



AI 100

Smart Field Indicator

for Differential / Gauge / Absolute Pressure Measurement

Instruction Manual

Document Number: IM-AI100



Smart Transmitter

This manual is made so that general user can help to install and operate
Smart Transmitter efficiently.

Before handling the model of transmitter, all users have to be fully aware of it.

Information on this manual can be changed
Without an advance notice.

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1. Introduction

To use A100, the user shall understand the manual. To ensure correct and efficient use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating & installing it.

- ① To use this instrument, the user shall understand the manual.
- ② The contents of this manual are subject to change without prior notice.
- ③ All rights reserved. No part of this manual may be reproduced in any form without Autrol's written permission.
- ④ If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Autrol sales office.
- ⑤ The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instrument.
- ⑥ Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional of performance standpoint.

1.1. Summary

A1100 loop indicator is main or sub-display device based on micro-processor. Its input is analog value as 4 to 20mA and display on LCD. This device recommends using in high accurate system because it has Ex type construction, high precision, high accuracy and good reliability performance.

1.2. Overview

The construction of AI100 Loop Indicator is as figure 1-1 & 1-2

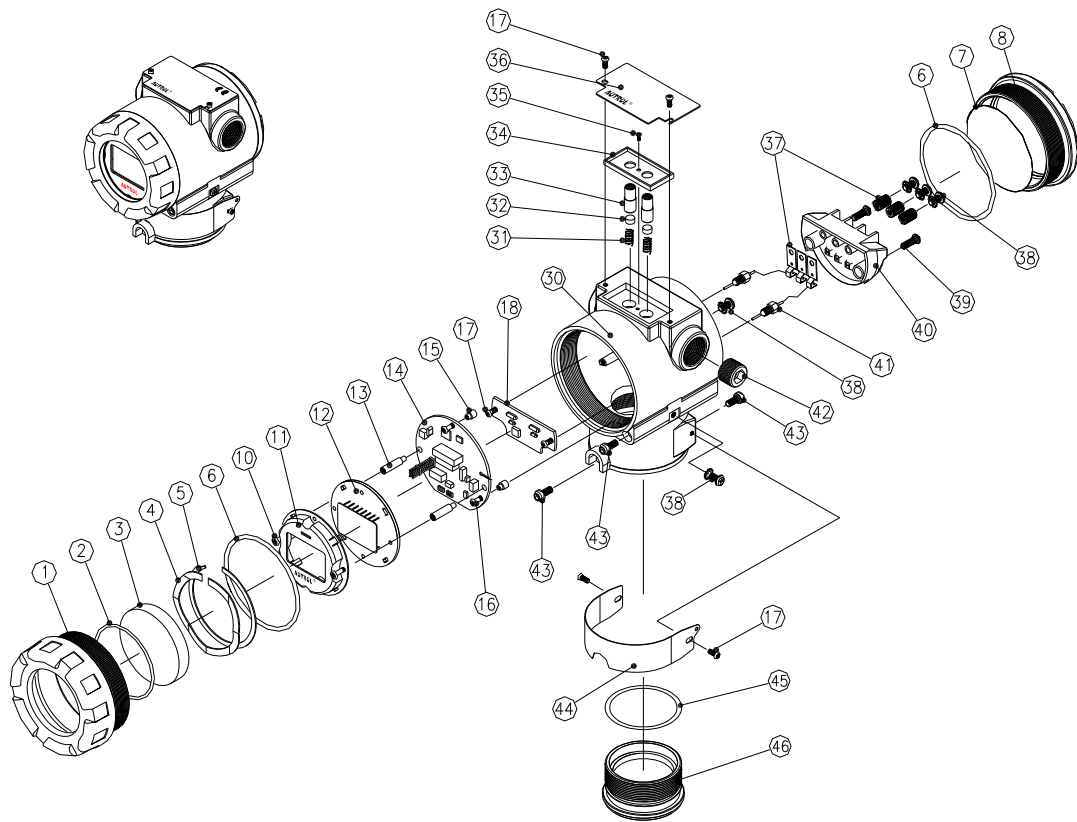


Figure 1-1. Model AI-100 Indicator Exposed View (Housing)

P.N	PART NAME	MAT'L	Q'TY	SIZE	REMARK
1	FRONT COVER	ASTM B85 A360	1	ø80x38.5L	
2	O-RING/GLASS	ASTM D1418 FKM	1	ø50.52x1.78W	
3	GLASS	TEMPERED GLASS	1	ø58x10t	
4	WAVE WASHER	SK5	1	ø61x0.8t	
5	C-SNAP RING	SUS 304	1	ø62x0.8t	
6	O-RING/COVER	ASTM D1418 NBR	2	ø67.94xø2.62W	
7	LABEL	은무지	1	ø60	
8	REAR COVER	ASTM B85 A360	1	ø80x26.5L	
10	SCREW/LCD	STEEL/ NICKEL PLATING	2	BH M3x10L	
11	LCD COVER	PA66/ UL94-V0.G30	1	ø58.9	
12	LCD BOARD	FR4	1	ø62x1.6t	
13	POST/LCD	STEEL/ NICKEL PLATING	2	ø5x19L	
14	MAIN BOARD	FR4	1	ø66x1.6t	
15	POST/MAIN BOARD	STEEL/ NICKEL PLATING	3	ø5x4.8L	
16	SCREW/MAIN BOARD	STEEL/ NICKEL PLATING	3	PH M3x8L	
17	SCREW	SUS304	6	PH M3x6L	
18	TERMINAL BOARD	FR4	1	66x25x1.6t	
30	HOUSING	ASTM B85 A360	1	80x113	
31	SPRING/SWITCH	SWPC	2	ø5.5xø0.4W	
32	MAGNET/SWITCH	NDFEB	2	ø6x3.3L	
33	BOTTON/SWITCH	PA66/ UL94-V0.G30	2	ø7.6x19	
34	COVER/SWITCH	PA66/ UL94-V0.G30	1	43.4x21.8	
35	SCREW/ SWITCH COVER	SUS304	1	FH M2x4L	
36	NAMEPLATE	SUS304	1	69x39x0.8t	
37	COMMUNICATION TEST PIN	BRASS/ NICKEL PLATING	6		
38	SCREW/WASHER	SUS304	5	BH M4x8L	
39	SCREW/TERMINAL BLOCK	BRASS/ NICKEL PLATING	2	PH M4x12L	
40	TERMINAL BLOCK	PA66/ UL94-V0.G30	1	ø62x23t	
41	EMI FILTER	BRASS/ NICKEL PLATING	2	M5x27L	
42	PIPE PLUG	STEEL	1	1/2NPT	
43	SCREW	SUS304	4	Hex. M4x8L	
44	TAGPLATE	SUS304	1	144x22x0.4t	
45	O-RING/SENSOR MODULE	ASTM D1418 NBR	1	ø52.07IDxø2.62W	
46	SENSOR MODULE TOP	ASTM B85 A360	1	M56x32L	

Figure 1-2. INDICATOR COMPONENTS

2. FUCTIONS

2.1. Summary

This chapter describe how to operate the indicator and the task before installation in the safety area.

2.2. Safety Message

Procedures and instructions in this chapter may require special precautions to ensure the safety of the person performing the operations. Information that raises potential safety issues is indicated by a warning symbol(▲). Refer to the following safety messages before performing an operation preceded by this symbol.

2.3. Warning

▲ Warning

Explosion can result in death or serious injury:

- ◆ Do not remove the device covers in explosion environments when the circuit is alive.
- ◆ Transmitter covers must be fully engaged to meet explosionproof requirements.

▲ Warning

Electric current can result in death serious injury:

- ◆ The qualification which is educated only the person whom it prepares will be able to establish the transmitter.

▲ Warning

Electric current can result in death serious injury:

- ◆ Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

2.4. External Button Function.

External Button (Zero & Span button) is located under nameplate. With these Zero & Span buttons some of parameters can be modified. The available parameters can be checked on figure 2-4 figure.

