



**FLOWSERVE**

GESTRA

**GESTRA Steam Systems**

**LRR 1-40**



**Installation Instructions 818527-00**

TDS Control Unit LRR 1-40



**CANopen**

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# Functional Elements

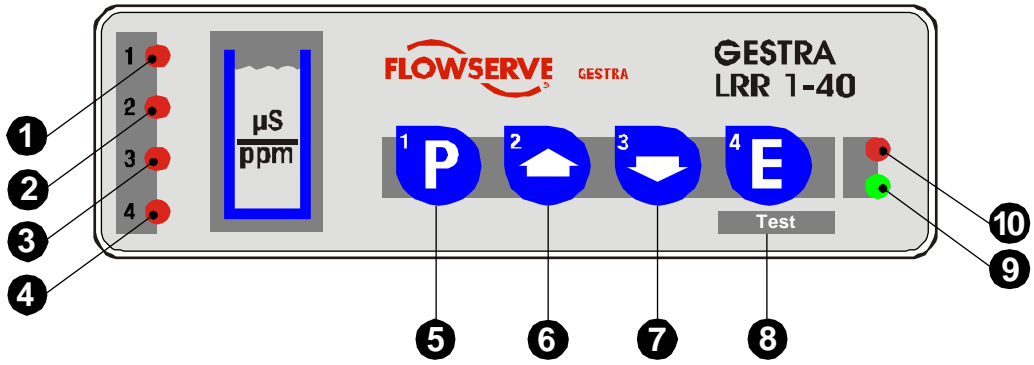


Fig. 1

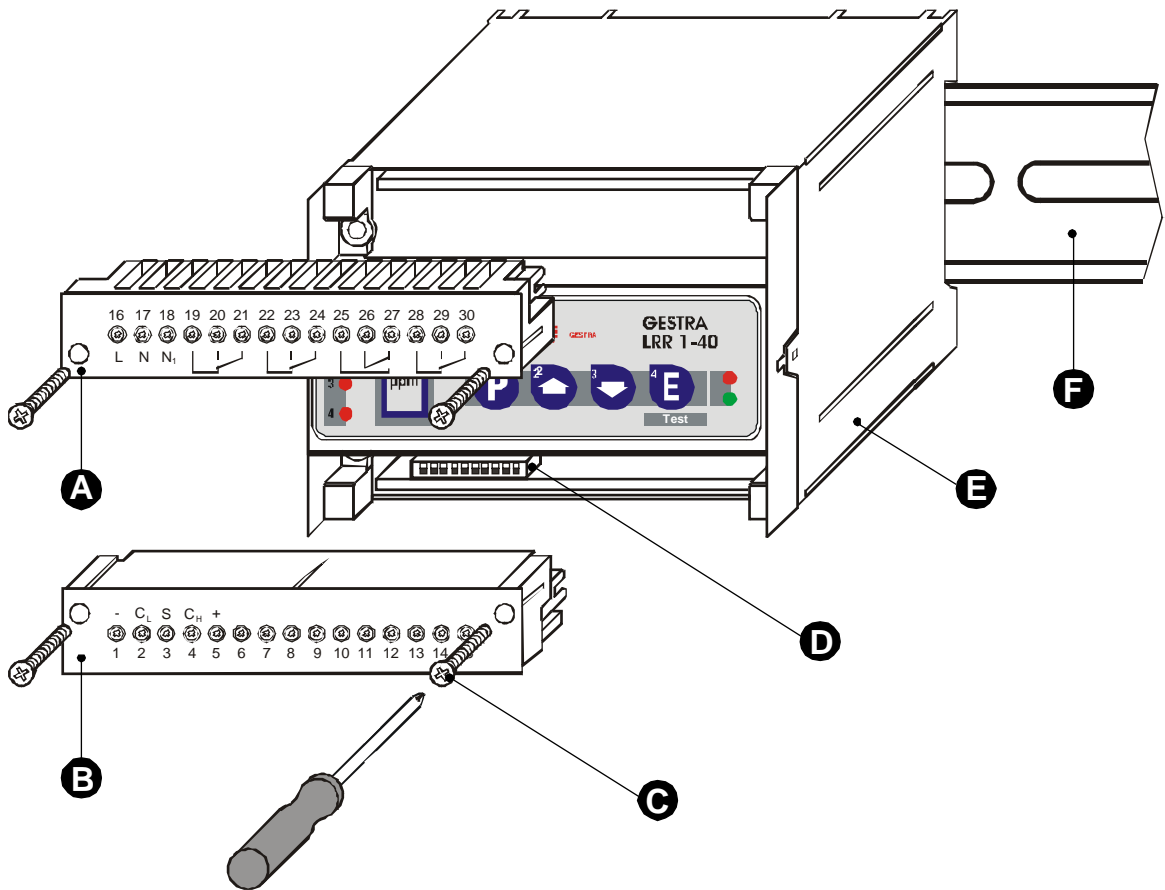


Fig. 2

## Key

- ① LED 1 (MAX)
  - ② LED 2 (Valve closed)
  - ③ LED 3 (Valve open)
  - ④ LED 4 (MIN)
  - ⑤ Program button for switching between operating and parameterising mode
  - ⑥ Increase button
  - ⑦ Decrease button
  - ⑧ Enter button / test mode
  - ⑨ Green LED "Power"
  - ⑩ Red LED "Status CAN bus"
- 
- A Upper terminal strip
  - B Lower terminal strip
  - C Fixing screws (cross recess head screws M4)
  - D Code switch
  - E Casing
  - F Supporting rail type TH 35, EN 60715

## Important Notes

### Usage for the intended purpose

Use blowdown controller LRR 1-40 only in conjunction with conductivity electrode LRG 16-40 and an operating & display unit type URB or SPECTOR*control* for detecting and monitoring electrical conductivity in liquids.

Note that the application of the control unit LRR 1-40 for conductivity limiting purposes or continuous boiler blowdown is only permissible if it is used in conjunction with the conductivity electrode LRG 16-40 and an operating & display unit type URB or SPECTOR*control*.

To guarantee a trouble-free operation observe the requirements made on water quality as specified in the pertinent TRD and EN regulations.

Any type of use differing from the usage described above must be considered as improper. The resulting risk will have to be borne by the user alone. The manufacturer hereby expressly rejects any claims for any damage resulting from improper usage.

### Safety note

The equipment must only be installed 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.

For installation, removal, commissioning, operation and maintenance, every person who works with the equipment must have read and understood the complete installation manual. Furthermore, responsibilities must have been defined clearly and unambiguously and must be adhered to.

Usage of the equipment for the intended purpose includes compliance with the rules and notes in these installation instructions for installation, removal, commissioning, operation and maintenance.

The operating company must ensure that, whenever the equipment is being operated, it is in perfect condition.

Working methods that jeopardise safety must not be used!

## Important Notes – continued –

### ATEX (Atmosphères Explosibles)

According to the European Directive 94/9/EC the equipment must not be used in potentially explosive areas.

### Danger note



#### Danger

The terminal strip of the control equipment is live during operation. This presents the danger of electric shock!

**Cut off power supply** before attaching or detaching the terminal strip of the control equipment!

## Explanatory Notes

### Scope of supply

#### LRR 1-40

- 1 Control unit LRR 1-40 (plug-in unit in plastic case)
- 1 Terminating resistor 120Ω
- 1 Installation manual

### Description

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.

In addition, excess phosphate (due to phosphate treatment) or concentrated residual hardness particles form accumulated sludge that deposits on heating surfaces and on the bottom of the steam boiler. The insulating layer formed by these deposits can cause the boiler metal to become overheated, resulting in a dangerous situation since the metal is now subjected to design pressure at an elevated temperature.

The TDS control unit LRR 1-40 in conjunction with the conductivity electrode LRG 16-40 and the operating & display unit type URB or SPECTOR*control* ensure efficient boiler blowdown.

The quality of the boiler water is monitored with the aid of:

- Conductivity control / limitation,
- Continuous boiler blowdown control,
- Automatic intermittent blowdown control.

The TDS controller LRR 1-40 can be used in combination with the conductivity electrode LRG 16-40 and an operating & display unit type URB or SPECTOR*control* for TDS control (conductivity limitation) and continuous boiler blowdown in steam boilers and (pressurised) hot-water plants.

The data exchange between the control unit LRR 1-40, the conductivity electrode LRG 16-40 and the operating device as well as further equipment is effected via CAN bus according to ISO 11898, using the CANopen protocol.



### Function

The conductivity electrode LRG 1-40 sends at regular intervals data telegrams via CAN bus to the control unit LRR 1-40.

