GESTRA®

Level Controller NRR
Visual Display and Operating Unit URB

NRR 2-52
NRR 2-53
URB 55

EN (USA)
English

Original Installation &
Operating Manual

850698-00

Contents

Contents

Contents

Content of this Manual

Product:

- Level NRR 2-52
- Level NRR 2-53
- Visual display and operating unit URB 55

First edition:

BAN 850698-00/08-2021cm

Applicable documents:

You can find the latest Installation & Operating Manuals on our website:
http://www.gestra.com

Scope of supply, product package

NRR 2-5x

- 1 x Level NRR 2-52 or NRR 2-53

URB 55

- 1 x visual display and operating unit URB 55
- 4 x retaining clips
- 1 x power supply connector
- 1 x data cable URB 55

NRR 2-5x + URB 55

- 1 x Installation & Operating Manual

How to use this Manual

This Installation & Operating Manual describes the correct use of the NRR 2-52, NRR 2-53 level controller in combination with the URB 55 visual display and operating unit. It applies to persons who integrate this equipment in 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.
- 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 results 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 results in damage to property or the environment.

Specialist terms, abbreviations

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

NRR .. / NRG .. / NRGT ... / URB ...

GESTRA equipment and type designations, see page 8.

PI controller

Controller with proportional (P) and integral (I) control.

SELV

Safety Extra Low Voltage

Direction of corrective action

The direction of corrective action indicates whether the action involves filling (positive) or draining (negative).

Pb (proportional band)

The proportional band enables the controller amplification to be adapted to suit the controlled system. For further information, see page 8, guide to setting control parameters.

Ti (reset time)

The integral element ensures that control deviations can be fully corrected, with no remaining deviation. For further information, see page 8, guide to setting control parameters.

Neutral zone

If the actual value reaches the (set point +/- of the neutral zone), the manipulated variable does not change in this range, see page 8.

Usage for the intended purpose

NRR 2-52 and NRR 2-53 level controllers can be used in combination with NRGT 26-x level transmitters as water level controllers and limit switches, e.g., in steam boilers and hot water installations and in condensate and feedwater tanks.

Configuration, operation and visual display

The equipment is configured and operated and information is viewed via the URB 55 visual display and operating unit. The URB 55 is designed for installation in a control cabinet door or switch panel. It may only be used when correctly installed.

Overview of possible equipment combinations

Level controller	Level electrode	Visual display and operating unit
NRR 2-52 NRR 2-53	NRGT 26-2	URB 55

Fig. 1

Key to Fig. 1:

NRR = level controller

NRG = level electrode

NRGT = level transmitter

URB = visual display and operating unit

To ensure proper use in all applications, please also read the Installation & Operating Manuals for the system components used.

- You can find the latest Installation & Operating Manuals for the system components named in **Fig. 1** on our website:
  http://www.gestra.com

Usage for the intended purpose

IT security and rules for the use of Ethernet devices

The plant operator is responsible for the security of his/her IT network and must take appropriate action to protect equipment, systems and components from unauthorized access.

Pay attention to the following instructions when using Ethernet devices in your plant:

- Do not connect equipment, systems or components to an open network, such as the Internet, without safeguards in place.
- To fully protect a PLC runtime system on a control system that is available on the Internet, the use of common security mechanisms (firewall, VPN access) is absolutely essential.
- Restrict access to all components to authorized persons only.
- Change default passwords before bringing into service for the first time!
- Deploy defense in depth mechanisms in your plant security, to restrict access and control to individual products and networks.

Applicable directives and standards - NRR 2-52, NRR 2-53

The NRR 2-52, NRR 2-53 level controller has been tested and approved for use in the scope governed by the following directives and standards:

Standards:

- UL 60730-1 and CAN/CSA E60730-1
  General Requirements for Automatic Electrical Controls
- UL 60730-2-15 and CAN/CSA E60730-2-15
  Requirements for Automatic Electrical Water Level Sensing Controls

Usage for the intended purpose

Applicable directives and standards - URB 55

The URB 55 has been tested and approved for use in the scope governed by the following directives and standards:

Standards:

- UL 61010-1 and CAN/CSA C22.2 No. 61010-1
  Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use - Part 1: General Requirements
- UL 61010-2-201 and CAN/CSA C22.2 No. 61010-2-201
  Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 2-201: Particular Requirements for Control Equipment

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.

Do not bring any equipment into service that does not have its own specific rating plate.

The rating plate indicates the technical features of the equipment.

Basic safety information

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.

Faulty equipment is a danger to plant safety.

- If the NRR 2-52, NRR 2-53 level controller does not behave as expected, it may be faulty.
- Perform failure analysis.
- 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
Setup work	Specialist staff	Plant construction

Fig. 2

Notes on product liability

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

Function

In the level controller, the actual value is compared with the set point, and a corrective signal is formed to compensate the control deviation. In addition, switching operations can be triggered by the output contacts when defined switchpoints are reached.

Possible combinations of functions and equipment

Combining the NRR 2-52, NRR 2-53 level controller with level electrodes and the URB 55 visual display and operating unit provides the following common functions:

Level controller	NRR 2-52	NRR 2-53
Evaluation of the current signal of a connected NRGT 26-2 level transmitter	●	●
3-position stepping controller with proportional-plus-integral control action (PI controller) and actuation of an electrically operated control valve	●	
Continuous PI controller for actuating an electro-pneumatically operated control valve		●
Continuous PI controller for actuating frequency-controlled pumps		●
MIN/MAX water level alarm	●	●
Current inputs for steam and feedwater flowrate (3-element control) (optional)	●	●
Indication of valve position by connecting a potentiometer (in the control valve)	●	
Actual value output 4-20 mA	●	●
2 x pump enable (ON/OFF) with actuation of a frequency-controlled pump *		●

** Controller software version 311178.13 or later*

Fig. 3

Function

Visual display and operating unit	URB 55
Indication of actual value (bar chart in %)	●
Indication of actual value for 3-element control (compensated/uncompensated reading)	●
Indication of valve position (bar chart and in %)	●
Measuring range standardization when an NRG 2.-.. level electrode is connected	●
Indication/setting of control parameters	●
Standardization and evaluation of current inputs for steam and feedwater flowrate (3-element control) (optional)	●
Trend log	●
Indication and listing of errors, alarms and warnings	●
Test of MIN/MAX output relays	●
Manual/automatic mode	●
Password protection	●
Level and conductivity controllers can be operated simultaneously	●

Fig. 4

Technical data of the NRR 2-52, NRR 2-53

Supply voltage

- 24 V DC +/-20%; PELV / CLASS2

Power consumption

- Max. 5 W

Current input

- Max. 0.3 A

Required external fuse

- M0.5A (medium time-lag)

Input/output

- Interface for data exchange with the URB 55 visual display and operating unit

Inputs

- 1 x analog input for potentiometer 0 - 1000 Ω, 2-wire connection (indication of valve position, NRR 2-52 only)
- 1 x analog input IN 2 / 4 - 20 mA (feedwater flowrate) (optional)
- 1 x analog input IN 3 / 4 - 20 mA (steam flowrate) (optional)
- 1 x 24 V DC digital input alarm signal (from control center)

Outputs of NRR 2-52 *

1 x MIN / 1 x MAX alarm

- 2 x volt-free relay contacts (changeover relays) **
- Maximum switching current - 8 A at 250 V AC / 30 V DC - cos φ = 1 **

2 x control valves (OPEN/CLOSED)

- 2 x volt-free relay contacts (changeover relays) **
- Maximum switching current - 8 A at 250 V AC / 30 V DC cos φ = 1 **

Outputs of NRR 2-53 *

2 x MIN / 2 x MAX alarm

- 4 x volt-free relay contacts (changeover relays), MIN/MAX alarm **
- Maximum switching current - 8 A at 250 V AC / 30 V DC - cos φ = 1 **

or

1 x MIN1 / 1 x MAX1 alarm and
2 x pump enable (ON/OFF) - (MIN2 / MAX2 = enable Pump 1/Pump 2)

- 2 x volt-free relay contacts (changeover relays), MIN1/MAX1 alarm **
- 2 x volt-free relay contacts (changeover relays), MIN2/MAX2 enable Pump 1/Pump 2 **
- Maximum switching current - 8 A at 250 V AC / 30 V DC - cos φ = 1 **

* Inductive loads must have interference suppression (RC combination) in accordance with the manufacturer's specification

** Contact material AgNi0.15, AgSnO2

Off delay of MIN/MAX alarm outputs

- Factory default setting 3 seconds.

Technical data of the NRR 2-52, NRR 2-53

Analog outputs of NRR 2-52

- 1 x actual value output OUT 1: 4 - 20 mA, e.g., for an actual value indication
- Max. load resistance 500 Ω

Analog outputs of NRR 2-53

- 1 x actual value output OUT 1: 4 - 20 mA, e.g., for an actual value indication
- 1 x analog output OUT 2: 4 - 20 mA, manipulated variable Yw
- Max. load resistance 500 Ω

Indicators and controls

- 1 x multicolor LED (amber, green, red)
  - ◆ amber = power up
  - ◆ green = running
  - ◆ red = malfunction
- 1 x 4-pole code switch for configuration

Protection

- Terminal box: IP40 according to EN 60529
- Terminal strip: IP20 according to EN 60529
- As a UL open type, the equipment must be installed in a control cabinet.

