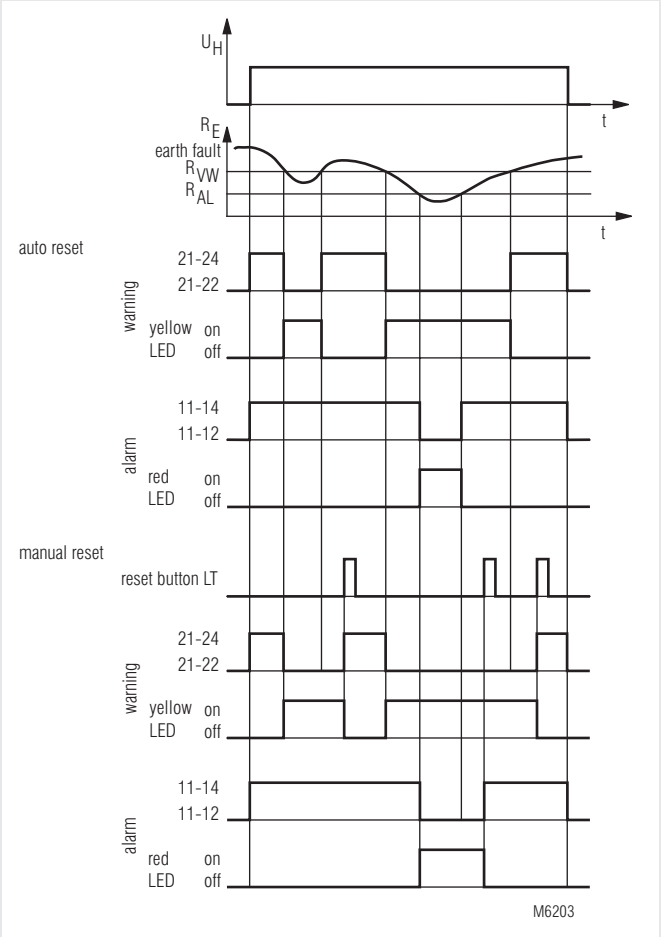
VARIMETER IMD
Insulation Monitor
RP 5888

0272088

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

- Increasing the availability of machines and plants
- For preventive maintenance
- According to IEC/EN 61 557-8
- 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 MΩ
- 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
- Width: 70 mm

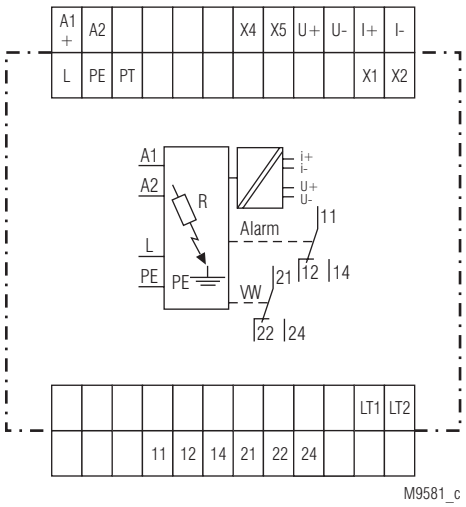
Approvals and Markings

CE

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 kOhm x 10 (max fine tuning) x 5 = 250 kOhm setting value range 5 kOhm x 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. Overlayed 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 occure 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 ... 1.25 U_N
Nominal frequency:	AC 50 / 60 Hz
Nominal consumption	
at AC:	5 VA
at DC:	2.5 W

Measuring ciruit

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 MΩ
Prewarning value R_{VW}:	R_{AL} ... 5 MΩ
Setting of ranges R_{AL} in 5 steps:	5 ... 50 kΩ, 10 ... 100 kΩ, 50 ... 500 kΩ, 100 k ... 1 MΩ and 0.5 M ... 5 MΩ
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 kΩ
Internal AC resistance:	> 250 kΩ
Internal DC resistance:	> 250 kΩ
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 kΩ, CE = 1 µF	
R_E from ∞ to 0,9 R_{AL}:	< 2 s
R_E from ∞ to 0 kΩ:	< 1,4 s
Hysteresis	
at R_{AL} = 50 kΩ:	approx. 15 %

Output

Contacts:	1 changeover contact for alarm 1 changeover contact for prewarning	
at R_{AL} = R_{VW}:	2 changeover contacts	
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:	≥ 5 x 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:	≥ 30 x 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 supression:		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
Climate resistance:	20 / 060 / 04 IEC/EN 60 068-1
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
Wire fixing:	box terminal with wire protection
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

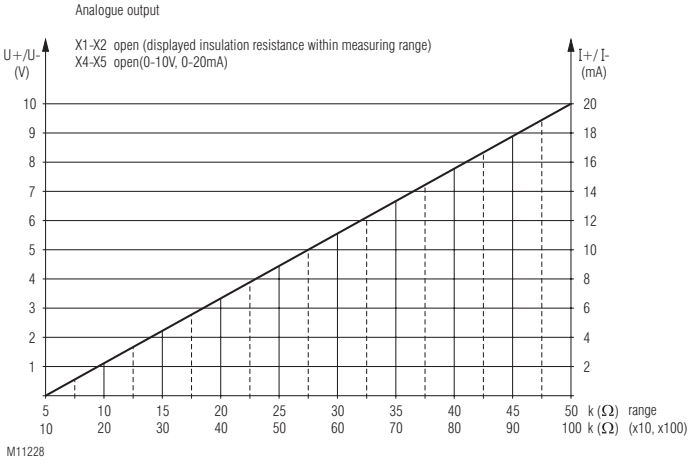
Article number:	0060868
• Auxiliary voltage U_H:	AC/DC 80 ... 230 V
• Setting alarm value: R_{AL}:	5 k ... 5 MΩ
• Width:	70 mm