The data telegram of the conductivity electrode LRG 16-40 contains the following data:

- Conductivity reading (actual value X), based on 25°C
- Temperature of boiler water,
- Alarm: Internal cable monitoring signals malfunction(s),
- Alarm: Temperature sensor for boiler water is defective,
- Alarm: Excessively high temperature in terminal box.

All transmitted process data are continuously evaluated by the control unit and assigned to the control range and the respective switch points.

If the associated conductivity electrode interrupts the data transmitting cycle, an alarm message is given and a visual signal is indicated by the display of the operating device.

Use operating device URB or SPECTOR *control* to configure, parameterize, operate and show the available parameters of the conductivity electrode. The control unit LRR 1-40 can only test the energizing/de-energizing of the relays for the limit values.

The control unit features the following functions:

- Use as 2-position controller for the control of a continuous blowdown valve,
- Use as 3-position proportional stepping controller for the control of a continuous blowdown valve with feedback potentiometer,
- Triggering of daily purging pulse (24h) to actuate the continuous blowdown valve,
- De-activation of control function during stand-by operation of steam boiler,
- Alarm signal in the event of a malfunction in the conductivity electrode,
- Max. limit alarm for conductivity limiting,
- Min. limit alarm or
- Automatic blowdown control with timed actuation of the intermittent blowdown valve,
- Analog actual value output (4-20 mA) for external conductivity indication (optional).

## Technical data

### Type approval no.

TÜV.WÜL.02-007

EG BAF-MUC 02 05 103881 003

### Input/Output

Interface for CAN bus to ISO 11898 CANopen.

### Inputs

CAN bus interface with power supply 18-36V DC, short circuit protected.

Analog control input for indicating valve position via feedback potentiometer 1000 $\Omega$ , angle of rotation 320°, supply voltage 5V DC.

Voltage input 18-36V AC (50/60 Hz) or DC for external command:

Control OFF, valve CLOSED, intermittent blowdown OFF. With DC protected against polarity reversal.

### Outputs

Four volt-free relay contacts.

Max. contact rating with a switching voltage of 24V AC/DC, 115V AC and 230V AC: resistive / inductive 4A.

Contact material AgNi 0.15.

Current output 4-20mA as actual value output, max. load 750 $\Omega$  (optional).

Conductivity measuring range with actual value output 4-20mA

Beginning of measuring range			End of measuring range		
ppm*	$\mu\text{S/cm}$ *	mA	ppm*	$\mu\text{S/cm}$ *	mA
0.25	0.5	4	10	20	20
			50	100	20
			100	200	20
			250	500	20
			500	1000	20
			1000	2000	20
			3000	6000	20
			6000	12000	20

\* based at 25°C



### Note

The electrical conductivity is measured in  $\mu\text{S/cm}$ . For ppm (parts per million) use the following conversion:  
 $1 \mu\text{S/cm} = 0.5 \text{ ppm}$ .

### Technical data – continued –

#### Indicators and adjustors

Four pushbuttons as operating elements.  
Four LEDs for indicating the operating modes.  
One green LED for power supply.  
One red LED for status indication of CAN bus.  
One 10-pole code switch for setting node ID and baud rate.

#### Setpoint W

Adjustable within the measuring range between the adjusted MIN/ MAX limits.

#### Control range (configuration as proportional controller)

Beginning: 0.5 x setpoint W up to 1.5 x setpoint W

#### Dead band (configuration as proportional controller)

Based on setpoint W:

Setpoint W below 2000  $\mu\text{S}/\text{cm}$  (1000 ppm) DB = 3%

Setpoint W above 2000  $\mu\text{S}/\text{cm}$  (1000 ppm) DB = 1%

#### Switching hysteresis of controller output (configuration as 2-position controller)

Adjustable between 1 and 25% of the adjusted setpoint.

#### Operating position of the continuous blowdown valve

Adjustable as a function of the continuous blowdown valve.

#### Proportional band Xp

From 1 to 150% relative to setpoint W (configuration as proportional controller), adjustable, 0% (configuration as 2-position controller).

#### MIN/MAX limits

##### Measuring range up to 200 $\mu\text{S}/\text{cm}$ (100 ppm):

MIN limit adjustable between 0.5  $\mu\text{S}/\text{cm}$  (0.25 ppm) and MAX limit  
- 2  $\mu\text{S}/\text{cm}$  (1 ppm),

MAX limit adjustable between 200  $\mu\text{S}/\text{cm}$  (100 ppm) and MIN limit  
+2  $\mu\text{S}/\text{cm}$  (1 ppm).

##### Other measuring ranges:

MIN limit adjustable between 0.5  $\mu\text{S}/\text{cm}$  (0.25 ppm) and MAX limit  
-20  $\mu\text{S}/\text{cm}$  (10 ppm),

MAX limit adjustable between end of measuring range and MIN limit  
+20  $\mu\text{S}/\text{cm}$  (10 ppm).

#### MIN/MAX limits,

##### Switching hystereses

MIN limit: +1% of the adjusted MIN limit,

MAX limit: -1% of the adjusted MAX limit.

## Explanatory Notes – continued –

### Technical data - continued -

#### 24 hr purging pulse

Forced opening of the continuous blowdown valve every 24 hours, adjustable.

#### Automatic intermittent blowdown

Interval time (duration of break): 1-120 hours, adjustable in steps of one hour.

Duration of pulse: 1-60 seconds, adjustable in steps of one second.

#### Mains supply

230V +10 / -15%, 50-60 Hz

115V +10 / -15%, 50-60 Hz (optional)

24V +10 / -15%, 50-60 Hz (optional)

#### Power consumption

10VA

#### Protection

Casing: IP 40 to EN 60529,

Terminal strip IP 20 to EN 60529.

#### Admissible ambient temperature

0-55°C

#### Casing

Design: Case made of insulating material, with plug-in terminals

Casing material: Base: black polycarbonate; front panel: grey polycarbonate,

Number of terminals: 30

Cross section of connector: 1x4.0 mm<sup>2</sup> solid or  
1x2.5 mm<sup>2</sup> stranded wire with sleeve to DIN 46228 or  
2x1.4 mm<sup>2</sup> stranded wire with sleeve to DIN 46228,

Fixing of conductor: Plus/ Minus terminal screw M 3.5,  
Terminals with self-lifting wire protection.

Terminal strip: Separately detachable,

Fixing of casing: Mounting clip on supporting rail TH 35, EN 60715.

