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71666998
2024-06-29

Operating Instructions
Analog transmitter AT1000 AT1

Potentiometer type

Endress+Hauser
People for Process Automation

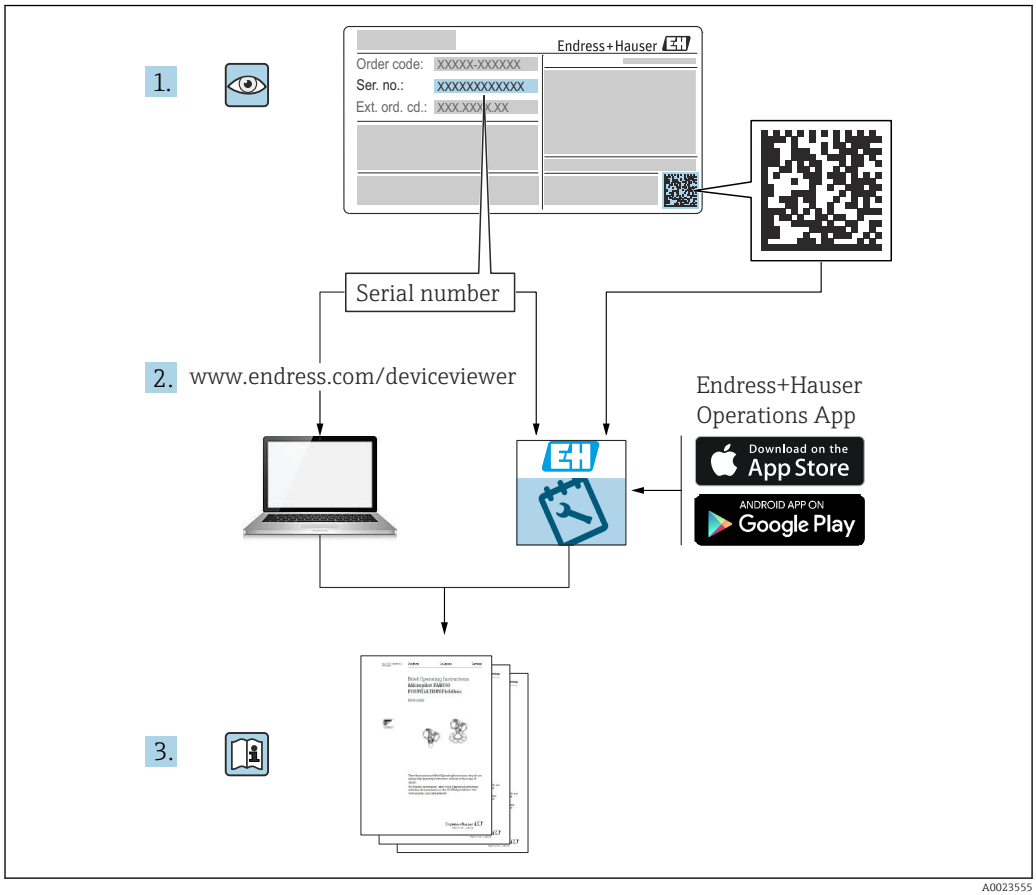

1.
Endress+Hauser
Order code: XXXXX-XXXXXX
Ser. no.: XXXXXXXXXXX
Ext. ord. cd.: XXX XXX XX XX
Serial number
2. www.endress.com/deviceviewer
Endress+Hauser
Operations App
Download on the App Store
ANDROID APP ON Google Play
3.
A0023555

Table of contents

1 Document information

1.1 Document function

These 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 Symbols used

1.2.1 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.

1.2.2 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.

1.2.3 Tool symbols

Phillips head screwdriver

Flat blade screwdriver

Torx screwdriver

Allen key

Open-ended wrench

1.2.4 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

1.3 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.

1.3.1 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.

1.3.2 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.

1.3.3 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.

2 Safety-related basic instructions

2.1 Basic safety instructions

2.1.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:
- 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.

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

2.2 Intended use

Applications and measured materials
Equipment intended for use in hazardous locations, sanitary applications, or high-risk applications due to process pressure have the corresponding label attached to 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 ensure that the ordered equipment has the correct specifications for the certification-related area (example: explosion proof, safety of pressure vessels).
- 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.
- Provide permanent protection for the equipment against corrosion caused by environmental effects.
- Do not exceed the limit values in "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 only if it is in proper technical condition, free from errors and faults.
- The 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, consult with the manufacturer.

Repair

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

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

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.

2.5.1 CE mark

This measuring 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.

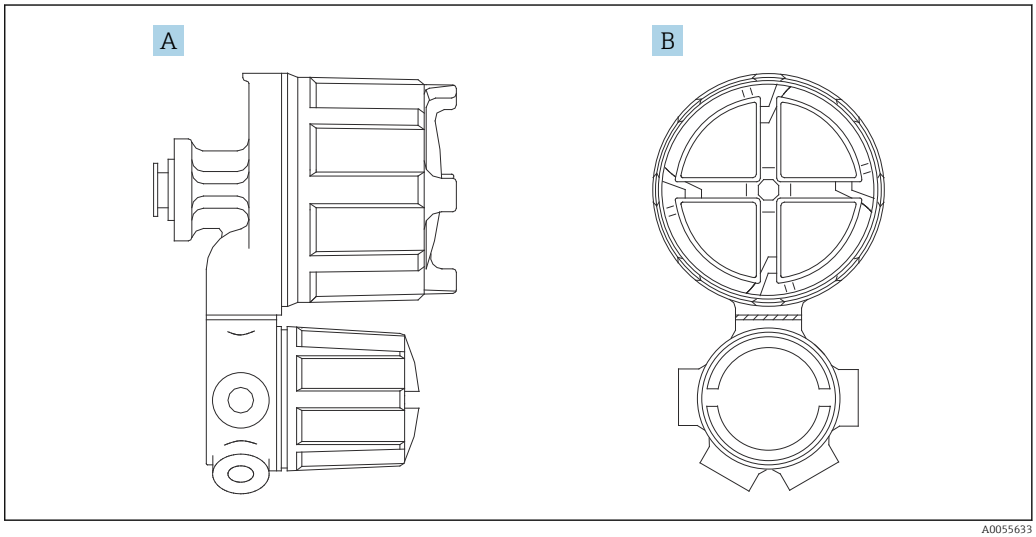
Endress+Hauser affixes the CE mark to this equipment as a sign of guarantee that this equipment has successfully passed testing.

3 Product description

AT1 analog transmitter is designed to be installed onto LT or LTC series level gauging systems and converts level information into an electric current signal for output. It can also be equipped with a maximum of six alarm contact signals. In addition to transmitting the level, contact signals can be received by this transmitter alone, enabling easy control of the valve and pump.