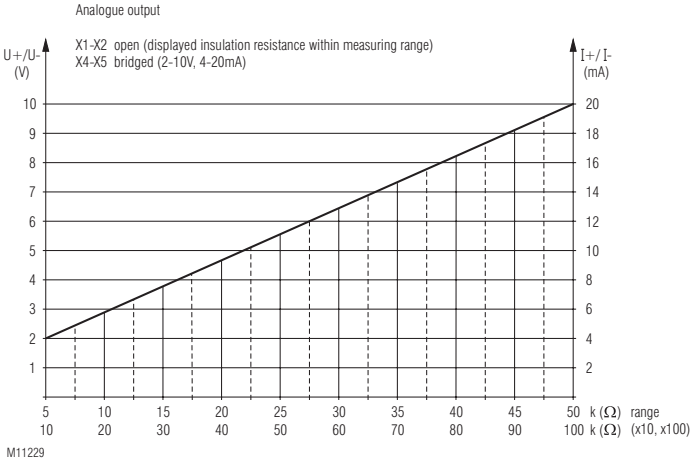
Ordering Example

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

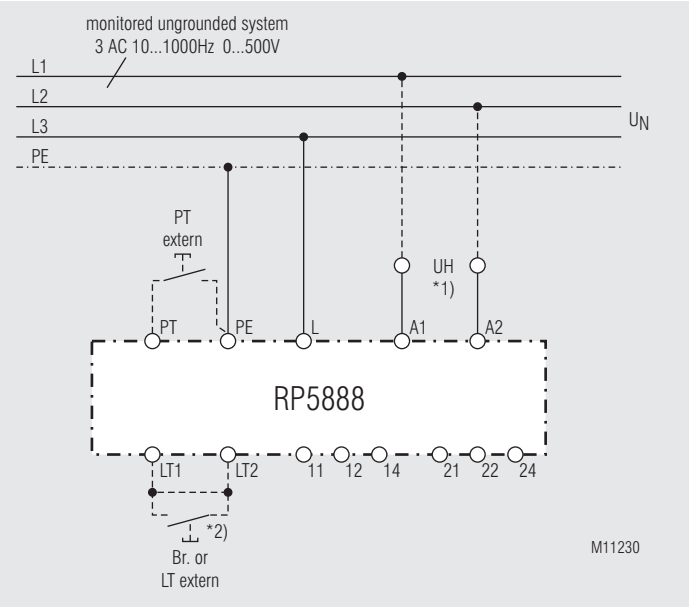
- Alarm value
- Auxiliary voltage
- Contacts
- Type

Setting Aid





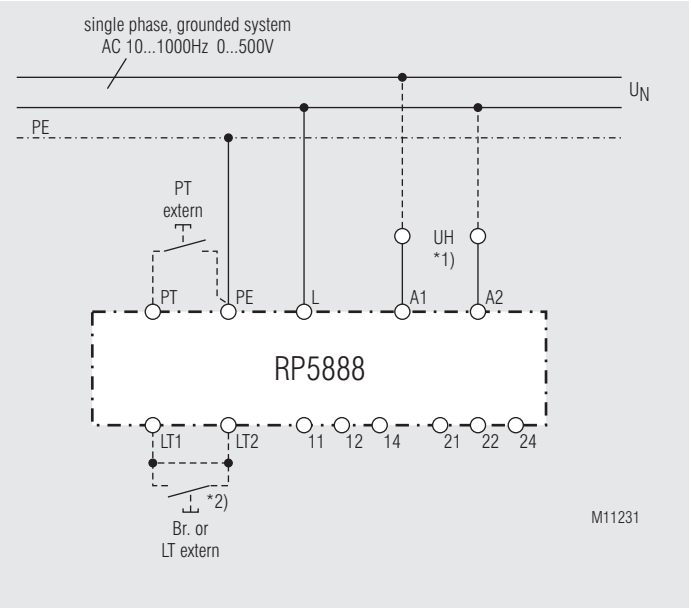
Connection Examples



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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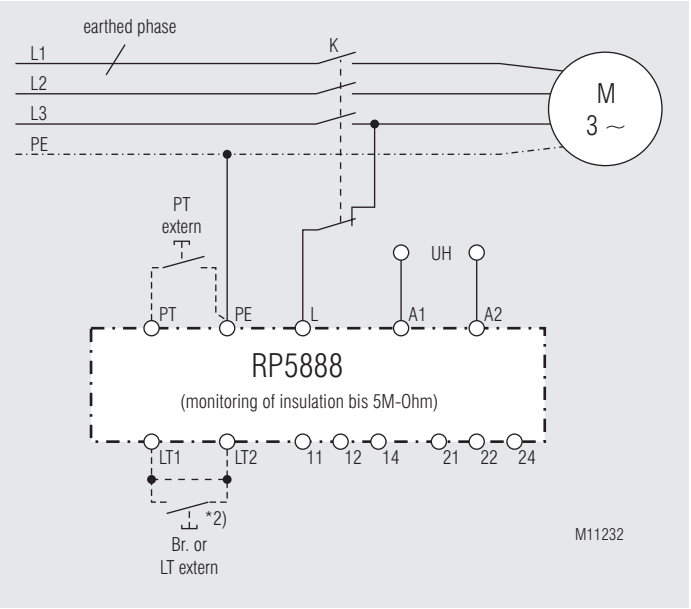

Monitoring of motorwindings against ground.
The insulation of the motor to ground is monitored as long as contactor K does not activate the load.

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