



Instruction Manual

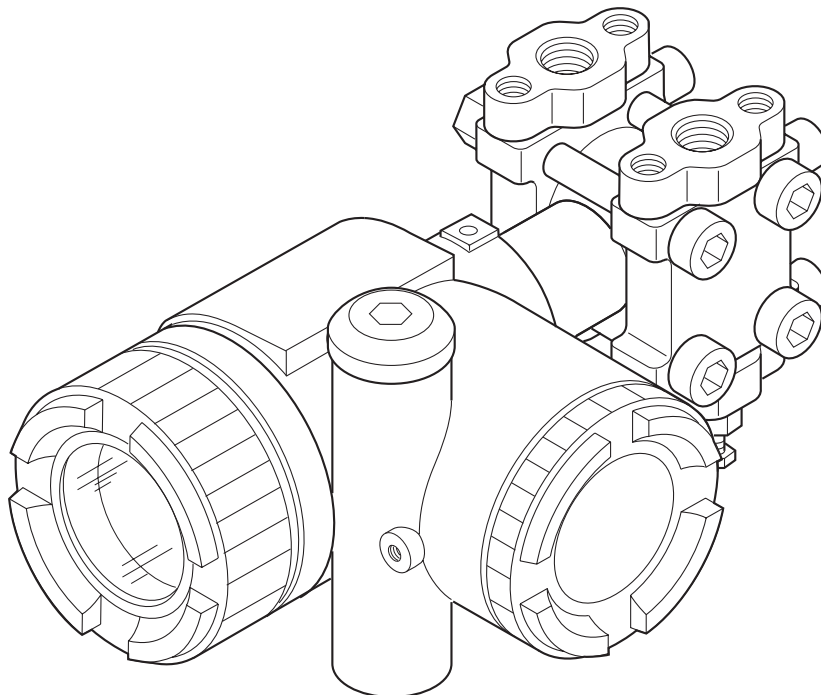
FCX-AIV

**Pressure transmitters
with safety functions**

**Standard process covers
FKC, FKG, FKA**

**Direct mount
FKP, FKH**

**With remote seal
FKE, FKD, FKB, FKM, FKP, FKH**



INTRODUCTION

Thank you very much for purchasing FCX-AIV series of pressure transmitters with safety functions.

Read this manual carefully before proceeding with the installation, commissioning and maintenance of the FCX-AIV transmitters.


- Transmitter specifications are subject to change without prior notice for product improvements.
- Any modification of the transmitter without authorization is strictly prohibited. Fuji Electric will not bear any responsibility for troubles caused by such a modification.
- This manual should be kept by the persons in charge of installation, commissioning and maintenance.
- This manual is available at anytime on the [Fuji Electric website](#) or by reading the QR Code located on the cover of the terminal block.
- Drawings in this manual are not contractuel. For detailed specifications and general arrangement drawings, please refer to the dedicated datasheets.
- Transcription of all or part of this manual is prohibited.
The content of this manual is subject to change without prior notice.

TRANSMITTER IDENTIFICATION

Each FCX-AIV pressure transmitter has its own nameplate riveted to the housing. It summarizes the main characteristics of the transmitter and possibly the type of approval with the related parameters.

Make sure the identification of the transmitter is fully corresponding to your application.

The figure here below describes the FCX-AIV nameplate

 ①		FCX-A IV			
Model	②	⑩			
Range	③				
Power Supply	④				
Output	⑤			OAN	⑧
M.W.P	⑥			Mfd	⑨
Ser.No.	⑦			CE	⑪
Assembled in France (F-63039 Clermont-Ferrand)				IP66/67	338B365
Fuji Electric France S.A.S.					

- ① Tag No: TAG number
- ② Model: Model code
- ③ Range: Calibrated range and/or maximum cell measuring range
- ④ Power Supply: Power supply range or maximum value (may depend of the type of approval)
- ⑤ Output: Output type (for example 4-20 mA_{dc})
- ⑥ M.W.P: Maximum Working Pressure
- ⑦ Ser.No: Transmitter serial number
- ⑧ OAN: Oder Acknowledgement Number
- ⑨ Mfd: Manufacturing Date
- ⑩ Type of approval description
- ⑪ Notified body number

GENERAL RECOMMENDATIONS

1. Storage for a long period:

Store the transmitter in a dry room with normal temperature and humidity.
Keep protective caps in place at electrical conduits and process connections.

2. Select the appropriate place for installation:

The location of the on-site installation should provide a minimum level of vibrations and limitation of exposure to dust and corrosive atmospheres.
The location should also allow an easy access for setup and maintenance of the transmitter.

3. Mounting position:

Mount the FCX-AIV pressure transmitter in a horizontal or vertical position.



4. Beware of overpressure:



Please carefully check the Maximum Working Pressure (MWP) of the transmitter.
Do not apply a pressure outside the specified range and limits.

GENERAL SAFETY INSTRUCTIONS

For your own safety and the correct use of the FCX-AIV pressure transmitters, please carefully read the following general recommendations:

1. The risks related to a non-respect of the instructions provided in this manual are ranked and identified as follow:

 DANGER	Risk of death or severe injury if the safety instructions are not followed.
 WARNING	In case of wrong handling probable injury or physical damage can happen.

 CAUTION	Important instructions to be respected.
 INDICATION	General observations concerning the product, product handling and correct use of the transmitter.

2. Applications in hazardous locations (potentially explosive atmospheres)

FCX-AIV series of pressure transmitters are certified to be compliant with several standards and protection modes.

Installation, commissioning and maintenance must be carried out on site by personnel qualified to work in classified areas and according to the protection modes of the FCX-AIV pressure transmitters.

Please refer to the dedicated datasheet for further details on protection mode and related parameters.

3. Magnetic stick (contactless setting)

An optional magnetic stick can be used to configure the FCX-AIV pressure transmitter without opening the local display cover. This option is particularly useful for applications in hazardous locations with flameproof protection mode.

The magnetic stick is made of a high efficiency neodymium magnet producing a strong magnetic field.

- Do not use this magnetic stick if you have a medical device such as a pacemaker.
- Keep away the magnetic stick from devices or items sensitive to magnetic fields.

4. Safety Instrumented Systems

FCX-AIV series of pressure transmitters are certified SIL 2 (HFT=0) and SIL 3 (HFT=1) according to IEC 61508 and IEC 61511 standards.

For evaluation of your safety instrumented system, please refer to the FCX-AIV Safety Manual (TN5A5137) for further details on FMECA results, failure rates and expected product lifetime.

TABLE OF CONTENTS

INTRODUCTION	P. 1
TRANSMITTER IDENTIFICATION	P. 2
GENERAL RECOMMANDATIONS	P. 3
GENERAL SAFETY INSTRUCTIONS	P. 4
TABLE OF CONTENT	P. 5
1. PRODUCT OVERVIEW	P. 6
1.1 Amplifier unit and junction box	.7
1.2 Items displayed by the optional local indicator	.8
1.3 Operating modes of the local display with configuration switches	.9
2. INSTALLATION AND PIPING	P. 10
2.1 Installation	.10
2.1.1 Mounting bracket	.10
2.1.2 Pipe mounting	.11
2.1.3 Flanged mounting (rigid assembly)	.12
2.1.4 Wall mounting	.12
2.2 Change the orientation of the transmitter housing	.12
2.3 Space around the transmitter	.13
2.4 Change the position of the vent/drain plug	.13
2.5 Piping	.14
2.5.1 Differential pressure and flow transmitters (model FKC)	.14
2.5.2 Gauge and absolute pressure transmitters (models FKG and FKA)	.16
2.5.3 Direct mount pressure transmitters (models FKP and FKH)	.18
2.5.4 Remote seal type pressure transmitters (models FKE, FKD, FKB and FKM)	.19
3. WIRING	P. 24
3.1 Wiring procedure	.24
3.2 Electrical conduit	.25
3.3 Power supply and load resistance	.26
3.4 Grounding	.26
4. COMMISSIONING AND SHUTDOWN	P. 27
4.1 Preliminary verifications	.27
4.2 Commissioning	.27
4.2.1 Differential pressure transmitter	.27
4.2.2 Gauge and absolute pressure transmitters	.27
4.3 Shutdown	.28
4.3.1 Differential pressure transmitter	.28
4.3.2 Gauge and absolute pressure transmitters	.28
5. TRANSMITTER SETTINGS	P. 29
5.1 Using the external adjustment screw	.29
5.1.1 Zero adjustment	.29
5.1.2 Span adjustment	.30
5.2 Using the local indicator	.31
5.2.1 Menu list	.32
5.2.2 Switching menus	.33
5.2.3 Operating procedure	.34
5.3 Using a HART Hand Held Communicator	.65
5.3.1 HHC wiring diagram (intrinsically safe protection mode)	.65
5.3.2 HART Device Description files	.65
5.3.3 Organization of the HART menus and functions	.66
5.4 Using a HART modem and FDT Device Type Manager™ (FDT DTM)	.70
6. MAINTENANCE	P. 71
6.1 Periodic inspection	.71
6.2 Proof Test (IEC 61508/IEC 61511)	.71
6.3 Troubleshooting	.72
6.4 Replacement of defective parts	.73
6.5 Calibration	.79
6.6 Default factory settings	.82

1 PRODUCT OVERVIEW

The FCX-AIV series of pressure transmitters accurately measures a differential, gauge or absolute pressure, and converts it into a proportional 4-20 mA output current. In its differential architecture the FCX-AIV pressure transmitter can be used for flowrate, level and density measurements.

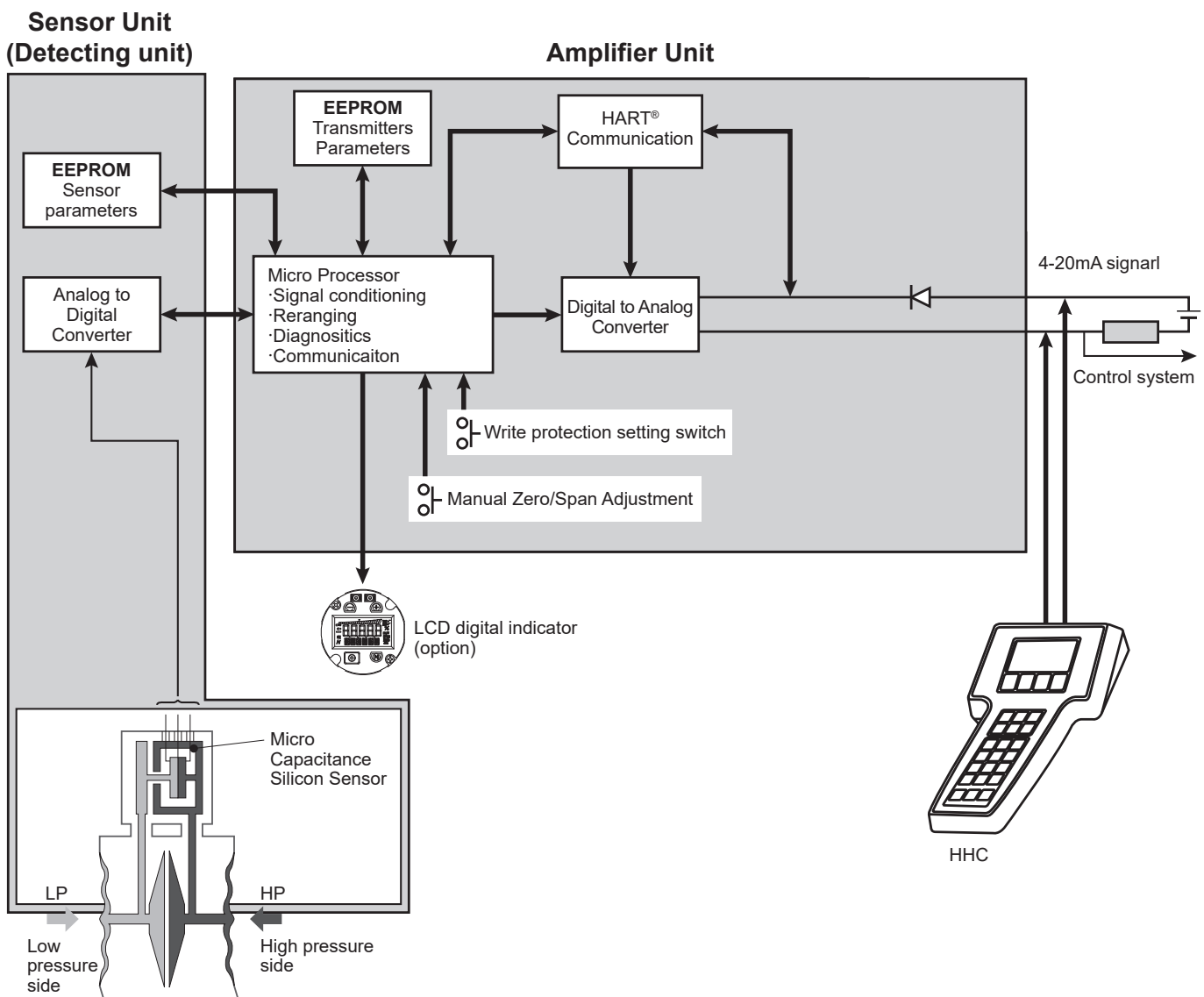
The transmitter uses the unique and proven Fuji Electric silicon micro-capacitive sensor in combination with state-of-the-art digital signal processing to provide exceptional performances, high functionality and reliability.

Transmitter settings can be changed either using the HART communication protocol or the optional digital display. Zero and span adjustment can also be done locally with the external adjustment screw located on the transmitter housing.

Measuring principle

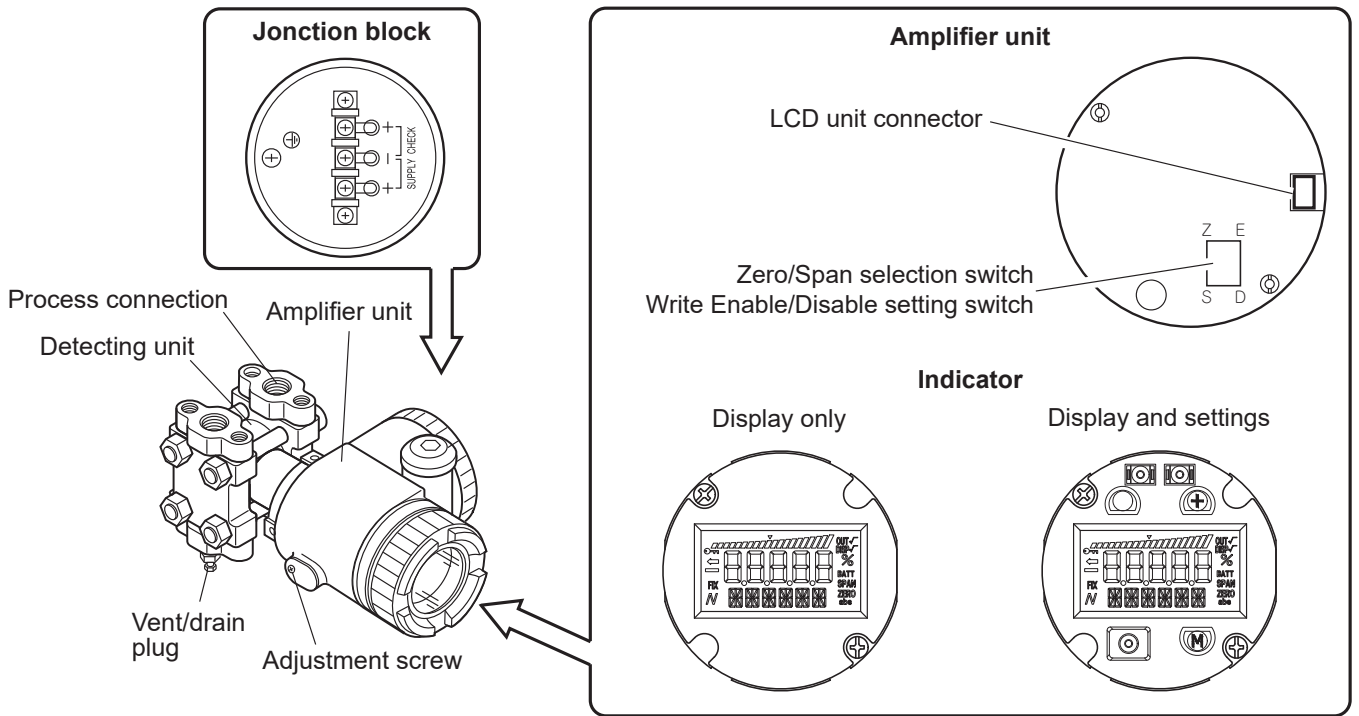
The operating principle of the FCX-AIV pressure transmitter is shown in the block diagram below.

The input pressure is detected by the micro-capacitive silicon sensor and then converted by the amplifier unit into a 4-20 mA output signal combined with the HART 7 communication protocol.



1 PRODUCT OVERVIEW

1.1 Amplifier unit and junction block



Amplifier unit

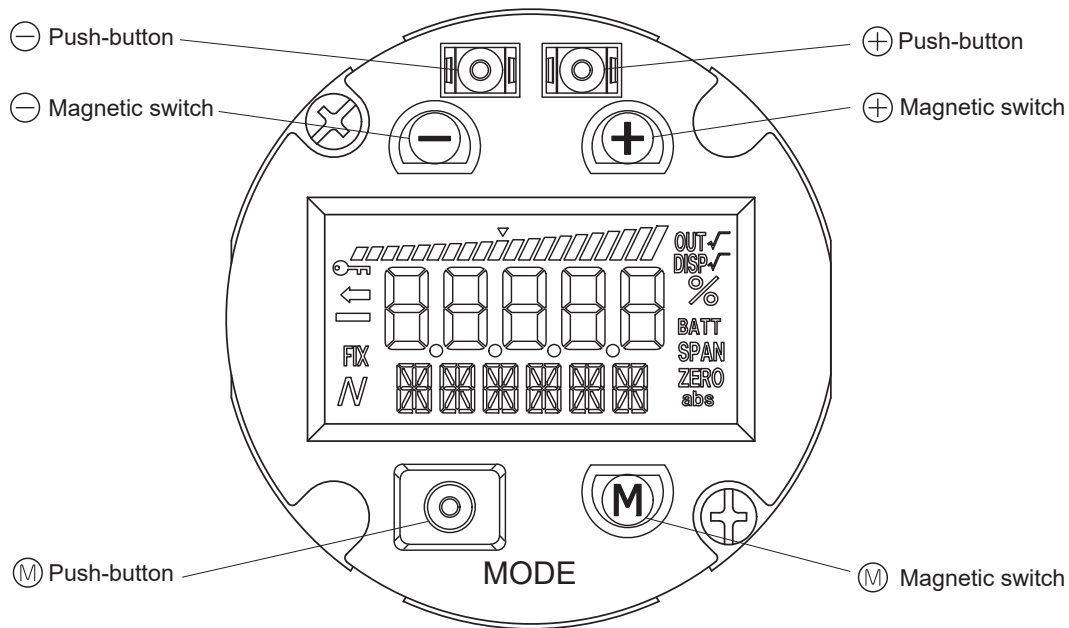
Item	Description
LCD unit connector	Used to connect the optional digital indicator.
Zero/Span selection switch	Used to select either zero or span to be adjusted by the external screw.
Write Enable/Disable selection switch	Used to prevent modification of the transmitter settings. E = Enable / D = Disable write capability

Junction block

Symbol	Description
	DC power supply and 4-20 mA + HART connections
	Can be used for an external field indicator Note: the impedance of the indicator must be < 12 Ω (Ohm).
	Terminal used for grounding (earth)

1 PRODUCT OVERVIEW

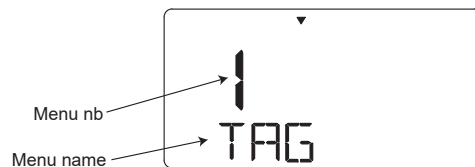
1.3 Operating modes of the local display with configuration switches



Normal mode (the transmitter is performing measurements)



Configuration mode



Functions of the three sets of switches

Each function can be managed by two redundant switches:
One push-button and one magnetic switch.

- The configuration with the push-buttons requires to open the display cover.
- The configuration with the magnetic switches can be done with a magnetic stick and without opening the transmitter housing (hazardous locations without intrinsic safety protection mode).

Fonction	Description
M (Mode)	Enables to switch between the normal and configuration mode. Validates a new parameter setting value.
- (Minus)	Decreases the configuration menu number or the parameter value.
+ (Plus)	Increases the configuration menu number or the parameter value.

Please refer to the section "Configuration with the local display unit" for further details.

2 INSTALLATION AND PIPING



INDICATION

If the transmitter is to be stored before the installation, leave it packed in a room with normal temperature and humidity (25°C [77°F], 60% RH).

2.1 Installation

During the unpacking of the transmitter, check the conformity of the transmitter and all the accessories. Before installation, the customer must check the compatibility of the wetted parts with the application.



WARNING

- The transmitter is heavy. Be careful when handling it.
- The transmitter should be installed in a place that meets the operating conditions as defined in its data sheet.
- Process connections must match with the process temperature and pressure.
- The measuring diaphragms are very sensitive. Be careful when handling.



DANGER

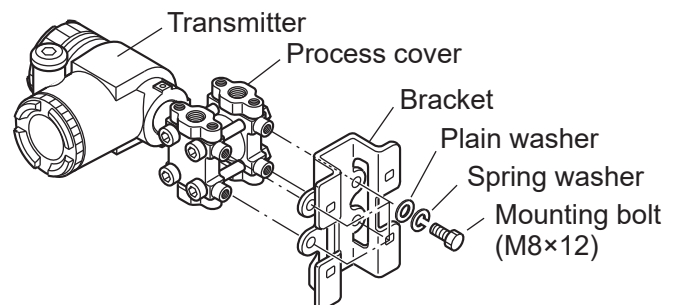
Potentially explosive atmospheres :

- Check that the protection mode corresponds with the type of process and installation area.
- Flameproof protection mode :
 - Always de-energize the transmitter before opening it.
 - Local configuration can only be done using the magnetic stick.

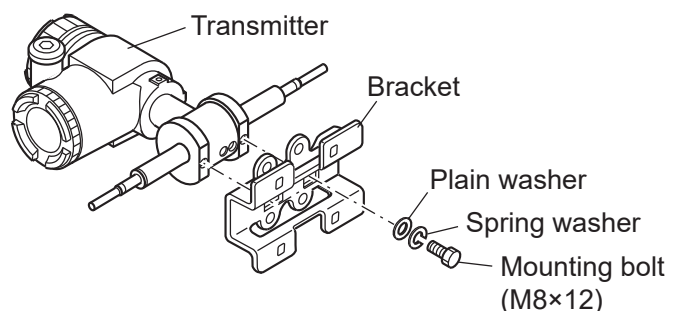
2.1.1 Mounting bracket

Depending the type of transmitter, the mounting bracket can be assembled as shown below.

- Differential, gauge and absolute pressure transmitter with standard process covers (FKC, FKG and FKA models):

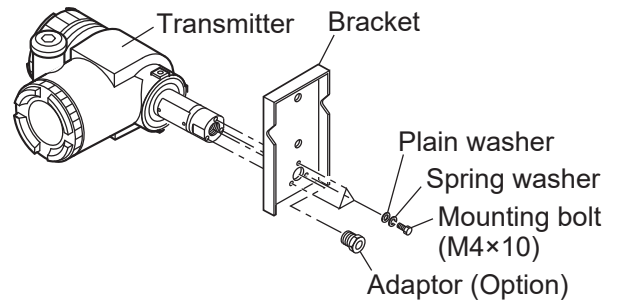


- Differential, gauge and absolute pressure transmitter with capillary and remote seal (FKD, FKB and FKM models):



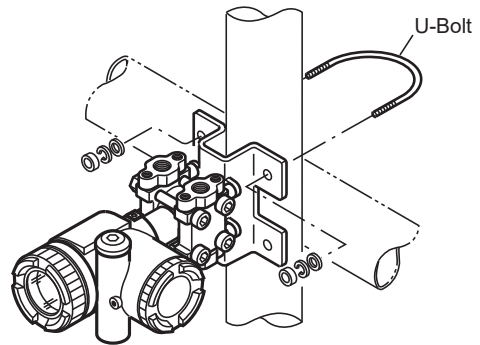
2 INSTALLATION AND PIPING

- Gauge and absolute direct mount type pressure transmitters (FKP and FKH models):

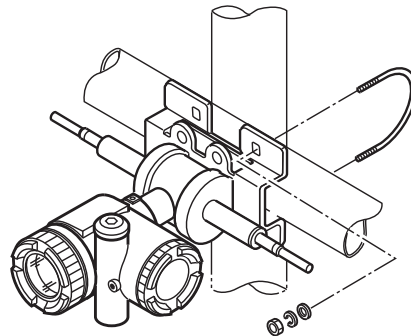


2.1.2 Pipe mounting

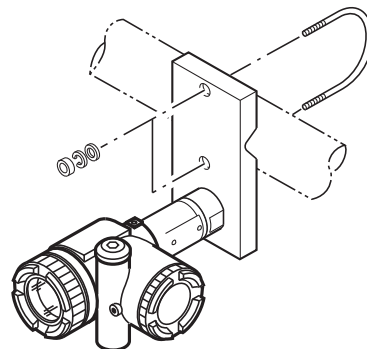
- Standard process cover type (FKC, FKG and FKA models):



- Remote seal type (FKD, FKB and FKM models):



- Direct mount type (FKP and FKH models):



Note 1: The transmitter shall be mounted either on a horizontal or vertical pipe

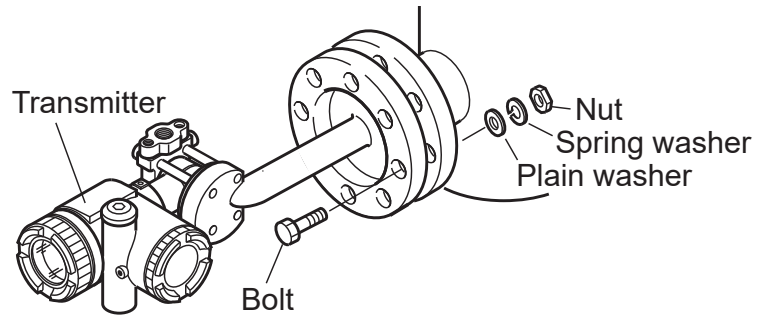
Note 2: The U-bolt is designed for DN 50, 2" pipe (external diameter = 60.5 mm)

Note 3: Tightening torque = 15 ± 0.8 N.m

2 INSTALLATION AND PIPING

2.1.3 Flanged mounting (rigid assembly)



- Transmitters with remote seal can be designed with a flanged rigid assembly, FKE level transmitter. Flange bolting and gasket are not provided with the transmitter.



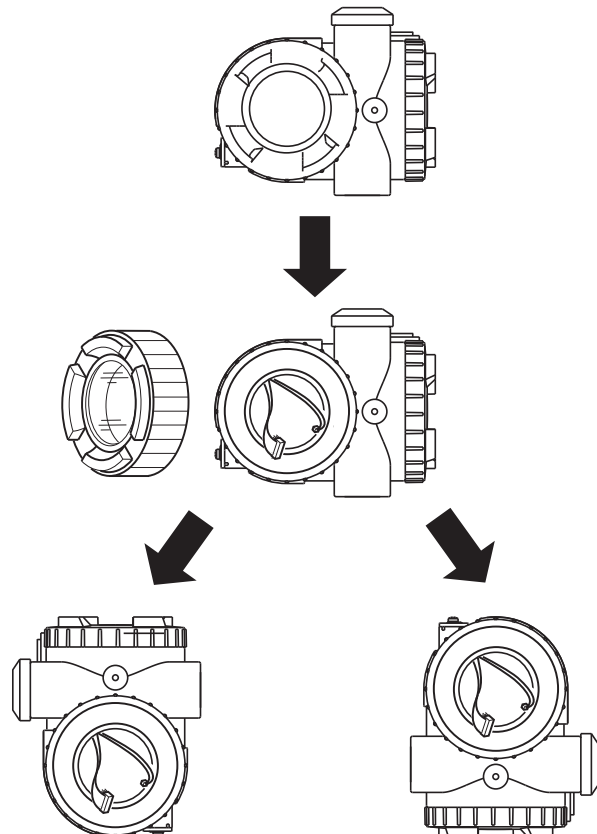
2.1.4 Wall mounting

- Fasten to the wall using the U-bolt holes and M8 bolts.

2.2 Change the orientation of the transmitter housing

 DANGER	Potentially explosive atmosphere: <ul style="list-style-type: none">For flameproof protection mode, never apply this procedure without deenergizing the transmitter.
 WARNING	The transmitter housing position can be modified by steps of 90°. Before rotating the housing, it is recommended to dismantle the amplifier unit to avoid damaging the ribbon cable of the measuring cell

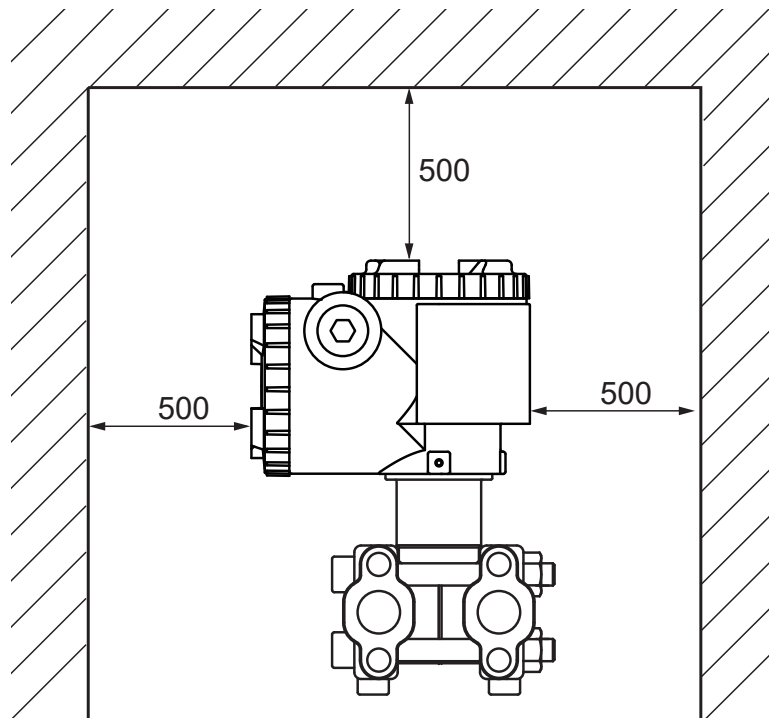
- Remove the housing cover and dismantle the amplifier unit.
- Loosen the three fixation screws (M6 x 12) of the transmitter housing.
- Rotate the housing in 90° steps to the desired orientation.
- Tighten the three fixation screws of the housing.
- Reassemble the amplifier unit and replace the housing cover.



2 INSTALLATION AND PIPING

2.3 Space around the transmitter

Make sure there is enough space around the transmitter to facilitate wiring and maintenance.

