KA01577G/00/EN/01.22-00
71565762
2022-04-30

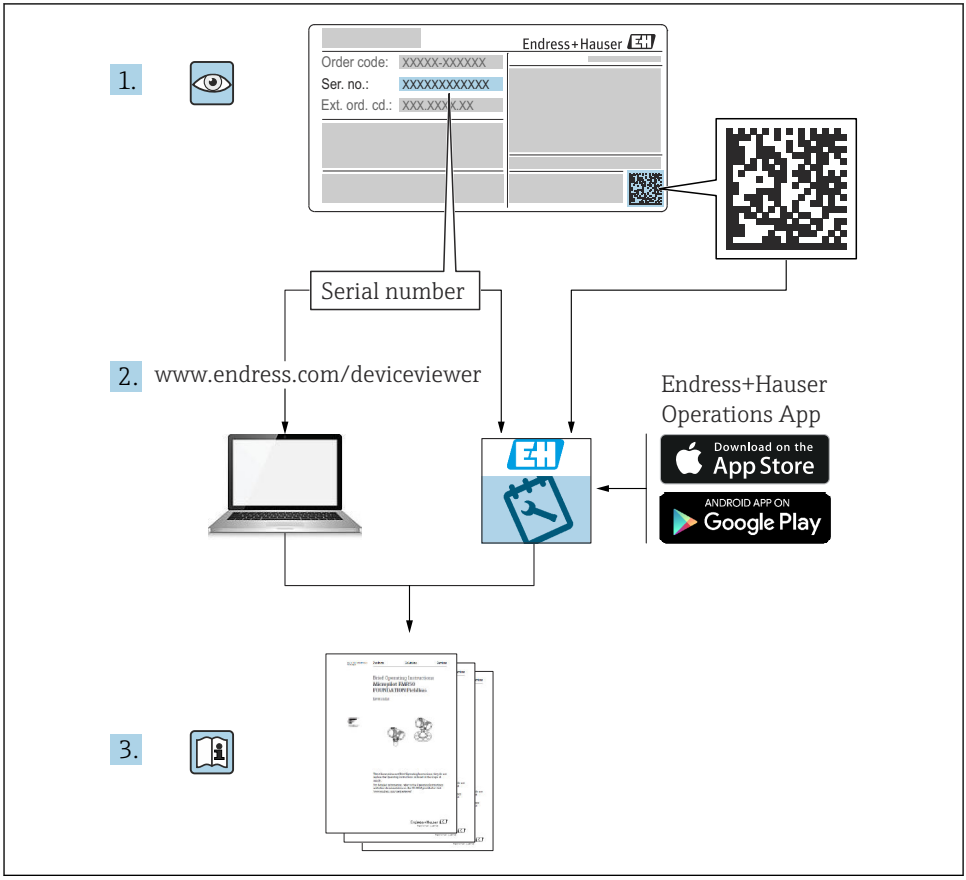
Brief Operating Instructions **NAR300 system**

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*

Endress+Hauser
People for Process Automation


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.

A0023555

Table of contents

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 documents can be found in the Download area of our 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 from 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 1st 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 Requirements for personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- Be specialists who are trained and have a relevant qualification for this specific function and task.
- Be authorized by the plant owner-operator.
- Be familiar with local/national regulations.
- Before starting work, read and understand the instructions in the Operating Instructions and supplementary documentation as well as the certificates (depending on the application).
- Follow instructions and comply with basic conditions.

The operating personnel must fulfill the following requirements:
- Be instructed and authorized according to the requirements of the task by the facility's owner-operator.
- Follow the instructions in this manual.

2.2 Designated use

Application and measured materials
Depending on the version ordered, the device can also be used with potentially explosive, flammable, poisonous or oxidizing materials.

Devices that are used in hazardous areas have corresponding labels on their nameplates.

To ensure that the device remains in proper condition for the operation time:
- Only use the device in full compliance with the data on the nameplate and the general conditions listed in the Operating Instructions and supplementary documentation.
- Check the nameplate to verify if the device can be put to its intended use in hazardous areas.
- If the device is not operated at an atmospheric temperature, compliance with the relevant basic conditions specified in the relevant device documentation is absolutely essential.
- Protect the device permanently against corrosion from environmental influences.
- Observe the limit values in the "Technical Information".

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Workplace safety

For work on and with the device:
- Wear the required personal protective equipment according to local/national regulations.

2.4 Operational safety

Risk of injury!
- Operate the device in proper technical conditions and fail-safe conditions only.
- The plant owner-operator is responsible for interference-free operation of the device.

Modifications to the device

Unauthorized modifications to the device are not permitted and can lead to unforeseeable dangers:
- If modifications are nevertheless required, contact your Endress+Hauser Sales Center.

Repair

To ensure continued operational safety and reliability:
- Carry out repairs on the device only if they are expressly permitted.
- Observe local/national regulations pertaining to repair of an electrical device.
- Use only original spare parts and accessories from Endress+Hauser.

Ex-area

Observe the following notes to eliminate the risk of danger to persons or the facility when the device is used in Ex-areas (e.g. explosion protection, pressure equipment safety):
- Check the model nameplate to ensure that the ordered device is explosion proof.
- Observe the specifications in the separate supplementary documentation attached to these Instructions.

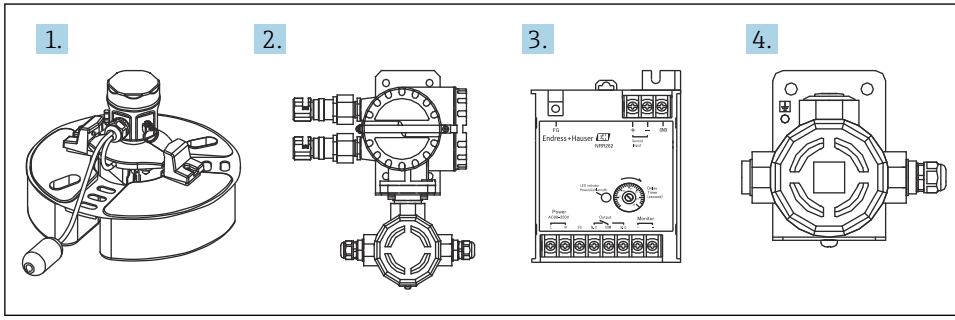
2.5 Product safety

This device was designed in accordance with GEP (Good Engineering Practice) to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. It meets the general safety standards and legal requirements.

3 Product description

3.1 Product design

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



1 Product design

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

The NAR300 system is installed in an oil-retaining wall in a tank or in a sump pit near a plant or a pump yard, and it provides the ultimate leak detection function for oils, such as petrochemicals and vegetable oils. Sensors with two different detection principles, a conductive type and a tuning fork type, are used to monitor detection conditions individually. A two-stage alarm logic allows for an extremely low false-positive alert, ensuring the safety of the tank yard with a precise and simple device configuration.

3.2 Technical data

3.2.1 Float sensor NAR300

Item	Description
Protection class	IP67 (outdoor installation)
Power supply	Supplied by a sensor I/F Ex box or NRR261 (NAR300 sensor I/F Ex box, integrated type)
Wetted material	▪ Float: SUS316L, conductive sensor: SUS316 and PTFE ▪ Tuning fork sensor: SUS316L-equivalent
Detection sensitivity [1)]	▪ Water-filled pit: 10 ± 1 mm (0.04 in) with kerosene at the time of shipment from the factory ▪ Empty pit: 50 ± 5 mm (0.17 in) with kerosene

Item	Description
I/O cable	Dedicated shielded cable (PVC) as well as with cable float (Standard 6 m (19.69 ft))
Weight	Approx. 2.5 kg (5.5 lb) (including the dedicated shielded cable (PVC) 6 m (19.69 ft))

1) Adjusted with oil (kerosene: approx. density: 0.8), lower-layer water (water: approx. density: 1.0), static level condition and/or without surface tension.

