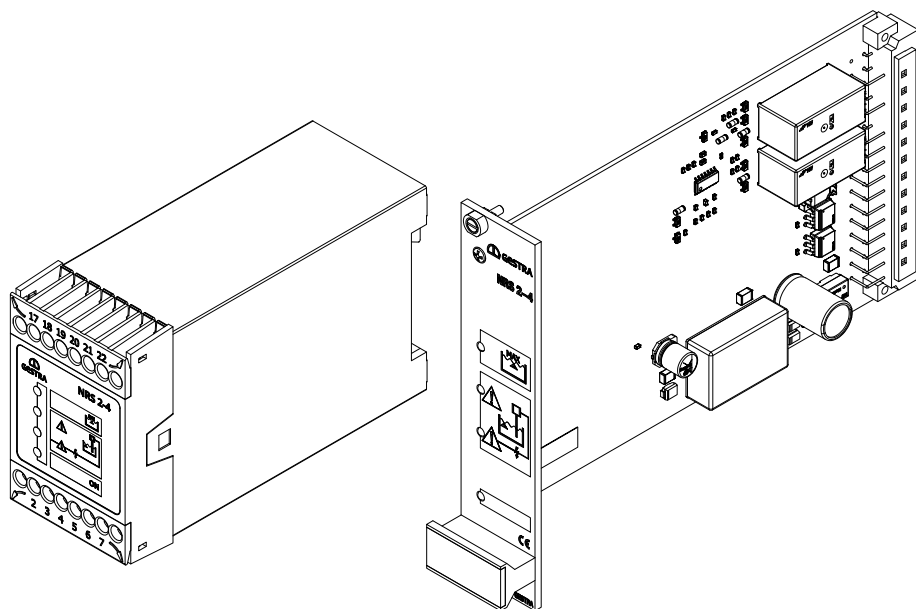


Level Switch

NRS 2-4b

NRS 2-4d



Contents

Page

Intended use	4
Safety note	4
Improper use	4
Use in potentially explosive atmospheres	4
Information	5
Product package	5
System description	5
Function	5
Designs	5
Technical data	6
NRS 2-4	6
Example name plate/Identification	7
NRS 2-4b	7
NRS 2-4d	7
Installation	8
Dimensions of the NRS 2-4b	8
Key	8
Dimensions of the NRS 2-4d	8
Functional elements	9
NRS 2-4	9
Key	9
Installation	10
Installation in a control cabinet	10
NRS 2-4 d	10
Tools	10

Contents

Page

Electrical connection.....	11
NRS 2-4.....	11
Wiring diagrams	11
Key	12
Bringing into service	13
Checking the electrical connections	13
Switching on the supply voltage	13
Function test.....	13
Table 1	13
Malfunctions during operation	14
Fault checklist, malfunctions during operation.....	14
Declaration of Conformity; Standards and Directives.....	15

Intended use

The NRS 2-4 level switch is used in combination with NRG 211 or NRG 29 level electrodes in turbine drainage systems and indicates when the water has reached the maximum admissible level.

Safety note

The level switch is a safety device and may only be installed, electrically connected and brought into service by suitable, trained staff.

Retrofitting and maintenance work may only be performed by authorised staff who have undergone specific training.



Danger

The terminal strip of the NRS 2-4 is live during operation!
There is a risk of serious injury due to electric shock!

Always cut off power to the system before working on the equipment and before inserting or removing terminal strips or the 19" plug-in!



Attention

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

Improper use

Use in potentially explosive atmospheres

Do **not** use the NRS 2-4 level switch in potentially explosive atmospheres.

Information

Product package

NRS 2-4b

1 level switch for mounting on a DIN rail (IEC/EN 60 715)

1 Installation & Operating Manual

NRS 2-4d

1 level switch in the form of a 19" plug-in card, front panel to EN 60297-3-100, 6U

1 Installation & Operating Manual

System description

The NRS 2-4 level switch is an analogue electronic amplifier for NRG 211 or NRG 29 capacitance level electrodes.

In combination with the NRG 211 or NRG 29 level electrodes, the level switch detects when a high water level is reached.