Electrical safety

- Pollution degree 2, overvoltage category II according to UL 60730-1

Admissible ambient conditions

- Service temperature: 14 ° - 131 °F (-10 ° - 55 °C)
  [at power-on 32 ° - 131 °F (0 ° - 55 °C)]
- Storage temperature: -4 ° - 158 °F (-20 ° - 70 °C) *
- Transport temperature: -4 ° - 176 °F (-20 ° - 80 °C) (< 100 hours) *
- Air humidity: Max. 95%, non-condensing
  * Only switch on after a defrosting period of 24 hours

Terminal box

- Terminal box material: Lower section of black polycarbonate (glass-fiber reinforced), front of gray polycarbonate
- 2 x 15-pole terminal strips, removable separately
- Max. wire size per screw terminal:
  - ◆ 1 x AWG12 (4.0 mm^2) solid, or
  - ◆ 1 x AWG14 (2.5 mm^3) stranded with sleeve, or
  - ◆ 2 x AWG16 (1.5 mm^2) stranded with sleeve
- Terminal box attachment: Mounting clip on support rail TH 35 (according to EN 60715)

Weight

- Approx. 1.1 lb (0.5 kg)

Other information

- Incorporated type 1 action operating control
- Pollution degree 2, impulse voltage DC supply = 500 V, AC output = 2500 V

Technical data of the URB 55

Supply voltage

- 24 V DC (⎓) +/- 20%; PELV / CLASS2

Power consumption

- Max. 14.4 W

Current input

- Max. 0.6 A (at 24 V)

Fuse

- Internal, automatic

Interfaces for data transmission

- 2 x Ethernet 10/100 Mbit switched (Modbus TCP/IP)
- 1 x USB host port (versions 2.0 and 1.1)
- 1 x slot for SD card

Indicators and controls

- Capacitive 5" touchscreen with LED backlight
- Resolution 800 x 480 pixels (WVGA)
- Brightness 200 Cd/m^2, dimmable
- Size (screen) 4.33 in (110 mm) x 2.56 in (65 mm)

Protection

- Front: IP66 according to EN 60529
- Back: IP20 according to EN 60529

Admissible ambient conditions

- Service temperature: 32 ° - 140 °F (0 ° - 60 °C)
- Storage temperature: -4 ° - 158 °F (-20 ° - 70 °C)
- Transport temperature: -4 ° - 158 °F (-20 ° - 70 °C)
- Air humidity: 5 % – 85% relative humidity, non-condensing

Enclosure

- Material: Front (metal/glass) / back (metal enclosure for electronics)
- Enclosure attachment with the supplied fastening elements
- Intended for installation in a control cabinet or switch panel

Dimensions, see page 17

- Front panel (W x H) 5.79 in (147 mm) x 4.21 in (107 mm)
- Switch panel cutout (W x H) 5.35 in (136 mm) x 3.78 in (96 mm)
- Mounting depth 2.05 in (52 mm) + 0.32 in (8 mm) protruding

Technical data of the URB 55

Weight

- Approx. 2.21 lb (1 kg)

Internal battery, permanently installed, non-replaceable

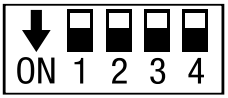
- Type: Lithium-ion, charged automatically

If the equipment is out of service for six months or more, we recommend connecting it to the supply voltage for one day, to recharge the battery.

Factory default settings of the NRR 2-52, NRR 2-53

The level controller is delivered with the following factory default settings:

- Code switch setting: Sliding switch, white (1 to 4 = OFF)



Controller configuration,
see page 19, **Fig. 20**.

- Switch S3 must be switched to ON for operation with the NRGT 26-2 level transmitter.
- Measuring range: 100%

NRR 2-52

- MAX switchpoint: 80%
- MIN switchpoint: 20%

NRR 2-53

- MAX1 switchpoint: 80%
- MAX2 switchpoint: 60%
- MIN2 switchpoint: 40%
- MIN1 switchpoint: 20%

NRR 2-52, NRR 2-53

- Set point: 50% of measuring range
- Direction of corrective action: Fill control
- Proportional band (Pb): ± 20% of set point
- Reset time (Ti): 0 seconds
- Neutral zone: ± 5% of set point
- Off delay for MIN/MAX alarm: 3 seconds (default)

Factory default settings of the URB 55

The visual display and operating unit is delivered with the following factory default settings:

- PWL 1: 111
- Conductivity in: µS/cm
- Remote access: ON
- Target IP: 192.168.0.84
- Subnet: 255.255.255.0
- Gateway: 192.168.0.1
- Modbus TCP: Off

Rating plate, identification of the NRR 2-52

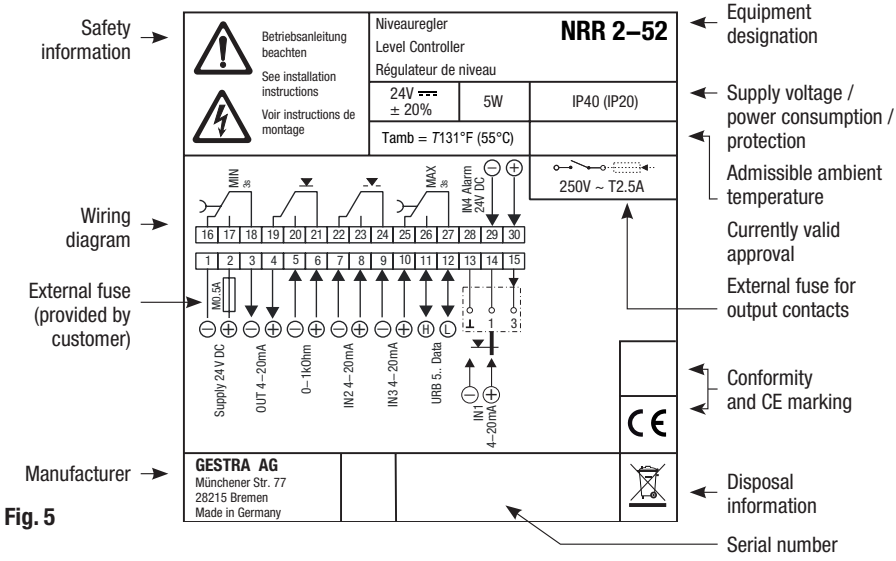


Fig. 5

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

c UL us OPERATING CONTROL E513189	Input rating: 24VDC, 5W
	Output rating : Pilot duty B300 / R300
	Ambient temperature: 32–131°F (0–55°C)
	Wiring: Use Copper Conductors Only, Use 60/75°C Conductors, Use No.18-16 AWG Wire Size Only, Tightening: Torque 0.79Nm or 7lb in.
	Use with accessory: NRGT 26–2, URB 55

Fig. 6

Rating plate, identification of the NRR 2-53

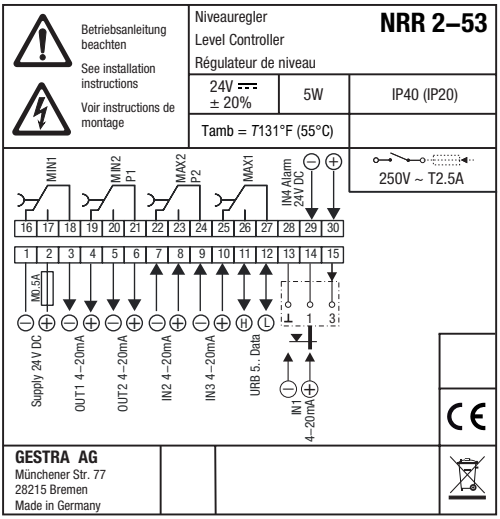


Fig. 7

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

c UL us OPERATING CONTROL E513189	Input rating: 24VDC, 5W
	Output rating : Pilot duty B300 / R300
	Ambient temperature: 32–131°F (0–55°C)
	Wiring: Use Copper Conductors Only, Use 60/75°C Conductors, Use No.18-16 AWG Wire Size Only, Tightening: Torque 0.79Nm or 7lb in.
	Use with accessory: NRGT 26–2, URB 55