3.2.2 Ex [ia] sensor I/F Ex box

Item	Description
Protection class	IP67 (outdoor installation)
Power supply	Supplied by NRR261 or NRR262
Cable entry	▪ NAR300 (float sensor) side: G1/2, with cable gland ▪ NRR261 or NRR262 (transmitter) side: G1/2, NPT1/2, M20
Weight	3.2 kg (7.1 lb)
Materials	Housing/cover: Aluminum casting

3.2.3 Ex d [ia] transmitter NRR261

Item	Description
Protection class	IP67 (outdoor installation)
Permissible power-supply voltage range	▪ AC power supply: 90 to 250 V_{AC}, 50/60 Hz ▪ DC power supply: 22 to 26 V_{DC} (built-in power supply arrester)
Maximum power consumption	▪ AC power supply: 20 VA DC ▪ Power supply type: 2 W
Output	▪ Contact output: 1SPDT ▪ Maximum contact rating: 250 V_{AC}, 1 A, 100 VA or 100 V_{DC}: 1 A, 25 W ▪ Fail-safe function: Activated when the power is turned off and when it freezes (see "Alarm output table")
Cable entry	▪ G3/4 x2 (Ex d), G1/2 x1 (Ex ia) ▪ G1/2 x 2 (Ex d), G1/2 x 1 (Ex ia) ▪ NPT3/4 x2 (Ex d), NPT1/2 x1 (Ex ia) ▪ NPT1/2 x2 (Ex d), NPT1/2 x1 (Ex ia) ▪ M25 x2 (Ex d), M20 x1 (Ex ia) ▪ M20 (Ex d), M20 x1 (Ex ia) ▪ TIIS explosion-proof specifications are equipped with cable gland model SXBM
Lightning arrester	Built-in (power supply arrester)
Weight	Approx. 10 kg (22 lb)
Materials	Housing/cover: Aluminum casting

3.2.4 Ex [ia] transmitter NRR262

Item	Description
Protection class	IP20 (indoor installation), installed in non-hazardous locations
Permissible power-supply voltage range	▪ AC power supply: 90 to 250 V_{AC}, 50/60 Hz ▪ DC power supply: 22 to 26 V_{DC} (built-in power supply arrester)
Maximum power consumption	▪ AC power supply: 20 VA DC ▪ Power supply type: 2 W

Item	Description
Output	▪ Contact output: 1SPDT ▪ Maximum contact rating: 250 V_{AC}, 1 A, 100 VA or 100 V_{DC}: 1 A, 25 W ▪ Fail-safe function: Activated when the power is turned off and when it freezes (see "Alarm output table")
Lightning arrester	Built-in (power supply arrester)
Weight	Approx. 0.6 kg (1.3 lb)
Materials	Housing: Plastic

3.3 Process conditions

3.3.1 Float sensor NAR300 / sensor I/F Ex box

Item	Description
Requirements for object detection	▪ Density is at least 0.7 g/cm^3 but less than 1.0 g/cm^3 ▪ Floats in water (if the density is 0.9 g/cm^3 or higher, the viscosity must be at least 1 mPa·s. Water ≒ 1 mPa·s) ▪ Water-insoluble ▪ Non-conductive ▪ Liquid
Operating temperature	▪ Ambient temperature: −20 to 60 °C (−4 to 140 °F) ▪ Measured liquid temperature: 0 to 60 °C (32 to 140 °F)
Requirements for pit water	▪ Density is at least 1.0 g/cm^3 but less than 1.13 g/cm^3 (only if the kinematic viscosity is 1 mm^2/sec) [1)] ▪ Not frozen ▪ Conductivity is at least 10 µS/cm (not more than 100 kΩ·cm) ▪ Cannot be used at sea level or in locations that may be penetrated by seawater
Other	▪ Promptly remove any debris that adheres to the sensor unit. ▪ Ensure that there is no caked-on mud (dried solids), etc. ▪ Avoid installation conditions that cause the float sensor to tilt off-balance or change the draft line. ▪ Install measures, such as a breakwater, to avoid cross-currents and waves.

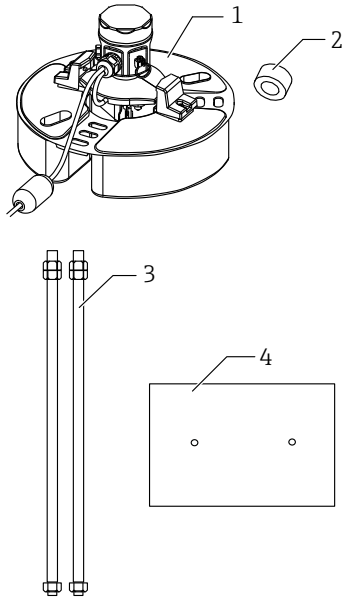
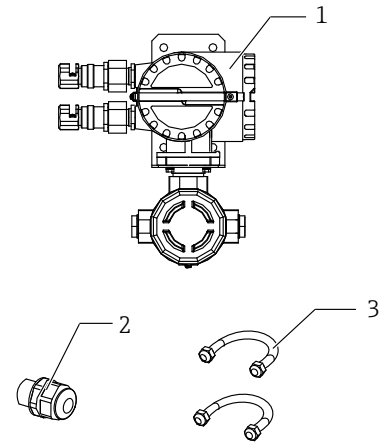
1) Sensitivity will vary with the specific gravity of lower-layer water that differs from the factory-setting environment, such as when an antifreeze is used.

3.3.2 Connecting cable (connection to transmitter NRR261/262 from sensor I/F Ex box)

Item	Description
Connecting cables	Maximum inductance: 2.3 mH, maximum capacitance: 83 nF Example: Use of KPEV-S (instrumentation cable) C = 65 nF/Km, L= 0.65 mH/km CW/C = 0.083 µF / 65 nF = 1.276 km....1 LW/L = 2.3 mH / 0.65 mH = 3.538 km.....2 Maximum extended cable length: 1.27 km The smaller of 1 or 2 is the maximum cable length (round down instead of rounding off)
Operating temperature	–20 to 60 °C (–4 to 140 °F)

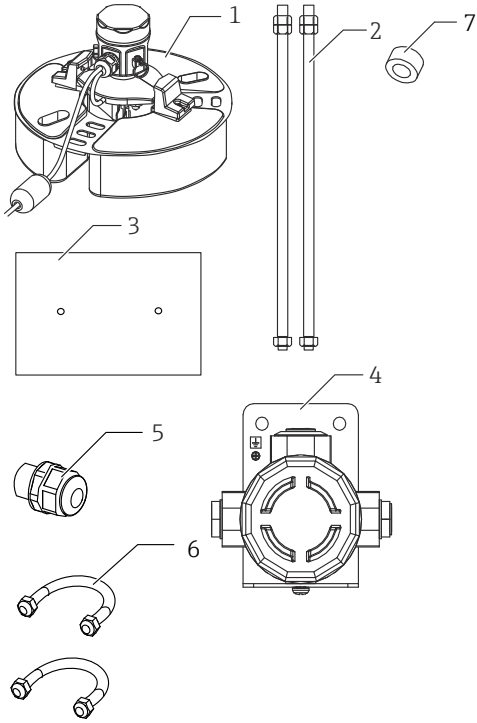
3.4 Delivery example by order code

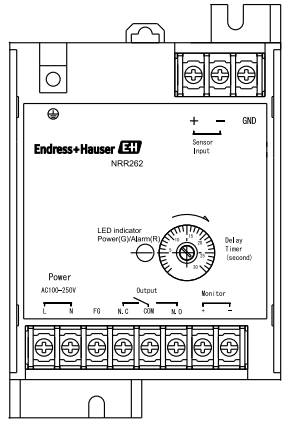
Delivery example 1

Float sensor order code	Transmitter order code
NAR300- * 1* * 2 / 3 A	NRR261-A/B/C/2/4
 *1 Float sensor* *2 Check tool (accessory)* *3 Float guide (bar) packaged separately* *4 Weight (packed at the bottom of the box with the transmitter)*	 *1 NRR261* *2 Cable gland (Ex [ia] cable entry) is only included with TIIS explosion-proof specifications* *3 U-bolt*