The level switch also indicates malfunction signals from the electrode and malfunctions in the connecting cable.

Function

The NRS 2-4 is a single-channel unit featuring a voltage transformer and voltage decoder. The electrode receives a 12 V DC supply from the NRS 2-4 and converts various operating states into a corresponding measuring voltage, which is then fed back to the NRS 2-4. The voltage decoder in the NRS 2-4 allocates the measuring voltage to an operating state, which is indicated via LEDs on the front panel and via relay contacts and signalling outputs.

The level switch can indicate four operating states:

- Normal operation
- High level (MAX) alarm
- Level electrode malfunction
- Connecting cable malfunction

In the event of a high level (MAX) alarm, the relevant output relays are energized.

As well as the output relays, optocouplers are available as semiconductor signalling outputs.

Designs

NRS 2-4b:

Equipment for mounting on a DIN rail (IEC/EN 60 715)

NRS 2-4d:

Spare 19" plug-in card, front panel to EN 60297-3-100, 6U.

Technical data

NRS 2-4

Measuring circuit input

1 V to 10 V DC (measuring voltage from level electrode)

Measuring circuit output

12 V DC (supply voltage to level electrode)

Output

2 volt-free relay contacts. Maximum contact rating with switching voltages of 24 V, 115 V and 230 V AC: 4 A resistive, 0.75 A inductive at $\cos \varphi$ 0.5.

Maximum contact rating at a switching voltage of 24 V DC: 4 A. Contact material AgNi 90/10.

2 optocouplers (NPN), short-circuit-protected due to inherent current limiting characteristics, max. 70 V, 10 mA

Indicators and controls

1 "Alarm" LED, 2 "Malfunction" LEDs, 1 "Power" LED

Supply voltage

24V DC +/-20%

Power consumption

3 W

Housing materials

NRS 2-4b: PC-GF, black cover, front panel in light grey RAL 7035

NRS 2-4d: Aluminium front panel

Weight

NRS 2-4b: approx. 0.25 kg

NRS 2-4d: approx. 0.6 kg

Ambient temperature

0 - 70 °C

Transport temperature

-20 - +80 °C (< 100 hours), only switch on after a defrosting period of 24 hours.

Storage temperature

-20 - +70 °C, only switch on after a defrosting period of 24 hours.

Relative humidity

Max. 95%, non-condensing

Example name plate/Identification

NRS 2-4b

16	2	3	4
17		5	6
18			
19			
20			
21	7	8	9
22			
23			

12		15	16	17	1
11	13	14	18	19	2
					3
					4
					5
					6
					7
					8

Fig. 1

- 1 Terminals 16-23
- 2 Wiring diagram, terminals 16-23
- 3 Equipment function
- 4 Equipment designation
- 5 IP rating
- 6 Protection class
- 7 Operating data (maximum ambient temperature)
- 8 Cutout relay
- 9 Safety note
- 10 Manufacturer
- 11 Material number-serial number
- 12 Mark of conformity
- 13 Disposal information
- 14 Component type approval
- 15 Power supply
- 16 Power consumption
- 17 External fuse for supply
- 18 Wiring diagram, terminals 1-8
- 19 Terminals 1-8

NRS 2-4d

3	1	2	
		4	5
6	7	8	9

Fig. 2

- 1 Equipment designation
- 2 Safety note
- 3 Material number-serial number
- 4 Supply voltage
- 5 Power consumption
- 6 IP rating
- 7 Maximum ambient temperature
- 8 Relay
- 9 Mark of conformity
- 10 Manufacturer
- 11 Disposal information

