VARIMETER IMD
Insulation Monitor
IL 5881, SL 5881

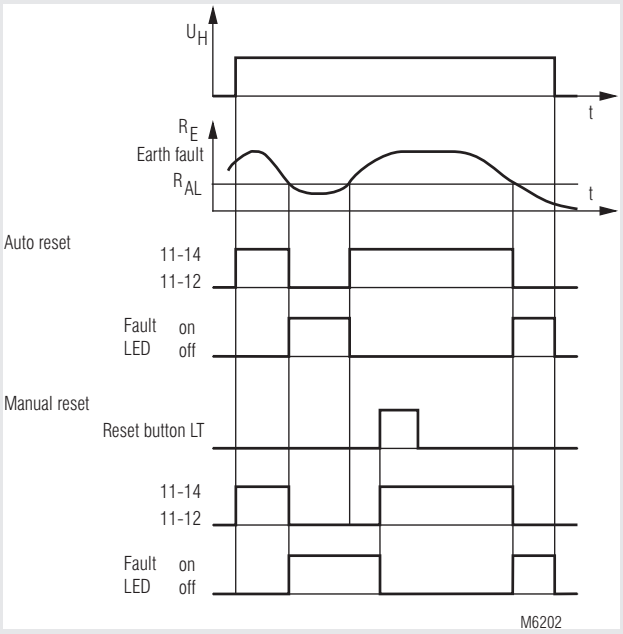
Translation of the original instructions

0238810

Product Description

The insulation monitor IL 5881 of the series VARIMETER IMD monitors the insulation resistance of non-earthed DC systems (IT-systems) with nominal voltage up to DC 12 ... 280 V. The supply voltage (auxiliary voltage) is taken from the monitored system. The device has LEDs to indicate the operating status. The response value can be set in a user-friendly way on the front of the device via a potentiometer.

Function Diagram



IL 5881/100, SL 5881/100; IL 5881, SL 5881

Your Advantage

- Preventive fire and system protection
- For DC voltage systems up to 12 ... 280 V
- Wide voltage range of measuring input U_N DC 12 ... 280 V (on request DC 24 ... 500 V with separate auxiliary supply, Measuring range 20 ... 500 kΩ)
- Easy adjustment of response value
- Selective ground fault indication for L+ and L- allows fast fault finding

Features

- With reference to IEC/EN 61557-8 (see also section "Notes")
- Adjustable tripping value R_{AL} of 5 ... 200 kΩ or 10 ... 500 kΩ
- Selective ground fault indication for L+ and L- allows fast fault finding
- Without auxiliary supply
- De-energized on trip
- 2 changeover contacts
- Automatic or manual reset, programmable
- With test and reset buttons
- Connection for external test and reset button possible
- Galvanic separated AC or DC auxiliary supply available as option
- Adjustable time delay as option
- 2 models available:
  - IL 5881: 61 mm deep with terminals near to the bottom to be mounted in consumer units or industrial distribution systems according to DIN 43880
  - SL 5881: 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 | CCC* | DC | UKCA

* For IL 5881

Application

- Monitoring of asymmetrical insulation resistance of ungrounded DC-voltage systems to earth.
- For industrial and railway applications

Function

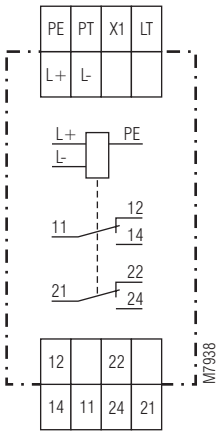
If the insulation resistance R_E between L+ or L- to ground drops below the adjusted alarm value R_{AL} (insulation failure) the corresponding red LED goes on and the output relay switches off (de-energized on trip). If the unit is on auto reset (bridge between LT-X1) and the insulation resistance gets better (R_E rises), the insulation monitor switches on again with a certain hysteresis and the red LED goes off.
Without the bridge between LT-X1 the insulation monitor remains in faulty state even if the insulation resistance is back to normal. The location of the fault on L+ or L- is indicated on the corresponding LED (selective fault indication).
The reset is done by pressing the internal or external reset button or by disconnecting the auxiliary supply.
By activating the "Test" button internal or external an insulation failure can be simulated to test the function of the unit.

