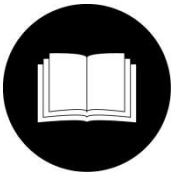
RoHS



READ THE INSTRUCTION MANUAL BEFORE USING

INSTRUCTION MANUAL

Intrinsically Safe Explosion-proof Structure: ia

Type Examination Certification No. CML 19JPN2072X

MANOSTAR TRANSMITTER

EMT1H

No. TR-EMT1H-ia-E01

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Manostar

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INTRODUCTION

Thank you very much for choosing our Manostar Transmitter Type EMT1H. The apparatus is a micro differential pressure transmitter wherein our manostar transmitter type EMT1 is improved to ensure the intrinsic safe explosion-proof structure. It features, in addition to the performance of the original high-precision micro differential pressure transmitter, explosion-proof performance that prevents the apparatus from being the ignition source even it is used in a hazardous area where flammable gas is generated.

⚠ CAUTION	For using the apparatus safely: – Be sure to carefully read the operating instruction manual before using the apparatus and use it in a correct and safe manner within the rated specifications. Improper use may cause apparatus failure, which may induce damage, accidents, etc. – Keep this manual handy in a safe place.

I. PRECAUTIONS

The apparatus features the intrinsic safe explosion-proof structure. Although the structure has higher reliability compared to other explosion-proof structures, the reliability will deteriorate significantly unless the prerequisites for explosion-proof structures are observed and the intended explosion-proof performance cannot be maintained. Before using the apparatus, the following precautions must be observed. For details related to explosion protection, refer to the references shown below:

References:

- JNIOSH-TR-46-1:2015
- JNIOSH-TR-46-6:2015
- JNIOSH-TR-NO.44

⚠ WARNING

- **Do not use the apparatus in dangerous places, excluding the target gas atmosphere.**
  Use of the apparatus in the non-target flammable gas atmosphere may cause an explosion because the apparatus becomes the ignition source.
- **Use the apparatus in combination with the safety barrier.**
  Use of the apparatus not combined with the safety barrier may cause an explosion because the apparatus becomes the ignition source.
- **Lay down the apparatus with the capacitance and inductance of wiring cables set below the allowable values.**
  Wiring cables whose capacitance and inductance exceeds the allowable values accumulates energy that could be the ignition source, which may cause an explosion.
- **Wiring cables should be laid down in a manner that they are not affected by electromagnetic induction and static induction.**
  When a voltage or current is induced by electromagnetic induction or static induction, sparks that could be ignition sources may occur, resulting in the danger of explosion.
- **Use the apparatus with the cover installed.**
  The intrinsic safety cannot be guaranteed with the cover detached and the apparatus cannot be used in hazardous areas.
- **In case a seal is attached on the apparatus, the surface area should be 400 mm^2 or below, or the thickness should be 0.2 mm or below. In addition, use a waste cloth immersed in water should be use for cleaning of non-metallic material parts.**
  Charging of static electricity may cause sparks that could be ignition sources, resulting in an explosion hazard.
- **Do not use the apparatus for measuring pressure of corrosive gases and toxic gases**
  The apparatus is not of the corrosion-proof type. Use of the apparatus for measuring pressure of corrosive gases and toxic gases may erode the internal mechanism and discharge gases, which may pose hazards to the human body.
- **Do not use the apparatus in places where significant vibrations or shocks exist.**
  Use of the apparatus in places where significant vibrations or shocks exist may induce deterioration in performance or failures, which may cause damage and disasters.
- **Do not disassemble or modify the apparatus.**
  Disassembling or modification of the apparatus not only voids the warranty, but also induces deterioration in performance or failures, which may cause damage and disaster.

⚠ CAUTION

- **Regarding the installation place and installation method, be sure to refer to the operating instruction manual.**
- **Do not use organic solvents for cleaning the apparatus.**
  Use of organic solvents corrode the surface and may cause deterioration in performance or failures, including peeling off of the coating.
- **Do not pull the pipes with excessive power.**
  Pulling the pipes with excessive power may break the connector.

II. INTRINSICALLY SAFE EXPLOSION-PROOF STRUCTURE

1. Certification as explosion-proof apparatus

In Japan, only the explosion-proof apparatuses that passed the type examination for electric machines and apparatus of explosion-proof construction can be used. The type examination of explosion proof includes the guidelines according to the explosion proof design standards for electrical and mechanical equipment (popular name: the structure standards) and the guidelines that are harmonized with international standards (popular name: the technical standards). The micro differential pressure transmitter described herein (EMT1H type) passed the examination of the certification authority and is certified as the explosion proof design electrical and mechanical apparatus featuring an intrinsically safe explosion-proof structure that conforms to the International harmonization explosion-proof Guideline Ex2015.
(Type examination certification No. CML 19JPN2072X)

2. Concept of intrinsically safe explosion proof structure

The explosion-proof structures include the following:

Explosion-proof structure	Explosion-proof method	Brief Summary
Pressurized apparatus	Isolation of ignition source	Explosion proof performance is secured by isolating the parts of electric apparatus that could be ignition sources from the surrounding explosive atmosphere.
Oil-immersion		
Equipment protection by resin immersion		
Encapsulation		Although an explosion occurs inside the electric apparatus, explosion proof performance is secured by isolating the flame so that it will not ignite the surrounding explosive atmosphere.
Increased safey	Enhancement of safety degree	Regarding electric apparatuses wherein no spark-generating part or high-temperature part that could be an ignition source exists, explosion proof performance is secured by further enhancing safety.
Intrinsic safety	Inhibition of ignition ability	Explosion proof performance is secured by inhibiting occurrence of energy that could be an ignition source even in the regular condition or in the stipulated failure condition with the use of intrinsically safe circuits.

