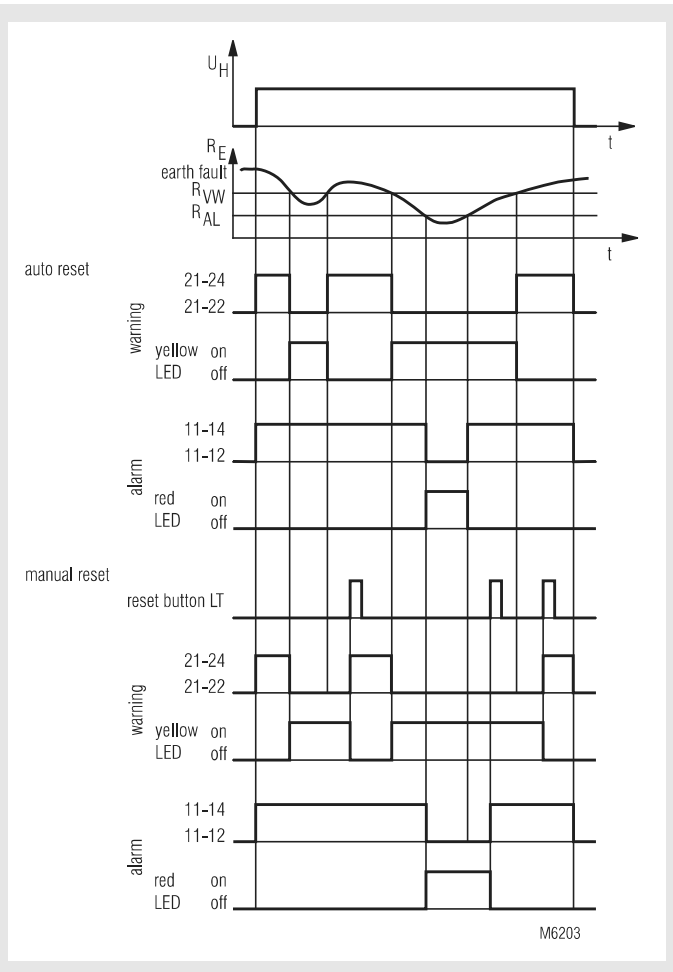




- Increasing the availability of machines and plants
- For preventive maintenance
- According to IEC/EN 61 557-1/-2
- With configurable analogue output for insulating value
- For three-phase and A.C. power systems with 0 ... 500 V and 10 ... 1000 Hz
- Adjustable alarm value for ground fault R_{AL} of 5 k ... 5 M Ω
- Monitors also disconnected voltage systems
- Energized / de-energized on trip settable
- Measuring circuit, auxiliary voltage, output contacts and analogue output are galvanically separated
- Programmable for manual reset or hysteresis function
- With test and reset button
- Connections for external test and reset buttons possible
- LED indicators for operation and alarm
- 2 changeover contacts
- Output function programmable
- With RS-485 interface, in preparation
- Width: 70 mm

Function Diagram



Function: de-energized on trip
With function energized on trip, the status of the relay contacts 11, 12, 14 and 21, 22, 24 is inverted

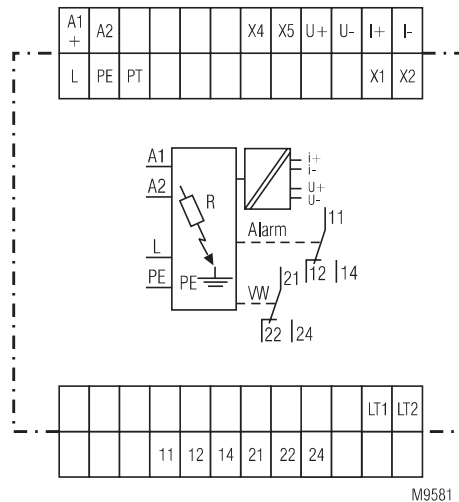
Approvals and Markings



Application

- Monitoring of insulation resistance of ungrounded voltage systems to earth
- Can also be used to monitor standby devices for earth fault, e.g. motor windings of devices that have to function in the case of emergency
- Other resistance monitoring applications