3.1 Product design

The side view and front view of AT1 analog transmitter are shown below. For more details, such as dimensions, → 14



1 AT1 analog transmitter

A Side view of AT1
B Front view of AT1

3.2 Technical data

Output		4 to 20 mA
Accuracy	Analog output	4 to 20 mA: ± 0.5 %
	Alarm contact output	± 0.5 % (for full span)
Power supply		24 V_{DC} (valid for 20 to 40 V_{DC}) 100 V_{AC} / 110 V_{AC} / 200 V_{AC} / 220 V_{AC} ± 10 %, 50 Hz / 60 Hz
Power consumption		Approx. 5 VA
Permissible temperature		Weather-proof type: −20 to 60 °C (4 to 140 °F) (accuracy coverage: 0 to 40 °C (32 to 104 °F))
		Ex d type: −10 to 40 °C (14 to 104 °F) (accuracy coverage: 0 to 40 °C (32 to 104 °F))
Storage temperature		−20 to 60 °C (4 to 140 °F)
Measuring range		0 to 1.5 m (0 to 4.92 ft), 2.5 m (8.2 ft), 3 m (9.84 ft), 3.5 m (11.48 ft), 4 m (13.12 ft), 5 m (16.4 ft), 6 m (19.68 ft), 8 m (26.25 ft), 10 m (32.8 ft), 12 m (39.37 ft), 14 m (45.93 ft), 16 m (52.49 ft), 20 m (65.62 ft), 25 m (82.02 ft), 30 m (98.43 ft)
Hysteresis		Within 2 % of measuring range

Cable entry (hub diameter)	Ex d type (B): With cable gland: G 1 TF22-15, G 3/4 TF16-11,G 1-1/4 TF28-20	
	Ex d type (E): G 3/4, G 1-1/2	
	Weather-proof type (W): G 3/4, G 1-1/2, NPT 3/4, NPT1, M25	
Transmission line	For DC power supply: 2 lines	
	For AC power supply: 4 lines	
Alarm contacts	2, 4, 6 points using micro-switch (SPDT) Select any of the following contacts (only the selected contact may be used) Contact A (normally open) Contact B (normally closed) Contact C (transfer contact)	
Contact rating	TIIS Ex d rating: 250 V, 4.2 A, 1050 V_{AC}, DC 180W	
Allowable contact capacity	Alarm 2 points (Contact A, B, C)	220 V_{AC} 2.8 A, 125 V_{DC} 0.5 A
	Alarm 4 points (Contact A, B)	220 V_{AC} 2.8 A, 125 V_{DC} 0.5 A
	Alarm 4 points (Contact C)	220 V_{AC} 2.2 A, 125 V_{DC} 0.5 A
	Alarm 6 points (Contact A, B, C)	220 V_{AC} 2.2 A, 125 V_{DC} 0.5 A
Protection class	Weather-proofed: IP65 Ex d: d2G4	
Color	Silver	
Weight	Weather-proofed: Approx. 7 kg (15.43 lb) Ex d: Approx. 13 kg (28.66 lb)	

	Voltage	**20 V_{DC}**	**24 V_{DC}**	**40 V_{DC}**	**100 V_{AC} 110 V_{AC} 200 V_{AC} 220 V_{AC}**
Current output (max. impedance)	4 to 20 mA	200 Ω	400 Ω	1100 Ω	630 Ω

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?

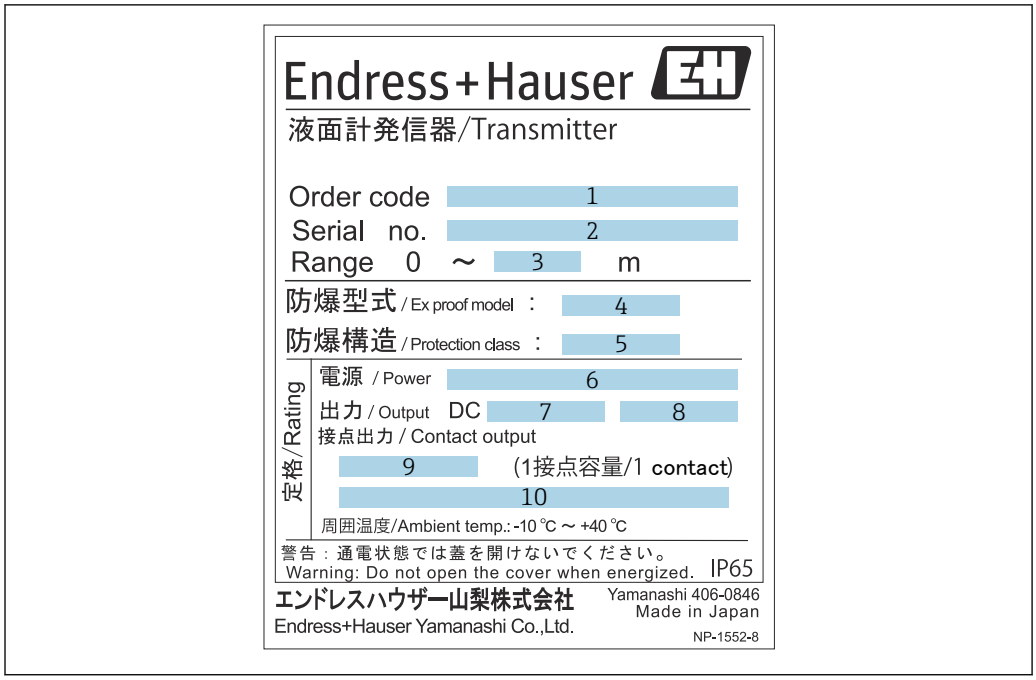
If one or more of these conditions are not satisfied, contact your Endress+Hauser Sales Center or distributor.

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 notice when credentials and certificates are updated.

4.2.1 Nameplate



2 *AT1 nameplate (TIIS approval)*

1 *Order code*
2 *Serial number*
3 *Measuring range*
4 *Explosion proof model*
5 *Anti-explosion structure*
6 *Power supply voltage*
7 *Output*
8 *Analog output*
9 *Contact output*
10 *Contact output*

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

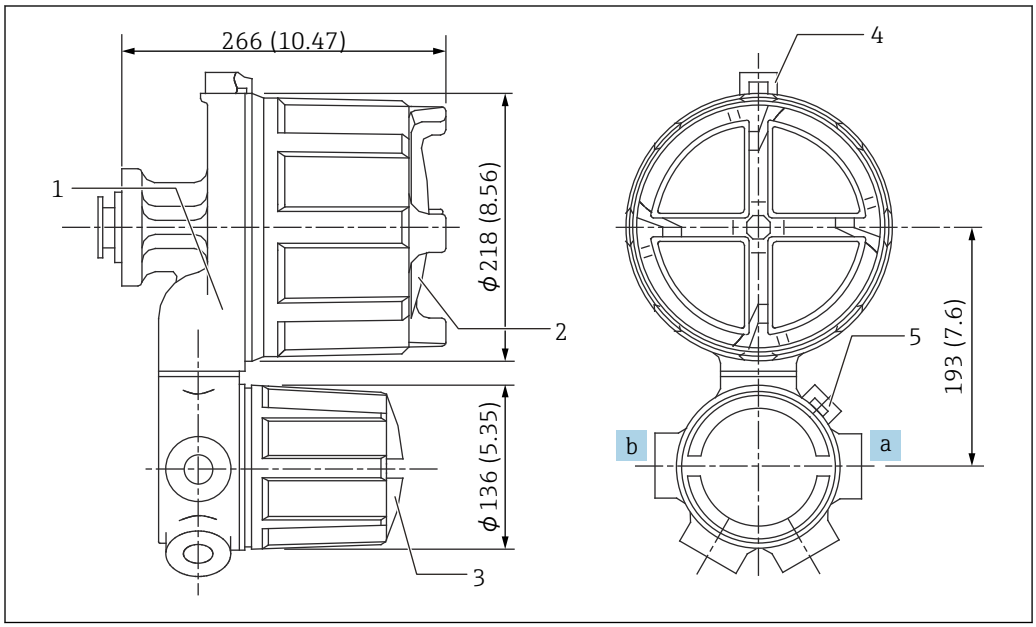
- When transporting the device to the measuring point, either use the device's original packaging or hold by the process connector.
- Secure a hoisting device (such as a hoisting ring or a lifting eye bolt) to the process connector, not to the housing. Pay attention to the device's center of gravity 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 External dimensions

