



DATA SHEET

AAL-2 Insulation monitors

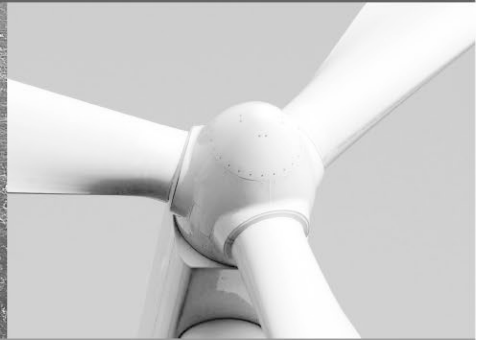




-power in control



DATA SHEET



Insulation monitors, AAL-2

- Warning delay and power-up delay
- Indication of set point on front
- Measuring range up to 440 V AC



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Document no.: 4921230026D

Application

The AAL-2 continuously monitors the insulation resistance between the connected AC network (IT network) and protective ground (PE).

Due to the warning delay functionality, the AAL-2 can be used in applications with moderate capacitance.

Measuring principle

12 V DC is superimposed on the system that is monitored, and the resulting current is measured.

Basic operation

The functionality of the product is to measure and monitor the insulation resistance between the network and PE.

Functionality

The green power indicator will be ON when auxiliary power is connected. The insulation resistance is then measured continuously and is readable on the meter.

When the measured resistance is lower than the set point, a relay is activated and the red warning indicator is ON.

When the measured resistance is higher than the set point, the relay is de-activated and the red warning indicator is turned OFF.

Indicators

The measuring can be monitored by looking at the indicators.

Indicator	General functionality	Remarks
POWER	Always ON when power is connected	If OFF, check power and wiring
WARNING	OFF when measurement is higher than set point - ON when measurement is lower than set point	WARNING always follows RELAY operation, within an on delay of 4 s (user-selectable 0 or 4 s)
METER	Shows the actual measurement	In case of capacitance on the network, the meter will show an insulation error until capacitance is fully charged

Set point adjustment

The warning set point is set on the back of the housing by means of a screwdriver.

The warning set point can then be indicated permanently on the meter by means of the adjustable red marker pointer.

Relay output

One change-over relay contact. By means of a built-in switch, located under the rear cover, the relay can be configured to either:

- NE (normally energised contact). Recommended for alarm purposes. In case of an auxiliary supply drop-out, the contact is activated immediately. It is recommended to supply the AAL-2 from a separate source if this type is used.
- ND (normally de-energised contact). Recommended for control purposes. Also recommended if the auxiliary supply for the AAL-2 comes from the same power system under supervision. An auxiliary supply failure will not result in an unwanted activation of the relay contact.

Red section on scale

Table 1 Red section

1 to 0 MΩ scales	10 to 0 MΩ scales	Typically Used Network Voltage*
0.010 to 0 MΩ	0.100 to 0 MΩ	100 V AC
0.011 to 0 MΩ	0.110 to 0 MΩ	110 V AC
0.012 to 0 MΩ	0.120 to 0 MΩ	120 V AC
0.022 to 0 MΩ	0.220 to 0 MΩ	220 V AC
0.023 to 0 MΩ	0.230 to 0 MΩ	230 V AC
0.024 to 0 MΩ	0.240 to 0 MΩ	240 V AC
0.038 to 0 MΩ	0.380 to 0 MΩ	380 V AC
0.040 to 0 MΩ	0.400 to 0 MΩ	400 V AC
0.042 to 0 MΩ	0.415 to 0 MΩ	415 V AC
0.044 to 0 MΩ	0.440 to 0 MΩ	440 V AC
0.045 to 0 MΩ	0.450 to 0 MΩ	450 V AC
0.048 to 0 MΩ	0.480 to 0 MΩ	480 V AC
0.060 to 0 MΩ	0.600 to 0 MΩ	600 V AC
0.066 to 0 MΩ	0.660 to 0 MΩ	660 V AC
0.069 to 0 MΩ	0.690 to 0 MΩ	690 V AC
	1.000 to 0 MΩ	-

* The scale selected is not limited to a certain network voltage, but often (typically) 0.1kΩ/V or 1kΩ/V is used

