GESTRA®

Safety Control Unit

URS 60
URS 61

EN
English

Installation & Operating Manual

819634-01

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Content of this Manual

Product:

- Safety Control Unit URS 60
- Safety Control Unit URS 61

First edition:

BAN 819634-00/08-2019cm

Scope of delivery/Product package

- 1 x Safety Control Unit URS 60 or URS 61
- 1 x Installation & Operating Manual

How to use this Manual

This Installation & Operating Manual describes the correct use of URS 60 and URS 61 safety control units. It applies to all persons who integrate this equipment into control systems, install, bring into service, operate, maintain and dispose of this equipment. Anyone carrying out the above-mentioned activities must have read this Installation & Operating Manual and understood its contents.

- Read this Manual in full and follow all instructions given.
- Please also read the instructions for use of any accessories.
- The Installation & Operating Manual is part of the product package. Keep it in an easily accessible location.

Availability of this Installation & Operating Manual

- Make sure this Installation & Operating Manual is always available to the operator.
- If you pass on or sell the equipment to a third party, please also hand over the Installation & Operating Manual.

Illustrations and symbols used

1. Action to be taken
2.

- Lists
  - ◆ Bullet points in lists

Ⓐ Keys to illustrations

	Additional information
	Read the relevant Installation & Operating Manual

Hazard symbols in this Manual

	**Danger zone/Dangerous situation**
	**Danger of death from electric shock**

Types of warning

⚠ DANGER

Warning of a dangerous situation that will result in death or serious injury.

⚠ WARNING

Warning of a dangerous situation that may possibly result in death or serious injury.

⚠ CAUTION

Warning of a situation that may result in minor or moderate injury.

⚠ ATTENTION

Warning of a situation that will result in damage to property or the environment.

Specialist terms/Abbreviations

Here, we explain some abbreviations, specialist terms, etc., which are used in this Manual.

IEC 61508

International standard IEC 61508 describes both the type of risk assessment and actions taken to provide appropriate safety functions.

SIL (safety integrity level)

Safety integrity levels SIL 1 to 4 are used to quantify risk reduction. SIL 4 is the highest level of risk reduction. International standard IEC 61508 forms the basis for establishing, testing and operating technical safety systems.

CAN (Controller Area Network) bus

Data transmission standard and interface for connecting electronic equipment, sensors and control systems. Data can be sent and received.

TRV .. / NRG .. / LRG ... / SRL ...

Equipment and type designations of GESTRA AG, see page 9.

PhotoMOS output

PhotoMOS are a special kind of semiconductor relay, which use a light-emitting diode on the input side that is optically coupled to an output transistor. This type of electrically non-conductive connection makes sure the input and output circuits are electrically isolated from each other.

SELV

Safety Extra Low Voltage

Usage for the intended purpose

URS 60 and URS 61 safety control units can be used in combination with various safety sensors of types NRG 1..., NRG 2…, LRG 1… and TRV 5… to act as safety limiters for steam boiler and water boiler systems.

The equipment can be used as:

- A low-level limiter, in combination with the NRG 1x-60/NRG 26-61 level electrode.
  Low-level limiters switch off the heating when the water drops below the set minimum level.
- A safety high-level limiter, in combination with the NRG 1x-61/NRG 26-61 level electrode.
  Safety high-level limiters switch off the feedwater supply when the water rises above the set maximum level.
- A conductivity limiter, in combination with the LRG 1x-6x conductivity electrode.
  Conductivity limiters switch off the heating if the set maximum conductivity is exceeded.
- A safety temperature monitor/limiter, in combination with the TRV 5-60 temperature transmitter.
  Safety temperature limiters or monitors switch off the heating when the maximum admissible temperature is reached. Mode of operation TYPE 2.BKP (+JV, with external lock) to EN 60730-1.
- The above functions may be combined.
- The SRL 6-60 monitoring unit is available for ensuring a regular, separate flushing process when level electrodes are used in external level pots.
- Viewing and operation take place via a choice of operating terminals: the URB60 and SPECTOR*control*.

Usage for the intended purpose

Technical rules for steam boilers - a knowledge base:

This Manual occasionally refers to EN 12952 as a knowledge base.

These regulations have not been in force since 01/03/2019 and are no longer updated. They have been replaced by the TRBS (German Technical Rules for Operational Safety).

Always observe the current regulations (EU directives, EN standards, information from employers' liability insurance associations, etc.) in order to comply with the current state of the art.

Usage for the intended purpose

Admissible accessories, dependent on the required safety integrity level

URS 60 and URS 61 safety control units can be operated with the following system components:

	Low-level limiter	Safety high-level limiter	Conductivity limiter	Temperature limiter	Operating unit	Monitoring unit
SIL 3 to EN 61508	NRG 16-60 NRG 17-60 NRG 19-60 NRG 111-60	NRG 16-61 NRG 17-61 NRG 19-61 NRG 111-61	–	TRV 5-60	URB 60 SPECTOR *control*	SRL 6-60
SIL 2 to EN 61508	NRG 26-61 NRG 16-60 NRG 17-60 NRG 19-60 NRG 111-60	NRG 26-61 NRG 16-61 NRG 17-61 NRG 19-61 NRG 111-61	LRG 16-60 LRG 16-61 LRG 17-60	TRV 5-60	URB 60 SPECTOR *control*	SRL 6-60

Fig. 1

Key to Fig. 1:

NRG = level electrode

LRG = conductivity electrode

TRV = temperature transmitter

URB = visual display and operating unit

SRL = monitoring unit

To ensure the proper use of equipment during all types of use, please also read the Installation & Operating Manuals for the sensors and operating units used.