5.1.1 Ex d type AT1

Alarm points: For 0, 2, 4. 6 points

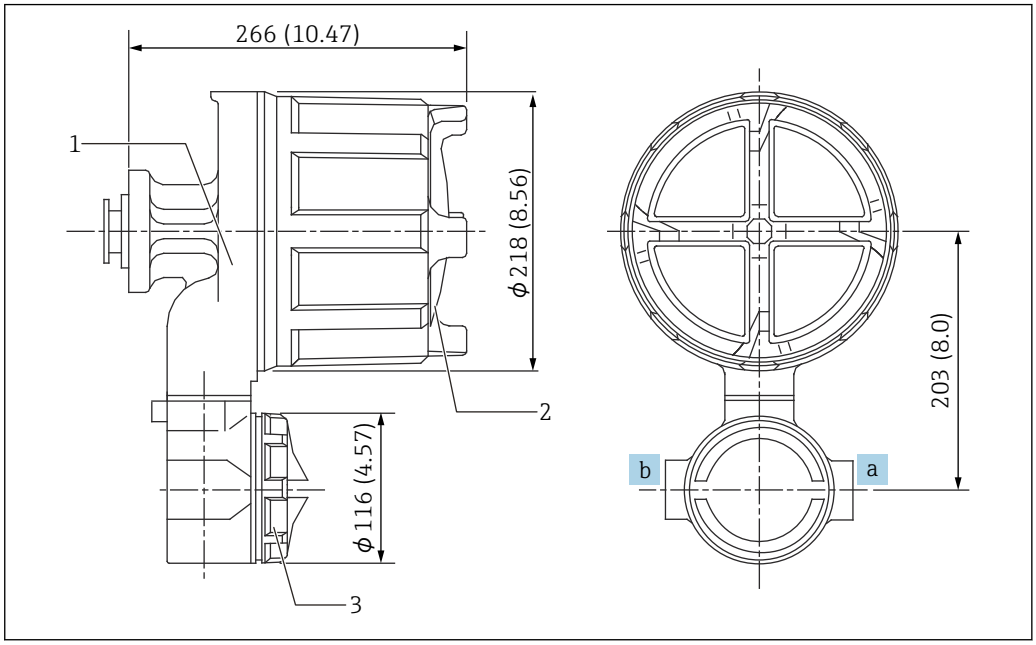


3 External dimensions of AT1: Ex d type

1 AT1 main unit
2 Main unit cover
3 Terminal box cover (large)
4 Locking fitting 1
5 Locking fitting 2
a Cable entry (refer to the table below for more details)
b Cable entry (refer to the table below for more details)

5.1.2 Weather-proof type AT1

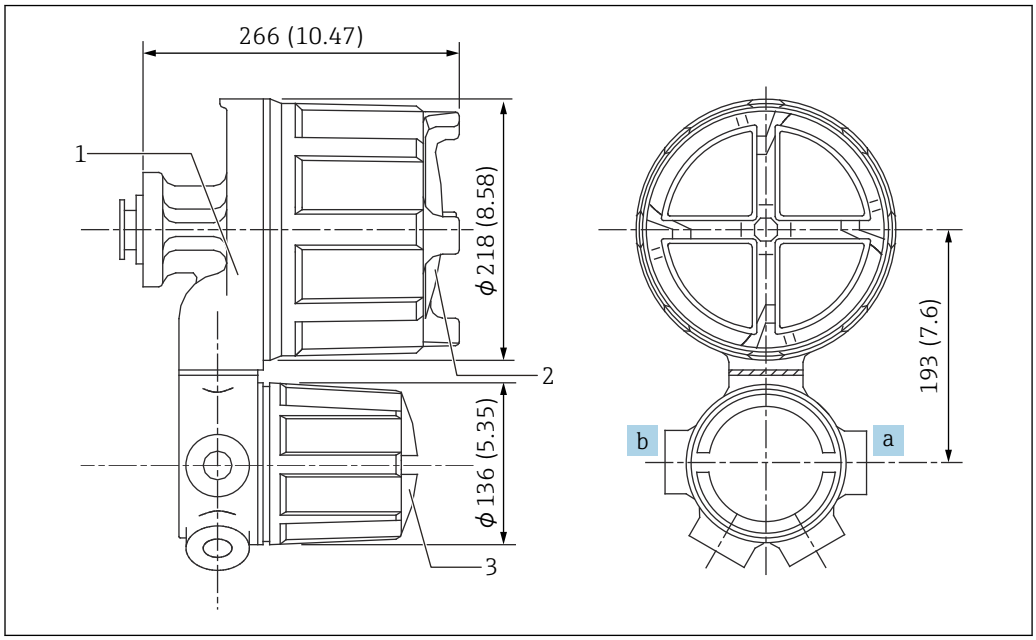
Alarm points: For 0, 2 points



4 *External dimensions of AT1: Weather-proof type 1*

1 AT1 main unit
2 Main unit cover
3 Terminal box cover (small)
a Cable entry (refer to the table below for more details)
b Cable entry (refer to the table below for more details)

Alarm points: 0, 2, 4. 6



5 *External dimensions of AT1: Weather-proof type 2*

1 AT1 main unit
2 Main unit cover
3 Terminal box cover (large)
a Cable entry (refer to the table below for more details)
b Cable entry (refer to the table below for more details)

5.1.3 Cable entry list

070: Cable entry	a	b	070: Cable entry	a	b
A	Screw G 3/4		G	Gland G1 TF 22-15	
B	Screw G 3/4	Screw G 3/4	H	Screw NPT1	
C	Screw G 1-1/2		K	Screw M25	
D	Screw G 1-1/2	Screw G 3/4	M	Gland G1-1/4 TF28-20	Gland G 3/4 TF16-11
E	Gland G 3/4 TF16-11		Q	Screw NPT3/4	
F	Gland G 3/4 TF16-11	Gland G 3/4 TF16-11	R	Screw NPT 3/4	Screw NPT 3/4

5.2 Installation on level gauge and setting

Since the AT1 main unit and coupling unit are delivered separately, the coupling unit needs to be mounted on AT1 first. AT1 also comes in different specifications: one with and one without an alarm. This section describes the mounting of the coupling unit and the alarm setting procedure.

