

ATT082
Temperature transmitter
Brief User's Manual



Azbil Corporation

NOTICE

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These Instructions are Brief User's Manual.

For detailed information, refer to the User's Manual and other documentation. These Brief User's Manual do not act as a substitute for the User's Manual included in the scope of delivery.

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Terms and Conditions

Chapter 1. Important document information

1-1. Function of document and how to use

1-1-1. Document function

These Brief User's Manual contain all the essential information from incoming acceptance to initial commissioning.

1-1-2. Safety Instructions

When using in hazardous areas, the national safety requirements must be met. Separate Ex documentation is contained in these User's Manual for measurement systems that are to mounted in hazardous areas. Strict compliance with the installation instructions, ratings and safety instructions as listed in this supplementary documentation is mandatory. Ensure you are using the correct Ex documentation for the relevant Ex-approved device. The number of the related Ex documentation is indicated on the nameplate. You can use this Ex documentation if the two numbers (i.e. in the Ex documentation and on the nameplate) are identical.

1-2. Safety

Precautions for Use

For safe use of the product, the following symbols are used in this manual.



WARNING

Warnings are indicated when mishandling the product might result in the death or serious injury of the user.



CAUTION

Cautions are indicated when mishandling the product might result in minor injury to the user or damage to property.

In describing the product, this manual uses the icons and conventions listed below.



Use caution when handling the product.



The indicated action is prohibited.



Be sure to follow the indicated instructions.



Handling Precautions:





Handling Precautions indicate items that the user should pay attention to when handling the ATT082.







To use this product correctly and safely, always observe the following precautions.

We are not responsible for damage or injury caused by the use of the product in violation of these precautions.



1-2-1. Handling Precautions for This Product





Installation Precautions

 WARNING	
	When installing, use proper fittings and proper tightening torque for connections to the process and to the exhaust. Gas leakage is dangerous because process gas and calibration gas are flammable. Please refer to the leak check instructions in this manual and verify that there is no gas leakage.
	Do not use the product except at the rated pressure, specified connection standards, and rated temperature. Use under other circumstances might cause damage that leads to a serious accident.
	For wiring work in an explosion-proof area, follow the work method stated in the explosion-proof policy.

 CAUTION	
	After installation, do not step or stand on this unit. Doing so may damage the device or cause injury.
	Bumping the glass of the display with a tool may cause damage or injury. Be careful.
	Install the device correctly. Incorrect or incomplete installation will cause output errors and violation of regulations.
	This product is quite heavy. Protect your feet with safety shoes when working.
	Do not subject the product to shock or impact.

Wiring Precautions

 WARNING	
	Do not do wiring work with wet hands or while electricity is being supplied to the product. There is a danger of electric shock. When working, keep hands dry or wear gloves, and turn off the power.

 CAUTION	
	When wiring, check the specifications carefully and make sure to wire correctly. Incorrect wiring can cause device damage or malfunction.
	Supply electric power correctly according to the specifications. Supplying power that differs from the specifications can damage the device.
	Use a DC power supply that has overload protection.

Maintenance Precautions **WARNING**

When removing this device for maintenance, be careful of residual pressure or residual process gas. Leakage of process gas is dangerous.



When working on the vent, check its direction so that people do not come into contact with vented gas. There is a danger of burns or other physical harm.



When the device is being used in an explosion-proof area, do not open the cover. Opening the cover may cause an explosion.

 **CAUTION**

This product was kept under carefully controlled conditions until it was shipped. Never try to modify this device. Doing so could damage it.

Chapter 2. Basic safety instructions

2-1. Requirements for the personnel

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

- Trained, qualified specialists must have a relevant qualification for this specific function and task
- Are authorized by the plant owner/operator
- Are familiar with federal/national regulations
- Before beginning work, the specialist staff must have read and understood the instructions in the User's Manual and supplementary documentation as well as in the certificates (depending on the application)
- Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- Being instructed and authorized according to the requirements of the task by the facility's owner-operator
- Following the instructions in these User's Manual.

2-2. Designated use

The device is a universal and user-configurable temperature transmitter with either one or two sensor inputs for a resistance thermometer (RT), thermocouples (TC), resistance and voltage transmitters. The head transmitter version of the device is intended for mounting in a flat-face terminal head as per DIN EN 50446. The manufacturer is not liable for damage caused by improper or non-designated use.

2-3. Operational safety

- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for interference-free operation of the device.

