GESTRA®

Level Switch

NRS 1-50

For **TWO** electrodes

EN (USA)
English

Original Installation &
Operating Manual
850694-00

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Content of this Manual

Product:

- Level Switch NRS 1-50, for TWO electrodes

First edition:

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Scope of supply, product package

NRS 1-50
1 level switch NRS 1-50
1 Installation & Operating Manual

How to use this Manual

This Installation & Operating Manual describes the correct use of the NRS 1-50 level switch. 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

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.

NRGT .. / NRR.. / NRS.. / URS .. / URB .. / SRL .. / etc.

Equipment and type designations of GESTRA AG.

SELV

Safety Extra Low Voltage

Operating point (of the plant)

The operating point describes the operating parameters within which a plant or boiler is operated in its nominal range. In a steam boiler, for example, these parameters would be output, pressure, and temperature.

The design data may be a lot more stringent, however.

A boiler that is operated at 145 psi (10 bar) and 356°F (180°C) may be designed to withstand a pressure of 870 psi (60 bar) and a temperature of 527°F (275°C), for example, which is therefore not necessarily its operating point.

Usage for the intended purpose

The NRS 1-50 level switch is used in conjunction with NRG 1...-50 level electrodes as a water level limiter for steam boilers and hot water installations.
Water level limiters switch off the heating when the water drops below the set low water level (LW). The NRS 1-50 is classified as a protective control Class B (C) in accordance with UL 60730-1.
When used as intended, the NRS 1-50 level switch is combined in a circuit with the level electrodes stipulated by the directives or standards below:

Level electrodes NRG 1...-..			
UL 60730-2-15, CAN/CSA E60730-2-15	NRG 16-50	NRG 17-50	NRG 19-50

Applicable directives and standards

The equipment 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

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 plant before performing connection work.
- Check that the plant is not carrying live voltage before commencing work.



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

- The NRS 1-50 level switch may only be repaired by the manufacturer, GESTRA AG.
- 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	The equipment may only be installed, wired and brought into service by qualified and competent staff.
Operation	Boiler service technician	Staff trained by the plant operator.
Maintenance work	Specialist staff	Fitting and maintenance work may only be performed by authorized staff who have undergone specific training.
Refits	Specialist staff	Persons trained by the plant operator to work with pressure and temperature.

Notes on product liability

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

Function

The NRS 1-50 level switch is designed for boiler water conductivities of >=10 µS and for the connection of two or one level electrode(s).

If the water falls below the minimum level, the level electrodes are exposed and an alarm is triggered in the level switch. This switchpoint is determined by the length of the electrode extension (level electrode NRG 1...-50).

When the off delay has elapsed, the two output contacts of the level switch open the safety circuit for heating. The heating cut-off is interlocked in the external safety circuit and this interlock can only be deactivated again when the level electrode is immersed once more. The NRS 1-50 level switch must be used in combination with an external manual reset when used as a protective device per ASME CSD-1

In addition, two signal contacts for external signaling devices close without a delay. An alarm is also triggered if faults occur in a level electrode and/or the electrical connection.

If the level electrode is installed in a level pot outside the boiler, make sure the connection pipes are sufficiently large.

The manufacturer recommends connection pipes of ≥ 1.57 in (40 mm) for steam and ≥ 3.94 in (100 mm) for water. If smaller connection pipes or fittings are used, these shall not be smaller than 1-inch NPS. The level pot must have a suitable flushing device at its lowest point. This device flushes the connection pipes to the boiler and enables the function of the water level limiter to be tested. No shut-off valves of any type shall be placed in the piping between the boiler and the low water cutoff.

An automatic self-test monitors the safety functions in the level switch and the level electrodes. In the event of a fault, the safety circuit opens without a delay and switches the heating off.

Alarm and fault indications are displayed by LEDs, and furthermore a signal output is actuated without delay for each level electrode. An alarm can be simulated by pressing a button.

Technical data

Supply voltage
24 VDC +/–20%, 0.3 A; SELV / PELV / CLASS2
100 – 240 VAC +10/–15%, 47 – 63 Hz, 0.2 A (optional)

Fuse
External 0.5A; UL category JDYX, e.g., RND 170-00012

Power consumption
7 W

Response sensitivity [Water conductivity at 77 °F (25 °C)]
> 5 ... < 5000 ppm (> 10 ... > 10000 µS/cm)

Level electrode connection
2 inputs for NRG 1...-50 level electrode, 4-pole with shield

Safety circuit
2 volt-free NO contacts, 6 A 250 V AC / 30 V DC cos $\varphi = 1$.
Off delay 3 seconds.
Inductive loads must have interference suppression (RC combination) as specified by the manufacturer.

Signal output
2 volt-free outputs for external signaling without delay, 24 V DC, max. 100 mA (semiconductor output).

Indicators and controls
2 buttons for testing and diagnosis,
2 red/green LEDs for indicating operating state and alarm.
3 red LEDs for fault diagnosis,
2 2-pole code switches for setting the number of electrodes.

