GESTRA®

Level Switch

NRS 1-41

spector bus

CANopen

EN
English

Original Installation Instructions

810830-03

Contents

Contents – continued –

Page

Contents – continued –

Page

Important Notes

Usage for the intended purpose

Use level switch NRS 1-41 only in conjunction with GESTRA level electrode NRG 16-41, NRG 17-41 or NRG 19-41 for signalling high water level (max. alarm).

Safety note

The equipment must only be installed and commissioned by qualified staff.

Maintenance and service work must only be performed by adequately trained persons who have a recognized level of competence.

Danger

The terminal strip of the equipment is live during operation.
This presents the danger of electric shock.
Cut off power supply before mounting or removing the terminal strips and housing lid.

Attention

The name plate indicates the technical specification of the equipment.
Do not commission or operate equipment without a name plate.

ATEX (Atmosphère Explosible)

According to the European Directive 2014/34/EU the equipment must **not** be used in explosion-risk areas.

Note on the Declaration of Conformity / Declaration by the Manufacturer CE

For details on the conformity of our equipment according to the European Directives see our Declaration of Conformity or our Declaration of Manufacturer.
The current Declaration of Conformity and Declaration of Manufacturer are available in the Internet under www.gestra.com ➙ documents or can be requested from us.

Explanatory Notes

Scope of supply

NRS 1-41

1 Level switch NRS 1-41 (plug-in unit in plastic case with terminals)
1 Terminating resistor 120 Ω
1 Installation manual

Description

The switching controller type NRS 1-41 is a self-monitoring high-water level limiter with periodic self-checking and monitoring feature of the output relay contacts designed to be used in conjunction with **one** level electrode type NRG 16-41, 17-41 or 19-41. The switching controller has the following function:

■ High-water level alarm with **one** level electrode

The equipment detects the max. water level (high-level limiter) and complies with the German regulations for use in steam and hot-water plants operating without constant supervision according to TRD 604, sheets 1 and 2 (24/72 hrs operation) as well as DIN EN 12952 and DIN EN 12953.

This item of electrical equipment complies with the Technical Regulations on Protection Circuits DIN EN 50156-1.

The level data are transferred from the electrode NRG 1…-41 to the switching controller via CAN bus using the CANopen protocol. Only **one** high-level limiting system may be used per CAN-based network.

Function

At regular intervals the level electrode NRG 1…-41 sends a data telegram to the switching controller NRS 1-41. The data transfer is effected by means of a CAN bus according to ISO 11898. The transferred measuring data are constantly evaluated by the controller. A periodic self-checking routine tests every 3 seconds the integrity of the system and its safety functions, with a malfunction in the switching controller resulting in immediate boiler shutdown. When the CAN bus line and, consequently, the data transmitting cycle are interrupted, the controller sends a visual signal to indicate a faulty condition and the relays are instantaneously de-energized (fail-safe position).

The switching controller also facilitates user-friendly performance tests and detection/evaluation of malfunctions.

To guarantee the correct and safe functioning of the high-level limiter a min. electrical conductivity of 0.5 μS/cm at 25 °C is required.

The relay de-energizing delay is normally set to 3 seconds at the factory but delays of 15 to 25 seconds are available on request.

Apart from the burner protection circuit there is also a separate Photo-MOS make contact output for remote indication.

The automatic self-testing routine of the switching controllers checks every 3 seconds their safety functions. The corresponding functions of the level electrodes will be tested by the electrode's self-checking routine every 10 sec. The malfunction information is updated with every self-test. If no faults have occurred the malfunction information will be deleted automatically. If faults persist the malfunction information remains stored. If a malfunction is detected, the signal output of the control unit (terminal 7 and 8) is opened and closed in a clock pulse controlled way. As part of the automatic self-testing routine of the switchting controller, the switching-off of the output relays every 6 hrs is checked, too.

Explanatory Notes – continued –

Associated components

NRG 16-41
Level electrode NRG 16-41, PN 40

NRG 17-41
Level electrode NRG 17-41, PN 63

NRG 19-41
Level electrode NRG 19-41, PN 160

Design

NRS 1-41
Enclosure of insulating material with terminals for installation in control cabinets.
The terminals are externally accessible.
Snapping onto a 35 mm standardised supporting rail (DIN EN 50022).
External dimensions: 73 x 100 x 118

Technical Data

NRS 1-41

Type approval no.
TÜV · SWB/SHWS · 12-403
EG BAF-MUC 0202 103881 002

Input/Output
Interface for CAN bus to ISO 11898 CANopen protocol

Output voltage supply for electrode
18 – 36, short-circuit protected

Output for control circuit
Two volt-free relay contacts, locally connected in series.
Max. contact rating for switchting voltages 24 V AC/DC, 115 V AC and 230 V AC:
4 A resistive/inductive. Contact material: hard-gold plated (AgNi 0.15)

Interference suppression
Provide contactor with external RC combination (100 Ω / 47 nF)

Signal output
Photo-MOS output, instantaneous with high level, timed malfunction signal, max. contact rating for switching voltages 24 V AC, 115 V AC and 230 V AC/DC:
100 mA resistive

Relay de-energizing delay
Output “High-level alarm”, set to 3 sec. (default), or 15 sec., 25 sec.
internally connected for relay contact test

Indicators and adjustors
4 pushbuttons “Parameterisation/TEST”
1 red LED for “High-level alarm electrode”
3 red LEDs “Multifunction”
1 red LED “Bus status”
1 green LED “Power”
1 ten-pole code switch, 7 poles for setting node ID, 3 poles for setting baud rate
1 two-pole code switch, without function.

