



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



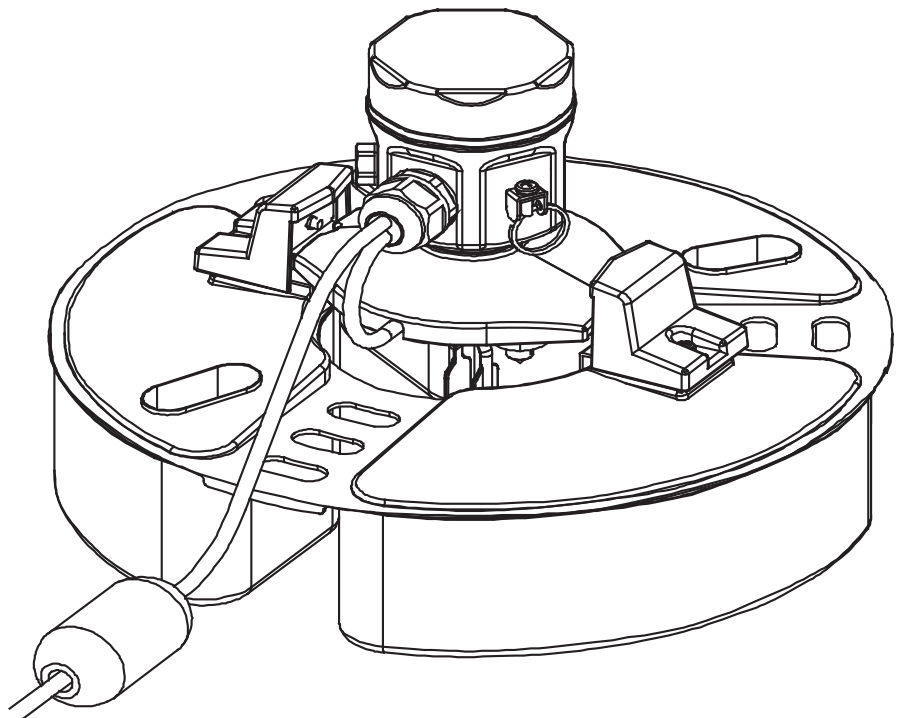
Services



Solutions

## Operating Instructions

# Oil Leak Detector NAR 300 System



## System block diagram

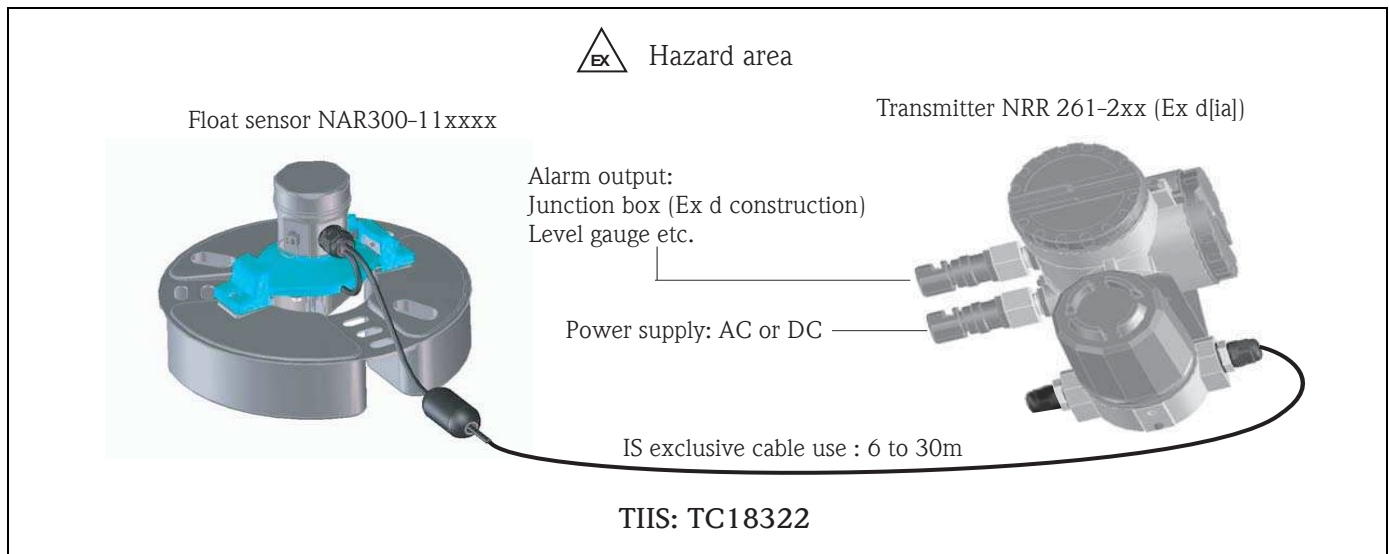
Oil Leak Detector NAR300 system can select from 3 type of system structure by application

### Ex d System : Ex d[ia] IIB T4

This Ex d[ia] system can monitor every process of oil leak detection to alarm output at outside hazardous area.

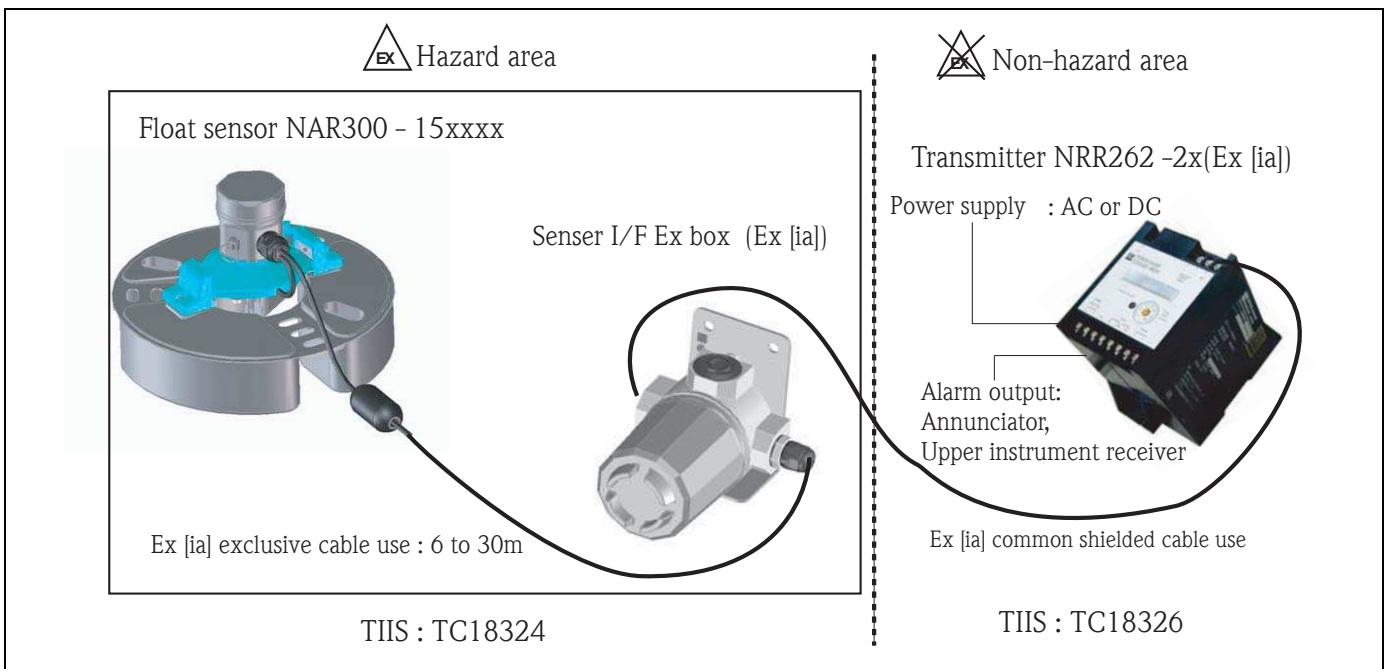
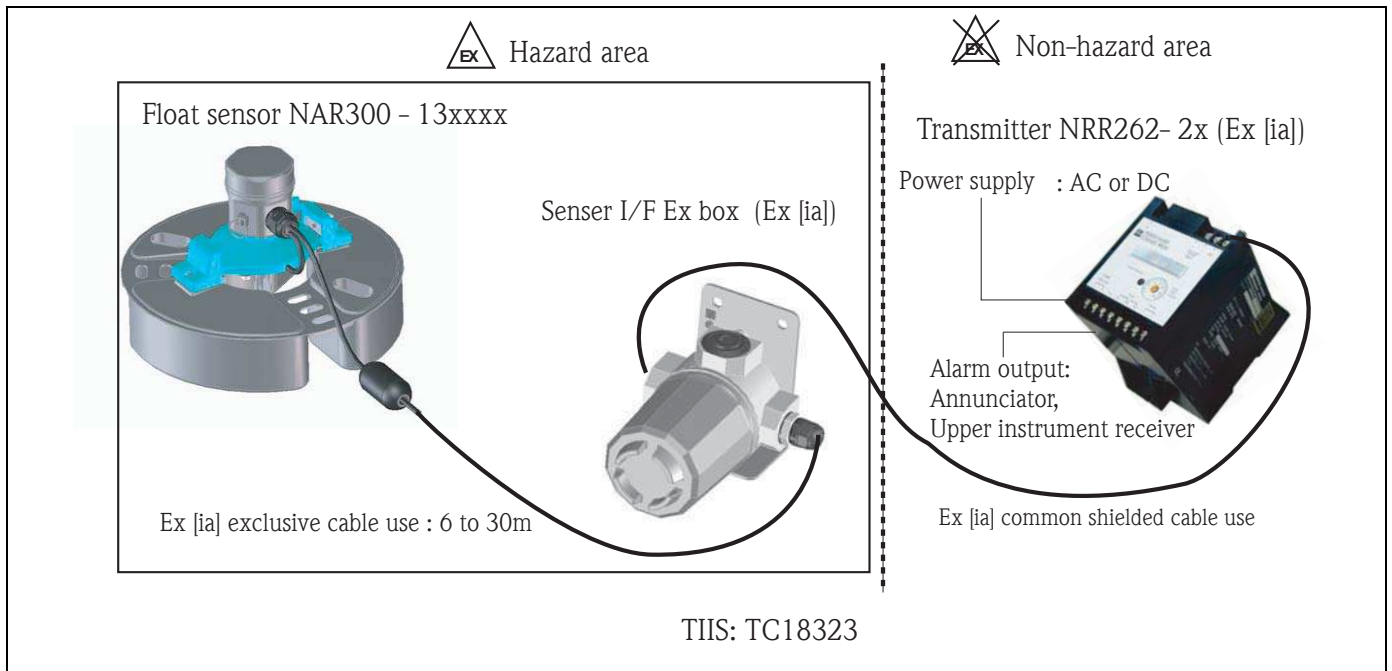
The circuit is IS from the Float Sensor NAR 300 to the connecting terminal box of Transmitter NRR 261 (Ex d[ia]).

The Transmitter NRR 261 (Ex d[ia]) can connect directly to a junction box or gauge relay input located outside the yard.



### Ex [ia] System : Ex ia IIB T4

This Ex [ia] system is set up with the Transmitter NRR 262 (Ex [ia]) in a non-hazardous area such as an instrument panel room and sends the alarm output to an annunciator or upper instrument receiver. The signal from the Float Sensor NAR 300 is sent to the Transmitter NRR 262 (Ex [ia]) through the Sensor I/F Ex box with Ex [ia] connections.

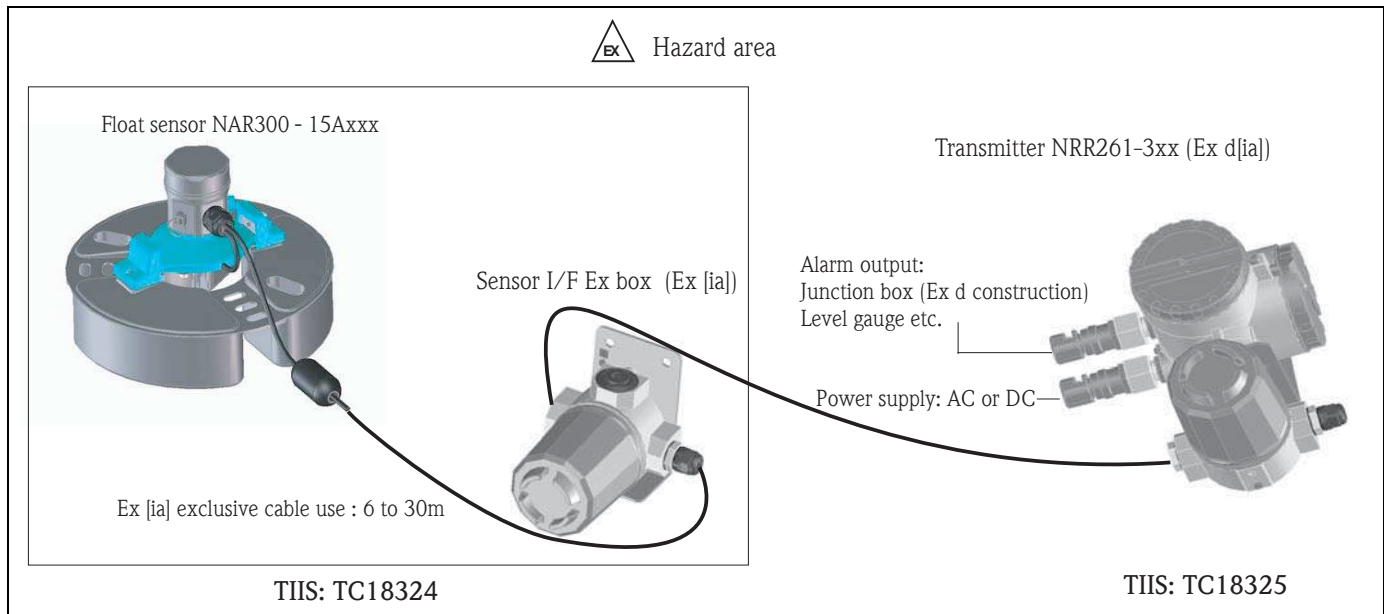


### Ex d[ia]system : Ex d[ia] IIB T4

This Ex d[ia] system can monitor every process of oil leak detection to alarm output at outside hazardous area.