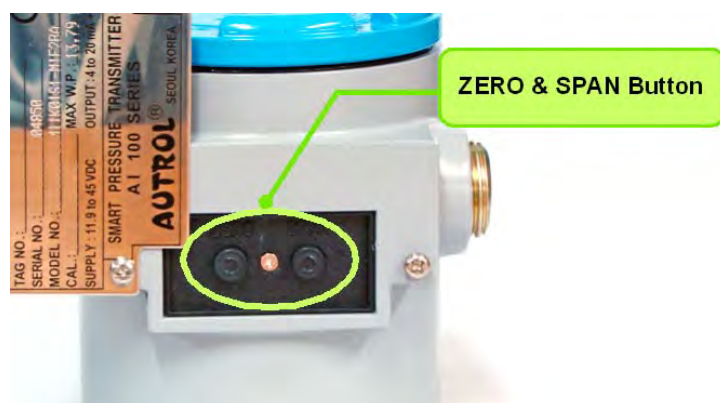
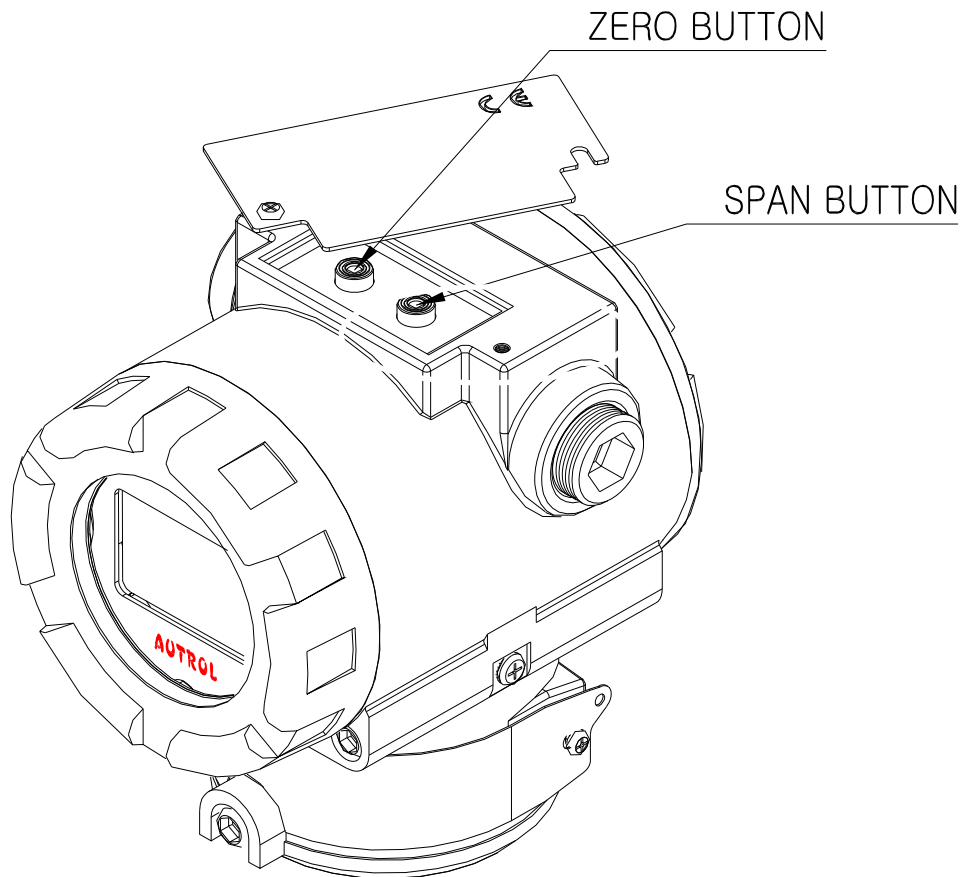


Figure 2-1. Location of Zero, Span button

2.4.1. How to use External buttons (Zero, Span buttons)

- 1) The open nameplate on the top of the device. There are external buttons on the top of the device figure 2-1.
- 2) To get into Menu function, pushing Zero & Span button at the same time during more 5 seconds, LCD will display the 'Menu' message in order to perform button function menu and display the '1 Trim' on LCD.
- 3) To exit, pushing Zero & Span buttons at the same time during more 3 seconds while menu status.
- 4) To save the value after modification, 'Save' function & message shall indicate at the end of all sub-menu and push Span button while 'Save' message is blinking during the indication.
- 5) To cancel the value after modification, 'Cancel' function & message shall indicate at the end of all sub-menu and push Span button while 'Cancel' message is blinking during the indication.
- 6) To change either 'Save' or 'Cancel' message while blinking, push Zero button to select.
- 7) The basic concept of each button.
 - A. Zero button : Forward, Move to next row
 - B. Span button : Enter, Save, Move to sub-menu
 - C. Zero + Span button : Backward, Exit from button function @ Main menu
 - D. Push Zero button when blinking : changeable the valued
 - E. Push Span button when blinking : enter the status
- 8) To provide various set-up functions with 2 buttons, ZERO and SPAN, this product allows menu control in the Tree method.

[Note1] ZERO and SPAN button are designed to be active by finger push but, depending on use environment, tools such as pen or screw driver should be used to push deep for accurate action.

[Note2] If magnetic screw driver is used, button may not be active. Hence, non-magnetic screw driver should definitely be used.

- **Caution: It will be back to normal condition if there is no activity of button function during 30 seconds.**

2.4.2. Input Number, Words, Symbols.

1) Input Numbers

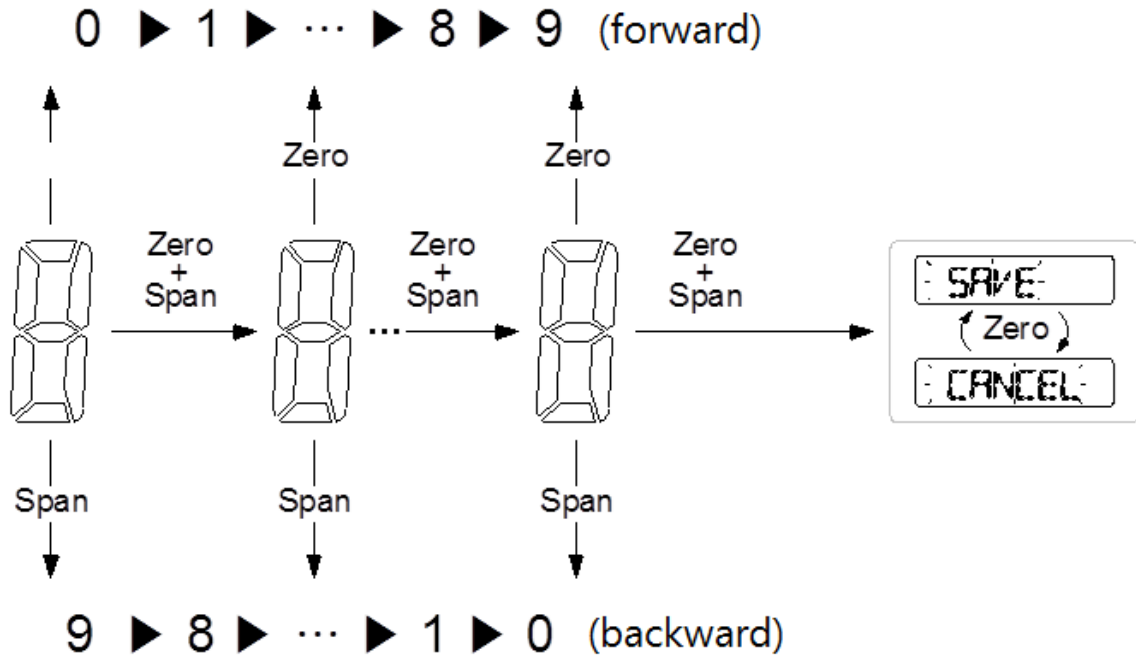


Figure 2-2. Number input diagram

Implement

- | | |
|--|--|
| ① Zero button | : Forward the number. |
| Span button | : Backward the number. |
| Zero + Span button | : Move to next row. |
| blinking the value | : changeable |
| ② Push Zero button when blinking | : change the value |
| ③ Push Span button when blinking | : enter the status |
| ④ At the end of last row when blinking | : changeable 'Save' or 'Cancel' the value by Zero button |
| | : Enter the status by pushing Span button |

2) Input Words & Symbols

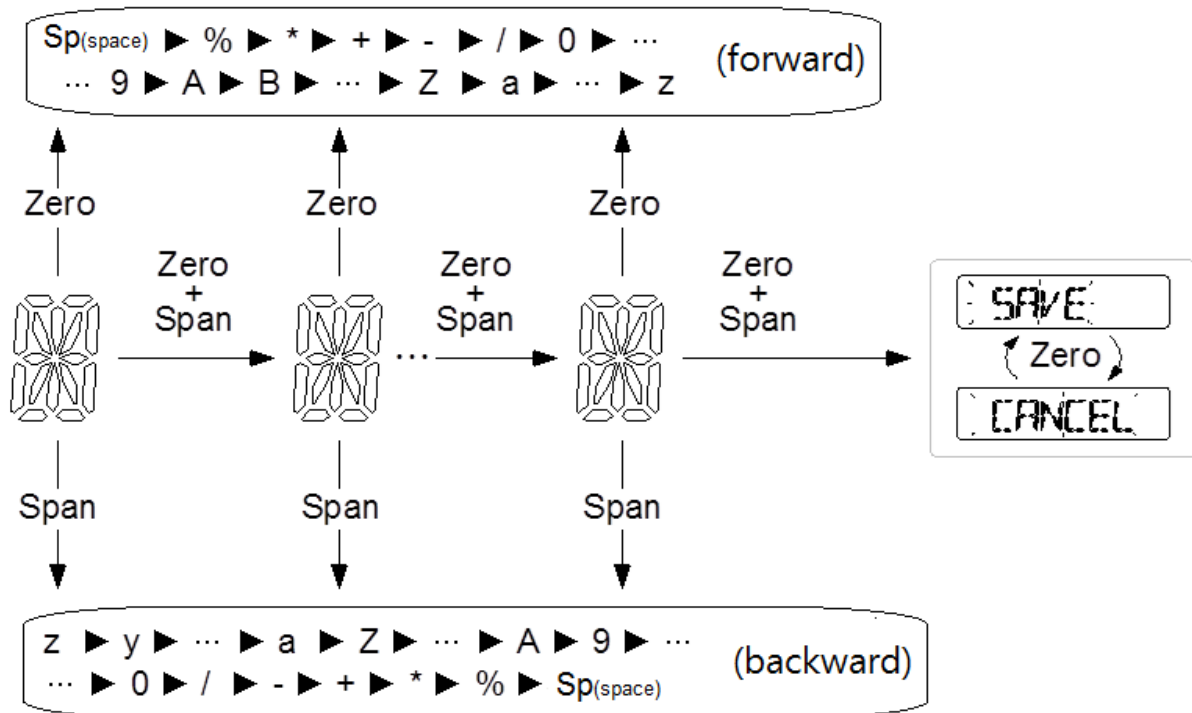


Figure 2-3 Words input diagram

Implement

- ① Zero button : Forward the word & symbols.
Span button : Backward the word & symbols.
Zero + Span button : Move to next row.
blinking the value : changeable
- ② Push Zero button when blinking : changeable the value
- ③ Push Span button when blinking : enter the status
- ④ At the end of last row when blinking : changeable 'Save' or 'Cancel' the value by Zero button
: Enter the status by pushing Span button

