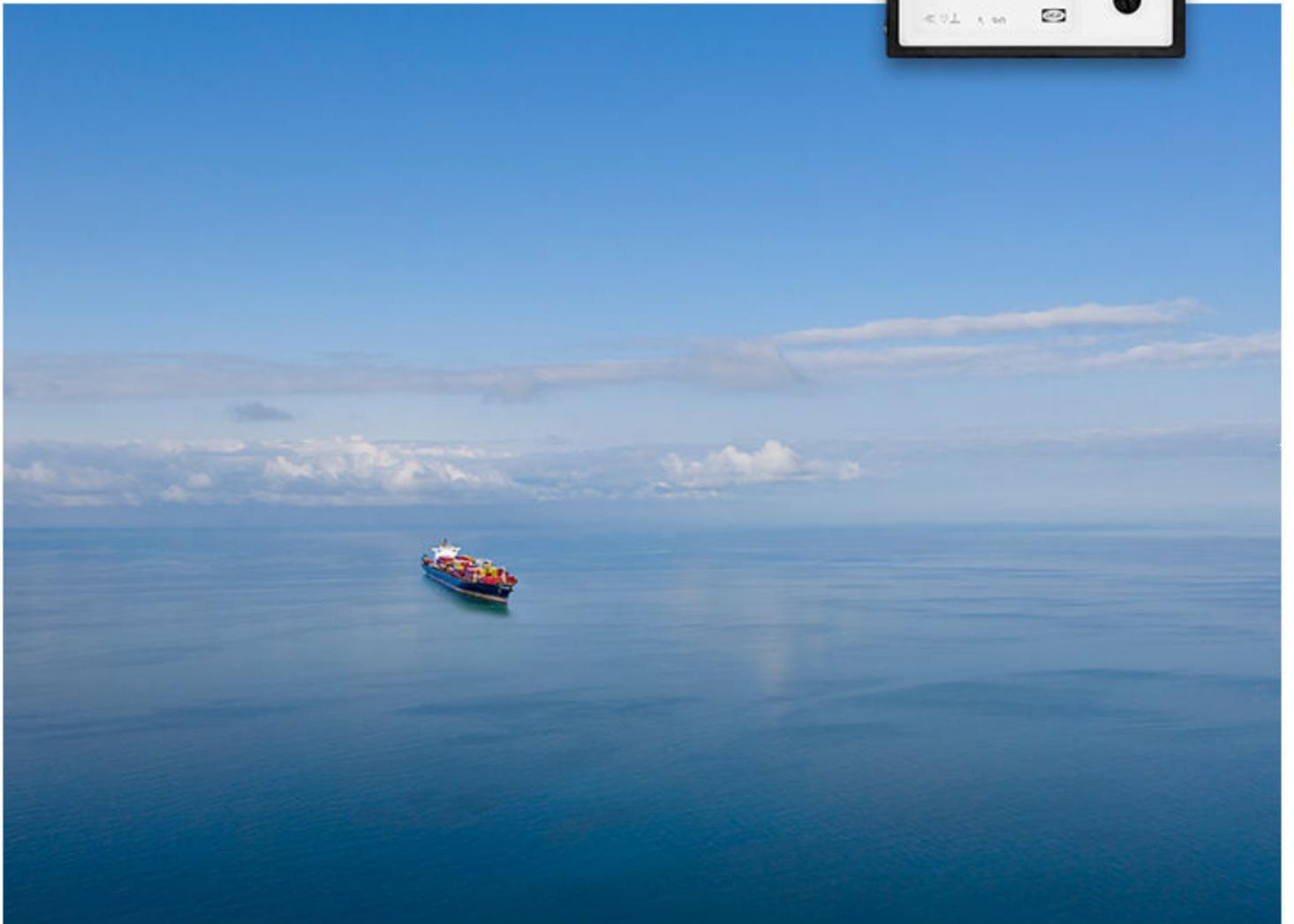


ADL-111Q96

Insulation monitor

Data sheet



- Monitoring of insulation resistance on a DC network
- 24 V, 110 V or 220 V DC
- Accepts up to 120 μ F leakage capacitance

1 Application

The ADL is used for supervision of the insulation resistance between an insulated voltage distribution network (IT network) and earth cable/safety cable. The instrument is applicable in conjunction with DC networks of 24 V, 110 V or 220 V DC.

