AT9000 Advanced Transmitter SuperAce

Flange Type JTC Series Differential Pressure Transmitter

JTC9□□S/W Models

Overview

The AT9000 Advanced Transmitter is a smart transmitter which features a built-in microprocessor and outstanding stability.

It is capable of measuring pressure, liquid levels, etc., outputting a 4 to 20 mA DC analog signal corresponding to the measured pressure.

This flange type differential pressure transmitter is mounted on the flange on the side of a tank, and is appropriate for measuring the liquid level, boundary surface level, or specific gravity in the tank.

Features

(1) Outstanding long-term stability
- Achieves an extremely high level of stability: zero point drift of ±0.2 % in 10 years.

(2) Outstanding usability
- Zero adjustment can be performed without removing the cover.

(3) A wide variety of functions
- Using a communicator, historical information regarding excessive pressure, abnormal temperature, etc., can be checked.

Product Usage Precautions

- This product is intended for the general industrial market.

- This product is not subject to the regulations pursuant to the Chinese electronic information product pollution control laws. However, if the product is used with semiconductor manufacturing equipment, special-purpose equipment for electronic devices, etc., it may in some cases be necessary to include documents and to mark the product in accordance with Chinese electronic information product pollution control laws. If necessary, please indicate this in advance to our sales department.

Specifications

Measuring span/setting range/working pressure range:
See Table 1.

Output signal:
Analog output: 4 to 20 mA DC

Communications: SFN, HART®
HART® Version: 5

Supply voltage/load resistance:
DC 12.5 to 45 V DC
For communication with a communicator, load resistance of at least 250 Ω is required between loops. Regarding supply voltage and load resistance, see Figure 1.

Sealed liquid:
Silicone oil (regular type), fluorine oil (for oxygen or chlorine use)

Waterproof/dustproof structure: IP66/IP67

Ambient temperature range:
- Normal operating range:
  For general-purpose use: -30 to +75 °C
  For general-purpose use (with indicators): -25 to +80 °C
  For oxygen or chlorine use: -10 to +75 °C
- Operative limit range:
  For general-purpose use: -50 to +80 °C
  For general-purpose use (with indicators): -40 to +80 °C
  Regular type, For oxygen or chlorine use (with indicators): -30 to +80 °C
- TIIS special explosion-proof model:
  -20 to +60 °C (without indicators)
  -20 to +55 °C (with indicators)

Wetted part temperature range:
- Normal operating range:
  For general-purpose use: -40 to +110 °C
  For oxygen or chlorine use: -20 to +75 °C
- Operative limit range:
  For general-purpose use: -50 to +115 °C
  For oxygen or chlorine use: -40 to +80 °C
- TIIS special explosion-proof model: -20 to +110 °C

Transport and storage temperature range:
Without indicators: -50 to +85 °C
With indicators: -25 to +80 °C

Ambient humidity limits: 5 to 100 % RH

Supply voltage/voltage characteristics: ±0.005 % FS/V

EMC regulation compliance: EN 61326-1:2013
IEC 61326-2-3
Lightning protection characteristics (surge immunity test, IEC 61000-4-5)
Line-to-line (S+, S-): ±1 kV
Line-to-ground (S+, S-): ±2 kV
Waveform: 1.2/50 (8/20) μs

Response time: 150 ms or less (at ambient temperature 23 ± 2 °C)

Long-term stability (zero point): ±0.2 %/10 years
Drift under standard operating conditions (23 ± 2 °C, atmospheric pressure)

Damping time constant: Settable to 10 levels in range 0 to 32 s
(HART® communication protocol can be set in range 0 to 128 s)

Output saturation point:
High limit: 21.6 mA
Low limit: 3.6 mA

Vibration characteristics:
Amplitude: 1.5 mm / frequency: 5 to 9 Hz
Acceleration: 4.9 m/s^2 (0.5 G) / 9 to 200 Hz

Shock characteristics: acceleration 9.8 m/s^2 (1 G)

Process pipe connection:
- Measured pressure (liquid level) side:
  Flange flush diaphragm type:
  JIS 10K, 20K, 30K, 63K-40A,50A, 80A (RF) equivalent, ANSI 150, 300, 600-1.5 inches, 2 inches, 3 inches (RF) equivalent, JPI 150, 300, 600-1.5 inches, 2 inches, 3 inches (RF) equivalent
  Extended flange type:
  JIS 10K, 20K, 30K-50A, 80A, 100A (RF) equivalent, ANSI 150, 300-2 inches, 3 inches, 4 inches (RF) equivalent, JPI 150, 300-2 inches, 3 inches, 4 inches (RF) equivalent
- Standard pressure:
  Rc1/2 internal thread, Rc1/4 internal thread, 1/2 NTP internal thread, 1/4 NPT internal thread, open to the atmosphere

Table 1. Measuring Span/Setting Range/Working Pressure Range

Model No.	Measuring Span	Setting Range	Working Pressure Range
JTC929☐	2.5 to 100 kPa	-100 to +100 kPa	Up to flange rating (for negative pressure, see Figures 2 and 3; for flange ratings, see "Maximum Working Pressure Table")
JTC940☐	70 to 3500 kPa	-100 to +3500 kPa	

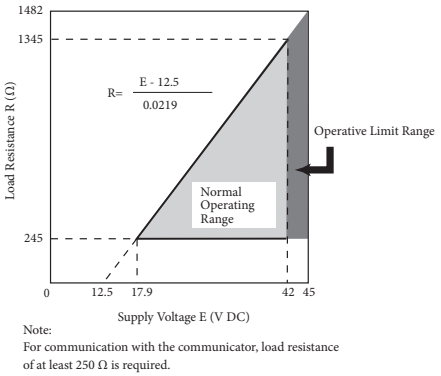


Figure 1. Supply Voltage and Load Resistance Characteristics

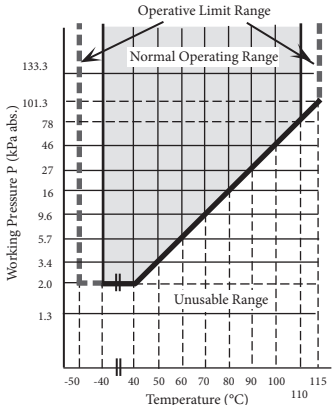


Figure 2. Wetted Parts Working Pressure and Temperature (General Purpose)

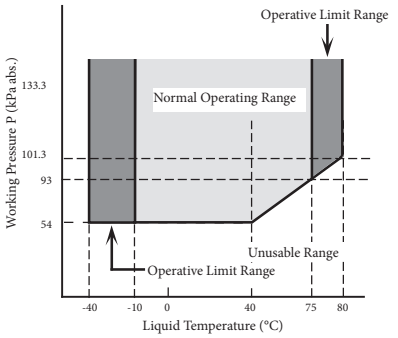


Figure 3. Wetted Parts Working Pressure and Temperature (for Oxygen/Chlorine)

Using the Flange Type Transmitter Correctly

To take full advantage of the capabilities of this flange type transmitter, please read the following accuracy-related stipulations and important notes.

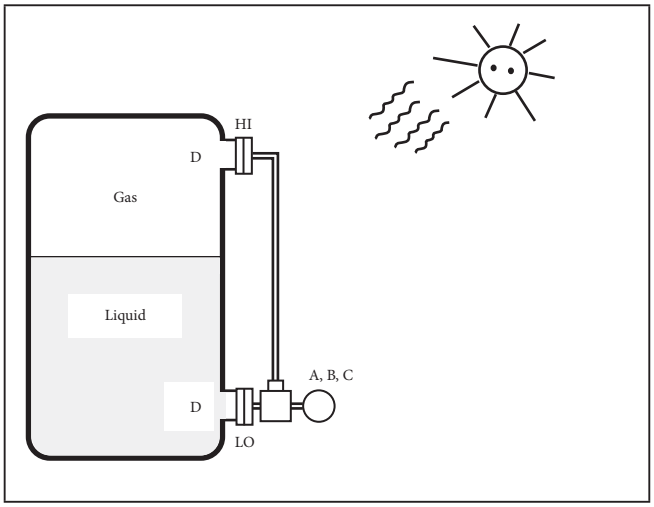
A. Standard accuracy
Shows linearity at a constant ambient temperature and a constant static pressure (For details, see pages 7–9.)

B. Ambient temperature characteristics
Shows accuracy at a constant static pressure as ambient temperature varies. (For details, see pages 7–9.)

C. Static pressure characteristics
Shows accuracy at a constant ambient temperature as static pressure varies. (For details, see pages 7–9.)

D. Wetted part temperature characteristics
Shows the combined shift when the temperature difference between the process contact liquid of the upper flange portion (gas side) and the lower flange portion (liquid side) has varied.
Also shows the combined shift when the upper flange portion open to the atmosphere and the temperature difference between the ambient temperature and the process contact liquid has varied.

Note: Please take the above into consideration for level measurement applications in which the temperature of a reaction furnace or other process changes. However, even if a difference arises in the process temperature, any discrepancies can be canceled out by performing a zero adjustment when the difference arises.



