KA01578G/00/EN/04.24-00
71663999
2024-06-28

Brief Operating Instructions **NAR300 system for high temperature**

Oil leak detector float sensor

These Instructions are Brief Operating Instructions; they are not a substitute for the Operating Instructions pertaining to the device.

Detailed information about the device can be found in the Operating Instructions and the other documentation:
Available for all device versions via:
- Internet: www.endress.com/deviceviewer
- Smart phone/tablet: *Endress+Hauser Operations App*

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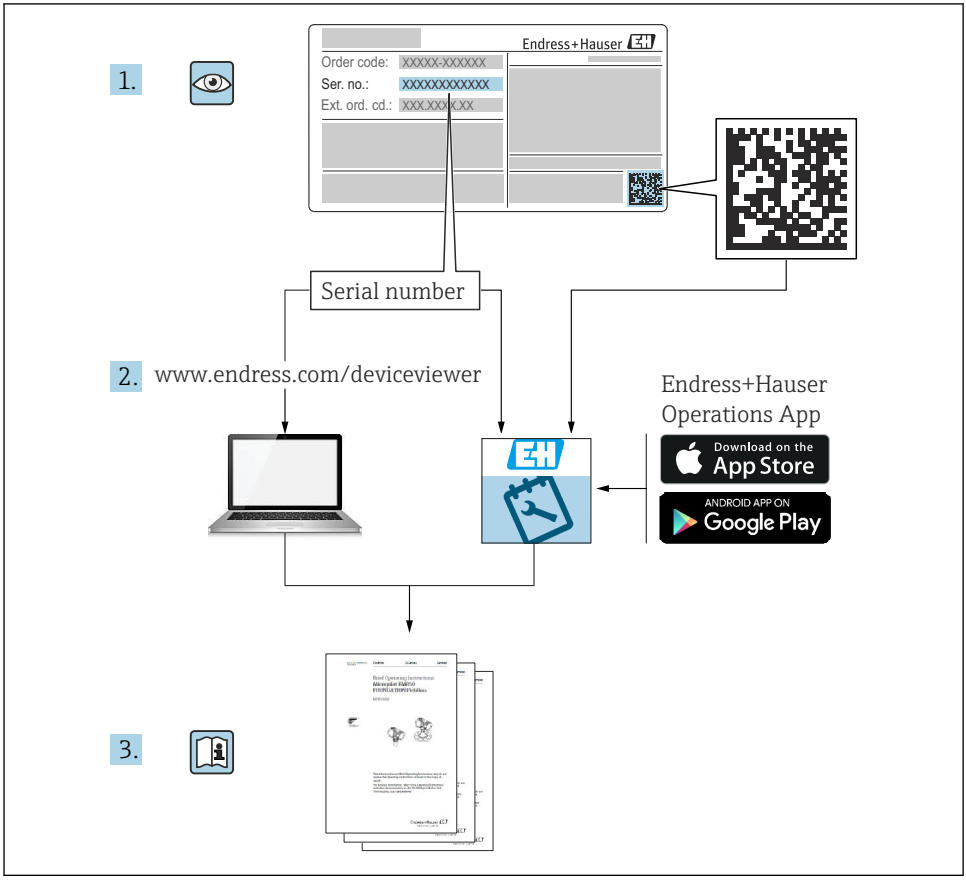
1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXXX
Ext. ord. cd.: XXX.XXX.XXX
Serial number
2.
www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the
App Store
ANDROID APP ON
Google Play
3.

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1 Document information

1.1 Symbols used

1.1.1 Safety symbols

⚠ DANGER
This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.

⚠ WARNING
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.

⚠ CAUTION
This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.

NOTICE
This symbol contains information on procedures and other facts which do not result in personal injury.

1.1.2 Electrical symbols

Alternating current

Direct current and alternating current

Direct current

Ground connection

A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Protective earth (PE)

Ground terminals that must be connected to ground prior to establishing any other connections.

The ground terminals are located on the interior and exterior of the device:
- Interior ground terminal: protective earth is connected to the mains supply.
- Exterior ground terminal: device is connected to the plant grounding system.

1.1.3 Tool symbols

Phillips head screwdriver

Flat blade screwdriver


Torx screwdriver


Allen key


Open-ended wrench

1.1.4 Symbols for certain types of information and graphics

Permitted
Procedures, processes or actions that are permitted

Preferred
Procedures, processes or actions that are preferred

Forbidden
Procedures, processes or actions that are forbidden

Tip
Indicates additional information


Reference to documentation


Reference to graphic

▶
Notice or individual step to be observed

1., 2., 3.
Series of steps


Result of a step


Visual inspection


Operation via operating tool


Write-protected parameter

1, 2, 3, ...
Item numbers

A, B, C, ...
Views

→ Safety instructions
Observe the safety instructions contained in the associated Operating Instructions


Temperature resistance of the connection cables
Specifies the minimum value of the temperature resistance of the connection cables

1.2 Documentation

The following documentation types are available in the Downloads area of the Endress +Hauser website (www.endress.com/downloads).

For an overview of the scope of the associated Technical Documentation, refer to the following:
W@M Device Viewer (www.endress.com/deviceviewer): Enter the serial number on the nameplate.

1.2.1 Technical Information (TI)

Planning aid
The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.

1.2.2 Brief Operating Instructions (KA)

Guide that takes you quickly to the first measured value
The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

1.2.3 Operating Instructions (BA)

The Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance, and storage, to mounting, connection, operation, and commissioning, through to troubleshooting, maintenance, and disposal.

1.2.4 Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

2 Basic safety instructions

2.1 Basic instructions regarding safety

2.1.1 Requirements for the personnel

The personnel must fulfill the following requirements for its tasks:
- Trained, qualified specialists must have a relevant qualification for this specific function and task.
- Are authorized by the plant owner/operator.
- Are familiar with federal/national regulations.
- Before starting work, read and understand the instructions in the manual and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

2.2 Intended use

Application and measured materials
Measuring devices for use in hazardous areas, in hygienic applications or in applications where there is an increased risk due to process pressure are labeled accordingly on the nameplate.

Take the following measures to ensure that the device is used under appropriate conditions while in operation:
- Only use the measuring device in full compliance with the specifications on the nameplate and the general conditions listed in the operating instructions and supplementary documentation.
- Check the nameplate specifications to ensure that the ordered device can be put to its intended use in the approval-related area (e.g. explosion protection, pressure vessel safety).
- When not using this device at atmospheric temperature, it is important to comply with the basic requirements listed in the relevant documentation for the device.
- Protect the device permanently against corrosion caused by environmental effects.
- Observe the limit values in the "Technical Information."

The manufacturer is not liable for damage caused by improper or unintended use.

2.3 Workplace safety

When working with the device:
- Wear personal protection gear required by your regional/national regulations.

2.4 Operational safety

Risk of injury!
- Operate the device only if it is in proper technical condition, free from errors and faults.
- The operator is responsible for interference-free operation of the device.

