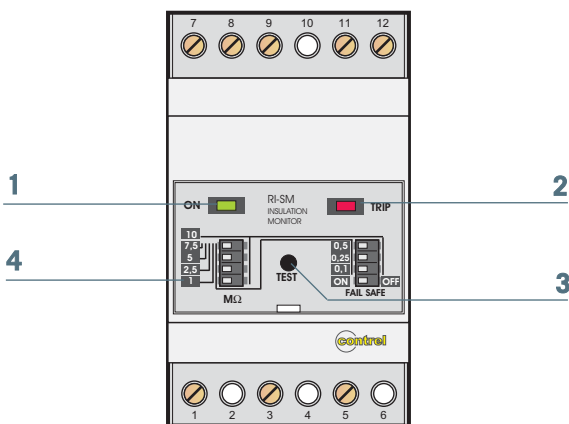
This device allow regulation of trip threshold by micro switches. Devices have on frontal panel signal of active device ON, signal TRIP (low insulation), a test button and micro switches series for regulating trip threshold.

## MODELS

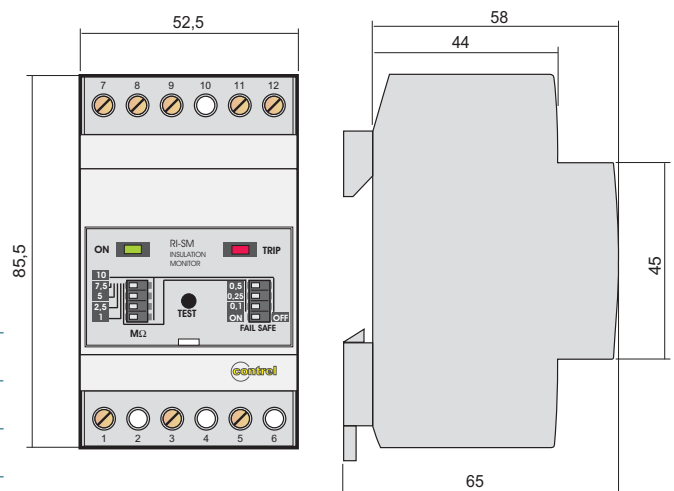
- RI-SM** Vaux: **230 V** 50-60 Hz (standard version)
- RI-SM** Vaux: **115 V** 50-60 Hz (optional version)

## FUNCTIONS AND OPERATORS - LEGEND

## DIMENSIONS



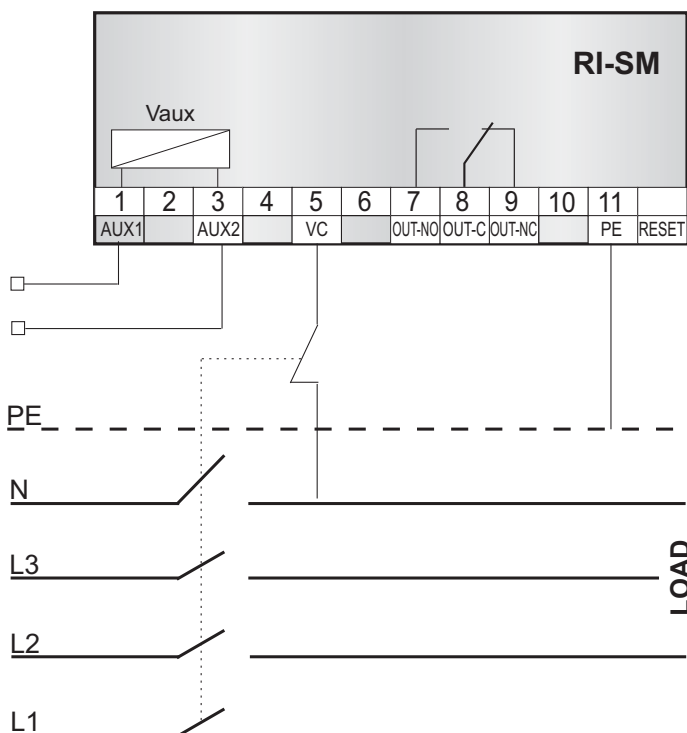
- 1** green led ON indication of active device
- 2** red led TRIP trip signal for low insulation
- 3** test button for testing device's serviceability
- 4** micro switches for selecting trip threshold



## ELECTRIC CHARACTERISTICS

Auxiliary supply	230 V 50-60 Hz $\pm 20\%$ 115 V 50-60 Hz $\pm 20\%$ (optional)
Self-consumption	5 VA MAX
Network voltage	MAX 700 Vac/dc
Voltage's measure	20 V MAX
Current's measure	15 $\mu$ A dc MAX
Internal impedance	dc 1.5 Mohm - ac 1 Mohm
Trip threshold	0.1 - 0.25 - 0.5 - 1 - 2.5 - 5 - 10 Mohm (by microswitch)
Delay trip	1 - 2.5 sec
Type of monitoring signal	direct current component
Output	auxiliary output relay with possibility of fail safe function programming NO-C-NC MAX 5 A 250 Vac - It could be activated for low insulation
Visualizations	green led ON - red led TRIP
Working temperature	- 10 ... + 60 °C
Storing temperature	- 25 ... + 70 °C
Relative humidity	< 95 %
Insulation test	2.5 kV 60 sec
Assembling position	indifferent
Connection type	by screw terminals - wire section MAX 2.5 mm <sup>2</sup>
Protection's degree	IP 50 frontal with cap (sealable) - IP 20 case
Mounting according with DIN 50022	easy connection snap on DIN rail 35 mm / 3 modules of 17.5 mm
Weight	approximately 100 g
Standard reference	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 / CEI-EN 61326-1

## WIRING DIAGRAMS



**AUXILIARY SUPPLY - terminals 1-3**  
auxiliary supply available from under-control network

**INSULATION MONITORING - terminals 5-11**  
both terminals have to be connected between under-control network and referring earth.  
Terminal 5 have to be connected to under-control network single phase or three phase and to neutral conductor. If three phase network is three wires, it is required to connect single phase network.  
Maximum applicable voltage between these terminals is 700 V ac/dc.

**CONNECTIONS RELAY OUTPUT - terminals 7-8-9.**  
connections for remote signal by relay with switch voltage-free, max 5 A 250 V on resistive load

# HRI series

INSULATION MONITORING

## VERSIONS FOR USE IN MEDICAL ROOMS

### GENERAL

Devices allow insulation monitoring for IT systems in medical use rooms, as well as hospital and ambulatory clinic, in compliance with standard IEC 60364-7-710.

Measure's modality consist in application of a direct-current voltage or

codified signal between the secondary of insulation and device's unipotential node. In case of failure to earth, it surveys current flowing inside the relay and correspondent insulation resistance of device.

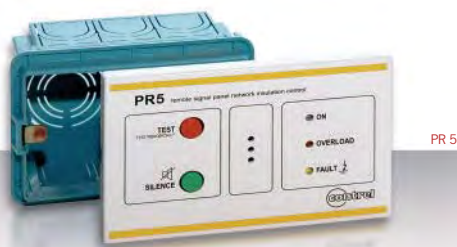
### MODELS

<b>HRI-R40</b>	network voltage 230 Vac, auxiliary supply 110-230 Vac
<b>HRI-R40W</b>	network voltage 230 Vac, auxiliary supply 110-230 Vac
<b>HRI-R22t</b>	network voltage 230 Vac, auxiliary supply 230 Vac
<b>HRI-R24</b>	network voltage 240 Vac/dc, auxiliary supply 24 Vac/dc



### ACCESSORIES

- PR5** remote signalling panel for wall mounted (universal box E503) coupled with HRI-R22t, HRI-R24, HRI-R40 e HRI-R40W (indication of low insulation ALARM and overload and over temperature).



### OPTIONAL (only for HRI-R40 and HRI-R40W)

- T2** second temperature input from PT100 or PTC probe
- S** serial output RS485 bidirectional with MODBUS-RTU protocol communication

\* On requested, **insulation's transformers single phase and three phase** are available for hospital use 230 V / 230 V and 230 V / 24 V up to power 10 kVA.  
(for information please contact our sales dept.)

# HRI-R40 series HRI-R40W series

INSULATION MONITORING  
VERSIONS FOR USE IN MEDICAL ROOMS

## GENERAL



### HRI-R40 series

This device allows insulation monitoring to earth of supply network and thermal and electric overcharge monitoring of transformer. This works in order to serve everything requested in specific standard regulation for these applications.

Insulation's resistance monitoring is carried out applying a measure's signalling between isolated network and earth.

Surveying leakage generated to earth it's possible to measure insulation's level.

Modern and sophisticated measure's techniques integrated allow correct measure of insulation's resistance level also in case of strong obstructions, with high harmonic and direct-current components.

HRI-R40 model uses a monitoring signalling with direct-current component. For reducing problems caused by the presence of direct-current components on network (rectifiers), device has a digital filter which is able to divide the majority of direct-current from eventual direct-current components in network.

HRI-R40 could set a large number of programming possibilities with frontal button and 3 digit digital display for visualising measuring and programming parameters.

### HRI-R40W series

HRI-R40W version has same fundamental characteristics of previous model but it uses particular measuring technique applying a measure's signal codified and varying, in order to guarantee a correct measure of insulation independently from under-control network type.

Device has two input of temperature's measure (one is optional) for temperature's probe PT100 or PTC (DIN 44081) for monitoring thermal overcharge of insulation's transformer.

There is also a input of current's measure of current transformer for monitoring overcharge on network.

Signalling output are apt for coupling with specific panels of signalling and remote monitoring PR5 (max 2 panels, on request 4 panels).

There is also a output for relay voltage-free with functions adjustable by the user.

Optionally it's available a serial output RS485 for bidirectional communication with monitoring system (PLC, PC, and so on).

Communication's protocol used is MODBUS-RTU.

Specific characteristics make these devices conform to standard regulation:

EN 61557-8

IEC 60364-7-710

VDE 0100 part 710

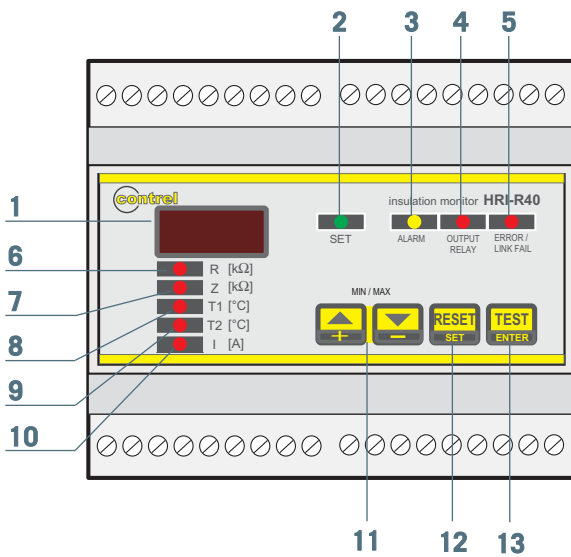
CEI 64.8/7-710 V2

UNE 20615.

Actually presence in network of strong distortions with high harmonic components (sub harmonic) and direct-current components could cause measure's problems to others techniques.

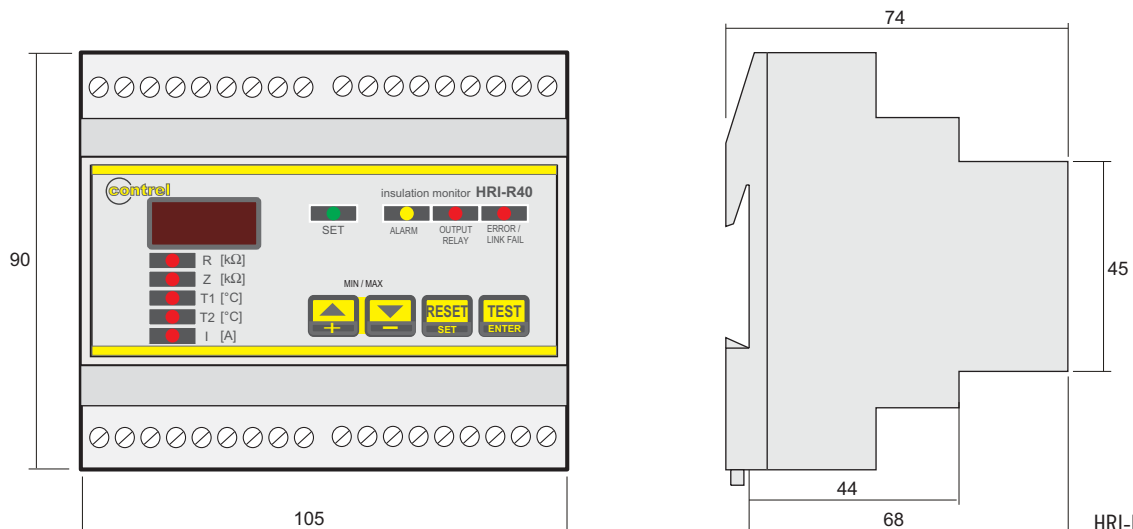
This solution allow the using of HRI-R40W in network with rectifiers, power's electronics, variable-speed drive and so on.

## FUNCTIONS AND OPERATORS - LEGEND



- 1 display for visualising under-control parameters' degree and for visualising settings
- 2 green LED SET for indication of programming status
- 3 yellow LED ALARM for indication alarm for parameter's degree out-threshold
- 4 red LED OUTPUT RELAY for indication status of auxiliary relay output
- 5 red LED ERROR / LINK FAIL for indication alarm of internal failure, lack connection to under-control network, temperature's probe PT100 open or short circuit
- 6 red LED R for indication visualisation of insulation's resistance parameter; flashing light for out-threshold parameter
- 7 red LED Z for indication visualisation of insulation's impedance parameter; flashing light for out-threshold parameter.
- 8 red LED T1 for indication visualisation parameter of transformer's temperature; flashing light for out-threshold parameter.
- 9 red LED T2 for indication visualisation parameter of second sensor temperature; flashing light for out-threshold parameter.
- 10 red LED I for indication visualisation current of network parameter; flashing light for out-threshold parameter.
- 11 button +/- UP/DOWN for selecting parameter that has to be visualised, for regulating device's setting and for visualising maximum and minimum memorized degrees
- 12 button RESET / SET for entering device's programming, for stopping alarms and memorized degrees resetting
- 13 button TEST / ENTER for testing device and remote signalling panels and for confirming SETUP settings

## DIMENSIONS





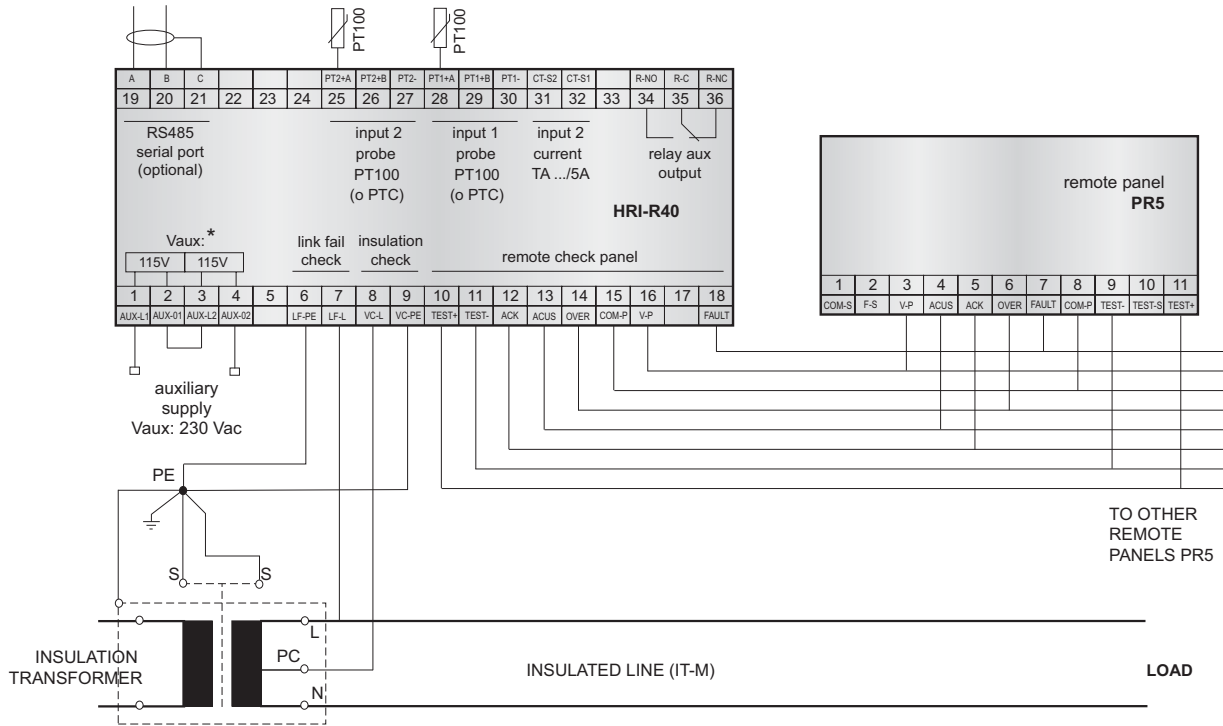
## ELECTRIC CHARACTERISTICS

TYPE	HRI-R40	HRI-R40W
Auxiliary supply	110 - 230 V $\pm$ 20%	110 - 230 V $\pm$ 20%
Frequency	50 $\div$ 60 Hz	50 $\div$ 60 Hz
Self-consumption	5 VA	5 VA
Unde-control network voltage	24 $\div$ 230 V 50 $\div$ 60 Hz	24 $\div$ 230 V 50 $\div$ 60 Hz
Voltage's measure	24 V	24 V
Current's measure	1 mA	1 mA
Internal impedance for resistive measure	200 kohm	200 kohm
Selectable trip threshold	50 $\div$ 500 kohm (low insulation) hysteresis 10 % 20 $\div$ 180 °C (over-temperature) precision 2 % - 1 $\div$ 99.9 A (over-current) precision 2 % - delay 1 $\div$ 60 sec	
Visualisation	insulation and impedance's degree by three digits display 1 $\div$ 999 kohm temperature's degree 0 $\div$ 200 °C (1st and 2nd probe) by display current's value 0 $\div$ 99.9 A by display parameters' configuration output status: - signalling alarms' led - led of signalling output of active relays - led of failed insertion signalling	
Output	for PR5 (max 5) panel + 1 contact NO-C-NC 5 A - 250 V low insulation, overload + option serial RS485 MODBUS-RTU	
Input	from isolated network 230 Vac (insulation measure) 1st probe PT100 2 or 3 wires (temperature measure) 30 $\div$ 200 °C $\pm$ 2% 2nd probe PT100 2 or 3 wires (temperature measure) (OPTIONAL) 30 $\div$ 200 °C $\pm$ 2% CT (overload current' measure max 5 A precision 2 % current transformer ratio selectable 1 $\div$ 40	
Voltage of signal circuit	< 24 Vdc	< 24 Vdc
Measure's method	signalling dc	codified and varying signal
Insulation's test	2.5 KV 60 sec	
Working temperature	-10 $\div$ 60 °C	
Storing temperature	-20 $\div$ 80 °C	
Relative humidity	MAX 90 %	
Standard regulation	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 / CEI 64.8/7-710 V2 IEC 60364-7-710 / VDE 0100 part.710 / UNE 20615 / CEI-EN 61326-1	
Assembling according to DIN 50022	snap on DIN rail 35 mm	
Dimensions	6 modules DIN 17.5 mm	
Protection's degree	IP50 frontal - IP20 case	
Connections	by screw terminals max 2.5 mm <sup>2</sup>	

# HRI-R40 series HRI-R40W series

INSULATION MONITORING  
VERSIONS FOR USE IN MEDICAL ROOMS

## WIRING DIAGRAMS - LEGENDA HRI-R40 AND HRI-R40W



### AUXILIARY SUPPLY - TERMINALS 1-2-3-4

supply's section is carried out with double input 115 V nominal  
for device supplying with 230 V, it is required to connect both sections in series  
for device supplying with 115 V, it is required to connect both sections in parallel

### LINK-FAIL MONITORING - TERMINALS 6-7

both terminals have to be connected between a isolated network's phase and unipotential node (PE)  
Maximum applicable voltage is 250 V (see insulation's monitoring)

### INSULATION'S MONITORING - TERMINALS 8-9

both terminals have to be connected between centre tap of secondary transformer or a isolated network's phase and unipotential node (PE)  
Maximum applicable voltage is 230 Vca so single phase networks could have max voltage of 230 V, three phase networks three wires could have max voltage of 230 V phase-phase; but three phase networks four wires could have max voltage of 230 V phase-neutral

### REMOTE PANEL'S CONNECTIONS PR5 - TERMINALS 10-11-12-13-14-15-16-18

connections for linking to remote panels PR5, Max voltage on these conductors is 24 V

### SERIAL PORT RS485 (OPTIONAL) - TERMINALS 19-20-21

terminals A-B (19-20) head to serial bus, terminal C (21) is a mass' reference that could be connected to eventual screen of cable RS485  
Standard protocol used is modbus-rtu, documented in a specific handbook [IM833-U]

### INPUT TEMPERATURE PROBE 2 (OPTIONAL) - TERMINALS 25-26-27

connections for linking to a temperature's sensor - PT100 (EN 60751) or PTC (DIN 44081) sensor could be used.  
In case of PT100 probes three wires, it is required to connect compensation's conductor to the same terminal of correspondent conductor.  
In case of PTC, it is necessary external resistor of 120 ohm min 1/4 W

### INPUT TEMPERATURE PROBE 1 - TERMINALS 28-29-30

connections for linking to a temperature's sensor - PT100 (EN 60751) or PTC (DIN 44081) sensor could be used.  
In case of PT100 probes three wires, it is required to connect compensation conductor to the same terminal of correspondent conductor.  
In case of PTC, it is necessary external resistor of 120 kohm min 1/4 W

### INPUT FOR CURRENT MEASURE - TERMINALS 31-32

connection for external current transformer with secondary 5 A (current transformer ratio is programmable); if there is 3-phase network must be used the special adapter type TSA-03 for 3 current transformer to permit to monitor in the insulation relay the highest value of the 3-phase currents.  
Only the module of the current value is measured (i.e. it is not important S1-S2 connection sequence).