Flange type	Unspecified	
Sealed liquid	Unspecified	
Process Wetted Material	SUS316/SUS316L	ASTM B575 (hastelloy C-276 equivalent), tantalum
Wetted temperature characteristics (combined shift for setting range)	$\pm(\frac{60}{55}\times\frac{\Delta T}{\chi})$ %	$\pm(\frac{75}{55}\times\frac{\Delta T}{\chi})$ %

χ: the upper range value (URV) or lower range value (LRV) of the calibration range, or the maximum value (kPa) of the span.
L: flange length (mm) (for a flush diaphragm flange, L = 0 mm)
ΔT: the temperature difference between the ambient temperature of the flange part and the ambient temperature of the body

Applied flange standard (with year):
JIS: JIS B 2220 (2004)
ANSI: ANSI B16.5 (1988)
JPI: JPI-7S-15-93

Electrical conduit connection: G 1/2 internal thread,
1/2 NPT internal thread,
M20 internal thread

Case material
Main unit: SUS316
Transmitter: aluminum alloy

Process wetted material:
Meter Case cover: SCS14A (SUS316 equivalent)
Adapter flange (optional): SCS14A (SUS316 equivalent)
Wetted part of main unit: SUS316 (diaphragm-only SUS316L), alloy C-276, tantalum, SUS316L
Vents and plugs: SUS316
Gaskets for wetted part: FEP
Flange material: SUS304, SCS14A (SUS316 equivalent), PVC

Bolt and nut material (for meter Case cover fastening):
carbon steel (SNB7), SUS304, SUS630

Finish:
Standard corrosion prevention: baked acrylic resin coating finish
Corrosion-proof finish: urethane baked finish
Standard color: Case cover: Azbil Bold 2.5R 2.25/5, silver N-8.2
Case: silver N-8.2
Silver: Case cover: silver N-8.2
Case: silver N-8.2

Built-in indicators: Digital LCD indicators (optional)
Engineering unit scale display compatible
Can be set to any value in the range -19999 to +19999 (4.5 digits). Specify the following when issuing engineering unit scale commands.
- Meter calibration range
- Engineering unit scale
- Proportional or square root display

All data setting operations are performed from the communicator.

Failure mode: The following can be selected
Upscale: 21.6 mA (110 %) or higher
Downscale: 3.6mA (-2.5 %) or lower

Grounding: D class (resistance: lower than 100 ohms)

Mass: approx. 5.9 kg (for JIS 10K-80A)
For JTC9☐☐W, +1.0 kg

Explosion-proof Structure

TIIS special explosion-proof model (Ex d IIC T4)
Note:
Use cables with the maximum allowable temperature shown below.
JTC9☐☐S: 65 °C (with indicators)
70 °C (without indicators)
JTC9☐☐W: 60 °C (with indicators)
65 °C (without indicators)

Options

External zero adjustment function:
On-site zero adjustment of the transmitter can be performed using the included magnetic bar.
Note: Be sure to use this in conjunction with the indicators.

Long vent drain:
Maintenance, process conditions, and safety are addressed by using a drain whose length (60 mm) is longer than the standard length (27 mm).

Elbow:
An adapter for changing the orientation of the electrical conduit connection port from horizontal to vertical in order to fit the on-site wiring conditions. Either one or two can be selected as necessary.

High-grade moisture-free finish (including oil-free finish):
Shipped with water content and oil content removed from the wetted part. (A small amount of fluorine oil is applied to vent/drain plugs in order to prevent sticking.)

Moisture-free finish (incl. oil-free finish):
Shipped with water content and oil content removed from the wetted part (including the vent/drain plugs).

Oil-free finish:
Shipped with oil content removed from the wetted part. (A small amount of fluorine oil is applied to vent/drain plugs in order to prevent sticking.)

FEP protective film:
Used to prevent deformation of a diaphragm due to slurry fluid and adhered fluid, or when there is an aversion to metal ions from the diaphragm, as in, for example, the semiconductor industry.
Operating temperature range: 0 to 110 °C
Working pressure range: atmospheric pressure - flange rating (up to JIS 10K, ANSI 150, JPI 150)
(cannot use at negative pressure)

Electric power specification:
Applicable in cases in which particularly strict quality control is required, as in the electric power and gas industries.
Stability tests under high static pressure, confirmation tests of differential pressure gauge input-output characteristics under high-speed static pressure variation, and the like are performed.

Special failure mode (3.2 mA):
Safe failure output values (low limit) during abnormal conditions will be 3.2 mA (-5 %) or lower.

Variable output saturation point: can be set within the following range:
12 mA (50 %) ≤ output high limit ≤ 21.6 mA (110 %)
3.6mA (-2.5 %) ≤ output low limit ≤ 12mA (50 %)

Notes: Regarding the HART® communication protocol
1. Option J8: When "Special failure mode 3.2 mA" is selected, 3.2 mA (-5 %) ≤ output lower limit < 12 mA (50 %).
2. Option J8: When "Special failure mode 3.2 mA" is not selected, 3.8mA (-1.25 %) ≤ output lower limit < 12 mA (50 %).

Test report:
Shows the results of having tested the appearance, input output characteristics, insulation resistance, dielectric strength, etc., of the transmitter.

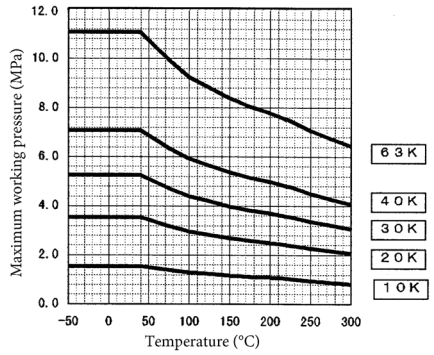
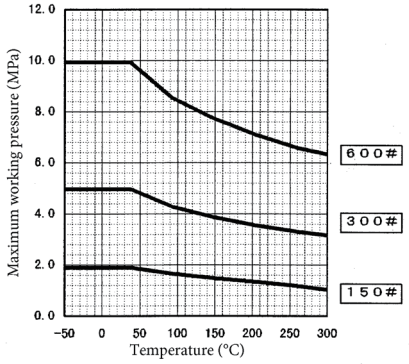
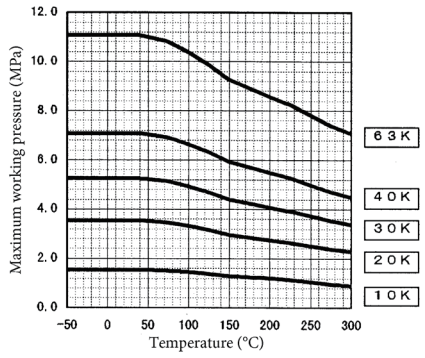
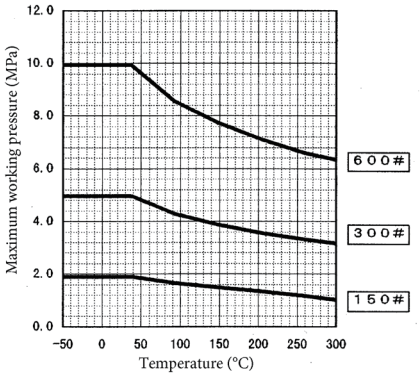
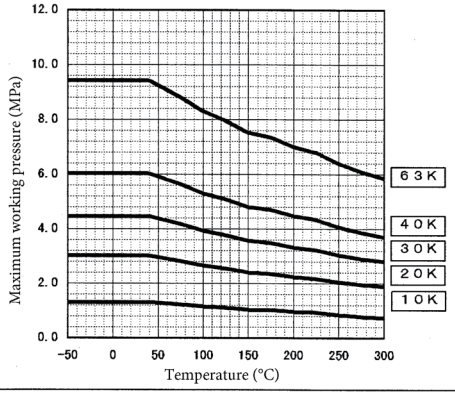
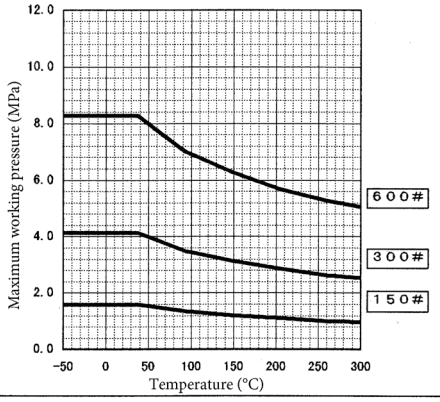
Mill sheet:
Shows data related to the chemical composition, heat treatment condition, and mechanical properties of the wetted part material.

Strength calculation sheet:
Shows the results of having calculated the strength of the meter Case cover, flanges, and bolts.

Withstand pressure and air tight test (general-purpose use):
Shows the results of the wetted part withstand pressure test (water pressure: 10 minutes) and air tight test (N_2: 10 minutes).

Test report (with traceability certificate):
Comprised of three documents: a traceability diagram, a calibration certificate, and a test report.

Maximum Working Pressure

	JIS	JPI and ANSI
SUS304		
SUS316		
SUS316L		

Notes
- Maximum working pressure based on flange rating, flange material, and working temperature is as shown above.
- Maximum working pressure of GTX60F is the lower of 3.5 MPa and the value in the graph.

Product Usage Precautions

Bear in mind the following points when using the product in order to take full advantage of its capabilities. Also be sure to read the operating instructions for the product before use.

Installation Precautions

⚠ Warning

- When installing the product, make sure that the gaskets do not stick out at the connections with the process (connections between adapter flanges and connecting pipes and flanges). There is a danger that the measured fluid will leak out and cause scalding and other harmful health effects. If the measured fluid is harmful to the human body, take safety measures such as wearing goggles or a mask so that it does not contact the skin or the eyes, become inhaled, etc.
- Use this product within the limits of the described usage conditions (explosion proofing, pressure rating, temperature, humidity, voltage, vibration, shock, installation orientation, ambient atmosphere, and the like). There is a danger of scalding and other harmful health effects as a result of instrument failure, fire, etc.
- When working in a hazardous area, perform installation and deployment according to the construction methods prescribed by the hazard guidelines.
  In addition, with the TIIS flameproof model, for flameproof packing cable wiring system, be sure to use flameproof cable glands certified by this company.

⚠ Caution

- After installing this product, do not use it as a scaffold, place your body weight on it, etc. Doing so may cause damage to the product.
- Be careful not to strike the glass portion of the display with tools, etc. The glass can become damaged, and injuries can occur.
- As this product is extremely heavy, when installing it exercise care regarding scaffolding, and be sure to wear safety shoes.
- This product is a precision instrument. Be sure to avoid subjecting it to shock. Shock may damage the product.

Wiring Precautions

⚠ Warning

- Do not perform wiring work, turn on the electricity, etc., when your hands are wet. There is a risk of electric shock.