Hazardous area

To eliminate a danger for persons or for the facility when the device is used in the hazardous area (e.g. explosion protection or safety equipment):

- Based on the technical data on the nameplate, check whether the ordered device is permitted for the intended use in the hazardous area. The nameplate can be found on the side of the transmitter housing.
- Observe the specifications in the separate supplementary documentation that is an integral part of these Instructions.

Electromagnetic compatibility

The measuring system complies with the general safety requirements in accordance with EN 61010-1, the EMC requirements of IEC/EN 61326 and NAMUR Recommendation NE 21 and NE 89.

Note: The unit must only be powered by a power supply that operates using an energy-limited electric circuit that is compliant with IEC 61010-1, "SELV or Class 2 circuit".

Chapter 3. Identification

3-1. Device designation

The following options are available for identification of the device:

- Nameplate specifications

3-1-1. Nameplate

The right device?

Compare and check the data on the nameplate of the device against the requirements of the measuring point:

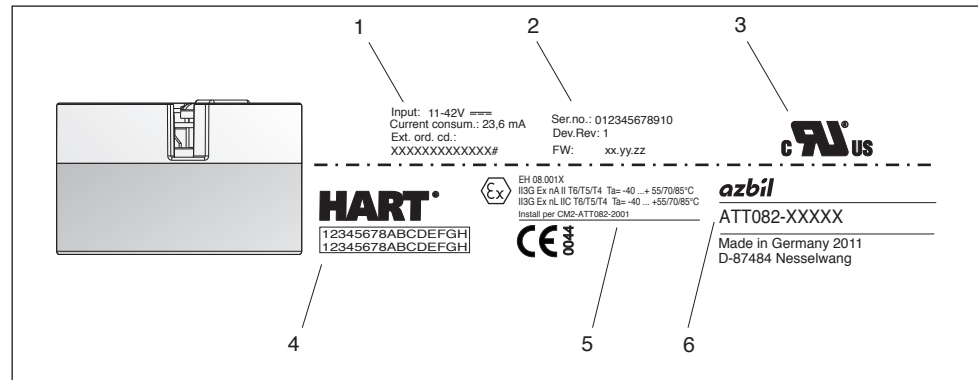


Figure 3-1. Nameplate of the head transmitter (example, Ex version)

1. Power supply, current consumption and extended order code
2. Serial number, device revision and firmware version
3. Approvals with symbols
4. 2 lines for the TAG name
5. Approval in hazardous area with number of the relevant Ex documentation
6. Order code and manufacturer ID

3-2. Scope of delivery

The scope of delivery of the device comprises:

- Temperature transmitter
- Mounting material
- Hard copy of Brief User's Manual
- Additional documentation for devices which are suitable for use in hazardous areas, such as Safety Instructions, Control or Installation Drawings.

3-3. Certificates and approvals

The device left the factory in a safe operating condition. The device complies with the standards EN 61 010-1 "Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures" and with the EMC requirements of IEC/EN 61326.

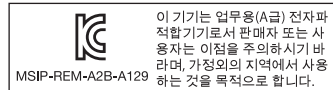
3-4. CE mark, Declaration of Conformity

The device therefore meets the legal requirements of the EC guidelines. The manufacturer confirms that the device is compliant with the relevant guidelines by applying the CE mark.

3-5. HART® Protocol Certification

The temperature transmitter is registered by HART® Communication. The device meets the requirements of the HART Communication Protocol Specifications, Revision 7.0.

3-6. Korea Certification Mark



Chapter 4. Installation instructions

4-1. Incoming acceptance, transport, storage

4-1-1. Incoming acceptance

- Is the packaging or content damaged?
- Is the delivery complete? Compare the scope of delivery against the information on your order form.

4-1-2. Transport and storage

- Pack the device in such a way as to protect it reliably against impact for storage (and transportation). The original packaging provides optimum protection.
- Permitted storage temperature: -50 to $+100$ °C (-58 to $+212$ °F)

