TY-ZT15-002 A

INSTRUCTION MANUAL

FOR

PRESSURE TRANSMITTER

MODEL ZT15

Indoor installation only

NAGANO KEIKI CO., LTD.

Mar. '99.REV.

MANUAL FOR ACCURATE AND SAFE OPERATION

SAFETY CHAPTER
FOR
DIGITAL PRESSURE GAUGE

To use these devices accurately and safety, carefully read this manual and the operation manual. Incorrect usage may cause malfunction and result in human injury, accidents, etc.
Be sure to keep this manual for reference after reading.

WARNING

1. Do not apply more than the maximum allowable pressure.
   Human injury or damage to surroundings may result due to explosion or breakdown of the pressure elements.

2. Use with the unspecified power supply may cause fire hazard or electric shock.

3. Do not use these devices on measured objects which are corrosive to fluid or gas contacting areas.
   Human injury or damage to surroundings may result due to explosion or breakdown of the pressure elements and exposure of dangerous measured objects.

4. Do not apply excessive weight, vibration or shock.
   Human injury or damage to surroundings may result due to explosion or breakdown of these devices and exposure of dangerous measured objects.

5. This gauge does not have an explosion-proof construction.
   Do not use in dangerous places with flammable gas or fluid liable to cause ignition and explosion.

6. Connect wiring accurately according to the wiring drawings or instructions in the operation manual.
   Incorrect wiring may result in human injury or fire hazard.

7. Use with the instrument temperature range.
   Use outside the instrument temperature range may cause human injury or damage to surroundings due to explosion of breakdown of the devices.

8. If the measured object is oxygen, use devices with anti-oil treatment.
   Standard devices may possibly contain remaining oil, and there is danger of combustion and explosion if oil acts on oxygen.

9. Accurately install these devices according to the installation instructions in the operation manual.

10. Never attempt to reconstruct the main body of devices nor add any new function to the devices, etc. Contact us for repairs.

11. Accurately operate switches according to the operating method described in the operation manual. Incorrect operation may cause malfunction.

12. As this is a precise gauge, keep sources of noise as far away as possible.
    Suppress noise with a noise suppressor, etc. When supplying power to this gauge.

Note : Inform us in advance when using these devices in a way that may result in fatal or serious injury due to malfunction or incorrect operation.

NAGANO KEIKI CO, LTD. Oct. '95

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1. General description

Type ZT15 is a pressure transmitter beamed for semiconductor industries, using semiconductor strain gage technology for its pressure detection. It is a reliable product that can be used for more than one mega bit process line. Its welding structure improves leak efficiency. Furthermore, this product has the following features to keep the reacting atmosphere clean.

(1) The external leaking volume is extremely small.
(2) The dead zone where gas accumulates is very small.
(3) The pressure sensitive part (diaphragm) use Co-Ni alloy, which are extremely corrosion resistant in addition to having high safety and durability levels.
(4) For UC grade products, the internal surface roughness of gas contact has sub-micron flatness. So it has maximum effect for reducing particles.
(5) For BA grade products, the surface roughness is about Ry2.5μm to keep anti-corrosiveness and air tightness. It is an economy type suited for cost reduction for gas piping.