(1) Inhibiting energy

For flammable gas to catch fire, energy exceeding a certain quantity is required. Should a spark occur, the gas will not catch fire if the energy of spark does not reach the afore-said energy. Therefore, energy is inhibited with the relay barrier that is installed in the non-hazardous area to prevent feeding excessive energy to the micro differential pressure transmitter.

(2) Not accumulating energy

Even if the feeding of energy is inhibited externally, it is meaningless when energy is accumulated in hazardous areas. Our apparatus is designed in a manner that the energy to be accumulated in circuits can be inhibited to prevent the apparatus will not be the ignition source.

(3) Inhibiting increase in temperature

Flammable gases catch fire due to temperature. Our apparatus is designed in a manner that the increase in temperature is inhibited to the level that any target gas will not catch fire within the range of operating ambient temperatures.

3. List of laws and regulation related to explosion-proof electric apparatuses

(1) Industrial Safety and Health Act
June 8, 1972 Law No. 57
(2) Enforcement ordinance of Industrial Safety and Health Act
August 19, 1972 Cabinet Order No. 318
(3) Ordinance on Industrial Safety and Hygiene
September 30, 1972 Ministry of Labour Ordinance No. 32
(4) Ordinance on Examination of Machines and Other Equipment
September 30, 1972 Ministry of Labour Ordinance No. 45

4. Matching standards and guidelines

(1) Explosion proof design standards for electrical and mechanical equipment
April 1, 1969 Ministerial Notification No. 16 of the Ministry of Labour
(2) Explosion-Proof Guide
August 31, 2015 Labor Standards Bureau Notification 0831 No. 2, etc.
(International harmonization explosion-proof guideline Ex2015)

5. Explosion-proof performance of the apparatus (Ex ia IIC T4 Ga)

Ex	ia	IIC	T4	Ga
(i)	(ii)	(iii)	(iv)	(v)

(i) The code shows the explosion-proof structure conforming to the International harmonization explosion-proof guideline.

(ii) The code "**i**" shows the intrinsically safe explosion-proof structure and it is further classified into "**ia**", "**ib**" and "**ic**." For the intrinsic safety, "**ia**" shows the highest level and it can also be used as "**ib**" or "**ic**".

(iii) The code shows the group of apparatus and it is further classified into "**I**", "II" and "III". In addition, regarding "**II**" and "**III**", they are further segmentalized by adding either one of "**A**", "**B**" or "**C**".

Group **I**: Usable in mines that are likely to be affected by mine air.

Group **II**: Usable in areas, excluding mines that are likely to be affected by mine air, where explosive gas atmosphere exists.

＊"**IIC**" can also be used as "**IIB**" or "**IIA**".

Group **III**: Usable in the explosive-dust atmosphere, excluding mines that are likely to be affected by mine air.

(iv) The code shows the temperature classes and is further classified according to the maximum surface temperatures to which the apparatus reaches within the range of operating temperatures.

＊For Group **II**, the range of usable gas atmosphere is determined according to combinations of (iii) and (iv) as shown below:

Table II-(1): Typical Explosive Gas Groups and Temperature Classes

Temperature Class (Ignition Temperature) \ Group		Low ← Hazard Ratio → High		
		IIA	IIB	**IIC**
Low ↑ Hazard Ratio ↓ High	T1 (Exceeding 450° C)	Acetone Ammonia Ethane Acetic acid Ethyl acetate Toluene Benzene Methane	Carbon monoxide	Water gas Hydrogen
	T2 (Exceeding 300° C and 450° C or below)	Isopentyl acetate Butane Propane Methanol Acetic acid anhydride	Ethanol Ethylene Ethylene oxide	Acetylene
	T3 (Exceeding 200° C and 300° C or below)	Hexane		
	T4 (Exceeding 135 and 200° C or below)	Acetaldehyde	Diethyl ether	
	T5 (Exceeding 100° C and 135° C or below)			
	T6 (Exceeding 85° C and 100° C or below)			Carbon bisulfide

＊The content of the table is quoted from JNIOSH-TR-44.

: Shows the scope where the apparatus can be used.

(v) The code indicates the equipment protection level (EPL) and shows the hazardous area where installation is possible. The intrinsically safe explosion-proof structure Group II is classified into either of "**Ga**", "**Gb**" or "**Gc**".

"**Ga**": Installation is possible in Class 2 hazardous area, Class 1 hazardous area and special hazardous area.