Hazardous area

To eliminate danger to persons or the facility when the device is used in the hazardous area (e.g. explosion protection):

- ▶ Check the nameplate to verify if the device ordered can be put to its intended use in the hazardous area.
- ▶ Observe the specifications in the separate supplementary documentation that is an integral part of these instructions.

2.5 Product safety

The NAR300 system is designed in accordance with GEP (Good Engineering Practice) to meet the latest safety requirements, and it has been tested to ensure that it is ready to be used safely before being shipped from the factory. The NAR300 system meets general safety standards and legal requirements.

2.5.1 CE mark

This measurement system meets the legal requirements of the applicable EU directive. These are listed in the corresponding EU Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

3 Product description

NAR300 system is designed to be installed in a pit within an oil retaining dike, a plant, or a sump pit near a pump yard, where it can provide the ultimate in leak detection function for oils, such as petrochemicals and vegetable oils. A sensor with a conductivity detection function is used to monitor the detection conditions. With a two-stage alarm logic process, it has an extremely low false alarm rate, and this ensures the safety of the tank yard with an accurate yet simple device configuration.

NOTICE

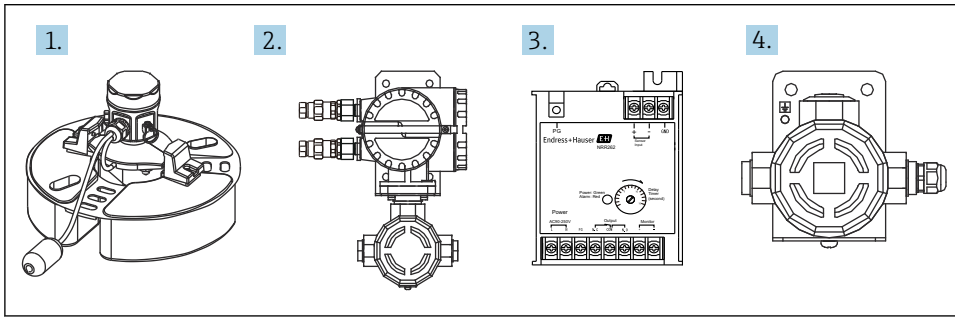
TIIS specifications

These operating instructions are not intended for products with TIIS specifications.

- If you are using a product with TIIS specifications, download and refer to KA01578G/33/JA/01.22-00 or an earlier version from our website (www.endress.com/downloads).

3.1 Product design

NAR300 system is configured in combination with mainly the following products.



1 NAR300 product design

1 *Float sensor NAR300*
2 *Ex d [ia] converter NRR261*
3 *Ex [ia] converter NRR262*
4 *Ex [ia] sensor I/F Ex box*

4 Incoming acceptance and product identification

4.1 Incoming acceptance

Upon receipt of the goods, check the following:
- Are the order codes on the delivery note and the product label identical?
- Are the goods undamaged?
- Do the nameplate data match the ordering information on the delivery note?
- If required (see nameplate): Are the Safety Instructions (XA) enclosed?

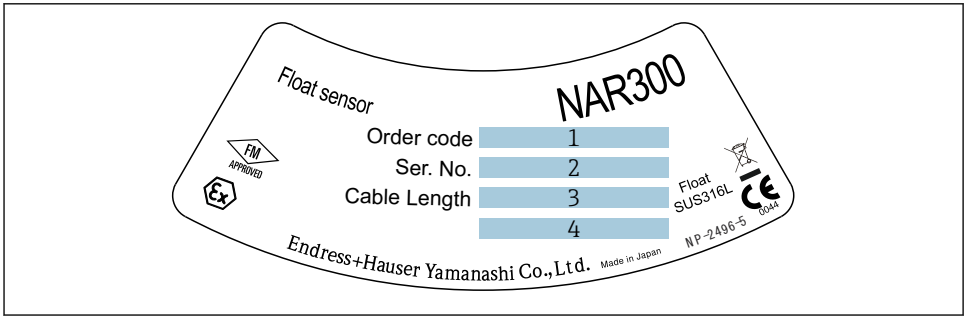
If one or more of these conditions are not satisfied, contact your Endress+Hauser Sales Center or distributor.

4.2 Product identification

The following options are available for identification of the device:
- Nameplate specifications
- Extended order code on the delivery note (including details of the device specification codes)
- Entering the serial number from the nameplate in *W@M Device Viewer* (www.endress.com/deviceviewer) will display all the information about the device.

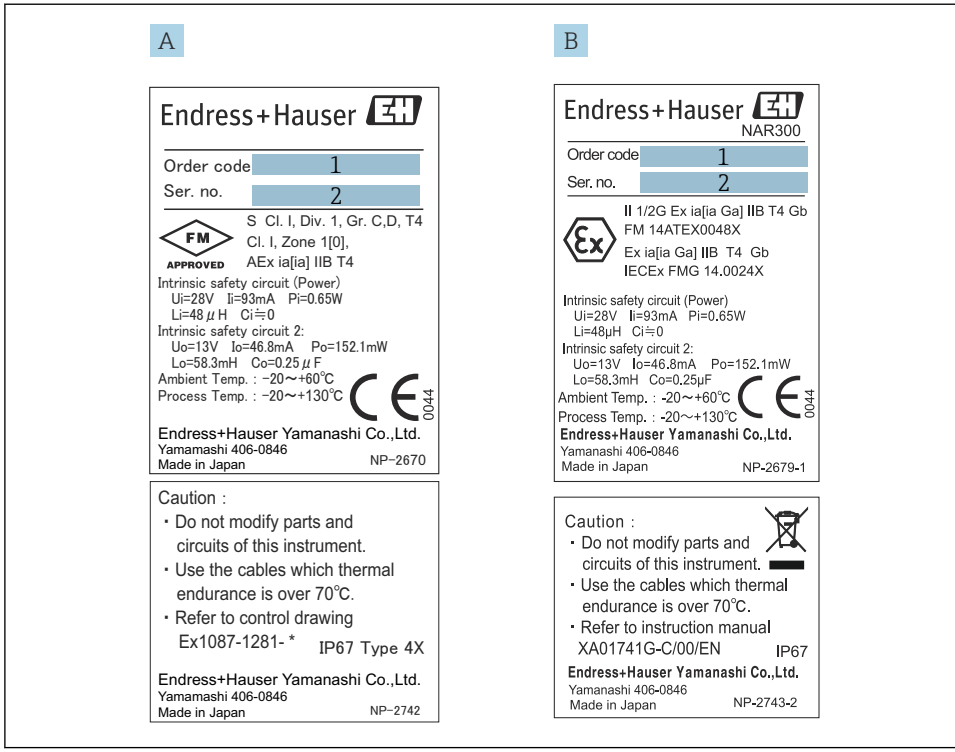
Note that the information on a nameplate may be changed without warning when credentials and certificates are updated.