Terminal box
Terminal box material: base of black polycarbonate, front of gray polycarbonate
Wire size: 1 x AWG12 (4.0 mm^2) solid, or
1 x AWG14 (2.5 mm^2) stranded with sleeve acc. to DIN 46228, or
2 x AWG16 (1.4 mm^2) stranded with sleeve acc. to DIN 46228
Terminal strips can be removed separately
Terminal box attachment: Mounting clip on support rail TH 35, EN 60715

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

Protection
Terminal box: IP 40 according to EN 60529
Terminal strip: IP 20 according to EN 60529
As a UL open type, the equipment must be installed in a control cabinet.

Weight
Approx. 1.1 lb (0.5 kg)

Ambient temperature
at power-on 32 ° ... 131 °F (0 ° … 55 °C)
in operation 14 ° … 131 °F (-10 ° … 55 °C)

Transport temperature
-4 ° … 176 °F (-20 ° … +80 °C) (<100 hours), defrosting time of de-energized equipment before it can be put into operation: 24 hours.

Storage temperature
-4 ° … 158 °F (-20 ° … +70 °C), defrosting time of de-energized equipment before it can be put into operation: 24 hours.

Relative humidity
Max. 95%, non-condensing

Site altitude
Max. 6560 ft (2000 m)

Other information
Incorporated Type 2 action protective control Class B (C)
Pollution degree 2, impulse voltage 2500 V

Rating plate, identification

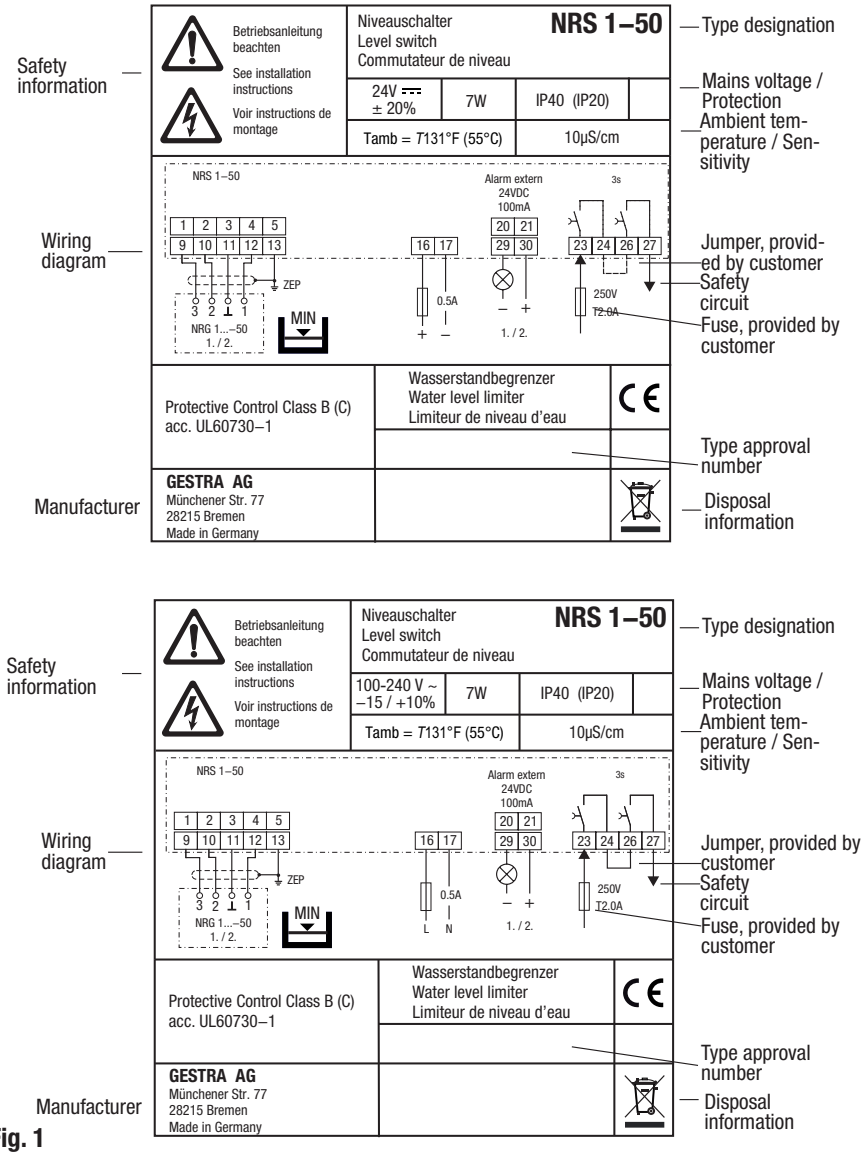


Fig. 1

c UL us OPERATING CONTROL E513189	Input rating: 24VDC, 7W
	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: NRG 16,17,19,111-11,-50,-50(F),NRG 16-36

c UL us OPERATING CONTROL E513189	Input rating: 100–240VAC, 7W	
	Frequency: 50/60Hz	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: NRG 16,17,19,111-11,-50,-50(F), NRG 16-36	

