FLOWSERVE GESTRA

GESTRA Steam Systems

LRR 1-52
LRR 1-53
URB 50

EN
English

Installation & Operating Instructions
819225-01

Conductivity Controller LRR 1-52
Conductivity Controller LRR 1-53
Operating & Display Unit URB 50

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Important notes

Usage for the intended purpose

The functional unit consisting of the operating & display unit URB 50 / conductivity controller LRR 1-52, LRR 1-53 in conjunction with conductivity electrodes LRG 1.-.. and conductivity transmitter LRGT 1.-.. is used as conductivity controller and limiter, for instance in steam boilers, (pressurized) hot-water installations as well as condensate and feedwater tanks. The conductivity controller indicates when the preset MAX or MIN conductivity is reached, opens or closes a continuous blowdown valve and may also control an intermittent blowdown valve.

The conductivity controllers are designed for use with conductivity electrodes and transmitters in the following equipment combinations: Conductivity controller LRR 1-52 together with conductivity electrodes LRG 12-2, LRG 16-4, LRG 16-9, LRG 17-1 and LRG 19-1;

Conductivity controller LRR 1-53 together with conductivity transmitters LRGT 16-1, LRGT 16-2 and LRGT 17-1.

Glossary

Continuous boiler blowdown (top blowdown)
As the boiler water evaporates, the concentration of non-volatile dissolved solids (TDS) left behind in the boiler increases over time as a function of steam consumption. If the TDS (= total dissolved solids) concentration exceeds the limit defined by the boiler manufacturer, foaming and priming occurs as the density of the boiler water increases, resulting in a carry-over of solids with vapour into steam lines and superheaters.

As a consequence, the operational safety is impaired and severe damage to boiler and tubes may occur. To keep the TDS concentration within admissible limits, a certain portion of boiler water must be removed continuously or periodically (by means of a blowdown valve) and fresh make-up water must be added to the boiler feed to compensate for the water lost through blowdown.

Electrical conductivity - here as a result of the TDS content of boiler water - is measured in microSiemens/cm (µS/cm). However, in some countries ppm (parts per million) is used for conductivity readings. Conversion: 1µS/cm = 0.5 ppm.

Intermittent boiler blowdown (bottom blowdown)
During the evaporation process fine sludge deposits settle on heating surfaces and in the lowest part of the steam boiler. Boiler sludge is caused e. g. by oxygen-scavenging agents. The accumulated sludge sediments form a thermally insulating layer and can damage the boiler walls due to excessive heat. To perform a bottom blowdown the intermittent blowdown valve must be opened abruptly. The resulting suction effect occurs only at the moment when the valve is being opened, the opening time should therefore not exceed 3 seconds. Longer blowdown periods will merely waste boiler water.

The timed pulse/interval control of the intermittent blowdown valve optimises sludge removal while minimising loss of boiler water. The interval between the intermittent blowdown pulses can be set between 1 and 200 h (intermittent blowdown interval Ti). The duration T of the intermittent blowdown can be set between 1 and 10 sec. For larger boilers it may be necessary to repeat the intermittent blowdown pulses. The repetition rate can be set between 1 and 10 with a time interval between 1 - 10 seconds (pulse interval Tp).

External intermittent boiler blowdown
Note that simultaneous intermittent blowdown is not allowed If several steam boilers are connected to one single blowdown receiver / mixing cooler. In this case the external intermittent blowdown control unit PRL 50-4 monitors and controls the individual intermittent blowdown operations.

Glossary - continued -

Temperature compensation
The electrical conductivity changes as the temperature falls or rises. To obtain meaningful readings it is therefore necessary that the measurements are based on the reference temperature of 25 °C and that the measured conductivity values are corrected by the temperature coefficient factor tC.

Cell constant and correction factor
The cell constant is a geometric quantity characteristic of the conductivity electrode and is taken into account when calculating the conductivity. However, in the course of time this constant may chance, e. g. due to dirt deposits accumulated on the measuring electrode. Deviations can be compensated by changing the correction factor C LRG.

Purging of the continuous blowdown valve
To prevent the continuous blowdown valve from getting stuck the valve can be rinsed automatically. At regular intervals (purging interval Ti) the continuous blowdown valve is motored into the open position and rinsed (purging time Sd). After purging the valves is motored back into the required control position.

Stand-by operation (conductivity control)
To avoid loss of water, the continuous blowdown control and the programme-controlled intermittent boiler blowdown (if activated) can be de-activated during stand-by operation or when the burner is switched off. An external control command will be triggered and, as a result, the continuous blowdown valve will be closed. During stand-by operation the MIN/MAX limits and the monitoring function remain active.

After the equipment switches back to normal operation, the continuous blowdown valve is motored back into control position. In addition an intermittent blowdown pulse is triggered off (provided that automatic intermittent boiler blowdown has been activated and an interval period and pulse duration has been set).

Function

The **operating & display unit URB 50** and the **conductivity controller LRR 1-52, LRR 1-53** form a functional unit featuring the following properties:

Conductivity controller	**LRR 1-52**	**LRR 1-53**
Conductivity monitoring using conductivity electrode LRG 1.-.. and separate resistance thermometer Pt 100 (TRG 5-..) or conductivity electrode LRG 16-9 with integrated resistance thermometer.	X	
Evaluation of temperature-compensated current signal of conductivity transmitter LRGT 1.-..		X
3-position stepping controller with proportional-plus-integral control action **(PI controller)** and control of an electrically actuated continuous blow-down valve	X	X
Indication of MAX conductivity limit (conductivity limiter)	X	X
Indication of MIN conductivity limit or control of intermittent blowdown valve	X	X
Indication of valve position if continuous blowdown valve is provided with a potentiometer	X	X
Actual value output 4-20 mA (optional)	X	X
Operating & display unit		**URB 50**
Indication of actual value (indicated in percent and as bar graph)		X
Indication of valve position (indicated in percent and as bar graph)		X
Setting of measuring range		X
Indication/adjustment of control parameters and settings		X
Trend record		X
Indication and listing of errors, alarms and warnings		X
Test of MIN / MAX output relays and/or control of intermittent blowdown valve		X
Manual/automatic operation		X
Password protection		X

Important Notes - continued -

Safety note

The equipment must only be installed, wired and commissioned by qualified and competent staff.

Retrofitting and maintenance work must only be performed by qualified staff who - through adequate training - have achieved a recognised level of competence.

Danger

The terminal strips of the equipment are live during operation.
This presents the danger of electric shock!
Always **cut off power supply** to the equipment before mounting, removing or connecting the terminal strips!

Attention

The name plate specifies the technical features of the equipment. Note that any piece of equipment without its specific name plate must neither be commissioned nor operated.

Note

The conductivity electrodes LRG 12-2, LRG 16-4, LRG 16-9, LRG 17-1 and LRG 19-1 are simple items of electrical equipment as specified in EN 60079-11 section 5.7.
According to the European Directive 94/9/EC the equipment must be equipped with approved Zener barriers if used in potentially explosive areas. Applicable in Ex zones 1, 2 (1999/92/EC).

The equipment does not bear an Ex marking. The suitability of the Zener barriers is certified in a separate wiring diagram.

Directives and standards

EC Pressure Equipment Directive 97/23/EC

The conductivity control & monitoring equipment LRG 1.-.., LRGT 1.-.., LRR 1-5.. meets the safety requirements of the Pressure Equipment Directive (PED). The conductivity control & monitoring equipment is EC type approved according to EN 12952/EN 12953. These Directives state, among other things, the requirements made on limiting systems and equipment for steam boiler plants and (pressurised) hotwater installations.

VdTÜV Bulletin "Water Monitoring 100"

The functional unit consisting of the operating & display unit URB 50 / conductivity controller LRR 1-52, LRR 1-53 in conjunction with conductivity electrode LRG 1.-.. and conductivity transmitter LRGT 16-1 is type approved according to VdTÜV Bulletin "Wasserüberwachung (= Water Monitoring) 100".
The VdTÜV Bulletin "Water Monitoring 100" states the requirements made on water monitoring equipment.

LV (Low Voltage) Directive and EMC (Electromagnetic Compatibility)

The equipment meets the requirements of the Low Voltage Directive 2006/95/EC and the EMC Directive 2004/108/EC.

ATEX (Atmosphère Explosible)

According to the European Directive 94/9/EC the equipment must **not** be used in explosion risk areas.

Note on the Declaration of Conformity / Declaration by the Manufacturer CE

For details on the conformity of our equipment according to the European Directives see our Declaration of Conformity or our Declaration of Manufacturer.
The current Declaration of Conformity / Declaration of Manufacturer are available in the Internet under www.gestra.com/documents or can be requested from us.