- You will find the current Installation & Operating Manuals for the safety sensors and operating units named in Fig. 1 on our website: http://www.gestra.com

Improper use

There is a danger of death due to explosion if the equipment is used in potentially explosive atmospheres.

Do not use the equipment in potentially explosive atmospheres.

Basic safety notes

There is a risk of electric shock during work on electrical systems.

- Always switch off the voltage to the equipment before performing work on the terminal strips.
- Check that the plant is not carrying live voltage before commencing work.

Attempts to repair the equipment will cause the plant to become unsafe.

- Do not repair the URS 60/URS 61 safety control unit.
- Only replace faulty equipment with identical equipment from GESTRA AG.

Required personnel qualifications

Activity	Personnel	
Integration in control system	Specialist staff	Plant designer
Installation/electrical connection/bringing into service	Specialist staff	Electrician/installer
Operation	Boiler service technician	Staff trained by the plant operator
Maintenance work	Specialist staff	Electrician
Refits	Specialist staff	Plant construction

Fig. 2

Notes on product liability

We the manufacturer cannot accept any liability for damages resulting from improper use of the equipment.

Functional safety, safety integrity level (SIL)

The URS 60/URS 61 safety control unit is suitable for safety functions up to SIL 3.

It is an element of a safety circuit up to SIL 3 as per EN 61508 in the SPECTOR*connect* system, and can process alarm indications from up to four safety sensors.

When combined with the accessories, you will have a type B subsystem. The technical and safety characteristics in Fig. 4 are based on the URS 60/URS 61 safety control unit with output contacts.

Breakdown of safety function failure rates

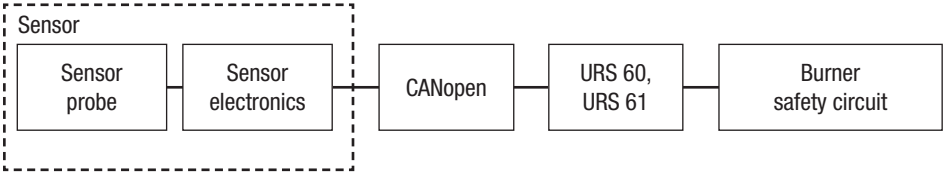


Fig. 3

The CANopen interface is a “black channel” type, and can be ignored during calculation due to the low failure rate of < 1FIT.

Performing an annual function test

Check the function of the URS 60/URS 61 safety control unit at least once a year by triggering the safety circuit (T1 = 1 year). You can check the function either by pressing buttons 1 – 4 (see page 28) or by making the equipment actually exceed the limit values.

Reliability data to EN 61508

Description	Characteristic values
Safety integrity level	SIL 3
Architecture	1oo1
Type of equipment	Type B
Hardware fault tolerance	HFT = 0
Overall failure rate for dangerous undetected failures	$\lambda_{DU} < 20.0 * 10^{-9}$ 1/h
Overall failure rate for dangerous detected failures	$\lambda_{DD} < 2000 * 10^{-9}$ 1/h
Safe failure fraction	SFF > 99.0%
Test interval	T1 = 1 year
Probability of dangerous failure on demand	$PFD < 20.0 * 10^{-5}$
Diagnostic coverage. Percentage of dangerous failures detected by a test.	DC > 99.0%
Mean time to dangerous failure	$MTTF_D > 90$ a
Diagnostic interval	T2 = 1 hour
Performance level (to ISO 13849)	PL = d
Probability of dangerous failure on demand per hour	$PFH < 20 * 10^{-9}$ 1/h
Ambient temperature as a basis for calculation	Tu = 45 °C
Mean time to repair	MTTR = 0 (no repair)
Fraction of undetected dangerous failures that have a common cause	beta = 2%
Fraction of detected dangerous failures that have a common cause	beta d = 1%

Fig. 4

Function

The URS 60/URS 61 safety control unit cyclically evaluates data telegrams from up to four safety sensors of types NRG 1..., NRG 2…, LRG 1… and TRV 5. The data are transferred via ISO 11898 CAN bus using the CANopen protocol, and saved. The safety functions are monitored by cyclical self-tests. The two integrated relays are switched off in the event of alarms or errors. Function tests and failure diagnosis can be performed using the control unit or an operating terminal.

The data telegrams contain the following information:

- Sensor alarms if the limits are exceeded
- Fault indications on the occurrence of faults in electronic or mechanical parts
- Excessive temperature in the sensor terminal boxes

Behaviour in the event of alarms

When level, temperature or conductivity alarms occur, both output contacts open after a power-off delay and this interrupts the safety circuit (fail-safe position). The safety control unit does not lock independently; this function must be implemented in the downstream circuit. The URS 60 or URS 61 can only activate one safety circuit (heater or pump) at any one time.

The safety circuit is interrupted without a delay if the following fault indications occur:

- Fault in sensors (negative self-test, excessively high temperature in terminal box)
- Fault in control unit (negative self-test)
- Communication failure

Behaviour in the event of fault indications

Cyclical self-tests monitor the safety functions of the equipment in the safety control unit and sensors. Fault indications are updated with each self-test. If there are no faults, the message is automatically deleted and the output contacts close once more. Alarms and fault indications are displayed by LEDs or an operating unit.

In addition, you can choose to have alarms displayed on an external signalling device via the signalling outputs, either with or without a delay. Faults are always indicated without a delay, however.

Alarm simulation

You can simulate alarms by pressing the button or via external 24V DC signals.