Circuit Diagram



Function

The device is connected to the supply via terminals A1-A2. The unit can either be supplied from the monitored voltage system or from an separate auxiliary supply. Terminal L is connected to the monitored voltage and PE to earth. If the insulation resistance R_E drops below the adjusted alarm value R_{AL} the red LED goes on and the output relay switches off (de-energized on trip) or switches on (energized on trip). If the unit is on auto reset (bridge between LT1-LT2) and the insulation resistance gets better (R_E rises), the insulation monitor switches on (de-energized on trip) or switches off (energized on trip) again with a certain hysteresis and the red LED goes off. Without the bridge between LT1-LT2 the Insulation monitor remains in faulty state even if the insulation resistance is back to normal. The reset is done by pressing the internal or external reset button or by disconnecting the auxiliary supply. By activating the "Test" button an insulation failure can be simulated to test the function of the unit.

5 measuring ranges can be selected by rotary switch. 5 ... 50 kOhm; 10 ... 100 kOhm; 50 ... 500 kOhm; 100 K ... 1 MOhm and 0.5 M ... 5 MOhm. The fine tuning is done with potentiometer R_{AL} x Bereich. With the range selector also the relay function is set. The 5 ranges on the left are with function de-energized on trip, the 5 functions on the right with function energized on trip.

With the 4 smaller ranges up to max. 1 MOhm a pre-warning can be adjusted between setting value and 5 MOhms. On the range 0.5 ... 5 MOhm the pre-warning is adjustable between setting value and 10 MOhm. The pre-warning reacts on contact 21, 22, 24, the alarm value on contact 11, 12, 14. Turning R_{VW} fully anti clockwise contact 21, 22, 24 switches together with the alarm contact.

The pre-warning behaves similar as the alarm signal concerning manual reset. Hysteresis, energized or de-energized on trip

The devices have an analogue output that indicates the insulation resistance.

A Version with RS 485 interface is in preparation.

Analogue output:

Output Terminal	Terminal X4-X5 bridged	Terminal X4-X5 open
u+ / u-	2 ... 10 V	0 ... 10 V
i+ / i-	4 ... 20 mA	0 ... 20 mA

Terminal X1-X2, Analogue output:

X1-X2 open: Insulation value within the adjusted measuring range R_{AL} e.g. 50 ... 500 kOhm is proportional to 0 ... 10 V on terminals u+/u- (x4-X5 is open).
The analogue value in relation to the insulation resistance can be seen in the diagrams M9605, M9606 (page 3 Setting aid).

X1-X2 bridged: Insulation value from 5 times the measuring range max 10 MOhm down to R_{AL} setting. e.g. range $R_{AL} = 5 \text{ kOhm} \times 10$ (max fine tuning) $\times 5 = 250 \text{ kOhm}$
setting value range $5 \text{ kOhm} \times 4$ (fine tuning) = 20 kOhm
Analogue output 4... 20 mA is proportional to 20 ... 250 kOhm

Indication

green LED "ON":	On, when supply voltage connected (readiness for operation)
yellow LED "VW":	On, when insulation resistance is under prewarning value, $R_E < R_{VW}$
red LED "AL":	On, when insulation fault detected, $R_E < R_{AL}$ (value has fallen below alarm level)

Notes

The Insulation monitor RP 5888 is designed to monitor AC-voltage systems. Overlaid DC voltage does not damage the instrument but may change the conditions in the Measuring Circuit. In one voltage system only one Insulation monitor must be connected. This has to be observed when coupling voltage system.

Line capacitance C_E to ground does not influence the insulation measurement, as the measurement is made with DC-voltage. It is possible that the reaction time in the case of insulation time gets longer corresponding to the time constant $R_E * C_E$.

The Insulation monitor can be used, because of it's higher setting value, to monitor single or 3-phase loads for ground fault.

If the load is operated from a grounded system the insulation resistance of the load can only be monitored when disconnected from the mains. This is normally the fact with loads which are operated seldom or only in the case of emergency but then must be function (see connection example).

The auxiliary supply can be connected to a separate auxiliary supply or to the monitored voltage system. The range of the auxiliary supply input has to be observed.