Technical data

LRR 1-52, LRR 1-53

Supply voltage
24 VDC +/– 20%

Fuse
external 0.5 A (semi-delay)

Power consumption
5 VA

Reset hysteresis
MAX limit: – 3 % of the adjusted MAX limit, fixed setting

Input/output
Interface for data exchange with operating & display unit URB 50

Inputs
1 volt-free input, 24 VDC, for external command "Control OFF", "Valve CLOSED", "Intermittent blowdown OFF" (stand by).
1 analogue input for potentiometer 0 - 1000 Ω, two-wire connection (indication of valve position)

Outputs
2 volt-free change-over contacts, 8 A 250 V AC / 30 V DC cos φ = 1 (continuous blowdown valve).
2 volt-free change-over contacts, 8 A 250 V AC / 30 V DC cos φ = 1,
De-energizing delay: 3 seconds (MIN/MAX alarm)
or
1 volt-free change-over contact, 8 A 250 V AC / 30 V DC cos φ = 1,
De-energizing delay: 3 seconds (MAX alarm)
1 volt-free change-over contact, 8 A 250 V AC / 30 V DC cos φ = 1 (intermittent blowdown valve)

Provide inductive loads with RC combinations according to manufacturer's specification to ensure interference suppression.

1 analog output 4-20 mA, max. load 500 ohm (actual value) (optional)

Indicators and adjustors
1 tri-colour LED indicator (start-up = amber, power ON = green, malfunction = red)
1 code switch with four poles for configuration

Housing
Housing material: base: polycarbonate, black; front: polycarbonate, grey
Conductor size: 1 x 4.0 mm^2 solid per wire or
1 x 2.5 mm^2 per stranded wire with sleeve to DIN 46228 or
2 x 1.5 mm^2 per stranded wire with sleeve to DIN 46228 (min. ∅ 0.1 mm)
Terminal strips can be detached.
Fixing of housing: Mounting clip on supporting rail TH 35, EN 60715

Electrical safety
Pollution degree 2 for installation in control cabinet with protection IP 54, completely insulated

Protection
Housing: IP 40 to EN 60529
Terminal strip: IP 20 to EN 60529

Weight
approx. 0.5 kg

Technical data - continued -

Only LRR 1-52

Connection of conductivity electrode
1 input for conductivity electrode LRG 1.-.. (cell constant 1 cm^{-1}), 3 poles with screen or
1 input for conductivity electrode LRG 16-9 (cell constant 0.5 cm^{-1}), with integrated resistance thermometer Pt 100, 3 poles with screen

Measuring voltage
0.8 V_{SS}, pulse duty factor tv = 0.5, frequency 20-10000 Hz.

Measuring range
1 to 10,000 µS/cm at 25 °C or 1 to 5,000 ppm at 25 °C.

Only LRR 1-53

Connection of conductivity transmitter
1 analogue input 4-20 mA, e. g. for conductivity transmitter LRGT 1.-.., 2 poles with screen.

Measuring range
0.5 - 20, - 100, - 200, - 500, - 1000, - 2000, - 6000, - 12000 µS/cm adjustable,
100 - 3000, - 5000, - 7000, - 10000 µS/cm adjustable

LRR 1-52, LRR -53

Ambient temperature
when system is switched on: 0 ° .... 55 °C,
during operation: -10 ... 55 °C

Transport temperature
–20 ... +80 °C (<100 hours), defrosting time of the de-energized equipment before it can be put into operation: 24 hours.

Storage temperature
–20 ... +70 °C, defrosting time of the de-energized equipment before it can be put into operation: 24 hours.

Relative humidity
max. 95%, no moisture condensation

Approvals:

TÜV certificate	VdTÜV Bulletin "Wasserüberwachung 100" (= Water Monitoring 100): Requirements made on water level monitoring equipment
	Type approval no. TÜV · WÜL · 12-017 (see name plate).

Technical data - continued -

URB 50

Supply voltage
24 VDC +/– 20%

Fuse
internal automatic

Power consumption
8 VA

Input / output
Interface for data exchange

Graphic user interface
Analogue resistive touch screen, resolution 480 x 271 pixels, illuminated

Dimensions
Front panel: 147x107 mm
Panel cut-out: 136x96 mm
Depth: 56 + 4 mm

Electrical connection
1 connector with 3 poles,
1 D-SUB connector with 9 poles.

Protection
Front panel: IP 65 to EN 60529
Back: IP 20 to EN 60529

Weight
approx. 1.0 kg

Ambient temperature
when system is switched on: 0 ° .... 55 °C,
during operation: -10 ... 55 °C

Transport temperature
–20 ... +80 °C (<100 hours), defrosting time of the de-energized equipment before it can be put into operation: 24 hours.

Storage temperature
–20 ... +70 °C, defrosting time of the de-energized equipment before it can be put into operation: 24 hours.

Relative humidity
5 - 85 %, no moisture condensation

Scope of supply

LRR 1-52
1 Conductivity controller LRR 1-52
1 Installation manual

LRR 1-53
1 Conductivity controller LRR 1-53
1 Installation manual

URB 50
1 Operating & display unit URB 50
1 Data line L = 5m

In control cabinet: Installing the conductivity controller

Dimensions LRR 1-52, LRR 1-53

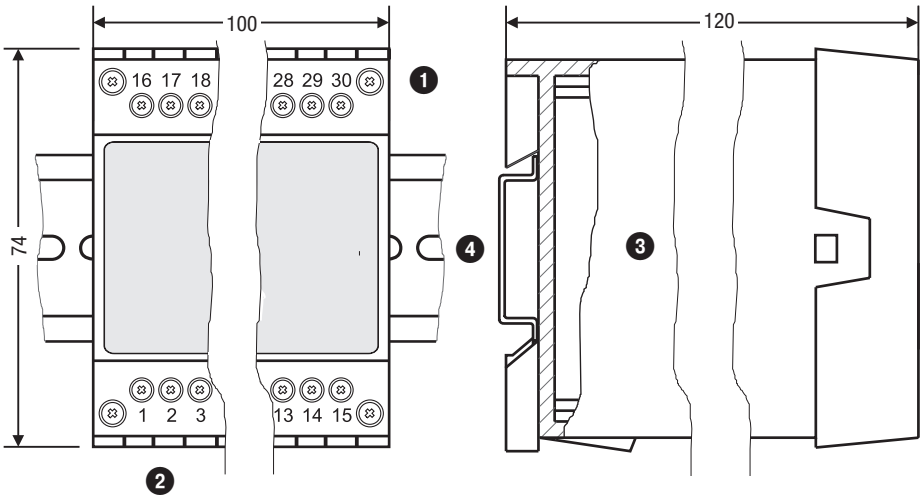


Fig. 1

Key

1. Upper terminal strip
2. Lower terminal strip
3. Housing
4. Supporting rail type TH 35, EN 60715

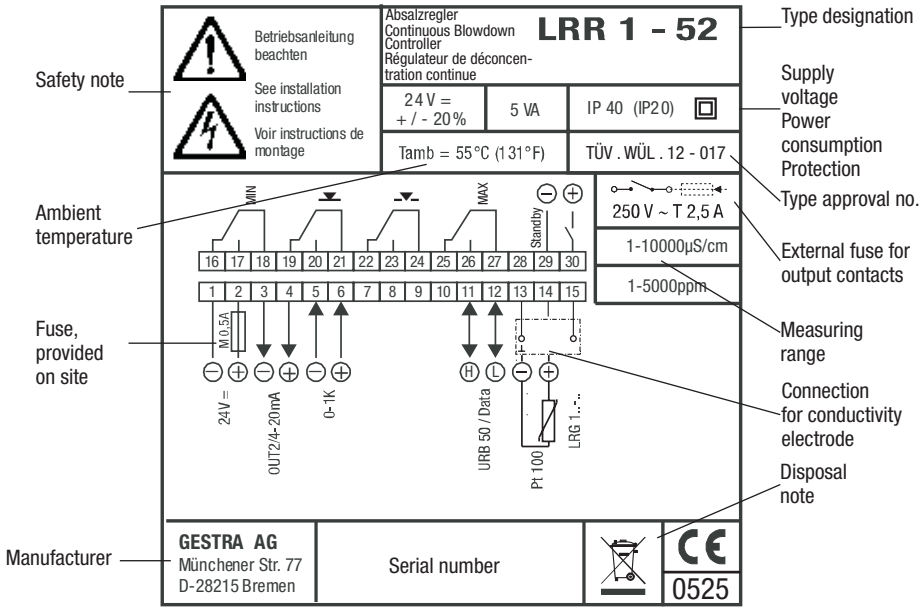
Installation in control cabinet

The conductivity controller LRR 1-52, LRR 1-53 is clipped onto the support rail type TH 35, EN 60715 in the control cabinet. **Fig. 1** ❹

