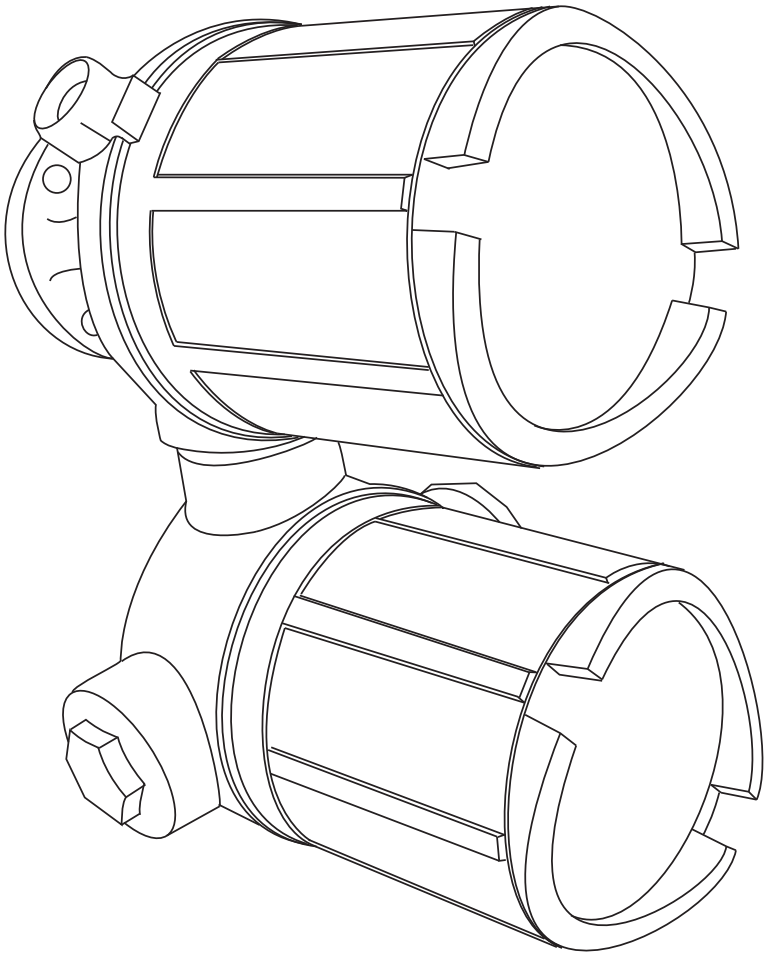
Level Pressure Flow Temperature Liquid Analysis Registration Systems Components Services Solutions

Operating Instructions

Analog Transmitter AT5000 AT500

Alarm Transmitter for Mechanical Level Gauges



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Endress+Hauser

People for Process Automation

Endress+Hauser

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Declaration of Hazardous Material and De-Contamination

Erklärung zur Kontamination und Reinigung

RA No. ☐☐☐☐☐☐☐

Please reference the Return Authorization Number (RA#), obtained from Endress+Hauser, on all paperwork and mark the RA# clearly on the outside of the box. If this procedure is not followed, it may result in the refusal of the package at our facility.
Bitte geben Sie die von E+H mitgeteilte Rücklieferungsnummer (RA#) auf allen Lieferpapieren an und vermerken Sie diese auch außen auf der Verpackung. Nichtbeachtung dieser Anweisung führt zur Ablehnung ihrer Lieferung.

Because of legal regulations and for the safety of our employees and operating equipment, we need the "Declaration of Hazardous Material and De-Contamination", with your signature, before your order can be handled. Please make absolutely sure to attach it to the outside of the packaging.
Aufgrund der gesetzlichen Vorschriften und zum Schutz unserer Mitarbeiter und Betriebseinrichtungen, benötigen wir die unterschriebene "Erklärung zur Kontamination und Reinigung", bevor Ihr Auftrag bearbeitet werden kann. Bringen Sie diese unbedingt außen an der Verpackung an.

Type of instrument / sensor
Geräte-/Sensortyp _____

Serial number
Seriennummer _____

☐ **Used as SIL device in a Safety Instrumented System** / Einsatz als SIL Gerät in Schutzeinrichtungen

Process data/Prozessdaten
Temperature / Temperatur_____ [°F] _____ [°C]
Pressure / Druck _____ [psi] _____ [Pa]
Conductivity / Leitfähigkeit _____ [µS/cm]
Viscosity /Viskosität _____ [cp] _____ [mm^2/s]

Medium and warnings
Warnhinweise zum Medium

	Medium /concentration Medium /Konzentration	Identification CAS No.	flammable entzündlich	toxic giftig	corrosive ätzend	harmful/ irritant gesundheits-schädlich/ reizend	other * sonstiges*	harmless unbedenklich
Process medium / Medium im Prozess								
Medium for process cleaning / Medium zur Prozessreinigung								
Returned part cleaned with / Medium zur Endreinigung								

* explosive; oxidising; dangerous for the environment; biological risk; radioactive
* explosive;brandfördernd; umweltgefährlich; biogefährlich; radioaktiv

Please tick should one of the above be applicable, include safety data sheet and, if necessary, special handling instructions.
Zutreffendes ankreuzen; trifft einer der Warnhinweise zu, Sicherheitsdatenblatt und ggf. spezielle Handhabungsvorschriften beilegen.

Descriptio n of failure / Fehlerbeschreibung _____

_____

_____

Company data / Angaben zum Absender

Company /Firma _____
_____
Address / Adresse
_____
_____

Phone number of contact person / Telefon-Nr. Ansprechpartner:
_____
Fax / E-Mail _____

Your order No. / Ihre Auftragsnr. _____

"We hereby certify that this declaration is filled out truthfully and completely to the best of our knowledge.We further certify that the returned parts have been carefully cleaned. To the best of our knowledge they are free of any residues in dangerous quantities."
"Wir bestätigen, die vorliegende Erklärung nach unserem besten Wissen wahrheitsgetreu und vollständig ausgefüllt zu haben. Wir bestätigen weiter, dass die zurückgesandten Teile sorgfältig gereinigt wurden und nach unserem besten Wissen frei von Rückständen in gefahrbringender Menge sind."

_____ (place, date / Ort, Datum)

_____ Name, dept./Abt. (please print /bitte Druckschrift)

_____ Signature / Unterschrift

Table of Contents

1 Safety Instructions

1.1 Designated Use

AT500 analog transmitter is used in combination with LT11/12/14/16 float tank gauge.
When the level gauge indicator reaches alarm setting point, AT500 transmitter outputs an alarm contact signal by operating a micro switch.
AT500 is a limit contact unit that has six contacts for controlling the level of the tank contents.

1.2 Installation, Commissioning and Operation

- Mounting, electrical installation, start-up, and maintenance of the instrument may only be performed by trained personnel authorized by the operator of the facility.
- Personnel must read and understand these installation instructions before performing the procedures.
- The instrument may only be operated by personnel who are authorized and trained by the operator of the facility. All instructions in this manual must be observed.
- The installer must make sure that the measuring system is correctly wired according to the wiring diagrams. The measuring system must be grounded.
- Observe all law and regulations applicable and valid for your country and pertaining to the opening and repairing of electrical devices.