The signal from the Float Sensor NAR 300 is received through Sensor I/F Ex box from the Float Sensor NAR 300 to the connecting terminal box of Transmitter NRR 261 (Ex [ia]).

The Transmitter NRR 261 (Ex d[ia]) can connect directly to a junction box or gauge relay input located outside the yard.



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# 1 Safety instructions

## 1.1 Designated use

The Oil Leak Detector NAR 300 System uses two types of detection principles: conductivity and tuning-fork.

This system is set up in a pit, dike or plant, the sump pit near the pump yard, where it provides the ultimate leak detection function for oils and vegetable oil.

Explosion-proof system:

With the Transmitter NRR 261 (outside setting) use, connect to the switch input mechanism such as a existing Level Gauge, Transmitter directly and can send the alarm.

IS system:

Using in combination the Converter NRR 262 (inside setting) and the Sensor I/F Ex box (outside setting), can establish the alarm system.

## 1.2 Installation, commissioning and operation

- Mounting, electrical installation, start-up and maintenance of the instrument may only be carried out by trained personnel authorized by the operator of the facility.
- Personnel must absolutely and without fail read and understand this Operating Manual before carrying out its instructions.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual are to be observed without fail.
- The installer must make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system is to be grounded.
- Please observe all provisions valid for your country and pertaining to the opening and repairing of electrical devices.

## 1.3 Note for Handling

### Power cable

- Use cables recommended by Endress+Hauser.
- Be sure to ground the cables. For details, refer to "Electrical Connections" and "Installation"

### Grounding

- Do not remove a ground terminal or wire power is on.
- For details, refer to "Electrical Connections"

### External connection

If external connections are required, before connecting the device to an external control circuit, provide protective grounding

### Caution!

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



## 1.4 Return

The following procedures must be carried out before the Oil Leak Detector NAR 300 system sent to Endress+Hauser for repair:

- Always enclose a duly completed "Declaration of Contamination" form. Only then can Endress +Hauser transport, examine and repair a returned device.
- Enclose special handling instructions if necessary, for example, safety data sheet as per EN 91/155/EEC.
- Remove all residue which may be present. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is dangerous to health, e.g. corrosive, poisonous, carcinogenic, radioactive, etc.

A copy of the "**Declaration of Contamination**" is included at the end of this operating manual.



### Caution!

- No instrument should be sent back for repair without all dangerous material being completely removed first, e.g. in scratches or diffused through plastic.
- Incomplete cleaning of the instrument may result in waste disposal or cause harm to personnel (burns, etc.). Any costs arising from this will be charged to the operator of the instrument.

## 1.5 Disposal

In case of disposal, please separate the different components according to their material consistency.

## 1.6 Software history












Software version / Date	Software changes	Documentation changes
OILEYE CI/ST V. 1.40/11.03	Original software.	

## 1.7 Contact addresses of Endress+Hauser

The addresses of Endress+Hauser are given on the back cover of this operating manual. If you have any questions, please do not hesitate to contact your E+H representative.

## 1.8 Notes on safety conventions and symbols

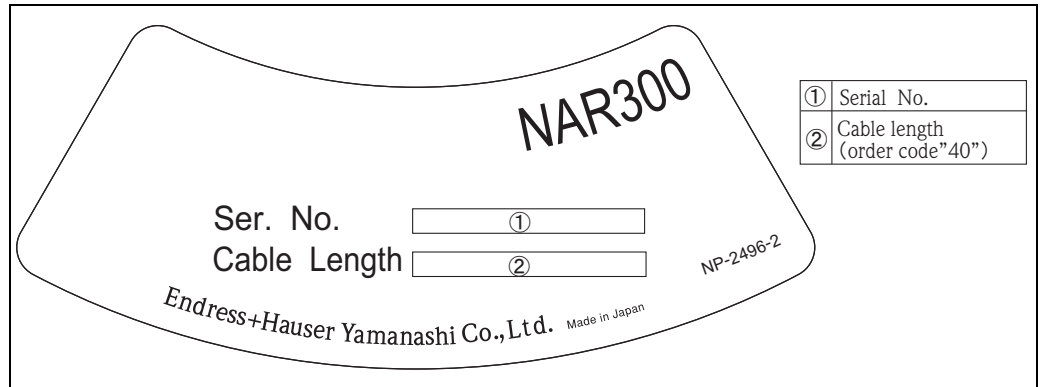
In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding symbol in the margin.

Symble	Meaning
	<b>Warning!</b> A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument
	<b>Caution!</b> Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument
	<b>Note!</b> A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned
	<b>Device certified for use in explosion hazardous area</b> If the device has this symbol embossed on its name plate, it can be installed in an explosion hazardous area
	<b>Explosion hazardous areas</b> Symbol used in drawings to indicate explosion hazardous areas. – Devices located in and wiring entering areas with the designation “explosion hazardous areas” must conform with the stated type of protection
	<b>Safe area (non-explosion hazardous area)</b> Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. – Devices located in safe areas still require a certificate if their outputs run into explosion hazardous areas
	<b>Direct voltage</b> A terminal to which or from which a direct current or voltage may be applied or supplied
	<b>Alternating voltage</b> A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied
	<b>Grounded terminal</b> A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system
	<b>Protective grounding (earth) terminal</b> A terminal which must be connected to earth ground prior to making any other connection to the equipment
	<b>Equipotential connection (earth bonding)</b> A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice



## 2 Identification

### 2.1 Float sensor NAR 300 Nameplate



Information on the nameplate of the Float Sensor NAR 300

NRR261-2xx

**Endress+Hauser**

**NRR261**

---

Order Code **NRR261-** ①

Ser. No: ②

---

漏油検出装置 NR30261 ③

Exd [ia] IIB T4

本安回路 2:

$U_o \leq 13V$     $I_o \leq 38mA$     $P_o \leq 123.5mW$

$C_o \leq 0.25 \mu F$     $L_o \leq 80mH$

非本安回路:

電 源: ④

許容電圧: AC250V 50/60Hz, DC250V

周囲温度: 60°C   被測定物温度: 60°C

注意:

- ・ 機器内部の部品及び配線の変更、改造等を行わないで下さい。
- ・ 許容温度70°C以上のケーブルを使用して下さい。
- ・ 容器の開放は、電源遮断後10分以上経過してから行って下さい。
- ・ 取扱説明書(BA1027)を参照して下さい。

**IP67**

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エンドレスハウザー山梨株式会社   Made in Japan

Yamanashi 406-0846   NP-2478-2

①	SAP cord
②	Serial No.
③	Explosion-proof type
④	Power supply

労(平20. 4)検

第TC18322号

エンドレスハウザー  
山梨株式会社

NP-2479-2

Ex d[ia] system (NAR300-11xxxx+NRR261-2xx system)

NRR262-2x

**Endress+Hauser**

**NRR263**

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Order Code **NRR263-** ①

Ser. No: ②

---

漏油検出装置 NR30262

漏油検出器 NAR300-1

防爆性能 Ex ia IIB T4

本安回路 2:

$U_o \leq 13V$     $I_o \leq 38mA$

$P_o \leq 123.5mW$

$C_o \leq 0.25 \mu F$     $L_o \leq 80mH$

周囲温度: 60°C  

被測定物温度: 60°C

エンドレスハウザー山梨株式会社

Made in Japan   NP-2487-2

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注意:

- ・ 機器内部の部品及び配線の変更、改造等を行わないで下さい。
- ・ 許容温度70°C以上のケーブルを使用して下さい。
- ・ 取扱説明書(BA1027)を参照して下さい。

エンドレスハウザー山梨株式会社

Made in Japan   NP-2488-2

**Endress+Hauser**

**NRR262**

---

Order Code **NRR262-**

Ser. No:

---

漏油検出装置 NR30262

変換器 NRR262-1

防爆性能 Ex ia IIB T4

本安回路:

$U_o \leq 28V$     $I_o \leq 93mA$     $P_o \leq 0.65W$

非本安回路:

電 源:

許容電圧: AC250V 50/60Hz, DC250V

周囲温度: 60°C

注意:

- ・ NRR262は、非危険場所に設置してください。
- ・ 機器内部の部品及び配線の変更、改造等を行わないで下さい。
- ・ 許容温度70°C以上のケーブルを使用して下さい。
- ・ 取扱説明書(BA1027)を参照して下さい。

エンドレスハウザー山梨株式会社

Made in Japan   Yamanashi 406-0846   NP-2480-2

①	SAP cord
②	Serial No.
③	Power supply

労(平20. 4)検

第TC18323号

エンドレスハウザー  
山梨株式会社

NP-2481-2

Ex [ia] system (NAR300-13xxxx+NRR262-2x system)

<div style="text-align: right; font-weight: bold; font-size: 1.2em;">Endress+Hauser </div> <div style="text-align: right; font-weight: bold; font-size: 1.1em;">NAR300</div> <hr/> <p>Order Code <b>NAR300-15A</b> (1)</p> <p>Ser. No: <input style="width: 100px;" type="text"/> (2)</p> <hr/> <p>漏油検出器 (Order code 参照)                  防爆性能 Ex ia IIB T4                  本安回路 (電源回路):                  Ui=28V, Ii=93mA, Pi=0.65W,                  Li=48 μH, Ci: 無視できる値                  本安回路 2:                  Uo=13V, Io=38mA, Po=123.5mW,                  Lo=80mH, Co=0.25 μF                  周囲温度 : 60°C                   被測定物温度 : 60°C                  エンドレスハウザー山梨株式会社                  Made in Japan <span style="float: right;">NP-2570-1</span></p> <hr/> <p>注意 :</p> <ul style="list-style-type: none"> <li>・ 機器内部の部品及び配線の変更、改造等を行わないで下さい。</li> <li>・ 許容温度70°C以上のケーブルを使用して下さい。</li> <li>・ 防爆注意事項説明書 (Ex572-829XJ) を参照して下さい。</li> </ul> <p style="text-align: center;">エンドレスハウザー山梨株式会社                  Made in Japan <span style="float: right;">NP-2571-1</span></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">①</td><td>SAP cord</td></tr> <tr><td style="text-align: center;">②</td><td>Serial No.</td></tr> </table> <div style="border: 2px solid black; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">                 労(平20. 4)検                  第TC18324号                  エンドレスハウザー                  山梨株式会社  <small>NP-2577</small> </div>	①	SAP cord	②	Serial No.
①	SAP cord				
②	Serial No.				

Ex [ia] Sensor I/F Ex box, Extended type (NAR300-15xxxx )

NRR262-2x							
<div style="text-align: right; font-weight: bold; font-size: 1.2em;">Endress+Hauser </div> <div style="text-align: right; font-weight: bold; font-size: 1.1em;">NRR262</div> <hr/> <p>Order Code <b>NRR262-2</b> (1)</p> <p>Ser. No: <input style="width: 100px;" type="text"/> (2)</p> <hr/> <p>変換器 / Converter : (Order Code 参照) / (Refer to Order Code)                  防爆性能 / Protection class : [Ex ia] IIB                  本安回路 / Intrinsically safe circuit :                  Uo=28V, Io=93mA, Po=0.65W, Co=0.083 μF, Lo=3.05mH                  非本安回路 / non Intrinsically safe circuit :                  電源 / Power supply: <input style="width: 100px;" type="text"/> (3)                  許容電圧 (Um) : AC250V 50/60Hz, DC250V                  周囲温度 / Ambient temperature : 60°C</p> <hr/> <p>注意 : ・ NRR262は、非危険場所に設置してください。                  ・ 機器内部の部品及び配線の変更、改造等を行わないでください。                  ・ 防爆注意事項説明書 (Ex581-838XJ) を参照して下さい。</p> <p>Note: ・ NRR262 must be installed in non-hazardous area.                  ・ Do not modify internal parts or circuits.                  ・ Refer to Ex-instruction manual (Ex581-838XJ).  → </p> <hr/> <p style="text-align: center;">エンドレスハウザー山梨株式会社                  Endress+Hauser Yamanashi Co.,Ltd. <span style="float: right;">Made in Japan</span>                  Yamanashi 406-0846 <span style="float: right;"> NP - 2573-1</span></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="text-align: center;">①</td><td>SAP code</td></tr> <tr><td style="text-align: center;">②</td><td>Serial No.</td></tr> <tr><td style="text-align: center;">③</td><td>Power supply</td></tr> </table> <div style="border: 2px solid black; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">                 労(平20. 4)検                  第TC18326号                  エンドレスハウザー                  山梨株式会社  <small>NP-2579</small> </div>	①	SAP code	②	Serial No.	③	Power supply
①	SAP code						
②	Serial No.						
③	Power supply						

Ex [ia] transmitter, Extended type (NRR262-2x )

NRR261-3xx

**Endress+Hauser** **NRR261**

Order Code NRR261-3 ①

Ser. No: ②

変換器 NRR261-3 ③

Converter  
防燥性能 Ex d[ia] IIB T4  
Protection class

本安回路: Intrinsically safe circuit  
Uo=28V Io=93mA Po=0.65W  
Co=0.083 μF Lo=3.05mH

非本安回路: non Intrinsically safe circuit  
電源: ④

Power supply:  
許容電圧: AC250V 50/60Hz, DC250V  
Maximum voltage (Um):

周囲温度: 60°C  
Ambient temp.:

**IP67**

注意:  
・機器内部の部品及び配線の変更、改造等は行わないでください。  
・許容温度70℃以上のケーブルを使用してください。  
・容器の開放は、電源遮断後10分以上経過してから行って下さい。  
・防燥注意事項説明書 (Ex581-832KJ) を参照して下さい。

Note  
・Do not modify internal parts or circuits.  
・Use heat-resistant cable 70°C or more.  
・Wait 10 minutes after power shut off when opening cover.  
・Refer to Ex-instruction manual (Ex581-832KJ).

