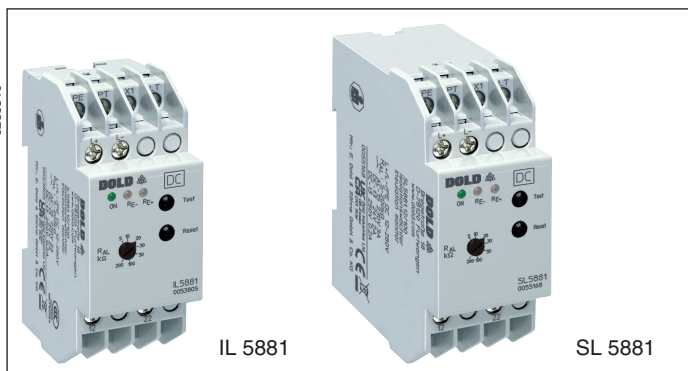


## VARIMETER IMD Insulation Monitor IL 5881, SL 5881

Translation  
of the original instructions



### 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 k $\Omega$ )
- 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 k $\Omega$  or 10 ... 500 k $\Omega$
- 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

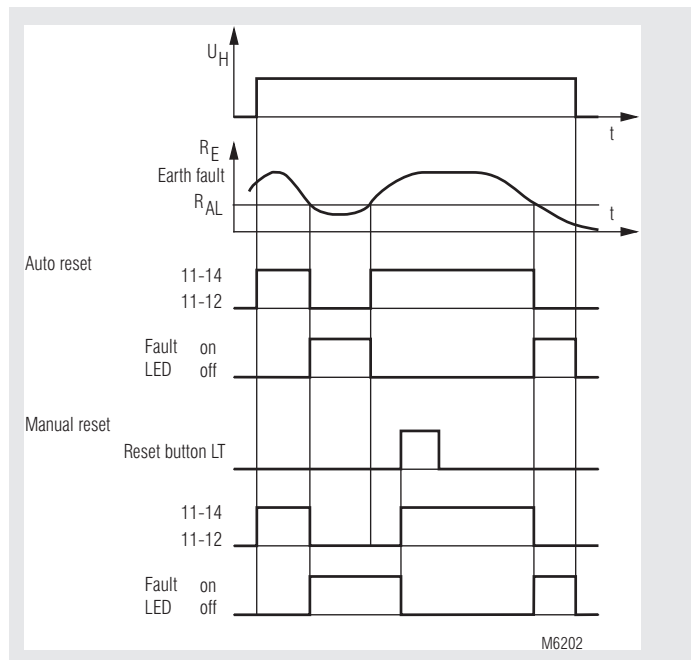
- DIN rail or screw mounting
- 35 mm width

### 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

### Approvals and Markings



### 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).

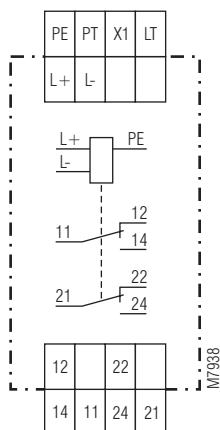
The reset is done by pressing the internal or external reset button or by disconnecting the auxiliary supply.

By activating the "Test" button internal or external an insulation failure can be simulated to test the function of the unit.

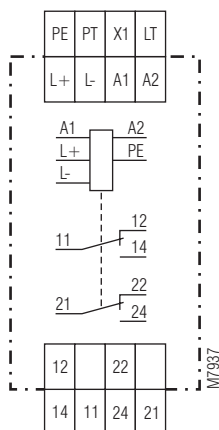
### Indicators

- 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-

## 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 and 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 or 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 and 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 occurrence 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:  $R_{AL} = 200 \text{ k}\Omega$ ;  $C_E > 1 \mu\text{F}$

IL / SL 5881:  $R_{AL} = 50 \text{ k}\Omega$ ;  $C_E > 6 \mu\text{F}$

IL / SL 5881:  $R_{AL} = 20 \text{ k}\Omega$ ;  $C_E > 16 \mu\text{F}$

IL / SL 5881/100:  $R_{AL} = 500 \text{ k}\Omega$ ;  $C_E > 0.8 \mu\text{F}$

IL / SL 5881/100:  $R_{AL} = 200 \text{ k}\Omega$ ;  $C_E > 0.8 \mu\text{F}$

IL / SL 5881/100:  $R_{AL} = 50 \text{ k}\Omega$ ;  $C_E > 2.0 \mu\text{F}$

IL / SL 5881/100:  $R_{AL} = 20 \text{ k}\Omega$ ;  $C_E > 4.5 \mu\text{F}$

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 ( $U_H = U_N = \text{DC } 12 \dots 280 \text{ V}$ ).