1.3 Operational safety

1.3.1 Hazardous Areas

Measuring systems for use in hazardous environments are accompanied by separate "Ex documentation", which is an integral part of this operating manual. Strict compliance with the installation instructions and ratings as stated in this supplementary documentation is mandatory.

- Ensure that all personnel are suitably qualified.
- Observe the specifications in the certificate as pipe as national and local regulations.

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 Notes on Safety Conventions and Symbols

To highlight safety-relevant or alternative operating procedures in this manual, the following conventions have been used, each indicated by a corresponding symbol on the left.

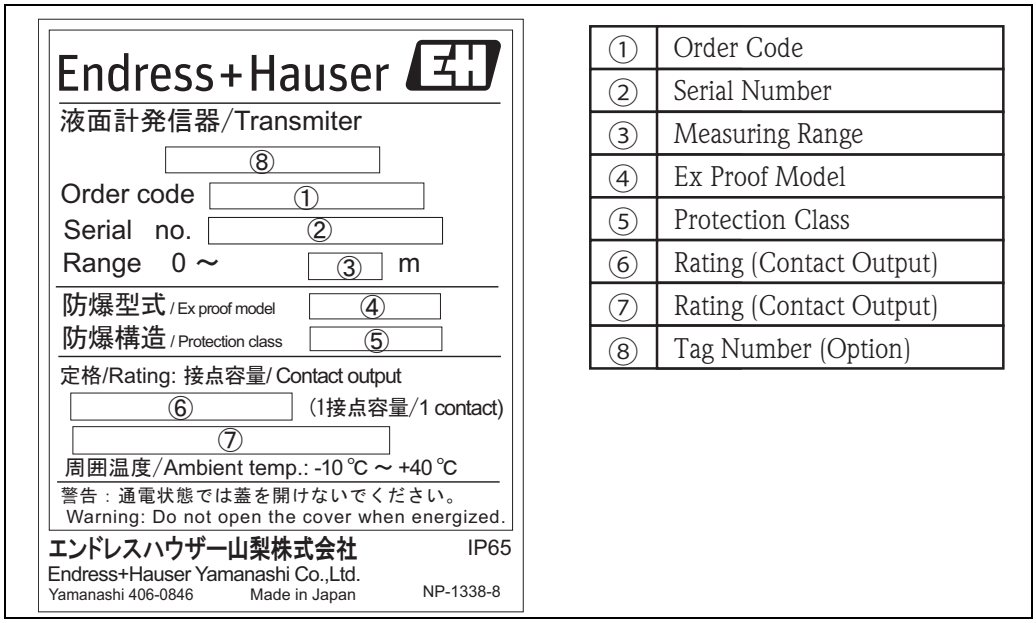
Safety Conventions	
	**Warning!** Indicates an action or procedure that, if not performed correctly, will lead to personal injury, a safety hazard, or destruction of the instrument
	**Caution!** Indicates an action or procedure that, if not performed correctly, may lead to personal injury or malfunction of the instrument
	**Note!** Indicates an action or procedure that, if not performed correctly, may indirectly affect operation or lead to an unexpected instrument response.
Explosion Protection	
	**Device certified for Use in Explosion Hazardous Area** If the device has this symbol embossed on its name plate, it can be installed in an explosion hazardous area.
	**Explosion Hazardous Areas** Symbol used in drawings to indicate explosion hazardous areas. Devices located in and wiringentering areas designated as “explosion hazardous areas” must conform to the stated type of protection.
	**Safe Area (non-explosion hazardous area)** Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. Devices located in safe areas still require a certificate if wiring enters into explosion hazardous areas
Electrical Symbols	
	**Direct Voltage** A terminal to or from which a direct current or voltage may be applied or supplied
	**Alternating Voltage** A terminal to or from which an alternating (sine-wave) current or voltage may be applied or supplied
	**Grounded Terminal** A grounded terminal, that is already grounded by means of an earth grounding system for the purpose of the operator
	**Protective Grounding (earth) Terminal** A terminal that must be connected to an earth ground prior to making any other connection to the equipment
	**Equipotenial Connection (earth bonding)** A connection that must be made to the facility grounding system, such as a star-shaped connection grounding system or equipotential line, according practices of the country or company.

2 Identification

2.1 Device Designation

2.1.1 Nameplate

The following technical data are given in the instrument nameplate.



①	Order Code
②	Serial Number
③	Measuring Range
④	Ex Proof Model
⑤	Protection Class
⑥	Rating (Contact Output)
⑦	Rating (Contact Output)
⑧	Tag Number (Option)

Figure 1: TIIS approval type

2.2 Ordering information

010	**Alarm Output:**	
	2	2-point
	4	4-point
	6	6-point
020	**Function:**	
	0	Basic version
	1	Special version, TSP-no. to be spec.
030	**Approval:**	
	B	Flame proof d2G4,cable gland, TIIS
	E	Flame proof d2G4, TIIS
	W	Weather proof IP65
	Y	Special version, TSP-no. to be spec.
040	**Level Gauge Combination:**	
	1	LT1100/1200/3100/3200?R:300mm?Low pressure LT version
	2	LT1400/1600/3400/3600?R:300mm?High pressure LT version
	3	LTC 2100 L:600mm
	4	LTC 2230/2240 R:600mm
	9	Special version, TSP-no. to be spec.
050	**Measuring Range:**	
	1	2.5m (not available for LTC)
	2	5m
	3	10m
	5	20m
	6	30m
	9	Special version, TSP-no. to be spec.
060	**Alarm Contact:**	
	1	A?normal open
	2	B?normal close
	3	C?transfer contact
070	**Cable Entry:**	
	A	Thread G3/4
	C	Thread G1-1/2
	G	Gland G1, TF22-13
	H	Gland G1, TF22-15
	K	Gland G1-1/4, TF28-21
	R	ThreadNPT3/4
	S	Thread NPT1
	T	Thread M25
	Y	Special version, TSP-no. to be spec.
080	**Color:**	
	0	Sliver
	9	Special version, TSP-no. to be spec.
AT500-		Complete product designation

2.3 Scope of Delivery

Caution!

It is extremely important to follow the instructions concerning the unpacking, transportation and storage of measuring instruments provided in the chapter "Incoming Acceptance, Transportation, Storage".
The scope of delivery consists of:

- Assembled Instrument

Accompanying Documentation:

- Operating Manual (this manual)
- Safety Instructions

3 Installation

3.1 Incoming Acceptance, Transport, Storage

3.1.1 Incoming Acceptance

Check the packing and contents for any signs of damage.
Check the shipment, and make sure that nothing is missing and that the items match your order.

3.1.2 Transport

Caution!

- Follow the safety instructions and conditions of transportation for instruments in excess of 18kg (40 lbs.).
- Do not lift the measuring instrument by its terminal box during transportation.