#### Weight

Approx. 0.8 kg

# Explanatory Notes – continued –

## Name plate

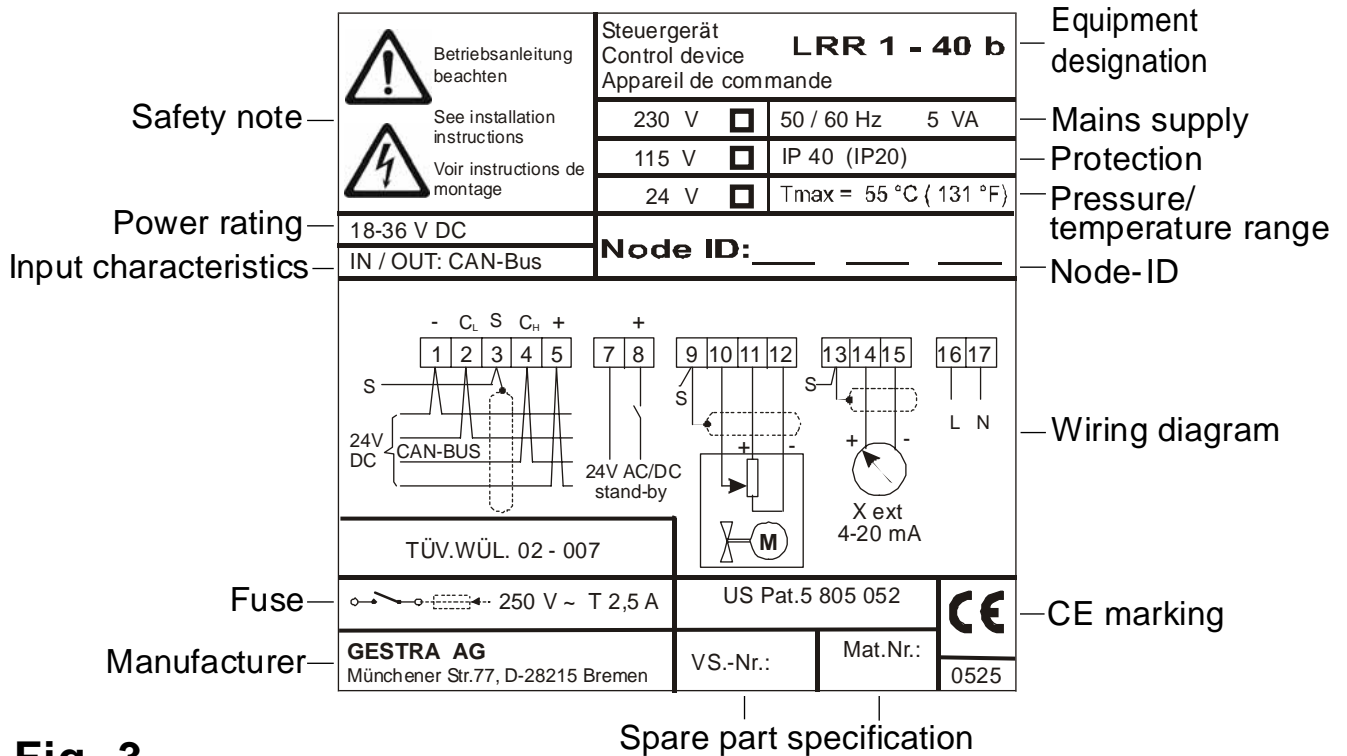


Fig. 3

## Installation

### Control unit LRR 1-40

The control unit LRR 1-40 is installed in a control cabinet on a supporting rail **F** type TH 35, EN 60715.

1. Clip casing **E** with the upper mounting rail onto the support rail **F**. When the casing **E** snaps into place a clicking sound can be heard.
2. Make sure that the white mounting slide is correctly located.
3. Align the control unit horizontally on the support rail **F**.

### Tools

- Screwdriver, size 5.5/100

# Wiring

## Bus cable

Note that screened multi-core twisted-pair control cable is required as bus line, e.g. UNITRONIC® BUS CAN 2x2x...mm<sup>2</sup> or RE-2YCYV-fl 2x2x...mm<sup>2</sup>.

The baud rate (data transfer rate) dictates the cable length between the bus nodes, and the conductor size dictates the total power consumption of the sensor.

S 8	S 9	S 10	Baud rate	Cable length	Number of pairs and conductor size [mm <sup>2</sup> ]
OFF	ON	OFF	250	125 m	2x2x0.34
Factory setting					
ON	ON	OFF	125 kBits/s	250 m	2x2x0.5
OFF	OFF	ON	100 kBits/s	335 m	2x2x0.75
ON	OFF	ON	50 kBits/s	500 m	available on demand (depends on bus configuration)
OFF	ON	ON	20 kBits/s	1000 m	
ON	ON	ON	10 kBits/s	1000 m	

The baud rate is set via code switches **D** (S8 to S10). Default factory setting of control unit LRR 1-40: baud rate 250 kbit/s (cable length 125 m).

For longer cable lengths reduce baud rate accordingly. Make sure that all bus nodes feature the same settings.

### Change baud rate

1. Remove lower terminal strip **B**.
2. The terminal strip can be unplugged after undoing the right and the left fixing screws **C**.
3. Set the baud rate via code switches **D** S8 to S10 as specified in the previous table under "Baud rate" by using a thin blade screwdriver.
4. Re-insert terminal strip **B** and fasten the fixing screws **C**.

### Wire terminal strip

Wire the terminal strips **A** **B** in accordance with the wiring diagram.

Only terminal 3 requires a screen.

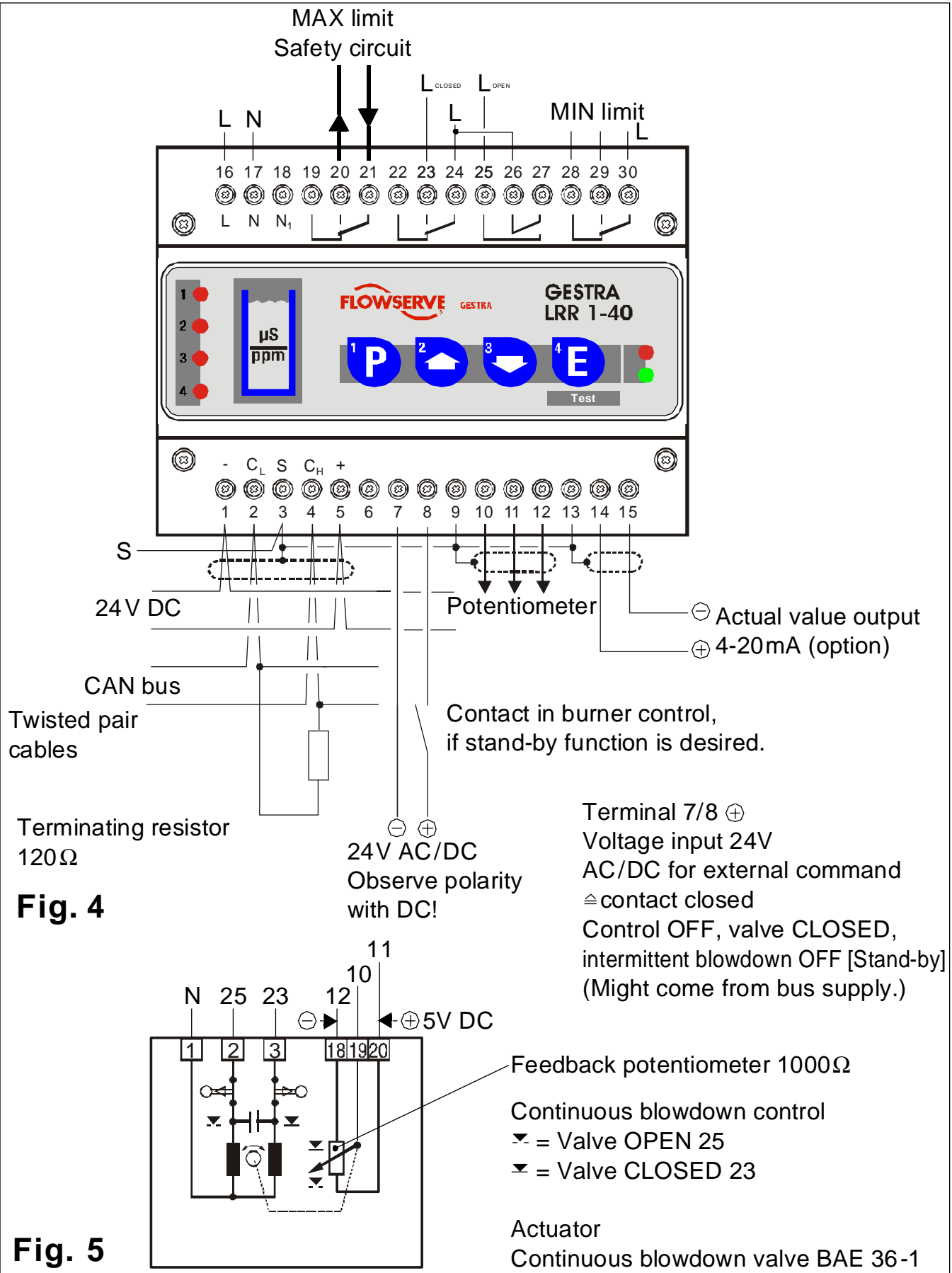


#### Note

The max. baud rates and cable lengths indicated above are based on empirical values obtained by GESTRA. In certain cases it may be necessary to reduce the baud rate in order to ensure operational safety.

The design and preparation of the data cable is an important factor for the electromagnetic compatibility (EMC) of the equipment. Wiring should therefore be carried out with special care.