4.2.1 Nameplate specifications



2 *NAR300 model nameplate*

1 *Order code*
2 *Serial number*
3 *Cable length (order code 040)*
4 *Explosion-proof performance (except TIIS specification)*



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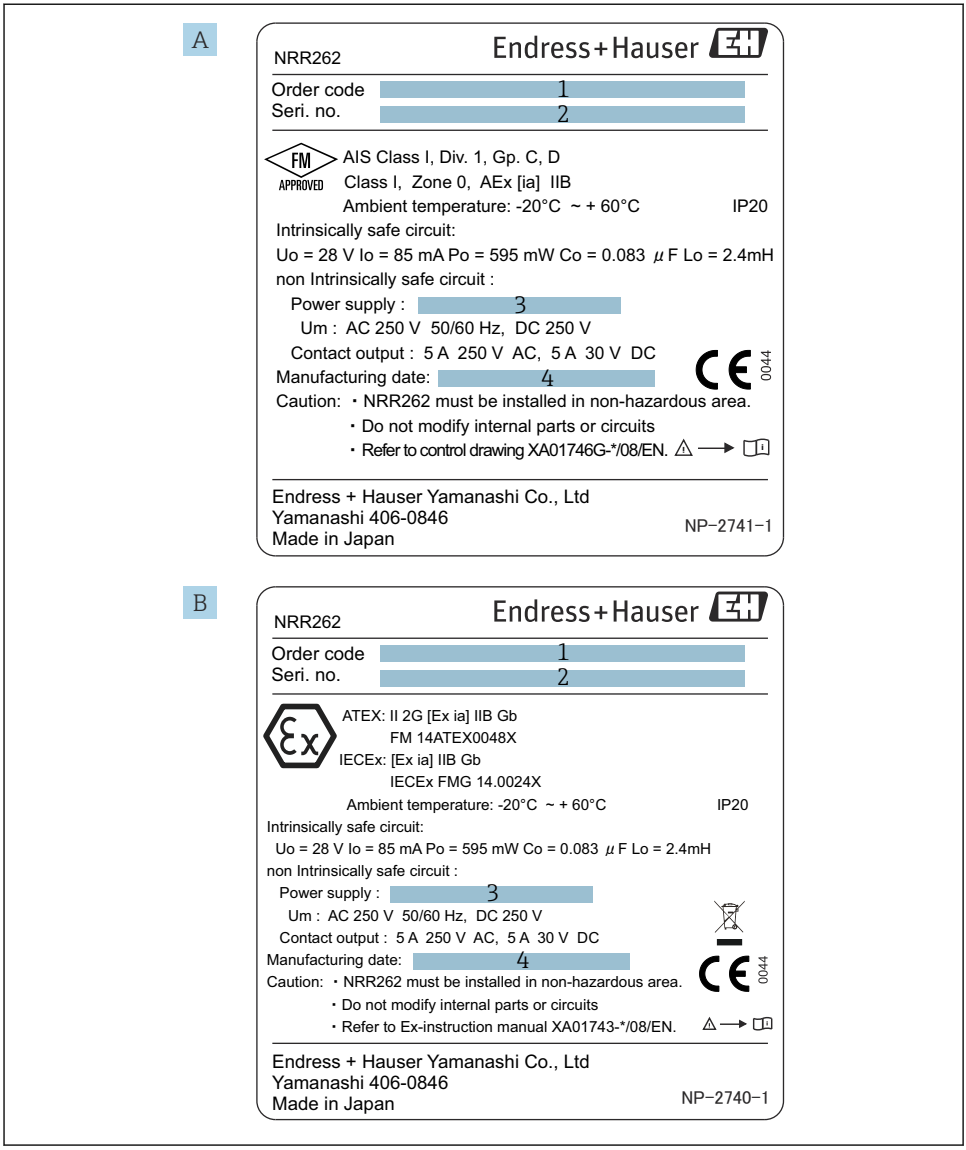
3 Nameplate for NAR300

A NAR300 for FM
B NAR300 nameplate for ATEX / IECEx
1 Order code
2 Serial number



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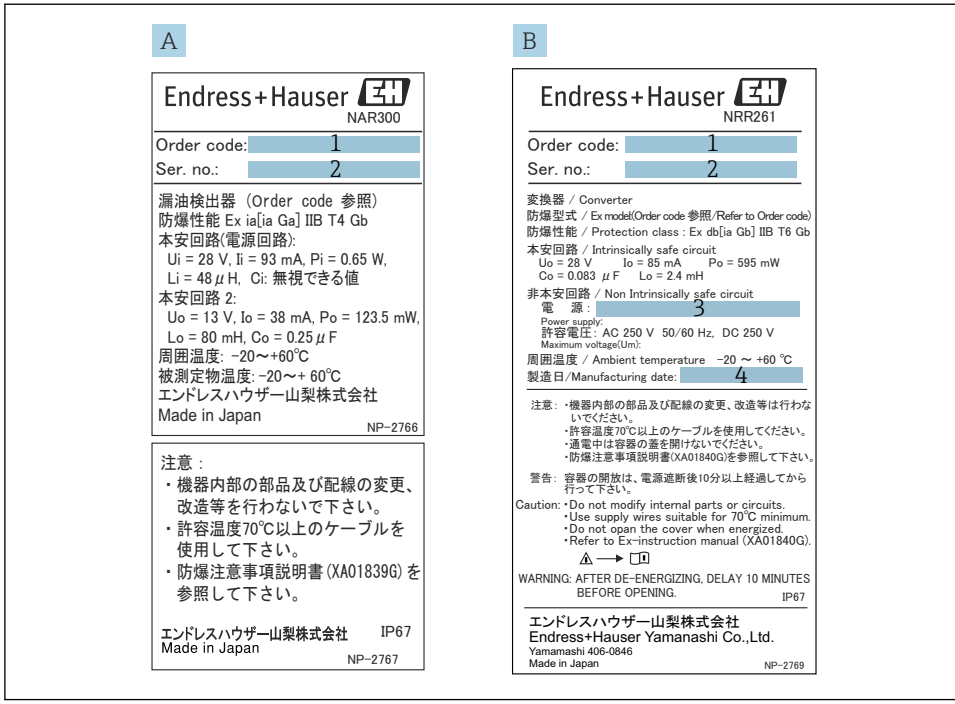
4 Nameplate for NRR262

A NRR262 nameplate for FM
B NRR262 nameplate for ATEX / IECEx
1 Order code
2 Serial number
3 Power supply voltage
4 Manufacturing date



