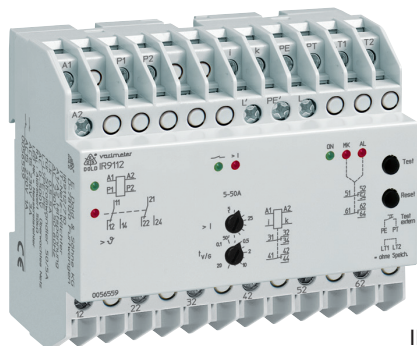
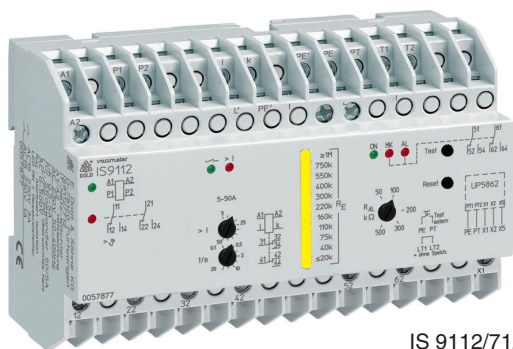


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IR 9112/710



IS 9112/712

- According to IEC/EN 60255-1, IEC/EN 61557-8
- For rooms used for medical purposes according to IEC 60364-7-710, DIN VDE 0100-710
- Consisting of:
  - \* Current monitoring system
    - Measuring ranges of 5 ... 50 A (with external converter 50 / 5 A)
    - Adjustable from 0.1 ... 1 I<sub>n</sub>
    - Hysteresis fixed at approx. 4%
    - Adjustable switching delay
    - LED indicators for correct status and overcurrent
    - 2 changeover contacts
  - \* Temperature monitoring system
    - Detection of temperature overrange
    - Deetection of wire breakage in the sensor circuit
    - Input P1 / P2 for 1 ... 6 thermistors
    - LED for auxiliary voltage and contact position
    - 2 changeover contacts
  - \* Insulation monitoring
    - For straight three-phase and A.C. power systems with 0 ... 300 V and 10 ... 1000 Hz
    - Fixed alarm threshold for ground fault R<sub>g</sub> of 50 kΩ ... 500 kΩ
    - With line breakage monitoring function of the Measuring circuit
    - Optionally, programmable for storing or non-storing of errors
    - With reset and test key
    - Additional external reset and test keys can be connected
    - LED indicators for operability, insulation error, and interruption of Measuring circuit
    - 2 changeover contacts
- With LED chain do display the momentary status of insulation and/or connection of the test and indication panel UP 5862, as option (width 140 mm)
- 105 mm width