### OUTPUT AUXILIARY RELAY - TERMINALS 34-35-36

switch contact free from voltage and with programmable functions. Contact's performance MAX 250 V 5 A resistive load

# HRI-R22t series

INSULATION MONITORING  
VERSIONS FOR USE IN MEDICAL ROOMS

## GENERAL



### HRI-R22t series

The device has similar characteristics of previous model but it's more cheap and it has less functions.

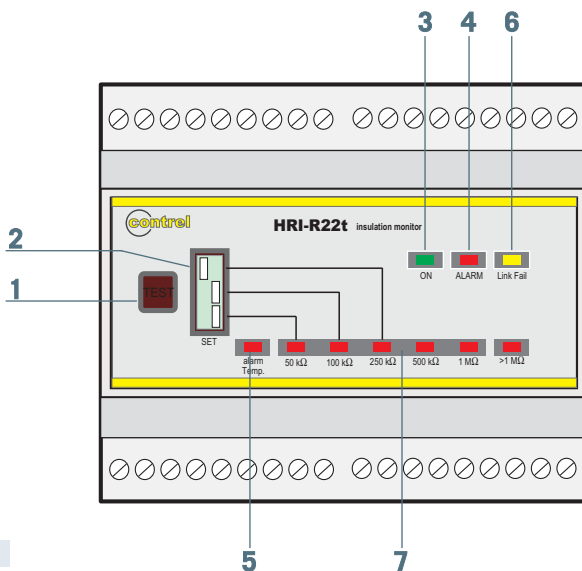
There is measuring signalling and it is able to verify temperature of insulation' power transformer (1 PTC input with contact NO or NC directly supplied by device) and insulation's level.

These inputs are available: for remote repeaters panels PR2 and PR2-t and 1 relay NO-C-NC, that is activate when fixed threshold (insulation and temperature) are over-ride. HRI-R22t has frontally a bar led for visualising insulation's level of device and eventual alarm's presence is visualised frontally by led.

Testing button is available and it works for monitoring insulation's level preset with calibration on relay (for example, with 50 kohm calibration all the led with inferior limit of 50 kohm will light during the test).

This button monitors eventual remote reply panels PR-5 (max 2 panels).

## FUNCTIONS AND OPERATORS - LEGEND



### 1 TEST PUSHBUTTON

### 2 MICRO SWITCH for threshold set

- turning the switch to right, corresponding insulation's resistance degree has to be digit, highest degree heads
- with all the switches turned to left, fixed degree of 50 kohm doesn't change

### 3 LED signalling supplied relay

### 4 LED signalling pre-fixed insulation's threshold reached

### 5 LED signalling temperature's threshold reached

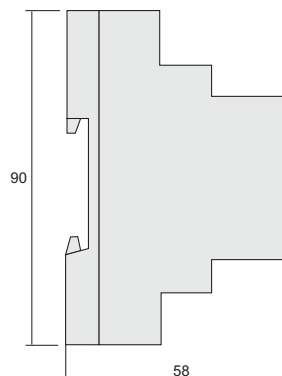
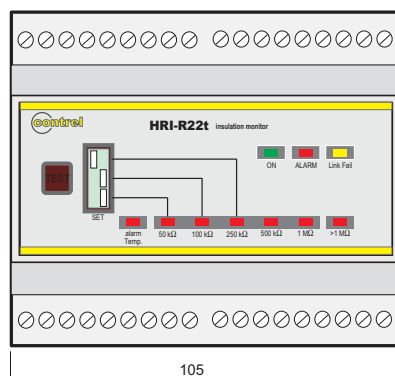
### 6 LED signalling relay connected correctly

### 7 LED signalling instant insulation's value of device, identified by lowest degree between active led

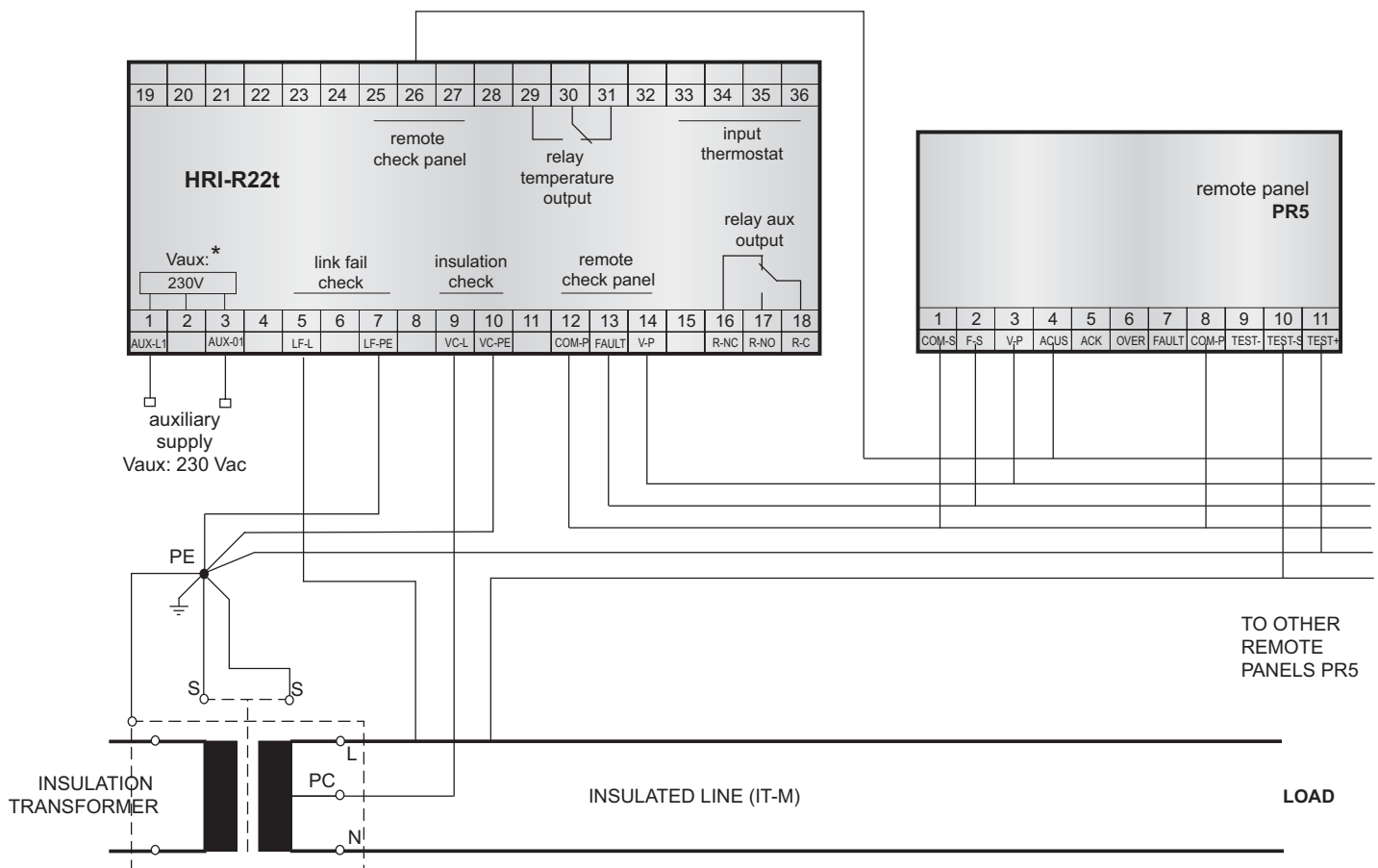
## ELECTRIC CHARACTERISTICS

TYPE	HRI-R22t
Auxiliary supply	230 V $\pm$ 20%
Frequency	50 $\div$ 60 Hz
Self-consumption	3 VA
Unde-control network voltage	24 $\div$ 230 V 50 $\div$ 60 Hz
Voltage's measure	< 15 V
Current's measure	< 0.6 mA
Internal impedance for resistive measure	1 Mohm
Selectable trip threshold	50-100-250 kohm (low insulation) by switches
Visualisation	led of insulation value by led bar 50 $\div$ 1000 kohm led of signalling network's presence led of signalling low insulation led of signalling over-temperature led of failed insertion signalling
Output	for panel PR5 (max 2) total + 1 contact NO-C-NC 5 A - 250 V (low insulation) + 1 contact NO-C-NC 5 A - 250 V (over-temperature )
Input	from isolated network 230 Vac (insulation measure) PTC probe (temperature measurement)
Voltage of signal circuit	< 24 Vdc
Measure's method	signalling dc
Insulation's test	2.5 kV 60 sec
Working temperature	-10 $\div$ 60 °C
Storing temperature	-20 $\div$ 80 °C
Relative humidity	MAX 90 %
Standard regulation	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 CEI 64.8/7-710 V2 / IEC 60364-7-710 / UNE 20615 / CEI-EN 61326-1
Assembling according to DIN 50022	snap on DIN rail 35 mm
Dimensions	6 modules DIN 17.5 mm
Protection's degree	IP50 frontal - IP20 case
Connections	by screw terminals max 2.5 mm <sup>2</sup>

## DIMENSIONS



## WIRING DIAGRAMS - LEGEND



### AUXILIARY SUPPLY - TERMINALS 1-3

### MONITORING INSULATION - TERMINALS 5-9

both terminals have to be connected between centre tap of secondary transformer or isolated network's phase and unipotential node (PE). Maximum voltage applicable is 230 Vca. Consequentially single phase networks could be maximum 230 V, three phase networks of three wires is 230 V phase-phase but three phase networks four wires is max 230 V phase-neutral

### CONNECTIONS FOR REMOTE PANELS PR5 - TERMINALS 12-13-14-26

### INPUT THERMAL PROBE - TERMINALS 33-34 or 35-36.

PTC (DIN 44081) probe could be used

### AUXILIARY RELAY OUTPUT - TERMINALS 29-30-31

contact in switch voltage-free with programmable functions. Contact's capacity 250 V 5 A resistive load

# HRI-R24 series

INSULATION MONITORING  
VERSIONS FOR USE IN MEDICAL ROOMS

## GENERAL

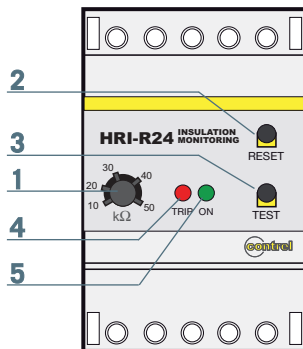


### HRI-R24 series

For monitoring 24 V networks (sialytic lamps), monitor HRI-R24 is used. This is able to supply insulation's control adjustable by frontal potentiometer. Frontally there is also testing button for allowing the test of device's correct functionality and eventual remote repeaters panels.

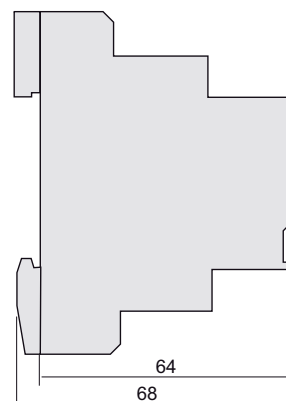
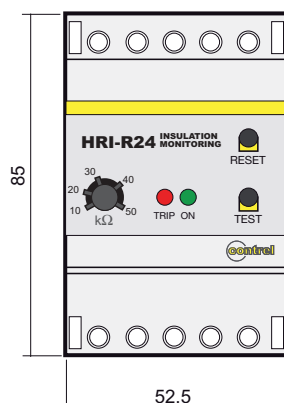
Outputs are available for remote repeaters panels PR-5 (max 2 panels).

## FUNCTIONS AND OPERATORS - LEGEND



- 1 Potentiometer for regulating trip threshold
- 2 Button of manual resetting
- 3 Test pushbutton
- 4 LED signalling supplied relay
- 5 LED signalling pre-fixed threshold reached

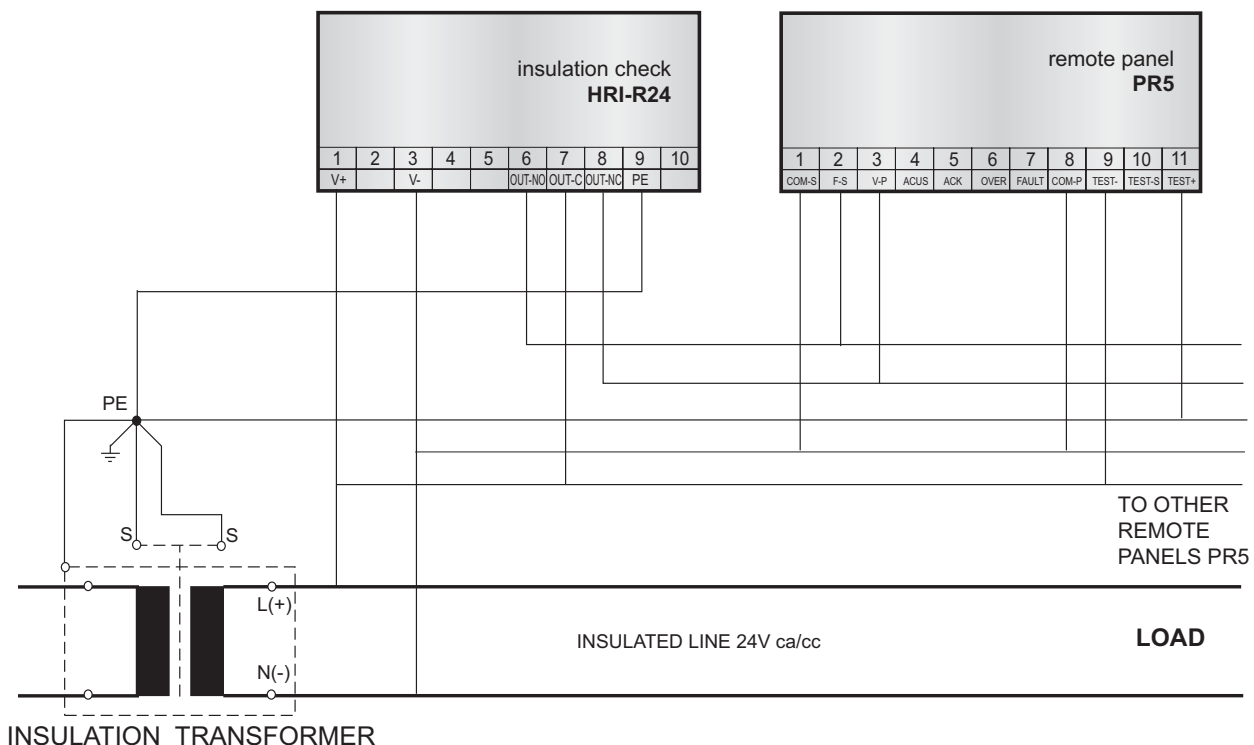
## DIMENSIONS



## ELECTRIC CHARACTERISTICS

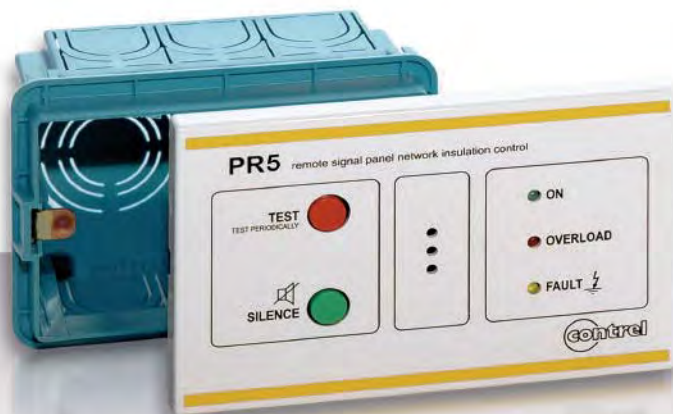
TYPE	HRI-R24
Auxiliary supply	24 Vdc/ac -20 % +10 %
Frequency	50 ÷ 60 Hz
Self-consumption	3 W
Unde-control network voltage	24 Vdc/ac 50 ÷ 60 Hz
Current's measure	< 0.5 mA
Internal impedance for resistive measure	50 kohm
Internal impedance for resistive measure	10 ÷ 50 kohm (by potentiometer)
Visualisation	led of signalling network's presence led of signalling low insulation
Output	for PR5 panel (max 2)
Input	from isolated network 240 Vac/dc (insulation measure)
Voltage of signal circuit	< 24 Vdc
Measure's method	variation of polarity's potential
Insulation's test	2.5 kV 60 sec
Working temperature	-10 ÷ 60 °C
Storing temperature	-20 ÷ 80 °C
Relative humidity	MAX 90 %
Standard regulation	CEI-EN 61010-1 / CEI-EN 61557-8 / VDE 0413 part.8 CEI 64.8/7-710 V2 / IEC 60364-7-710 / UNE 20615 / CEI-EN 61326-1
Assembling according to DIN 50022	snap on DIN rail 35 mm
Dimensions	3 modules DIN 17.5 mm
Protection's degree	IP50 frontal - IP20 case
Connections	by screw terminals max 2.5 mm <sup>2</sup>

## WIRING DIAGRAMS - LEGEND



# PR5 REPEATER PANELS

## GENERAL



PR 5

Panels of remote signalling PR allow to give alarm signalling of insulation's monitoring devices HRI.

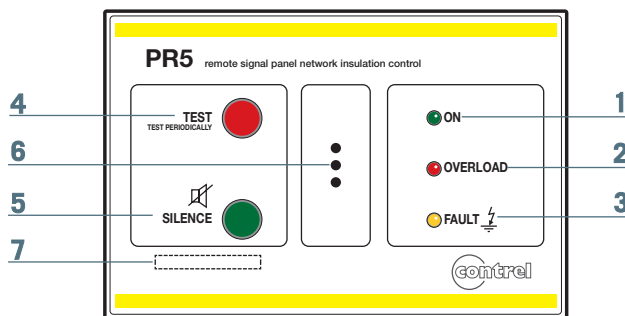
HRI devices monitor permanently insulation's level and the overload of supply network in medical use rooms (IT- M networks).

Signals of low insulation alarm and/or overload could be signalled in rooms supplied from network and by board, which incorporate signals with LED of active device and low insulation alarm (and overload, if it is

forecasted).

They have also an acoustic signaller incorporated, a test button and a button for stopping acoustic signal.

Board is flush mounted universal box (E503) in order to be located in rooms supplied by under-control network. Maximum of repeater boards associable with HRI device is 2.