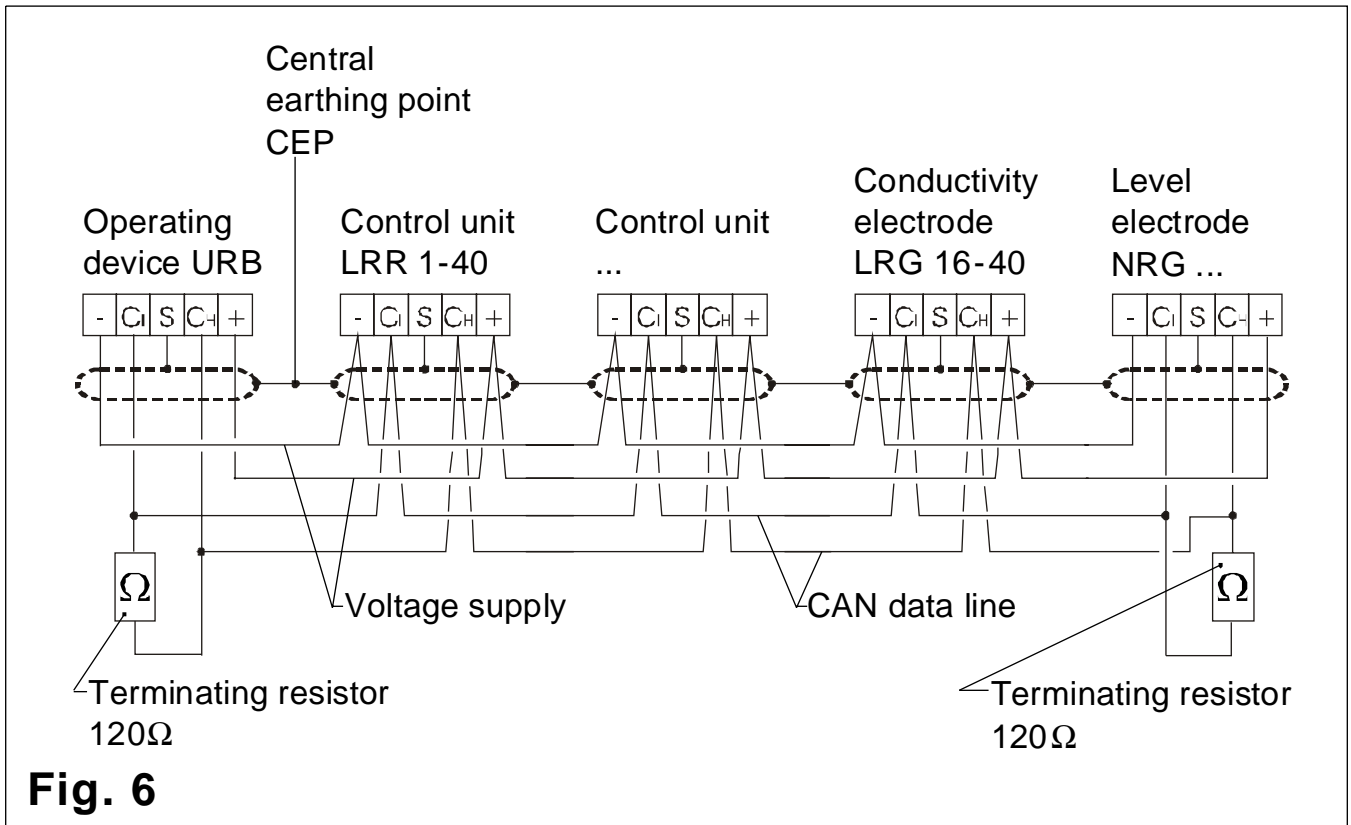
**Wiring diagram LRR 1-40**





## Wiring diagram for CAN bus

The following wiring diagram serves as an example:



### Attention

- Wire equipment in series. Star-type wiring is not permitted!
- Link screens of bus cables such that electrical continuity is ensured and connect them **once** to the central earthing point (CEP).
- To protect the switching contacts provide the circuit with a T 2.5A or 1A fuse (TRD 604, 72 hours operation without constant supervision).
- If two or more system components are connected in a CAN bus system, provide the first and the last device with a terminating resistor of 120Ω (terminal CL/CH Fig. 6).
- The CAN bus system must not be interrupted during operation.  
**In the event of an interruption a malfunction alarm is raised.**  
 If the control unit has to be replaced, detach the terminal strip (Fig. 2). Before taking the CAN bus line from the terminal strip, make sure that all connected system components are out of service.



#### Note

- Connect screens only to the specified terminals.
- The loop resistance must be below  $10\Omega$ .
- The rated voltage is indicated on the name plate.
- When switching off inductive loads, voltage spikes are produced that may impair the operation of control and measuring systems. Connected contactors must therefore be provided with suppressors such as RC-combinations.
- Even in correctly wired systems high frequency interference caused by the installation can occur, leading to system outages and malfunction alarms. For more information on malfunctions see “Fault finding list for troubleshooting system faults“ on page 32.

#### Tools

- Screwdriver for slotted screws, size 2.5, completely insulated according to DIN VDE 0680-1.
- Screwdriver for cross-recess head screws, size 2

# Basic Settings

## CAN bus

All devices (level, conductivity) are interconnected via CAN bus. The CANOpen protocol is used for the data exchange between the equipment groups. All devices have an electronic "address" - the node ID. The four-core bus cable serves as power supply and data highway for high-speed data exchange.

The CAN address (node ID) can be set between 1 and 123.

The control unit LRR 1-40 has already been configured at our works for operation with other GESTRA components and can be used straight away without having to set the nodeID.

If several identical systems are to communicate in a CAN bus network, allocate a different nodeID for each system.

Please observe the following "Table Node ID".

## Node ID

Should it be necessary to establish other node IDs please take the interdependence of the equipment into consideration and assign the node IDs for the individual group components according to the following table:

Reserved	LRR 1-40	LRG 16-40	Reserved	
X - 1	X	X + 1	X + 2	
	50	51		Factory setting

reserved area

### Factory setting

The control unit LRR 1-40 features the following factory set default values:

#### Control parameters

- Setpoint W: 5000  $\mu\text{S}/\text{cm}$
- Switching hysteresis of controller output (configuration as 2-position controller): 10%
- Operating position of continuous blowdown valve: 8%
- Proportional band Xp: 0%
- MAX (Hi) switchpoint): 7000  $\mu\text{S}/\text{cm}$
- MIN (Lo) switchpoint: 1000  $\mu\text{S}/\text{cm}$
- Automatic intermittent blowdown: Off
- 24-h Purging pulse: Off

#### System settings

- Baud rate: 250 kbit/s (125m bus cable length)
- Node ID: 50

Enter the assigned node ID on the name plate.



#### Danger

The terminal strips **A** **B** of the control equipment are live during operation. This presents the danger of electric shock!

Cut off the power supply to the equipment before dismantling it or before removing the terminal strips **A** **B** and the code switch **D**.

# Commissioning

## Start

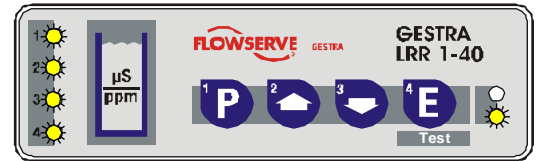
Apply mains voltage.

LED 1-4 are flashing rapidly.

LED "Power" is illuminated.

LED 1-4 go out after a short period of time.

Then the equipment switches either to normal operating mode or alarm mode.



### Note

Malfunctions that occur during the commissioning procedure and the corresponding corrective actions are described in the chapters "Malfunctions" and "System Faults".

## Performance of the continuous blowdown valve

The continuous blowdown valve is motored into the CLOSED position and then into the OPERATING position or the control position.

Only applicable if the 24 hour purging was activated:

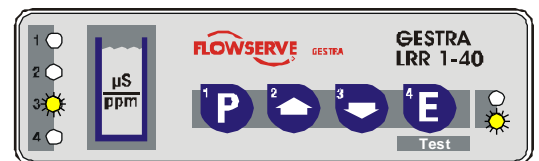
The continuous blowdown valve is operated for 2 minutes. The valve opens and the LED 3 is flashing.

Once the adjusted time has elapsed LED 3 goes out.

The continuous blowdown valve is then closed for 2 minutes.

LED 2 is flashing.

Then the continuous blowdown valve is motored into the OPERATING position or into the required control position.



### Note

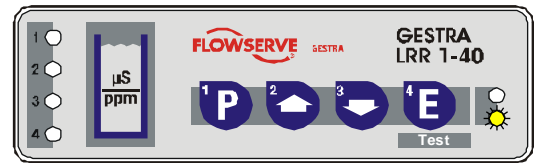
Since the MIN limit is not yet activated during commissioning, LED 4 or 1 is flashing rapidly for about 60 seconds (see MIN limit).

# Operation

## Normal operation

LED "Power" is illuminated.

LEDs 1 - 4 are not illuminated, the conductivity electrode is immersed.



## Continuous boiler blowdown

LED "Power" is illuminated.

LED 2 is flashing while the continuous blowdown valve is closing.

LED 3 is flashing while the valve is opening.



### Note

LEDs 2 and 3 go out once the valve position dictated by continuous blowdown control is reached.

## Intermittent boiler blowdown

**Only applicable if Automatic Intermittent Blowdown Control was activated:**

Upon application of mains voltage the timed intermittent blowdown interval (time between intermittent blowdowns) is started.

