REA 107
Arc Protection Module

Operator's Manual

Contents

1. General

REA 107 is an extension unit designed to be used together with the arc protection relay REA 101. The function of the unit is to detect light and to provide the REA 101 relay with information about this. The use of the extension unit allows the protection area to be extended and the object to be divided into smaller areas.

1.1. Features

- Eight lens type sensors for arc detection
- Two signal relays
- Two RJ-45 ports for the connection to a REA 101 relay and/or other extension units
- Self-supervision unit monitoring operating voltages
- LED indicators for each sensor

2. Safety

	National and local electrical safety regulations must always be followed.
	Dangerous voltages can occur on the connectors, even though the auxiliary voltage is disconnected.
	The frame of the device has to be carefully earthed.
	Only a competent electrician is allowed to carry out the electrical installation.
	Sensor fibres have to be handled according to the instructions given by the sensor fibre manufacturer.
	Settings and configuration changes have to be done with the auxiliary supply voltage (U_{aux}) disconnected. Malfunction may occur if changes are made with the supply voltage connected.

3. Block diagram

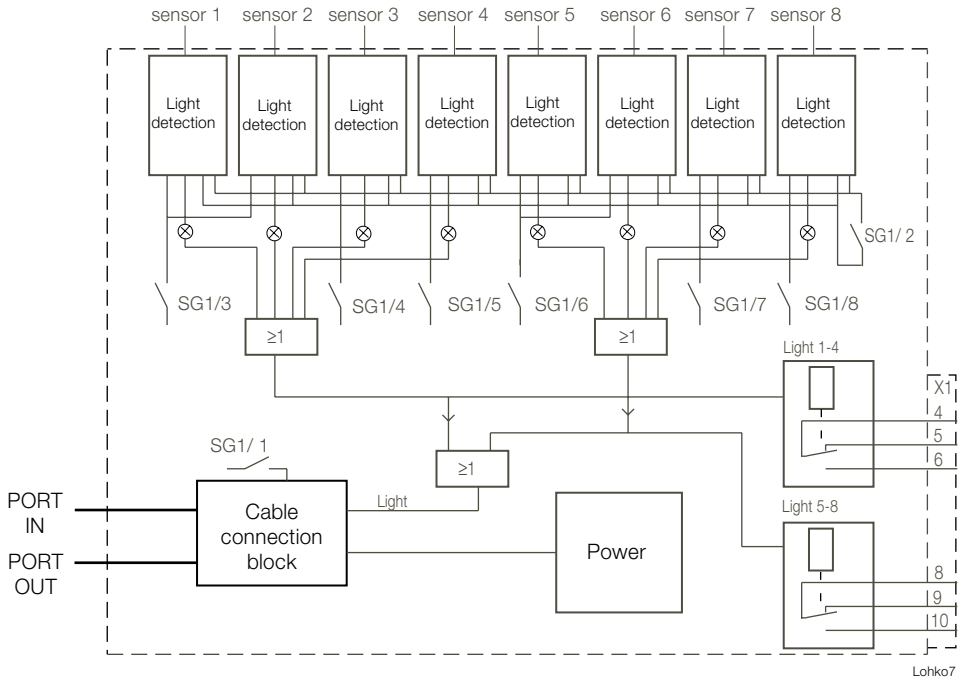

Fig. 3.-1 Block diagram of REA 107

4. Description of operation

4.1. Light indication

The light is collected by the lens type sensors, which are connected with plastic fibres to the sensor inputs 1...8. The switches SG1/3...8 are used for selecting sensors 1...8. The light captured by the sensor is amplified and compared either to an automatic or a manual reference level. When the reference level is exceeded, a signal is generated to the central unit, the signal relay (Light 1...4 or 5...8) of the concerned sensor group is activated for about 0.5 second and a corresponding LED is lit. In a trip situation, the central unit REA 101 provides information about the tripping, and the relay is locked in the active state. If no tripping occurs, the signal relay will be reset.

The SG1/2 switch is used for selecting the automatic or manual reference level. The unit itself forms the automatic reference level according to the present backlight intensity measured by an individual sensor. The potentiometer "Light Ref. Level Adj." (common to all of the sensors) on the front panel is used for selecting the manual reference level.