3.1.3 Storage

Pack the measuring instrument so that it is protected against impacts during storage and transportation.
The original packing material provides the optimum protection for this.
The allowed storage temperature is -20°C to +60°C (-4°F to +140°F)

3.2 Installation conditions

3.2.1 Dimensions

Flame Proof

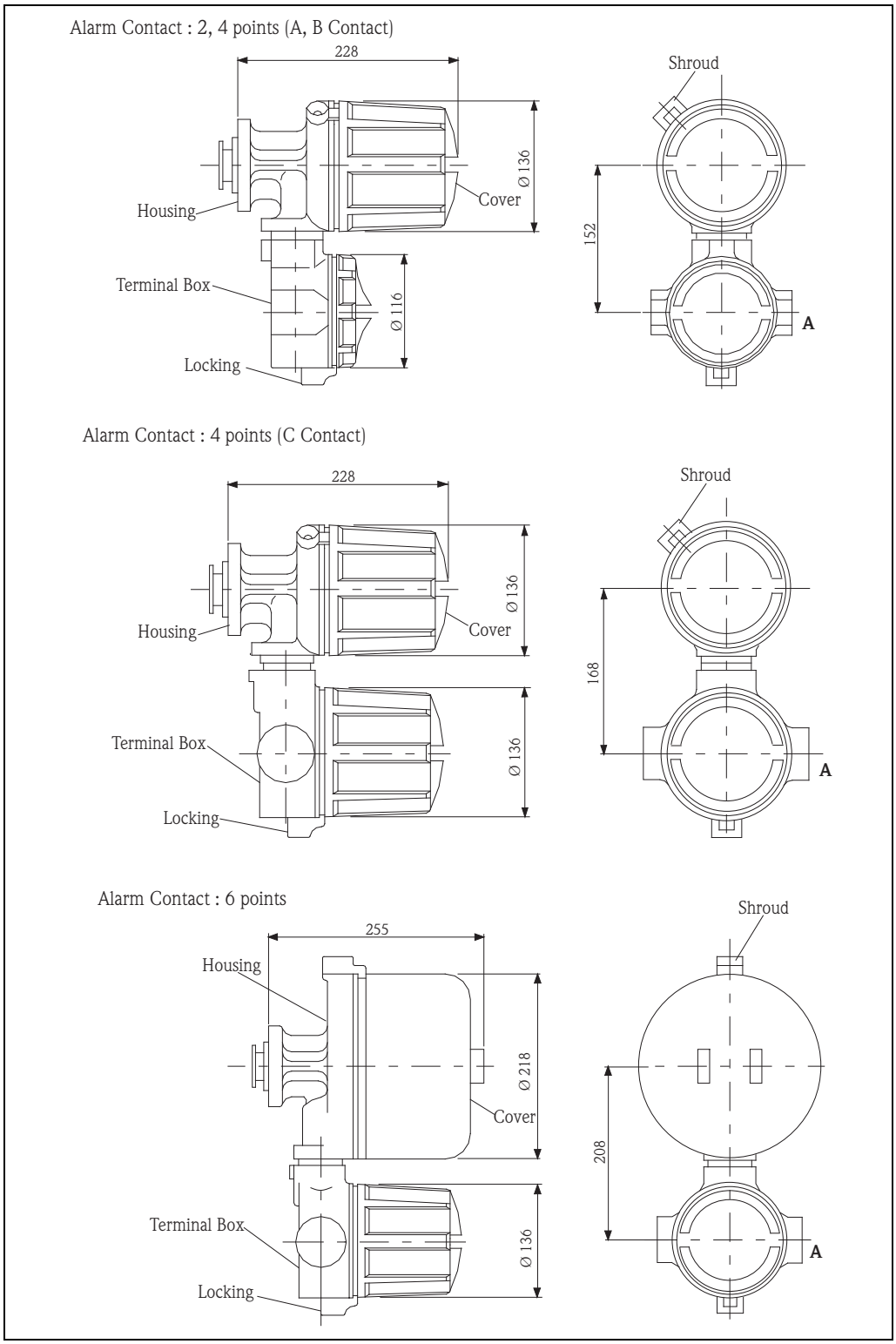


Figure 2: Dimensions of Flame Proof

Weather Proof

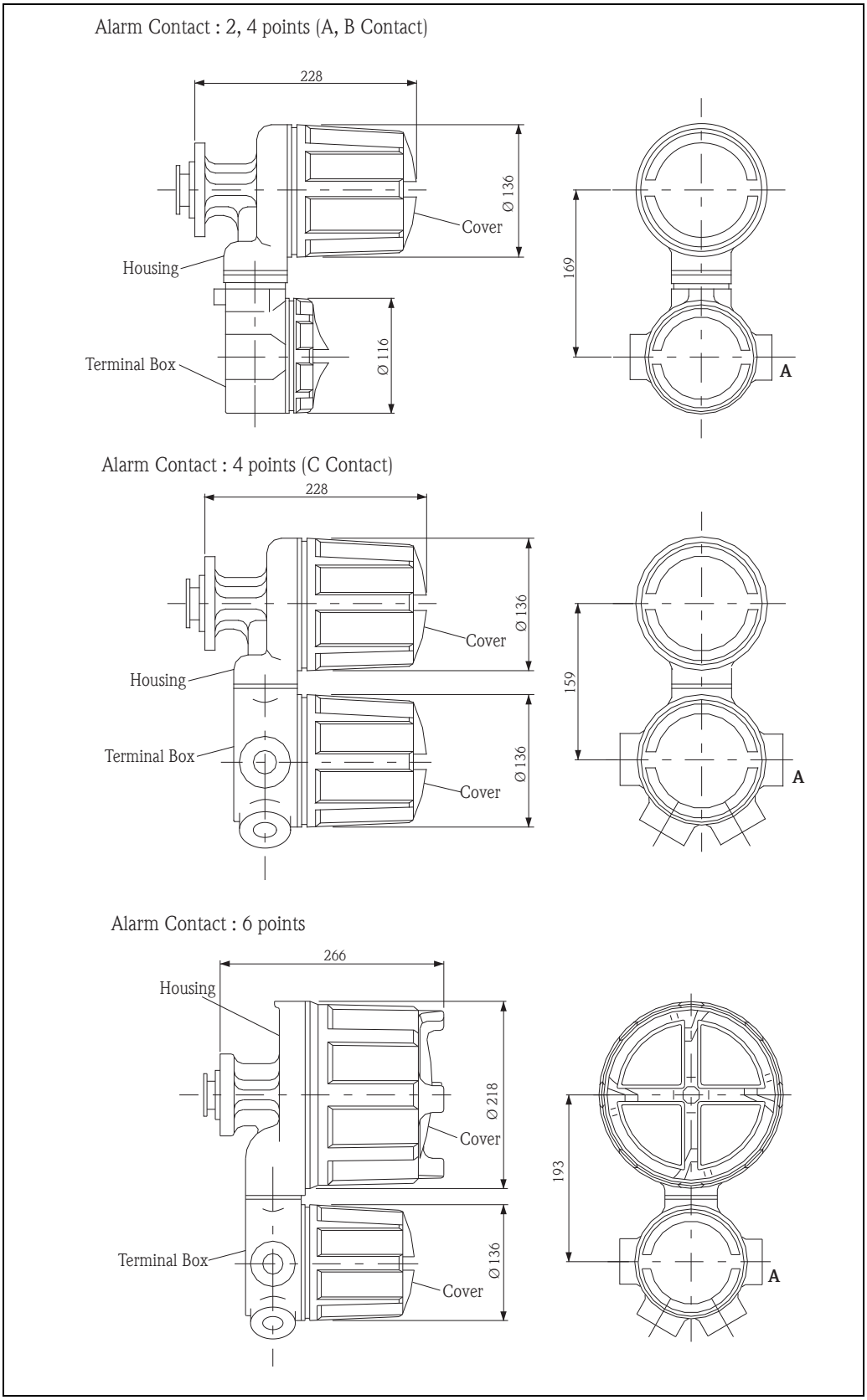


Figure 3: Weatherproof Dimensions

Cable Entry

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

3.3 Installation

Installation Procedure
Attach the stud bolts, nut, washer, and coupling to the level gauge and AT500 transmitter, as shown in the diagram below.

1. Screw the stud bolts onto the back of the level gauge, as shown in the diagram
   - The side with the shorter screw is the rear side of the blind cover.

Note!