Internal self-checking routine
Every 3 seconds

Periodic testing of output relay contacts
Every 6 hours

Mains voltage
230 V +/– 10 %, 50/60 Hz, 115 V +/– 10 %, 50/60 Hz (optional)

Power consumption
10 VA

Sensitivity
≥ 0.5 µS/cm at 25 °C

Technical Data – continued –

NRS 1-41 – continued –

Protection
Enclosure: IP 40 to DIN EN 60529
Terminal strip: IP 20 to DIN EN 60529

Admissible ambient temperature
0 °C to 55 °C

Enclosure material
Front panel: polycarbonate, grey
Enclosure: polycarbonate, black

Weight
Approx. 0.8 kg

Corrosion resistance

When used for its intended purpose the safe functioning of the equipment will not be impaired by corrosion.

Name plate / Marking

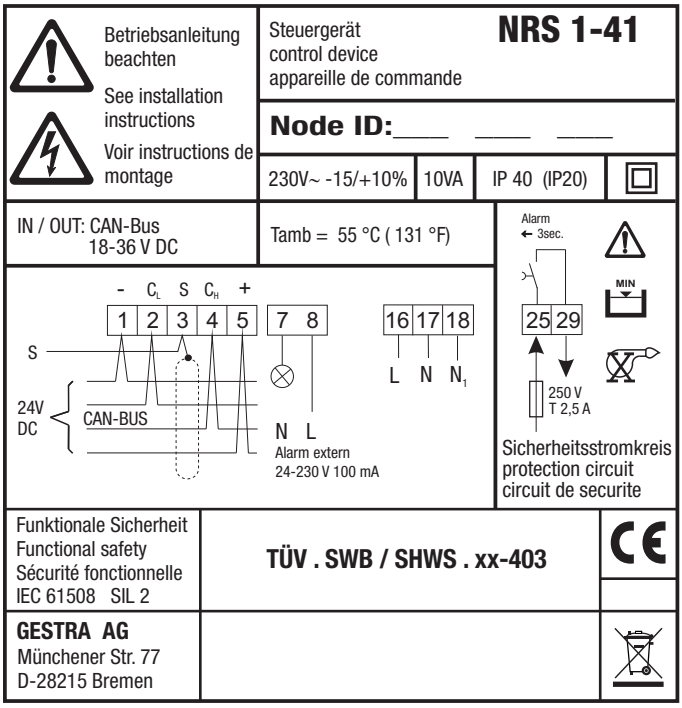


Fig. 1

Dimensions

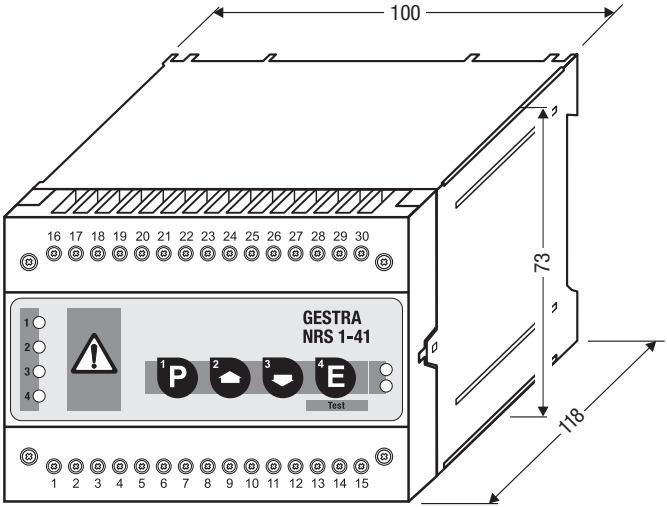


Fig. 2

Design

NRS 1-41

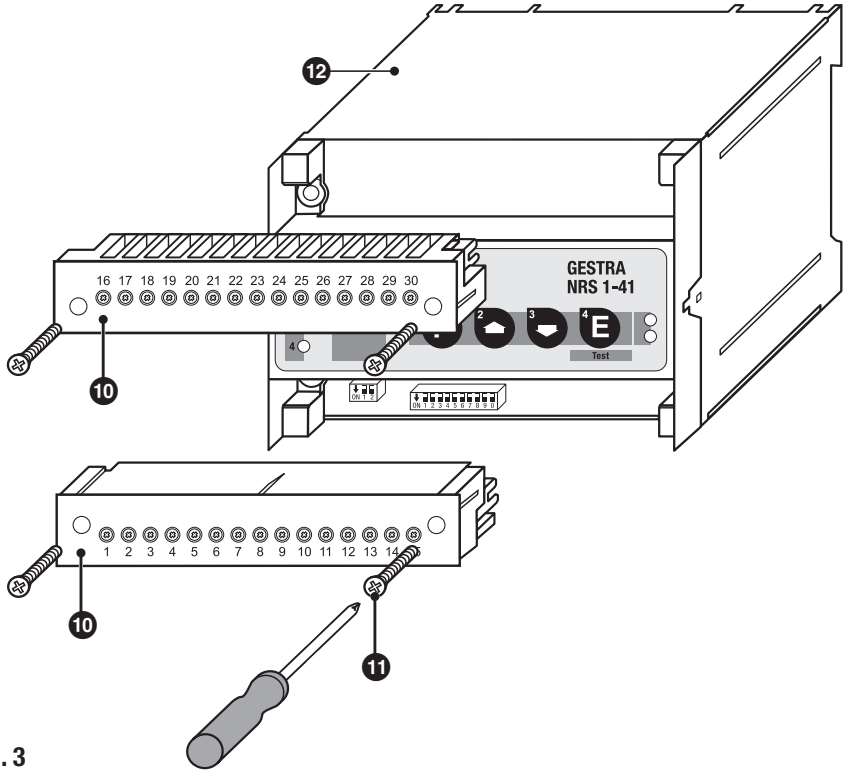


Fig. 3

Functional Elements

NRS 1-41

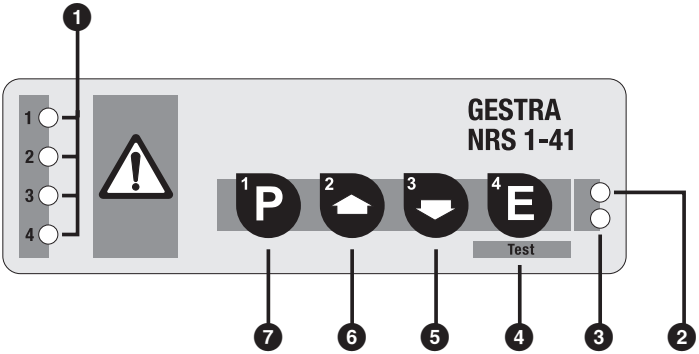


Fig. 4

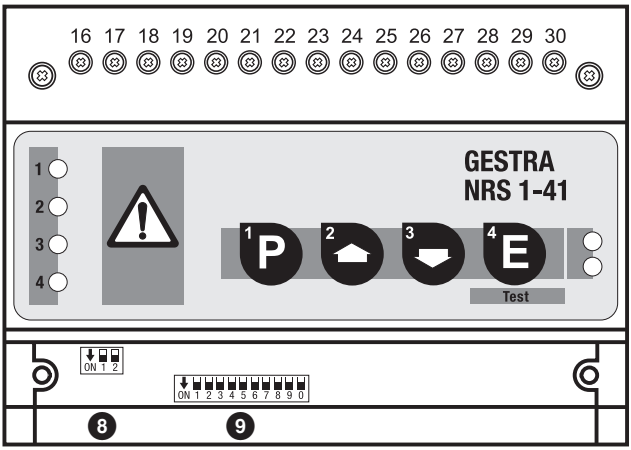


Fig. 5

Design / Functional Elements – continued –

Key

❶	Status LED	**Alarm**	**Malfunction**
	LED 1 Electrode	High-level alarm	Malfunction alarm
	LED 2	no function	Malfunction alarm
	LED 3	no function	Malfunction alarm
	LED 4	no function	Malfunction alarm