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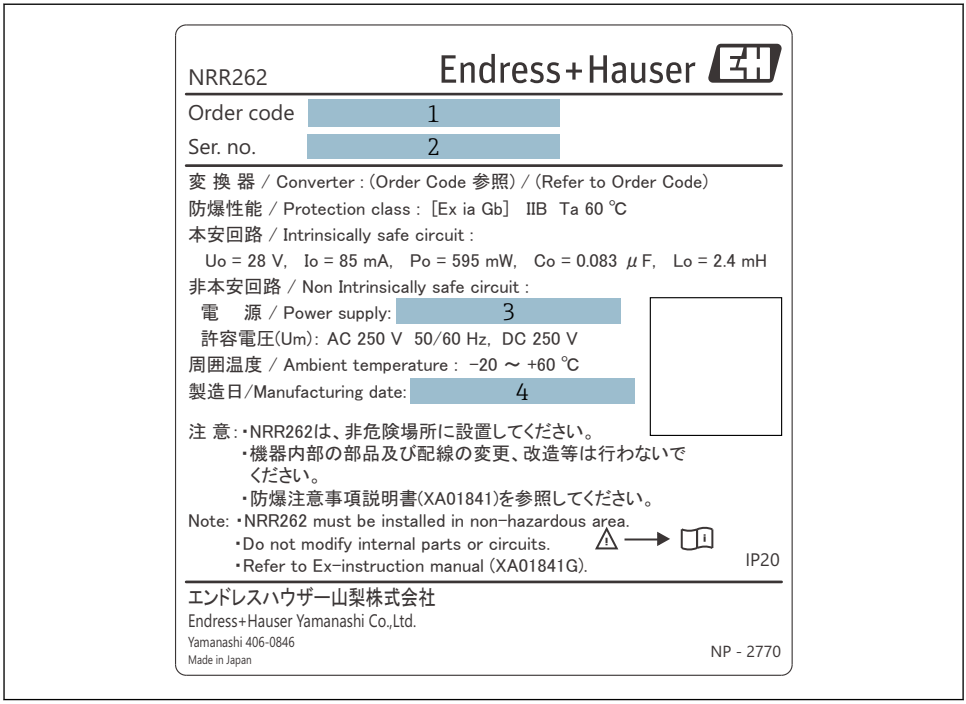
5 Nameplate for JPN Ex

A NAR300 nameplate for JPN Ex
B NRR261 nameplate for JPN Ex (NAR300 separate type)
1 Order code
2 Serial number
3 Power supply voltage
4 Manufacturing date



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6 NRR262 nameplate for JPN Ex

1 *Order code*
2 *Serial number*
3 *Power supply voltage*
4 *Manufacturing date*

4.3 Manufacturer address

Endress+Hauser Yamanashi Co., Ltd.
406-0846
862-1 Mitsukunugi, Sakaigawa-cho, Fuefuki-shi, Yamanashi

4.4 Storage and transport

4.4.1 Storage conditions

- Storage temperature: −20 to +60 °C (−4 to 140 °F)
- Store the device in its original packaging.

4.4.2 Transport

NOTICE

The housing may become damaged or dislodged.

Risk of injury

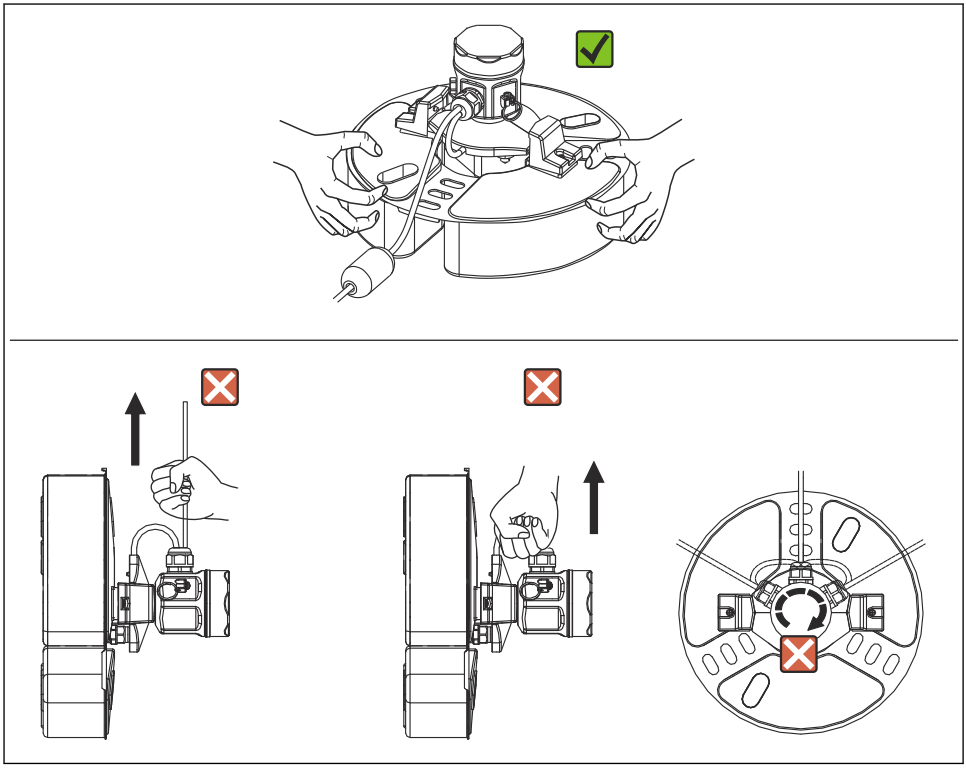
- When transporting the device to the measuring point, either use the device's original packaging or hold by the process connector.
- Secure a hoisting device (such as a hoisting ring or a lifting eye bolt) to the process connector, not to the housing. Pay attention to the device's center of gravity to prevent unexpected tilting.
- Comply with the safety precautions and transportation conditions for devices that weigh 18 kg (39.6 lbs) or more (IEC61010).

5 Installation

5.1 Mounting NAR300 system

5.1.1 Handling precautions

When transporting NAR300, be sure to hold the float with both hands. Avoid holding the parts shown in the diagram below, and do not lift NAR300 by the top of the float sensor. In addition, do not rotate the housing. Doing so may cause device failure.