→

エンドレスハウザー山梨株式会社  
Endress+Hauser Yamanashi Co.,Ltd. Made in Japan  
Yamanashi 406-0846 NP - 2572-1

①	SAP cord
②	Serial No.
③	Ex-proof model
④	Power supply

労(平20.4)検

第TC18325号

エンドレスハウザー  
山梨株式会社  
NP-2578

Ex d[ia] transmitter, Extended type (NRR261-3xx )

## 2.2 Product structure

### 2.2.1 Float Sensor NAR 300

10		Approval	
	1	Ex [ia] IIB T4, TIIS	
	9	Special version	
20		Sensor Type	
	1	Float	
	2	Float + Module set (Econounce)	
	4	Float + Ex box(Econounce)	
	5	Float + Ex box (extended range)	
	9	Special version	
30		Signal Output	
	A	2-wire current	
	Y	Special version	
40		Signal Cable	
	A	6 m	
	B	10 m	
	C	15 m	
	D	20 m	
	E	25 m	
	F	30 m	
	Y	Special version	
50		Float Guide	
	1	Not used	
	2	Material mild steel	
	3	Material SS304	
	9	Special version	
60		Cable Entry	
	A	Not selected	
	B	PF (G)1/2	
	C	NPT 1/2	
	D	Pg16	
	E	M25	
	Y	Special version	
NAR300-		Complete product designation	

### 2.2.2 Transmitter NRR 261

10		<b>Approval</b>																					
	2	Ex d [ia] IIB T4, TIIS (NAR 300)																					
	3	TIIS Ex d [ia] IIB T4 (extended range)																					
	9	Special version																					
20		<b>Power Supply</b>																					
	A	90-250VAC																					
	B	22-26VDC																					
	Y	Special version																					
30		<b>Cable Entry</b>																					
	A	G PF3/4 x 2 (Ex d)																					
	B	NPT3/4 x 2 (Ex d)																					
	C	Pg16 x 2 (Ex d)																					
	D	M25 x 2 (Ex d)																					
	E	G PF3/4 x 2 (Ex d) + G PF 1/2 x 1 (Ex ia)																					
	K	G PF1/2 x 2 (Ex d) + G PF 1/2 x 1 (Ex ia)																					
	Y	Special version																					
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> </tr> <tr> <td>NRR261-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Complete product designation</td> </tr> </table>														NRR261-									Complete product designation
NRR261-									Complete product designation														

### 2.2.3 Transmitter NRR 262

10		<b>Approval</b>																					
	2	Ex [ia] IIB T4, TIIS (NAR 300)																					
	9	Special version																					
20		<b>Power Supply</b>																					
	A	90-250VAC																					
	B	22-26VDC																					
	Y	Special version																					
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> <td style="width:10%;"></td> </tr> <tr> <td>NRR262-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Complete product designation</td> </tr> </table>														NRR262-									Complete product designation
NRR262-									Complete product designation														

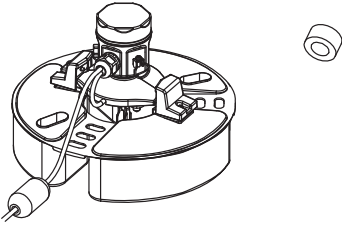
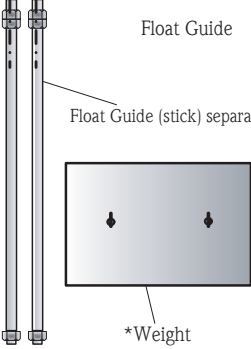
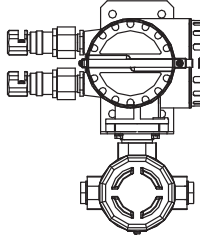

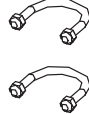
## 2.3 Scope of delivery

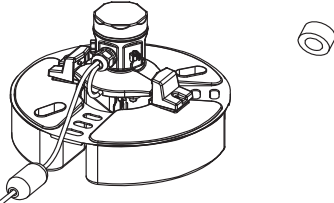
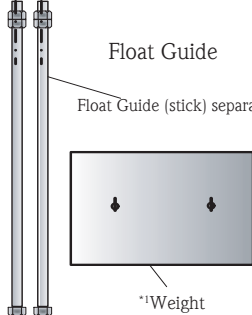
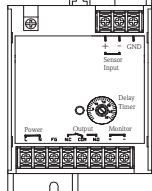

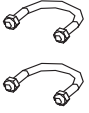
- Instrument according to the version ordered
- Operating manual (this manual)

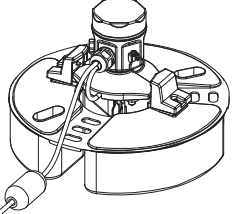

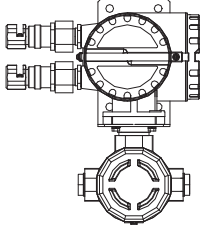


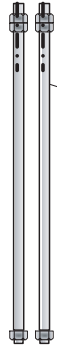

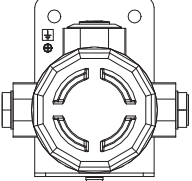

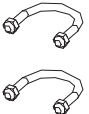
## 2.4 Operating Manual (BA1027N, this booklet)

Describe the installation and commissioning of the Oil Leak Detector NAR300.

### 3 Delivery example of each Order Code

Float Sensor order code	Transmitter order code
NAR300 - * 1 * * 2 or 3 * A	NRR261 - 2 * *
<p data-bbox="555 501 655 521">Float Sensor</p> <p data-bbox="775 501 863 521">Check tool</p>  <p data-bbox="679 792 767 813">Float Guide</p> <p data-bbox="608 882 863 902">Float Guide (stick) separate packing</p>  <p data-bbox="663 1106 735 1126">*Weight</p> <p data-bbox="440 1144 887 1164">*(This weight is set in the bottom of Transmitter packing box)</p>	<p data-bbox="1142 490 1230 510">Transmitter</p>  <p data-bbox="999 864 1086 884">Cable gland</p>  <p data-bbox="1198 864 1358 884">U bolt for mounting</p> 

Float sensor order code	Transmitter order code
NAR300 - * 3 or 5 * * 2 or 3 * A	NRR262 - 2 * *
<p data-bbox="531 1386 632 1406">Float sensor</p> <p data-bbox="759 1386 847 1406">Check tool</p>  <p data-bbox="632 1682 735 1702">Float Guide</p> <p data-bbox="560 1738 847 1758">Float Guide (stick) separate packing</p>  <p data-bbox="663 1935 735 1955">*Weight</p> <p data-bbox="456 1973 903 1993">*(this weight is packed in bottom of box with transmitter)</p>	<p data-bbox="1126 1368 1214 1388">Transmitter</p>  <p data-bbox="935 1693 1166 1713">*2Sensor I/F Module Box</p> <p data-bbox="1126 1727 1214 1747">Cable gland</p>  <p data-bbox="1238 1727 1390 1747">U bolt for mounting</p>  <p data-bbox="935 1939 1398 1982">*2 included in order code NAR300-13xxxx or NAR300-15xxxx. Ex [ia] system is used with Transmitter NRR 262-2x.</p>

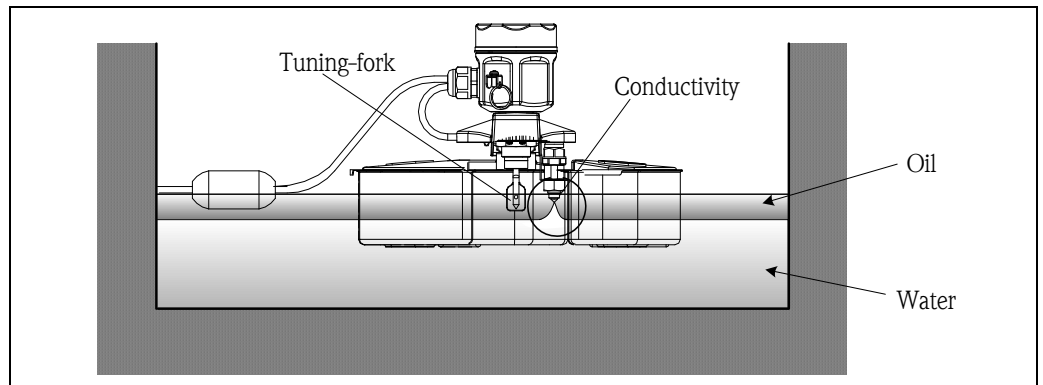
Float sensor order code	Transmitter order code
NAR300 - 1 5 x x 2 or 3 A	NRR261 - 3 x x
<p>Float sensor</p>  <p>Check tool</p> 	<p>Transmitter</p>  <p>Cable gland</p>  <p>mounting U bolt</p> 
<p>Float guide</p>  <p>Float guide bar (separate packing from weight)</p>  <p>Weight :</p> <p>(this weight packed in bottom of box with transmitter)</p>	<p>*Sensor I/F Ex box</p>  <p>Cable gland</p>  <p>mounting U bolt</p>  <p>* included in order code NAR300-15xxxx. Ex d[ia] system is used with Transmitter NRR261-3x.</p>



## 4 Instruction for use

### 4.1 Detection Sensitivity

Depending on actual condition, water may sometimes cling to the electrode, even though the sensor is floating on oil above the water (see figure 3). In such case, oil detection sensitivity may be affected by 1 to 2 mm. When absolute precision is required we recommend coating the electrode with a mild detergent in order to keep water from clinging to the electrode.



Water clinging to the electrode

### 4.2 Water in a pit

#### Impossible to use on sea water

Float sensor is not designed for using on sea water. There may be the following troubles, when using it on sea water.

- When Float Sensor is overturned by ocean waves, non-alarm or the alarm delay may occur.
- When the bypass is generated between the conductive sensor and float body by sea salt, alarm delay may occur.
- Float Sensor is corroded by the sea salt

#### Particular water in a pit

When using the Float Sensor on particular water such as a solvent blend, it may be corroded and damaged.

#### High electrical resistance water in a pit

When using the Float Sensor on high electrical resistance water such as a steam drain or pure water, an alarm may ring. Electric conductivity should be  $\geq 10\mu\text{S}/\text{cm}$  and  $\leq 100\text{k}\Omega\cdot\text{cm}$ .

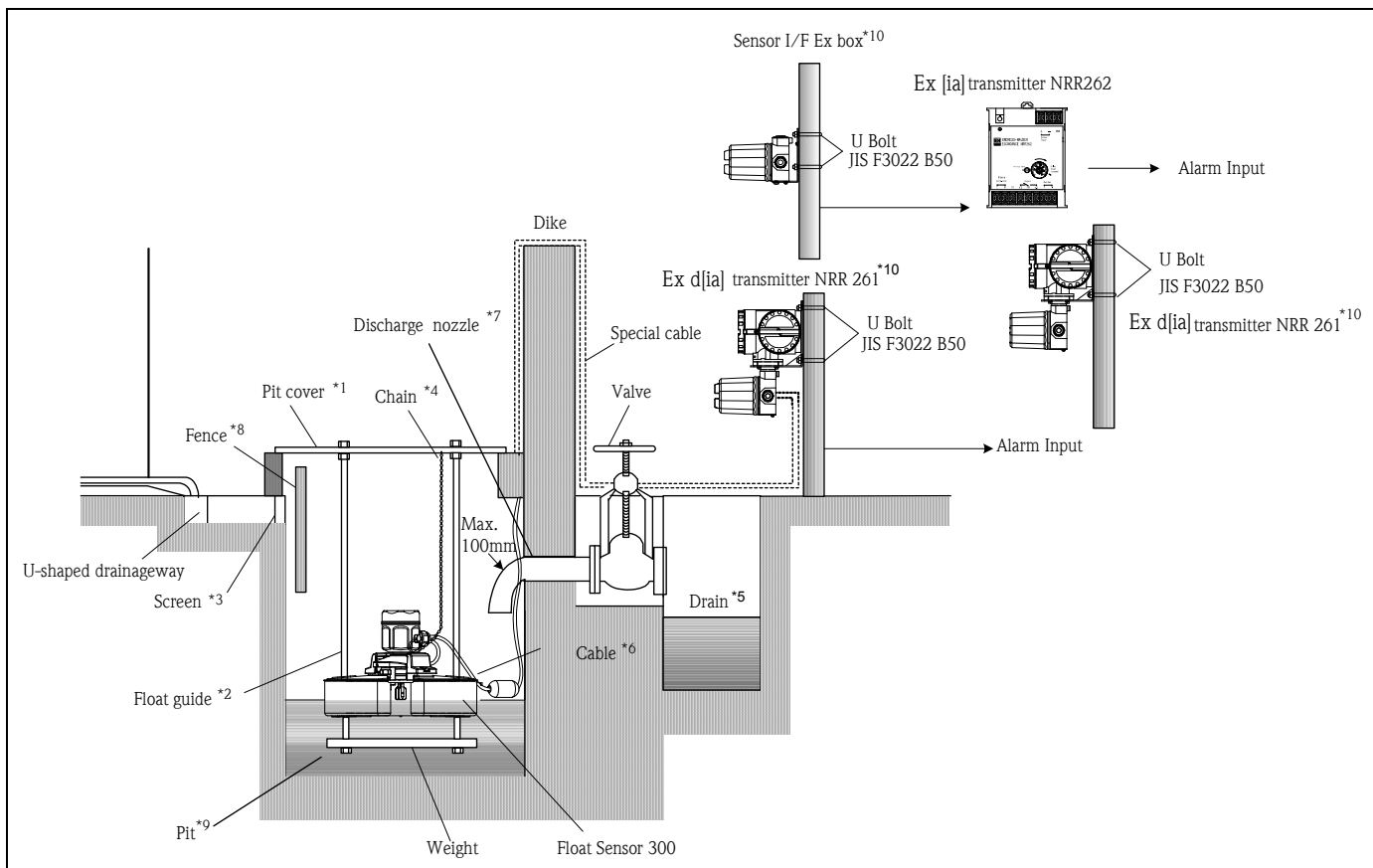
As an example:

Pure water - 1 to  $0.1\mu\text{S}/\text{cm}$  (1 to  $10\text{M}\Omega\cdot\text{cm}$ )

#### The water freezing in a pit

When water in the pit freezes, the water in a pit, the alarm may ring (fail safe function). Please implement countermeasures to prevent freezing.