During the time-controlled blowdown pulse the automatic intermittent boiler blowdown takes place:

LED "Power" is illuminated.

LED 4 is lit during intermittent blowdown and relay contact 4 is closed. The intermittent blowdown valve opens.



### Note

LED is not lit during the timed interval between intermittent boiler blowdowns. Relay contact 4 is open, the intermittent blowdown valve is closed.

## Stand-by operation

To avoid loss of water, the continuous blowdown control and the automatic boiler blowdown (if activated) can be de-activated during stand-by operation or when the firing is switched off. An external control command (see wiring diagram) triggers off the signal.

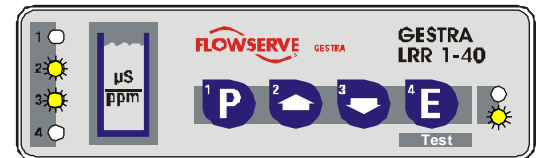
LED "Power" is illuminated.

The continuous blowdown valve is motored into the CLOSED position.

LED 2 is flashing and LED 3 is illuminated during the stand-by operation.

The MIN/MAX limit and the monitoring function remain active during stand-by operation.

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



## 24 hr purging pulse

**Only applicable if the 24 hour purging pulse was activated:**

To prevent blocking of the continuous blowdown valve a purging pulse is set off upon application of the mains voltage.

LED "Power" is illuminated.

The continuous blowdown valve is operated and opened for 2 minutes.

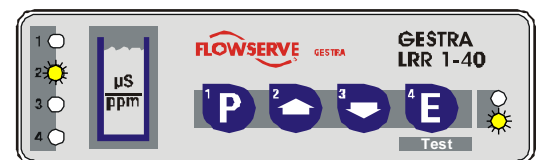
LED 3 is flashing.

Once the adjusted time has elapsed LED 3 goes out.

The continuous blowdown valve is then closed for 2 minutes, LED 2 is flashing.

Then the valve is motored into the OPERATING position or into the required control position.

This process is repeated every 24 hours. During stand-by operation the time interval continues without triggering off the purging pulse. Note that during the purging process the MIN limit is not active.



## Operation – continued –

### MAX limit / MIN limit

#### Only applicable if:

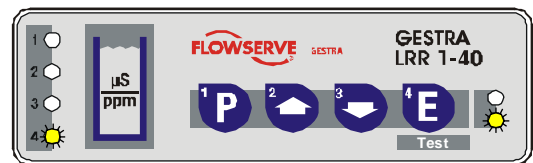
- Relay contact 1 (feedback LED 1) works as switching output for MAX limit
- Relay contact 4 (feedback LED 4) works as switching output for MIN limit

LED 1 lights up once the set MAX limit is reached.  
Relay contact 1 opens (safety circuit).

LED 1 goes out once the value falls below its limit.  
Relay contact 1 closed.

LED 4 lights up once the set MIN limit is reached.  
Relay contact 4 opens.

LED 4 goes out once the value exceeds its limit.  
Relay contact 4 closed.



### MAX limit / MIN limit = Automatic intermittent boiler blowdown

#### Only applicable if:

- Relay contact 1 (feedback LED 1) works as switching output for MAX limit and MIN limit
- Relay contact 4 (feedback LED 4) works as switching output for automatic intermittent boiler blowdown

LED 1 lights up once the set MAX or MIN limit is reached. Relay contact 1 opens (safety circuit).

LED 1 is not lit if the actual value is between the MIN and MAX limit. Relay contact 1 closed.

LED 4 is lit during intermittent blowdown and relay contact 4 is closed. The intermittent blowdown valve opens.

LED 4 is not illuminated during the time between intermittent blowdown. Relay contact 4 is open, the intermittent blowdown valve is closed.



#### Note

The MIN limit is activated approx. 60 seconds after the mains voltage has been applied. During this time LED 1 or - depending on the setting - LED 4 is flashing rapidly.



## Operation – continued –

### Performance test

As part of the performance test a value is simulated that exceeds the measuring range limit of 12000  $\mu\text{S}/\text{cm}$  of the conductivity electrode. The equipment must response as if the MAX limit were exceeded.

Press button **E** briefly.

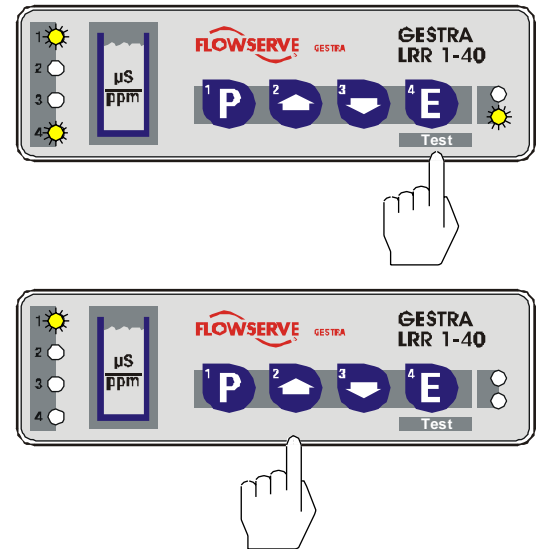
LED 1 and 4 are flashing rapidly.

LED 4 is illuminated during intermittent boiler blowdown.

The test mode remains active for 10 seconds.

Press button **P** and wait until LED 1 is illuminated.  
Relay contact 1 opens.

As long as the button is pressed down a conductivity value greater than 12000  $\mu\text{S}/\text{cm}$  is simulated.



### Please note when using the equipment as conductivity limiter



#### Note

The control unit LRR 1-40 does not lock automatically when the adjusted MAX limit is exceeded.

If a lock function is required by the installation it must be provided in the following circuitry (safety circuit). This circuit must meet the requirements of DIN VDE 0116, prEN 50156-1.

## Performance test for relays 1 and 4

Press button **E** briefly.

LED 1 and 4 are flashing rapidly.

LED 4 is illuminated during intermittent boiler blowdown.

The test mode remains active for 10 seconds.

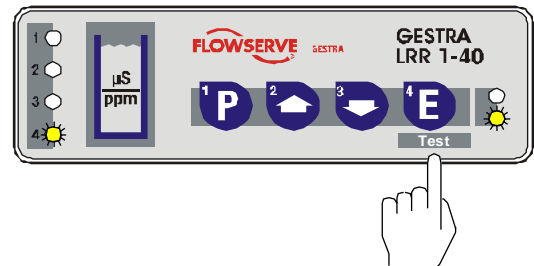
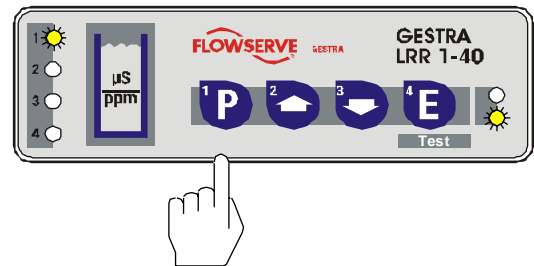
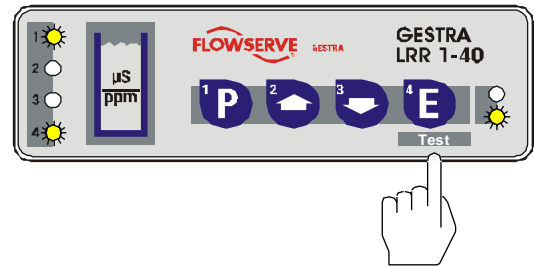
Press button **P**.

As long as the button is pressed down LED 1 is lit and relay contact 1 opens (MAX limit).

Press button **E**. As long as the button is pressed down LED 4 is lit and relay contact 4 opens (MIN limit).

When automatic intermittent boiler blowdown is active:

Press button **E**. As long as the button is pressed down LED 4 is lit and relay contact 4 closes (intermittent blowdown valve opens).



# System Faults

## Causes

Malfunctions occur if CAN bus components have been mounted or configured incorrectly or if electronic component parts are defective, or in the event of excessive heat in the equipment or electrical interference in the supply system.

Malfunction alarms are set off by:

- Fault in the conductivity electrode (internal connecting cable defective, temperature sensor defective),
- Measuring surface of electrode exposed,
- Excessively high temperature in the electrode terminal box,
- Faulty communication within the CAN-Bus system,
- Failure of the 24V power supply unit.

If one of the first four malfunctions occurs, relay contact 1 (MAX limit) is opened and the continuous blowdown valve closes.

For a more detailed malfunction analysis the operating and display device URB or SPECTOR*control* must be used. Please observe the respective installation manuals.