Fig. 8

Rating plate, identification of the URB 55

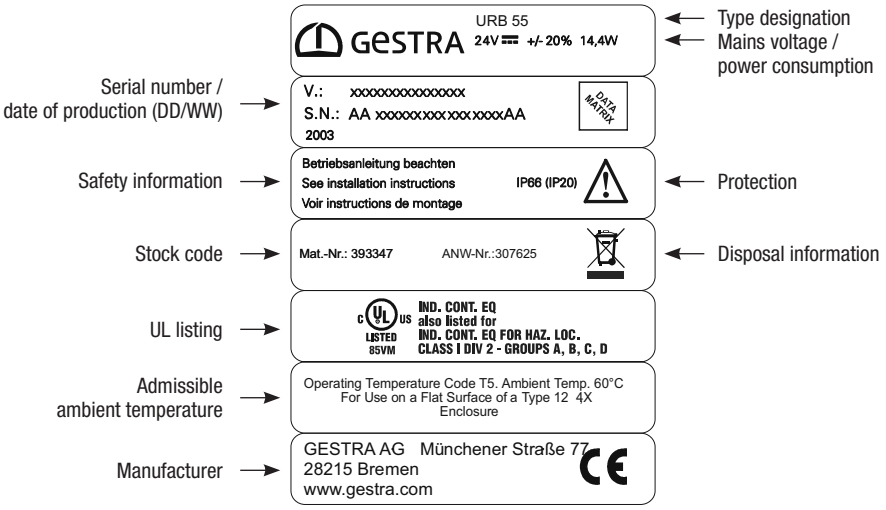


Fig. 9

Functional elements and dimensions of the NRR 2-52, NRR 2-53

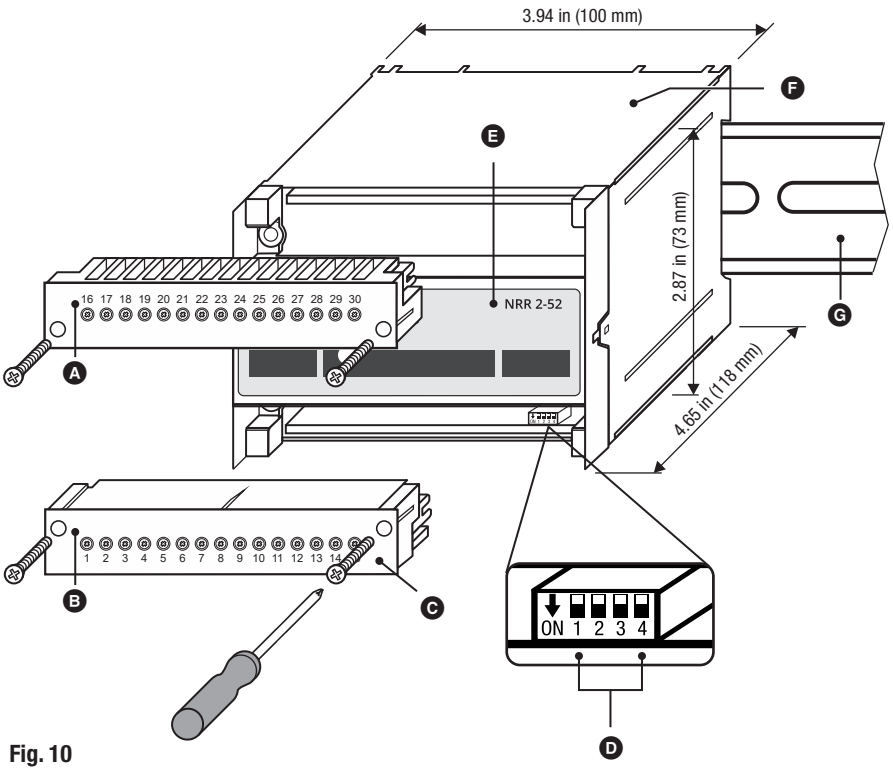


Fig. 10

- **A** Upper terminal strip
- **B** Lower terminal strip
- **C** Fastening screws (M3)
- **D** 4-pole code switch for configuring the level controller
- **E** Front membrane with status LED, see page 24
- **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 24.

Installing the NRR 2-52, NRR 2-53 level controller

The NRR 2-52, NRR 2-53 level controller snaps 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. Switch off the voltage to the plant and secure any surrounding equipment in the control cabinet that is live, so it cannot be touched.
2. Carefully press the unit onto the support rail until the holder clips into place.

Dimensions of the URB 55

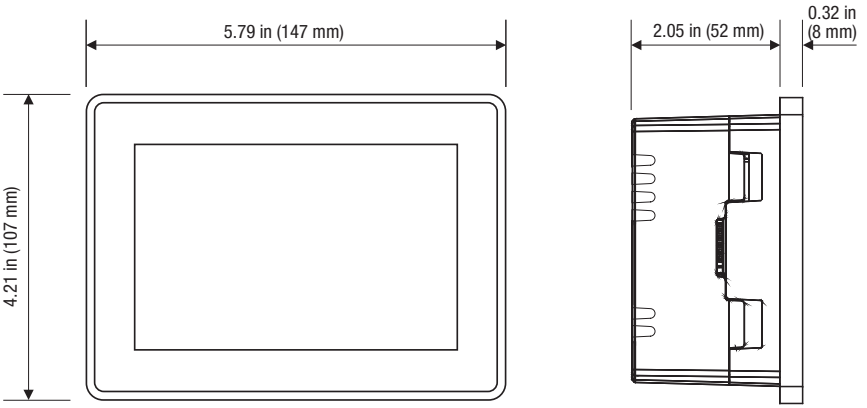


Fig. 11

Required installation aperture in the control cabinet door or switch panel

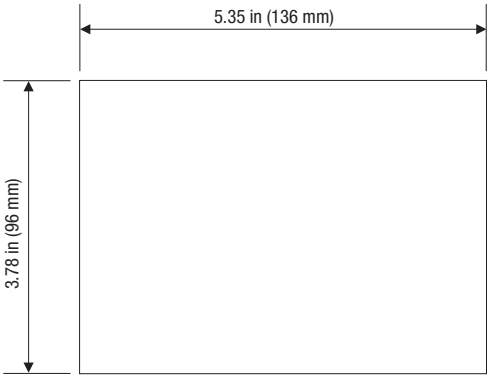


Fig. 12

Installing the URB 55

The URB 55 is designed for installation in control cabinet doors or switch panels. The maximum panel thickness is 0.39 in (10 mm).

For this, you will need the following tools:

- A tool for cutting the installation aperture
- A Phillips PH2 screwdriver

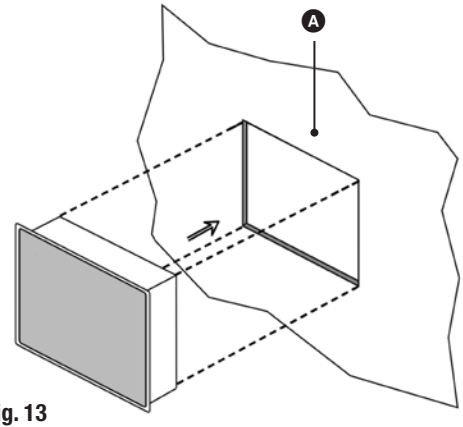


Fig. 13

Ⓐ Installation aperture 5.35 in (136 mm) x 3.78 in (96 mm), e.g., in a control cabinet door

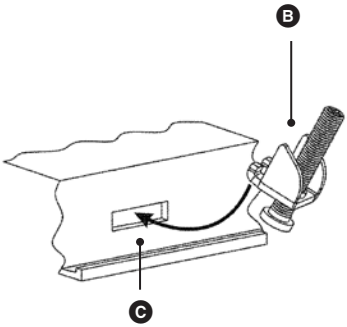


Fig. 14

Ⓑ 4 x fastening elements (supplied)

Ⓒ 4 x mounting holes in the unit

1. Cut an aperture (see **Fig. 13**) in the control cabinet door or switch panel.
2. Stick the supplied gasket to the back of the display frame.
3. Carefully push the URB 55 visual display and operating unit through the aperture, making sure the gasket is correctly seated.
4. Insert the supplied fastening elements and tighten until the corners of the display frame are in contact with the gasket.
5. Remove the protective film from the display.

Connecting the URB 55

Ports and sockets on the back of the unit

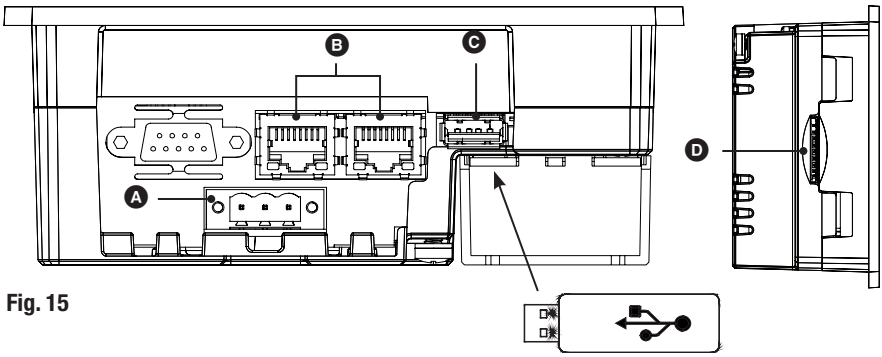


Fig. 15

- **A** 1 x 3-pole connector for 24 V DC supply voltage
- **B** 2 x Ethernet ports 10/100 Mbit switched (Modbus TCP/IP)
- **C** 1 x USB host port (versions 2.0 and 1.1) for USB sticks with FAT32/FAT or exFAT file format
- **D** 1 x slot for SD card with FAT32 file format (for service purposes) *

  ** SDHC memory cards are not supported.*

Connection for 24 V DC supply voltage - pin assignment

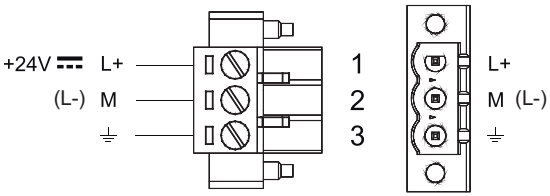
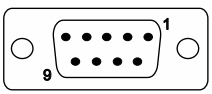


Fig. 16 Connector Socket

Use a SELV (Safety Extra Low Voltage) power supply unit for connecting the supply voltage. To connect the supply voltage to the supplied 3-pole connector, use a cable with a max. wire size of AWG14 (2.5 mm²).

Pin assignment of data line between URB 55 and NRR 2-52, NRR 2-53



Pin 2 = Data_L >> NRR 2-52, NRR 2-53 = terminal 12

Pin 7 = Data_H >> NRR 2-52, NRR 2-53 = terminal 11

Fig. 17

Safety information for electrical connection of the level controller

⚠ DANGER

Incorrectly connecting the level controller or any associated components is a danger to plant safety.

- Connect the level controller and all associated components as shown in the wiring diagrams in **Fig. 18** / **NRGT 26-2** of this Manual.
- Do not use unused terminals as jumpers or support terminals.