3) Menu Tree

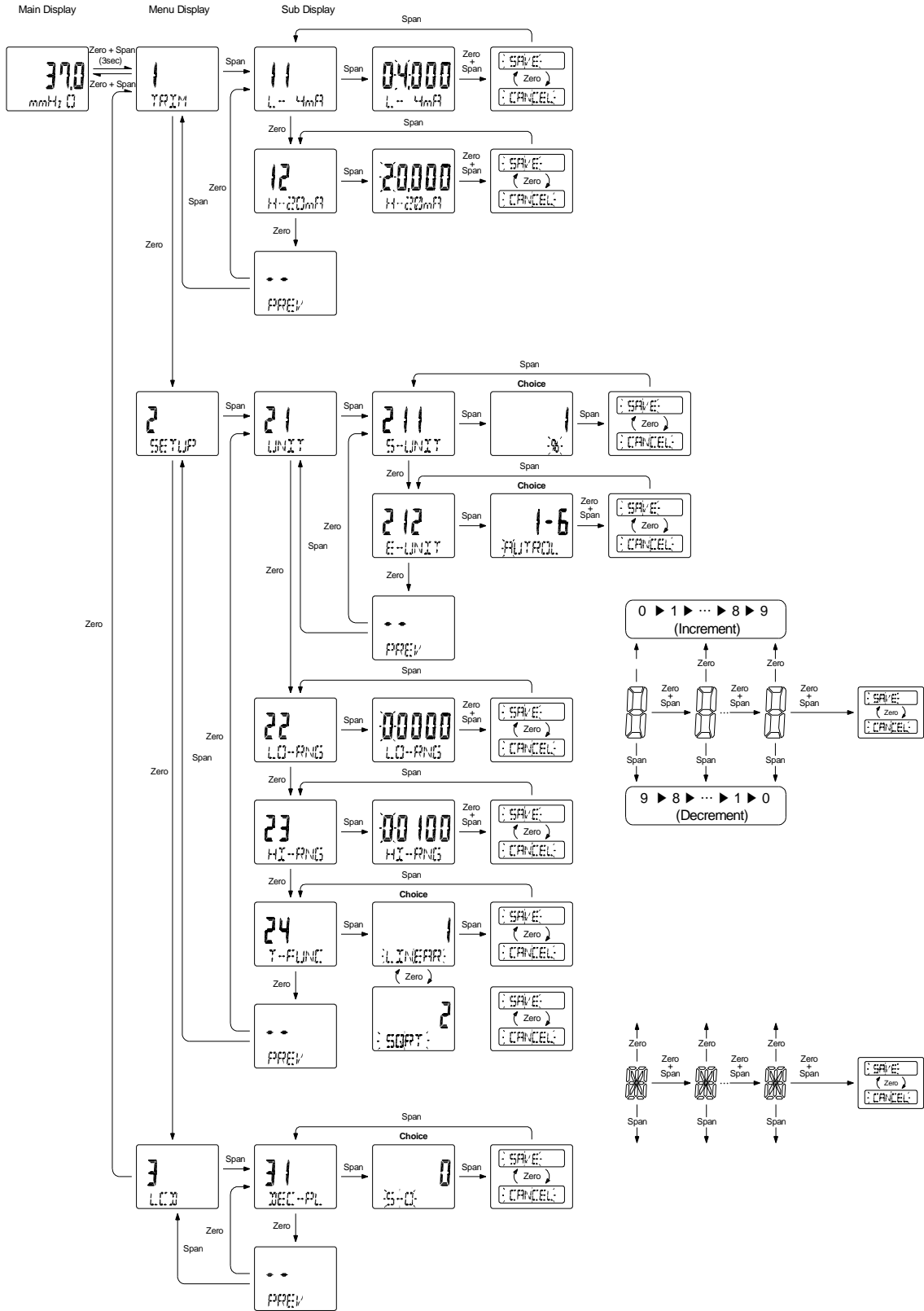


Figure 2-4 Menu tree

2.5 Description of the function with external buttons

2.5.1. TRIM

This function is to calibrate the 4 ~ 20mA current. Prepare the wiring as below diagram & check the current source is stable with validity.

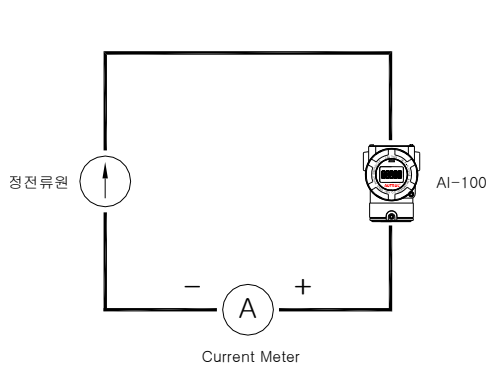


Figure 2-5-1 Trim with constant current source

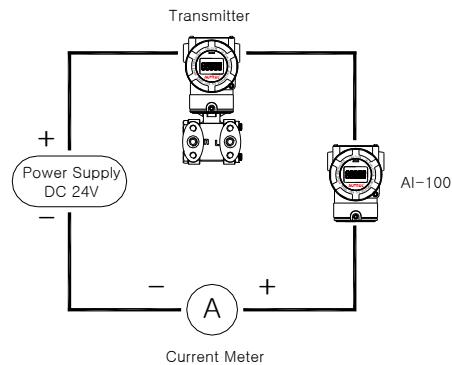


figure 2-5-2. Trim with Transmitter

1) L- 4mA (Low 4mA trim)

To trim the Low(4mA) value.

- ① In the menu tree, go to '11 L- 4mA' menu
 - ② Supply 4mA to the device through Loop Test function in the device(or constant current source)
 - ③ Input the same value to the device from the current meter value.
 - ④ '-DONE-' message blinks on LCD if the 'value saves well. And go back to the main menu.
Trying to do it again from ① status if - FAIL -' message blinks on LCD, which means save is not worked.
 - ⑤ Trying to do it again if the trimmed value is different with the value
- If the trimmed value is not stable or different with the value more than 3 times, make the current source stable. Check the calibration date of current source.

2) H-20mA (High 20mA trim)

To trim High(20mA) value.

- ① In the menu tree, go to '12 H-20mA' menu
 - ② Supply 20mA to the device through Loop Test function in device(or constant current source)
 - ③ Input the same value to the device from the current meter value.
 - ④ '-DONE-' message blinks on LCD if the 'value saves well. And go back to the main menu.
Trying to do it again from ① status if '-FAIL-' message blinks on LCD, which means save is not worked.
 - ⑤ Trying to do it again if the trimmed value is different with the value
- If the trimmed value is not stable or different with the value more than 3 times, make the current source stable. Check the calibration date of current source.

2.5.2. SETUP

This menu is for changing the unit, range and transfer function.

1) UNIT (Unit Change)

Purpose : Change the unit value on LCD.

2) S-UNIT (Select Unit)

Purpose : Select the unit from the memorized.

Go to '211 S-unit' on menu tree. '%' will be indicated as the first unit. See below table.

- Zero button : Forward.
- Span button : Backward, Save
- Zero + Span button : move to next row
- blink : changeable

- Select Unit table.

Num	Display Unit	Num	Display Unit	Num	Display Unit
01	%	15	Kg/cm ²	29	MI/d
02	mA	16	PA	30	ft ³ /S
03	V	17	KPA	31	ft ³ /d
04	Ohm	18	MPA	32	m ³ /S
05	cnt	19	TORR	33	m ³ /d
06	InH ₂ O	20	ATM	34	IGal/h
07	InHg	21	ft ³ /m	35	IGal/d
08	FtH ₂ O	22	Gal/m	36	`C
09	mmH ₂ O	23	l/m	37	`F
10	mmHg	24	IGal/m	38	`R
11	PSI	25	m ³ /h	39	K
12	BAR	26	Gal/S	40	(empty)
13	mBAR	27	MGal/d		
14	g/cm ²	28	l/S		

- Check the saved value is indicated on LCD from out of the menu after changing all parameters what user wants to indicate.

3) E-UNIT (Engineering Unit)

Purpose : User define unit. This function is able to select what the user want to use with number, words, symbols on LCD.

Go to '212 E-UNIT' on Menu tree. The first digit blinks on LCD.

- Zero button : Forward.
- Span button : Backward, Save @ end of digits
- Zero + Span button : move to next row
- blink : changeable

- Check the saved value is indicated on LCD from out of the menu after changing all parameters what user wants to indicate.

4) LO-RNG (Low Range Change)

Purpose : Modifying Low range value

Go to '22 LO-RNG' on menu tree. The first digit blinks on LCD.

Zero button : Forward.

Span button : Backward, Save @ end of digits

Zero + Span button : move to next row

blink : changeable

- Check the saved value is indicated on LCD from out of the menu after changing all parameters what user wants to indicate. Supply corrected 4 mA current source to the device when checking.