## 5 Installation



\*1: We recommend to set up a rubbish guard, a roof and a cover in order not to allow rubbish and snow into the pit.  
 When snow accumulates on the Float Sensor, the sensitivity declines as the draft increases to 1mm per 50g.  
 Also, when the ambient temperature might be over 50 °C, set up a sun shade to avoid direct sunlight.  
 In downpour, just in case the water in pit overflow, mount the pit cover higher than the pit in order not to submerge the housing of float sensor in the water.  
 If the float sensor is submerged, it becomes the source of troubles and breakages.

\*2: When the float sensor is out of balance (approx. gradient of 3 degree and over), it may cause a malfunction and alarm delay. Please set up the float guide and pay attention to the placement of cable and chain.

\*3: Please mount a screen to prevent rubbish at inlet entrance of the water and conduct periodical check and cleaning due to prevent the error caused by rubbish and foreign substances that block up the pit and the sensor.

\*4: It is convenient to attach a chain to the ring of sensor head side preliminarily. But the sensitivity declines as the draft increases to 1mm per 50g (load increment of Float).  
 When using the chain to prevent the float sensor flowage, please do not pull the chain when checking.

\*5: When the water in the pit is full, even if the oil leaks, oil layer is not formed in the pit.

\*6: Do not pull the sensor by its cable. Doing so may damage the sensor.

- \*7: When the valve is kept open, please shape the oil layer by curving the nozzle down 100 mm and over.  
When the oil outflows from the pit before the detectable oil layer is shaped, it may cause an alarm failure or delay.  
In case of the pit without discharge nozzle, please create the condition which the oil layer is shaped using a divider which separates oil from water.
- \*8: If necessary, please set up a divider to prevent the extreme wave, crosscurrent and dropping of the liquid on the float.
- \*9: If a pit is too wide, oil layer may be too thin to detect.  
If the oil leak layer is not thick enough, the oil cannot be detected.
- \*10: Please mount the NAR 300, NRR 261 and I/F Ex box at least 50 cm away from each other.

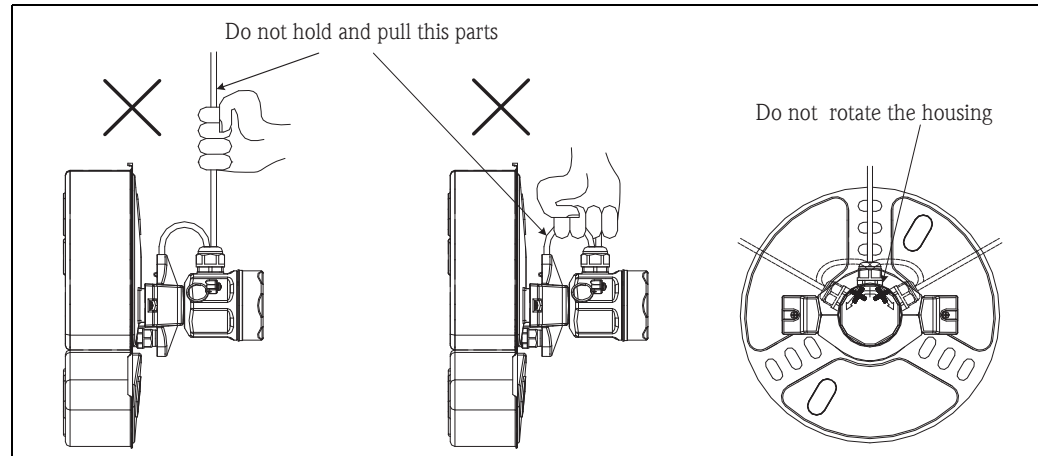
## 5.1 Float Sensor NAR 300

### 5.1.1 Handling Instructions

Do not carry the float sensor by holding the cable as below fig.

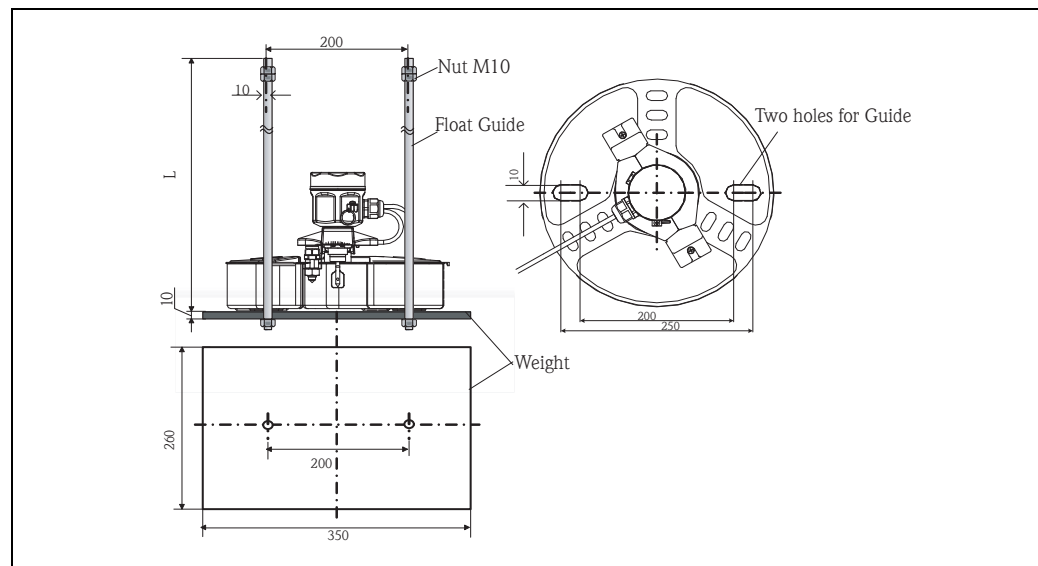
When carrying it, please make sure to hold it with both hands.

When lifting and holding the sensor, take care not to remove the top cover.



### 5.1.2 Float guide mounting

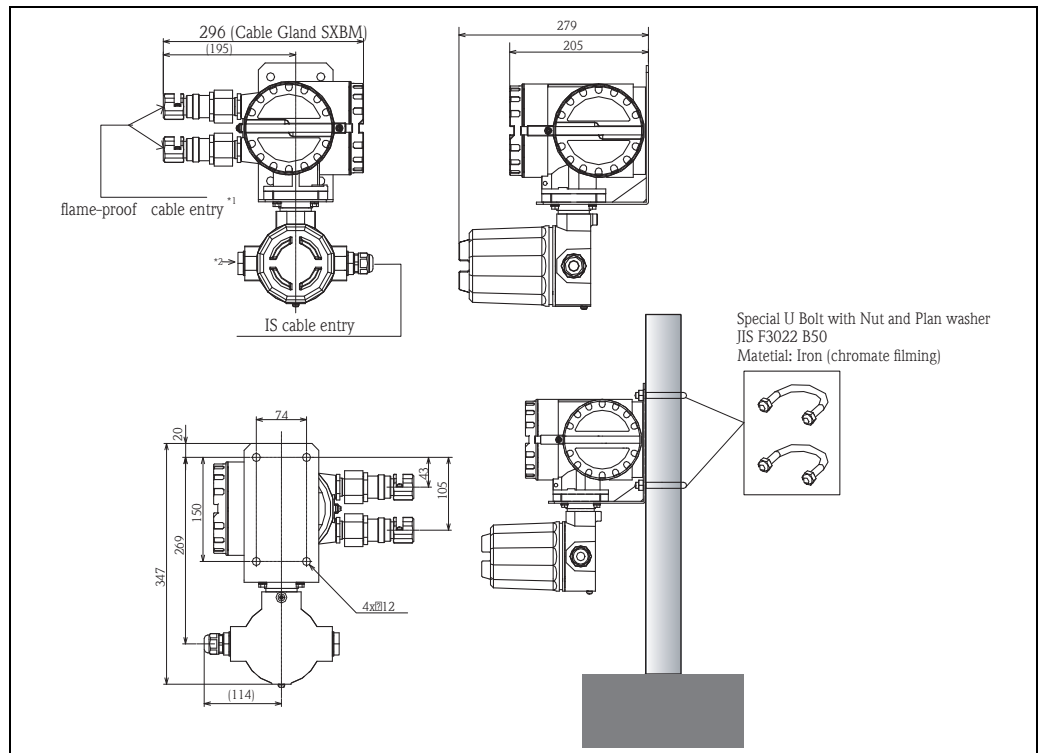
The Float Sensor NAR 300 can install in the float guide for our existing products (CFD10, CFD30, UFD10, NAR291, NAR292)



## 5.2 Transmitter NRR 261

Transmitter NRR 261 is usually fixed to a pipe in tank yard using a mounting U bolt (JIS F3022 B 50).

The NRR 261 is possible to mount directly on wall surface (4 x  $\Phi$  12 mm, fixing Bolts M10 and Nuts).

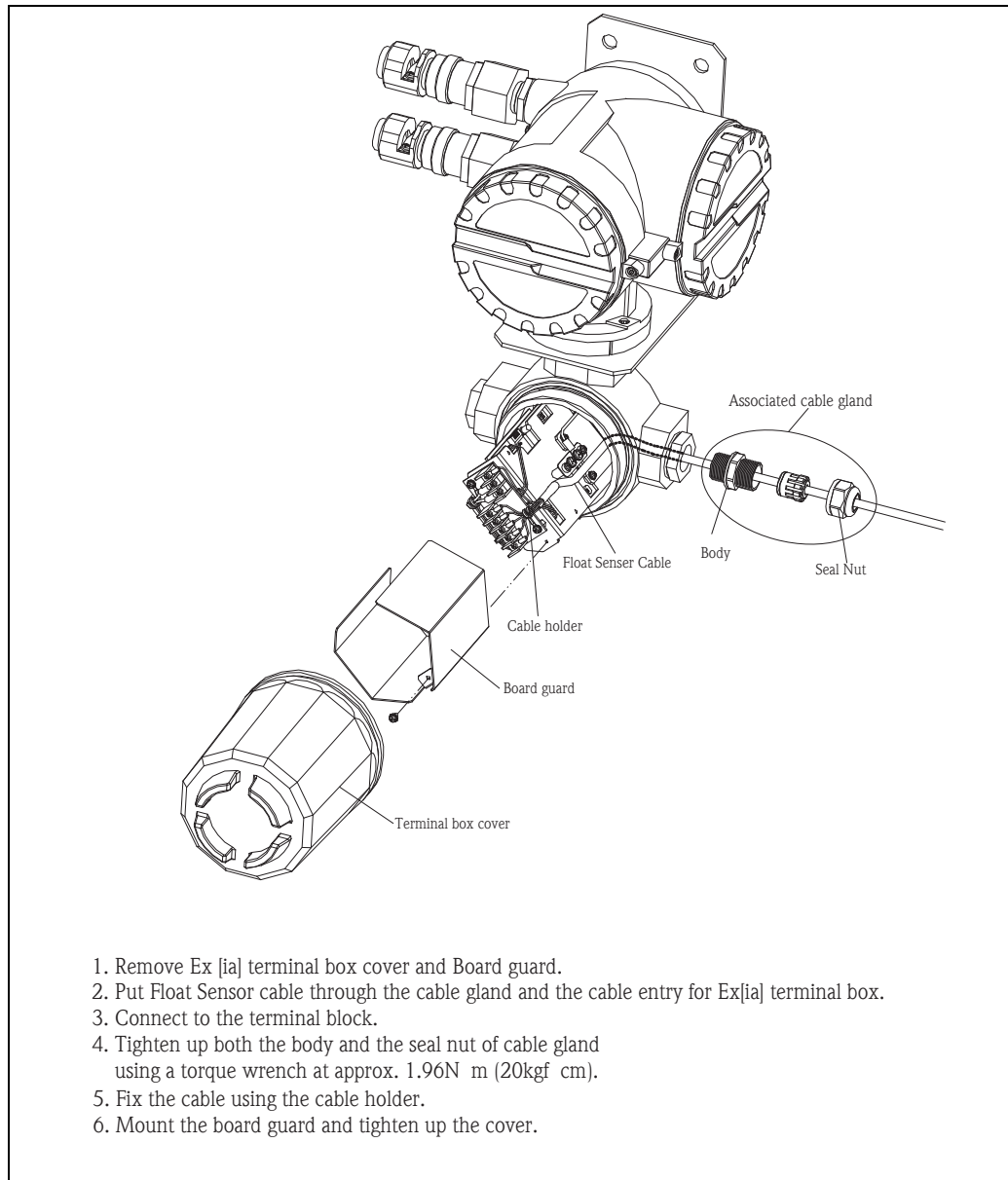


\*1: Only if the order is TIIS explosion-proof specification, it comes with the cable gland .  
Adjusted cable external diameter:  $\Phi$ 12 to 16 mm.