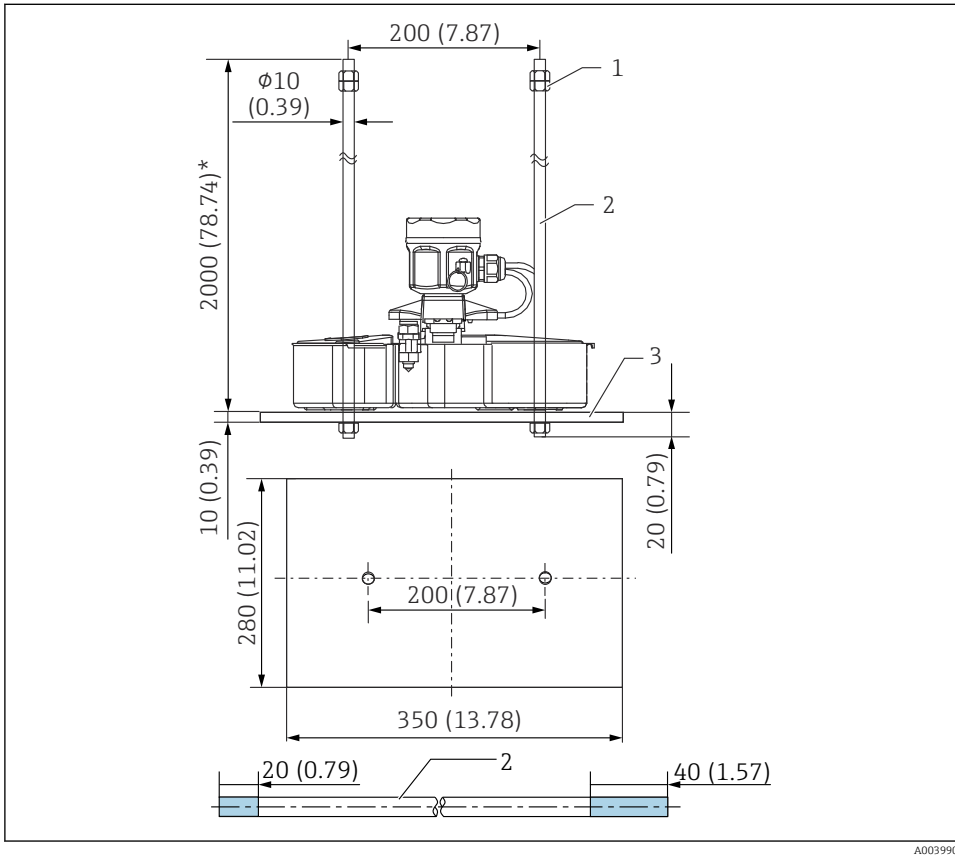


7 Handling NAR300

5.1.2 Mounting the float guide

NAR300 can be mounted onto a float guide that has been installed for existing products (CFD10, CFD30, UFD10, NAR291, NAR292).

The float guide is 2 000 mm (78.74 in) in size. If a length shorter than 2 000 mm (78.74 in) is required for use, cut it to size. If a float guide longer than 2 000 mm (78.74 in) is required, contact your Endress+Hauser Sales Center.



8 NAR300, float guide

1 Nut (M10)
2 Float guide
3 Weight

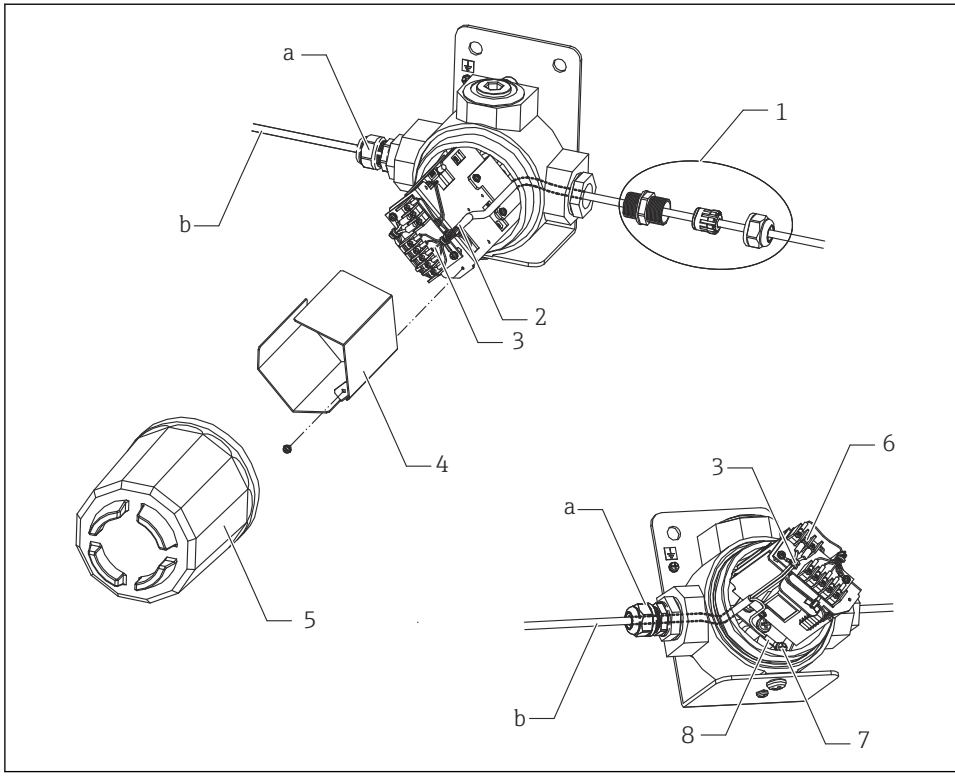
The 20 mm (0.73 in) and 40 mm (1.57 in) of the float guide in the diagram indicate the lengths of thread grooves.

5.1.3 NAR300-x6xxxx and sensor I/F Ex box cable mounting

Mounting procedure

1. Remove the intrinsically safe terminal box cover [5] and the circuit board guard [4].
2. Pass the float sensor cable [2] through the cable gland [1] and the cable entry of the intrinsically safe terminal box.
3. Connect the cable to the terminal block (refer to "Electrical connection").
4. Tighten the main unit of the cable gland [1] and the seal nut.
   ↳ Tightening torque (main unit, seal nut): approx. 1.96 N·m (20 kgf·cm)
5. Pass the NRR262/NRR261 connecting cable through the cable entry of the terminal box, and connect it to the terminal block.
6. Secure the cable in place with a cable holder [3].
7. Attach the circuit board guard, and close the cover of the intrinsically safe terminal box.

This completes the mounting procedure.



9 *NAR300-x6xxxx and sensor I/F Ex box cable mounting*

a Cable gland (must be procured separately)
b Shielded cable for NRR261/262 (must be procured separately)
1 Cable gland (waterproof connection)
2 Float sensor cable
3 Cable holder
4 Circuit board guard
5 Intrinsically safe terminal box cover
6 Screw (M3) for shielded cable
7 Screw (M5)
8 Shielded cable gland

