DI-MON 1
Residual Current Monitor

3-348-912-37
1/7.98

1 Applications

The DI-MON 1 test instrument allows for potential-free measurement or recording of residual current which is generated by an electrical device within a system with the help of a multimeter or a recorder. The DI-MON 1 need only be connected to the earthing contact outlet upstream from the device to be monitored.

The DI-MON 1 is also equipped with an alarm system, which indicates that a predetermined limit value has been exceeded, which is selected with the help of a rotary knob. The DI-MON 1 is even suited for long-term monitoring of electrical devices without the use of an additional display or recording instrument.

If several DI-MON 1 devices are used together, you can determine which of any number of load components within the electrical circuit has caused triggering of the system's residual current device through the generation of sporadic, excessive leakage current.

2 Safety Features and Precautions

The DI-MON 1 test instrument is manufactured and tested in accordance with IEC 61 010-1/EN 61 010-1/VDE 0411-1 safety regulations. If used for its intended purpose, the safety of both the operator and the instrument is assured.

Read the operating instructions carefully and completely before placing your instrument into service, and follow all instructions contained therein.

The instrument may not be used:

- if the housing has been opened
- if it demonstrates visible damage
- if it no longer functions flawlessly
- after extraordinary stresses due to transport
- after long periods of storage under unfavorable conditions (e.g. moisture, dust or excessive temperatures)
- after excessive overloading, i.e. if the overload limits listed under Characteristic Values have been exceeded

2.1 Meanings of Symbols on the Instrument

The symbols on the instrument have the following meanings:

⚠	Caution, refer to operating instructions
CAT II	Overvoltage category II device
300 V	Operating voltage
CE	Indicates EU conformity
$\frac{10-16}{250}$	Electrical outlet nominal current/voltage
I_Δ	Differential/residual current
$I_{\Delta max}$	Differential/residual current limit

3 Measuring Differential and Residual Current

The DI-MON 1 determines differential current at a connected load component between the L and N terminals. This allows for the recognition of all current which is discharged by the load component to the protective conductor or other earth conductors. This corresponds to the resulting residual current, which is applied to the electrical system.

The DI-MON 1 is equipped with a circuit which is capable of recognizing even short peak values for differential current (with a duration of approx. 10 ms) with adequate accuracy.

The DI-MON 1 has two contact-protected 4 mm jacks which allow for the display of this differential or residual current, and which are identified with the symbol I_Δ. A direct voltage can be taken from these jacks, which is equal to 10 times the differential current in volts.

Example:

A direct voltage of 1.23 V corresponds to a differential current of 123 mA.

The red jack identifies the positive, and the black jack the negative terminal. Connect a multimeter or another display instrument to these jacks with suitable measurement cables. Select the volts DC measuring range which corresponds to 10 times the anticipated differential current. Input resistance at the display instrument should have a value of at least 1 MΩ.

Maximum voltage at the DI-MON 1 jacks is 5 V DC.

If your display instrument is equipped with a MIN/MAX function, it should be activated. In this way you can log the peak value of the differential current. Since the output jacks at the DI-MON 1 are electrically isolated from the supply voltage, several DI-MON 1 devices can be connected to a single evaluation system.

Note

The feeding of an interference voltage to the jacks which are identified with the I_{Δ} symbol must be avoided! The use of long cables should also be avoided. When in doubt, used shielded cables!

4 Using the Alarm System

The DI-MON 1 is equipped with an optical alarm system, which indicates that a predetermined limit value has been exceeded, which is selected with the $I_{\Delta max}$ rotary knob. If the green LED is lit during operation, the limit value has not been violated. The red LED indicates that the limit value has been exceeded. This message is stored, and can be cancelled by activating the RESET key.

The alarm function is enabled approximately 1 minute after the DI-MON 1 has been plugged into the electrical outlet. The buffer capacitor is fully charged after about 5 minutes.

The buffer capacitor assures that the alarm system LEDs remain visibly illuminated for at least 40 minutes after supply voltage has been disconnected (for example due to tripping of an RCD). If only minimal ambient light prevails, the red LED remains visibly lit for about one hour. The limit value is selected with the $I_{\Delta max}$ knob. The scale is logarithmic, so that even minimal values can be easily selected. Limit values ranging from 1 to 250 mA are available. The instrument is set at the factory to the 30 mA mark which is used as a reference point. The further you adjust the knob away from the 30 mA mark, the less accurate the setting becomes, which is caused by logarithmic deviation within the adjuster.

As a result of pre-adjustment to the 30 mA mark, you may be able to turn the knob varying distances beyond the 1 mA or the 250 mA mark. In any case, the right hand physical limit corresponds to 250 mA.

Avoid settings in close proximity to zero. This range demonstrates the greatest sensitivity to interference from the mains or from load components, which may cause the alarm to respond without reason. Always select the greatest possible value, for example 50% of nominal residual current of the RCCB installed to the system.

If the alarm status cannot be cancelled despite repeated activation of the RESET key, a limit value has been selected which is less than the detected differential current. Select a higher value in such cases.

Note

When mains voltage is restored after an interruption, the red LED always lights up. Check the condition of the alarm system before mains voltage is switched back on!

5 Characteristic Values

5.1 Electrical Connections

Mains Voltage	230 V ±10%
Nominal Current at Outlet	10/16 A
Frequency	50 ... 60 Hz
Power Consumption	approx. 1 W

5.2 Measuring Circuit

Measuring Range	1 mA ... 500 mA AC
Measurement Method	summation current transformer, L-N
Output Voltage	0 V ... 5.0 V DC, potential-free
Transformation Ratio	10 mV DC / 1 mA AC
Accuracy	1.5% rdg. - 0.5 mA
Output Offset	< 1 mV (corresponds to 100 µA)
Load Current Influence	< 2 mV at 16 A load current
Residual Ripple	< 1% rdg.
Output Rise Time	> 1 V/10 ms
Output Decay Time	approx. 1 V/s
Output Internal Resistance	10 kΩ

5.3 Alarm Display

Charge Time to Operation	1 min
Charge Time to Max. Buffer	5 min
Display Duration	approx. 40 min
Setting Range	0 ... 250 mA, logarithmic
Setting Accuracy	10% of set value ±2 mA

5.4 Ambient Conditions

Storage Temperature	–20 °C ... +60 °C
Operating Temperature	–10 °C ... +50 °C
Application Range	for indoor use only
Climatic Category	3z/-20/50/60/75% (in compliance with VDI/VDE 3540)
Altitude	max. 2000 m

5.5 Electrical Safety

Protection Class	I per IEC 61010-1/EN 61010-1/ VDE 0411-1, measuring circuit protection class II
Operating Voltage	300 V
Test Voltage	1.35 kV
Overvoltage Category	II
Contamination Factor	2
EMC, Interference Emission	EN 50081-1: 1992
EMC, Interference Immunity	EN 50082-1: 1992

5.6 Mechanical Design

Protection	IP20
Dimensions (LxWxH)	120 mm x 65 mm x 100 mm
Weight	approx. 360 gr.

6 Housing Maintenance

Use a dry or slightly dampened cloth to clean the housing. Avoid the use of solvents or abrasives. No liquids may be allowed to enter the housing!

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GOSSEN-METRAWATT GMBH
Thomas-Mann-Str. 16-20
D–90471 Nuremberg, Germany
Telephone +49 911 8602-0
Fax +49 911 8602-669
http://www.gmc-instruments.com