4-2. Installation conditions

4-2-1. Dimensions

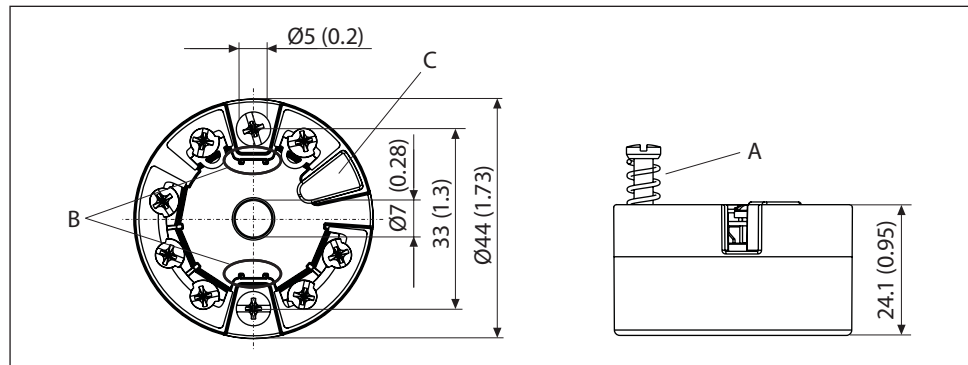


Figure 4-1. Head transmitter version with screw terminals. Dimensions in mm (in)

- A. Spring travel $L \geq 5$ mm (not for US - M4 securing screws)
- B. Mounting elements for attachable measured value display
- C. Interface for contacting measured value display

4-2-2. Mounting location

- Head transmitter:
 - In the terminal head, flat face, as per DIN EN 50446, direct mounting on insert with cable entry (middle hole 7 mm)
 - In the field housing, separated from the process

4-2-3. Important ambient conditions

- Ambient temperature: -40 to $+85$ °C (-40 to 185 °F)
- Climate class C1 according to EN 60654-1
- Condensation as per IEC 60068-2-33
- Maximum relative humidity: 95 % according to IEC 60068-2-30
- Degree of protection: IP 66/67 (NEMA Type 4x encl.)

! Handling Precautions:

When using in the hazardous area, the limit values of the certificates and approvals must be observed (see Safety Instructions).

4-3. Installation instructions

A Phillips head screwdriver is required to mount the head transmitter.

Handling Precautions:

Do not overtighten the mounting screws as this could damage the head transmitter.

>> Maximum torque = 1 N·m (3/4 pound-feet).

4-3-1. Mounting the head transmitter

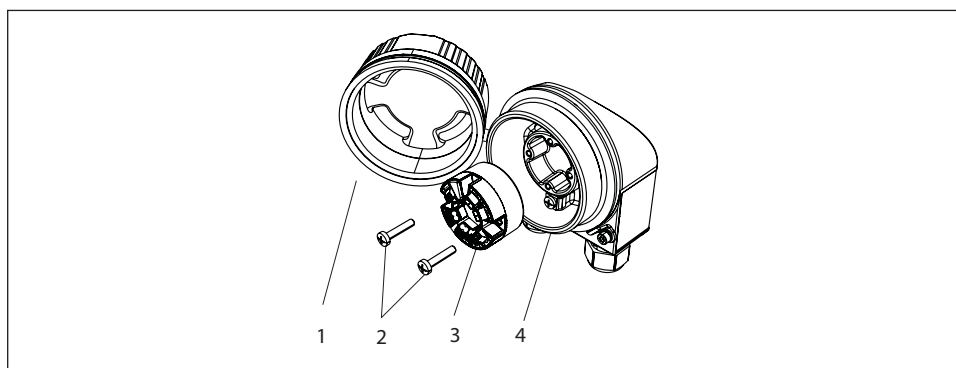


Figure 4-2. Head transmitter mounting (three versions)

Procedure for mounting in a field housing:

1. Open the cover (1) of the field housing (4).
2. Guide the mounting screws (2) through the lateral bores of the head transmitter (3).
3. Screw the head transmitter to the field housing.
4. After wiring, close the field housing cover (1).

4-4. Post-installation check

After installing the device, always run the following final checks:

Device condition and specifications	Notes
Is the device undamaged (visual inspection)?	—
Do the ambient conditions match the device specification (e.g. ambient temperature, measuring range, etc.)?	(Refer to page 9)

Handling Precautions:

Make sure the sensor type.

Make sure that the sensor type and model are correct.

Use of the incorrect sensor and model might cause temperature errors or abnormal outputs.

Chapter 5. Wiring

! CAUTION



Switch off power supply before installing or connecting the device. Failure to observe this may result in destruction of parts of the electronics.



Supply electric power correctly according to the specifications. Supplying power that differs from the specifications can damage the device.



Use a DC power supply that has overload protection.

A Phillips head screwdriver is required to wire the head transmitter with screw terminals.



Handling Precautions:

Do not overtighten the screw terminals, as this could damage the transmitter.

>> Maximum torque = 1 N·m (3/4 pound-feet).

