



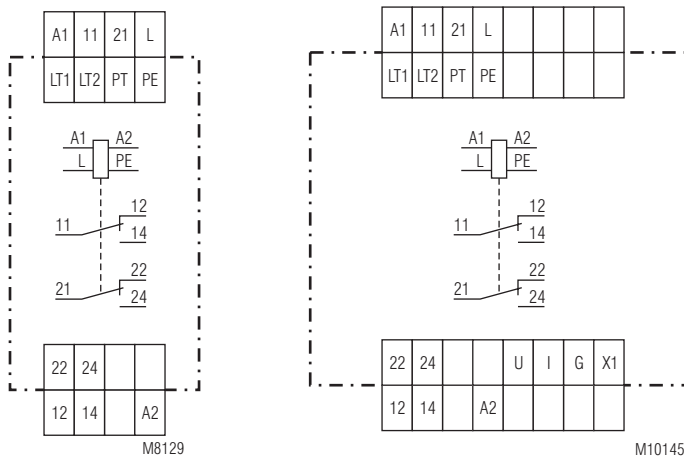
### Product Description

The insulation monitors MK 5880N and MH 5880 of the VARIMETER IMD family provides best insulation monitoring of pure three-phase and AC IT systems in a state of the art way fulfilling the relevant standards. The adjustment of the setting values is simple and user friendly done on 2 rotary switches on the front of the device.

The MH 5880 also has a galvanic separated analogue output and a 11 step LED chain for display the actual insulation value.

- According to IEC/EN 61557-8
- For single and 3-phase AC-systems up to 0 ... 500 V and 10 ... 1000 Hz
- Monitors also disconnected voltage systems
- Adjustable tripping value  $R_{AL}$  of 5 ... 100 k $\Omega$
- De-energized on trip
- Auxiliary voltage, measuring circuit and output contacts are galvanically separated
- Manual and auto reset
- With test and reset button
- Connections for external test and reset buttons possible
- LED indicators for operation and alarm
- 2 changeover contacts
- MK 5880N/200 with additional prewarning
  - Adjustable prewarning value 10 k $\Omega$  ... 5 M $\Omega$
  - 1 output relay for alarm and 1 for pre-warning
- MH 5880/500: Similar to MK 5880N but with galvanic separated analogue output and 11 step LED chain for the actual insulation value
- Wire connection: also 2 x 1.5 mm<sup>2</sup> stranded ferruled, or 2 x 2.5 mm<sup>2</sup> solid DIN 46228-1/-2/-3/-4
- As option with pluggable terminal blocks for easy exchange of devices
  - With screw terminals
  - Or with cage clamp terminals
- MK 5880N: 22.5 mm width  
MH 5880: 45 mm width

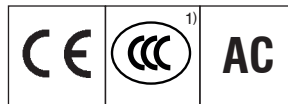
### Circuit Diagrams



MK 5880N

MH 5880

### Approvals and Markings



<sup>1)</sup> Only MK 5880N, see CCC-Data

### Applications

- Monitoring of insulation resistance of ungrounded voltage systems to earth
- MK 5880N/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.
- Other resistance monitoring applications