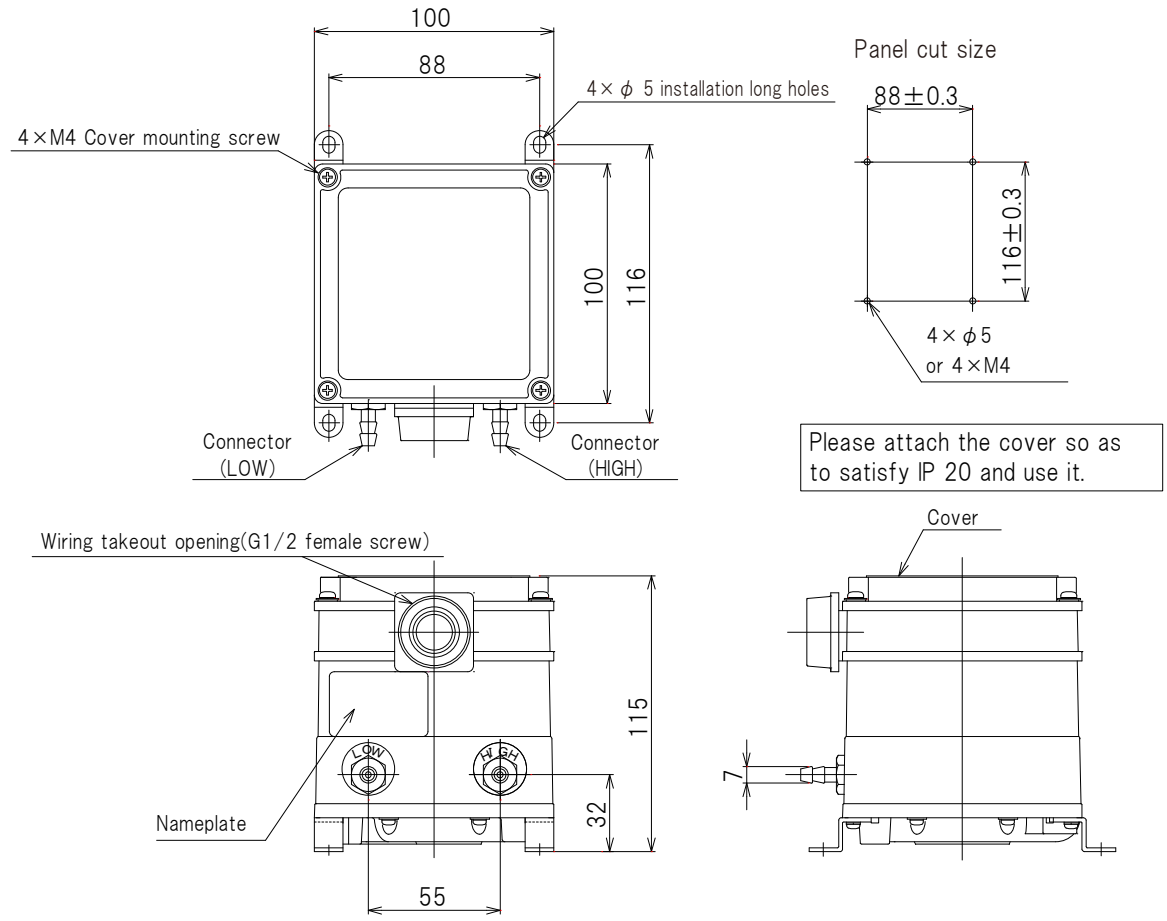
"**Gb**": Installation is possible in Class 2 hazardous area and Class 1 hazardous area.

"**Gc**": Installation is possible in Class 2 hazardous area.

⚠ CAUTION	The apparatus is not the corrosion-proof type. Even for gases that are classified in the above-stated scope, the apparatus cannot be used in the corrosive-gas atmosphere.

III. NAME OF EACH PART

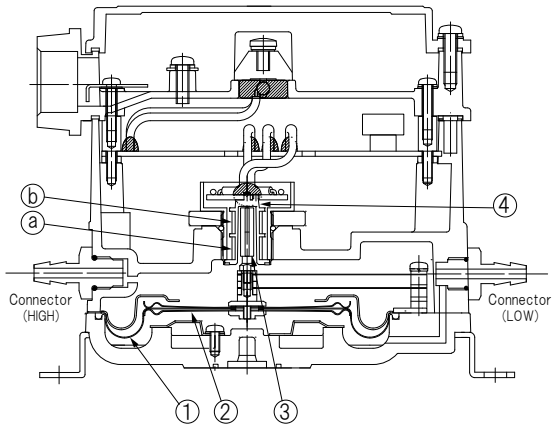
Name of Each Part (for vinyl tube) and Panel cut size



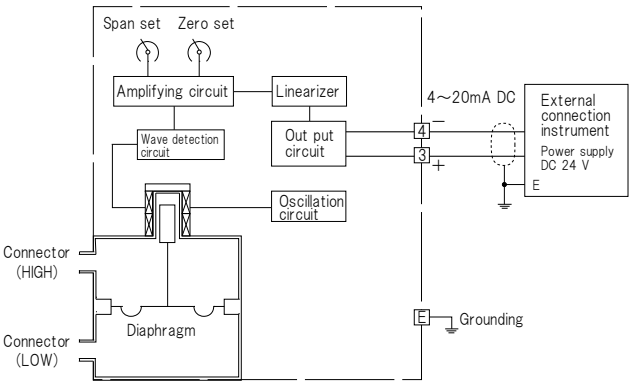
IV. BRIEF SUMMARY OF OPERATING PRINCIPLE AND STRUCTURE

When a pressure is applied to the connector (HIGH), connector (LOW) or simultaneously to both connectors, Diaphragm① and Diaphragm Disk ② push Core ③ installed at the leading end of double leaf spring in the upward or the downward direction. On the outer perimeter of the core, two coils (a) and (b) are wrapped around Bobbin ④, and the bobbin divides the pressure-receiving chamber and the outside world. When the core moves up or down, the inductance (electromagnetic interaction) of Coil (a) or Coil (b) changes in a differential manner; either one increases or another one decreases. The differential amount of inductance is proportionate to the pressure, and measurement of the differential inductance value can measure the pressure indirectly.
In the electronic circuit, the difference in inductance of Coil (a) and Coil (b) is converted into voltage by using the oscillation circuit and the detector circuit. Thereafter, the span adjustment and the zero-point adjustment are implemented in the amplifying circuit, and the linearity is compensated in the linearizer circuit. The output circuit plays the role of the 4 to 20 mA current source when viewed from the externally connected equipment, and the pressure value is shown in current values by proportionating the current value to the output voltage of the linearizer circuit.