For wiring a mounted head transmitter, proceed as follows:

1. Open the cable gland and the housing cover on the terminal head or the field housing.
2. Feed the cables through the opening in the cable gland.
3. Connect the cables as shown in 5-1.
4. Retighten the cable gland and close the housing cover.

In order to avoid connection errors always take note of the hints given in the section connection check!

5-1. Quick wiring guide

Terminal assignment of head transmitter

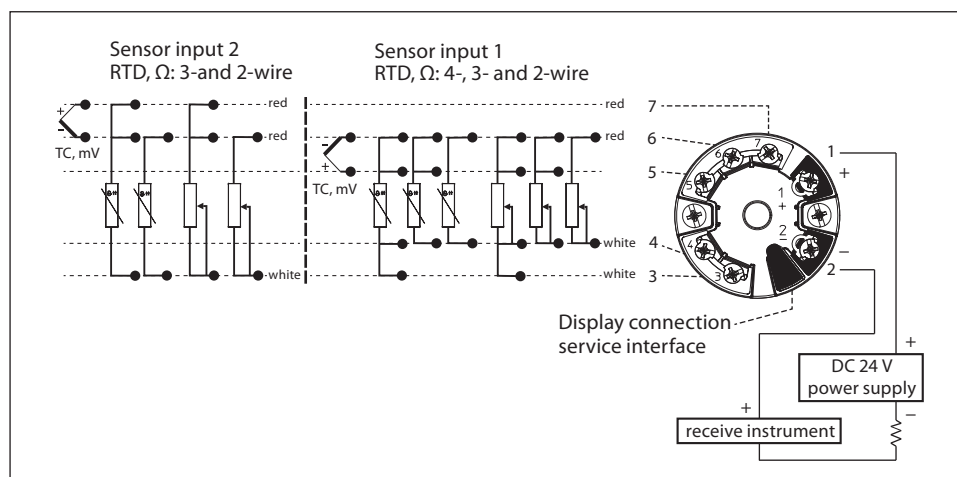


Figure 5-1. Wiring the head transmitter

To operate the device via the HART® protocol (terminals 1 and 2), a minimum load of 250 Ω is required in the signal circuit.



Handling Precautions:

ESD - electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction or malfunction of parts of the electronics.

5-2. Connecting the sensor cables

Refer to Terminal assignment of head transmitter, shown on 5-1. Quick wiring guide.

Handling Precautions:

When connecting 2 sensors ensure that there is no galvanic connection between the sensors (e.g. caused by sensor elements that are not isolated from the thermowell). The resulting equalizing currents distort the measurements considerably.

>> The sensors must remain galvanically isolated from one another by connecting each sensor separately to a transmitter. The transmitter provides sufficient galvanic isolation (>2 kV AC) between the input and output.

The following connection combinations are possible when both sensor inputs are assigned:

			Sensor input 1			
			RTD or resistance transmitter			Thermocouple (TC), voltage transmitter
			2- wire	3- wire	4- wire	
Sensor input 2	RTD or resistance transmitter	2-wire	✓	✓	—	✓
		3-wire	✓	✓*	—	✓*
		4-wire	—	—	—	—
	Thermocouple (TC), voltage transmitter		✓	✓*	✓	✓*

* Refer to CM2-ATT082-2003, Functional Safety Manual.

5-3. Connecting the power supply and signal cables

CAUTION



Switch off power supply before installing or connecting the transmitter. Failure to observe this may result in destruction of parts of the electronics.

Cable specification

- A normal device cable suffices if only the analog signal is used.
- A shielded cable is recommended for HART® communication. Observe grounding concept of the plant.

Please also observe the general procedure on the page 10.