Wiring diagram of the NRR 2-52 level controller

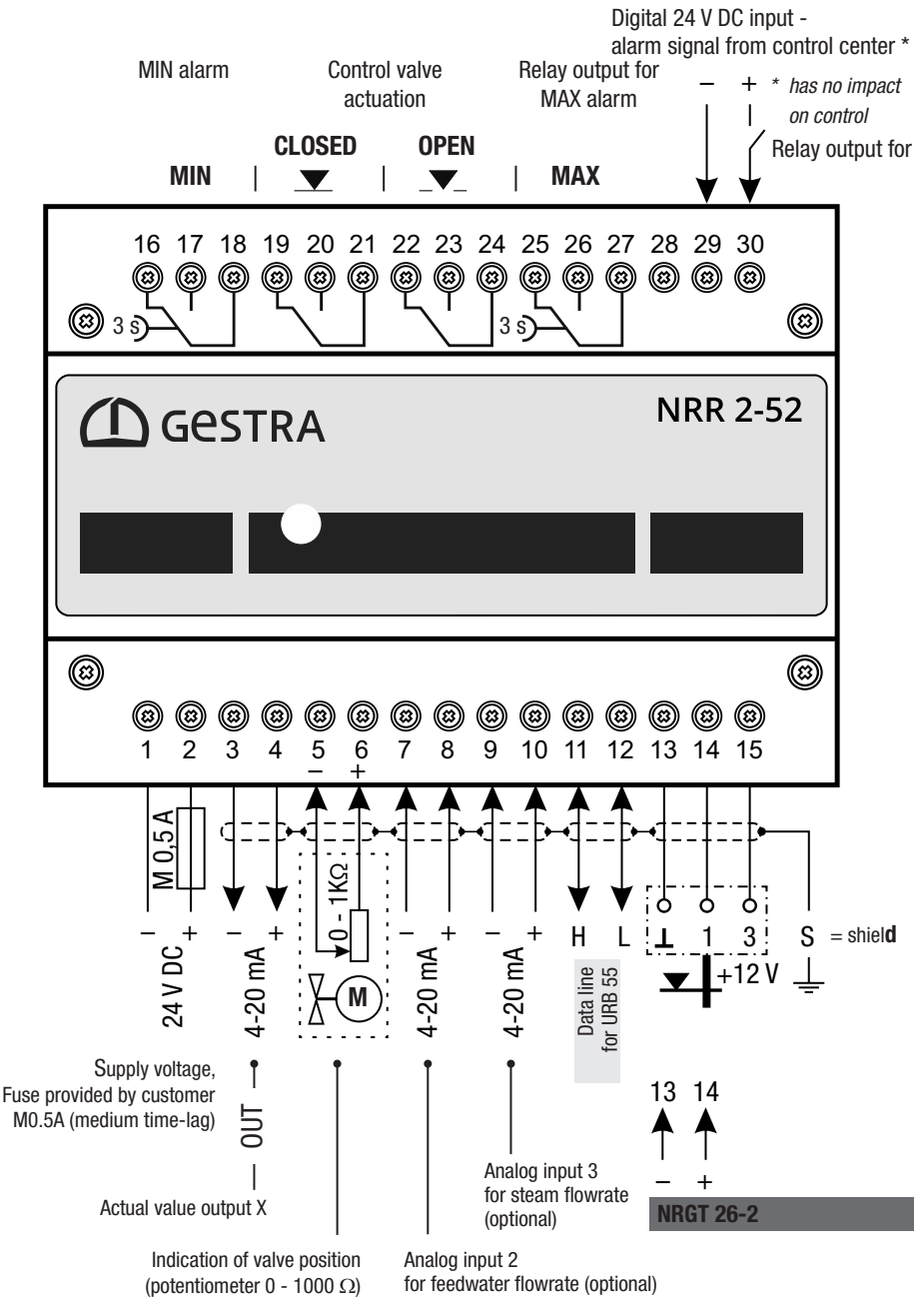


Fig. 18

Wiring diagram of the NRR 2-53 level controller

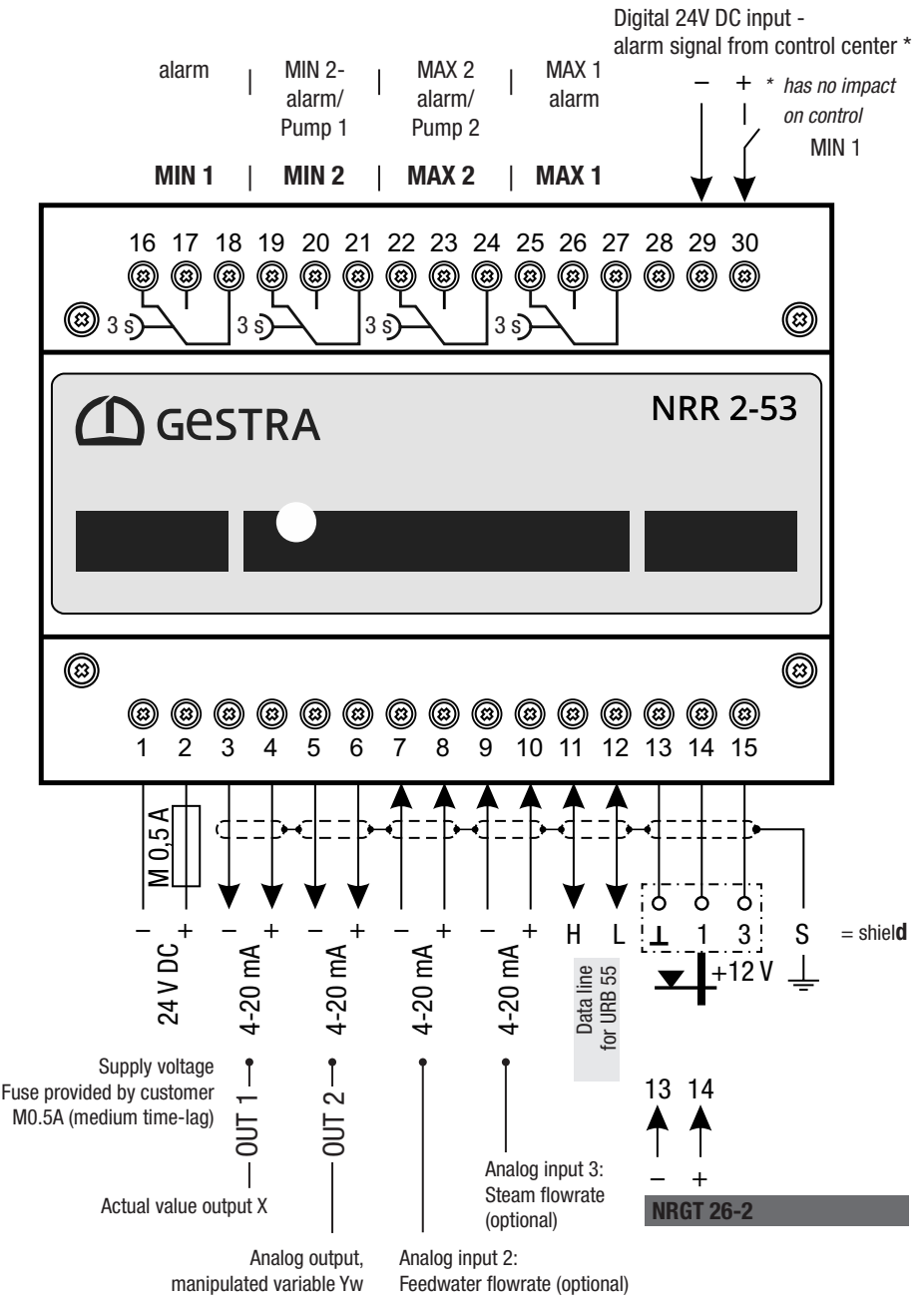


Fig. 19

Electrical connection of the NRR 2-52, NRR 2-53

Connecting the 24 V DC power supply

- The NRR 2-52 or NRR 2-53 level controller is supplied with 24 V DC.
- A safety power supply unit that delivers a Safety Extra Low Voltage (PELV / CLASS2) must be used to supply the equipment with 24 V DC.
- Use a 0.5A medium time-lag fuse as an external fuse.

Connecting the output contacts

- Connect the outputs as shown in the wiring diagrams in **Fig. 18** / **Fig. 19**.
- Only use the terminals specified in the wiring diagrams.
- Use a 2.5A slow blow fuse to protect the switching contacts.

Notes on connecting inductive loads

All connected inductive loads, such as contactors and actuators, must have interference suppression using RC combinations in accordance with the manufacturer's specification.

Connecting the level electrode/level transmitter

- Use a shielded, multi-core TC-ER control cable with minimum wire size AWG18, e.g., OELFLEX CONTROL TM CY 5G1.
- Maximum cable length = 328 ft (100 m).
- Connect the shield as shown in the wiring diagrams.
- Route connecting cables separately from power cables.

Connecting the actual value output OUT1 and analog output OUT2 (4 - 20 mA)

- Please note the load resistance of max. 500 Ω.
- Use a shielded, multi-core TC-ER control cable with minimum wire size AWG18, e.g., OELFLEX CONTROL TM CY 3G1.
- Maximum cable length = 328 ft (100 m).
- Route connecting cables separately from power cables.

Connecting the digital input (terminals 29/30)

- Alarm signal displayed on the alarm page of the URB 55. (Ext. alarm input, see page 32).
- Maximum cable length = 98 ft (30 m).

Connecting the potentiometer (0 - 1000 Ω)

- Use a shielded, multi-core TC-ER control cable with minimum wire size AWG18, e.g., OELFLEX CONTROL TM CY 3G1.
- Maximum cable length = 328 ft (100 m).
- Route connecting cables separately from power cables.

Connecting the data line between the level controller and the URB 55

A pre-wired control cable with socket is supplied for connecting the equipment. For terminal assignment, see wiring diagram **Fig. 18**, **Fig. 19.**

- If you are not using the pre-wired control cable, you must use a shielded, twisted-pair control cable with minimum wire size AWG23 (0.25 mm^2), e.g., LIYCY 2 x AWG23 (0.25 mm^2).
- Maximum cable length 98 ft (30 m).
- Wire the terminal strip as shown in the wiring diagram, **Fig. 18**, **Fig. 19**.
- Wire the 9-pole D-Sub connector as shown in **Fig. 17**.
- Connect the grounding point of the enclosure (URB 55) to the central grounding point in the control cabinet. Connect the shield just once to the central grounding point in the control cabinet.
- Route connecting cables separately from power cables.