## 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  $U_H$

**Frequency range (AC):** 45 ... 400 Hz

### Nominal consumption

AC: Approx. 2 VA  
DC: Approx. 1 W

### Measuring Circuit

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

$R_E$  from ∞ to 0 kΩ:

**Response inaccuracy:** ± 15 % + 1.5 kΩ

IEC 61557-8

### Hysteresis

At  $R_{AL} = 50$  kΩ:

**Time delay:** Approx. 10 ... 15 %  
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<sup>5</sup> 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<sup>6</sup> 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 Subject 94

**Vibration resistance:** Amplitude 0.35 mm

frequency 10 ... 55 Hz IEC/EN 60068-2-6

25 / 060 / 04 IEC/EN 60068-1

**Climate resistance:** EN 50005

**Terminal designation:** DIN 46228-1/-2/-3/-4

**Wire connection:** 2 x 2.5 mm<sup>2</sup> solid or

2 x 1.5 mm<sup>2</sup> stranded wire

Cross section: 10 mm

Stripping length: 0.8 Nm

**Fixing torque:** Flat terminals with self-lifting clamping piece

**Wire fixing:** 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

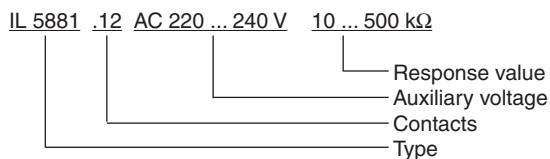
- Without auxiliary supply  $U_H$
- Nominal voltage  $U_N$ : DC 12 ... 280 V
- Adjustable alarm value  $R_{AL}$ : 5 ... 200 kΩ
- Width: 35 mm

### 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:

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

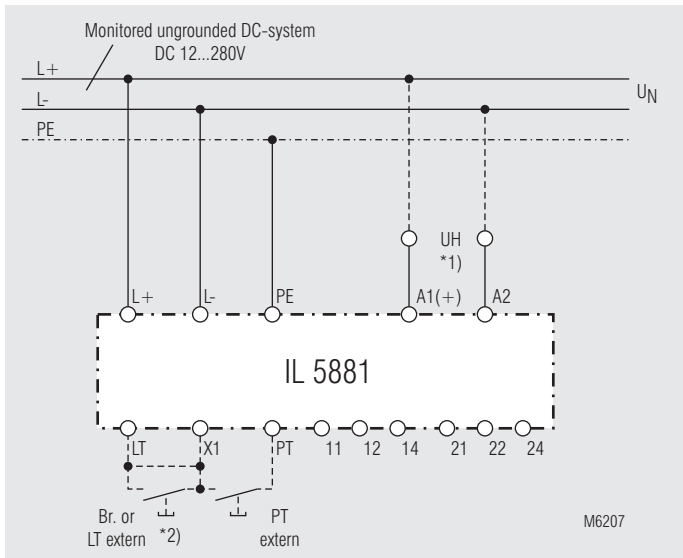
### Ordering example for variants



### Accessories

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

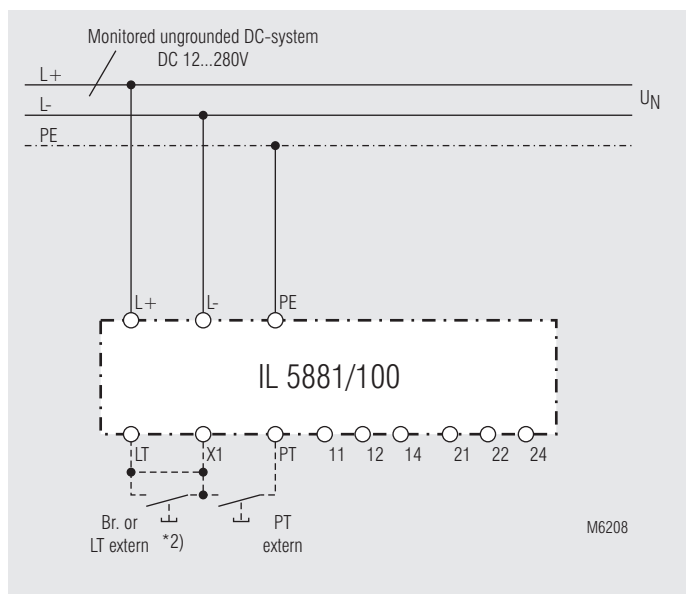
### Connections Examples



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