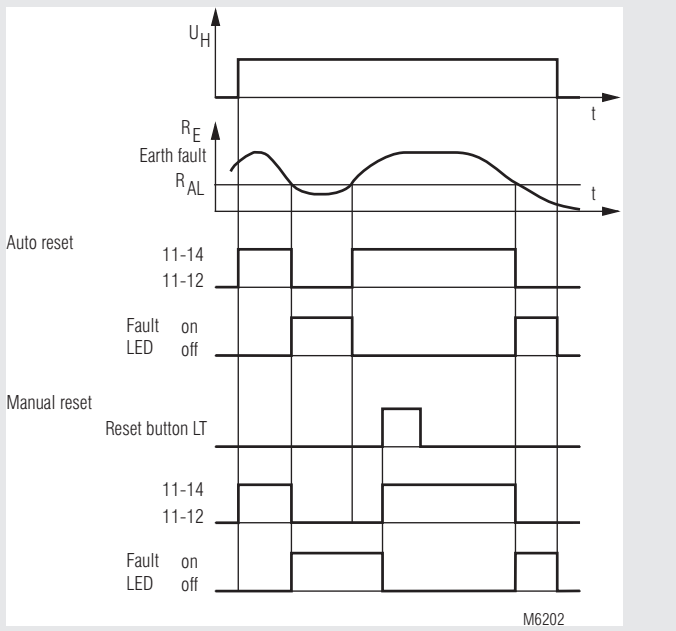
### Connection Terminals

Terminal designation	Signal description
A1, A2	Auxiliary voltage
L	Connection for measuring circuit
PE	Connection for protective conductor
PT/(PE)	Connection for external test button
LT1/LT2	Connection for external reset or control input for hysteresis function or manual reset LT1/LT2 bridged: Hysteresis function LT1/LT2 not bridged: Manual reset
11, 12, 14	Alarm signal relay (1 changeover contact)
21, 22, 24 <sup>1)</sup>	Prewarning signal relay (1 changeover contact)
U, I, G, X1 <sup>2)</sup>	Analogue output X1/G not bridged: U-G 0 ... 10V; I-G 0 ... 20mA X1/G bridged: U-G 2 ... 10V; I-G 4 ... 20mA

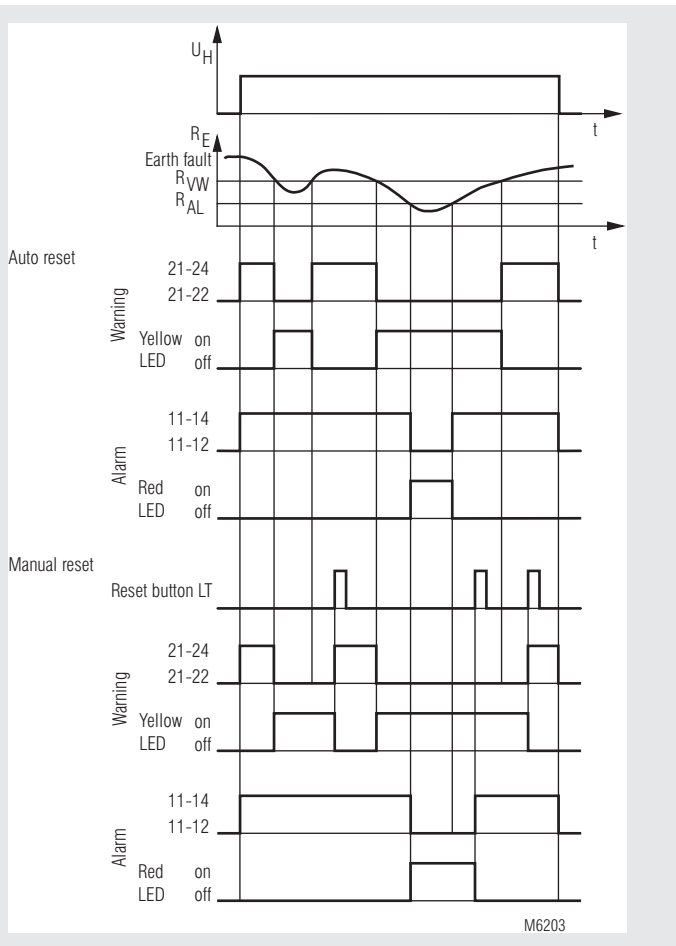
<sup>1)</sup> Only MK 5880N/200 and MH 5880

<sup>2)</sup> Only MH 5880

## Function Diagram



MK 5880N



MK 5880N/200

## 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 a 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. 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.