## Test

When carrying out the individual tests please check:

### Wiring:

Is the wiring in accordance with the wiring diagram?

Is the polarity of the bus line always correct?

Is the bus line of each of the end nodes provided with a 120Ω resistor?

Is the feedback potentiometer connected?

### Conductivity electrode:

Is the measuring surface of the electrode permanently submerged?

### Node ID:

Are the node IDs correctly set?

Note that a node ID must only be used for one item of equipment!

### Baud rate:

Is the length of the cable in accordance with the adjusted baud rate?

Is the baud rate the same for all devices?



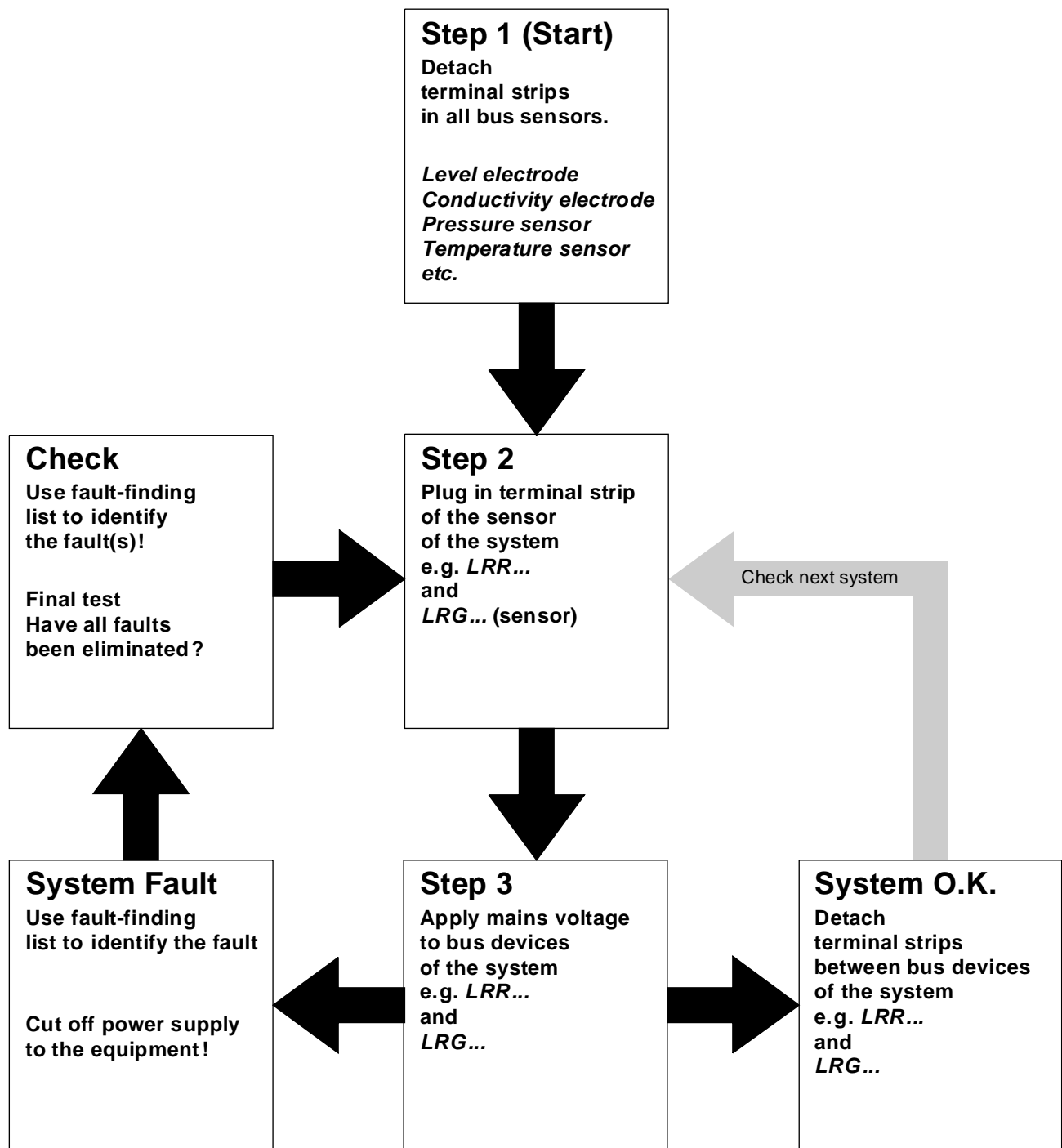
## Danger

The terminal strip **A** **B** of the LRR 1-40 is live during operation. This presents the risk of severe cases of electric shock! Cut off power supply before installing or removing the equipment!

## Systematic malfunction analysis

The sources of malfunctions occurring in CAN bus systems operating with several bus-based stations must be analysed systematically since faulty components or incorrect settings can give rise to negative interactions with intact bus devices in the CAN bus system. These unwanted interactions can cause error messages in fully functional bus devices, which will make fault detection even more difficult.

**We recommend the following systematic fault finding procedure:**



### Fault finding list for troubleshooting system faults

#### LED 1-3 (4 for MIN limit) are flashing rapidly

**Fault:** The initialising phase has not been finished during start-up.  
No communication with conductivity electrode.

**Remedy:** Check installation. Check and, if necessary, change node ID and baud rate setting. If modifications have to be made, switch off the mains voltage and switch it on again after about 5 seconds.

#### LED 1-3 (4 for MIN limit) are flashing slowly

**Fault:** Measuring surface of conductivity electrode is exposed.

**Remedy:** Check installation and make sure that the measuring surface is submerged.

**Fault:** Internal wires of the conductivity electrode are defective or the temperature sensor failed.

**Remedy:** Replace conductivity electrode.

**Fault:** The temperature in the terminal box of the conductivity electrode exceeds the max. limit.

**Remedy:** Check installation of electrode and, if necessary, protect the equipment against excessively high temperatures. As soon as the temperature falls below the max. admissible limit, the equipment switches back to operating mode.

#### LED bus status is flashing slowly

**Fault:** Faulty communication in the CAN-bus system. Malfunction cannot be acknowledged by pressing button **E**.

**Remedy:** Check 24V bus supply, wiring, node ID, baud rate setting and terminating resistors. If modifications have to be made, switch off mains voltage and switch it on again after about 5 seconds.

**Fault:** No or faulty communication with conductivity electrode. The fault occurs at longer intervals and can be acknowledged by pressing button **E**.

**Remedy:** There is a source of interference in the surrounding area. Take corrective action, e. g. suppress interference of valve actuators with 22nF/220Ω. Take action against high frequency interference. After the remedial action acknowledge the interference suppression by pressing button **E**.

#### LED Power is flashing slowly

**Fault:** 24V power supply unit in controller failed.

**Remedy:** Replace controller.

## Action against high frequency interference

Due to the digital signal evaluation we recommend the following measures for interference suppression in installations susceptible to electromagnetic interference (e.g. interference caused by phase asynchronous switching operations):

### H. F. Interference suppression of voltage supply

Install ferrite ring just before the control equipment. Loop supply lines L and N as often as possible (5-10 times) through the ring. Several control units that are located next to each other can also be fed by this supply line.