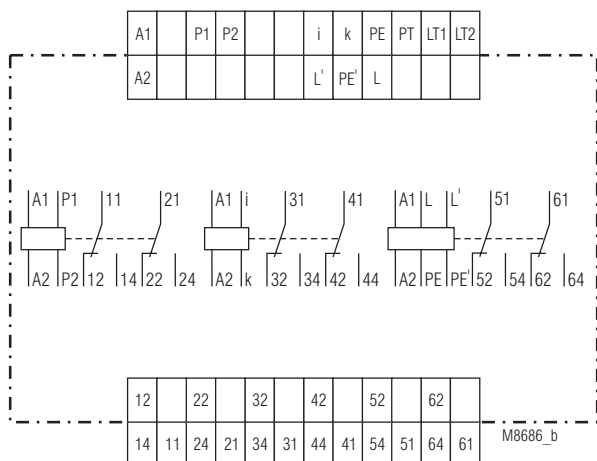
### Approvals and Markings



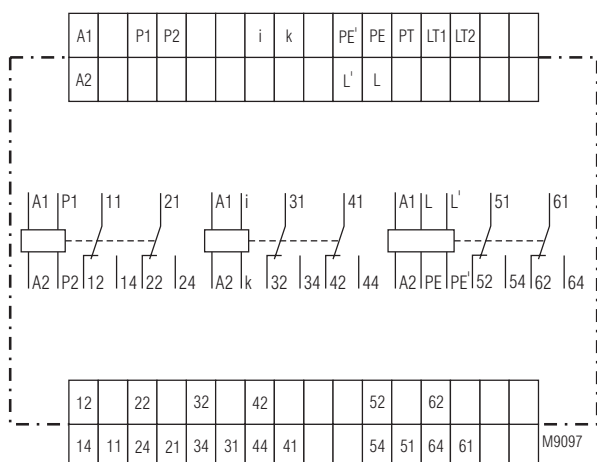
### Applications

- To monitor the IT system of rooms used for medical purposes according to VDE 0100-710:
- Overcurrent and temperature control of the IT isolating transformers
  - Insulation monitoring of the IT power system

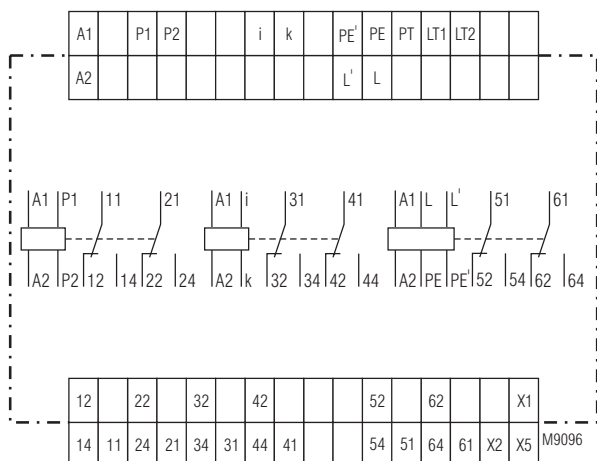
## Circuit Diagrams



IR 9112/710



IS 9112/711



IS 9112/712

## Connection Terminals

Terminal designation	Signal description
A1, A2	Auxiliary voltage
P1, P2	Connection for up to 6 thermistors
11-12-14; 21-22-24	2 changeover contacts, Temperature monitoring
i, k	Current Measuring Circuit
31-32-34; 41-42-44	2 changeover contacts, Current monitoring
L / L'; PE / PE'	Measuring Circuit Insulation monitoring
PE / PT	Connection test button Insulation monitoring
LT1 / LT2	Reset, auto / manual Insulation monitoring
51-52-54; 61-62-64	2 changeover contacts, Insulation monitoring

## Function

### Current monitoring system

The current monitoring path (i-k) of the IT line monitor is designed for connection of an external current transformer 50 / 50 A. This provides for overload monitoring of all isolation transformers (3, 15 to 8 kVA) for the IT power system in medical applications by setting the pickup value accordingly. If the current value exceeds the set pickup value, the red LED "> I" is illuminated, and both respective changeover contacts (31-32-34, 41-42-44) fall back into normal position after the set delay time  $t_v$  (0.1 – 20 s); the green LED stops lighting.

### Temperature monitoring system

To monitor the transformer temperature, temperature sensors (1 ... 6 PTC thermistors according to DIN 44081 / 44082 or NC contacts) are connected to the terminals P1 - P2. When the pick-up value of one of the sensors is exceeded or the sensor circuit is interrupted, both respective changeover contacts (11-12-14, 21-22-24) fall back into normal position, the red LED is illuminated.

### Insulation monitoring system

The terminals L/L' and PE/PE' are connected to the respective lines of the IT power system. If the IT transformer has a centre tapping or a star point, the terminals L / L' are preferably connected to this point. The terminals L' and PE' should be connected with separate lines and possibly not in the same place (at least not at the same terminal) of the IT power system to allow for safe recognition of an interruption in the measuring circle.

The insulation resistance of the IT power system against ground is measured between the terminals L / L' and PE / PE'. If the ground fault resistance  $R_E$  falls below the pickup value  $R_{AL}$  of the line isolation monitor, the red LED "AL" will be illuminated, and the two respective changeover contacts (51-52-54, 61-62-64) fall back into normal position.

