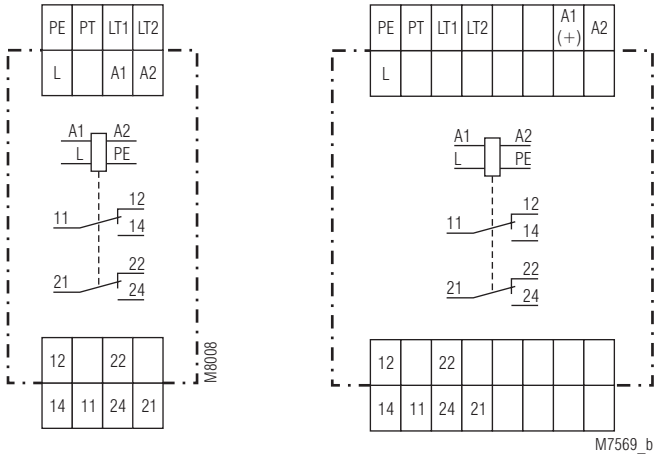
VARIMETER IMD
Insulation Monitor
IL 5880, IP 5880, SL 5880, SP 5880

0238809



Circuit Diagram



IL 5880, SL 5880 IP 5880, SP 5880

Connection Terminals

Terminal designation	Signal description
A1	L / +
A2	N / -
L	Connection for monitored IT-systems
PE	Connection for protective conductor
PT	Connection for external test button
LT1, LT2	Connections for external reset or manual and auto reset: LT1/LT2 bridged: hysteresis function LT1/LT2 not bridged: manual reset
11, 12, 14 21, 22, 24	Changeover contact (each for switch in position VW or AL)

Applications

- Monitoring of insulation resistance of ungrounded voltage systems to earth.
- IL/SL 5880/200 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.
- IL/SL 5880/300 according to DIN VDE 0100-551 to monitor mobile generator systems
- Other resistance monitoring applications.
- For industrial and railway applications

- According to IEC/EN 61 557-8
- For single and 3-phase AC-systems up to 0 ... 500 V and 10 ... 10000 Hz
- Adjustable tripping value R_{AL} of 5 ... 100 kΩ or 10 ... 500 kΩ
- Monitors also disconnected voltage systems
- De-energized on trip
- Auxiliary voltage Measuring Circuit and output contacts are galvanically separated
- Manual and auto reset
- With test and reset button
- Connections of external test and reset buttons possible
- LED indicators for operation and alarm
- 2 changeover contacts
- IL/SL 5880/200 with additional prewarning
  - adjustable prewarning value 10 kΩ ... 5 MΩ
  - output function programmable
- Variant IL/SL 5880/300 according to DIN VDE 0100-551 for mobile generator sets available
- 4 models available:
  IL 5880, IP 5880: 61 mm deep with terminals near to the bottom to be mounted in consumer units or industrial distribution systems according to DIN 43 880
  SL 5880, SP 5880: 98 mm deep with terminals near to the top to be mounted in cabinets with mounting plate and cable ducts
- DIN rail or screw mounting
- 35 mm width