Fig. 2

Factory default settings

Level switch NRS 1-50

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

- Off delay: 3 s
- Configuration: Operation with two NRG 1 ...-50 level electrodes. Code switches ❹ and ❺ in OFF position **(Fig. 3)**

Dimensions of the NRS 1-50

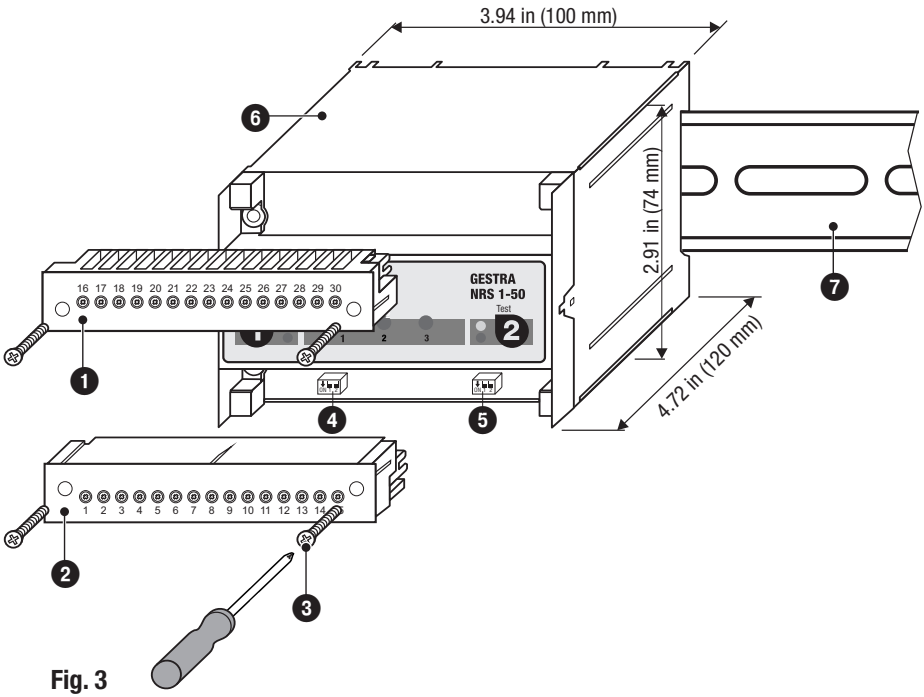


Fig. 3

The code switches are accessed by undoing the right and left fastening screws and detaching the lower terminal strip.

Key

1. Upper terminal strip
2. Lower terminal strip
3. Fastening screws (cross recess head screw M3)
4. Code switch for switching level electrode 1 or 2 on/off
5. Code switch for switching level electrode 1 or 2 on/off
6. Terminal box
7. Support rail TH 35, EN 60715

Important notes

Safety information

Water level limiters are classed as protective control according to UL 60730-1 and may only be installed, electrically connected and brought into service by qualified and competent staff.

Fitting and maintenance work may only be performed by authorized staff who have undergone specific training.



Danger

The terminal strips of the equipment are live during operation!
There is a risk of serious injury due to electric shock.
Always **cut off power** to the equipment before working on the terminal strips (installation, removal, connecting cables).



Attention

The rating plate indicates the technical features of the equipment. Do not bring into service or operate any equipment that does not bear its own specific rating plate.



Attention

Pay attention to regulations in your country, e.g., NEC, NFPA, CEC, when using this equipment.

Preparing for installation

If the control cabinet is to be installed outdoors, outside the protection of a building, environmental influences may adversely affect function.

- Pay attention to the admissible ambient conditions in the technical data, see page 1712.
- Do not operate the equipment if the temperature is below freezing.
  - ◆ At temperatures below freezing, use a suitable heat source (e.g., control cabinet heater, etc.).
- Connect all parts of the plant to a central grounding point to prevent equalizing currents.
- Use UV-resistant cable ducts for routing the connecting cable.
- Take further measures to protect the equipment from lightning, insects and animals, and salty air.

You will need the following tools:

- Pozidriv screwdriver PZ1

Installation

⚠ ATTENTION

Incorrect installation can lead to malfunctions in the plant or the level electrode.

The NRS 1-50 level switch snaps onto a TH 35, EN 60715 support rail in a control cabinet. **Fig. 3** ❼

Electrical connection

Supply voltage

Please provide the NRS 1-50 level switch with an external 0.5A fuse.

Connecting the level electrode

Please use the following to connect the level electrode(s):

- For an NRS 1-50 level switch with a response sensitivity of 5 ppm (10 µS):
  Use a shielded, multi-core TC-ER control cable with minimum wire size AWG18, e.g., OELFLEX CONTROL TM CY 5G1.

Wire the terminal strip as shown in the wiring diagram. Fig. 7. Connect the shields to terminals 5 and 13 and to the central grounding point **(CGP)** in the control cabinet.

Connecting the safety circuit

Please connect the safety circuit for the heating to terminals 23, 24 and 26, 27. If using the equipment as a water level limiter, please connect the output contacts of the two monitoring channels by adding a wire jumper between terminals 24 and 26.