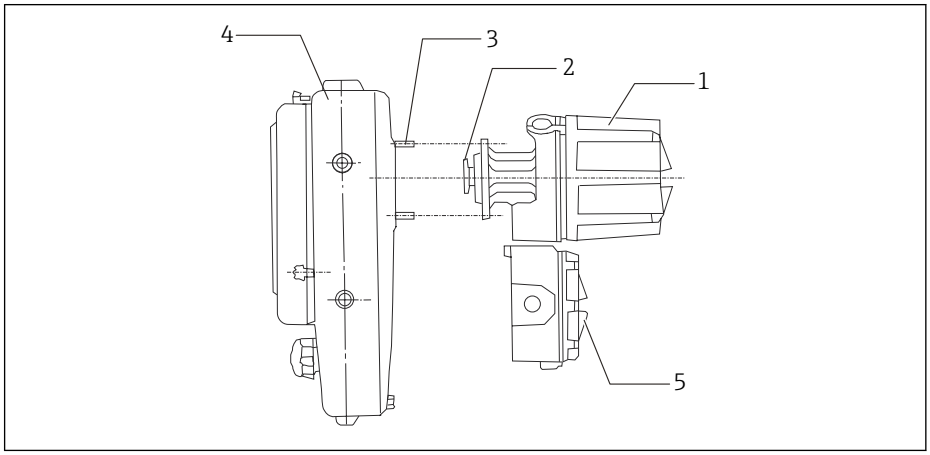
If your AT1 does not come with an alarm, skip "5.2.4 AT1 alarm setting."

5.2.1 Mounting AT1 coupling unit

AT1 comes with a coupling unit (stud bolts, nuts, washers, coupling) separately.

Mounting procedure

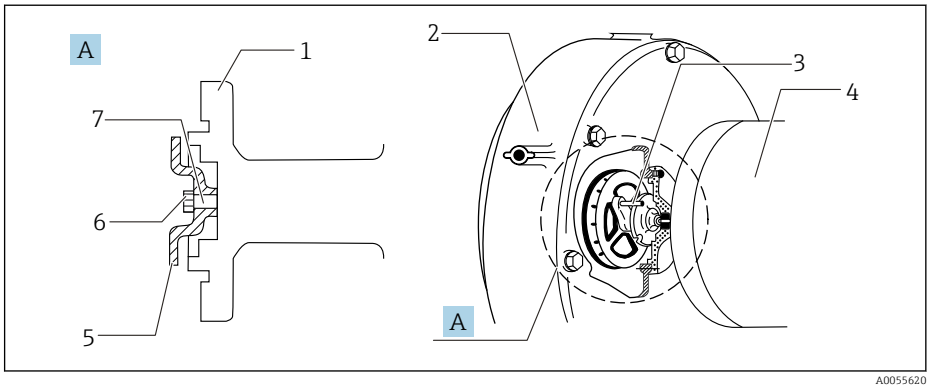
1. Remove the blind plate on the back cover of the level gauge where AT1 is to be mounted.
2. Place stud bolt [3] on the back cover of the level gauge (the shorter screw facing the level gauge side).



6 *Mounting on level gauge*

1 AT1 main unit
2 Coupling
3 Stud bolt
4 Level gauge
5 Terminal box

3. Insert coupling [5] into drive shaft [7] of AT1 and secure it in place by tightening nut / lock washer [6].
   ↳ Tightening torque: 1.5 Nm



7 *Coupling unit*

A Details of the coupling unit
1 AT1 mounting flange
2 Level gauge main unit
3 Coupling pin
4 AT1
5 Coupling
6 Nut / tooth lock washer
7 Drive shaft

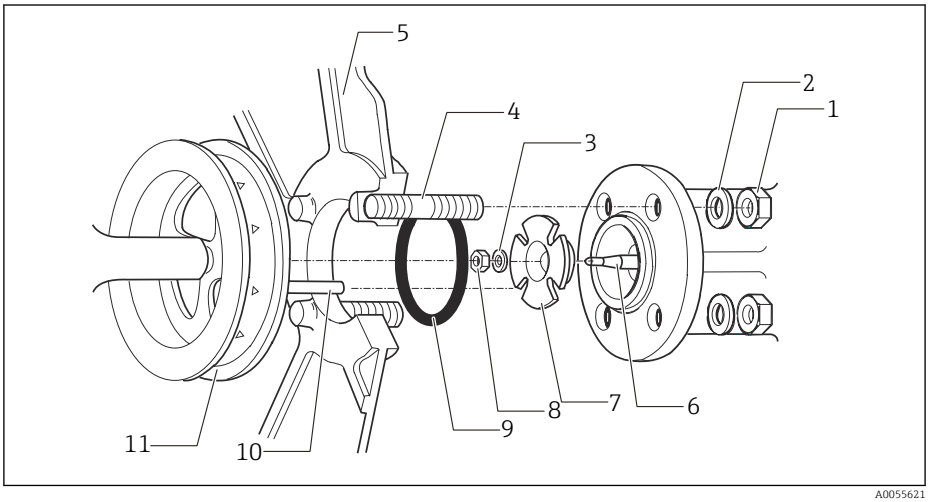
This completes the mounting procedure.

5.2.2 Mounting AT1 and level gauge

Although the terminal box may be mounted in any direction, it is recommended to be mounted horizontally with the cable entry facing down.

Mounting AT1 on level gauge (for low pressure)

1. Mount the included o-ring [9] on AT1.
2. Align the coupling groove and the level gauge coupling pin [10] for mounting.
   ↳ Level gauge and AT1 cannot be connected if the coupling groove and the coupling pin are not aligned.



8 *For low pressure (LT11/LT12/LT31/LT32/LT5-1/LT5-2)*

1 Hexagonal nut
2 Washer
3 Tooth lock washer
4 Stud bolt
5 Back cover of level gauge
6 Drive shaft
7 Coupling
8 Hexagonal nut
9 O-ring
10 Coupling pin
11 Sprocket

This completes the procedure of mounting AT1 on a level gauge (for low pressure).

NOTICE

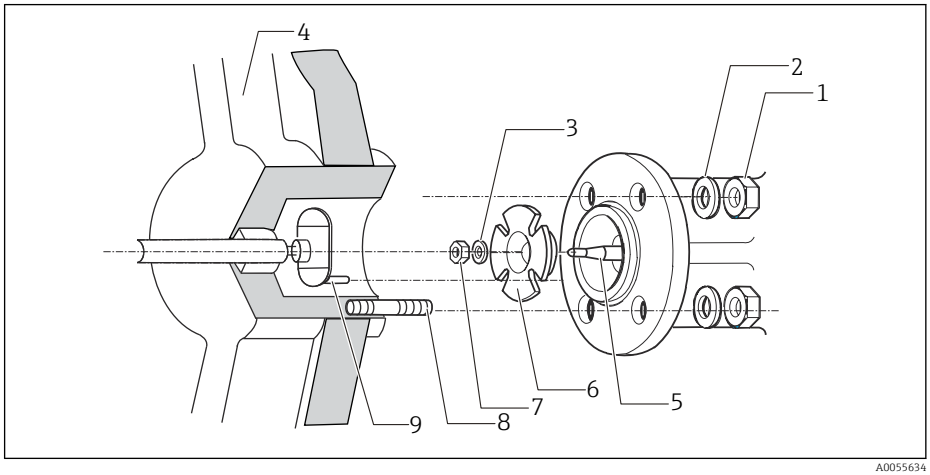
Drive shaft handling

Forcing in the drive shaft when the coupling is not properly fitted may render the drive shaft damaged and unusable.