In control cabinet: Mounting the conductivity controller - continued -

Name plate / marking

Name plate LRR 1-52



Name plate LRR 1-53

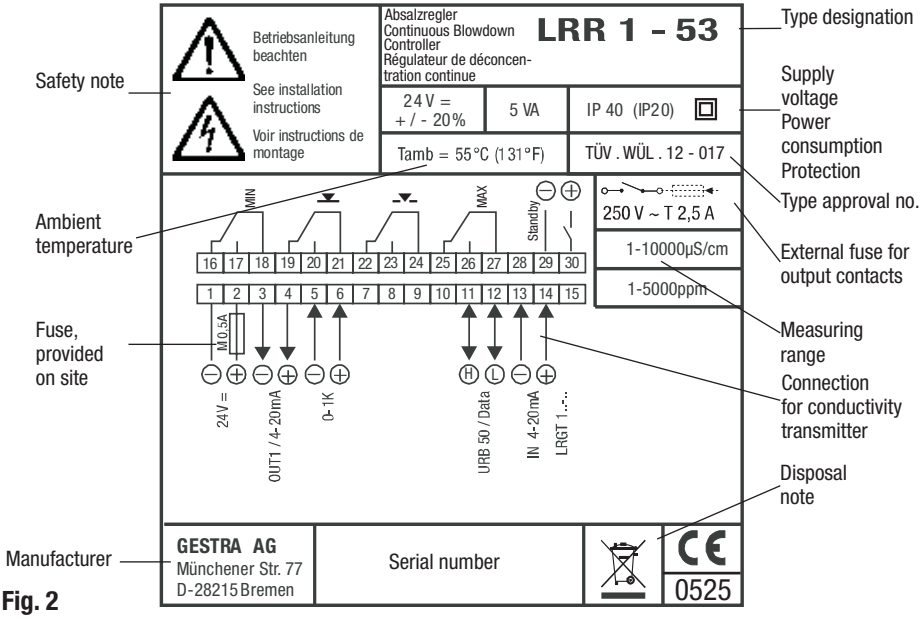


Fig. 2

In control cabinet: Installing the operating & display unit

Dimensions URB 50

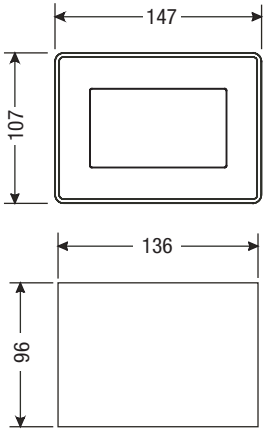
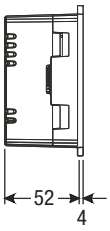


Fig. 3



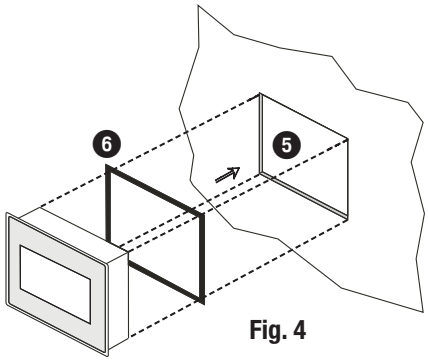


Fig. 4

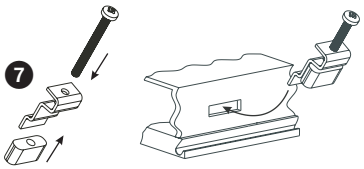


Fig. 5

Key

❺ Control panel cut-out: 136 x 96 mm

❻ Gasket

❼ Fixing elements

Installation in control cabinet

- Provide a control panel cut-out with the dimensions indicated in **Fig. 3 and 4**.
- Insert the operating & display unit into the control panel cut-out. Make sure the gasket ❻ is properly seated.
- Insert and fasten the screws **Fig. 5** until the edges of the frame are flush with the panel of the control cabinet.