Explanatory Chart of Structure



Block Diagram of Electronic Circuit



V. INSTALLATION

1. Places where the apparatus can be used

The apparatus can be used in the special hazardous area, Class 1 hazardous area and Class 2 hazardous area. The apparatus should be installed and used in the area where all of the following conditions are satisfied.

Target gas atmosphere	Refer to Table II-(1) "Typical Explosive Gas Groups and Temperature Classes" on Page 3. * The apparatus cannot be used for corrosive gas.
Ambient temperature	0° C to +40° C (No freezing) * Avoid installation in areas where ambient temperatures change suddenly.
Ambient humidity	90%RH or below (No condensing)

⚠ WARNING	- In the special hazardous area (Zone 0), robustly prevent generation of sparks that could be the ignition source caused by applying shocks or frictions on the apparatus container. - Do not use the apparatus for measuring pressure of corrosive gases or toxic gases.

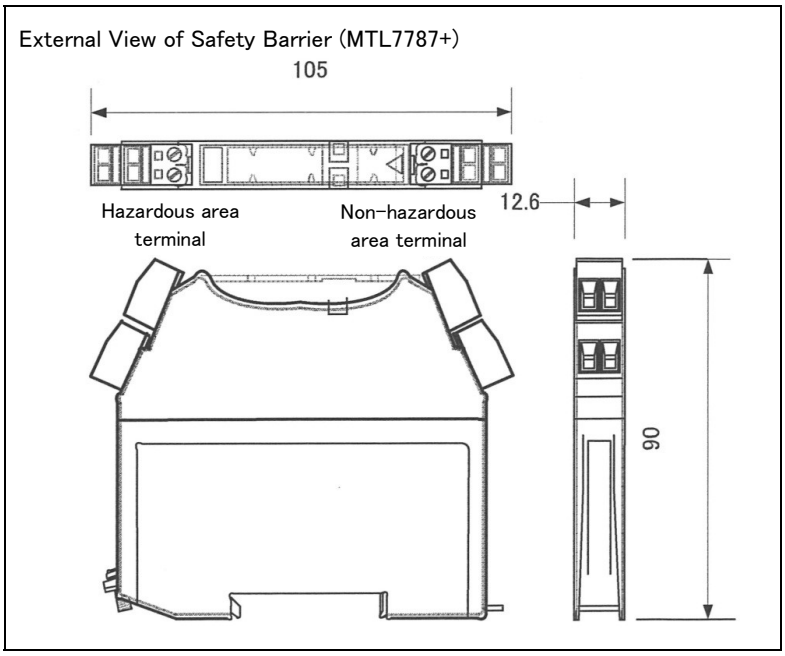
⚠ CAUTION	- Pay careful attention to handling in the environment where static electricity is likely to be charged. - The apparatus cannot be installed outdoors as it is. Install the apparatus after accommodating it in an outdoor storage box. - Install the apparatus as far as possible from devices that generate strong electromagnetic fields.

2. Installation

- The apparatus must be installed in a horizontal posture (inclination angle: within ±5°)
  * If the installation surface is vertical, use the "bracket for installation on vertical wall surface" (Refer to Page 13).
- A minimum space of 0.5 m must be allowed above the apparatus for the purpose of adjustment and maintenance services.

3. Safety barrier

The apparatus constitutes the intrinsically safe explosion-proof structure when it is used in combination with the Safety Barrier (MTL7787+).



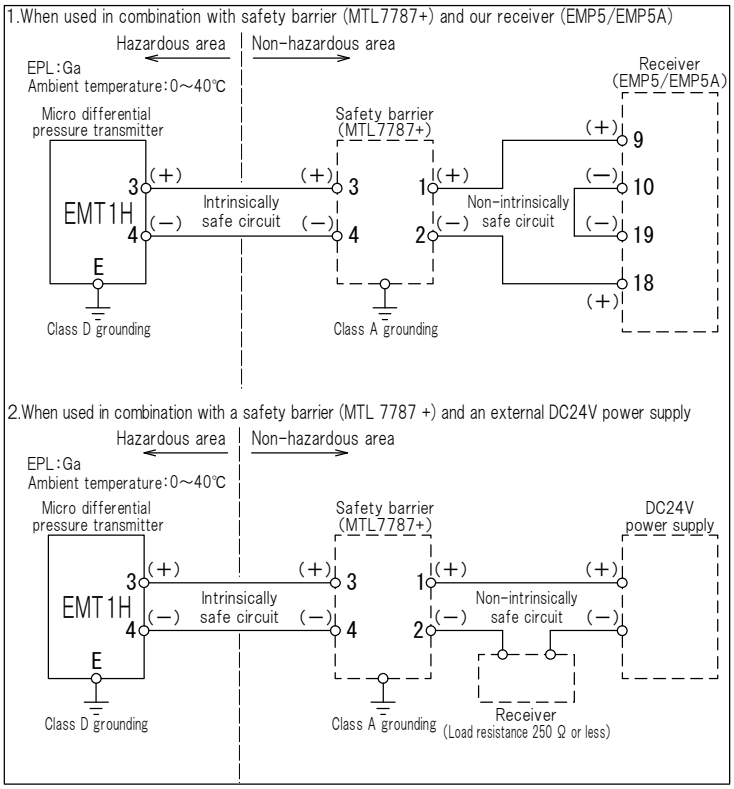
* Installation/wiring of safety barrier (MTL7787+)
  - The barrier should be installed in non-hazardous areas, and Class A grounding should be applied independently.
  - Installation of the barrier on the DIN rail enables conduction between the grounding terminal of the barrier and the DIN rail.
  - When the DIN rail is mounted on a metal panel or cabinet, an insulating block, grounding terminal, etc. are required to ensure the Class A grounding independently. Use the optional DIN rail set (Refer to Page 13).