Indicators

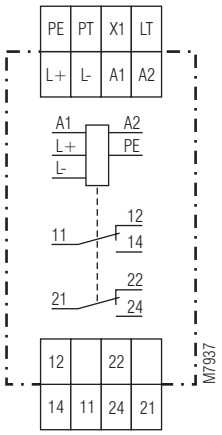
Green LED "ON":	On, when supply voltage connected
Red LED "RE+":	On, when insulation fault detected ($R_{E+} < R_{AL}$) on L+
Red LED "RE-":	On, when insulation fault detected ($R_{E-} < R_{AL}$) on L-

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.

Circuit Diagrams



IL 5881.12/100



IL 5881.12

Connection Terminals

Terminal designation	Signal description
A1	L / +
A2	N / -
L+, L-	Connection for monitored IT-systems
PE	Connection for protective conductor
PT, X1	Connection for external test button
LT, X1	Connections for external reset or manual and auto reset: LT/X1 bridged: Hysteresis function LT/X1 not bridged: Manual reset
11, 12, 14 21, 22, 24	Changeover contact (insulation failure)

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 X1 have no galvanic separation to the measuring circuit L+/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+/L-.
- No external potentials may be connected to external control terminals PT, LT1 und X1.

Attention!

- Before checking insulation and voltage, disconnect the insulation monitor IL/SL 5881 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.
- According to IEC/EN 61 557-8 insulation monitors must be able to monitor the isolation resistance of the IT-system including symmetric and none symmetric occurance of the isolation resistance. Because of the measuring principle with a resistor bridge (asymmetry principle) the insulation monitor IL/SL 5881 will not detect symmetric ground faults of L+ and L-. Also a voltfree (disconnected U_N = 0V) system cannot be monitored. If the monitoring of symmetrical insulation resistances in ungrounded DC systems is required, the RL 5881 insulation monitor, for example, is suitable.

Attention!

- The IL/SL 5881 can be used in systems with high leakage capacity to ground. When the unit is adjusted to high alarm values a leakage capacity can create a pulse when switching the system on (short alarm pulse). This happens at the following values:

  IL / SL 5881: R_{AL} = 200 kΩ: C_E > 1 µF
  IL / SL 5881: R_{AL} = 50 kΩ: C_E > 6 µF
  IL / SL 5881: R_{AL} = 20 kΩ: C_E > 16 µF

  IL / SL 5881/100: R_{AL} = 500 kΩ: C_E > 0.8 µF
  IL / SL 5881/100: R_{AL} = 200 kΩ: C_E > 0.8 µF
  IL / SL 5881/100: R_{AL} = 50 kΩ: C_E > 2.0 µF
  IL / SL 5881/100: R_{AL} = 20 kΩ: C_E > 4.5 µF

  An optional time delay (on request) could suppress this pulse.

- On models with separate auxiliary supply the alarm state is not defined when the voltage drops below 3 V. To avoid false alarm an additional auxiliary relay should be used which is connected to the monitored voltage or the variant IL 5881.12/010 is used.

- On the models with galvanic separation between DC auxiliary supply and measuring input, the supply (A1/A2) can be connected to the monitored voltage system (L+/L-). The voltage range of the auxiliary input must be noticed which is only 1.25 of U_H while the measuring input always goes up to 280 V. If no auxiliary supply is available the model IL/SL 5881/100 (without auxiliary supply) can be used which takes the auxiliary supply from the monitored system (U_H = U_N = DC 12 ... 280 V).

Technical Data

Auxiliary Circuit
(only at IL/SL 5881)

Auxiliary voltage U_H:	AC 220 ... 240 V, 380 ... 415 V DC 12 V, 24 V DC 24 ... 60 V
Voltage range:	
AC:	0.8 ... 1.1 U_H
DC:	0.9 ... 1.25 U_H
Nominal frequency U_H:	50 ... 400 Hz
Frequency range U_H:	- 10 % / + 5 %
Nominal consumption	
AC:	Approx. 2 VA
DC:	Approx. 1 W

Measuring Circuit

	Standard	extended, on request
Nominal voltage U_N at		
≤ 5 % residual ripple:	DC 12 ... 280 V	DC 24 ... 500 V
≤ 48 % residual ripple:	DC 12 ... 220 V	
Voltage range:	0,9 ... 1,1 U_N	0,9 ... 1,1 U_N
Alarm value R_{AL}:	1.) 5 ... 200 kΩ 2.) 10 ... 500 kΩ	20 ... 500 kΩ
Setting R_{AL}:	infinite setting	infinite setting
Internal DC resistance L+ and L- to PE:	1.) each appr. 75 kΩ 2.) each appr. 100 kΩ	each approx. 190 kΩ
Max. meas. current at PE (R_E = 0):	1.) U_N / 75 kΩ 2.) U_N / 100 kΩ	U_N / 190 kΩ