4.2. Operation of IN and OUT ports

The ports IN and OUT are connected in parallel. The connection cable from the central unit REA 101 is connected to the port IN and the connection cable to the next extension unit departs from the port OUT. A maximum of five extension units, one after the other, can be linked to one port of the central unit. The terminators have to be connected (switch SG1/1) in the last extension unit of the chain. Then the REA 101 unit is able to monitor the condition of the connection cable. Should the terminators be unconnected, the fault indication LED "Port A/B Fault LED" of the central unit REA 101 and the IRF indicator are activated, and the IRF relay is reset. The REA 107 extension unit does not need its own auxiliary voltage supply; it is supplied by the central unit REA 101 over the connection cable.

4.3. Self-supervision unit

The self-supervision system monitors the operating voltages of the device. If a fault is detected in the operating voltages, the self-supervision unit prevents the device from operating. When the IRF indicator of the REA 107 extension unit is lit, the port fault LED "Port A/B Fault" of the REA 101 relay starts flashing, the IRF indicator is lit and the IRF relay is reset.

4.4. Front panel

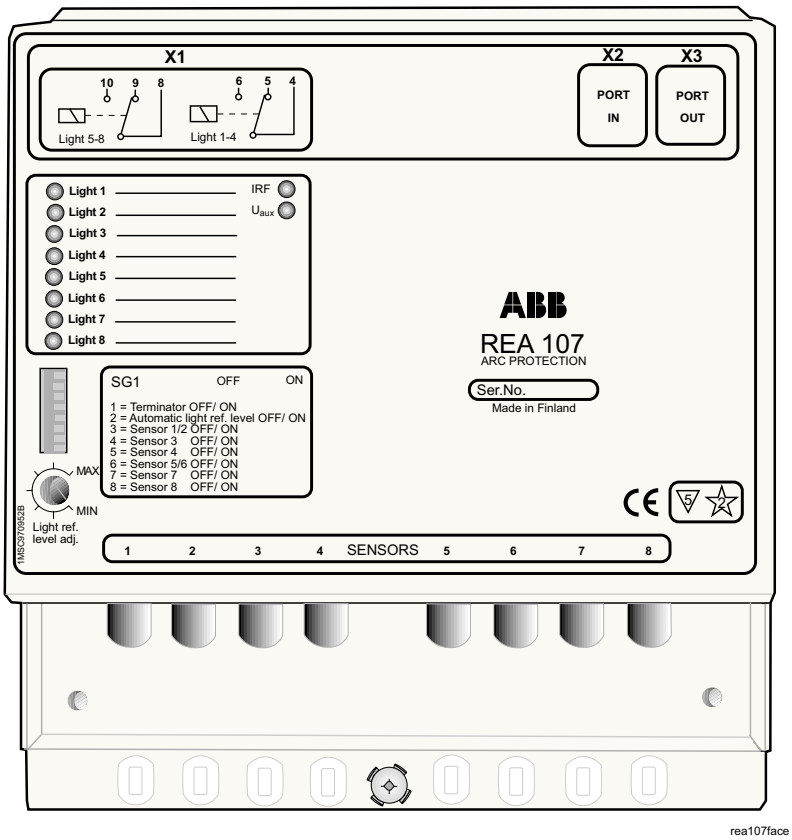

Fig. 4.4.-1 Front panel of REA 107

4.5. Function of LEDs and switches

Table 4.5.-1 LEDs activated

U_{aux}	Power supply is connected.
Light 1	The sensor 1 has detected light.
Light 2	The sensor 2 has detected light.
Light 3	The sensor 3 has detected light.
Light 4	The sensor 4 has detected light.
Light 5	The sensor 5 has detected light.
Light 6	The sensor 6 has detected light.
Light 7	The sensor 7 has detected light.
Light 8	The sensor 8 has detected light.
IRF	The self-supervision system has detected a fault. (The fault LED "Port A/B Fault" of the REA 101 relay is flashing, the IRF indicator is lit, and the IRF relay has been reset.)

Light Ref. Level Adj.

Potentiometer for manual backlight compensation:

- potentiometer in use, if switch SG1/2 in OFF position.
- potentiometer not in use, if switch SG1/2 in ON position.