## MODEL

### PR5 Repeater panel for HRI-R22t, HRI-R24, HRI-R40V, HRI-R40W (indication of low insulation alarm)

- 1 green LED of signalling active device (voltage presence)
- 2 red LED of sigalling overload or overtemperature
- 3 yellow LED of sigalling FAILURE (low insulation)
- 4 test button for testing functionality of HRI system and PR board
- 5 internal buzzer
- 6 internal buzzer
- 7 space for notes



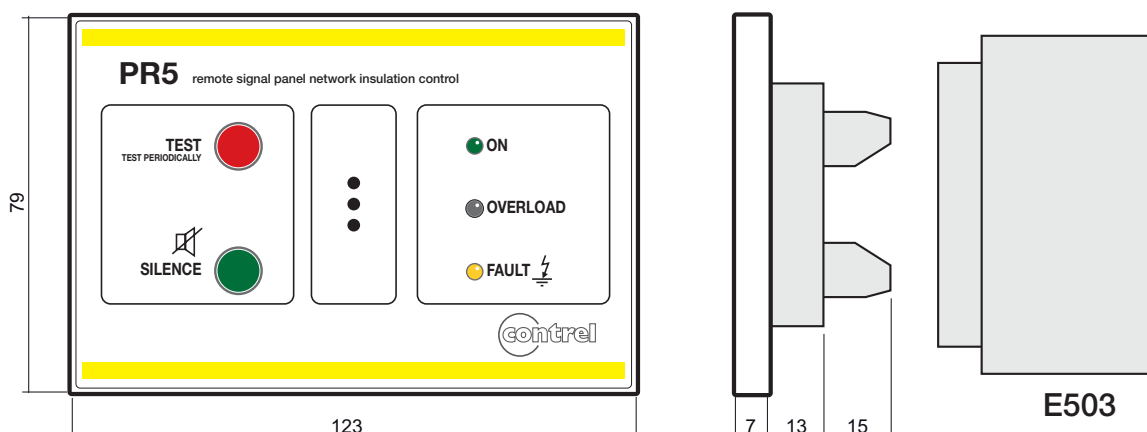
## ELECTRIC CHARACTERISTICS

Operative voltage	12 - 24 Vac/dc (from HRI device)
Signallings	green led NETWORK - red led ALARM of overload yellow led ALARM of FAILURE low insulation, acoustic signal
Operators	test button - stopping acoustic signal button
Working temperature	- 10 ... + 60 °C
Storing temperature	- 25 ... + 80 °C
Relative humidity	MAX 95 %
Insulation test	2.5 kVrms 50 Hz for 60 sec
Connection type	by screw terminals - wire section MAX 2.5 mm <sup>2</sup>
Protection's degree	IP 30 front panel - IP 20 case
Mounting	universal flush-mount box E503
Weight	approximately 200 g
Standard reference	CEI-EN 61010-1   CEI-EN 61557-8 / VDE 0413 part.8 CEI 64.8/7-710 V2/ IEC 60364-7-710 / UNE 20615   CEI-EN 61326-1

## ASSEMBLING PANEL'S CONNECTIONS



## DIMENSIONS



# EML-12S

SERIAL REMOTE CONCENTRATOR

## FOR REMOTE MONITORING OF NETWORK'S PARAMETERS

### GENERAL

Serial remote concentrator is a device which allow remote monitoring of parameters originated from insulation's supervisors for medical use rooms HRI-R40 and HRI-R40W with serial output RS485.

By serial communication RS485 Modbus-RTU protocol different supervisors are connected to concentrator EML-12S.

Device could supply degrees of insulation and impedance's resistance, of network's temperature and current, and eventual alarm's presence with

data-logger function.

By its time, device could be connected to a PC and transmit different parameters gathered. It could also be connected to a remote visualisation panel with function of signalling alarms in network.

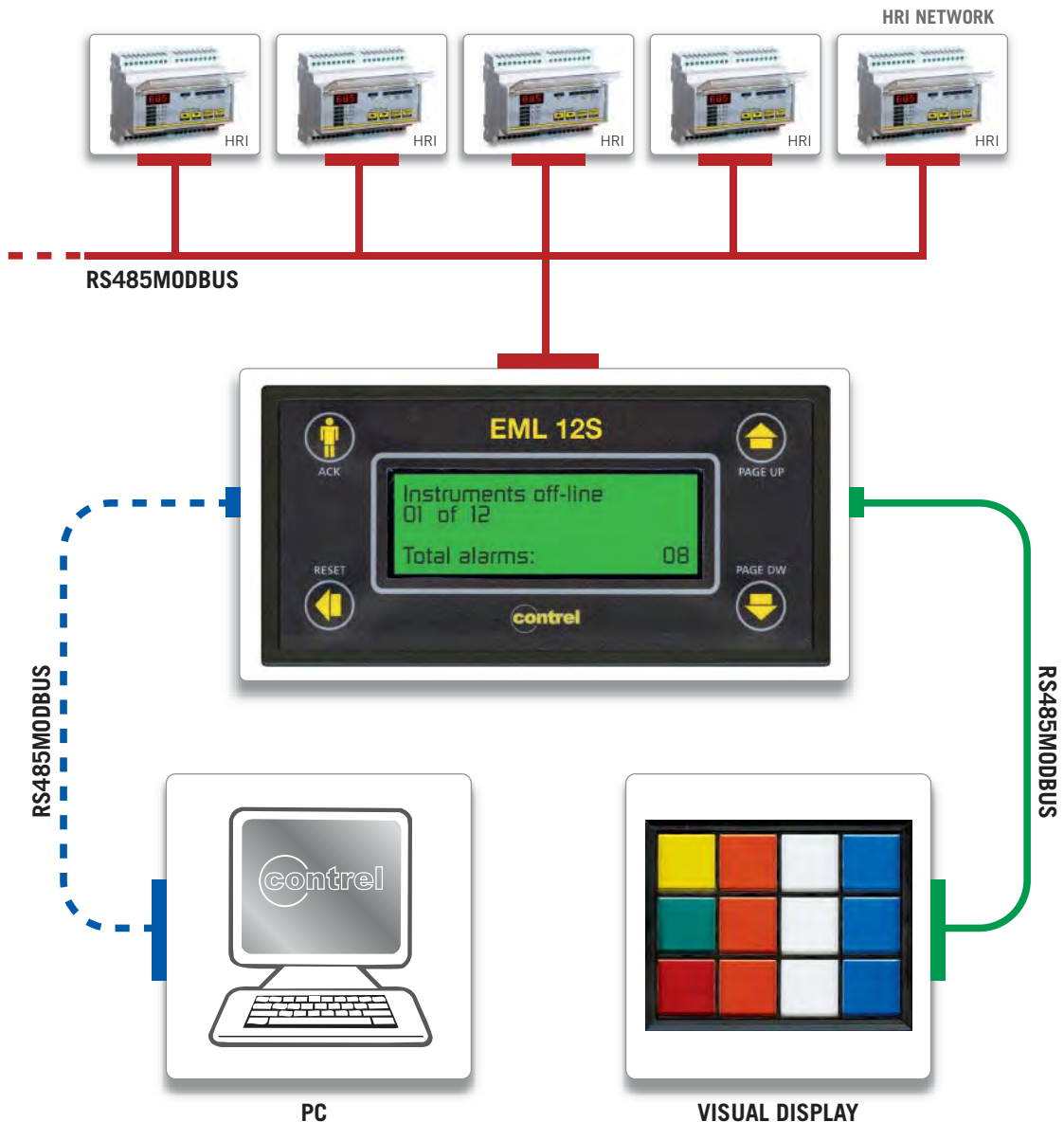
### MODELS

EML-12 remote concentrator Vaux 24 Vdc/ac

### HRI NETWORK

Devices HRI-R40 or HRI-R40W are connected to EML-12S concentrator by serial output RS485.

**Maximum 12 HRI devices could be connected**



## VISUALISATION



For every device connected it's possible to visualise

**INSULATION'S RESISTANCE,  
IMPEDANCE,  
TEMPERATURES AND CURRENTS.**



For every device connected it's possible to visualise instrument's status

**ON = (online)  
OFF (offline).**



For every instrument it's possible to visualise last 4 intervened alarms.

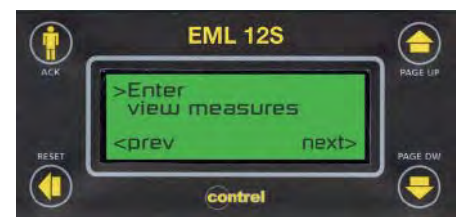
### EVENTS

When there is an alarm, it's automatically visualised on display with indication of total alarms active in that moment.



### MENU AND SETTINGS

By menu, it's possible to set parameters as date and hour, language, number of connected devices and settings for serial communication.



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ISO 9001:2008  
**9105-C035**



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### GENERAL

The system is composed by:

- 1) Alarm card
- 2) Power supply and flashing card
- 3) Relay card
- 4) Timing card
- 5) Card holder unit
- 6) Power transformers and Dc/Dc converters
- 7) Signalling cells, SQ type (with LED on request)

It's available in 2 different executions:

- The first one being supplied with its various components unassembled, but fitted with their corresponding wiring terminals.
- The second is being supplied as a prewired solution in a flush mounting rack.

The first solution is the most versatile either for assembling or displaying.

As far as its operation is concerned, the alarm unit (optical and acoustic signalling) is excited, when its input contact changes its status ( i.e. When it changes from open or normal condition to close or alarm condition).

The alarm action behaviour follows the detailed patterns given in the ISA selection table, at the page 5, according with the selected sequence.

The system is also fitted with terminals for wiring external push-buttons for:

- Sequence test, in order to control the system's efficiency.
- Acknowledge, in order to intervene on the siren during its normal operation.
- For resetting the cards, which memorize the tripping of the functions.

An interesting feature of the COMPALARM A, are the interconnections available at its splittable terminal, which makes the wiring much easier, as it allows to wire the terminal block detached from the card.

The particular position of the terminal block allows also to optimize the available space at the board.

### ELECTRICAL CHARACTERISTICS

Auxiliary power supply	24-48-110-220-380 Vc.a.
Operating contact voltage	18 ÷ 38 V
Current input	4mA Aproximately
Electronic circuits consumption	Negligible compared to that of the lamps
Optical signalling output	250 mA max
1 change-over contact for acoustic signalling	10 A - 250 Va.c. Resistive load
Output relay for remote control 1 change-over	10 A - 250 Va.c. Resistive load
Remote repeating output relay (for all points) 1 change-over	10 A - 250 Va.c. Resistive load
Static output for remote control of the relay	24 Vc.c - 250 mA max
Flashing frequency	1F Slow frequency 2F Fast frequency
	1÷1,5 Hz 2÷3 Hz
Power of transformers a.c./a.c.	30-50-100-200 VA
Power of converters d.c./d.c.	50-100-250 W
Working temperature	-10°C ÷ 60°C
Storing temperature	-20°C ÷ +80°C
Relative Humidity	90%
Isolation test	2kV 60 seg.

\*For d.c. Voltage generated by rectifiers use filters FD

## TABLE OF SEQUENCES

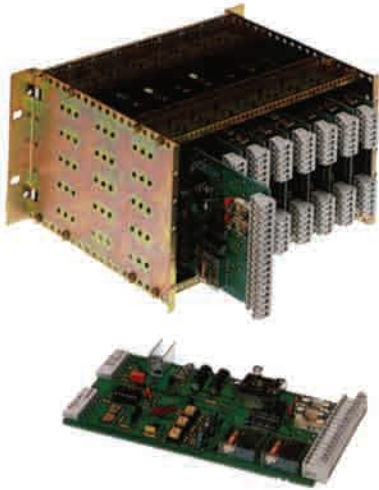
Sequence specifications		Type of signal	Normal conditions	Alarm condition	After acknowledge		Return to normal conditions	After reset	Push buttons required
ISA-RP181	ISA-S18.1				Persisting Alarm	Momentary Alarm			
ISA1	A	Optical	Off	Flashing	On	Off	Off	---	Acknowledge
		Acoustic	Silent	Blows	Silent	Silent	Silent	---	
ISA1A	A-5	Optical	Off	On	On	Off	Off	---	Acknowledge
		Acoustic	Silent	Blows	Silent	Silent	Silent	---	
ISA1 B	A-4	Optical	Off	Flashing*	On	---	Off	---	Acknowledge
		Acoustic	Silent	Blows*	Silent	---	Silent	---	
ISA1 C	A-4-5	Optical	Off	On *	On	---	Off	---	Acknowledge
		Acoustic	Silent	Blows*	Silent	---	Silent	---	
ISA2 A	R-8	Optical	Off	Flashing fast	On	Flashing slow	Flashing slow	Off	Acknowledge and reset
		Acoustic	Silent	Blows*	Silent	Blows	Blows	Silent	
ISA2 C	M	Optical	Off	Flashing	On	On	On	Off	Acknowledge and reset
		Acoustic	Silent	Blows	Silent	Silent	Silent	Silent	
ISA2 D	M-5	Optical	Off	On	On	On	On	Off	Acknowledge and reset
		Acoustic	Silent	Blows	Silent	Silent	Silent	Silent	
**		Optical	A) On B) Off	Flashing	Flashing	A) On B) Off	A) On B) Off	----	Acknowledge
SPECIAL CL 101		Acoustic	Silent	Blows	Silent	Silent	Silent	---	

\* Valid condition during the pulse duration only, this is to say, the momentary alarms come back to normal condition without pressing on the acknowledge push-button.

\*\* The present sequence is particularly suitable for the motor operation control.

The (A) shows that motor is running

The (B) shows that motor is stopped



### GENERAL

#### Alarm card

With 100x190-mm size, it is capable of governing up to 6 alarm points (4-alarm point card is also available). This card is subdivided in 6 or 4 different sections, in order to allow them a totally independent operation, to prevent that good working of more than one alarm point can be affected by failure of one single component.

This card is capable of accepting either normally open input contacts (NO) or normally closed contacts (NC). Selection is made by means of dipswitches, placed on the card and can be varied at any instant without involving the electronics circuitry.

The selection of the input contact is independent for each point and therefore, the card operation is being possible partly with some normally open contacts (NO) and other normally closed contacts (NC).

In a few applications it can be of use to discriminate which of a certain group of alarms has tripped first. To check this, it is necessary to resort to a different behavior between the first tripped alarm and the subsequent alarms, by using the first out. Successive alarms show to be in already acknowledged, in this case.

The lamp does not flash and siren remains still when tripping of successive alarm, this until the first tripped alarm has been acknowledged.

The first out is applicable to the sequences ISA 1 - ISA2C - ISA2A (A-M-R8), whilst it is of no use if applied to sequences ISA1 A, ISA1 B, ISA1C - ISA1 D (A5-A4-A45 -M5).

The ISA1 is the most used sequence with first out and it is identified with the reference ISA4A (F 1A). When the card is arranged to operate with first-out sequence, adequate dipswitches are fitted to it. It allows the eventual exclusion of the function for each alarm, thus ensuring the possibility of miscellaneous rating on same card and in the meantime allowing variations in the rating logic during normal use without variations on the electronic circuitry.

The operated alarm sequences are all those as per ISA-S18.1 specifications, the most common of which are those indicated in the table at page 4.

#### Power supply and flashing card

With 100 x 190 mm overall size, it can produce 2 flashing types, 1,1,5Hz and 2,3Hz frequency.

On the flash card is located also the relay for the acoustic signaling, the capacity of which is featured by 10 A 250 Vac and 2500 VA as max commutable power.

There is also possibility of inserting in same card the remote control cumulative relay for distance detection of a tripped system, having the same characteristics as for the acoustic signaling relay.

The auxiliary power supply is also signaled by means of green LED on the flashing card. Whilst the simple and double flashing are visualized by two red LEDs, which show the alarm condition.

#### Relay card

With 100x190-mm size, it is capable of housing 6 relays with the following electric characteristics of capacity: 10A, 250Vac and 2500VA, as commuting power.

Said card is used when it is necessary to remotely detect the signals of all single alarm points.

There are 2 different versions available:

- The first one with repeating relays of the alarm condition input contact, i.e. they are dienergized when the alarm signal appears, independently from effected operations.

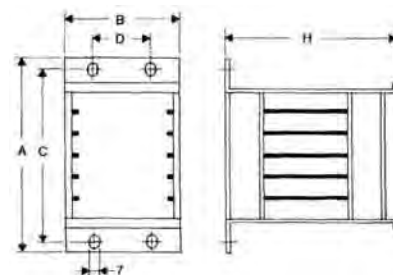
- The second version with relays, according with the alarm sequence, but only if acknowledgement operations procedures and reset are ended, according with the selected alarm sequence. The wiring with the alarm card, is achieved by using the appropriate flat connection. The relay card should be inserted close to the alarm card.

#### Cardholder

They are available for 4-7-11-15 card locations, in basic versions. They have the same dimensions as those given in table here below.

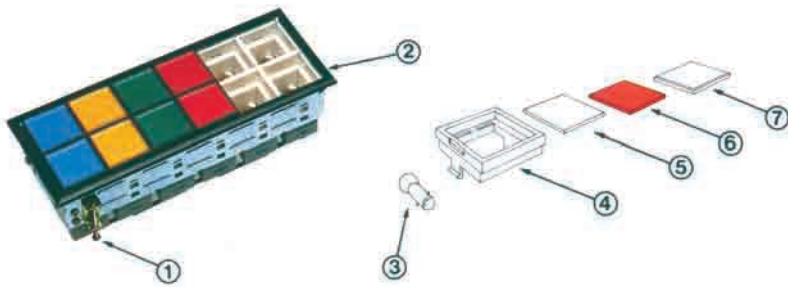
These locations can be combined so as to reach the desired number of card locations (by using the interconnection card).

### DIMENSIONS



Type	DIMENSIONS				
	A	B	C	D	H
CH4	200	132,5	183	57	200
CH7	270	132,5	253	57	200
CH11	375	132,5	360	57	200
CH15	484	132,5	467	57	200

### CONFIGURATION



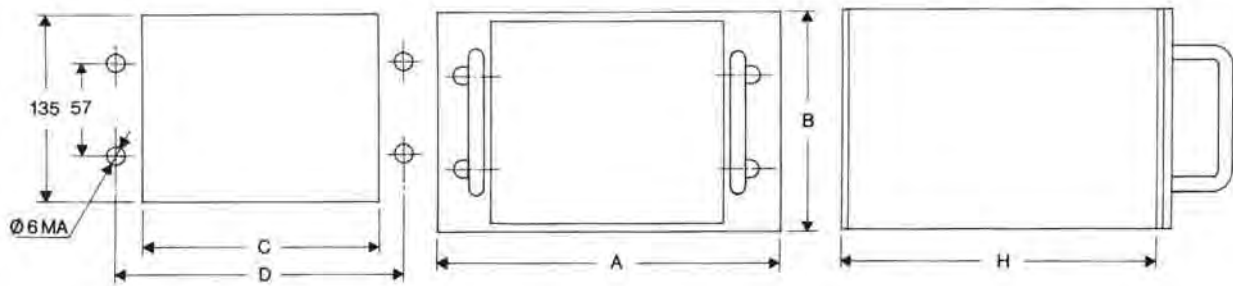
### DESCRIPTION

- 1- Fixing clips
- 2- Black external frame
- 3- Lamp
- 4- Lens fixing frame
- 5- Printing plate
- 6- Colour plate: blue, green, red, yellow and white
- 7- Lens

### ELECTRICAL CHARACTERISTICS

Operation voltage	24 ÷ 30 V
Lamps power	1W
Lamps type	BA9S
Number of lamps	1 per basic cell type A
Maximum number of points	200 points
Isolation resistance	10 Mohm or over (Megger 500V)
Isolation test	2kV a.c. 60 seconds
Colour of plates	White, red, green, yellow, blue
Material	Synthetic resin
Screw terminals	Screw M 3.5
Working temperature	-20 ÷ + 40°C
Relative humidity	90%

### DIMENSIONES



Type	Points Number	Dimensions					
		A	B	C	D	E	H
Ep12	12	200	150	170	183	135	300
Ep18	18	270	150	240	253	135	300
Ep24	24	270	180	240	253	165	300
Ep30	30	375	150	347	360	135	300
Ep39	39	484	150	454	467	135	300
Ep48	48	484	180	454	467	165	300
Ep60	60	484	210	454	467	195	300



## DIMENSIONS and DRILLS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	●●			
																				Dimens.		●●	
																				A	C	B	D
42	35	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	42	72
72	65	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	102	132
102	95	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	162	192
132	125	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	222	252
162	155	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	282	312
192	185	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	342	372
222	215	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	402	432
252	245	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160	462	492
282	275	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180	522	552
312	305	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	582	612

● Number of rows

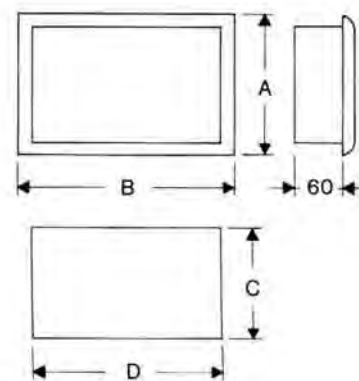
●● Number of columns

- The number of visualisation cells is equal to the result of multiplying the number of rows by the number of columns.
- The external measures are given by the dimensions A (height) B (width). The drill dimensions are C (height) and D (width).
- The tolerance is of 0 , 1 mm.