Operate delay		
At R_{AL} = 50 kΩ, C_E = 1 µF		
R_E from ∞ to 0.9 R_{AL}:	Approx. 0.8 s	
R_E from ∞ to 0 kΩ:	Approx. 0.4 s	
Response inaccuracy:	± 15 % ± 1.5 kΩ	IEC 61557-8
Hysteresis		
At R_{AL} = 50 kΩ:	Approx. 10 ... 15 %	
Time delay:	0.5 ... 20 s (variant)	

Output

Contacts:		
IL / SL 5881.12:	2 changeover contacts	
Thermal current I_{th}:	4 A	
Switching capacity		
To AC 15:	3 A / AC 230 V	IEC/EN 60947-5-1
Switching capacity		
To DC 13:	2 A / DC 24 V 0.2 A / DC 250 V	IEC/EN 60947-5-1
Electrical life		
To AC 15 at 1 A, AC 230 V:	≥ 2 x 10^5 switching cycles	IEC/EN 60947-5-1
Short circuit strength		
max. fuse rating:	4 A gG / gL	IEC/EN 60947-5-1
Mechanical life:	≥ 10 x 10^6 switching cycles	

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 25 ... + 60°C	
Storage:	- 25 ... + 70°C	
Altitude:	≤ 2000 m	
Clearance and creepage distances		
Rated impulse voltage / pollution degree between auxiliary supply connections(A1 / A2):	4 kV / 2 at AC-auxiliary voltage	IEC 60664-1
Between measuring input connections (L+ / L- / PE):	4 kV / 2	IEC 60664-1
Between auxiliary supply and measuring input connections:	4 kV / 2	IEC 60664-1
Input to output(contacts):	6 kV / 2	IEC 60664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61000-4-2
HF irradiation:		
80 MHz ... 1 GHz:	12 V / m	IEC/EN 61000-4-3
1 GHz ... 2.7 GHz:	10 V / m	IEC/EN 61000-4-3
Fast transients:	2 kV	IEC/EN 61000-4-4
Surge voltages		
Between A1 - A2 and L+ - L-:	1 kV	IEC/EN 61000-4-5
Between A1, A2 - PE and L+, L- - PE:	2 kV	IEC/EN 61000-4-5
HF-wire guided:	10 V	IEC/EN 61000-4-6
Interference suppression:	Limit value class B	EN 55011
Degree of protection		
Housing:	IP 40	IEC/EN 60529
Terminals:	IP 20	IEC/EN 60529
Housing:	Thermoplastic with V0 behaviour according to UL Subjekt 94	
Vibration resistance:	Amplitude 0.35 mm frequency 10 ... 55 Hz	IEC/EN 60068-2-6
Climate resistance:	25 / 060 / 04	IEC/EN 60068-1
Terminal designation:	EN 50005	
Wire connection:	DIN 46228-1/-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 60999-1
Mounting:	DIN rail mounting (IEC/EN 60715) or screw mounting M4, 90 mm hole pattern, with additional clip available as accessory	
Weight		
IL 5881:	Approx. 170 g	
SL 5881:	Approx. 200 g	

Dimensions

Width x height x depth:	
IL 5881:	35 x 90 x 61 mm
SL 5881:	35 x 90 x 98 mm

Classification to DIN EN 50155 for IL 5881

Vibration and shock resistance: Category 1, Class B IEC/EN 61373
Service temperature classes: OT1 compliant
Protective coating of the PCB: No

Standard Types

IL 5881.12/100 DC 12 ... 280 V 5 ... 200 kΩ
Article number: 0053805
- Without auxiliary supply U_H
- Nominal voltage U_N: DC 12 ... 280 V
- Adjustable alarm value R_{AL}: 5 ... 200 kΩ
- Width: 35 mm

SL 5881.12/100 DC 12 ... 280 V 5 ... 200 kΩ
Article number: 0055168
- Without auxiliary supply U_H
- Nominal voltage U_N: DC 12 ... 280 V
- Adjustable alarm value R_{AL}: 5 ... 200 kΩ
- Width: 35 mm