Provide the output contacts with a slow blow T1A fuse.



Note

- In the event of an alarm, the NRS 1-50 level switch interlock does not take place automatically.
  If the installation requires an interlock, this must be implemented in the down-stream (safety) circuit.
- In order to guarantee Class C function with second fault protection in accordance with UL 60730-1, both signaling outputs must be monitored during interlock deactivation.
- It is important that the interlock is not deactivated when the level switch signals a malfunction to the diagnostic LEDs or the signaling outputs.

Electrical connection

Connecting the signal output

A signal output for connecting further external signaling devices, maximum load 100 mA, is allocated to each monitoring channel in the level switch. For connection, please use a control cable, e.g., 2 x AWG20 (0.5 mm^2). In the event of alarm and fault indications, the signal outputs (terminals 20, 21 and 29, 30) close without a delay.



Danger

- A safety power supply unit (SELV / PELV / CLASS2) must be used to supply the NRS 1-50 level switch with 24 V DC. This must provide a level of isolation against dangerous contact voltages that at least meets the requirements for double or reinforced insulation in accordance with UL 60730-1 (protective electrical isolation).



Attention

- Provide the NRS 1-50 level switch with an external 0.5A fuse.
- Connect the shields to terminals 5 and 13 and to the central grounding point **(CGP)** in the control cabinet.
- Provide the safety circuit with a slow blow T1A fuse to protect the switching contacts.
- Switching off inductive loads produces surges that can have a major adverse effect on open and closed-loop control systems. Connected inductive loads must therefore have interference suppression (RC combination) as specified by the manufacturer.
- Connect terminals 24 and 26 with a wire jumper.
- Route the connecting cables to the level electrodes and the logic unit separately from power lines.
- Do not use unused terminals as support terminals.
- If, despite the necessary measures being taken, one of the signaling outputs is activated when a relay closes (terminals 23, 24 and 26, 27), there may be a dangerous second fault. Check the equipment and replace if necessary.

Electrical connection

Wiring diagram of level switch NRS 1-50

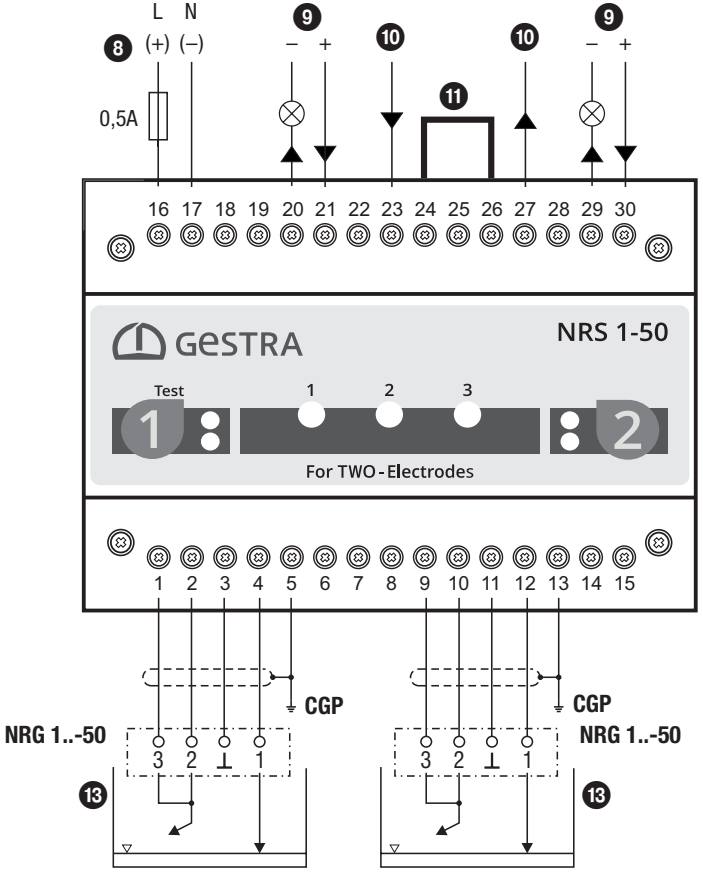


Fig. 4

Key

- **8** Supply voltage
- **9** Signal output 1 / 2 for external alarm 24 V DC, 100 mA (semiconductor output)
- **10** Safety circuit, input and output
- **11** Jumper, provided by customer
- **13** Level electrode NRG 1...-50

CGP Central grounding point in control cabinet

Electrical connection

Wiring diagram for Class C protection against second faults with automatic prevention of interlock deactivation in the event of malfunction. The Reset button is acting to the external lockout reset function