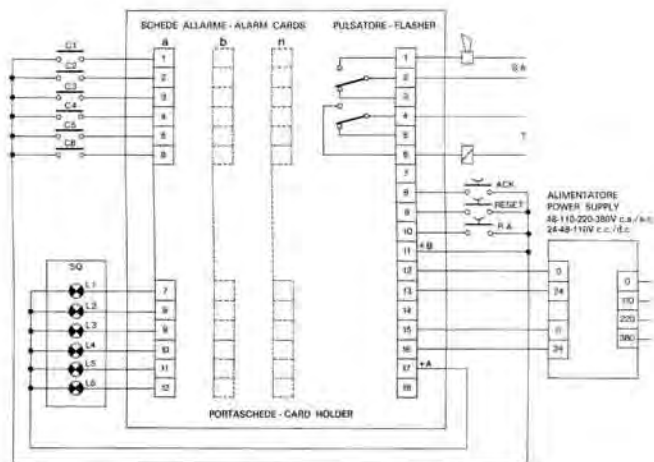
Example: 5 rows by 7 columns visualisation panel.

- The total number of cells would be 35
- The external dimensions would be 162 mm of height by 222 of width
- The drill dimensions would be 155mm height by 215 of width.

There are also fully pre-wired solutions for flush mounting in four standard versions with 12-18-20-39 points.



## WIRING DIAGRAM

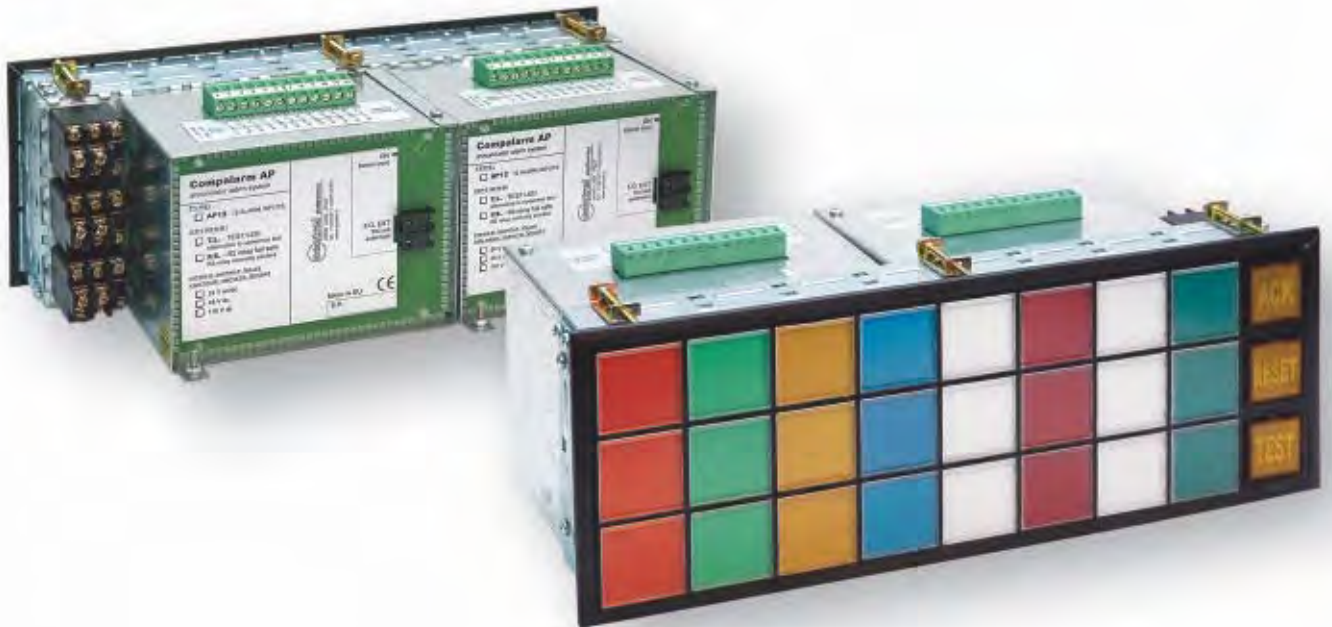


## DESCRIPTION

- a/b/--/n/** Alarm cards (in each card of 6 points the terminals 1÷6 are corresponding to the alarm inputs, whilst the terminals 7÷12 correspond to the lamps output)
- Flascher** Power supply and flashing card.
- S.A.** Acoustic signaling relay.
- T** Remote control relay for remote cumulative detection of the system in alarm condition.
- ACK** Acknowledgement push button.
- RESET** Reset push button.
- P.A.** Test of sequence push button
- +A** Common for lamps.
- +B** Common for contacts and push buttons.

**Note:** The common for lamps (+A) and the the common for contacts and push buttons (+B) should be well identified, in order to have a complete separation of the alarm electronic systems and the external circuits (input/output contacts, lamps -external push buttons, supply).

# COMPALARM AP



## GENERAL

The **COMPALARM AP** is a point alarm system, with as many normally closed input contacts. It gives the possibility of selecting the alarm sequence according with 30 x 30 mm cells, fitted with ultra bright white LED's, achieving a low power consumption and a lamp maintenance free operation.

The interconnecting possibility allows to design other supervision alarm systems with many extensions.

The alarm systems type **COMPALARM AP** has been conceived with its very reduced dimensions, but maintaining the characteristics of the **COMPALARM A** system.

This system has been studied for the most critical uses, i.e. electrical plants in which a malfunctioning of a single component should only harm the function of one channel at most.

Each channel is protected by optoisolators, which keep free of any external disturbances.

Every channel is fitted with a micro-switch allowing the selection of a normally open (N.O.) or a normally closed (N.C.) contact.

The **COMPALARM AP** allows also the selection of two types of sequences by means of a micro-switch, either ISA1 (ISA A) or ISA2C (ISA M) and for both sequences the first-out function (F1A and F1M), channel per channel. It is also possible to select a different functioning of the output relays for the acousting signalling in order to have 2 signalling types according with the alarm type.

With regard to this possibility, there might be the following options, which might be selected by a micro-switch:

- 6 inputs on relay 1 and 6 inputs on relay 2
- 8 inputs on relay 1 and 4 inputs on relay 2
- 10 inputs on relay 1 and 2 inputs on relay 2
- 12 inputs on relay 1 and the relay 2 working as cumulative for indication of a group in alarm situation

The visualisation is being made by special LED's granting a high brightness together with a long lasting life (millions of working hours), which saves the lamps replacement problems.

### Features:

- 12 contact inputs
- 4 push button inputs (test, horn off, ack, reset)
- Optoisolated inputs
- Normally open / closed input contacts
- Horn output
- Alarm cumulative output
- Flush panel mounting
- 1 wire expansion line
- Low power consumption
- No lamp maintenance required
- Fauto-reset power supply fuse
- 4 pre-selectable sequences:  
ISA A - ISA M - ISA F1A - ISA F1M

## WORKING PRINCIPLE

Whenever there is a change over the input contacts, from the normally open (N.O.) to close situation or from normally closed (N.C.) to open situation, the COMPALARM AP device changes from rest condition to the alarm condition.

There will be therefore an optic and acoustic signalling with the particular behaviour, which will depend on the particular selected sequence (see the sequence table).

All the operations required by the sequences, which the device can perform, may be achieved by the push buttons, as silence, acknowledge and reset.

The silence push button particularly, reacts only on the siren, without interfering the lamp.

Whenever the silence push button is not being used, it is possible to perform simultaneously the silence of the acoustic alarm so as the change of the optic signalling from flashing to fix, by using the acknowledge push button.

We can perform the complete test of the system through the test push button.

On request, it is possible to perform the LED's test only, instead of the complete test.

## SPECIFICATIONS

Supply voltage	24 Vca/cc or 48 Vcc or 110 Vcc $\pm$ 20 %
Frequency	cc - 50 $\div$ 60 Hz
Power consumption	10 W MAX
Terminals	Plug in terminal block for screws
Operating temperature	0 $\div$ 60 °C
Storage temperature	- 20 $\div$ 70 °C
Relative humidity	45 $\div$ 90 % (non condensing)
Max vibration allowed	0,5 G
Operating position	Whatever
Line fuse	Internal autoreset
Overall dimensions	132 x 102 x 80 mm
Cut-out dimensions	125 x 115 mm
Weight	800 g MAX
EMC compliance	Directive EMC 89/336/CEE
Emission	EN 50081-1
Immunity	EN 50082-2
Inputs	12 optocoupled channels
Voltage	24 Vca/cc or 48 Vcc or 110 Vcc $\pm$ 20 %
Current	2,5 mA MAX      3,7 mA MAX      5 mA MAX
First out line	1000 m MAX
Outputs	2 NO-N-NC contacts
Max switching voltage	220 Vcc / 250 Vca
Max switching power	20 W MAX
Output protection fuse and crowbar	1 A fast
Galvanic separation	Input   Output   Supply
Test voltage	2500 V 50 Hz, 1 Minute
Isolation voltage	300 V <sub>RMS</sub> MAX
Display	Hi-efficiency white LED
Illumination face	30 x 30 mm
Lens	28 x 28 mm
Engraving area	27 x 27 mm
Screen colors	Orange, white, red, green, yellow, blue



## VERSIONS

The COMPALARM AP alarm systems is available with various auxiliary supply and operation voltages.

The available types are as follows:

- auxiliary supply and contact voltages 110 Vcc
- auxiliary supply and contact voltages 48 Vcc
- auxiliary supply and contact voltages 24 Vca/cc

## MODELS

The available executions are as follows:

- 12 points execution type COMPALARM AP12
- 24 points execution type COMPALARM AP24
- 36 points execution type COMPALARM AP36
- 48 points execution type COMPALARM AP48
- other on request

Should it be necessary to extend the first out function on the full system and not only to a 12 points groups, on the AP24, AP36, AP48 executions, it is necessary to use FOO connecting accessory.

It's possible to have other executions with a multiple of 12 number of points (ex. 60).

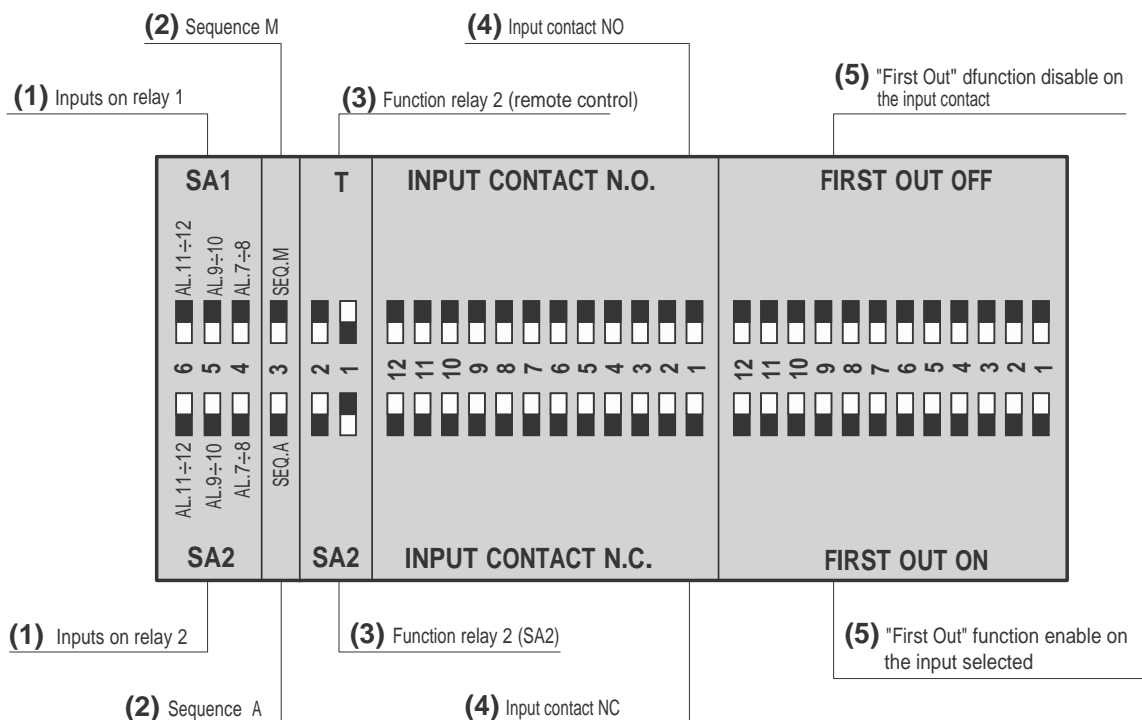
## ACCESSORIES

Connector and cable for the FIRST OUT connection between two or more COMPALARM AP units.

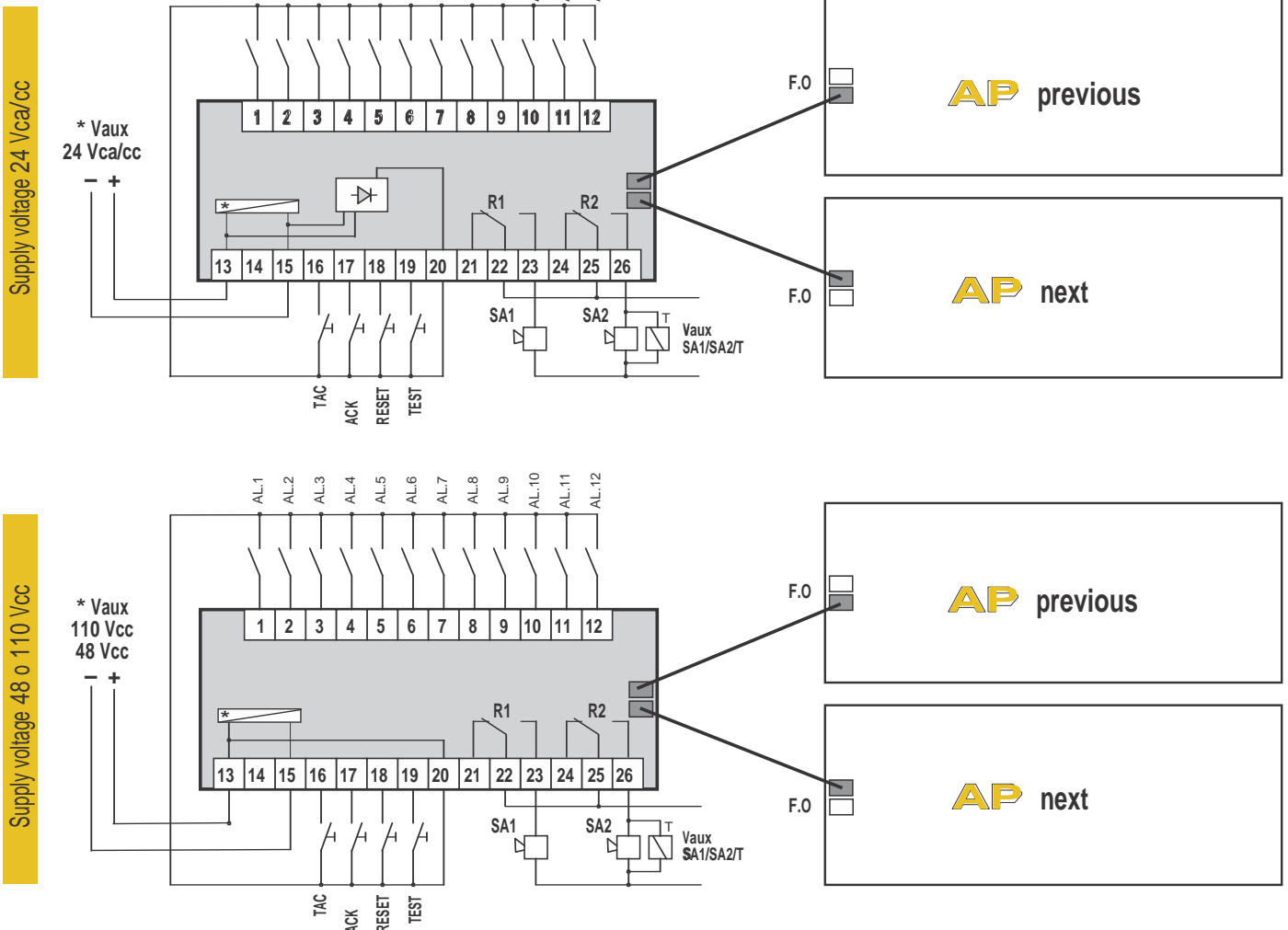
## OPTIONS

- test of LED (as alternative to the test of sequence)
- sifail safe (relay 2 normally excited)
- incorporate push buttons

## PROGRAMMING

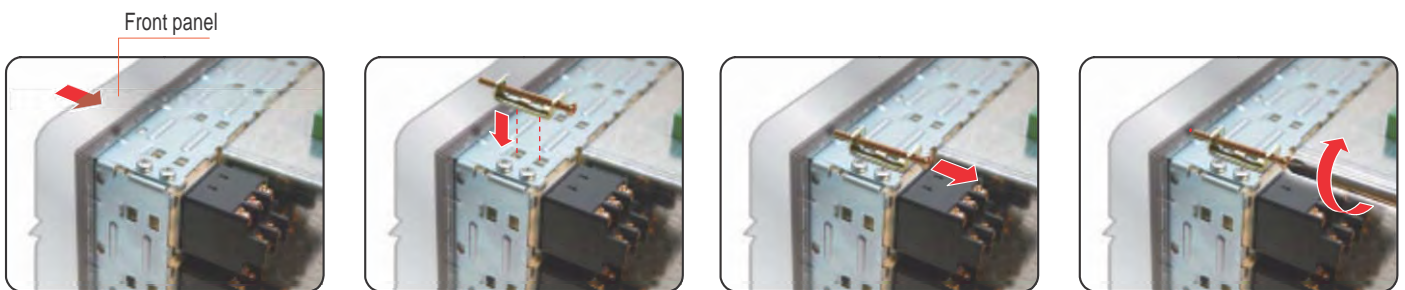


## CONNECTIONS



## GROUP FIXING

5



**1** Insert the device by the front of the panel through the available location.

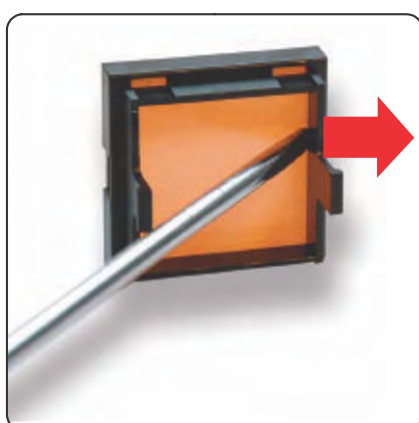
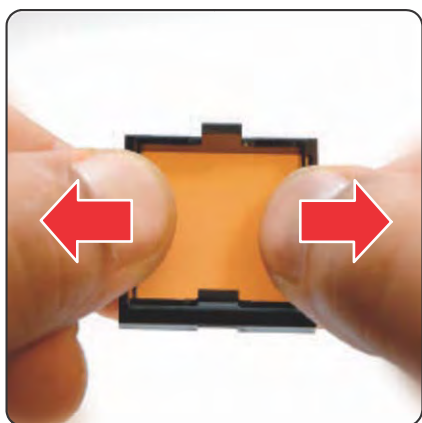
**2** Install the fixing devices into their available grooves, as shown in the image and screw down up to their complete fixing.

- Should the device be subject to vibrations, block the screws with the varnish or similar fixing material.
- The number of fixings varies according with the dimensions of the group, which should be supported. Four fixings are sufficient for a basic unit, up the maximum of twelve for 16 units groups.

