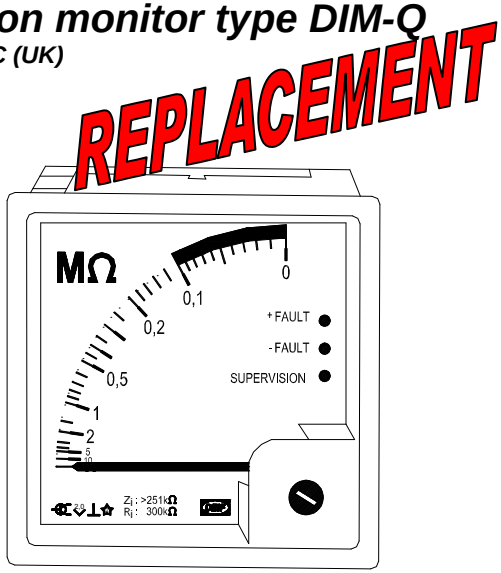
DEIF A/S

Installation/operation instructions

Insulation monitor type DIM-Q

4189330015C (UK)



- ***Monitoring of insulation resistance on an AC network***
- ***Working voltage up to 690V AC, withstands up to 1000V DC***
- ***Measuring range 0...1Mohm or 0...10Mohm***
- ***Alarm on exceeding the adjusted set point***
- ***Interchangeable scales***
- ***AC auxiliary voltage***

CE

DEIF A/S
Frisenborgvej 33, DK-7800 Skive
Denmark

Tel.: *(+45) 9614 9614*
Fax: *(+45) 9614 9615*
E-mail: *deif@deif.com*

Generally

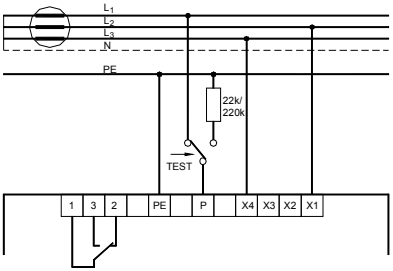
Description

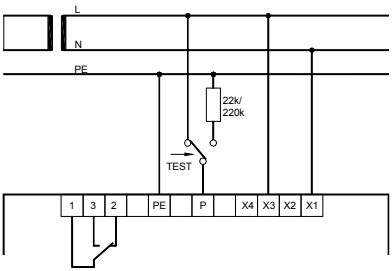
The DIM-Q can be used for insulation monitoring on a single-phase or a 3-phase IT system with or without neutral. The special characteristic of an IT power system is the fact that no live conductor is connected directly to earth. The DIM-Q is connected to the power system by connecting the terminal marked **P** to one of the phases (or the neutral). The PE input is then connected to the safety cable. To be able to monitor any kind of insulation failure, all accessible conductive building structures must be connected to the cable marked **PE** (protective earth).

Installation

Connection

If a test function is desirable, an arrangement based on a resistor and a push-button can be mounted as illustrated on the drawings below. The value of the resistor can be any value from 0Ω to the max. allowed insulation value. The DIM-Q can be supplied from the IT system under supervision, but it can also be supplied from another source.

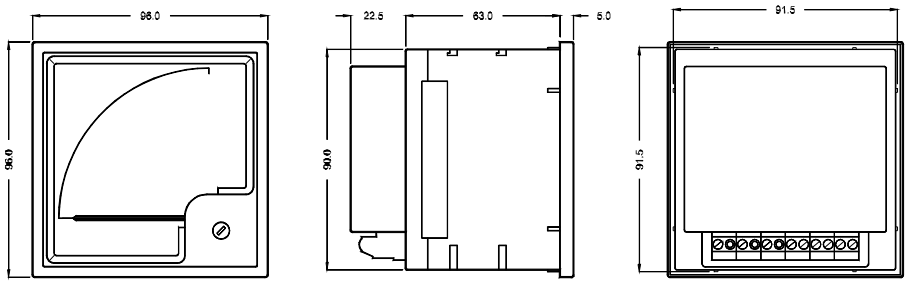




Connection of auxiliary supply

Type: 80...152V AC	Type: 176...288V AC	Type: 320...576V AC
X_1, X_2: 100V AC ±20%	X_1, X_2: 220V AC ±20%	X_1, X_2: 400V AC ±20%
X_1, X_3: 110V AC ±20%	X_1, X_3: 230V AC ±20%	X_1, X_3: 450V AC ±20%
X_1, X_4: 127V AC ±20%	X_1, X_4: 240V AC ±20%	X_1, X_4: 480V AC ±20%

Dimensions



Configuration of the relay function

The relay contact can be configured to either a normally energized contact (NE) or a normally de-energized contact (ND). ND function is recommended, if the DIM-Q is supplied from the IT system under supervision, because a disconnection of the supply will not result in an alarm. Figure 1 below shows the location of the switch S1 on the PCB for selection of either ND or NE relay function. The PCB is located under the lid.