This type of insulation measurement is only carried out on DC networks where both conductors are isolated from the protective earth/the hull of the ship.

The ADL can be used for marine installations and other types of insulated voltage networks, for example DC manoeuvre voltages of transformer stations.

1.1 Measuring principle

The insulation is monitored between the negative conductor and the safety cable.

The instrument emits alternating polarity DC voltage, and the resulting current is measured. To be able to eliminate the influence from the monitored network capacitances and DC components, the ADL performs an automatic measuring cycle that will compensate for these. Measurement time depends on the setting for C_e , higher capacity results in longer measurement time.

1.2 Indicators

The measuring can be monitored by looking at the indicators, *Fig 1*.

Indicator	General functionality
METER	Shows the measured resistance value.
FAULT LED (red)	Glowes when the measured earth resistance is below the chosen set point.
SUPERVISION LED (green)	Glowes when aux. power is connected, and measuring is in progress. Flashes when the measuring fluctuates, and the meter will then show the last steady result.



Fig. 1

1.3 Relay output

The ADL is equipped with one change-over relay contact. By means of a built-in switch (S1), which is located under the rear cover, the relay can be configured to either:

- NE (normally energised contact), recommended for alarm purposes.
- ND (normally de-energised contact), recommended for control purposes.

By default, the instrument will be delivered with the relay set to NE.

1.4 Product variants

The ADL is available in two different versions – standard and advanced.

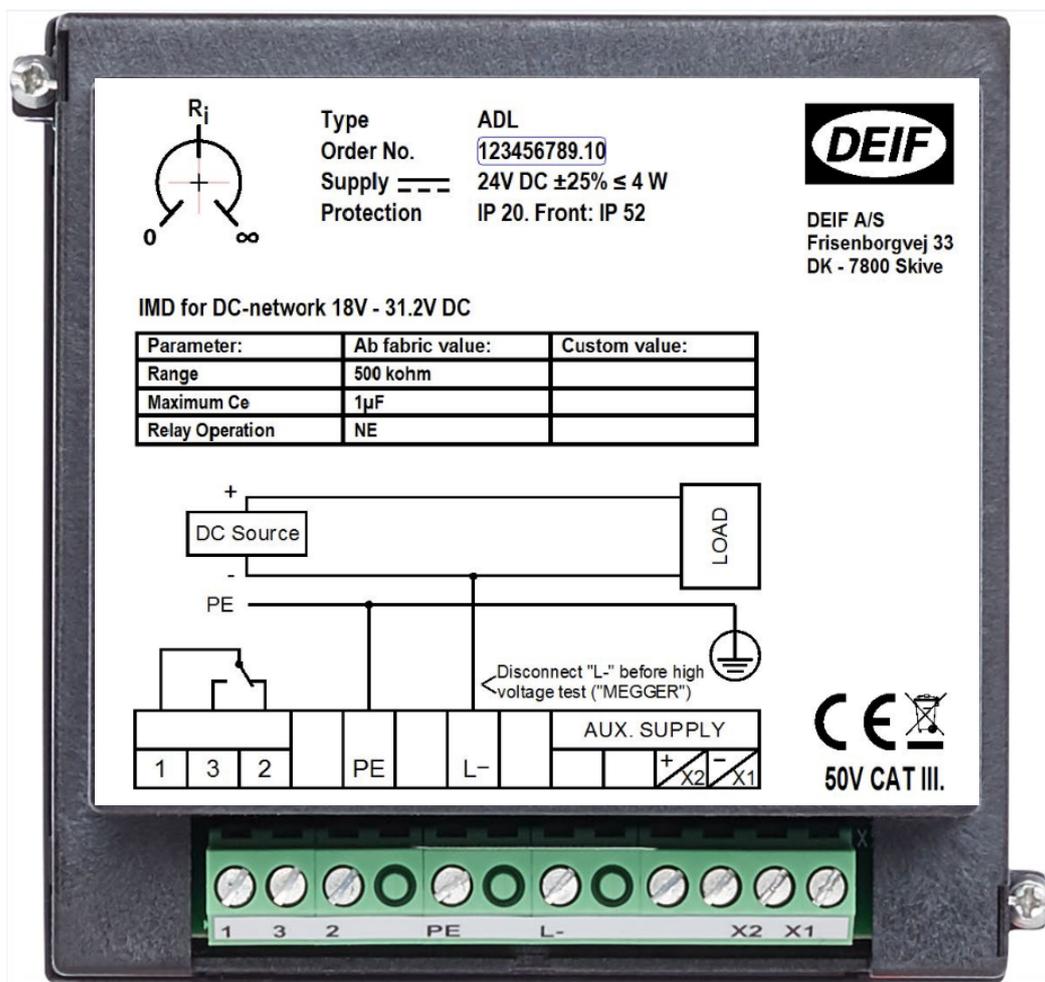
1.4.1 Standard versions:

Type	Variant no.	Network/aux. voltage	Measuring range	Note
ADL-111Q96 24 V DC	01	24 V DC	0 to 50 kΩ	≤20μF capacitance (1μF default)
ADL-111Q96 110 V DC	02	110 V DC	0 to 250 kΩ	≤20μF capacitance (1μF default)
ADL-111Q96 220 V DC	03	220 V DC	0 to 500 kΩ	≤20μF capacitance (1μF default)

- 1μF or 20μF maximum capacitance on network (user-selectable via S1 under the rear cover). See ADL Quick guide.
- Set point adjustment from ohm scale at the rear of the instrument.

Set point

The requested alarm limit value is set on an ohm scale at the rear of the instrument.



1.4.2 Advanced versions:

Type	Variant no.	Network/aux. voltage	Measuring range	Note
ADL-111Q96 24 V DC	04	24 V DC	0 to 500 k Ω	$\leq 120\mu\text{F}$ capacitance (1 μF default)
ADL-111Q96 24 V DC	05	24 V DC	0 to 1 M Ω	$\leq 120\mu\text{F}$ capacitance (1 μF default)
ADL-111Q96 24 V DC	06	24 V DC	0 to 10 M Ω	$\leq 120\mu\text{F}$ capacitance (1 μF default)

- 1 μF to 120 μF maximum capacitance on network (selectable via S1 under the rear cover). See ADL Quick guide.
- Set point is automatically visible on front scale during power-up and adjustment.
- Due to the low injection voltage, problems with activation of possible over-voltage protections are eliminated.

Set point

When the set point potentiometer at the rear of the instrument is turned, the product automatically goes to meter indication of set point during setting and power-up.

As soon as the set point potentiometer is turned, the product enters setting mode. This is indicated by the fast flashing of the SUPERVISION LED, and by the meter pointer showing the set point setting instead of actual measurement.

When the desired set point level is reached, the product automatically returns to normal measuring mode after a few seconds, by which the SUPERVISION LED stops flashing fast, and the meter pointer returns to normal reading.

Set point test/control

During power-up, for a few seconds, the meter pointer shows the actual set point setting while the SUPERVISION LED is flashing fast. This function enables a test function for fast control of settings from the front of the switchboard.