⚠ Caution

- Be sure to thoroughly check the specifications to ensure that the wiring is carried out correctly. Incorrect wiring can cause instrument damage or malfunctions.
- Supply power correctly based on the specifications. Inputting an incorrect power supply can damage the instrument.
- Use a power supply for this product which has overcurrent protection capability.

Usage Precautions for HART® Devices

- If operation using a secondary host (HART® Communicator, etc.) is necessary, set the communication interval of the primary host (distributed control system, device management system, etc.) to 8 seconds or longer, or terminate communication from the primary host before using the secondary host. If the primary host repeats HART® communication before 8 seconds have elapsed, the secondary host may not receive the request (i.e., may not be able to communicate).
- If, as a result of the effects of electrical noise in the installation environment, HART® communication with the host is not possible, take countermeasures such as distancing the signal cable from the noise sources, re-evaluating the grounding conditions, and changing the signal cable to a shielded cable. However, even if HART® communication is not possible due to noise, control by the 4 to 20 mA analog signal will not be affected.
- When using this product in multidrop mode, there is a limit to the number of units which can be used. If using multidrop, please consult our representative for more details.

Performance Specifications

The performance specifications (accuracy/temperature characteristics/static pressure characteristics) show the absolute values of the lower range value (LRV)*1 and upper range value (URV)*2 of the calibration range, as well as the maximum value χ in the span. The value relative to the span is as follows.
(Span-related value) = (χ-related value) × (χ) / (span)

JTC929□ (Flange Side Wetted Part Material: SUS316, SUS316L)

Accuracy	Linear output:	±0.15 % $\pm(0.05 + 0.1\times\frac{12.5}{\chi})$ %	(χ ≥ 12.5 kPa) (χ < 12.5 kPa)
Temperature characteristics (shift from set range) 55 °C change	Combined shift: (incl. zero/span shift)	±1.45 % $\pm(0.35 + 1.1\times\frac{12.5}{\chi})$ %	(χ ≥ 12.5 kPa) (χ < 12.5 kPa)
Static pressure characteristics (shift from set range) 70 kPa change	Zero shift:	$\pm(0.03 + 0.64\times\frac{25}{\chi})$ %	(χ: kPa)
	Combined shift: (incl. zero/span shift)	±0.97 % $\pm(0.03 + 0.94\times\frac{25}{\chi})$ %	(χ ≥ 25 kPa) (χ < 25 kPa)

JTC929□ Diaphragm Thickness 0.1 mm (Optional)

Accuracy	Linear output:	±0.8 % $\pm(0.15 + 0.3\times\frac{12.5}{\chi})$ %	(χ ≥ 12.5 kPa) (χ < 12.5 kPa)
Temperature characteristics 30 °C change	Combined shift: (incl. zero/span shift)	$\pm(0.6 + 5.4\times\frac{25}{\chi})$ %	(χ: kPa)
Static pressure characteristics	Zero shift:	$\pm(0.64 + 2.64\times\frac{25}{\chi})$ %	(χ: kPa)
	Combined shift: (incl. zero/span shift)	$\pm(1.17 + 2.0\times\frac{25}{\chi})$ % $\pm(0.23 + 2.94\times\frac{25}{\chi})$ %	(χ ≥ 25 kPa) (χ < 25 kPa)

JTC929□ (Flange Side Wetted Part Material: Alloy C-276, Tantalum)

Accuracy	Linear output:	±0.4 % $\pm(0.25 + 0.15\times\frac{12.5}{\chi})$ %	(χ ≥ 12.5 kPa) (χ < 12.5 kPa)
Temperature characteristics (shift from set range) 30 °C change (-5 to +55 °C range)	Combined shift: (incl. zero/span shift)	$\pm(0.6 + 2.4\times\frac{25}{\chi})$ %	(χ: kPa)
Static pressure characteristics (shift from set range) 70 kPa change	Zero shift:	$\pm(0.03 + 1.64\times\frac{25}{\chi})$ %	(χ: kPa)
	Combined shift: (incl. zero/span shift)	$\pm(1.07 + 1.0\times\frac{25}{\chi})$ % $\pm(0.13 + 1.94\times\frac{25}{\chi})$ %	(χ ≥ 25 kPa) (χ < 25 kPa)

JTC940□ (Flange Side Wetted Part Material: SUS316, SUS316L)

Accuracy *3	Linear output:	±0.1 % $\pm(0.05 + 0.05\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)
Temperature characteristics (shift from set range) *3 55 °C change	Combined shift: (incl. zero/span shift)	±0.75 % $\pm(0.35 + 0.4\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)
Static pressure characteristics (shift from set range) *3	Zero shift:	$\pm(0.03 + 7.5\times\frac{350}{\chi})$ %	(χ: kPa)
7 MPa change	Combined shift: (incl. zero/span shift)	±9.00 % $\pm(1.5 + 7.5\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)

Notes: *1: URV is the measured value when 100 % (20 mA DC) is output.
*2: LRV is the measured value when 0 % (4 mA DC) is output.
*3: Range is URV ≥ 0, LRV ≥ 0

JTC940□ Diaphragm Thickness 0.1 mm (Optional)

Accuracy *3	Linear output:	±0.6 % $\pm(0.3 + 0.3\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)
Temperature characteristics *3 30 °C change (-5 to +55 °C range)	Combined shift: (incl. zero/span shift)	$\pm(0.35 + 2.6\times\frac{350}{\chi})$ %	(χ: kPa)
Static pressure characteristics	Zero shift:	$\pm(0.03 + 9.5\times\frac{350}{\chi})$ %	(χ: kPa)
	Combined shift: (incl. zero/span shift)	±9.00 % $\pm(1.5 + 7.5\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)

JTC940□ (Flange Side Wetted Part Material: Alloy C-276, Tantalum)

Accuracy *3	Linear output:	±0.2 % $\pm(0.1 + 0.1\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)
Temperature characteristics (shift from set range) *3 30 °C change (-5 to +55 °C range)	Combined shift: (incl. zero/span shift)	$\pm(0.35 + 0.65\times\frac{350}{\chi})$ %	(χ: kPa)
Static pressure characteristics (shift from set range) *3 7 MPa change	Zero shift:	$\pm(0.03 + 8.5\times\frac{350}{\chi})$ %	(χ: kPa)
	Combined shift: (incl. zero/span shift)	±9.00 % $\pm(1.5 + 7.5\times\frac{350}{\chi})$ %	(χ ≥ 350 kPa) (χ < 350 kPa)

Notes: *1: URV is the measured value when 100 % (20 mA DC) is output.
*2: LRV is the measured value when 0 % (4 mA DC) is output.
*3: Range is URV ≥ 0, LRV ≥ 0

FEP Protective Film Usage Performance Specifications*

JTC929□

Accuracy	Linear output:	±(body accuracy + 3) %	(χ ≥ 12.5 kPa)
		±(body accuracy + $3\times\frac{12.5}{\chi}$) %	(χ < 12.5 kPa)
Temperature characteristics (shift from set range) 30 °C change	Zero shift:	±(body temperature characteristics + 2.2) %	(χ ≥ 12.5 kPa)
		±(body temperature characteristics + $2.2\times\frac{12.5}{\chi}$) %	(χ < 12.5 kPa)
	Combined shift: (incl. zero/span shift)	±(body temperature characteristics + 3) %	(χ ≥ 12.5 kPa)
		±(body temperature characteristics + $3\times\frac{12.5}{\chi}$) %	(χ < 12.5 kPa)
Static pressure characteristics (shift from set range) 7 MPa change	Zero shift:	±(body static pressure characteristics + 2.2) %	(χ ≥ 12.5 kPa)
		±(body static pressure characteristics + $2.2\times\frac{12.5}{\chi}$) %	(χ < 12.5 kPa)
	Combined shift: (incl. zero/span shift)	±(body static pressure characteristics + 3) %	(χ ≥ 12.5 kPa)
		±(body static pressure characteristics + $3\times\frac{12.5}{\chi}$) %	(χ < 12.5 kPa)

JTC940□

Accuracy**	Linear output:	±(body accuracy + 2) %	(χ ≥ 350 kPa)
		±(body accuracy + $2\times\frac{350}{\chi}$) %	(χ < 350 kPa)
Temperature characteristics **3 (shift from set range) 30 °C change	Zero shift:	±(body temperature characteristics + 1.5) %	(χ ≥ 350 kPa)
		±(body temperature characteristics + $1.5\times\frac{350}{\chi}$) %	(χ < 350 kPa)
	Combined shift: (incl. zero/span shift)	±(body temperature characteristics + 2) %	(χ ≥ 350 kPa)
		±(body temperature characteristics + $2\times\frac{350}{\chi}$) %	(χ < 350 kPa)
Static pressure characteristics **3 (shift from set range) 7 MPa change	Zero shift:	±(body static pressure characteristics +1.5) %	(χ ≥ 350 kPa)
		±(body static pressure characteristics + $1.5\times\frac{350}{\chi}$) %	(χ < 350 kPa)
	Combined shift: (incl. zero/span shift)	±(body static pressure characteristics +2) %	(χ ≥ 350 kPa)
		±(body static pressure characteristics + $2\times\frac{350}{\chi}$) %	(χ < 350 kPa)

Note: For body performance specifications (accuracy, temperature characteristics, and static pressure characteristics), see pp. 7-8.
*These are reference specifications, dependent upon protective film installation conditions, usage date, etc.
**Range is URV ≥ 0, LRV ≥ 0

Model Number Configuration Table

Standard Flange Type 3 inches (80A)

Basic Model No. — Selections — Additional Selections — Options

Measuring Span	2.5 to 100 kPa	JTC929S	
		JTC929W (with external terminal box)	
	70 to 3500 kPa	JTC940S	
		JTC940W (with external terminal box)	

Output/ communication format	4 to 20 mA DC (standard)	1
	Digital output (DE protocol) Note 1	3
	4 to 20 mA DC (HART* communication)	5