Name plate / marking

Fig. 6

In control cabinet: Wiring the conductivity controller

Wiring diagram for conductivity controller LRR 1-52

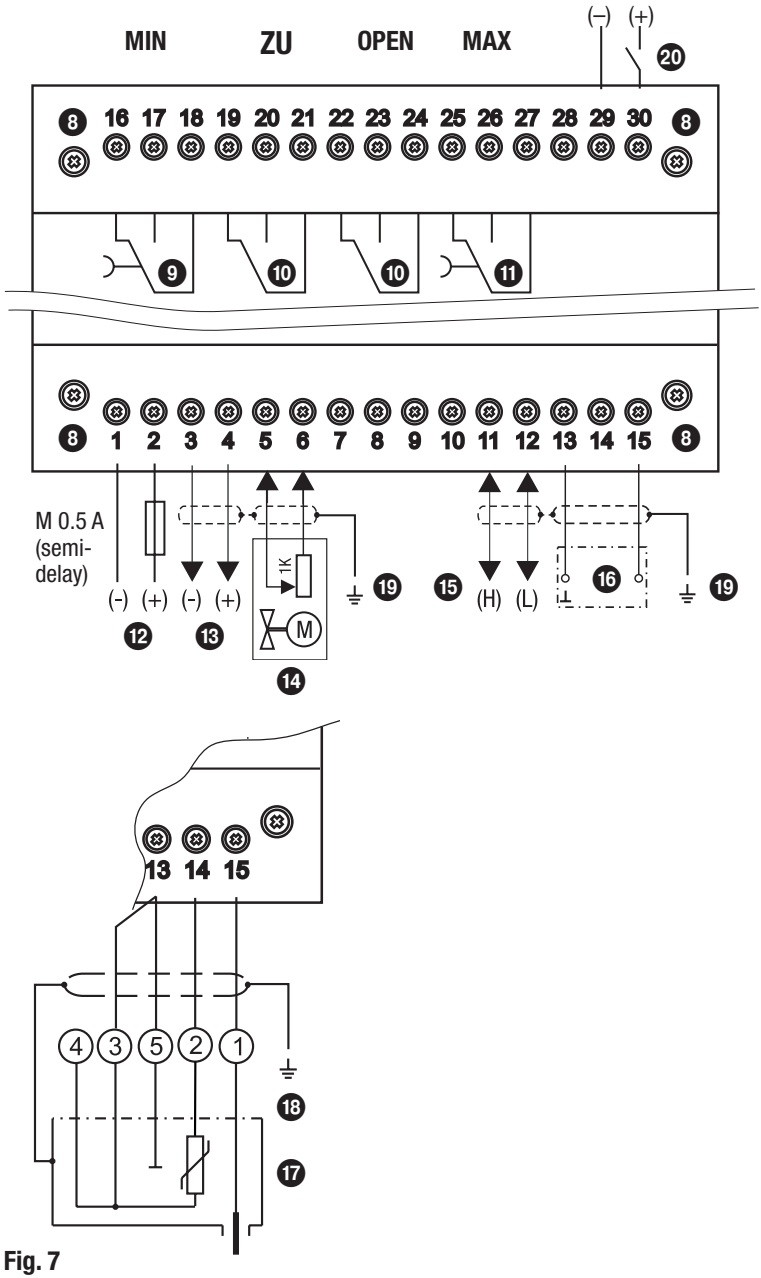


Fig. 7

In control cabinet: Wiring the conductivity controller - continued -

Wiring diagram for conductivity controller LRR 1-53

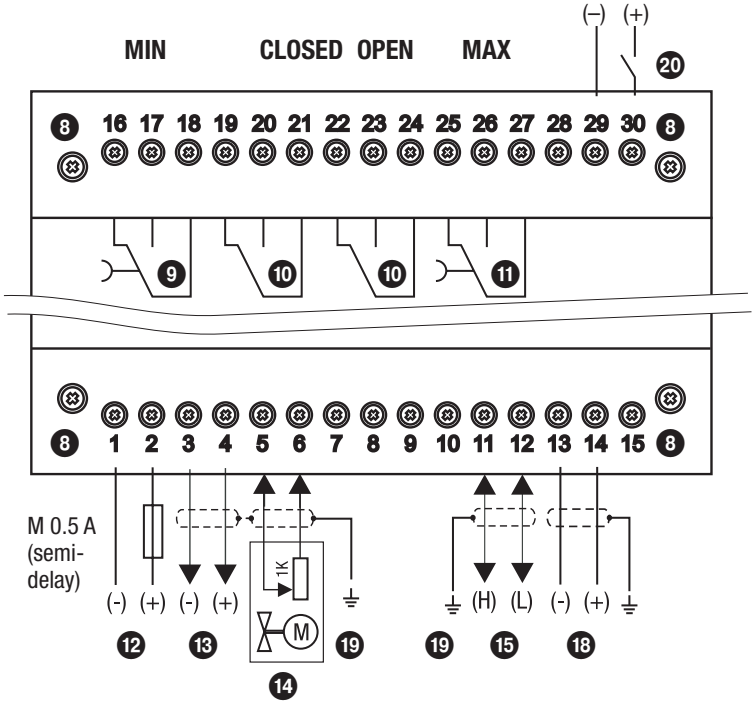


Fig. 8

Key

8 Fixing screws for terminal strip

9 MIN output contact, de-energizing delay 3 sec. or actuation of intermittent blowdown valve

10 Output contact for actuation of continuous blowdown valve

11 MAX output contact, de-energizing delay: 3 sec.

12 Connection of supply voltage **24 V DC** with fuse 0.5 A (semi-delay), provided on site

13 Actual value output 4-20 mA (optional)

14 Indication of valve position, potentiometer 0 - 1000 Ω

15 Data line for operating & display unit URB 50

16 Conductivity electrode LRG 1.-.. (Terminal 13/14: A resistance thermometer can be connected)

9 Conductivity electrode LRG 16-9 with integrated resistance thermometer

18 Conductivity transmitter LRGT 1.-.., 4-20 mA, with earthing point

19 Central earthing point (CEP) in control cabinet

20 Stand-by input, 24 VDC, for external command "Control OFF", "Valve CLOSED", "Intermittent blowdown OFF"

In control cabinet: Wiring the operating & display unit

Back of equipment, position of connector

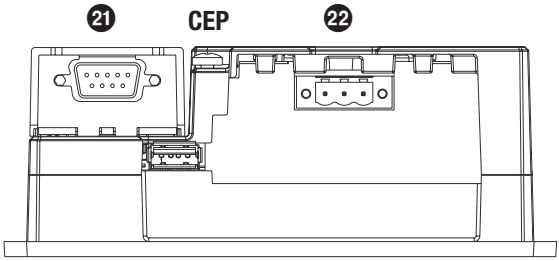


Fig. 9

Connection of supply voltage

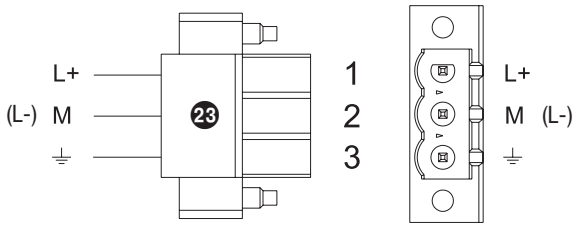
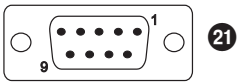


Fig. 10

Pin assignment for data line LRR 1-52, LRR 1-53 - URB 50



PIN 2	Data_L
PIN 7	Data_H

Fig. 11

Key

21 D-SUB connector with 9 poles for data line

22 Connector with 3 poles for supply voltage connection **24 V DC**

23 Connection for supply voltage 24 V DC, pin assignment

In control cabinet:
Wiring the conductivity controller / the operating & display unit

Connection of supply voltage

Each conductivity controller and operating unit is supplied with 24 V DC and provided with an internal (URB) or external (LRR 1-5.., M 0.5A) fuse. The equipment is separately supplied with 24 V DC and fused with an external semi-delay fuse 0.5 A. Please use a safety power supply unit with safe electrical isolation.

The power supply unit must be electrically isolated from dangerous contact voltages and must meet at least the requirements on double or reinforced isolation according to one of the following standards: DIN EN 50178, DIN EN 61010-1, DIN EN 60730-1 or DIN EN 60950.

After switching on the supply voltage and start-up of the equipment the LED of the conductivity controller LRR 1-52, LRR 1-53 lights up green.

Connecting output contacts

Wire the upper terminal strip ❶ (terminals 16-23) according to the desired switching functions.
Provide an external slow-blow fuse 2.5 A for the output contacts.
When switching off inductive loads, voltage spikes are produced that may impair the operation of control and measuring systems. Connected inductive loads must be provided with suppressors such as RC combinations as specified by the manufacturer.

When used as conductivity limiter the conductivity controller LRR 1-52, LRR 1-53 does not interlock automatically when the readings exceed the MAX limit.

If an interlock function is required for the installation it must be provided in the follow-up circuitry (safety circuit). The circuitry must meet the requirements of the EN 50156.

Connecting conductivity electrode LRG 12-2, LRG 16-4, LRG 17-1 and LRG 19-1, resistance thermometer TRG 5-..

To connect the equipment use screened multi-core control cable with a min. conductor size 0.5 mm^2, e.g. LiYCY 4 x 0.5 mm^2 .

Wire terminal strip in accordance with the wiring diagram. **Fig. 7**

Connect the screen only once to the central earthing point (CEP) in the control cabinet.

Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

Connection of conductivity electrode LRG16-9

The conductivity electrode LRG 16-9 is equipped with a sensor plug-in connection type M 12, with 5 poles, A-coded, pin assignment see **Fig. 7.** For connecting the equipment control cable assemblies (with male and female connectors) of various lengths are available as add-on equipment.

To connect the conductivity controller LRR 1-52, LRR 1-53 remove the male connector and wire the terminal strip according to the wiring diagram. **Fig. 7**

Connect the screen only once to the central earthing point (CEP) in the control cabinet.

If you do not use the prefabricated control cable assembly, use screened five-core control cable, e. g. LiYCY 5 x 0.5 mm^2, for connecting the equipment. In addition, connect at the electrode end a screened female connector to the control cable.

Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

In control cabinet:
Wiring the conductivity controller / the operating & display unit - continued -

Connection of conductivity transmitter LRGT 1.-..

To connect the equipment use screened multi-core control cable with a min. conductor size 0.5 mm^2, e. g. LiYCY 4 x 0.5 mm^2 , max. length: 100 m.

Wire terminal strip in accordance with the wiring diagram. **Fig. 8**
Wire screen in accordance with the wiring diagram.

Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

Connection of data line for the conductivity controller / operating & display unit

For connecting the equipment preconfigured control cable assemblies (with female connector) are available as add-on equipment. Wire terminal strip in accordance with wiring diagram. **Fig. 7, 8**

If you do not use the above-mentioned control cable assembly, use screened multi-core control cable, e. g. LiYCY 2 x 0.25 mm^2, min. conductor size 0.25 mm^2, max. length 30 m, for connecting the equipment.

Wire the terminal strips according to the wiring diagram **Fig. 7, 8.** Wire the 9-pole D-SUB connector according to **Fig. 11.**

Connect the earthing point of the housing (URB 50) to the central earthing point in the control cabinet.

Connect the screen **only once** to the central earthing point **(CEP)** in the control cabinet. Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

Connecting the potentiometer (for indication of valve positions), connections IN ../ OUT / 4-20 mA

For the connection use screened multi-core control cable with a min. conductor size 0.5 mm^2, e. g. LiYCY 2 x 0.5 mm^2, max. length 100 m.

Please observe the max. load of 500 ohm for the outputs.

Wire terminal strip in accordance with the wiring diagram. **Fig. 7, 8**
Connect the screen **only once** to the central earthing point (CEP) in the control cabinet. Make sure that connecting cables are segregated and run separately from power cables.

Attention

- Do not use unused terminals as support point terminals.

In the plant:
Wiring the conductivity electrode / transmitter

Connecting conductivity electrode LRG 12-2, LRG 16-4, LRG 17-1 and LRG 19-1, resistance thermometer TRG 5-..

To connect the equipment use screened multi-core control cable with a min. conductor size 0.5 mm², e.g. LiYCY 4 x 0.5 mm² . Wire terminal strip in accordance with the wiring diagram. **Fig. 3.** Connect the screen only once to the central earthing point (CEP) in the control cabinet.

Max. cable length between conductivity electrode / resistance thermometer and conductivity controller: 30 m, with conductivities from 1 to 10 µS/cm: max. 10 m.

Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

Connection of conductivity electrode LRG16-9

The conductivity electrode LRG 16-9 is equipped with a sensor plug-in connection type M 12, with 5 poles, A-coded, pin assignment see **Fig. 3.** For connecting the equipment control cable assemblies (with male and female connectors) of various lengths are available as add-on equipment.

Note that the recommended control cable is not UV-resistant and, if installed outdoors, must be protected by a UV-resistant plastic tube or cable duct.

To connect the conductivity controller LRR 1-50 remove the connector and wire the terminal strip according to the wiring diagram. **Fig. 3.** Connect the screen only once to the central earthing point (CEP) in the control cabinet.

If you do not use the prefabricated control cable assembly, use screened five-core control cable, e. g. LiYCY 5 x 0.5 mm², for connecting the equipment. In addition, connect at the electrode end a screened female connector to the control cable.

Max. cable length between conductivity electrode and controller: 30 m, with conductivities from 1 to 10 µS/cm: max. 10 m.

Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

Connection of conductivity transmitter LRGT 1.-..

To connect the equipment use screened multi-core control cable with a min. conductor size 0.5 mm², e. g. LiYCY 4 x 0.5 mm² , max. length: 100 m.

Wire terminal strip in accordance with the wiring diagram. **Fig. 4**
Wire screen in accordance with the wiring diagram.

Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.

Achtung

- To commission the equipment please refer to the installation & operating manuals for LRG 12-2, LRG 16-4, LRG 16-9, LRG 17-1, LRG 19-1, TRG 5-.. and LRGT 1.-..
- Make sure that connecting cables leading to the equipment are segregated and run separately from power cables.
- Check the connection of the screen to the central earthing point (CEP) in the control cabinet.
- The conductivity transmitter must be separately connected to its own voltage supply.