Installation

Maße NRS 2-4b

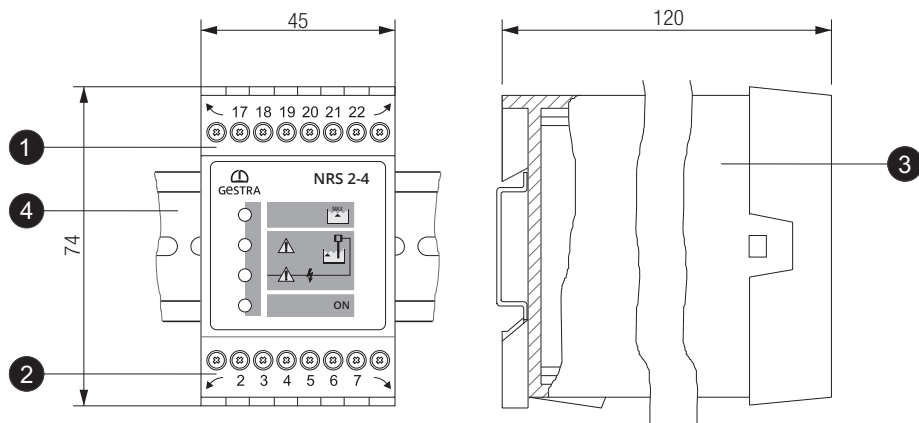


Fig. 3

Key

- ① Upper terminal strip
- ② Lower terminal strip
- ③ Case
- ④ Support rail TH 35, EN 60715

Dimensions of the NRS 2-4d

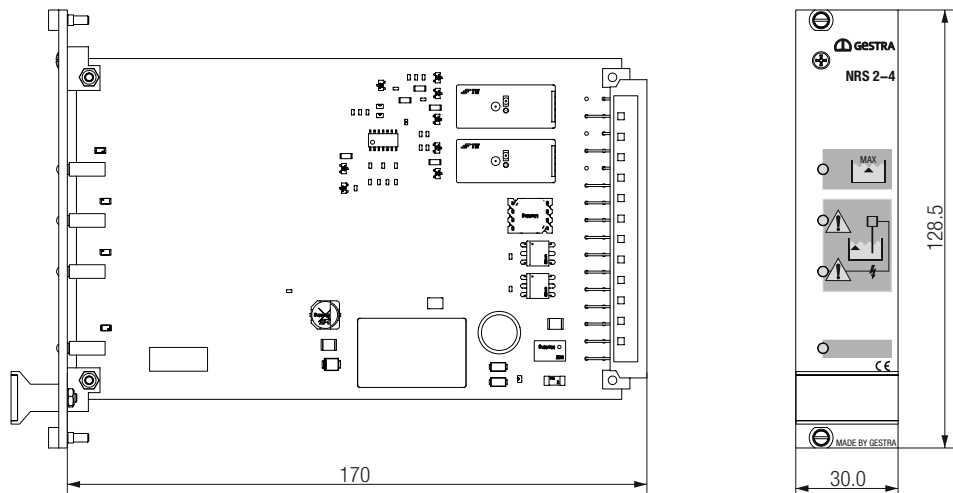


Fig. 4

Functional elements

NRS 2-4b

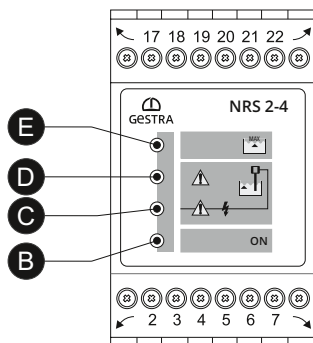


Fig. 5

NRS 2-4d

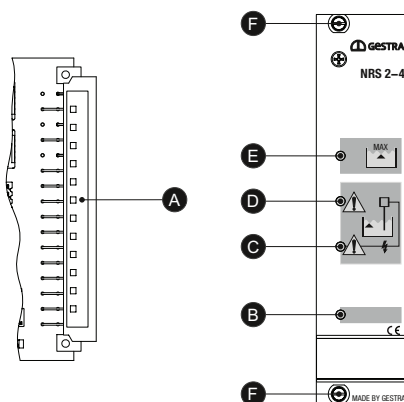


Fig. 6

Key

- A** 32-pin screw-type multipoint connector, DIN 41612, design D
- B** "Power" LED
- C** "Cable malfunction" LED
- D** "Level electrode malfunction" LED
- E** "High level (MAX) alarm" LED
- F** Screws

Installation

Installation in a control cabinet

The NRS 2-4 level switch is clipped onto a TH 35 DIN rail to EN 60715 in the control cabinet. **Fig. 3**