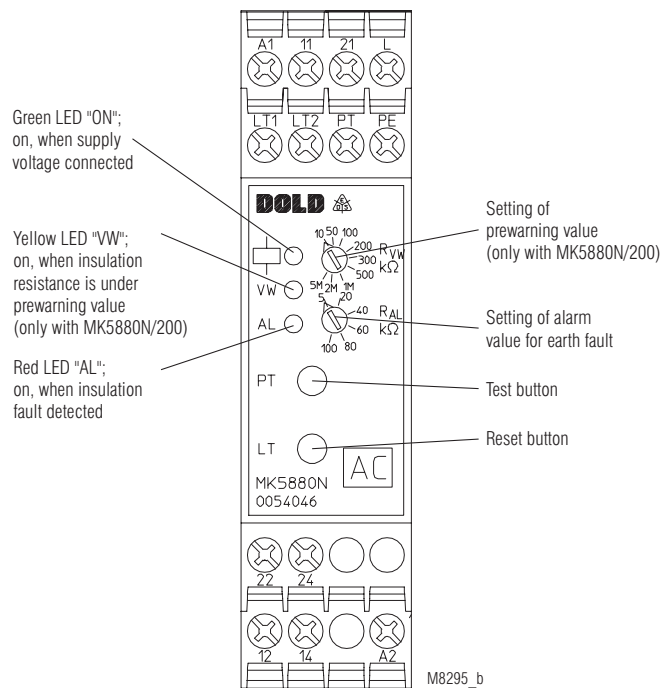
The variant MK 5880N.38/200 has a second setting range with a higher resistance up to 5 M $\Omega$  (Potentiometer  $R_{VW}$ ). This setting value can be used for pre-warning with relay output.

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 that the fault is stored and passed via contacts 21-22-24 to a PLC while the main fault does not lead to a disconnection of the mains via the contacts 11-12-14.

## 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 MK 5880N.38/200)

## Setting



**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 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 or bridges must provide a sufficient separation depending on the mains voltage on L.
- No external potentials may be connected to control terminals PT, LT1 and LT2.

**Attention!**

- Before checking insulation and voltage, disconnect the monitoring device MK 5880N / MH 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.

**Attention!**

- The insulation monitors MK 5880N / MH 5880 are designed to monitor AC-voltage systems. Overlaid 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 MK 5880N.38/200 can be used, because of its higher setting value up to 5 M $\Omega$ , 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  $\Omega$ ) via the feeding transformer. So failures that occur in the non-connected phases will also be detected.
- The MH5880/500 has in addition to the prewarning function also a galvanic separated analogue output and an 11 step LED chain indicator, that displays the actual insulation value between 20 k $\Omega$  and 1 M $\Omega$ . On terminals U/G of the analogue output 0-10 V are provided, on terminals I/G 0-20 mA are available. By bridging terminals X1 and G the output can be switched over to 2 ... 10 V and 4 ... 20 mA. For the scaling of the analogue output see Characteristic.

## Technical Data

### Auxiliary circuit

**Nominal voltage  $U_N$ :** AC 220 ... 240 V, AC 380 ... 415 V  
DC 12 V, DC 24 V

### Voltage range

AC: 0.8 ... 1.1  $U_N$   
DC: 0.9 ... 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 ... 1000 Hz  
**Alarm value  $R_{AL}$ :** 5 ... 100 k $\Omega$   
**Prewarning value  $R_{VW}$   
(only at MK 5880N/200):** 10 k $\Omega$  ... 5 M $\Omega$   
**Setting  $R_{AL}, R_{VW}$ :** Infinite variable  
**Internal test resistor:** Equivalent to earth resistance of < 5 k $\Omega$   
**Internal AC resistance:** > 250 k $\Omega$   
**Internal DC resistance:** > 250 k $\Omega$   
**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  $R_{AL} = 50$  k $\Omega$ ,  $C_E = 1$   $\mu$ F  
 $R_E$  from  $\infty$  to 0.9  $R_{AL}$ : Approx. 1.3 s  
 $R_E$  from  $\infty$  to 0 k $\Omega$ : Approx. 0.7 s  
**Response inaccuracy:**  $\pm 15\% + 1.5$  k $\Omega$  IEC 61557-8  
**Hysteresis**  
At  $R_{AL} = 50$  k $\Omega$ : Approx. 15 %