When monitoring 3-phase IT systems it is sufficient to connect the insulation monitor only to one phase. The 3-phases have a low resistive connection (approx. 3 - 5 Ω) via the feeding transformer. So failures that occur in the non-connected phases will also be detected.

Technical Data

Auxiliary circuit

Auxiliary voltage U_H : AC/DC 24 ... 80 V, AC/DC 80 ... 230 V
Voltage range: DC 19 ... 110 V, AC 19 ... 90 V,
 DC 64 ... 300 V, AC 64 ... 265 V
 $0.9 \dots 1.25 U_N$
Nominal frequency: AC 50 / 60 Hz

Nominal consumption
 at AC: 5 VA
 at DC: 2.5 W

Measuring circuit

Nominal voltage U_N : AC 0 ... 500 V
Voltage range: 0 ... $1.1 U_N$
Frequency range: 10 ... 1000 Hz
Alarm value R_{AL} : 5 k ... 5 M Ω
Prewarning value R_{VW} : $R_{AL} \dots 5 M\Omega$
Setting of ranges R_{AL} in 5 steps: 5 ... 50 k Ω , 10 ... 100 k Ω ,
 50 ... 500 k Ω , 100 k ... 1 M Ω
 and 0.5 M ... 5 M Ω
Setting R_{AL} : infinite variable
Setting R_{VW} : on relative scale related to R_{AL} setting value
Internal test resistor: equivalent to earth resistance of < 5 k Ω
Internal AC resistance: > 250 k Ω
Internal DC resistance: > 250 k Ω
Measuring voltage: approx. DC 15 V, (internally generated)
Max. measuring current ($R_E = 0$): < 0.1 mA
Max. permissible noise DC voltage: DC 500 V
Operate delay
 at $R_{AL} = 50$ k Ω , CE = 1 μ F
 R_E from ∞ to $0.9 R_{AL}$: < 2 s
 R_E from ∞ to 0 k Ω : < 1,4 s
Hysteresis
 at $R_{AL} = 50$ k Ω : approx. 15 %

Output

Contacts: 1 changeover contact for alarm
 1 changeover contact for prewarning
 2 changeover contacts
 at $R_{AL} = R_{VW}$:
Thermal current I_{th} : 4 A
Switching capacity
 to AC 15
 NO contacts: 5 A / AC 230 V IEC/EN 60 947-5-1
 NC contacts: 2 A / AC 230 V IEC/EN 60 947-5-1
Electrical life
 to AC 15 at 1 A, AC 230 V: $\geq 5 \times 10^5$ switch. cycl. IEC/EN 60 947-5-1
Short circuit strength
max. fuse rating: 4 A gL IEC/EN 60 947-5-1
Mechanical life: $\geq 30 \times 10^6$ switching cycles

General Data

Operating mode: Continuous operation
Temperature range: - 20 ... + 60°C
Clearance and creepage distances
 rated impuls voltage / pollution degree IEC 60 664-1
 auxiliary supply / measuring input / contacts: 6 kV / 2 IEC 60 664-1
 measuring input / analogue output: 4 kV / 2 IEC 60 664-1
 contacts 11,12,14 / 21,22,24: 4 kV / 2 IEC 60 664-1
EMC
 Electrostatic discharge(ESD): 8 kV (air) IEC/EN 61 000-4-2
 HF irradiation: 10 V / m IEC/EN 61 000-4-3
 Fast transients: 2 kV IEC/EN 61 000-4-4
 Surge voltages
 between A1 - A2: 1 kV IEC/EN 61 000-4-5
 between L - PE: 1 kV IEC/EN 61 000-4-5
 Interference suppression: EN 61 000-6-3
Degree of protection:
 Housing: IP 40 IEC/EN 60 529
 Terminals: IP 20 IEC/EN 60 529