FRONT PANEL

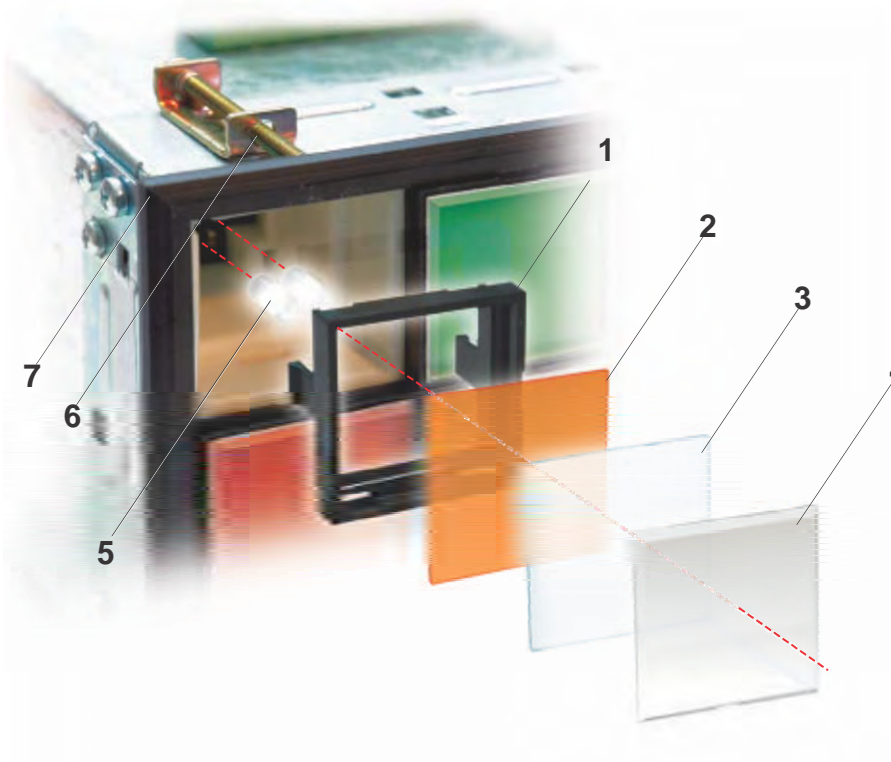


1  
For removing the lens groups, it's sufficient to insert the screwdriver tip into the frame's groove and lever up slightly, as indicated .



2  
To separate the parts of the group, press on the rear of the plate, enlarging slightly the frame, as indicated on the left image, or levering up with a small screwdriver.

COMPONENTS



- 1 Frame
- 2 Pcolored filtere (BLUE/GREEN/RED/YELLOW/WHITE/ORANGE)
- 3 Printing plate
- 4 Lens
- 5 Lamps
- 6 Screws
- 7 Frame

For printing, it's possible to print the number 3 part, or introduce a printed transparent film, similar to those used in luminous screens with printed texts, preferably printed with laser printers.

# PANEL SIGNALING SQ

The SQ type basic signaling cells are available in the 30 x 30 mm versions.

From the cells, it is possible to obtain other four types (A-B-C-D). The 30 x 30 mm dimension has been chosen, since one may reach the DIN 72 x 72 dimension with a possible combination of 4 cells. All above to allow its installation with other systems built, according with DIN standard.

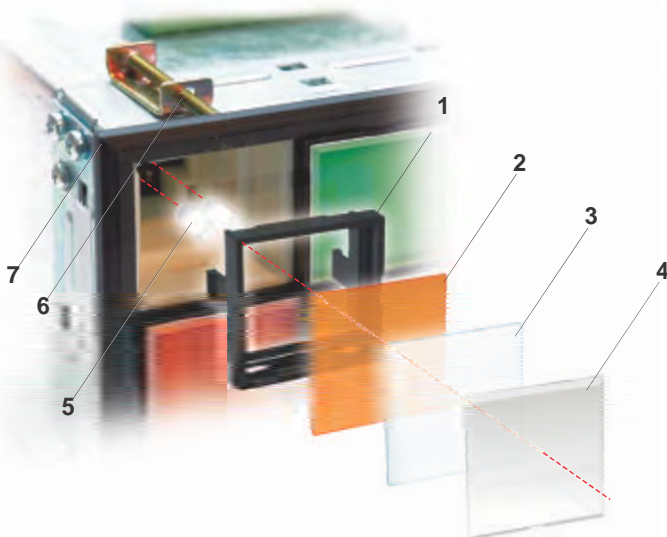
The SQ series are prepared to accept incandescent lamps or MULTILED, with BAS9 fixing and a power of 1W.

It is possible to reach up to 200 cells, with the COMPALARM A.

The lamp substitution is being made from the front side of the panel. While in the case the white LED are used, the substitution of the same must be made from the rear of panel. The available tensions are 24 V (when the visual display are with the alarm system COMPALARM A) or 48 - 110 - 230 (this last tension only for the white LED high light).



## CONFIGURATION AND DESCRIPTION



- 1 Black external frame
- 2 Colour plate (BLUE/GREEN/RED/YELLOW/WHITE/ORANGE)
- 3 Printing plate
- 4 Lens
- 5 Lamp
- 6 Fixing clips
- 7 Lens fixing frame

For the printing it is possible print the particular 3 or insert a transparent film of the type for projectors.

Using frames of various dimensions it is possible to create larger windows, grouping more luminous indications.

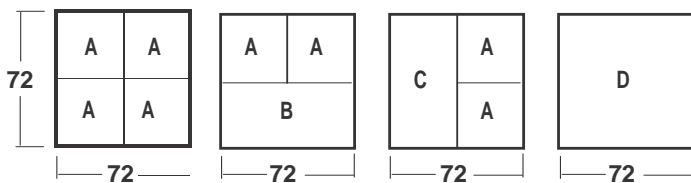


Plate Type	A	B	C	D
Dimensions	30x30	60x30	30x60	60x60
Printing area	25x25	55x25	25x55	55x55





## DIMENSIONS AND DRILLS

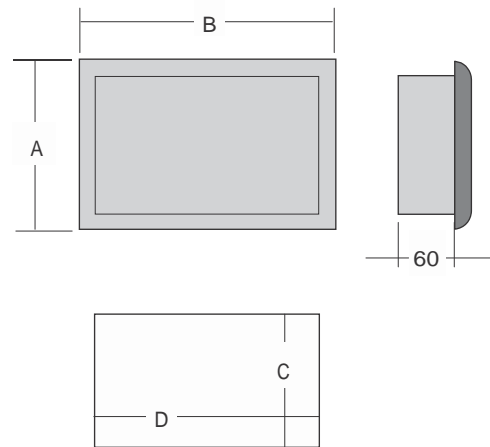
ROWS	COLUMNS		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20
	A	B	42	72	102	132	162	192	222	252	282	312	342	372	402	432	462	492	522	552	582	612
		C	D	35	65	95	125	155	185	215	245	275	305	335	365	395	425	455	485	515	545	575
01	42	35	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
02	72	65	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
03	102	95	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
04	132	125	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
05	162	155	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
06	192	185	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120
07	222	215	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140
08	252	245	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120	128	136	144	152	160
09	282	275	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	162	171	180
10	312	305	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200

• The number of visualisation cells is equal to the result of multiplying the number of rows by the number of columns.

- The drill dimensions are C (height).
- The tolerance is of 0,1 mm.

Example: **5 rows by 7 columns visualisation panel**

- The total number of cells would be 35.
- The external dimensions would be 162 mm of height by 222 mm of width.
- The drill dimension would be 155 mm height by 215 mm of width.



## ELETTRICAL CHARACTERISTICS

Operation voltage	24 ÷ 30 V
Lamps power	1 W MAX
Lamps type	BA9S or MULTILED BA9S or white LED high light
Number of lamps	1 per cell type A 30 x 30 - 2 per cell 60 x 30 - 4 per cells 60 x 60
Maximum number of points	200
Isolation resistance	> 10 Mohm (Megger 500 V)
Isolation test	2 kVca 60 seconds
Colour of plates	White, red, green, yellow, blue, orange
Material	Synthetic resin
Screw terminal	Screw M 3,5
Working temperature	-20 ÷ 40 °C
Relative humidity	90 %

### GENERAL

**Compalarm B** is an alarm system conceived with the aim of optimising the space saving so as to enabling its installation in standard civil buildings. It doesn't need of electric panel, and it can be housed in a flush mounting box.

A surface-mounting version is also available. This system is suitable for the control of 6 points, with information received from voltage free external contacts, either normally open (NO) or normally closed (NC).

The selection of contact types is made by means of dipswitches, placed inside of the device. Displaying of alarm condition is obtained through LED, whilst the acoustic is blown by an internal buzzer. Every alarm point is also provided with a changeover contact, which repeats with accuracy the input contact condition, for eventual remote repeating requirement

An output relay for possible repeating of acoustic signal is also available.

"COMPALARM B" is also provided with a particular operative logic, which allows its installation in unattended places. This, because after a certain period of persisting alarm condition, the acknowledgement takes automatically place.

The automatic acknowledgement is clearly to affect the acoustic signalling, whilst keeping the optical indication of an alarm, unchanged.

As far as its construction is concerned, "COMPALARM B" is practically immune to disturbances, due to its optoisolators separation, between the external contacts and internal circuits on alarm inputs. So as to the relays separation, between the internal circuits and the eventual remote repetitions.

### Operation

When powering the unit or when returning from a Voltage black out, the alarm system comes to rest, i.e. without optical nor acoustic signalling.

When the input contacts change position, due to a signal reception, "COMPALARM B" becomes active, with LEDS flashing. The relay is excited making the buzzer to blow intermittently.

After the manual acknowledgement, the buzzer will remain silent, and the light will be kept fixed, in case of the failure still existing. Otherwise, if the problem is over, the light will be Off.

The fix lighted LED keeps on until the external contact comes back to normal condition, switching the LED off, therefore:

Shouldn't the acknowledgement be made, the buzzer will start some series of blowing periods. First will blow for 15 sec. and will rest for 20sec. Second will blow for 12 sec., and rest for 20 sec.. Third blows for 10 sec., and will rest for 15 sec., after that will finally blow for 8 seconds and it will definitely stop.

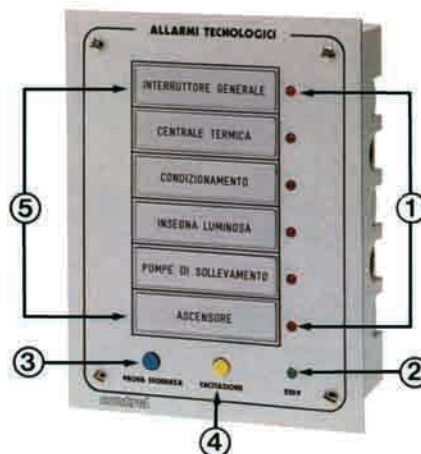
Nevertheless, the associated LED's to the alarm points will keep flashing, up to the next manual acknowledgement or coming back from voltage black out. All this allows an accurate supervision, on all events of the alarm system by the operator, even during unattended service time.

### ELECTRICAL CHARACTERISTICS

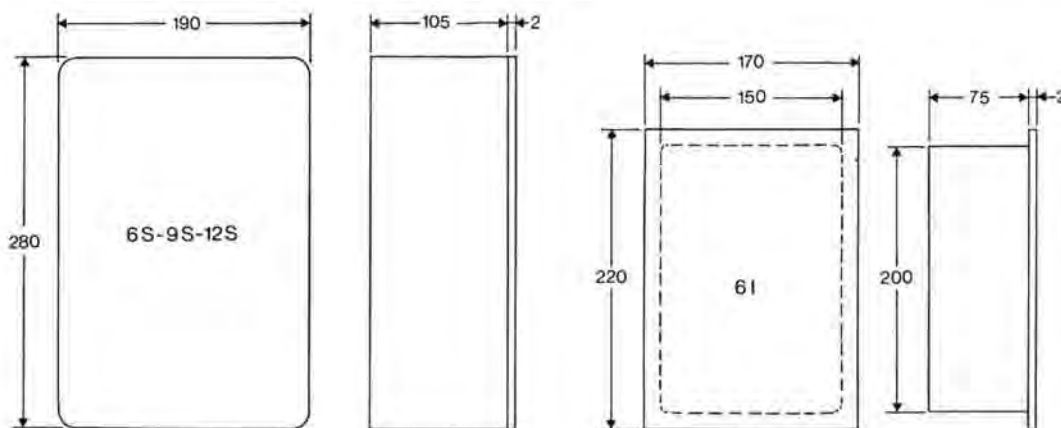
Auxiliary power supply	220V 50 Hz
Self-consumption	5 VA
Alarm sequence	ISA1
Input contact	N.O. or N.C. Selectable by means of dipswitch
1 changeover output contact per alarm point, which allows the repetition of the input contact position	
Contact power	5A
Commuting voltage	250V a.c. or 110V d.c.
Commuting power	960VA or 120W
Optical signal for presence of auxiliary supply	Green LED
Optical signal of alarm	Red LED
Acoustic signaling	With internal buzzer or with a change over relay for remote repetition
Sequence test push button	Built in
Push button for acknowledgment	Built in
Working temperature	-10°C ÷ + 60°C
Storing temperature	-20°C ÷ + 80°C
Relative Humidity	90%
Isolation test	2kV 60 seconds

## DESCRIPTION

- 1 - Tripped alarm signal with red LED
- 2 - Auxiliary supply presence with green LED
- 3 - Sequence test push button
- 4 - Push button for acknowledgement
- 5 - Alarms description printing plate



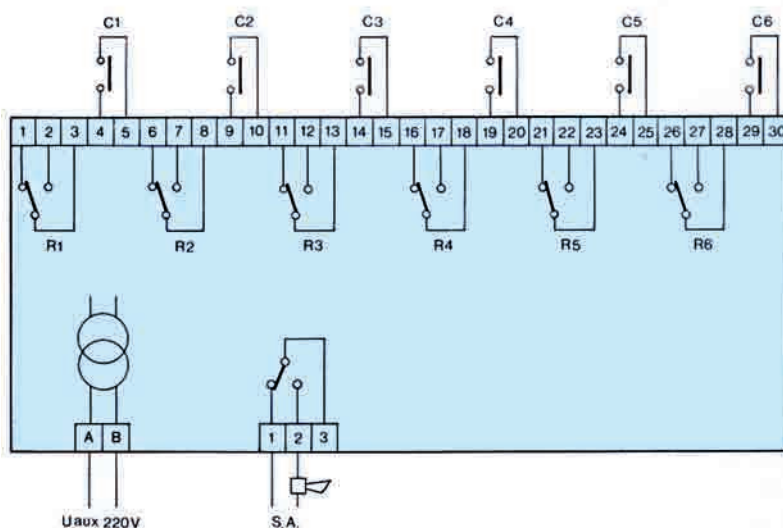
## DIMENSIONS



## WIRING DIAGRAM

### DESCRIPTION

- C1 ÷ C6 Alarm input contacts
- S.A. Remote acoustic signaling (on request)
- R1 ÷ R6 Repeating relays





- Compact alarm system, with a basic module of 12 signals.
- Multiple modules coupling possibility.
- Easy printing of the Alarm points description.
- Optoisolated inputs for 5,250V, NO or NC contacts, which can be set point by point.
- Signal power free inputs.
- 8 Alarm sequence possibilities according with ISA S 18.1
- Easy and fast programming by dipswitches.
- "First out" feature for recognizing the first tripped alarm
- Programmable memory and signalling mode, when return to normal.
- Interconnected systems for Alarm Management, distributed in various units.
- High safety and reliability, with self diagnosis function.

### GENERAL

The COMPALARM C3 is a very compact and efficient alarm system, suitable for 12 points connection, with NO or NC input contacts and LED signals.

This system is supplied in a DIN 72x144 mm enclosure for flush mounting. An easy alarm's description printing, easy wiring by plug-in terminals and a good front protection degree, come to complete this attractive alternative.

The COMPALARM C3 is being manufactured, in such a way to be capable to ensure an intrinsically safe reading of the inputs. The particular firmware and the internal watchdog, allow the functionality survey of the systems, in order to enable the outputs with fully operational instruments only.

The know how, used in the present instrument, has simplified the circuits up to a maximum, granting a high reliability and safety for avoiding false signals. It has also enabled to have a high immunity degree against external disturbance and signal management with increased voltage capability.

The electronic management system allows to program the alarm behaviour, according with the ISA S 18.1 standard, so as the inputs and outputs position.

### INPUTS

The COMPALARM C3 has 12 inputs that can be set as NO or NC by dipswitches. All inputs are optoisolated and can be supplied with any voltage between 5,250V ac/dc. It has been also foreseen the inputs for acknowledgement, test and reset push buttons. Every alarm and push button inputs may accept a big range of voltages with only one common, in order to allow the installation of the system in parallel with the loads to be surveyed (without using a back up relay) or with other annunciators.

### OUTPUTS

The outputs are fitted with two voltage free contacts relays. One of them is intended for the acoustic or alarm signalling and the other for a cumulative of alarms (normally excited or diexcited in case of alarm) for process activation approval, in presence of one active alarm (or non resetted yet) at least. The mentioned relay will also react due to a lack of power supply or due to its internal malfunction.

### INTERCONNECTION WITH OTHER MODULES

With the wiring of one cable through other similar devices, it is possible to enlarge the system, which will work as an unic system, in order to grant a correct operation of the various alarm sequences, "first out" function included (see table of ISA sequences). In such a case, the outputs can be detected by any of the interconnected modules.

Attention: In this case, the push buttons should be fitted with so many separated contacts as interconnected modules, in order to avoid the parallel input connection of different modules.

### PROGRAMMING AND OPERATION

Each COMPALARM C3 module accepts up to 12 contacts, with a common pole, either open or closed in a rest position, which can be set for each input by dipswitches, placed behind the alarms description panel.

The activation, memory and reset modes can be selected among the 8 most common sequences, according with the ISA 18.1 standard

ISA A - ISA F1 A - ISA F3 A - ISA M - ISA M 5 - ISA F1 M - ISA R 8 - ISA F1 R8

(See table of sequences for more information)

The mentioned sequences have following basic sequences:

- |           |  |
|-----------|--|
| ISA A     | Alarm signalling with automatic reset, after detection.  |
| ISA M     | Alarm signalling with manual reset after detection.  |
| ISA R 8   | Double flashing frequency for alarm signalling (fast for active alarm and slow when coming to normal status) with signalling to the return to normal situation and manual reset.   |
| ISA M5    | Signalling like ISA-M, but without flashing, when optical signalling.  |
| ISA F1... | "First out" function, to recognise the first tripped alarm, within a group, by means of the optical signal flashing (distinguishing the main alarm from other coupled alarms). The function will be reset after the detection. |
| ISA F3A   | A particular "first out" function, allowing the distinction of the first alarm from those "coupled alarms" and possible previous alarms already acknowledged.  |

## PROGRAMMING AND OPERATION

The programming has to be done, without power supply, by means of the dipswitches, placed behind the alarms description panel, with the help of the inscriptions, written nearby.