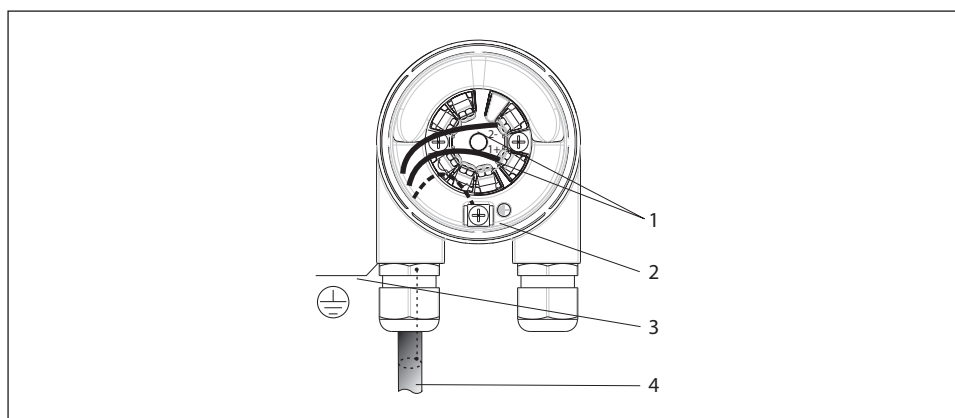


Figure 5-2. Connecting the signal cables and power supply

1. Terminals for HART® protocol and power supply
 2. Internal ground connection
 3. External ground connection
 4. Shielded signal cable (recommended for HART® protocol)
- The terminals for connecting the signal cable (1+ and 2–) are protected against reverse polarity.
 - Conductor cross-section:
 - Max. 2.5 mm² for screw terminals
 - Max. 1.5 mm² for spring terminals. Min. stripping length of wire 10 mm (0.39 in).

5-4. Shielding and grounding

Optimum electromagnetic compatibility (EMC) can only be guaranteed if the system components and, in particular, the lines are shielded and the shield forms as complete a cover as possible.

HART® communication allows three different types of shielding:

- Shielding at both ends
- Shielding at one end on the feed side with capacitance termination at the field device
- Shielding at one end on the feed side

The best results with regard to EMC are achieved in most cases with one-sided shielding on the feed side (without capacitance termination at the field device). Operation in the event of disturbance variables as per NAMUR NE21 is thus guaranteed.

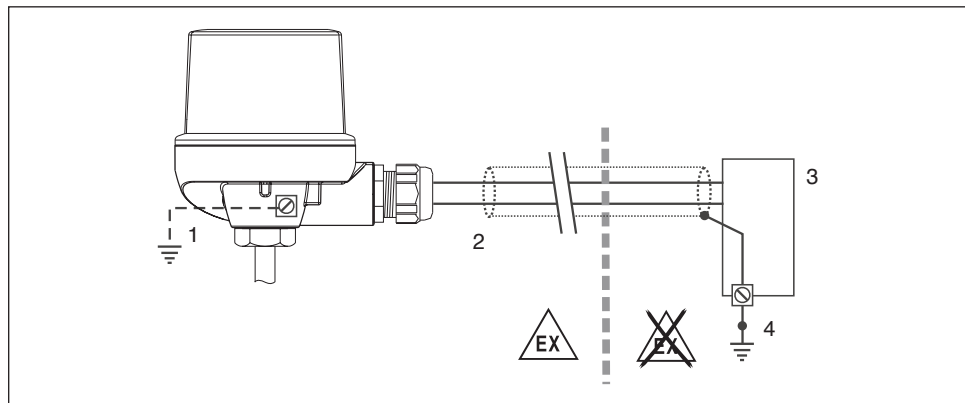


Figure 5-3. Shielding and grounding the signal cable at one end with HART® communication

1. Optional grounding of the field device, isolated from cable shielding.
2. Grounding of the cable shield at one end
3. Supply unit
4. Grounding point for HART® communication cable shield

! Handling Precautions:

If the shielding of the cable is grounded at more than one point in systems without potential matching, power supply frequency equalizing currents can occur that damage the signal cable or have a serious effect on signal transmission.

>> In such cases the shielding of the signal cable is to be grounded on only one side, i.e. it must not be connected to the ground terminal of the housing (terminal head, field housing). The shield that is not connected should be insulated!

5-5. Post-connection check

Device condition and specifications	Notes
Is the device or cable undamaged (visual check)?	--
Electrical connection	Notes
Does the supply voltage match the specifications on the nameplate?	<ul style="list-style-type: none"> • Head transmitter: U=11 to 42 V DC • SIL mode: U=11 to 32 V DC for the head transmitter or U=12 to 32 V DC for the DIN rail transmitter
Do the cables have adequate strain relief?	--
Are the power supply and signal cables correctly connected?	(Refer to page 11.)
Are all the screw terminals well tightened and have the connections of the spring terminals been checked?	--
Are all the cable entries installed, tightened and sealed?	--
Are all housing covers installed and firmly tightened?	--