Delivery example 2

Float sensor order code	Transmitter order code
NAR300- * 5* * 2 or 3*	NRR262

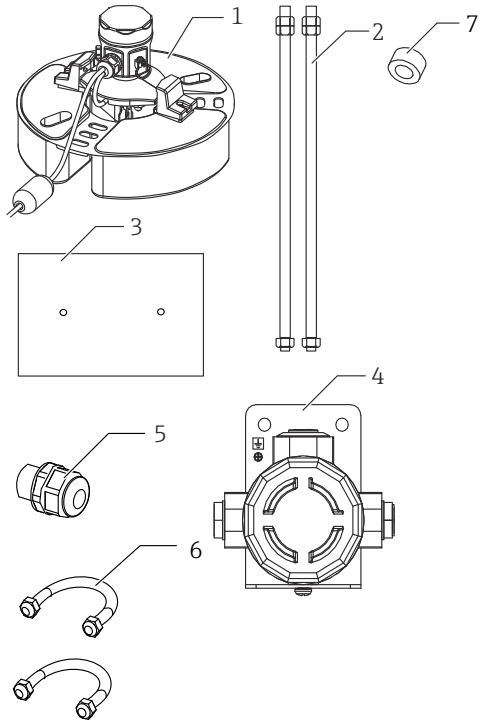
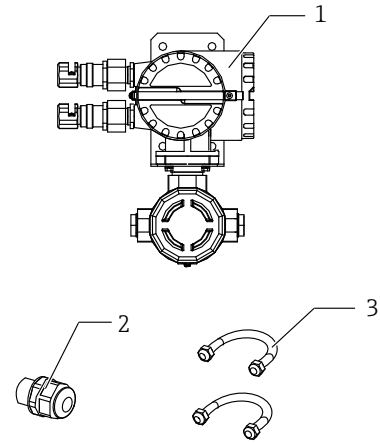




1 *Float sensor*
2 *Float guide (bar) packaged separately*
3 *Weight (packed at the bottom of the box with the transmitter)*
4 *Sensor I/F Ex box*
5 *Cable gland (Ex [ia] cable entry) is only included with TIIS explosion-proof specifications*
6 *U-bolt*
7 *Check tool (accessory)*

The sensor I/F Ex box is included in the order code NAR300-x5xxxx. The intrinsically safe system is used in combination with NRR262.

Delivery example 3

Float sensor order code	Transmitter order code
NAR300- * 5* * 2/3*	NRR261-3/5**
	
1 *Float sensor* 2 *Float guide (bar) packaged separately* 3 *Weight (packed at the bottom of the box with the transmitter)* 4 *Sensor I/F Ex box* 5 *Cable gland (Ex [ia] cable entry) is only included with TIIS explosion-proof specifications* 6 *U-bolt* 7 *Check tool (accessory)*	1 *NRR261* 2 *Cable gland (Ex [ia] cable entry) is only included with TIIS explosion-proof specifications* 3 *U-bolt*

The sensor I/F Ex box is included in the order code NAR300-x5xxxx. The pressure-resistant, intrinsically safe system is used in combination with NRR261-3/5**.

3.5 Operating conditions

3.5.1 Detection sensitivity

If the electrode tip is pulled out of the lower-layer water due to increased thickness of the oil layer, water may cling onto the electrode tip like an icicle even if the electrode tip is in oil. In this case, detection sensitivity may increase by 1 to 2 mm (0.04 to 0.08 in). When an accurate detection check is required, apply a small amount of neutral detergent to the electrode tip to keep water from clinging to the electrode.

3.5.2 Pit water

Do not use in sea water

The oil leak detectors is not designed for use in sea water. The following problems may occur if it is used in sea water:

- Failed or delayed alarm when overturned by waves
- Delayed alarm caused by generation of a bypass circuit between the conductive sensor and the float itself due to salt coating
- Corrosion of the float sensor caused by sea water

Other special pit water

If the float sensor is used in certain special pit water, such as pit water containing solvents, it may become corroded or damaged.

Pit water with high electrical resistance

Use in pit water with high electrical resistance, such as in a steam drain and pure water, may activate the alarm. Ensure that the conductivity of pit water is at least 10 µS/cm (not more than 100 kΩ·cm).

Example: Pure water: 1 to 0.1 µS/cm (1 to 10 kΩ·cm)

Frozen pit water

If ice forms in the pit, the alarm may be triggered (fail-safe function). Implement anti-freeze measures to prevent freezing.

3.6 Gasoline application

If the object to be detected is gasoline, check with your Endress+Hauser Sales Center and order the gasoline application specifications under special specifications.

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 of these conditions is not satisfied, contact your Endress+Hauser Sales Center.

4.2 Product identification

The following options are available for identification of the device:
- Nameplate specifications
- Extended order code with breakdown of the device features on the delivery note
- *W@M Device Viewer* (www.endress.com/deviceviewer): Enter the serial number from the nameplate; this will display all the information about the device.

4.3 Manufacturer contact address

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

4.4 Storage and transport

4.4.1 Transport

NOTICE

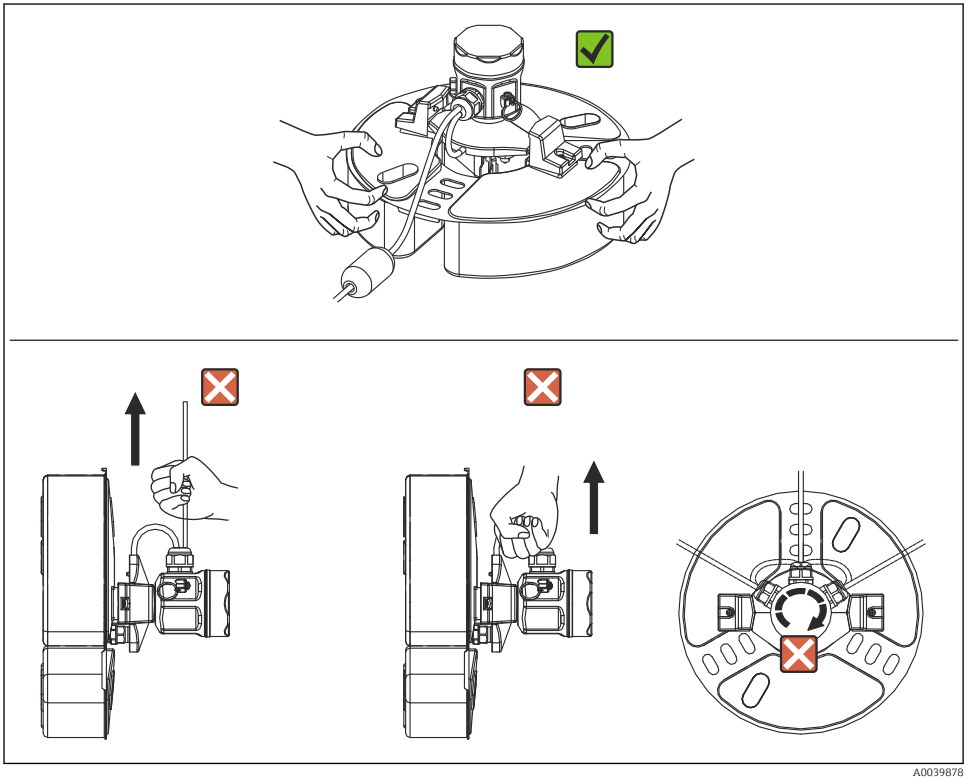
The housing may become damaged or dislodged.
Risk of injury
- ▶ When transporting the device to the measuring point, either use the device's original packaging or hold by the process connector.
- ▶ Secure a hoisting device (such as a hoisting ring or a lifting eye bolt) to the process connector, not 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 the NAR300 system

5.1.1 Handling precautions

Always use both hands to hold the float when carrying NAR300. Do not lift or hold by any of the components shown in the figure below, and do not lift by the upper portion of the float sensor. In addition, do not rotate the housing. Doing so may cause device failure.