Monitoring flushing processes

If a level electrode is installed outside the boiler in a level pot that can be shut off, the connecting pipes must be flushed regularly. During a flushing process, the water level is not measured in the level pot for up to five minutes. When prompted by an SRL 6-60 monitoring unit, the URS 60/URS 61 safety control unit therefore bypasses the level electrode and monitors the maximum bypass time.

If the steam pipe is ≥ 40 mm and the water pipe is ≥ 100 mm, installation is regarded as internal. In this case, upstream monitoring of flushing processes is not required.

Function

Possible combinations of functions and equipment

Combining sensors and safety control units in a circuit produces the following common combinations of functions:

Abbreviations used in Fig. 5 and Fig. 6

SLLL = safety low-level limiter
STL = safety temperature limiter
SHLL = safety high-level limiter
SCL = safety conductivity limiter

URS 60

e.g. safety circuit for heating			
Function 1	**Function 2**	**Function 3**	**Function 4**
SLLL 1 with level electrode NRG 1x-60			
SLLL 1 with level electrode NRG 1x-60	SLLL 2 with level electrode NRG 1x-60 NRG 26-61		
SLLL 1 with level electrode NRG 1x-60	SLLL 2 with level electrode NRG 1x-60 NRG 26-61	STL (STM) 1 with temperature transmitter TRV 5-60	SCL 1 with conductivity electrode LRG 1x-6x
SLLL 1 with level electrode NRG 1x-60	SLLL 2 with level electrode NRG 1x-60 NRG 26-61	STL (STM) 1 with temperature transmitter TRV 5-60	
SLLL 1 with level electrode NRG 1x-60	SLLL 2 with level electrode NRG 1x-60 NRG 26-61	SHLL 1 with level electrode NRG 1x-61 NRG 26-61	STL (STM) 1 with temperature transmitter TRV 5-60
SLLL 1 with level electrode NRG 1x-60	SLLL 2 with level electrode NRG 1x-60 NRG 26-61	STL (STM) 1 with temperature transmitter TRV 5-60	STL (STM) 2 with temperature transmitter TRV 5-60
STL (STM) 1 with temperature transmitter TRV 5-60	STL (STM) 2 with temperature transmitter TRV 5-60		
STL (STM) 1 with temperature transmitter TRV 5-60	STL (STM) 2 with temperature transmitter TRV 5-60	STL (STM) 3 with temperature transmitter TRV 5-60	STL (STM) 4 with temperature transmitter TRV 5-60

Fig. 5

Function

URS 61

e.g. safety circuit for feedwater pump			
Function 1	**Function 2**	**Function 3**	**Function 4**
SHLL 1 with level electrode NRG 1x-61 NRG 26-61			
SHLL 1 with level electrode NRG 1x-61 NRG 26-61	STL (STM) 1 with temperature transmitter TRV 5-60		
SHLL 1 with level electrode NRG 1x-61 NRG 26-61			
SHLL 1 with level electrode NRG 1x-61 NRG 26-61	STL (STM) 2 with temperature transmitter TRV 5-60	STL (STM) 3 with temperature transmitter TRV 5-60	
SCL 1 with conductivity electrode LRG 1x-6x			
STL (STM) 3 with temperature transmitter TRV 5-60			
STL (STM) 3 with temperature transmitter TRV 5-60	STL (STM) 4 with temperature transmitter TRV 5-60		
STL (STM) 5 with temperature transmitter TRV 5-60	STL (STM) 6 with temperature transmitter TRV 5-60	STL (STM) 7 with temperature transmitter TRV 5-60	STL (STM) 8 with temperature transmitter TRV 5-60

Fig. 6

The limiter ID defines the channel on the relevant safety control unit

ID = 1	>	URS 60, channel 1
ID = 2	>	URS 60, channel 2
ID = 3	>	URS 60, channel 3
ID = 4	>	URS 60, channel 4

ID = 5	>	URS 61, channel 1
ID = 6	>	URS 61, channel 2
ID = 7	>	URS 61, channel 3
ID = 8	>	URS 61, channel 4

■ Only one URS 60 and one URS 61 control unit may be used in the CAN bus network.

Further combinations are possible and permitted.

Technical data

Supply voltage

- 24V DC +/-20%

Power consumption

- Max. 7 W

Current input

- Max. 0.3 A

Internal fuse

- T2A

Input/output

- Interface for CAN bus to ISO 11898, CANopen, insulated

Safety circuit output

- 2 volt-free relay contacts, connected externally in series. Contact material AgNi
- Maximum switching current at switching voltages of 24 V AC/DC, 115 V AC and 230 V AC: ohmic/inductive 6 A
- Connected contactors must have interference suppression (RC combination) as per the manufacturer's specifications

Required external fuse for the safety circuit

- T2A or T1A for (EN 12952 *), 72 hrs. of operation

  ** see page 8*

Signal output

- 4 PhotoMOS outputs for external signalling, either with or without a delay
- 24 DC, max. current load 100 mA, NO characteristic

Test input

- 4 opto-coupler inputs for external test triggering, high active, 24V DC +/- 20%

Output relay OFF delay

- Factory default setting 3 seconds.
- Option of 10 seconds or 15 seconds

Indicators and controls

- 4 x buttons for operation/initiating test function in sensor
- 4 x green LEDs for indicating active channels
- 4 x red LEDs for indicating a malfunction/alarm
- 3 x yellow LEDs for indicating internal errors and external sensor errors
- 1 x 10-pole code switch for setting the number of limiters, the delay and baud rate