5) HI-RNG (High Range Change)

Purpose : Modifying High range value

Go to '23 HI-RNG' on menu tree. The first digit blinks on LCD.

Zero button : Forward.

Span button : Backward, Save @ end of digits

Zero + Span button : move to next row

blink : changeable

- Check the saved value is indicated on LCD from out of the menu after changing all parameters what user wants to indicate. Supply corrected 20 mA current source to the device when checking.

6) T-FUNC (Transfer Function)

Purpose : Change the linear value to sq-root value.

Go to '24 T-FUNC' on menu tree. '1' indicates & 'LINEAR' message is blinking. If pushing Zero button, it changes to 'SQRT' and it is blinking.

Zero button : Forward.

Span button : Backward, Save @ end of digits

Zero + Span button : move to next row

blink : changeable

- Check the saved value is indicated on LCD from out of the menu after changing all parameters what user wants to indicate. Supply corrected 20 mA current source to the device when checking.

2.5.3. LCD

This menu is for changing the indication parameters on LCD.

1) DEC-PL (Decimal Place)

Purpose : Change the decimal position on LCD.

Go to '31 DEC-PL' on menu tree. Decimal position changes by pushing 'Zero' button.

Zero button : Forward.

Span button : Backward, Save @ end of digits

Zero + Span button : move to next row

blink : changeable

- Check the saved value is indicated on LCD from out of the menu after changing all parameters what user wants to indicate.

The configuration is as follows

Display	Description	Value on LCD & Max. value to display on LCD
AUTO	Display automatically depending on value	99999
5-0	Display without decimal place.	99999
4-1	Display with one decimal place.	9999.9
3-2	Display with two decimal place.	999.99
2-3	Display with three decimal place.	99.999
1-4	Display with four decimal place.	9.9999

3. Handling Caution

3.1. Quick Reference manual

Steps	Job	Details	Tools
1	Unpacking	a) Indicator Unpack transmitter packing	
2	Model and specification check	a) Order Specification Indicator attached to make sure whether the transmitter is same as options attached on its nameplate	
3	Keep Storage	a) Store in a place where there is no vibration or impact without exposure to water b) Ambient temperature 25 deg C and relative humidity 65% RH	
4	Calibration in the calibration lab	a) Set up the basic Value b) Calibrating 4 to 20mA	- External Zero, Span buttons - Current Meter (LoopPower) - Ammeter
5	Installation Locations	Where ambient temperature is not fluctuated b) Where corrosion happens by chemical materials, etc. c) Where vibration and impact is not severe d) Where non-explosion area is matched on explosion-proof regulations e) Where maintenance is very easy	Engineering
6		a) Indicator	

	Mechanical considerations	Where transmitter can be handled easily a) Loop Current 24 Vdc b) Be cautious not leaking the pressure.	
7	Electrical Considerations	(11.9 Vdc ~ 45 Vdc) Connect 24 Vdc (Power Supply is 12 Vdc – 45 Vdc)	
8	Mounting and Installation	a) Indicator Bracket For mounting transmitter, an appropriate bracket should be used. b) Indicator Transmitter should be fixed well against swing.	when connecting and installing
9	Calibration on Spot	a) Low Sensor Zero Trim has to be done after ten seconds, namely, differential pressure become zero and stabilized. b) High 20mA. Make sure that PV value of transmitter is zero and current is 4 mA.	(LoopPower)
10	Checking the Operation	a) Indicator Make sure whether transmitter operates well or not	Visual Inspection

3.2. Unpacking

The packaging box and the packaging box **Indicator** and accessories are not damaged. When transporting the product to another location, re-pack it in its original packaging and transport it so that it will not be damaged.

When unpacking the indicator, be careful of any damage to the part and indicator inside of the box. In case of moving the indicator to the other place, pack it with its previous box and be careful of the damage to the box.

3.3. Checking models and specifications

The model and specifications of the Indicator are displayed on the nameplate attached to the Indicator Case (box), so check the model and specifications.

The model name and specifications are indicated on the nameplate to the case. Please check your specification and wanted model.

3.4. Storage

The following precautions should be observed when storing the indicator, especially when storing it for a long period of time.

1) The storage location must meet the following conditions. Select a storage area that meets the following conditions

a) It should not be exposed to rain or water.

It should not be exposed to rain or water.

b) Minimize the vibration and shock.

C) Ambient temperature and humidity are preferably 25°C and 65% RH,

If possible, it is preferable at normal temperature and humidity (approx. 25°C, 65% RH).

However, it has an ambient temperature and relative humidity within the following ranges.

- Ambient Temperature : -30 ~ 80 °C

- Relative Humidity : 0% ~ 100% RH (@ 40 °C)

2) When storing the product, keep it in the same condition as when it was delivered by the manufacturer.

4. Installations

4.1. Summary

This Chapter contains information on operating Model APT3500. Tasks that should be performed on the bench prior to installation are explained in this chapter.

4.2. Safety messages

Special care must be taken during installation and operation to ensure operator safety. Alarm indicator (▲) is placed where danger is special and safety is required. Please refer to the Safety Message when carrying out tasks with this mark.

4.3. Warning

▲ Warning

Explosion can result in death or serious injury:

- ◆ Do not remove the device covers in explosion environments when the circuit is alive.
- ◆ Transmitter covers must be fully engaged to meet explosionproof requirements.

▲ Warning

Electrical can result in death serious injury:

- ◆ The qualification which is educated only the person whom it prepares will be able to establish the transmitter.

▲ Warning

Electrical can result in death serious injury:

- ◆ Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

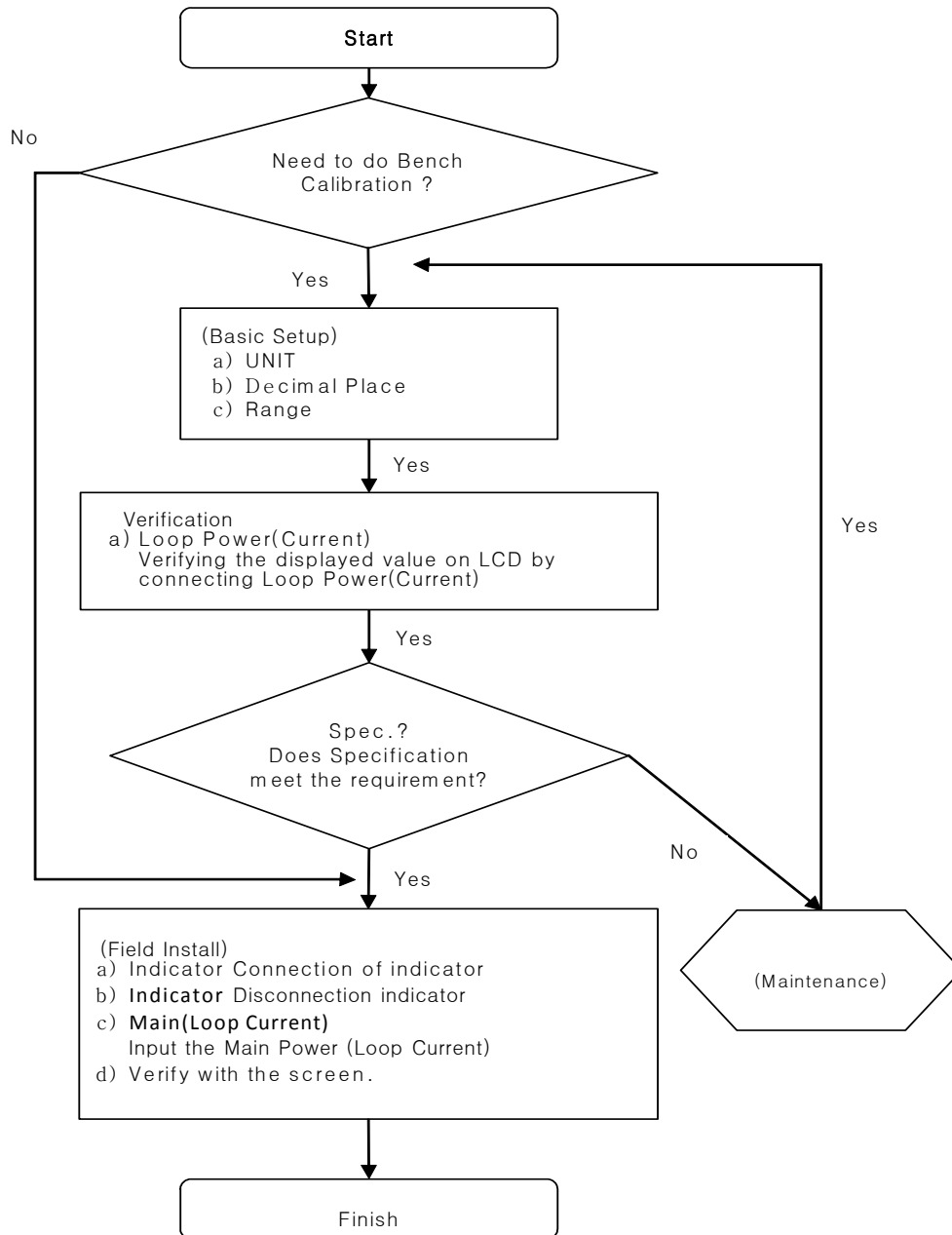
4.4. Selection of installation site.

The indicator is designed to withstand severe environmental conditions. However, to ensure stable and accurate operation for many years, the following precautions must be observed when selecting an installation location.