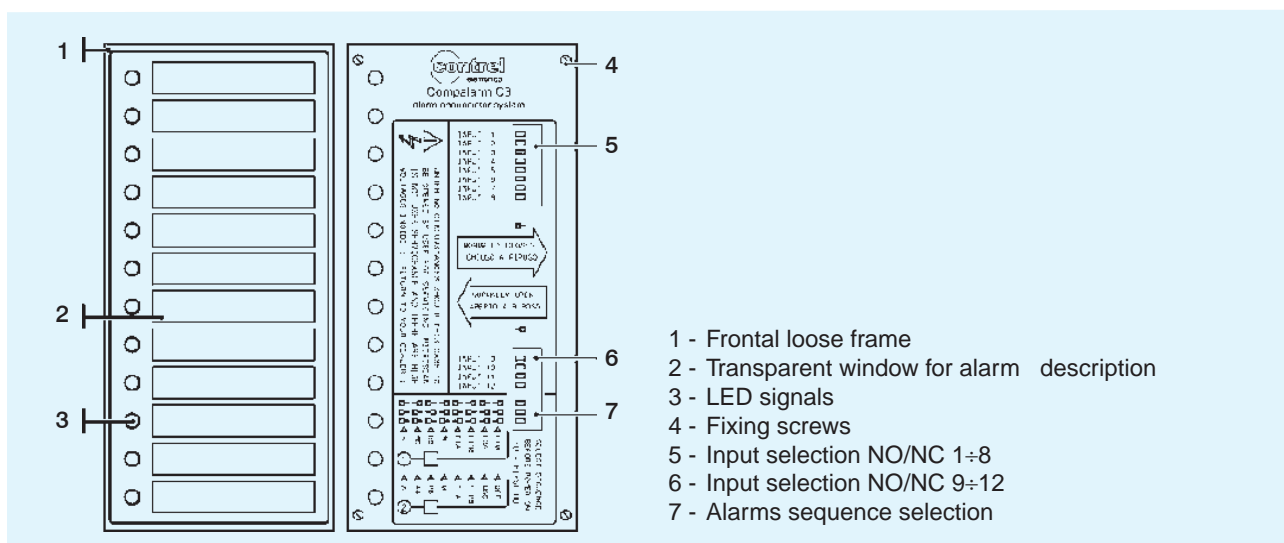
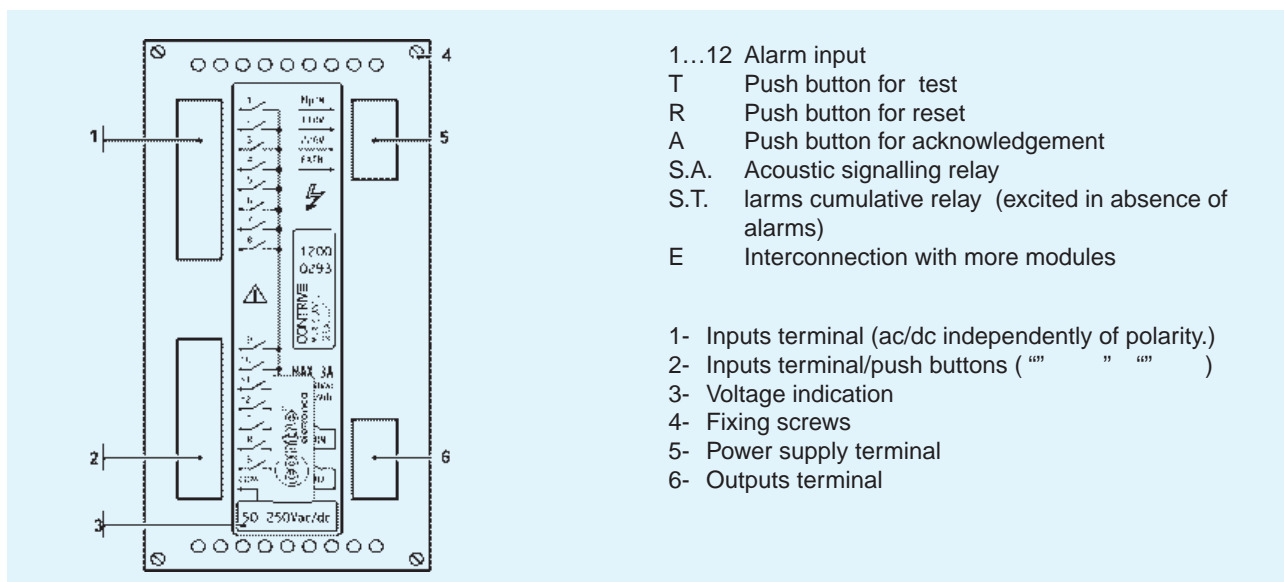
The alarm detection operations, so as the reset and the LED test may be performed by the external push buttons (for a single device or for various devices in parallel, depending on the used external connection) with normally open contacts. Please note that the alarm detection or acknowledgement is made by pressing the push button, but the reset operation is performed when the push button has been released, after it was pressed, according with the specifications, which foresee an acknowledgement of an avary.

## ALARMS DESCRIPTION

Two printing cards are supplied with the present instrument, to enable the user an easy description of the alarms. These can be made by printing a text or colouring spaces.

## MODELS

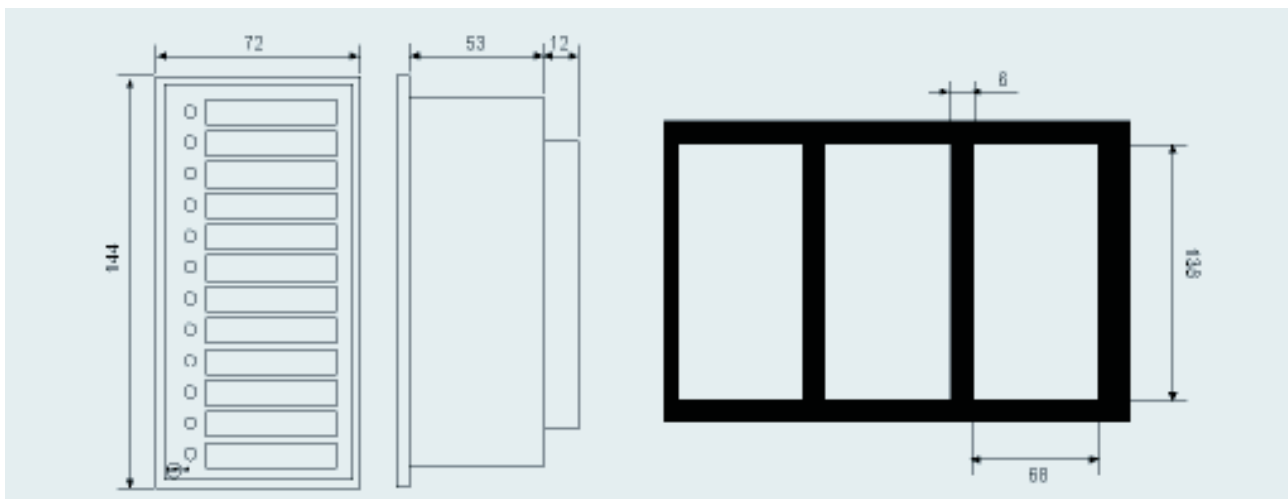
On top of the standard model, other sequence alternatives can be produced on request.



### TECHNICAL CHARACTERISTICS

Auxiliary voltage supply	115-230 V (24V) 50-60Hz
Self consumption	Max. 3VA
Inputs	12 alarm inputs (N.O. or N.C. selectable) 3 inputs for push buttons
Inputs voltage	5- 250 Vac/dc (to be specified)
Outputs	1 N.O. relay, for acoustic signal (acknowledgeable alarm) 1 N.O. relay (di-excited) for alarm cumulative / internal faults
Outputs max. Power	5 A 250 V resistive load – 3 A cosfi 0,4
Optical Signalling	12 red LED
Alarms signalling sequences	8 programmable according with ISA S18.1 standard
Internal fuse	500 mA delayed
Watchdog fuse	200mA
Inputs absorption	2,5 mA max.
Time detection of alarms	50 ms
Waiting time to switching on	5 sec.
Self diagnosis CPU	When switching on
Inputs/dipswitches self diagnosis	Continuous
Self diagnosis extension	Continuous
Self diagnosis push button	Continuous
watchdog software (T)	Lack of pulses
watchdog hardware	Fuse
Length of the extension line	Max. 10 km
Protection degree	IP 52 frontal- IP 20 enclosure
Storing temperature	-20÷ 80 °C
Working temperature	-10÷ 60 °C relative humidity max 90%
Enclosure	Self extinguishing
Dimensions	LxAxP 72x144x65 (DIN 43700)
Weight	350 g
Isolation test	-2kV 60 sec.-
Standard of reference	Isolation EN 61131-2/ EN 61000-2-4 EN 50204 I EC 1000-4-3 IEC 1000-4-6 EN 60255-6
Electromagnetic Compatibility	EN 50081-2 / EN 50082-2

### DIMENSIONS



# COMPALARM CO/sq

## VERSIONS FOR ONLY VISUALIZATION



CO.4 / sq



CO.3 / sq



## DESCRIPTION

The COMPALARM CO/sq is a very attractive and economic alternative to the traditional signalling lamps, by grouping 3 or 4 light signals.

COMPALARM CO/sq in a very compact enclosure 48 x 48 mm is available in different versions: CO.3/sq three lights points and CO.4/sq four lights points: these versions can be demanded with various different voltages, by accepting either dc or ac power supply.

The alarm description can be printed in a normal paper, in order to place it under the polycarbonate front panel, which will be fixed by a frame.

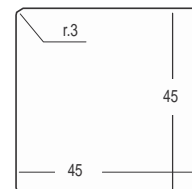
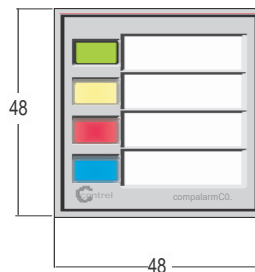
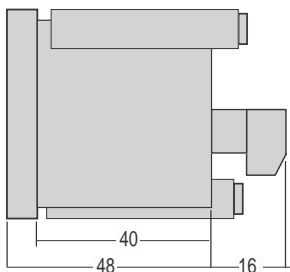
As an option, the multiled could be supplied with interchangeable lights, which can be easily substituted by the front, with red, blue, amber or green colours.

## OPERATION

The wiring is being made, in the same manner as a standard lamp.

The required indications are given at the back of the units and a sole common return is available.

## DIMENSIONS

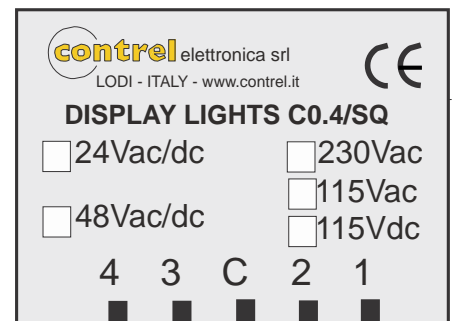
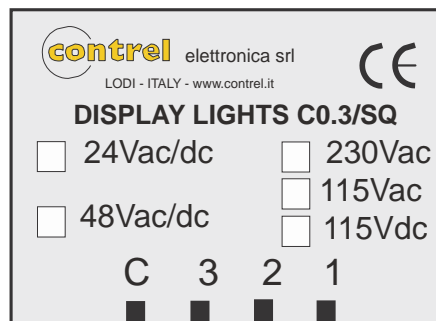


## TECHNICAL CHARACTERISTICS

Connection	Plug-in screw terminal block
Working temperature	-20 ÷ 60 °C
Storing temperature	-20 ÷ 70 °C
Relative umidity	30 ÷ 95 % (non condensing)
Maximum accepted vibration	0,5 G
Dimensions (DIN43700)	48 x 48 x 65 mm
Dimensions of perforation	45 x 45 mm
Weight	50 g
Material	Noryl self-extinguishing
Protection degree DIN VDE 0470	IP52
<b>Inputs C0.3/sq.024</b>	<b>3 leds</b>
Voltage supply	24 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.3/sq.048</b>	<b>3 leds</b>
Voltage supply	48 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.3/sq.115</b>	<b>3 leds</b>
Voltage supply	115 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.3/sq.115C</b>	<b>3 leds</b>
Voltage supply	115 Vdc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.3/sq.230</b>	<b>3 leds</b>
Voltage supply	230 Vac ± 20 %

Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.4/sq.024</b>	<b>4 leds</b>
Voltage supply	24 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.4/sq.048</b>	<b>4 leds</b>
Voltage supply	48 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.4/sq.115</b>	<b>4 leds</b>
Voltage supply	115 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.4/sq.115C</b>	<b>4 leds</b>
Voltage supply	115 Vdc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Inputs C0.4/sq.230</b>	<b>4 leds</b>
Voltage supply	230 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
<b>Visualisation</b>	Red, yellow, blue, green, white MULTILED
Windows available dimension for text	24 x 10 mm
<b>Electromagnetic Compability</b>	Directive EMC 89/336/CEE
Emission	EN 50082-1
Immunity	EN 50082-2

## REAR VIEW



## INFORMATIONS FOR ORDERS

**3 lights points**

24 Vac/dc	<b>C0.3/sq.024</b>
48 Vac/dc	<b>C0.3/sq.048</b>
115 Vac	<b>C0.3/sq.115</b>
115 Vdc	<b>C0.3/sq.115C</b>
230 Vac	<b>C0.3/sq.230</b>

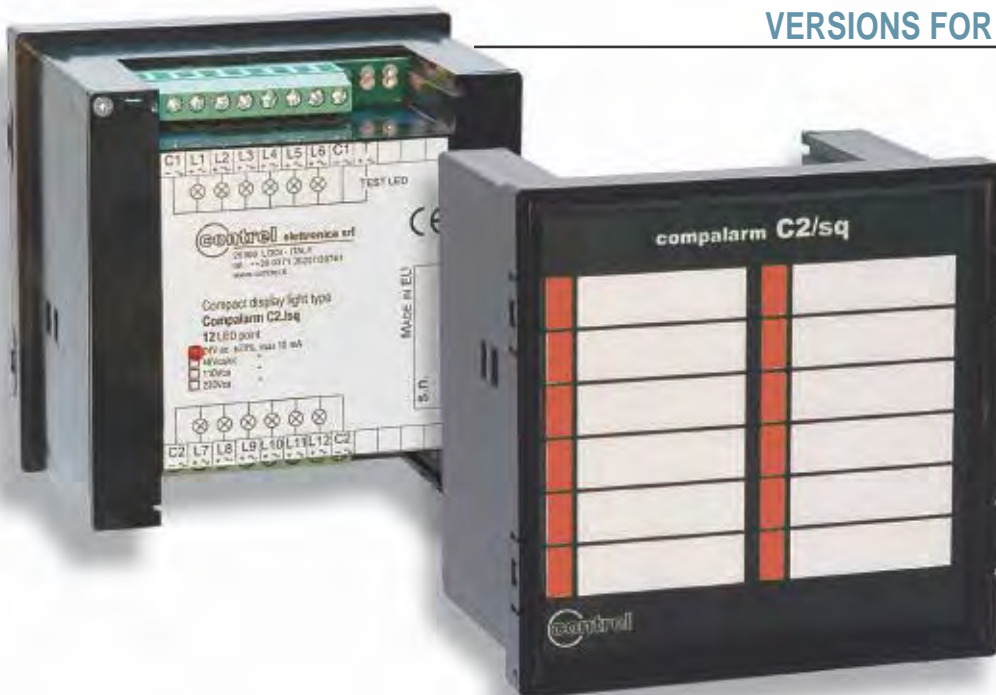
**4 lights points**

24 Vac/dc	<b>C0.4/sq.024</b>
48 Vac/dc	<b>C0.4/sq.048</b>
115 Vac	<b>C0.4/sq.115</b>
115 Vdc	<b>C0.4/sq.115C</b>
230 Vac	<b>C0.4/sq.230</b>



# COMPALARM C2/sq

VERSIONS FOR ONLY VISUALIZATION



## DESCRIPTION

**COMPALARM C2/sq** is a very attractive and economic alternative to the traditional signalling lamps, by grouping 12 light signals.

**COMPALARM C2/sq** in a very compact enclosure 96 x 96 mm is available in different versions of various different voltages, by accepting either dc or ac power supply.

The alarm description can be printed in a normal paper, in order to place it under the polycarbonate front pane, which will be fixed by a frame.

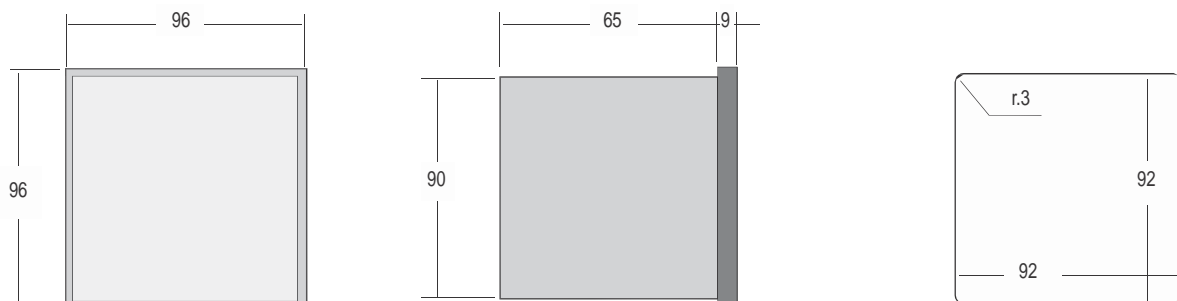
As an option, the multiled could be supplied with interchangeable lights, which can be easily substituted by the front, with red, blue, amber or green colours.

## OPERATION

The wiring is being made, in the same manner as a standard lamp: all light signals are already supplies of a common return and a

specific input supplies to turn on all lights indicators, carrying out the test function lamps.

## DIMENSIONS



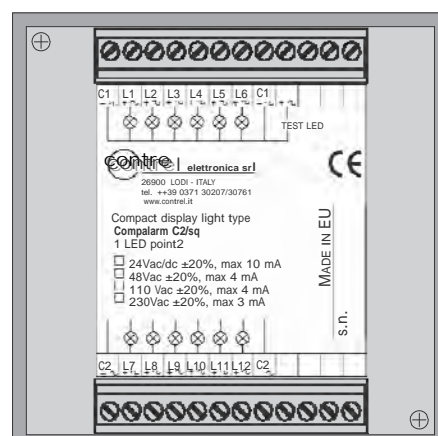
## INFORMATIONS FOR ORDERS

12 lights points	24 Vac/dc	<b>C2/sq.024</b>
	48 Vac/dc	<b>C2/sq.048</b>
	115 Vac	<b>C2/sq.115</b>
	115 Vdc	<b>C2/sq.115C</b>
	230 Vac	<b>C2/sq.230</b>

**TECHNICAL CHARACTERISTICS**

Connection	Plug-in screw terminal block
Working temperature	-20 ÷ 60 °C
Storing temperature	-20 ÷ 70 °C
Relative umidity	30 ÷ 95 % (non condensing)
Maximum accepted vibration	0,5 G
Dimensions (DIN43700)	96 x 96 x 65 mm
Dimensions of perforation	92 x 92 mm
Weight	50 g
Material	Noryl self extinguishing
Protection degree DIN VDE 0470	IP52
<b>Inputs C2/sq.024</b>	12 leds
Voltage supply	24 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C2/sq.048</b>	12 leds
Voltage supply	48 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C2/sq.115</b>	12 leds
Voltage supply	115 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C2sq.115 C</b>	12 leds
Voltage supply	115 Vdc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C2/sq.230</b>	12 leds
Voltage supply	230 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Visualization</b>	red, yellow, blue, green, white MULTILED
Windows available dimensions for text	45 x 9 mm
<b>Electromagnetic compability</b>	Directive EMC 89/336/CEE
Emission	EN 50082-1
Immunity	EN 50082-2

**REAR VIEW**



# COMPALARM C3/sq

## VERSIONS FOR ONLY VISUALIZATION

### DESCRIPTION

COMPALARM C3/sq is a very attractive and economic alternative to the traditional signalling lamps, by grouping 12 light signals. COMPALARM C3/sq in a very compact enclosure 72 x 144 mm is available in different versions of various different voltages, by accepting either dc or ac power supply. The alarm description can be printed in a normal paper, in order to place it under the polycarbonate front panel, which will be fixed by a frame. As an option, the multiled could be supplied with interchangeable lights, which can be easily substituted by the front, with red, blue, amber or green colours.

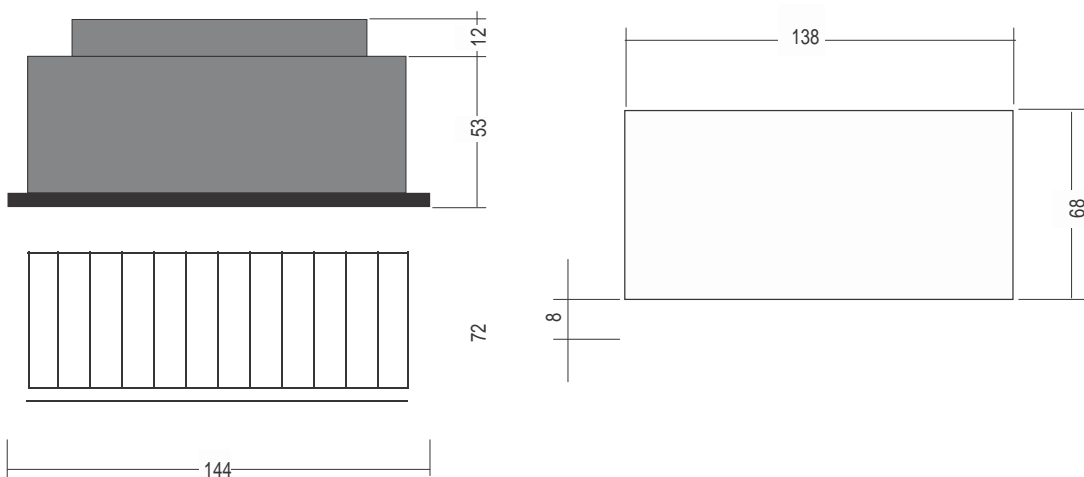


### OPERATION

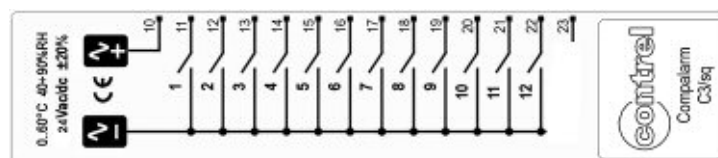
The wiring is being made, in the same manner as a standard lamp: all light signals are already supplies of a common return and a

specific input supplies to turn on all lights indicators, carrying out the test function lamps.