❷ LED “Bus status”

❸ LED “Power”

❹ Enter / Test mode

❺ Decrease

❻ Increase

❼ Program key

❽ Two-pole code switch (no function)

❾ Ten-pole code switch

❿ Terminal strip

⓫ Screws for terminal strip

⓬ Housing

⓭ Mounting rail TS 35 x 15 DIN EN 50022

Installation

NRS 1-41

Installation on mounting rail

1. Clip switching controller onto mounting rail 35 x 15 mm (DIN EN 50022).
2. Align switching controller, **Fig. 7**

Note

- If an external measuring pot is used, each level electrode type NRG 1…-41 requires **one** switching controller type NRS 1-41 and **one** GESTRA monitoring unit SRL 6-40.

Tool

- Screwdriver (5.5/100)

Key

⑩ Terminal strip

⑪ Screws for terminal strip

⑫ Housing

⑬ Mounting rail TS 35 x 15 DIN EN 50022

Example of installation

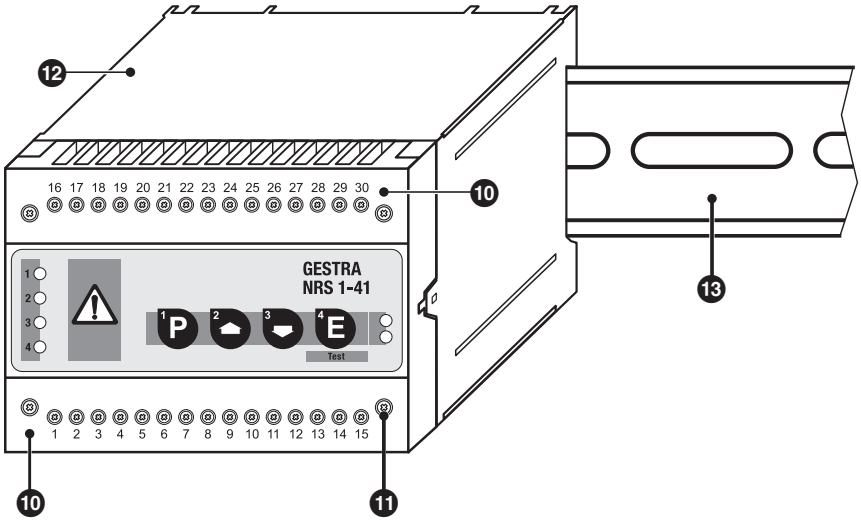


Fig. 6

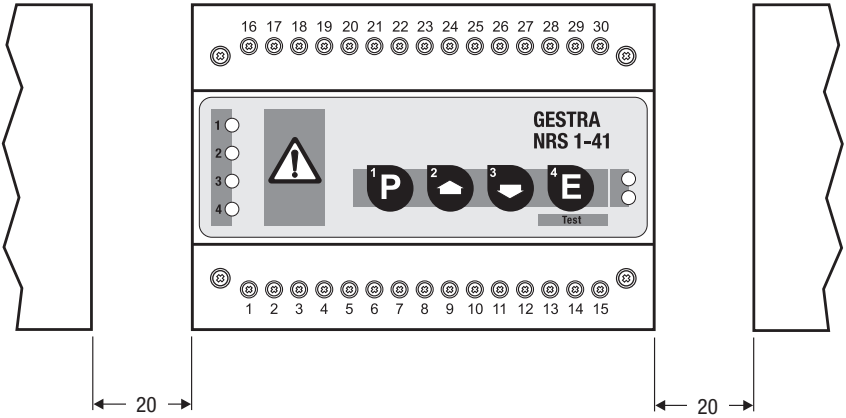


Fig. 7

Electrical Connection

Control cable

NRS, NRR, LRR, TRS, URB 1
To wire the equipment, screened multi-core twisted-pair control cable **must** be used for the bus line, e. g. UNITRONIC® BUS CAN 2 x 2 x ... mm² or RE-2YCYV-fl 2 x 2 x ... mm².

Control cable assemblies (2 x 2 x 0.32 mm² cable with plug and connector) of various lengths are available as add-on equipment.