	Meter body cover	Vent/drain plugs	Flange side wetted part	Reference side process wetted material	
Process Wetted Material	SCS14A	SUS316	SUS316	SUS316	E
	SCS14A	SUS316	Alloy C-276	SUS316	F
	SCS14A	SUS316	Tantalum	SUS316	H
	SCS14A	SUS316	SUS316L	SUS316	L

Sealed liquid	Regular type (silicone oil)	1
	For oxygen service (fluorine oil)	2
	For chlorine service (fluorine oil) Note 2	5

Process connection (standard pressure)	Rc 1/2, process upper portion	A
	Rc 1/2, process lower portion	B
	1/2 NPT internal thread, process upper portion	F
	1/2 NPT internal thread, process lower portion	G
	Rc 1/4, process upper portion	L
	Rc 1/4, process lower portion	M
	1/4 NPT internal thread, process upper portion	R
	1/4 NPT internal thread, process lower portion	S
	Open to the atmosphere	W

Flange Standard	JIS10K	A
	JIS20K	C
	JIS30K	D
	JIS63K Note 3	F
	ANSI150	G
	ANSI300	H
	ANSI600 Note 3	J
	JPI150	N
	JPI300	P
	JPI600 Note 3	Q

Flange Size	3 inches/80A	2
Flange Type	Standard	1

Flange material / bolt and nut material	SUS304 / carbon steel	D
	SUS304 / SUS304	E
	SUS304 / SUS630	F
	SUS316 / carbon steel	G
	SUS316 / SUS304	H
	SUS316 / SUS630	J
	SUS316L / carbon steel	K
	SUS316L / SUS304	L
	SUS316L / SUS630	M

X X	No options	
A 2	External zero adjustment	Note 4
A 5	Long vent drain	
B 7	For mounting a high load resistance smart meter	
G 1	Elbow x 1 (left)	
G 2	Elbow x 1 (right)	
G 3	Elbow x 2	
G 6	Adapter for dual diaphragm	Note 5
D 1	Moisture-free (incl. oil-free) finish	
E 6	Moisture-free (incl. oil-free) finish, high-grade	
D 2	Oil-free finish	
D 3	FEP protecting film	Note 3
E 4	Diaphragm thickness: 0.1 mm	Note 6
J 2	Electric power specification	
J 8	Special failure mode (3.2 mA)	
K 9	Variable output saturation point	
T 1	Test report	
T 2	Mill sheet	
T 5	Strength calculation sheet	
T 6	Withstand pressure and air tight test (general-purpose use)	
T 8	Test report (with traceability certificate)	
□□	Other	

X	Electrical connection / explosion-proof	G 1/2, water-tight
2		G 1/2, TIIS special explosion-proof model with 1 cable gland attached
3		G 1/2, TIIS special explosion-proof model with 2 cable glands attached
A		1/2 NPT, non-explosion-proof

X	Indicators	None
1		Digital meter linear scale (0 to 100 %)
2		Digital meter engineering unit scale

X	Corrosion-resistant finish	Standard corrosion-proofing
B		Heavy corrosion-proofing
C		Silver paint (standard corrosion-proofing)
D		Silver paint (heavy corrosion-proofing)

X	Flange processing	None (standard: JIS Ra3.2 (12.5 s))

X	Failure mode	None
U		Upscale
D		Downscale

Note 1: Cannot be combined with Failure mode "None,"variable output saturation point, or external zero adjustment.
Note 2: For flange side wetted part, only "tantalum" can be selected.
Note 3: Cannot be used with adapter for dual diaphragm.
Note 4: Be sure to select indicators.
Note 5: Select model number of adapter for dual diaphragm (see p. 14).
Note 6: For flange side wetted part, only "SUS316, SUS316L" can be selected. Cannot be used with sealed liquid "for chlorine" or adapter for dual diaphragm.

Standard Flange Type 2 inches (50A), 1.5 inches (40A)

Basic Model No. | Selections | Additional Selections | Options

Measuring Span	2.5 to 100 kPa	JTC929S	
		JTC929W (with external terminal box)	
	70 to 3500 kPa	JTC940S	
		JTC940W (with external terminal box)	

Output/ communication format	4 to 20 mA DC (standard)	1
	Digital output (DE protocol) Note 1	3
	4 to 20 mA DC (HART* communication)	5

	Meter body cover	Vent/drain plugs	Flange side wetted part	Reference side process wetted material	
Process Wetted Material	SCS14A	SUS316	SUS316	SUS316	E
	SCS14A	SUS316	Alloy C-276	SUS316	F
	SCS14A	SUS316	Tantalum	SUS316	H
	SCS14A	SUS316	SUS316L	SUS316	L

Sealed liquid	Regular type (silicone oil)	1
	For oxygen service (fluorine oil)	2
	Process connection (standard pressure) Note 2	5

Process connection (standard pressure)	Rc 1/2, process upper portion	A
	Rc 1/2, process lower portion	B
	1/2 NPT internal thread, process upper portion	F
	1/2 NPT internal thread, process lower portion	G
	Rc 1/4, process upper portion	L
	Rc 1/4, process lower portion	M
	1/4 NPT internal thread, process upper portion	R
	1/4 NPT internal thread, process lower portion	S
	Opening to the atmosphere	W

Flange Standard	JIS10K	A
	JIS20K	C
	JIS30K	D
	JIS63K Note 3	F
	ANSI150	G
	ANSI300	H
	ANSI600 Note 3	J
	JPI150	N
	JPI300	P
	JPI600 Note 3	Q

Flange Size	2 inches / 50A	3
	1.5 inches / 40A Note 3	4

Flange Type	Standard	1

Flange material / bolt and nut material	SUS304 / carbon steel	D
	SUS304 / SUS304	E
	SUS304 / SUS630	F
	SUS316 / carbon steel	G
	SUS316 / SUS304	H
	SUS316 / SUS630	J
	SUS316L / carbon steel	K
	SUS316L / SUS304	L
	SUS316L / SUS630	M

X	Electrical connection / explosion-proof	G 1/2, water-tight
2		G 1/2, TIIS special explosion-proof model with 1 cable gland attached
3		G 1/2, TIIS special explosion-proof model with 2 cable glands attached
A		1/2 NPT, non-explosion-proof

X	Indicators	None
1		Digital meter linear scale (0 to 100 %)
2		Digital meter engineering unit scale

X	Corrosion-resistant finish	Standard corrosion-proofing
B		Heavy corrosion-proofing
C		Silver paint (standard corrosion-proofing)
D		Silver paint (heavy corrosion-proofing)

X	Flange processing	None (standard: JIS Ra3.2 (12.5 s))

X	Failure mode	None
U		Upscale
D		Downscale

X X	No options
A 2	External zero adjustment Note 4
A 5	Long vent drain
B 7	For mounting a high load resistance smart meter
G 1	Elbow x 1 (left)
G 2	Elbow x 1 (right)
G 3	Elbow x 2
G 6	Adapter for dual diaphragm Note 5
D 1	Moisture-free (incl. oil-free) finish
E 6	Moisture-free (incl. oil-free) finish, high-grade
D 2	Oil-free finish
D 3	FEP protecting film Note 6
J 2	Electric power specification
J 8	Special failure mode (3.2 mA)
K 9	Variable output saturation point
T 1	Test report
T 2	Mill sheet
T 5	Strength calculation sheet
T 6	Withstand pressure and air tight test (general-purpose use)
T 8	Test report (with traceability certificate)
□□	Other

Note 1: Cannot be combined with Failure mode "None," variable output saturation point, or external zero adjustment.
Note 2: For flange side wetted part, only "tantalum" can be selected.
Note 3: Cannot be used with adapter for dual diaphragm.
Note 4: Be sure to select indicators.
Note 5: Select model number of adapter for dual diaphragm (see p. 14).
Note 6: For flange side wetted part, only "SUS316, SUS316L" can be selected. Cannot be used with sealed liquid "for chlorine" or adapter for dual diaphragm.

Protruding Flange Type 4 inches (100A)

Basic Model No. — Selections — Additional Selections — Options

Measuring Span	2.5 to 100 kPa	JTC929S	
		JTC929W (with external terminal box)	
	70 to 3500 kPa	JTC940S	
		JTC940W (with external terminal box)	

Output/ communication format	4 to 20 mA DC (standard)	1
	Digital output (DE protocol) Note 1	3
	4 to 20 mA DC (HART® communication)	5

	Meter body cover	Vent/drain plugs	Flange side wetted part	Reference side process wetted material	
Process Wetted Material	SCS14A	SUS316	SUS316	SUS316	E
	SCS14A	SUS316	SUS316L	SUS316	L

Sealed liquid	Regular type (silicone oil)	1
	For oxygen service (fluorine oil)	2

Process connection (standard pressure)	Rc 1/2, process upper portion	A
	Rc 1/2, process lower portion	B
	1/2 NPT internal thread, process upper portion	F
	1/2 NPT internal thread, process lower portion	G
	Rc 1/4, process upper portion	L
	Rc 1/4, process lower portion	M
	1/4 NPT internal thread, process upper portion	R
	1/4 NPT internal thread, process lower portion	S
	Open to the atmosphere	W

Flange Standard	JIS10K	A
	JIS20K	C
	JIS30K	D
	ANSI150	G
	ANSI300	H
	JPI150	N
	JPI300	P

Flange Size	4 inches / 100 A	1

Flange Type	Extension length: 50 mm	2
	Extension length: 100 mm	3
	Extension length: 150 mm	4
	Extension length: 200 mm	5
	Extension length: 250 mm	6
	Extension length: 300 mm	7

Flange material / cover flange clamping bolt and nut material	SUS304 / carbon steel	D
	SUS304 / SUS304	E
	SUS304 / SUS630	F
	SUS316 / carbon steel	G
	SUS316 / SUS304	H
	SUS316 / SUS630	J
	SUS316L / carbon steel	K
	SUS316L / SUS304	L
	SUS316L / SUS630	M

Note 1: Cannot be combined with Failure mode "None," variable output saturation point, or external zero adjustment.
Note 2: Be sure to select indicators.