Switchgroup SG1:

1. Terminator ON/OFF
   - Switch in ON position: terminators connected.
2. Automatic light ref. level ON/OFF
   - Switch in ON position: Automatic backlight compensation selected. (Potentiometer "Light Ref. Level Adj." not in use).
   - Switch in OFF position: Manual backlight compensation selected. (Potentiometer "Light Ref. Level Adj." in use).
3. Sensor 1/2 ON/OFF
   - Switch in ON position: Sensors 1 and 2 are used for arc detection.
4. Sensor 3 ON/OFF
   - Switch in ON Position: Sensor 3 is used for arc detection.
5. Sensor 4 ON/OFF
   - Switch in ON Position: Sensor 4 is used for arc detection.
6. Sensor 5/6 ON/OFF
   - Switch in ON position: Sensors 5 and 6 are used for arc detection.
7. Sensor 7 ON/OFF
   - Switch in ON Position: Sensor 7 is used for arc detection.
8. Sensor 8 ON/OFF
   - Switch in ON Position: Sensor 8 is used for arc detection.

5. Connections

Connector X1:

1	Not in use	
2	Not in use	
3	Not in use	
4	Light 1...4 common	Signal relay of sensors 1...4
5	Light 1...4 /NC	Signal relay of sensors 1...4
6	Light 1...4 /NO	Signal relay of sensors 1...4
7	Not in use	
8	Light 5...8 common	Signal relay of sensors 5...8
9	Light 5...8 /NC	Signal relay of sensors 5...8
10	Light 5...8 /NO	Signal relay of sensors 5...8

Connection ports X2 and X3:

X2 Port IN
X3 Port OUT

Sensor 1 connector
Sensor 1
Sensor 2 connector
Sensor 2
Sensor 3 connector
Sensor 3
Sensor 4 connector
Sensor 4
Sensor 5 connector
Sensor 5
Sensor 6 connector
Sensor 6
Sensor 7 connector
Sensor 7
Sensor 8 connector
Sensor 8

6. Commissioning

6.1. Instructions for commissioning

All switch settings have to be made before the auxiliary voltage of the unit is connected.

The following procedure should be followed when the unit is commissioned:

1. Switchgroup SG1

   Default setting: SG1 00000000

   Set the switches as required by the application. See sections "Function of LEDs and switches" in this manual and "Application examples" of the REA 101 Operator's manual.

2. Potentiometer "Light Ref. Level Adj."

   Default setting: middle position. If the SG1/2 switch is set for automatic backlight compensation, the setting of the potentiometer does not have to be changed.

6.2. Testing of arc protection system

1. Check the current measurement function of each REA 101 relay by measuring the primary or secondary circuit. When the current limit is exceeded, the "I> Start" LED of the relay is lit. The testing must be done to every REA 101 unit.
2. Turn the Trip Condition key switch into position "Light" to check that overcurrent data is transmitted through the entire system arrangement, as required by the application. Make sure that the "I> Start" LED is lit in the REA 101 units required by the application. After testing, turn the Trip Condition key switch into position "I> & Light". The testing must be done to every REA 101 unit.

6.3. Light reference setting

1. Set the lighting level as close to normal work conditions as possible.
2. Turn the "Light Ref. Level Adj." potentiometer until the "Light" LED is lit or goes out.
3. Turn the potentiometer one scale mark interval to the right.
4. Should the "Light" LED remain dark, even though the potentiometer is in the Min. position, the potentiometer can be either left in this position or turned one scale mark interval to the right, depending on the sensitivity level desired.
5. Turn the key switch Trip Condition of one REA 101 relay into position "Light".
6. Expose one sensor at a time to light, for example using a flash, and check that the right circuit breakers operate.
7. When all of the sensors have been tested, set the Trip Condition key switch/key switches as required by the application.