⚠ CAUTION	For details of the safety barrier (MTL7787+), refer to the URL shown below: Cooper Industries Japan K.K.: http://www.cooperindustries.jp/

4. Wiring/connection

(1) Connection diagram

Figure V-(1): Terminal Connection Diagram



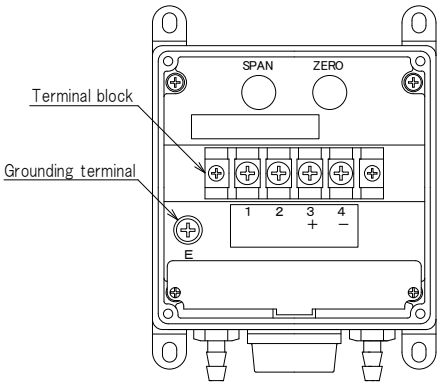
・Since our receiving instrument incorporates the DC power supply circuit for micro differential pressure transmitter, no separately-installed DC power supply is required.

＊When EMP5A is used, an input resistance of 50 Ω is required between 18 and 19.

・For the 24 V DC power supply used, use the constant-voltage power supply whose ripple is within 0.2 V P-P.
・The 0 V terminal of the DC power supply should be connected to the grounding terminal of the barrier.
・ The apparatus should be operated with the load resistance of 250 Ω or below.

⚠ CAUTION	Because the safety barrier (MTL7787+) that comes with the apparatus is of the non-isolated barrier (Zener barrier), when the apparatus is used in the special hazardous area, the power supply isolated with the two-winding transformer (24V DC) and the protection by means of adequately rated fuse at the primary side are required. For details, refer to JNIOSH-TR-NO. 44.

Figure V-(2): Terminal Arrangement Diagram



Terminal Block

Terminal 1 ------ Do not connect anything.
Terminal 2 ------ Do not connect anything.
Terminal 3 ------ Micro differential pressure transmitter output (+)
Terminal 4 ------ Micro differential pressure transmitter output (-)

⚠ CAUTION	- The terminal block and the grounding terminal should be robustly connected by using crimping terminals that fit M4 screws. - The terminal screws should be tightened with the force of 1.0 to 1.3 N・m. - Be careful that excessive tightening results in damage of the instrument. - For the wiring cables of the intrinsically safe circuit, shielded cables should be used and the shield wires should be connected to the grounding terminal of the safety barrier.

(2) Power supply

The apparatus should be used with the power supply voltage of 24 V ± 10% DC (Ripple: Within 0.2 V P-P).

(3) Wiring

With the electric circuits of the apparatus, the capacitance and the inductance are controlled so that any energy that could be ignition sources will not be accumulated. However, because the capacitance and the inductance that are generated in wiring cables (intrinsically safe circuit) from the apparatus to the safety barrier differ depending on the installation environment, the user is asked to control and keep them at the allowable value or below.
Wiring should be done so that the following conditions can be satisfied:

Wiring Conditions between EMT1H and Safety Barrier (MTL7787+)

Capacitance (Cc)	: 0.05 μF	or below
Inductance (Lc)	: 2.00 mH	or below
Interconnection resisance	: 10 Ω	or below
Cross-sectional area of wire conductor	: 0.5 to 2.5 mm^2	

* Because it is difficult to execute adjustment of wiring cables after finishing wiring, it is recommended that the actual capacitance and the inductance of the cable to be used should be measured in advance and then start the work after giving a general guide.

⚠ CAUTION	- Execute wiring of cables according to Figure V-(1): Terminal Connection Diagram and, after finishing the work, be sure to check for any wrong wiring. - For wiring cable and pipes, reliable parts should be used. Regarding the wiring, detailed explanation is described in the Reference JNIOSH-TR-44 according to different types of installation environment.

5. Zero point adjustment

The apparatus should be installed in a horizontal posture and then zero point adjustment must be executed.

(1) After checking for any wrong wiring/connection, feed the power and conduct warming up for about 10 minutes.

(2) In case the pipes at the mouth rings of the apparatus are detached both at HIGH and LOW sides to ensure the atmospheric open condition or the calibration valve device is installed, activate the valve to reduce the pressure to be applied to the apparatus to zero (0).

(3) Detach the cover of the apparatus, and rotate the ZERO SET adjuster located inside to set the current to the zero-point output current shown in Table V-(1).

Fig. V-(3) Transmission Output Diagram
(Pressure-Output Signals)

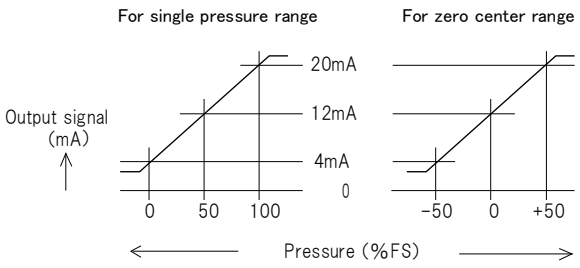
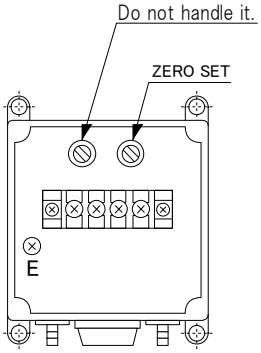


Fig. V-(4) Adjuster Arrangement Diagram



(Caution)
The SPAN SET adjuster has been adjusted in the factory. Do not rotate it.