Connecting the SPECTOR*modul* system

Using the supplied data cable [16 ft (5 m)], connect the URB 55 to the first controller in the system. If the system has a second controller, position this immediately next to the first controller and connect terminals 11 and 12 of the two controllers to one another as follows:

- Terminal 11 (controller 1) to terminal 11 of controller 2
- Terminal 12 (controller 1) to terminal 12 of controller 2

Changing the equipment settings

⚠ DANGER

Danger of death from electric shock! Do not touch live connections on terminal strips.

- 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.

If necessary, you can change the input and function of the NRR 2-52, NRR 2-53 level controller at any time using code switch Ⓓ (see **Fig. 20**).

Make changes before installing the level controller, when access is easier.

You will need the following tools:

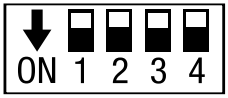
- Flat blade screwdriver, size 3/32 in (2.4 mm), fully insulated
- Pozidriv screwdriver size PZ1, fully insulated

Proceed as follows:

1. Switch off the supply voltage to the equipment or plant.
2. Unscrew and pull off the lower terminal strip, see **Fig. 10**.
3. Set code switch Ⓓ (see **Fig. 10**) as desired, see **Fig. 20**.
4. When your changes are complete, put the terminal strip back on and screw in place.

Changing the equipment settings

Code switch Ⓓ - sliding switch, white



NRR 2-52, NRR 2-53 level controller

Code switch Ⓓ				
S1	**S2**	**S3**	**S4**	**Configuration**
	OFF			**Fill control (factory setting)**
	ON			Drain control
		OFF		**N/A**
		ON		Input for connecting an NRGT 26-x (level transmitter)

Fig. 20

Setting the measuring range

⚠ DANGER

An incorrectly calibrated level electrode is a danger to plant safety.

Before bringing the level controller into service, set the active measuring range of the connected level electrode by calibrating the lower and upper bounds.

For your measurement of the fill level, set the lower bound (0% calibration value) and upper bound (100% calibration value) of the measuring range of the connected level electrode. This will give you the necessary active measuring range as a percentage of the boiler level.

You can determine these values for the connected level electrode by performing calibration.

Setting the measuring range for the NRGT 26-2 level transmitter

When connecting the NRGT 26-2 level transmitter, you need to set the upper and lower bounds of the measuring range on the transmitter.

Status display of the NRR 2-52, NRR 2-53

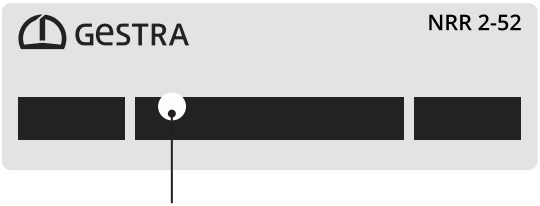


Fig. 21

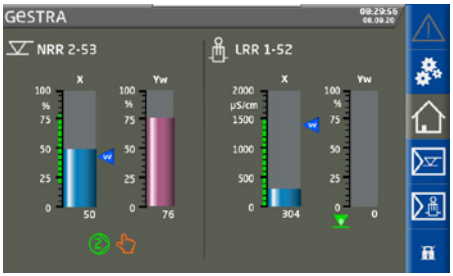
Multicolor LED (amber/green/red),
amber = power up/green = running/red = malfunction

Visual display and operating unit URB 55

Switching on the supply voltage

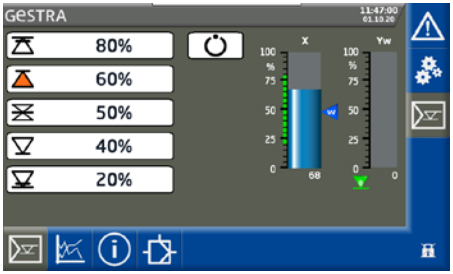
Please switch on the supply voltage for the NRR 2-5x level controller and/or LRR 1-5x conductivity controller and for the URB 55 visual display and operating unit.

- For the level controller(s), the LED first lights up amber, then green.
- The home screen of the URB 55 visual display and operating unit appears.
- If two controllers are connected to the visual display and operating unit, both controllers will be shown, see example.



If you tap one of the controller overview screens, a full screen for that controller will open on the display, see screenshot below.

- If just one controller is connected, the home screen of this controller will be shown (example).

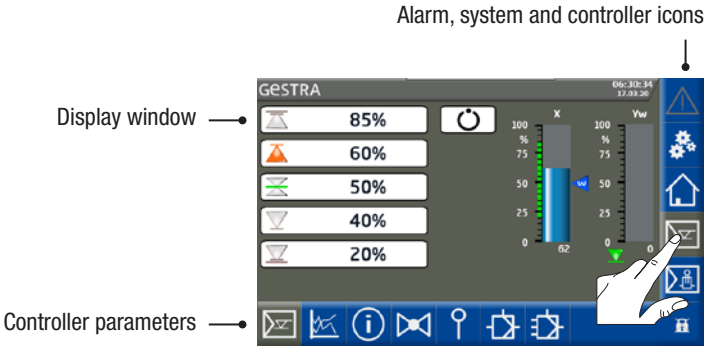


Operation and navigation

The URB 55 is operated in situ using the color touchscreen or via Ethernet using remote software.

User interface (example)

The URB 55 visual display and operating unit shows parameters, operating states, etc. on a display. The user interface of the URB 55 is divided into three areas:



- The display window shows operating states and actual values.
- The various parameter screens are opened via the icons. These icons change dynamically and are either shown or hidden, depending on the current page and configuration.
- All entries and actions, e.g., opening setup menus and parameter screens, are initiated by tapping the buttons and input fields. The active screen has a gray background, see above.
- You can close smaller windows that appear by touching the screen outside of the window.

Color coding of input and status fields

Background color	Description, function
Gray	Unavailable/static
White	Input field
Green	Status information, On, OK status
Red	Status information, Alarm status

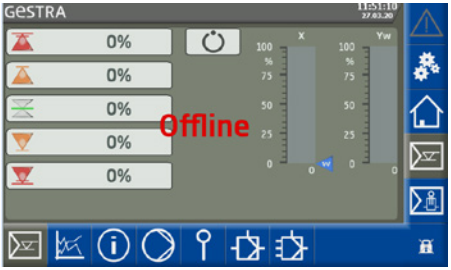
Fig. 21

Operation and navigation

Automatic functions

If you do not input anything on the display for 10 minutes, the brightness is automatically dimmed and you will be logged off.

- If you do not input anything on the display for one hour, the program automatically returns to the home screen.
- If communication to the controller is disrupted, the message “Offline” appears in the general display area.

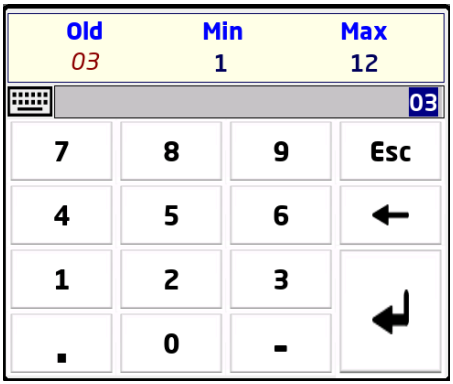


Entering parameters using the virtual keypad

Tapping an input field opens a numeric virtual keypad.

The keypad shows the old value (Old) and the limits (Min/Max).

Your entries must remain within these limits.



Function keys:

← Delete last digit.

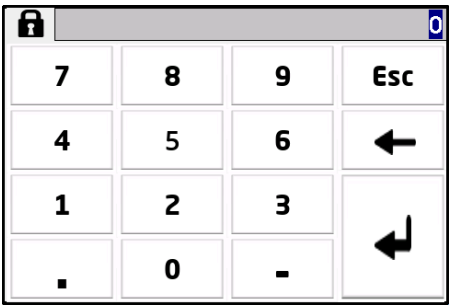
↵ Confirm entry.

Esc Discard entries and close keypad.

Operation and navigation

Entering parameters with password protection

Password protection prevents parameters and settings from being changed by unauthorized persons. The password prompt appears automatically when you tap an input field.



If you do not input anything for 10 minutes, you will be logged off again.

Factory-set password:

- Password = 111

Recommendation for initial setup

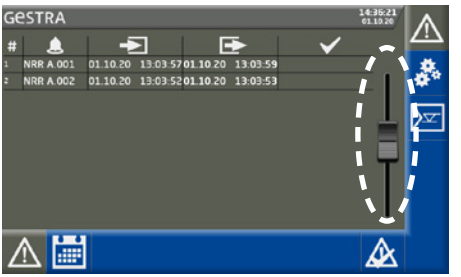
Log on using the factory-set password, then safeguard your system by creating your own password.

Disabling parameter entry after successful login

-  Parameter entry can be disabled by tapping the struck-through padlock icon at the bottom right. The icon appears after you have logged in successfully.

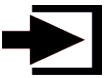
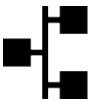
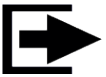
Scroll bar for long lists and menus

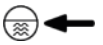
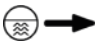
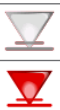
You can use the scroll bar to navigate up and down long lists and menus in order to select the desired parameters.