Chapter 6. Operating options

6-1. Measured value display and operating elements

6-1-1. Option: Display with transmitter

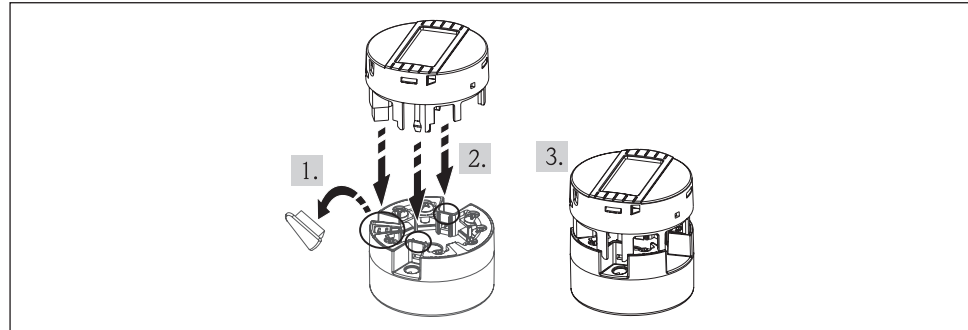


Figure 6-1. Attach the display to the transmitter

6-1-2. Display elements

Head transmitter

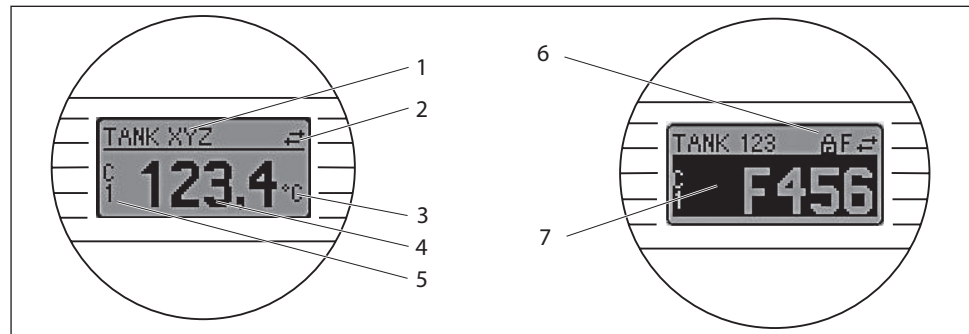


Figure 6-2. Optional LC display for head transmitter

Item No.	Function		Description
1	Displays the TAG		TAG, 32 characters long.
2	“Communication” symbol		The communication symbol appears when read and write-accessing via the fieldbus protocol.
3	Unit display		Unit display for the measured value displayed.
4	Measured value display		Displays the current measured value.
5	Value/channel display S1, S2, DT, PV, I, %		e.g. S1 for a measured value from channel 1 or DT for the device temperature
6	“Configuration locked” symbol		The “configuration locked” symbol appears when configuration is locked via the hardware.
7	Status signals		
	Symbols	Meaning	
	F	Error message “Failure detected” An operating error has occurred. The measured value is no longer valid. The display alternates between the error message and “- - -” (no valid measured value present). Detailed information on the error messages can be found in the User's Manual.	
	C	“Service mode” The device is in service mode (e.g. during a simulation).	
	S	“Out of specification” The device is being operated outside its technical specifications (e.g. during warm-up or cleaning processes).	
	M	“Maintenance required” Maintenance is required. The measured value is still valid. The display alternates between the measured value and the status message.	

6-1-3. Local operation



Handling Precautions:

ESD - electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in destruction or malfunction of parts of the electronics.

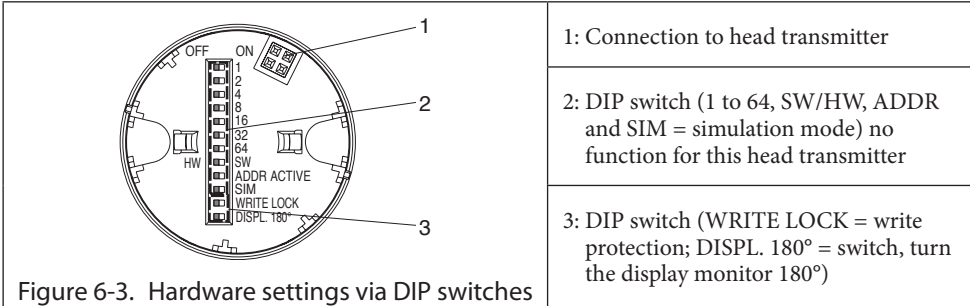


Figure 6-3. Hardware settings via DIP switches

Procedure for setting the DIP switch:

1. Open the cover of the terminal head or field housing.
2. Remove the attached display from the head transmitter.
3. Configure the DIP switch on the rear of the display accordingly. In general: switch to ON = function enabled, switch to OFF = function disabled.
4. Fit the display onto the head transmitter in the correct position. The head transmitter accepts the settings within one second.
5. Secure the cover back onto the terminal head or field housing.