Table V-(1) Output Signal

	Single pressure range	± range
Zero-point output current	4.0mA DC	12.0mA DC

⚠ CAUTION	- The zero-point adjustment must not be executed under the explosive atmosphere. - After completing the zero-point adjustment, be sure to restore the cover of the apparatus to the original position. The intrinsic safety is not guaranteed with the cover detached.

6. Measurement of pressure and connection of pipes

(1) Measurement of positive pressure

Connect the pipe to the connector (HIGH). The connector (LOW) is subject to atmospheric pressure.

(2) Measurement of negative pressure

Connect the pipe to the connector (LOW). The connector (HIGH) is subject to atmospheric pressure.

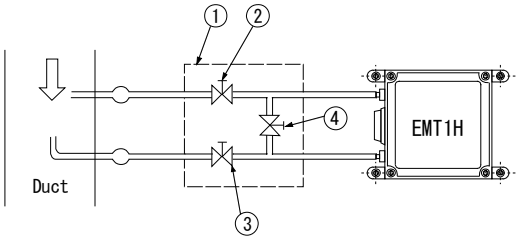
(3) Measurement of differential pressure

Connect the pipe with higher pressure to the connector (HIGH) and the pipe with lower pressure to the connector (LOW).

⚠ CAUTION	When the gauge pressure is measured with a zero-center range instrument, the pipe should be connected to the connector (HIGH) to match the codes (+ and −) of the receiving instrument and the polarity of the inner pressure of pipe. Ensure the pressure at the connector (LOW) to be atmospheric pressure.

7. Precautions regarding pipe

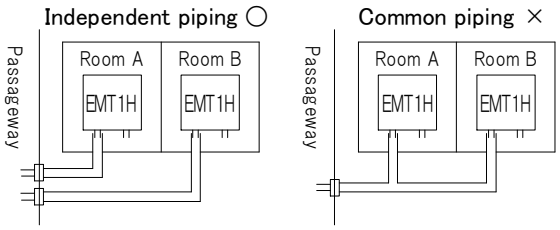
- Before starting the piping work, be sure to read through the Section VII "EMT1H Accessories."
- Considering the maintenance service work, it is recommended to install the calibration valve device as shown in the right-hand figure.



①Calibration valve device
②Static pressure side valve
③Total pressure side valve
④Pressure equalizing valve

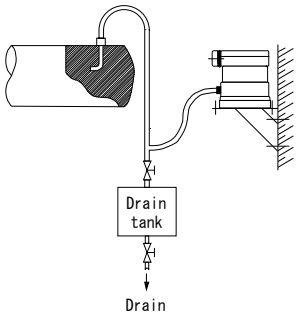
- Prohibition of common piping

The pipes from the pressure detector and the instrument shall be independent pipes for each line as shown in the right-hand figure, and never allow common pipes with neighboring lines. If common pipes are employed, errors will occur because the pressures from the independent lines interfere with each other.



- Prevention of clogging of pipe caused by drainage

Because measurement error for pressure occurs when drainage accumulates in the pipes, the instrument should be installed above the pressure pick-up port of the pressure detector to prevent accumulation of drainage at the sagging part generated on the pipe. If unavoidable, install the drain tank on the way of the pipe as shown in the right-hand figure and execute cleaning on a regular basis. After completing the cleaning work, check that airtightness is ensured.



- Pressure setting of high-temperature gas

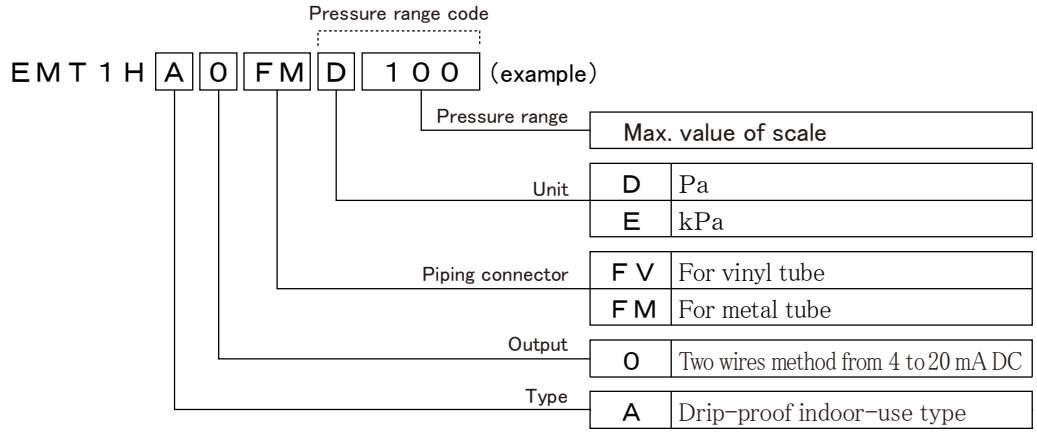
For the pressure setting of high-temperature gas, use a refractory metal (stainless steel pipe, for example) for the pressure detector (pitot tube), and use metal pipes having the length that is required for cooling the high-temperature gas between the detector and the instrument body.

- Error caused by long-distance pipe

If piping of instrument is done for a long distance, the response speed will become slower. Employ thicker pipes on the way as much as possible. In addition, because the pipe resistance differs at the higher-pressure and lower-pressure sides if piping conditions significantly differ for the higher and the lower sides, a time lag in pressure transmission occurs and accurate differential pressure cannot be measured.