Scroll bar

Icons and functions of the NRR 2-52, NRR 2-53

Icon	Description	Icon	Description
	Alarm		Pump (mode) Only pump or valve mode is possible!
	Setup/settings		Valve (mode) Only pump or valve mode is possible!
	Home screen		Controller parameters
	Level controller		3E controller parameters
	Conductivity controller		Open valve
			Close valve
	Logged in with password/ Log off		Alarm history
	Info		Reset alarm
	Time		Alarm number
	Password		Alarm coming
	Network		Alarm going
	Modbus TCP overview (optional)		Reset alarm

Icon	Description	Icon	Description
	New password		Valve/electrode raw value
	Confirm new password		Neutral zone
	Discard entry/Cancel		Water (flowrate)
	Apply entry/Confirm entry		Steam (flowrate)
	Switch on		Fill control
	Switch off		Drain control
	Datalog/Trend		Pump OFF threshold
	Electrode calibration		Pump ON threshold
	Set point		Stop pump in manual mode
	Manual (mode)		Start pump in manual mode
	Max alarm switchpoint Off/On		Automatic
	Min alarm switchpoint Off/On		Relay test
	Max switchpoint	Pb	Proportional band
	Min switchpoint	Ti	Reset time
	Set point	Tt	Valve runtime

Icon	Description	Icon	Description
	Pump 1 On		Pump 2 On
	Pump 1 Off		Pump 2 Off
	Forced pump switchover		

Fig. 22

Home screen of NRR 2-52, NRR 2-53 level controllers

The home screen provides an overview of the controller status and parameters. Bar charts display current readings and change color depending on their status. This enables you to rapidly assess the plant status.

Icons on the bar charts indicate the status of the connected electrode.

In the lower part of the screen, buttons are shown or hidden depending on the current configuration.

Opening the parameter screens:

Use the following buttons to open the controller parameter screens:

Switchpoints,
see page 45

Trend,
see page 45

Test/Controller information
see page 45

Valve control,
see page 45

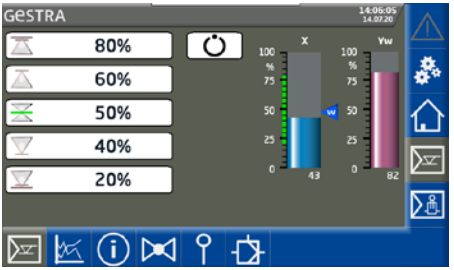
or

Pump control
see page 45

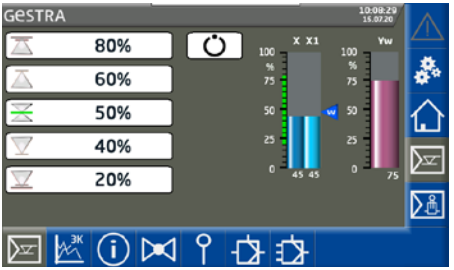
Boiler level calibration,
see page 45

Set controller parameters,
see page 45

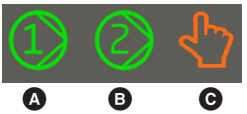
Set 3E controller parameters,
see page 45



Home screen of a 3-element (3E) controller (example)



Further icons appear below the bar charts, depending on the configuration. These are explained in the sections below.



- **A** Pump 1 On
- **B** Pump 2 On
- **C** Manual (mode)

Alarm and fault indications

Status and color of warning triangle:

- **Yellow, flashing**
  Active alarms are present that have not been reset.
- **Yellow, on continuously**
  Active reset alarms are present.
- **Gray**
  No alarms are active.

Opening the alarm and error list

Open the list of active alarms.

Description of the alarm and error list

Alarms and fault indications are entered in the columns (Coming, Going, Reset) with a time stamp. The most recent alarm is always shown at the top of the list.

Description of display:

The alarms are stored in the list with a code:

A = alarm / E = error

Coming

Time at which the event occurred.

Going

Time when the event ended.

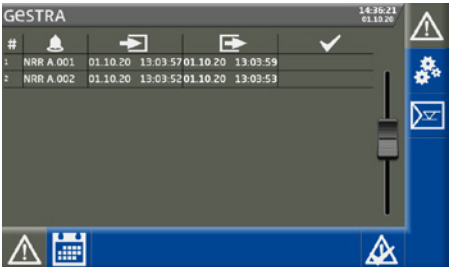
Reset

Date and time the event was reset.

Options:

Reset alarms and errors. Finished “alarms” are deleted after they have been reset.

Open the alarm history, see page 46.



Description of error codes for controller, see page 46.

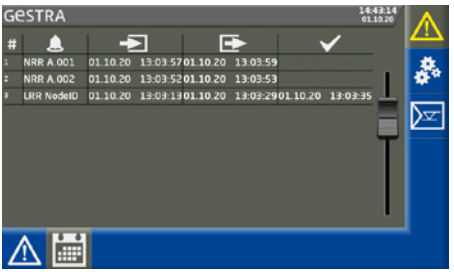
Alarm and fault indications

Opening the alarm history

All alarms are stored in the alarm history. The memory can hold 300 alarms.

Alarms are stored cyclically and are restored after a power failure.

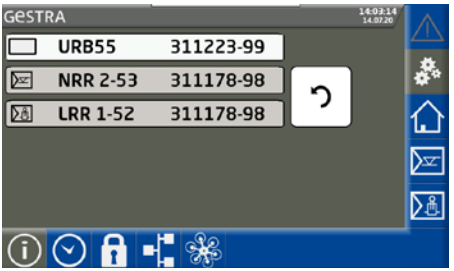
Open the alarm history.



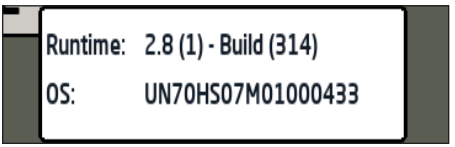
System settings

Tapping the icon opens the menu containing the list of all connected controllers.

The current equipment firmware is also shown.



URB 55 Tap the line containing the URB 55 for > 2 s to see the runtime and OS of the URB 55.



Opening further menus:

System information

Setting the date/time

Password

Network settings

Open Modbus TCP list (optional)

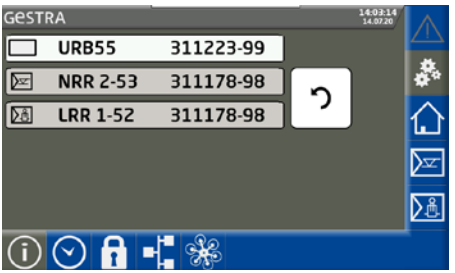
System information

Open the "*System Information*" menu and select the desired action.

Description of display:

The connected controller(s) are shown with their software version.

Press the button to update a system or view installed (new) equipment.

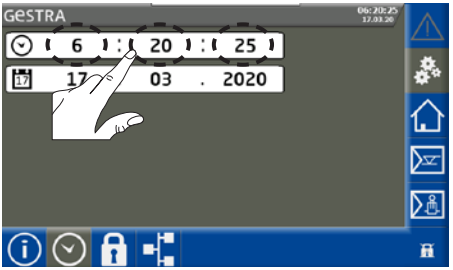


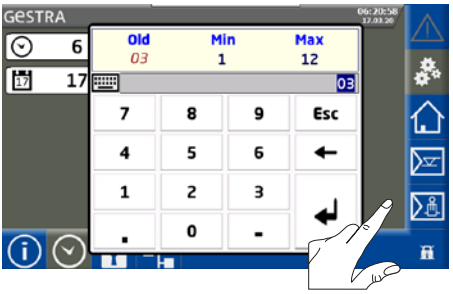
Setting the date/time

Open the "*Date/Time*" menu and enter the desired settings.

Description of display/settings:

- **Time / Date**
  Tap the appropriate field and set the date and time.
  Confirm these changes to apply them.





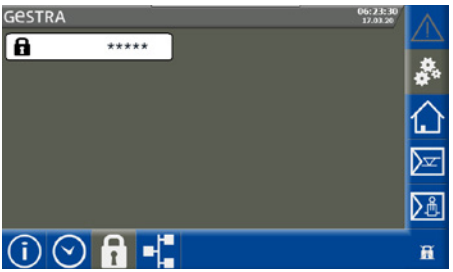
Password

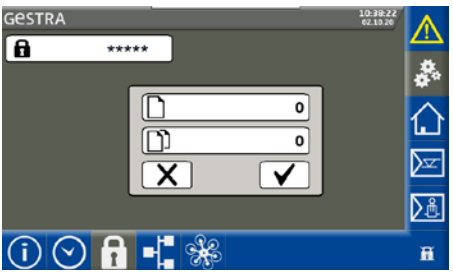
Open the "*Password*" menu.

Factory default setting: **111**

Changing your password:

1. Tap the input field.
2. Enter the new password in the top line and confirm it by entering it again in the second line.

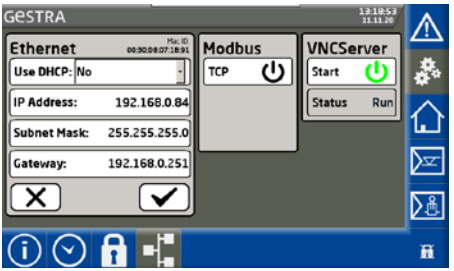




Network settings

Open the "*Network settings*" menu.

Set the network to suit your local requirements and, at the end, confirm your settings.



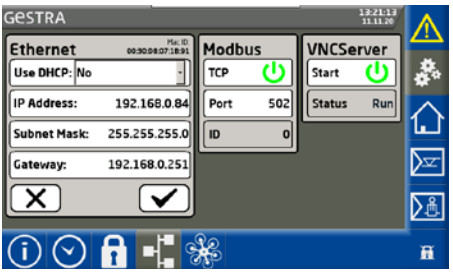
Description of display:

- **Use DHCP:**
  - **No**: Static IP address
  - **Yes**: The IP address is obtained via DHCP
- **IP Address**
  The IP address of the URB 55.
- **Subnet mask**
  The current subnet mask.
- **Gateway**
  The IP address of the gateway.