X	Electrical connection / explosion-proof	G 1/2, water-tight
2		G 1/2, TIIS special explosion-proof model with 1 cable gland attached
3		G 1/2, TIIS special explosion-proof model with 2 cable glands attached
A		1/2 NPT, non-explosion-proof

X	Indicators	None
1		Digital meter linear scale (0 to 100 %)
2		Digital meter engineering unit scale

X	Corrosion-resistant finish	Standard corrosion-proofing
B		Heavy corrosion-proofing
C		Silver paint (standard corrosion-proofing)
D		Silver paint (heavy corrosion-proofing)

X	Flange processing	None (standard: JISRa3.2 (12.5 s))

X	Failure mode	None
U		Upscale
D		Downscale

X X	No options
A 2	External zero adjustment Note 2
A 5	Long vent drain
B 7	For mounting a high load resistance smart meter
G 1	Elbow x 1 (left)
G 2	Elbow x 1 (right)
D 1	Moisture-free (incl. oil-free) finish
E 6	Moisture-free (incl. oil-free) finish, high-grade
D 2	Oil-free finish
E 4	Diaphragm thickness: 0.1 mm
J 2	Electric power specification
J 8	Special failure mode (3.2 mA)
K 9	Variable output saturation point
T 1	Test report
T 2	Mill sheet
T 5	Strength calculation sheet
T 6	Withstand pressure and air tight test (general-purpose use)
T 8	Test report (with traceability certificate)
□□	Other

Protruding Flange Type 3 inches (80A), 2 inches (50A)

Basic Model No. — Selections — Additional Selections — Options

Measuring Span	2.5 to 100 kPa	JTC929S	
		JTC929W (with external terminal box)	
	70 to 3500 kPa	JTC940S	
		JTC940W (with external terminal box)	

Output/ communication format	4 to 20 mA DC (standard)	1
	Digital output (DE protocol) Note 1	3
	4 to 20 mA DC (HART® communication)	5

	Meter body cover	Vent/drain plugs	Flange side wetted part	Reference side process wetted material	
Process Wetted Material	SCS14A	SUS316	SUS316	SUS316	E
	SCS14A	SUS316	SUS316L	SUS316	L

Sealed liquid	Regular type (silicone oil)	1
	For oxygen service (fluorine oil)	2

Process connection (standard pressure)	Rc 1/2, process upper portion	A
	Rc 1/2, process lower portion	B
	1/2 NPT internal thread, process upper portion	F
	1/2 NPT internal thread, process lower portion	G
	Rc 1/4, process upper portion	L
	Rc 1/4, process lower portion	M
	1/4 NPT internal thread, process upper portion	R
	1/4 NPT internal thread, process lower portion	S
	Opening to the atmosphere	W

Flange Standard	JIS10K	A
	JIS20K	C
	JIS30K	D
	ANSI150	G
	ANSI300	H
	JPI150	N
	JPI300	P

Flange Size	3 inches / 80 A	2
	2 inches / 50 A	3

Flange Type	Extension length: 50 mm	2
	Extension length: 100 mm	3
	Extension length: 150 mm	4

Flange material / bolt and nut material	SUS304 / carbon steel	D
	SUS304 / SUS304	E
	SUS304 / SUS630	F
	SUS316 / carbon steel	G
	SUS316 / SUS304	H
	SUS316 / SUS630	J
	SUS316L / carbon steel	K
	SUS316L / SUS304	L
	SUS316L / SUS630	M

Note 1: Cannot be combined with Failure mode "None," variable output saturation point, and external zero adjustment.

Note 2: Be sure to select indicators.

X	Electrical connection / explosion-proof	G 1/2, water-tight
2		G 1/2, TIIS special explosion-proof model with 1 cable gland attached
3		G 1/2, TIIS special explosion-proof model with 2 cable glands attached
A		1/2 NPT, non-explosion-proof

X	Indicators	None
1		Digital meter linear scale (0 to 100 %)
2		Digital meter engineering unit scale

X	Corrosion-resistant finish	Standard corrosion-proofing
B		Heavy corrosion-proofing
C		Silver paint (standard corrosion-proofing)
D		Silver paint (heavy corrosion-proofing)

X	Flange processing	None (standard: JISRa3.2 (12.5 s))

X	Failure mode	None
U		Upscale
D		Downscale

X X	No options
A 2	External zero adjustment Note 2
A 5	Long vent drain
B 7	For mounting a high load resistance smart meter
G 1	Elbow x 1 (left)
G 2	Elbow x 1 (right)
G 3	Elbow x 2
D 1	Moisture-free (incl. oil-free) finish
E 6	Moisture-free (incl. oil-free) finish, high-grade
D 2	Oil-free finish
J 2	Electric power specification
J 8	Special failure mode (3.2 mA)
K 9	Variable output saturation point
T 1	Test report
T 2	Mill sheet
T 5	Strength calculation sheet
T 6	Withstand pressure and air tight test (general-purpose use)
T 8	Test report (with traceability certificate)
□□	Other

JTC929□/JTC940□ Adapter for Dual Diaphragm Models

Basic Model No. - Selections - Options

Basic Model No.		
Basic Model No.	Adapter for dual diaphragms (existing installation compatible version)	H H

Selections

Body model	JTC (with one adapter)	C
Process Wetted Material	SUS316 (diaphragm: SUS316L)	2
	Tantalum	4
	Alloy C-276 Note 2	H
	SUS316L	8
Sealed liquid	Regular type (silicone oil)	1
	For oxygen service (fluorine oil)	2
	For chlorine service (fluorine oil)	5
Flange Standard	JIS 10K	A
	JIS 20K	C
	JIS 30K	D
	ANSI 150	G
	ANSI 300	H
	JPI 150	N
	JPI 300	P
Flange Size	3 inches / 80A	2
	2 inches / 50A	3
Flange Type	Standard (flange type)	1
Flange processing	Standard	X

Options

	No options	XX
Note 1	Water/oil-free finish	D1
Note 1	Oil-free finish	D2
Note 1	Mill sheet	T2
Note 1	Document for high-pressure gas regulation	T3
Note 1	Over load pressure test	T7

Note 1: When selecting this model type, be sure to select the product with the same model number.

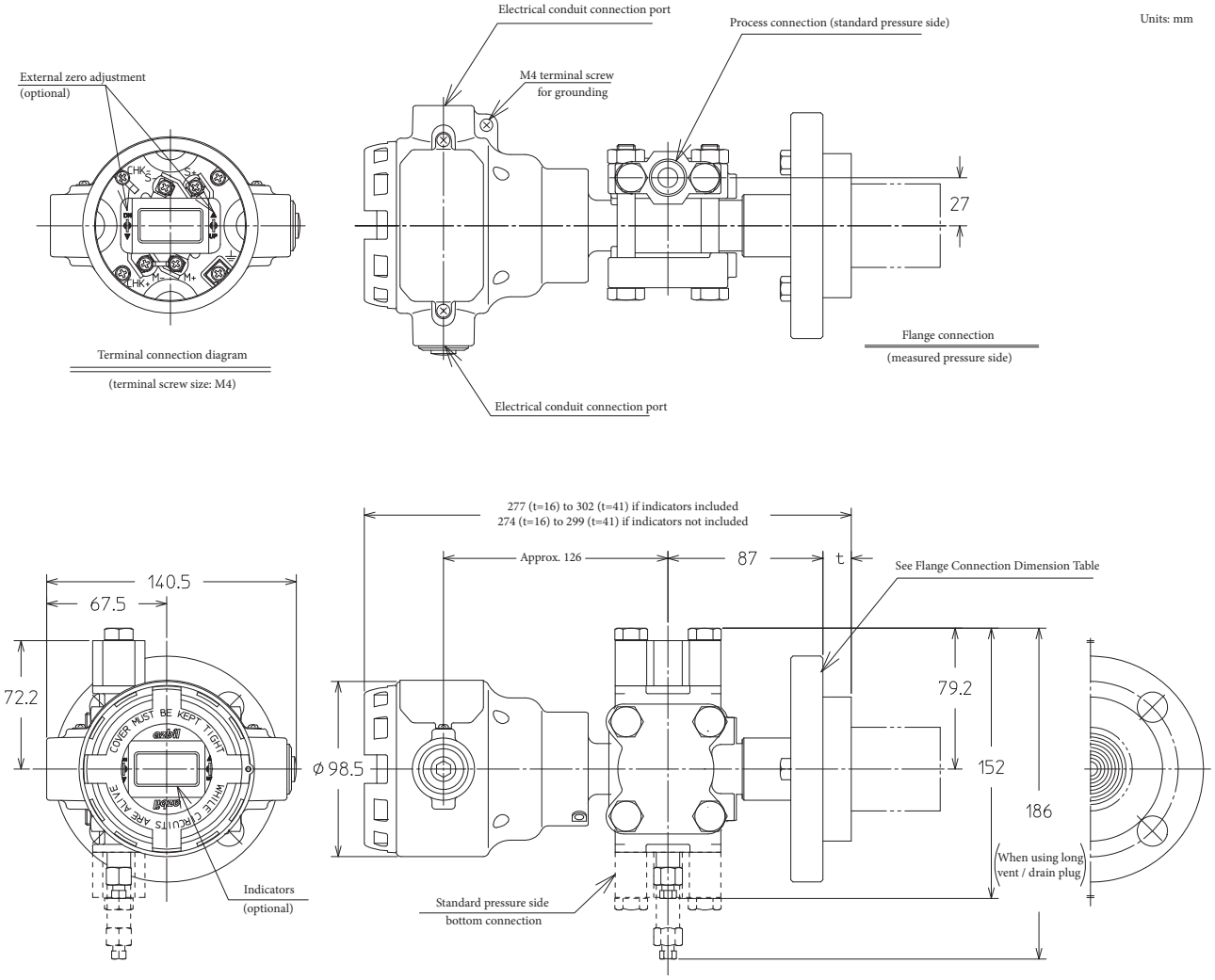
Note 2: Alloy C-276 is 3B only.