NRS 2-4 d

1. Insert the level switch in the 19" rack and secure with screws **F**.

Tools

- Screwdriver 3.5 x 0.6

Electrical connection

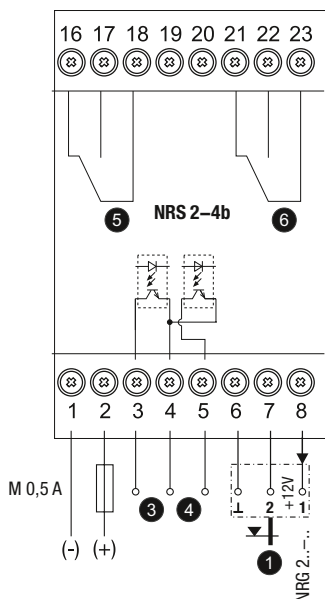
NRS 2-4

Use a shielded, four-core cable as the supply cable, e.g. IY (ST)Y 2 x 2 x 0.8 or LIYCY 4 x 0.5 mm², maximum length 500 m.

Wire the screw-type connector as per the wiring diagram. **Fig. 7**

Wiring diagrams

NRS 2-4b



NRS 2-4d

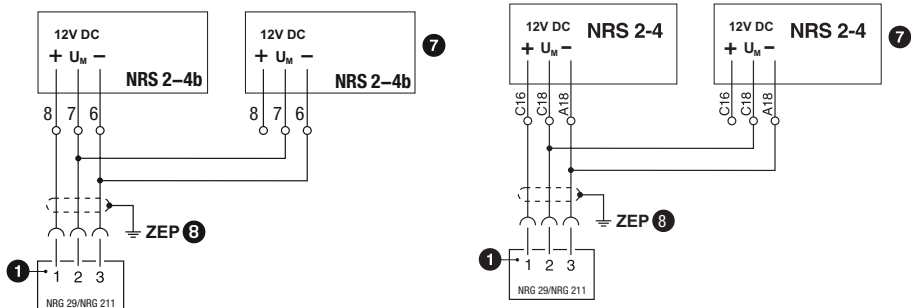
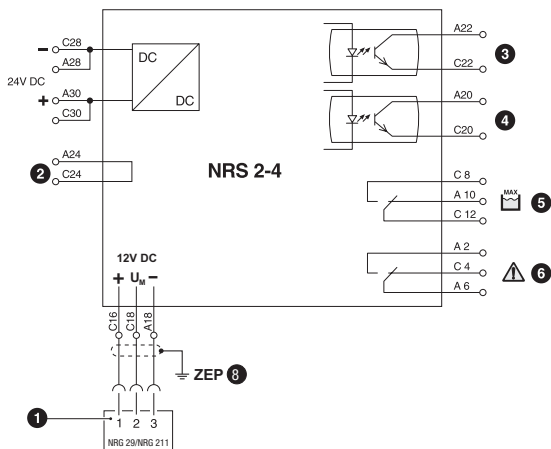


Fig. 7

Electrical connection

Key

- ➊ NRG 211 or NRG 29 level electrode
- ➋ Test loop for the equipment
- ➌ Switching output for "Alarm" (optocoupler)
- ➍ Switching output for "Malfunction" (optocoupler)
- ➎ Switching output for "Alarm" (relay)
- ➏ Switching output for "Malfunction" (relay)
- ➐ Example circuit with two high level (MAX) switches installed in parallel (redundancy)
- ➑ Cable shield connected to CEP (central earthing point) at the control cabinet end



Attention

- To protect the relay contacts, use a T2.5A fuse (or a T1A fuse for 72h operation)
- The shield must be connected to the CEP at the control cabinet end.



Note

- Using the "Malfunction" relay output of the NRS 2-4, monitoring of the level electrode and its connecting cable can be incorporated in the safety circuit.
- The rated voltage is indicated on the name plate.
- When inductive loads are switched off, voltage spikes are produced that may impair the operation of open and closed-loop control systems. We therefore recommend including commercially available RC combinations in the circuit, e.g. 0.1 μF /100 Ω .