The terminal box can be attached to the tank in any direction, however it is recommended to attach it sideways.

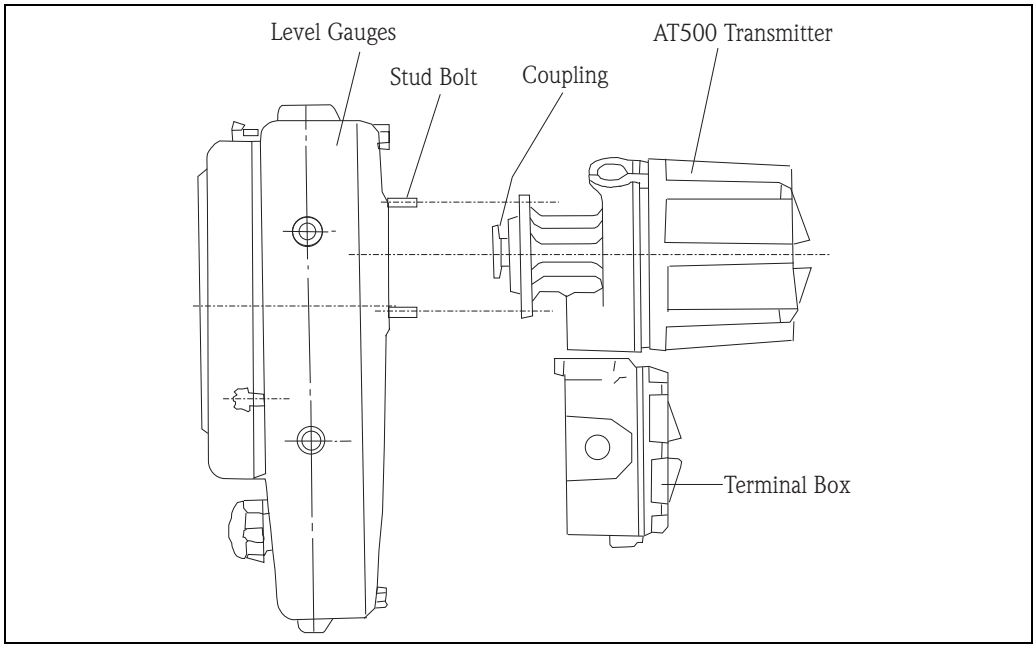


Figure 4: Installation of Transmitter

2. Insert the coupling into the drive shaft of the transmitter, and secure the coupling with the tooth lock washer and the nut.
3. Align the groove on the coupling with the coupling pin on the level gauge and mount the transmitter on the level gauge.
   - If the groove on the coupling and the pin are not aligned, the transmitter can not be mounted on the level gauge.

This completed the installation procedure.

Note!
If the groove is not aligned, do not push and forcibly install the coupling. Check the position of the coupling and re-install using the procedures above.
Forcibly installing the coupling may cause damage or malfunction of the drive shaft or the device.

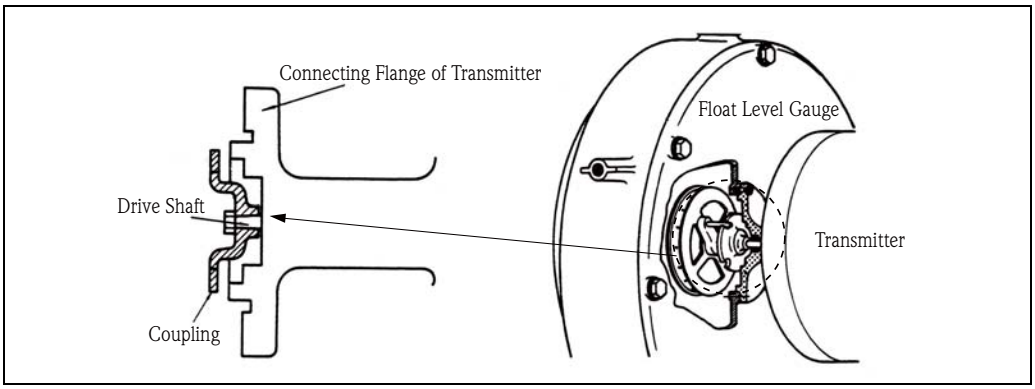


Figure 5: Couplings

Installation at Low Pressure (LT11/12/31/32)