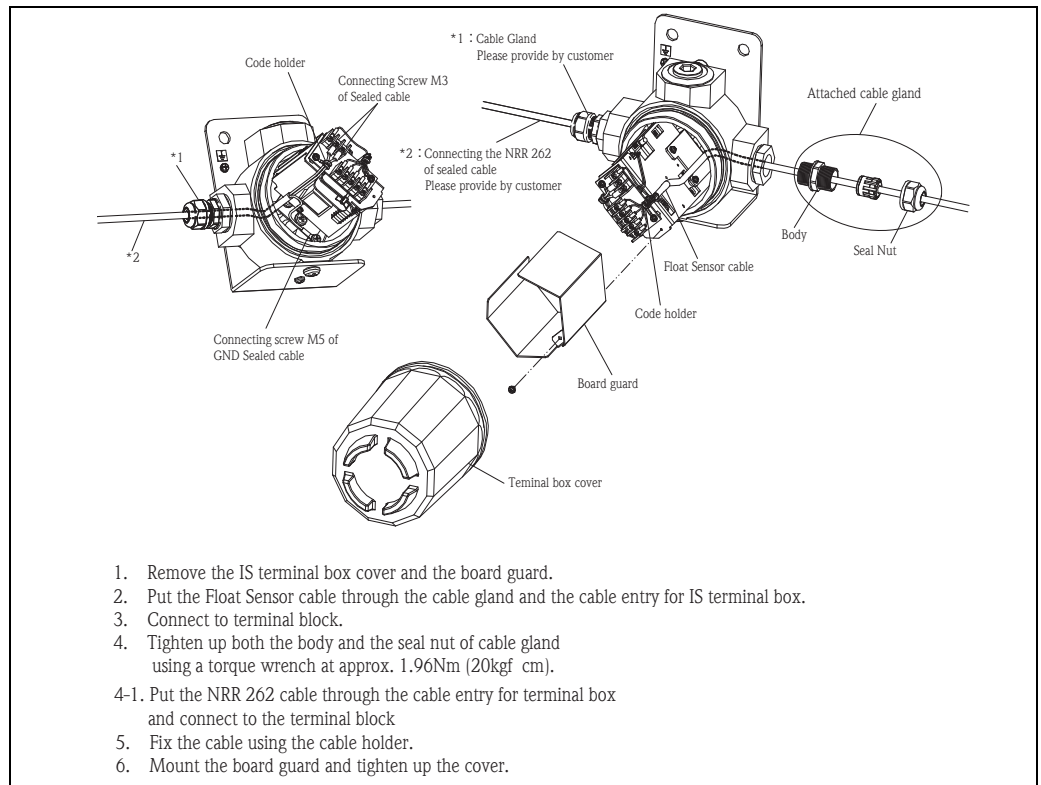
\*2: Please select the cable entry from Transmitter NRR261 order code (7 page).

## 5.2.1 Wiring

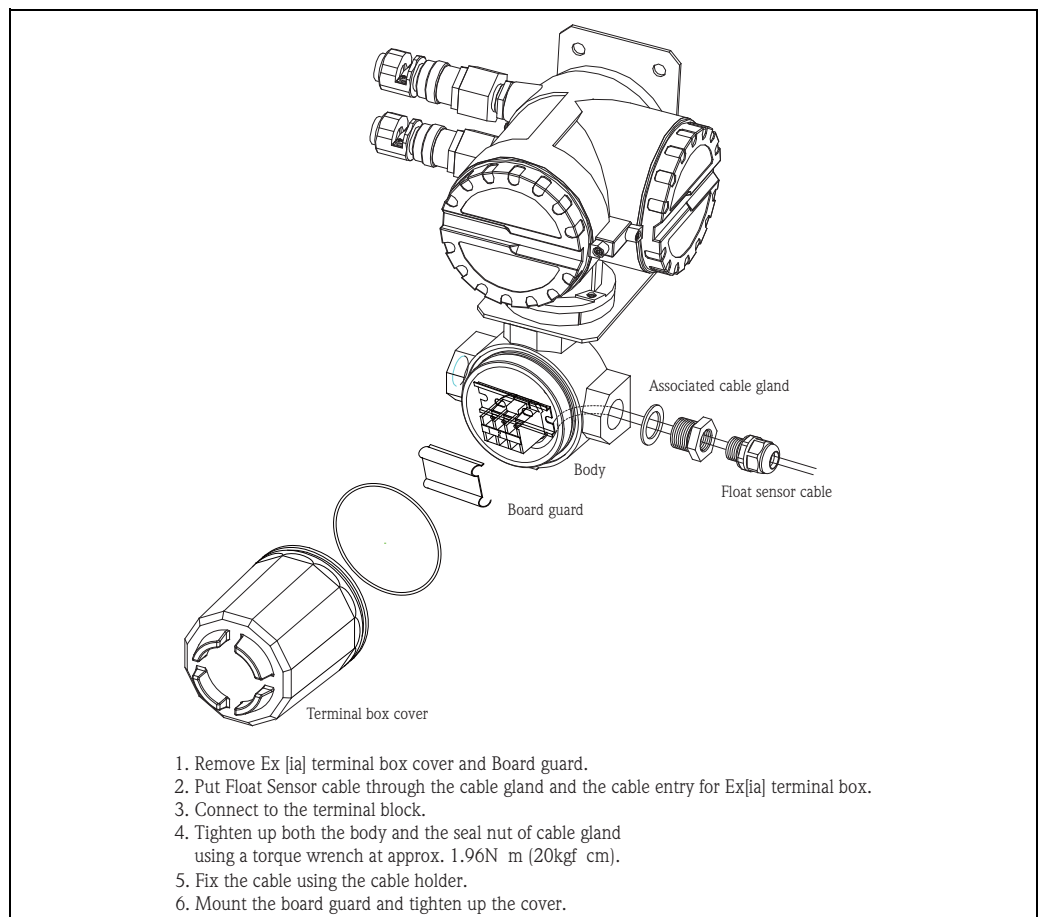
### NRR261-2xx



### NAR300-15xxxx wiring, Sensor I/F Ex box



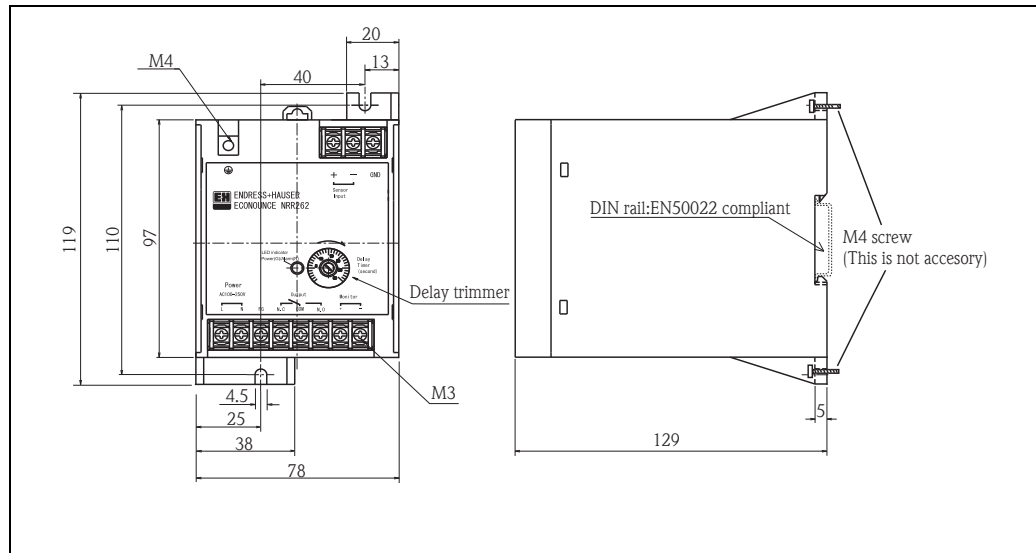
### NRR261-3xx, transmitter



### 5.3 Transmitter NRR 262

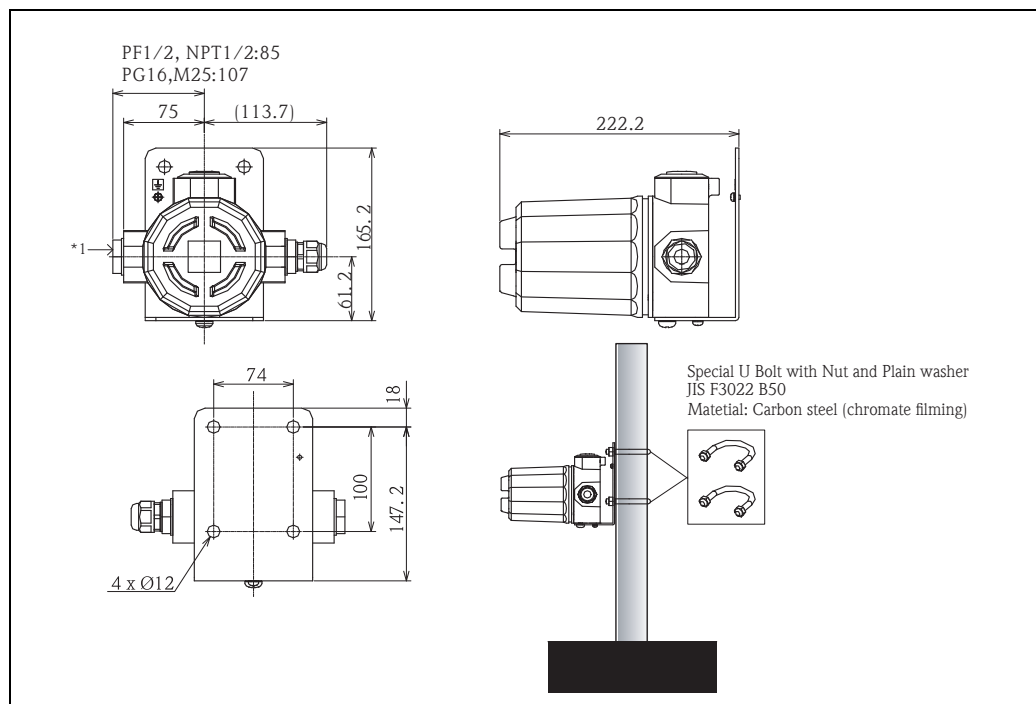
The NRR 262 sets up indoors such as in an instrument room and can install easily using two M4 screws.

It is possible to install with snap-in of simple one-touch function by using DIN rail EN50022. When installing multiple transmitters consecutively and having a plan to install more, this rail mounting is convenient.



### 5.4 Sensor I/F Ex box

The Sensor I/F Ex box uses in combination with Transmitter NRR 262 to translate the signals from Float Sensor. The Ex box usually mounts a pipe in tank yard and tighten up using U bolt ( JIS f 3022 B50). Also, it is possible to mount directly on wall surface (4 x  $\Phi$  12 mm, fixing Bolts M10 and Nuts).



\*1: Please select the cable entry from the Sensor I/F Ex box order code (6 page).



# 6 Electrical connection

## 6.1 Transmitter NRR 261

Float sensor NAR300-11xxxx

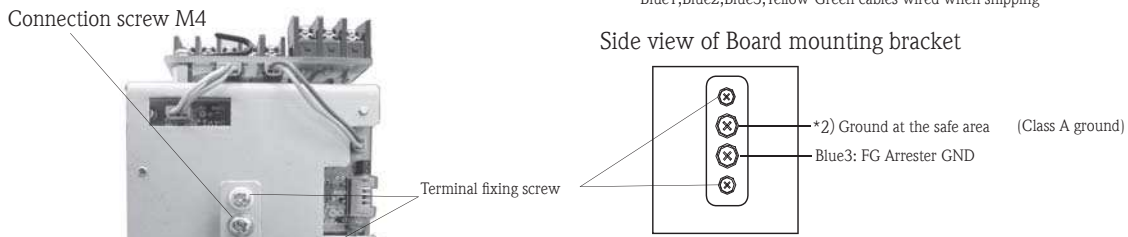
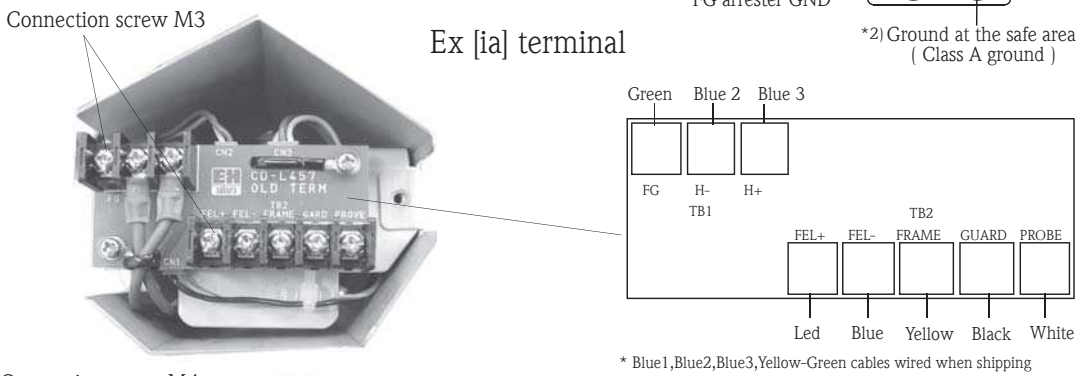
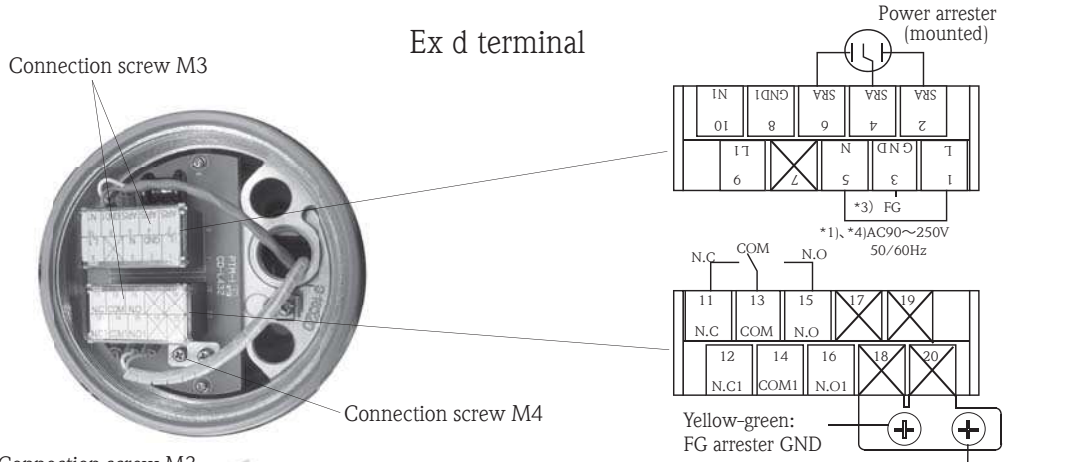
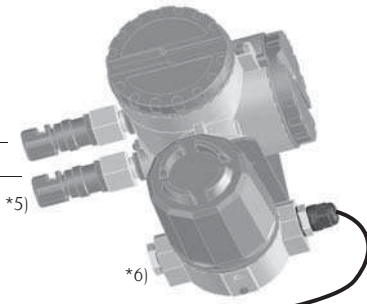