NRG, LRG, EF, URZ, TRV, URB 2
The equipment is fitted with sensor plug-in connectors (5 poles, A-coded). For connecting the bus devices control cable assemblies (with plug and connector) of various lengths are available as add-on equipment.

Note that the recommended control cables are not UV-resistant and must be protected by a UV-resistant plastic tube or cable duct if the equipment is installed outdoors (except for URB 2).

The baud rate (data transfer rate) dictates the cable length and size between the bus nodes. The total power consumption must also be taken into consideration when selecting the conductor size. The total power consumption is obtained from the number of bus nodes.

If the cable length between the steam boiler and the control cabinet exceeds 15 m, we recommend that you fit a branching box that is resistant to electromagnetic interference (stock code 1501214) and use a control cable with a larger conductor size for the distance to the control cabinet.

S 8	S 9	S 10	Baud rate	Cable length	Number of pairs and conductor size [mm²]
OFF	**ON**	**OFF**	**250 kBit/s**	**125 m**	2 x 2 x 0.32
Factory setting					
ON	ON	OFF	125 kBit/s	250 m	2 x 2 x 0.5
OFF	OFF	ON	100 kBit/s	335 m	2 x 2 x 0.75
ON	OFF	ON	50 kBit/s	500 m	on request, depending on bus configuration
OFF	ON	ON	20 kBit/s	1000 m	
ON	ON	ON	10 kBit/s	1000 m	

Set baud rate via code switch ❾. Make sure that all bus nodes feature the same settings.

Note

- The max. baud rates and cable lengths indicated above are based on empirical values obtained by GESTRA. In certain cases it may be necessary to reduce the baud rate in order to ensure operational safety.
- The type and design of the data cable has a strong influence on the electromagnetic compatibility (EMC) of the equipment. Take special care when connecting the equipment.
- If you do not use the control cable assemblies connect the connectors and jacks for the control cables as indicated in the assignment diagram for sensor plug-in unions.

CAN bus voltage supply

To ensure the troublefree operation of the CAN bus system make sure that the voltage supply for all bus devices is sufficient.

Please use the following table to check the voltage supply of your bus system.

Control units with voltage supply	Qty.	x	Power output per item	=	Sum
		x	6 W	=	W
	Please enter data.		Sum 1	=	W
Sensor, transmitter, control units, operating & display unit URB 1	Qty.	x	Power consumption per item	=	Sum
		x	3 W	=	W
Operating & display unit URB 2		x	5 W	=	W
	Please enter data.		Sum 2	=	W

If sum 2 exceeds sum 1 supply the CAN bus with 24 V DC coming from a separate and stabilized safety power supply unit (e. g. SITOP Smart 24 V 2.5 A).

The power supply unit must be electrically isolated from dangerous contact voltages and must meet at least the requirements on double or reinforced isolation acc. to DIN EN 50178 or DIN 61010-1 or DIN EN 60730-1 or DIN EN 60950 (safe isolation).

The power supply unit must be provided with an overcurrent protective device in accordance with EN 61010-1.

Attention

If a safety power supply unit (e. g. SITOP smart, 24 V, 2.5 A) is used for the voltage supply of the CAN bus do not tap the supply voltage from the terminals 1 and 5 of the GESTRA control devices.

SITOP smart is a registered trademark of Siemens AG, Munich

Wiring diagram

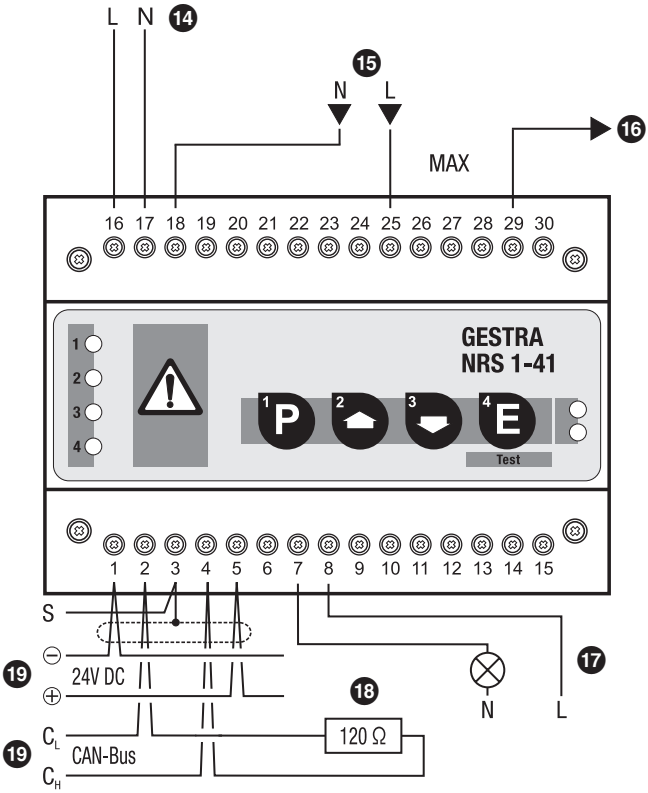


Fig. 8

Attention

- Do not connect terminals 19 – 24 and 26, 27, 28 and 30!
- Do not connect terminals 10, 11 and 12!