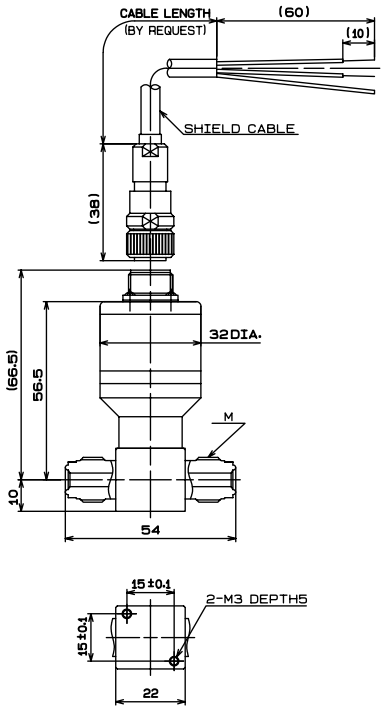
2. Specifications

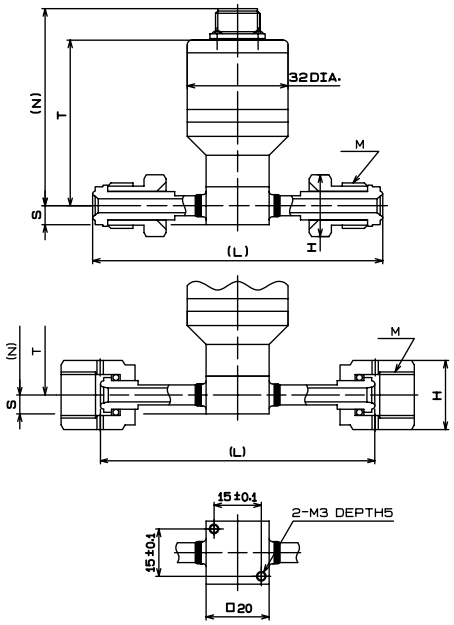
Grade	UC	BA
Connection	1/4",3/8" <UJR,VCR,JSK, CVC >	
Pressure sensor seal method	Welding type	
Surface roughness of gas contact	Less than Ry 0.7 μm	Less than Ry 2.5 μm
Gas contact parts materials	Fitting:SUS316L Pressure sensor :Co-Ni alloy	
Pressure range	0 to 0.3 → 0 to 20MPa -0.1 to 0.3 → -0.1 to 2MPa	
Max. allowable pressure	200% of rated pressure	
Operating temperature range	-20 to 70 ℃	
Storage temperature range	-30 to 80 ℃	
Accuracy	±1.0%F.S.(Standard) ±0.5%F.S.(The range is more than 0.5MPa)	
Temperature coefficient (Both Zero and Span)	±0.1%F.S./℃(Accuracy ±1.0%F.S.) ±0.05%F.S./℃(Accuracy ±0.5%F.S.)	
Power source	24V DC±10%	
Output	4 to 20mA DC	
Load resistance	500Ω max.	
Transmission system	2 wire system(shield cable)	
Construction	Indoor type	
Treatment	Ultra-clean (UC) treatment	Degreasing
Leakage (He leak late)	Less than 5.07 × 10^{-12} Pa・m^3/s	
Particle	Zero count for size 0.1 μm or greater (In our inspection standard)	Not specified
Major use point, manufacturing process	Semiconductor materials gas High purity supply system	Bulk gas supply system Purge, exhaust gas system

3. Drawing

3-1. UC-Grade

T Type



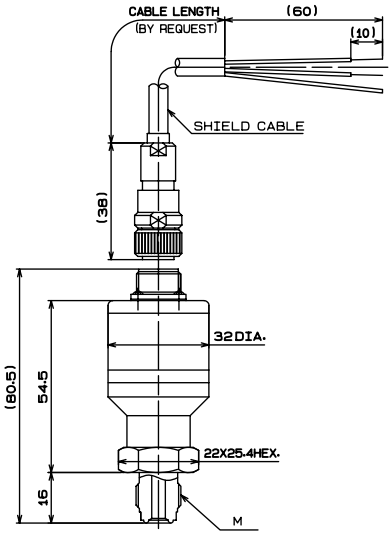


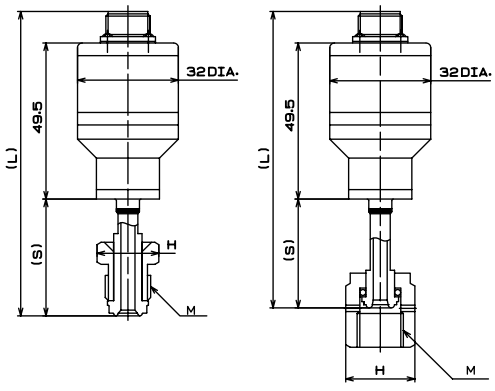
Type No.	JOINT	Piping DIA.
ZT15-136	Compatible with VCR Male	1/4"

