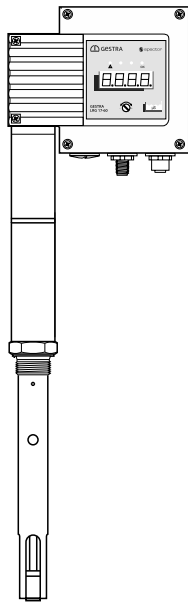
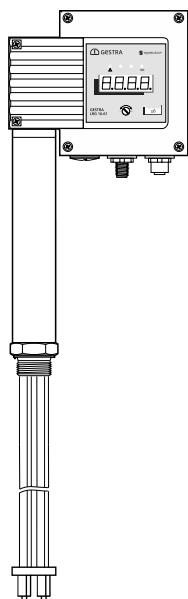


LRG 16-60



LRG 17-60



LRG 16-61

Conductivity Electrodes

LRG 16-60 LRG 16-61 LRG 17-60

System description

LRG 1x-6x conductivity electrodes are used in combination with the URS 60 or URS 61 safety control unit as conductivity limiters, or in combination with an LRR 1-60 conductivity controller as continuous blowdown controllers and limit indicators in pressurised steam and hot-water plants. The units measure the electrical conductivity of conductive fluids.

In combination with the URS 60 / URS 61 safety control unit, the conductivity electrodes are suitable for safety functions up to a rating of SIL 2.

Visualisation and operation take place via the URB 60 or SPECTORcontrol operating unit.

Function

Measuring process of the LRG 16-60 and LRG 17-60

LRG 16-60 and LRG 17-60 conductivity electrodes use the conductometric two-electrode measuring process. A measuring current with a suitable frequency for the measuring range is introduced into the fluid. This produces a potential gradient between the electrode and the measuring tube, which is analysed as a measuring voltage.

Measuring process of the LRG 16-61

The LRG 16-61 conductivity electrode use the conductometric four-electrode measuring process.

It consists of two current and two voltage electrodes. The current electrodes introduce a measuring current with a fixed frequency into the fluid. This gives rise to a potential gradient between these electrodes. This potential gradient is then picked up by the voltage electrodes and analysed as measuring voltage.

Temperature compensation of readings based on a reference temperature (25 °C)

The electrical conductivity changes as a function of the temperature. In order to base the readings on a reference temperature, an integrated resistance thermometer measures the temperature of the fluid. The electrical conductivity is calculated from the measuring current and measuring voltage, and then based on the reference temperature of 25 °C through temperature compensation.

Compensation process

Based on a set temperature coefficient, the conductivity reading is corrected to form a linear characteristic. The coefficient (default 2.1 % per °C) is normally used for steam generating units with a constant pressure.

Behaviour in the event of an alarm

The alarm state indicating that a limit has been exceeded is shown on the display as "Hi.C" alternating with the actual conductivity value. The alarm is transferred to the URS 60 or URS 61 safety control unit via CAN data telegram.

Once the time delay has elapsed, the alarm signal triggers the safety shutoff in the safety control unit. The URS 60 or URS 61 safety control unit does not perform lockout automatically. LEDs 1 and 4 indicate a MAX alarm.

Automatic self-test

An automatic self-test periodically monitors the safety and function of the conductivity electrode and measured value acquisition. The data are transferred to the URS 60 / URS 61 safety control unit in the form of a Black Channel data telegram in the CANopen protocol via an ISO 11898 CAN bus.

Technical data

Model and mechanical connection

- LRG 16-60, LRG 16-61, LRG 17-60:
Thread G1 A, EN ISO 228-1

Nominal pressure rating, admissible service pressure and temperature

- LRG 16-60: PN 40 32 bar (g) at 238 °C
- LRG 16-61: PN 40 32 bar (g) at 238 °C
- LRG 17-60: PN 63 60 bar (g) at 275 °C

Materials

- Terminal box: 3.2581 G AISI12, powder-coated
- Sheath: 1.4301 X5 CrNi 18-10
- Measuring electrodes: 1.4571 X6CrNiMoTi17-12-2
- Electrode insulation: PTFE
- Screw-in body:
 - ◆ Measuring tube/screw of LRG 16-60, LRG 17-60: 1.4571, X6CrNiMoTi17-12-2
 - ◆ Spacer disc of LRG 16-60, LRG 16-61, LRG 17-60: PEEK

Available electrode lengths (do not shorten)

- LRG 16-60, LRG 17-60:
200, 300, 400, 500, 600, 800, 1000 (mm)
- LRG 16-61:
180, 300, 380, 500, 600, 800, 1000 (mm)

Temperature sensor

- Resistance thermometer: Pt 1000
- Measuring range for fluid temperature: 0 to 280 °C

Conductivity range at 25 °C

- LRG 16-60, LRG 17-60:
0.5 µS/cm to 6000 µS/cm, 0.25 - 3000 ppm *
◆ Preferred measuring range up to 1000 µS/cm
 - LRG 16-61:
50 µS/cm to 10,000 µS/cm, 25 - 5000 ppm *
◆ Preferred measuring range from 500 µS/cm
- * Conversion µS/cm in ppm (parts per million):
1 µS/cm = 0.5 ppm

Measuring cycle

- 1 second

Temperature compensation

- The temperature compensation process is linear and set via parameter tC.