Conductivity controller: Factory settings

Conductivity controller LRR 1-52, LRR 1-53

Conductivity controller LRR 1-52

- Measuring range = 0.5 bis 10000 µS/cm
- MAX switchpoint = 6000 µS/cm
- MIN switchpoint = 500 µS/cm
- Reset hysteresis:
  MAX limit – 3 % (fixed)
- Setpoint SP = 3000 µS/cm
- Proportional band Pb = + / – 20 % of the setpoint
- Integral time Ti = 0 %
- Dead band = + / – 5 % of the setpoint
- Valve travel time tt = 360 s
- Correction factor C LRG = 1 cm^{-1}
- Temperature compensation deactivated
- Temperature coefficient = 2.1 % / °C
- Purging pulse Ti = 0 h
- Purging duration = 180 s (valve opens 180 sec. and closes 180 sec.)

If an intermittent blowdown valve is controlled

- Intermittent blowdown interval Ti = 24 h
- Duration of intermittent blowdown T = 3 s
- Repetition rate = 1
- Pulse interval Tp = 2 s

- **Code switch ㉔**:
  S 1 OFF, S 2 ON, S 3 OFF, S 4 OFF

Conductivity controller LRR 1-53

- Measuring range = 0.5 bis 6000 µS/cm
- MAX switchpoint = 6000 µS/cm
- MIN switchpoint = 500 µS/cm
- Reset hysteresis:
  MAX limit – 3 % (fixed)
- Setpoint SP = 3000 µS/cm
- Proportional band Pb = + / – 20 % of the setpoint
- Integral time Ti = 0 %
- Dead band = + / – 5 % of the setpoint
- Valve travel time tt = 360 s
- Correction factor C LRG = 1 cm^{-1}
- Temperature compensation deactivated
- Temperature coefficient = 2.1 % / °C
- Purging pulse Ti = 0 h
- Purging duration = 180 s (valve opens 180 sec. and closes 180 sec.)

If an intermittent blowdown valve is controlled

- Intermittent blowdown interval Ti = 24 h
- Duration of intermittent blowdown T = 3 s
- Repetition rate = 1
- Pulse interval Tp = 2 s

- **Code switch ㉔**:
  S 1 OFF, S 2 ON, S 3 ON, S 4 OFF

Conductivity controller: Changing factory settings

Danger

The upper terminal strip ❶ of the equipment is live during operation.

This presents the danger of electric shock!

Always cut off power supply to the equipment before mounting, removing or connecting the terminal strips!

Changing the function and unit

The input and the function are determined by the code switch ㉔ setting.
To change the code switch setting proceed as follows:

- Cut off supply voltage.
- **Lower** terminal strip: Unscrew the left and right fixing screws. **Fig. 7, 8**
- Remove terminal strip.

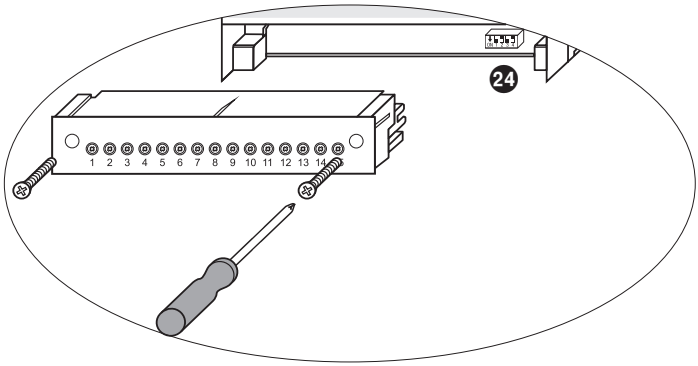


Fig. 12

After the new code switch settings have been established as new defaults:

- Attach lower terminal strip and fasten fixing screws.
- Apply supply voltage. Equipment is restarted.

Conductivity controller: Changing factory settings - continued -

Changing the function and unit - continued -

If you want to change the function or the unit, set the switches S1 and S4 of the code switch ㉔ as indicated in the following table **Fig. 13.**

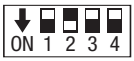
Code switch ㉔	 Toggle switch, white **LRR 1-52**	 Toggle switch, white **LRR 1-53**	
Conductivity controller LRR 1-52, LRR 1-53		**S 1**	**S 4**
Output contacts 16, 17, 18 set as MIN output contacts		OFF	
Output contacts 16, 17, 18 set for actuating an intermittent blowdown valve		ON	
Electrical conductivity measured in µS/cm			OFF
Electrical conductivity measured in ppm			ON

Fig. 13

grey = factory setting

Attention

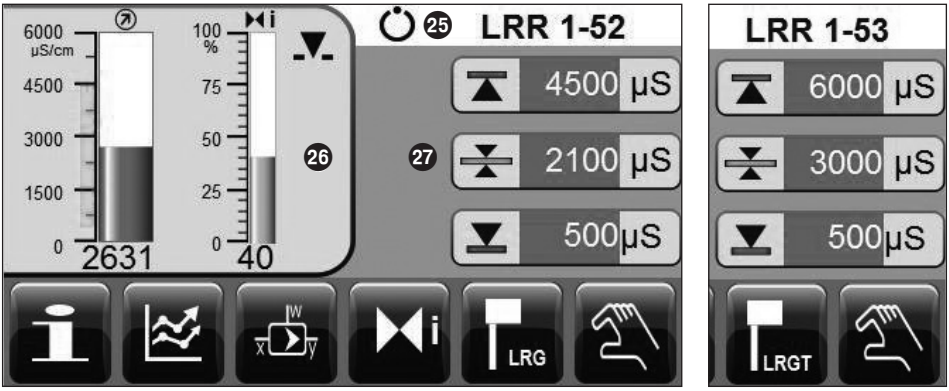
Do **not** change the code switch ㉔ settings of S2 and S3.

Tools

- Screwdriver, size 3.5 x 100 mm, completely insulated according to VDE 0680-1.
- Screwdriver, size 2 x 100 mm, completely insulated according to VDE 0680-1.

Operating & display unit URB 50

User interface



Start window 28

Key

25 Status bar

26 Display field

27 Input field

28 Button bar

Switch on supply voltage

Switch on the supply voltage for the conductivity controller LRR 1-5.. and for the operating & display unit URB 50. The LED of the conductivity controller first turns amber and then green. The operating & display unit shows the start window.

Important notes

After approx. 2 minutes of user inactivity the display brightness automatically dims.

If you call up another screen display from the start window and you do not make an entry, the system automatically returns to the start window after approx. 5 minutes (time out).

Operating & display unit URB 50 - continued -

Explanation of icons

Icon	Description	Icon	Description
	MAX switchpoint		Setpoint
	MIN switchpoint		Conductivity reading
	Position of the continuous blowdown valve		Stand-by input active
	Continuous blowdown valve is motored into OPEN position		Continuous blowdown valve is motored into CLOSED position
	System switches to manual operating mode		System switches to automatic operating mode
	Go to parameter setting window for conductivity electrode		Go to parameter setting window for conductivity transmitter
	Enable temperature compensation		Set up measuring range for LRGT: 4-20 mA = 0.5 - 6,000 µS/cm.
	Disable temperature compensation		
	Temperature coefficient, adjustable between 0.0 - 3 %/°C in increments of 0.1		Correction factor, adjustable between 0.05 and 5,000 in increments of 0.001
	Go to parameter setting window for continuous blowdown valve		Calibration of valve OPEN (indication of valve position via potentiometer)
	Calibration of valve CLOSED (indication of valve position via potentiometer)		Activate purging pulse for continuous blowdown valve
	Purging pulse for continuous blowdown valve, adjustable between 0 and 24 hrs in steps of 1 h.		De-activate purging pulse for continuous blowdown valve
	Indication is flashing while continuous blowdown valve is being purged		
	Go to parameter setting window for controller		Proportional band, adjustable between 10 and 150 %
	Integral action time, adjustable between 0 - 120 sec. in increments of 1 sec.		Neutral zone (dead band), adjustable between 0 and +/– 20%, based on the setpoint, adjustable in increments of 1 %.
	Valve travel time, adjustable between 10 - 600 sec. in increments of 1 sec.		