- If there is a gap between the level gauge and AT1's mounting surface, do not forcibly push it in. Check the position of the coupling before attempting mounting.

Mounting AT1 on level gauge (for medium and high pressure)

1. Mount a coupling for medium and high temperature on a level gauge.
2. Align the coupling groove and the level gauge coupling pin for mounting.
   ↳ Level gauge and AT1 cannot be connected if the coupling groove and the coupling pin are not aligned.



9 For medium and high pressure (LT14/LT16/LT34/LT36/LT5-4, LT5-6)

1 Hexagonal nut
2 Washer
3 Tooth lock washer
4 Back cover of level gauge
5 Drive shaft
6 Coupling
7 Hexagonal nut
8 Stud bolt
9 Coupling pin

This completes the procedure of mounting AT1 on a level gauge (for medium and high pressure).

NOTICE

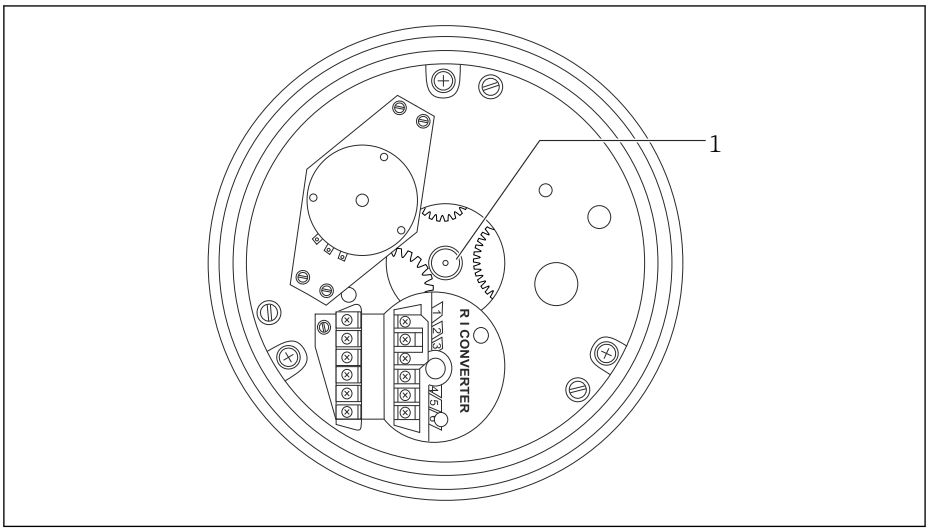
Drive shaft handling

Forcing in the drive shaft when the coupling is not properly fitted may render the drive shaft damaged and unusable.

- If there is a gap between the level gauge and AT1's mounting surface, do not forcibly push it in. Check the position of the coupling before attempting mounting.

5.2.3 Setting AT1

1. Remove the cover of AT1.
2. Loosen gear [1] of the drive shaft inside the transmitter.
3. Convert the level gauge's last indicated value into current. Rotate and secure the drive shaft in place to match the current.



10 AT1 front view (back side)

1 Gears

4. Mount the cover of AT1 main unit.
   - If it comes with an alarm, set the alarm before closing the cover (refer to the next section).

This completes the AT1 setting procedure.

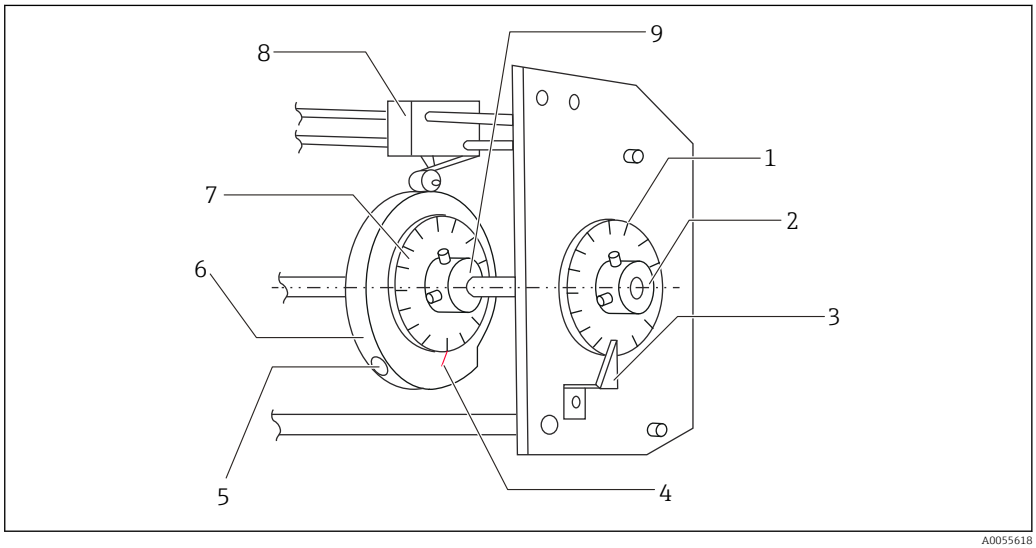
5.2.4 AT1 alarm setting

If you have selected an AT1 with alarm, configure the setting as described below.

Alarm setting procedure

1. Loosen the cam securing screw (2 places) of the alarm cam in the alarm unit (where the micro-switch is).
2. Align the red scale on the alarm cam to the intended alarm position on the alarm scale, and secure it with a cam fixing screw.
3. Repeat step 2 to set the alarm for the number of alarm points.
4. Once the alarm setting is complete, rotate the coupling to align the standard scale to the indicated value on the level gauge.
5. Mount the cover of the transmitter main unit.

This completes the alarm setting procedure.