7. Dimensions and fixing

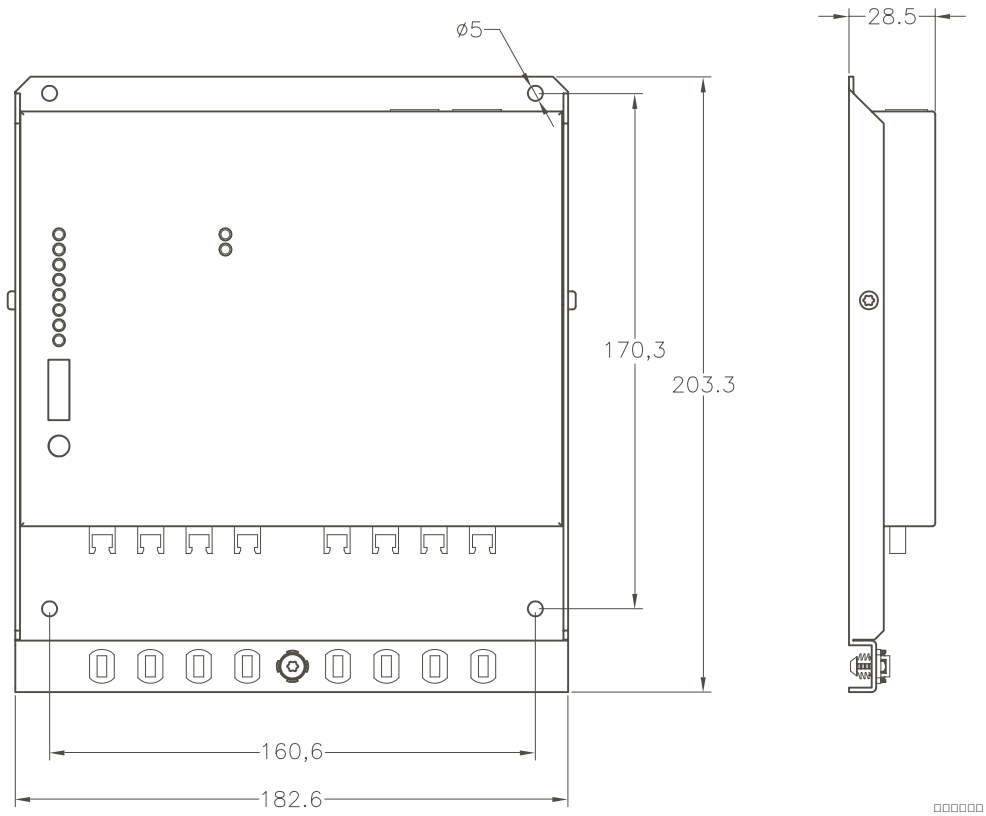

Fig. 7.-1 Dimensions of REA 107

Fixing method 1: M4 threaded hole, fixing with M4 machine screw.
Fixing method 2: ϕ 4.2 mm hole, fixing with M4 machine screw and nut.
Fixing method 3: Fixing with a self-tapping M4 screw.

Lens sensors

Fixing method: The lens is put in a hole (ϕ 10 mm) drilled in the wall of the supervised space and fixed with a self-tapping M3 screw. An alternative fixing method: with a cable tie.