Technical data

Protection class

- II double insulated

IP rating to EN 60529

- Terminal box: IP 40
- Terminal strip: IP 20

Admissible ambient conditions

- Service temperature: 0 °C – 55 °C - installed in control cabinet
- Storage temperature: - 40 °C – 80 °C
- Transport temperature: - 40 °C – 80 °C
- Air humidity: 10% – 95%, non-condensing
- Altitude: up to 2000 m

Terminal box

- Terminal box material: Lower section of black polycarbonate (glass-fibre reinforced), front of grey polycarbonate
- 2 x 15-pole terminal strips, removable separately
- Max. cross-section per screw terminal:
  - 1 x 4.0 mm^2 solid, or
  - 1 x 2.5 mm^2 stranded with sleeve, or
  - 2 x 1.5 mm^2 stranded with sleeve
- Terminal box attachment: Mounting clip on support rail TH 35 (to EN 60715)
- Installation in control cabinet (IP54) required

Weight

- Approx. 0.4 kg

Example rating plate/identification of URS 60/URS 61

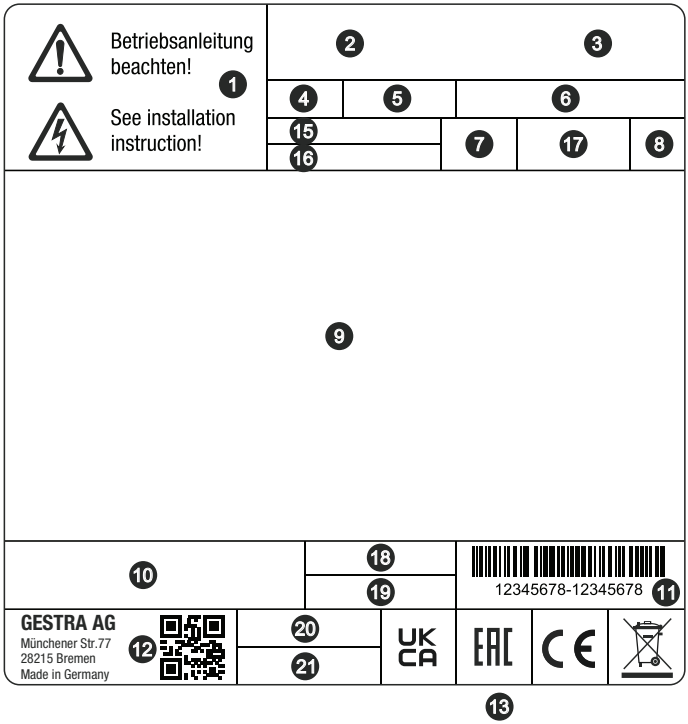


Fig. 7

1. Safety note
2. Equipment function
3. Equipment designation
4. Power consumption
5. IP rating
6. Operating data (maximum ambient temperature)
7. Power supply
8. Protection class
9. Wiring diagram
10. Component type approval
11. Material number-serial number
12. Manufacturer
13. Component type approval
14. Disposal information

Optional information

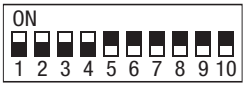
15. Measuring range in µS/cm
16. Measuring range in ppm
17. Cutout relay
18. Information on functional safety
19. Marking for temperature limiters (STL) or monitors (STM)
20. Field for set limit value
21. Mode of operation in accordance with EN 60730-1

The date of production is printed on the side of the equipment.

Factory settings

Safety control unit URS 60

- Baud rate: 50 kbit/s (max. cable length 1000 m)
- Signalling delay: OFF
- Configuration:
  Operation e.g. with two NRG 1x-60 level electrodes
- Code switch setting - sliding switch, white



Safety control unit URS 61

- Baud rate: 50 kbit/s (max. cable length 1000 m)
- Signalling delay: OFF
- Configuration:
  Operation e.g. with one NRG 1x-61 level electrode
- Code switch setting - sliding switch, white