Advanced functionality

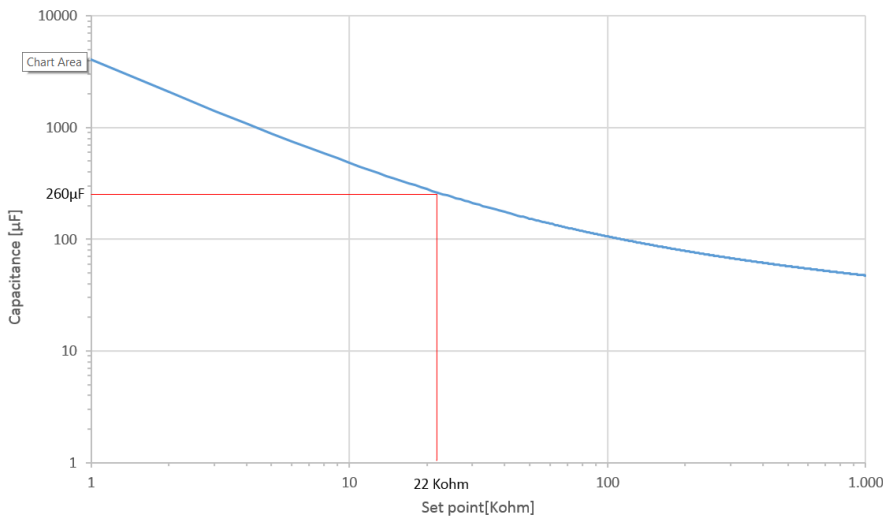
Delays

To minimise the number of unwanted warnings, delay functionalities are available in the product.

Description	Time	Remarks
Power ON delay	3 seconds	When powering up the product
Warning ON delay	0 or 4 seconds	Delay between warning indication and relay operation
Warning OFF delay	-	

By means of a jumper it is possible to select between no warning delay or 4 s warning delay.

Capacitive load on network as function of set point, 1 MΩ range

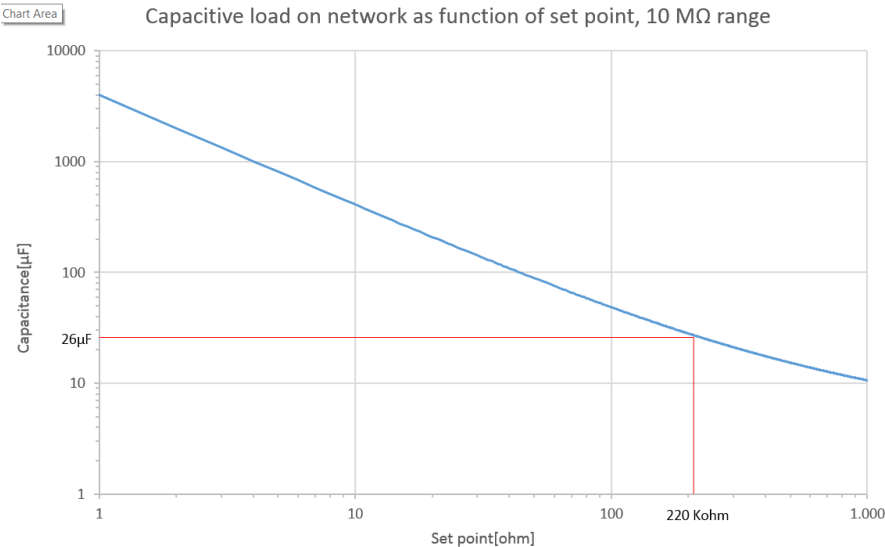


The shown 22 kΩ set point will accept capacitance up to 260 μF on 1 MΩ range, without false warning.

For higher capacitive load, the set point will have to be decreased accordingly.

If the resulting set point is unacceptably low, it is recommended to use a SIM-Q MKII.

Capacitive load on network as function of set point, 10 MΩ range



The shown 220 kΩ set point will accept capacitance up to 26 μF on 10 MΩ range, without false warning.

For higher capacitive load, the set point will have to be decreased accordingly.

If the resulting set point is unacceptably low, it is recommended to use a SIM-Q MKII.

Standard products

The following products are “off-the-shelf” products with very short delivery times and optimised prices.

AAL-2, Standard 1:

- Measuring range/scale: 10 to 0 MΩ (corresponding to 0.22 MΩ at scale centre)
- Red marker pointer
- NE relay
- Warning delay: 4 seconds

AAL-2, Standard 2:

- Measuring range/scale: 10 to 0 MΩ (corresponding to 0.22 MΩ at scale centre)
- Red marker pointer
- ND relay
- Warning delay: 4 seconds

AAL-2, Standard 3:

- Measuring range/scale: 1 to 0 MΩ (corresponding to 22 KΩ at scale centre)
- Red marker pointer
- ND relay
- Warning delay: 4 seconds

It is not possible to change the configuration of these products during ordering; use the custom product instead.

On-site flexibility

The product’s built-in flexibility enables the user to make some on-site configurations of the above-mentioned standards:

- Scale change
 - Scale change is possible through a sliding slot in the top of the housing
- Relay function
 - The relay contact can be changed from ND to NE by means of a jumper
- Warning delay
 - The range can be changed from 0 to 4 seconds by means of a jumper

Custom product

If the above-mentioned standard versions do not fulfil your needs, the product can be ordered with custom specifications. The following options are available:

- Standard or custom-designed scale/design/logo
- Red point marker
- Red section on scale (see Table 1)
- Anti-glare front glass
- 0 to 10 MΩ or 0 to 1 MΩ measuring range
- NE or ND relay (can be changed on-site)
- 0 or 4 seconds warning delay (can be changed on-site)

Test

An instrument self-test can be carried out according to IEC 61557-8, as shown in Fig. 1 below. ¼ W resistance and switch ratings according to network voltages.