Alarm output :  
Junction box and level gauge  
of Flame-proof Specification

Power supply:  
AC or DC

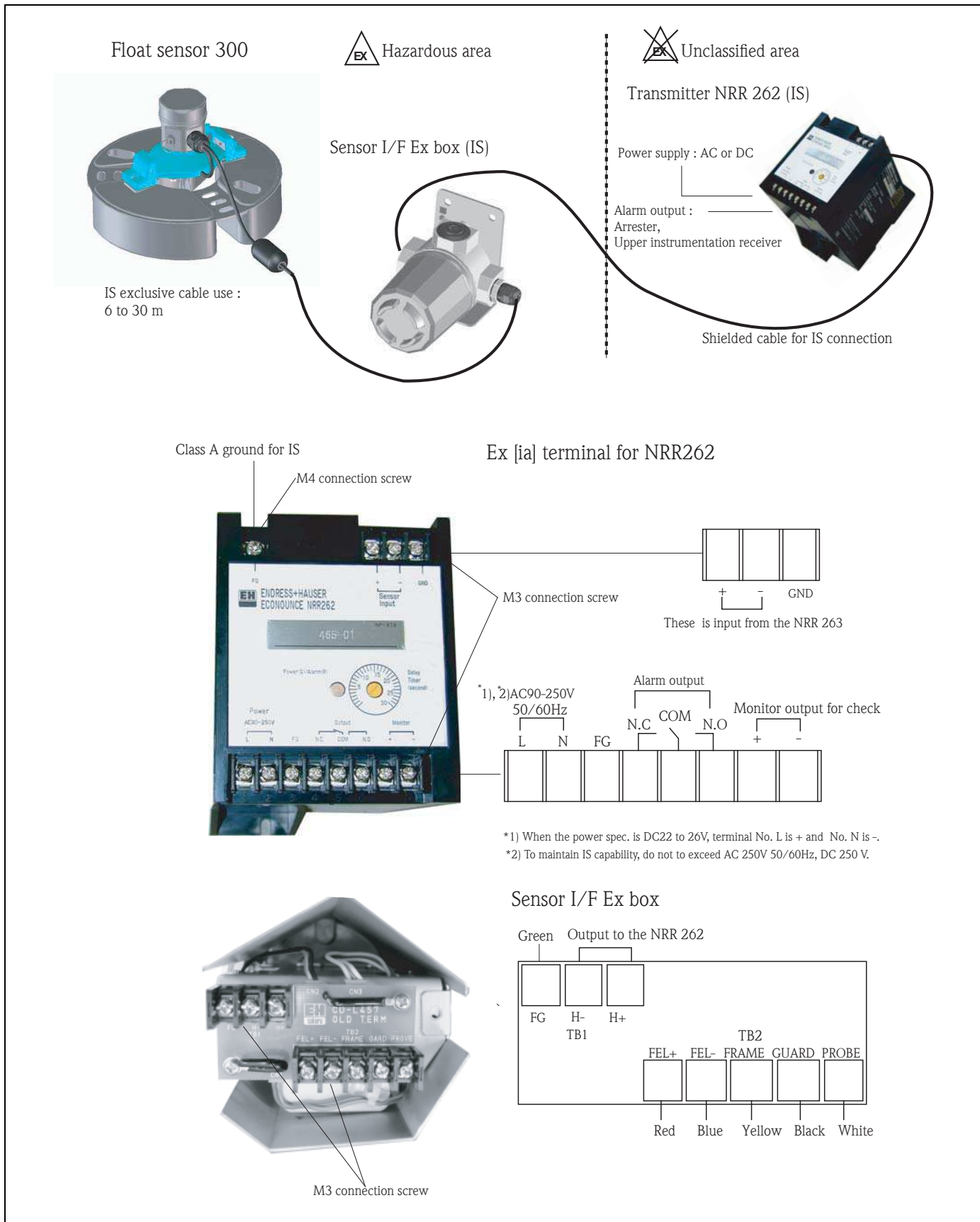
Special Cable for IS connection:  
6 to 30 m

Transmitter NRR261-2xx

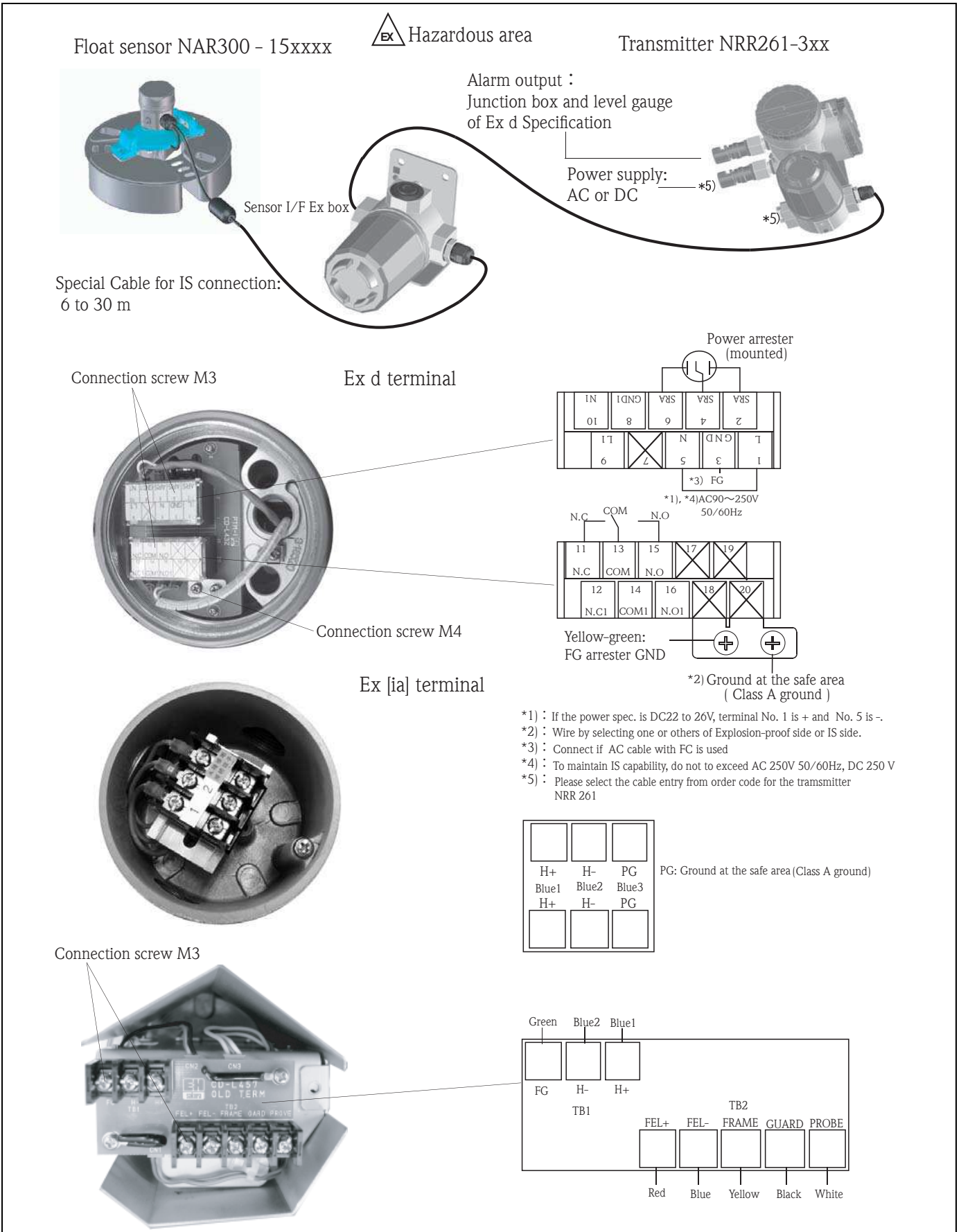


- \*1) : If the power spec. is DC22 to 26V, terminal No. 1 is + and No. 5 is -.
- \*2) : Wire by selecting one or others of Explosion-proof side or IS side.
- \*3) : Connect if AC cable with FG is used
- \*4) : To maintain IS capability, do not to exceed AC 250V 50/60Hz, DC 250 V
- \*5) : Please select the cable entry from order code for the transmitter NRR 261.

## 6.2 Transmitter NRR 262



### 6.3 Transmitter NRR 262



## 6.4 Principle of Alarm operation

The oil leak detection signal detected on the float sensor NAR 300 is converted into 8mA (alarm OFF), 16mA (alarm ON) at the current output circuit in the transmitter or the Sensor I/F Ex box and is connected to the current detection circuit through IS safety barrier.

In the current detection circuit, the presence or absence of the oil leak alarm signal is judged according to the current value size and turns the alarm output relay ON or OFF through the operation delayed circuit.

The operation delayed circuit has the delay time setting trimmer and possible to set the time of approx. 1 to 30 sec. (furthermore, 6 sec. delay time on detection circuit is added). In the relay contacts output, the fail-safe performance is available. Please refer to the below table.

Alarm output operating table

Condition	NRR 262 N.C to COM	NRR 262 N.O to COM
	NRR 261 <PP26,27> 11, 13	NRR 261 <26,27> 13, 15
Oil leak alarm	Contact Close	Contact Open
Power OFF	Contact Close	Contact Open
Breaking	Contact Close	Contact Open
Liquid freezing	Contact Close	Contact Open
Tuning-fork failure	Contact Close	Contact Open
Non-alarm	Contact Open	Contact Close

## 7 Adjustment

### 7.1 Transmitter adjustment

#### 7.1.1 Alarm output relay

The delay time (ON delay) is set by time setting trimmer. In the delay performance, when continuous alarm condition continues for a certain period of time, it is judged as the alarm output. When operating within the set time, it is not judged as the alarm output. This function is used to prevent the false alarm.

Note!

Response delay time of approx. 6 sec. is always added to the detection circuit except for delay time by the trimmer.

Caution!

In the NRR 261, please open the body cover only after power has been off for 10 minutes.

#### Transmitter NRR 261

The trimmer is visible by opening the body cover.

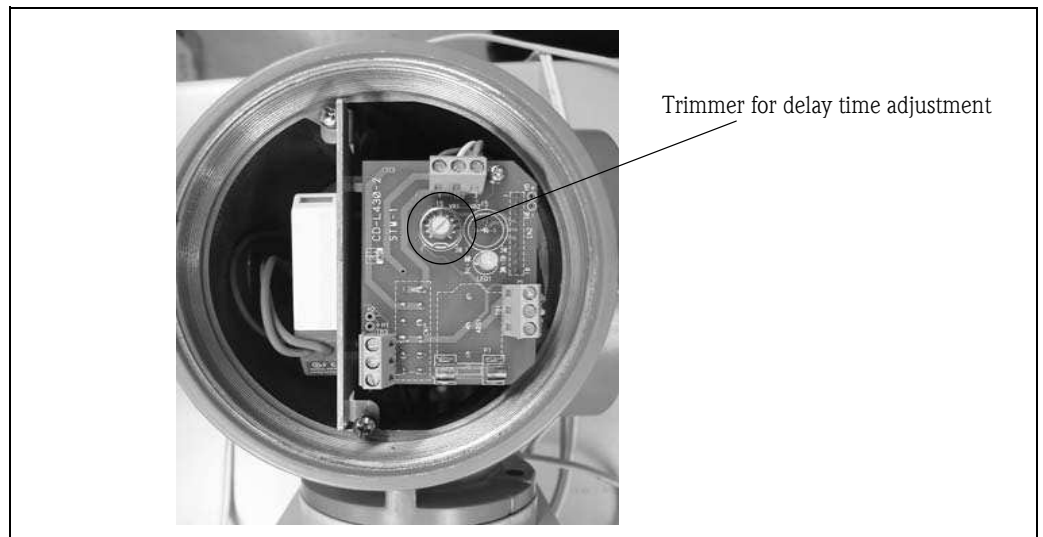


Fig. 13 Trimmer of Transmitter NRR 261

#### Transmitter NRR 262

There is a trimmer on the surface of case and it is available to set up necessary delay time. The settable delay time value is 1 to 30 sec. (internally approx. 6 sec. of the delay time are added to this time).

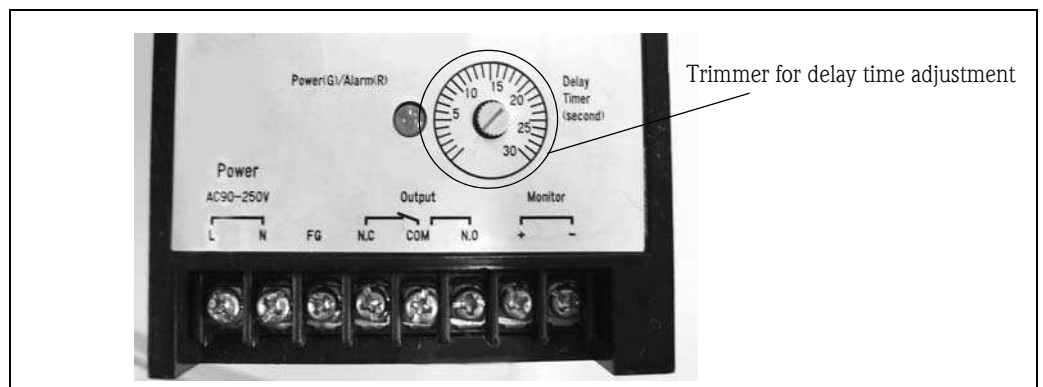


Fig. 14 Trimmer of Transmitter NRR 262

## 8 Troubleshooting

### Alarm output logic

Sensors \ Condition	Water	Air	Oil
	Conductivity	OFF	ON
Tuning-fork	ON	OFF	ON

→ Alarm output

### 8.1 Fail safe (alert when not oil leak)

The alarm may be output by the below reason, even if the oil leak does not occur.