Type No.	Joint	Piping DIA.	Size M	Dimentions				
				N	T	S	H	L
ZT15-1E6	Male nut *1 (TOM JOINT)	1/4"	9/16-18UNF	62.5	52.5	6	16X18.5HEX.	90
ZT15-1F6		3/8"	7/8-14UNF	68	58	7	24X27.7HEX.	95
ZT15-1G6	Female nut *1 (SUPER TOMJOINT)	1/4"	9/16-18UNF	62.5	52.5	6	19X21.9HEX.	79
ZT15-1H6		3/8"	7/8-14UNF	68	58	7	27X31.2HEX.	83
ZT15-1J6	VCR Male nut	1/4"	9/16-18UNF	62.5	52.5	6	16X18.5HEX.	86
ZT15-1K6		3/8"	7/8-14UNF	68	58	7	24X27.7HEX.	90.5
ZT15-1L6	*2 VCR Female nut	1/4"	9/16-18UNF	62.5	52.5	6	19X21.9HEX.	80.8
ZT15-1M6		3/8"	7/8-14UNF	68	58	7	27X31.2HEX.	81.8
ZT15-1N6	UJR Male nut	1/4"	9/16-18UNF	62.5	52.5	6	17X19.6HEX.	87
ZT15-1P6		3/8"	7/8-14UNF	68	58	7	23X26.6HEX.	100
ZT15-1Q6	UJR Female nut (with purering)	1/4"	9/16-18UNF	62.5	52.5	6	19X21.9HEX.	87
ZT15-1R6		3/8"	7/8-14UNF	68	58	7	26X30HEX.	100

*1 Compatible with VCR
*2 Bearings are not included.

S Type





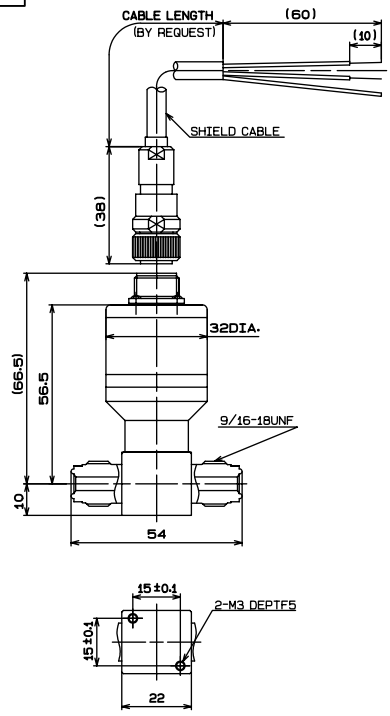
Type No.	JOINT	Piping DIA.
ZT15-136	Compatible with VCR Male	1/4"

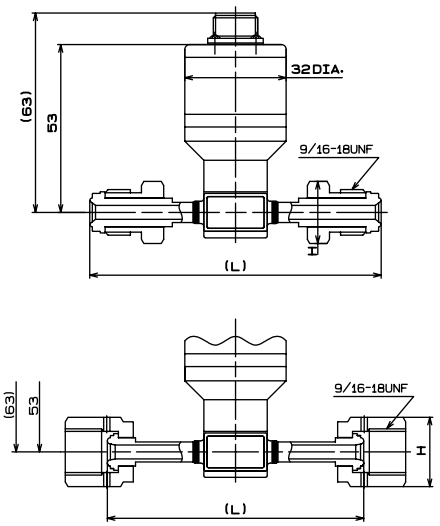
Type No.	Joint	Piping DIA.	Size M	Dimensions		
				L	H	S
ZT15-2E6	Male nut *1 (TOM JOINT)	1/4"	9/16-18UNF	90	16X18.5HEX.	30.5
ZT15-2G6	Female nut *1 (SUPER TOMJOINT)	1/4"	9/16-18UNF	90	19X21.9HEX.	30.5
ZT15-2J6	VCR Male nut	1/4"	9/16-18UNF	93.5	16X18.5HEX.	34
ZT15-2L6	*2 VCR Female nut	1/4"	9/16-18UNF	90.9	19X21.9HEX.	31.4
ZT15-2N6	UJR Male nut	1/4"	9/16-18UNF	96.5	17X19.6HEX.	37
ZT15-2Q6	UJR Female nut (with pureing)	1/4"	9/16-18UNF	94	19X21.9HEX.	34.5

*1 Compatible with VCR
*2 Bearings are not included.