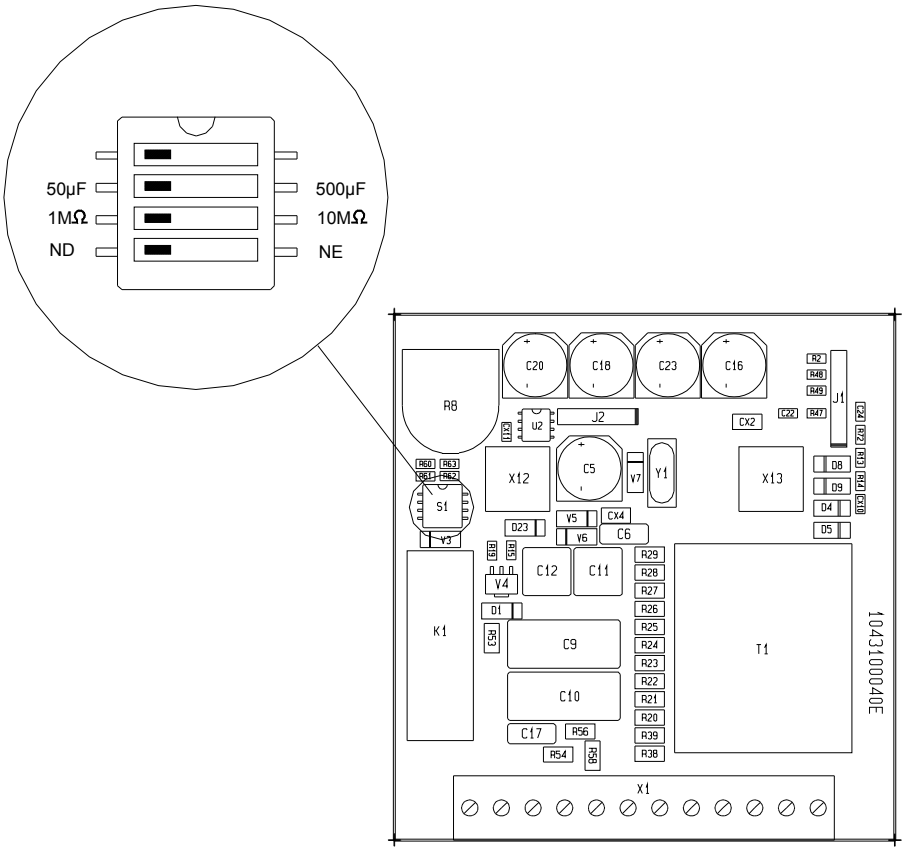


Figure 1

Example:

- Max. 50µF leakage capacitor is selected
- 1MΩ is selected as measuring range
- ND is selected as relay function

Configuration of the measuring range

The DIM-Q can be configured for measuring range 0…1MΩ with 22kΩ on the scale centre or for 0…10MΩ with 220kΩ on the scale centre. Figure 1 shows the position of the switch for selection of either 1MΩ or 10MΩ measuring range. Please notice that a change of measuring range also involves a change of scale. Change of scale can be done by following the instructions below.

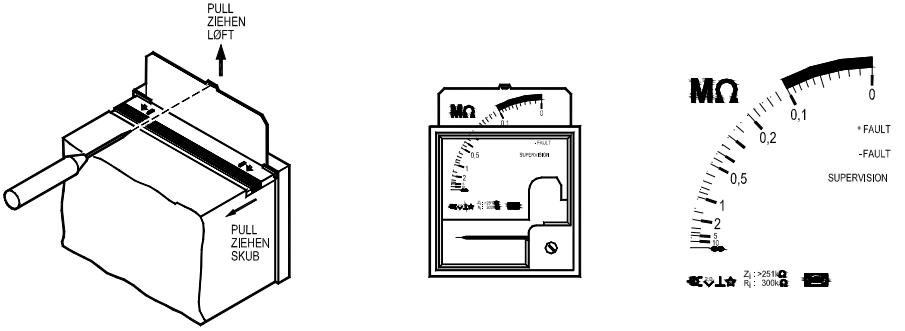


Figure 2

- Interrupt signal/supply to the terminals before exchanging the scale
- Push the scale cover towards the rear edge
- Remove the scale by means of a screwdriver or the like
- Insert new scale and press gently till it snaps into place
- Push the scale cover back again, after this the unit is ready for mounting

Adjustment of the set point

The requested alarm limit value is set on an ohm scale on the rear of the instrument, see Figure 3.