Approvals and Markings

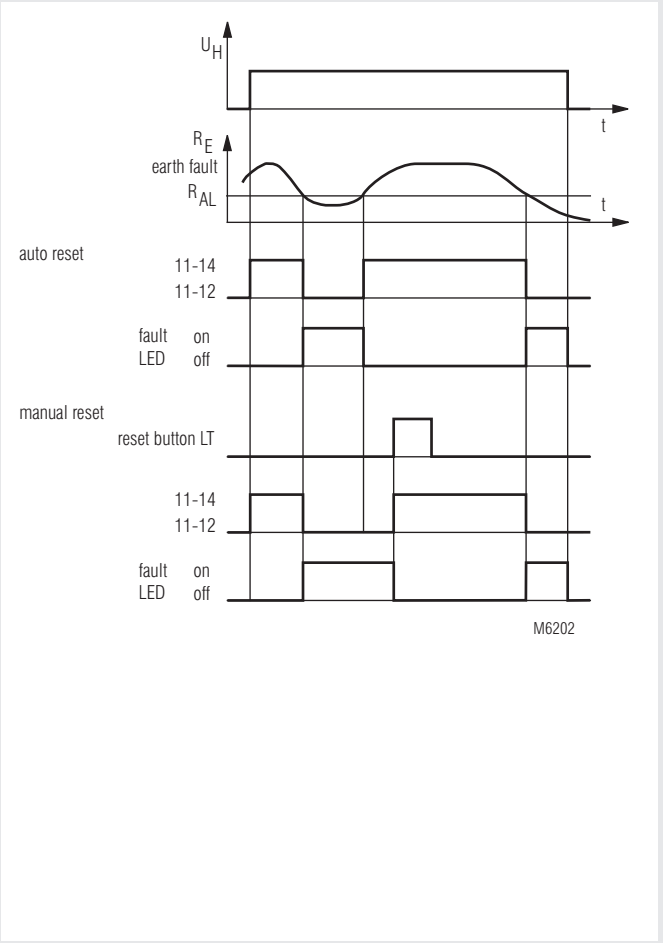
CE cULus A025518 AC

Function

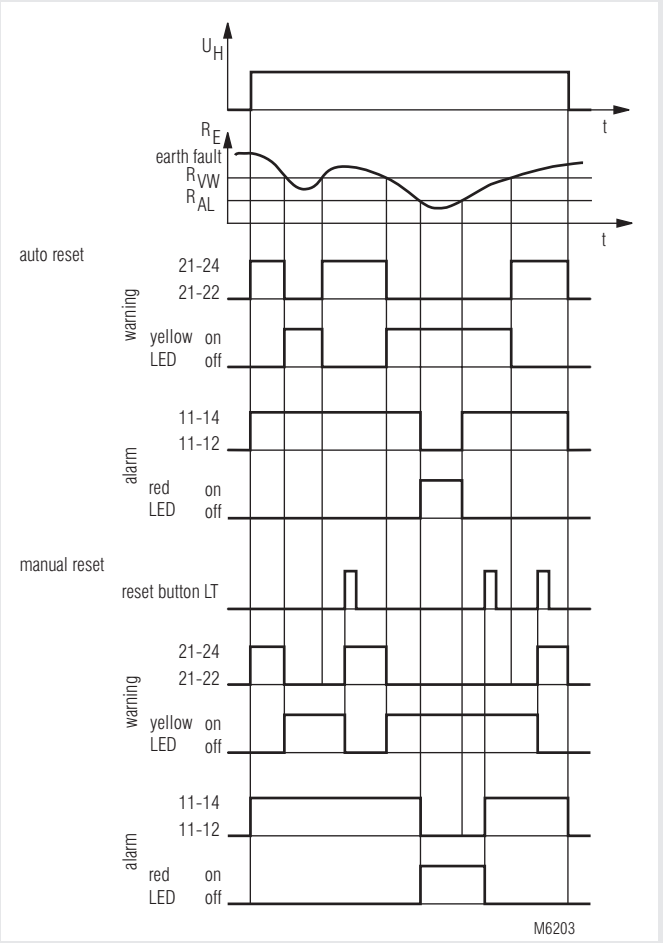
The device is connected to the supply via terminals A1-A2. The unit can either be supplied from the monitored voltage system or from an separate auxiliary supply. Terminal L is connected to the monitored voltage and PE to earth. If the insulation resistance R_E drops below the adjusted alarm value R_{AL} the red LED goes on and the output relay switches off (de-energized on trip). 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 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. (In order to achieve failure storage, the voltage system showing a fault must not be switched off too fast after detection of the failure, see notes). 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.
The variants IL/SL 5880.12/200 have a second setting range with a higher resistance up to 5 MΩ (Potentiometer R_{VW}). This setting value can be used for pre-warning with relay output, by positioning the lower setting switch to "AL 11-12-14; VW 21-22-24".
If the higher setting range should be used only, the setting switch is put in position "VW 2u" and both contacts react only to the higher setting.
If the lower setting range should be used only, the setting switch is put in position "AL 2u" and both contacts react only to the lower setting.
When set to manual reset the latching is active on both settings R_{AL} and R_{VW}. Therefore it is possible in the case of a short insulation decrease (Switch position AL 11-12-14; VW 21-22-24), to pass the warning signal to a PLC while the main fault does not lead to a disconnection of the mains via the contacts 11-12-14.

