GESTRA Steam Systems

NRS 1-8

EN
English

Installation Instructions 818612-03

Level Switch NRS 1-8

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Important Notes

Usage for the intended purpose

Use level switch NRS 1-8 only in conjunction with level electrodes NRG 16-12, NRG 17-12, NRG 19-12 for water level limiting (high level alarm).

Safety note

The equipment must only be installed and commissioned by qualified and competent staff. Retrofitting and maintenance work must only be performed by qualified staff who – through adequate training – have achieved a recognised level of competence.

Danger

The terminal strips of the NRS 1-8 are live during operation.
This presents the danger of electric shock!
Cut off power supply before mounting or removing the terminal strips and the housing cover.

Attention

The name plate specifies the technical features of the equipment. Note that any item of equipment without its specific name plate must neither be commissioned nor operated.

ATEX (Atmosphère Explosible)

The equipment constitutes a simple item of electrical equipment as defined in DIN EN 50020 section 5.4. According to the European Directive 94/9/EC the equipment must be equipped with approved Zener barriers if used in potentially explosive areas. Applicable in Ex zones 1, 2 (1999/92/EC). The equipment does not bear an Ex marking. The suitability of the Zener barriers is certified in a separate document.

Explanatory Notes

Scope of supply

NRS 1-8
1 Level switch NRS 1-8
1 Installation manual

Description

Self-monitoring high-level alarm with periodic self-checking routine, designed for use in conjunction with level electrodes NRG 16-12, PN 40, NRG 17-12, PN 63, NRG 19-12, PN 160.
The equipment combination detects the MAX water level (high level limiter). Application in steam and pressurised hot water plants in accordance with TRD 602, sheet 1 and sheet 2 as well as EN 12952 and 12953.

Explanantory Notes – continued –

Function

The level switch NRS 1-8 is a two-channel unit provided with an automatic self-checking circuitry in accordance with DIN VDE 0116, prEN 50156. The self-checking is effected periodically. During the test the cable between electrode and level switch and the self-checking circuitry (redundancy) are checked.
The output relays are not influenced by the internal tests.
The level switch can also be tested manually by pushing the button “TEST 1” to simulate a malfunction in the level electrode.
The toggle switch “TEST 2 / INSPECTION” is designed for testing the function of the self-checking routine by simulating a malfunction. The contact relays are of the normally closed type and will automatically signal alarm condition in the event of a malfunction. The level switch can signal the following three operating conditions:

- Normal operation (correct water level in boiler)
- Alarm (level in boiler too high)
- Alarm (malfunction in level switch or level electrode)

A green LED indicates power supply. Two red LEDs signal an alarm in the event of high water level or system malfunction.
The failure of one channel (loss of redundancy) is signalled by one red LED.
The equipment combination of electrode NRG 16-12, NRG 17-12 or NRG 19-12 and level switch NRS 1-8 provides fail-safe protection against a first fault, i. e. the system will still continue to provide the safety function even after the occurrence of a first fault.

System components

NRG 16-12
Level electrode **NRG 16-12**, PN 40

NRG 17-12
Level electrode **NRG 17-12**, PN 63

NRG 19-12
Level electrode **NRG 19-12**, PN 160

Design

NRS 1-8

Plug-in unit in plastic case for installation in control cabinets. Remove cover to access the terminals in the housing base. Thanks to the code plug the equipment cannot be connected inadvertently to wrong GESTRA equipment. The equipment may be snapped onto a 35 mm supporting rail or screwed into position on a mounting panel.

Technical Data

NRS 1-8

TÜV approval
TÜV · HWS · 08-417

Input
Four terminals for one level electrode
NRG 16-12, PN 40
NRG 17-12, PN 63
NRG 19-12, PN 160

Output
Two volt-free relay contacts
Max. contact rating: 250 V, 300 W, 3 A resistive with a life of 5×10^5 switching cycles
or 0.35 A inductive with a life of 2×10^6 switching cycles. Contact material: silver, hard-gold plated.

Delay of response
Default factory setting: 3 sec.
Up to 25 sec. after prior consultation with TÜV.