On interruption of the Measuring circuit, the two respective changeover contacts will likewise fall back into normal position, and the red LED "MK" will be illuminated.

After correction of the error ( $R_E > R_{AL}$ , Measuring circuit connected) and jumpered terminals LT1 – LT2 (= error not stored), the changeover contacts will change into work position (correct status), and the red error LEDs will stop lighting.

If you wish to store errors, remove the jumper LT1 – LT2. In this way, also short-lived errors as e.g. a temporary deterioration of insulation, for example by touching of a line or unreliable contact making in the Measuring circuit may trigger a stored alarm: The output contacts remain open also after the error has been corrected. The type of the error can be seen in retrospect from the illuminated error LED "AL" or "MK".

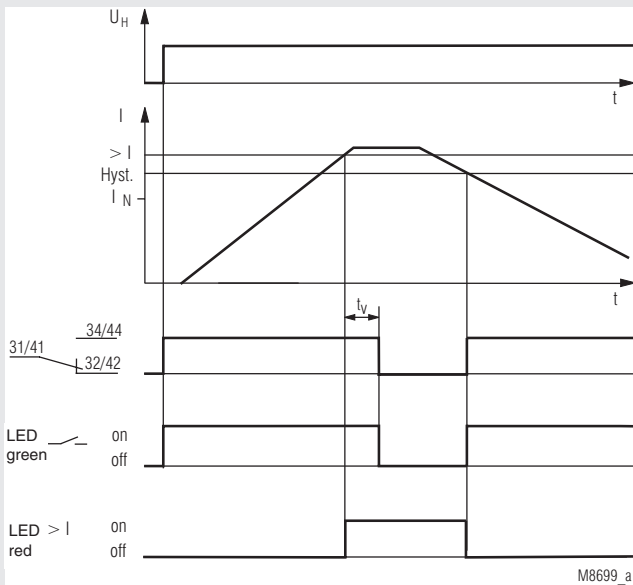
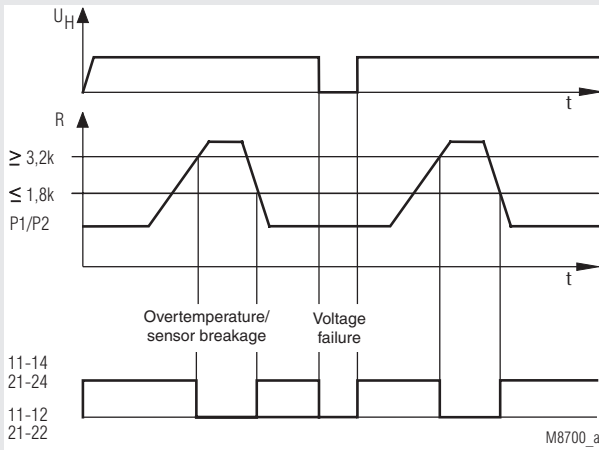
The error memory can be reset by pressing the internal or external reset key, or by switching off the auxiliary voltage.

By pressing the internal or external "Test" key, a deterioration of insulation is simulated in the Measuring circuit ( $= R_E$  approx. 40 k $\Omega$ ); thus, the correct response of the isolation monitor is checked.