All technical data in this list relate to the state at the moment of edition. We reserve the right for technical improvements and changes at any time.

Function Diagram



IL 5880, SL 5880, IP 5880, SP 5880



IL 5880/200, SL 5880/200, IP 5880/200, SP 5880/200

Indicators

Green LED "ON": On, when supply voltage connected
Red LED "AL": On, when insulation fault detected, ($R_E < R_{AL}$)
Yellow LED "VW": On, when insulation resistance is under prewarning value, ($R_E < R_{VW}$) (only with variant IL/SL 5880.12/2_ _ and /300)

Notes

Risk of electrocution!
Danger to life or risk of serious injuries.

- Disconnect the system and device from the power supply and ensure they remain disconnected during electrical installation.
- The terminals of the control input PT, LT1 und LT2 have no galvanic separation to the measuring circuit L and are electrically connected together, therefore they have to be controlled by volt free contacts or bridge. These contacts ore bridges must provide a sufficient separation depending on the mains voltage on L.
- No external potentials may be connected to external control terminals PT, LT1 und LT2.

Attention!

- Before checking insulation and voltage, disconnect the insulation monitor IL/SL 5880 from the power source!
- In one voltage system only one insulation monitor can be used. This has to be observed when interconnecting two separate systems.
- 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.

Notes

Attention!

- The Insulation monitors IL/SL 5880 are designed to monitor AC-voltage systems. Overlayed DC voltage does not damage the instrument but may change the conditions in the measuring circuit.
- 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 model /200 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).
- 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.
- Storing of insulation failures:
  The storing of an insulation failure is delayed slightly longer the reaction of the output relay because of interference immunity. In cases where the defective voltage system is switched off immediartely by the output of the insulation monitor it can happen that the fault is not stored (e. g. mobile generator sets). For these applications we recommend the variant IL/SL 5880/300, where the output relay reacts only after the fault ist stored. All other features of this variant are simular to IL/SL 5880/200.

Technical Data

Auxiliary Circuit

Nominal voltage U_N		
IL 5880, SL 5880:	AC 220 ... 240 V, AC 380 ... 415 V 0.8 ... 1.1 U_N DC 12 V, DC 24 V 0.9 ... 1.25 U_N	
IP 5880, SP 5880:	AC / DC 110 ... 240 V 0.7 ... 1.25 U_N	
Frequency range (AC):	45 ... 400 Hz	
Nominal consumption:		
AC:	approx. 2 VA	
DC:	approx. 1 W	

Measuring Circuit

Nominal voltage U_N:	AC 0 ... 500 V	
Voltage range:	0 ... 1.1 U_N	
Frequency range:	10 ... 10000 Hz	
Alarm value R_{AL}:	5 ... 100 kΩ 10 ... 500 kΩ	
Prewarning value R_{VW} (only at IL/SL 5880/2_ _ and IL/SL 5880/300):	10 kΩ ... 5 MΩ	
Setting R_{AL}, R_{VW}:	infinite variable	
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}:	< 1.3 s	
R_E from ∞ to 0 kΩ:	< 0.7 s	
Response inaccuracy:	± 15 % + 1.5 kΩ	IEC 61557-8
Hysteresis		
at R_{AL} = 50 kΩ:	approx. 15 %	

Output

Contacts:		
IL / SL 5880.12, IP / SP 5880.12:	2 changeover contacts	
IL / SL 5880.12/2_ _, IL / SL 5880.12/300, IP / SP 5880.12/2_ _:	2 x 1 changeover contact, programmable	
Thermal current I_{th}:	4 A	
Switching capacity		
to AC 15		
NO:	5 A / AC 230 V	IEC/EN 60 947-5-1
NC:	2 A / AC 230 V	IEC/EN 60 947-5-1
to DC 13:	2 A / DC 24 V	IEC/EN 60 947-5-1
Electrical life		
to AC 15 at 1 A, AC 230 V:	≥ 5 x 10^5 switching cycles	IEC/EN 60 947-5-1
Short circuit strength		
max. fuse rating:	4 A gG / gL	IEC/EN 60 947-5-1
Mechanical life:	≥ 30 x 10^6 switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 20 ... + 60°C	
Storage:	- 20 ... + 70°C	
Altitude:	< 2.000 m	
Clearance and creepage distances		
rated impulse voltage / pollution degree		
between auxiliary supply connections (A1- A2):	4 kV / 2 at AC-auxiliary voltage	IEC 60 664-1
between measuring input connections (L - PE):	6 kV / 2	IEC 60 664-1
between auxiliary supply and measuring input connections:	6 kV / 2	IEC 60 664-1
auxiliary supply connections and measuring input to relay contacts:	6 kV / 2	IEC 60 664-1
relay contact 11-12-14 to relay contact 21-22-24:	4 kV / 2	IEC 60 664-1
Insulation test voltage		
Routine test:	AC 4 kV; 1 s AC 2,5 kV; 1 s	