Functional elements and dimensions

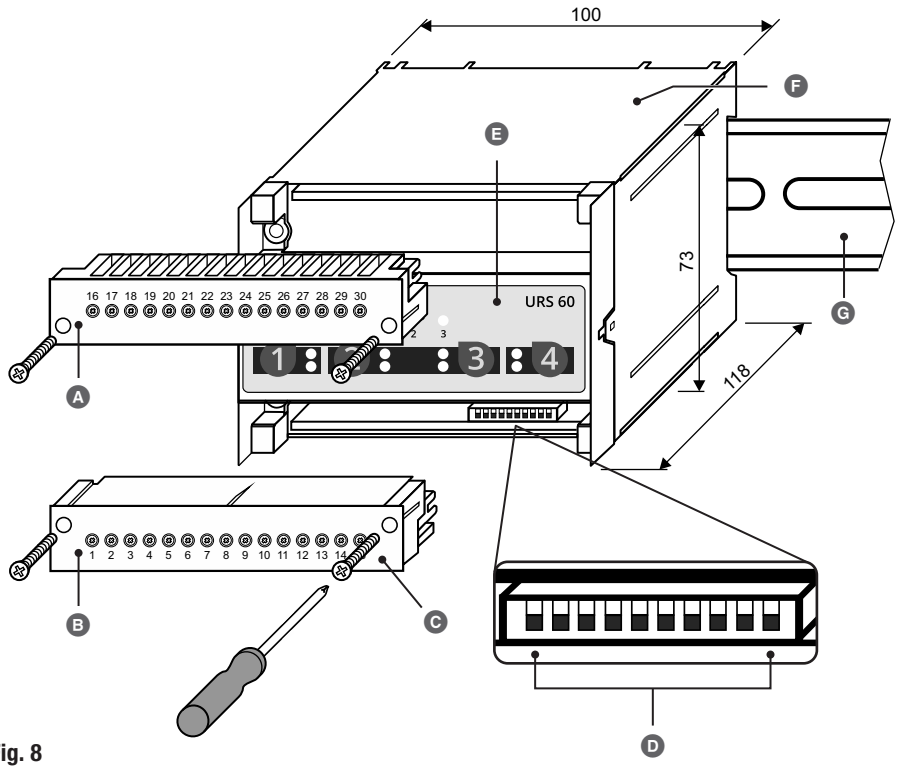


Fig. 8

- **A** Upper terminal strip
- **B** Lower terminal strip
- **C** Screws (M3)
- **D** 10-pole code switch, for setting the number of limiters, the delay and baud rate
- **E** Front membrane with operating keys and LEDs, see page 28
- **F** Terminal box
- **G** Support rail TH 35

The code switch can be accessed by disconnecting and removing the lower terminal strip.

Equipment settings,
see page 26.

Installing the URS 60/URS 61 safety control unit

The URS 60/URS 61 safety control units are clipped onto a TH 35 support rail in a control cabinet.

⚠ DANGER

There is a risk of electric shock during work on electrical systems.

- Switch off the voltage to the plant before you install the equipment.
- Check that the plant is not carrying live voltage before commencing work.

1. Before you install the equipment, switch off the voltage to the plant or secure the surrounding equipment in the control cabinet, if live, so it cannot be touched.
2. Carefully press the unit onto the support rail until the holder clips into place.

Wiring diagram of the URS 60/URS 61 safety control unit

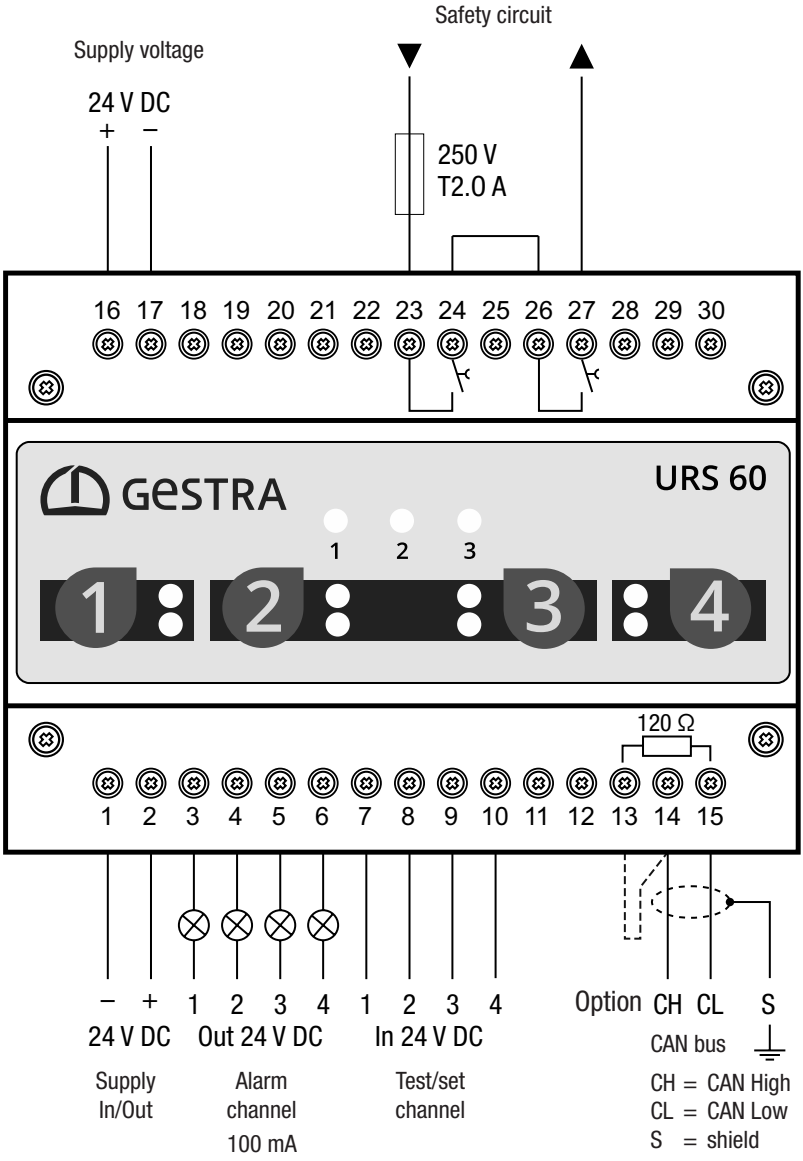


Fig. 9

The URS 61 control unit is connected as shown in the wiring diagram for the URS 60.

Electrical connection

Bus line, cable length and cross-section

- Use a shielded, multi-core, twisted-pair control cable, e.g. UNITRONIC® BUS CAN 2 x 2 x .. mm^2 or RE-2YCYV-fl 2 x 2 x .. mm^2 as the bus line.
- Pre-wired control cables (with connector and coupling) are available as accessories in various lengths.
- The baud rate is determined by the line length (transfer rate) between the bus terminal devices, and the conductor size is determined by the overall current input of the measuring sensors.
- As far as possible, route the bus line separately from power lines and protected from environmental influences.

Connecting the 24V DC power supply

- The URS 60/URS 61 safety control unit is supplied with 24V DC.
- A safety power supply unit that delivers a Safety Extra Low Voltage (SELV) must be used to supply the equipment with 24V DC.