- 1) Avoid locations subject to wide temperature variations or a significant temperature gradient. If the location is exposed to radiant heat from plant equipment, provide adequate insulation or ventilation.
- 2) Avoid installing the transmitter in a corrosive atmosphere. If the transmitter must be installed in a corrosive atmosphere, there must be adequate ventilation as well as measures to prevent intrusion or stagnation of rainwater in conduits. Moreover, there should be appropriate ventilation preventing corrosion by rain gathered on conduct.
- 3) Select an installation site suffering minimum shock and vibration (although the transmitter is designed to be relatively resistant to shock and vibration)
- 4) Explosion-protected transmitters can be installed in hazardous areas according to the gas types for which they are certified.
- 5) Select a place that transmitter maintenance is very easy.

4.5. Commissioning manual / Check list

Indicator could be adjusted under Commission of person in charge after and before installation of indicator. However it is recommended that operating indicator should be done under the commissioning for appropriate control and getting to know the function



(Installation Flow Chart)

4.5.1. General consideration

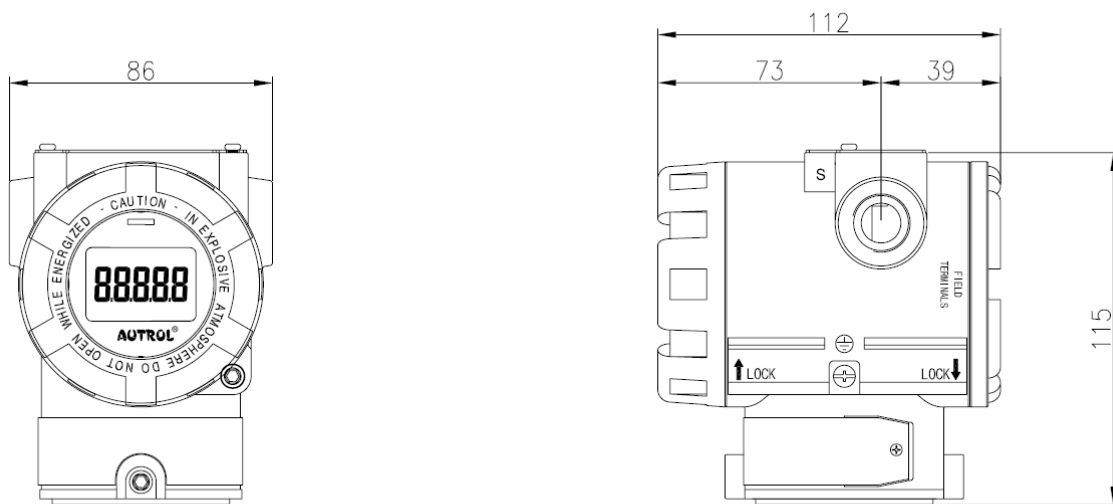
The purpose of this indicator is to convert Analog signal into Digital signal inserting in existing Analog signal. This device doesn't need any power supply because it can extract from existing Analog signal. Therefore it can make up-to 2 voltage of Voltage drop. To acquire high accuracy, it is located near its processor line and make it short the length as minimum. Moreover, it has to be concerned its convenience, safety of the user, and adjustable availability of the field. Also it has to be installed on the place which is minimum of vibration, external impact and change of the temperature.

4.5.2. Electronic consideration

The inside part of AI-100 Loop Indicator housing is separated with 2 parts. One is the area that electronic circuit is, other part has Terminal block. And the Terminal block is located backside of the Indicator, it is indicated as "Field Terminal" on the outside of the housing. Also, opening this housing, there is the Terminal Block inside it. Loop Current Power should be connected considering the Polarity of this Terminal Block.

4.5.3. Mechanical consideration

The drawing# 4-2 is the dimension of the Loop Indicator

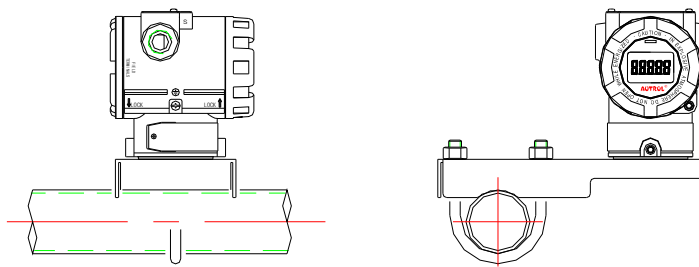


4-2 - External dimension drawing of Indicator

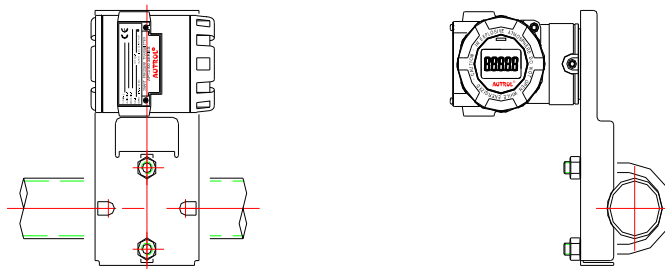
4.6. Mounting

4.6.1. Installation of Indicator

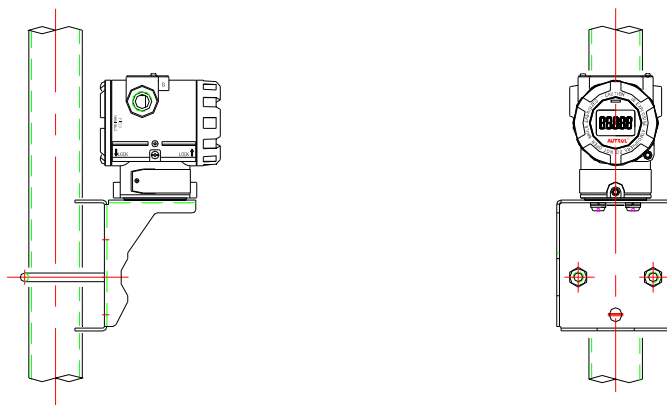
In the vibration environment, the Indicator needs extra support part to install for the stability. If the vibration is too high, it is recommended to use optional mounting bracket like below drawing# 4-3 into the pipe line.



FLAT BRACKET TYPE

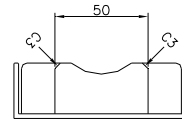
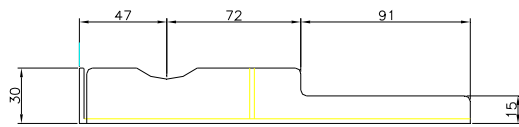
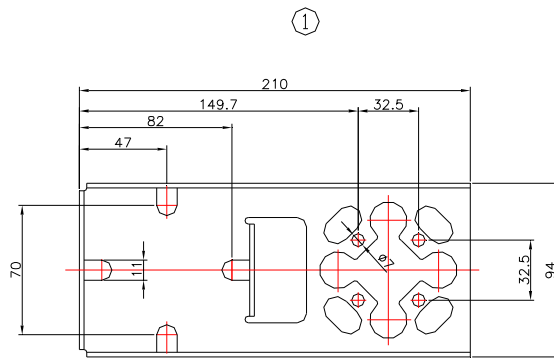
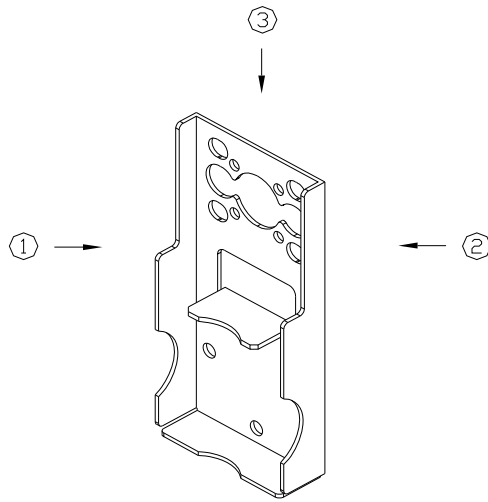


FLAT BRACKET 90° TYPE



ANGLE BRACKET TYPE

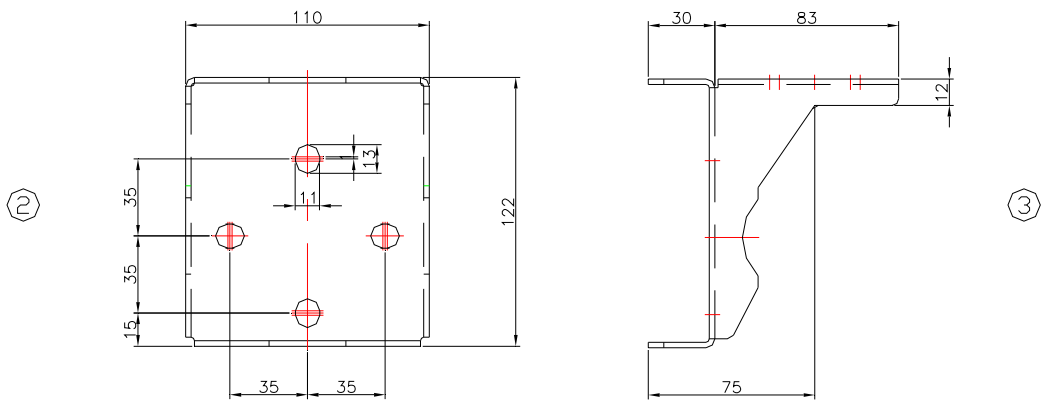
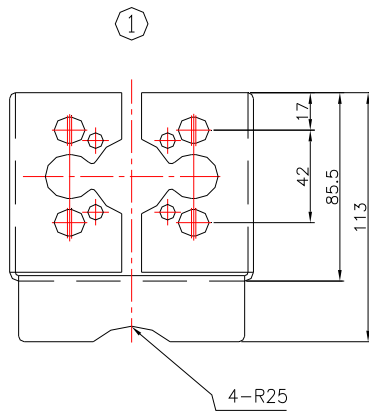
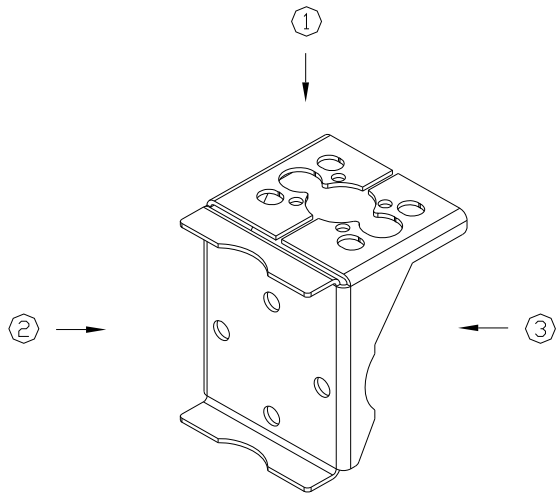
4-2 - Connection drawing of the Indicator