Technical Data

EMC

Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation		
80 MHz ... 1 GHz:	10 V / m	IEC/EN 61 000-4-3
1 GHz ... 2.5 GHz:	3 V / m	IEC/EN 61 000-4-3
2.5 GHz ... 2.7 GHz:	1 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:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:		
IL / SL 5880:	Limit value class B	EN 55 011
IP / SP 5880:	Limit value class A*)	

*) The device is designed for the usage under industrial conditions (Class A, EN 55011).
When connected to a low voltage public system (Class B, EN 55011) radio interference can be generated. To avoid this, appropriate measures have to be taken.

Degree of protection:		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL Subjekt 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:	DIN 46 228-1/-2/-3/-4	
Cross section:	2 x 2.5 mm^2 solid or 2 x 1.5 mm^2 stranded wire	
Stripping length:	10 mm	
Fixing torque:	0.8 Nm	
Wire fixing:	Flat terminals with self-lifting clamping piece	IEC/EN 60 999-1
Mounting:	DIN rail mounting (IEC/EN60715) or screw mounting M4, 90 mm hole pattern, with additional clip available as accessory	

Weight:	
IL 5880:	160 g
SL 5880:	189 g
IP 5880:	250 g
SP 5880:	300 g

Dimensions

Width x height x depth:	
IL 5880:	35 x 90 x 61 mm
SL 5880:	35 x 90 x 98 mm
IP 5880:	70 x 90 x 61 mm
SP 5880:	70 x 90 x 98 mm

Classification to DIN EN 50155 for IL 5880

Vibration and shock resistance:	Category 1, Class B	IEC/EN 61 373
Ambient temperature:	T1 compliant T2, T3 and TX with operational limitations	
Protective coating of the PCB:	No	

Standard Types

IL 5880.12 AC 220 ... 240 V

Article number:	0053378
• Auxiliary voltage U_H :	AC 220 ... 240 V
• adjustable alarm value R_{AL}:	5 ... 100 kΩ
• Width:	35 mm

SL 5880.12 AC 220 ... 240 V

Article number:	0055396
• Auxiliary voltage U_H :	AC 220 ... 240 V
• adjustable alarm value R_{AL}:	5 ... 100 kΩ
• Width:	35 mm

Variants

IL / SL 5880.12/100:	same as standard type, but alarm value not adjustable, but fixed value
IL / SL 5880.12/200:	with pre-warning and programmable outputs
IL / SL 5880.12/201:	as version IL / SL 5880.12/200, but both output relays with ergized on Trip principle
IL / SL 5880.12/300:	according to DIN VDE 0100-551 as version IL / SL 5880.12/200, but for use with mobile generator sets