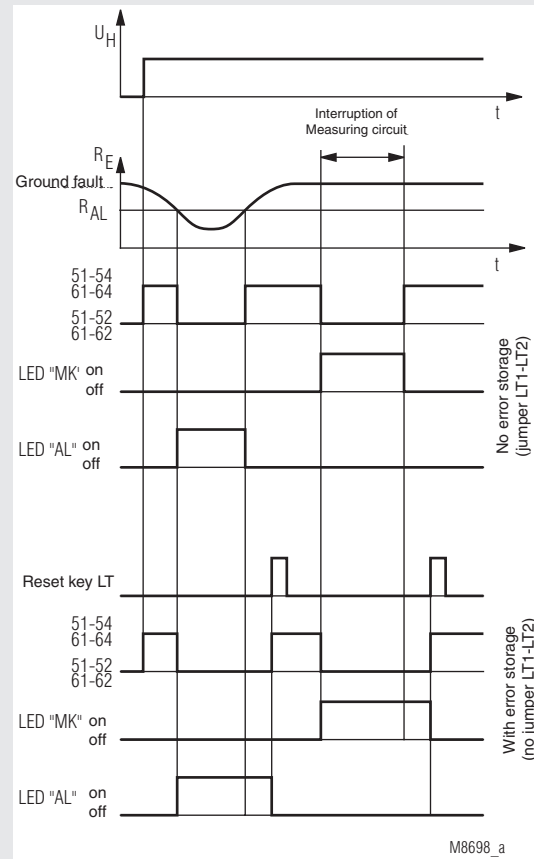
The variant IR 9112/711 comprises an 11-stage LED chain for indication of the current insulation resistance of the power system. By means of differently colored LEDs, the insulation status in the range of 20 k $\Omega$  ... 1 M $\Omega$  is indicated. In this way, deterioration of insulation can be detected even before an alarm is triggered.

The variant IR 9112/712 includes a 11 step LED indicator to monitor the actual state of the insulation, an additional power supply and relays to connect a test and indicator unit UP 5862. The width is 70 mm.

## Function Diagram temperature / current monitoring system



## Function Diagram insulation monitoring system



### Notes

#### General

Before checking insulation and voltage of the system, disconnect the monitoring device IR 9112 from the power source.

#### Current monitoring system

Recommended setting values of the pickup value " $> I$ " in relation to the IT transformer:

Transformer (kVA)	3.15	4	5	6.3	8
Single-phase	14 A	18 A	22 A	28 A	35 A
3-phase	8 A	10 A	13 A	16 A	20 A

#### Insulation monitoring system

The isolation monitor is designed to monitor straight AC power systems. Any interfering direct voltages getting into the Measuring circuit will not damage the device but will falsify the conditions in the Measuring circuit while they are affecting it. As insulation measuring is performed via direct current, it will not be falsified by system capacitances against protective ground  $C_E$ . However, the pickup time may be longer in case of insulation failure, in the order of the time constant  $R_E$  times  $C_E$ .

In every IT circuit, only one isolation monitor must be connected.

This has to be observed when coupling voltage system.

### Indicators

#### Current monitoring system

- Green LED: Is illuminated when the current is in correct state (correct status)
- Red LED " $> I$ ": Is illuminated when overcurrent is present

#### Temperature monitoring system:

- Green LED: Is illuminated when auxiliary voltage has been applied
- Red LED: Is illuminated when overtemperature or interruption in the sensor circuit is present

#### Insulation monitoring system:

- Green LED "ON": Is illuminated when auxiliary voltage has been applied (operability)
- Red LED "AL": Is illuminated when an insulation failure is present,  $R_E < R_{AL}$  (value has fallen below alarm level)
- Red LED "MK": Is illuminated when one of the lines of the Measuring circuit is interrupted (L, L', PE, PE')

## Technical Data

### Current Measuring Circuit

<b>Pickup value</b>	Adjustable from 5 ... 50 A with external converter 50 / 5 A
<b>Hysteresis:</b>	Approx. 4%
<b>Nominal frequency of the measuring current:</b>	50 / 60 Hz
<b>Frequency range:</b>	± 5 %
<b>Temperature effect:</b>	≤ 0.05 % / K
<b>Repeat accuracy:</b>	≤ ± 1 %
<b>Time delay <math>t_v</math>:</b>	Adjustable from 0.1 ... 20 s