Electrical Connection – continued –

Wiring diagram for the sensor plug-in connections

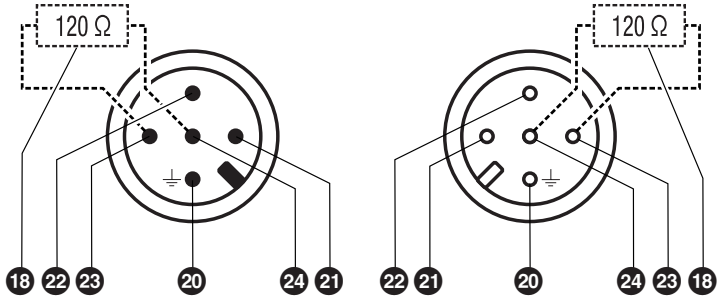


Fig. 9

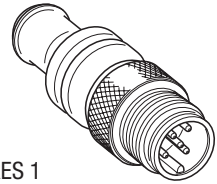


Fig. 10 RES 1

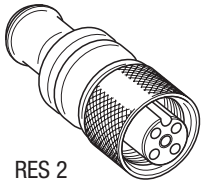


Fig. 11 RES 2

Key

⓮ Mains voltage

⓯ Safety circuit, uninterrupted, ≥ 18 V AC/DC

⓰ Other devices in the safety circuit

⓱ Photo-Mos output 24 V-230 V AC/DC, 100 mA.
With HW-alarm: instantaneous. With malfunction alarm: switched

⓲ Terminating resistor 120 Ω, RES 1 or RES 2

⓳ CAN bus line, twisted pair control cable

⓴ Pin 1: Screen

㉑ Pin 2: Power supply 24 V DC+ (red)

㉒ Pin 3: Power supply 24 V DC– (black)

㉓ Pin 4: CAN data line C_H (white)

㉔ Pin 5: CAN data line C_L (blue)

CAN bus wiring diagram

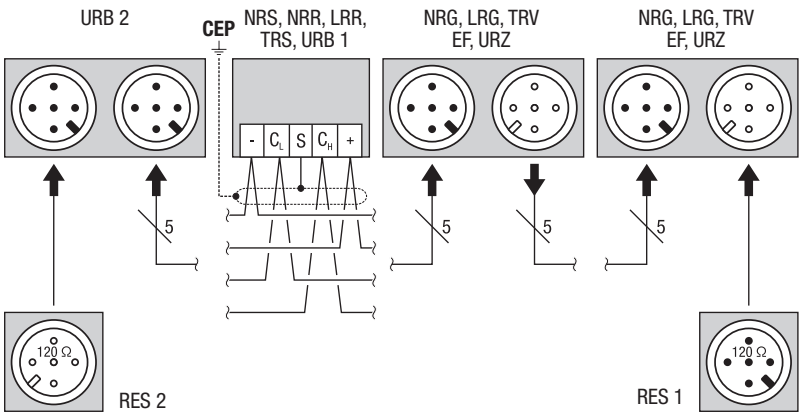


Fig. 12

Attention

- Wire equipment in series. Star-type wiring is not permitted!
- Link screens of control cables such that electrical continuity is ensured and connect them **once** to the central earthing point (CEP). If equipotential bonding currents are to be expected, for instance in outdoor installations, make sure that the screen is separated from the central earthing point (CEP).
- To protect the switching contacts fuse circuit with T 2.5 A or according to TRD regulations (1.0 A for 72 h operation).
- If two or more system components are connected in a CAN bus system, provide the first and the last device with a terminating resistor of 120 Ω, **Fig. 10, Fig. 11**
- Note that in a CAN bus network only **one** high-water level limiting system may be used.
- Do **not** interrupt the CAN bus network during operation with one or more system components!

  If the CAN bus network is interrupted the safety circuit will be opened.

  If the control unit is to be replaced detach terminal strip ⑩, **Fig. 3**

  Before taking the CAN bus line from the terminal strip, make sure that all connected system components are out of service.

Electrical Connection – continued –

Note

- Connect screen only to terminal 3, ensuring electrical continuity and connect equipment once to the central earthing point (CEP).
- The loop resistance must be under 10 Ω.
- The rated voltage is stated 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 therefore be provided with commercial arc suppressor RC combinations, e. g. 0.1 µF / 100 Ω.
- Despite correct wiring H. F. interference caused by the installation may lead to system breakdowns and malfunction messages. If necessary refer to the **"Fault finding list for troubleshooting"**.
- In the event of a shut-down due to a malfunction the signal output (terminals 7 and 8) is cyclically openend and closed in order to ensure an optical distinction between "High level" (signal output permanently closed) and "Malfunction shut-down". If necessary conncect terminals 7 and 8 externally to an indicator lamp, **Fig. 8.**

Tool

- Screwdriver of slotted screws, size 2.5, completely insulated according to VDE 0680.

Basic Settings

Bus cable

All level and conductivity controllers and associated electrodes are interconnected by means of a CAN bus using the CANopen protocol. Every item of equipment features an electronic address (node ID). The four-core bus cable serves as power supply and data highway for high-speed data exchange.

The CAN address (node ID) can be set between **1** and **123**.

The NRS 1-41 is configured at our works and ready for service with other GESTRA system components without having to set the node ID.

If several systems of the same kind are to communicate in one CAN bus network, be sure to assign one node ID for each individual system component (e. g. controller).

Change code switch ❾ setting if the length of the CAN bus cable exceeds 125 m.

For more information on switch positions see **Basic Settings / Switch positions**.

Basic Settings – continued –

Node ID

Water level limiter

NRS 1-40	NRG 16-40 (1)	NRG 16-40 (2)	Reserved	Reserved	
X	X + 1	X + 2	X + 3	X + 4	
1	2	3			Factory setting

Safety system for steam boilers with superheater

NRS 1-40.1	NRG 16-40 (1)	NRG 16-40 (2)	TRV 5-40	Limiter 4	
X	X + 1	X + 2	X + 3	X + 4	
1	2	3	4		Factory setting

Safety system (e. g. hot-water generating units)

NRS 1-40.1	NRG 16-40 (1)	NRG 16-40 (2)	Limiter 3	Limiter 4	
X	X + 1	X + 2	X + 3	X + 4	
1	2				Factory setting

Safety system (e. g. hot-water generating units)

NRS 1-40.2	TRV 5-40 (1)	TRV 5-40 (2)	Limiter 3	Limiter 4	
X	X + 1	X + 2	X + 3	X + 4	
6	7	8	9	10	Factory setting
	TRS 5-40 (1)	TRS 5-40 (2)			
	X + 1 + 90	X + 2 + 90			
	97	98			