②

③

FLAT BRACKET TYPE DRAWING



ANGLE BRACKET TYPE DRAWING

4-3 - Bracket drawing

4.6.2. Consideration for suitable place to install

When choosing the place to install, it should be considered whether it is convenient to use the Indicator.

- ⑤ Rotation of the Housing : Adjustable the housing by 90° .
- ⑥ Terminal Block of the Indicator: Convenient of using the Terminal Block.
- ⑦ The Place which has enough space to take off the Indicator cover and dealing with the Electronic circuit inside it.

4.7. Environmental consideration

4.7.1. Effect of ambient temperature

The ambient temperature that the Indicator could withstand is -20°C to 70°C, installation location should be meet this range of condition. If the temperature seems to be approached the limitation or over it, there has to be additional way to block the heat.

4.7.2. Humid / corrosive condition

AI-100 Indicator is designed to be protected from humidity and corrosion. The Electric circuit is separated from the Terminal block, and the O-ring is protecting for inside once the cover is connected.

4.7.3. Installation at Hazardous location

AI-100 is designed with Explosion-proof housing. It should be checked whether the installation location is corresponding the condition for Explosion-proof.

4.8. Insulation resistance test and dielectric strength

The Indicator is conducted in course of the production before it release. Therefore, it doesn't need this test. However, if it is needed unavoidably, it should follow below procedure.

- 1) Do not test over it is needed. Even though the test doesn't affect the insulation with visible damage, it could make decreased its dielectric strength and safety factors.
- 2) Regarding Insulation resistance test and dielectric strength, do not put over 500[VDC](if there is lightning protection inside it, less than 100[VDC]).
- 3) Before test, all of signal line cable should be taken off from the block, execution following below procedure for Insulation Resistance and dielectric strength test.
- 4) Insulation Resistance test
 - a. Short-circuit "+"socket and "-"socket of the power at the Terminal block(short-circuit).
 - b. Turn off the power of the test machine, connecting "+"socket of the machine into short-circuit, and connecting "-" into the ground socket.
 - c. Turn on the machine, measure the Insulation resistance as short as possible. The measuring value should be over 20[Mohm].
 - d. After completion, keep careful not to touch exposed conductor, separating the machine, and connecting 100[Kohm] of registration between ground socket and short-circuit. And keep wait for over 3 sec. to discharge the static. During discharging, caution not to touch to the socket.
- 5) (Dielectric Strength Test)
 - a. Connect "+" socket and "-"socket at the power of Terminal block(short-circuit)
 - b. Turn off the power test machine, connecting the machine between short-circuit and the ground socket.
 - c. Set the limit value of the machine with 10[mA], put the power in and increasing the voltage from Zero(0) to regulated limit value little by little.
 - d. Stop for 1 minute once it meet the limit value.
 - e. After completion, make it decreased little by little, not to occur surge voltage.

4.9. Installation for Explosion-proof Indicator

4.9.1. KOSHA Certificate

1) KOSHA Flameproof (Explosion-proof) consideration is as below.

Note 1. Explosion-proof condition against Hazardous gas of the Model AI-100

- Code notation for protection : Ex d II C T6
- Temperature grade : T6
- (Ambient Temperature) : -20 ~ 70 °C

Note 2. Electronic Specification

- Input signal : 4 ~ 20 mA, up-to 24mA

Note 3. Installation

- All of wiring should be meet installation requirements.
- Service-entrance equipment should has Explosion-proof certificate and it is adapted to using condition.

Note 4. Operation

- Before open the Indicator, turning off the power and keep wait for 1 minuet.
- When using at the Hazardous area, keep careful not to occur mechanical spark

Note 5. Maintenance and Repair

- It is allowed to adjust and replace its parts by only authorized person who has qualification from Autrol if not, these Certificate is invalid.

4.9.2. EMC Conformance Standard

- EMI (Emission) : EN50081-2
- EMS (Immunity) : EN50082-2

It is recommended to adapt the Metal conduct Wiring to meet EMC Standard, and signal line cable should be used Twisted pair Shield Cable when user install AUTROL Indicator at the field.

5. Wiring

5.1. Safety message

The detailed procedure on this page is required high caution for user safety. There is a caution mark(▲) at the area that required high caution safety. Please refer this Safety message when working marked job.

5.2. Warning

▲ Warning
<p>Explosion can bring the death or fatal damage :</p> <ul style="list-style-type: none">◆ During the Indicator turning on, do not open its cover at the Explosive Atmospheres.◆ Before connecting HHT, should check the Indicator is being installed according to intrinsic safety regulation.◆ Prove that the operating condition correspond to Hazardous area properly.◆ Both side of the cover of the Indicator should correspond to requirments of Explosion-proof condition.

▲ Warning
<p>It could be bring the death or fatal damage if do not follow this article.</p> <ul style="list-style-type: none">◆ Only trained person could install the Indicator.

▲ Warning
<p>It could be dead or get fatal damage by Electric shock. If this Indicator will be installed at the High voltage condition or bad condition, it could occur high voltage at the power cable or the socket.</p> <ul style="list-style-type: none">◆ it is required high caution when touching power cable or the socket.

5.3. Selecting wiring materials

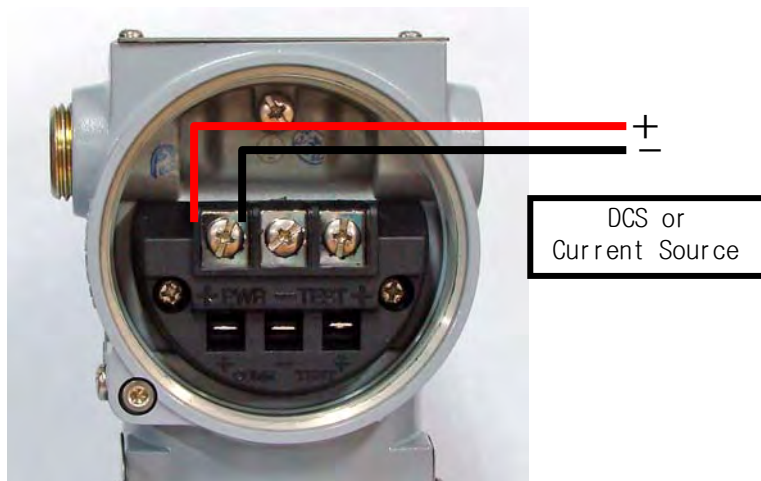
- 1) The cable should be used with 600V grade or Insulation type or Standard lead wire.
(It should be used 24AWG or the wire over than it, do not exceed the length over 1,500m)
- 2) At the area could be affected Electric noise, the Shielded wire must be required.
- 3) At the area the ambient temperature is higher than regulated or less than it, the cable or wire is considered with suitable one.
- 4) If there are an oil, solvent, corrosive gas or liquid, please use the cable corresponding to the environment.
- 5) Termination of the lead wire, please use the terminal lug which haven't soldered and make the termination area insulated with the tube.

5.4. Connection of external wiring

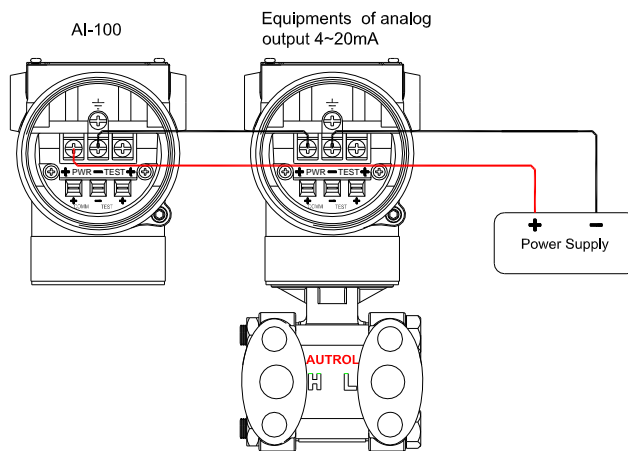
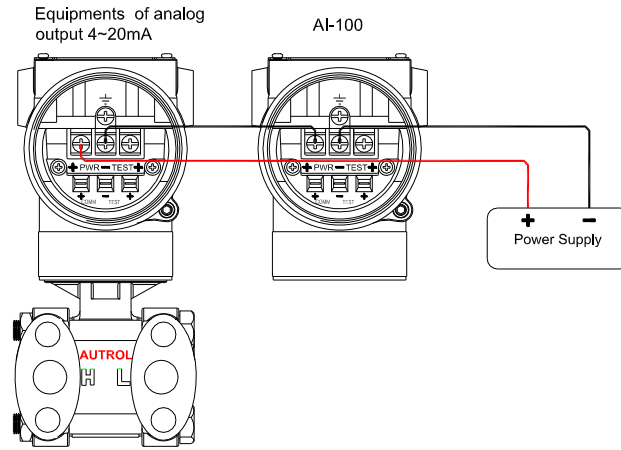
AI-100 wiring should follow below procedure.