Dimensions

JTC929S/940S

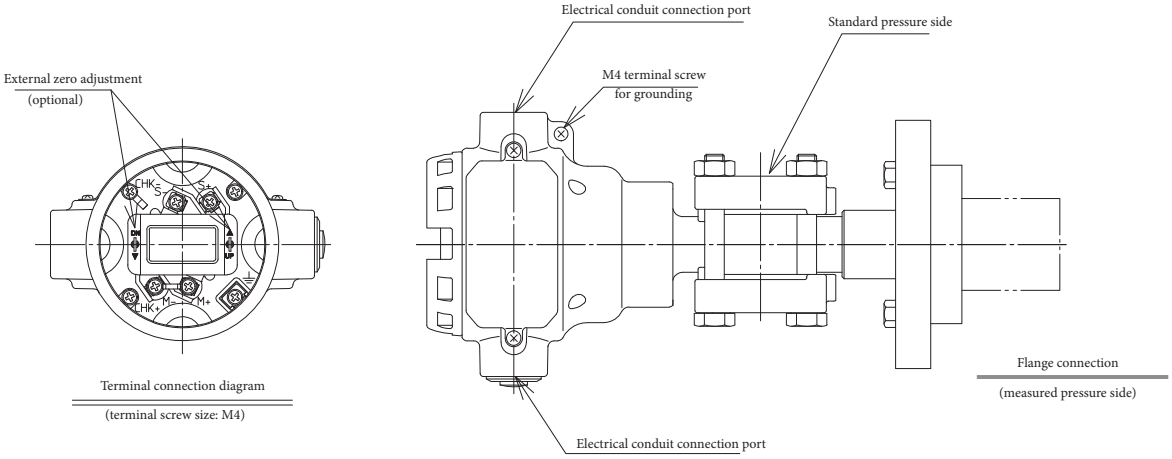
Standard Pressure Side: Upper/Lower Connection

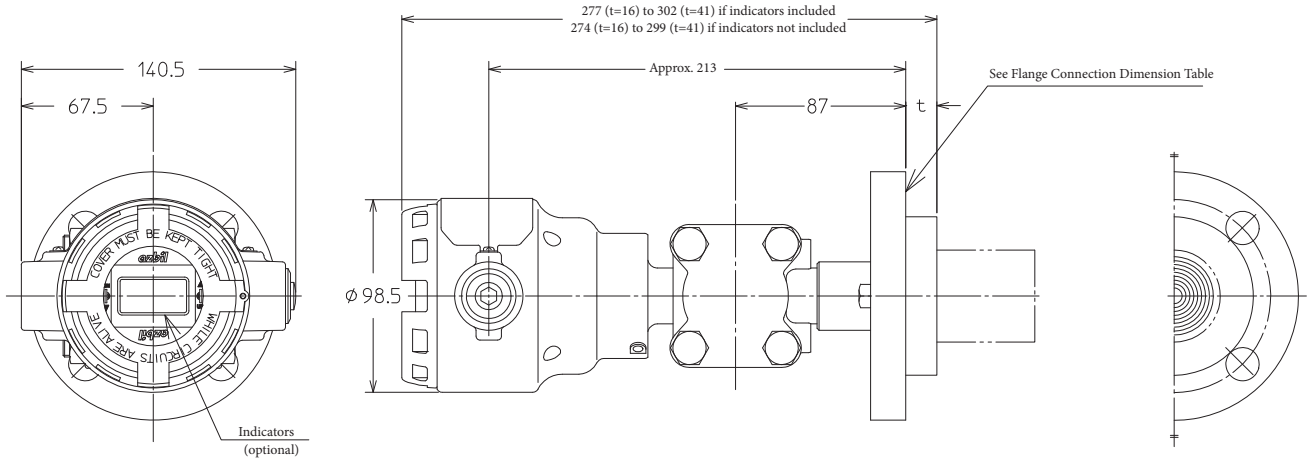
Units: mm

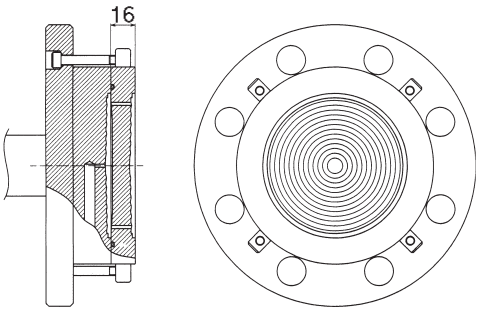


Standard Pressure Side: Open to Atmosphere

Units: mm



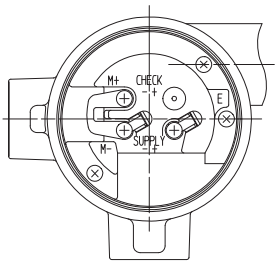




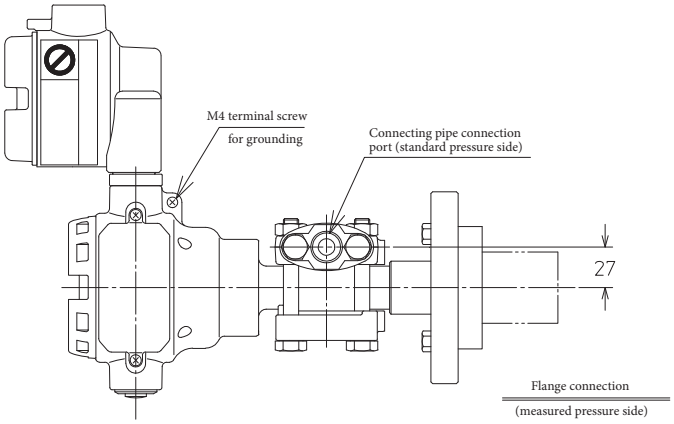
Dual diaphragms

JTC929W/940W
Standard Pressure Side: Upper/Lower Connection

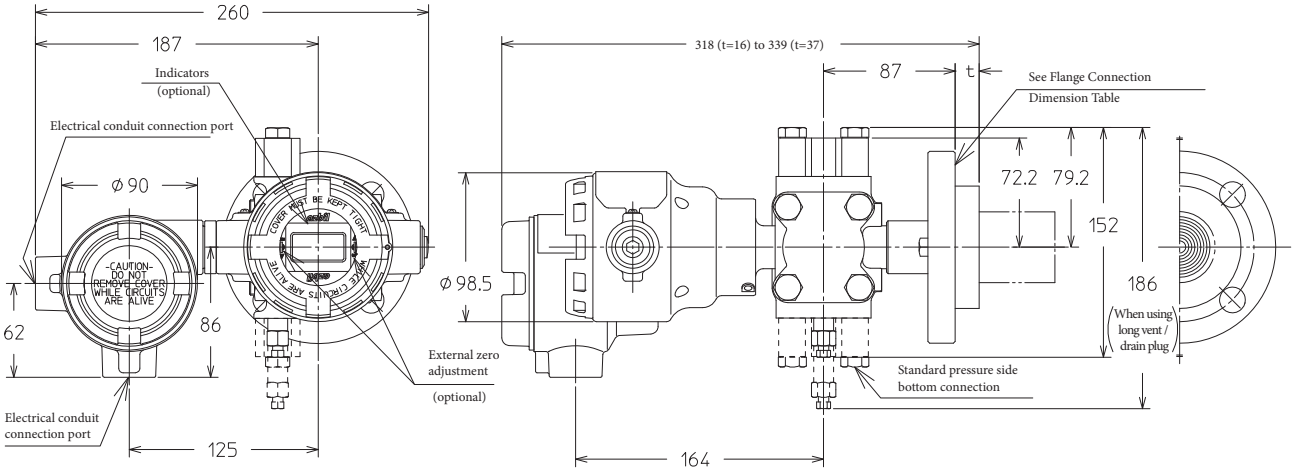
Units: mm



Terminal connection diagram
(terminal screw size: M4)

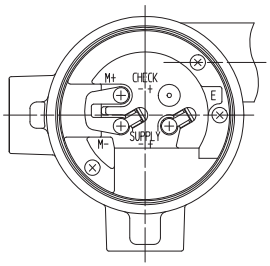


Flange connection
(measured pressure side)