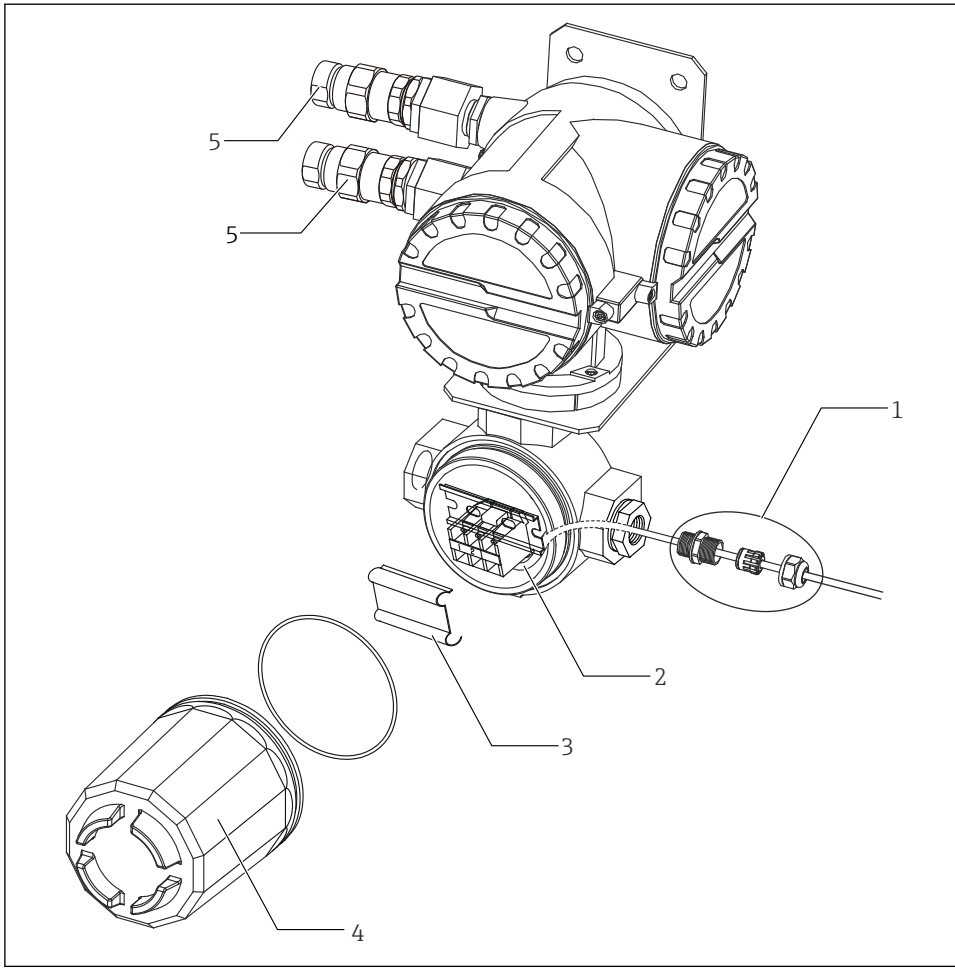
Since the cable gland "a" shown in the diagram is not supplied with products that do not have JPN Ex specifications, a water-proof cable gland that is IP67 or higher must be procured separately.

5.1.4 NRR261-5xx cable mounting

Mounting procedure

1. Remove the intrinsically safe terminal box cover [4] and the terminal block cover [3].
2. Pass the float sensor cable [2] through the cable gland [1] and the cable entry of the intrinsically safe terminal box.
3. Connect the cable to the terminal block (refer to "Electrical connection").
4. Mount the cable gland [1] according to the operating instructions.
5. Secure the cable in place with the cable holder.
6. Attach the terminal block cover, and close the cover of the intrinsically safe terminal box.

This completes the mounting procedure.



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10 NRR261-5xx cable mounting

1 Cable gland (waterproof connection)
2 Float sensor cable
3 Terminal block cover
4 Intrinsically safe terminal box cover
5 Cable gland (Ex d) (supplied with JPN Ex specifications only)

Since the cable gland [1] shown in the diagram is not supplied with products that do not have JPN Ex specifications, a water-proof cable gland that is IP67 or higher must be procured separately.

5.2 Adjustment

5.2.1 Verification of detection sensitivity with actual liquid

Verification of detection sensitivity with water in the bottom layer and oil in the top layer

When the tip of an electrode is pulled out from the water in the bottom layer, water may cling to the electrode tip like an icicle even when it is in the oil layer due to increased thickness of the oil layer, and this will increase the detection sensitivity by 1 to 2 mm. If accurate sensitivity verification is required, apply a small amount of neutral detergent to the electrode tip to improve water release.

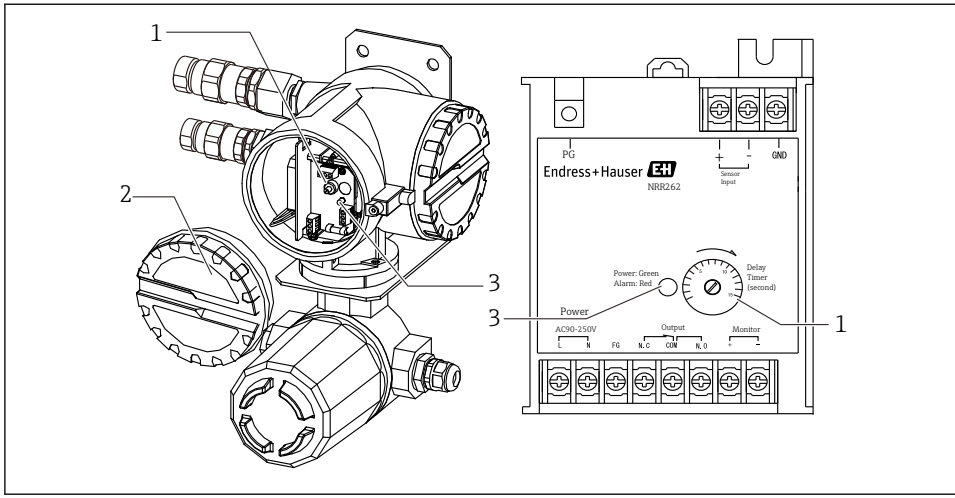
Verification of oil layer thickness with a transparent container

Be cautious as liquid surface tension and adhesion of liquid onto the container wall may cause a reading error.

5.2.2 Adjustment of alarm output

Only the delay operation time (ON delay) setting of the alarm output relay can be adjusted on the converter. Time can be set using the delay trimmer. In NRR261, the delay trimmer can be found by turning off the power supply and opening the main unit's cover. In NRR262, the delay trimmer is found on the case surface. Match the setting to the necessary delay time in units of seconds. Delay operation is used to prevent false alarms by activating the alarm when an alarm state persists continuously over a certain period of time and not activating the alarm for operation that occurs within the set delay time. This can be set up to a maximum of 15 seconds for SIL specifications.

- The response delay time of approximately 6 seconds on the detection circuit is always added to the delay time of the delay trimmer.
- When opening the main unit cover of NRR261, ensure that at least 10 minutes have passed after the power supply was cut.