Operating & display unit URB 50 - continued -

Explanation of icons - continued -

Icon	Description	Icon	Description
	Automatic intermittent blowdown		Interval for intermittent blowdown, adjustable between 1 and 200 hrs in steps of 1 h.
	Pulse for intermittent blowdown, adjustable between 1 - 10 sec. in steps of 1 sec.		Number of intermittent blowdown pulses, adjustable between 1 and 10 in steps of 1.
	Time between intermittent blowdown pulses (if > 1), adjustable between 1 - 10 sec. in steps of 1 sec.		Toggle command: Intermittent boiler blowdown internal/external Password protected
	Activate internal intermittent blow-down		Activate external intermittent blowdown
	Go to trend log window.		Move trend log window 1 hr forward
	Move trend log window 1 hr backwards		Zoom out trend log curve (increases time)
	Get information		Zoom in trend log curve (decreases time)
	Log in		Log out
	Relay test of MAX switchpoint		Relay test of MIN switchpoint
	Logged in		Logged out
	Enter new password		New password
	Deactivate password handling		Password
	Confirm password		Scroll back
	Hand slider for control valve		Time and date setting

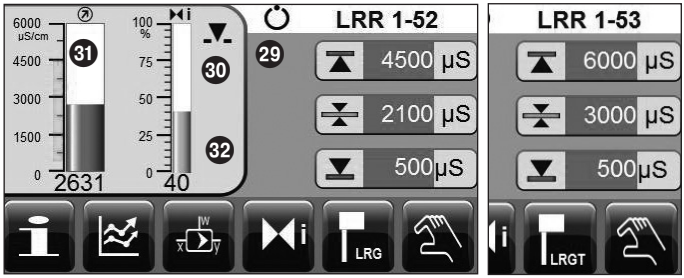
Operating & display unit URB 50 - continued -

Explanation of icons - continued -

Icon	Description	Icon	Description
	Alarm message / Go to alarm list		Go to alarm list
	Alarm message received		Alarm message gone
	Go to first line in alarm list		Scroll down alarm list
	Go to next active alarm		Scroll up alarm list

Commissioning procedure

Adjusting the MIN/MAX switchpoints and setpoint



Press the green button for each switchpoint or the setpoint. Use the on-screen numberpad **Screen display 2** to enter the desired value.

Screen display 1

Numberpad

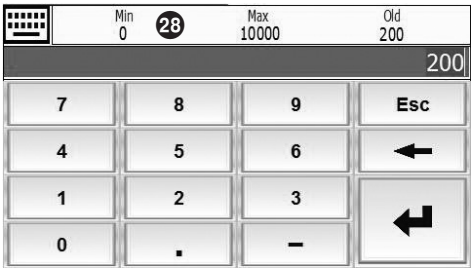


Fig. 2

The green buttons in the following windows indicate that user input is possible. When you press on these green buttons a numberpad appears and you can enter the desired values and parameter settings.

The bar ㉘ shows the old value and the limit range.

To undo any incorrect data input press the **Backspace** key.

If you do not want to enter data press the **Esc** key. The start window re-appears.

To confirm your data input press the **Enter** key. The start window re-appears again.

Key

㉘ Bar showing the old value and the limit range

㉙ Status indication (here: automatic operating mode)

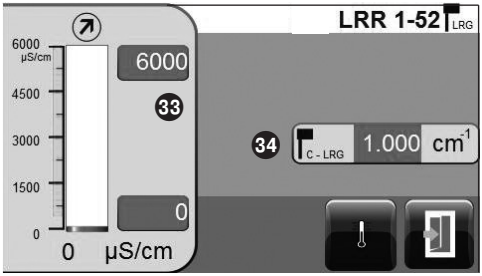
㉚ Continuous blowdown valve motored to OPEN position

㉛ Conductivity reading in µS/cm

㉜ Bar chart indication of manipulated variable Y [in %], relative to valve lift of continuous blowdown valve

Conductivity controller LRR 1-52:
Setting the measuring range, correction factor and temperature compensation

Press button  to open the parameter setting window for the conductivity electrode.



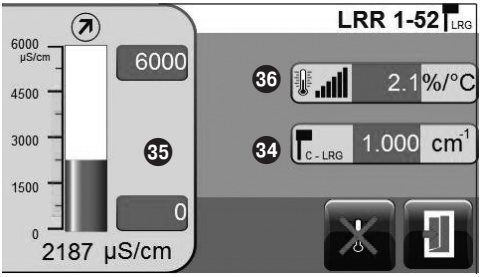
Screen display 3

Press button  to enable temperature compensation.

For conductivity electrode LRG 1.-..

To establish the measuring range 33 and the correction factor C LRG 34 press the green button. Use the on-screen numberpad to enter the desired value.

Correction factor C LRG: Once the operating temperature is reached measure the electrical conductivity of a water sample (at 25°C). Set the correction factor (in increments) until the indicated actual value agrees with the reference measured value. As a result the conductivity readings will be adapted to the specific conditions of the installation and any deviations during operation will be compensated for.



Screen display 4

Press button  to go back to the start window.

Conductivity electrode LRG 1.-.. with separate resistance thermometer and LRG 16-9:
To establish the measuring range 33, the temperature coefficient 36 and the correction factor C LRG 34 press the green button. Use the on-screen numberpad to enter the desired value.

Temperature coefficient: Once the operating temperature is reached measure the electrical conductivity of a water sample (at 25°C). Set the temperature coefficient (in increments) until the indicated actual value agrees with the reference measured value.

Correction factor C LRG: During operation the indicated conductivity reading may deviate from the reference value due to e. g. dirt deposits or contamination. Change the correction factor (in increments) until the indicated actual value agrees with the reference measured value.

Key

33 Measuring range in µS/cm

34 Correction factor C LRG

35 Conductivity reading in µS/cm

36 Temperature coefficient %/°C

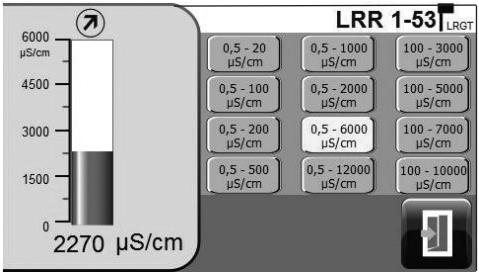
Conductivity controller LRR 1-53: Setting measuring range

Press button 

to open the parameter setting window for the conductivity transmitter.

Note

Note that the conductivity transmitter LRGT 1.-.. must be put into operation first. Refer to the installation & operating manual for LRGT 16-1, LRGT 16-2, LRGT 17-1.



The factory-set measuring range is shown. If required press the button for your required measuring range.

Please take the conductivity transmitter setting into consideration. This setting is decisive.

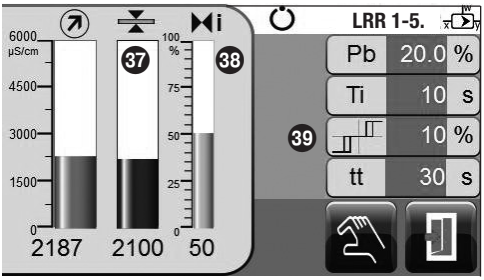
Screen display 5

Press button 
to go back to the start window.

Commissioning - continued -

Setting the control parameters

Press button  to open the parameter setting window for the controller.



Screen display. 6

For each parameter setting press the green button. Use the on-screen numberpad to enter the desired value.

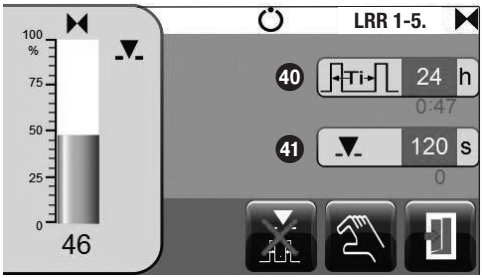
Press button  to go back to the start window.

Additional information on control parameter settings

Parameter		Deviation	Continuous blowdown valve
Proportional band **Pb**	larger	large remaining deviation	responds slowly
	smaller	small remaining deviation	responds quickly and may open/closes all the time
	Example	Measuring range 0 - 6000 µS/cm Setpoint SP = 3000 µS/cm Proportional band Pb = +/- 20% of setpoint = +/- 600 µS/cm With a measuring range of 0 - 6000 µS/cm and a setpoint of 3000 µS/cm the proportional band will be +/- 600 µS/cm within a range of 2400 to 3600 µS/cm.	
Integral time **ti**	larger	slow correction of deviations	responds slowly
	smaller	fast correction of deviations, control system may tend to overshoot	responds quickly
Neutral zone (dead band) 39	larger	time-delayed correction of deviations	will not respond until the deviation exceeds the neutral band
	smaller	fast correction of deviations	
Valve travel time **tt**			Adjust the valve travel time specified by the valve manufacturer.

Continuous blowdown valve: Setting the purging pulse and duration

Press button  to open the parameter setting window for the continuous blowdown valve.



Screen display 7

To enter the purging pulse ㊵ and the purging duration ㊶ press the green button. Use the on-screen numberpad to enter the desired time setting. The new time settings are accepted after the system is re-started or as soon as the previous purging pulse is over.

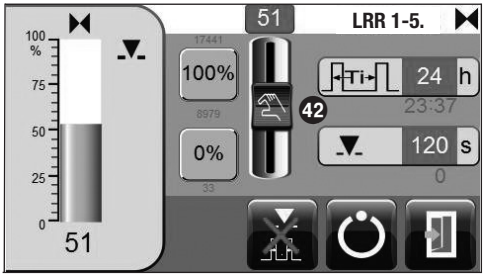
If you do not want the continuous blowdown valve to be purged automatically, deactivate the purging pulse by pressing the key  .

Press button  to go back to the start window.

Continuous blowdown valve: Calibrating the potentiometer for indication of valve position

Press button  to open the parameter setting window for the continuous blowdown valve.

Press button  to switch to manual operating mode.