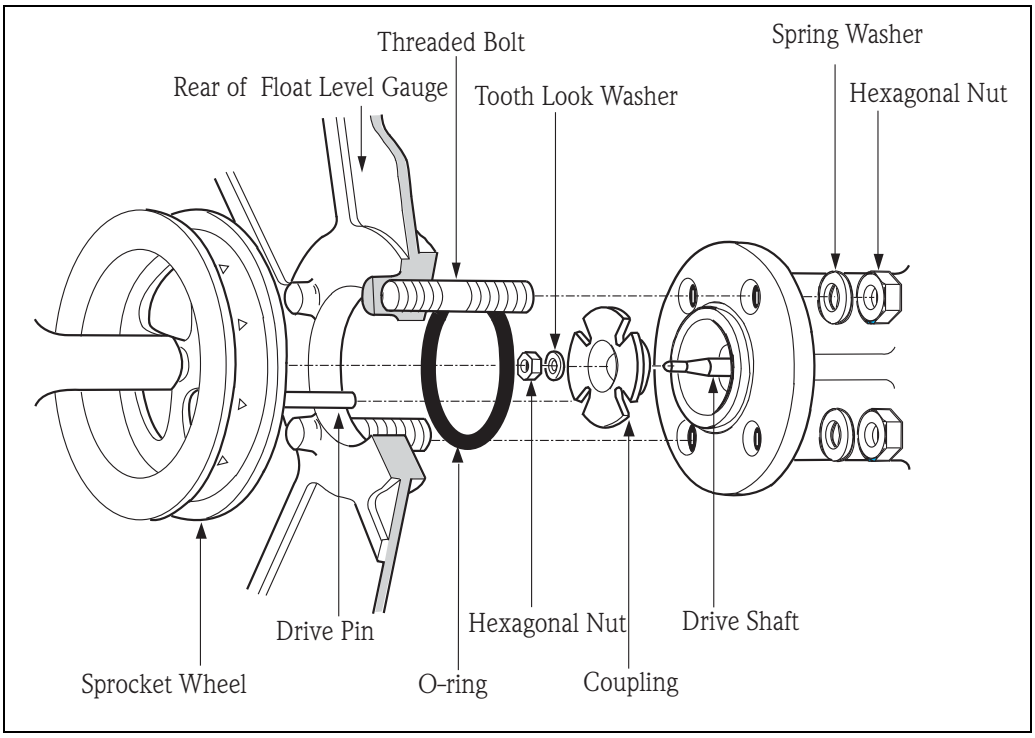


Figure 6: Installation for Low Pressure

Installation at Medium or High pressure(LT14/16/34/36)

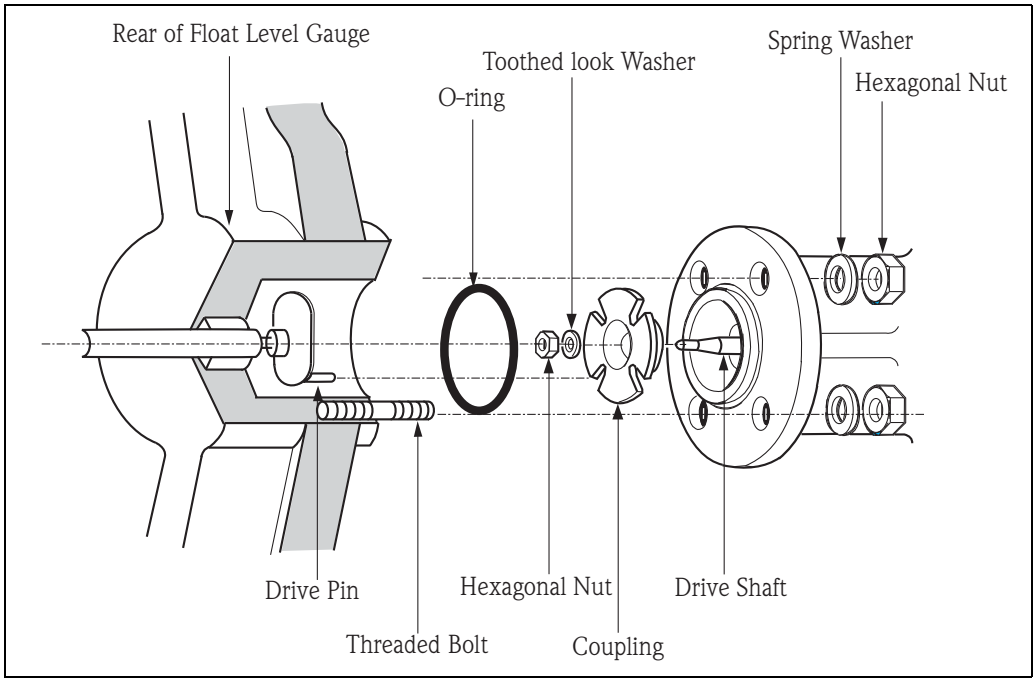


Figure 7: Installation for Medium or High Pressure

3.3.1 Installation of Transmitter to Float Tank Gauge

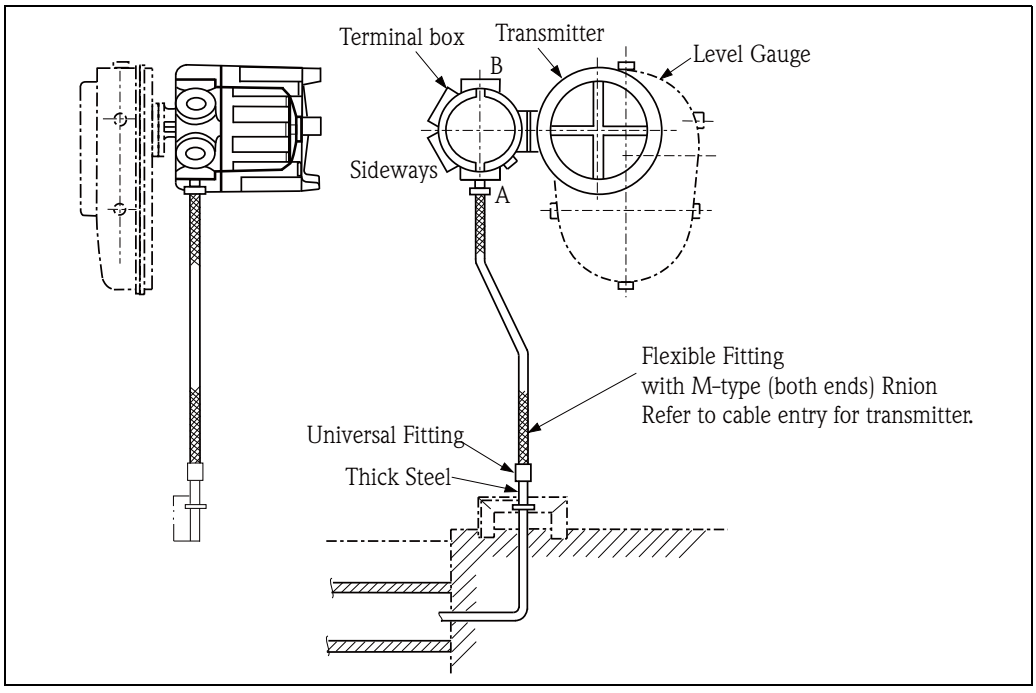


Figure 8: Transmitter and Tank Gauge

Caution!

When installing the transmitter with cable grands, ensure to use cable glands which are attached to the transmitter. Select an option for cable glands in the feature 070 of the order structure (refer to "2.2 Ordering Information").