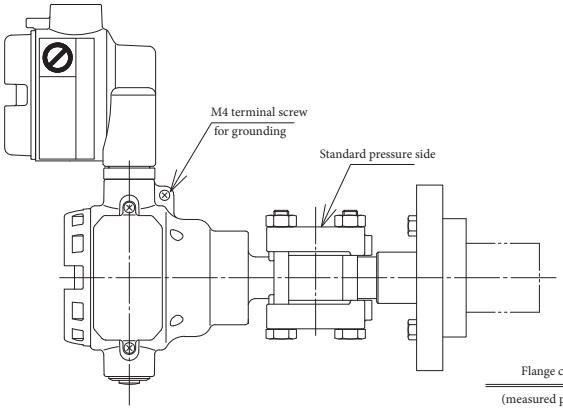


Standard Pressure Side: Open to Atmosphere

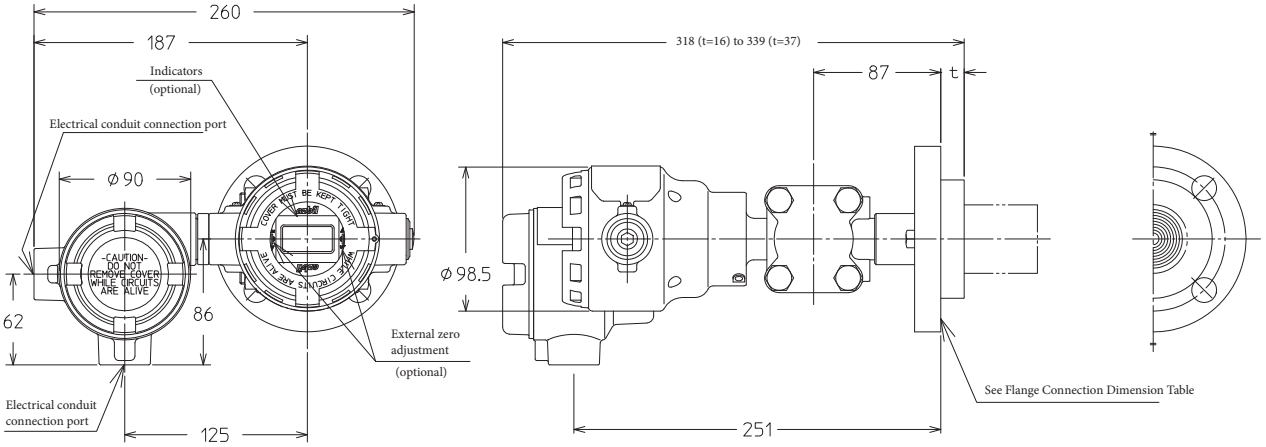
Units: mm

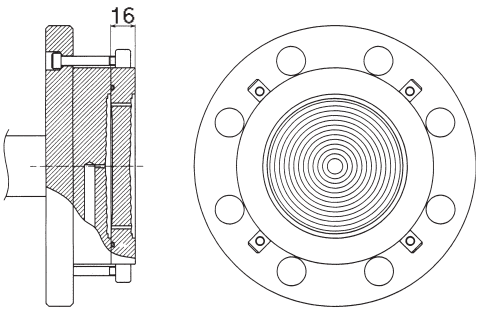


Terminal connection diagram
(terminal screw size: M4)



Flange connection
(measured pressure side)

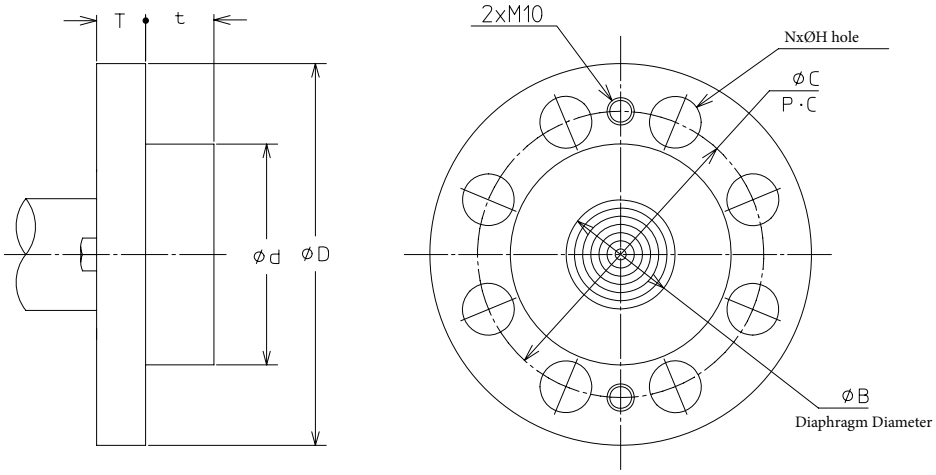




Dual diaphragms

Standard Flange
Process-Wetted Material: SUS316, SU316L, Alloy C-276

Units: mm



Model No.		Flange Rating		øD	T	øC	N	øH	ød	t
Flange Size	Flange Standard	Flange Size	Flange Standard							
D	A1	1-½ inches (40A)	ANSI 150	127	18	98.6	4	16	81	16
	A2		ANSI 300	155	25	114.3	4	22		
	A3		ANSI 600	155	32	114.3	4	22		
	P1		JPI 150	127	18	98.6	4	16		
	P2		JPI 300	155	25	114.3	4	22		
	P3		JPI 600	155	32	114.3	4	22		
	J1		JIS 10K	140	18	105	4	19		
	J3		JIS 20K	140	18	105	4	19		
	J4		JIS 30K	160	25	120	4	23		
	J6		JIS 63K	175	32	130	4	25		
E	A1	2 inches (50A)	ANSI 150	152	19.5	120.6	4	19	99	19
	A2		ANSI 300	165	22.5	127	8	19		
	A3		ANSI 600	165	25.5	127	8	19		
	P1		JPI 150	152	19.5	120.6	4	19		
	P2		JPI 300	165	22.5	127	8	19		
	P3		JPI 600	165	25.5	127	8	19		
	J1		JIS 10K	155	16	120	4	19		
	J3		JIS 20K	155	18	120	8	19		
	J4		JIS 30K	165	22	130	8	19		
	J6		JIS 63K	185	34	145	8	23		
F	A1	3 inches (80A)	ANSI 150	190	24	152.4	4	19	129.5	22
	A2		ANSI 300	210	28.5	168.1	8	22		
	A3		ANSI 600	210	32	168.1	8	22		
	P1		JPI 150	190	24	152.4	4	19		
	P2		JPI 300	210	28.5	168.1	8	22		
	P3		JPI 600	210	32	168.1	8	22		
	J1		JIS 10K	185	18	150	8	19		
	J3		JIS 20K	200	22	160	8	23		
	J4		JIS 30K	210	28	170	8	23		
	J6		JIS 63K	230	40	185	8	25		

Diaphragm Diameter

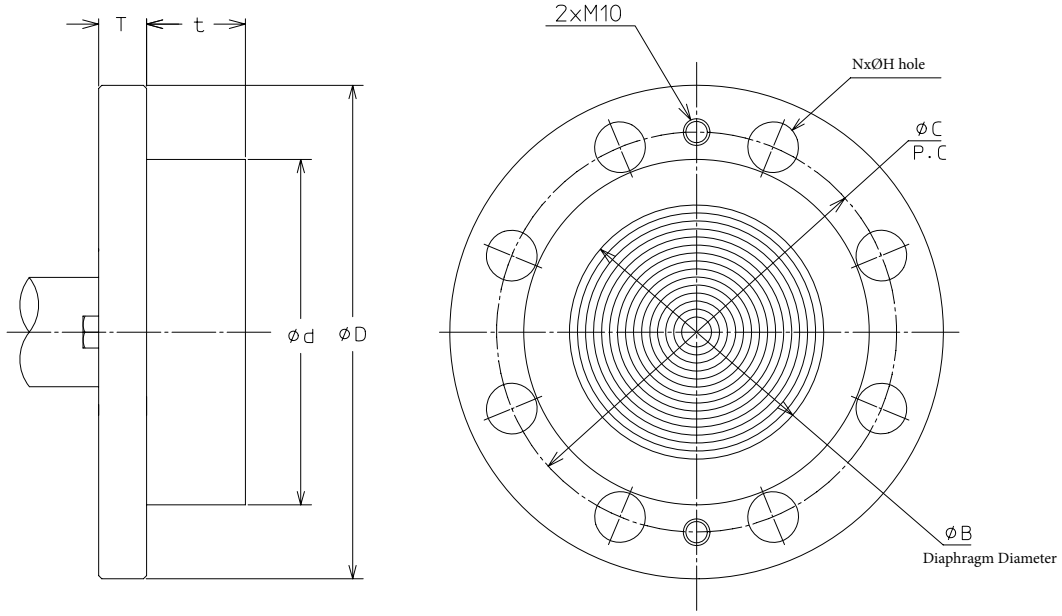
Model No.	Wetted part material	øB
A	SUS316	40
B	Alloy C-276	43
D	SUS316L	40

Source of standard: ASME/ANSI B16.5 (1988)
JPI-7S-15-93
JIS B2220 (2004)

Note 1: Use gaskets that do not come into contact with the diaphragm after installation.

Standard Flange
Process-Wetted Material: Tantalum

Units: mm



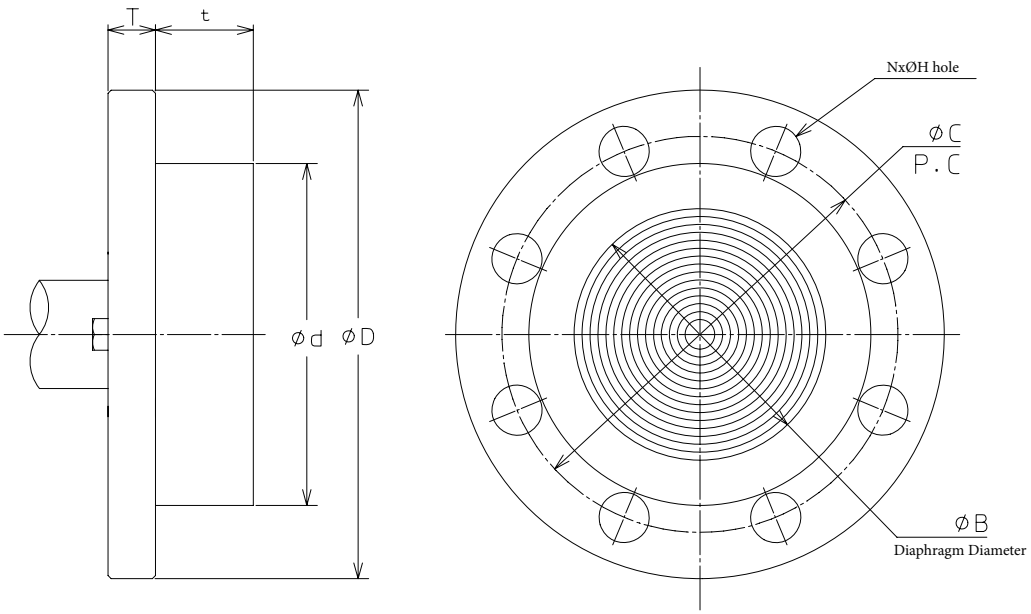
Model No.		Flange Rating		øD	T	øC	N	øH	ød	t	øB
Flange Size	Flange Standard	Flange Size	Flange Standard								
E	A1	2 inches (50A)	ANSI 150	152	19.5	120.6	4	19	99	33	62
	A2		ANSI 300	165	22.5	127	8	19			
	A3		ANSI 600	165	25.5	127	8	19			
	P1		JPI 150	152	19.5	120.6	4	19			
	P2		JPI 300	165	22.5	127	8	19			
	P3		JPI 600	165	25.5	127	8	19			
	J1		JIS 10K	155	16	120	4	19			
	J3		JIS 20K	155	18	120	8	19			
	J4		JIS 30K	165	22	130	8	19			
	J6		JIS 63K	185	34	145	8	23			
F	A1	3 inches (80A)	ANSI 150	190	24	152.4	4	19	129.5	36	95
	A2		ANSI 300	210	28.5	168.1	8	22			
	A3		ANSI 600	210	32	168.1	8	22			
	P1		JPI 150	190	24	152.4	4	19			
	P2		JPI 300	210	28.5	168.1	8	22			
	P3		JPI 600	210	32	168.1	8	22			
	J1		JIS 10K	185	18	150	8	19			
	J3		JIS 20K	200	22	160	8	23			
	J4		JIS 30K	210	28	170	8	23			
	J6		JIS 63K	230	40	185	8	25			

Source of standard: ASME/ANSI B16.5 (1988)
JPI-7S-15-93
JIS B2220 (2004)

Note 2: Use gaskets that do not come into contact with the diaphragm after installation.