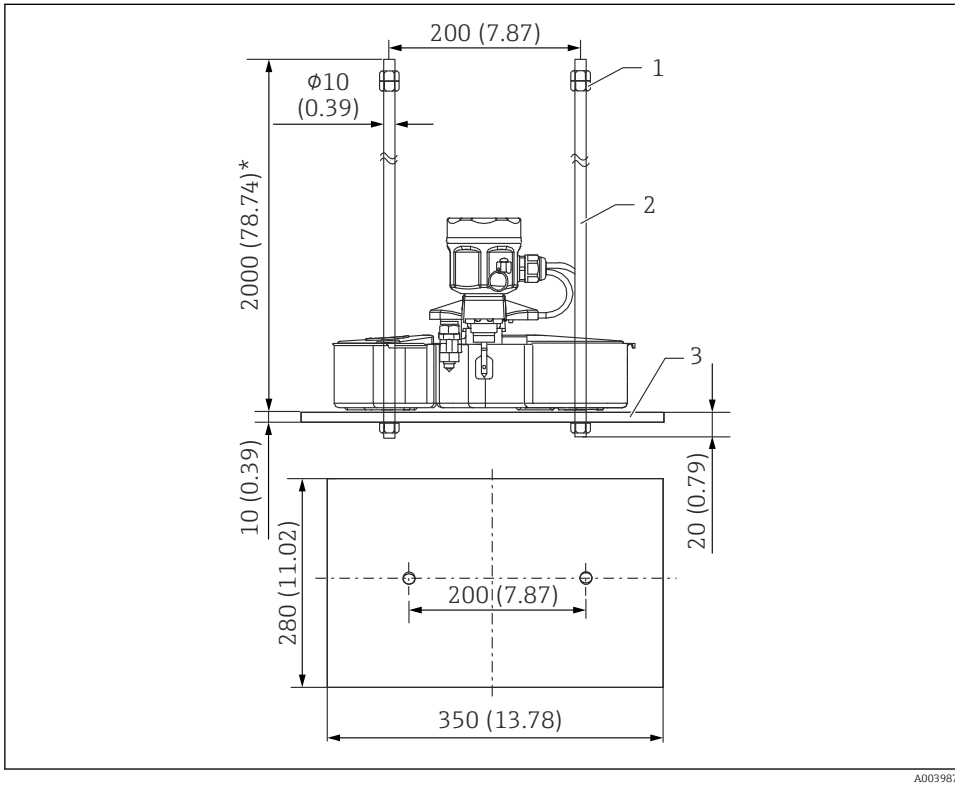


2 *Handling the NAR300*

5.1.2 Float guide mounting

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

If the float guide is shorter than 2 000 mm (78.74 in), either cut and use it or follow the protocol for when it is 2 000 mm (78.74 in) or longer and contact your Endress+Hauser Sales Center.



3 NAR300/float guide. Unit of measurement mm (in)

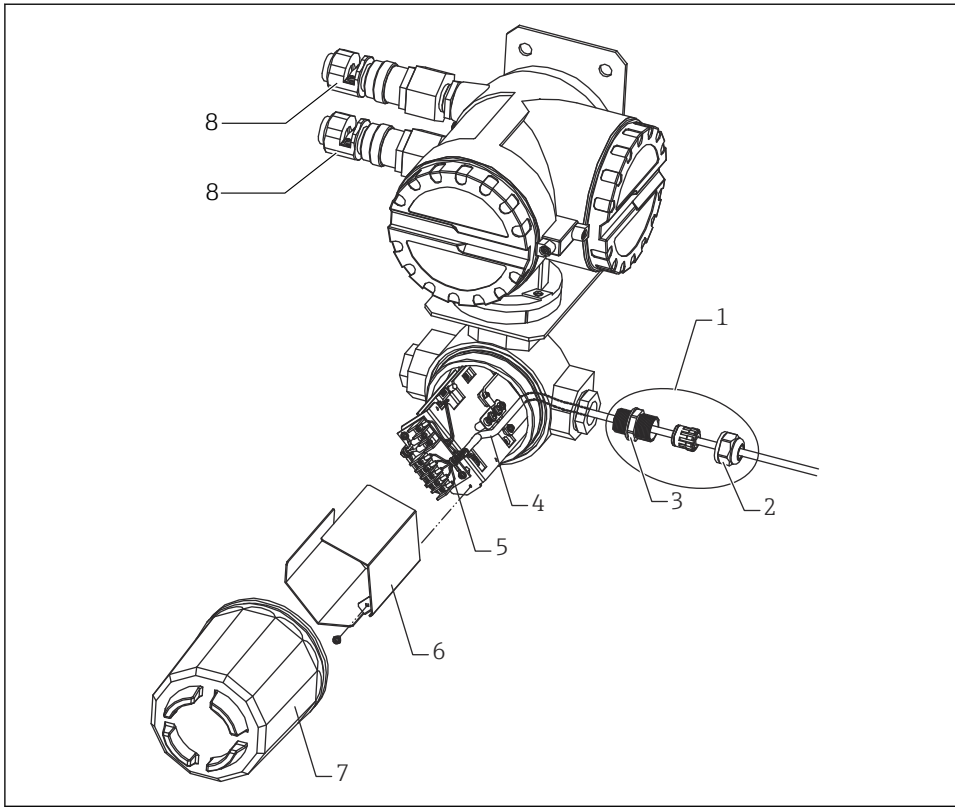
1 Nut (M10)
2 Float guide
3 Weight

5.1.3 NRR261 (integrated type) cable mounting

Mounting procedure

1. Remove the intrinsically safe terminal box cover [7] and the circuit board guard [6].
2. Insert the float sensor cable [4] into the cable gland [1] and cable entry for the intrinsically safe terminal box.
3. Connect the cable to the terminal block (see "Electrical connection").
4. Tighten the main unit of the cable gland [3] and the seal nut [2].
   ↳ Tightening torque (main unit and seal nut): approx. 1.96 N·m (20 kgf cm)
5. Secure the cable in place with a cable holder [5].
6. Install the circuit board guard and close the cover of the intrinsically safe terminal box.

This completes the mounting procedure.



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4 *NRR261-2xx cable mounting*

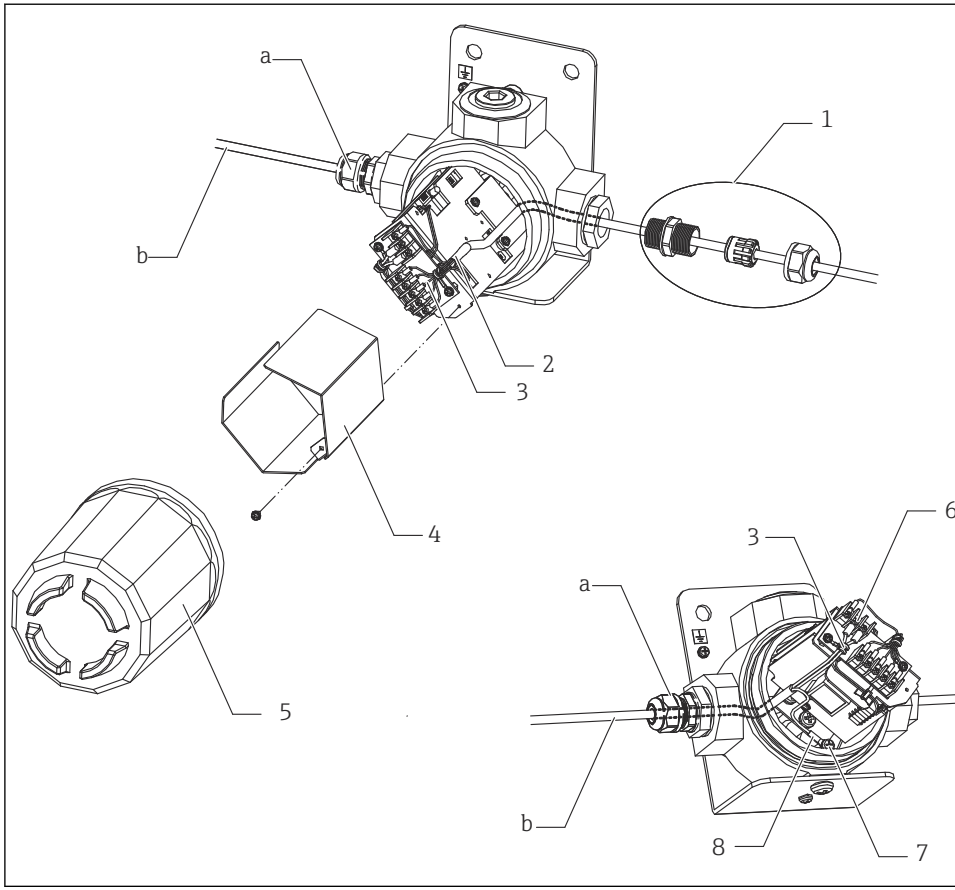
1 Cable gland (supplied for TIIS/JPN Ex specifications only)
2 Seal nut
3 Main unit
4 Float sensor cable
5 Cable holder
6 Circuit board guard
7 Intrinsically safe terminal box cover
8 Cable gland (Ex d) (supplied for TIIS/JPN Ex specifications only)

5.1.4 NAR300-x5xxxx 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. Insert the float sensor cable [2] into the cable gland [1] and cable entry of the intrinsically safe terminal box.
3. Connect the cable to the terminal block (see "Electrical connection").
4. Tighten the main unit of the cable gland and the seal nut.
   ↳ Tightening torque (main unit and seal nut: approx. 1.96 N·m (20 kgf ·cm)
5. Insert the NRR262/NRR261 connection cable into 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. Install the circuit board guard and close the cover of the intrinsically safe terminal box.