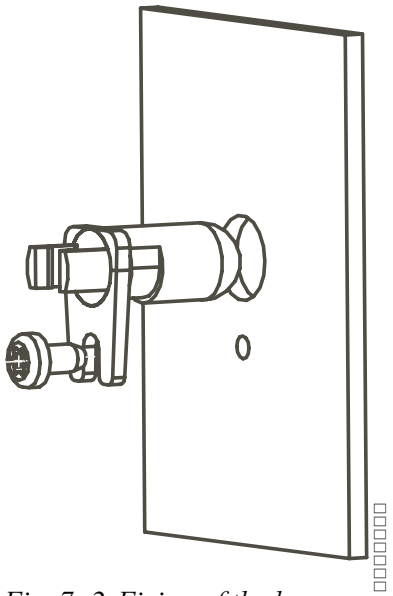

Fig. 7.-2 Fixing of the lens sensor

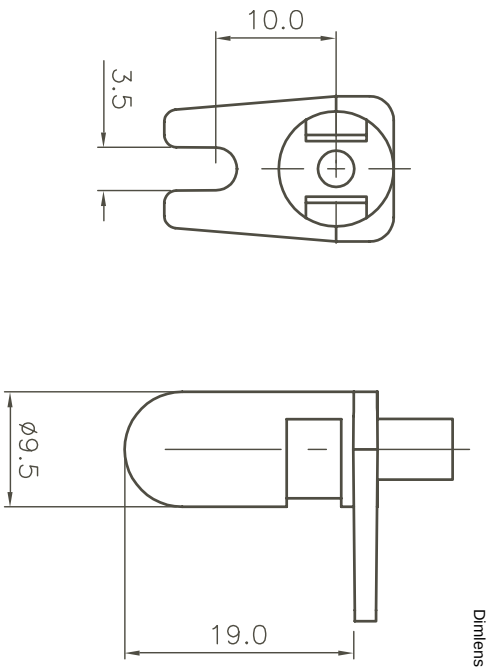

Fig. 7.-3 Dimensions of the lens sensor

8. Technical data

Signal contacts (Light 1...4, Light 5...8)		
	Maximum system voltage	250 V dc/ac
	Continuous carry	5 A
	Make and carry for 0.5 s	10A
	Make and carry for 3 s	8A
	Breaking capacity for dc, when the control circuit time constant L/R ≤ 40ms, at 48/110/220 V dc	1 A/0.25 A/0.15 A
Power consumption (operating voltage over the port of REA 101)		
	Under quiescent conditions/ maximum	~1.7 W / ~2.7 W
	Note: Maximum of 5 extension units can be linked to one port of REA 101	
Lens sensor		
	Normal service temperature range	-40... +100 °C
	Maximum service temperature, max 1h	+140 °C
	Minimum permissible bending radius of the connection fibre	100 mm
Connection cable (master-slave)		
	Max. length [1)]	40 m
Operating time		
	Operating time from the light	< 1.0 ms
Environmental conditions		
	Service temperature range	-10... +55 °C
	Transport and storage temperature range	-40...+70 °C
	Storage temperature test	acc. to IEC 68000-2-48
	Damp heat test	acc. to IEC 68000-2-30 (BS 2011: Part 2.1 Db)
	Dry heat test	acc. to IEC 68000-2-2 (BS 2011: Part 2.1 B)
	Dry cold test	acc. to IEC 68000-2-1 (BS 2011: Part 2.1 A)
Enclosure		
	Degree of protection, IEC 60529	IP 20
	Weight	1.0 kg
Insulation tests		
	Dielectric test acc. to IEC 60255-5	2 kV, 50 Hz, 1 min
	Impulse voltage test acc. to IEC 60255-5	5 kV, 1.2/50 µs, 0.5 J
	Insulation resistance test acc. to IEC 60255-5	> 100 MΩ, 500 Vdc
Electromagnetic compatibility tests		
	1 MHz burst disturbance test acc. to IEC 60255-22-1	
	• common mode	2.5 kV
	• differential mode	1.0 kV
Electrostatic discharge test		
	acc. to IEC 61000-4-2 and IEC 60255-22-2	
	class III	
	• contact discharge	6 kV

	• air discharge	8 kV
Radio frequency electromagnetic field disturbance test		
	acc. to IEC 61000-4-3 and IEC 60255-22-3 (2000)	
	• frequency	80 - 1000 MHz
	• field strength	10 V/m (rms), amplitude-modulated
Radio frequency electromagnetic field disturbance test		
	acc. to ENV 50204 and IEC 60255-22-3 (2000)	
	• frequency	900 MHz
	• field strength	10 V/m, pulse-modulated
Radio frequency electromagnetic field disturbance test		
	acc. to IEC 60255-22-3 (1989)	
	• test with a portable transmitter, method C	f = 77.2 MHz, P = 6 W f = 172.25 MHz, P = 5 W
Radio frequency disturbance test		
	acc. to IEC 61000-4-6	
	• conducted, common mode	10 V, 150 kHz...80 MHz
Fast transient disturbance test		
	acc. to IEC 60255-22-4 and IEC 61000-4-4	4 kV
Surge immunity test		
	acc. to IEC 61000-4-5	
	signal output contacts	
	• line to earth	2 kV
	• line to line	1 kV
Electromagnetic emission tests		
	acc. to EN 55011, class A and IEC 60255-25	
	• limits for radiated RF emission	EN 50081-2 and EN 50263
	• limits for conducted RF emission (mains terminal)	EN 50081-2 and EN 50263
Power frequency (50 Hz) magnetic field		
	acc. to IEC 61000-4-8	
	• continuous	100 A/m
	• 1 to 3 s	300 A/m
Mechanical tests		
	Vibration tests acc. to IEC 60255-21-1	class 1
	Shock and bump test acc. to IEC 60255-21-2	class 1
	Seismic tests acc. to IEC 60255-21-3	class 2