High level alarm

NRS 1-41	NRG 16-41	Reserved	Reserved	Reserved	
X	X + 1	X + 2	X + 3	X + 4	
6	7	8	9	10	Factory setting

Further components

SRL 40		
X = (sensor: level limiter // hi alarm) + 2		Factory setting
ORT 6		
98		Factory setting

On-off level control

Reserved	NRS 1-42	NRG 16-42		
X – 1	X	X + 1		
19	20	21		Factory setting

Modulating level control

URZ 40	NRS 2-40	NRR 2-40	NRG 26-40	Reserved	
X – 2	X – 1	X	X + 1	X + 2	
38	39	40	41	42	Factory setting

Automatic continous blowdown control

EF 1-40	Reserved	LRR 1-40	LRG 1-4...	Reserved	
X – 2	X – 1	X	X + 1	X + 2	
48	49	50	51	52	Factory setting

Control unit

URB 1, URB 2		
60		Factory setting

Basic Settings – continued –

Factory setting

The switching controller features the following factory set default values:

- Baud rate: **250 kb/s for 125 cable length**
- Sensitivity: **0.5 µS/cm**
- Node ID: **6**
- Relay de-energizing delay: **3 s**
- Configuration: **Operation with one level electrode NRG 1.. .-41**

Establishing / changing node ID

If several identical systems are to communicate in a CAN bus network, set a different node ID for each system (e. g. limiter, controller, etc).

In most cases the default GESTRA setting can be used. To set code switches ❽ and ❾ detach the lower terminal strip ❿.

Attention

- We recommend that you commission the CAN bus devices with the default factory setting.
- Do **not** use a node ID for more than one piece of equipment in the CAN bus system.

Code switch settings

		Node ID	6
S1	OFF	1	
S2	***ON***	2	
S3	***ON***	4	
S4	OFF	8	
S5	OFF	16	
S6	OFF	32	
S7	OFF	64	

Fig. 13 (Factory setting)

		Node ID	12
S1	OFF	1	
S2	OFF	2	
S3	***ON***	4	
S4	***ON***	8	
S5	OFF	16	
S6	OFF	32	
S7	OFF	64	

Fig. 14 (Example)

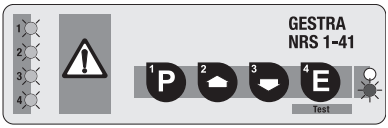
S8	S9	S0	Baud rate	Cable length
OFF	***ON***	OFF	250 kBit/s	125 m
ON	***ON***	OFF	125 kBit/s	250 m
OFF	ON	***ON***	100 kBit/s	335 m
ON	ON	***ON***	50 kBit/s	500 m
OFF	***ON***	***ON***	20 kBit/s	1000 m
ON	***ON***	***ON***	10 kBit/s	1000 m

Fig. 15 (Factory setting 250 kBit/s)

Commissioning

NRS 1-41

Apply power to the unit.
The four status LEDs flash rapidly.
The LED “Power” lights up.
The test cycle takes about 3 sec.



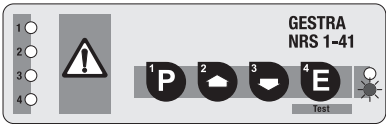
Note

- To analyse and eliminate malfunctions that may occur during the commissioning procedure refer to section **“System Malfunctions”**.

Operation

NRS 1-41

Normal operation, electrode exposed.
The four indicator LEDs are not illuminated.
The LED “Power” lights up.

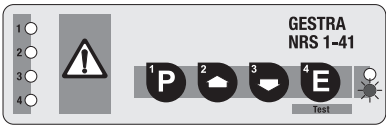


Test Cycle

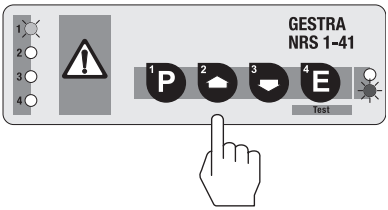
NRS 1-41

Press button E briefly (1 s).
The test mode is activated for about 10 sec.
Be sure to press button ▲ or ▼ within these 10 sec.

Note: The control circuit will be interrupted during the test cycle.



Press button ▲ for 3 sec.
LED 1 flashes rapidly and remains permanently illuminated after 3 sec.
A high-level alarm is simulated for level electrode 1.

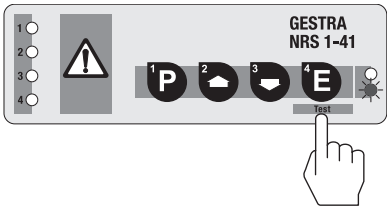


Alarm

NRS 1-41

There is one alarm condition:

- High level alarm for water level limiter

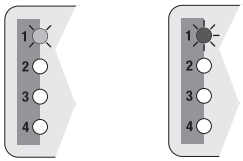


High-water level alarm for water level limiter

LED 1 flashes rapidly.

LED 1 remains permanently illuminated after the de-energizing delay.

De-energizing delay: 3 sec. (default)



Note

- The switching controller does not have its own lock-out circuit. The lock-out function has to be provided externally.
- The signal output (terminal 7 and 8) is instantaneously energized (no delay of response) in the event of an alarm.

Operational Malfunctions

Danger

The terminal strips of the equipment are live during operation.
This presents risk of severe cases of electric shock!
Cut off power supply to the equipment before mounting or removing the terminal strips or the housing cover!

Fault finding list for troubleshooting

Switchpoint HW exceeded – control unit does not respond

Fault: LED "Power" is not illuminated.
Remedy: Apply mains voltage. Wire equipment according to the wiring diagram.

Level has not yet reached switchpoint HW – control unit raises HW alarm

Fault: The vent hole in the protection tube is flooded.
Remedy: Check protection tube.

Fault: The isolating valves of the external measuring pot (optional) are closed.
Remedy: Open isolating valves.