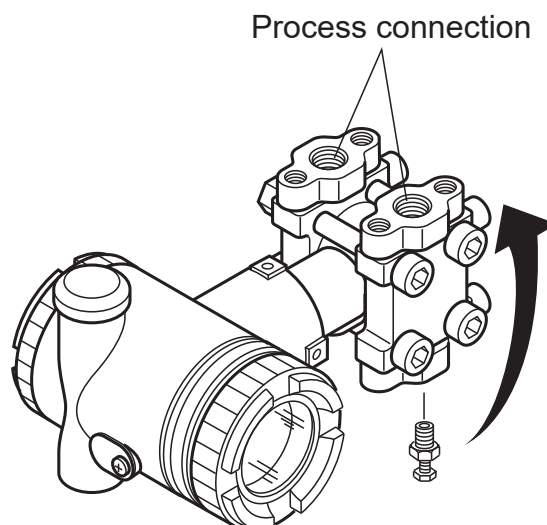


2.4 Change the position of the vent/drain plug

Unscrew slowly the vent/drain plug.

Clean the thread and reapply sealing tape (4 turns, 1/10 mm thickness) before screwing the vent/drain plug back on.

Tightening torque : 30 N.m (3 kgf.m) <18ft.lb>



2 INSTALLATION AND PIPING

2.5 Piping

For optimal operation and measurement, the connection to the process piping must respect the following rules:

1. For liquid or steam monitoring, the transmitter must be installed below the process piping.
2. For gas monitoring, the transmitter must be installed above the process piping.



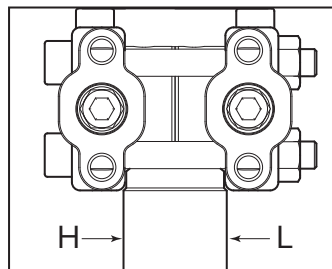
DANGER

All parts, including transmitters, valves and manifolds, to be connected to the process line must be selected to comply with the piping class and maximum working pressure (MWP). If the selected parts do not meet the rating, it may lead to a hazard.

2.5.1 Differential pressure and flow transmitters (model FKC)

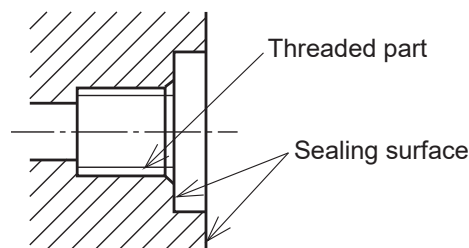
Check the high and low pressure side on the transmitter:

The high and low pressure sides are respectively indicated by "H" and "L" on the cell neck.



Remove the protective cap:

The process connection ports of the transmitter are fitted with protective caps. Before piping, be sure to remove the caps. When removing the caps, carefully protect the threaded portion and sealing face from damage.



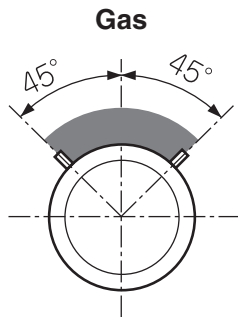
Connection of the transmitter to the impulse pipes:

1. When using a manifold valve, it must first be fixed to the transmitter by tightening four 7/16-20UNF bolts, and then the impulse pipes must be connected to the manifold valve. Tightening torque of the 7/16-20UNF bolts should be 30 to 40 Nm (3 to 4 kgf m).
2. If a manifold is not used, the impulse pipes can be directly screwed into the transmitter process covers. If the thread size does not match between the transmitter and the impulse pipes, an oval flange can be used. The tightening torque of the 7/16-20UNF bolts of the oval flanges should be 30 to 40 Nm (3 to 4 kgf m).

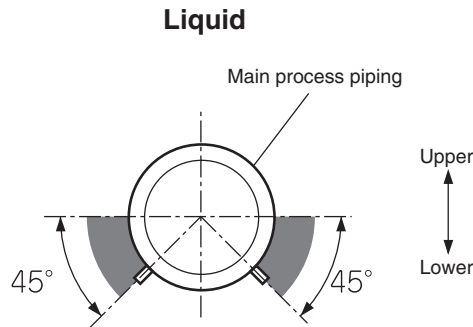
2 INSTALLATION AND PIPING

Positions of the process connection:

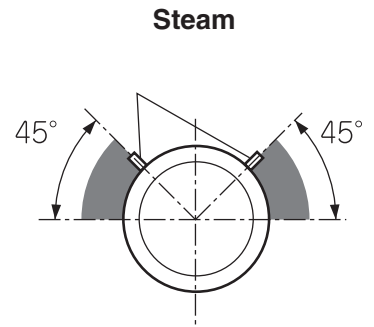
The position of the fittings to the process pipe depends on the nature of the process. Please refer to the drawings below for further details for gas, liquids and steam measurement.



Connections on the upper side (0 to $\pm 45^\circ$ from the vertical)



Connections on the lower side (0 to -45° from the horizontal)

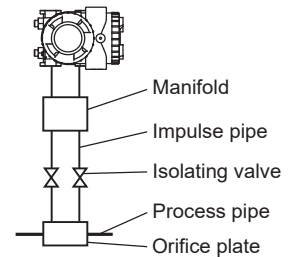


Connections on the upper side (0 to $+45^\circ$ from the horizontal)

Typical examples of process piping connections:

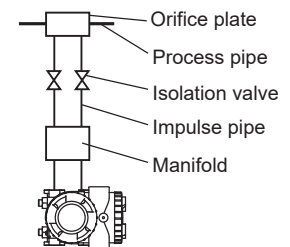
- Gas flow measurement**

Standard process cover type.
Place the transmitter above the process piping.
If the process temperature is high, please use condensers.



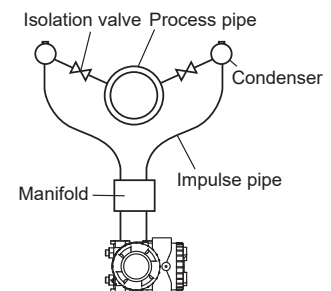
- Liquid flow measurement**

Place the transmitter below the process piping.
Make piping so that gas bubbles that might be present in the impulse pipes cannot reach the transmitter.



- Steam flow measurement**

Install two condensers at the same height near the piping connexion. Fill the pipes between the condensers and the transmitter with water.
The installation of drains is required.



2 INSTALLATION AND PIPING

- **Level measurement: The reference column is filled**

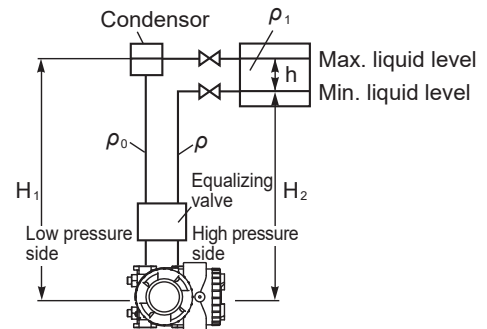
Connect the high level connection of the tank to the low pressure connection of the transmitter, and the low level connection of the tank to the high pressure connection of the transmitter. The reference column (connected to the high level connection) must be filled with fluid.

Level calculation formula:

$$\text{LRV} = \rho H_2 - \rho_0 H_1$$

$$\text{URV} = \rho H_2 + \rho_1 h - \rho_0 H_1$$

LRV	Low limit of measurement (0% point).
URV	High limit of measurement (100% point).
ρ, ρ_0, ρ_1	Specific weight (N/m ³).
H_1, H_2	Liquid level.
h	Liquid level change.



- **Level measurement: The reference column is empty**

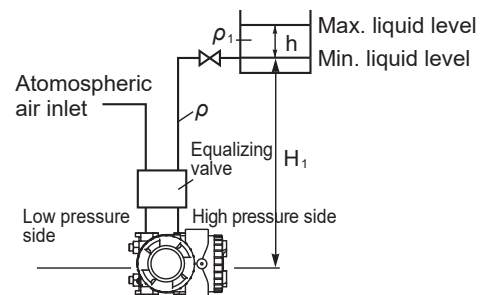
For an open tank, the low pressure of the transmitter is left at the atmospheric pressure.

Level calculation formula:

$$\text{LRV} = \rho H_1$$

$$\text{URV} = \rho H_1 + \rho_1 h$$

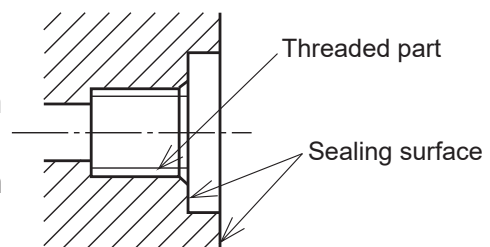
LRV	Low limit of measurement (0% point).
URV	High limit of measurement (100% point).
ρ, ρ_1	Specific weight (N/m ³).
H_1, H_2	Liquid level.
h	Liquid level change.



2.5.2 Gauge and absolute pressure transmitters (models FKG and FKA)

Remove the protective cap:

The process connection port of the transmitter is fitted with a protective cap. Before piping, be sure to remove the cap. When removing the cap, carefully protect the threaded portion and sealing face from damage.



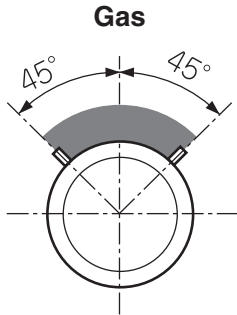
Connection of the transmitter to the impulse pipe:

The impulse pipe can be directly screwed into the transmitter process cover. If the thread size does not match between the transmitter and the impulse pipe, an oval flange can be used. The tightening torque of the 7/16-20UNF bolts of the oval flanges should be 30 to 40 Nm (3 to 4 kgf m).

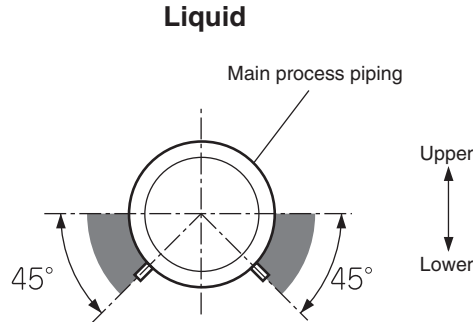
2 INSTALLATION AND PIPING

Positions of the process pipe connections:

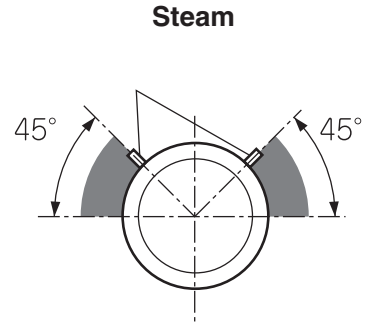
The position of the fittings to the process pipe depends on the nature of the process. Please refer to the drawings below for further details for gas, liquids and steam measurement.



Connections on the upper side (0 to $\pm 45^\circ$ from the vertical)



Connections on the lower side (0 to -45° from the horizontal)

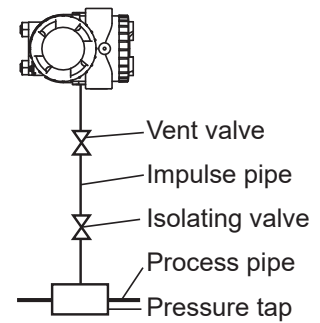


Connections on the upper side (0 to $+45^\circ$ from the horizontal)

Typical examples of process piping connections:

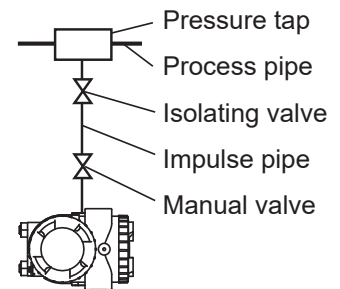
- **Gas line pressure measurement**

Place the transmitter above the pressure source. If the process temperature is high, please use a condenser like for steam.



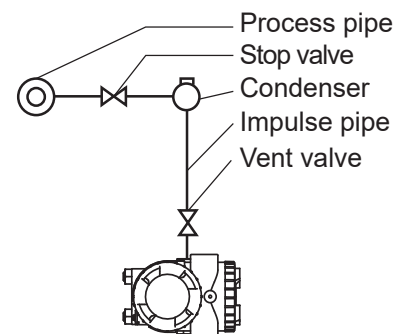
- **Liquid line pressure measurement**

Place the transmitter below the process piping. Make piping so that gas bubbles that might be present in the impulse pipe cannot reach the transmitter.



- **Steam line pressure measurement**

Install a condenser near the piping connection. Fill the pipe between the condenser and the transmitter with water. The installation of a drain is required.

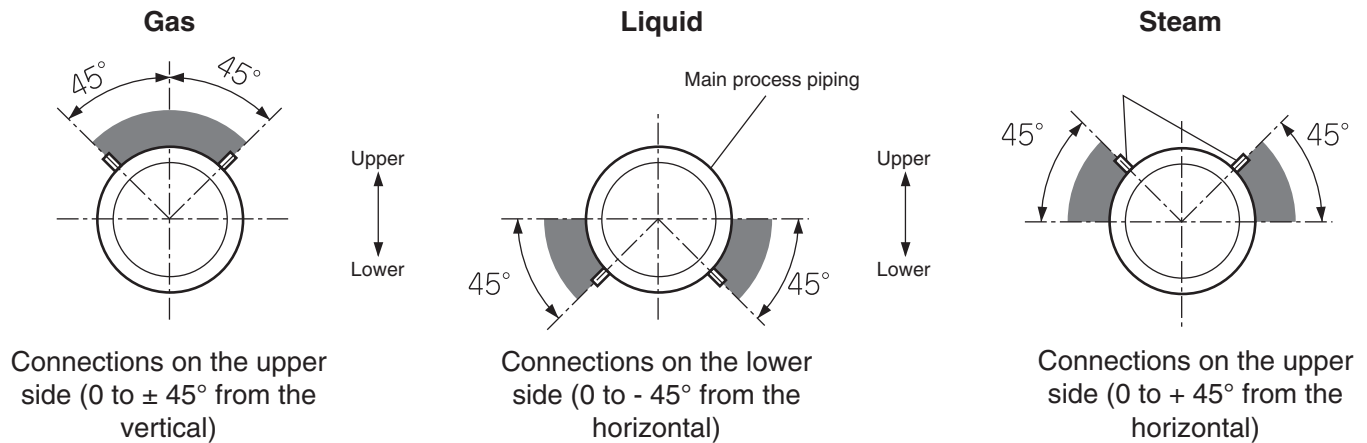


2 INSTALLATION AND PIPING

2.5.3 Direct mount pressure transmitters (models FKP and FKH)

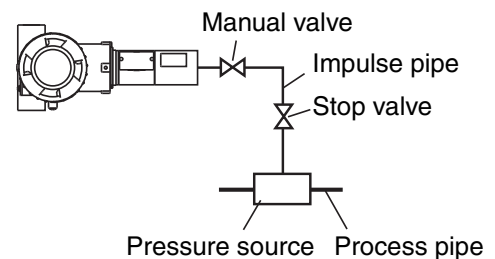
Positions of the process connection:

The position of the fittings to the process pipe depends on the nature of the process. Please refer to the drawings below for further details for gas, liquids and steam measurement.

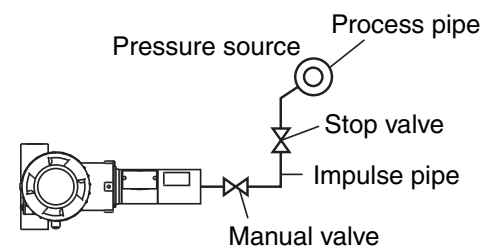


Typical examples of process piping connections:

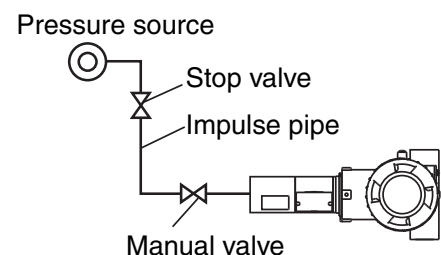
- **Gas line pressure measurement**
Place the transmitter above the pressure source.



- **Liquid line pressure measurement**
Place the transmitter below the process piping. Make piping so that gas bubbles that might be present in the impulse pipe cannot reach the transmitter.



- **Steam line pressure measurement**
Place the transmitter below the process piping.



2 INSTALLATION AND PIPING

! INDICATION

General recommendations for impulse piping:

- For liquids, the impulse pipes should have a downward slope of 1/10 or more from the process connection to the pressure transmitter to prevent the accumulation of gas bubble in the measuring chamber.
- For gas, the impulse pipes should have an upward slope of 1/10 or more from the process connection to the pressure transmitter to prevent the accumulation of condensate in the measuring chamber.
- Avoid sharp bends in the impulse pipe which can cause gas or liquid to accumulate in the impulse pipe.
- Avoid mechanical stress on both the impulse pipe and the pressure transmitter connection.
- Protect impulses lines and pressure transmitters from the possibility of freezing.

2.5.4 Remote seal type pressure transmitters (models FKE, FKD, FKB and FKM)

Remote seal level transmitter (Model FKE)

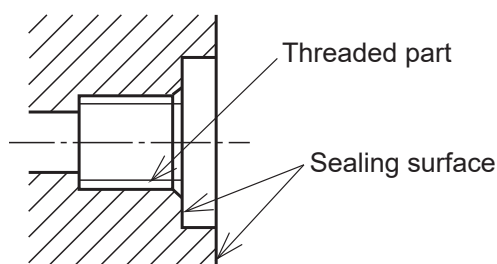
- The FCX-AIV FKE pressure transmitter has been designed with a differential pressure cell and is optimized for level measurements.
- The HP measuring side consists of a flanged measuring diaphragm with a rigid assembly.
- The LP measuring side consists of a standard process cover which can either be left at atmospheric pressure (open tanks) or connected to the static pressure at the top of the vessel (pressurized tanks)

Connection to the process:

The connection of the HP process flange must be carried out in accordance with the recommendations of the relevant flange standard (EN 1092-1, ASME B16.5, EN 1759-1...), its sizing, type of gasket surface and maximum working pressure.

The connection of the LP side to the process is made on the process cover via a standard 1/4-18 NPT thread. A thread conversion is possible by using an oval flange.

Before proceeding with the LP side, remove the protective cap and carefully protect the threaded portion and sealing surface from scratch



2 INSTALLATION AND PIPING

! INDICATION

Please refer to FCX-AIV FKE pressure transmitter datasheet for further details on selection of flange type and wetted materials.

Level measurement on an open tank:

The low pressure side of the FKE transmitter is left at atmospheric pressure.

Level calculation formula:

$$\text{LRV} = \rho H_1$$

$$\text{URV} = \rho (H_1 + h)$$

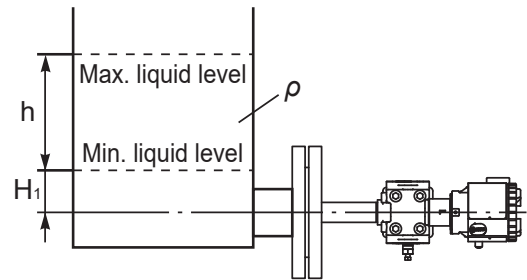
LRV Low limit of measurement (0%)

URV High limit of measurement (100%)

ρ Specific weight (N/m^3)

H_1 Liquid level between the flange axis and the minimum level

h Liquid level change



Level measurement in a closed tank:

The reference column is filled

Level calculation formula:

$$\text{LRV} = \rho H_1 - \rho_0 H_2$$

$$\text{URV} = \rho (H_1 + h) - \rho_0 H_2$$

LRV Low limit of measurement (0%)

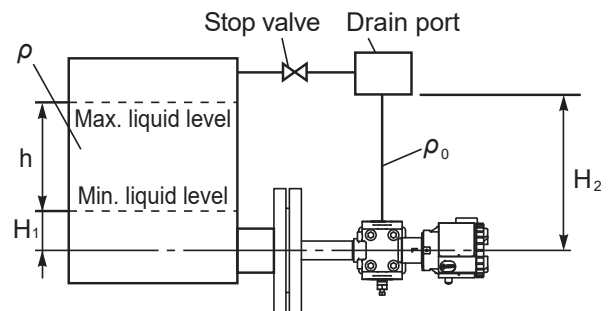
URV High limit of measurement (100%)

ρ Specific weight (N/m^3)

ρ_0 Density of the liquid column

H_1 Liquid level between the flange axis and the minimum level

h Liquid level change



The reference column is empty:

Level calculation formula:

$$\text{LRV} = \rho H_1$$

$$\text{URV} = \rho (H_1 + h)$$

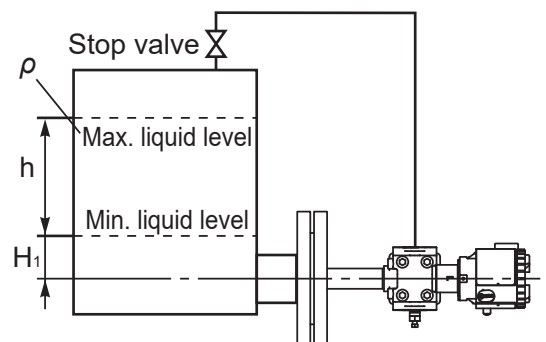
LRV Low limit of measurement (0%)

URV High limit of measurement (100%)

ρ Specific weight of the process (N/m^3).

H_1 Liquid level between the flange axis and the minimum level.

h Liquid level change



2 INSTALLATION AND PIPING



CAUTION

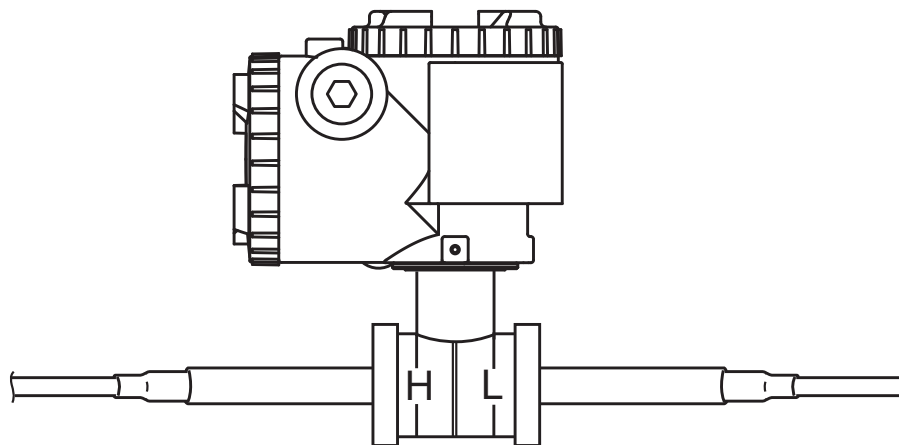
- H1 must be greater than half the diameter of the measuring diaphragm. Otherwise measurement will not be linear until the diaphragm is completely immersed.
- When handling the transmitter, be careful to not shock or scratch the measuring diaphragm or the flange gasket surface.
- Assemble the measuring flange with the appropriate gasket and respecting the tightening torque.

Remote seal differential pressure transmitter (Model FKD)

The FCX-AIV FKD differential pressure transmitter provides remote seal process connections on both the HP and LP side. The connection between the measuring membrane and the pressure cell is made with fully welded capillaries.

Check the high and low pressure side on the transmitter:

The high and low pressure sides are respectively indicated by "H" and "L" on the cell neck.



Connection to the process:

The connection of the measuring process flange must be carried out in accordance with the recommendations of the relevant flange standard (EN 1092-1, ASME B16.5, EN 1759-1...), its sizing, type of gasket surface and maximum working pressure.

For small process connection, flange to flange or screwed adapters can be used to increase the measuring diaphragm diameter.



INDICATION

Please refer to FCX-AIV FKD differential pressure transmitter datasheet for further details on selection of flange type and wetted materials.

2 INSTALLATION AND PIPING

Level measurement in a closed tank:

The level measurement using a differential pressure transmitter allows to compensate the static pressure effect in a closed tank.

Level calculation formula:

$$LRV = \rho H_1 - \rho' D$$

$$URV = \rho (H_1 + h) - \rho' D$$

LRV Low limit of measurement (0%)

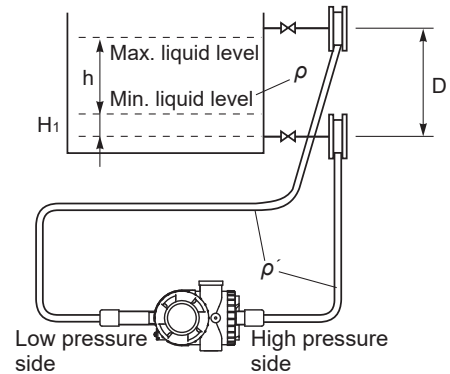
URV High limit of measurement (100%)



ρ Specific weight of the process (N/m³)

ρ' Specific weight of the filling fluid (N/M³)

H_1 Liquid level reference

h Level variation



 INDICATION	<p>If the process can reach vacuum conditions, the transmitter body must be installed below the process connections.</p>
 CAUTION	<ul style="list-style-type: none"> • H_1 must be greater than half the diameter of the measuring diaphragm. Otherwise measurement will not be linear until the diaphragm is completely immersed. • When handling the transmitter, be careful to not shock or scratch the measuring diaphragm or the flange gasket surface. • Assemble the measuring flange with the appropriate gasket and respecting the tightening torque.


Remote seal gauge and absolute pressure transmitters (Models FKB and FKM)

The FCX-AIV FKB (gauge) and FKM (absolute) pressure transmitters provide a remote seal process connection. The connection between the measuring membrane and the pressure cell is made with a fully welded capillary.

Connection to the process:

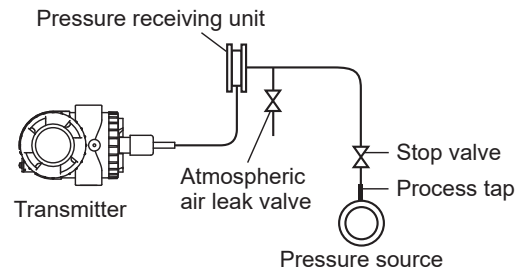
The connection of the measuring process flange must be carried out in accordance with the recommendations of the relevant flange standard (EN 1092-1, ASME B16.5, EN 1759-1...), its sizing, type of gasket surface and maximum working pressure.

For small process connection, flange to flange or screwed adapters can be used to increase the measuring diaphragm diameter.

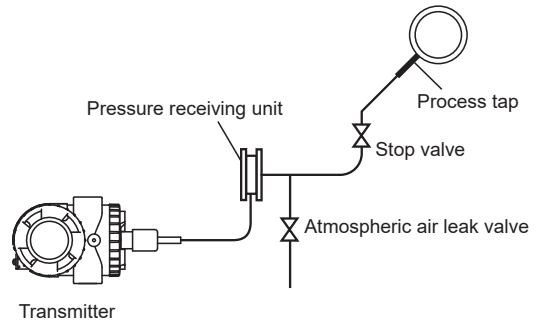
 INDICATION	<p>Please refer to FCX-AIV FKB and FKM pressure transmitter datasheet for further details on selection of flange type and wetted materials.</p>
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2 INSTALLATION AND PIPING

- Gas measurement:**
 Locate the process connection above the process pipe



- Liquid measurement:**
 Locate the process connection below the process pipe



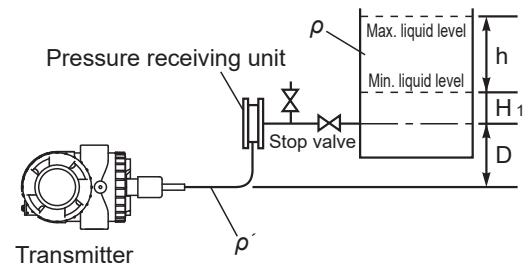
- Level measurement in an open tank:**

Level calculation formula:

$$\text{LRV} = \rho H_1 + \rho' D = 0\%$$

$$\text{URV} = \rho (H_1 + h) + \rho' D = 100\%$$


- ρ Specific weight of the process (N/m^3)
- ρ' Specific weight of the filling fluid (N/M^3)
- H_1 Liquid level reference
- h Level variation.




CAUTION

- H_1 must be greater than half the diameter of the measuring diaphragm. Otherwise measurement will not be linear until the diaphragm is completely immersed.
- When handling the transmitter, be careful to not shock or scratch the measuring diaphragm or the flange gasket surface.
- Assemble the measuring flange with the appropriate gasket and respecting the tightening torque.

3 WIRING

 DANGER	Potentially explosive atmosphere: For flameproof protection mode, never open the transmitter on site while it is powered.
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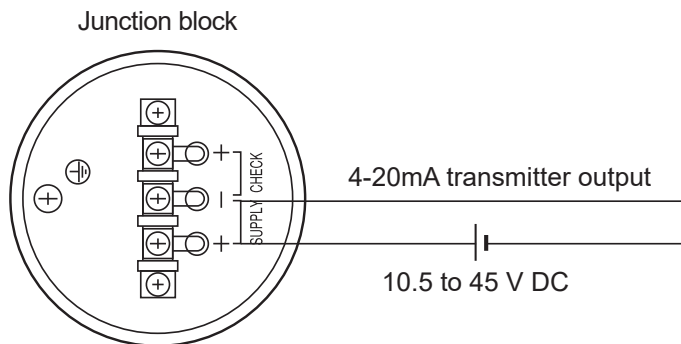
 WARNING	<ul style="list-style-type: none">• The application of a voltage greater than 60 Vdc or 40 Vac (33 Vdc or 23 Vac with the optional arrester) between the "+" and "-" terminals may cause permanent damage to the transmitter.• It is recommended to use a shielded cable.• After installation, check that all transmitter covers are securely screwed on.
--	---

3.1 Wiring procedure

Terminal block connection diagram:

The connection diagram is shown just below.

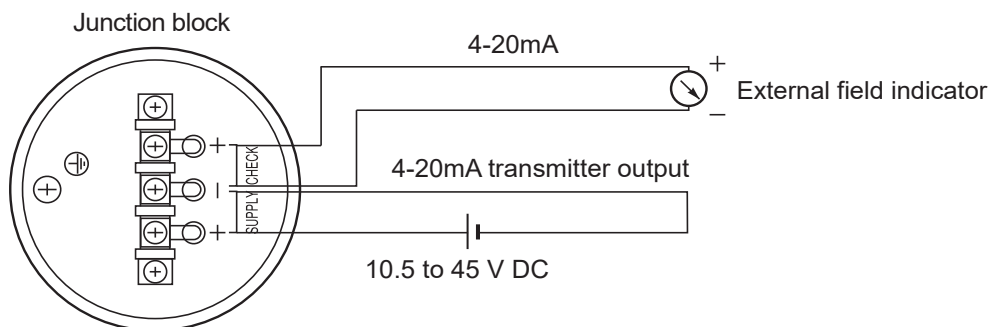
Tighten the terminal screws (M3.5 × 10) to a torque of approximately 1.5 N·m (15 kgf·cm) <11ft·lb>



Using an external field indicator:

An external field indicator can be connected between CHECK "+" and "-" as shown below.