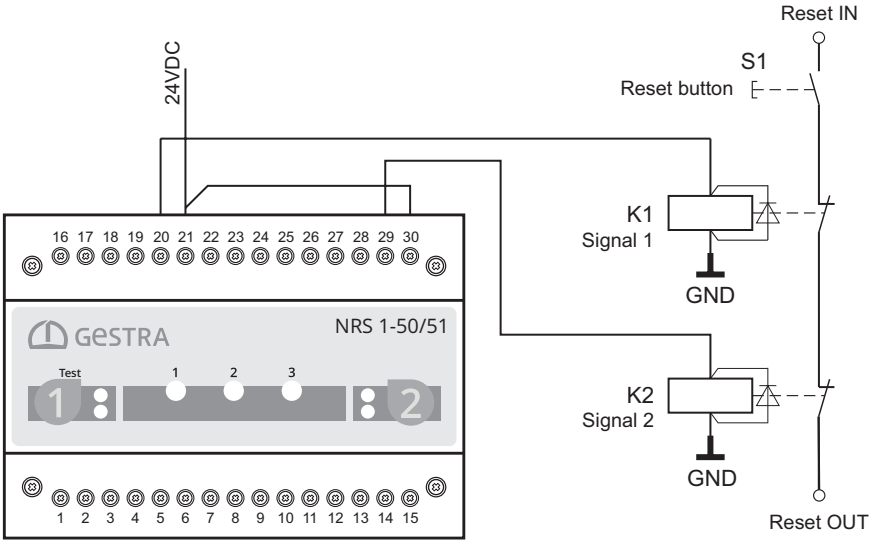


Fig. 5

Electrical connection

Example switching combinations

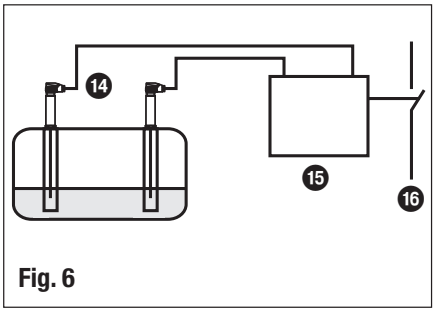


Fig. 6

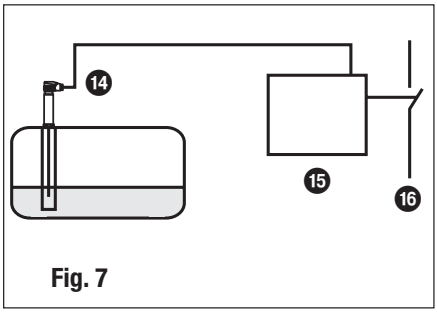


Fig. 7

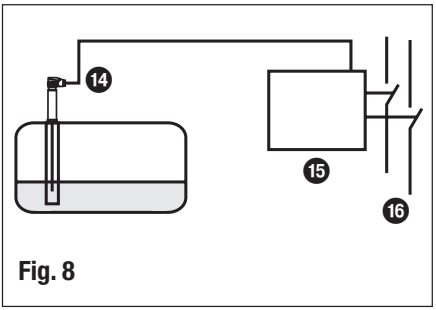


Fig. 8

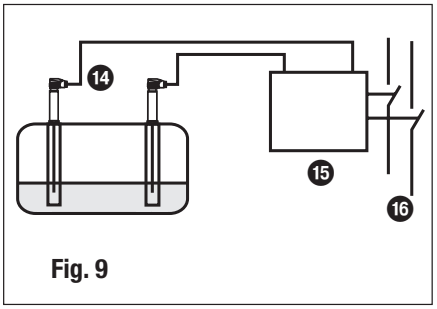


Fig. 9

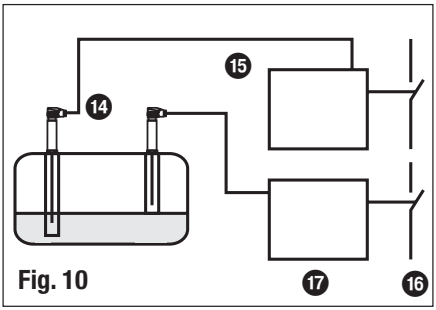


Fig. 10

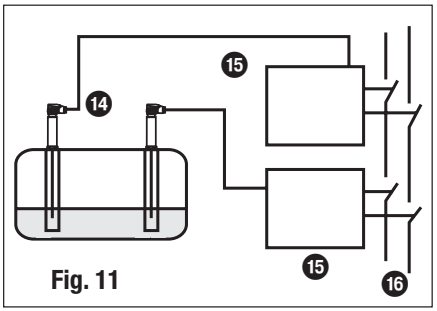


Fig. 11

Key

14 Level electrode(s) NRG 1...-50

15 Level switch NRS 1-50

16 Safety circuit

17 Level switch NRS 1-50 for advance low water alarm

Electrical connection

Key to example switching combinations

Steam boiler plants

Figure 6
Combination consisting of 2x NRG 1...-50 level electrodes plus NRS 1-50 level switches as water level limiters.
This combination satisfies the requirement for two mutually independent water level limiters.

Hot water installations and electrically heated steam boilers

Figure 7
Combination consisting of 1x NRG 1...-50 level electrode plus NRS 1-50 level switch as a water level limiter.
The requirement for hot water installations to have two mutually independent water level limiters is satisfied by installing a combination consisting of one NRG 1...-50 + NRS 1-50 in the hot water generator and another in the pressure maintaining vessel or expansion tank, etc., depending on the type of pressurization. Electrically heated steam boilers require only one water level limiter.
If the plant operator requires greater availability from the steam boiler plant, this can be achieved by installing two mutually independent NRG 1...-50 + NRS 1-50 combinations in the steam boiler.