Connecting the 24V DC I/O interface

- The I/O interface can be supplied with power either from the supply voltage of the safety control unit (see above) or via a separate 24V DC voltage.
- The signalling outputs and test inputs are wired using single-core wires e.g. H07V-U.

Instructions for connecting the safety circuit

- Connect the safety circuit to terminals 23, 24 and 26, 27.
- If using the equipment as a low-level limiter to EN 12952/EN 12953, you must connect the output contacts of the two monitoring channels to a wire bridge between terminals 24 and 26.
- Use a T2A or T1A fuse (EN 12952, 72 hrs. of operation) to protect the switching contacts of the safety circuit.
- If the installation requires a lockout function, this must be implemented in the downstream (safety) circuit. This circuit must conform to the requirements of EN 50156.

Notes on connecting inductive loads

All connected inductive loads, such as contactors and actuators, must have interference suppression using RC combinations as per the manufacturer's specifications.

Wiring diagram of CAN bus system

Example

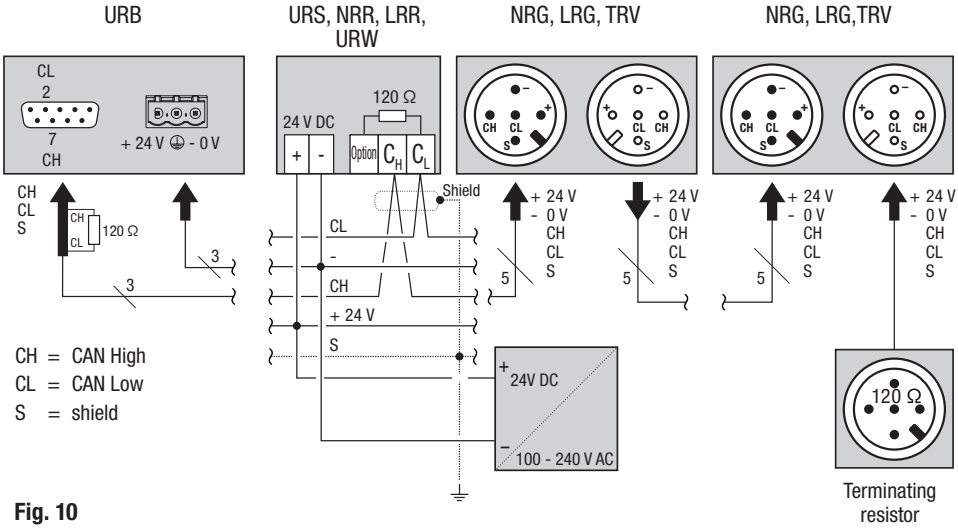


Fig. 10

Important notes on connecting the CAN bus system

- A dedicated 24V DC SELV power supply unit that is isolated from connected loads must be used to supply the SPECTOR*connect* system.
- Make sure wiring is in line, not in a star!
- Use a central earth to prevent differences in potential between plant parts.
  - Connect the bus line shields to one another all the way along, and connect them to the central earthing point (CEP).
- If two or more system components are connected in a CAN bus network, a 120 Ω terminating resistor must be connected to the **first** and **last** units.
- The URS 60/URS 61 safety control units have an internal terminating resistor.

  To activate this internal terminating resistor in the URS 60/URS 61 control units, insert a bridge between the terminals (“Option” and “CH”).
- Only **one** URS 60 and **one** URS 61 control unit may be used in the CAN bus network.
- The CAN bus network must not be interrupted during operation!
  If it is, an alarm is triggered.

Changing the equipment settings

⚠ DANGER

There is a risk of electric shock during work on electrical systems.

- Always switch off the voltage to the equipment before performing work on the terminal strips.
- Check that the plant is not carrying live voltage before commencing work.

You can change the factory settings of the URS 60/URS 61 safety control units at any time.

Make changes before installing the safety control unit, when access is easier.

You will need the following tools:

- Size 2.5 slotted screwdriver
- Size 1 Phillips screwdriver

Proceed as follows:

1. Unscrew and pull off the lower terminal strip, see **Fig. 8**.
2. Set code switch Ⓓ (see **Fig. 8**) as desired, see page 26 and 27.
3. Put the terminal strip back on and screw in place.

Changing the baud rate

Set the baud rate using the code switch Ⓓ **Fig. 8** (S9), see page 27.
Set the same baud rate for all bus nodes.

Changing the equipment settings

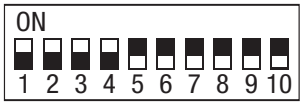
The URS 60/URS 61 safety control units are designed for up to four limiter functions for monitoring water level, temperature and conductivity. You can connect NRG 1x-6x or NRG 26-61 level electrodes, the TRV 5-60 temperature transmitter and the LRG 1x-6x conductivity electrode.

For operation, define the number of limiter functions you wish the control units to work with. Set the limiting function you require by connecting the various sensors for level, temperature and conductivity and assigning the necessary parameters.

With the lower terminal strip removed:

Using a thin-blade screwdriver, configure code switch Ⓓ (see **Fig. 8**) using switches S1 to S10 as shown in the table. Then, put the terminal strip back on and tighten the screws.

Code switch Ⓓ - sliding switch, white



Configuring the limiter function

Safety control unit URS 60/URS 61

Code switch Ⓓ								Limiter functions 1 to 4 (see Fig. 5)				
S1	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	>	**1**	**2**	**3**	**4**
OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	>				
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	>	Active			
ON	ON	ON	ON	OFF	OFF	OFF	OFF	>	Active	Active		
ON	ON	ON	ON	ON	ON	OFF	OFF	>	Active	Active	Active	
ON	ON	ON	ON	ON	ON	ON	ON	>	Active	Active	Active	Active
Factory setting of URS 60												
ON	ON	ON	ON	OFF	OFF	OFF	OFF	>	Active	Active		
Factory setting of URS 61												
ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	>	Active			

Changing the equipment settings

Configuring the delay time and baud rate

Use S9 to change the baud rate from 50 kbit/s to 250 kbit/s, and S10 to delay the signalling outputs (see table below).