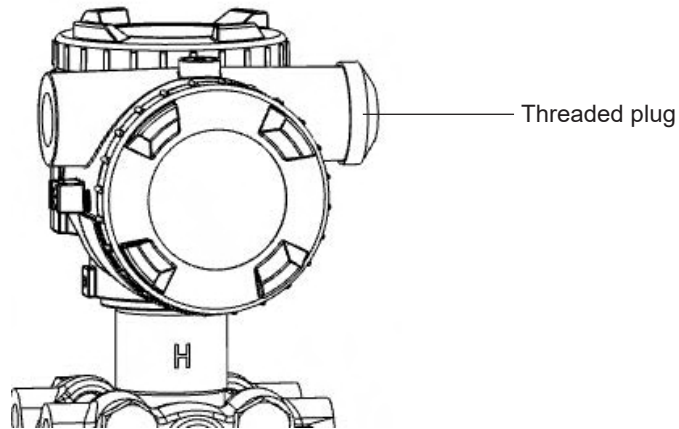
The internal resistance of the field indicator must be less than 12 Ω.





3 WIRING

3.2 Electrical conduit

Two electrical conduits are available on the FCX-AIV pressure transmitters. According to the factory default configuration, a threaded plug is installed on one of the two electrical conduits as shown below.



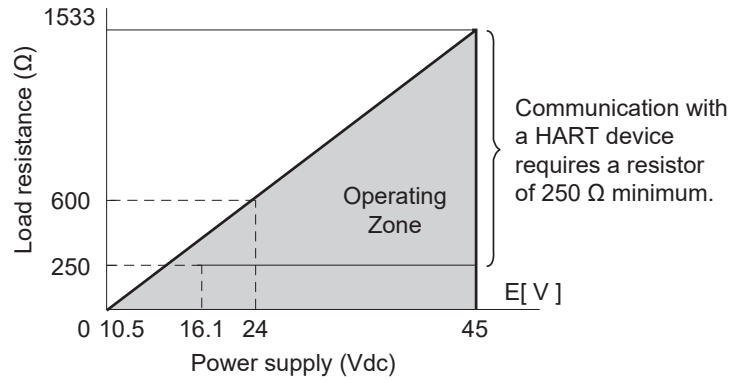
Depending on the desired side for the cable entry, the cap can be unscrewed and installed on the opposite side.

 CAUTION	<p>FCX-AIV transmitters ensure IP66 and IP67 ingress protection ratings. Make sure to ensure the sealing effectiveness when installing the screw cap by:</p> <ul style="list-style-type: none">• The use of the appropriate gasket with M20x1.5 or Pg 13.5 threads• The application of threadlocker (recommended) or Teflon tape with 1/2-14 NPT thread.
 DANGER	<p>Potentially explosive atmospheres:</p> <p>For flameproof protection mode and depending the nature of the atmosphere, make sure to use a cable gland with suitable characteristics (type of gas, dust, class or zone).</p>

3 WIRING

3.3 Power supply and load resistance

A load resistance is required to communicate through the HART communication protocol. The diagram below shows the relationship between the possible value of the load resistance and the power supply voltage.



The load resistance can be defined using the following formula:

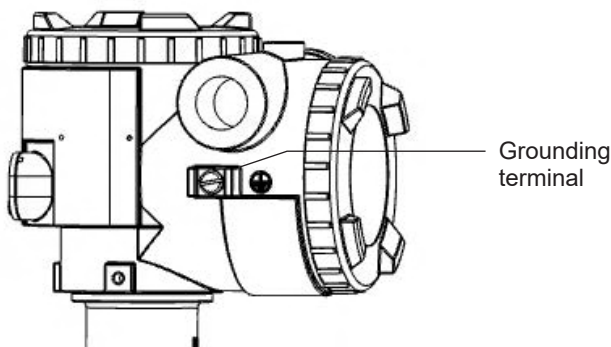
$$R [\Omega] = \frac{E [V] - 10.5}{(I_{\max} [\text{mA}] + 0.9) \times 10^{-3}}$$

Depending on the configuration of the transmitter, I_{\max} can be 20 mA, $I_{\text{sat-high}}$ or $I_{\text{burnout-high}}$

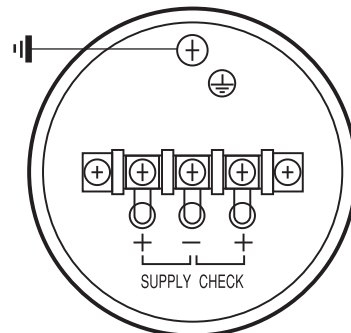
3.4 Grounding

Two terminals are available to perform the grounding of the transmitter housing.

- **One outside the transmitter housing:**



- **One inside the transmitter housing near the junction block:**

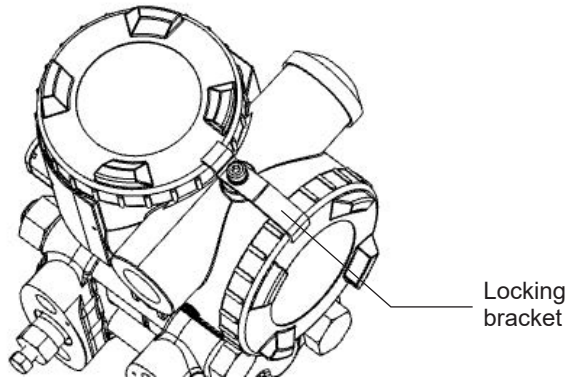


4 COMMISSIONING AND SHUTDOWN

4.1 Preliminary verifications

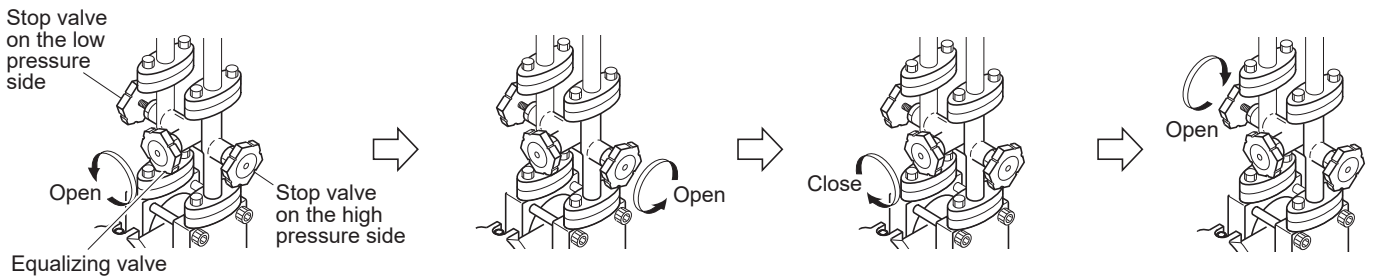
Before commissioning the transmitter, please proceed with the following verifications:

- Check for liquid or gas leaks at the process connections.
- For liquid processes, purge the measuring chamber of the pressure cell.
- For flameproof protection mode, make sure that both transmitter covers are securely tightened and the locking bracket is in place.



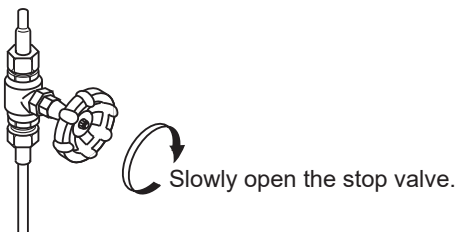
4.2 Commissioning

4.2.1 Differential pressure transmitter:



1. Open the equalizing valve.
2. Slowly open the stop valve on the high pressure side.
3. Close the equalizing valve.
4. Finally, slowly open the stop valve on the low pressure side.

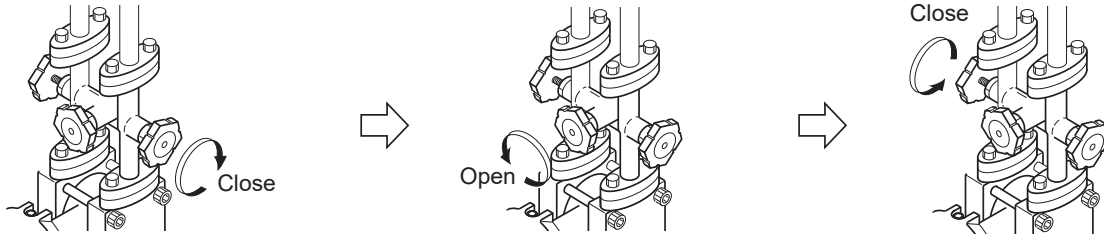
4.2.2 Gauge and absolute pressure transmitters:



4 COMMISSIONING AND SHUTDOWN

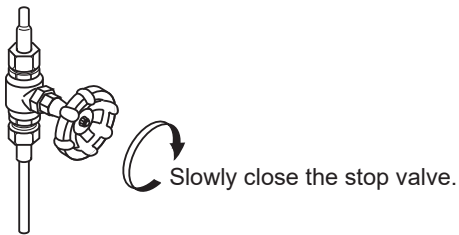
4.3 Shutdown

4.3.1 Differential pressure transmitter:



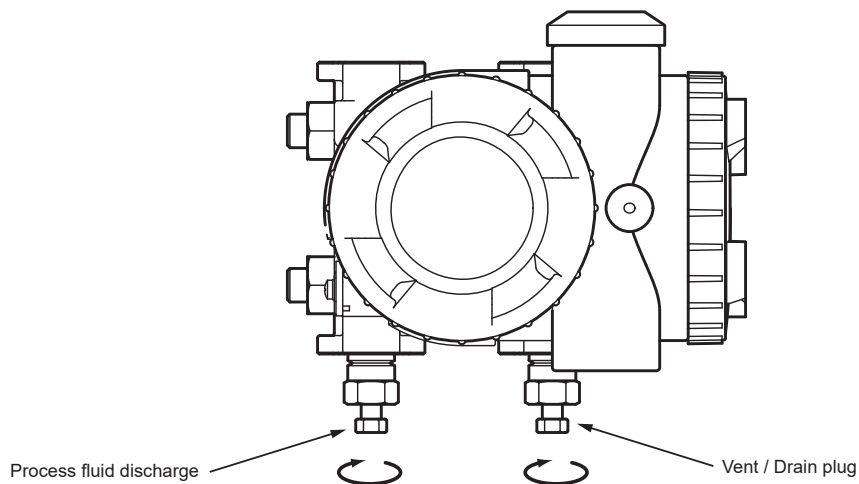
1. Slowly close the stop valve on the high pressure side.
2. Open the equalizing valve.
3. Slowly close the stop valve on the low pressure side.

4.3.2 Gauge and absolute pressure transmitters:




! INDICATION

To avoid corrosion, deposits or freezing during an extended shutdown, please completely drain the transmitter measurement chamber using the vent/drain plugs

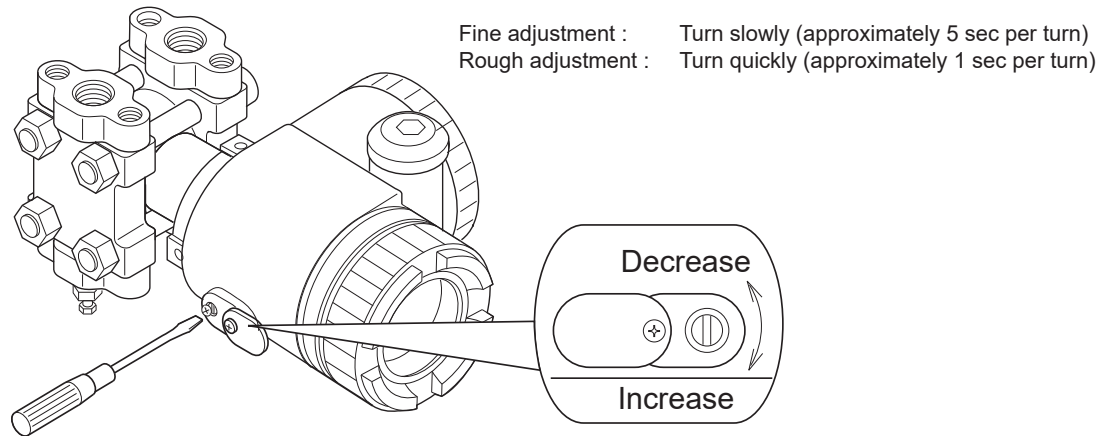


5 TRANSMITTER SETTINGS


5.1 Using the external adjustment screw

 INDICATION	<p>To be effective, the external adjustment screw must not be inhibited (please refer to the menu "F.LOCK" of the LCD display)</p>
---	--

The external adjustment screw allows to locally adjust the zero and span of the transmitter.

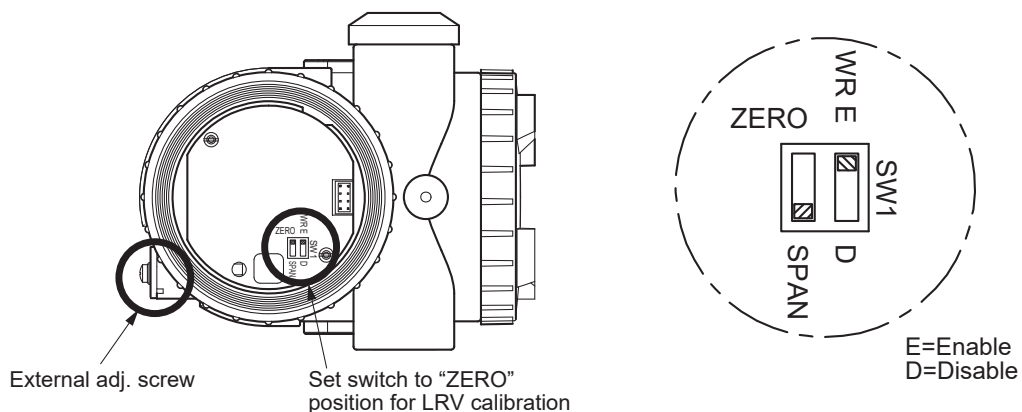


The selection between zero and span adjustment is made using a micro-switch located on the upper electronic board of the amplifier unit. For the adjustment to be effective, the "WR" micro-switch must be in the "E" (enable) position.

 DANGER	<p>Potentially explosive atmosphere: For flameproof protection mode, never open the transmitter on site while it is powered.</p>
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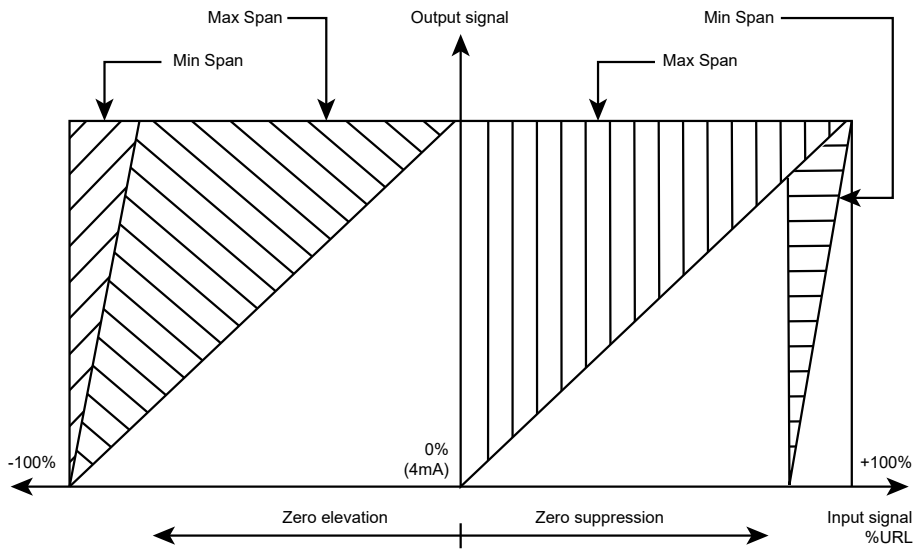
5.1.1 Zero adjustment

1. Set the ZERO/SPAN micro-switch to the "ZERO" position and the "WR" micro-switch to the "E" position.
2. Apply the input pressure corresponding to the Lower Range Value (0% = 4 mA).
3. Adjust the output signal to 4.000 mA by turning the external screw.
4. If needed, return the "WR" micro-switch to the "D" (disable) position

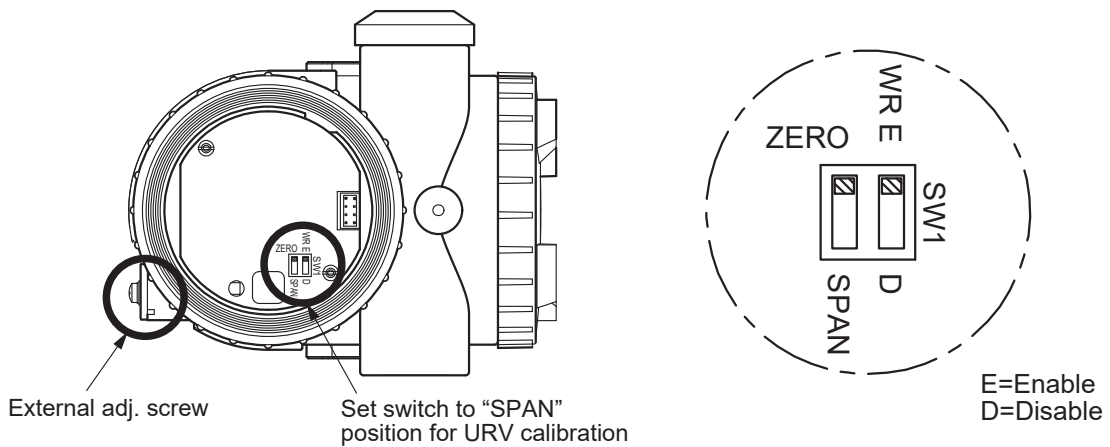


5 TRANSMITTER SETTINGS


The graphic below shows the possibility to perform a zero elevation or zero suppression within the range of the pressure cell.




5.1.2 Span adjustment



1. Set the ZERO/SPAN micro-switch to the "SPAN" position and the "WR" micro-switch to the "E" position.
2. Apply the input pressure corresponding to the Upper Range Value (100% = 20 mA).
3. Adjust the output signal to 20.000 mA by turning the external screw.
4. If needed, set back the "WR" micro-switch to the "D" (disable) position.

 CAUTION	After span adjustment, always return the ZERO/SPAN micro-switch to the "ZERO" position
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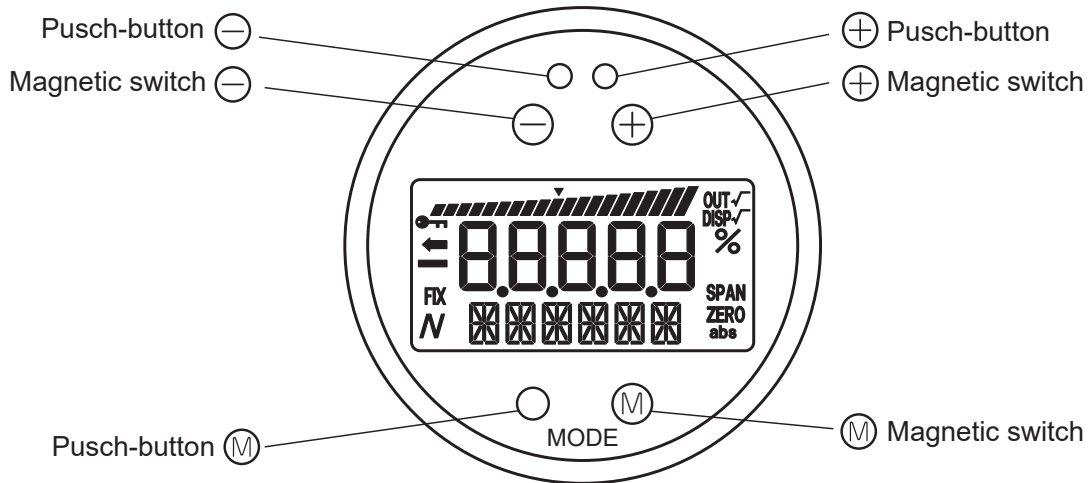
 INDICATION	After adjustment, the transmitter must remain powered for approximately 10 seconds (writing of the new parameters into non-volatile memory)
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5 TRANSMITTER SETTINGS

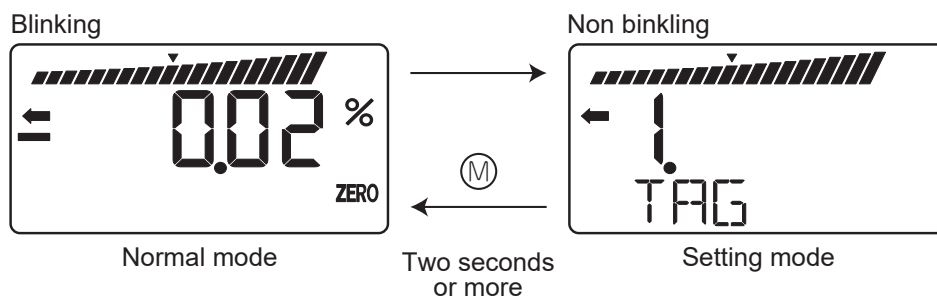
5.2 Using the local indicator

 DANGER	<p>Potential explosive atmosphere:</p> <p>For flameproof protection mode, never open the transmitter on site while it is powered.</p>
---	--

The figure below shows the optional local indicator with push-buttons and magnetic switches.



 INDICATION	<p>Potential explosive atmosphere:</p> <p>Using the magnetic stick allows the configuration of the transmitter without having to open the indicator cover</p>
---	--



- To switch between the standard mode and configuration mode, press the MODE button for at least two seconds.
- In configuration mode, the external adjustment screw is inhibited.
- If a configuration error occurs, the "SETErr" message is displayed on the the LCD.



5 TRANSMITTER SETTINGS

5.2.1 Menu list

The table below shows the available menus of the local indicator.

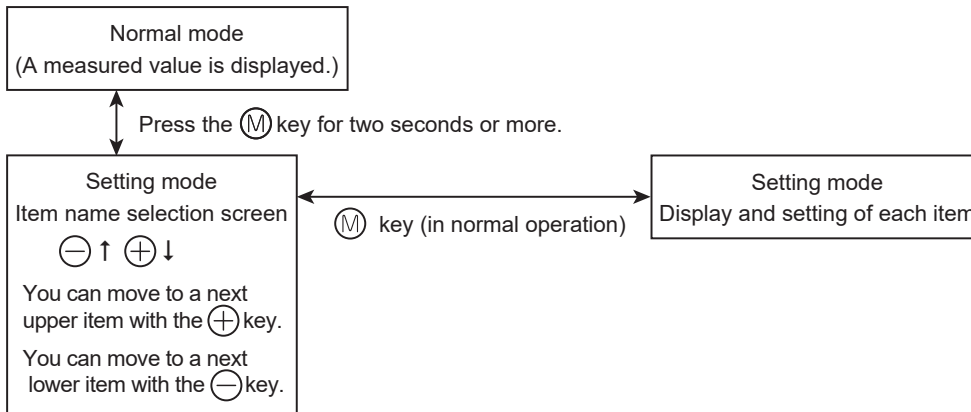
Item (large classification)	Item name	Description	Note
1 TAG No.	1. TAG	Display and setting of the TAG number	(*1)
2 Model code	2. TYPE	Display the type of transmitter and setting of the Model Code	(*1)
3 Serial No.	3-1. SERIAL N	Display the serial number	
	3-2. VER	Display the transmitter software version	
4 Engineering unit	4. UNIT	Display and change the engineering unit	(*1)
5 Range limit	5. URL	Display the maximum measuring range	
6 Measuring range	6-1. LRV	Change the LRV (lower range value of measuring range = 0% point)	(*1)
	6-2. URV	Change the URV (upper range value of measuring range = 100% point)	(*1)
7 Damping	7. DAMP	Change the damping time constant	(*1)
8 Output mode	8-1. OUT Md	Change the output mode	(*3)(*1)
	8-2. CUT Pt	Setting off the low flow rate cut point	(*3)(*1)
	8-3. CUT Md	Setting off the low flow rate cut mode	(*3)(*1)
9 Direction and value of burnout	9-1. BURNOT	Change the burnout direction	(*1)
	9-2. OVER	Change the output value when burnout direction = OVERSCALE	(*1)(*4)
	9-3. UNDER	Change the output value when burnout direction = UNDERSCALE	(*1)(*5)
A Zero/span calibration	A-1. ZERO	Zero calibration	(*2)(*6)
	A-2. SPAN	Span calibration	(*2)(*6)
B Output circuit calibration	b-1. 4mAAdj	4 mA output calibration	(*2)(*8)
	b-2. 20mAAdj	20 mA output calibration	(*2)(*8)
	b-3. FIXcur	Constant current output	(*8)
D Self-diagnosis	d-1. AMPTMP	Display of internal temperature of transmitter	
	d-2. ALMCHK	Display the self-diagnosis results	
E Preview	E. PREV	Display the software version, URL, damping and write protect status	
F Locking of adjustment functions	F. LOC	Locking or unlocking the external adjustment screw	(*1)
G Setting of LCD display	G-1. LDV	LDV (Lower Display Value) setting	(*1)
	G-2. UDV	UDV (Upper Display Value) setting	(*1)
	G-3. DP	DP (number of digit after Decimal Point) setting	(*1)
	G-4. LcdUnit	LcdUnit (LCD Unit Code) setting	(*1)
	G-5. LcdOpt	LcdOpt (LCD Option) setting	(*1)
H Output linearization	H-1. LINRIZ	Setting the linearization points	(*1)
	H-2. EFFECT	Enable or disable the linearization function	(*1)
I Rerange : adjustment by LRV/URV change	I-1. LRVAdj	Zero adjustment by range (LRV) change	(*2)(*6)
	I-2. URVAdj	Span adjustment by range (URV) change	(*2)(*6)
J Value and specification of saturation current	J-1. SAT LO	Change of saturation current value (lower limit)	(*1)(*7)
	J-2. SAT HI	Change of saturation current value (upper limit)	(*1)(*7)
	J-3. SPEC	Selection of the specification (Normal/Expanded) for the burnout and saturation currents	(*1)
K Parameter protection (write protect)	K-1. WPRTCT	Enabling or disabling the write protect function	(*9)
	K-2. CHPWD	Changing the write protect password	(*9)
	K-3. TIMER	Write protect timer	(*9)
L History data	L-1. HisZERO	Display of zero calibration data for users	
	L-2. HisSPAN	Display of span calibration data for users	
	L-3. HisHoUR	Amplifier and cell operating hours totalizer	
	L-4. HisAMP	Display of min/max of amplifier temperature history information	
	L-5. HisCELL	Display of min/max of cell temperature history information	
	L-6. HisERR	Display of error history information	

1. If the write protect function is enabled (menu "K. WPRTCT"), it is not possible to modify the setting.
2. If the external adjustment screw is disabled (Menu "F.Lock") or the write protect function is selected (Menu "K. WPRTCT") the item names is not displayed.
3. Only differential pressure transmitters have this function. Other transmitters do not display this menu.
4. Menu 9-2 is displayed only if the burnout direction (Menu 9-1) has been set to "OVERSCALE".
5. Menu 9-3 is displayed only if the burnout direction (Menu 9-1) has been set to "UNDERSCALE".
6. This menu is valid only if linearization function is disabled. If the linearization function is enabled, the menu name is not displayed.
7. You cannot change the value if the normal specification is selected in "J-3: SPEC."
8. In the multidrop mode, this menu is disabled and not displayed.
9. If the write protect function (with a password) is enabled with a HHC, this menu is not displayed.

5 TRANSMITTER SETTINGS

5.2.2 Switching menus

- Press the M key for a few seconds to switch from the normal mode to the setting mode.
- Press the + or - key to navigate in the main menus list.
- Press the M key to enter in a main menu.
- Press the M key for a few seconds to switch back to the normal mode.



1. TAG	↑ ↓	→ 1. Display and setting of TAG No.
2. TYPE	↑ ↓	→ 2. Display and setting of type
3-1. SERIAL N	↑ ↓	→ 3-1. Display of serial No.
3-2. VER	↑ ↓	→ 3-2. Display of transmitter software version
4. UNIT	↑ ↓	→ 4. Display and change of engineering unit
5. URL	↑ ↓	→ 5. Display of maximum measuring range
6-1. LRV	↑ ↓	→ 6-1. Change of LRV (lower range value of measuring range = 0% point)
6-2. URV	↑ ↓	→ 6-2. Change of URV (upper range value of measuring range = 100% point)
7. DAMP	↑ ↓	→ 7. Change of damping time constant
8-1. OUT Md	↑ ↓	→ 8-1. Change of output mode
8-2. CUT Pt	↑ ↓	→ 8-2. Setting of low flow rate cut point
8-3. CUT Md	↑ ↓	→ 8-3. Setting of low flow rate cut mode
9-1. BURNOT	↑ ↓	→ 9-1. Change of burnout direction
9-2. OVER	↑ ↓	→ 9-2. Chang of output value when burnout direction = OVERSCALE
9-3. UNDER	↑ ↓	→ 9-3. Chang of output value when burnout direction = UNDERSCALE
A-1. ZERO	↑ ↓	→ A-1. Zero calibration
A-2. SPAN	↑ ↓	→ A-2. Span calibration
B-1. 4mAAdj	↑ ↓	→ B-1. 4 mA calibration
B-2. 20mAAdj	↑ ↓	→ B-2. 20 mA calibration
B-3. FIXcur	↑ ↓	→ B-3. Constant current output
D-1. AMPTMP	↑ ↓	→ D-1. Display of internal temperature of transmitter
D-2. ALMCHK	↑ ↓	→ D-2. Display of self-diagnosis.
F. LOCK	↑ ↓	→ F. Locking and unlocking of the adjusting screw and the adjustment function in the setting mode
G-1. LDV	↑ ↓	→ G-1. LDV (Lower Display Value) setting
G-2. UDV	↑ ↓	→ G-2. UDV (Upper Display Value) setting
G-3. dP	↑ ↓	→ G-3. DP (Digit Number Under Decimal Point) setting
G-4. LcdUnit	↑ ↓	→ G-4. LcdUnit (LCD Unit Code) setting
G-5. LcdOpt	↑ ↓	→ G-5. LcdOpt (LCD Option) setting
I-1. LRVAAdj	↑ ↓	→ I-1. Zero adjustment by range (LRV) change
I-2. URVAAdj	↑ ↓	→ I-2. Span adjustment by range (URV) change
J-1. SAT LO	↑ ↓	→ J-1. Change of saturation current value (lower limit)
J-2. SAT HI	↑ ↓	→ J-2. Change of saturation current value (upper limit)
J-3. SPEC	↑ ↓	→ J-3. Selection (nomal specification/expanded specification) of specifications of burnout & saturation current
J-3. SPEC	↑ ↓	→ K. Setting and cancellation of set value protection (write protect)
K-1. WPRTCT	↑ ↓	→ L-1. Display of zero calibration data for users
L-1. HisZERO	↑ ↓	→ L-2. Display of span calibration data for users
L-2. HisSPAN	↑ ↓	→ L-3. Clearing of zero/span calibration data
L-3. HisCLEAR	↑ ↓	→ L-4. Display of min/max of amplifier temperature history information
L-4. HisAMP	↑ ↓	→ L-5. Display of min/max of cell temperature history information
L-5. HisCELL	↑ ↓	

5 TRANSMITTER SETTINGS

5.2.3 Operating procedure

Menu 1. TAG

Up to 26 alphanumeric characters can be entered to set the TAG number:

- Press the M key on the screen ① to display the TAG. Number setting (②).
- Input alphanumeric characters as required with the - or + keys on the screen ②.