For further uses, please refer to the regulations in your country

Figure 8
Combination consisting of 1x NRG 1...-50 level electrode plus NRS 1-50 level switch as a water level limiter.
The level switch opens two separate safety circuits.

Figure 9
Combination consisting of 2x NRG 1...-50 level electrodes plus NRS 1-50 level switches as water level limiters.
The level switch opens two separate safety circuits.

Figure 10
Combination consisting of 1x NRG 1...-50 level electrode plus 1x NRS 1-50 level switch as a water level limiter and 1x NRG 1...-50 level electrode plus 1x NRS 1-50 level switch as an advance low water alarm.

Figure 11
Combination consisting of 2x NRG 1...-50 level electrodes plus 2x NRS 1-50 level switches as water level limiters.
The level switches open two separate safety circuits.

Bringing into service

⚠ 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.

Changing the configuration

To operate with one level electrode only – e.g., in emergency mode – please change the settings as follows:

- Switch off the mains supply.
- Undo the right and left fastening screws and detach the lower terminal strip **Fig. 3** ❷ ❸.
- Set code switch ❹ or ❺ to ON position, depending on which electrode you wish to deactivate.
- Put the terminal strip back on and tighten the fastening screws.
- Switch the mains supply back on. The equipment restarts.

❹ 

White toggle switch

❺ 

White toggle switch

	Code switch ❹		Code switch ❺	
	S 1	S 2	S 1	S 2
Level electrode 1 active	OFF		OFF	
Level electrode 1 passive	ON		ON	
Level electrode 2 active		OFF		OFF
Level electrode 2 passive		ON		ON

Note

- If only one level electrode is switched on, only the operating state and alarm LEDs of the relevant channel light up.

Bringing into service

Checking the switchpoint and function

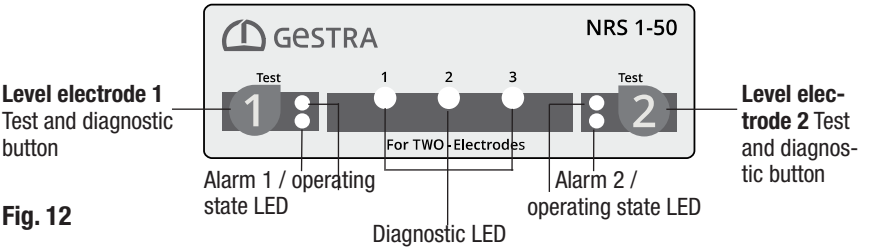


Fig. 12

Starting		
Action	**Indication**	**Function**
Switch on mains supply.	All LEDs light up	System is started and tested, approx. duration 10 s. Output contacts open. Signal outputs 1 and 2 closed.
	All LEDs light up for more than 10 s	System error. Possible causes: Supply voltage error, faulty level switch.
Fill boiler until water is above low water (LW) level. Level electrode(s) immersed.	Green level electrode LED 1 / 2 lit	Output contacts closed, signal outputs 1 and 2 open.

Checking the switchpoint and function		
Drain water until it is below the low water (LW) level. Level electrode(s) exposed	Red level electrode LED 1 / 2 flashing	Off delay in progress, signal output 1 and 2 close without a delay.
	Red level electrode LED 1 / 2 lit	Delay has elapsed, output contacts open. Signal outputs 1 and 2 closed.

Possible errors during installation		
Status and display	**Error**	**Corrective action**
Water below low water (LW) switchpoint according to sight glass, but red level electrode LED 1 / 2 not lit! Safety circuit closed.	Electrode rod(s) too long.	Cut electrode rod(s) in line with LW switchpoint.
	For internal installation: Upper pressure relief hole in protective tube is missing or obstructed.	Check level electrode installation and make sure that the level in the protective tube corresponds to the actual water level.
Water level sufficient. Red level electrode LED 1 / 2 lit! Safety circuit open.	Electrode rod(s) too short.	Replace electrode rod(s) and cut new ones in line with LW switchpoint.
	Ground connection to tank is interrupted.	Clean sealing surfaces and screw in level electrodes with metal sealing rings. Do not insulate with hemp or PTFE tape.
	Electrical conductivity of boiler water is too low.	Use an enlarged measuring surface for the level electrodes.
	Upper pressure relief hole is flooded.	Check level electrode installation and make sure that the level in the protective tube corresponds to the actual water level.