Range "x10" is marked:
The scale values on the ohm scale are multiplied by 10.

Typical setting:
Insulation resistance corresponding to lower limit of the section marked with red on the scale.

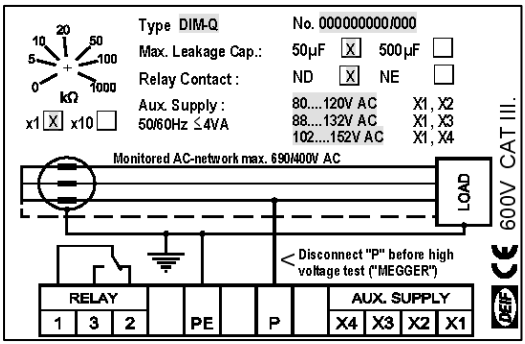


Figure 3

Operation

Indicators

The DIM-Q is equipped with 3 LED indicators, one green and 2 red LEDs. Only the green indicator marked SUPERVISION is lit when the unit is connected to auxiliary supply and no insulation error is detected. If the DIM-Q detects a change in the insulation measurement, the SUPERVISION LED starts flashing with a fast rate. If the insulation error detected is fluctuating, the internal integration time is automatically extended, which is indicated by a slower flash rate. As long as the SUPERVISION LED is flashing, the latest measured value is kept and indicated on the instrument until a new value is found, then the reading on the instrument is updated.

The 2 red LED indicators marked +FAULT and -FAULT are illuminated, if an insulation error below the set point is detected. If a DC voltage (component) occurs on the system together with an insulation error, the +FAULT or the -FAULT LED is illuminated, indicating the polarity of the DC voltage. This function will indicate the reason for the insulation error. In case only one red LED is illuminated, the fault is to be found in a load with a built-in rectifier, e.g. a frequency converter.

If a DC voltage is detected, but the alarm limit value is not yet reached, the +FAULT or the -FAULT LED will flash to indicate that there is a DC component higher than 50V DC between the power system and earth (PE), but no insulation error below the alarm limit value yet. Figure 4 on the next page illustrates a situation where a DC can occur between the P and the PE input of the DIM-Q.

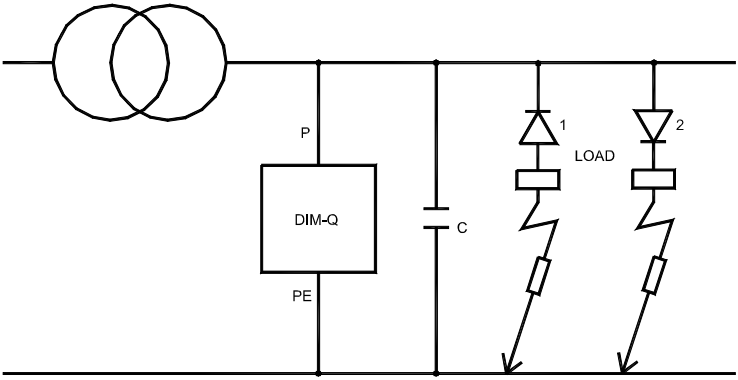


Figure 4

The capacitor marked C illustrates the leakage capacitor.
The diodes marked 1 and 2 illustrate the rectifier in the load.
If the situation is as illustrated at diode marked 2, the +FAULT LED is illuminated.
If the situation is as illustrated at diode marked 1, the -FAULT LED is illuminated.

Response time after a reset

If a leakage capacitor is <1µF and the insulation resistance does not fluctuate, the response time will be ≤10 seconds. For further information on response times - see the table below.

Insulation resistance between P and PE	**Leakage capacitor on an IT power system**	
kΩ	**50µF**	**500µF**
0	6 sec.	10 sec.
10	6 sec.	125 sec.
100	200 sec.	1000 sec.
1000	200 sec.	1750 sec.
10000	200 sec.	1750 sec.

If a test button is implemented (see the connection diagram on page 2) it is recommended to reset the DIM-Q by disconnecting and reconnecting the auxiliary supply (reset time 1 second) in connection with activation of the test button to obtain a response time of 6 seconds. If the DIM-Q is set to 500µF, the response time in connection with a test will likewise be 6 seconds.