Functions of the keys:

- : To define the characters at the cursor position. (0 to 9, space, A to Z, -)
- + : To move the cursor position to the next digit. (1 → 2 → 3 ... → 26 → 1)

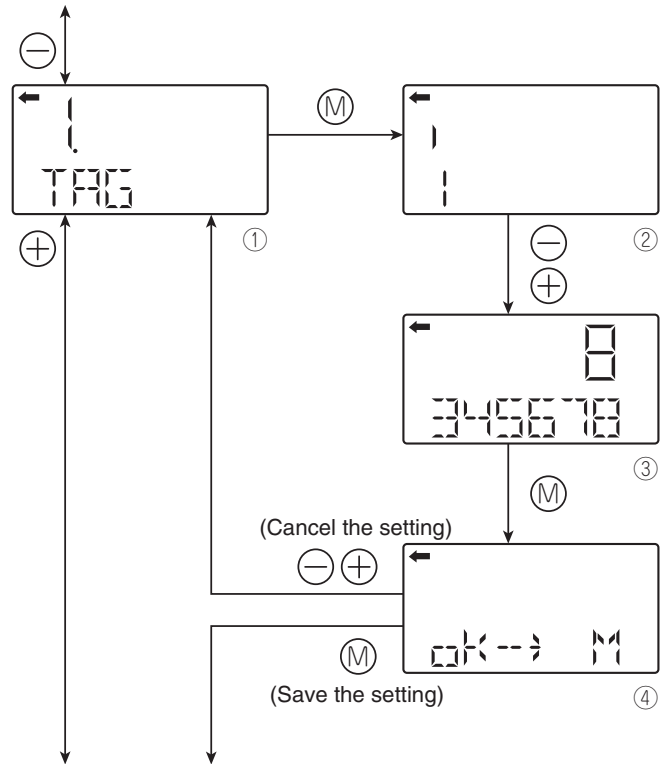
Note:

Characters other than numerical, capital letters, space or "-" are displayed as "*".

The initial six digits are displayed with a vertical bar indicating the digit under modification (see exemple screen ② : the first digit is under edition).

To edit the seventh or the following digits, use the + key to move right the digit index position.

The digit number will be indicated (see exemple screen ③: the eighth digit is under edition).



5 TRANSMITTER SETTINGS

Menu 2. TYPE (Model Code)

The model code of the transmitter is displayed and can be modified (example for a differential pressure transmitter).

- Press the M key on the screen ① to display the model code (②).
- On the screen ② you can modify the model code by using the - and + keys.

Functions of the keys:

- : To define the characters at the cursor position. (0 to 9, space, A to Z, -)
- + : To move the cursor position to the next position. (1 → 2 → 3 ... → 26 → 1)

Note:

Up to 24 characters can be entered.

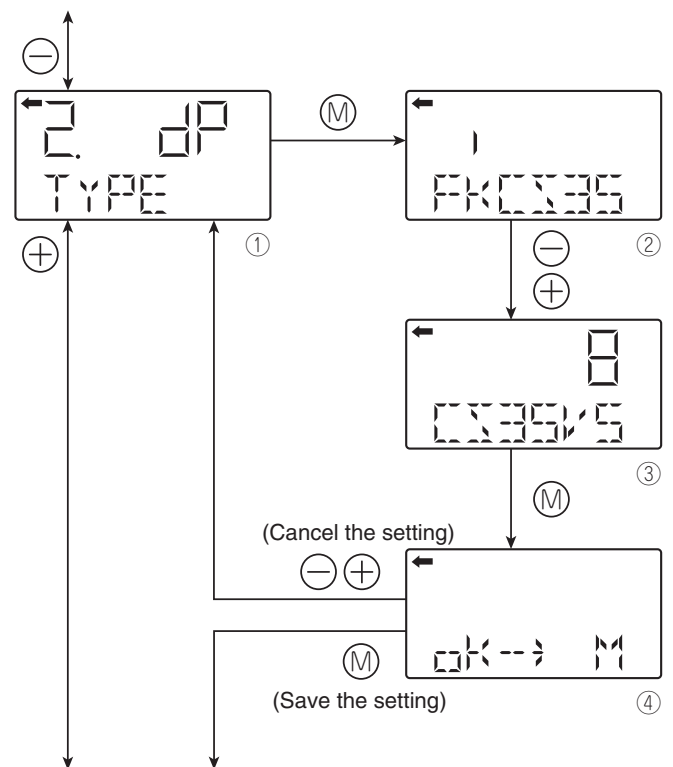
Characters other than numerical characters, capital letters of the alphabet, space, and “-” are displayed as “*.”

Initial six characters are displayed. (The cursor position is displayed by a vertical bar.) To display the seventh and following characters, scroll the characters to the left. (The cursor position (far right) is displayed as a number.)

In the example ②, the cursor position is 2. and “K” is the second digit to be modified.

In the example ③, the cursor position is 8 and “5” is the eighth digit to be modified.

- Select whether the type setting is saved on the screen ④.
Press the M key to save the type setting.
Press the - or + key to cancel the setting.
- Description of the displays on the first line on the item name selection screen (①).
dP: Differential pressure transmitter.
G P: Pressure (gauge pressure) transmitter.
A P: Absolute pressure transmitter.



5 TRANSMITTER SETTINGS

Menu 3. S/N & Software version

SERIAL number (8 characters) and software version are displayed.

3-1 SERIAL N: Display of Serial Number

- Press the M key on the screen ① to display the SERIAL N (②).

Note:

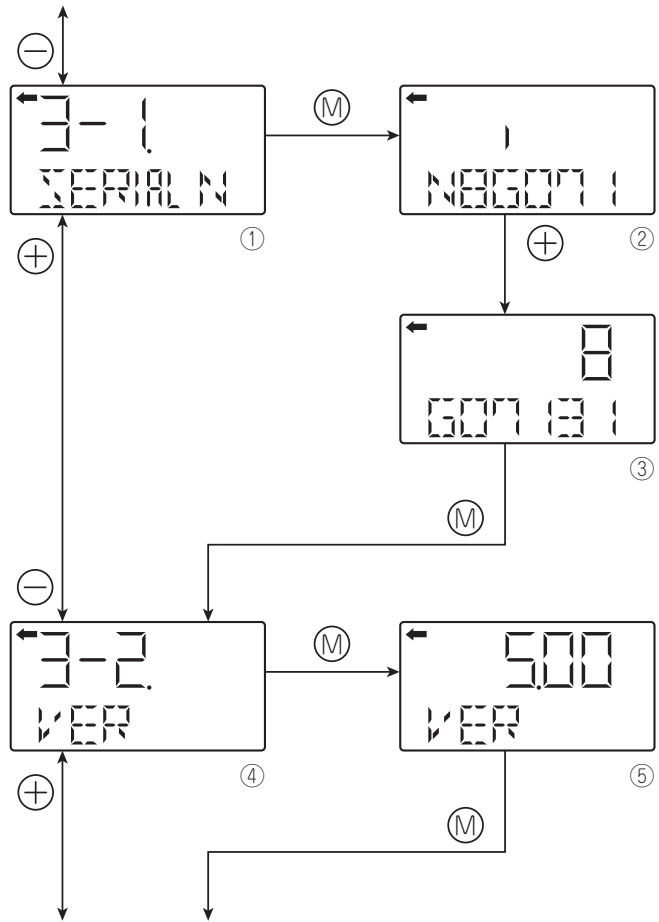
Characters other than numerical characters, capital letters of the alphabet, space, and “-” are displayed as “*.”

Initial six characters are displayed. (The cursor position is displayed by a vertical bar.)

To display the seventh and following character③, scroll the characters to the left by pressing key. (The cursor position (far right) is displayed as a number.)

3-2 VER: Display of transmitter software version

- To display the software version (⑤), press the M key on the screen ④.



5 TRANSMITTER SETTINGS

Menu 4. UNIT

- This main menu allows to display and modify the engineering unit used with the HART communication (Primary Variable value).
- On the menu "4. UNIT" press the M key to display the current engineering unit (②).
- Select a new engineering unit with the - and + keys on the screen (②).
- Available units for FCX-AIV:

mmH ₂ O	*	↑
cmH ₂ O	*	
mH ₂ O	*	
g/cm ²	*	
kg/cm ²	*	
Pa		
hPa		
kPa		
MPa		
mbar		
bar		
psi	*	
inH ₂ O	*	
ftH ₂ O	*	
mmAq	*	
cmAq	*	
mAq	*	
mmWC	*	
cmWC	*	
mWC	*	
mmHg	*	
cmHg	*	
mHg	*	
inHg	*	
< Torr >	*	
< atm >	*	↓

Note:

The mark < > is settable for absolute pressure transmitter only.

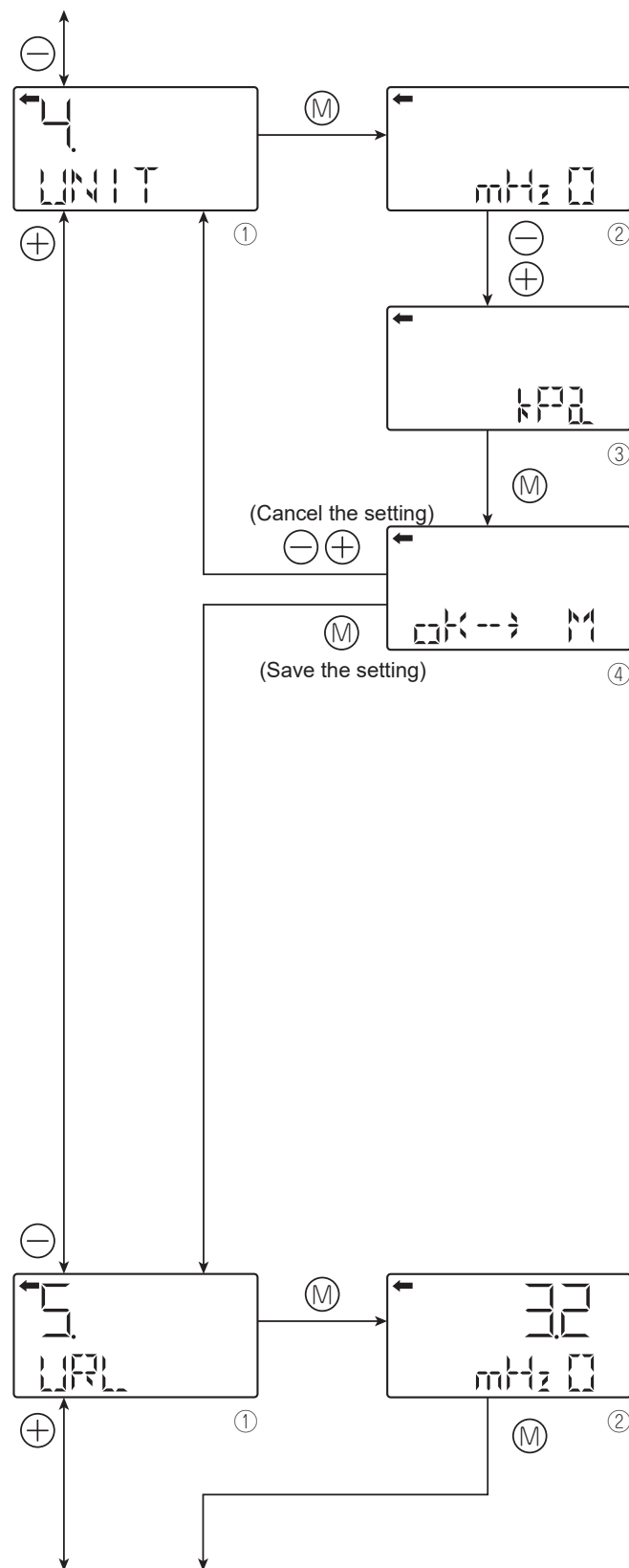
Menu 5. URL

Indicates the maximum measuring range (Upper Range Limit) of this transmitter.

- To display the range limit value (②), press the M key on the screen (①).

Note:

If "UUUUU" is displayed as a URL value, the unit is not supported.



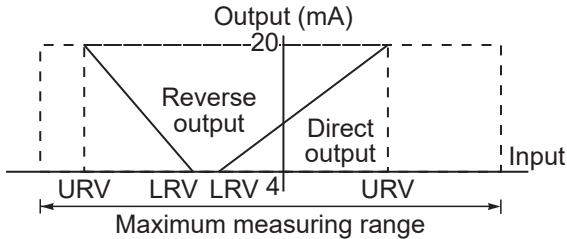
5 TRANSMITTER SETTINGS

Menu 6. Measuring range (LRV, URV)

LRV: Lower Range Value (0% point)

URV: Upper Range Value (100% point)

Selectable setting range:



Note:

If the setting value of LRV or URV is out of the possible range, a setting error is displayed. The maximum setting range is ± 99999 . The URV may exceed the upper limit depending on the change of the engineering unit. If this configuration occurs change first the URV.

6-1. LRV:

Change the lower limit of the measuring range (0% = 4 mA output).

- Press the M key on the 6-1 menu (①) to display and modify the current LRV setting (②). "Zero" is displayed on the right of the display. Modify the LRV value using the + and - keys (③).

Selectable setting range:

- : To decrease the value.

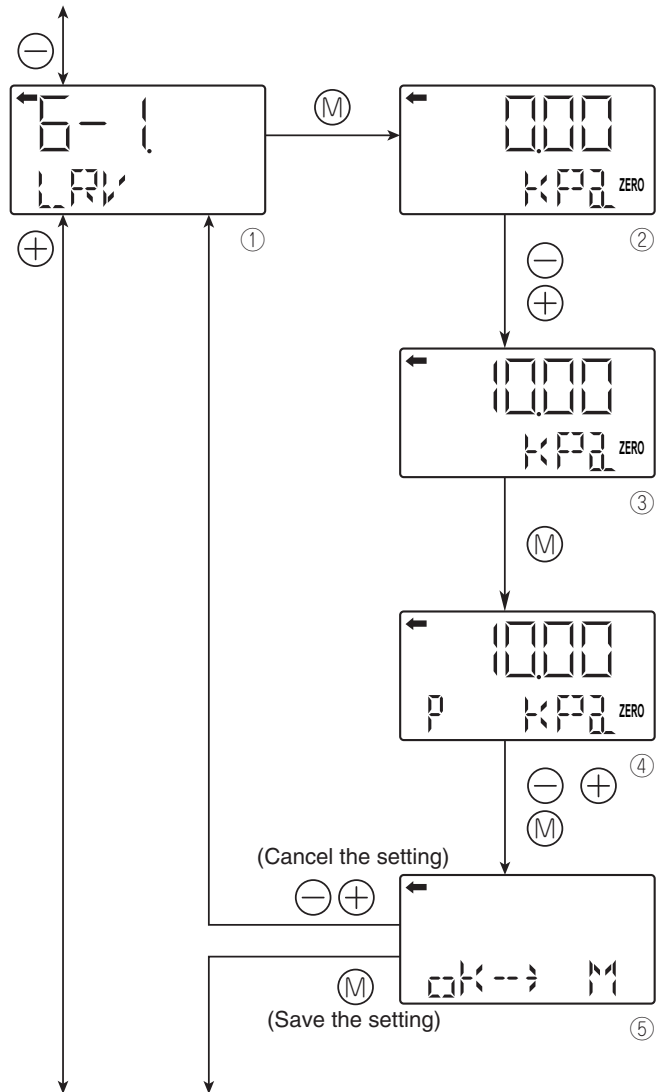
+ : To increase the value.

Range: $- 99999 \leq \text{LRV} \leq 99999$

Note:

If "UUUUU" is displayed as LRV value, the unit is not supported.

- To set the decimal point position, press the M key on the screen (③). "P" is displayed on the bottom left (④).
- The position of the decimal point can be defined using the - and + keys.



- : To move the decimal point position to the left.

+ : To move the decimal point position to the right.

- Press the M key to select whether the new LRV setting has to be stored (⑤).
- Press the M key to save the 0 % point range setting.
- Press the - or + key to cancel the new setting.

5 TRANSMITTER SETTINGS

6-2. URV:

Change the upper limit of the measuring range (100% = 20 mA output)

- Press the M key on the 6-2 menu (①) to display and modify the current URV setting (②). "Span" is displayed on the right of the display. Modify the URV value using the - and + keys (③).

Functions of the keys:

- : To decrease the value.

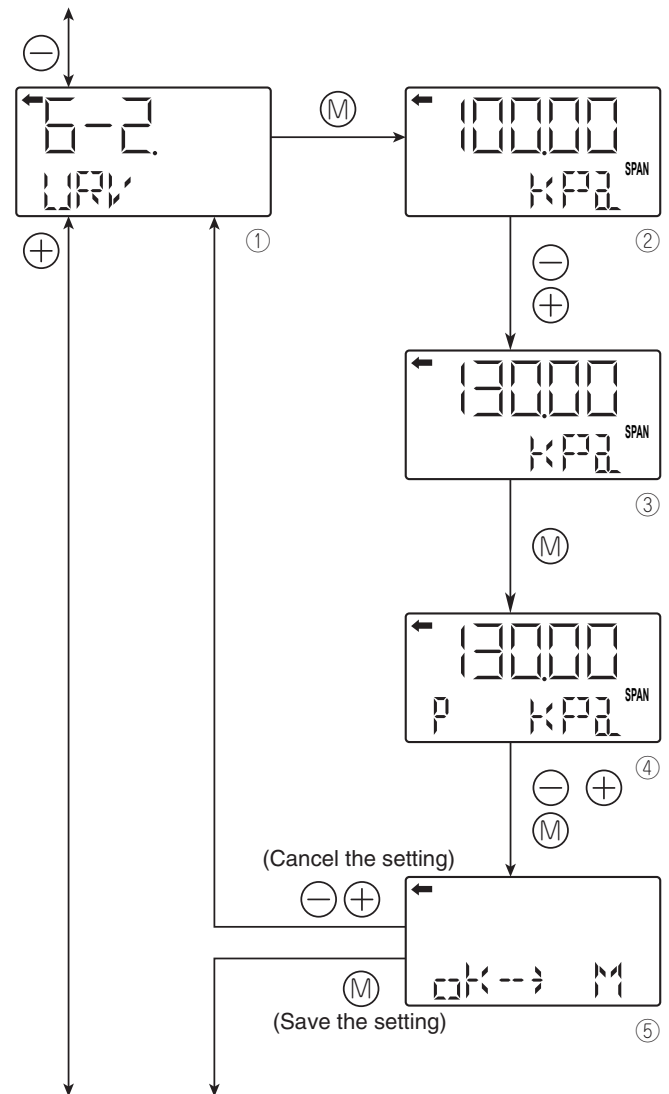
+ : To increase the value.

Range: $-99999 \leq \text{LRV} \leq 99999$

Note:

If "UUUUU" is displayed as URV value, the unit is not supported.

- To set the decimal point position, press the M key on the screen (④). "P" is displayed on the bottom left (④). The position of the decimal point can be defined using the - and + keys.
- : to move the decimal point position to the left.
- + : to move the decimal point position to the right.
- Press the M key to select whether the new URV setting has to be stored (⑤). Press the M key to save the 100 % point range setting. Press the - or + key to cancel the new setting.



INDICATION

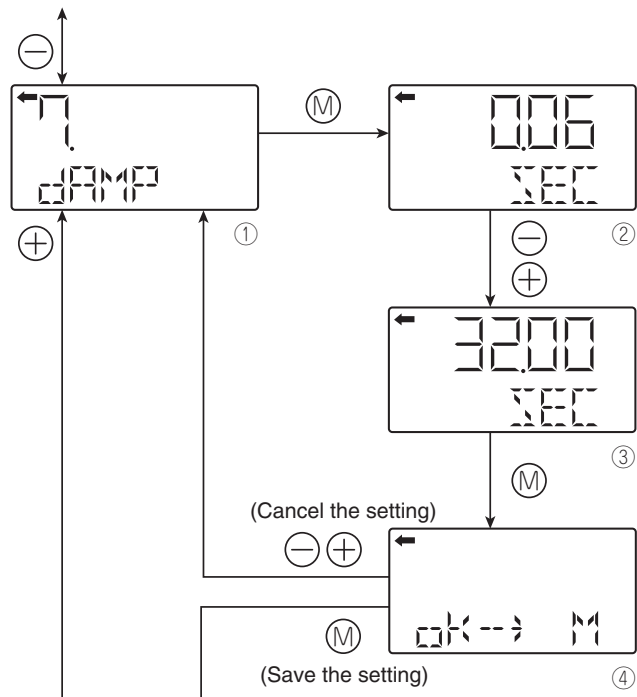
The setting range of the measuring cell is independent of the setting range of the indicator. After changing the range in this menu, it is necessary to change the range in the LCD indicator accordingly (menu G).

5 TRANSMITTER SETTINGS

Menu 7. dAMP (Damping)

In the case where the input fluctuation of the process or the vibration of the installation is important, it is necessary to set an appropriate damping time to avoid the output fluctuation.

- Press the M key on the screen ① to display the current damping time constant setting (②).
- Set the damping time constant with the - and + keys on the screen ③.
- Setting range: 0.04 to 32.0 sec
- Select on the screen ④ whether the new damping time constant setting has to be saved.
 Press the M key to save the damping time constant setting.
 Press the - or + key to cancel the new setting.



Note 1) It is settable to two places of decimals point. After setting, exact numbers may not be shown due to resolution capability.

About the damping and output fluctuation of the transmitter caused by vibrations									
1. Magnitude of the output fluctuations (oscillations) caused by vibrations									
<p>If the transmitter is mounted to a place subject to severe vibration, output fluctuation (oscillation) may increase. Since the transmitter uses oil as internal pressure transmitting medium, if acceleration is caused by vibration, internal pressure is generated in accordance with the acceleration value, thus resulting in the output fluctuation. The magnitude of output oscillation may become the value shown below at the maximum.</p> <ul style="list-style-type: none"> • Oscillation frequency: 10 to 150 Hz • Within $\pm 0.25\%$ of URL/(9.8m/s²) 									
2. Damping									
<p>The output fluctuation (oscillation) of the transmitter in an environment subject to vibration can be damped by setting an appropriate damping time constant. The following table shows the effect of damping on the vibration of 10Hz where the output fluctuation becomes the maximum.</p> <p>Guideline of the damping effect on the output fluctuations (oscillations)</p> <table border="1"> <thead> <tr> <th>Damping set value [sec]</th> <th>Damping of output oscillation</th> </tr> </thead> <tbody> <tr> <td>1.2</td> <td>1/3 or lower</td> </tr> <tr> <td>4.8</td> <td>1/5 or lower</td> </tr> <tr> <td>19.2</td> <td>1/10 or lower</td> </tr> </tbody> </table>		Damping set value [sec]	Damping of output oscillation	1.2	1/3 or lower	4.8	1/5 or lower	19.2	1/10 or lower
Damping set value [sec]	Damping of output oscillation								
1.2	1/3 or lower								
4.8	1/5 or lower								
19.2	1/10 or lower								
<p><u>Note:</u> In the oscillation range from 10 to 150Hz, the output fluctuation (oscillation) becomes the maximum at 10Hz, that is, the lowest frequency.</p>									

5 TRANSMITTER SETTINGS

Menu 8. Output mode

For differential pressure transmitters only, the output mode is used to select either the linear mode (proportional to input differential pressure) or the square root extraction mode (proportional to a flow rate) to be applied on the 4-20 mA output signal. In the square root extraction mode, you can define the low cutoff threshold (output instabilities at low measurement) and the return to zero mode below the cut point.

8-1. oUT Md:

Change the output mode

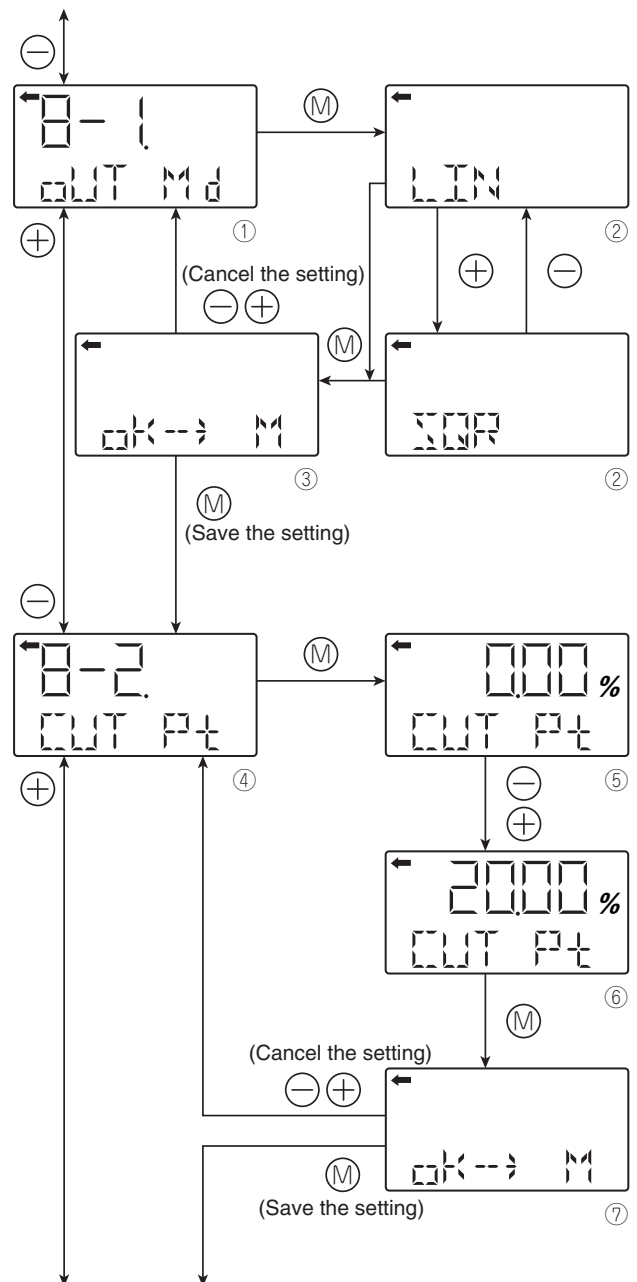
- Press the M key on the screen ① to display the screen for changing the output mode (②).
- You can select the linear or square root extraction mode on the screen ②. Select LIN (linear mode) or SQR (square root extraction mode) with the - or + key and press the M key.
- Select whether the output mode setting is saved on the screen ③. Press the M key to save the output mode setting. Press the - or + key to cancel the setting.

8-2. CUT Pt:

Low cutoff point setting

If you select the square root mode, you can set the low cutoff point which is adjustable within the range of 0.00 to 20.00 % of the URV. Note that if the cutoff point is set near 0 %, a small variation of the input differential pressure will conduct to a large output fluctuation. The cutoff point is used for improving the measurement in case of low flowrate.

- Press the M key on the screen ④ to display the screen ⑤ for setting the low cutoff point. Adjust the low cutoff point with the - or + key (⑥).
- Select on the screen ⑦ whether the new low cutoff point setting has to be saved: Press the M key to save the cutoff point setting. Press the - or + key to cancel the new setting.



5 TRANSMITTER SETTINGS

8-3. CUT Md :

Low cutoff mode setting

There are two modes :

- Linear return to zero of the output between the cutoff point and zero differential input (fig A).
- Direct return to zero of the output once the cutoff point has been reached (fig B).

Fig. A: Output with linear return to zero

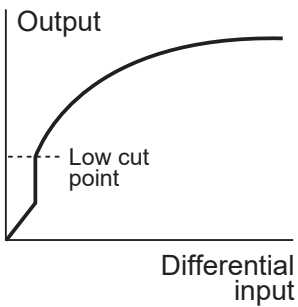
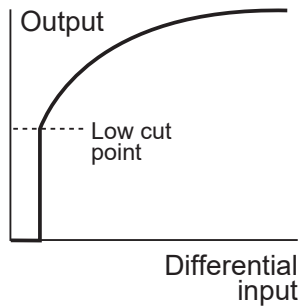
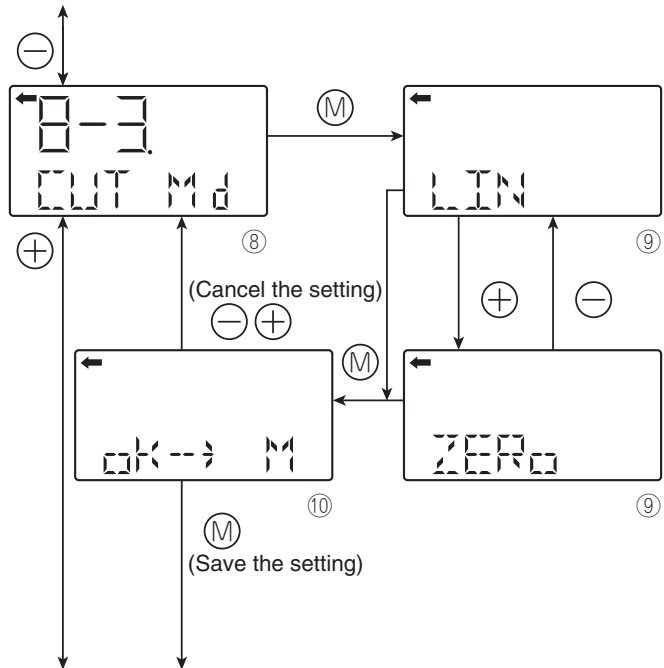


Fig. B: Output with direct return to zero



- Press the M key on the screen ⑧ to display the screen ⑨ for changing the output mode below the cutoff point.
- Select either LIN (linear) or ZERO on the screen ⑨ with the - or + key and press the M key.
- Select on the screen ⑩ whether the new cutoff mode setting has to be saved. Press the M key to save the new setting. Press the - or + key to cancel the setting.



5 TRANSMITTER SETTINGS

Menu 9. Burnout settings

Used for selecting the direction of the output at occurrence of a fault detected by the transmitter.

9-1. bURNoT:

Change the burnout direction

UNDER → UNDERSCALE

OVER → OVERSCALE

HOLD → Output hold

- For NAMUR specification, press the M key on the screen ① to display the screen for changing the burnout (②).
- Select UNDER, OVER or HOLD on the screen ② with the - or + key and press the M key.
- Select on the screen ③ whether the new setting has to be saved. Press the M key to save the burnout setting. Press the - or + key to cancel the setting.