Data exchange via Modbus TCP

The URB 55 visual display and operating unit has a Modbus TCP server. This enables all values to be forwarded to a higher-level control system or control center.

For Modbus communication, switch on the connection using the TCP On button.



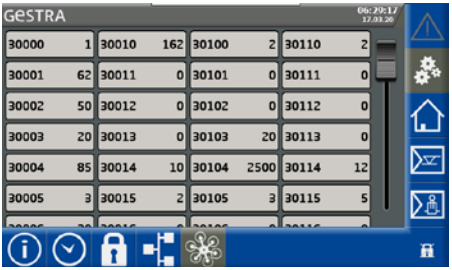
Parameter:

- Modbus ID: 0
- Port: 502
- Modicon Modbus: 1-based

Data exchange via Modbus TCP

If Modbus communication has been switched on, you can open the dynamic datapoint list.

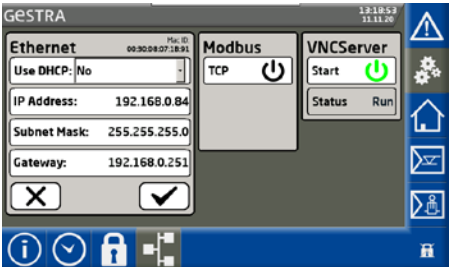
- The raw data from the register is shown on this screen. There is a scroll bar at the side for scrolling through the data.
- You can find the latest datapoint list on our website at: http://www.gestra.com/documents/brochures.html



VNC server / Remote software

The URB 55 can be operated remotely from a PC using VNC remote software, e.g., UltraVNC Viewer. This allows a 1:1 display of the URB 55 on the computer.

To access the URB 55, use the previously set network parameters. You also need to switch on the service.



Configuring the level controller

Setting the MIN/MAX switchpoints and set point

Open the parameter screen.

Example: NRR 2-53 level controller

Description of parameters:

MAX alarm switchpoint

MAX switchpoint

Set point

MIN switchpoint

MIN alarm switchpoint

For each switchpoint, press the relevant button and enter the required value using the virtual keypad.

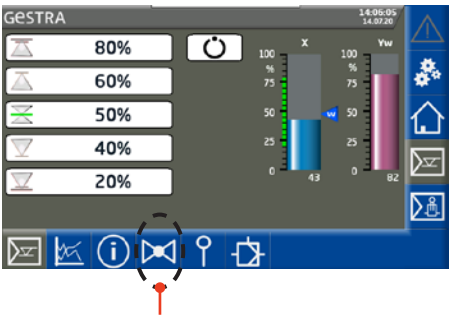
The icons in the buttons change color to indicate switchpoints/ alarm points that are too high or too low.

Description of bar charts:

X	Actual value (uncompensated)
X1	Actual value (compensated), 3E controller (not shown here)
W	Set point
	The set point is shown with a small arrow in the actual value bar chart.
Yw	Manipulated variable

Change of color on alarm

The bar chart column turns red in the event of an alarm.



Icons and functions that vary depending on configuration:

Valve controller

If the controller is configured as a valve controller, valve actuation after Closed/Open is shown by green valve icons on the manipulated variable bar chart.

Pump controller

If the controller is configured as a pump controller, the pump icon is shown when the pump is active.

Configuring the level controller

Automatic/Manual mode

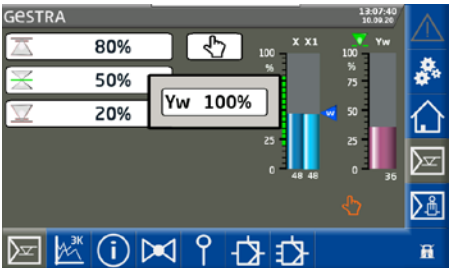
The controller is normally in automatic mode. Press the button to switch the controller to manual mode.

Here, if the controller is configured as a valve controller, an input field opens in which you can enter the valve position or manipulated variable.

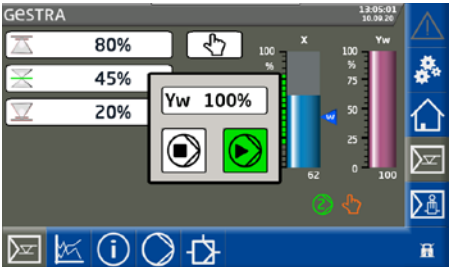
If the controller is configured as a pump controller, the manipulated variable is entered and the pump is switched on / off.

Manual mode is not disabled automatically.

Valve control in manual mode (example)



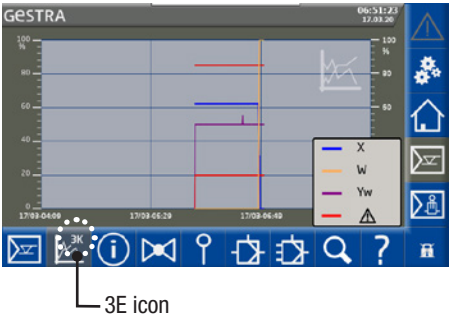
Pump control in manual mode (example)



Configuring the level controller

Trend log

Open the trend log.



3E icon

Description of display

The trend log shows the characteristic curve of the actual value (X), set point (W), manipulated variable (Yw) and alarm limits (⚠) over a 7-day period.

Options:

Open the associated key.

Open a menu bar with further functions:

Navigation:

Navigate forwards and backwards on the time axis using these buttons or by swiping horizontally

Zoom in/out using these buttons or two fingers (pinch gesture)

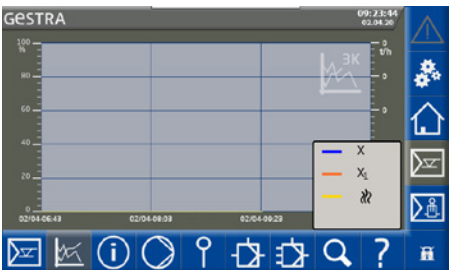
Close the window

Trend log for a 3E controller

If the controller is configured as a 3E controller, the parameters are also shown as a trend. Here, the 3E icon (see white circle above) is additionally shown in the Trend button.

Press this button to view the 3E trend.

You will then see the actual value (X), corrected actual value (X1), steam flowrate and, as an option, the water flowrate.



Configuring the level controller

Test - Testing the relays of the connected level controller

Open the Info/Test menu to test the alarm and switching contacts of the connected controller.

Press and hold the button to initiate the relay test (3-second delay).

This causes actual tripping of relay contacts in the controller.

The relevant icons are shown in the top part of the screen, depending on the configuration (example).

As long as you press the button, the relay in the level controller remains active.

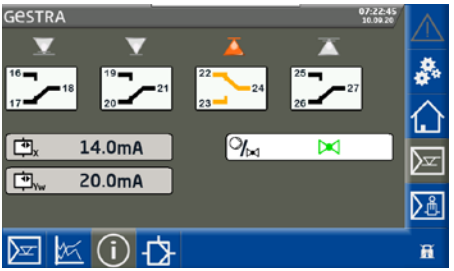
Actual value output (X) 4 - 20 mA Out 1 *

Manipulated variable output (Yw) Pump(s) 4 - 20 mA Out 2 *

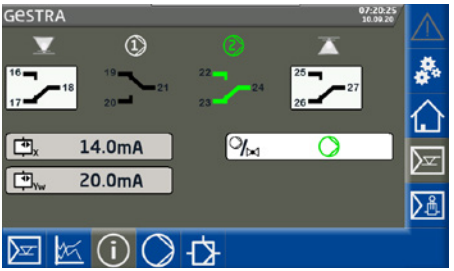
Switch between valve and pump control *

* Controller software version 311178.13 or later

Valve control (example)



Pump control (example) *



Valve calibration in manual mode when a feedback potentiometer is connected

Even with a feedback potentiometer connected to the controller, the valve runtime still needs to be established and entered precisely.

Open the “Valve” menu.

Active parameters when a feedback potentiometer is connected to the NRR 2-52 level controller:

Tt **Valve runtime (NRR 2-52 only), see page 56**

100% (OPEN) / 0% (CLOSED)

Calibrated valve positions.

The calibrated raw data is shown in both fields.

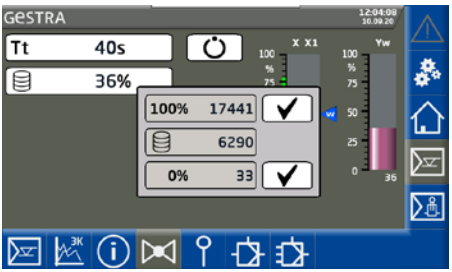
Raw data

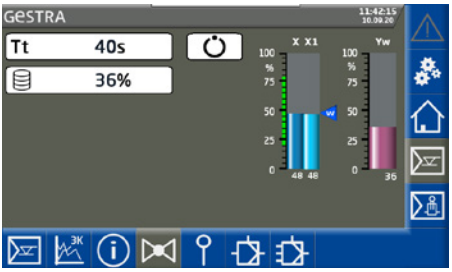
Indicates the current digital valve position.

Auto / Manual

Switch between automatic and manual mode.

If no feedback potentiometer is connected to the level controller, the parameters are not displayed.





1. Press the Automatic button and switch to manual mode.
2. Yw 0% — Enter “0%” as the manipulated variable (Yw).
3. When the valve is in the (CLOSED) end position, confirm this position.
4. 0% 6490 — The raw data from the central field is automatically entered in the 0% (CLOSED) field.
5. Yw 100% — Next, enter “100%” as the manipulated variable (Yw).
6. When the valve is in the (OPEN) end position, confirm this position.
7. 100% 26075 — The raw data from the central field is automatically entered in the 100% (OPEN) field.

Configuring the level controller

Pump control *

If the controller is configured as a pump controller, a maximum of two pumps can be operated

Open the “Pump” menu.