Standard Flange
Diaphragm Thickness: 0.1 mm

Units: mm

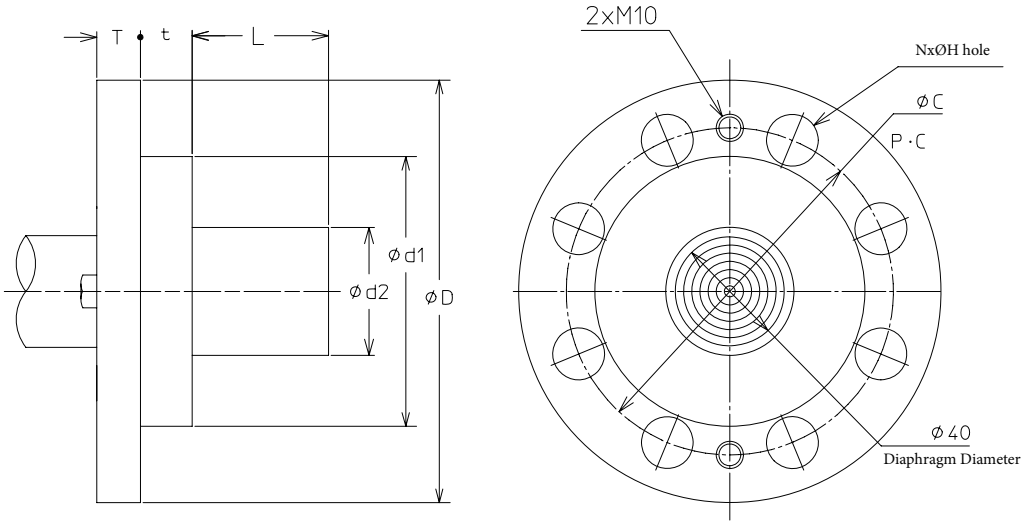


Model No.		Flange Rating		ØD	T	ØC	N	ØH	Ød	t	ØB
Flange Size	Flange Standard	Flange Size	Flange Standard								
F	A1	3 inches (80A)	ANSI 150	190	24	152.4	4	19	129.5	22	95
	A2		ANSI 300	210	28.5	168.1	8	22			
	A3		ANSI 600	210	32	168.1	8	22			
	P1		JPI 150	190	24	152.4	4	19			
	P2		JPI 300	210	28.5	168.1	8	22			
	P3		JPI 600	210	32	168.1	8	22			
	J1		JIS 10K	185	18	150	8	19			
	J3		JIS 20K	200	22	160	8	23			
	J4		JIS 30K	210	28	170	8	23			
	J6		JIS 63K	230	40	185	8	25			

Source of standard: ASME/ANSI B16.5 (1988)
JPI-7S-15-93
JIS B2220 (2004)

Protruding Flange

Units: mm



Model No.		Diaphragm Diameter		øD	T	øC	N	øH	ød1	ød2	t
Flange Size	Flange Standard	Flange Size	Flange Standard								
E	A1	2 inches (50A)	ANSI 150	152	19.5	120.6	4	19	99	$47^{\pm1}$	19
	A2		ANSI 300	165	22.5	127	8	19			
	A3		ANSI 600	165	25.5	127	8	19			
	P1		JPI 150	152	19.5	120.6	4	19			
	P2		JPI 300	165	22.5	127	8	19			
	P3		JPI 600	165	25.5	127	8	19			
	J1		JIS 10K	155	16	120	4	19			
	J3		JIS 20K	155	18	120	8	19			
	J4		JIS 30K	165	22	130	8	19			
	J6		JIS 63K	185	34	145	8	23			
F	A1	3 inches (80A)	ANSI 150	190	24	152.4	4	19	129.5	$69^{\pm1}$	22
	A2		ANSI 300	210	28.5	168.1	8	22			
	A3		ANSI 600	210	32	168.1	8	22			
	P1		JPI 150	190	24	152.4	4	19			
	P2		JPI 300	210	28.5	168.1	8	22			
	P3		JPI 600	210	32	168.1	8	22			
	J1		JIS 10K	185	18	150	8	19			
	J3		JIS 20K	200	22	160	8	23			
	J4		JIS 30K	210	28	170	8	23			
	J6		JIS 63K	230	40	185	8	25			
G	A1	4 inches (100A)	ANSI 150	229	24	190.5	8	19	157	$95^{\pm1}$	23
	A2		ANSI 300	254	32	200.2	8	22			
	A3		ANSI 600	273	38.5	215.9	8	26			
	P1		JPI 150	229	24	190.5	8	19			
	P2		JPI 300	254	32	200.2	8	22			
	P3		JPI 600	273	38.5	215.9	8	26			
	J1		JIS 10K	210	18	175	8	19			
	J3		JIS 20K	225	24	185	8	23			
	J4		JIS 30K	240	32	195	8	25			
	J6		JIS 63K	270	44	220	8	27			

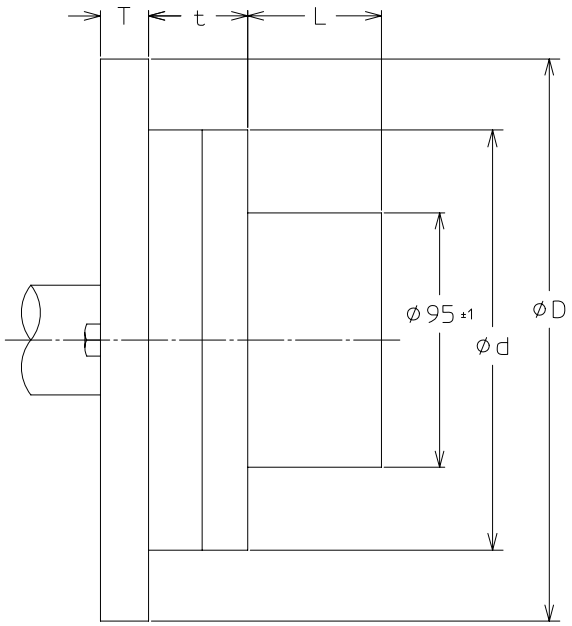
Extension length L

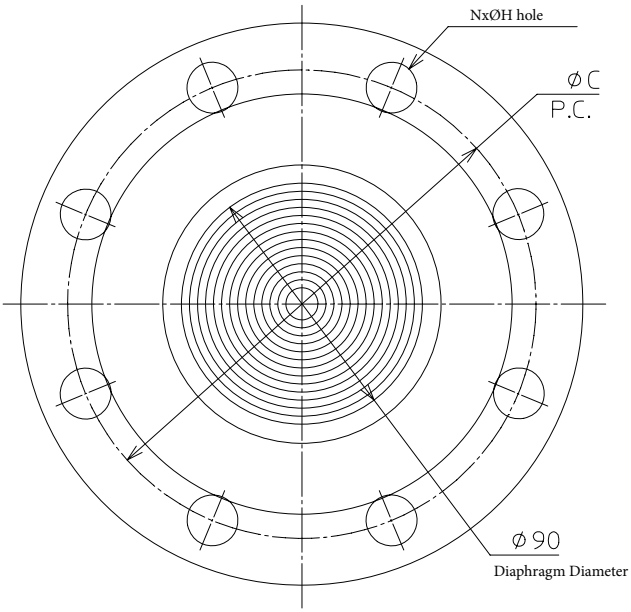
Model No.	L
B	50
C	100
D	150
E	200
F	250
G	300

Source of standard: ASME/ANSI B16.5 (1988)
JPI-7S-15-93
JIS B2220 (2004)

Protruding Flange
Diaphragm Thickness: 0.1 mm

Units: mm





Model No.		Flange Rating		ØD	T	ØC	N	ØH	t	Ød
Flange Size	Flange Standard	Flange Size	Flange Standard							
G	A1	4 inches (100A)	ANSI 150	229	24	190.5	8	19	37	157
	A2		ANSI 300	254	32	200.2	8	22		
	P1		JPI 150	229	24	190.5	8	19		
	P2		JPI 300	254	32	200.2	8	22		
	J1		JIS 10K	210	18	175	8	19		
	J3		JIS 20K	225	24	185	8	23		
	J4		JIS 30K	240	32	195	8	25		

Source of standard: ASME/ANSI B16.5 (1988)
JPI-7S-15-93
JIS B2220 (2004)

Extension length L

Model No.	L
B	50
C	100
D	150
E	200
F	250
G	300

Note 1: Use gaskets that do not come into contact with the diaphragm after installation.

Please read the "Terms and Conditions" from the following URL before ordering or use:

http://www.azbil.com/products/bi/order.html

Specifications are subject to change without notice.

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