Switching write protection on/off

Write protection is switched on and off via a DIP switch on the rear of the optional attachable display. When write protection is active, parameters cannot be modified. A key symbol on the display indicates that the write protection is on. Write protection prevents any write access to the parameters. The write protection remains active even when the display is removed. To deactivate the write protection, the device must be restarted with the display attached and the DIP switch deactivated (WRITE LOCK = OFF).

Turning the display

The display can be rotated 180° using the “DISPL. 180°” DIP switch. The setting is retained when the display is removed.

6-2. Configuration of transmitter and HART® protocol

The transmitter and measured value display are configured via the HART® protocol. The configuration of device-specific parameters is described in detail in the User's Manual.

Chapter 7. Commissioning

7-1. Post-installation check

Before commissioning the measuring point make sure that all final checks have been carried out:

- Checklist “Post-installation check” (Refer to page 10)
- Checklist “Post-connection check” (Refer to page 15)

7-2. Switching on the transmitter

Once the final checks have been successfully completed, it is time to switch on the supply voltage. The transmitter performs a number of internal test functions after power-up. As this procedure progresses, the following sequence of messages appears on the display:

Step	Display
1	“Display” text and firmware version of the display
2	Firm logo
3	Device name with firmware and hardware versions
4	Information on the sensor configuration (sensor element and type of connection)
5	Set measuring range
6a	Current measured value or
6b	Current status message If the switch-on procedure is not successful, the relevant diagnostics event, depending on the cause, is displayed. A detailed list of diagnostic events and the corresponding troubleshooting instructions can be found in the User's Manual.

The device is operational after approx. 30 seconds, and the plug-in display after approx. 33 seconds in normal operating mode. Normal measuring mode commences as soon as the switch-on procedure is completed. Measured values and status values appear on the display.

7-3. Enabling configuration

If the device is locked and the parameter settings cannot be changed, it must first be enabled via the hardware or software lock. The device is write-protected if the keyhole symbol appears in the header of the measured value display.

To unlock the device

- either switch the write protection switch on the back of the display to the “OFF” position (hardware write protection), or
- deactivate the software write protection via the operating tool. See the description for the ‘Define device write protection’ parameter in the User's Manual.

When hardware write protection is active (write protection switch on the back of the display to the “ON” position), write protection cannot be disabled via the operating tool. Hardware write protection must always be disabled before software write protection can be enabled or disabled.