Response time on duty

Settings 50µF or 500µF with actual leakage capacitor 1µF:
Step in insulation error

- From 1MΩ to 1kΩ: Response time max. 10 seconds
- From 1kΩ to 1MΩ: Response time max. 10 seconds

Setting 50µF with actual leakage capacitor 50µF:

- From 1MΩ to 1kΩ: Response time max. 120 seconds
- From 1kΩ to 1MΩ: Response time max. 240 seconds

Setting 500µF with actual leakage capacitor 500µF:

- From 1MΩ to 1kΩ: Response time max. 800 seconds
- From 1kΩ to 1MΩ: Response time max. 1600 seconds

Note:
If the insulation error is fluctuating (indicated by a flashing SUPERVISION LED), the above response times will be prolonged.

Power-up

The first 15 seconds after a power-up the DIM-Q is turned into a fast measuring mode. This mode is useful when a switchboard test is carried out, or if the set point has to be adjusted to match a test resistor (see above regarding reset of the DIM-Q). After 15 seconds the DIM-Q is automatically turned into normal measuring mode. If there is a leakage capacitor in the system the DIM-Q will indicate an insulation error for the first 15 seconds after a power-up. If the set point is exceeded the 2 red LEDs will be lit, but the relay output is inhibited for the first 15 seconds after power-up.

Fuses:
Recommended fuse for aux. supply X2, X3, X4 max. 2A.

Technical specifications

Measuring

Measuring circuit	DC resistance (R_i):	300kΩ ±1%
	AC impedance (Z_i):	251kΩ ±1% at 50Hz
	Measuring voltage:	±28V DC ±5%
	Mains voltage / leakage cap.:	Max. 690V AC +20% continuously / max. 1000V DC continuously / max. 50µF leakage capacitor or max. 500µF leakage capacitor
Instrument	Measuring range:	1MΩ / 10MΩ
	- Accuracy:	±5% of scale length (1MΩ) / ±2% of scale length (10MΩ)
	- Temperature drift:	Max. 0.5% of scale length per 10°C
	- Aux. supply influence:	Max. 0.2% of scale length at U_s +20...-15% Max. 5.0% at scale centre at U_s -15...-20%
	- Response time:	Depends on the actual insulation error / leakage capacitor (see table on page 7)
	Scale:	Exchangeable, with red section

Set point/relay

Set point:	0…1000kΩ / 0…10000kΩ corresponding to 22k or 220kΩ at scale centre
- Accuracy:	±5% of scale length for potentiometer
- Reproduceability:	±1% of scale length for potentiometer
- Hysteresis:	±1% of scale length for potentiometer
- Temperature drift:	Max. 0.2% of scale length for potentiometer per 10°C
- Voltage drift:	Max. 0.2% of scale length for potentiometer at U_s ±20%
- Response time:	Same as instrument (the relay is updated simultaneously with the instrument reading)
Relay output:	Change-over contact
Contact rating:	AC1: 8A, 250V AC – DC1: 8A, 24V DC AC15: 3A, 250V AC – DC13: 3A, 24V DC Life mechanical: 2×10^7 operations Life electrical: 1×10^5 operations
Relay coupling:	Normally energized NE or normally de-energized ND

General technical specifications

Auxiliary voltage:	100-110-127V AC or 220-230-240V AC or 400-450-480V AC ±20% 40...70Hz (≤4VA)
EMC: (see **Note 1**)	To IEC 61000-6-1, 61000-6-2, 61000-6-3, 61000-6-4, SS4361503 (PL4) and IEC 255-4 (class 3)
Galv. separation:	Relay output / measuring circuit / aux. voltage: 3.25kV - 50Hz - 1 min.
Temperature:	-10...55°C (nominal), -25...60°C (operating), -25...65°C (storage)
Climate:	Class HUE, to DIN 40040
Protection:	Instrument: IP52 / IP54. Electronics: IP20. Terminals: IP20. To IEC 529 and EN 60529
Connections:	Screw terminals: 2.5 mm^2 (multi-stranded), 4 mm^2 (single-stranded)
Materials:	All plastic materials are self-extinguishing to UL94 (V0)

Note 1:
The DIM-Q is CE marked for residential, commercial and light industry plus industrial environment. Regarding approvals, please see our homepage, www.deif.com, search for DIM-Q under the menu Documentation.

Warning:
If the installation is to be tested by means of a high-voltage "MEGGER", the measuring leads to the DIM-Q at terminal "p" must be disconnected before testing is carried out. Omitting this may result in damage to the DIM-Q, if the test voltage is higher than 1000V AC/DC. Besides the insulation test will be affected by the built-in DC voltage generator impedance (approx. 250kΩ).

For further information regarding the measurement method used in the DIM-Q or other technical specifications, please see the data sheet, document no. 4921230018.

Errors and changes excepted