Condition	Detail description
<b>The water freezing in a pit</b>	– When the water in pit freezes, the conductivity sensor judges it as an insulator
<b>Float sensor tilt</b>	– With the float sensor floating on the water in a pit, when the conductivity sensor tilts and rises out of the water, the sensor judges it as "an insulator (air)". – In case of the empty pit and the same condition (tilt) as the above, tuning-fork sensor detects a liquid first, and conductivity sensor detects insulator (air).
<b>Trash on the bottom of an empty pit</b>	– When the water level rises because of rain from empty pit and materials with a certain level of strength such as broken styrofoam are at the end of tuning-fork sensor, the sensor judges it as a liquid and the conductivity sensor detects an insulator (air). – When the conductivity sensor is covered with insulators such as a vinyl sheet or plastic bag, the conductivity sensor detects an insulator (air) and the tuning-fork sensor detects a liquid (water).
<b>The sensor buried in mud</b>	– When the float sensor is buried in mud, and it hardens and dries, the tuning-fork sensor judges it as a liquid and the conductivity sensor detects an insulator (air) by air space of field moisture loss.
<b>Snow covering the sensor</b>	– In the empty pit, when the sensor is covered with snow, the conductivity sensor detects an insulator and the tuning-fork sensor detects a liquid.
<b>The water in pit which close equivalent to pure</b>	– In case of the water in pit has high resistance such as drain water, the conductivity sensor detects an insulator.

## 8.2 Alarm delay (no alert when oil leak)

The alarm may be not output by the below reason, even if the oil leak occurs.

Condition	Detail description
<b>The wave and convection on liquid level</b>	– When the water and oil layer in pit is instability because of a deep-surge of strong wind, the conductivity sensor detects the water in pit.
<b>Float sensor tilt</b>	– When the float sensor is tilted heavily to one side by snow, trash or animal on the float sensor or tangles of cable or chain, the conductivity sensor detects the water under oil layer and the tuning-folk sensor dose not alert because it is out of the oil layer.
<b>Sinking of the float sensor</b>	– When the float sensor sinks by weight of snow, trash or animal on the float, the conductivity sensor detects the water under oil layer and does not alert.
<b>Trash containing water</b>	– When trash or algae containing water contact between the conductivity sensor and earth, the conductivity sensor detects the water and does not alert.
<b>Oil leak when it is snowing</b>	– When snow is floating on oil layer surface, the conductivity sensor detects the water by snowmelt.
<b>Gravity change of the water in pit</b>	– When using an antifreeze fluid to prevent freeze, detection sensitivity is lower than usual and causes the alarm delay because the density of the water in a pit increases and the sensor float comes up.

### 8.3 Alarm other than Oil leak detection or Fail safe (breaking, freezing)

Note!

When performing the following work, please be sure to consult a service person from Endress+Hauser.

#### 8.3.1 Segmentation of trouble spot

##### In case of the IS construction system:

Please measure the voltage between "Sensor Input" + and - terminal in the Transmitter NRR 262 using Tester.

##### In case of the Explosion-proof construction system:

Please measure the voltage between " TB-1" H+ and H- terminal in the Sensor I/F Ex box using Tester.

Condition	Countermeasure
0±0.5 V : without system power	<ul style="list-style-type: none"> <li>■ There is not the power supply for the sensor.</li> <li>■ There is the cause of false alarm in the transmitter or upper alarm system side. *In case of IS construction, it is the same problem if the wiring between a transmitter NRR 262 and a Sensor I/F Ex box shorts out.</li> <li>■ Please check the LED luminescent color on the transmitter.</li> <li>■ Please proceed to the next section "8.3.2 Problem between Transmitter and Alarm system"</li> </ul>
17.5±0.5 V: normal alarm condition	<ul style="list-style-type: none"> <li>■ Alarm signal is input on the transmitter.</li> <li>■ There is the cause for false alarm in a lower detection system from the board of the Sensor I/F Ex box to the float sensor.</li> <li>■ Please proceed to the next section "8.3.3 Problem between Sensor I/F Ex box board and Sensor problem"</li> </ul>
20.7±0.5 V: Voltage when the empty pit	<ul style="list-style-type: none"> <li>■ The detection signal for empty pit is input on the transmitter.</li> <li>■ The false alarm is generated by the transmitter.</li> <li>■ Please replace the transmitter.</li> </ul>
23.2±0.5 V: the breaking between Transmitter NRR 262 and Sensor I/F Ex box	<ul style="list-style-type: none"> <li>■ The voltage of condition which there is no electrical load on system is detected.</li> <li>■ Please check a electrical continuity of the transmitter NRR 262 and a Sensor I/F Ex box.</li> </ul>



### 8.3.2 Problem between Transmitter and Alarm system

Please check the status lamp (LED).

Condition	Countermeasure
LED red luminescent : normal alarm	<ul style="list-style-type: none"> <li>■ Even though the voltage for sensor is not detected, the alarm is output. If there is not any wiring problem between a transmitter and a Sensor I/FEx box, please replace a transmitter.</li> </ul>
LED green luminescent : alarm signal from sensor is not output	<ul style="list-style-type: none"> <li>■ When the alarm is output in condition of the left column, please check the resistance value on the alarm output terminal in the transmitter in the following order.               <ol style="list-style-type: none"> <li>1: Power off in the alarm system</li> <li>2: Remove the wire for alarm output from transmitter.</li> <li>3: Check that LED is emitting light (green) continuously</li> <li>4: Measure the resistance value between NO (or NC) and COM</li> </ol>               NO connection:                If the resistance value is <math>0\Omega</math>, it is OK, but other than <math>0\Omega</math>, change the transmitter.                NO connection:                If the resistance value is <math>20\Omega</math> and more, replace the transmitter.             </li> </ul>
LED non-luminescent : transmitter is power-off	<ul style="list-style-type: none"> <li>■ If the regular voltage is measured between terminal L and N on the transmitter, replace the transmitter.</li> <li>■ If the regular voltage is not measured between terminal L and N on the transmitter, check the power supply and power cable in the transmitter.</li> </ul>

### 8.3.3 Problem between Sensor I/F Ex box and Sensor

Each independent signal sent from sensors of conductivity and tuning-fork is combined in Sensor I/F Ex box board and are recognized as a oil leak alarm for the first time.

In consequence, when the setting condition and detection output logic for each sensors are not consistent with each other, it is the failure of complete sensor unit.

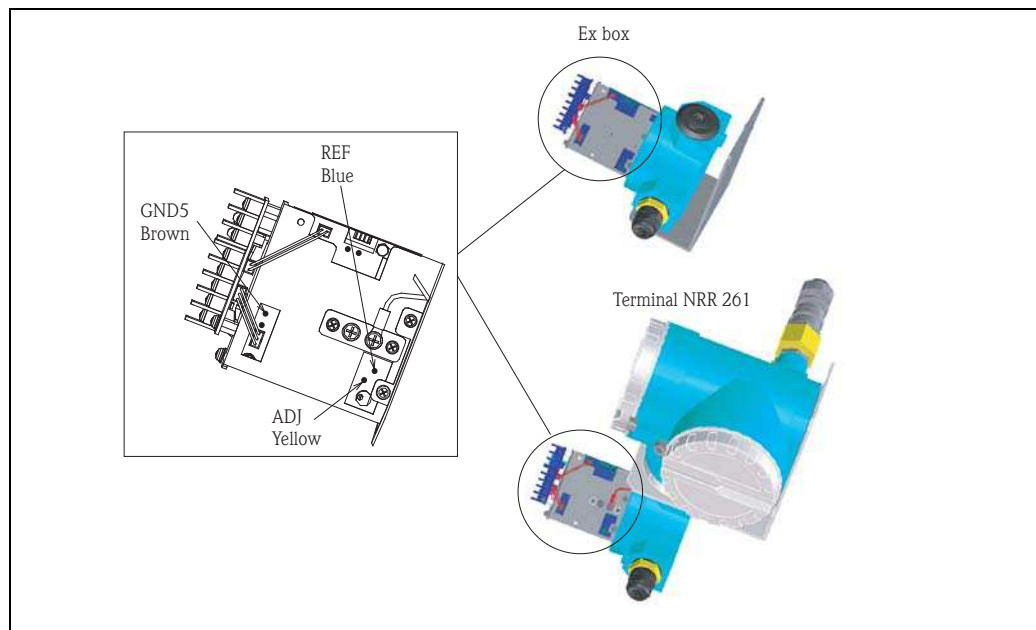
Note!

Before checking the false alarm of the Float Sensor NAR 300, please make sure the condition is not in oil leak detection or fail safe.

Please make sure to remove the oil film on electrode of conductivity sensor and the trash in tuning-fork sensor.

1. Remove the board guard after removing the cover of transmitter NRR 261 (IS terminal box) or Sensor I/F Ex box.
2. When the conductivity and tuning-fork sensors are movable, measure the direct voltage.

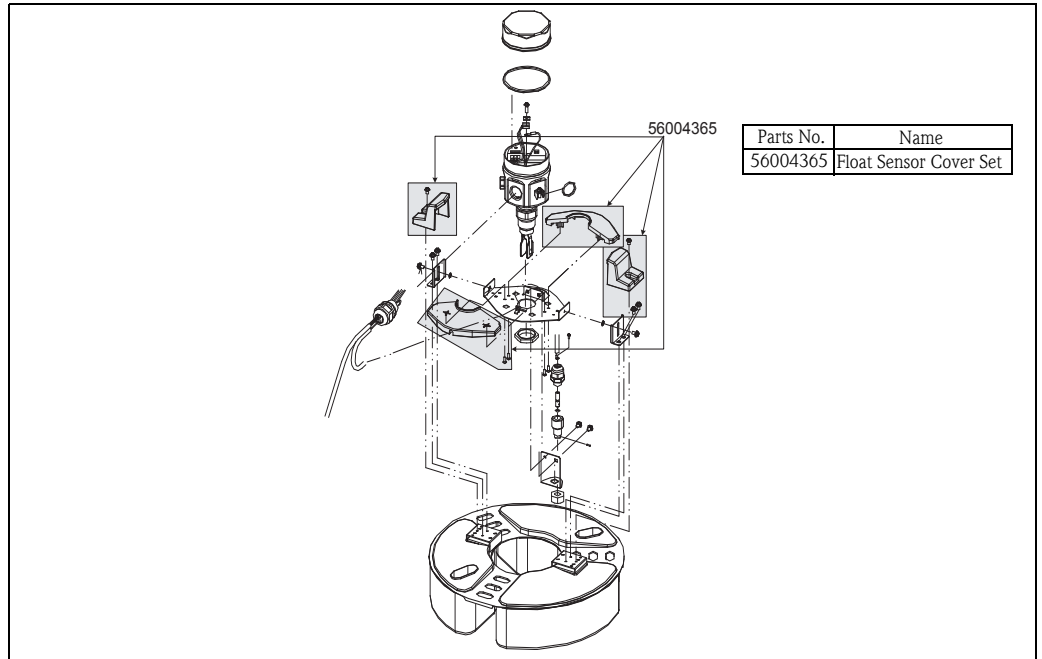
<p>Conductivity sensor</p>	<p>Two terminals on backside of board: GND5 brown, ADJ yellow For example: When detecting oil or air : <math>1.0 \pm 0.3V</math> When detecting water: <math>5.0 \pm 0.3V</math> Two terminals on backside of board: GND5 brown, REF blue Conductive threshold: <math>1.5 \pm 0.3V</math> *Refer to the below fig.15 "IS terminal box "</p> <p>Note! When bordering on the conductive threshold, when it is lower, oil or air are detected. When it is upper, water is detected.</p>
<p>Tuning-fork sensor</p>	<p>Between board terminal FEL+ and FEL- When detecting the liquid: <math>6.3 \pm 0.5V</math> When detecting the empty pit: <math>8.3 \pm 0.5V</math> When breaking of cable: <math>9.4 \pm 0.5V</math> *Refer to "6. Electrical connection, IS terminal diagram"</p>



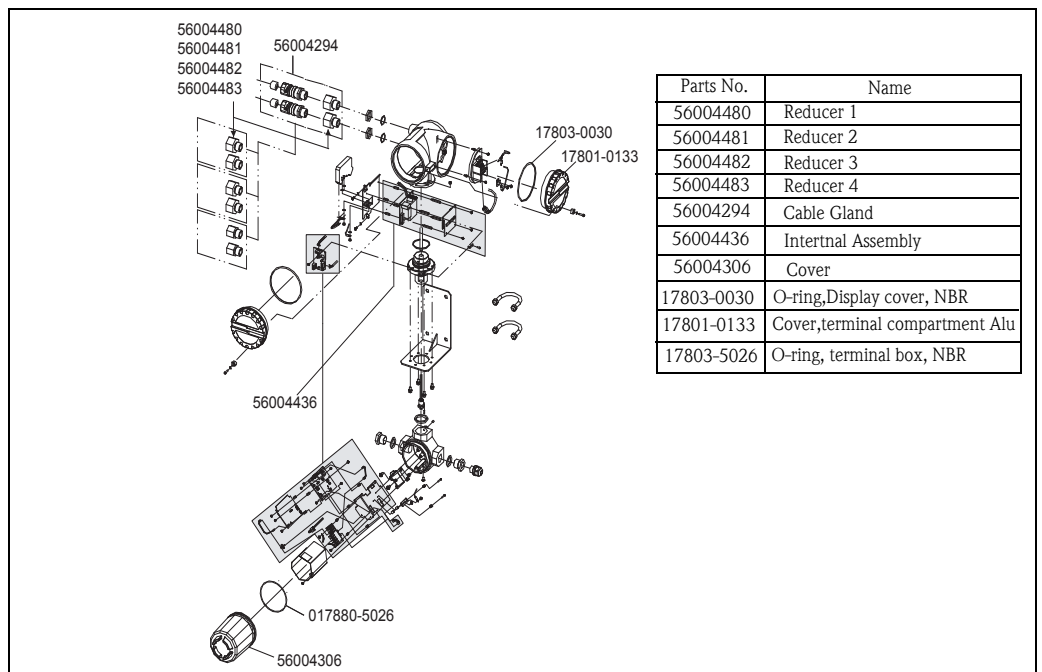
## 8.4 Spare Parts

The Endress + Hauser repair concept assumes that the measuring device has a modular design and that customers are able to undertake repairs themselves. Spare parts are contained in suitable kits. They contain the related replacement instructions. Spare parts that you can order from Endress+Hauser Japan for the Oil Leak detector NAR 300 System are shown with their order number in the diagram below. For more information on service and spare parts, contact the Service Department at Endress+Hauser Yamanashi.