Sensitivity of response
10 µS/cm at 25 °C when used in conjunction with level electrode without measuring surface extension and cell constant 0.3.
0.5 µS/cm at 25 °C when used in conjunction with level electrode with measuring surface extension and cell constant 0.13 (see data sheet NRG 16-12).

Indicators and adjustors
Two LEDs for “Alarm”, one LED for “Power”, one button “TEST 1”,
one toggle switch “TEST 2 / INSPECTION”.

Mains voltage
230 V +/– 10 %, 50/60 Hz (please state voltage when ordering).
Special voltage 115 V +/– 10 %, 50/60 Hz or 24 V+/– 10 %, 50/60 Hz.
When using the ancillary unit URN 1 the equipment can also be fed with 24 V DC.

Power consumption
5 VA

Protection
NRS 1-8 IP 40 to EN 60529

Admissible ambient temperature
0 °C to 55 °C

Case materials
Base: Noryl SE 1-GFN 2 UL 94 VO, black
Cover: R-ABS UL 94 VO, stone grey

Weight
approx. 0.6 kg

Technical Data – continued –

Corrosion resistance

If the equipment is used for the intended purpose, its safety is not impaired by corrosion.

Name plate/marking

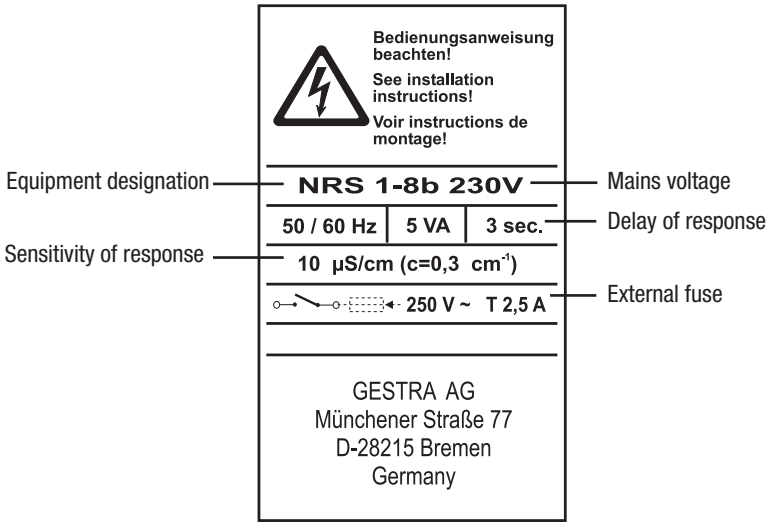


Fig. 1

Technical Data – continued –

Dimensions

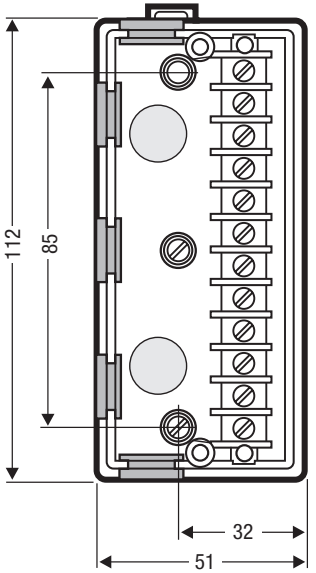


Fig. 2