9-2. oVER:

Set the burnout current to OVERSCALE

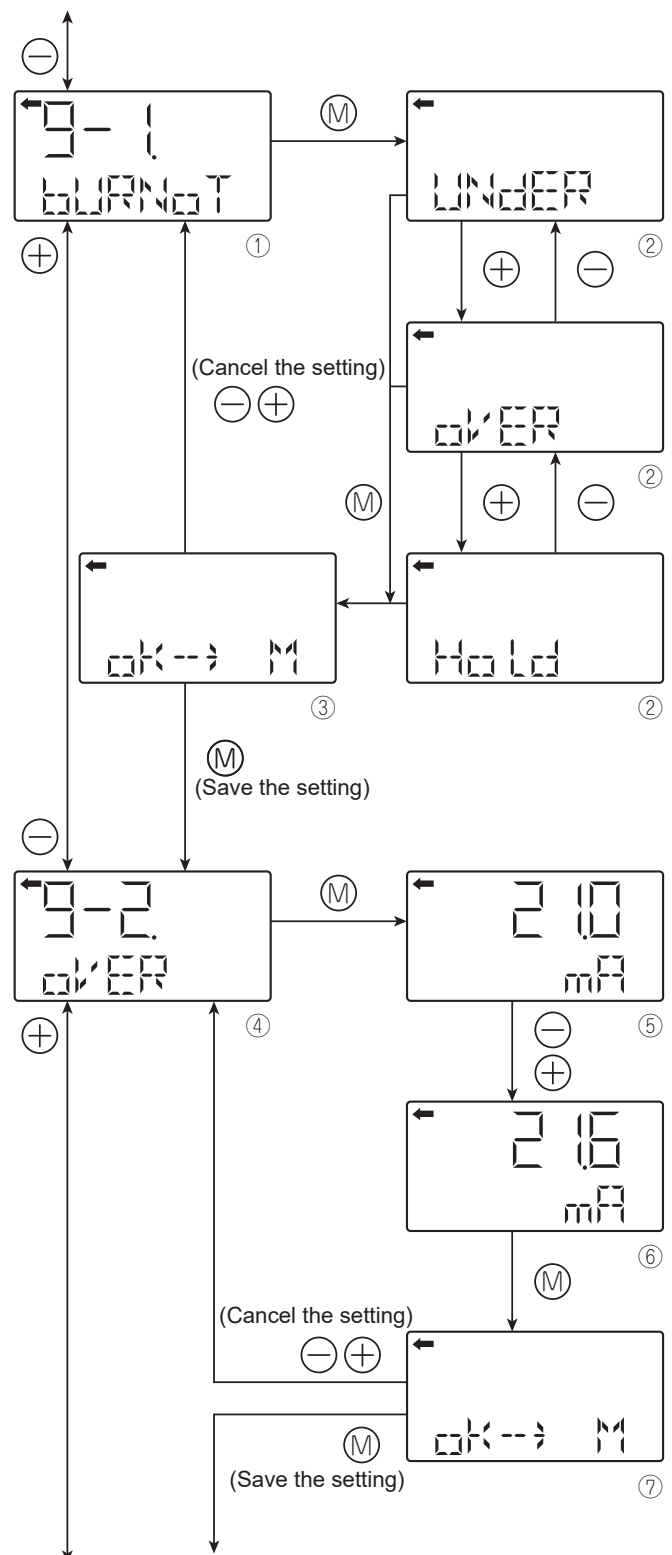
This display appears if you select "OVER" for the burnout.

- Press the M key on the screen ④ to display the screen for changing the burnout current for OVERSCALE (⑤).
- You can change the burnout current with the - and + keys on the screen ⑤. Adjustable range:
 $20.8 \text{ mA} \leq \text{Burnout (OVER)} \leq 22.5 \text{ mA}$ but above the saturation current vale (upper limit)
 For NAMUR specification:
 21.6, 21.8, 22.0, 22.2, 22.4, 22.5 can be selected.

Note:

For extended setting values, please refer to the menu J (custom or NAMUR specifications).

- Select on the screen ⑦ whether the new burnout current setting has to be saved. Press the M key to save the burnout current setting for OVERSCALE. Press the - or + key to cancel the setting.



5 TRANSMITTER SETTINGS

9-3. UNDER :

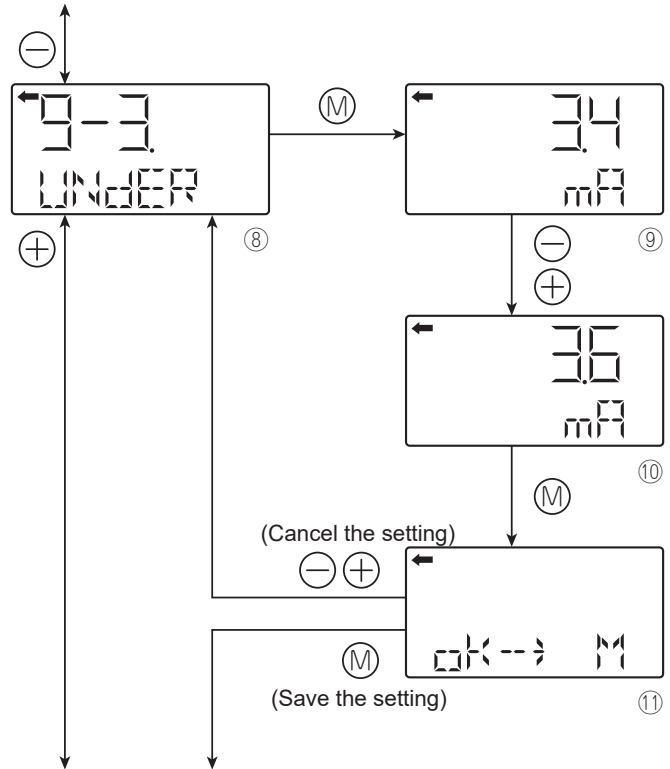
Set the burnout current to UNDERSCALE

This display appears if you select “UNDER” for the burnout direction.

- Press the M key on the screen ⑧ to display the screen for changing the burnout current for UNDERSCALE (⑨).
- You can change the burnout current with the - or + key on the screen ⑨.
Adjustment range:
 $3.4 \text{ mA} \leq \text{Burnout (UNDER)} \leq 3.8 \text{ mA}$
For NAMUR specification:
 $3.4 \text{ mA} \leq \text{Burnout (UNDER)} \leq 3.6 \text{ mA}$
- Select on the screen ⑩ whether the new burnout current setting has to be saved. Press the M key to save the burnout current setting for UNDERSCALE. Press the - or + key to cancel the setting.

Note:

For extended setting values, please refer to the menu J (custom or NAMUR specifications).



5 TRANSMITTER SETTINGS

Menu A. Zero & span calibration

This menu gives the possibility to calibrate Zero (LRV) and span (URV) of the transmitter. According to the settings in the menu 6: 'Measuring range'. Please use the menu A (calibration) only when the LRV and URV have been defined in the menu 6. An input reference pressure is required to perform zero and span calibration.

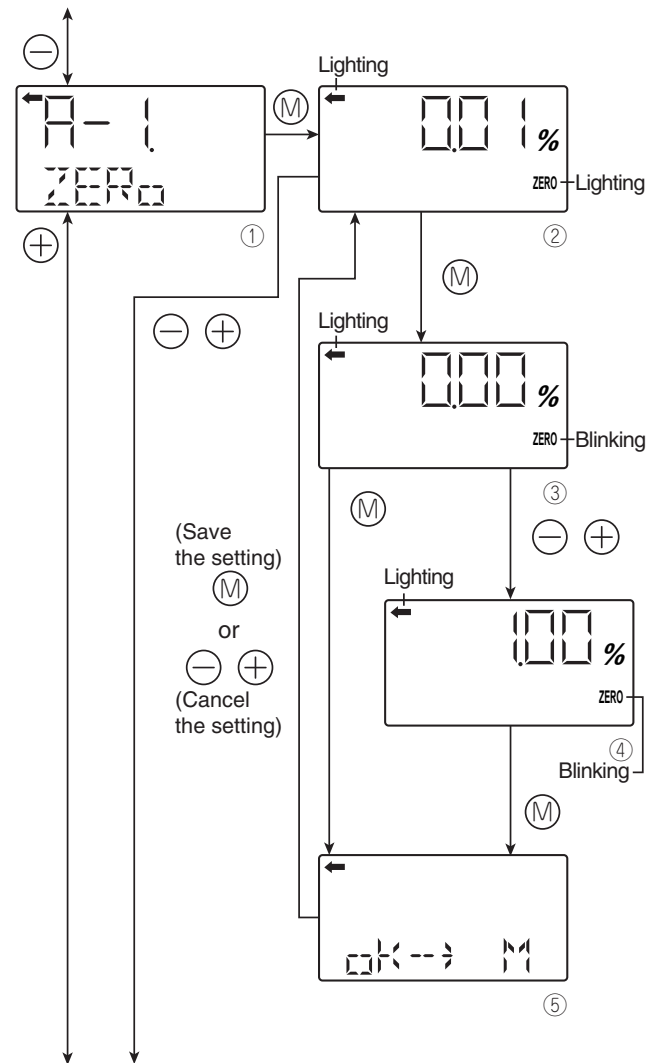
! INDICATION

After performing a zero calibration, perform a span calibration.

If you input the value that exceeds the adjustable range, the setting will not be changed even after the setting is saved.

Adjustable range:

Zero calibration:
within $\pm 40\%$ of the max span
Span calibration:
within $\pm 20\%$ of the set span



A-1. Zero: LRV calibration

- Press the M key on the screen ① to select the zero calibration mode. The measured value and the unit on the screen ② are the same as those in the normal mode. "←" and "ZERO" are lit.
- Apply the input pressure reference corresponding to LRV on the screen ②. After checking the measured value, press the M key.
- "ZERO" blinks on the screen ③. Press the M key on the screen ③ to perform the LRV calibration while the input pressure reference is stable. To perform a zero calibration at a point other than 0%, input the desired setting value (%) (④) with the - or + key and press the M key.

Adjustable range:

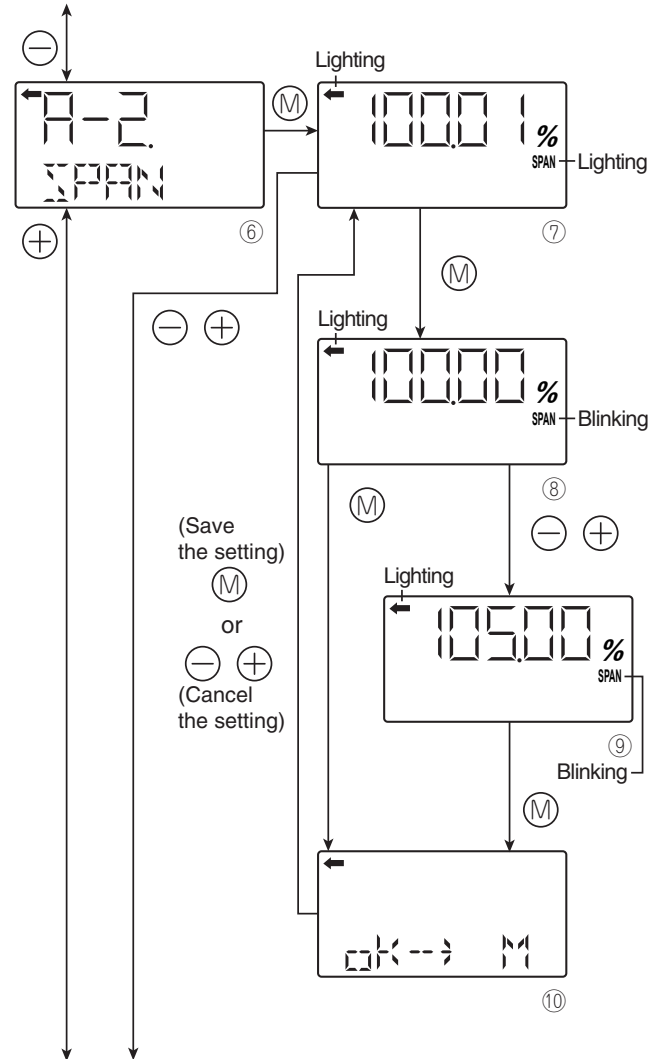
$-1.000 \% \text{ CS}^{(*)} \leq \text{PL} \leq 100.000 \% \text{ CS}^{(*)}$
 $\text{PL} = \text{Lower limit of adjustment point} \times 100$
 Setting range
 (*) CS = Calibrated Span

- Select on the screen ⑤ whether the zero calibration value setting has to be saved. Press the M key to save the zero calibration value setting and return to the screen ②. Press the - or + key to cancel the setting and return to the screen ②.
- Check that the zero calibration was performed as intended. Press the M key to perform a zero calibration again. Press the - or + key to move to the previous or next menu.

5 TRANSMITTER SETTINGS

A-2. Span: URV calibration

- Press the M key on the screen ⑥ to select the span calibration mode.
The measured value and the unit on the screen ⑦ are the same as those in the normal mode. “←” and “SPAN” are lit.
- Apply the input pressure reference corresponding to URV on the screen ⑦. After checking the measured value, press the M key.
- “SPAN” blinks on the screen ⑧. Press the M key on the screen ⑧ to perform the URV calibration while the input pressure reference is stable.
To perform a span calibration at a point other than 100%, input the desired setting value (%) (⑨) with the - or + key, and press the M key.
- Select on the screen ⑩ whether the new span calibration value has to be saved:
Press the M key to save the span calibration value setting and return to the screen ⑦.
Press the - or + key to cancel the setting and return to the screen ⑦.
- Check that the span calibration was performed as intended.
Press the M key to perform again a span calibration.
Press the - or + key to move to the previous or the next menu.



5 TRANSMITTER SETTINGS

Menu B. Calibration of the 4-20 mA output

This menu allows to check or calibrate the 4-20 mA analog output (Digital to Analog Converter section). This operation requires a precision ammeter ($\pm 1 \mu\text{A}$) wired according the section "6.2 Calibration".

b-1. 4mA Adj:

4 mA output calibration

- Press the M key on the screen ① to display the screen for calibrating the 4.000 mA output (②).
- Using the - or + keys check the ammeter value to reach the 4.000 mA calibration point.
- Press the M key to move to the screen ③ for calibrating the 20.000 mA output.

b-2. 20mA Adj:

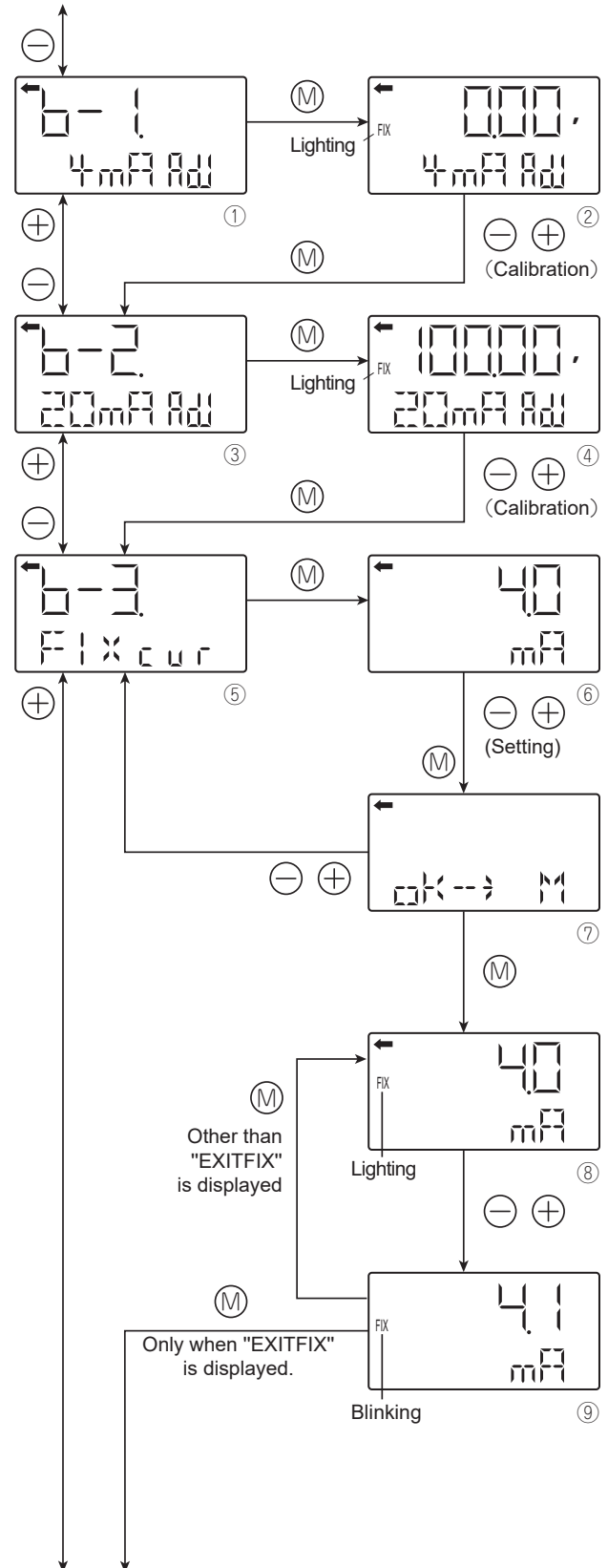
20 mA output calibration

- Press the M key on the screen ③ to display the screen for calibrating the 20.000 mA output (④).
- Using the - or + keys, check the ammeter value to reach the 20.000 mA calibration point.
- After the calibration, press the M key to move to the screen ⑤ constant current output.

b-3. FIXcur:

Constant output current

- On the screen ⑤ press the M key to display the screen ⑥ for setting a specific output current.
- Using the - or + keys set the desired output value and press the M key.
- Adjustable range:
- $3.400 \text{ mA} \leq \text{FIXcur} \leq 22.500 \text{ mA}$
- On the screen ⑦ Press the M key to validate and generate the output value (⑧) otherwise press the - or + keys to cancel the new setting (⑤).
- On the screen ⑧ the constant current previously defined is effectively generated on the 4-20 mA output. The "FIX" icon is permanently lit.
- To modify the fixed current output value, press the - or + keys to set the new value (⑨). During the setting the "FIX" icon is blinking. Press the M key to validate the new output value (⑧)
- To exit the constant current mode, press the - or + keys until displaying "EXITFIX".



Note:

If nothing is input for three minutes while in constant output current mode (⑧ ↔ ⑨), the transmitter returns in its normal operating mode with the constant output current kept. The "FIX" icon is then permanently lit. To restore the normal output, enter in the setting mode, menu "b-3 FIXcur", screen ⑨, "EXITFIX" and press the M key.

5 TRANSMITTER SETTINGS

Menu D. Self-diagnosis

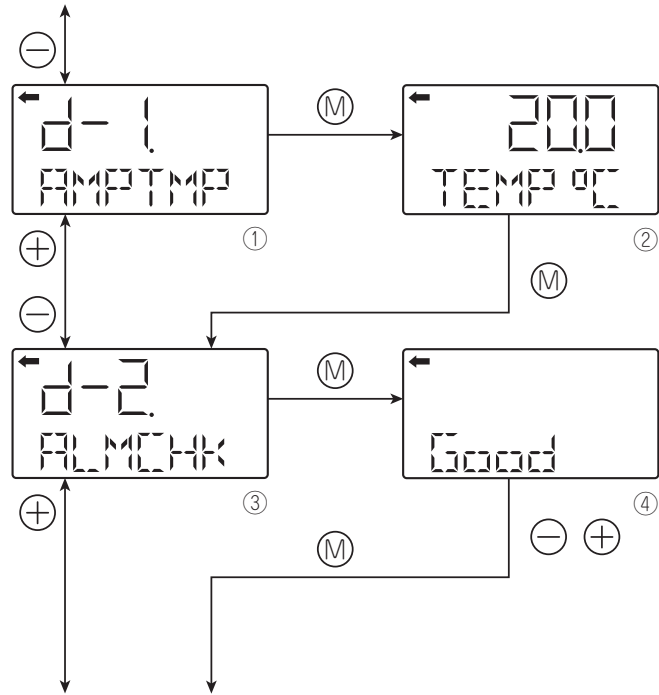
The self-diagnosis menu displays the internal temperature of the transmitter and diagnostic results.

d-1. AMPTM: Amplifier temperature

- Press the M key on the screen ① to display the internal temperature of the transmitter (②).
If a temperature alarm has been reached, the message “TEMP” is changed to “ALM.” If the internal temperature cannot be measured due to the self-diagnosis results, the message “IMPOSS” is displayed.
Press the M key to reach the selfdiagnosis results menu (d-2 ALMCHK).

d-2. ALMCHK: Self-diagnosis results

- Press the M key on the screen ③ to display the self-diagnosis results (④). If no fault has been detected, the message "Good" is displayed.
If one or more faults have been detected, press the - or + key to scroll and display the nature of the fault.
Please refer to the table below for more details on the type and associated error code of the detected fault.



5 TRANSMITTER SETTINGS

Error Message Displayed on the center of the LCD	Error Code Displayed on the bottom of the LCD	4-20 mA output status when an alarm occurs	Cause	Remedy
FL-1	0101	Burnout (Default value 3.6 mA)	Sensor value abnormality. Detector circuit abnormality. Connection error with the detecting unit.	Check the wiring between the amplifier and the detecting unit. Replace the detector if it cannot be fixed.
FL-1	0102			
FL-1	0103			
FL-1	0104			
FL-1	0105			
FL-1	0106	Burnout (Default value 3.6 mA)	Detector circuit abnormality. Connection error with the detecting unit.	Check the wiring between the amplifier and the detecting unit. Replace the detector if it cannot be fixed.
FL-1	0107			
FL-1	0110	Burnout (Default value 3.6 mA)	Ambient temperature outside operating range. Detector circuit abnormality Connection error with the detecting unit.	Optimize ambient temperature. Check the wiring between the amplifier and the detecting unit. Replace the detector if it cannot be fixed.
FL-1	0111			
FL-1	0112			
FL-1	0115	Burnout (Default value 3.6 mA)	Internal power supply fault.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0116			
FL-1	0119	Burnout (Default value 3.6 mA)	Output current circuit fault.	Check state of recovery by turning the power supply OFF and ON. Implement and confirm 4 to 20 mA current adjustment. Replace the transmitter if it cannot be fixed.
FL-1	0120			
FL-1	0122	Burnout (Default value 3.6 mA) Or shutdown (About 2.9 mA)	Output current circuit fault.	Check state of recovery by turning the power supply OFF and ON. Implement and confirm 4 to 20 mA current adjustment. Replace the transmitter if it cannot be fixed.
FL-1	0123	Burnout (Default value 3.6 mA)	Transmitter digital circuit fault.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0124			
FL-1	0125			
FL-1	0126			
FL-1	0127			
FL-1	0128			
FL-1	0129			
FL-3	0201	Burnout (Default value 3.6 mA)	Detector circuit fault. Connection error with the detecting unit.	Check the wiring between the transmitter and detector. Replace the detector if it cannot be fixed.
FL-3	0202			
FL-2	0301	Burnout (Default value 3.6 mA)	Transmitter memory error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-2	0302			
FL-1	0401	Burnout (Default value 3.6 mA)	Clock error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0403	Burnout (Default value 3.6 mA)	Transmitter CPU operation error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0404			
FL-1	0407			
FL-1	0408			
FL-1	0409			
FL-1	0410			
FL-1	0411			
FL-1	0412			
FL-1	0413	Shutdown (About 2.9 mA)	Transmitter operation error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0414			

5 TRANSMITTER SETTINGS

FL-1	0415	Burnout (Default value 3.6 mA)	Transmitter processing sequence error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0416			
FL-1	0417			
FL-1	0418			
FL-1	0419			
FL-1	0420	Burnout (Default value 3.6 mA)	Transmitter AD conversion error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0421			
FL-1	0422			
FL-1	0423	Burnout (Default value 3.6 mA)	Transmitter internal communication error.	Check state of recovery by turning the power supply OFF and ON. Replace the transmitter if it cannot be fixed.
FL-1	0426			

Alarm				
T.ALM	-	Measured output	Amplifier temperature outside specification range.	Correct the internal temperature of the transmitter by optimizing the ambient temperature. The HART communicator can be used to check whether the error is due to the temperature of the amplifier or the temperature of the sensor.
			Sensor temperature outside operating range.	
OVER	-	Upper saturation current value	Input pressure is greater than or equal to the saturation current value (Hi) or Detector abnormality when a state of excessive pressure continues even after optimizing the input pressure.	Optimize the input pressure or replace the detector.
UNDER	-	Lower saturation current value	Input pressure is less than or equal to the saturation current value (Lo) or detector abnormality when a state of excessive pressure continues even after optimizing the input pressure.	

5 TRANSMITTER SETTINGS

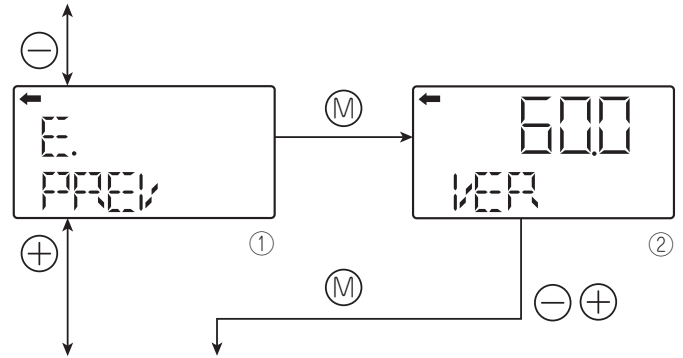
Menu E. Preview

Display the following information of transmitter:

- Software version
- Upper Range Limit
- Damping time constant
- Write protect

Each item is displayed for 2 seconds.

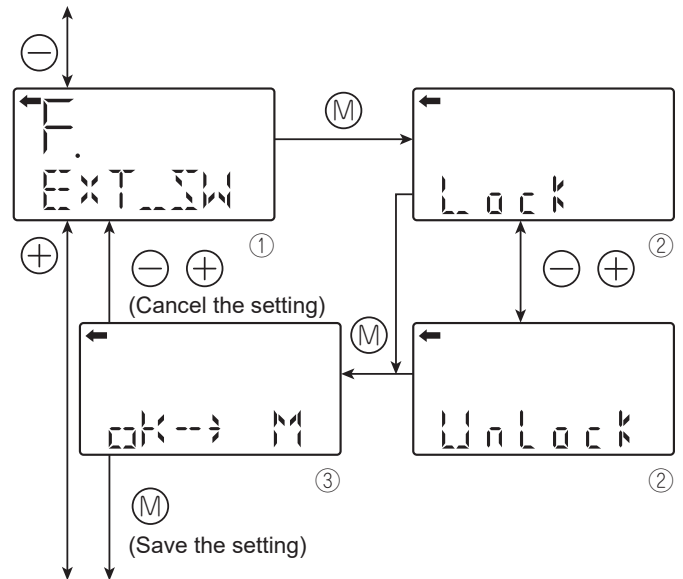
- Press the M key on the screen ① to display the screen of preview (②).



Menu F. EXT_SW (external adj. screw)

You can lock/unlock the external adjustment screw:

- Press the M key on the screen ① to display the screen ②.
- Select Lock or UnLock function by using the - or + keys.
- Select on the screen ② whether the new setting has to be saved. Press the M key to save the new setting. Press the - or + key to cancel the setting.



5 TRANSMITTER SETTINGS

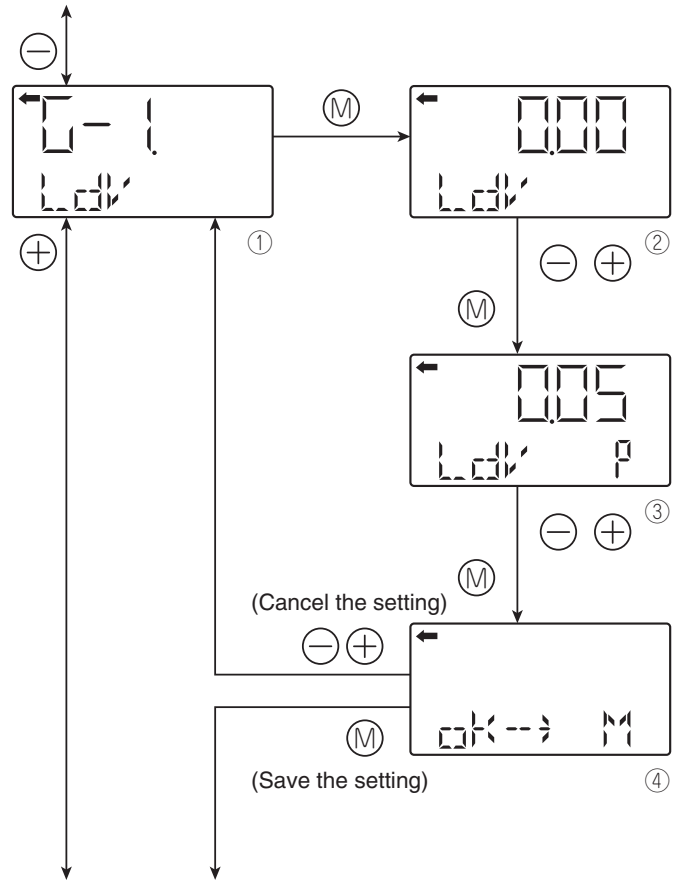
Menu G. LCD setup

The local display is totally independent from the amplifier unit. It is possible to define the range as well as the engineering unit to be displayed.

G-1. LDV

(Lower Display Value) for 0 % (4 mA)

- Press the M key on the screen ① to display the screen for setting the Lower Display Value ②).
- Using the - or + keys, define the value corresponding to 0 % (4 mA)
- Press the M key to reach the screen ③ and define the position of the decimal point. "P" is displayed on the bottom right of the LCD. Use the - or + keys as follow:
 - : To shift right the position of the decimal point.
 - +: To shift left the position of the decimal point.
- Press the M key and select whether the new LDV setting has to be saved ④). Press the M key to save the new setting. Press the - or + key to cancel the setting.



5 TRANSMITTER SETTINGS

G-2. UDV:

Upper Display Value for 100% (20 mA)

- Press the M key on the screen (5) to display the screen for setting the Upper Display Value (6).
- Using the - or + keys, define the value corresponding to 100 % (20 mA).
- Press the M key to reach the screen (7) and define the position of the decimal point. "P" is displayed on the bottom right of the LCD. Use the - or + keys as follow:
 - : To shift right the position of the decimal point.
 - +: To shift left the position of the decimal point.
- Press the M key and select whether the new UDV setting has to be saved (8). Press the M key to save the new setting. Press the - or + key to cancel the setting.