VI. Specifications

1. Product code



Pressure range code	Pressure range
D 10	0 ～ 10 Pa
D 15	0 ～ 15 Pa
D 20	0 ～ 20 Pa
D 30	0 ～ 30 Pa
D 50	0 ～ 50 Pa
D 75	0 ～ 75 Pa
D 100	0 ～ 100 Pa
D 150	0 ～ 150 Pa
D 200	0 ～ 200 Pa
D 300	0 ～ 300 Pa
D 500	0 ～ 500 Pa
D 750	0 ～ 750 Pa
D 1000	0 ～ 1000 Pa
E 1	0 ～ 1 kPa
E 2	0 ～ 2 kPa
E 3	0 ～ 3 kPa
E 5	0 ～ 5 kPa
E 10	0 ～ 10 kPa
E 20	0 ～ 20 kPa
E 30	0 ～ 30 kPa
E 50	0 ～ 50 kPa
E 100	0 ～ 100 kPa
D +−10	−10 ～ +10 Pa
D +−20	−20 ～ +20 Pa
D +−30	−30 ～ +30 Pa
D +−50	−50 ～ +50 Pa
D +−100	−100 ～ +100 Pa

2. General specifications

Product name	Micro differential pressure transmitter
Type	EMT1H type
Pressure measurement system	Diffrential pressure type
Atmosphere to be measured	Air and non-corrosive gas (Liquids cannot be measured)
Withstanding pressure of main instrument body	500kPa
Rated voltage	24 V DC ± 10% (Ripple: Within 0.2 V P-P)
Output signal	4 to 20 mA DC (Load resistance: 250 Ω or below)
Withstand voltage	Across terminals and grounding terminal 500 V AC 50/60 Hz, 1 min., 1 mA or below
Operating ambient temperature	0 to 40° C (No freezing) *1
Operating ambient humidity	90% RH or below (No condensing)
Mechanical durability vibration	5 to 10 Hz Amplitude 10mm; 10 to 50 Hz Acceleration 39 m/s^2 (3 axial directions; 2 hours each)
Impact resistance	100 m/s^2 (3 axial directions; 6 times each)
Installation posture	Horizontal (0° ±5°)
Weight	Approx. 1100 g

*1: The operating ambient temperature of the apparatus is 0 to 40° C, which is different from the regular range of operating ambient temperature (-20° C to +40° C) of general electric apparatuses.

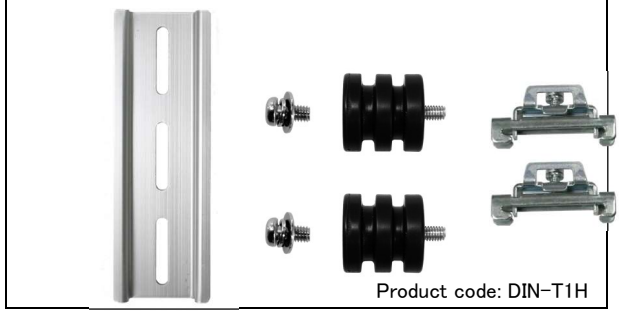
3. Specifications concerning explosion proof

Explosion-proof performance	Intrinsically safe explosion-proof structure (Ex ia IIC T4 Ga)
Applicable guidelines	JNIOSH-TR-46-1:2015 JNIOSH-TR-46-6:2015
Allowable voltage of intrinsically safe circuit (Ui)	28 V
Allowable current of intrinsically safe circuit (Ii)	93 mA
Allowable electric power of intrinsically safe circuit (Pi)	0.65 W
Internal inductance (Li)	Ignorable value
Internal capacitance (Ci)	Ignorable value
Target gas atmosphere	Refer to Table II-(1) "Typical Explosive Gas Groups and Temperature Classes" on page 3.
Maximum surface temperature	135° C
Equipment protection level (EPL)	Ga
Degree of protection	IP20
Hazardous areas where the apparatus can be installed	Special hazardous area *2 Class 1 hazardous area Class 2 hazardous area

*2: In the special hazardous area, robustly prevent generation of sparks that could be the ignition source caused by shocks or friction on the container.

VII. EMT1H ACCESSORIES

DIN Rail Set for Safety Barrier [Optional]

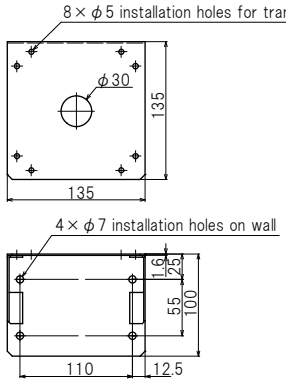


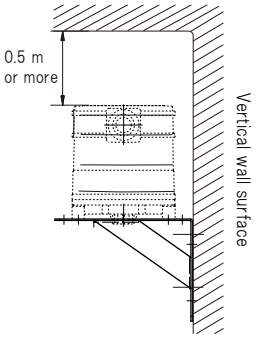
Product code: DIN-T1H

DIN rail mounting image

- Use the DIN rail set to ensure Class A grounding of the accessory safety barrier independently.
- Up to five units of safety barrier can be installed.

Bracket for Installation on Vertical Wall Surface: Made of steel [Optional]





* Mounting screws are not included.

Product code: BRKT-T1GP1

- The apparatus must be installed in a horizontal posture (inclination angle: within ±5°).
- If the installation surface is vertical, use the bracket for installation on vertical wall surface to ensure the horizontal installation.
- A minimum space of 0.5 m must be allowed above the apparatus for the purpose of adjustment and maintenance services.