Bringing into service

Checking the electrical connections

Check that the NRS 2-4 and NRG 211 or NRG 29 level electrode are wired as shown in the wiring diagram.
Fig. 7

Switching on the supply voltage

Switch on the supply voltage. The green LED **B** lights up. **Fig. 3, 4**



Danger

The screw-type multipoint connector of the NRS 2-4 b/d is live during operation!
There is a risk of serious injury due to electric shock!

Always cut off power to the system before working on the equipment and before inserting or removing the 19" plug-in!

Function test

NRS 2-4 b/d

1. After the supply voltage is switched on, the green LED **B** must light up continuously. **Fig. 3, 4**
2. Increase the level until the high level mark is exceeded.
The red LED **E** on the level switch must light up.
3. This red LED must go out again when the water has fallen below the high level mark.
4. When the connector of the level electrode is unplugged, the yellow LED **C** must light up (cable malfunction).
5. When terminals C16 and C18 (NRS 2-4d) or terminals 6 and 8 (NRS 2-4b) are bridged, the yellow LED **D** must light up (equipment malfunction).

Table 1 shows the measuring voltages of the various operating states.

Table 1

Measuring voltage U_M	Decoded meaning
$\leq 1\text{ V}$	Malfunction in electrode supply cable (short circuit, open circuit)
$1\text{ V} - 4\text{ V}$	Electrode exposed
$4\text{ V} - 7\text{ V}$	Electrode submerged, high level (MAX)
$\geq 9\text{ V}$	Electrode malfunction (faulty insulator, leaky stuffing box)

Malfunctions during operation



Danger

The screw-type multipoint connector of the NRS 2-4 b/d is live during operation!
There is a risk of serious injury due to electric shock!

Always cut off power to the system before working on the equipment and before inserting or removing the 19" plug-in!

Fault checklist, malfunctions during operation

Green "Power" LED does not light up

Fault: Power failure

Remedy: Measure voltage at A/C 28 and A/C 30, NRS 2-4b terminals 1 and 2
Check the power supply/electrical connection

"Level electrode malfunction" and "High level (MAX) alarm" LEDs light up

Fault: Locking screw on level electrode not removed

Remedy: Remove locking screw

Fault: Faulty level electrode (insulator, stuffing box)

Remedy: Check the measuring voltage at C 18/A 18, NRS 2-4b terminals 7 and 6
If the measuring voltage ≥ 9 V, replace the level electrode

"Cable malfunction" LED lights up

Fault: Faulty electrode supply cable (short circuit, open circuit)

Remedy: Check electrode supply cable/electrical connection

Only the green "Power" LED lights up but the MAX level has been exceeded

Fault: Level electrode is not submerged

Remedy: Check the measuring voltage at C 18/A 18, NRS 2-4b terminals 7 and 6
If no voltage can be measured, check the level electrode installation and modify if necessary

Fault: Faulty amplifier in the level electrode.

Remedy: If no measuring voltage can be measured even though the 12 V supply to the electrode (C 16/A 18, terminal 8/terminal 6) is intact, replace the amplifier

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

Declaration of Conformity; Standards and Directives

You can find details on the conformity of the equipment and the relevant standards and directives, where applicable, in the Declaration of Conformity and associated certificates or approvals.

The valid Declaration of Conformity is available to download at www.gestra.com.

You can request the associated certificates and approvals by writing to the following address:

GESTRA GmbH

Münchener Straße 77

28215 Bremen

Germany

Tel. +49 421 3503-0

Fax +49 421 3503-393

e-mail info@de.gestra.com

Website www.gestra.com

Modifications to the equipment not approved by us will invalidate the Declaration of Conformity, certificates and approvals.



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

GESTRA GmbH

Münchener Straße 77
28215 Bremen
Germany

Tel. +49 421 3503-0
Fax +49 421 3503-393
e-mail info@de.gestra.com
Website www.gestra.com

UK Importer: GESTRA UK Ltd

Unit 1 Sopwith Park, Royce Close,
West Portway Business Park, Andover,
Hampshire SP10 3TS
United Kingdom