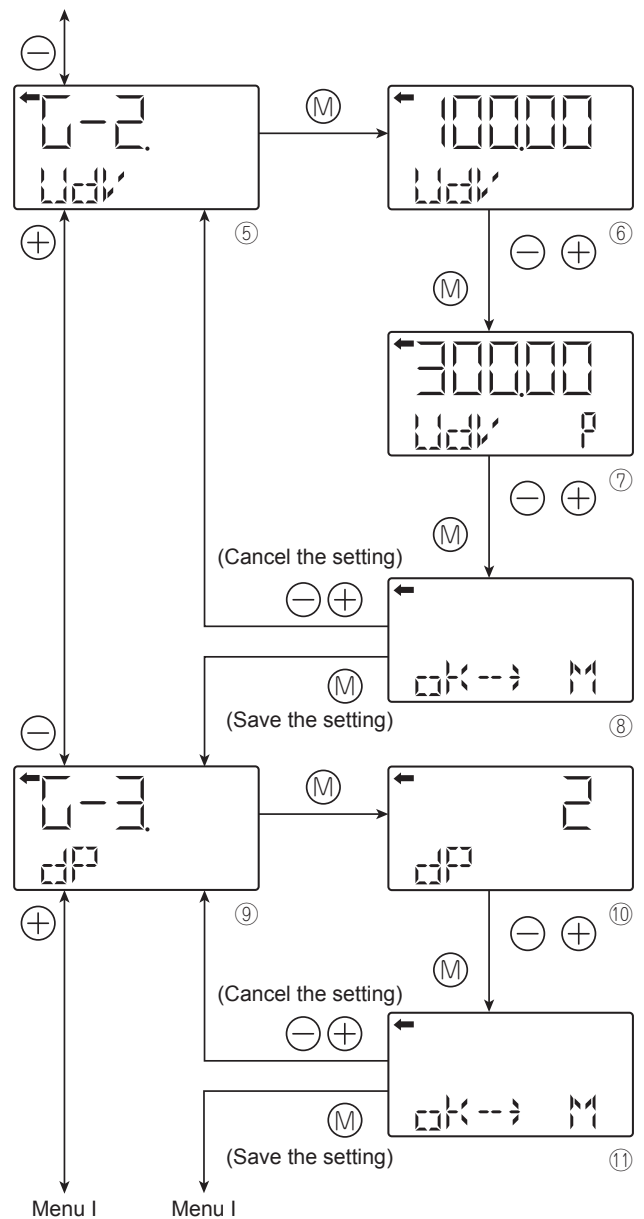
G-3. DP:

Decimal point setting

- Press the M key on the screen (9) to display the screen for setting the decimal point (10).
- Set the DP using the - or + keys. Setting range: $0 \leq DP \leq 4$

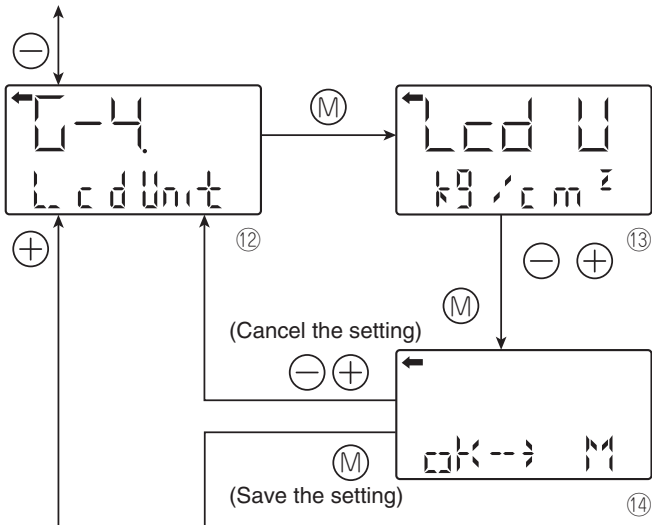
Displayed range	
DP=0	-99999...99999
DP=1	-9999.9...9999.9
DP=2	-999.99...999.99
DP=3	-99.999...99.999
DP=4	-9.9999...9.9999

- Press the M key and select whether the new DP setting has to be saved (11). Press the M key to save the new setting. Press the - or + key to cancel the setting.



5 TRANSMITTER SETTINGS

G-4. LcdUnit: Setting of engineering units



- Press the M key on the screen ⑫ to display the screen for setting the engineering unit (⑬).
- Using the - or + keys select the desired units to be displayed (⑬).
- Press the M key and select whether the new setting has to be saved (⑭).
Press the M key to save the new setting.
Press the - or + key to cancel the setting.

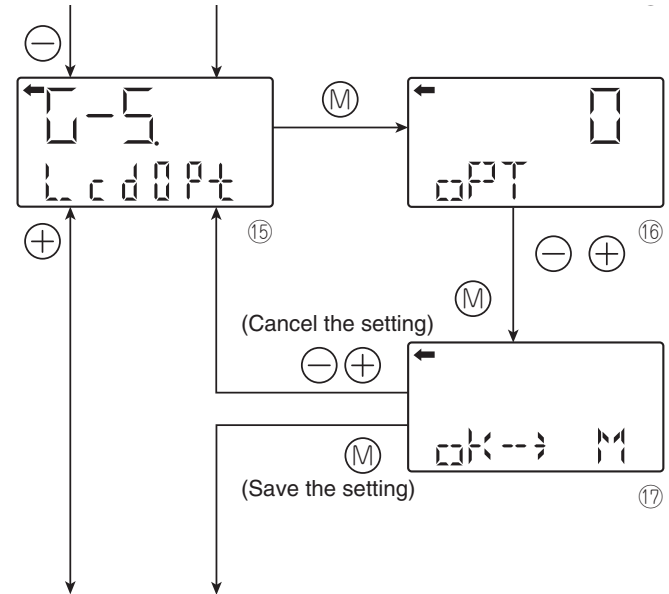
Available unit for FCX-AIV transmitters

(a)	(b)	(c)
%(LIN)	mm	%(SQR)
NONE(LIN)	cm	NONE(SQR)
MPa	m	Nm ³ /s
kPa	in	Nm ² /min
hPa	ft	Nm ² /h
Pa		Nm ³ /d
bar		m ³ /s
mbar		m ³ /min
kg/cm ²		m ³ /h
g/cm ²		m ³ /d
mmH ₂ O		l/s
cmH ₂ O		l/min
mH ₂ O		l/h
inH ₂ O		l/d
ftH ₂ O		l/s
mmAq		l/min
cmAq		l/h
mAq		l/d
mmWC		gal/s
cmWC		gal/min
mWC		gal/h
mmHg		gal/d
cmHg		ft ³ /s
mHg		ft ³ /min
inHg		ft ³ /h
PSI		ft ³ /d
<atm>		bbl/s
<Torr>		bbl/min
		bbl/h
		bbl/d
		kg/s
		kg/min
		kg/h
		kg/d
		t/s
		t/min
		t/h
		t/d

* Only for absolute pressure transmitters

Flow units in the column (c) can only be used with differential pressure transmitters.

G-5. LcdOPT: LCD unit options



- Press the M key on the screen ⑮ to display the screen for setting the LCD option (⑯).
- Using the - or + keys select the desired option as follow:

LCD Option	Function
0	Normal display: as per G-1 to G-4 settings
1	Alternate display: as per G-1 to G-4 settings and % [1% resolution]
2	Alternate display: as per G-1 to G-4 settings and % [0.1% resolution]
3	Alternate display: as per G-1 to G-4 settings and % [0.01% resolution]

- Press the M key and select whether the new setting has to be saved (⑰).
Press the M key to save the new setting.
Press the - or + key to cancel the setting.

5 TRANSMITTER SETTINGS

Menu H. Linearization function

H-1. LINRIZ:

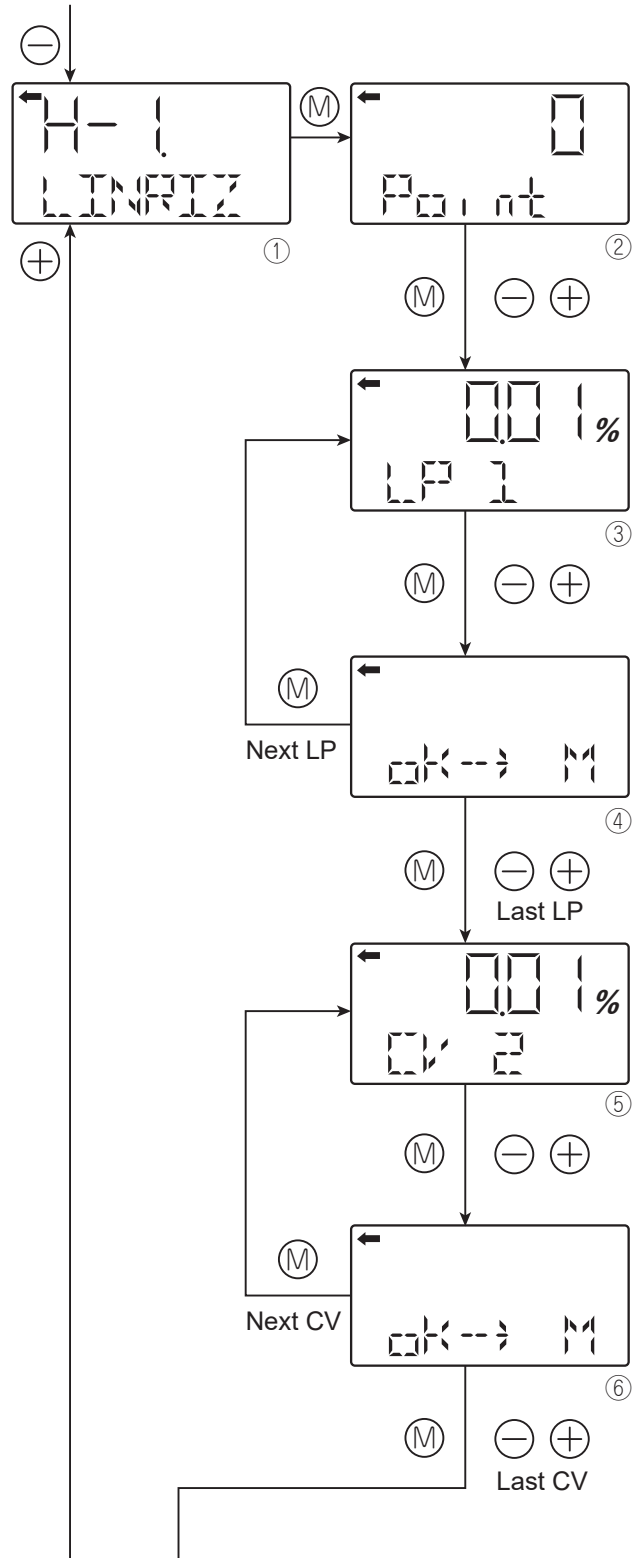
Programmable linearization function

The linearization function can be used in level measurement application where there is no linear relationships between the height and the volume (therefore the mass) of the process.

Typically, with spherical, partially conical or horizontal cylindrical tanks.

Up to 14 point pairs can be used to redefine the relationship between the height (hydrostatic pressure) and the output (volume or mass).

- Press the M key on the screen ① to display the number of linearization points to be used (②).
- Select the number of linearization point by using the + key, taking into account the following sequence (3 points minimum):
0 → 3 → 4 → ... → 13 → 14 → 0 → 3 ...
- Press the M key to reach the screen ③ and start defining the linearization points. Set the value (% of the calibrated span) of the first linearization point (LP 1) using the - or + keys. Press the M key to reach the screen ④.
- Press the M key on the screen ④ to either:
 - Go back to the screen ④ and define the next linearization point.
 - Reach the screen ⑤ when the last linearization has been defined and start defining the compensation values (CV) associated to each linearization points (LP).
- On the screen ⑤, set the value (% of the 4-20 mA output) of the first compensation value using the - or + keys. Press the M key to reach the screen ⑥. Press the M key on the screen ⑥ to either:
 - Go back to the screen ⑤ and define the next compensation point.
 - Exit the H-1 menu when the last compensation point has been defined

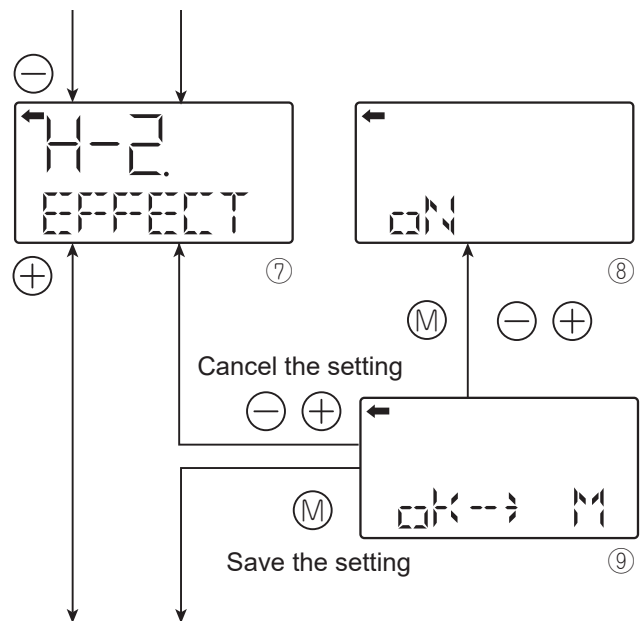


5 TRANSMITTER SETTINGS

H-2. EFFECT:

Switch on/off the linearization function

- Press the M key on the screen ⑦ to display the screen ⑧ for setting ON/OFF the linearization function.
- Define the on/off status using the - or + keys and press the M key. Press the M key to save the new setting or the - or + keys to cancel it.



5 TRANSMITTER SETTINGS

Menu I. Rerange: adjustment by LRV/URV change

The rerange menu is specially dedicated to level measurement applications.

The factory calibration is not representative of the final configuration of the installation (position of the level transmitter and associated LRV). In this case, the rerange function is useful to simply redefine the LRV (4 mA) point, keeping the factory calibration of the span.

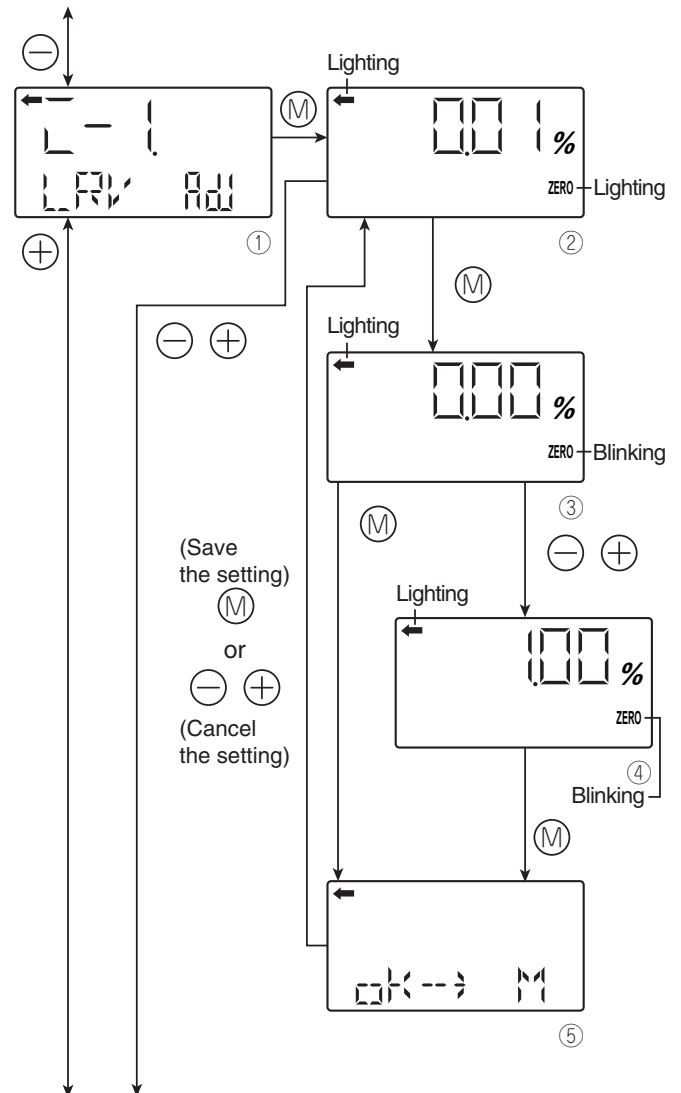
I-1. LRV Adj : Zero adjustment by changing the range (LRV)

- Press the M key on the screen ① to select the LRV adjustment mode.
The measured value and unit displayed on the screen ② are those of the normal mode. “←” and “ZERO” light up.
- Apply the reference pressure for LRV (4mA) on the screen ②. After checking the measured value corresponding to 4 mA, press the M key.
- “ZERO” blinks on the screen ③. Press the M key on the screen ③ to perform a zero adjustment at the input pressure.

Settable range:

$$-1.00\% \leq \text{LRV (Note 1)} \leq 100.00\%$$

- Select whether the LRV adjustment value setting is saved on the screen ⑤.
Press the M key to save the LRV adjustment value setting and return to the screen ②.
Press the - or + keys to cancel the setting and return to the screen ②.
- Check that the zero adjustment (LRV) was performed as intended on the screen ②.
- Press the M key to perform a new zero adjustment or press the - or + keys to move to the previous or next menu.

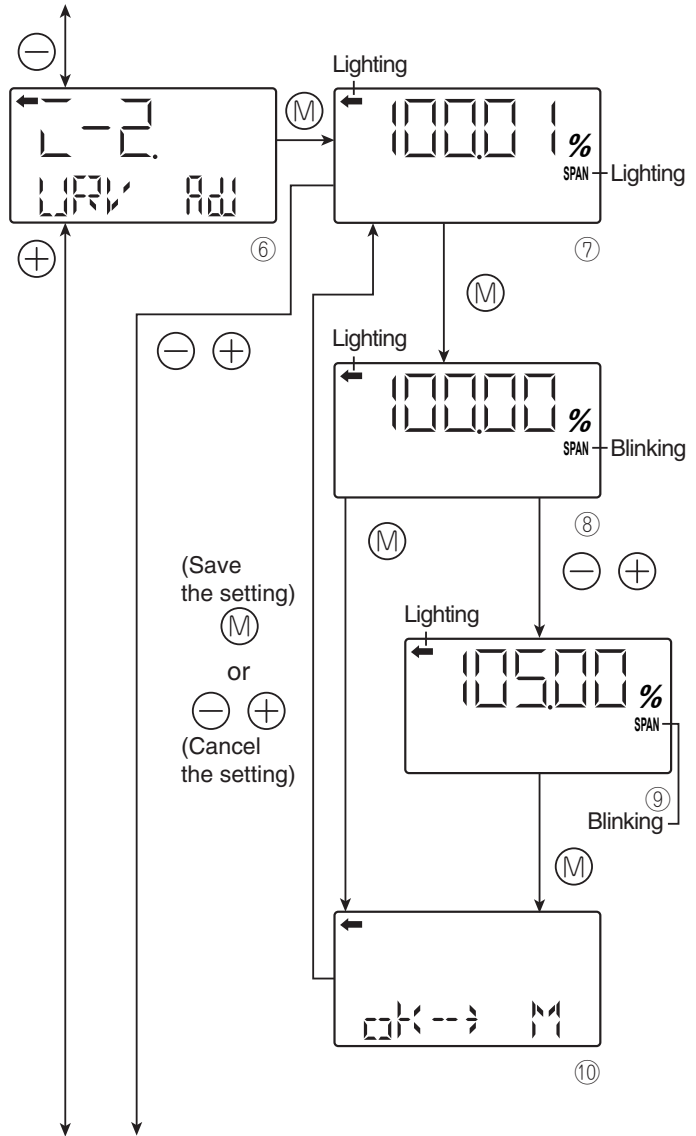


5 TRANSMITTER SETTINGS

I-2. URV Adj:

Span adjustment by changing the range (URV)

- Press the M key on the screen ⑥ to select the URV adjustment mode.
The measured value and unit displayed on the screen ⑦ are those of the normal mode and. “←” and “ZERO” light up.
- Apply the reference input pressure for URV (20 mA) on the screen ⑦.
After checking the measured value corresponding to 20 mA, press the M key.
- “SPAN” blinks on the screen ⑧. Press the M key on the screen ⑧ to perform a span (100% point) adjustment at the input reference pressure:
 $0.00\% \leq \text{URV (Note 2)} \leq$
Saturation current value (upper limit).
- Select whether the URV adjustment value setting is saved on the screen ⑩.
Press the M key to save the URV adjustment value setting and return to the screen ⑦.
Press the - or + key to cancel the setting and return to the screen ⑦.
- Check that the span adjustment (URV) was performed as intended on the screen ⑦.
- Press the M key to perform a new span adjustment or press the - or + keys to move to the previous or next menu.



⊘ CAUTION

If LRV or URV are adjusted, with the rerange function, the measurement range is changed as explained below:

LRV adjustment:

The measurement ranges LRV and URV are changed and the span is not changed.

URV adjustment:

The URV and span are changed. The LRV is not changed.

The following are the setting conditions for the adjustment point:

$-1.00\% \leq \text{LRV (Note 1)} \leq 100.00\%$

$0.00\% \leq \text{URV (Note 2)} \leq \text{Saturation current value (upper limit)}$

Note 1: Output adjustment value (%) corresponding to the input pressure for the LRV adjustment

Note 2: Output adjustment value (%) corresponding to the input pressure for the URV adjustment

5 TRANSMITTER SETTINGS

Menu J. Saturation current (values and specification)

The J menu is used to define both the values of the saturation current as well as the specification to be applied: NAMUR or Customized. If the NAMUR specification has been selected in menu J-3, it will not be possible to modify the values of the saturation currents. To change the saturation current settings, please select "CUSToM" in the J-3 menu.

J-1. SAT Lo: Change the lower limit of the saturation current

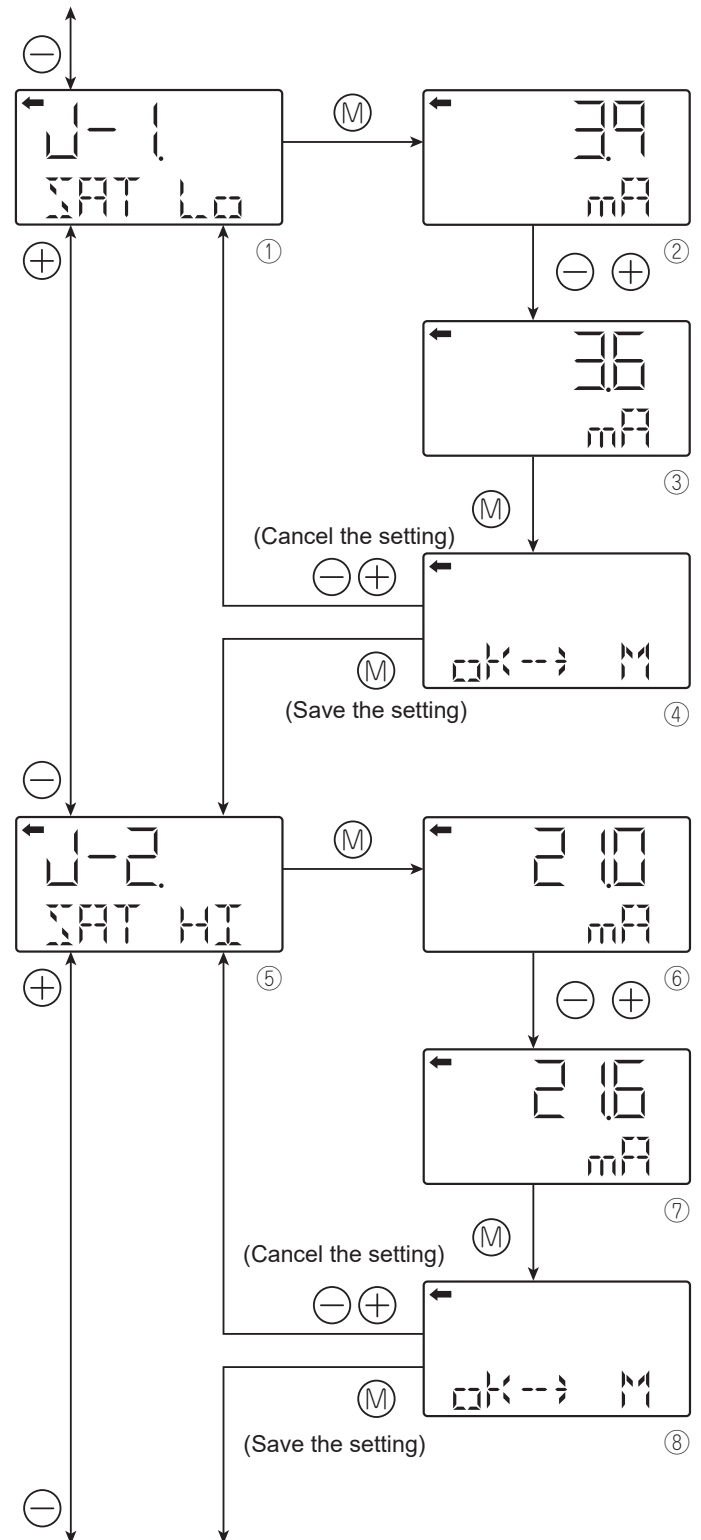
- Press the M key on the screen ① to display the screen for setting the lower limit of the saturation current (②).
- Set the lower limit on the screen ② with the - or + keys
Setting range:
 $3.4 \text{ mA} \leq \text{Burnout current (UNDER)} \leq \text{Saturation current (lower limit)} \leq 4.0 \text{ mA}$.
- Select whether the lower limit setting of the saturation current is saved on the screen ④. Press the M key to save the new setting or press the - or + keys to cancel the setting.

J-2. SAT HI: Change the upper limit of the saturation current.

- Press the M key on the screen ⑤ to display the screen for setting the upper limit of the saturation current (⑥).
- Set the upper limit on the screen ⑥ with the - or + keys.
Setting range:
 $20.0 \text{ mA} \leq \text{Saturation current (upper limit)} \leq \text{Burnout current (OVER)} \leq 22.5 \text{ mA}$.
- On the screen ⑧ Select whether the upper limit setting of the saturation current has to be saved: Press the M key to save the new setting or press the - or + keys to cancel the setting.

Note:

Please refer to the menu 9 to set the direction and value of the burnout current.



5 TRANSMITTER SETTINGS

J-3. SPEC :

Selection of CUSTOM/NAMUR specification for the burnout & saturation currents

- Press the M key on the screen ⑨ to display the screen to select the type of specification for the burnout and saturation currents (⑩)
- Select "CUSTOM" or "NAMUR" with the - or + keys.

The table below lists the possibilities of output values for saturation currents:

	NAMUR setting	CUSTOM setting
Saturation current value (lower limit)	3.8 mA (fixed)	3.6 mA to 4.0 mA Settable in 0.1 mA increments
Saturation current value (upper limit)	20.5 mA (fixed)	20.0 mA to 21.6 mA Settable in 0.1 mA increments

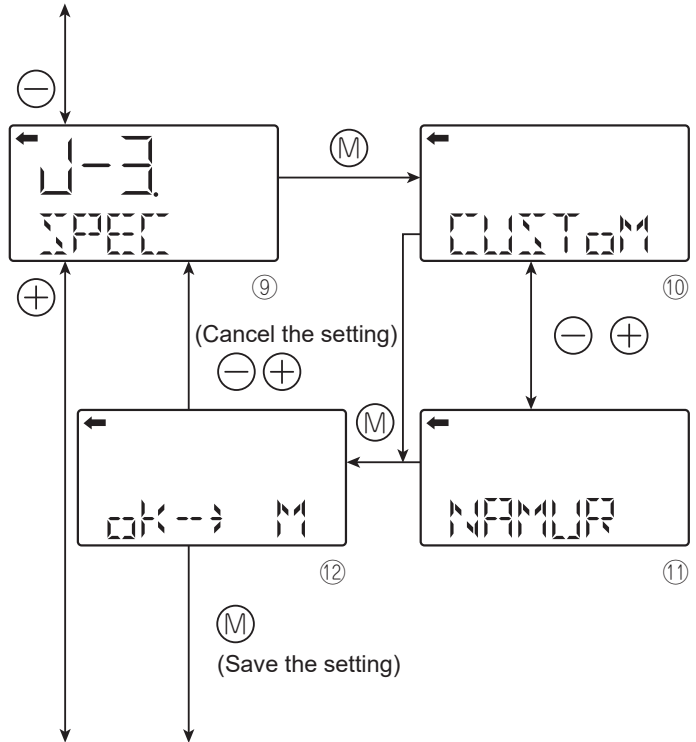
The table below lists the possibilities of output values for the burnout current:

	NAMUR setting	CUSTOM setting
Burnout current value (UNDER)	3.4 to 3.6 mA	3.4 mA to 3.8 mA Settable in 0.1 mA increments
Burnout current value (OVER)	20.8 to 21.6 mA	20.0 mA to 22.5 mA Settable in 0.1 mA increments

- On the screen ⑪ select whether the CUSTOM or NAMUR setting has to be saved:
Press the M key to save the new setting or press the - or + key to cancel the setting.

Note :

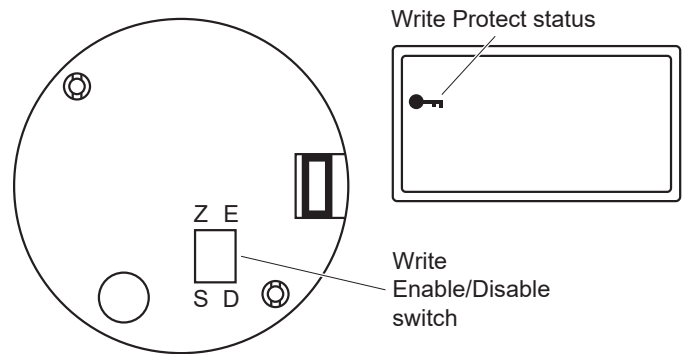
When NAMUR is selected and burnout direction is set to HOLD, burnout will automatically change to UNDERSCALE.



5 TRANSMITTER SETTINGS

Write protect switch and Menu

- Write protect micro-switch.
A micro-switch on the amplifier unit allows to enable or disable the write capability. The switch remains accessible and does not provide password protection.
- Write protect menu K
This menu can be used to enable the write protect mode with password protection. When activated, with this menu, the write protect mode overrides the micro-switch and the external adjustment screw.



Menu K. WPRTCT:

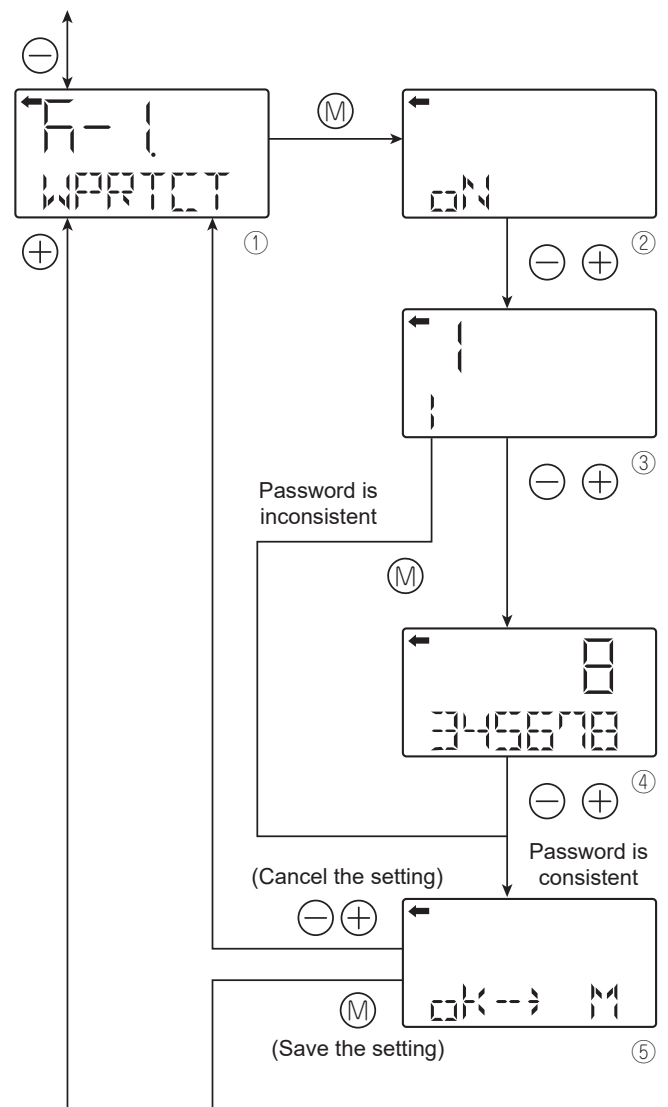
Write protect

This menu enables or disables the write protect mode. When the write protect mode is enabled, any modification of the parameters of the transmitter is prohibited. If the write protect timer is enabled in the menu K-3, after cancelling the write protect, it will automatically revert to write protect when the timer ends.