3. Drawing
3-2. BA-Grade

T Type



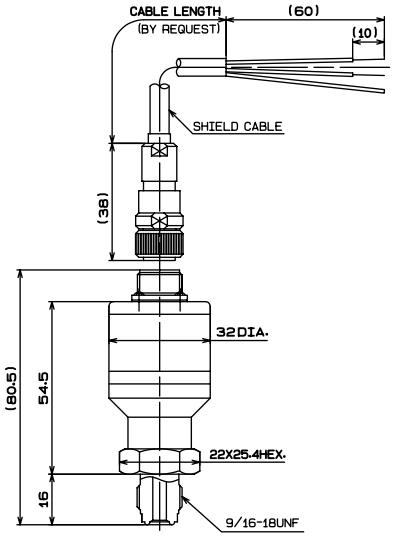


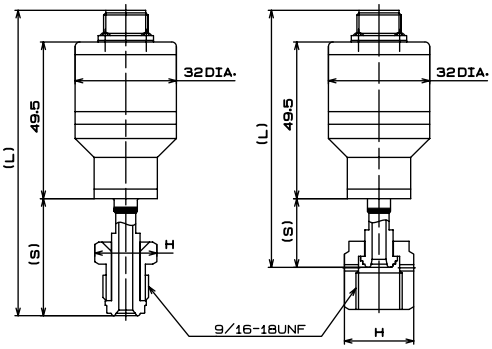
Type No.	JOINT	Piping DIA.
ZT15-13N	Compatible with VCR Male	1/4"

Type No.	Joint	Piping DIA.	Size M	Dimentions H	Dimentions L
ZT15-1EN	Male nut *1 (TOM JOINT)	1/4"	9/16-18UNF	16X18.5HEX.	90
ZT15-1GN	Female nut *1 (SUPER TOM JOINT)	1/4"	9/16-18UNF	19X21.9HEX.	79
ZT15-1JN	VCR Male nut	1/4"	9/16-18UNF	16X18.5HEX.	86
ZT15-1LN	*2 VCR Female nut	1/4"	9/16-18UNF	19X21.9HEX.	80.8
ZT15-1NN	UJR Male nut	1/4"	9/16-18UNF	17X19.6HEX.	92
ZT15-1QN	*3 UJR Female nut	1/4"	9/16-18UNF	19X21.9HEX.	81

*1 Compatible with VCR
*2 Bearings are not included.
*3 Pureings are not included.

S Type





Type No.	JOINT	Piping DIA.
ZT15-23N	Compatible with VCR Male	1/4"

Type No.	Joint	Piping DIA.	Size M	Dimensions L	Dimensions H	Dimensions S
ZT15-2EN	Male nut *1 (TOM JOINT)	1/4"	9/16-18UNF	90	16X18.5HEX.	30.5
ZT15-2GN	Female nut *1 (SUPER TOM JOINT)	1/4"	9/16-18UNF	90	19X21.9HEX.	30.5
ZT15-2JN	VCR Male nut	1/4"	9/16-18UNF	93.5	16X18.5HEX.	34
ZT15-2LN	*2 VCR Female nut	1/4"	9/16-18UNF	81.3	19X21.9HEX.	21.8
ZT15-2NN	UJR Male nut	1/4"	9/16-18UNF	96.5	17X19.6HEX.	37
ZT15-2QN	*3 UJR Female nut	1/4"	9/16-18UNF	81.2	19X21.9HEX.	21.7

*1 Compatible with VCR
*2 Bearings are not included.
*3 Purerings are not included.