Description of parameters:

Pump 1 / 2 (⏻ On/Off)

Enable a connected pump so it is ready for operation.

ON threshold

Set the value at which the pump turns on.

OFF threshold

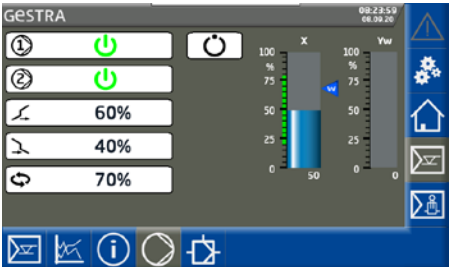
Set the value at which the pump turns off.

Forced switchover

Set the value (level) at which an automatic change of pump must take place.

Description of bar chart

The(Yw) bar chart shows the manipulated variable of the controller output (4 - 20 mA) normalized to 100%.



* Controller software version 311178.13 or later

Configuring the level controller

Calibrate the boiler level (for NRG2.-.. ONLY)

Open the "*Electrode*" menu.

Description of parameters:

Raw data

Indicates the current digital boiler level.

100% (calibration point) / 0%

Calibrated boiler levels.

The calibrated raw data is shown in both fields, 100% and 0%.

Calibration point

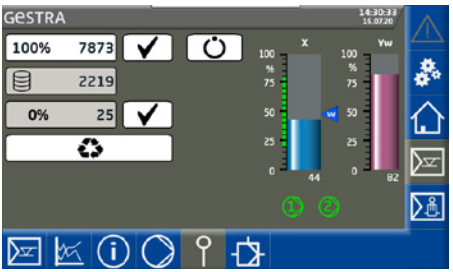
The desired calibrated level can be set between > 25% and 100%.

Replacing a level controller

If a level controller needs to be replaced, this function can be used to transfer level calibration values to the new controller. To do this, enter the data in the 0% and 100% fields.

Only applies if you are using the NRG 2.. as the electrode.

If you are using the NRGT 26-2, calibration takes place on the NRGT 26-2. In this case, the electrode icon is not visible.



Performing calibration:

Go to or calibrate the 0% range.

Calibration may be performed in any order.

1. Press the Automatic button and switch to manual mode.
2. **0%** Reduce the boiler level to 0%.
3. When this level is reached, confirm it.

   The raw data is automatically entered in the **0%** field.
4. **100%** Fill the boiler up to the defined calibration point xxx%.

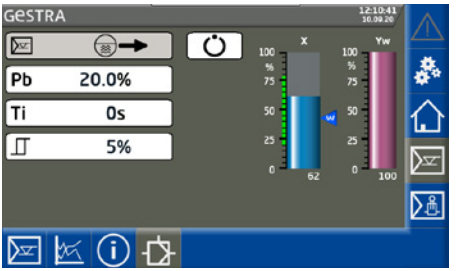
   The calibration point can be defined within the limits > 25% to 100% using interpolation.
5. When this level is reached, confirm it.

   The raw data is automatically entered in the **100%** field.

Configuring the level controller

Setting the level controller

Open the control parameter screen.



Description of parameters:

Direction of corrective action (fill)

Direction of corrective action (drain)

Control is set for either filling or draining.

Set the direction of corrective action using the code switch on the level controller, see page 59.

Guide to setting control parameters

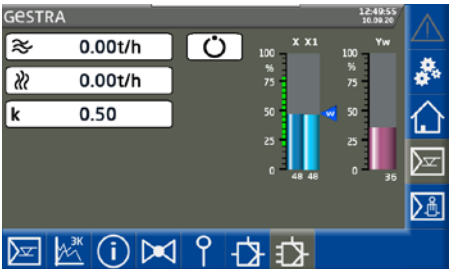
Parameter		Control deviation	Control valve
Proportional band **Pb**	> larger	Large remaining deviation	Reacts slowly
	< smaller	Small remaining deviation	Reacts quickly and may open/close continually
	Example:	Measuring range 100% = 7.87 in (200 mm) from sight glass Set point SP = 80% of measuring range = 6.3 in (160 mm) Proportional band Pb = +/- 20% of set point = +/- 1.26 in (32 mm) With the measuring range and set point mentioned above, the proportional band is then +/- 16% = +/- 1.26 in (32 mm) or in the range 5.04 in (128 mm) to 7.56 in (192 mm).	
Reset time **Ti**	> larger	Slow correction of deviations	Reacts quickly
	< smaller	Fast correction of deviations, the control loop may tend to overshoot	Reacts slowly
Neutral zone	> larger	Correction of deviations starts with a delay	In this range, the manipulated variable does not change. Only reacts when the control deviation is larger than the “neutral zone”.
	< smaller	Correction of deviations starts rapidly	
Valve runtime **Tt**	*For NRR 2-52 only*		Establish the real valve runtime in seconds, e.g., from “Closed” to “Open” (0 - 100%).

Fig. 23

Configuring the level controller

Setting the level controller for 3-element control

The 3E controller icon appears only if a controller of this type is used in the system.



Open the screen showing the 3E control parameters.

Description of parameters:

Feedwater flowrate

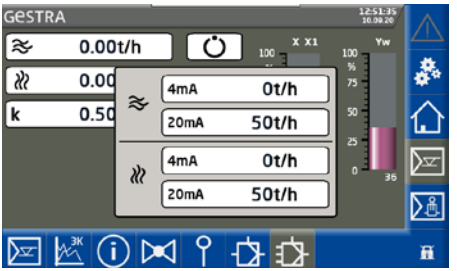
Steam flowrate

k **Quality factor**

This factor assesses to what extent the difference (steam flowrate - feedwater flowrate) influences the measured level.

When one of the parameters is selected, the following window opens.

For each type of flowrate, enter the measuring range of the connected sensors for the analog signal inputs (4 mA / 20 mA).



System malfunctions in the URB 55

Indication of system malfunctions in the alarm and error list using error codes

Error codes for the NRR 2-52/NRR 2-53 level controllers		
Error code	**Possible errors**	**Corrective action**
A.001	Above MAX switchpoint	-
A.002	Below MIN switchpoint	-
A.003	External alarm input triggered	Controller software version 311178.13 or later
E.005	Measuring voltage < 0.5 V DC	Check level electrode and replace if necessary Check electrical connection
	Measuring current < 4 mA	
E.006	Measuring voltage > 7 V DC	Check level electrode and replace if necessary Check electrical connection
	Measuring current > 20 mA	
E.011	Calibration points implausible/ wrong way round Valve: CLOSED (0%) > OPEN (100%)x	Recalibrate the potentiometer on the control valve
E.012	Lower and upper bounds of measuring range changed round	Reset the measuring range
E.013	Switchpoints implausible MIN > MAX	Reset the switchpoints
E.015	Steam flowrate measuring current < 4 mA	Check steam flowrate current transmitter and replace if necessary Check electrical connection
E.016	Steam flowrate measuring current > 20 mA	Check steam flowrate current transmitter and replace if necessary Check electrical connection
E.017	Feedwater flowrate measuring current < 4 mA	Check feedwater flowrate current transmitter and replace if necessary. Check electrical connection
E.018	Feedwater flowrate measuring current> 20 mA	Check feedwater flowrate current transmitter and replace if necessary Check electrical connection
E.025	Pump 1 output too low or pump faulty	Check controller parameters and pump switching thresholds Check pump electrical connection Replace pump if necessary
E.026	Pump 2 output too low or pump faulty	

All error codes from E.001 to E.027 not listed here are available as reserves

Fig. 24

System malfunctions in the URB 55

Common faults and issues during use of the URB 55

USB stick cannot read/write files
Remedy:
■ Reboot the URB 55 with the USB stick inserted and perform the desired action again. ■ The USB stick must have the file format FAT32. ■ The USB stick may not be suitable for the data transfer.

The home screen remains blank
Remedy:
■ The URB 55 is not correctly connected to the data interface. The conductivity controller is not switched over when two units are connected.

Incorrect parameter display
Remedy:
Reboot the URB 55.

System malfunctions in the NRR 2-52, NRR 2-53

Causes

System malfunctions occur if components have been incorrectly installed or configured, if the equipment has overheated, if there is interference in the supply network or 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?
- Do the signal lines have the correct polarity?

Level controller configuration:

- Are the inputs and functions correctly set on code switch Ⓓ?

Electrode configuration:

- Are the electrodes correctly set and has the measuring range been calibrated?

⚠ 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, removal).
- Disconnect all poles of the supply cable from the mains and secure so it cannot be switched back on.
- Check that the plant is not carrying live voltage before commencing work.

What to do in the event of system malfunctions

Checking installation and function

When you have corrected system malfunctions, perform a function test as follows.

- Check installation and function
- Check settings

In the event of malfunctions or errors that cannot be corrected with the aid of this Installation & Operating Manual, please contact our service center or authorized agent.

Taking the NRR 2-52, NRR 2-53 out of service

1. Switch off the supply voltage and switch off the voltage to the equipment.
2. Check that the equipment is not carrying voltage.
3. Unscrew and pull off the upper and lower terminal strips, see **Fig. 10** Ⓐ; Ⓑ
4. Release the slider holder on the base of the equipment and detach the level controller from the support rail.

Taking out of service URB 55

1. Switch off the supply voltage and secure so that it cannot be turned on again.
2. Unplug the mains connector from the equipment.
3. Unplug all plug and socket connections.
4. Unscrew the screws and remove the retaining clips.
5. Carefully push the unit out of the cutout in the door of the control cabinet.

Disposal

Dispose of the level controller and the visual display and operating unit in accordance with statutory waste disposal regulations.

UL components

NRR 2-52 and NRR 2-53 level controllers are registered under XACN.E513189. The URB 55 visual display and operating unit is registered under E514624.

For your notes

For your notes

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