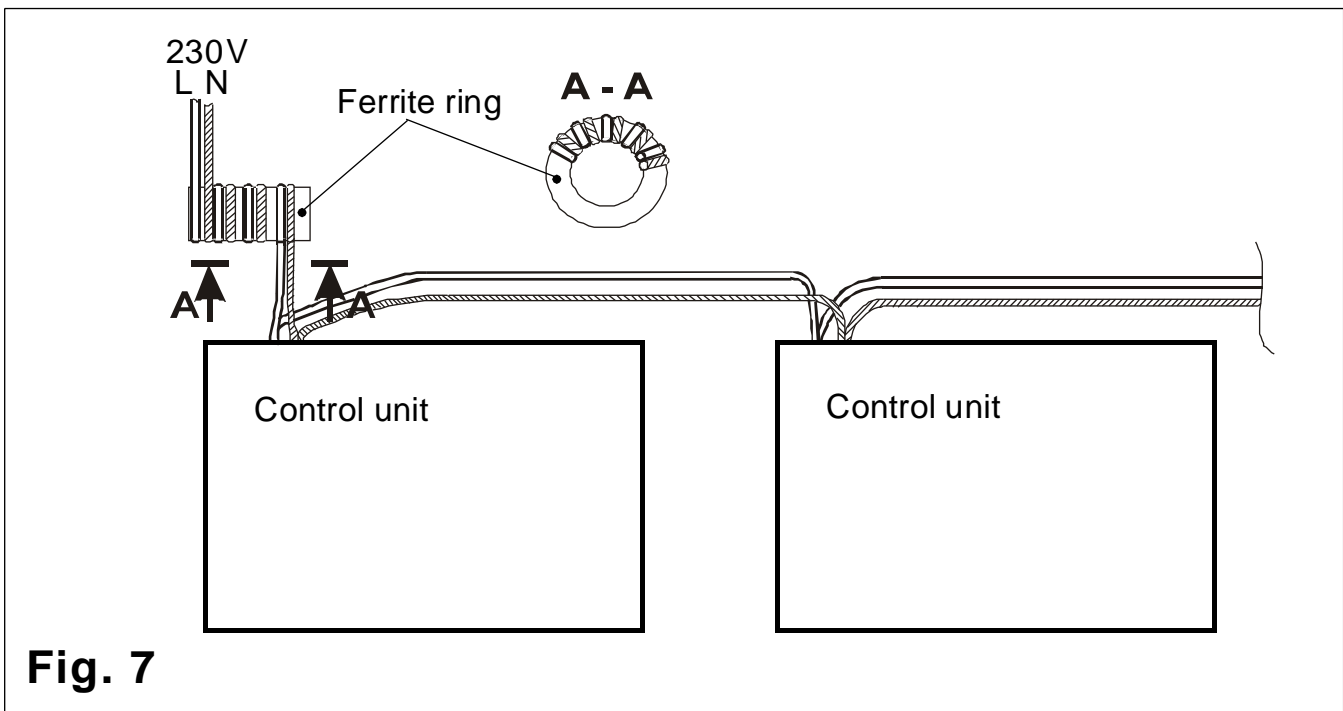
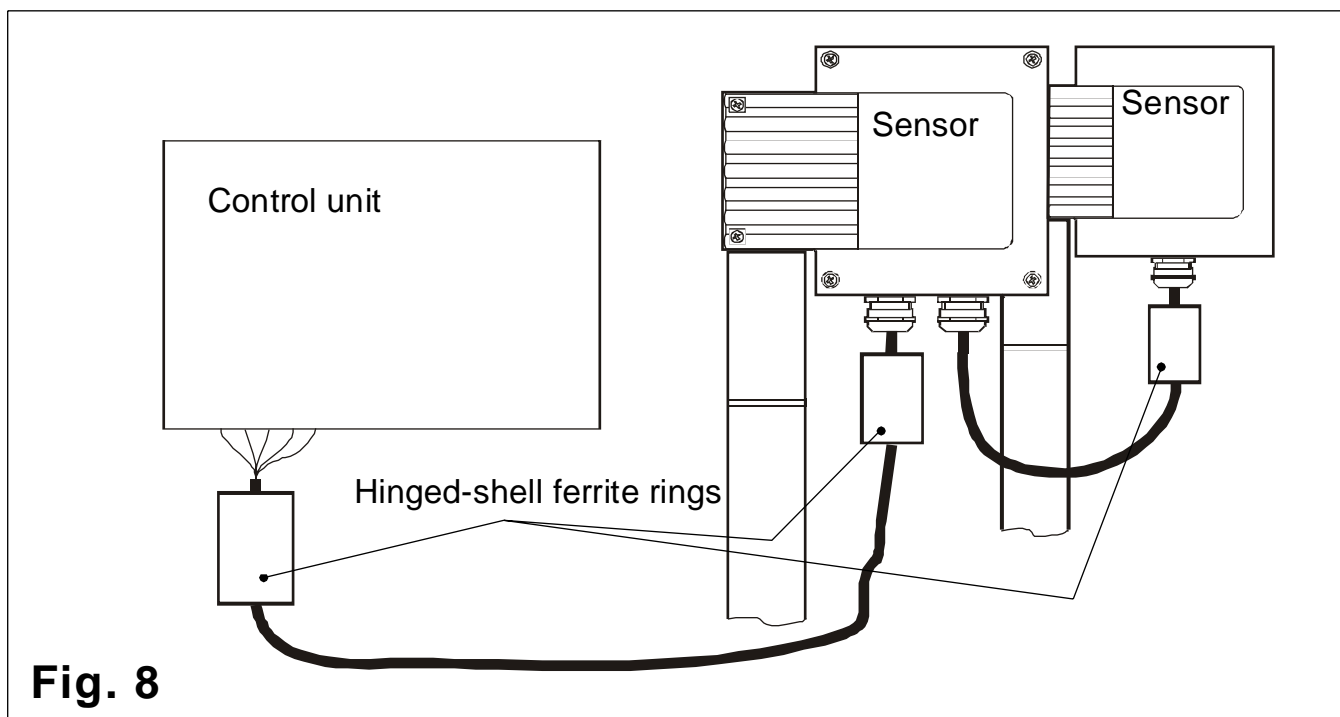


Fig. 7

### Action against high frequency interference – continued –

#### H. F. Interference suppression of CAN bus line

Clamp hinged-shell ferrite rings just before the equipment enclosures onto the bus line. Make sure that both halves of the shell rings fit snugly together. If, in addition, a feedback potentiometer is connected, clamp the ferrite ring also onto the connecting line just before the control unit. Select the ferrite rings according to the diameter of the line.



### Replace controller

1. First unplug the terminal strips **A** **B**. For this purpose turn the right and left fixing screws **C** in direction of the arrow until the terminal strip can be removed.
2. Undo the fixing slide in order to snap out the controller and take it off the supporting rail **F**.



#### Danger

Cut off power supply before exchanging the controller!

When the CAN-bus is interrupted during operation a malfunction message will be given. When ordering spare parts please state the serial number indicated on the name plate.

If possible read and write down the adjusted parameters of the operating terminal URB or SPECTOR control.

# Malfunctions

## Fault finding list for troubleshooting

### Equipment does not work - no function

**Fault:** LED "Power" ⑨ is not illuminated.

**Remedy:** Switch on power supply and wire equipment in accordance with the wiring diagram.

### Equipment does not work correctly

**Fault:** The connected actual value indicator shows incorrect values.

**Remedy:** Dirt deposits on the conductivity electrode. Remove the equipment and clean the measuring surface.

**Fault:** A MIN or MAX limit alarm is given although the actual value (reference measurement) lies within these limits.

**Remedy:** Dirt deposits on the conductivity electrode. Remove the equipment and clean the measuring surface.

### If configured as proportional controller: The equipment works as two-position (on-off) controller

**Fault:** The feedback potentiometer in the continuous blowdown valve is either defective or not connected.

**Remedy:** Wire the equipment in accordance with the wiring diagram and check the potentiometer.



## Annex

### Factory setting of node IDs

#### Control Unit

NRS 1-40	ID:001
NRS 1-41	ID:006
NRS 1-42	ID:020
NRS 2-40	ID:039
NRR 2-40	ID:040
LRR 1-40	ID:050

#### Sensor

NRG 16-40	ID:002
NRG 16-40	ID:003
NRG 16-41	ID:007
NRG 16-42	ID:021
NRG 26-40	ID:041
LRG 16-40	ID:051

Individual node IDs must be set manually in the respective equipment.

Please observe the pertinent installation instructions.

### Establishing / changing node ID

In order to enable communication within the CAN bus system, each item of equipment (e.g. controller) must have a unique node ID.

1. Remove lower terminal strip **B**. The terminal strip can be unplugged after undoing the right and the left fixing screws **C**.
2. Use a thin blade screwdriver to set the node ID via code switch **D** S1 to S7. Use the table as reference.
3. Re-insert terminal strip **B** and fasten the fixing screws **C**.
4. Enter the adjusted node ID on the name plate.
5. If necessary (refer to installation instructions) change the node ID of the conductivity electrode LRG 16-40.



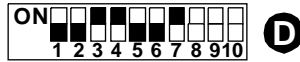
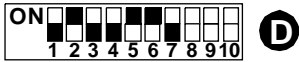
#### Attention

A node ID must not be used for more than one item of equipment in the CAN bus system.

The node ID 0 is not permissible.

## Table Node ID

In a CAN bus system a maximum of 123 nodes (devices) can be administered. Each node has its own address (node ID). This address can be set via a 10-pole code switch **D**.