Equipment does not work – malfunction message in control unit

Fault: In spite of correct wiring and commissioning of the equipment an error message is indicated.
Remedy: Cut off power supply to the equipment. Remove terminal strips and re-attach them. Re-start system after 5 sec.
Remedy: Carry out systematic fault finding as described in chapter **"System Malfunctions"**.

Electrode submerged – no HW alarm

Fault: The electrode body does not have earth connection to the vessel.
Remedy: Clean seating surfaces and insert metal joint ring (of stainless steel 1.4301) D 27 x 32 to DIN 7603.
Do **not** insulate electrode with hemp or PTFE tape!

Fault: No HW alarm is raised although the electrode is submerged.
Remedy: The conductivity of the fluid to be monitored is below 0.5 µS/cm. Increase the conductivity of the fluid.

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

System Malfunctions

Danger

The terminal strips of the equipment are live during operation.
This presents risk of severe cases of electric shock!
Cut off power supply to the equipment before mounting or removing the terminal strips or the housing cover!

Causes

Malfunctions occur if CAN bus components have been mounted, wired or configured incorrectly or if electronic component parts are defective, or in the event of excessive heat in the equipment or electrical interference in the supply system. In the event of a system malfunction the safety circuit (terminals 25 and 29) will be interrupted instantaneously.

There are four malfunction conditions for the control unit and the measuring transducer:

- Admissible temperature in electrode terminal box exceeded
- No or faulty communication between control unit and sensor
- Malfunction in CAN bus
- Failure of 24 V power supply unit or failure of external PSU

A self-test is performed in the control unit every 3 seconds and in the measuring sensor (e.g. level electrode) every 10 seconds. Any error messages will be saved in the control unit during the self-testing routine. The error messages are stored in the control unit until the cause of the error has been eliminated. During an error message the signal output will be switched off and on (terminals 7 and 8) in a clock-pulse controlled way. As part of the self-test the output relays are also checked every six hours.

System Malfunctions – continued –

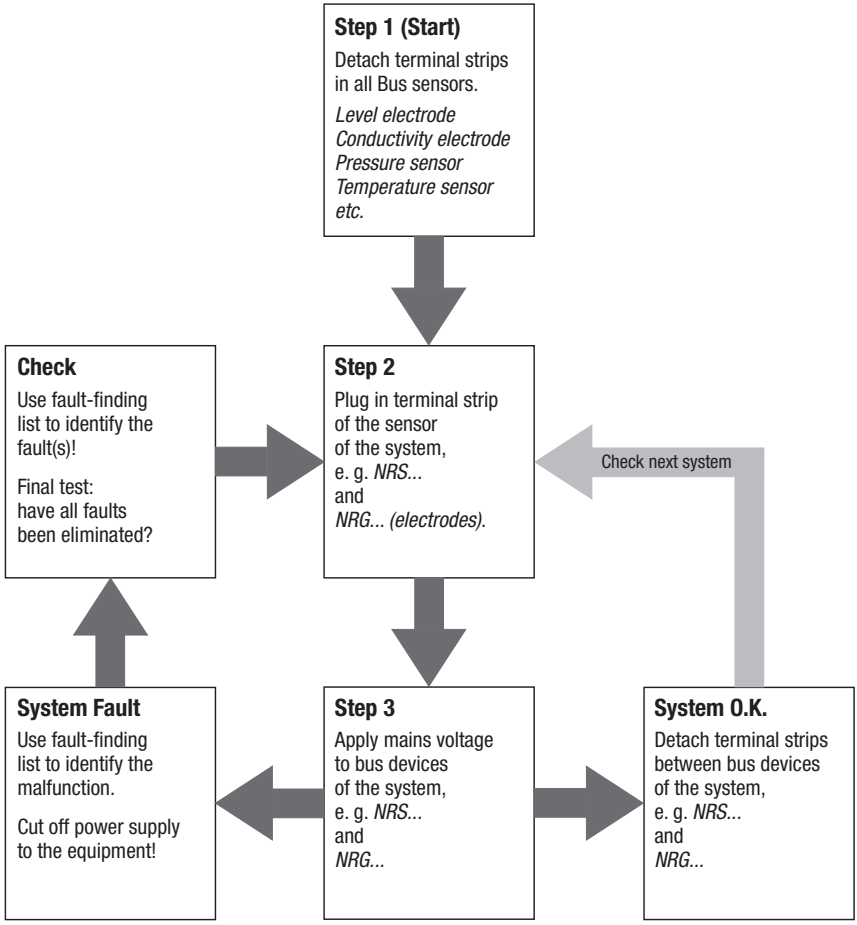
Danger

The terminal strips of the equipment are live during operation.
This presents risk of severe cases of electric shock!
Cut off power supply to the equipment before mounting or removing the terminal strips or the housing cover!

Systematic fault finding procedure for system malfunctions

The sources of malfunctions occurring in CAN bus systems operating with several bus-based stations must be analysed systematically since faulty components or incorrect settings can give rise to negative interactions with intact bus devices in the CAN bus system. These unwanted interactions can cause error messages in fully functional bus devices, which will make fault detection even more difficult.

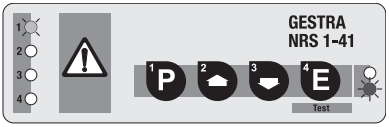
We recommend the following systematic fault finding procedure:



Error message 1

LED 1 flashes slowly.

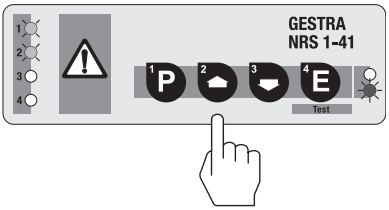
A system malfunction in level **electrode** was detected.



Hold down button .

LED 1 and LED 2 are flashing slowly.

A



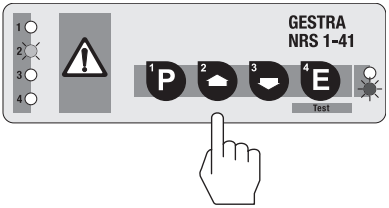
Fault: The max. admissible temperature in the terminal box of the electrode has been exceeded.