### DIMENSIONS



### REAR VIEW



## INFORMATIONS FOR ORDERS

12 lights points	24 Vac/dc	C3/sq.024
	48 Vac/dc	C3/sq.048
	115 Vac	C3/sq.115
	115 Vdc	C3/sq.115C
	230 Vac	C3/sq.230

## TECHNICAL CHARACTERISTICS

Connection	Plug-in screw terminal block
Working temperature	-20 ÷ 60 °C
Storing temperature	-20 ÷ 70 °C
Relative umidity	30 ÷ 95 % (non condensing)
Maximum accepted vibration	0,5 G
Dimensions (DIN43700)	72 x 144 x 65 mm
Dimensions of perforation	67 x 137 mm
Weight	50 g
Material	Noryl self extinguishing
Protection degree DIN VDE 0470	IP52
<b>Inputs C3/sq.024</b>	12 leds + test
Voltage supply	24 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C3/sq.048</b>	12 leds + test
Voltage supply	48 Vac/dc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C3/sq.115</b>	12 leds + test
Voltage supply	115 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C2sq.115</b>	12 leds
Voltage supply	115 Vdc ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Inputs C3/sq.230</b>	12 leds + test
Voltage supply	230 Vac ± 20 %
Frequency	0 ÷ 1000 Hz
Consumption / each input	0,5 W MAX
Consumption / test input	4 W MAX
<b>Visualization</b>	red, yellow, blue, green, white MULTILED
Windows available dimensions for text	45 x 9 mm
<b>Electromagnetic compability</b>	Directive EMC 89/336/CEE
Emission	EN 50082-1
Immunity	EN 50082-2

### WIRING

The power supply must be connected at terminal 01-02, with 24V dc or ac.

Inputs are opto isolated from power supply, and the complete separation of these circuits grant a better immunity to electrical noise (device C), nevertheless it is possible to use the same supply source for both, inputs and power supply, ( A and B devices in the figure).

The available outlets are SPST type, with a single common, protected by a 1A fuse .

Terminal 21 is to be connected to an acoustic device, this output will behave according with the selected ISA sequence specifications (table on page 4).

Terminal 22 can be used for process consent , this output will be activated only at normal condition. Should an alarm event come up, this contact can be resetted only with the RESET push button, even for those sequences which do not require this button normally.

The return can be connected to terminal 23 (the other end of the power supply connected to terminal 20, as per device A in the figure), this wiring assures a "crowbar" function: a wrong relay operation will blow the fuse.

Should the case be of a requirement for surveying a higher number of inputs, it is possible to set more devices, interconnected by the extension line to the terminal 3 . This may grant a common hierarchy of the first-out and the simultaneous actions for all alarms .

The single wire extension line works only with those devices supplied with same common.

The push buttons circuit is common with the inputs one and it is possible to arrange a single keypad for many devices, but having the same inputs power supply.

### OPERATION

At powering on or when returning from a power failure, the alarm system will come to a rest position, i.e. Without optical and acoustic signalling.

A 5 seconds delay is set initially, in order to grant possible startings of external devices. The system doesn't register any event and the consent output is disabled, at this time.

When an input associated contact changes its status, the alarm system comes from rest to alarm condition, this means that the input indications will light up and siren output will be excited according with the pre-set selected sequence.

The consent output will be disabled simultaneously.

By means of push buttons it's possible to acknowledge the alarm, silence the siren and reset to normal condition. A specific push button allows to perform the optical test, without disturbing its normal operation.

All the alarm system is based on fail safe logic and all inputs are continuously self-checking during the full operation.

Should any failure occurre, the device will be set in the less dangerous condition, unabling the consent output and activating the siren.

A failure to extension line will be displayed by an asynchronous flashing of led positions 1,8. Whilst a failure to safety related to the internal memory, it will be displayed by an asynchronous flashing of led positions 9,12.

The device is internally protected against overvoltages and temporary power supply disturbs, with an auto-reset type protection : this is to say, an inert device can be in a protection status and may seem to be completely off. Check the supply.

It's important to grant a sufficient air ventilation at the back of the device.

## APPLICATIONS

The COMPALARM C4 is suitable for 12 inputs connection of normally open (NO) or normally closed (NC) contact, with the possibility of programming up to 8 operating sequences according to ISA specifications.

The C4 is a compact device, all its microprocessor based logic is embedded in the display unit itself .

The alarms visualisation is being made by a flush mounting display, built up with 30 x 30 mm cells and high bright white leds. This may grant a clear vision and a low consumption, together to other savings due to the almost lack of lamps substitution.

There are unlimited operations that could be achieved by coupling up several C4 units, with the wiring of only 1 additional cable for interconnection.

Its high reliability, continuous self diagnosis and fail safe logic are important features for this device that is more than a simple annunciator and could be used like supervisor.

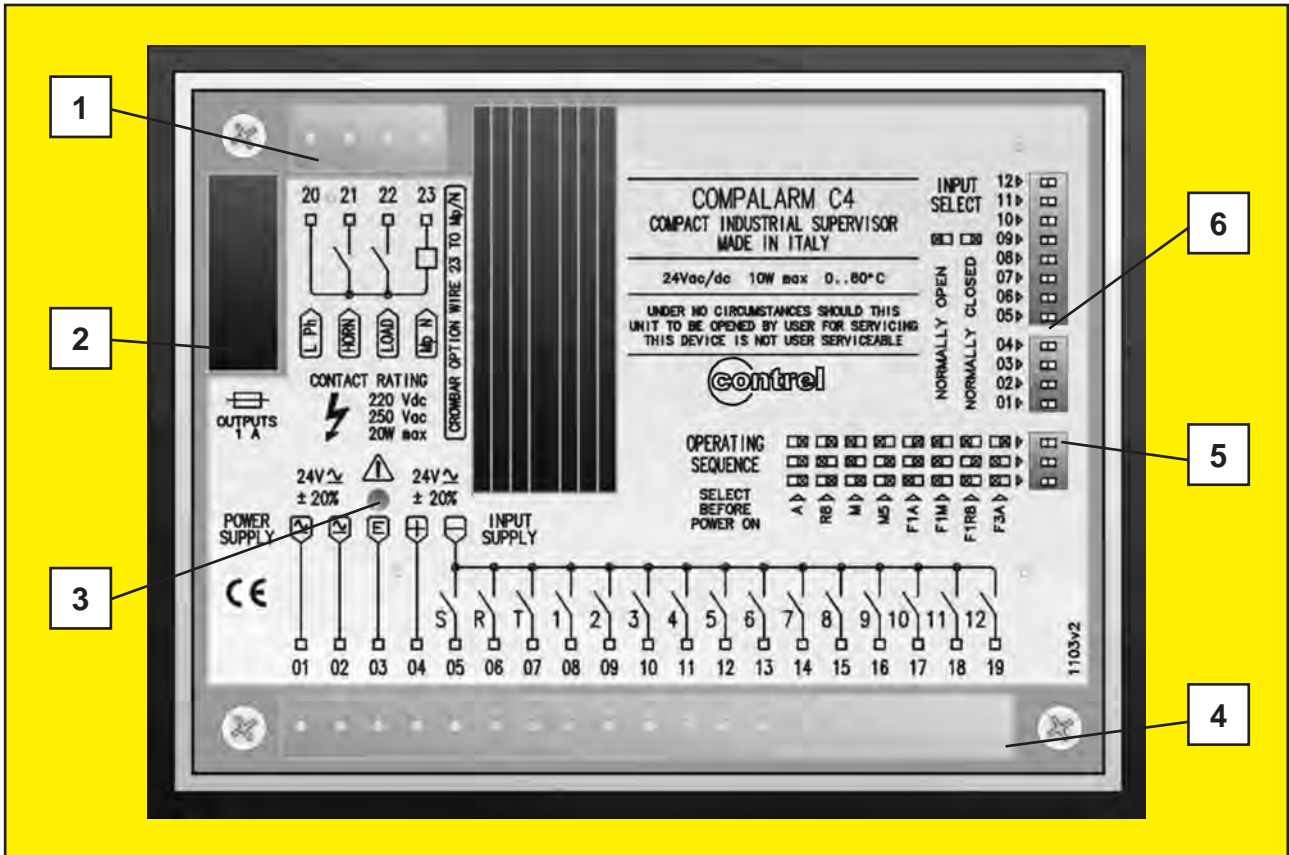
## DESCRIPTION

- 12 contact or voltage inputs
- 3 push button inputs
- Opto isolated inputs
- Device status indicator
- Normally open / closed input contacts
- Siren output, protected
- Load output, protected
- Flush mounting
- 1 wire expansion line
- Low power
- No lamp, increased reliability
- Auto-reset power supply fuse
- 8 pre-selectable Sequences:

A  
R8  
M  
M5  
F1A  
F1M  
F1R8  
F3A



REAR VIEW



- 1 OUTPUTS TERMINAL
- 2 FUSE FOR OUTPUT CONTACTS PROTECTION 1A FAST 5x20mm
- 3 INDICATION OF DEVICE IN ALARM (1 ACTIVE INPUT AT LEAST)
- 4 SUPPLYING TERMINAL / EXTENSION / PUSH BUTTONS / INPUT
- 5 SEQUENCE CONFIGURATION
- 6 INPUT CONTACTS SELECTION NO / NC

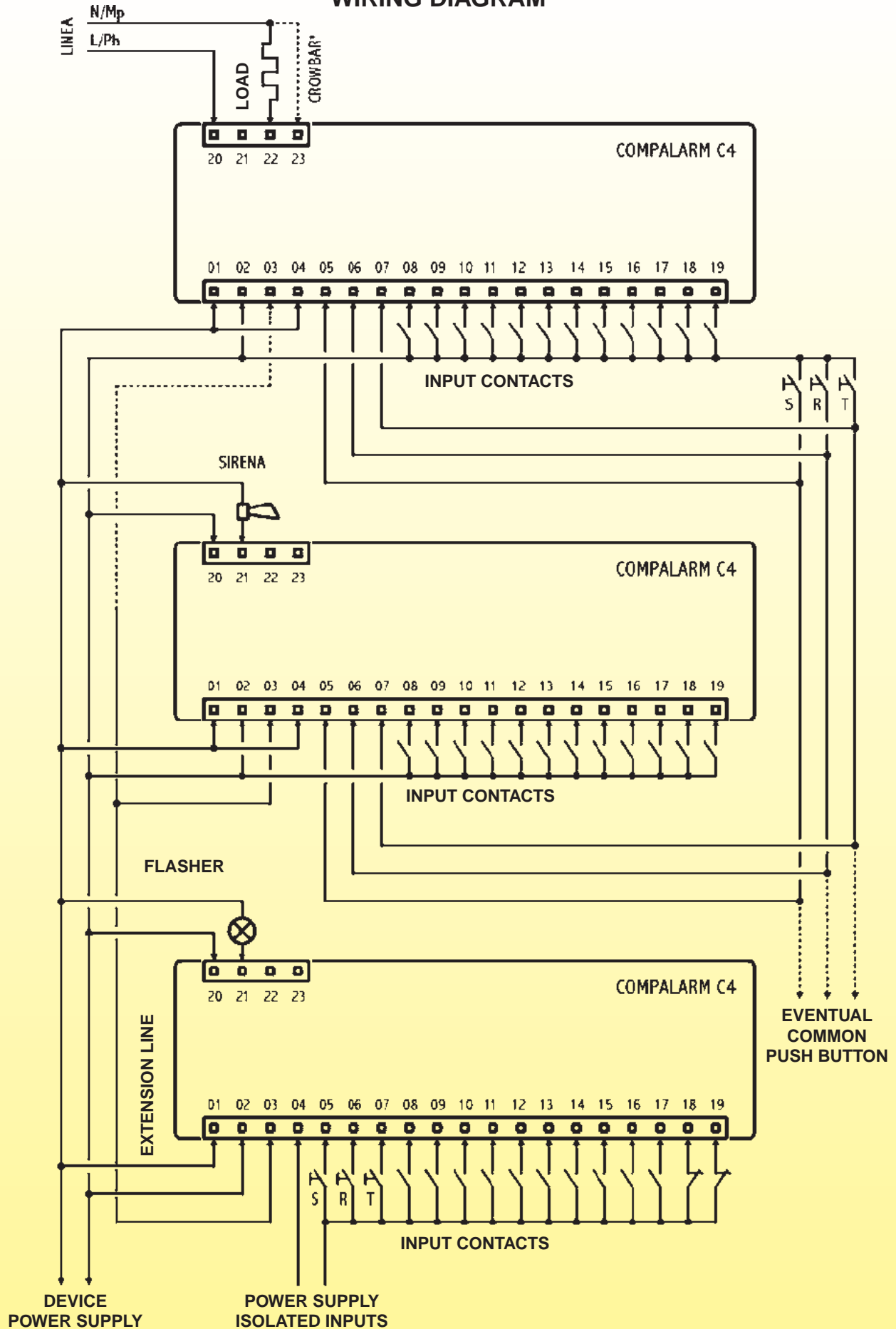
**CAUTION !**

**MAIN POWER SUPPLY CAN BE DC OR AC VOLTAGE, REGARDLESS THE POLARITY  
 INPUTS POWER SUPPLY CAN BE DC OR AC VOLTAGE  
 WITH DC VOLTAGE, POLARITY MUST BE CORRECTLY WIRED**

The modularity of the C4 gives the possibility of arranging in multiple unit panels, having a single frame for all devices. It's possible also to build complex annunciator mixed with directly driven, white led, different voltages display and pushbuttons.

Operating sequence must be selected before power-on, changes during operating condition will be effective only at next power-on.

### WIRING DIAGRAM





## SPECIFICATIONS

Supply Voltage	24 Vac/dc $\pm$ 20%
Frequency	dc $\div$ 1000 Hz
Power consumption	10 W MAX
Terminals	Screw and plug terminal block
Operating Temperature	0 ... 60°C
Storage Temperature	-20 ... 70°C
Relative Humidity	max 95 % (non condensing)
Max Vibration allowed	0.5 G
Operating Position	Vertical (preferred)
Line Fuse	Internal, auto reset
Overall Dimensions	132 x 102 x 80 mm
Cut-out Dimensions	125 x 95 mm
Weight	800 g <sub>MAX</sub>
EMC Compliance	EMC Directive 89/336/EEC
- Emission	EN 50081-1
- Immunity	EN 50082-2
Inputs	12 optisolated channels
Voltage	24V ca/cc $\pm$ 20%
Current (any)	5 mA <sub>MAX</sub>
Extension Line	For systems with common supply
Voltage	24V ac/dc
Status display	Red led
Line length	1000 m <sub>MAX</sub>
Outputs	2 SPST contacts
Max switching voltage	220V dc / 250 Vac
Max switching power	20 W <sub>MAX</sub>
Protection and crowbar fuse	1 A fast
Galvanic separation	Inputs   Outputs   Supply
Test voltage	2500 V @ 50 Hz, 1 minute
Isolation voltage	300 V <sub>RMS</sub> max
Display	Hi-efficiency white led
Cell dimension	30 x 30 mm
Lens dimension	28 x 28 mm
Engraving area	27 x 27 mm
Screen colours	Transparent, White, Red, Green, Yellow, Blue
Safety	
Power-on delay	5 s
CPU self check	Power-on
Inputs/dip-switches auto-diagnosis	Continuous
Extension line auto-diagnosis	Continuous
Software watchdog	missing pulse
Hardware watchdog fuse	200 mA internal



## SAFETY CAUTIONS

Disconnect power supply and follow all usual safety cautions before performing any operation on the device.

The user shouldn't repair the present instrument.

A faulty device must be disconnected and sent to manufacturers for servicing.

# COMPALARM CM-CMT



## GENERAL

The **COMPALARM CM** devices allow to maintain the information of the parameter in every or alarm, even without the auxiliary power supply or voltage black out.

As a matter of fact, whenever any parameter fails and it is associated to an alarm signal, the mobile flag -sited at the front panel - will turn to orange, due to its magnetic withholding.

It is only possible to return to the initial position (black colour) by an opposed polarity pulse by pressing the reset button, after that the external anomaly (associated to the alarm) has disappeared.

The **COMPALARM CM** is fitted with two output relays, with a different switching system, according with different version types.

In the **CM4** and **CM6** versions, the output relays (S.A. And T) will be excited simultaneously, when one of the input contacts is closed. Then the associated relay to the acoustic signal (S.A.) may be brought to the rest position by pressing the acknowledging push button, even with an existing external anomaly. Whilst the cumulative alarms relay (T) can only be brought to the rest position by pressing the Reset push button, provided that all the input contacts are re-opens, because the external alarm causes have disappeared.

In the CMT2, CMT4 and CMT6 versions, the acoustic signal associated relay (S.A.) will be excited, when one of the input alarm contacts is closed, and it follows same behaviour as the CM4 and CM6. Whilst the (T) relay, which is used to open the breakers in this version, will only be excited with the closing of the C4-C5 and C6 contacts.

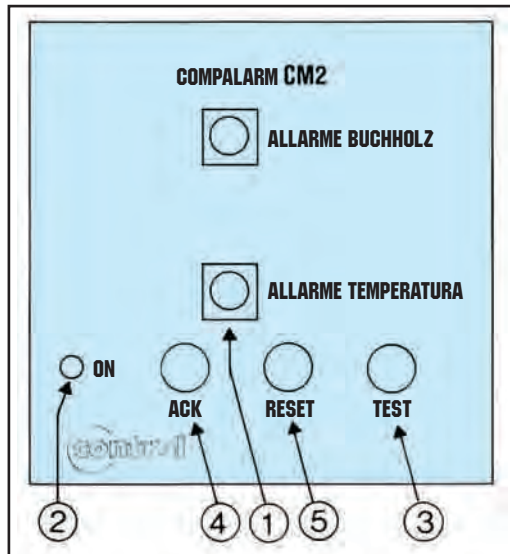
The most suitable solution for the Transformers control is the CMT type, this is to say: it becomes the idoneous substitution of the classic relays built-in a panel, with the addition of the DIN 96x96mm drill, the grouping of 6 signals in an unic compact enclosure and the possibility of controlling 2 output relays (siren and disconnecting coil) without further wiring.

Other particular feature, common to all COMPALARM CM series, is the multiple auxiliary supply and the possibility of remote acknowledgment of the siren.