2 Technical specifications

Standard range:

Network voltage (U _n)	Range - Measurement - Scale (R _F) - Set point (R _{an})	Product variant	Aux. voltage (U _s)	Internal resistance (R _i)	Injection voltage (U _m)	C _{leakage} (C _e) – 1μF	C _{leakage} (C _e) – 20μF
						Response time (t _{an})	Response time (t _{an})
24 V DC	0 to 50 kΩ Scale midpoint: 1.1 kΩ	01	24 V DC +30 %/-25 %	12 kΩ	±12 V DC	1 s	4 s
110 V DC	0 to 250 kΩ Scale midpoint: 5.5 kΩ	02	110 V DC +30 %/-25 %	55 kΩ	±25.5 V DC	4 s	23 s
220 V DC	0 to 500 kΩ Scale midpoint: 11 kΩ	03	220 V DC +30 %/-25 %	110 kΩ	±25.5 V DC	5 s	46 s

Advanced range:

Network voltage (U _n)	Range - Measurement - Scale (R _F) - Set point (R _{an})	Product variant	Aux. voltage (U _s)	Internal resistance (R _i)	Injection voltage (U _m)	C _{leakage} (C _e) – 1μF	C _{leakage} (C _e) – 50μF	C _{leakage} (C _e) – 120μF
						Response time (t _{an})	Response time (t _{an})	Response time (t _{an})
24 V DC	0 to 500 kΩ Scale midpoint: 11 kΩ	04	24 V DC +30 %/-25 %	11 kΩ	±5 V DC	1 s	9 s	20 s
	0 to 1 MΩ Scale midpoint: 22 kΩ	05		22 kΩ	±5 V DC	1 s	4 s	54 s
	0 to 10 MΩ Scale midpoint: 220 kΩ	06		220 kΩ	±5 V DC	4 s	165 s	396 s

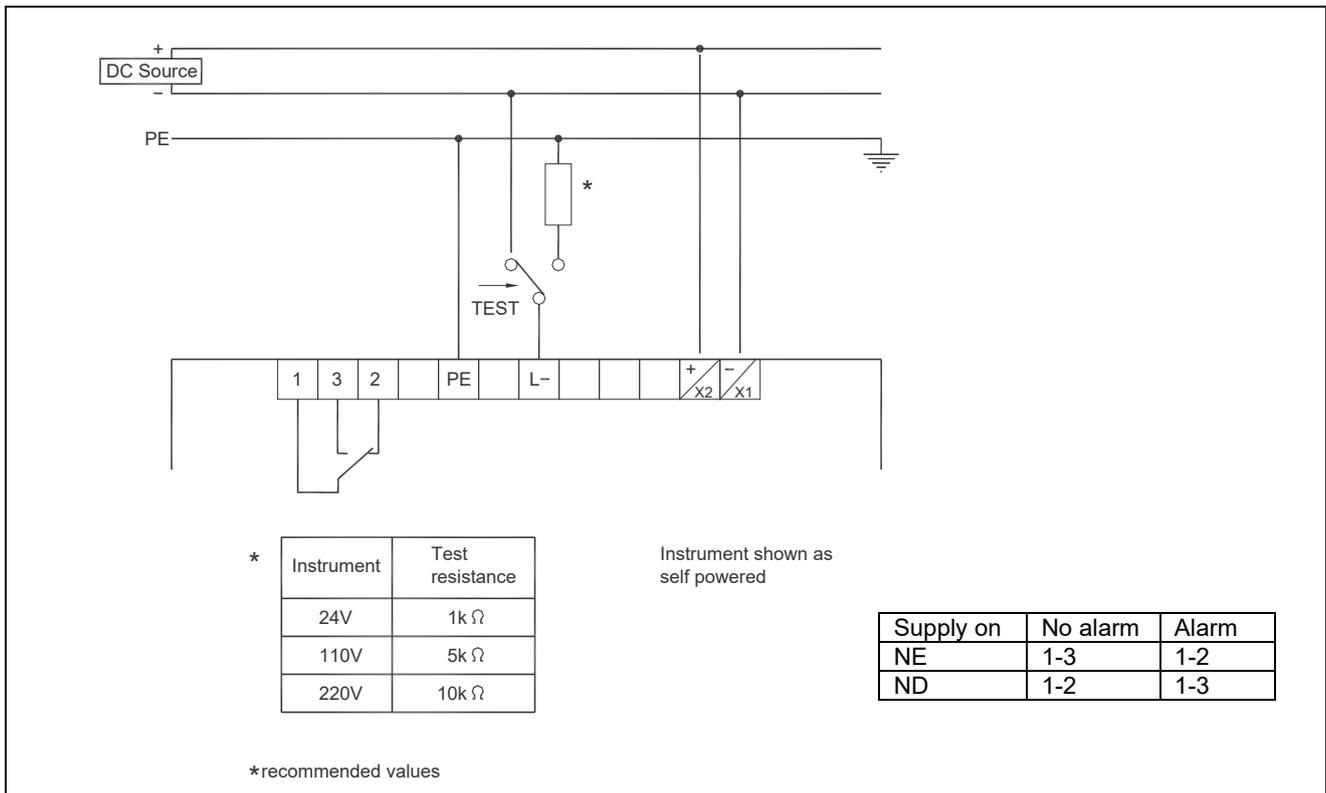
General technical specifications			
Meter	- Accuracy	±5 % of scale length	
	- Temperature drift	Max. 0.5 % of scale length per 10 °C	
	- Aux. supply influence	Max. 0.2 % of scale length at U _s +20 to -15 % Max. 5.0 % at scale centre at U _s -15 to -20 %	
	- Accuracy	±5 % of scale length for potentiometer	
	- Reproduceability		
	- Hysteresis		
- Temperature drift	±1 % of scale length for potentiometer		
- Aux. supply influence	±2 % of scale length for potentiometer		
Warning (Set point/relay)	- 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 %	
	- Relay output	Change-over contact	
IEC 61557-8	Contact rating	AC1: 8 A, 250 V AC – DC1: 8 A, 24 V DC AC15: 3 A, 250 V AC – DC13: 3 A, 24 V DC Life mechanical: 2 × 10 ⁷ operations Life electrical: 1 × 10 ⁵ operations	
		Relay coupling	Normally energised NE or normally de-energised ND