Appendix A. Explosion protected models

A-1. FM intrinsically safe, nonincendive and suitable approvals

1	2	3	4	5
改番 REV.	来 RECORD	盾 DATE	担当 BY	照査 CHK.
<p>Installation Notes ATT082</p> <ul style="list-style-type: none"> - FM Approved Apparatus must be installed in accordance with manufacturer instructions. - Use supply wires suitable for 5°C above surroundings. - Only simple apparatus should be terminated to the sensor connection. - Simple apparatus are components as defined by the NEC (1.2 V, 0.1 A, 0.25 mW or 20 µJ). - Warning: Substitution of components may impair intrinsic safety or suitability for Class I, Division 2. 				
<p>INTRINSICALLY SAFE IS Class I / Div. 1 / Groups ABCD</p> <ul style="list-style-type: none"> - Installation should be in accordance with ANSI/ISA RP 12.6.01 "Installation of Intrinsically safe systems for Hazardous (classified) locations" and the National Electrical Code (ANSI/NFPA 70). - FM Approved Associated Apparatus must meet the following parameters: $U_o \leq U_i$ $I_o \leq I_i$ $P_o \leq P_i$ $C_a \geq C_i + C_{cable}$ $L_a \geq L_i + L_{cable}$ Transmitter entity parameters (terminal 1 and 2) are as follows: U_i or $V_{max} \leq 30$ V DC $C_i = 0$ I_i or $I_{max} \leq 130$ mA $L_i = 0$ $P_i \leq 800$ mW $V_o + V_{oc}$ of Handheld device $< V_{max}$, $I_{sc} + I_{sc}$ of Handheld device $< I_{max}$, $P_o + P_o$ of Handheld device $< P_i$, $C_a > C_i + C_{cable} + C_i$ of Handheld device, $L_a > L_i + L_{cable} + L_i$ of Handheld device, when Programming Handheld device is used. 				
<p>NONINCENDIVE NI Class I / Div. 2 / Groups ABCD</p> <ul style="list-style-type: none"> - Depending on location install per National Electrical Code (NEC) using wiring methods described in article 500 through article 510. - Intrinsic safety barrier not required. $V_{max} \leq 35$ V DC. - Warning: Do not disconnect equipment unless power has been switched off or the area is known to be non hazardous. - Nonincendive field wiring installation The Nonincendive Field Wiring Circuit Concept allows interconnection of Nonincendive Field Wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Associated Intrinsically Safe Apparatus or Associated Apparatus not specifically examined in combination as a system using any of the wiring methods permitted for undclassified locations, when $V_{oc} \leq V_{max}$, $C_a \geq C_i + C_{cable}$, $L_a \geq L_i + L_{cable}$. Transmitter Nonincendive Field Wiring parameters are as follows: U_i or $V_{max} \leq 35$ V DC $C_i = 0$ $L_i = 0$ I_i or $I_{max} =$ see following note below For these current controlled circuits, the parameter I_{max} is not required and need not to be aligned with parameter I_{sc} and it of the Associated Nonincendive Field Wiring Apparatus or Associated Apparatus. 				
<p>Functional ratings These ratings do not supersede Hazardous Location values $U_{nom} \leq 42$ DC $I_{nom} \leq 4$ to 20 mA</p>				
<p>FM Approved Associated Apparatus or Associated Nonincendive Field Wiring Apparatus</p>				
<p>Temperature range</p> <p>without display, TID10 T4 -50°C ... +85°C T5 -50°C ... +75°C T6 -50°C ... +58°C</p> <p>with display, TID10 T4 -40°C ... +85°C T5 -40°C ... +70°C T6 -40°C ... +55°C</p>				
<p>INTRINSICALLY SAFE IS Class I / Div. 1 / Groups ABCD</p> <p>NONINCENDIVE, FIELD WIRING NI Class I / Div. 2 / Groups ABCD</p> <p>Sensor circuits (Terminals 3 ... 7)</p> <p>U_o or V_{oc} or $V_t = 7.6$ V I_o or $I_{sc} = 13$ mA $P_o = 24.7$ mW</p> <p>Group A, B resp. IIC C_o or $C_a = 10.4$ µF L_o or $L_a = 236$ mH Group C, D resp. IIB C_o or $C_a = 160$ µF L_o or $L_a = 946$ mH Group C, D resp. IIA C_o or $C_a = 1000$ µF L_o or $L_a = 1,893$ H</p>				
<p>図番 DWG.NO. 80396231</p>				
<p>記入のない許差 TOLERANCE UNLESS NOTED</p> <p>表面性状 SURFACE TEXTURE 鋭角除去 CHAMFER 処理 TREATMENT/FINISH</p> <p>設計 DR. 照査 CHK. 認可 APPD 尺度 SCALE</p> <p>組立図 ASSY ATT082</p> <p>名称 TITLE CONTROL DRAWING FM IS, NI</p> <p>図番 DWG.NO. 80396231</p> <p>改番 REV シート SHT. 00</p> <p>A4</p>				

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products. You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

- (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
- (2) Failure caused for other reasons than Azbil Corporation's product;
- (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
- (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
- (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
- (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use

Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down.

You are required to provide your Equipment with safety design such as fool-proof design, *1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance, *3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.

*2. A design that is safe even if the device fails.

*3. Avoidance of device failure by using highly reliable components, etc.

*4. The use of redundancy.

3. Precautions and restrictions on application

Azbil Corporation's products other than those explicitly specified as applicable (e.g. azbil Limit Switch For Nuclear Energy) shall not be used in a nuclear energy controlled area (radiation controlled area).

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product.

However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

In addition,

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below.

Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

- (1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals

- (2) For use of specific purposes, such as:
 - * Nuclear energy/radiation related facilities
[For use outside nuclear energy controlled areas] [For use of Azbil Corporation's Limit Switch For Nuclear Energy]
 - * Machinery or equipment for space/sea bottom
 - * Transportation equipment
[Railway, aircraft, vessels, vehicle equipment, etc.]
 - * Antidisaster/crime-prevention equipment
 - * Burning appliances
 - * Electrothermal equipment
 - * Amusement facilities
 - * Facilities/applications associated directly with billing
- (3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
- (4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
- (5) Machinery or equipment that may affect human lives, human bodies or properties
- (6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations. In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions. Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquiries or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

- (1) Installation, adjustment, guidance, and attendance at a test run
- (2) Maintenance, inspection, adjustment, and repair
- (3) Technical guidance and technical education
- (4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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