This completes the mounting procedure.



5 NAR300-15xxxx and sensor I/F Ex box cable mounting

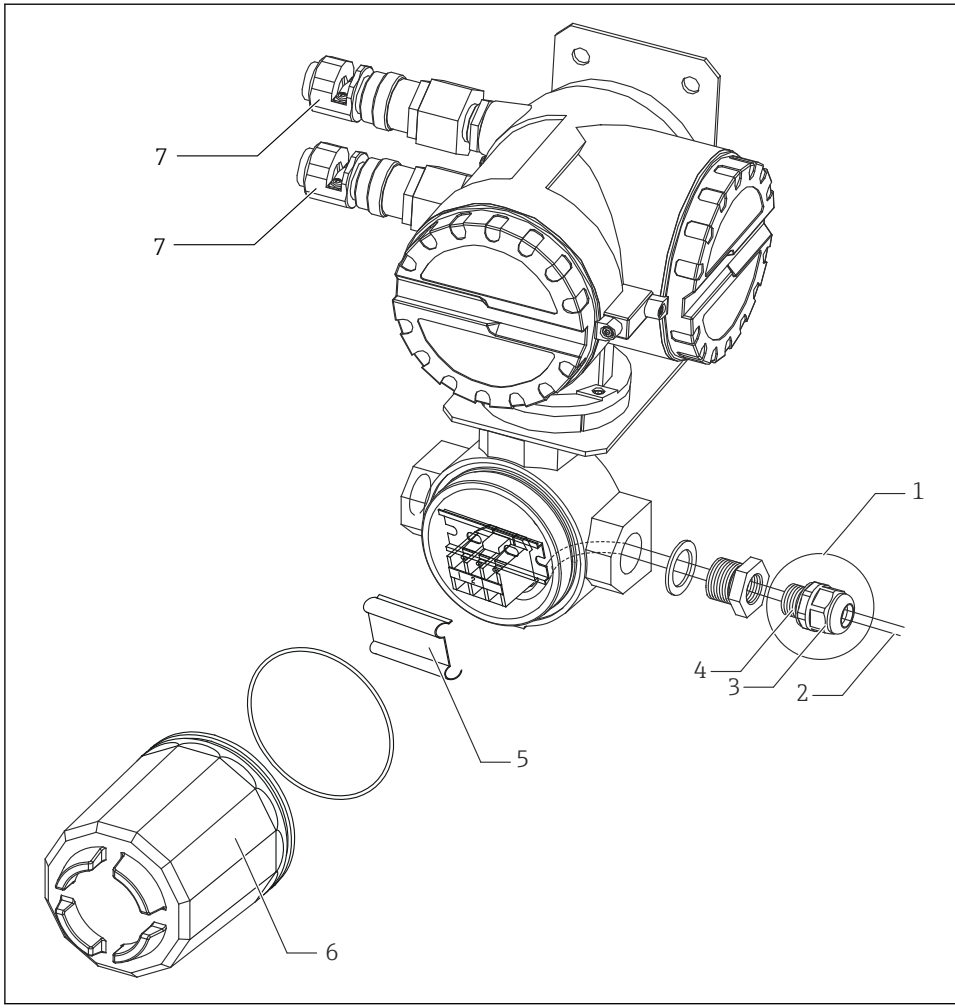
a Cable gland (must be procured separately)
b Shielded cable for NRR261/262 (must be procured separately)
1 Cable gland
2 Float sensor cable
3 Cable holder
4 Circuit board guard
5 Intrinsically safe terminal box cover
6 Shielded cable thread (M3)
7 Thread (M5)
8 Shielded cable gland

5.1.5 NRR261-3/5xx cable mounting

Mounting procedure

1. Remove the intrinsically safe terminal box cover [6] and the terminal block cover [5].
2. Insert the float sensor cable [2] into the cable gland [1] and cable entry for the intrinsically safe terminal box.
3. Connect the cable to the terminal block (see "Electrical connection").
4. Tighten the main unit of the cable gland [4] and the seal nut [3].
   ↳ Tightening torque (main unit and seal nut): approx. 1.96 N·m (20 kgf ·cm)
5. Secure the cable in place with the cable holder.
6. Install the terminal block cover and close the intrinsically safe terminal box cover.

This completes the mounting procedure.



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6 NRR261-3xx cable mounting

1 Cable gland (supplied for TIIS/JPN Ex specifications only)
2 Float sensor cable
3 Seal nut
4 Cable gland main unit
5 Terminal block cover
6 Intrinsically safe terminal box cover
7 Cable gland (Ex d) (supplied for TIIS/JPN Ex specifications only)

5.2 Adjustment

5.2.1 Verification of detection sensitivity in actual liquid

Verification of detection sensitivity when the lower layer is water and the upper layer is oil

If the electrode tip is pulled out of the lower-layer water due to increased thickness of the oil layer, water may cling onto the electrode tip like an icicle even if the electrode tip is in oil. In this case, detection sensitivity may increase by 1 to 2 mm. When an accurate detection check is required, apply a small amount of neutral detergent to the electrode tip to keep water from clinging to the electrode.

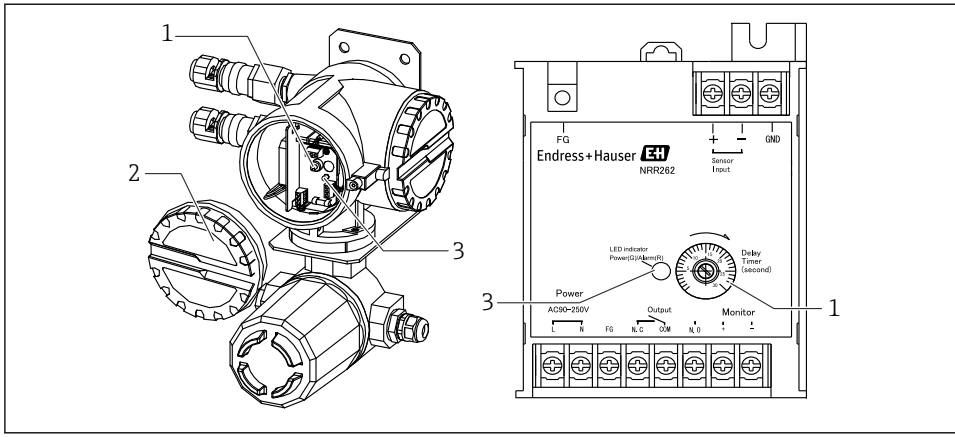
Verification of the oil layer thickness in a transparent container

Exercise caution, as a reading error may occur due to the liquid's surface tension, liquid adhesion to the container wall, and for other reasons.

5.2.2 Alarm output adjustment

The only adjustment that can be made on the transmitter is the delayed activation time (ON delay) setting for the alarm output relay. Time is set on the delay trimmer. In NRR261, the delay trimmer can be found by turning off the power 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. Delayed activation is used to prevent a false alarm by recognizing an alarm condition that continues over a certain period of time as an alarm while not outputting an alarm when the alarm condition stops within the delay time setting. This can be set to 30 seconds for the TIIS specification, and up to a maximum of 15 seconds for all other specifications.

- A response delay time in the detection circuit of approximately 6 seconds is always added to the delay time of the delay trimmer.
- Open the NRR261 main unit cover after the power has been turned off for at least 10 minutes.



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7 Alarm output relay

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

6 Electrical Connection

Connect the external grounding terminal according to the "Class A grounding" standards (≤ 10 Ω) in the shortest implementable distance.

When using Ex [ia] float sensor NAR300 and Ex d [ia] transmitter NRR261, it is necessary to ground the NRR261 to a built-in safety barrier by following the procedure below (TIIS specifications only).