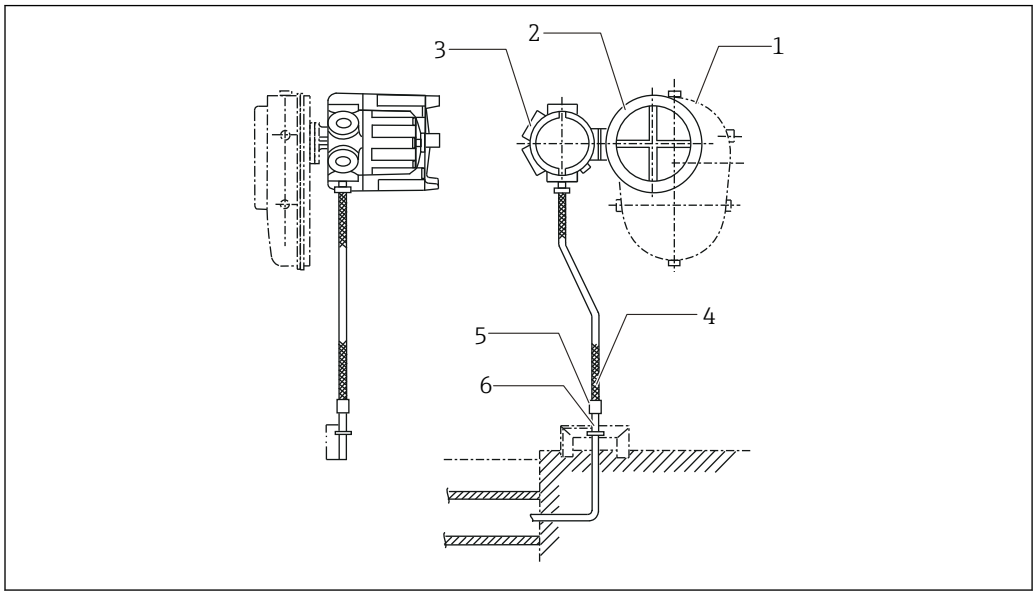


11 *Alarm unit setup*

1 *Standard scale*
2 *Scale set boss*
3 *Index*
4 *Scale*
5 *Cam securing screw*
6 *Alarm cam*
7 *Alarm scale*
8 *Micro-switch*
9 *Cam set boss*

5.3 Mounting on a tank

If using a cable gland for the installation, always use the cable gland that is included with the device. Use the seventh digit of the order code to select a device with a cable gland.



12 *Combining with a level gauge*

1 *Level gauge*
2 *AT1 transmitter*
3 *Terminal box*
4 *Flexible fitting (see below)*
5 *Universal fitting*
6 *Thick steel conduit tube*

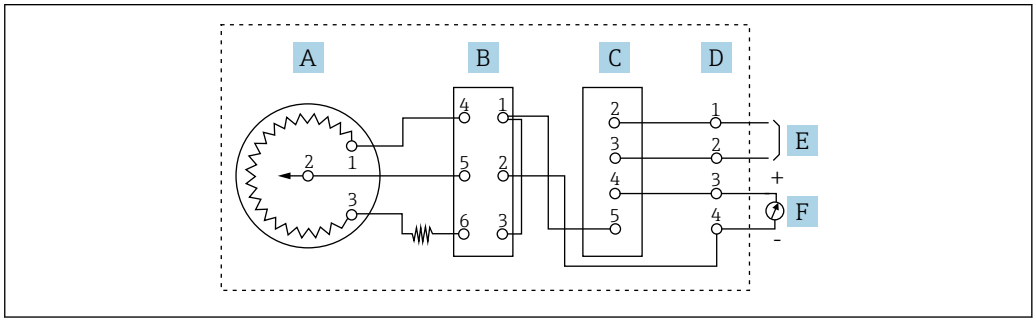
Flexible fitting comes with M-type union on both ends. For sizes, → 16

6 Electrical connection

6.1 Wiring

To maintain a certain precision of AT1 and the receiver, it is important to regulate the transmission line-related parameters. Keep a close eye on line resistance and load impedance.

6.1.1 For AC power supply (4 to 20 mA)

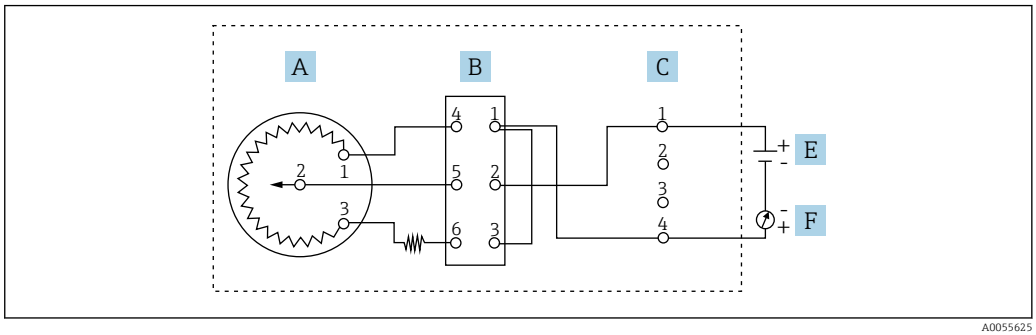


13 *AC power supply*

A Potentiometer
B Converter
C Power supply unit
D Connection terminal
E AC power supply
F Indicator

Refer to → 24 for models equipped with alarm contacts.

6.1.2 For DC power supply (4 to 20 mA)



14 *DC power supply*

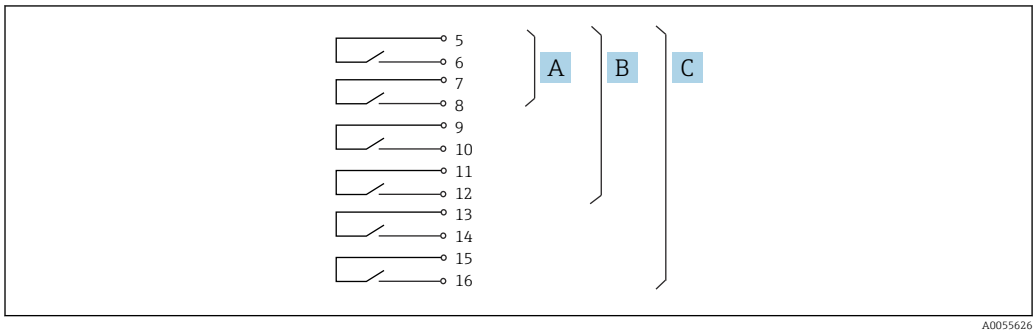
A Potentiometer
B Converter
C Power supply unit
E DC power supply
F Indicator

Refer to → 24 for models equipped with alarm contacts.

6.1.3 Models with alarm contacts

The following circuit is added for models with contact points using AC power supply (4 to 20 mA) and DC power supply (4 to 20 mA).