### Temperature Measuring Circuit

<b>Temperature sensor:</b>	PTC sensor according to DIN 44081/44082
<b>Number of sensors:</b>	1 ... 6 sensors in series
<b>Pickup value:</b>	3.2 ... 3.8 kΩ
<b>Resetting value:</b>	1.5 ... 1.8 kΩ
<b>Measuring circuit load:</b>	< 5 mW (with R = 1.5 kΩ)
<b>Interruption in the measuring circuit:</b>	> 3.8 kΩ
<b>Measuring voltage:</b>	≤ 2 V (with R = 1.5 kΩ)
<b>Measuring current:</b>	≤ 1 mA (with R = 1.5 kΩ)
<b>Voltage in case of sensor breakage:</b>	DC approx. 9 V
<b>Current with shorted sensor circuit:</b>	DC approx. 1.1 mA

### Insulation Measuring Circuit

<b>Nominal voltage <math>U_n</math>:</b>	AC 0 ... 500 V
<b>Voltage range:</b>	0 ... 1.1 $U_n$
<b>Frequency range:</b>	10 ... 1000 Hz
<b>Alarm value <math>R_{AL}</math>:</b>	
IR 9112:	50 kΩ non-adjustable)
IS 9112:	Adjustable, 50 ... 500 kΩ
<b>Internal testing resistor:</b>	Corresponds to an $R_t$ of approx. 40 kΩ
<b>AC internal resistance:</b>	> 250 kΩ
<b>DC internal resistance:</b>	> 250 kΩ
<b>Measuring voltage:</b>	Approx. DC 15 V (generated internally)
<b>Max. measuring current (<math>R_E = 0</math>):</b>	< 50 μA
<b>Max. permissible interfering direct voltage:</b>	DC 500 V
<b>Operate delay</b>	
With $R_{AL} = 50$ kΩ, CE = 1 μF	
$R_t$ of ∞ to 0.9 $R_{AL}$ :	< 1.3 s
$R_t$ of ∞ to 0 kΩ:	< 0.7 s
<b>Response inaccuracy:</b>	± 15 % + 1.5 kΩ IEC 61557-8
<b>Hysteresis:</b>	Approx. 15 %

### Auxiliary Circuit

<b>Auxiliary voltage <math>U_H</math>:</b>	AC 230 V
<b>Voltage range:</b>	0.9 ... 1.1 $U_H$
<b>Nominal consumption:</b>	7 VA
<b>Nominal frequency:</b>	50 / 60 Hz
<b>Frequency range:</b>	± 5 %

### Output

#### Number of contacts provided

For temperature monitoring:	2 changeover contacts (contacts 11-12-14, 21-22-24)
For current monitoring:	2 changeover contacts (contacts 31-32-34, 41-42-44)
For insulation monitoring:	2 changeover contacts (contacts 51-52-54, 61-62-64)

#### Thermal current $I_{th}$ : 5 A

#### Switching capacity

Acc. to AC 15		
NO contact:	3 A / AC 230 V	IEC/EN 60947-5-1
NC contact:	1 A / AC 230 V	IEC/EN 60947-5-1

#### Contact life

Acc. to AC 15 with 1 A, AC 230V:	3 x 10 <sup>5</sup> operat. cycles	IEC/EN 60947-5-1
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#### Short circuit strenght

<b>max. fuse rating:</b>	4 A gG / gL	IEC/EN 60947-5-1
<b>Mechanical life:</b>	> 30 x 10 <sup>6</sup> operating cycles	