Technical Data

Housing: Thermoplastic with V0 behaviour according to UL subject 94
Vibration resistance: Amplitude 0.35 mm
 Frequency 10 ... 55 Hz, IEC/EN 60 068-2-6
 20 / 060 / 04 IEC/EN 60 068-1
Climate resistance:
Terminal designation: EN 50 005
Wire connection: 1 x 2.5 mm² solid or
 1 x 2.5 mm² stranded wire
 DIN 46 228-1/-2/-3/-4
 box terminal with wire protection
Wire fixing:
Fixing torque: 0.4 Nm max.
Stripping length: 7.5 mm
Mounting: DIN rail IEC/EN 60 715
Weight: approx. 200 g

Dimensions

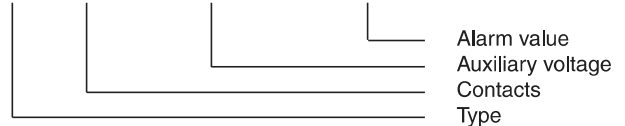
Width x height x depth: 70 x 90 x 71 mm

Standard Type

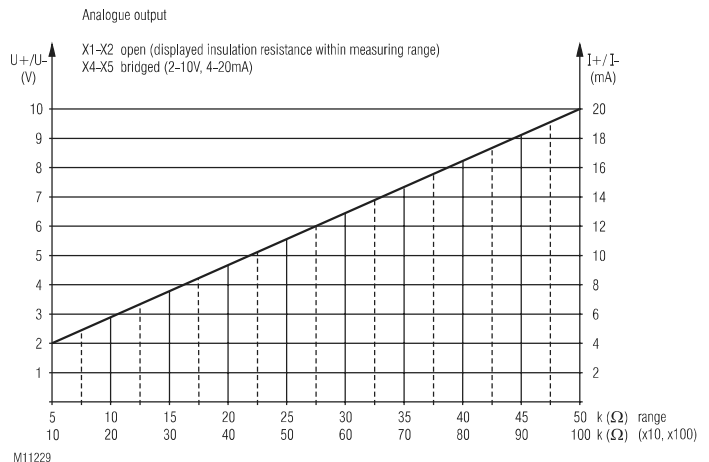
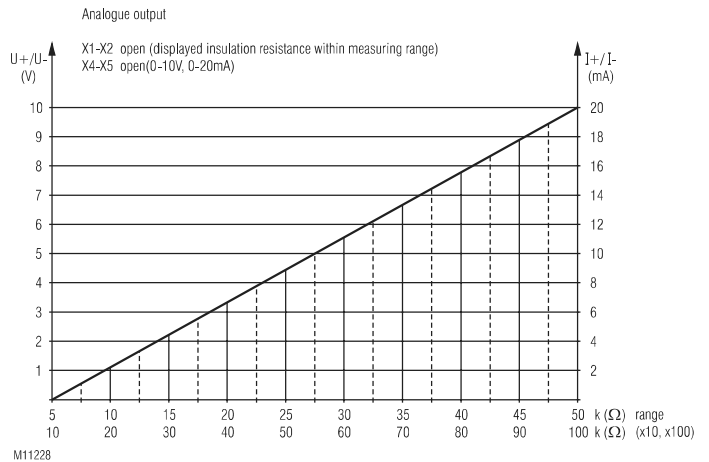
RP 5888.12 AC/DC 80 ... 230 V
 Article number: 0060868
 • Auxiliary voltage U_H : AC/DC 80 ... 230 V
 • Setting alarm value: R_{AL} : 5 k ... 5 M Ω
 • Width: 70 mm

Ordering Example

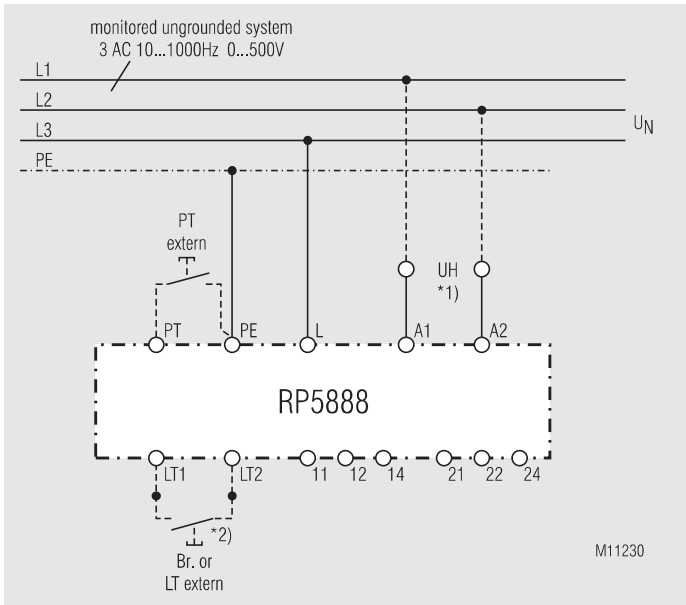
RP 5888 .12 AC/DC 80 ... 230 V R_{AL} 5 k ... 5 M Ω