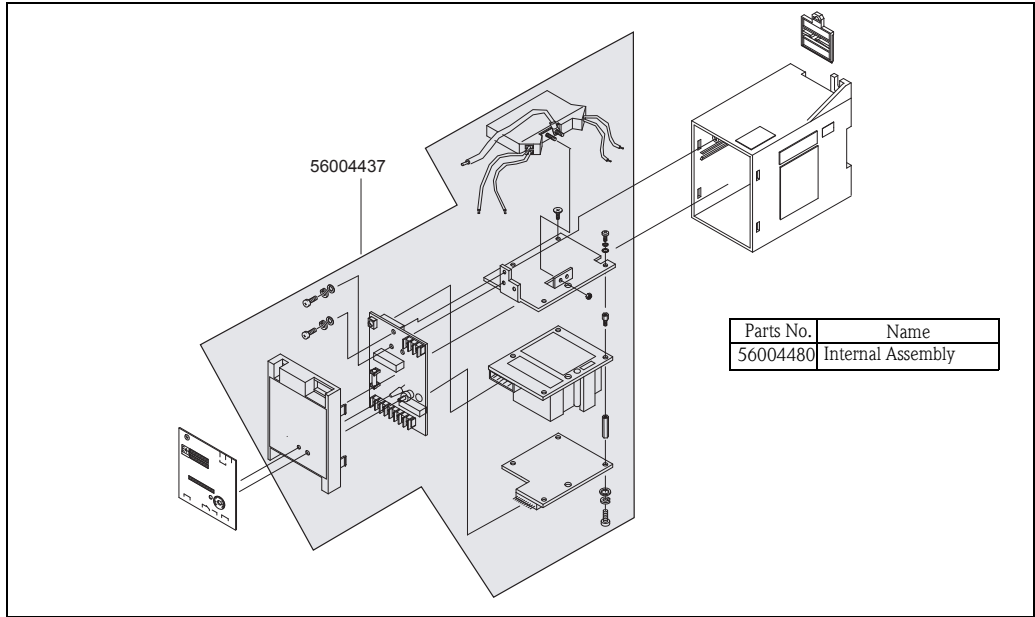
### 8.4.1 The float sensor NAR 300



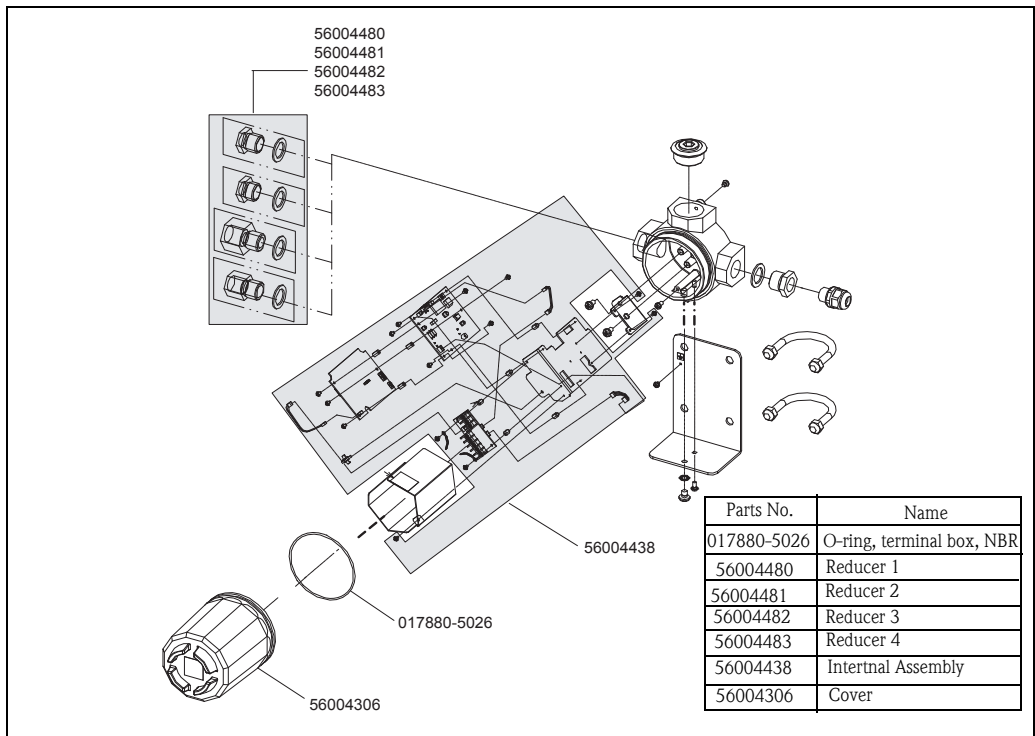
### 8.4.2 The transmitter NRR 261



### 8.4.3 Transmitter NRR 262



### 8.4.4 Sensor I/F Ex box



## 9 Operation check

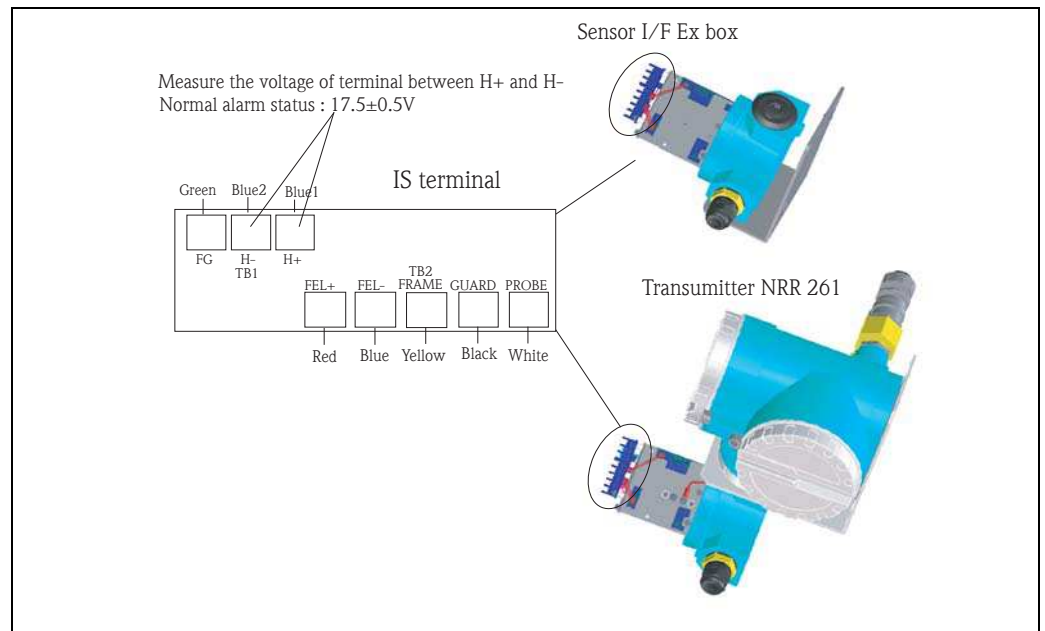


Warning!

Avoid electrostatic charge when handling sensor.

1. Preliminarily, even if the oil leak alarm is output, please take precaution not to affect the alarm system.
2. Lift float sensor and bring out in the air. The conductivity sensor gets into **the non-conducting (Oil or Air)** recognition condition by bringing out in the air.
3. Please put the check tool attached onto the one side of tuning-fork. The tuning-fork sensor gets into **the liquid** recognition condition by putting the check tool on. It gets into same conditions as the oil leak detection by **the non-conducting and the liquid**. If it is normal, the voltage of terminal between H+ and H- are  $17.5 \pm 0.5V$ .

Please refer to the below fig.



## 10 Maintenance

Please conduct the overall periodic inspections preferably semiannually or at least annually in conjunction with the below operation check.

### **Periodic inspections item**

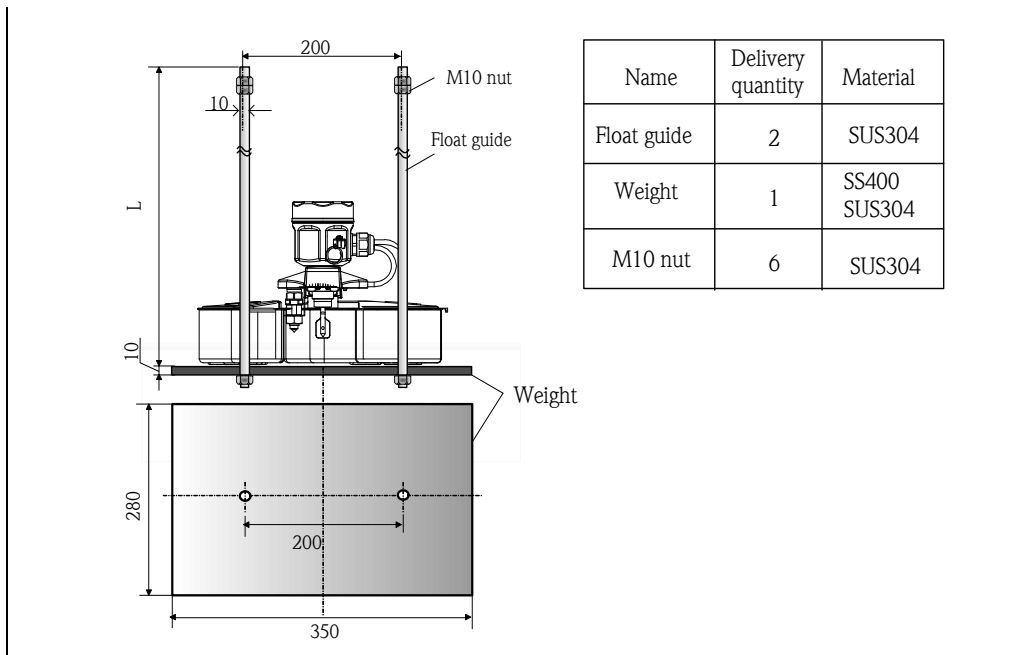
- Please carry out the periodic inspections and cleaning because mechanical error can occur when the sensors or pit are clogged up by trash, foreign materials and mosses. Also, when cleaning the sensor, wipe out using a soft cloth dipped in water.
- When trash, sand and snow are accumulated on the float sensor, please remove them at times because the water line comes down and the sensitivity changes.
- Please check that there is no cable breakage or wiring trouble (loosening of the screw), then carry out the operation check.

# 11 Accessory

## 11.1 Float guide

Note!

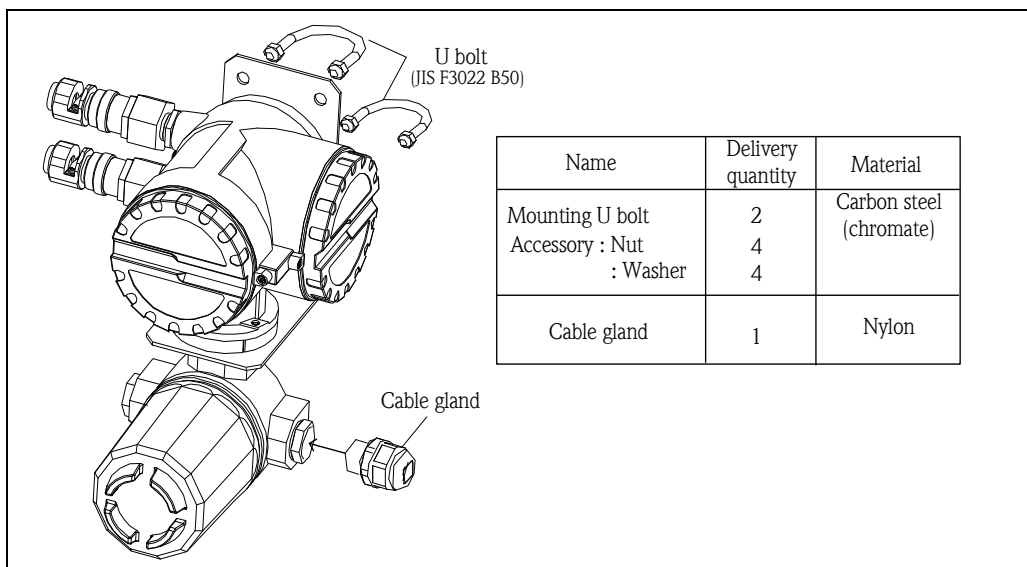
When mounting the float guide weight, set it up horizontally. Remove trash and stones on the pit bottom before mounting the Float Sensor. The length of float guide is 2m (standard), but if you need anything else, please order as special version.



## 11.2 U bolt and Cable gland

U bolt (JIS F3022 B50) is used for mounting the transmitter. Please prepare a pipe of nominal 50A (2B Φ60.5 mm).

Tighten and fix the cable gland after insert a cable from the float sensor NAR 300.











# Declaration of contamination

Dear customer,

Because of legal determinations and for the safety of our employees and operating equipment, we need this "Declaration of contamination" with your signature before your order can be handled. Please, include the completely filled in declaration with the device and the shipping documents in any case. Add also safety sheets and / or specific handling instructions if necessary.

Type of device / sensor:	_____	Serial no.:	_____
Medium / concentration:	_____	Temperature:	_____ Pressure: _____
Cleaned with:	_____	Conductivity:	_____ Viscosity: _____

## Warning hints for medium used (mark the appropriate hints)

							
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
radioactive	explosive	caustic	poisonous	harmful to health	biologically hazardous	inflammable	safe

## Reason for return

\_\_\_\_\_

\_\_\_\_\_

## Company data

Company:	_____	Contact person:	_____
	_____		_____
Address:	_____	Department:	_____
	_____	Phone:	_____
	_____	Fax / e-mail:	_____
		Your order no.:	_____

I hereby certify that the returned equipment has been cleaned and decontaminated acc. to good industrial practices and is in compliance with all regulations. This equipment poses no health or safety risks due to contamination.

\_\_\_\_\_  
(Place, date)

\_\_\_\_\_  
(Company stamp and legally binding signature)



[WWW.endress.com/worldwide](http://WWW.endress.com/worldwide)

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