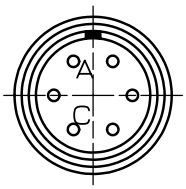
4. Wiring / Example of external connection

4-1. Wiring

4 - 20 mA DC output (2 wire system)

Connector: A (red) +24 VDC

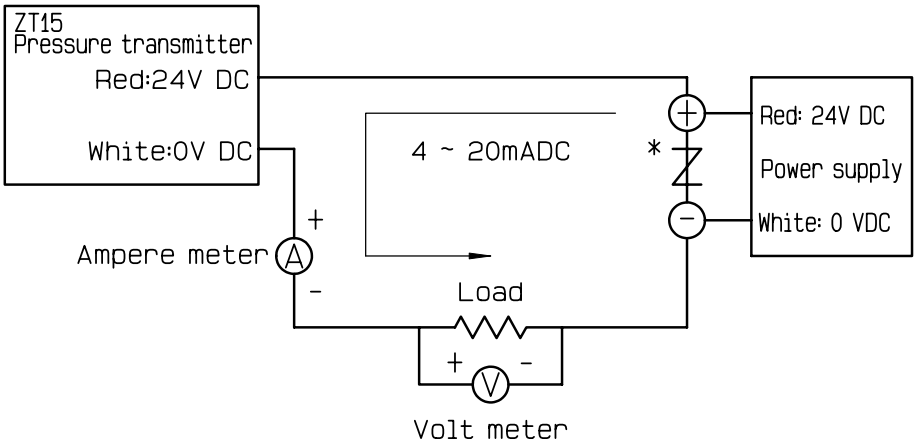
Connector: C (white) 0 VDC



Connector

4-2. Example of external connection

Two wire system 4 to 20mA DC output (current output)

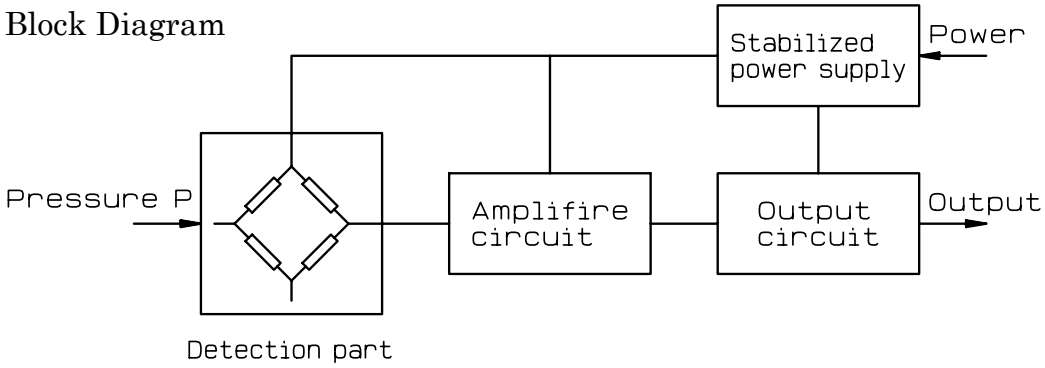


* We recommend use of varistor, etc. to avoid surge voltage from other equipment which connects same power supply.

5. Operating principles

This transmitter has a diaphragm that converts pressure to strain and picks up the strain with semiconductor strain gages on the diaphragm. Its pick up circuit uses full bridge system that has strain gages at four sides of the bridge. Full bridge circuit can get larger output and better linearity than the other circuits. The bridge circuit obtains an electrical signal in proportion to the strain, and transmit it as a direct current output.

Block Diagram



6. Installation

6-1. Precautions for installation

(1) Please unpack in a clean space just before the piping. Do not expose as much as possible.

(2) Take care not to touch or breathe on the gas contact parts.