### Output

#### Contacts:

MK 5880N.12: 2 changeover contacts  
MK 5880N.38/200: 2 x 1 changeover contact  
**Thermal current  $I_{th}$ :** 4 A

#### Switching capacity

To AC 15  
NO contact: 3 A / AC 230 V IEC/EN 60947-5-1  
NC contact: 1 A / AC 230 V IEC/EN 60947-5-1  
To DC 13: 1 A / DC 24 V IEC/EN 60947-5-1  
**Electrical life** IEC/EN 60947-5-1

To AC 15 at 1 A, AC 230 V:  $\geq 3 \times 10^5$  switching cycles

#### Short circuit strength

**max. fuse rating:** 4 A gG / gL IEC/EN 60947-5-1

**Mechanical life:**  $\geq 30 \times 10^6$  switching cycles

### Analogue output with MH 5880/500

#### galvanic separation AC 3750V

#### to auxiliary supply, measuring circuit and relay output

Terminal U(+) / G(-): 0 ... 10 V, max. 10 mA  
Terminal I (+) / G(-): 0 ... 20 mA, burden 500 Ohm  
Change to 2 ... 10 V or 4 ... 20 mA by bridging terminal X1 and G  
(see diagram M10142)

## Technical Data

### General Data

**Operating mode:** Continuous operation

### Temperature range:

Operation: - 20 ... + 60 °C  
Storage: - 25 ... + 70 °C  
**Altitude:** < 2000 m

### Clearance and creepage distances

Overvoltage category:

Auxiliary and measuring voltage

$\leq 300$  V: III  
> 300 V: II

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 - PE): 4 kV / 2 IEC 60664-1

Between auxiliary supply  
and measuring input: 4 kV / 2 IEC 60664-1

Between auxiliary supply  
and measuring input  
to relay contacts: 4 kV / 2 IEC 60664-1

Between relay contacts 11-12-14  
to relay contacts 21-22-24: 4 kV / 2 IEC 60664-1

Insulation test voltage

Routine test: AC 2.5 kV; 1 s

### EMC

Electrostatic discharge: 8 kV (air) IEC/EN 61000-4-2

HF irradiation

80 MHz ... 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: 2 kV IEC/EN 61000-4-5

Between L - PE: 2 kV IEC/EN 61000-4-5

Between A1 - A2 - PE: 4 kV IEC/EN 61000-4-5

HF-wire guided: 10 V IEC/EN 61000-4-6

Interference suppression:

Devices with AC-aux. voltage: Limit value class B EN 55011

Devices with DC-aux. voltage: 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 inter-  
ference can be generated.

To avoid this, appropriate measures have  
to be taken.

### 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

Amplitude 0.35 mm

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

20 / 060 / 04 IEC/EN 60068-1

**Terminal designation:** EN 50005

## Technical Data

<b>Wire connection</b>	DIN 46228-1/-2/-3/-4
<b>Screw terminals (integrated):</b>	1 x 4 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled or 2 x 1.5 mm <sup>2</sup> stranded ferruled or 2 x 2.5 mm <sup>2</sup> solid
Insulation of wires or sleeve length:	8 mm
<b>Plug in with screw terminals</b>	
Max. cross section for connection:	1 x 2.5 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled
Insulation of wires or sleeve length:	8 mm
<b>Plug in with cage clamp terminals</b>	
Max. cross section for connection:	1 x 4 mm <sup>2</sup> solid or 1 x 2.5 mm <sup>2</sup> stranded ferruled
Min. cross section for connection:	0.5 mm <sup>2</sup>
Insulation of wires or sleeve length:	12 <sup>+0.5</sup> mm
<b>Wire fixing:</b>	Plus-minus terminal screws M 3.5 box terminals with wire protection or cage clamp terminals
<b>Fixing torque:</b>	0.8 Nm
<b>Mounting:</b>	DIN rail IEC/EN 60715
<b>Weight</b>	
MK 5880N:	Approx. 180 g
MH 5880:	Approx. 320 g

## Dimensions

### Width x height x depth

MK 5880N:	22.5 x 90 x 97 mm
MK 5880N PC:	22.5 x 111 x 97 mm
MK 5880N PS:	22.5 x 104 x 97 mm
MH 5880:	45 x 90 x 97 mm

## CCC-Data

<b>Auxiliary circuit</b>	
<b>Nominal voltage U<sub>N</sub>:</b>	AC 220 ... 240 V DC 12 V, DC 24 V
<b>Switching capacity:</b>	
To AC 15	
NO contact:	1.5 A / AC 230 V



Technical data that is not stated in the CCC-Data, can be found in the technical data section.