Safety control unit URS 60/URS 61

Code switch Ⓓ		Configuration	
S9	**S10**	**Signalling delay***	**Baud rate**
Factory setting			
OFF	**OFF**	**OFF**	**50 kbit/s**
OFF	ON	ON	50 kbit/s
ON	OFF	OFF	250 kbit/s
ON	ON	ON	250 kbit/s

** The delay is the factory-set relay OFF delay of 3 seconds (a 10 or 15-second delay is available as an option).*

When defining limiter functions 1 – 4, please also pay attention to the Installation & Operating Manuals of the relevant sensors.

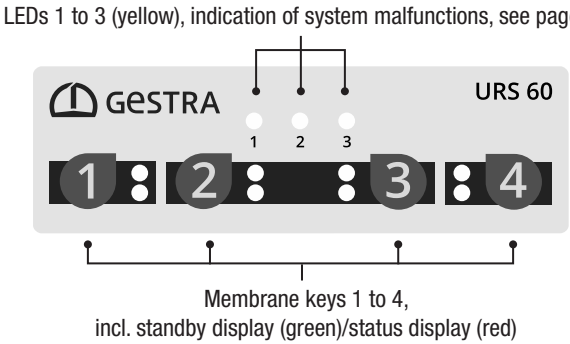


Fig. 11

Relationship between button/signal LED/limiter:

Button 1/LED 1: Limiter 1
Button 2/LED 2: Limiter 2
Button 3/LED 3: Limiter 3
Button 4/LED 4: Limiter 4

The following table is based on four activated limiter functions.

Starting		
Switch on supply voltage.	All LEDs light up	The system is started and tested. The output contacts open. The signal outputs close (bulb test).

Operation		
Limiters 1 – 4 do not signal an alarm	Signal LEDs 1 – 4 light up green	The output contacts are closed, the signal outputs are open.

Alarm		
Limiters 1 – 4, one or more signal an alarm	Signal LEDs 1, 2, 3, 4, one or more flash red rapidly	The OFF delay is running, the signal output closes with/without a delay.
	Signal LEDs 1, 2, 3, 4, one or more light up red	The delay time has elapsed, the output contacts are open. The signal outputs are closed.

Test of limiters 1 – 4		
In operating mode: Press button 1, 2, 3 or 4 and hold until the end of the test. The limiters must behave as if there were an alarm.	Signal LED 1, 2, 3 or 4 flashes red rapidly	Alarm simulation in limiters 1 – 4. The OFF delay is running, the signal output closes with/without a delay.
	Signal LED 1, 2, 3 or 4 lights up red	The delay time has elapsed, the output contacts are open. The signal output is closed. The test ends.

Bringing into service – starting, operation, alarm and testing

In the event of an alarm, the URS 60/URS 61 control units do not lock automatically.

If the installation requires a lockout function, this must be implemented in the downstream (safety) circuit. This circuit must conform to the requirements of EN 50156.

Faulty equipment jeopardises plant safety.

- If the URS 60/URS 61 control unit does not behave as described above in the “Alarm” and “Test of limiters 1-4” tables, it may be faulty.
- Perform failure analysis.
- Do not repair the URS 60/URS 61 safety control unit.
- Only replace faulty equipment with identical equipment from GESTRA AG.

Checking installation and function

Checking the switchpoints

The low water, high water and MAX temperature switchpoints must be checked by bringing the system to these water and temperature levels. The equipment must then behave as if there were an alarm.

Check the switchpoints when bringing the equipment into service and whenever the sensors are replaced. MAX conductivity is checked by means of regular manual reference measurements (e.g. every 72 hours) and test triggering.

System malfunctions

Causes

System malfunctions occur if CAN bus components have been incorrectly installed or configured, if the equipment has overheated, if there is interference in the supply network or if electronic components are faulty.

Check the installation and configuration before systematic troubleshooting:

Installation:

- Check that the installation location complies with the admissible ambient conditions in terms of temperature, vibration, interference sources, etc.

Wiring:

- Does the wiring conform to the wiring diagrams?
- Is the bus line polarity correct throughout?
- Is a 120 Ω terminating resistor connected to the terminal devices of the CAN bus line?

Control unit configuration:

- Are the limiter function, delay time and baud rate correctly set on code switch Ⓓ?

Sensor configuration:

- Are the sensors set to the correct limiter number 1,2,3,4,5,6,7,8?

Baud rate:

- Is the cable length correct for the set baud rate?
- Is the baud rate identical for all devices?

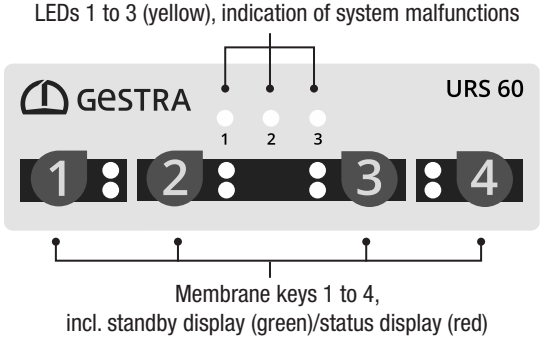
⚠ DANGER

There is a risk of electric shock during work on electrical systems.