Screen display 8

Switch back to automatic operating mode and scroll back. 

Calibration of "Valve CLOSED" (0%): Move the hand slider downwards until "0" is indicated in the green button. Press the key "0 %". 

Calibration of "Valve OPEN" (100%): Move the hand slider upwards until "100" is indicated in the green button. Press the key "100 %". Or press the green button and enter 100 in the numberpad. 

Key

㊲ Bar chart indication of setpoint [in µS/cm]

㊳ Bar chart indication of manipulated variable Y [in %], relative to valve lift of continuous blowdown valve

㉔ Dead band

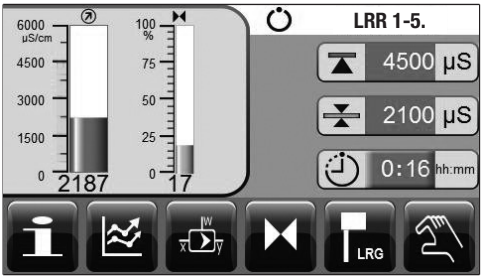
㊵ Purging pulse

㊶ Purging duration

㊷ Manual actuator for continuous blowdown valve

Automatic intermittent blowdown

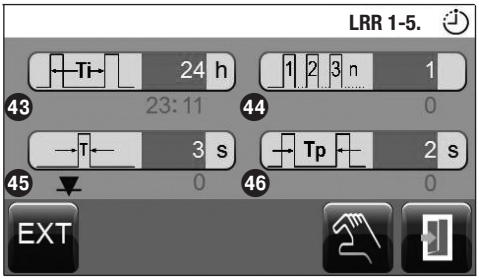
Screen display 9 appears once the output contacts 16, 17, 18 for controlling the intermittent blowdown valve have been configured **(Fig.13),**



Screen display 9

Press the green button next to the symbol 

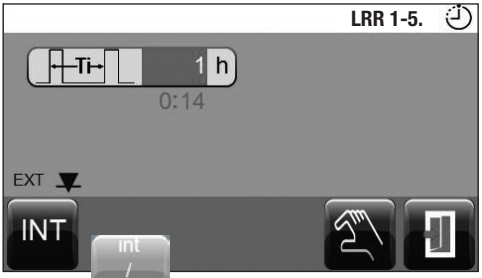
Screen display 10 appears.



Screen display 10

To enter the frequency ㊸ of and the pulse ㊺ for intermittent blowdown, the number of pulses ㊹ and the time between blowdown ㊻ press the green button. Use the on-screen numberpad to enter the desired time setting. The new time settings are accepted after the system is re-started or as soon as the previous intermittent blowdown interval is over.

Press button EXT for external control of the intermittent blowdown valve.



Screen display 11

The toggle command "internal/external" is not available when you are logged out.
Instead of button INT

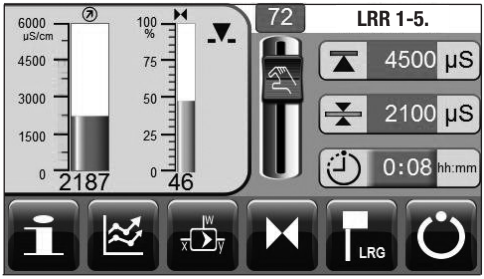
the field int / ext appears.

Press button  to go back to the start window.

Operation

Manual actuation of continuous blowdown valve

Press button  to switch to manual operating mode.



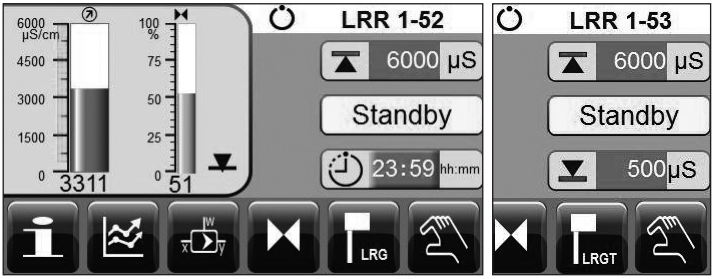
Use the hand slider to change the position of the continuous blowdown valve. The green button indicates the valve opening in %. Or press the green button and enter the desired valve opening in % in the numberpad.

Screen display 12

Switch back to automatic operation. 

Stand-by operation

If 24 VDC is present across the stand-by input, automatic control is deactivated, the continuous blowdown valve is motored into the CLOSED position and intermittent boiler blowdown is switched off. Screen display 13 appears. During stand-by operation the MIN/MAX limits and the monitoring function remain active.
After the equipment switches back to normal operation, the continuous blowdown valve is motored back into control position. In addition an intermittent blowdown pulse is triggered off (provided that automatic intermittent boiler blowdown has been activated and an interval period and pulse duration has been set).



Screen display 13

Key

43 Frequency ("interval") of intermittent blowdown

44 Number of intermittent blowdown pulses

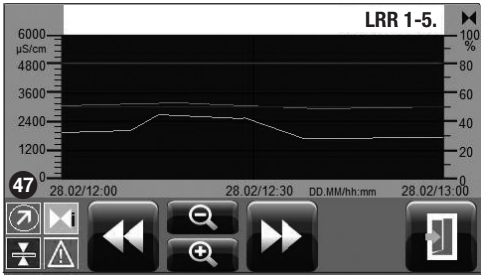
45 Pulse for intermittent blowdown

46 Time between intermittent blowdown pulses

Trending

Screen display 1

Press button  to open the trend log window.



Press button	
	to move 1 hour back in the trend log window
	to update the trend curve
	to move 1 hour forward in the trend log window

Screen display 14

Press button  to go back to the start window.

Key

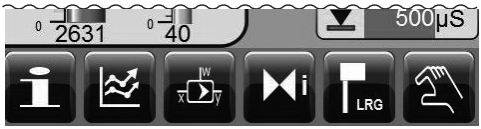
47 Designation of trend curves

	Conductivity reading, blue curve
	Position of control valve, grey curve
	Setpoint, purple curve
	Alarm message, red curves

48 Test button for MIN alarm

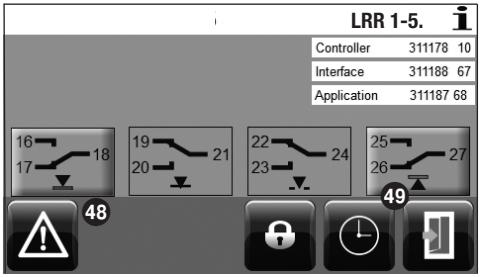
49 Test button for MAX alarm

Testing MIN/MAX alarm, entering date and time



Screen display 1

Press button  to open the information window

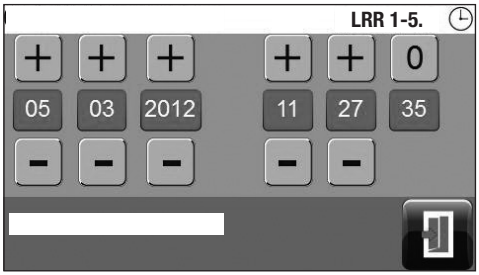


Screen display 15

Testing MIN alarm
Press and hold down button ㊽ for at least 3 sec. After the de-energizing delay the output contact 17-18 opens and the respective contact icon turns red.

Testing MAX alarm
Press and hold down button ㊾ for at least 3 sec. After the de-energizing delay the output contact 26-27 opens and the respective contact icon turns red.

Press button  to open the time/date window



Screen display 16

Press the green button and use the on-screen numberpad to enter the day, month, year and hours, minutes and seconds. To change the date and time use the +/- keys.

Press button  to go back to screen display 15.

Setting up a password and logging in

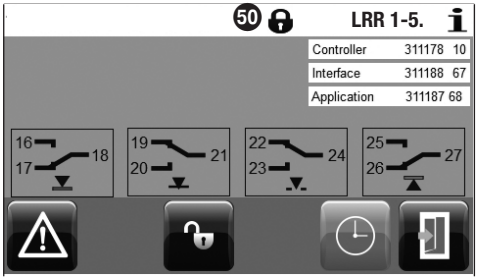
Screen display 17

You can allocate a password in order to protect the operating & display unit from unauthorized access and operation.

To allocate a password press button 

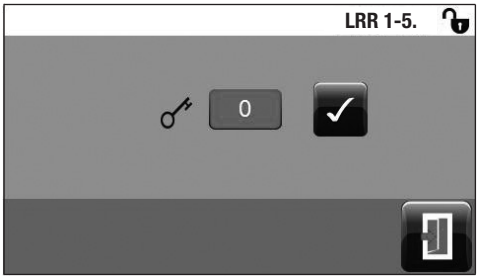
The following button(s) appear(s): 

Press again button 
Screen display 18 appears.



Screen display 18

Press the  key. Screen display 19 appears.