- 1) Open the housing cover which is indicated as "FIELD TERMINAL"
At the Hazardous area, do not open the cover being put the power into the circuit.
- 2) Make Loop Current Power connected to "+"socket(left side), "-"wire put the middle socket.
- 3) To prevent being gathered humidity at the Terminal block of the housing, please seal the conduct that is not used for the time being.
- 4) Since the power of the Indicator is supplied through the Signal Wiring, Signal line cable shouldn't installed with power cable and near heavy electric equipment. If grounding of the signal cable required, only "-"side should be grounded.
- 5) To make matched well, Screw sockets should be tightened.
- 6) Close the Indicator cover as usual. Especially using at the hazardous area, Explosion-proof requirements should be covered.

CAUTION) High voltage, AC power or Constant voltage should not put the Indicator socket. It could bring damage at the Indicator.



5-1 Loop Current Power socket connection

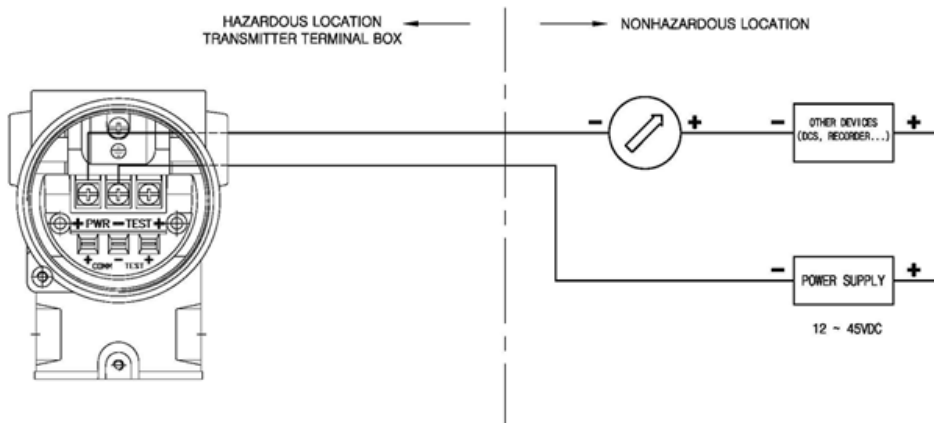


5-2 AI100 Electrical connection in the Loop

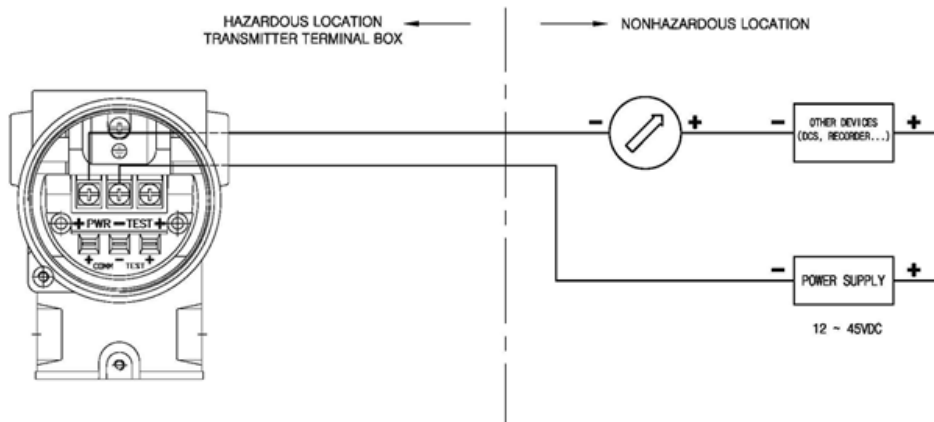
5.4.1. Loop Configuration

Autrol Indicators use a two-wire system for power supply. The signal line is used with the power supply line, the power supplied to the indicator is DC power, Loop Current Power, connected as below.

1) Non-Explosion proof

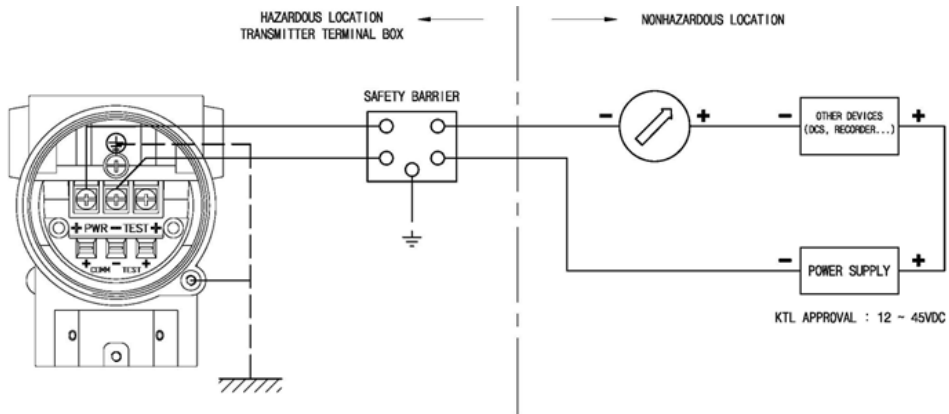


2) Explosion proof Type



3) Intrinsical Safety Type

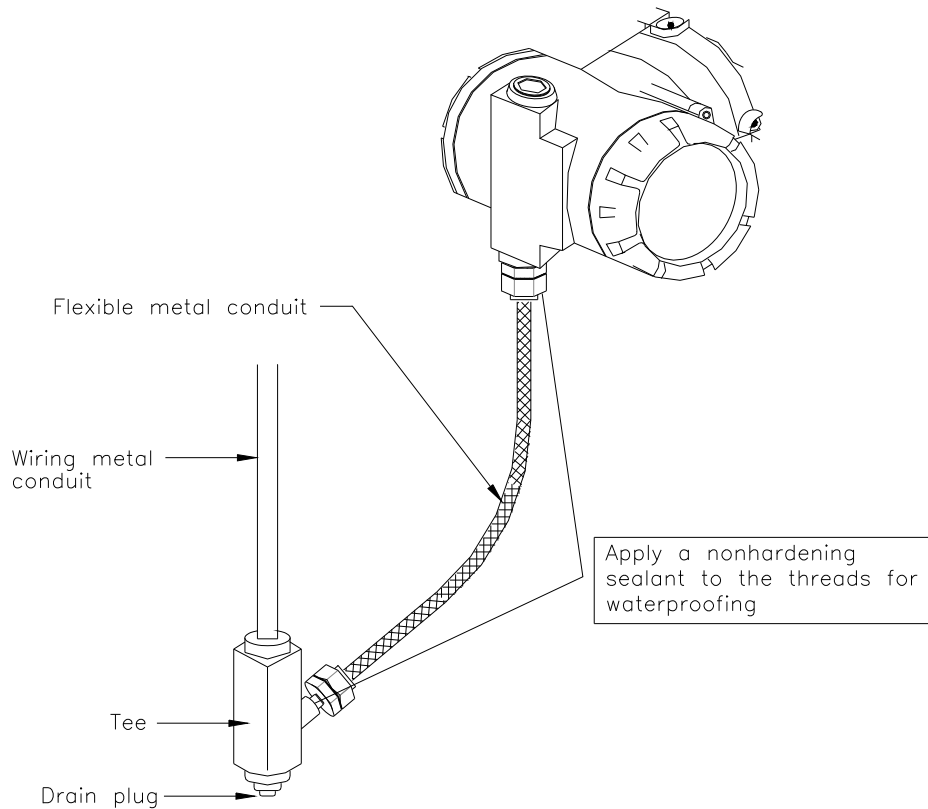
For Intrinsic Safety Type, Safety Barrier shall be included and connected inside the Loop.



5.4.2. Wiring Installations

- 1) General-use Type and intrinsic Safe Type

For Intrinsic Safety Type, Safety Barrier shall be included and connected inside the Loop.