Variants

IL / SL 5881.12: With auxiliary supply

IL / SL 5881.12/010 With auxiliary supply
no alarm at U_N < 3 V

IL / SL 5881.12/300 Without auxiliary supply
Nominal voltage U_N DC 12 ... 280 V
closed circuit operation
Time delay 0.5 ... 20 s

IL / SL 5881.12/800: Special low resistance range for the threshold value with limitation of the voltage range:

Article number:	0056910	0056911
Nominal voltage U_N at ≤ 5 % residual ripple:	DC 12 ... 110 V	DC 12 ... 24 V
Voltage range:	0.8 ... 1.25 U_N	0.8 ... 1.25 U_N
Alarm value R_{AL}:	1 ... 50 kΩ	0.2 ... 10 kΩ
Setting R_{AL}:	infinite setting	infinite setting
Internal AC resistance L+ and L- to PE:	each approx. 18.5 kΩ	each approx. 2.8 kΩ
Max. meas. current at PE (R_E = 0):	U_N / 18.5 kΩ	U_N / 2.8 kΩ

Ordering example for variants

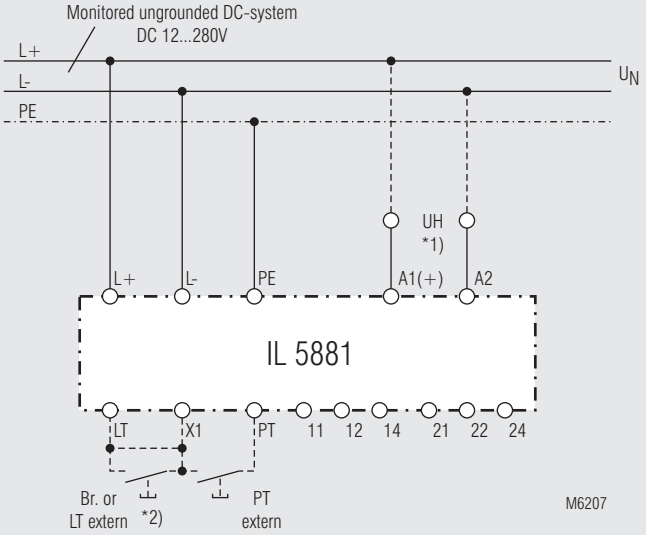
IL 5881 .12 AC 220 ... 240 V 10 ... 500 kΩ

- 10 ... 500 kΩ — Response value
- AC 220 ... 240 V — Auxiliary voltage
- .12 — Contacts
- IL 5881 — Type

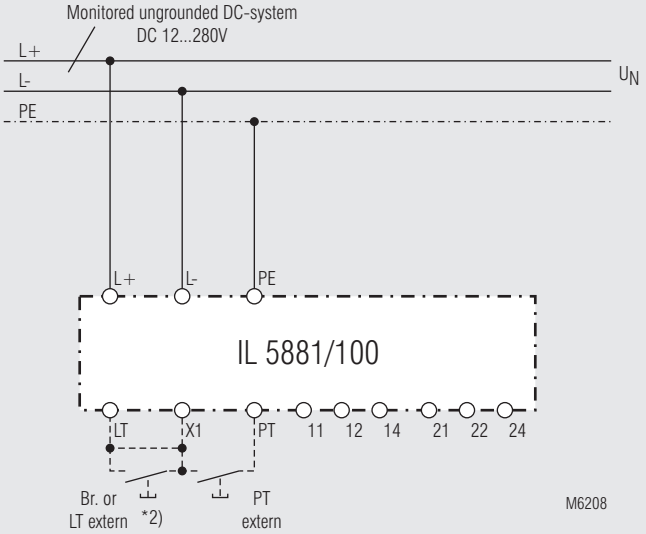
Accessories

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

Connections Examples



Monitoring of an ungrounded system.
*1) Auxiliary supply U_H (A1-A2) can be taken from monitored voltage system. The range of the auxiliary supply input must be observed.
*2) With bridge LT - X1: Automatic reset
Without bridge LT - X1: Manual reset, reset with button LT



Monitoring of an ungrounded system without auxiliary supply.
*2) With bridge LT - X1: Automatic reset
Without bridge LT - X1: Manual reset, reset with button LT