Connections

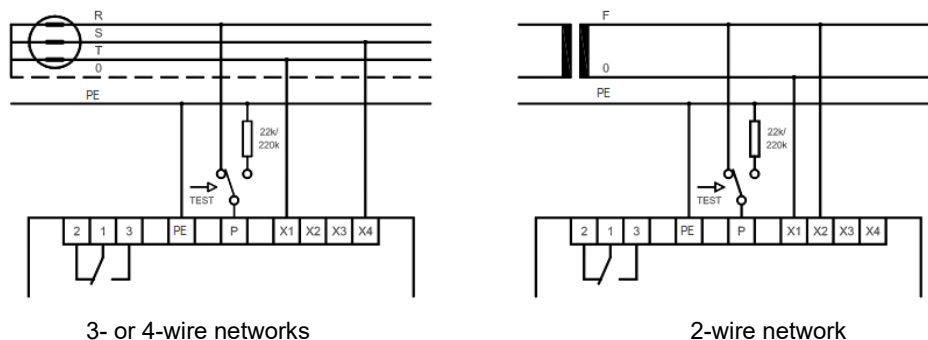


Fig. 1

Technical specifications

Technical specifications		
DC resistance (R_i):	22 k Ω or 220 k Ω \pm 5 % (1 M/10 M range)	
AC impedance (Z_i):	>100 k Ω at 50 Hz	
Measuring output voltage (U_m):	12 V DC \pm 10 %	
AC input voltage (max.) (U_n):	528 V AC continuously (440 V AC +20 %)	
Leakage capacitance (max.) (C_e):	25/250 μ F (1 M/10M range)	
Response time (1 M Ω) (t_{an}):	<0.5 s	
Response time (10 M Ω) (t_{an}):	<3.5 s	
Frequency range:	45 to 500 Hz	
Set point (R_{an}), 0 to 1 M Ω range (R_F):	0 to 150 k Ω (if set point above 150 k Ω is selected, warning relay will be disabled)	
Set point (R_{an}), 0 to 10 M Ω range (R_F):	0 to 1.5 M Ω (if set point above 1.5 M Ω is selected, warning relay will be disabled)	
Relay:	Change-over contact Standard: Normally de-energised (ND). Optional: Normally energised (NE)	
	Contact ratings: AC1: 8 A, 250 V AC – DC1: 8 A, 24 V DC AC15: 3 A, 250 V AC – DC13: 3 A, 24 V DC Mechanical life: 2×10^7 operations, electrical life: 1×10^5 operations	
AC auxiliary (U_s):	115 V AC \pm 20 % (X1+X2) 230 V AC \pm 20 % (X1+X3) 400 V AC \pm 20 % (X1+X4)	Frequency range: 45 to 65 Hz (f_n)
		Load: <4 VA

Type test specifications

Temperature	-25 to 60 °C (operating) -25 to 65 °C (storage)	EN IEC 60068-2-1 EN IEC 60068-2-2
Climate	55 °C 97 % RH	EN IEC 60068-2-30, test Db
Vibration	3 to 13.2 Hz: 2mm _{pp} 13.2 to 100 Hz: 0.7 g	EN IEC 60068-2-6 & IACS UR E10
Shock	50 g, 11 ms, half sine Tested with 3 impacts in each direction in all 3 axes. A total of 18 impacts per test	EN IEC 60068-2-27, test Ea
Safety	Installation Cat. III 600 V Pollution degree 2	EN IEC 61010-1 tested at 50 Hz, 1 min. Each galvanic group is tested to other galvanic groups and to protection earth LVD: EN 61010-1:2010+A1:2019+A1/AC:2019, EN 61010-2-030:2010, EN 61557-8:2015 and EN 60529:1991+A1:2000+A2:2013+ AC:1993 +AC:2016-12+A2/AC:2019-02
EMC		EN IEC 61000-6-1/2/3/4 EN IEC 60255-26 EN 61326-1:2013 EN 61326-2-4:2013 EN IEC 60533 power distr. zone IACS UR E10 power distr. zone
Materials	All plastic parts are self-extinguishing	UL 94 V-0 RoHS: EN IEC 63000:2018
Protection	Front: IP52 (IP54 optional by means of gasket) Housing/terminals: IP20	EN IEC 60529
Approvals and certificates	See the DEIF homepage for valid approvals and certificates	www.deif.com



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Due to our continuous development we reserve the right to supply equipment which may vary from the described.