3.4 Alarm Setup

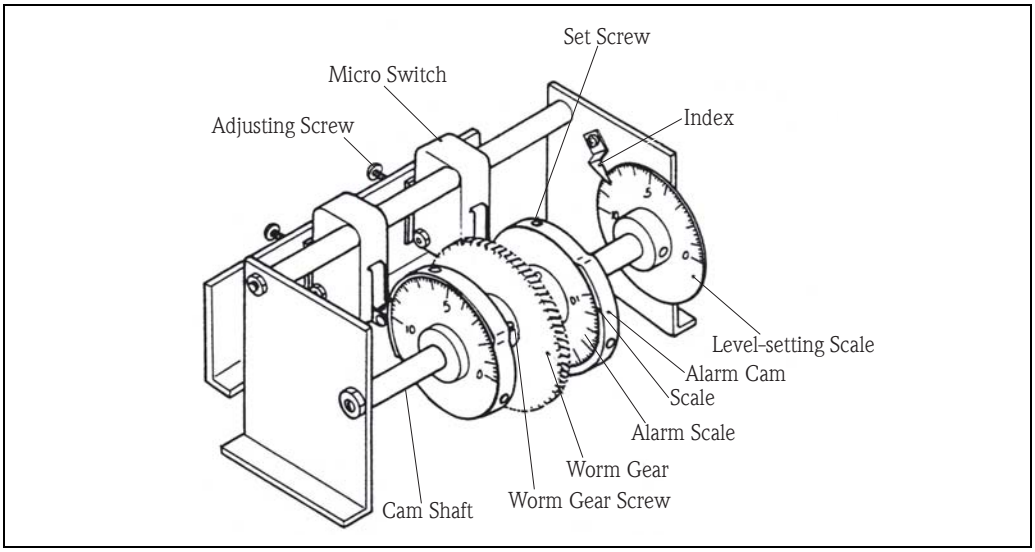


Figure 9: Alarm Unit

Alarm Setting Procedure

Note!
This procedure must be performed after aligning the indication of the level gauge and mounting the transmitter on the level gauge.

1. Remove the cover of the transmitter.
2. Loosen the set screw of the worm gear.
3. Rotate the cam shaft and align the level setting scale with the level data of the float level gauge, and tighten the set screw on the worm gear.
   - The transmitter and the level gauge are aligned at 0 point.
4. Loosen the two set screws and adjust the scale line to the desired alarm setting on the alarm scale.
5. Tighten the cam set screw to secure the unit.
   - If there are multiple alarm points, repeat the procedure above and set the alarms.

This completes the alarm setting procedure.

Upper and Lower Limit Settings

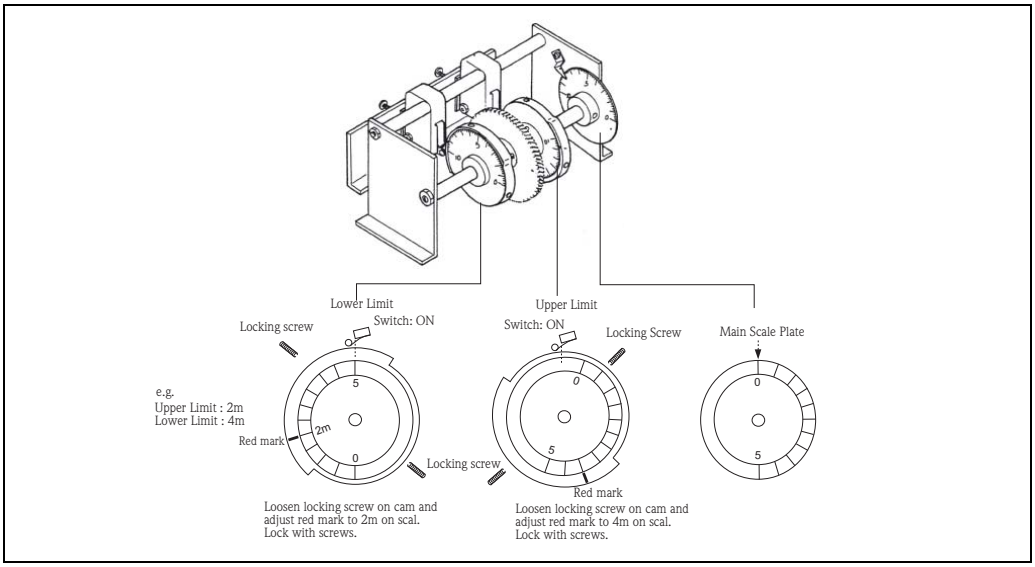
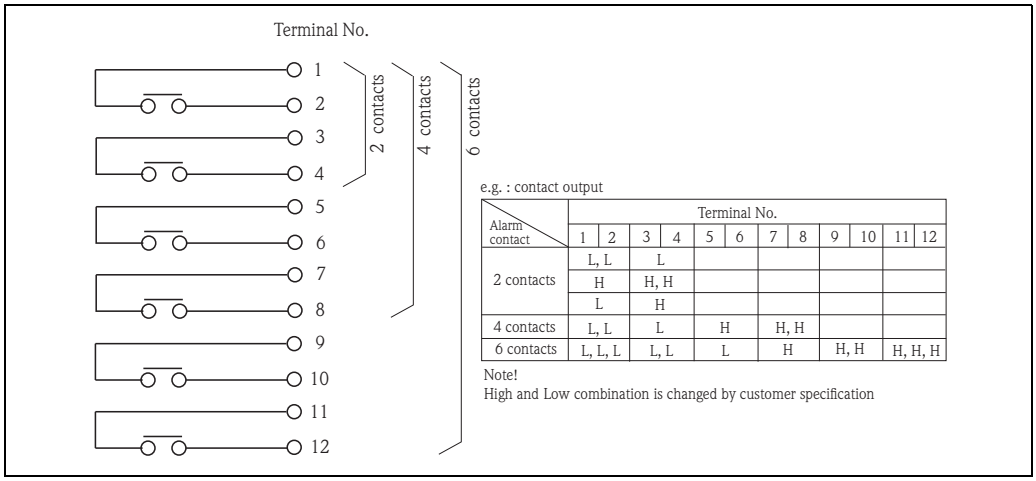


Figure 10: Upper and Lower Limit Settings

4 Wiring

The cable used for the wiring should be IV 1.25 mm^2 (JIS600V) or better.

Contact A: Normal Open



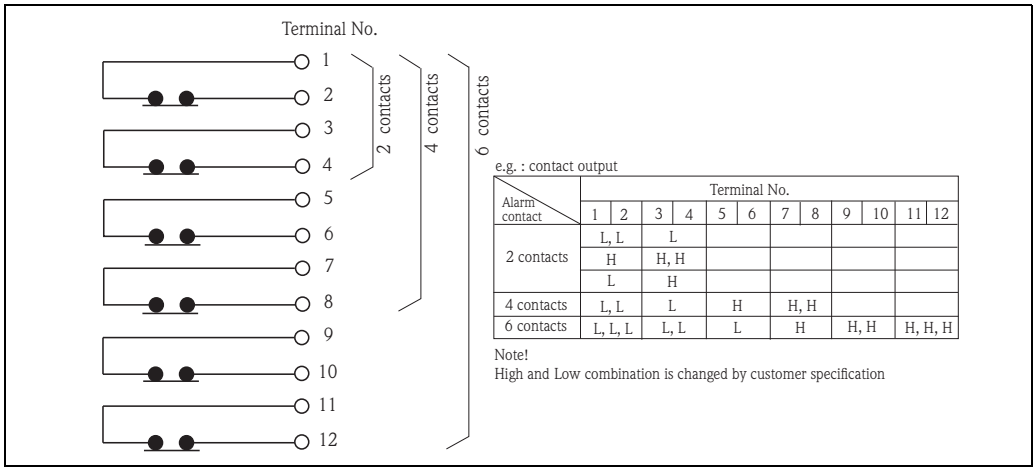
e.g. : contact output

Alarm contact	Terminal No. 1	2	3	4	5	6	7	8	9	10	11	12
2 contacts	L, L		L									
	H		H, H									
	L		H									
4 contacts	L, L		L		H		H, H					
6 contacts	L, L, L		L, L		L		H		H, H		H, H, H	