		Node ID	50
S1	OFF	1	
S2	<b>ON</b>	2	
S3	OFF	4	
S4	OFF	8	
S5	<b>ON</b>	16	
S6	<b>ON</b>	32	
S7	OFF	64	

(Factory setting)

		Node ID	76
S1	OFF	1	
S2	OFF	2	
S3	<b>ON</b>	4	
S4	<b>ON</b>	8	
S5	OFF	16	
S6	OFF	32	
S7	<b>ON</b>	64	

(Example)

S8	S9	S0	Baud rate	Cable length
OFF	OFF	OFF	1000 kBit/s	25 m
ON	OFF	OFF	500 kBit/s	100 m
OFF	ON	OFF	250 kBit/s	250 m
ON	ON	OFF	125 kBit/s	500 m
OFF	OFF	ON	100 kBit/s	670 m
ON	OFF	ON	50 kBit/s	1000 m
OFF	ON	ON	20 kBit/s	1000 m
ON	ON	ON	10 kBit/s	1000 m

(Factory setting 250 kBit/s)

## Change factory setting

Use operating device URB or SPECTOR*control* to configure, parameterize, operate and show the control parameters.

## Declaration of conformity

We hereby declare that the equipment LRR 1-40 conforms to the following European guidelines:

- LV guideline 73/23/eec version F 93/68/eec
- Pressure Equipment Directive (PED) 97/23/EC of 29 May 997  
Applied conformity assessment procedure: Annex III, Module B and D,  
verified by notified body 0525

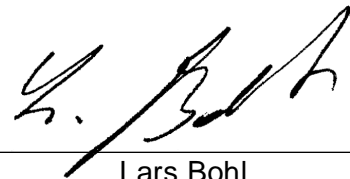
This declaration is no longer valid if modifications are made to the equipment without consultation with us.

Bremen, 5<sup>th</sup> October 2004  
GESTRA AG



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Uwe Bledschun  
Head of Design Dept.



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Lars Bohl  
Quality Assurance Representative

# Examples of installation

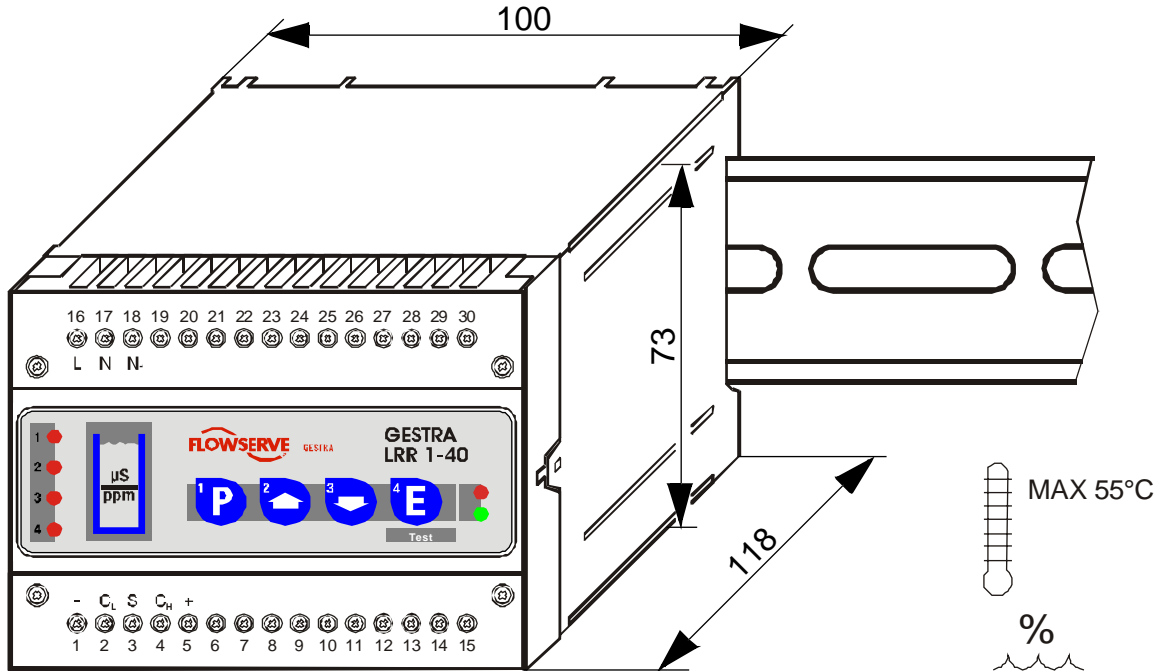


Fig. 9

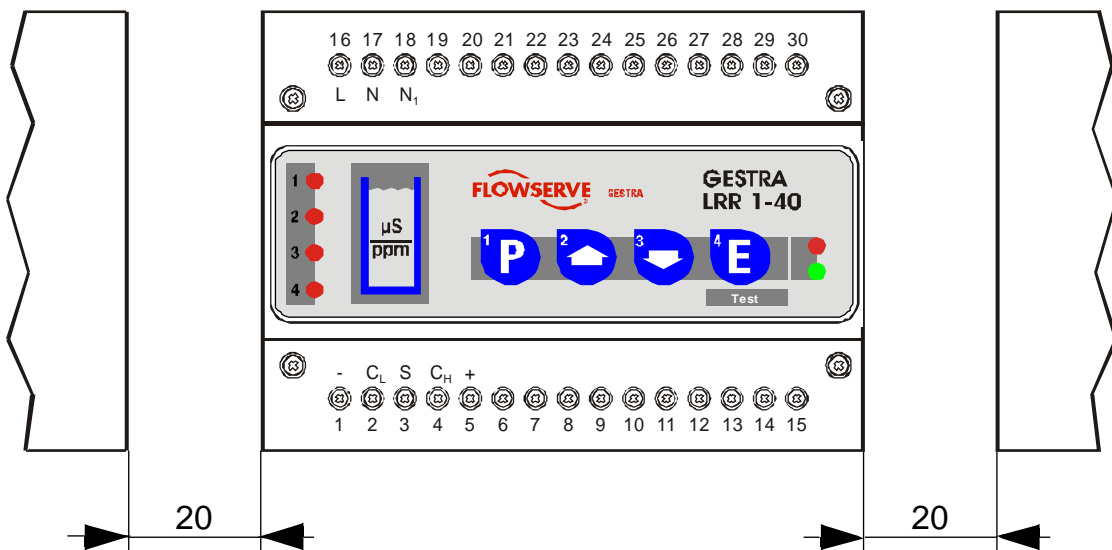


Fig. 10

**For your notes**



GESTRA

[www.gestra.de](http://www.gestra.de)

### España

#### **GESTRA ESPAÑOLA S.A.**

Luis Cabrera, 86-88

E-28002 Madrid

Tel. 00 34 91 / 51 52 032

Tel. 00 34 91 / 41 36 747; 51 52 036

E-mail: [aromero@flowserve.com](mailto:aromero@flowserve.com)

### Poland

#### **GESTRA POLONIA Spolka z.o.o.**

Ul. Schuberta 104

PL - 80-172 Gdansk

Tel. 00 48 58 / 306 10-02 od 10

Fax 00 48 58 / 306 33 00

E-mail: [gestra@gestra.pl](mailto:gestra@gestra.pl)

### Great Britain

#### **Flowserve Flow Control (UK) Ltd.**

Burrel Road, Haywards Heath

West Sussex RH 16 1TL

Tel. 00 44 14 44 / 31 44 00

Tel. 00 44 14 44 / 31 45 57

E-mail: [gestraukinfo@flowserve.com](mailto:gestraukinfo@flowserve.com)

### Portugal

#### **Flowserve Portuguesa, Lda.**

Av. Dr. Antunes Guimarães, 1159

Porto 4100-082

Tel. 0 03 51 22 / 6 19 87 70

Fax 0 03 51 22 / 6 10 75 75

E-mail: [jtavares@flowserve.com](mailto:jtavares@flowserve.com)

### Italia

#### **Flowserve S.p.A.**

Flow Control Division

Via Prealpi, 30

I-20032 Cormano (MI)

Tel. 00 39 02 / 66 32 51

Fax 00 39 02 / 66 32 55 60

E-mail: [infoitaly@flowserve.com](mailto:infoitaly@flowserve.com)

### USA

#### **Flowserve DALCO Steam Products**

2601 Grassland Drive

Louisville, KY 40299

Tel. 00 15 02 / 4 95 01 54, 4 95 17 88

Fax 00 15 02 / 4 95 16 08

E-mail: [dgoodwin@flowserve.com](mailto:dgoodwin@flowserve.com)

## GESTRA AG

Postfach 10 54 60, D-28054 Bremen

Münchener Str. 77, D-28215 Bremen

Tel. +49 (0) 421 35 03-0

Fax +49 (0) 421 35 03-393

E-Mail [gestra.ag@flowserve.com](mailto:gestra.ag@flowserve.com)

Internet [www.gestra.de](http://www.gestra.de)