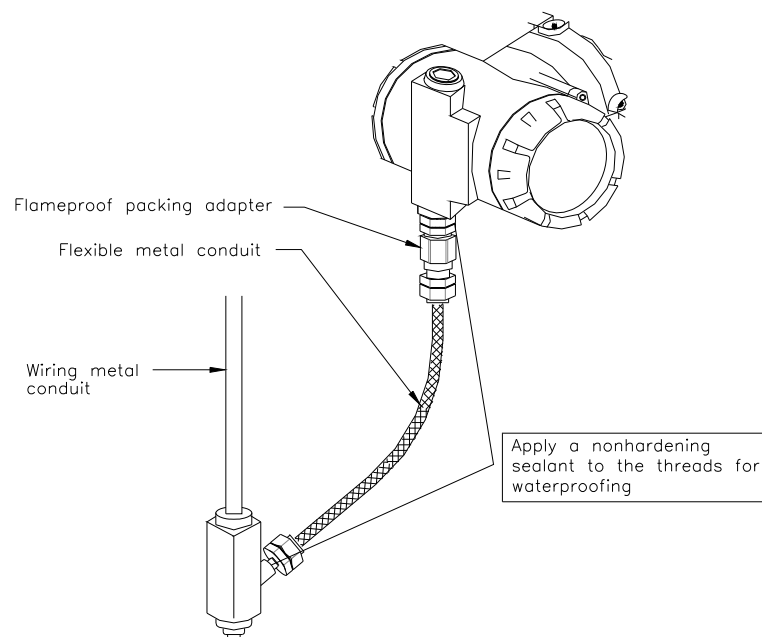


2) KOSHA Flameproof Type

Wire cables through a flameproof packing adapter, or using a flameproof metal conduct.

a) Wiring cable through flameproof packing adapter for KOSHA flameproof type

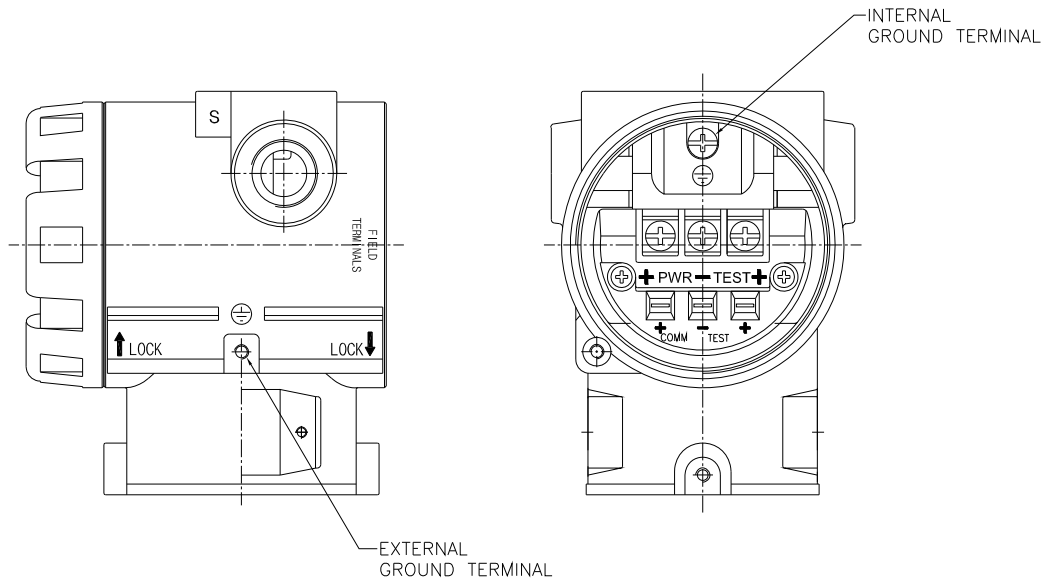
- Use only flameproof packing adapter by KOSHA.
- Apply a non-hardening sealant to the terminal box connection port and to the threads on the flameproof packing adapter for waterproofing
- Attach the packing adapter at the terminal block of the Indicator.
- Screw the flameproof packing adapter into the terminal box until the O-ring touches the terminal box wiring port (at least 5 full turns), and tighten the lock net.



- Flame proof metal conduct wiring
- Use the Flexible Metal conduct of Flameproof.
- Seal fitting must be installed near the terminal box connections port for a sealed construction.
- Apply a non-hardening sealant to the threads of the terminal box connection box, flexible metal conduct and deal fitting for waterproofing.

5.5. Grounding

- Grounding should satisfy KS requirements (grounding resistance, 10 Ohm or less). Grounding is required below 10 Ohm for explosion proof and intrinsic safety.
- There are ground terminals inside and outside of the terminal box. Either of these terminals may be used.
- Use 600V grade PVC insulated wire for grounding.



LOOP INDICATOR AI-100
INTERNAL AND EXTERNAL GROUND TERMINAL

[Note] In case of with Built-in Lightning Protector, Grounding should satisfy Special KS requirements (grounding resistance, 10 Ohm or less)

5.6. Power supply

- The power supply of the Indicator shall be Loop Current Power between 12 ~ 45V
- The Ripple of power voltage shall be equal or less than 2%.

6. Maintenance

6.1. Summary

Chapter 6 describes breakdown diagnostic and maintenance.

6.2. Safety Message

When operating, special care is required for the safety of the operator. Information that raises potential safety issues is indicated by a warning symbol(▲). Refer to the following safety messages before performing an operation preceded by this symbol.

6.3. Warning

▲ Warning

Explosion can result in death or serious injury:

- ◆ Do not remove the transmitter covers in explosion environments when the circuit is alive.
- ◆ Both transmitter covers must be fully engaged to meet explosion-proof requirements

▲ Warning

Not following this installation procedure can result in death or serious injury:

- ◆ The qualified persons fully educated can install the indicator.

▲ Warning

Electrical shock can result in death or serious injury

- ◆ Avoid contact with the leads and terminals. The voltage appeared on the lead line can cause electrical shock.

6.4. Hardware Diagnostics

Malfunction of Indicator is suspected, shall check and examine the hardware of indicator according to the description of table 6-1.

Current Status	Cause	Action method
No output on the LCD of Indicator	Loop Wiring	<ul style="list-style-type: none"> o. Check for adequate voltage to the Indicator Indicator The voltage shall be always 0.5 ~ 2V. o. Check the connection of terminal o. Check the intermittent shorts, open circuits or multiple grounds o. Check the supplied current is more than minimum press than maximum suggested at the specification.
The output value on the indicator is not correct.	Calibration Range Setting	<ul style="list-style-type: none"> o. Check the value on the display when suppling regular current. o. Check the setting range. o. After setting range, and setting decimal point, o. The range you set will be out of decimal point selection.

6-1 Troubleshooting

6.5. Maintenance

AI-100 Loop Indicator is designed as feature modular, it is easy to maintain.

Taking apart or assembling the product arbitrarily may cause the damage, the failure indicator or part shall be returned to Autrol service center.

6.5.1. Disassembling electrical board from housing

The indicator is designed with dual-compartment housing; one contains the electronics module, and the other contains all wiring terminals



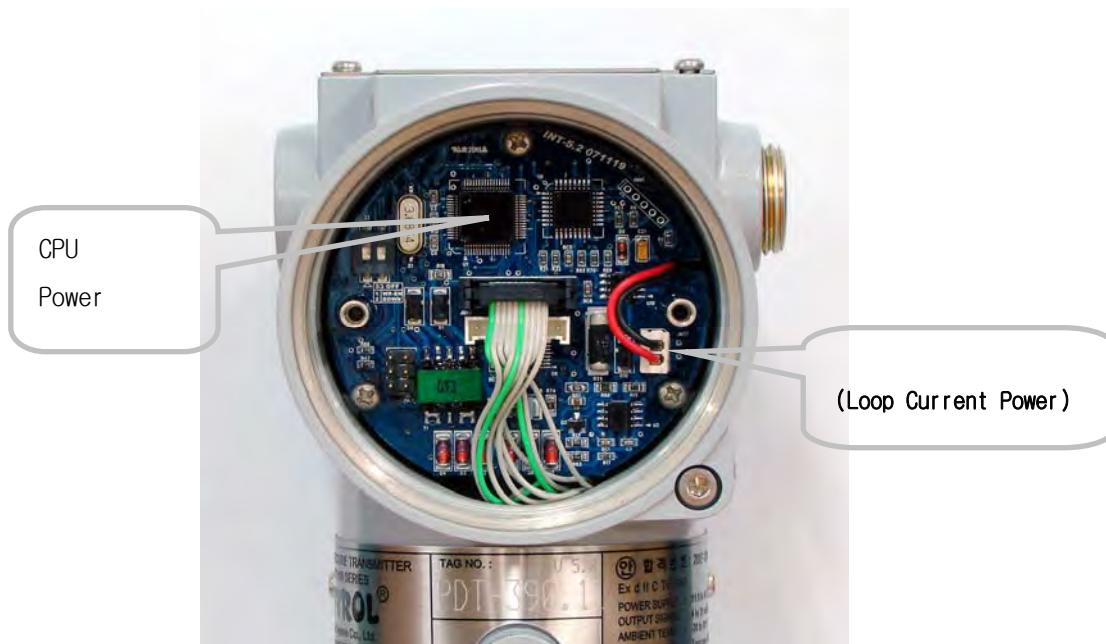
6-2. Housing of Indicator

1) Disassembling Electronics Module

Use the following procedure to remove the electronics module.

1. A. Disconnect the power from the indicator
- B. Remove the cover from the electronics side of the indicator housing (Figure 6.2)
- C. Take apart LCD module. Do not remove the instrument cover in explosive atmospheres when the circuit is alive)
- D. Remove 3 screws that anchor the electronics module to the indicator housing.

Inside of disassembled indicator (Figure 6-3)



Structure of Electronics Module inner Indicator

6.5.2. Assembling the Electronics Housing

- 1) Changing Electronic Circuit Module. Re-assembling procedure is as follow.
 1. A. Insert electronics Circuit module in the housing carefully.
 - B. With 3 screws, fix the electronics circuit module in the housing.
 - C. Assemble the LCD module.
 - D. Assemble the cover.



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