Remedy: Insulate electrode flange against heat radiation.

Hold down button .

LED 2 flashes slowly.

B



Fault: The electronic circuit board of the level electrode is defective.

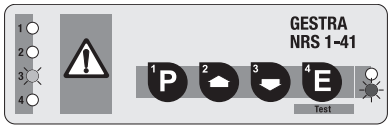
Remedy: Replace electronic circuit board of the level electrode.

System Malfunctions – continued –

Error message 2

LED 3 flashes slowly.

A communication malfunction in the bus line between the control unit and **level electrode** was detected.

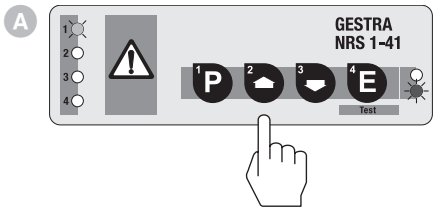


Hold down button 2.

↓

LED 1 flashes slowly.

↓



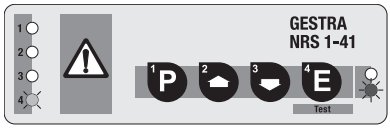
Fault:	The bus lines C_L and C_H have been mixed up.
Remedy:	Wire bus line in accordance with wiring diagram.
Fault	The data transfer between control unit and electrode is interrupted.
Remedy:	Make sure that the bus lines are all wired in accordance with the wiring diagram (observe polarity). All **end-of-line devices** must be provided with a terminating resistor of 120 Ω (see wiring diagram). Cut off power supply and restart system after 5 sec.
Fault:	The baud rate of one or more bus devices is not set correctly.
Remedy:	Check baud rate settings of all bus devices. The baud rate settings **must** be identical. Cut off power supply and restart system after 5 sec.
Fault:	The overall length of the bus line does not correspond to the baud rate setting.
Remedy:	Change baud rate settings of all bus based equipment. Cut off power supply and restart system after 5 sec.
Fault:	In spite of correct wiring and commissioning of the equipment an interference signal is indicated.
Remedy:	The interference signal is caused by H. F. interferences coming from the installation. For interference suppression of the voltage supply we supply ferrite rings, stock code 147253. The 230 V supply lines should be looped through the ferrite ring five to ten times. If several controllers are used in the system, they can be fed from the interference suppressed supply lines. For the interference suppression of the bus line we supply hinged-shell ferrite rings, stock code 147254. The hinged-shell ferrite rings are clamped onto the bus line close to the terminal strip of the controller. Restart the system after installation.

System Malfunctions – continued –

Error message 3

LED 4 flashes slowly.

A malfunction in the level switch has been detected.



Fault:	No voltage or switched-mode voltage across terminal 25, the self-test is not succesful.
Remedy:	Wire control unit as first device in the safety circuits and in accordance with wiring diagram (ensure permanent voltage across terminal 25). Restart system.

Fault:	Potential (voltage) applied across terminal(s) 26 and/or 30.
Remedy:	Do not connect these two terminals.

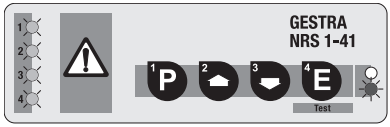
Fault:	Temperature in control cabinet too high (> 60 °C).
Remedy:	Observe installation distances in control cabinet (both sides 20 mm).
Remedy:	Provide better air venting of the control cabinet.

Fault:	The electronic circuit board of the control unit is defective.
Remedy:	Replace control unit. Restart system.

Error message 4

LEDs 1 to 4 flash rapidly.

A general communication malfunction has been detected.

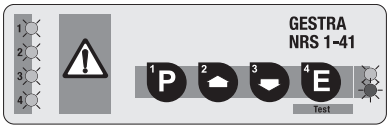


Fault:	No communication between bus devices possible.
Remedy:	Check wiring, node ID, baud rate setting, bus cable and terminating resistor. Cut off power supply and restart system after 5 sec.

System Malfunctions – continued –

Error message 5

LEDs 1 to 4 are flashing slowly or
LED “Bus status” is flashing slowly.



Fault:	Data transfer between control unit and electrode interrupted.
Remedy:	The bus cables have to be correctly connected according to the wiring diagram (observe polarity!). Make sure that all **end-of-line nodes** are provided with 120 Ω terminating resistors. Cut off power supply and restart system after 5 sec.

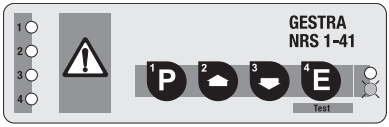
Fault:	The baud rate of one or more nodes is not set correctly.
Remedy:	Check baud rate settings of all bus nodes. The baud rates **must be identical**. Cut off power supply and restart system after 5 sec.

Fault:	The overall length of the bus cable does not correspond to the selected baud rate.
Remedy:	Change baud rate settings of all nodes. Cut off power supply and restart system after 5 sec.

Fault:	The electronic circuit board of the control unit is defective.
Remedy:	Replace control unit. Restart system.

Error message 6

LED “Power” flashes slowly.



Fault:	The power supply unit (PSU) is overloaded. The PSU may be misused for other components.
Remedy:	Check load of PSU. Be sure to use the PSU only for the voltage supply of bus-based network components. Cut off power supply and restart system after 5 sec.

Fault:	Power supply unit defective.
Remedy:	Replace power supply unit.

Decommissioning

Danger

The terminal strips of the equipment are live during operation.
This presents risk of severe cases of electric shock!
Cut off power supply to the equipment before mounting or removing the terminal strips or the housing cover!

Disposal

Dismantle the equipment and separate the waste materials according to the material specification.
Electronic component parts such as the circuit board must be disposed of separately!
For the disposal of the control unit observe the pertinent legal regulations concerning waste disposal.

For your Notes

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