Screen display 19

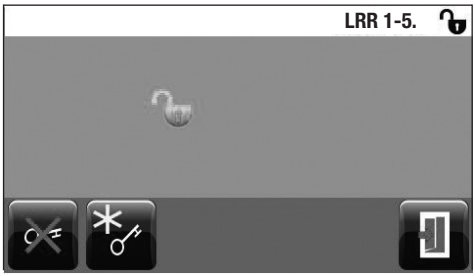
Press the green button and use the on-screen numberpad to enter "0" during first commissioning.

Press button  to confirm the password input.
Screen display 20 appears.

Key

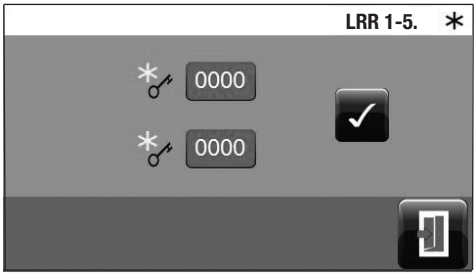
50 Log out symbol in status bar

Setting up a password and logging in



Screen display 20

Press button	
	to go to screen display 21 where you can enter a new password.
	to deactivate the password handling.
	to go back to the start window. All buttons and input options are now available



Screen display 21

Press the green button and use the on-screen numberpad to enter your new password twice.

Press button  to confirm the password and go back to screen display 20.

Press button  to go back to screen display 20

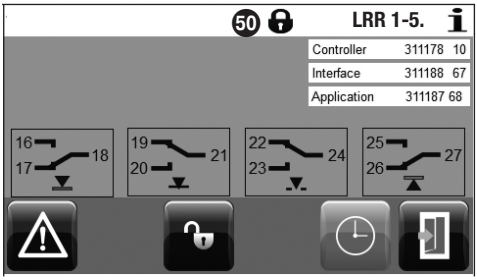
Log out

After having changed the parameters and settings you can log out again.

To log out press button 

The following button(s) appear(s): 

Press again button 
Screen display 18 appears.

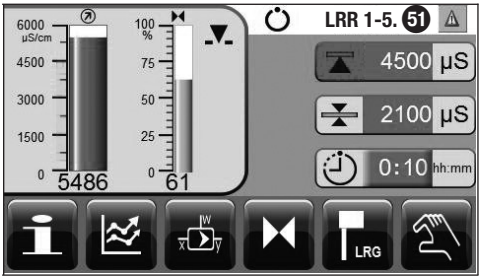


Press button  to go back to the start window.

All buttons and input options are now unavailable. The symbol "Logged out" appears in the status bar.

Screen display 18

Alarm list

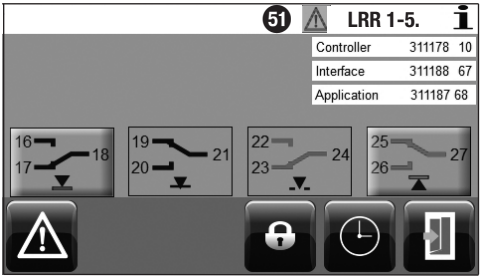


Screen display 1

Example:
The MAX switchpoint is exceeded. The warning triangle 51 and the change of colour indicate that there is an alarm message.

Press the button with the warning triangle 51 to view the alarm list (Screen display 23).

Press button  to open the information window



Screen display 22

Press button  to go back to the start window.

Press button go to the alarm list.

The active alarm or malfunction is highlighted in red. Press button	
	to call up the next active message.
 	to scroll forward in the alarm list (also possible by means of hand slider).
	to go back to the first line.
	to go back to the start window.

Key

51 Malfunction or alarm message received

52 Hand slider

Error, alarm and warning messages

Indication, diagnosis and remedy

Attention

Before carrying out the fault diagnosis please check:

Supply voltage:
Is the equipment supplied with the voltage specified on the name plate?

Wiring:
Is the wiring in accordance with the wiring diagram?

Alarm list / window		
	**Status / error**	**Remedy**
	Communication LRR/URB disrupted	Check electrical connection. Switch supply voltage off and on again to re-start the equipment.
Code		
A.001	MAX switchpoint exceeded	
A.002	Value below MIN switchpoint	
E.005	Conductivity electrode defective, measuring voltage < 0.5 VDC	Check conductivity electrode and, if necessary, replace it. Check electrical connection.
	Conductivity transmitter defective, measuring current < 4 mA	Check conductivity transmitter and, if necessary, replace it. Check electrical connection.
E.006	Conductivity electrode defective, measuring voltage > 7 VDC	Check conductivity electrode and, if necessary, replace it. Check electrical connection.
	Conductivity transmitter defective, measuring current > 20 mA	Check conductivity transmitter and, if necessary, replace it. Check electrical connection.
E.101	If continuous blowdown valve is equipped with a potentiometer: Calibration values 0 and 100 % have been reversed.	Re-calibrate the potentiometer in the continuous blowdown valve.
E.102	Beginning and end of measuring range have been reversed.	Re-adjust the measuring range.
E.103	MIN switchpoint above MAX switchpoint	Re-adjust the switchpoints.
In the event of a malfunction (E. xxx) a MIN and MAX alarm will be triggered and the continuous blowdown valve closes.		

Attention

- Please refer to the installation & operating manuals for LRG 12-2, LRG 16-4, LRG 16-9, LRG 17-1, LRG 19-1, TRG 5-.. and LRGT 1.-.. for further fault-finding and troubleshooting.

Note

If a malfunction occurs in the conductivity controller, MIN and MAX alarms will be triggered and the equipment is restarted.
Should this happen over and over again, replace the equipment with a new one.

Further Notes

Action against high frequency interference

High frequency interference can occur for example as a result of out-of-phase switching operations. Should such interference occur and lead to sporadic failures, we recommend the following actions in order to suppress any interference.

- Provide inductive loads with RC combinations according to manufacturer's specification to ensure interference suppression.
- Make sure that all connecting cables leading to the conductivity electrode or to the conductivity transmitter are segregated and run separately from power cables.
- Increase the distance to sources of interference.
- Check the connection of the screen. Check the screens of the equipment as stipulated in the respective installation & operating manuals. If equipotential bonding currents are to be expected (e. g. in outdoor installations) connect screen only at one end.
- HF interference suppression by means of hinged-shell ferrite rings.

Decommissioning / replacing the conductivity controller LRR 1-5

- **Switch off supply voltage** and cut off power supply to the equipment.
- Remove the lower and upper terminal strips. Unscrew the left and right fixing screws. **Fig. 12**
- Release the white fixing slide at the bottom of the equipment and take the equipment off the supporting rail.

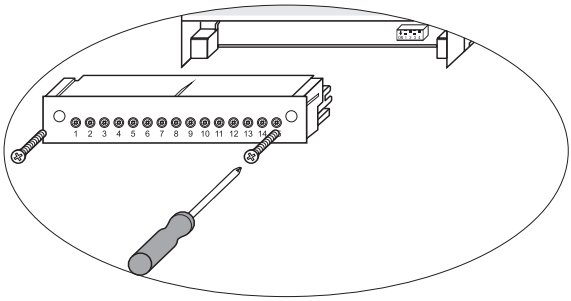


Fig. 12

Decommissioning / replacing the operating & display unit URB 50

- Switch off supply voltage and **cut off power supply** to the equipment.
- Unplug the connector, **FIg. 10 and 11.**
- Unscrew screws **Fig. 5** and remove fixing elements.
- Push the equipment out of the control cabinet panel cut-out.

Disposal

For the disposal of the equipment observe the pertinent legal regulations concerning waste disposal.

If faults occur that are not listed above or cannot be corrected, please contact our service centre or authorized agency in your country.

For your Notes

FLOWSERVE GESTRA

Agencies all over the world:

www.gestra.de

Great Britain

Flowserve GB Limited
Abex Road
Newbury, Berkshire RG14 5EY
Tel. 0044 16 35 / 46 99 90
Fax 0044 16 35 / 3 60 34
E-Mail gestraukinfo@flowserve.com
Web www.flowserve.com

Singapore

Flowserve Pte. Ltd.
12 Tuas Avenue 20
Singapore 63882
Tel. 0065 / 68 79 89 00
Fax 0065 / 68 62 49 40
E-Mail fcd_gestra_singapore@flowserve.com
Web www.gestra.com

South Africa

Flowserve SA (Pty) Ltd.
Unit No. 1
Director Road
Spartan Extension 2
Kempton Park 1613
Tel. 0027 11 / 9 23 73 00
Fax 0027 11 / 9 74 64 20
E-Mail tvniekerk@flowserve.com
Web www.flowserve.com

USA

Flowserve GESTRA U.S.
2341 Ampere Drive
Louisville, KY 40299
Tel. 001 502 / 267-22 05
Fax 001 502 / 266-53 97
E-Mail fcd-gestra-usa@flowserve.com

GESTRA AG

P. O. Box 10 54 60, D-28054 Bremen, Germany
Münchener Str. 77, D-28215 Bremen, Germany
Tel. 0049 (0) 421 / 35 03-0
Fax 0049 (0) 421 / 35 03-393
E-mail gestra.ag@flowserve.com
Web www.gestra.de

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