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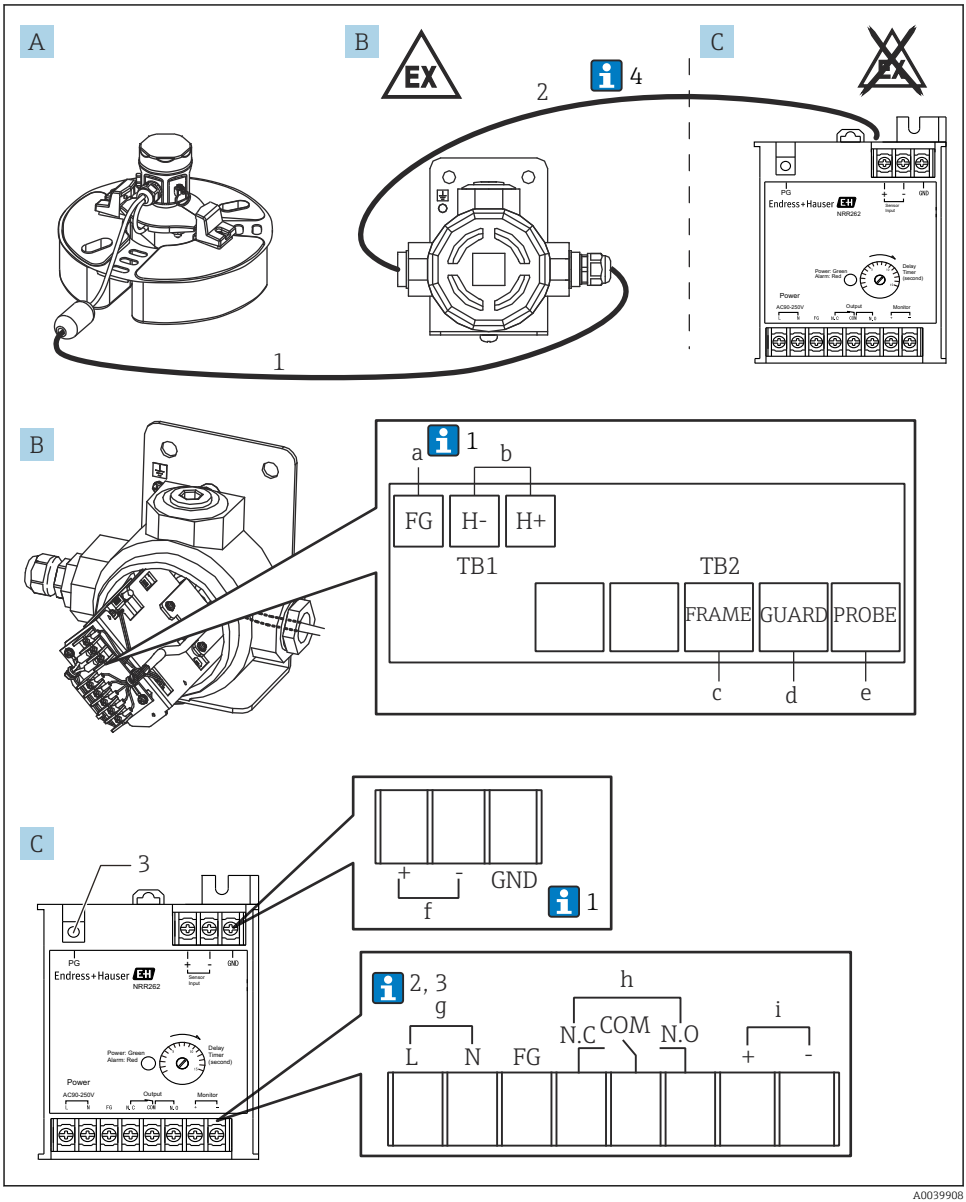
11 Alarm output relay

1 Delay trimmer
2 Cover
3 LED power (green) / alarm (red)

6 Electrical connection

6.1 NRR262-4/A/B/C wiring



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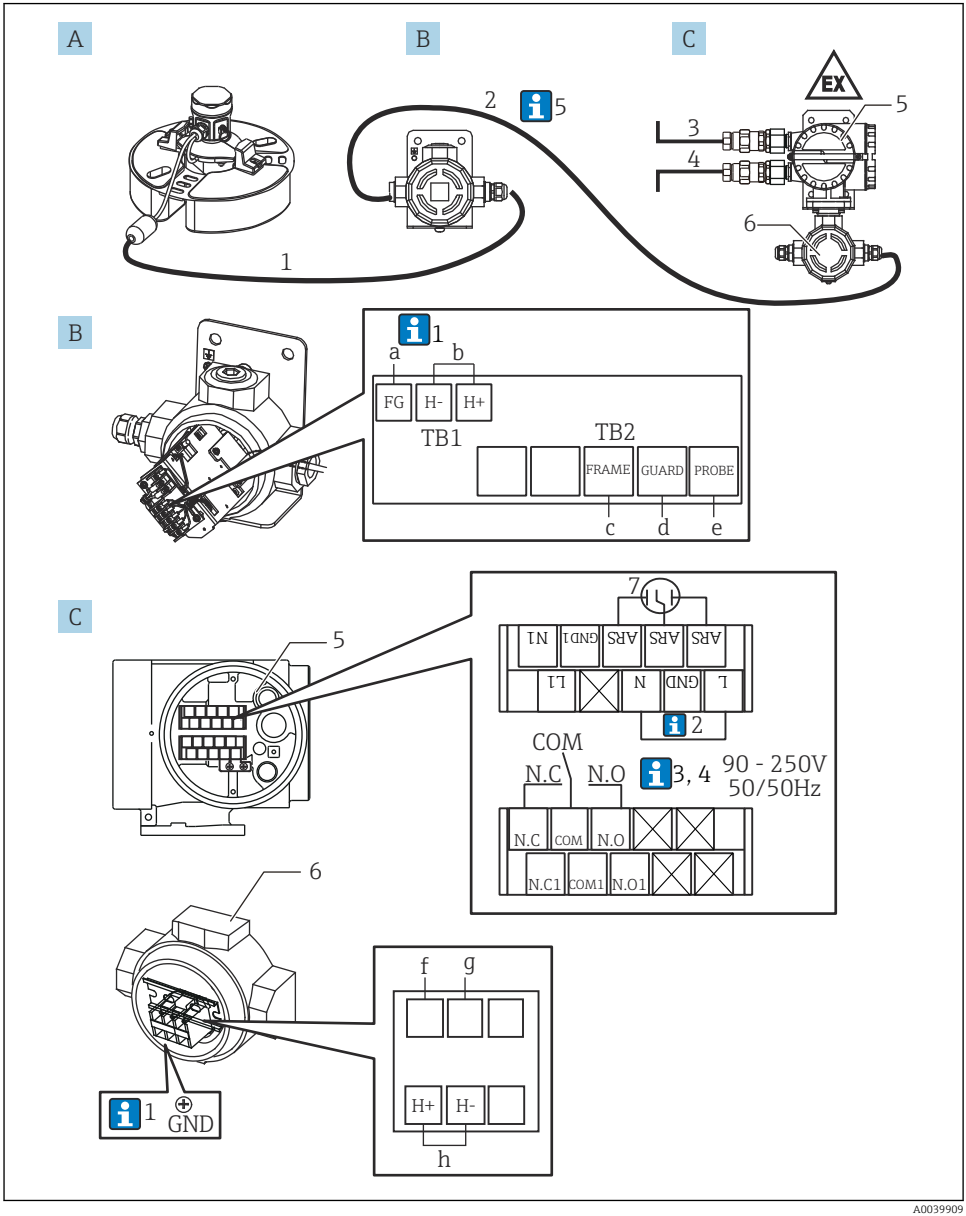
12 *Wiring of Ex [ia] converter NRR262-4/A/B/C*

A Float sensor NAR300-x6xxxx (sensor I/F Ex box is also included in the code)
B Sensor I/F Ex box
C Ex [ia] converter NRR262
a Green, screw (M3) (refer to Note 1 below)
b Output to NRR262, screw (M3)
c Yellow, screw (M3)
d Black, screw (M3)
e White, screw (M3)
f Input from sensor I/F Ex box, screw (M3)
g Power supply: AC/DC, screw (M3)
h Alarm output, screw (M3)
i Checking monitor output, screw (M3)
1 Using an Ex [ia]-dedicated connection cable (6 to 30 m (19.69 to 98.43 ft): included with the product depending on the option code)
2 Cable for sensor I/F Ex box and NRR262 (to be prepared by the customer)
3 For protective grounding, screw (M4)

Below, the numbers correspond to the description in the diagram.