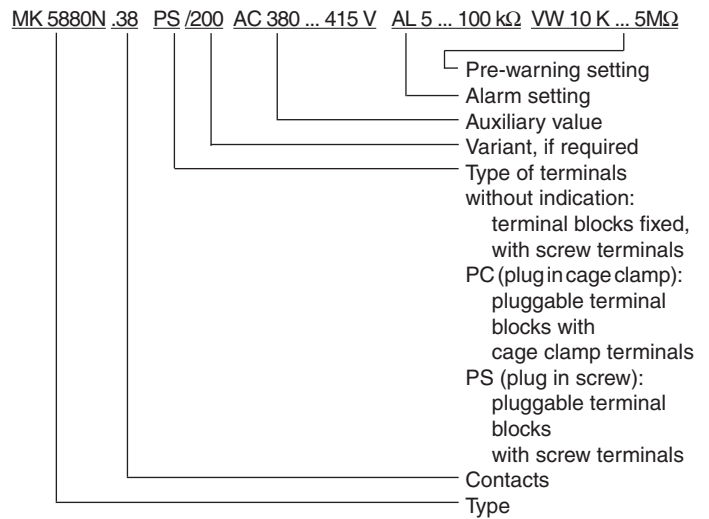
## Standard Type

MK 5880N.12 AC 220 ... 240 V	
Article number:	0054044
• Auxiliary voltage U <sub>H</sub> :	AC 220 ... 240 V
• Adjustable alarm value R <sub>AL</sub> :	5 ... 100 kΩ
• Width:	22.5 mm

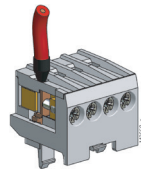
## Variants

MK 5880N.38/200:	With pre-warning
MH 5880.38/500:	Similar to MK 5880N but with galvanic separated analogue output (current/voltage) and 11 step LED chain for the actual insulation value Width: 45 mm

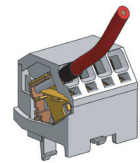
## Ordering example for variants



## Options with Pluggable Terminal Blocks



Screw terminal (PS/plugin screw)

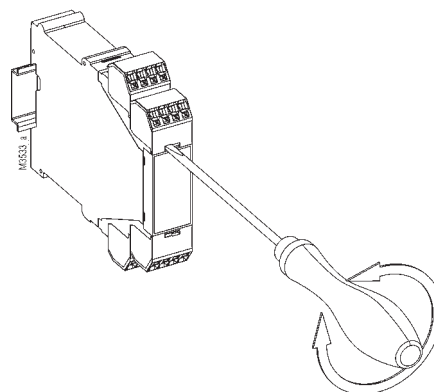


Cage clamp terminal (PC/plugin cage clamp)