(3) Model ZT15 pressure transmitter is designed for union connection such as UJR, VCR, JSK and CVC. Do not fail to use the specified gaskets for connection. When installing the unit on the pressure line, do not tighten the case with a pipe wrench, etc. Do not fail use the hexagonal part of the connecting joint or the rectangular (hexagonal) part of the body when installing...

6-2.Precautions for handling

(1) This is a finely adjusted instrument. It may become unusable if dropped or if it is subjected to extreme vibration.

(2) Do not use unreasonable force or bend the leads extending from the unit.

(3) Do not snoop test the sensor because it may deteriorate insulation resistance.

(4) A thorough inert gas purge is recommended before putting the unit into practical use to remove atmospheric components, particles and other foreign matter from inside the pipe.

(5) After using the unit for corrosive gas, do not fail to purge it with nitrogen gas, etc. before removing the unit. If it is removed and left as it is with corrosive gas inside, the water content and oxygen in the air will generate strong acid and alkaline substances, which accelerate corrosion of the internal parts of the unit.

(6) Do not increase pressure above the level indicated on the ZT15 label.

6-3.Precautions for storage

Store in a dry place no vibration and no dust, etc.

7. Operation

(1) Please check wiring connection before turning on the power switch.

(2) Before start operation, warm up approximately five minutes.

8. Maintenance

8-1.Maintenance

Type ZT pressure transmitter has no movable parts in the detector. It requires almost no maintenance labor. However, depending on operating condition, it requires proper maintenance. Generally, we recommend a periodical inspection twice a year. Refer following check list for periodical inspection.

<Checklist for periodical inspection>

- External appearance.
- Insulation between each terminal and case.(50V DC max.)
- Leak test for connecting screws, etc.
- Check output using a reference pressure gauge.

8-2.Adjustment

Adjustment is done with the connector removed.

(1) Zero Adjustment

Turn zero point adjust trimmer with a minus driver.

(2) Span adjustment

The pressure reference device is needed for the span adjustment.

The procedure of the span adjustment is as follows:

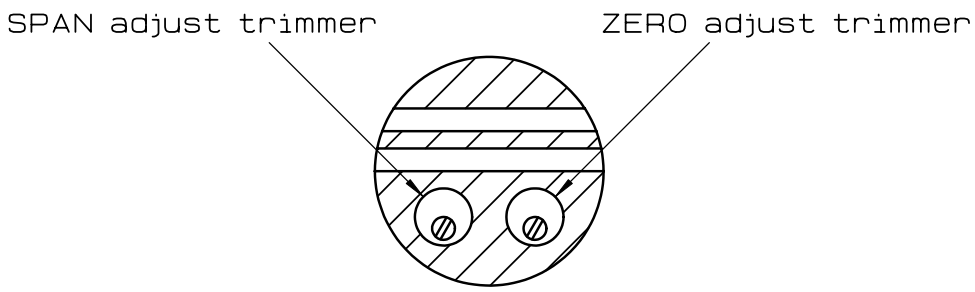
Note: The zero point shifts as the span adjustment trimmer is turned.

① Adjust the zero output to the 4mA DC with the air released (no pressure applied).

② Adjust the output to the 20mA DC using the span adjustment trimmer with the maximum pressure applied.

③ Adjust the span by repeating ① and ② for a few times.

④ Refer to the figure below for the position of each trimmer.



Top view circuit board

8-3.About the influence by the noise

Noise problems are generally complex. These are difficult to solve theoretically, or can get only incomplete solutions. If the measured value appears to fluctuate or indicates unreasonable value, it may be caused by noise. If the noise comes from power supply line, identify the source noise and provide suitable measures at the source itself. It is the most effective way for line noise. If noise occurs constantly, a noise filter is also effective. It is important to try connecting the transducer to another power source. The noise may come from signal lines through external induction. In this case, it is important to provide suitable measures such as moving the noise source far away, changing direction, and providing magnetic or electrostatic shield. These measuring are also effective for surging.

9. Other information

This manual cannot cover all details of the instrument or all other variations; Nor does it aim to explain all details of installation, maintenance and all other subjects. If you need more information, please feel free to contact us.