Operation, alarm and testing

Indicators and operation

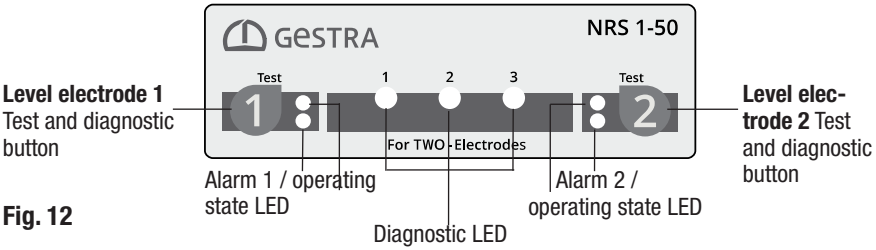


Fig. 12

Operation		
Action	**Indication**	**Function**
Level electrode(s) immersed	Green level electrode LED 1 / 2 lit	Output contacts closed, signal outputs 1 / 2 open.

Alarm		
Level electrode(s) exposed, water is below low water (LW) level	Red level electrode LED 1 / 2 flashing	Off delay in progress, signal outputs 1 / 2 close without a delay.
	Red level electrode LED 1 / 2 lit	Delay has elapsed, output contacts open. Signal outputs 1 / 2 closed.

Test of channels 1 and 2		
In operating mode: Press button 1 or 2 and hold until the end of the test. The level switch must behave as if there were an alarm.	Red level electrode LED 1 / 2 flashing	Alarm simulation in channel 1 or 2. Off delay in progress, signal outputs 1 / 2 close without a delay.
	Red level electrode LED 1 / 2 lit	Delay has elapsed, output contacts open. Signal outputs 1 / 2 closed. Test is complete.

Fault indications and troubleshooting

Indications, diagnosis and corrective action

Attention

Please check the following before fault diagnosis:

Supply voltage:
Is the level switch supplied with the voltage specified on the rating plate?

Wiring:
Does the wiring conform to the wiring diagram and your chosen switching combination?

Configuration:
Are code switches ❹ and ❺ set correctly for the number of level electrodes?

Fault indications and troubleshooting

Indications, diagnosis and corrective action

Fault indication			
Status	**Diagnosis**	**Function**	**Next action**
Error on evaluation of level electrode 1, channel 1	Diagnostic LED 1 and Alarm 1 LED light up	Output contacts open without a delay. Signal output 1 closes without a delay.	Next: Press **button 1**
Error on evaluation of level electrode 2, channel 2	Diagnostic LED 2 and Alarm 2 LED light up	Output contacts open without a delay. Signal output 2 closes without a delay.	Next: Press **button 2**
Error detected in level switch	Diagnostic LED 3 and Alarm 1 and 2 LEDs light up	Output contacts open without a delay. Signal outputs 1 and 2 close without a delay.	Next: Press **button 1 or button 2**

Diagnosis			
Indication 1 and action	**Indication 2**	**Error**	**Corrective action**
Alarm 1 LED and diagnostic LED 1 light up. Press and hold **button 1**	Diagnostic LED 1 flashes	Error in level electrode 1, error in level switch, wiring error, measuring voltage error.	- Check wiring, - measure electrode voltages, - clean level electrode, replace if necessary, - replace level switch.
	Diagnostic LED 2 flashes	Error in level electrode 1, error in level switch, wiring error.	
	Diagnostic LED 3 flashes	External voltage error, boiler wall has no PE.	Provide shielding and grounding, connect boiler to PE.
Alarm 2 LED and diagnostic LED 2 light up, press and hold **button 2**	Diagnostic LED 1 flashes	Error in level electrode 2, error in level switch, wiring error, measuring voltage error.	- Check wiring, - measure electrode voltages, - clean level electrode, replace if necessary, - replace level switch.
	Diagnostic LED 2 flashes	Error in level electrode 2, error in level switch, wiring error.	
	Diagnostic LED 3 flashes	External voltage error, boiler wall has no PE.	Provide shielding and grounding, connect boiler to PE.
Alarm 1 and 2 LEDs and diagnostic LED 3 light up, press and hold **button 1 or 2**	Diagnostic LED 1 flashes	Processor error, standby error.	Replace level switch.
	Diagnostic LED 2 flashes	Internal voltage error.	Replace level switch.
	Diagnostic LED 3 flashes	Relay error.	
Once the error has been rectified, the level switch reverts to normal operation. After troubleshooting, please switch the mains supply off and on again after approx. 5 s.			

Checking level electrodes

Measuring level switch voltages

Measuring electrode voltages on the level switch enables you to check whether the level electrode is immersed or whether a fault is present. Please pay attention to **Fig. 15.**

$U_{2\text{-}4/10\text{-}12}$	$U_{3\text{-}4/11\text{-}12}$		$U_{2\text{-}3/10\text{-}11}$
	immersed	exposed	fault (immersed/alarm)
≈ 0.7 V 85 Hz!	$< \frac{U_{2\text{-}4/10\text{-}12}}{2}$	$\geq \frac{U_{2\text{-}4/10\text{-}12}}{2}$	$\leq U_{3\text{-}4/11\text{-}12}$