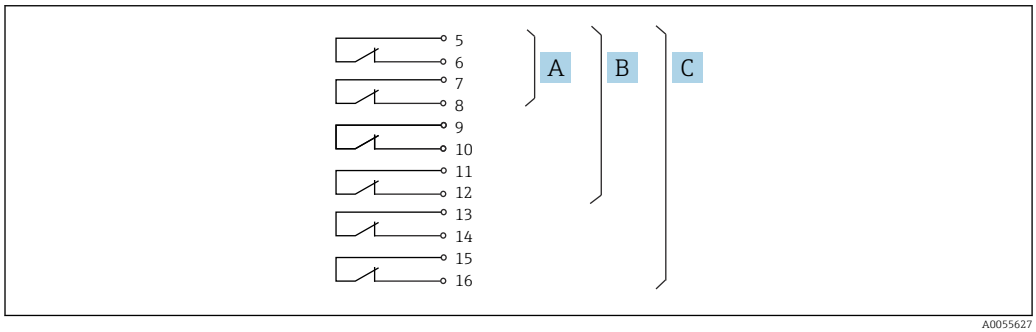
Contact point A: Normally open



15 *Contact point A*

A For 2 points
B For 4 points
C For 6 points

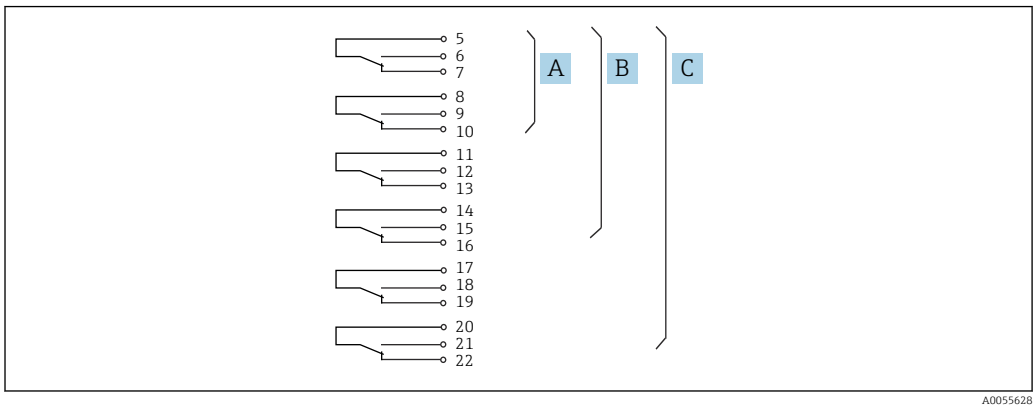
Contact point B: Normally closed



16 *Contact point B*

A For 2 points
B For 4 points
C For 6 points

Contact point C: Transfer contact point



17 *Contact point C*

A For 2 points
B For 4 points
C For 6 points

7 Operation

7.1 Span adjustment

The zero point cannot be changed, but the location of the 100 % level can easily be changed.

The adjustable range of span is 0 to 20 % of the maximum value on the standard scale.

7.1.1 When the liquid level can be changed

Adjustment procedure

1. Remove the cover of AT1 main unit when the tank level reaches the desired 100 % level.
2. Set the level indicator to 100 % using the span adjustment screw on the converter.
3. Close the cover of AT1 main unit.

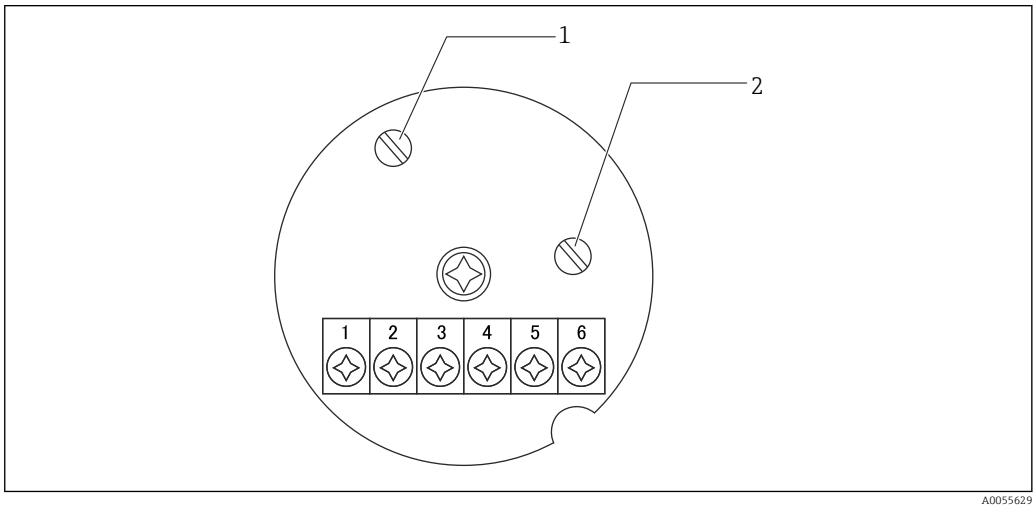
This completes the adjustment procedure.

7.1.2 When the liquid level cannot be changed

Adjustment procedure

1. Remove AT1 from the level gauge and remove the cover of AT1 main unit.
2. Rotate the coupling until the standard scale is aligned with the desired 100 % level.
3. Set the level indicator to 100 % using the span adjustment screw on the converter.
4. Rotate the coupling again to align the scale of the transmitter with that of the level gauge.
5. Close the cover of AT1 main unit and mount it on the level gauge.

This completes the adjustment procedure.