## ELECTRICAL CHARACTERISTICS

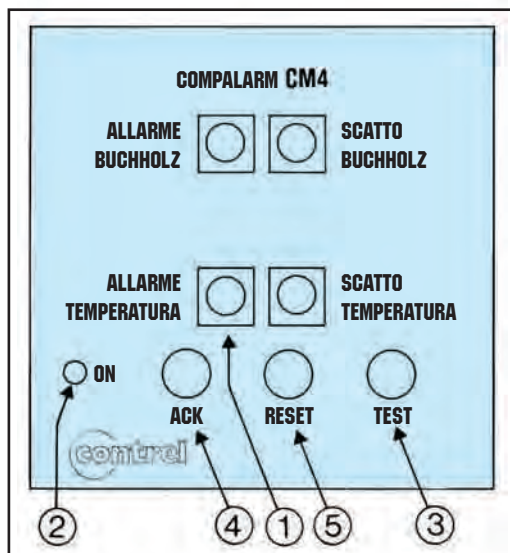
Auxiliary voltage supply	110-230-400Va.c. 24-48 Va.c./d.c. 110 Vd.c.
Self consumption	5VA
Input contact	NO
Output with 2 relays: -Acoustic signal relay -Remote control relay	
Power capacity	5VA
Commuting voltage	400Va.c.
Max. commuting power with resistive load	1100VA
Auxiliary voltage signal	Green LED
Alarm mechanical signal	Orange colour
Push button for test	Built in
Push button for acknowledgement	Built in
Push button for reset	Built in
Working temperature	-10°C ÷ +60°C
Storing temperature	- 20°C ÷ +80°C
Versions	
CM2- CMT2	2 mechanical signals
CM4- CMT4	4 mechanical signals
CM6- CMT6	6 mechanical signals

# COMPALARM CM-CMT



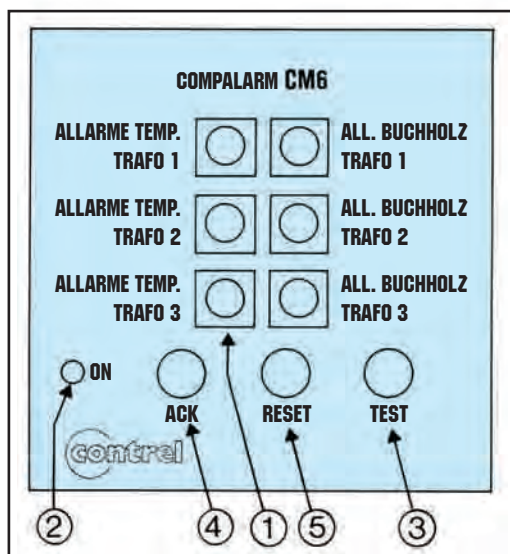
## DESCRIPTION

- 1 - Mechanical signalisation of avery (orange flag)
- 2 - Auxiliary voltage supply signalisation (green) LED
- 3 - Push button for test of alarm sequence
- 4 - Push button for acknowledging
- 5 - Push button for resetting



## DESCRIPTION

- 1 - Mechanical signalisation of avery (orange flag)
- 2 - Auxiliary voltage supply signalisation (green) LED
- 3 - Push button for test of alarm sequence
- 4 - Push button for acknowledging
- 5 - Push button for resetting



## DESCRIPTION

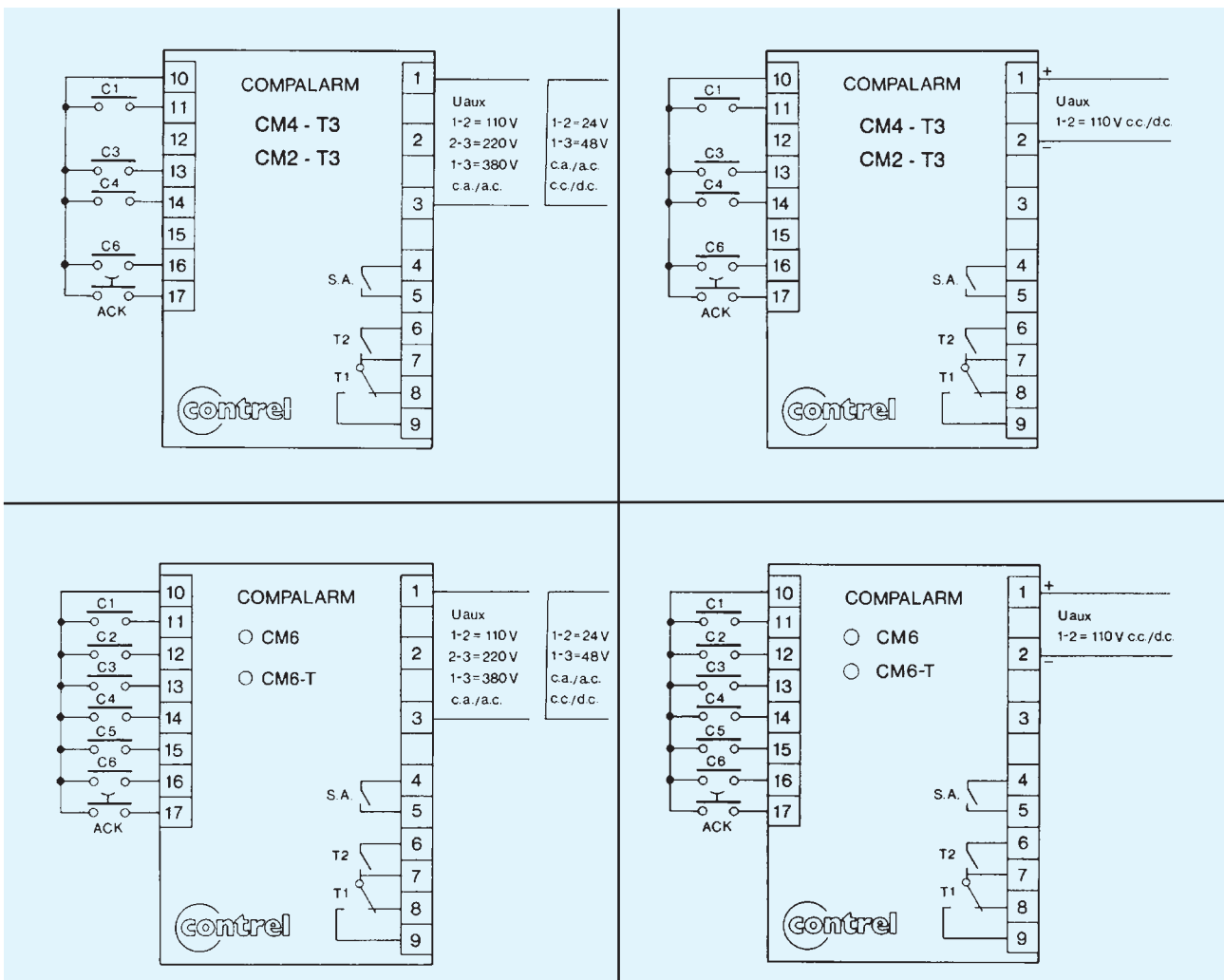
- 1 - Mechanical signalisation of avery (orange flag)
- 2 - Auxiliary voltage supply signalisation (green) LED
- 3 - Push button for test of alarm sequence
- 4 - Push button for acknowledging
- 5 - Push button for resetting

# COMPALARM CM-CMT

The behaviour of the output contacts related to the input contact can be found in the following table:

TYPE	INPUT CONTAC	TRIPPED RELAYS
CM2-T3	C1	S.A.-T2
	C3	S.A.-T1
CM4-T3	C1-C3	S.A.
	C4	S.A.-T2
	C6	S.A.-T1
CM6-T3	C1-C2-C3	S.A.
	C4	S.A.-T2
	C5-C6	S.A.-T1
CM6	C1-C2-C3	S.A.-T2
	C4-C5-C6	

## WIRING DIAGRAM



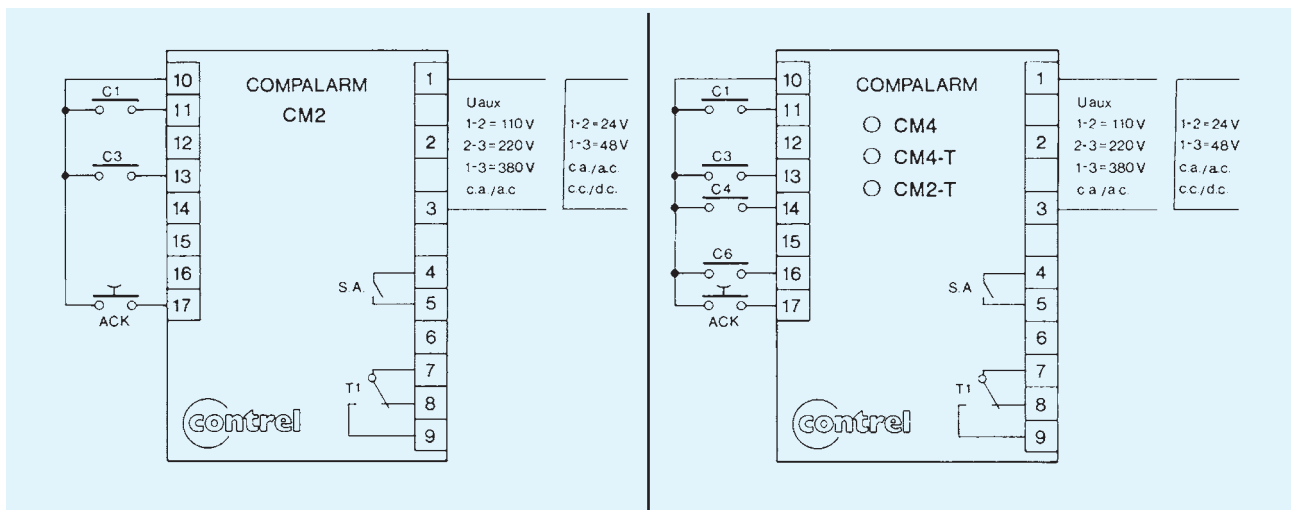
C1=C 6 Alarm input contacts  
 S.A. Acoustic signal  
 T1-T2 Remote signal or tripping  
 ACK Remote acknowledgement

# COMPALARM CM-CMT

The behaviour of the output relays, related to the input alarm contacts can be found in the following table

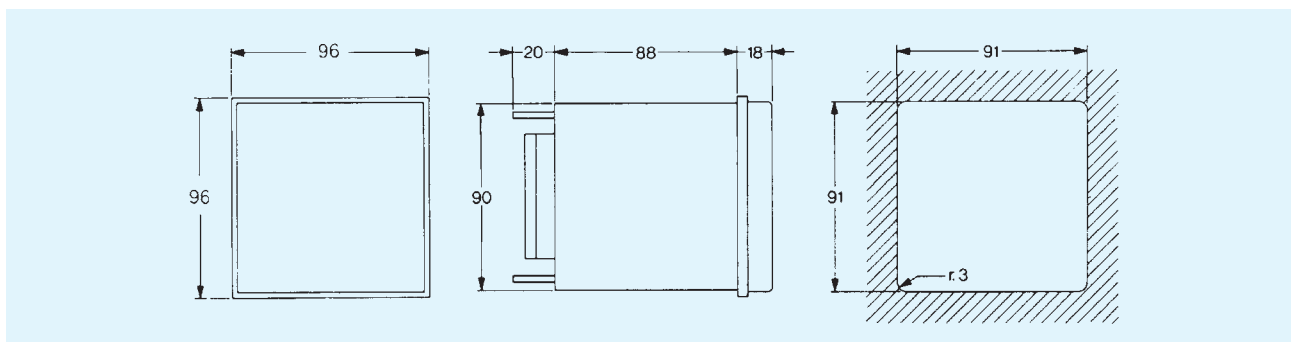
TYPE	INPUT CONTACT	TRIPPED RELAYS
CM2	C1-C3	S.A.-T1
CM2-T	C1	S.A.
	C3	S.A.-T1
CM4	C1-C3-C4-C6	S.A.-T1
	C4-C6	S.A.-T1

## WIRING DIAGRAM



- C1÷C6 Alarm input contacts
- S.A. Acoustic signal
- T1-T2 Remote signal or tripping
- ACK Remote acknowledgement

## DIMENSIONS



D-216L  
D-420L  
Dm-216L  
Dm-420L

# COMPALARM D

**ALPHANUMERIC ALARMS/ MESSAGES DISPLAY  
2 ROWS OF 16 CHARACTERS OR 4 ROWS OF 20 CHARACTERS LCD**



## GENERAL

“D” type, message/alarm display series, provide an easy operator interface, substituting light indicators with clear pre-stored messages.

In new equipment designs or existing refurbishing, the “D” message/alarm display series, can help you to show your information in an easily understandable language.

Different operating modes can meet your specific application requirements.

## MAIN FEATURES

Alarm annunciator and event recorder

Message display for PLC/PC

Remote terminal

Distributed detection

Status/diagnosis indicator

Operator's interface

Remote supervision and control

## DESCRIPTION

- 16 direct or 60 binary inputs
- EIA-485 com port for remote supervision
- NO/NC inputs selection
- Optoisolated inputs
- Modular and expandable architecture
- Real time clock without battery
- Simplified keyboard (can be re-exported)
- 8 groups with programmable behaviour
- Programming from the front keyboard
- Programming from the PS/2 standard keyboard
- Programming from the PC
- Cumulative SPDT contact
- Group outlets
- 6 audio tone internal generator
- Internal loudspeaker
- Audio output for tone diffusion
- Internal timer driven events
- Internal clock driven events
- Backlighted liquid crystal display
- Screen saver
- External GSM module for SMS, data and fax
- Possible interface with Windows® data logger

## TECHNICAL DATA

Supply voltage	12÷40 Vdc 9÷30 Vac	<b>ENCLOSURE</b>	DIN43700 Noryl UL V-0
Frequency	0÷1000 Hz	Overall dimensions	144 x 72 x 80 mm
Power consumption	5 VA MAX	Panel Drill dimensions	138 x 68 mm
Power dissipation	3 W MAX	Mounting	2 types, DIN rail and Flush mounting on panel
Terminals	SCREW AND PLUG 2 POLES 1,5 mm <sup>2</sup> 16 AWG	Mounting position	Any
Line fuse	Internal self-recovery	Protection class EN60529	IP40
Backup battery	External 12V Sealed Lead / 4Ah MAX	Accessories	WITH GASKET AND AUX FRONT DOOR IP54 Front panel gasket Transparent lockable door
Working temperature	0÷60 °C	<b>EMC COMPLIANCE</b>	89/336/EEC
Storage temperature	-20÷80 °C	Emission	EN50081-1
Relative humidity	NON CONDENSING 35÷75%	Immunity	EN50082-2
<b>INPUTS</b>		<b>ISOLATION INPUTS   INTERNAL LOGIC   OUTPUTS</b>	
Operating voltage	24Vac/dc ±20%	Test voltage	2500 V @ 50Hz, 1 minute
Current (any)	7 mA MAX @ 24V	Isolation voltage	300 V RMS
Terminals	SCREW AND PLUG 10 POLES 1,5 mm <sup>2</sup> 16 AWG		
<b>OUTPUTS</b>		<b>AUX OUTPUTS</b>	Single return open collector
Switching voltage	250Vdc MAX	Switching voltage	50 Vdc MAX
	250Vac MAX	Switching current per output	500 mA MAX
Switching current	2A cosφ=1	Total switching current	1000 mA MAX
Switching power	50W MAX	Switching power per output	20 W MAX
	250VA MAX	Total switching power	50 W MAX
Terminals	SCREW AND PLUG 4 POLES 1,5 mm <sup>2</sup> 16 AWG	Terminals	SCREW AND PLUG 10 POLES 1,5 mm <sup>2</sup> 16 AWG
<b>SERVICE PORT</b>	PS/2	<b>AUDIO OUT</b>	80÷4000 Hz
Voltage	5 Vdc MAX	Level	750 mV
Terminal	CONNECTOR Mini DIN 6 poli	Terminal	JACK PLUG 3,5 mm stereo
<b>COMMUNICATION</b>	EIA-485	<b>REAL TIME CLOCK</b>	
Line length	1200 meters	Precision	±15 minutes per year
Termination resistor §	EXTERNAL 120 Ω	Setting	Front panel keyboard or PS/2
Bias resistors (fail-safe)	EMBEDDED 1 kΩ	Backup	10 days, without battery
Terminals	SCREW AND PLUG 4 POLES 1,5 mm <sup>2</sup> 16 AWG		SYNCHRONIZATION THROUGH CCOMMUNICATION LINE
<b>MESSAGES MEMORY</b>	EEPROM		
2 Kbytes BASE	27 messages		
6 Kbytes ESPANSION 4 Kbytes	91 messages		

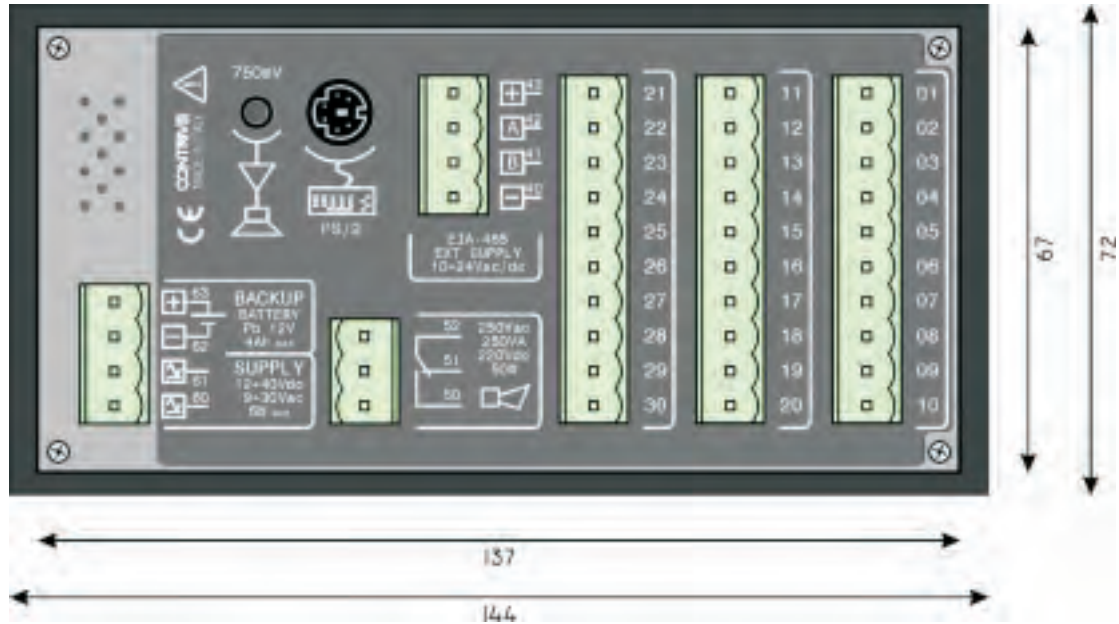


Terminating resistor must be installed at both end of the line, directly on the terminal block and it's mandatory only for line length beyond 500 meters.

D-216L  
 D-420L  
 Dm-216L  
 Dm-420L

# COMPALARM D

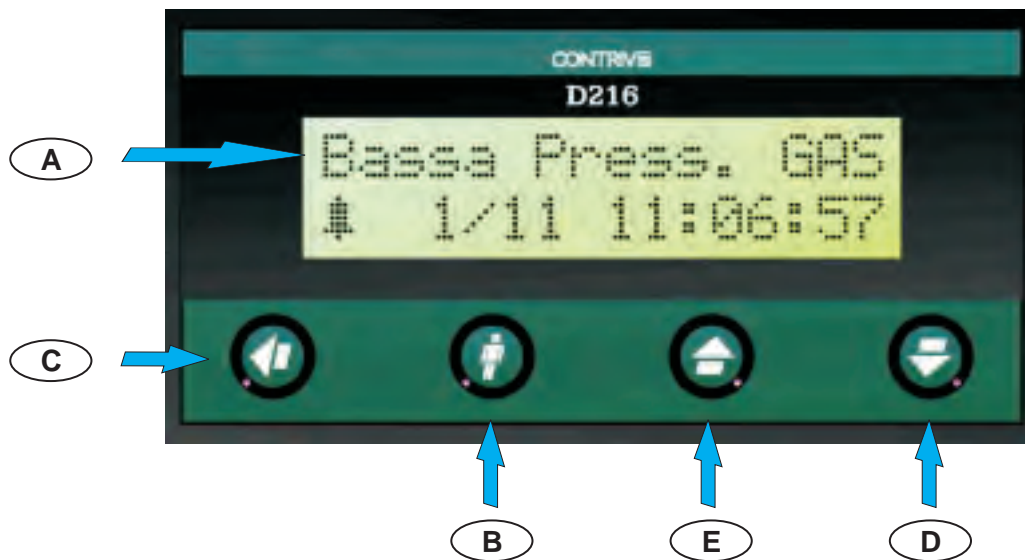
## REAR VIEW



- A SUPPLY AND OPTIONAL BACK UP BATTERY
- B CONTACT RELAY SPDT
- C INPUTS 9÷16 (common to terminals 9, 10)
- D INPUTS 1÷8 (common to terminals 19, 20)

- E EXT. KEYBOARD INPUTS OR GROUPS OUTPUTS
- F AUDIO OUTPUT for external amplifier 750 mV
- G PS/2 PORT for keyboard and accessories
- H ISOLATED INTERFACE EIA-485

## FRONTAL VIEW



- A LIQUID CRISTAL DISPLAY
- B PUSH BUTTON FOR HELP
- C CONFIRMATION PUSH BUTTON (ENTER)
- D SEARCH DOWN (SCROLL DOWN)
- E SEARCH UP (SCROLL UP)

ALL PUSH BUTTONS ARE FITTED WITH LIGHT SIGNALLING STATUS