Supply voltage

- 24 V DC +/-20 %

Power consumption

- Max. 7 VA

Current input

- Max. 0.35 A

Conductivity Electrodes

LRG 16-60

LRG 16-61

LRG 17-60

Internal fuse

- T2A

Safety cutout at excessive ambient temperature

- The cutout takes place at an excessive ambient temperature of $T_{amb.} = 75\text{ °C}$

Electrode voltage

- < 500 mV (RMS) at no load

Input/output

- Interface for CAN bus to ISO 11898, CANopen, insulated
- M12 CAN bus connector, 5-pole, A-coded
- M12 CAN bus socket, 5-pole, A-coded

Indicators and controls

- 1 x 4-digit green 7-segment display for indicating actual values and status information
- 1 x red LED for indicating an alarm
- 3 x green LED for indicating the unit $\mu\text{S/cm}$ / ppm and OK status
- 1 x rotary knob IP65 with button for menu navigation and test function

Protection class

- III Safety Extra Low Voltage (SELV)

IP rating to EN 60529

- IP 65

Admissible ambient conditions

- Service temperature: $0\text{ °C} - 70\text{ °C}$
- Storage temperature: $-40\text{ °C} - 80\text{ °C}$
- Transport temperature: $-40\text{ °C} - 80\text{ °C}$
- Air humidity: $10\% - 95\%$ (non-condensing)

Weight

- LRG 16-60, LRG 16-61, LRG 17-60: Approx. 2.1 kg

Applicable directives:

LRG 16-60, LRG 16-61, and LRG 17-60 conductivity electrodes have been tested and approved for use in the scope governed by the following directives and standards:

- Directive 2014/68/EU EU Pressure Equipment Directive
- Directive 2014/35/EU Low Voltage Directive
- Directive 2014/30/EU EMC Directive
- Directive 2011/65/EU RoHS II Directive

Please note our terms of sale and delivery.

Notes for planning

Installation

■ LRG 16-60, LRG 17-60

Provide spacing of approx. 30 mm between the lower end of the measuring tube and the boiler wall, the smoke tubes, any other metallic fittings, and the low water level (LW).

■ LRG 16-61

Provide spacing of approx. 60 mm between the lower end of the measuring tube and the boiler wall, the smoke tubes, any other metallic fittings, and the low water level (LW).

- Do **not shorten** the measuring electrode or measuring tube.

Electrical connection

Use a shielded, multi-core, twisted-pair control cable, e.g. UNITRONIC® BUS CAN 2 x 2 x .. mm² or RE-2YCYV-fi 2 x 2 x .. mm² as the bus line.

Pre-wired control cables (with plug and coupling) are available as accessories in various lengths.

The baud rate (transfer rate) is determined by the cable length between the bus terminal devices, and the wire cross-section is determined by the overall power input of the measuring sensors.

0.2 A at 24 V is required per sensor. With five sensors, there is therefore a voltage drop of approx. 8 V per 100 m when using cables of 0.5 mm². In this case, the system is operating at its limits.

With five or more sensors and a cable length of $\geq 100\text{ m}$, the wire cross-section needs to be doubled to 1.0 mm².

At larger distances of $> 100\text{ m}$, the 24 V DC supply can also be connected on site.

How to order:

Conductivity electrode

Type: Stock code:

- LRG 16-60 37910.. xx
- LRG 16-61 37915.. xx
- LRG 17-60 37920.. xx

Electrode length L (mm)	xx			
180	43			
200	43			
300	44			
380	45			
400	45			
500	46			
600	47			
800	48			
1000	50			
Electrode length is not available =				

Fig. 1

Additional modules:

- Safety control unit URS 60
- Safety control unit URS 61
- Conductivity controller LRR 1-60
- Visual display and operating unit URB 60 or SPECTORcontrol

Dimensions (LRG 16-60 is the example here) *

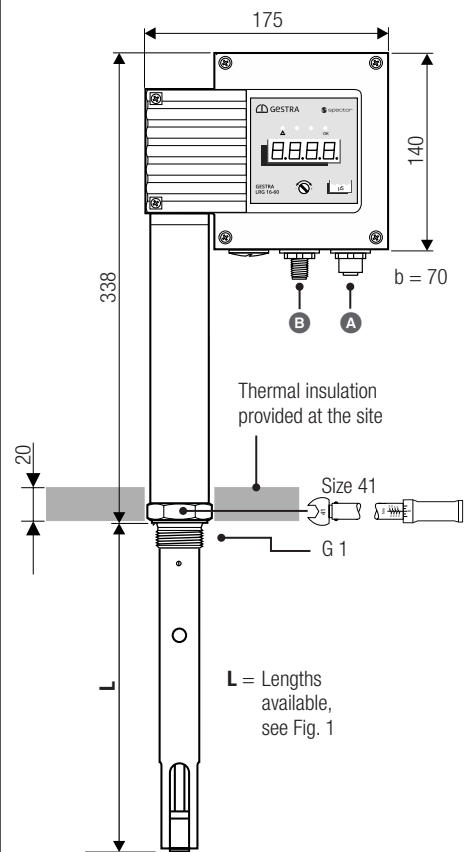


Fig. 2

* The above dimensions also apply to the LRG 16-61 and LRG 17-60, despite their different shapes, see page 1.

Connections

- A M12 CAN bus socket, 5-pole, A-coded
- B M12 CAN bus connector, 5-pole, A-coded

Wiring diagram of CAN bus system

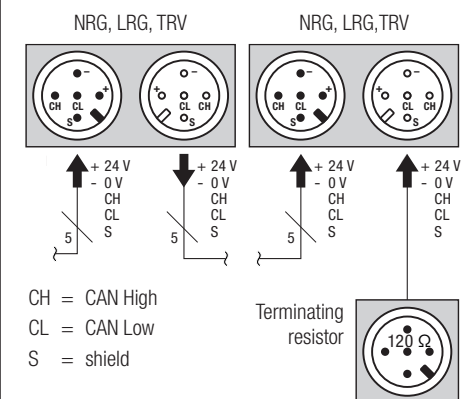


Fig. 3

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