The ADL is CE-marked for residential, commercial and light industry plus industrial environment.	
EMC	To EN IEC 61000-6-1/2/3/4, SS4361503 (PL4), IEC 255-4 (class 3), EN 61326-1:2013 and EN 61326-2-4:2013
Galvanic separation	Between aux. voltage and measuring circuit/relay output: 2200 V (max. 1.9 mA) Between measuring circuit and aux. voltage/relay output: 2200 V (max. 1.9 mA) Between relay output and measuring circuit/aux. voltage: 3250 V (max. 2.4 mA)
Temperature	-10 to 55 °C (nominal), -25 to 60 °C (operating), -25 to 65 °C (storage)
Climate	55 °C 95% RH to EN IEC 60068-2-30, test Db
Vibration	3 to 13.2 Hz: 2mm _{pp} 13.2 to 100 Hz: 0.7 g To EN IEC 60068-2-6
Bump	20 g, 16 ms To EN IEC 60068-2-27

Shock	<p>50 g, 11 ms, half sine</p> <p>Tested with 3 impacts in each direction in all 3 axes. A total of 18 impacts per test.</p> <p>To EN IEC 60028-2-27</p>
Protection	<p>Front: IP52 (IP54 optional). Rear/terminals: IP20. To IEC 529 and EN 60529</p> <p>With "red marker pointer" option, protection is limited to IP52</p>
Connections	<p>Screw terminals: 2.5 mm² (multi-stranded), 4 mm² (single-stranded)</p>
Materials	<p>All plastic materials are self-extinguishing to UL 94 V-0</p> <p>RoHS: EN IEC EN IEC 63000:2018</p>
Safety	<p>Supply 24V = 50V CAT III</p> <p>Supply 110V = 150V CAT III</p> <p>Supply 220V = 300V CAT III</p> <p>LVD: To 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</p>

Approvals are available on the DEIF website, www.deif.com – search for ADL and find them under Documentation.

2.1 Connection diagram



The auxiliary supply should be protected by means of a 2 A fuse.