Note!
High and Low combination is changed by customer specification

Figure 11: Contact A

Contact B: Normal Open



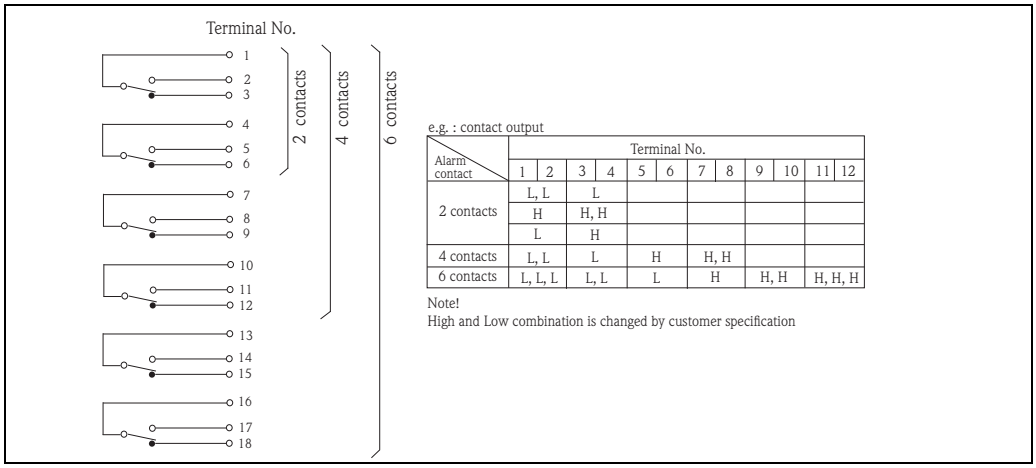
e.g. : contact output

Alarm contact	Terminal No. 1	2	3	4	5	6	7	8	9	10	11	12
2 contacts	L, L		L									
	H		H, H									
	L		H									
4 contacts	L, L		L		H		H, H					
6 contacts	L, L, L		L, L		L		H		H, H		H, H, H	

Note!
High and Low combination is changed by customer specification

Figure 12: Contact B

Contact C: Transfer Contact



e.g. : contact output

Alarm contact	Terminal No. 1	2	3	4	5	6	7	8	9	10	11	12
2 contacts	L, L		L									
	H		H, H									
	L		H									
4 contacts	L, L		L		H		H, H					
6 contacts	L, L, L		L, L		L		H		H, H		H, H, H	

Note!
High and Low combination is changed by customer specification

Figure 13: Contact C

5 Maintenance

After the transmitter and receiver have been installed and adjusted, ensure to replace the cover of the transmitter.
Check AT5000 or AT500 transmitter periodically in accordance with the following maintenance procedures.

Checking Spot	Checking Procedures	Countermeasures
Alarm cam	Check for an alarm cam (switching point)	If the switching point shifts from the right place, readjust the point.
Alarm micro switch	Check for a contact performance.	Replace the faulty-micro switch with a new one.
Wiring and connected terminal	Check for a disconnection or loose connection terminal.	

Repairs
The Endress+Hauser repair policy is based on the fact that the measuring devices have a modular design and that customers are able to undertake repairs themselves. Spare parts are contained in corresponding kits along with their related replacement instructions. Endress+Hauser provides spare parts for repairs of AT5000 or AT500, which are located with their order numbers on later pages (refer to "7.1 Spare Parts"). Contact Endress+Hauser service representatives for further assistance regarding service and spare parts.

Repairs to Ex-approved Devices
When performing repairs on Ex-approved devices, note the following:

- Repairs of Ex-approved devices may only be performed by trained personnel or by 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 spare parts, note the device information on the nameplate. Replace parts only with parts that have the same device information.
- Perform repairs according to the instructions. When completing repairs, perform the specified routine test on the device.
- Only Endress+Hauser service representatives may convert a certified device into a different certified variant.
- Document all repair work and conversions.

6 Troubleshooting

6.1 Spare Parts

Spare parts are contained in kits. Spare parts for AT5000 or AT500 which can be ordered from Endress+Hauser are shown with their order numbers in the diagram below. Contact Endress+Hauser service representatives for further assistance.