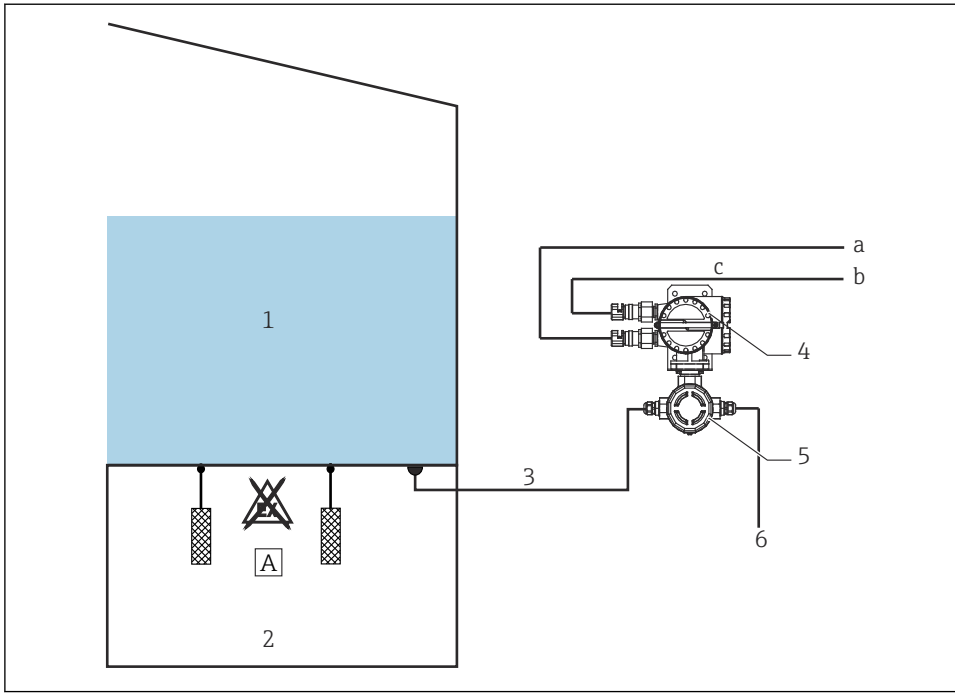
- The grounding cable for the safety barrier should be connected independently from grounding cables that are used for other purposes (lightning arrester), and it must be connected to a grounding point in accordance with "Class A grounding" standards in non-hazardous locations.
- Use a conductive grounding cable with a cross-sectional area of at least 2 mm^2. The communication cable shield of field devices with Class A grounding in an instrument room may also be used.

Class A grounding overview

Grounding resistance value	**10 Ω**
Grounding cable type	Metal cable with a tensile strength of at least 1.04 kN or an annealed copper cable with a diameter of at least 2.6 mm (0.1 in)

6.1 Procedure for wiring grounding cables

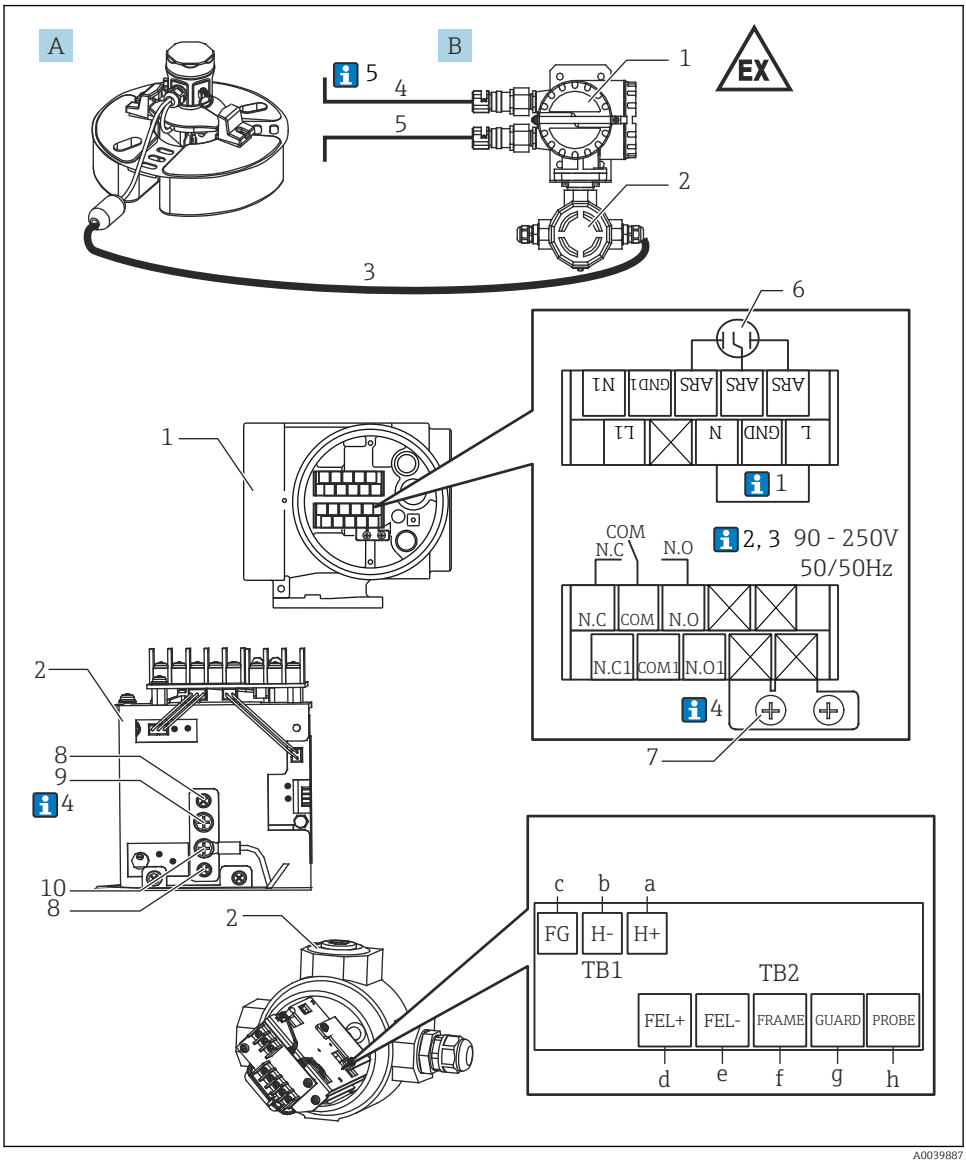
If performing Class A grounding from an Ex [ia] terminal instead of performing Class A grounding from an Ex d terminal, refer to the figure below.



8 Example of grounding transmitter NRR261

A Non-hazardous location Class A grounding work (TIIS specification only)
a Power supply
b Alarm output
c Ex d line
1 Tank
2 Underground
3 Grounding cable (TIIS specification only)
4 Ex d side terminal
5 Ex [ia] side terminal
6 From float sensor NAR300

6.2 NRR261-2/4/A/B/C wiring



9 *Wiring of Ex d [ia] transmitter NRR261-2/A/B/C*

A Float sensor NAR300-x1xxxx
B Ex d [ia] transmitter NRR261 (integrated type)
a Blue 1 (already wired at shipping)/Thread (M3)
b Blue 2 (already wired at shipping)/Thread (M3)

c Green/Thread (M3)
d Red/Thread (M3)
e Blue 3/Thread (M3)
f Yellow/Thread (M3)
g Black/Thread (M3)
h White/Thread (M3)
1 Ex d terminal
2 Ex [ia] terminal
3 Ex [ia]-dedicated connection cable used (6 to 30 m (19.69 to 98.43 ft): Attached to the product depending on the option code)
4 Power supply: AC/DC
5 Alarm output: Alarm/PLC/DCS, etc.
6 Power supply arrester (installed)
7 Green-yellow: FG safety barrier GND (for Class A grounding)/Thread (M4) (TIIS specification only), see 4 below
8 Terminal fixing screws (M3) (TIIS specification only)
9 FG safety barrier GND (for Class A grounding)/Thread (M4) (TIIS specification only), see 4 below
10 Blue 4: Internal wiring from Zener barrier/Thread (M4)