Test

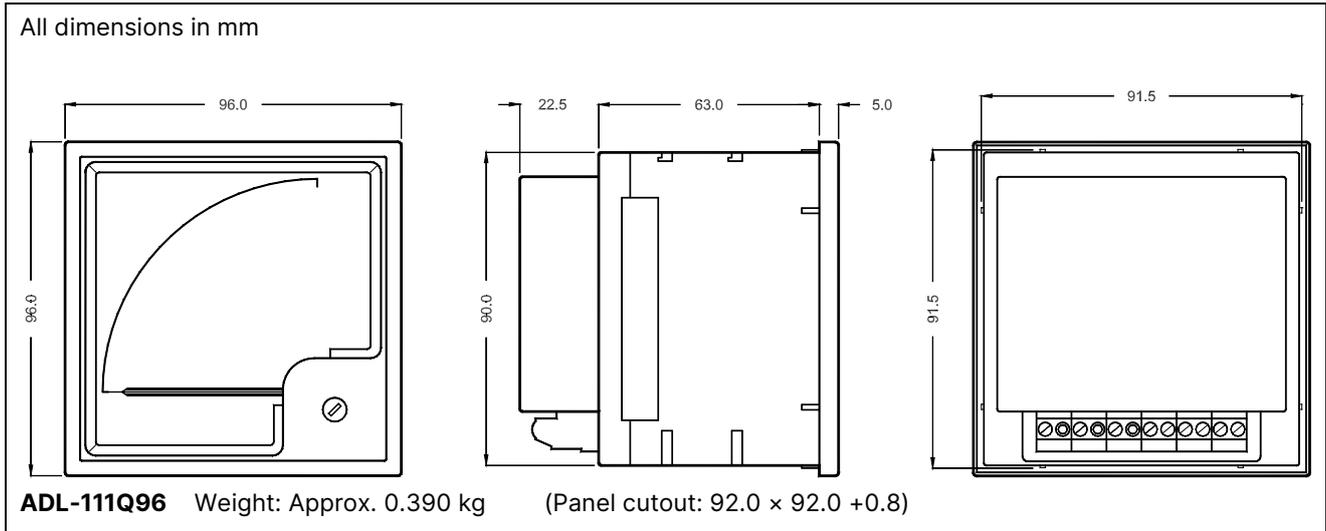
If a periodical test function is required, it can be achieved as shown in the connection diagram above.

Warning

If the installation is to be tested by means of a high-voltage "MEGGER", the measuring wire to the ADL must be disconnected before testing is carried out.

Note: The ADL-111Q96 insulation monitoring devices shall not be connected in parallel. This is due to the measuring principle, and correct insulation measuring is only possible when only one instrument is connected at a time.

2.2 Dimensions



2.3 Available variants

Type	Variant no.	Description	Item no.	Note
ADL-111Q96 24 V DC	01	24 V DC, 0 to 50 kΩ	2911750110-01	≤20μF capacitance
ADL-111Q96 110 V DC	02	110 V DC, 0 to 250 kΩ	2911750110-02	≤20μF capacitance
ADL-111Q96 220 V DC	03	220 V DC, 0 to 500 kΩ	2911750110-03	≤20μF capacitance
ADL-111Q96 24 V DC	04	24 V DC, 0 to 500 kΩ	2911750110-04	≤120μF capacitance
ADL-111Q96 24 V DC	05	24 V DC, 0 to 1 MΩ	2911750110-05	≤120μF capacitance
ADL-111Q96 24 V DC	06	24 V DC, 0 to 10 MΩ	2911750110-06	≤120μF capacitance

2.4 Available options

Option	Description	Type	Note
AG glass	Anti-glare glass	Glass	
IP54	IP54 protection incl. rubber gasket	Protection	
Glass with red adjustable pointer (IP52 only)	Red pointer, individually adjustable	Indication	IP52 only

2.5 Order specifications

Product variants

Mandatory information			Additional options to a standard variant		
Item no.	Type	Variant no.	Option	Option	Option

Example:

Mandatory information			Additional options to a standard variant		
Item no.	Type	Variant no.	Option	Option	Option
2911750110-01	ADL-111Q96 24 V DC	01	AG glass	IP54	-