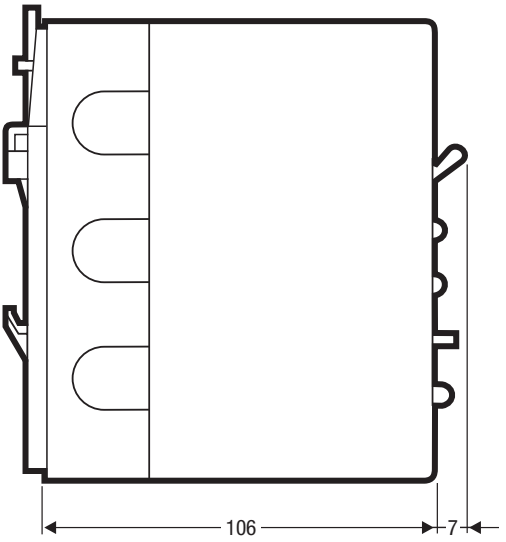


Fig. 3

Component Parts

NRS 1-8

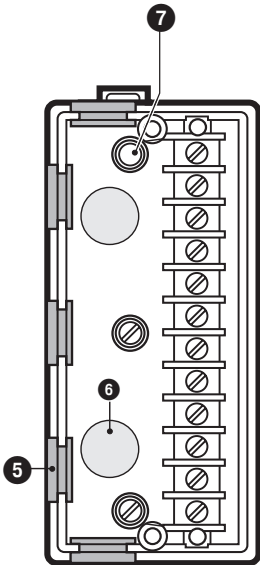


Fig. 4

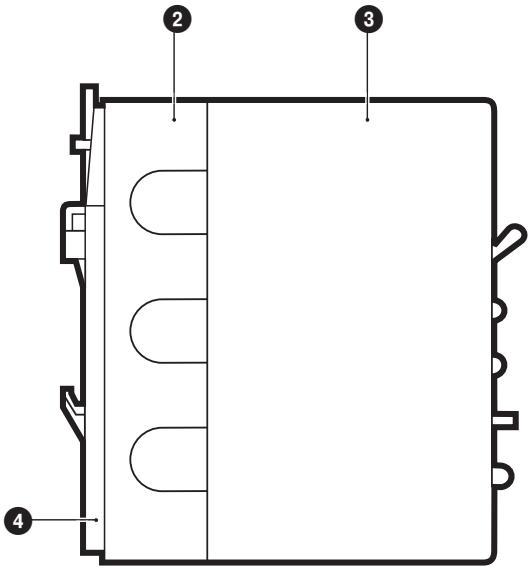


Fig. 5

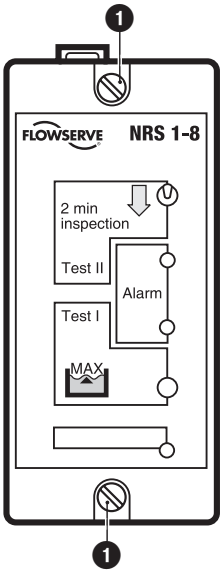
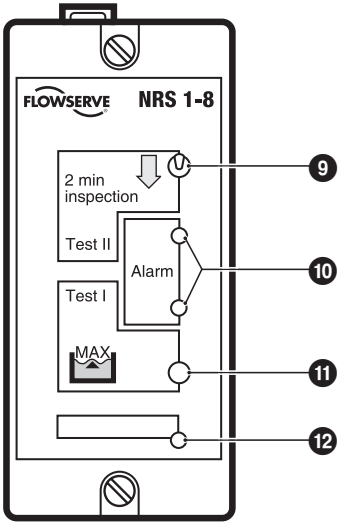


Fig. 6

Functional Elements

NRS 1-8



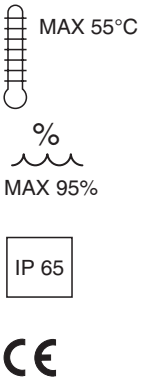


Fig. 7

Component Parts / Functional Elements

Key

1. Cover screws
2. Base
3. Upper part of housing
4. Mounting clip
5. Cable entry (flexible)
6. Cable entry (housing)
7. Fixing hole d = 4.3 mm

9. Toggle switch “TEST 2 / INSPECTION” for internal self-checking
10. Red LED “High level alarm”
11. Button “TEST 1” for simulating a high level alarm
12. Green LED “Power”, indicating power supply

Installation

NRS 1-8

On supporting rail (with mounting clip)

1. Clip level switch onto supporting rail.
2. Loosen cover screws ❶ and detach cover ❸ from base ❷.
3. Select cable entry ❺ and remove corresponding seal.

On mounting panel

1. Loosen cover screws ❶ and detach cover ❸ from base ❷.
2. Unscrew mounting clip ❹ .
3. Drill hole ❼ marked in the base to ∅ 4.3 mm.
4. Select cable entry ❺ / ❻ and remove corresponding seal.
5. Fix base with two M4 screws onto mounting panel.