## Technical Data

### General Data

<b>Nominal operation:</b>	Permanent operation	
<b>Temperature range:</b>		
Operation:	- 20 ... + 60°C	
Storage:	- 25 ... + 70°C	
<b>Altitude:</b>	< 2000 m	
<b>Clearance and creepage distances</b>		
Rated impulse voltage / pollution degree:	4 kV / 3	IEC 60664-1
Insulation test voltage		
Routine test:	AC 2,5 kV; 1 s	
<b>EMC</b>		
Static discharge (ESD):	8 kV (air discharge)	IEC/EN 61000-4-2
HF irradiation		
80 MHz ... 2.7 GHz:	10 V / m	IEC/EN 61000-4-3
Fast transients:	4 kV	IEC/EN 61000-4-4
Surges		
Between supply lines:	1 kV	IEC/EN 61000-4-5
Between wire and ground:	2 kV	IEC/EN 61000-4-5
HF-wire guided:	10 V	IEC/EN 61000-4-6
Radio interference suppression:	Limit value class B	EN 55011
<b>Degree of protection</b>		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
<b>Housing:</b>	Thermoplast with V0 behavior according to UL Subject 94	
<b>Vibration resistance:</b>	Amplitude 0.35 mm	
	Frequency 10 ... 55 Hz	IEC/EN 60068-2-6
	20 / 060 / 04	IEC/EN 60068-1
<b>Climate resistance:</b>	EN 50 005	
<b>Terminal designation:</b>		
<b>Wire connection</b>		
Cross section:	2 x 2.5 mm <sup>2</sup> massive, or 2 x 1.5 mm <sup>2</sup> stranded wire with sleeve	
	DIN 46228-1/-2/-3	
Stripping length:	10 mm	
<b>Wire fixing:</b>	Flat terminals with self-lifting clamping piece IEC/EN 60999-1	
	0.8 Nm	
<b>Fixing torque:</b>	DIN rail IEC/EN 60715	
<b>Mounting:</b>	430 g	
<b>Net weight:</b>	Approx. 430 g	
<b>IR 9112/710:</b>	Approx. 510 g	
<b>IS 9112/711:</b>	Approx. 570 g	
<b>IS 9112/712:</b>		

### Dimensions

<b>Width x height x depth</b>	
<b>R 9112/710:</b>	105 x 90 x 59 mm
<b>IS 9112/711, IS 9112/712:</b>	140 x 90 x 59 mm

### Standard Type

IR 9112/710 AC 230 V	
Article number:	0056559
• Output:	2 changeover contacts each
• Auxiliary voltage $U_H$ :	AC 230 V
• Overall width:	105 mm

### Variants

IS 9112/711:	With 11-stage LED chain for indication of the current insulation value
IS 9112/712:	With 11-stage LED chain for indication of the current insulation value, and connection facility for a test and indicator unit UP 5862

### Ordering Example

IR 9112/710	AC 230 V	
		Auxiliary voltage
		Type

## Accessories

### Test and indicator panel UP 5862

For insulation monitors in medically used rooms according to IEC 60364-7-710, DIN VDE 0100-710



- To mount in flush device boxes  
ø 60 mm, 35 mm deep;
- Test button to check the function of the device
- With green LED to indicate operation
- Reset button for audible alarm
- With yellow LED to monitor insulation failure

Max. wire length to IR / IS 9112

At wire cross section  $A = 0.5 \text{ mm}^2$ : 500 m

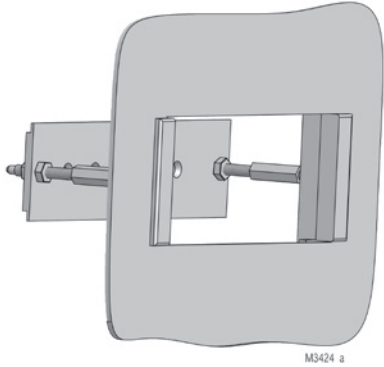
At wire cross section  $A = 1.5 \text{ mm}^2$ : 1000 m