1. The GND between L and N of NRR261 is connected when an FG-equipped AC cable is used.

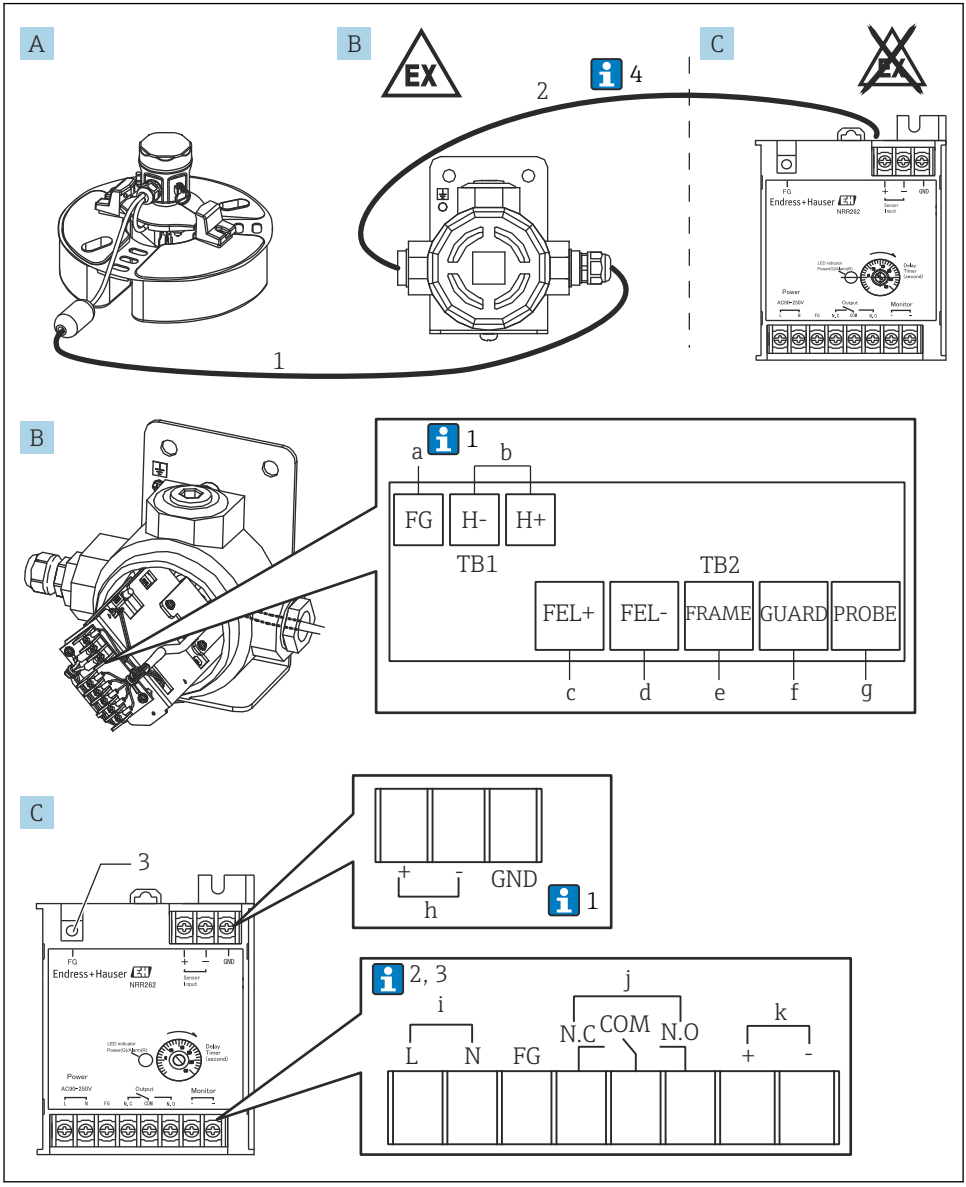
2. When using a 22 to 26 V_{DC} power supply, terminal number L is + (positive) and N is - (negative).

3. In order to maintain the Ex [ia] performance, ensure that the power supply voltage does not exceed 250 V_{AC} 50/60 Hz and 250 V_{DC} during normal time and abnormal time, respectively.

4. Perform Class A grounding work at a non-hazardous location using one of the FG safety barrier GNDs on terminal number 7 or 9 (TIIS specification only).

5. The cable for connecting NAR300 and NRR261 (3) is included with NAR300. The alarm output cable (4) from NRR261 and the power cable (5) to NRR261 are not included and must be prepared by the customer. For detailed information on the connection cables, see the "Process conditions" section.

6.3 NRR262-2/4/A/B/C wiring



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10 Wiring of Ex [ia] transmitter NRR262-2/A/B/C

A Float sensor NAR300-x5xxxx (sensor I/F Ex box is also included in the code)
B Sensor I/F Ex box
C Ex [ia] transmitter NRR262
a Green/Thread (M3) (see 1 below)
b Output to NRR262/Thread (M3)
c Red/Thread (M3)
d Blue/Thread (M3)
e Yellow/Thread (M3)
f Black/Thread (M3)
g White/Thread (M3)
h Input from sensor I/F Ex box/Thread (M3)
i 90 to 250 V_{AC}50/60 Hz/Thread (M3)
j Alarm output/Thread (M3)
k Check monitor output/Thread (M3)
1 Ex [ia]-dedicated connection cable used (6 to 30 m (19.69 to 98.43 ft): Attached to the product depending on the option code)
2 Sensor I/F Ex box and NRR262 cable (must be prepared by the customer)
3 For Class A grounding for intrinsic safety/Thread (M4)

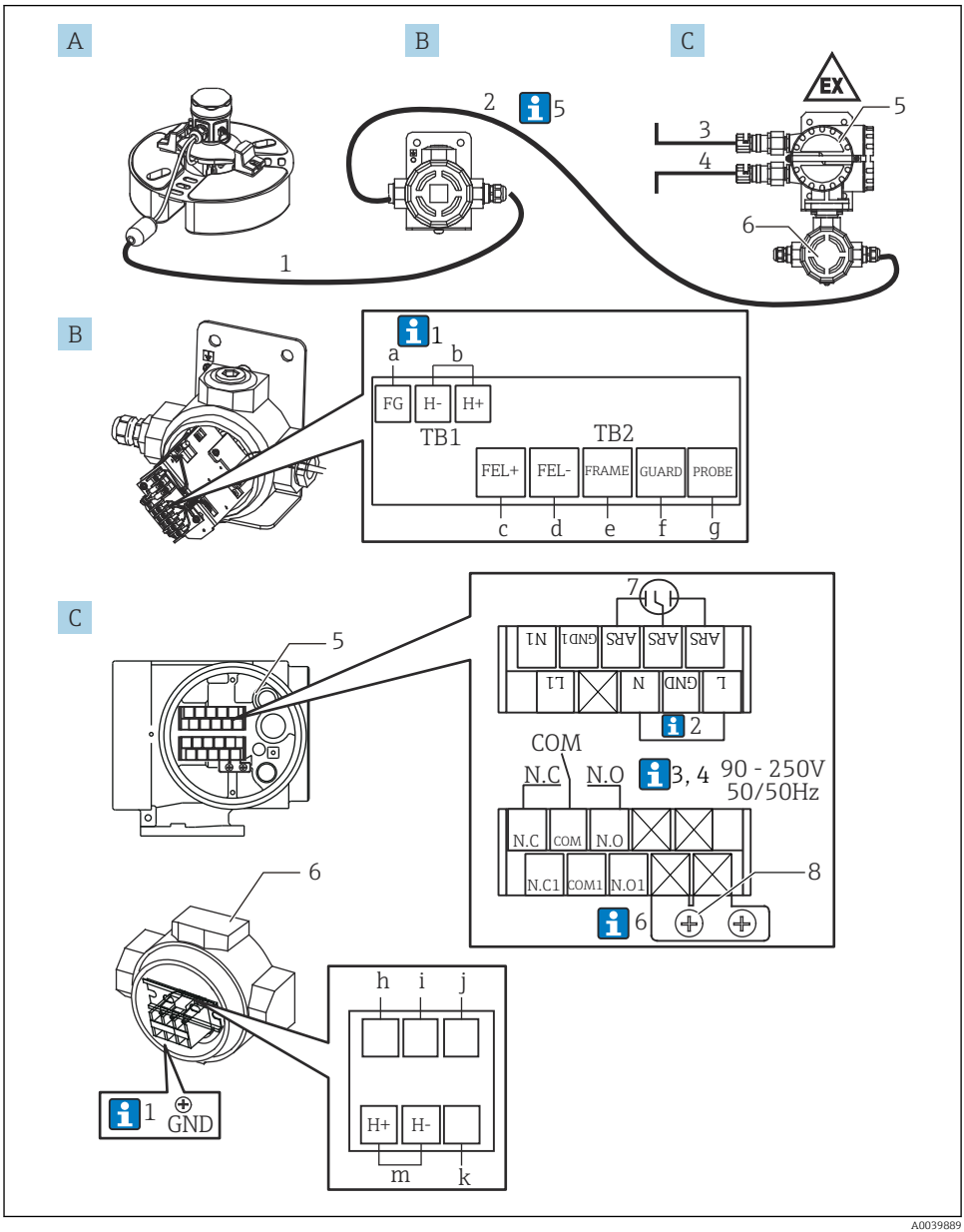
1. Normally, only the FG of a sensor I/F Ex box is shielded; however, depending on the installation environment, either the GND of NRR262 alone or both the FG of the sensor I/F Ex box and the GND of NRR262 are connected.