K-1 WPRCTC:

Enable/Disable the write protect mode

- Press the M key on the screen ① to display the screen for enabling/disabling the write protect mode (②).
- Select oN or oFF on the screen ② with the + or - keys.
- Press the M key on the screen ② to reach the screen ③ for entering a password.
- Press the - or + keys on the screen ③ to enter the password.
Functions of the keys:
+: Selection of the next digit.
-: Scroll the list of available characters.
- Once the 8 digits of the password have been entered press the M key (④).
- The password is not consistent: the message "Seterr" is displayed and the password must be reentered (③)



- The password is consistent: on the screen ⑤ select whether the write protect setting has to be saved Press the M key to save the new setting or the - or + keys to cancel it.

5 TRANSMITTER SETTINGS

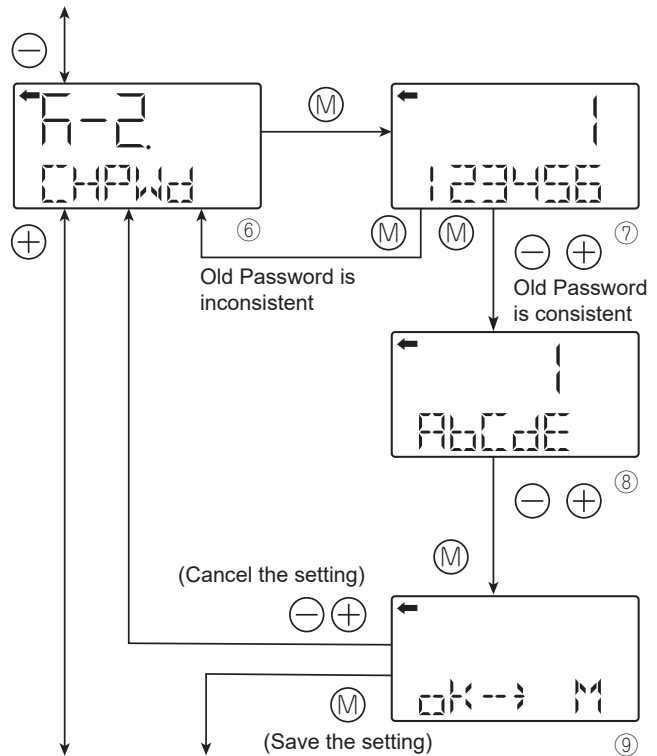
K-2. CHPWd: Change Password

- Press the M key on the screen ⑥ to display the write protect mode old password input screen.
- Using the - and + keys enter the old password.

Functions of the keys:

- + : Selection of the next digit.
- : Scroll the list of available characters.

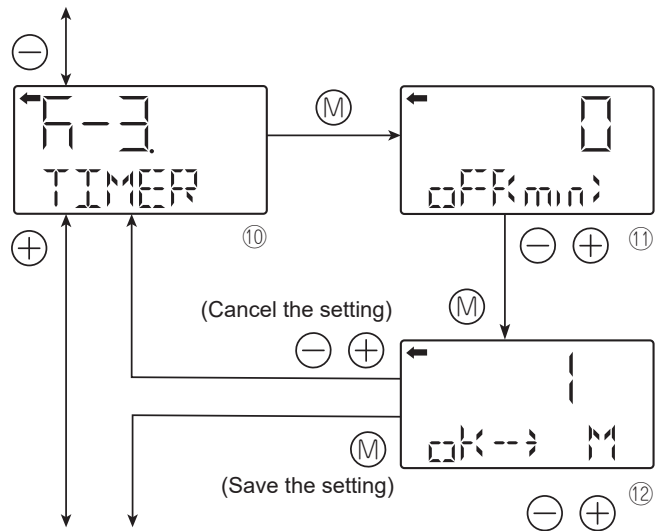
- Once the 8 digits of the password have been entered press the M key (⑦).
- The password is not consistent:
The message "Seterr" is displayed and the password must be reentered (⑦).
- The password is consistent:
On the screen ⑨ select whether the new password setting has to be saved. Press the M key to save the new setting or the - or + keys to cancel it.



K-3. TIMER:

Write protect timer setting

- Press the M key on the screen ⑩ to display the write protect timer setting display (⑪).
 - Use the - and + keys to define in minutes the timer value.
- Setting range:
1 to 255 minutes, 0 will disable the write protect mode.
- On the screen ⑫ select whether the new timer setting has to be saved. Press the M key to save the new setting or the - or + keys to cancel it.



5 TRANSMITTER SETTINGS

Menu L : Historical data

L-1. HisZER:

Last calibration data (user)

- Press the M key on the screen ① to display the zero calibration value (②).
- Press the M key to reach the next menu.

L-2. HisSPAN:

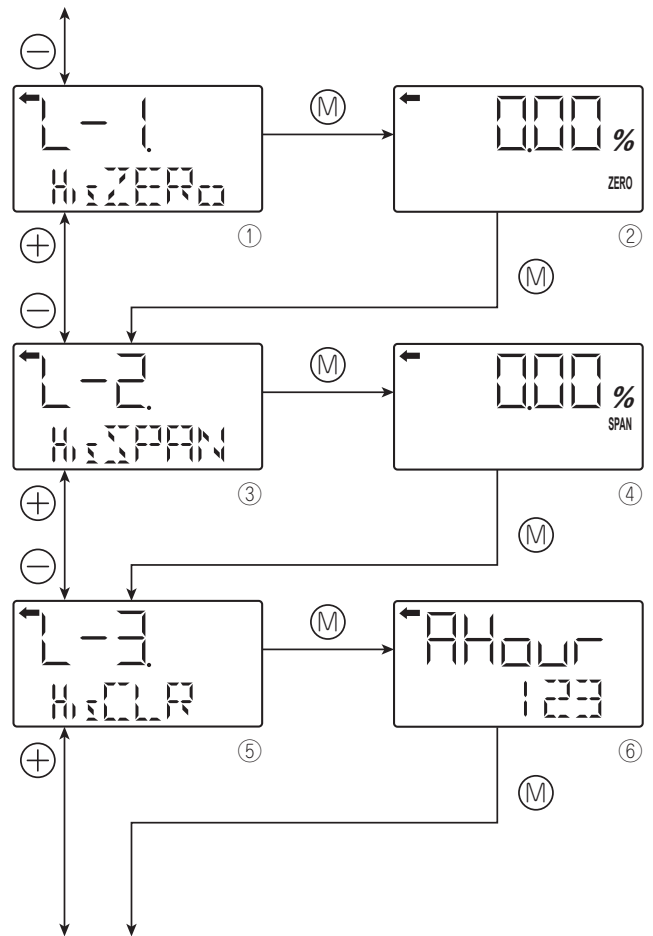
Last span calibration (user)

- Press the M key on the screen ③ to display the span calibration value (④).
- Press the M key to reach the next menu.

L-3. HisHoUR:

Amplifier and sensor operating hours totalizer

- Press the M key on the screen ⑤.
- Press the + key to scroll the amplifier and the sensor operating hours totalizer screen (⑥).
- Press the M key to reach the next menu.

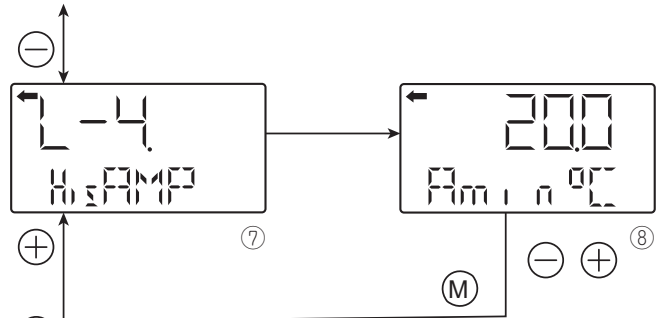


5 TRANSMITTER SETTINGS

L-4. HisAMP:

Min/Max amplifier temperature

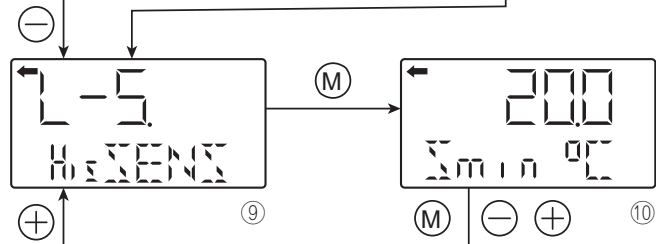
- Press the M key on the screen (7) to display the min/max values of the amplifier temperature.
- Use the - or + keys to display the minimal "Amin" or the maximal "Amax" values of the temperature history (8).
- Press the M key to reach the next menu.



L-5. HisSENS:

Min/Max sensor temperature

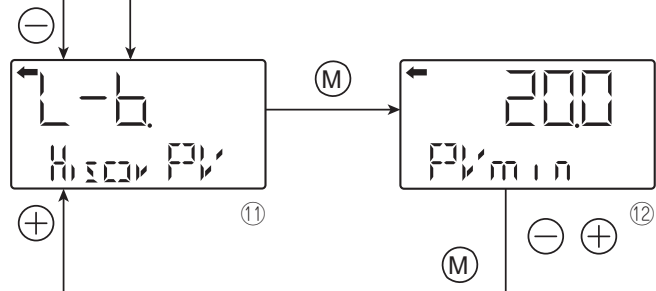
- Press the M key on the screen (9) to display the min/max values of the sensor temperature.
- Use the - or + keys to display the minimal "Smin" or the maximal "Smax" values of the temperature history (10).
- Press the M key to reach the next menu.



L-6. Hisov PV:

Min/Max pressure

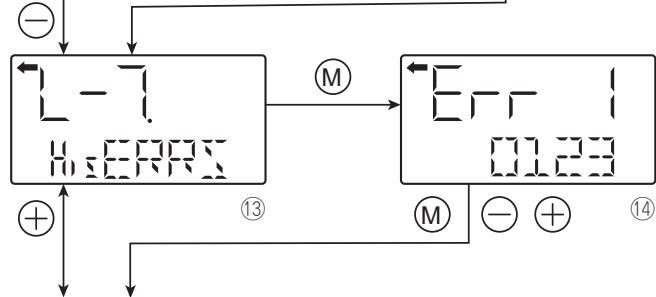
- Press the M key on the screen (11) to display the min/max values of the pressure.
- Use the - or + keys to display the minimal value "Cmin" or the maximal "Cmax" temperature history (12).
- Press the M key to reach the next menu.



L-7 HisERR :

Error history

- Press the M key on the screen (13) to display the last two errors.
- Use the - or + keys to scroll the last two errors (14) and error codes. Please refer to d-2. ALMCHK menu for further details regarding error codes.
- Press the M key to reach the next menu.

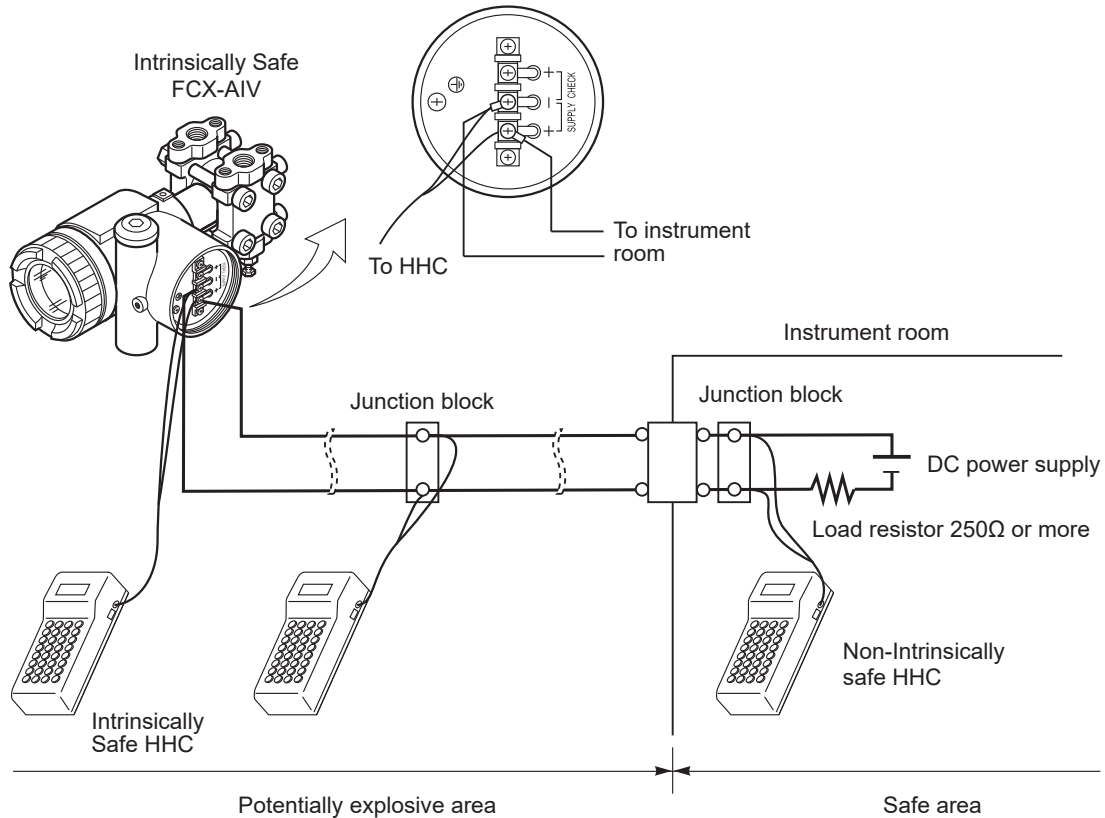


5 TRANSMITTER SETTINGS

5.3 Using a HART Hand Held Communicator

5.3.1 HHC wiring diagram (intrinsically safe protection mode)

The diagram below shows the possibilities of connecting the HART HHC to the FCX-AIV transmitter.



DANGER

Potentially explosive atmosphere:

For flameproof protection mode, the transmitter cover must not be opened while the transmitter is energized. The HART connection and communication can only be done from the safe area.

5.3.2 HART Device Description files

The FCX-AIV HART device description files must first be uploaded to your HART HHC (for example: MERIAM MFC5150) in order to describe all the functionalities of the FCX-AIV pressure transmitters and the required HART commands to comply with. FCX-AIV device description files can be retrieved from the FieldComm Group website: <https://www.fieldcommgroup.org/registered-products>.

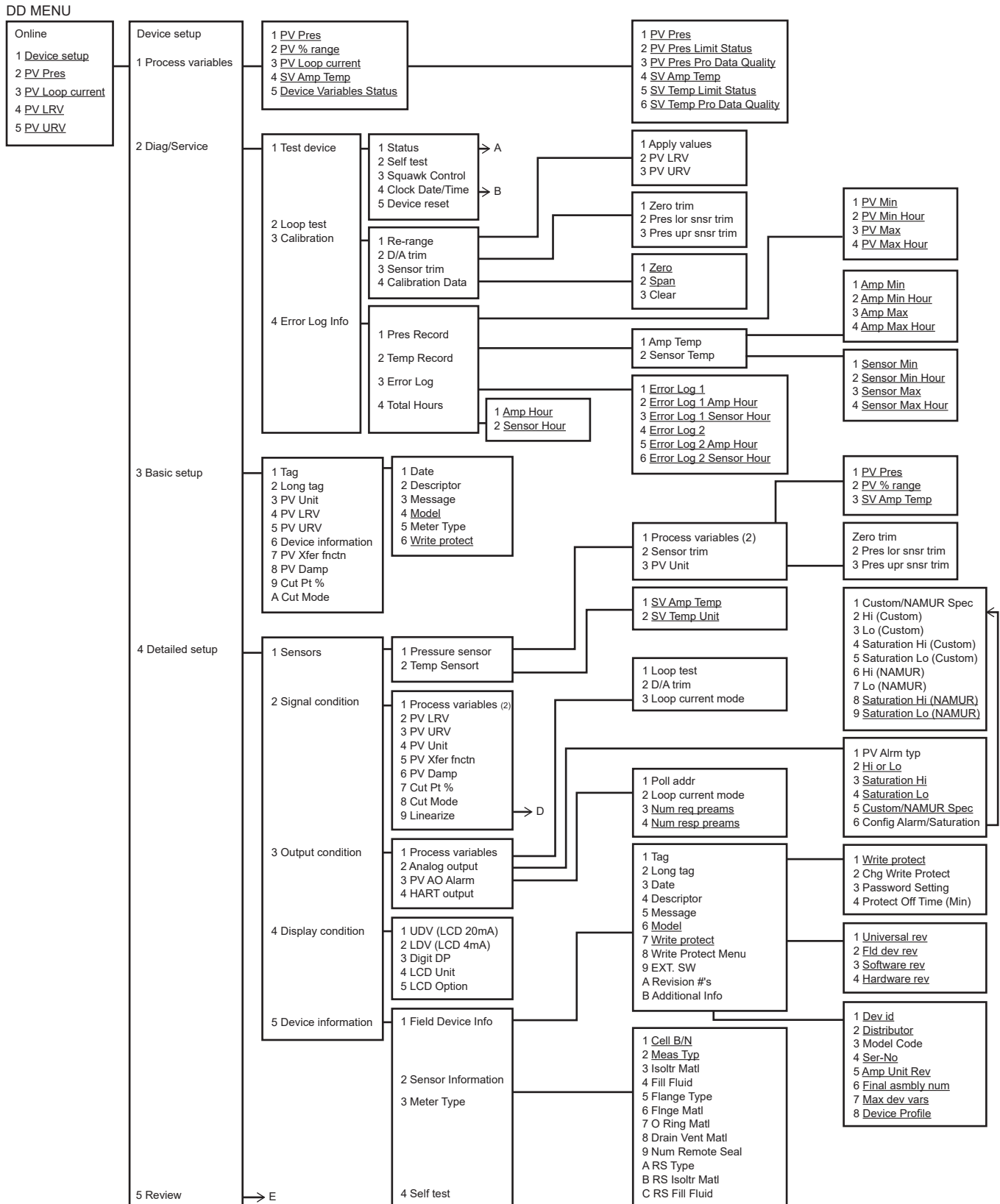
- Product name: FCX-A4
- Manufacturer ID: 0x000015
- Device Type ID: 0x1505
- DD revision: 0x01
- HART revision: 7

5 TRANSMITTER SETTINGS

5.3.3 Organization of the HART menu and functions

The synoptic below shows how is organized the HART menu and functions available in the Device Description files.

Underlined functions are read only:



5 TRANSMITTER SETTINGS

A - STATUS

- 1 [Device status](#)
- 2 [FCX Standard Status](#)
- 3 [Gate Array Error 1](#)
- 4 [Gate Array Error 2](#)
- 5 [A/D Input Data Error](#)
- 6 [EEPROM Error](#)
- 7 [CPU Error 1](#)
- 8 [CPU Error 2](#)
- 9 [CPU Error 3](#)
- A [CPU Error 4](#)
- B [Gate Array Comm. Error](#)
- C [Ext dev status](#)

Device status

Process applied to the PV is outside...(Primary Variable Out of Limits)	ON/OFF
Process applied to the non-PV is outside ... (Non-Primary Variable Out of Limits)	ON/OFF
PV Analog Channel Saturated (Loop Current Saturated)	ON/OFF
PV Analog Channel Fixed (Loop Current Fixed)	ON/OFF
Field device has more status available (More Status Available)	ON/OFF
A reset or self test of the field device has occurred, or power has ... (Cold Start)	ON/OFF
A modification has been made to the configuration of the field device (Configuration Changed)	ON/OFF
Field device has malfunction due to a hardware error or failure (Device Malfunction)	ON/OFF

FCX Standard Status

Overflow (Saturation upper value < PV value)	ON/OFF
Underflow (PV value < Saturation lower value)	ON/OFF
Not used	OFF
OUT of RANGE	ON/OFF
TEMP Alarm	ON/OFF
FL-1	ON/OFF
FL-2 (Amp EEPROM Error)	ON/OFF
FL-3 (Sensor EEPROM Error)	ON/OFF

Gate Array Error 1

Checksum error or All 0 (Detected by CPU)	ON/OFF
Not used	OFF
Feedback error	ON/OFF
Sensor (C1,C2): T1 Minimum value under	ON/OFF
Sensor (C1,C2): T1 Maximum value over	ON/OFF
Sensor (C1,C2): T2 Minimum value under	ON/OFF
Sensor (C1,C2): T2 Maximum value over	ON/OFF
Sensor (C1,C2): Minimum value < T1-T2	ON/OFF

Gate Array Error 2

ASIC circuit reference (T3): T3 Minimum value under	ON/OFF
ASIC circuit reference (T3): T3 Maximum value over	ON/OFF
Not used	OFF
Not used	OFF
Temp. of Sensor (T4, T7): T4,T7 Minimum value under	ON/OFF
Temp. of Sensor (T4, T7): T4,T7 Maximum value over	ON/OFF
Temp. of Sensor (T4, T7): Minimum value < T4-T7	ON/OFF
Input Decoder error	ON/OFF

A/D Input Data Error

Amp Temp (TempA): A0 Minimum value under	ON/OFF
Amp Temp (TempA): A0 Maximum value over	ON/OFF
Circuit Voltage (VPB): A1 Minimum value under (Low voltage)	ON/OFF
Circuit Voltage (VPB): A1 Maximum value over (Over voltage)	ON/OFF
Not used	OFF
Not used	OFF
Current FB (FB): A2 Minimum value under	ON/OFF
Current FB (FB): A2 Maximum value over	ON/OFF

EEPROM Error

Cell EEPROM Read/Write Error	ON/OFF
Cell EEPROM Double Memory check error	ON/OFF
Not used	OFF
Not used	OFF
Amp EEPROM Read/Write Error	ON/OFF
Amp EEPROM Double Memory check error	ON/OFF
Not Used	OFF
Not Used	OFF

5 TRANSMITTER SETTINGS

A - STATUS

- 1 Device status
- 2 FCX Standard Status
- 3 Gate Array Error 1
- 4 Gate Array Error 2
- 5 AD Input Data Error
- 6 EEPROM Error
- 7 CPU Error 1
- 8 CPU Error 2
- 9 CPU Error 3
- A CPU Error 4
- B Gate Array Comm. Error
- C Ext dev status

CPU Error 1

Clock 1 error (End interrupt none or T3 range over)	ON/OFF
Internal Watchdog timer timeout reset (Not used)	ON/OFF
Program sequence error	ON/OFF
Processing_units error	ON/OFF
ROM check error	ON/OFF
Stack overflow error	ON/OFF
RAM check error	ON/OFF
Calculation parameter error	ON/OFF

CPU Error 2

Error of magnitude relation of temperature (Amp)	ON/OFF
Error of magnitude relation of temperature (Cell)	ON/OFF
Temperature error (Amp alarm)	ON/OFF
Temperature error (Sensor alarm)	ON/OFF
Low Voltage check error(Not set)	ON/OFF
Over Voltage check error	ON/OFF
External Watchdog timer timeout or error	ON/OFF
An impossible error on a design	ON/OFF

CPU Error 3

ME2=INTR2 None	ON/OFF
SLA1 None	ON/OFF
SLA2 None	ON/OFF
SLA3 None	ON/OFF
DMA None	ON/OFF
Communication Error (ADC 1:A0=Amp Temp(TempA))	ON/OFF
Communication Error (ADC 2:A1=Circuit Voltage(VPB))	ON/OFF
Communication Error (ADC 3:A2=Current FB(FB))	ON/OFF

CPU Error 4

Communication Error (SPI 1:GA/CPU)	ON/OFF
Communication Error (SPI 2:LCD)	ON/OFF
Communication Error (SPI 3:ADS1220)	ON/OFF
Communication Error (SPI 4:PM(DAC))	ON/OFF
Not Used	OFF
Not Used	OFF
Not Used	OFF
Not Used	OFF

Gate Array Comm. Error

GA/CPU Interface Memory: CHKS=Checksum error (Detected by GA)	ON/OFF
GA/CPU Interface Memory: DBLM=Double memory comparison error	ON/OFF
GA/CPU Interface Memory: CMDE=Command error	ON/OFF
GA/CPU Interface Memory: FRME=Framing error	ON/OFF
Not Used	OFF
Not Used	OFF
Not Used	OFF
Not Used	OFF

Ext dev status

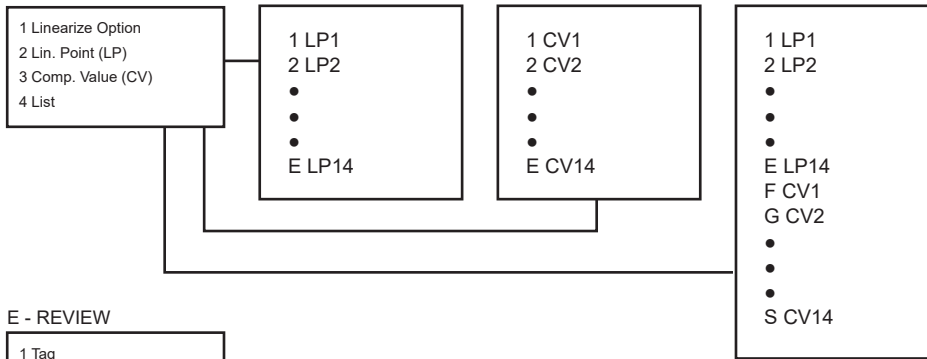
Maintenance required	OFF
Device variable alert	ON/OFF
Critical Power Failure	OFF

B - CLOCK DATE/TIME

- 1 Current Date
- 2 Current Time
- 3 Set Real Time Clock

5 TRANSMITTER SETTINGS

D - LINEARIZE



E - REVIEW

- 1 Tag
- 2 Long tag
- 3 Model
- 4 Distributor
- 5 Meas Typ
- 6 Ser-No
- 7 Amp Unit Rev
- 8 PV Xfer fnctn
- 9 Module Rnge
- A PV Unit
- B PV USL
- C PV LSL
- D PV Min span
- E PV LRV
- F PV URV
- G PV Damp
- H PV Alm typ
- I Hi or Lo
- J Saturation Hi
- K Saturation Lo
- L Custom/NAMUR Spec
- M LDV (LCD 4mA)
- N UDV (LCD 20mA)
- O LCD Unit
- P Linearize Option
- Q Write protect
- R EXT. SW
- S Cfg chng count
- T Descriptor
- U Message
- V Date
- W Dev id
- X Final asmbly num
- Y Universal rev
- Z Fld dev rev
- a Software rev
- b Poll addr
- c Loop current mode
- d Max dev vars
- e Num req preams
- f Num resp preams
- g Current Date
- h Current Time
- i Set Clock Date
- j Set Clock Time

5 TRANSMITTER SETTINGS

5.4 Using a HART modem and FDT Device Type Manager™ (FDT DTM)

The FCX-DTM package is available to configure the FCX pressure transmitters. The FCX-DTM installation package provides the following Device DTMs:

- FCX-AII/AIII (V4/V5), HART 5 protocol, compliant with FCX-AII (V4) and FCX-AIII (V5) pressure transmitters.
- FCX-AIIIS/AIV (VG/V6), HART 7 protocol, compliant with FCX-AIIIS (VG) and FCX-AIV (V6) pressure transmitters.

6 MAINTENANCE

6.1 Periodic inspection

The definition of the period for the inspection depends on the operating conditions (usually once per year). For Safety Instrumented Systems, as per IEC 61511, the periodic inspection can be done according to the definition of the Proof Test Interval.

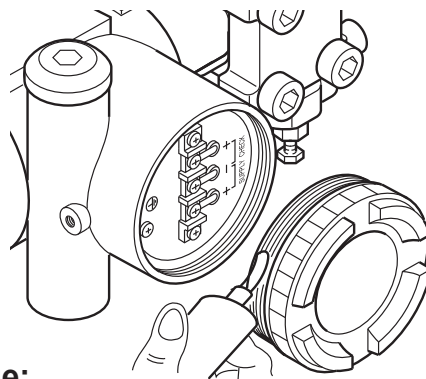
Visual inspection:

Visually inspect each part of the transmitter for identifying any damage or corrosion.

Transmitter housing cover and O-ring:

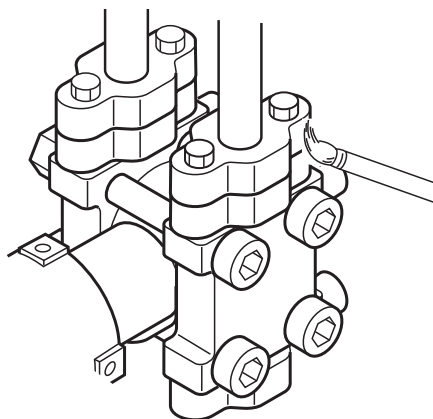
The transmitter has a waterproof and dustproof construction.

- Make sure that the O-ring of the housing covers are not damaged.
- Check that there is no dirt on the threads of the cover.
- Before screwing on the housing cover, apply preferably an anti-seize grease to the threads.



Process connection leakage:

Using soapy water or similar, check all process connections for leaks of process fluid. If necessary drain moisture that has accumulated in the transmitter and process piping.



6.2 Proof Test (IEC 61508/IEC 61511)

A proof test is mandatory to check that the FCX-AIV transmitter is running properly in a Safety Instrumented Function (SIF). The transmitter shall be tested at the appropriate interval T1 which has been defined according to the safety and integrity level to be insured by the SIF.

The proof test mainly consists of checking the value of the burnout output current and the calibration of the transmitter. For more details on the recommended proof test procedure, please refer to the FCX-AIV Safety Manual (TN5A5137).

6.3 Troubleshooting

If case of measurement error or malfunction, the simplest way to carry out a diagnosis is:

- Check the error code displayed on the local indicator (if present) and use the self-diagnosis function (3 buttons indicator, menu D, refer to page 52).
- Use a HART device and check the detailed status of the transmitter (refer to page 71 and 72).

The problem may also not be directly related to the transmitter. Investigations can be made with reference to the table below.

Symptom	Cause	Remedy
Output current overshoots scale (The value is more than the upper limit of the saturation current.)	(1) The manifold valve does not open/ close normally. _____ (2) Pressure leak is occurring. _____ (3) Process piping is improper. _____ (4) Process pipe is clogged. _____ (5) Power supply voltage and/or load resistance is improper. _____ (6) Voltage between the external connection terminals is wrong. _____ (7) Zero and span or fixed output current (4, 20 mA) are not adjusted. _____ (8) Electronic unit is faulty. _____	_____> Repair the valve so that it opens/closes normally. _____> Repair leak. _____> Make correct piping. _____> Eliminate the cause of clogging. _____> Make arrangement to obtain proper values. _____> Check for faulty cable, insulation, etc. and repair as needed. _____> Readjust according to chapter 5. _____> Replace the amplifier unit according to chapter 6.4.
No output current (The value is less than the lower limit of the saturation current.)	(1) Same as (1) to (4) above. (2) Power supply polarity is wrong. _____ (3) Power supply voltage is improper. _____ (4) Voltage between the external connection terminals is wrong. _____ (5) Zero and span or fixed output current (4, 20mA) are not adjusted. (6) Amplifier unit is faulty _____	_____> Correct wiring according to chapter 3.1. _____> Make arrangement to obtain proper values. _____> Check for faulty cable, insulation, etc. and repair as needed. _____> Read just according to chapter 5. _____> Replace the amplifier unit according to chapter 6.4.
Output current error.	(1) Process piping is improper. _____ (2) Gas or solution is mixed in. _____ (3) Liquid density changes. _____ (4) Ambient temperature changes widely. _____ (5) Zero and span or fixed output current (4, 20mA) has deviated. (6) Amplifier unit is faulty. _____	_____> Correct the piping. _____> Vent or drain the transmitter. _____> Perform density compensation. _____> Minimize the temperature change. _____> Readjust according to chapter 5. _____> Replace the amplifier unit according to chapter 6.4.
When the indicator is abnormal.	(1) An error code is displayed.	Refer to "Contents of message"

If repair is not possible, please contact Fuji Electric's service department.