Attention

- To provide sufficient ventilation, ensure a minimum spacing of 20 mm between adjacent units.

Tools

- Screwdriver (5.5/100)

Key

❶ Cover screws

❷ Base

❸ Upper part of housing

❹ Mounting clip

❺ Cable entry (flexible)

❻ Cable entry (housing)

❼ Fixing hole d = 4.3 mm

❽ Supporting rail TS 3 5 x 15 DIN EN 50022

Installation – continued –

Examples of installation

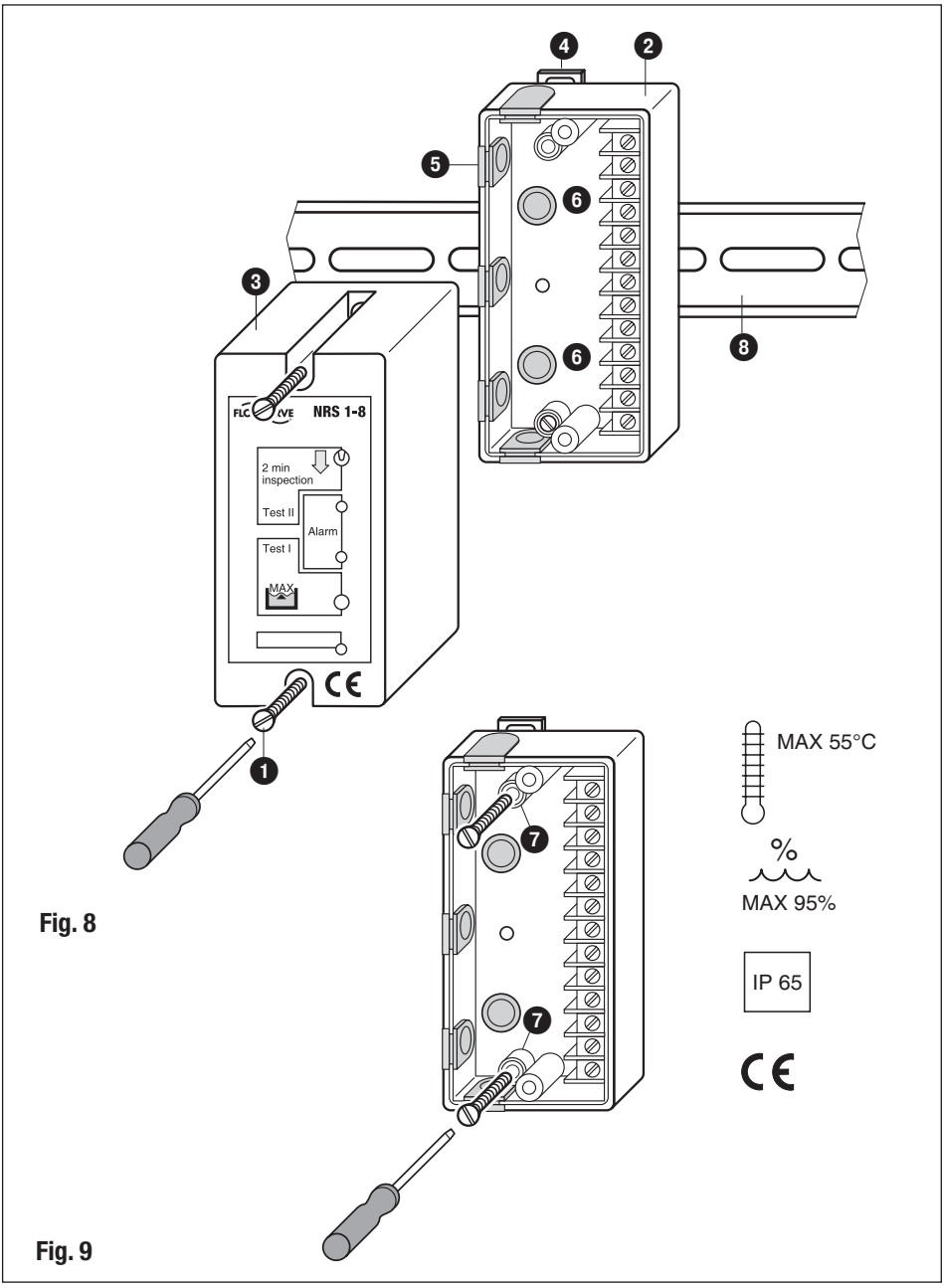


Fig. 8

Fig. 9

Electrical Connection

NRS 1-8

Cable required for wiring the electrode: four-core screened cable, e. g. I-Y(St)Y 2 x 2 x 0.8 or LIYCY 4 x 0.5 mm^2.
Max. cable length 100 m with a conductivity from 10 µS/cm.
Max. cable length 30 m with a conductivity from 0.5 µS/cm.
Max. cable length 15 m with a conductivity from 0.5 µS/cm when used in conjunction with ancillary unit URN 1 (24 V DC).

Voltage table

Use this voltage table as reference when checking the level electrode for malfunctions or submersion. Please observe the wiring diagram for NRS 1-8. **Fig. 10, Fig. 11**

U_{1-2}	U_{1-2}
10 µS/cm	0.5 µS/cm