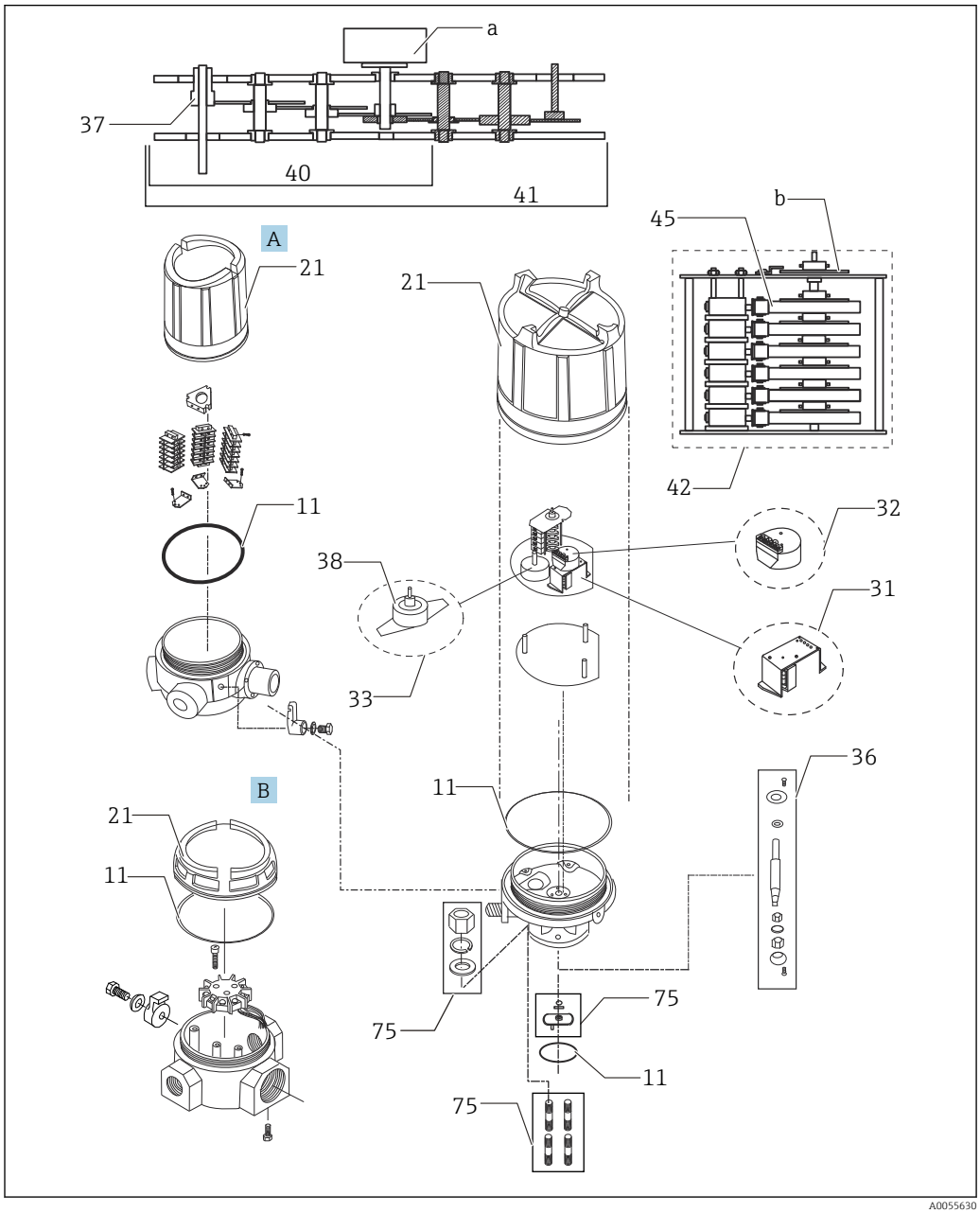
18 Span adjustment

1 Zero adjustment screw
2 Span adjustment screw

8 Diagnostics and troubleshooting

8.1 Spare parts

Spare parts are contained in kits. The order numbers of spare parts for AT1 are shown in the following diagram and table. For more details, contact your Endress+Hauser Sales Center.



19 *Spare parts*

A Terminal box: Weather-proof type (4 to 6 alarm contact points) / Ex d type (0 to 6 alarm contact points)
B Terminal box: Weather-proof type (0 to 2 alarm contact points)
a Potentiometer
b Dial plate (with alarm)

No.	Specifications	No.	Specifications
11 O-ring, packing		36 Drive shaft	
017880-5025	O-ring, terminal box (large), AT5 main unit, CR	017871-1210	Drive shaft set, AT1
017880-5026	O-ring, terminal box (small), CR	37 Input gear	
017880-5027	O-ring, electronic compartment, large	017871-1211	Gear, d = 11 mm (0.43 in)
017871-1231	O-ring, coupling with level gauge	017871-1212	Gear, d = 15 mm (0.59 in)
21 Cover		38 Scale	
017860-6323	Cover, terminal box cover (small)	XPN0001-	Scale AT1
017860-6326	Large-short main unit cover	40 Gear panel	
017860-6324	Cover, terminal box cover (large)	XPN0002-	Gear panel set AT1 (without alarm)
31 Power supply module		41 Gear panel	
017871-1201	Power supply unit R/I 100 V_{AC}	XPN0002-	Gear panel set AT1 (with alarm)
56004475	Power supply unit R/I 110 V_{AC}	42 Alarm assembly	
56004479	Power supply unit R/I 200 V_{AC}	XPN0003-	Alarm assembly
56004476	Power supply unit R/I 220 V_{AC}	45 Alarm	
32 R/I converter		017871-1220	Alarm cam
017871-1207	Converter R/I for DC power supply	75 Accessories	
56004478	Converter R/I for AC power supply	70106501	Stud bolt M10 x 40L, (with W + SW + N) 4 sets
33 Electronic potentiometer		017871-1233	Coupling, converter, LT11/LT12/LT5-1/LT5-2
017871-1202	Potentiometer, CP45-FB, LT,LTC2230/2240	017871-1232	Coupling, male, for gauge head, medium/high pressure LT14/LT16/LT5-4/LT5-6
56004470	Potentiometer, CP45-FB LTC2110		

8.1.1 Scale

XPN0001 scale

030	Alarm output:	
	0	None
	2	2 points
	4	4 points
	6	6 points

080		Mounting gauge:	
		1	LT5-1/LT11/LT12/LT31/LT32
		2	LT5-4/LT5-6/LT14/LT16/LT34/LT36
		3	LTC2100
		4	LTC2230/LTC2240

090			Measurement range:	
			A	1.5 m
			1	2.5 m
			C	3 m
			D	3.5 m
			E	4 m
			2	5 m
			F	6 m
			G	8 m
			3	10 m
			H	12 m
			J	14 m
			4	16 m
			5	20 m
			K	25 m
			6	30 m

AT1-				Complete product designation

8.1.2 Gear panel

XPN0002 gear panel assembly

030	Alarm output:
	0 None
	2 2 points
	4 4 points
	6 6 points

080		Mounting gauge:
		1 LT5-1/LT11/LT12/LT31/LT32 R: 300 mm (11.81 in) low pressure LT version
		2 LT5-4/LT5-6/LT14/LT16/LT34/LT36 R: 300 mm (11.81 in) high pressure LT version
		3 LTC2100
		4 LTC2230/LTC2240

090			Measurement range:	
			A	1.5 m
			1	2.5 m
			C	3 m
			D	3.5 m
			E	4 m
			2	5 m
			F	6 m
			G	8 m

090			Measurement range:	
			3	10 m
			H	12 m
			J	14 m
			4	16 m
			5	20 m
			K	25 m
			6	30 m

AT1-				Complete product designation

9 Maintenance

Once AT1 has been mounted and adjusted, do not forget to tighten the cover. Check the following during periodic inspection.

Inspection site	Inspection procedure	Description
Converter	Check for a discrepancy between the level at the converter (after conversion) and the level at the tank gauge.	If there is any discrepancy, readjust the setting accordingly.
Alarm cam	Check for misaligned alarm cam (misaligned setting point).	Readjust it if it is misaligned.
Alarm micro-switch	Check for contact performance.	Replace the faulty micro-switch with a new one.
Wiring and connected terminal	Check for a disconnection or loose connection terminal.	

10 Repair

10.1 General information on repairs

10.1.1 Repair concept

The Endress+Hauser repair concept assumes that the devices have a modular design and that repairs can be done by the Endress+Hauser Service Department or specially trained customers.

Spare parts are contained in suitable kits. They also come with relevant replacement instructions.

For more information on service and spare parts, contact the Service Department at Endress+Hauser.

10.1.2 Repairs to Ex-approved devices

When carrying out repairs to Ex-approved devices, note the following:

- Repairs to Ex-approved devices may only be carried out by trained personnel or by the Endress+Hauser Service.
- Comply with the prevailing standards, national Ex-area regulations, Safety Instructions (XA), and other relevant rules.
- Only use original spare parts provided by Endress+Hauser.
- When ordering a spare part, note the device designation on the nameplate. Only replace parts with identical parts.
- Carry out repairs according to the operating instructions. On completion of repairs, carry out the specified routine test on the device.
- Only Endress+Hauser Service may convert a certified device into a different certified version.
- Document all repair work and conversions.

10.2 Spare parts

For more information on spare parts, → 26

10.3 Endress+Hauser services

Endress+Hauser offers a wide range of services.

Your Endress+Hauser Sales Center can provide detailed information on the services.

10.4 Return

The requirements for safe device return can vary depending on the device type and national legislation.

1. Refer to the web page for information:
   http://www.endress.com/support/return-material
   ↳ Select the region.
2. Return the device if repairs or a factory calibration are required, or if the wrong device was ordered or delivered.

10.5 Disposal

Observe the following notes during disposal:
- Observe valid federal/national regulations.
- Ensure proper separation and reuse of the device components.

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