Dimensions (width x height): 80 x 80 mm

Article number: 0041706

### Flush mounting kit

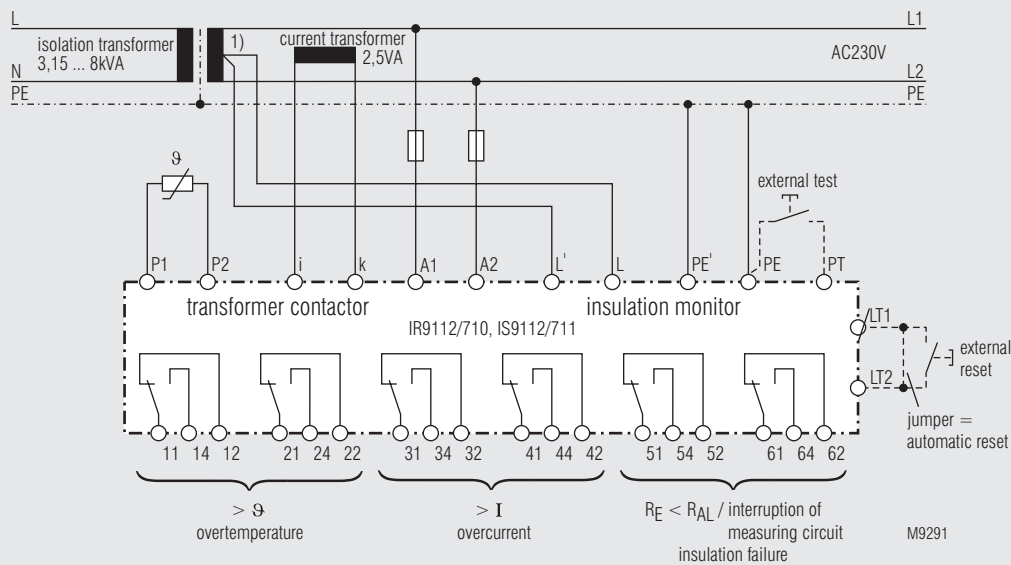
Order reference: KU 4087-150/005659



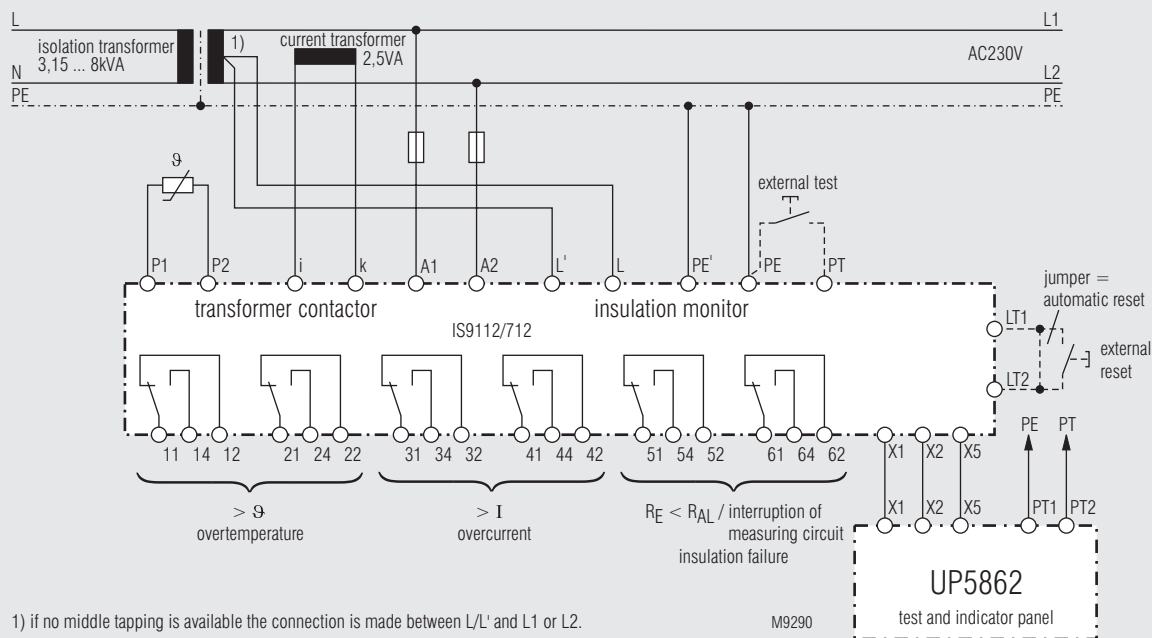
For universal use with:

- I-series devices of  
17,5 to 105 mm width
- Easy mounting

**Connection Examples**



1) if no middle tapping is available the connection is made between L/L' and L1 or L2.



1) if no middle tapping is available the connection is made between L/L' and L1 or L2.