2 V_{eff} C = 0.3 cm^{-1}	10 V_{eff} C = 0.13 cm^{-1}

Attention

- To protect the switching contacts provide circuit with a 2.5 A slow-blow fuse or according to TRD regulations (1.0 A for 72 h operation).
- The screen must not make any other electrical contact

Notice

- The self-checking routine of the level switch NRS 1-8 reduces U_{1-2} all 40 seconds to zero volt.
- Connect screen only to terminal 8 of the level switch.
- The sensitivity of response is indicated on the name plate.
- The rated voltage is indicated on the name plate.
- When switching off inductive loads, voltage spikes are produced that may impair the operation of control and measuring systems. Inductive loads should be provided with commercial arc suppressor RC combinations, e.g. 0.1 µF/100 W.

Tools

- Screwdriver for slotted screws, size 2.5, completely insulated according to DIN VDE 0680-1

Electrical Connection – continued –

Wiring diagram

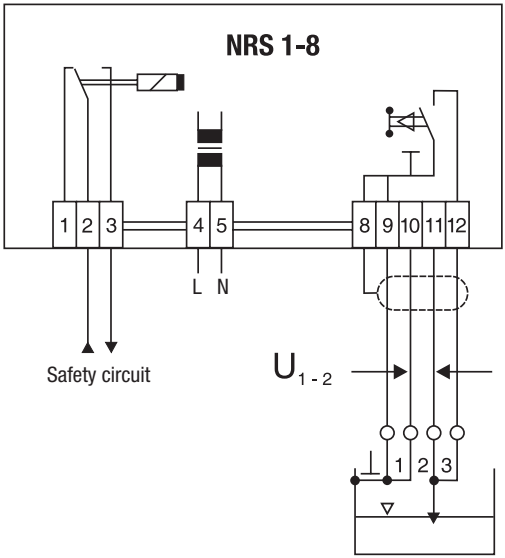


Fig. 10

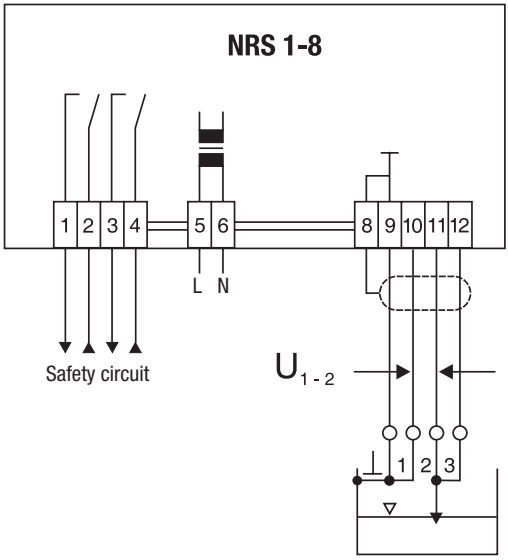


Fig. 11

This wiring diagram is only applicable for France!