Ordering example for variants

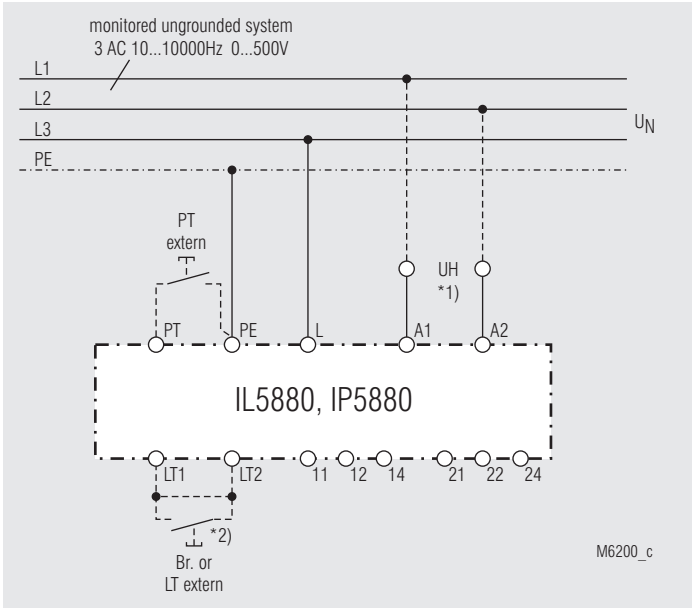
IL 5880 .12 / _ _ _ AC 380 ... 415 V AL 5 ... 100 kΩ VW 10 K ... 5MΩ

- Pre-warning setting
- Alarm setting
- Auxiliary voltage
- Variant, if required
- Contacts
- Type

Accessories

ET 4086-0-2:	Additional clip for screw mounting Article number: 0046578

Connection Example

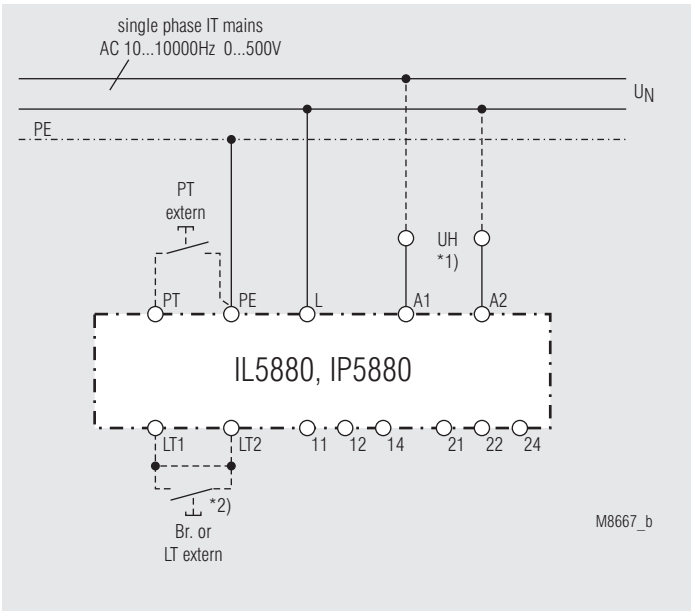


Monitoring of an ungrounded voltage system.

*1) Auxiliary supply U_H (A1 - A2) can be taken from the monitored voltage system. The voltage- and frequency 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

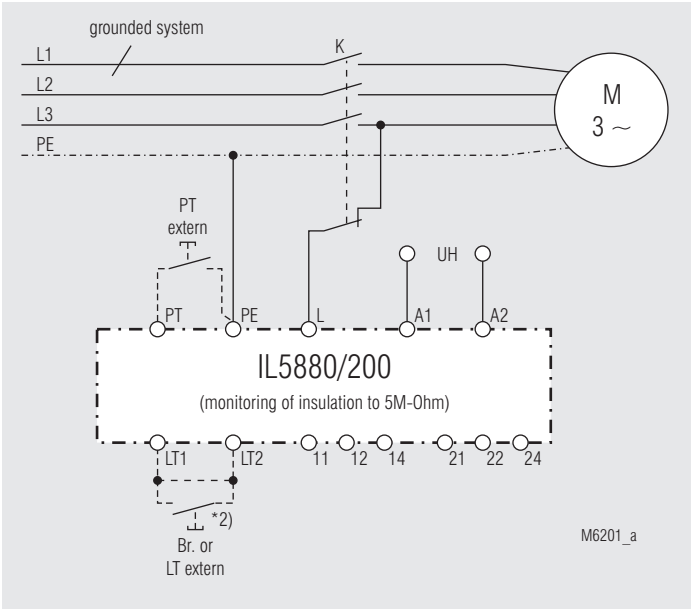
Connection Example



Monitoring of an ungrounded voltage system.

*1) Auxiliary supply U_H (A1 - A2) can be taken from the monitored voltage system. The voltage- and frequency 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



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