- Always switch off the voltage to the equipment before working on the terminal strips (installation, electrical connection, disassembly).
- Disconnect all poles of the supply cable from the mains and secure so they cannot be switched back on.
- Check that the plant is not carrying live voltage before commencing work.
- Interrupting the CAN bus during operation triggers an alarm.

System malfunctions

Indication of system malfunctions



Relationship between signal LED/button/limiter:

LED 1/button 1: Limiter 1

LED 2/button 2: Limiter 2

LED 3/button 3: Limiter 3

LED 4/button 4: Limiter 4

Indication of communication failures in limiter 1 – 4			**LED 1 lights up yellow**
Limiters 1 – 4	**Signal LEDs 1 – 4**	**Description**	**Remedy**
Communication failure in one or more limiters.	One or more LEDs flash green rapidly.	The output contacts open without a delay. The relevant signal output is closed.	Check the following points: ■ The wiring ■ The baud rate ■ The sensor limiter number Pay attention to the instructions on page 30.

Indication of malfunctions in limiter 1 – 4			**LED 1 lights up yellow**
Limiters 1 – 4	**Signal LEDs 1 – 4**	**Description**	**Remedy**
One or more limiters are malfunctioning.	One or more LEDs flash green slowly.	The output contacts open without a delay. The relevant signal output is closed.	Check the error display of the relevant sensor. Pay attention to the information in the relevant Installation & Operating Manual. If the sensor itself does not indicate a fault, the ID has been assigned to another sensor in duplicate.

System malfunctions

Indication of equipment malfunctions in the URS 60/URS 61			LED 2 lights up yellow
URS 60/URS 61	**Signal LEDs 1 – 4**	**Description**	**Remedy**
The configuration is incorrect or the function is not working correctly.	Current status.	The output contacts open without a delay. The relevant signal output is closed.	Check the configuration of the URS 60/URS 61 and connected sensors. Pay attention to the instructions on page 30. Only replace faulty equipment with identical equipment.

Indication of overheating in limiter 1 – 4			LEDs 1 + 3 light up yellow
Limiters 1 – 4	**Signal LEDs 1 – 4**	**Description**	**Remedy**
One or more limiters indicate overheating.	One or more LEDs flash green slowly.	The output contacts open without a delay. The relevant signal output is closed.	Check the installation location of the relevant sensor. Insulate the sensor flange against radiated heat.

What to do in the event of system malfunctions?

Checking installation and function

Checking the switchpoints

The low water, high water and MAX temperature switchpoints must be checked by bringing the system to these water and temperature levels. The equipment must then behave as if there were an alarm.

Check the switchpoints when bringing the equipment into service and whenever the sensors are replaced. MAX conductivity is checked by means of regular manual reference measurements and test triggering.

In the event of malfunctions or faults that cannot be remedied with the aid of this Installation & Operating Manual, please contact our service centre or authorised agent in your country.

Emergency mode

Emergency mode for water level limiter systems

If the URS 60/URS 61 safety control unit works with two NRG 1x-60 level electrodes (low-level limiter system), if one electrode fails, the equipment can continue working with **one** level electrode in emergency mode, under constant supervision, in accordance with EN 12952 and EN 12953.

The following settings are required:

1. Remove the faulty electrode from the CANopen bus system (connect the plug and socket of the connecting cable to one another).
2. Switch off the voltage to the equipment and unscrew the lower terminal strip.
3. Activate the limiter function now required via code switch Ⓓ **Fig. 8**.
4. Put the terminal strip back on and screw securely in place.

Important notes on emergency mode

- Enter the start of emergency mode in the boiler log.
- The plant must be supervised constantly when running in emergency mode!
- Replace the faulty level electrode immediately!
- Enter the end of emergency mode in the boiler log.

Taking out of service

1. Switch off the supply voltage and switch off the voltage to the equipment.
2. Check that the equipment is not live.
3. Unscrew and pull off the upper and lower terminal strips, see **Fig. 8** Ⓐ; Ⓑ
4. Release the slider holder on the base of the equipment, and detach the URS 60/URS 61 safety control unit from the support rail.

Disposal

Dispose of the safety control unit in accordance with statutory waste disposal regulations.

Returning decontaminated equipment

If products have come into contact with media that are hazardous to health, they must be drained and decontaminated before being returned to GESTRA AG.

Such media include solid, liquid or gaseous substances, mixtures of these, or radiation.

GESTRA AG can accept returned products only if accompanied by a completed and signed return note and also a completed and signed declaration of decontamination.

The return confirmation and declaration of decontamination must be attached to the returned goods and be accessible from the outside. Otherwise, the goods cannot be dealt with and will be returned, carriage unpaid.

Please proceed as follows:

1. Let GESTRA AG know about the return beforehand by e-mail or phone.
2. Wait until you have received the return confirmation from GESTRA.
3. Fill out the return confirmation (and declaration of decontamination) and send it with the products to GESTRA AG.

Declaration of Conformity
Standards and Directives

You can find details on the conformity of the equipment and the applicable standards and directives in the Declaration of Conformity and associated certificates.

You can download the Declaration of Conformity from www.gestra.com and request relevant certificates by writing to the following address:

GESTRA AG
Münchener Straße 77
28215 Bremen
Germany
Tel. +49 421 3503 0
Fax +49 421 3503 393
e-mail info@de.gestra.com
Website www.gestra.com

Modifications to the equipment not approved by us will invalidate the Declarations of Conformity and certificates.

GESTRA®

You can find our authorised agents around the world at: **www.gestra.com**

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