## Notes

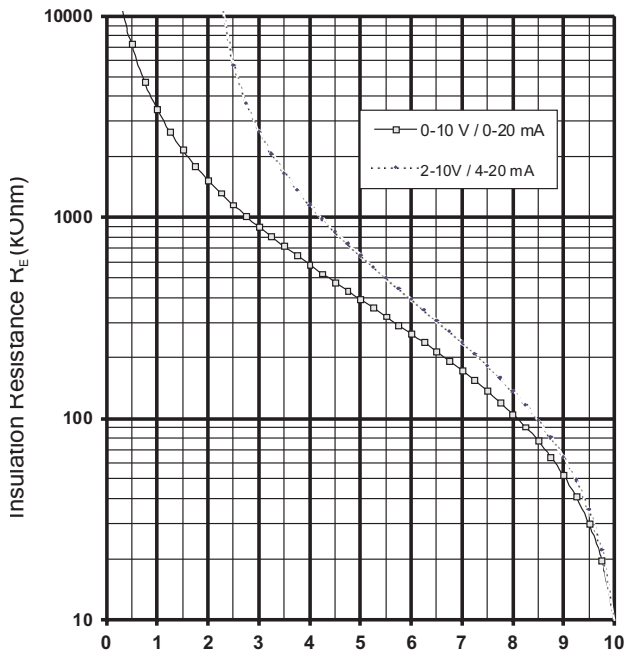
Removing the terminal blocks with cage clamp terminals

1. The unit has to be disconnected.
2. Insert a screwdriver in the side recess of the front plate.
3. Turn the screwdriver to the right and left.
4. Please note that the terminal blocks have to be mounted on the belonging plug in terminations.



**MH5880**

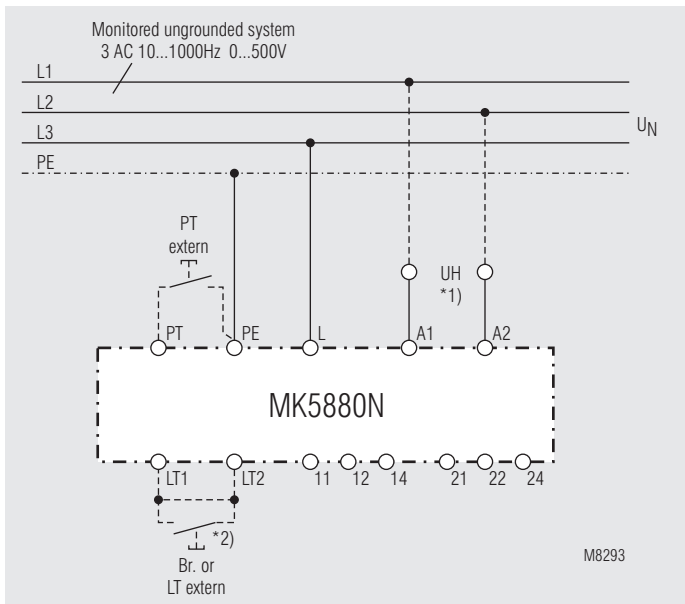
Analogue Output Voltage  $U_A$   
against Insulation Resistance  $R_E$



Analogue Output Voltage  $U_A$  (V)

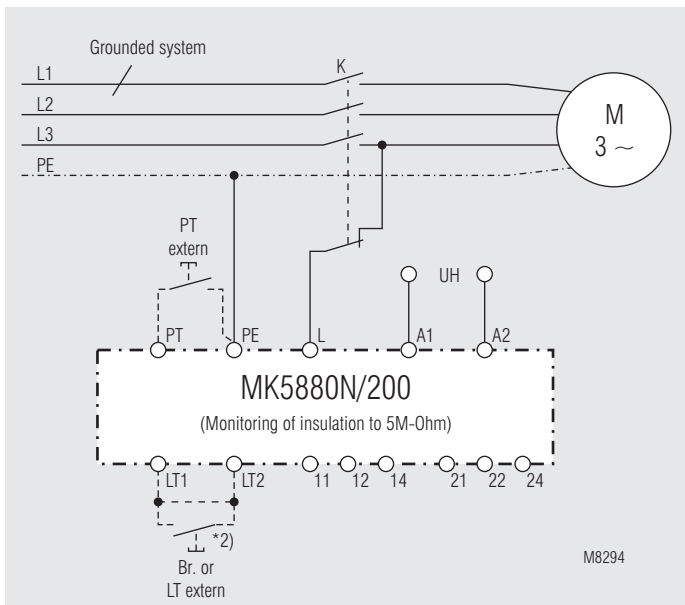
M10261

Analogue output voltage is proportional to the insulation resistance  $R_E$



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



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