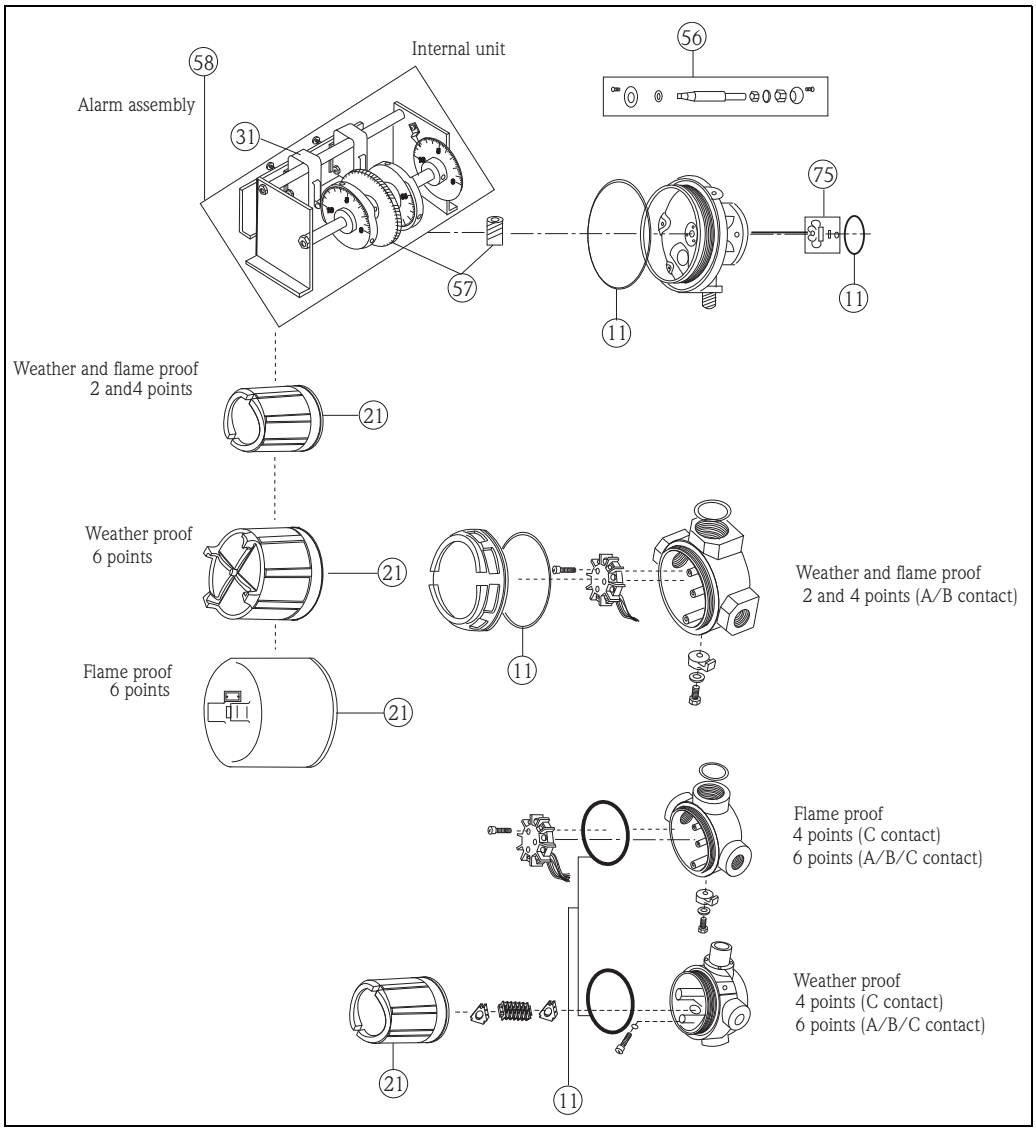


Figure 14: Spare Parts

⑪	017880-5025	O-ring, main body, NBR
	017880-5026	O-ring, terminal box, small, NBR
	017880-5027	O-ring, EI-compartment, large
	017880-1231	O-ring, coupling
㉑	017860-6324	Cover terminal box,large
	017871-6329	Large-long cover main body
	017860-6326	Large-short cover main body
㉛	017871-1230	Microswitch
㊻	017871-1221	Main shaft assembly, AT500
㊼	017871-1215	Gear wheel, LT2.5m, LTC5m, AT500
	017871-1216	Gear wheel, LT5m, LTC10m, AT500
	017871-1217	Gear wheel, LT10m, AT500
	017871-1218	Gear wheel, LT20m, AT500
	017871-1219	Gear wheel, LT30m, AT500
㊽	56004259	Alarm assembly, 2 contacts, LT2.5m, AT500
	56004262	Alarm assembly, 2 contacts, LT5m, AT500
	56004258	Alarm assembly, 2 contacts, LT10m, AT500
	56004260	Alarm assembly, 2 contacts, LT20m, AT500
	56004261	Alarm assembly, 2 contacts, LT30m, AT500
	71071076	Alarm assembly, 2 contacts, LTC5m, AT500
	56004264	Alarm assembly, 4 contacts, LT2.5m, AT500
	56004267	Alarm assembly, 4 contacts, LT5m, AT500
	56004263	Alarm assembly, 4 contacts, LT10m, AT500
	56004265	Alarm assembly, 4 contacts, LT20m, AT500
	56004266	Alarm assembly, 4 contacts, LT30m, AT500
	71071079	Alarm assembly, 4 contacts, LTC5m, AT500
	56004269	Alarm assembly, 6 contacts, LT2.5m, AT500
	56004272	Alarm assembly, 6 contacts, LT5m, AT500
	56004268	Alarm assembly, 6 contacts, LT10m, AT500
	56004270	Alarm assembly, 6 contacts, LT20m, AT500
	56004271	Alarm assembly, 6 contacts, LT30m, AT500
	71071080	Alarm assembly, 6 contacts, LTC5m, AT500
㊺	017871-1233	Coupling, transmitter,LT11,12
	017871-1232	Coupling, transmitter,LT14,16

6.2 Troubleshooting

Error Condition	Cause	Countermeasures
Alarm does not work or return.	Set screw of the alarm cam or the scale is loose.	Tighten the setscrew and reset the level.
	Micro switch is not working properly.	Replace the micro switch.
	Wires are broken or short-circuited.	Redo the wiring connection.

6.3 Return

The following procedure must be performed before returning AT1000 or AT1 transmitter to Endress+Hauser e.g. for repair or calibration.

- Remove all residue. Pay special attention to the gasket grooves and crevices where fluid may be present. This is especially important if the fluid is corrosive, poisonous, carcinogenic, radioactive, or otherwise hazardous.
- Always enclose a duly completed "Declaration of Hazardous Material and De-contamination" form (a copy of the “Declaration of Hazardous Material and De-contamination” is included at the end of this operating manual). Only then can Endress+Hauser transport, examine, and repair a returned device.
- Enclose special handling instructions if necessary, for example a safety data sheet as per EN 91/155/EEC.

Additionally specify:

- An exact description of the application
- The chemical and physical characteristics of the instrument
- A short description of the error that occurred (specify the error code where possible)
- Operating time of the device

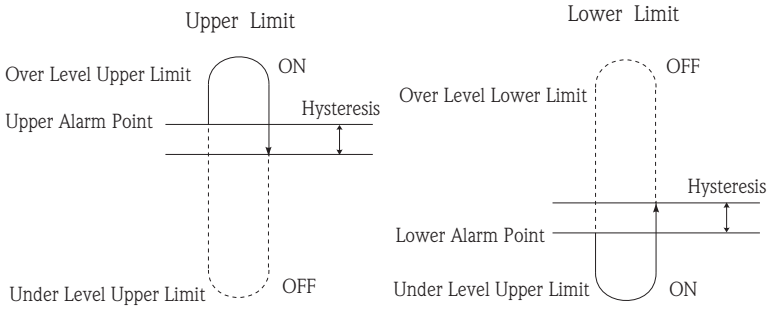
6.4 Disposal

In case of disposal, separate the various components according to their materials.

6.5 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, do not hesitate to contact your Endress+Hauser representative.

7 Technical Data

Contact Rating	Alarm 2 points: AC max. 220V, max. 4.2A, AC max. 1050VA, DC max. 180W Alarm 4 points: AC max. 220V, max. 2.8A, AC max. 700VA, DC max. 120W Alarm 6 points: AC max. 220V, max. 2.8A, AC max. 700VA, DC max. 120W (A, B contact) AC max. 220V, max. 2.2A, AC max. 550VA, DC max. 94W (C contact)
Accuracy	±0.5% (for full span)
Measuring Range	2.5m, 5m, 10m, 20m, 30m
Hysteresis	Within 2% of measuring range
Cable Entry	Flameproof with cable gland (B): G1 TF22-13, G1 TF22-15, G1-1/4 TF22-13 Flameproof (E): G3/4 , G1-1/2 Weather proof (W): G3/4 , G1-1/2, NPT3/4, NPT1, M25
Switch Operation	
Transmission Line (per one contact)	A contact (normal open), B contact (normal close): two lines C contact (transfer): two or three lines
Alarm Contacts	2, 4, 6 points, Micro switch (SPDT) Select any of the following contact A contact (normal open) B contact (normal close) C contact (transfer)
Ambient Temperature	Weather proof : -20...+60°C Flame proof : -10...+40°C
Storage Temperature	-20...+60°C
Protection	Weather proof : IP65 Flame proof : d2G4
Color	Silver
Weight	Weather proof : approx. 7kg Flame proof : approx. 13kg

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