Commissioning

Checking electrical connection

Make sure that the NRS 1-8 and the associated level electrode are wired in accordance with the wiring diagram. **Fig. 10, Fig. 11**

Applying mains voltage

Apply mains voltage to level switch NRS 1-8.

Performance test

Water level limiter

1. Check length of electrode rod (see installation manual of level electrode).
2. When switching on the mains voltage the green LED ⓬ must be permanently illuminated. **Fig. 7**
3. Completely open valves of water-level gauge glass on steam boiler.
4. Fill up with feedwater until the max. water level (high level mark) is exceeded.
   The two red LEDs ⓾ of the level switch must light up after the response delay.

   If the automatic self-testing routine is activated at this point in time an alarm will only be raised after twice the response delay time has elapsed.
5. To simulate a high level alarm when the electrode tip is exposed press button "TEST 1" ⓫. Press and hold down the button until the response delay has elapsed. Both red LEDs ⓾ must then light up.
6. To test the self-checking circuitry of the level switch proceed as follows:
   When the electrode tip is exposed set toggle switch "TEST 2 / INSPECTION" ❾ to the direction of the arrow.
   After max. two minutes the two red LEDs ⓾ should signal a low-level alarm. Note that the button "TEST 1" ⓫ must **not** be operated during this test **nor** must the level fall below the low level mark.
   After a successful test set switch ❾ back to its original position.
   Both red LEDs ⓾ must extinguish after the response delay.

Operation

Water level limiter

Use in conjunction with level switch NRG 1...-12 in steam and pressurised hot water plants in accordance with TRD 401, TRD 602, TRD 604, EN 12952, EN 12953 or according to other national regulations.

Notice

- To analyse and eliminate malfunctions refer to section "Fault finding list for troubleshooting" on pages 17 – 18.

Operational malfunctions

Fault finding list for troubleshooting

Level electrode exposed - High-level alarm

Fault:	The level switch raises a high-level alarm before the level in the boiler has reached the high-level mark.
Remedy:	Check length of high-level electrode tip. Make sure that the level switch and the electrode are wired in accordance with the wiring diagram.

Fault:	After lowering the water level below the high-level mark, the two red LEDs ⑩ are still illuminated or go out only after quite some time.
Remedy:	Check whether the protection tube is provided with a vent hole. If the electrode is fitted in a measuring pot outside the boiler, check positions of isolating valves.

Fault:	One or both LEDs ⑩ light up without the water level having reached the high-level mark.
Remedy:	This means loss of redundancy in the level switch, i. e. failure of one or two of the channels. Replace level switch.

High water level reached - no function

Fault:	The water level exceeds the high-level mark but neither of the two red LEDs ⑩ lights up.
Remedy:	Check whether the protection tube is provided with a vent hole. If the electrode is fitted in a measuring pot outside the boiler, check positions of isolating valves. Measure the conductivity of the boiler water and compare the value obtained with the specification on the name plate.

Fault:	The test "TEST 2 / INSPECTION" ⑨ was not successful, i. e. only one red LED ⑩ or none of the two lit up after max. two minutes .
Remedy:	Replace level switch.

Operational Malfunctions – continued –

If faults occur that are not listed above or cannot be corrected, please contact our service centre or authorized agency in your country.

Decommissioning

Danger

The terminal strips of the NRS 1-8 are live during operation.

This presents the danger of electric shock!

Cut off power supply before mounting or removing the terminal strips and the housing cover.

Disposal

Remove the level switch and separate the waste materials in accordance with the material specification.
Electronic components (circuit boards) must be disposed of separately.
For the disposal of the level switch observe the pertinent legal regulations concerning waste disposal.

Annex

Declaration of Conformity CE

We hereby declare that the equipment **NRS 1-8** conforms to the following European guidelines:

- Low Voltage Directive 73/23/eec version 93/68/eec
- EMC Directive 89/336/eec version 93/68/eec
- Low Voltage Standard EN 50178
- EMC Standard EN 50081-2, EN 50082-2

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

Bremen, 03rd January 2005
GESTRA AG

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