Setting Aid

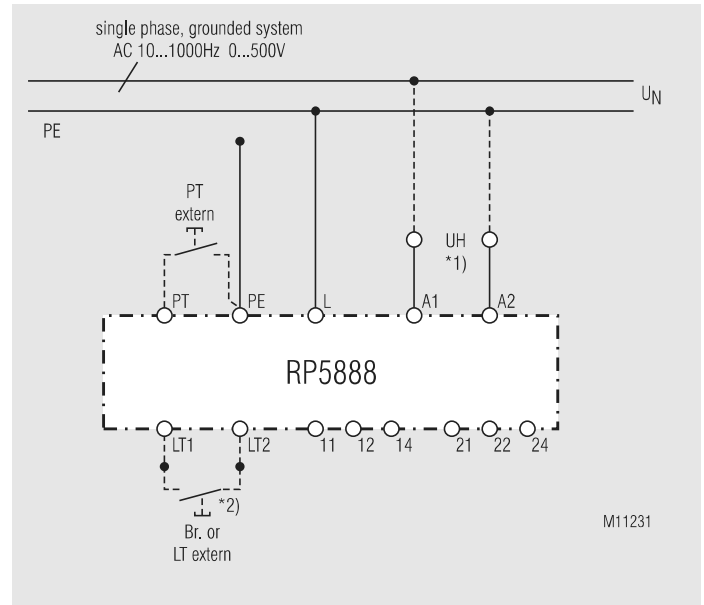


Connection Examples



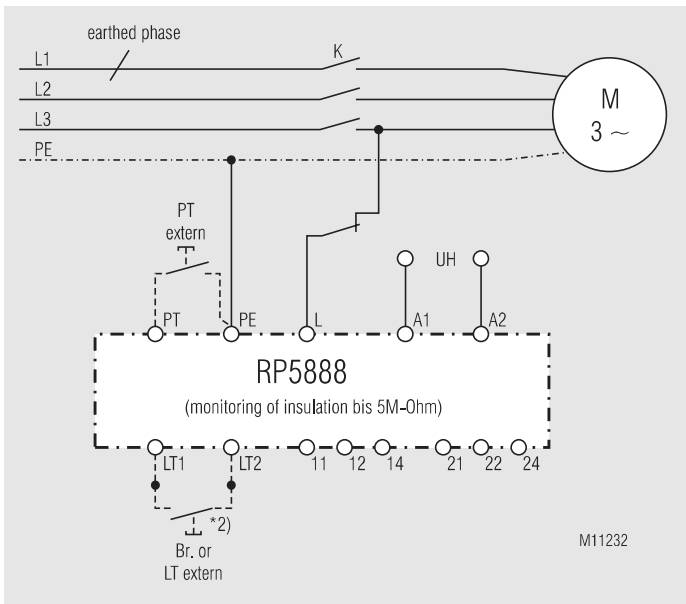
Monitoring of an ungrounded voltage system.

- *1) Auxiliary supply U_H (A1 - A2) can be taken from the monitored voltage system. The range of the auxiliary supply input must be observed.
- *2) with bridge LT1 - LT2: automatic reset
without bridge LT1 - LT2: manual reset, reset with button LT



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without bridge LT1 - LT2: manual reset, reset with button LT



Monitoring of motorwindings against ground.

The insulation of the motor to ground is monitored as long as contactor K does not activate the load.

- *2) with bridge LT1 - LT2: automatic reset
without bridge LT1 - LT2: manual reset, reset with button LT