Accessories for Cable Wiring

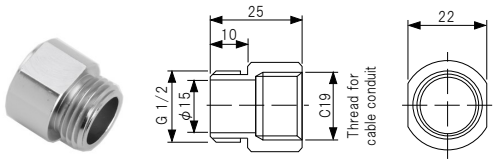
Metal Cable Gland: Made of ZDC and FCD [Optional] 【Non RoHS compliant product】

Product code	Color of Rubber Bush	Matched Outer Diameter of Wire (mm)	
		Min.	Max.
SC4-1T	Gray	3.5	7.0
SC4-2T	Black	6.5	9.0
SC4-3T	Red	8.5	11.0

- When instrumentation cables are used for wiring of the apparatus, use the cable gland shown in the above-stated figure.
- Pay careful attention to the finished outer diameter of the cable to be used and choose the cable of the size that enables the rubber bush to force down and under the outer diameter of cable when the hexagon cap nut is loosened.
- Shielded cable should be used.

Accessories for Conduit Wiring

Adapter for Conduit: Made of brass [Optional]



Product code: ADPA-EMT1

The cable inlet of the apparatus is of the female screw if G1/2. When wiring is made through the thin steel conduit pipe with nominal designation 19 or the flexible metal conduit pipe, use the adapter for conduit shown in the left-hand figure.

VT Type Connector (for vinyl pipe): Made of brass [Standard attachment for vinyl pipe]

Product code: KGAT1VT

The mouth ring designed for vinyl pipe, rubber pipe, urethane pipe, etc. that are installed on ＜EMT1HA0FV Type＞ as the standard part. For the pipe, use the one with internal diameter 6 and wall thickness of 1 mm or over. Note that, if the line pressure is 50 kPa or over, the withstanding-pressure pipe (including vacuum pressure, either) should be chosen.

MT Type Connector (for metal pipe; ring-joint type): Made of brass [Standard attachment for metal pipe]

Product code: KGAT1MT

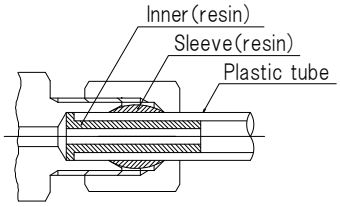
The mouth ring designed for copper pipe, aluminum pipe, etc. that are installed on <EMT1HA0FM Type> as the standard part. Metal pipe having the outer diameter 6 (6 ± 0.1) can be connected. When connecting a plastic pipe (outer diameter 6 x inner diameter 4), detach the brass sleeve and use the optional resin inner sleeve set (XIN6X4). (Fig. VII-(1))

Inner Sleeve Set: Made of polypropylene [Optional]

Product code: XIN6X4

This accessory is necessary when a plastic pipe (outer diameter 6 x inner diameter 4) is connected to the connector for metal pipe. (Fig. VII-(1))

Fig. Ⅶ-(1)



⚠ CAUTION	- Tighten the connector with a force of 1.2N・m. - Be careful that tightening with an excessive force may damage the instrument.

VIII. DISPOSAL

Disposal of the apparatus must be done according to related ordinances, laws, and regulations.
Note that lead-containing solder is used for the apparatus.

IX. REGULAR CALIBRATION

To maintain the service life and reliability of an instrument in general, it is important not to apply any stress caused by external factors to the apparatus. With the apparatus, no special maintenance service is required when it is adequately used according to the operating instructions manual. However, it is recommended to execute the regular calibration once a year. For the regular calibration, contact our distributor or Yamamoto Electric Works Co., Ltd.

X. PRODUCT WARRANTY

Warranty Period
The warranty period shall be for one year from the date that the product has been delivered to the location specified by the purchaser.

Warranty Scope
In the event of any failure or defect in the product or non-conformity of specifications due to the reasons solely attributable to Yamamoto Electric Works, Yamamoto Electric Works shall remedy such malfunctioning or defective product at its own cost in one of the following ways to be selected by Yamamoto Electric Works:
ⅰ) repair such product, ⅱ) replace such product.
However, this Warranty shall not cover the damages or defects that arise due to any of the following reasons.

(1) Any failure resulting from improper conditions, improper environments, improper handling, or improper usage other than described in the instruction manual or the specifications arranged between the purchaser and Yamamoto Electric Works.
(2) Any failure resulting from factors other than a defect of our product, such as the purchaser's equipment or the design of the purchaser's software.
(3) Any failure resulting from modifications or repairs carried out by any person other than Yamamoto Electric Works' staff.
(4) Any failure caused by a factor that cannot be foreseen at a scientific/technical level at the time when the product has been shipped from Yamamoto Electric Works.
(5) Any disaster such as fire, earthquake, and flood, or any other external factor, such as abnormal voltage, for which we are not liable.

Yamamoto Electric Works specifically disclaims all implied warranties of merchantability and/or fitness for a particular use or purpose, as well as liability for incidental, special, indirect, consequential or other damages relating to the product.

*This product warranty is only valid within Japan.

Product Applicability
Our products are designed and manufactured as general-purpose products for general industries. Therefore, our products are not intended for the applications below and are not applicable to them.

(1) Facilities where the product may greatly affect human life or property, such as nuclear power plants, aviation, railroads, ships, motor vehicles, or medical equipment
(2) Public utilities such as electricity, gas, or water services
(3) Usage outdoors, under similar conditions or in similar environments

This document has been translated from the original Japanese version, and the original Japanese version takes first priority. Be sure to refer to the original Japanese for the details of this warranty.

<Note>

The specifications and contents of the product described in the operating instruction manual may subject to change without notice for further improvement.