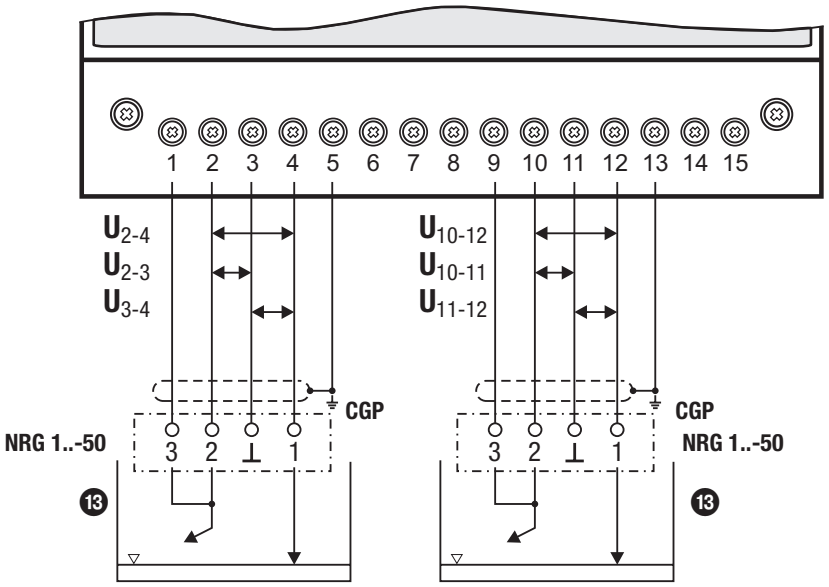


Fig. 13

Key

⓭ Level electrode NRG 1...-50

CGP Central grounding point in control cabinet

Note

■ The self-test of the NRS 1-50 level switch cyclically reduces $U_{2\text{-}4/10\text{-}12}$, possibly to 0 V.

Emergency mode

Emergency mode for water level limiters

If the NRS 1-50 level switch works with two NRG 1...-50 level electrodes (water level limiters), the plant can continue running with just **one** level electrode, under constant supervision, if one level electrode drops out.

To operate with one level electrode, please change the settings as follows:

- Switch off the mains supply.
- Undo the right and left fastening screws and detach the lower terminal strip **Fig. 3** ❷ ❸.
- Set code switch ❹ or ❺ to ON position, depending on which electrode you wish to deactivate.
- Put the terminal strip back on and tighten the fastening screws.
- Switch the mains supply back on. The equipment restarts.

❹ 

White toggle switch

❺ 

White toggle switch

	Code switch ❹		Code switch ❺	
	S 1	S 2	S 1	S 2
Level electrode 1 active	OFF		OFF	
Level electrode 1 passive	ON		ON	
Level electrode 2 active		OFF		OFF
Level electrode 2 passive		ON		ON



Attention

- Enter the start of emergency mode in the boiler log.
- Maintain constant supervision when operating the plant in emergency mode!
- Replace the faulty level electrode immediately!
- Enter the end of emergency mode in the boiler log
- Restore the original settings after emergency mode has ended.

Further information

Action against high-frequency interference

High-frequency interference can be caused by out-of-phase switching operations. If such interference occurs and results in sporadic failure, we recommend taking the following action to suppress interference:

- Provide inductive loads with RC combinations as specified by the manufacturer.
- Route the connecting cable to the level electrode separately from power lines.
- Increase the distance from sources of interference.
- Check the connection of the shield to the central grounding point **(CGP)** in the control cabinet.
- Suppress HF interference using hinged-shell ferrite rings.

Interlock and interlock deactivation

In the event of an alarm, the NRS 1-50 level switch interlock does not take place automatically.

If the installation requires an interlock, this must be implemented in the external (safety) circuit.

It is important that the interlock is not deactivated when the level switch signals a malfunction to the diagnostic LEDs or the signaling outputs.

In order to guarantee Class C function with second fault protection in accordance with UL 60730-1, both signaling outputs must be monitored during interlock deactivation. To conform with ASME CSD-1 two low water level limiters are required.

Checking switchpoints

The “Below low water (LW)” switchpoint can only be checked by reducing the water level. The level switch must then trigger an alarm and, after the off delay, it must open the safety circuit. The heating cut-off is interlocked in the safety circuit and this interlock can only be deactivated again when the level electrode is immersed once more. For this to happen, the Alarm 1 and Alarm 2 LEDs must light up and no errors should be indicated (diagnostic LEDs are not lit). Please carry out the switchpoint check when bringing the equipment into service, whenever the level electrodes have been replaced, and at regular intervals, e.g., once a year.

Taking out of service

Proceed as follows:

- Switch off the mains supply and **switch off the voltage to the equipment.**
- Unscrew the fastening screws on the right and left and detach the upper and lower terminal strips **Fig. 3** ❶ ❷ ❸.
- Release the white slider holder at the bottom of the unit and detach the unit from the support rail.

Disposal

Dispose of the level switch 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.

The term ‘media’ can refer to solid, liquid or gaseous substances or mixtures, as well as 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 outside of the return package, as processing will otherwise be impossible and the products will be returned to the sender at their expense.

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 (including declaration of decontamination) and send it with the products to GESTRA AG.

UL components

The NRS 1-50 level switch is registered under XACN.E513189.

For your notes

For your notes

GESTRA®

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