1. Normally, only the FG of a sensor I/F Ex box is connected to the cable's shielded wire; however, depending on the installation environment, either the GND of NRR262 alone or both the FG of the sensor I/F Ex box and the GND of NRR262 are connected.
2. When using 22 to 26 V_{DC} power supply, the terminal number "L" becomes positive (+) and "N" becomes negative (-).
3. To maintain the Ex [ia] performance, ensure that the power supply voltage does not exceed 250 V_{AC}50/60 Hz during normal times and 250 V_{DC} during emergencies.
4. While cable (1) for connecting NAR300 and sensor I/F Ex box is included with the device, cable (2) for connecting sensor I/F Ex box and NRR262 is not included with the device and therefore should be procured by the customer. For more details on connection cables, refer to "Process conditions."

6.2 NRR261-5 wiring



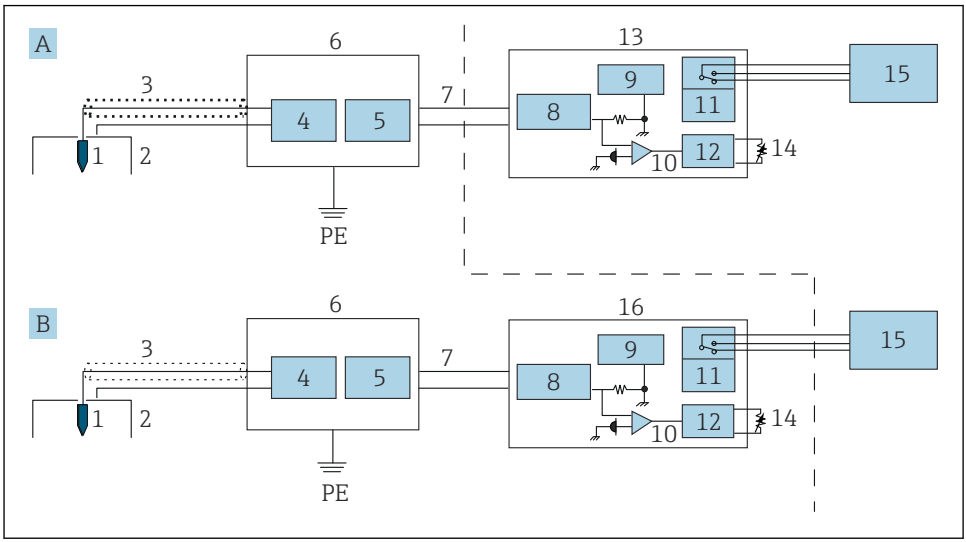
13 *Wiring of Ex d [ia] converter NRR261-5*

A Float sensor NAR300-x6xxxx (sensor I/F Ex box is also included in the code)
B Sensor I/F Ex box
C Ex d [ia] converter NRR261 (separate type)
a Green, screw (M3) (refer to Note 1 below)
b Output to NRR261-3xx, screw (M3)
c Yellow, screw (M3)
d Black, screw (M3)
e White, screw (M3)
f Blue 2, screw (M4) (already wired upon delivery)
g Blue 3, screw (M4) (already wired upon delivery)
h Input from sensor I/F Ex box, screw (M4)
1 Using an Ex [ia]-dedicated connection cable (6 to 30 m (19.69 to 98.43 ft): included with the product depending on the option code)
2 Cable for sensor I/F Ex box and NRR261 (to be prepared by the customer)
3 Power supply: AC/DC
4 Alarm output: Alarm/PLC/DCS, etc.
5 Ex d terminal
6 Intrinsically safe terminal
7 Power supply arrester (installed), screw (M3)

Below, the numbers correspond to the description in the diagram.

1. Normally, only the FG of a sensor I/F Ex box is connected to the cable's shielded wire; however, depending on the installation environment, either the GND of NRR262 alone or both the FG of the sensor I/F Ex box and the GND of NRR262 are connected.
2. Connect when using an AC cable with FG.
3. When using 22 to 26 V_{DC} power supply, the terminal number "L" becomes positive (+) and "N" becomes negative (-).
4. To maintain the Ex [ia] performance, ensure that the power supply voltage does not exceed 250 V_{AC}50/60 Hz during normal times and 250 V_{DC} during emergencies.
5. Cable (1) which connects NAR300 and sensor I/F Ex box is included with NAR300. Cable (5) which connects sensor I/F Ex box and NRR261, alarm output cable (2) from NRR261, and power supply cable (3) for NRR261 are not included and must be procured by the customer. For more details on connection cables, refer to "Process conditions."

6.3 Wiring diagram



14 *Wiring diagram*

A Explosion proof-type converter system (integrated type)
B Intrinsically safe-type converter system (separate type)
PE Protective earth (protective grounding)
1 Conductivity detection electrode (sensor)
2 Conductivity detection electrode (float)
3 Dedicated cable
4 Conductivity detection circuit
5 Current output circuit
6 Sensor I/F Ex box
7 Current signal
8 Safety barrier
9 Power supply circuit
10 Current detection
11 Relay
12 Delay circuit
13 Converter NRR262
14 Delay trimmer
15 Alarm
16 Converter NRR261 (separate type)

6.4 Alarm activation principle

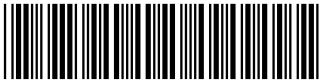
An oil leak detection signal detected by NAR300 float sensor is converted into a current signal inside the converter or sensor I/F Ex box. The signal is then connected to the current detection circuit through the intrinsically safe safety barrier inside the converter. In the current detection circuit, the presence or absence of an oil leak alarm signal is determined based on the size of current value, and the alarm output relay is turned ON/OFF through the operation delay circuit. The alarm delay circuit is equipped with a trimmer that can be used to set the delay time. Fail-safe operation is also available for relay contact point output, which is explained in the following "Alarm output operation table."

Alarm output operation table

NRR261/NRR262 terminals		Between NC and COM	Between NO and COM
State	Non-alarm	Open contact point	Closed contact point
	Oil leak alarm	Closed contact point	Open contact point
	Power OFF		
	Frozen liquid		

Since the sensor for high temperature is exclusively for use with water, it will be in alarm mode in an empty pit.

NAR300 current value	
Non-alarm	12 mA
Oil leak alarm	16 mA
Other trouble	< 10 mA or 14 mA <



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