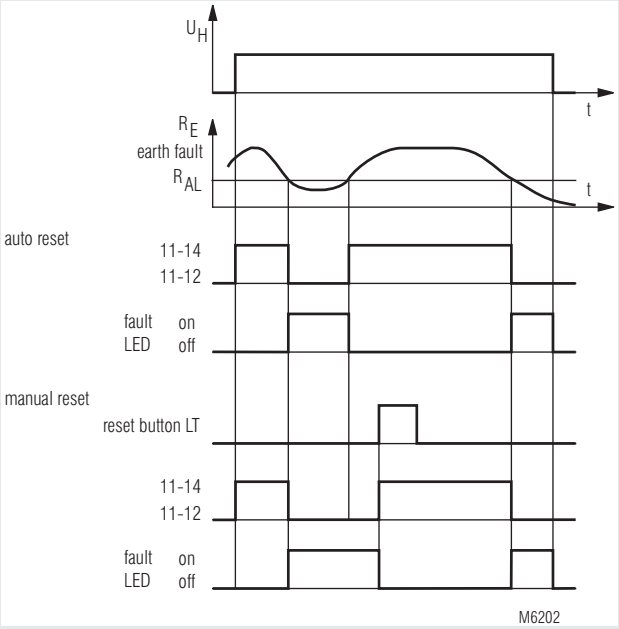
VARIMETER IMD
Insulation Monitor
IL 5881, SL 5881

0238810



Function Diagram



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

- With reference to IEC/EN 61 557-8 (see also section "Notes")
- 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)
- 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 43 880
  - 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 | cULus A025518 | DC

Application

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

Function

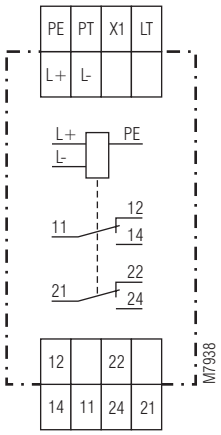
If the insulation resistance R_E between L+ or L- to ground drops below the adjusted alarm value R_{AL} (insulation failure) the corresponding red LED goes on and the output relay switches off (de-energized on trip). If the unit is on auto reset (bridge between LT-X1) and the insulation resistance gets 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

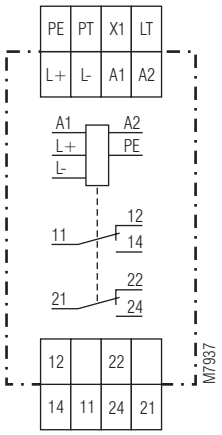
Green LED "ON":	On, when supply voltage connected
Red LED "RE+":	On, when insulation fault detected ($R_{E+} < R_{AL}$) on L+
Red LED "RE-":	On, when insulation fault detected ($R_{E-} < R_{AL}$) on L-

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

Notes

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).

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.

In one isolated voltage system only one insulation monitor must be connected, because several units would influence each other.

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

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.

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
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 AC 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)

Technical Data

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 60 947-5-1
Switching capacity		
to DC 13:	2 A / DC 24 V	
	0.2 A / DC 250 V	IEC/EN 60 947-5-1
Electrical life		
to AC 15 at 1 A, AC 230 V:	≥ 2 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:	≥ 10 x 10^6 switching cycles	

General Data

Operating mode:	Continuous operation	
Temperature range		
Operation:	- 20 ... + 60°C	
Storage:	- 20 ... + 60°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+ / L- / PE):	4 kV / 2	IEC 60 664-1
between auxiliary supply and measuring input connections:	4 kV / 2	IEC 60 664-1
Input to output(contacts):	6 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF irradiation:		
80 MHz ... 1 GHz:	12 V / m	IEC/EN 61 000-4-3
1 GHz ... 2.7 GHz:	10 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages		
between A1 - A2 and L+ - L-:	1 kV	IEC/EN 61 000-4-5
between A1, A2 - PE and L+, L- - PE:	2 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B	EN 55011
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 mm² solid or 2 x 1.5 mm² 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 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 61 373
Ambient temperature:	T1 compliant T2, T3 and TX with operational limitations	
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

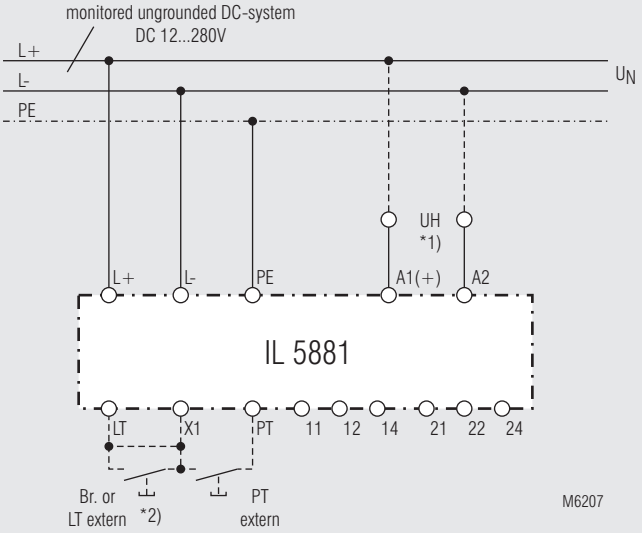
IL 5881 .12 AC 220 ... 240 V 10 ... 500 kΩ

- 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

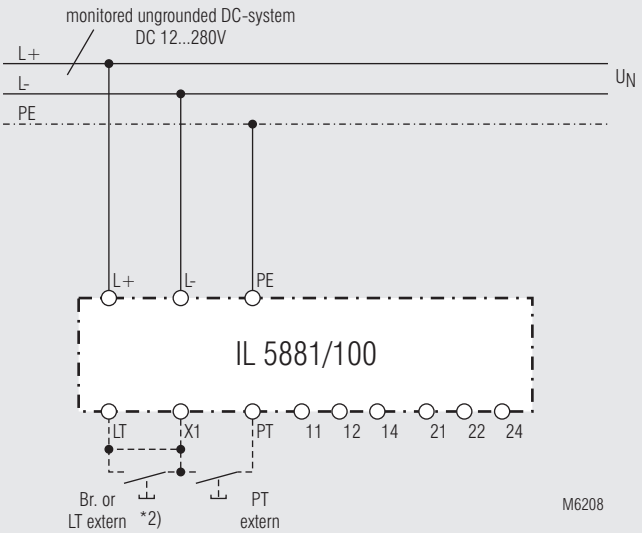
Connections Examples



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