[1)] Total length of the connection chain between the central unit and extension units

9. Order information

Order numbers

Arc protection relay REA 101 U_n = 110…240 V ac U_n = 110…220 V dc	1MRS 090416-AAA *)
Arc protection relay REA 101 U_n = 24…60 V dc	1MRS 090416-CAA *)
Arc protection relay REA 101 with optolink connectors for glass fibre U_n = 110…240 V ac U_n = 110…220 V dc	1MRS 090416-AAAG *)
Arc protection relay REA 101 with optolink connectors for glass fibre U_n = 24…60 V dc	1MRS 090416-CAAG *)
Rear plate protective cover	1MRS 060196
Mounting kit for semi-flush mounting	1MRS 050254
Mounting kit for surface mounting	1MRS 050240
Mounting kit for connecting cases together	1MRS 050241
Mounting kit for 19" rack	1MRS 050258
Extension unit REA 103	1MRS 090417-AA
Extension unit REA 105	1MRS 090418-AA
Extension unit REA 107	REA 107-AA

*) Includes mounting kit 1MRS 050209 for flush mounting

Pre-manufactured fibre sensors

Length	Order number
5 m ±3%	1MRS 120512.005
10 m ±3%	1MRS 120512.010
15 m ±3%	1MRS 120512.015
20 m ±3%	1MRS 120512.020
25 m ±3%	1MRS 120512.025
30 m ±3%	1MRS 120512.030
40 m ±3%	1MRS 120512.040
50 m ±3%	1MRS 120512.050
60 m ±3%	1MRS 120512.060

Accessories for manufacturing fibre sensors

Sensor fibre 100 m	1MSC 380018.100
Sensor fibre 300 m	1MSC 380018.300
Sensor fibre 500 m	1MSC 380018.500
ST connector	SYJ-ZBC 1A1
ST splice adapter	SYJ-ZBC 1A2
ST fibre termination kit	1MSC 990016

Pre-manufactured lens sensors for REA 107

1,5 m ±3%	1MRS 120534-1.5
3 m ±3%	1MRS 120534-3.0
5 m ±3%	1MRS 120534-5.0
7 m ±3%	1MRS 120534-7.0
10 m ±3%	1MRS 120534-10
15 m ±3%	1MRS 120534-15
20 m ±3%	1MRS 120534-20
25 m ±3%	1MRS 120534-25
30 m ±3%	1MRS 120534-30

Pre-manufactured lens sensors for REA 101, REA 103 and REA 105

2 m ±3%	1MRS 120536-2
3 m ±3%	1MRS 120536-3
5 m ±3%	1MRS 120536-5
10 m ±3%	1MRS 120536-10

Spare parts for lens sensors

Light collecting lens	1MRS060743

Cables for connecting REA 101 to an extension unit or extension units to each another

1 m ±3%	1MRS 120511.001
3 m ±3%	1MRS 120511.003
5 m ±3%	1MRS 120511.005
10 m ±3%	1MRS 120511.010
15 m ±3%	1MRS 120511.015
20 m ±3%	1MRS 120511.020
30 m ±3%	1MRS 120511.030
40 m ±3%	1MRS 120511.040

Plastic fibre optolink for signal transfer between central units

1 m ±3%	SPA-ZF AA 1
2 m ±3%	SPA-ZF AA 2
3 m ±3%	SPA-ZF AA 3
5 m ±3%	SPA-ZF AA 5
10 m ±3%	SPA-ZF AA 10
20 m ±3%	SPA-ZF AA 20
30 m ±3%	SPA-ZF AA 30
40 m ±3%	1MRS 120517

Glass fibre optolink for signal transfer between central units

50 m ±3%	SPA-ZF1MM50
60 m ±3%	SPA-ZF1MM60
70 m ±3%	SPA-ZF1MM70
80 m ±3%	SPA-ZF1MM80
90 m ±3%	SPA-ZF1MM90
100 m ±3% *)	SPA-ZF1MM100

*) Note! Lengths over 100 m on request, max. length 2000 m.

10. References

REA 10_ Technical Overview Brochure	1MRS 750929-MBG
REA 101 Operator's Manual	1MRS 751003-MUM
REA 103 Operator's Manual	1MRS 751004-MUM
REA 105 Operator's Manual	1MRS 751005-MUM

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