2. When using a 22 to 26 V_{DC} power supply, terminal number L is + (positive) and N is - (negative).

3. In order to maintain the Ex [ia] performance, ensure that the power supply voltage does not exceed 250 V_{AC} 50/60 Hz and 250 V_{DC} during normal time and abnormal time, respectively.

4. Although cable (1) that connects NAR300 and a sensor I/F Ex box is included with the device, a cable (2) that connects a sensor I/F Ex box and NRR262 is not included, and it must be prepared by the customer. For detailed information on the connection cables, see the "Process conditions" section.

6.4 NRR261-3/5 wiring



11 *Wiring of Ex d [ia] transmitter NRR261-3*

A Float sensor NAR300-x5xxxx (sensor I/F Ex box is also included in the code)
B Sensor I/F Ex box
C Ex d [ia] transmitter NRR261 (separate type)
a Green/Thread (M3) (see 1 below)
b Output to NRR261-3/5xx/Thread (M3)
c Red/Thread (M3)
d Blue 1/Thread (M3)
e Yellow/Thread (M3)
f Black/Thread (M3)
g White/Thread (M3)
h Blue 2/Thread (M4) (connected at the time of shipping)
i Blue 3/Thread (M4) (connected at the time of shipping)
j Blue 4/Thread (M4) (connected at the time of shipping) (TIIS specification only)
k Class A grounding connection terminal (TIIS specification only)/Thread (M4)
m Input from sensor I/F Ex box/Thread (M4)
1 Ex [ia]-dedicated connection cable used (6 to 30 m (19.69 to 98.43 ft): Attached to the product depending on the option code)
2 Sensor I/F Ex box and NRR261 cable (must 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)/Thread (M3)
8 Green-yellow: FG safety barrier GND (for Class A grounding/TIIS specification only)/Thread (M4) (see 6 below)

1. Normally, only the FG of a sensor I/F Ex box is shielded; 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. The GND between L and N of NRR261 is connected when an FG-equipped AC cable is used.

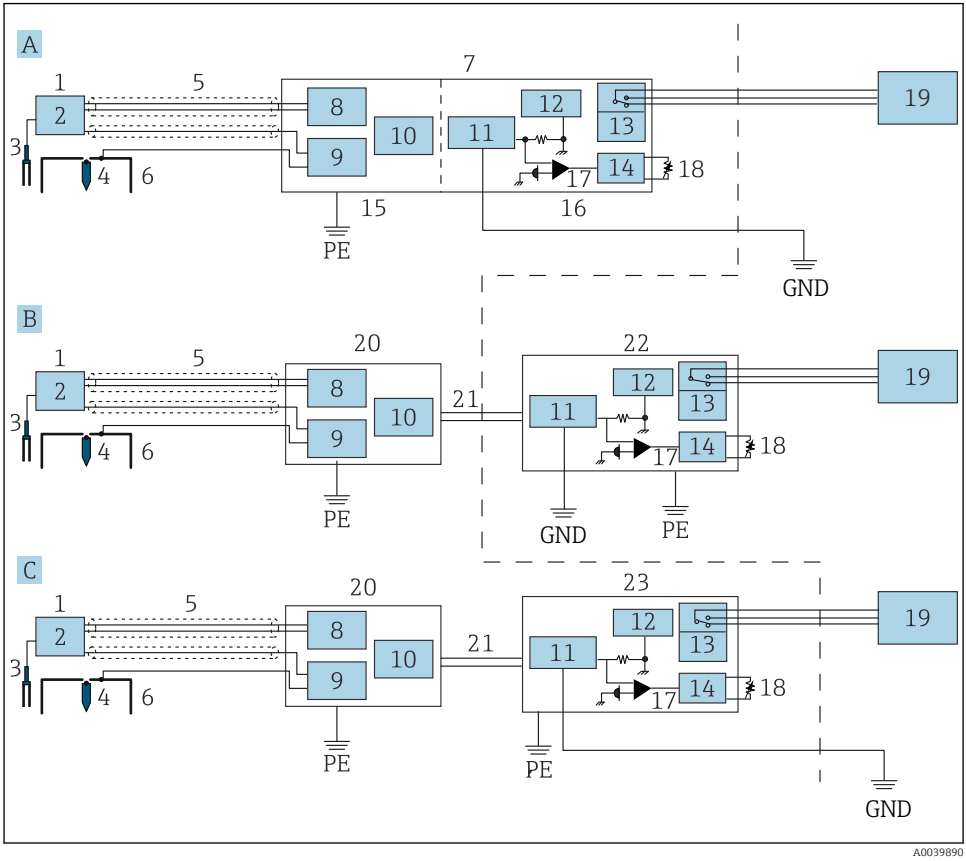
3. When using a 22 to 26 V_{DC} power supply, terminal number L is + (positive) and N is - (negative).

4. In order to maintain the Ex [ia] performance, ensure that the power supply voltage does not exceed 250 V_{AC} 50/60 Hz and 250 V_{DC} during normal time and abnormal time, respectively.

5. Cable (1) for connecting NAR300 and the sensor I/F Ex box is included with NAR300. Cable (2) for connecting the sensor I/F Ex box to NRR261, the alarm output cable (3) from NRR261, as well as the power cable (4) to NRR261 are not included and must be prepared by the customer. For detailed information on the connection cables, see the "Process conditions" section.

6. Perform Class A grounding work at a non-hazardous location using one of the FG safety barrier GNDs on terminal number 8 or k (TIIS specification only).

6.5 Wiring diagram



12 *Wiring diagram*

A *Ex d-type transmitter system (integrated type)*
B *Intrinsically safe-type transmitter system (separate type)*
C *Ex d [ia] transmitter system (separate type)*
PE *Protection earth (protective grounding)*
GND *Class A grounding (TIIS specifications only)*
1 *Float sensor NAR300*
2 *Tuning fork driving unit*
3 *Tuning fork*
4 *Conductivity detection electrode (sensor)*
5 *Dedicated cable*
6 *Conductivity detection electrode (float)*
7 *Transmitter NRR261 (integrated type)*
8 *Liquid detection circuit*
9 *Conductivity detection circuit*
10 *Current output circuit*

11 Safety barrier
12 Power supply circuit
13 Relay
14 Delay circuit
15 Ex [ia] circuit
16 Ex d circuit
17 Current detection
18 Delay trimmer
19 Alarm
20 Sensor I/F Ex box
21 Current signal
22 Transmitter NRR262
23 Transmitter NRR261 (separate type)

Although a Class A grounding cable can be shared with grounding of other safety barriers, it cannot be shared with grounding of a lightning arrester.

6.6 Operating principles of alarm activation

The oil leak detection signal detected by the NAR300 float sensor is converted to a power signal in the transmitter or the sensor I/F Ex box. After this, it is connected to the current detection circuit via the Ex [ia] safety barrier in the transmitter. In the current detection circuit, the presence or absence of an oil leak alarm signal is determined by the magnitude of electrical current values, and the alarm output relay is turned on or off by the operation delay circuit.

The delay time can be set, and there is a trimmer for setting the delay time in the alarm delay circuit. A fail-safe function is available in the relay contact output (refer to the following table).

Between terminals	**NRR262 between NC and COM**	**NRR262 between NO and COM**
Condition	**NRR261 between NC and COM terminal No.11, 13**	**NRR261 between NO and COM terminal No.13, 15**
Non-alarm	Contact point is open	Contact point is closed
Oil leak alarm	Contact point is closed	Contact point is open
Power OFF		
Frozen liquid		

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

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