6 MAINTENANCE

6.4 Replacement of defective parts

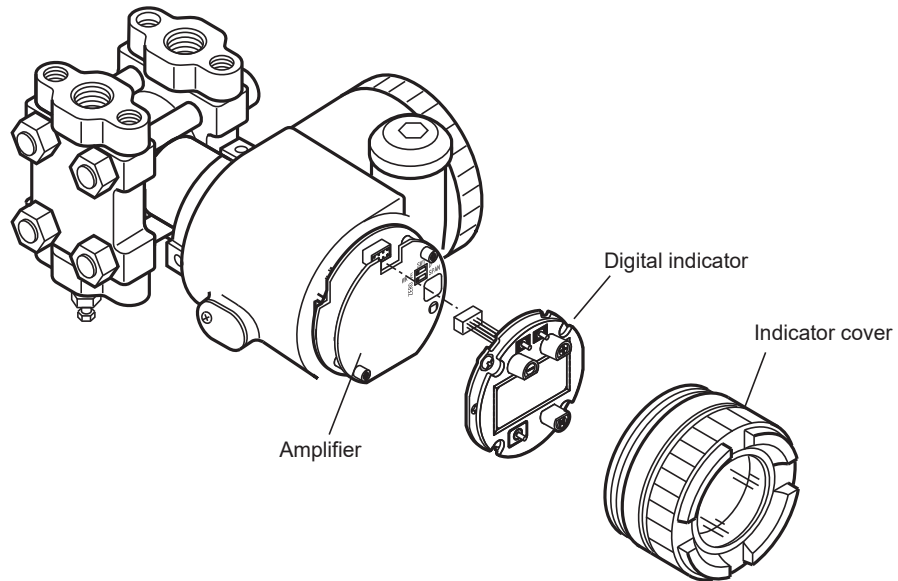


DANGER

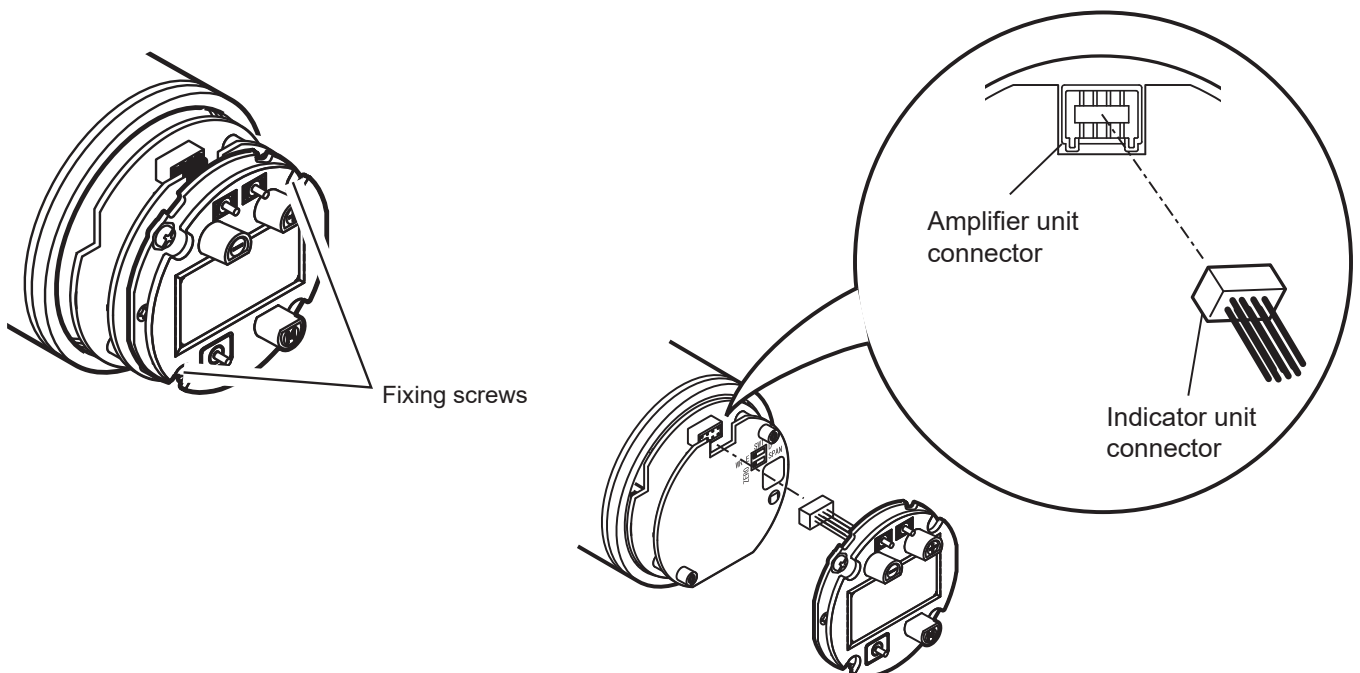
Potentially explosive atmosphere:

For flameproof protection mode, never open the transmitter on site while it is powered.

Digital indicator:



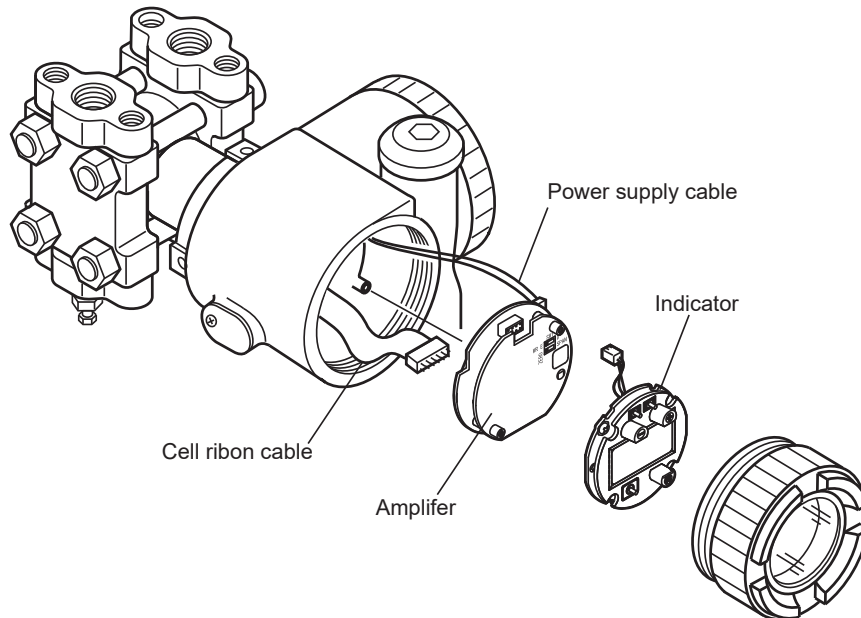
- (1) Loosen and remove the indicator cover
- (2) Unscrew the two fixing screw and remove the digital indicator
- (3) Disconnect the digital indicator from the amplifier unit connector.
- (5) Connect the new indicator to the amplifier unit.
- (6) Secure the digital indicator to the amplifier unit by tightening the two mounting screws.
- (7) Replace the indicator cover.



6 MAINTENANCE

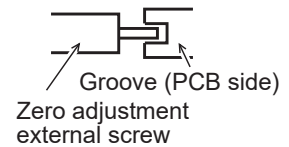
Amplifier unit:

- (1) Turn off the power supply.
- (2) Remove the indicator cover.
- (3) Remove the indicator (two screws).
- (4) Untighten the two screws securing the amplifier unit.



CAUTION

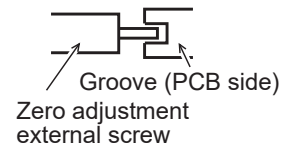
Before removing the amplifier, make sure the external adjustment screw is vertically aligned as shown in the picture to the right.



- (5) Remove the amplifier unit.
- (6) Disconnect the two cables (power supply and detecting unit).
- (7) Replace the amplifier by a new one and reconnect the two cables.

CAUTION

Before installing the amplifier in the transmitter housing, make sure the external adjustment screw is vertically aligned as well as the groove of the PCB rotator .

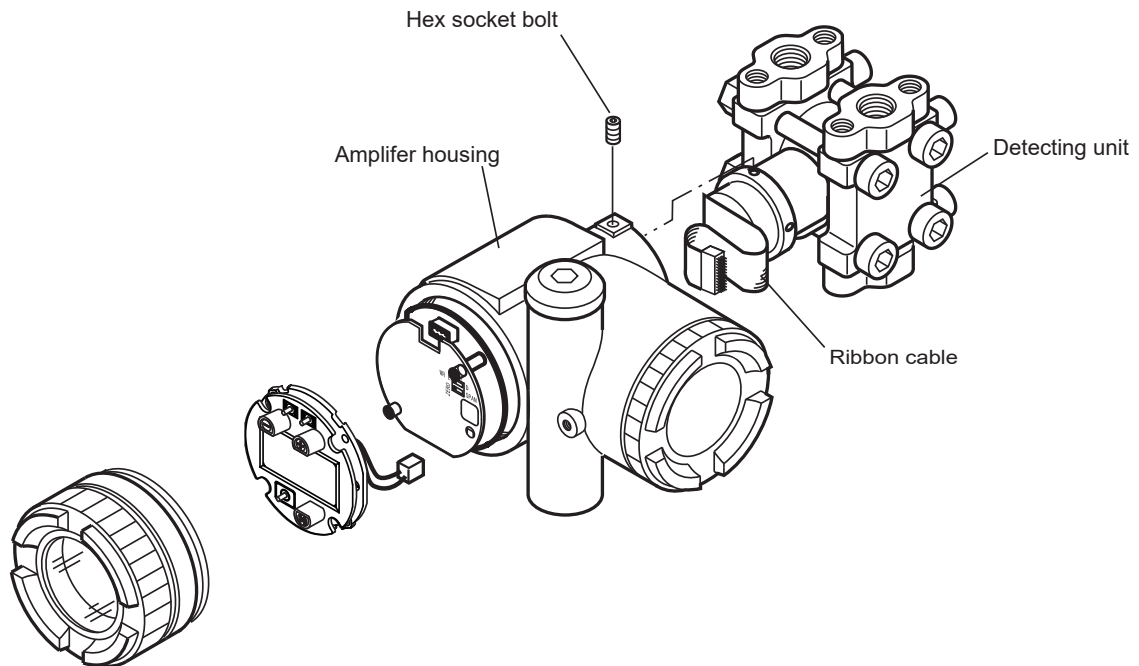


- (8) Install the new amplifier in the transmitter housing and complete the assembly by reversing the above procedure from (4) to (1)
- (9) After completion of the replacement, carry out a Zero and Span calibration.

6 MAINTENANCE

Replacement of the detecting unit

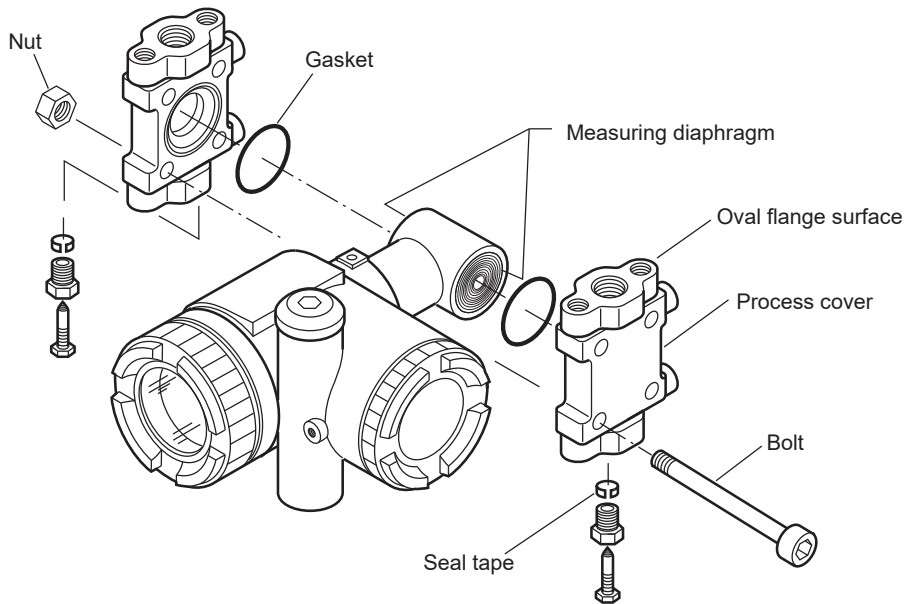
- (1) Remove the amplifier unit as described in the section above.
- (2) Remove three hex socket bolts from the amplifier housing.
Separate the amplifier housing from the detecting unit.
- (3) Replace the detecting unit with an identical new one.
- (4) Reassemble the transmitter by reversing the above procedure from (2) to (1).
- (5) After completion of the replacement, carry out a Zero and Span calibration.



6 MAINTENANCE

Internal parts of the detecting unit:

Differential and flow transmitters (FKC)



CAUTION

Do not disassemble the FKC#11 or FKC#22 detecting units. FKC#11 and FKC#22 shall be returned to Fuji Electric for repair.

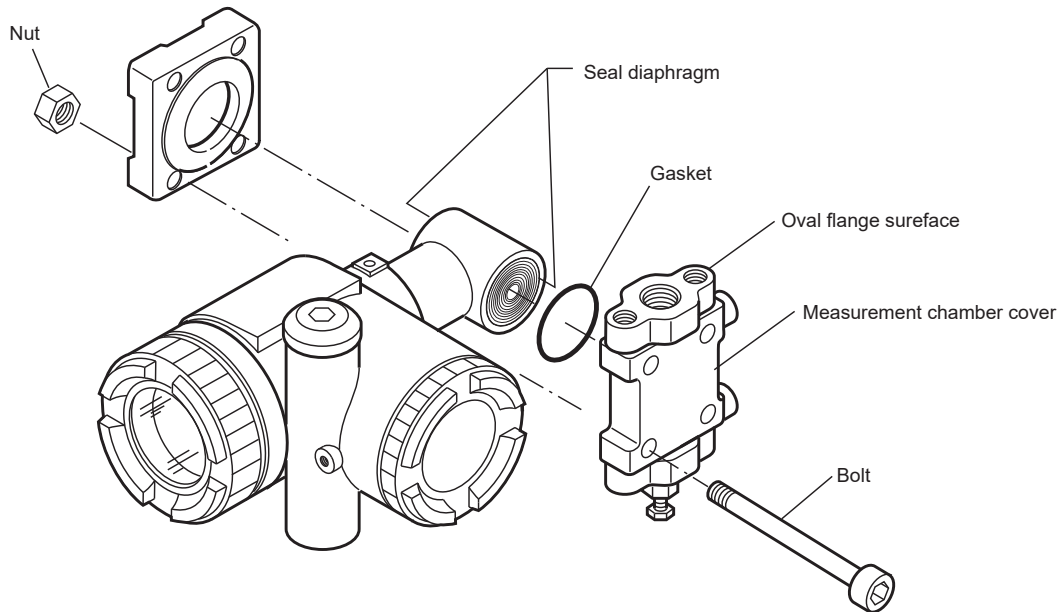
- (1) Loosen and remove the process cover bolting.
- (2) After disassembly, replace the faulty part with a new one.
- (3) Before reassembly, clean the gasket surface of the process cover with a soft cloth soaked in water, alcohol, or similar detergent.
- (4) Reassemble the detecting unit by reversing the disassembly procedure. Proceed with care in order not to damage the gasket or the measuring diaphragm. The tightening torque should follow the table below.

Size	Material	Tightening torque N·m (kgf·m) <ft·lb>
M10	Carbon steel	50 ± 2.5 (5 ± 0.25) <36 ± 1.8>
M10	SS 316	40 ± 2.0 (4 ± 0.2) <29 ± 1.5>
M10	SS 660	50 ± 2.5 (5 ± 0.25) <36 ± 1.8>
M12	Carbon steel	60 ± 3.0 (6 ± 0.30) <43 ± 2.1>
M12	SS 660	60 ± 3.0 (6 ± 0.30) <43 ± 2.1>

- (5) Carry out a pressure test at 150 % of the maximum working pressure simultaneously on both the HP and LP sides for 15 minutes and check that there is no leaks.

6 MAINTENANCE

Gauge and absolute pressure transmitters (FKG and FKA)



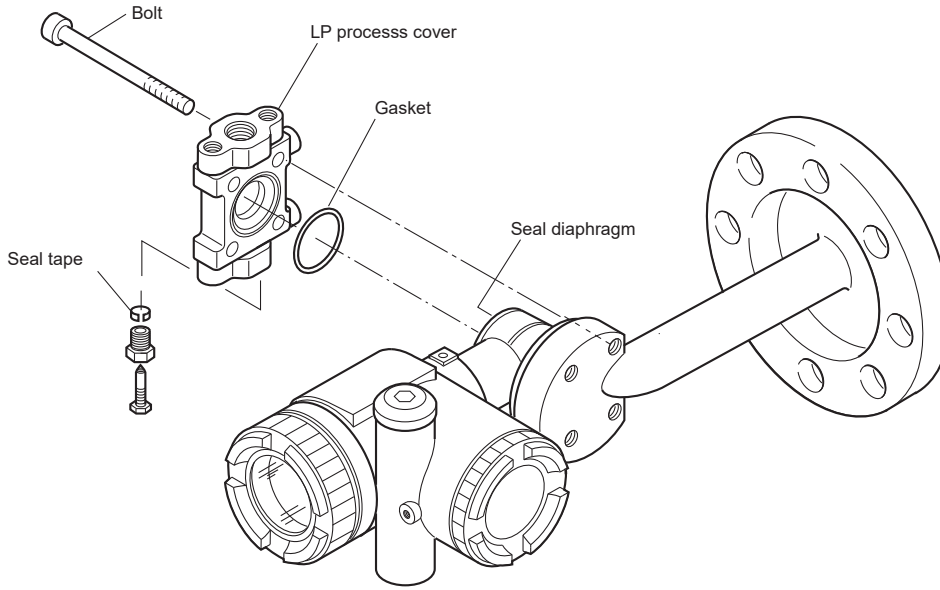
- (1) Loosen and remove the process cover bolting.
- (2) After disassembly, replace the faulty part with a new one.
- (3) Before reassembly, clean the gasket surface of the process cover with a soft cloth soaked in water, alcohol, or similar detergent.
- (4) Reassemble the detecting unit by reversing the disassembly procedure. Proceed with care in order not to damage the gasket or the measuring diaphragm. The tightening torque should follow the table below.

Size	Material	Tightening torque N·m (kgf·m) <ft·lb>
M10	Carbon steel	50 ± 2.5 (5 ± 0.25) <36 ± 1.8>
M10	SS 316	40 ± 2.0 (4 ± 0.2) <29 ± 1.5>
M10	SS 660	50 ± 2.5 (5 ± 0.25) <36 ± 1.8>
M12	Carbon steel	60 ± 3.0 (6 ± 0.30) <43 ± 2.1>
M12	SS 660	60 ± 3.0 (6 ± 0.30) <43 ± 2.1>

- (5) Carry out a pressure test at 150 % of the maximum working pressure on the HP side for 15 minutes and check that there is no leaks.

6 MAINTENANCE

Level transmitters (FKE)



- (1) Loosen and remove the process cover bolting.
- (2) After disassembly, replace the faulty part with a new one.
- (3) Before reassembly, clean the gasket surface of the process cover with a soft cloth soaked in water, alcohol, or similar detergent.
- (4) Reassemble the detecting unit by reversing the disassembly procedure. Proceed with care in order not to damage the gasket or the LP measuring diaphragm. The tightening torque should follow the table below.

Size	Material	Tightening torque N·m (kgf·m) <ft-lb>
M10	Carbon steel	50 ± 2.5 (5 ± 0.25) <36 ± 1.8>
M10	SS 316	40 ± 2.0 (4 ± 0.2) <29 ± 1.5>

- (5) Carry out a pressure test at 150 % of the maximum working pressure simultaneously on both the HP and LP sides for 15 minutes and check that there is no leaks.

6 MAINTENANCE

6.5 Calibration

Two main sections of the FCX-AIV pressure transmitters shall be calibrated:

1. The 4-20 mA analog output
2. The pressure measuring cell

To perform the calibrations, the following equipment is needed:

- A power supply: 24 Vdc nominal.
- A digital ammeter with a resolution of $\pm 1 \mu\text{A}$ (4-20 mA output calibration only)
- A pressure generator with an accuracy better than $\pm 0.05\%$. FCX-AIV transmitter. Models and their pressure ranges are listed in the tables below.
- A 250 Ω load resistor (HART communication).
- A HART communication equipment.

Pressure ranges:

Differential pressure (FKC models) [kPa] {mbar} <inH2O>	
FKC□11	[0.1 to 1] {1 to 10} <0.4 to 4>
FKC□22	[0.1 to 6] {1 to 60} <0.4 to 24>
FKC□33/FKC□43	[0.32 to 32] {3.2 to 320} <1.29 to 129>
FKC□35/FKC□45	[1.3 to 130] {13 to 1300} <5.2 to 522>
FKC□36/FKC□46	[5 to 500] {50 to 5000} <0.7 to 72.5 psi>
FKC□38/FKC□48	[30 to 3000] {300 to 30000} <4.35 to 465 psi>

Gauge pressure (FKG models) [kPag] {barg} <psig>	
FKG□01	[1.3 to 130] {0.013 to 1.3} <0.18 to 18.8>
FKG□02	[5 to 500] {0.05 to 5} <0.73 to 72.5>
FKG□03	[30 to 3000] {0.3 to 30} <4.35 to 435>
FKG□04	[100 to 10000] {1 to 100} <14.5 to 1450>
FKG□05	[500 to 50000] {5 to 500} <72.5 to 7252>

Absolute pressure (FKA models) [kPa abs] {bar abs} <psi abs>	
FKA□01	[1.6 to 16] {0.016 to 0.16} <0.23 to 2.32>
FKA□02	[1.6 to 130] {0.16 to 1.3} <0.23 to 18.85>
FKA□03	[5 to 500] {0.05 to 5} <0.73 to 72.5>
FKA□04	[30 to 3000] {0.3 to 30} <4.35 to 435>
FKA□05	[100 to 1000] {1 to 100} <14.5 to 1450>

Gauge pressure, direct mount type (FKP models) [kPag] {barg} <psig>	
FKP□01	[8.125 to 130] {0.08125 to 1.3} <1.18 to 18.85>
FKP□02	[31.25 to 500] {0.3125 to 5} <4.53 to 72.5>
FKP□03	[187.5 to 3000] {1.875 to 30} <27 to 435>
FKP□04	[625 to 10000] {6.25 to 100} <90.6 to 1500>

6 MAINTENANCE

Absolute pressure, direct mount type (FKH models) [kPa abs] {bar abs} <psi abs>	
FKH□02	[8.125 to 130] {0.08125 to 1.3} <1.18 to 18.85>
FKH□03	[31.25 to 500] {0.3125 to 5} <4.53 to 72.5>
FKH□04	[187.5 to 3000] {1.875 to 30} <27 to 435>

Differential pressure with remote seals (FKD models) [kPa] {bar} <psi>	
FKD□□3	[0.32 to 32] {0.03 to 0.32} <0.04 to 4.64>
FKD□□5	[1.3 to 130] {0.01 to 1.3} <0.19 to 18.85>
FKD□□6	[5 to 500] {0.05 to 5} <0.73 to 72.52>
FKD□□8	[30 to 3000] {0.3 to 30} <4.35 to 435>
FKD□□9	[500 to 20000] {5 to 200} <72.5 to 2901>

Gauge pressure with remote seal (FKB models) [kPa] {bar} <psi>	
FKB□□1	[1.3 to 130] {0.01 to 1.3} <0.19 to 18.85>
FKB□□2	[5 to 500] {0.05 to 5} <0.73 to 72.52>
FKB□□3	[30 to 3000] {0.3 to 30} <4.35 to 435>
FKB□□4	[100 to 10000] {1 to 100} <14.5 to 1450>
FKB□□5	[500 to 50000] {5 to 500} <72.5 to 7252>

Absolute pressure with remote seal (FKM models) [kPa] {bar} <psi>	
FKM□□1	[1.6 to 16] {0.016 to 0.16} <0.23 to 2.32>
FKM□□2	[1.6 to 130] {0.16 to 1.3} <0.23 to 18.85>
FKM□□3	[5 to 500] {0.05 to 5} <0.73 to 72.5>
FKM□□4	[30 to 3000] {0.3 to 30} <4.35 to 435>
FKM□□5	[100 to 1000] {1 to 100} <14.5 to 1450>

Level transmitter (FKE models) [kPa] {mH2O} <in H2O>	
FKE□□2	[0.1 to 6] {0.01 to 0.61} <0.03 to 2>
FKE□□3	[0.32 to 32] {0.032 to 3.2} <0.1 to 10.7>
FKE□□5	[1.3 to 130] {0.13 to 13} <0.43 to 43.5>
FKE□□6	[5 to 500] {0.5 to 50} <1.67 to 167.3>
FKE□□8	[30 to 3000] {3 to 300} <10 to 1004>

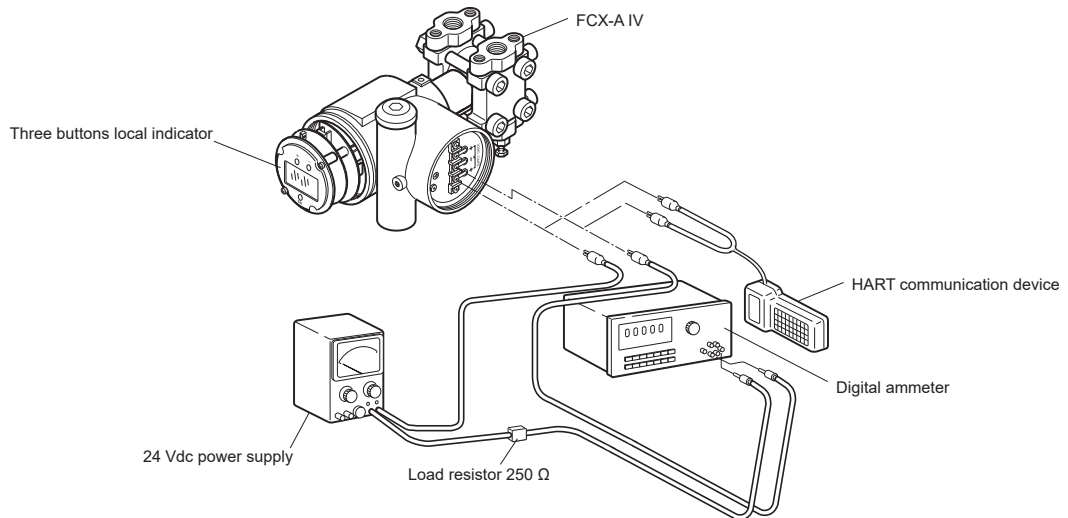
Gauge pressure with remote seal (FKP models) [kPag] {barg} <psig>	
FKP□□1	[8.125 to 130] {0.08125 to 1.3} <1.18 to 18.85>
FKP□□2	[31.25 to 500] {0.3125 to 5} <4.53 to 72.5>
FKP□□3	[187.5 to 3000] {1.875 to 30} <27 to 435>
FKP□□4	[625 to 10000] {6.25 to 100} <90.6 to 1450>

Absolute pressure with remote seal (FKH models) [kPa abs] {bar abs} <psi abs>	
FKH□□2	[8.125 to 130] {0.08125 to 1.3} <1.18 to 18.85>
FKH□□3	[31.25 to 500] {0.3125 to 5} <4.53 to 72.5>
FKH□□4	[187.5 to 3000] {1.875 to 30} <27 to 435>

6 MAINTENANCE

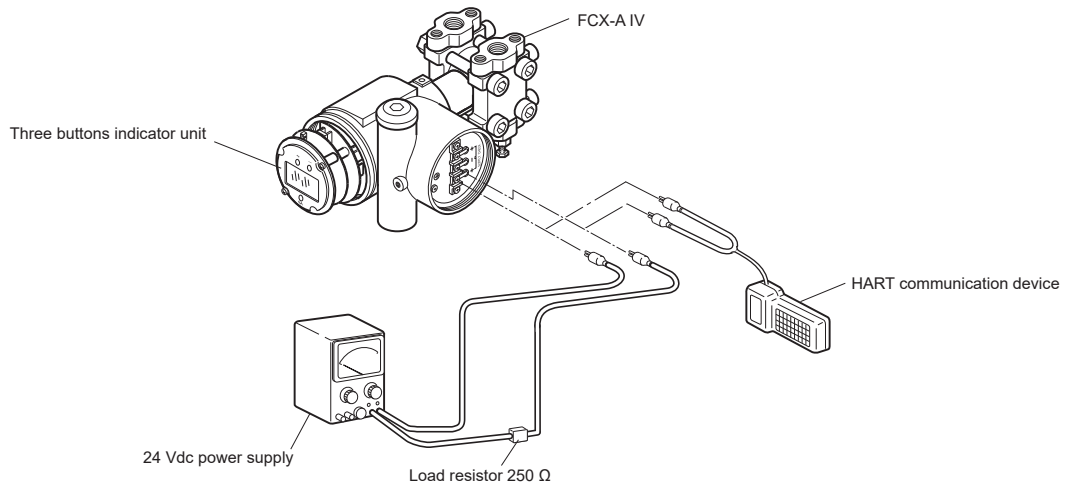
Calibration of the 4-20 mA analog output:

- Connect the equipment according to the schematic below.
- Using the three buttons local display unit:
Perform the 4 mA and 20 mA calibration with the menu "B. Calibration of the 4-20 A output" (refer to page 47).
- Using the HART communication device:
Perform the 4 mA and 20 mA calibration with the "D/A trim" menu.
(1 Device setup\2 Diag/Service\3 Calibration\2 D/A trim).



Calibration of the pressure cell:

- Connect the equipment according to the schematic below.
- Using the three buttons local display unit:
Perform the LRV and URV calibration with the menu "A. Zero & span calibration" (refer to page 45)
- Using the HART communication device:
Perform the LRV and URV calibration with the "Sensor trim" menu.
(1 Device setup\2 Diag/Service\3 Calibration\3 Sensor trim).



6 MAINTENANCE

6.6 Default factory settings

The table below describes the default settings for some parameters:

No.	Item	Contents of parameter
1	Damping value (time constant)	0.04s (min)
2	External adjustment screw	Enabled
3	4-20 mA output mode	Linear
3	Local indicator scale	As per 9th digit of the model code
4	Cut point (square-root output mode)	7.07%
5	Mode below cut point (square-root setting)	Linear
6	Burnout	Under (3.6mA)
7	Linearization function	Disabled
8	Saturation current	Custom (3.6mA to 21.6mA)
9	Write protect	Disabled



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