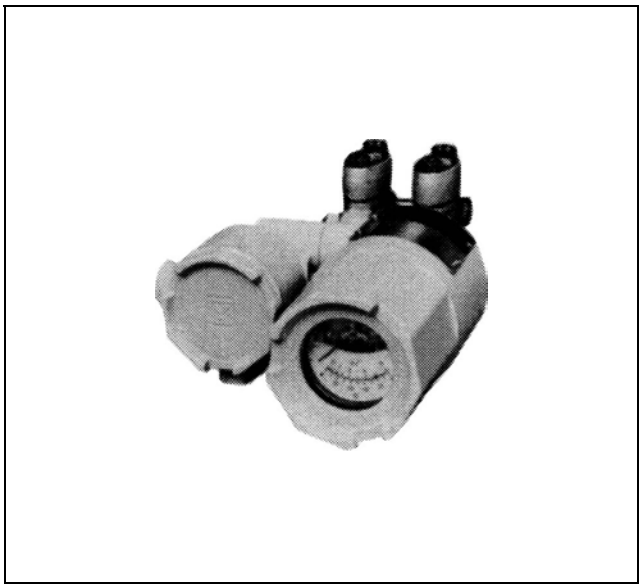
# ST3000 Smart Transmitter
# Model JTD520
## Differential Pressure Transmitter with Pressure Compensation

## OVERVIEW

The ST3000 differential pressure transmitter with pressure compensation is a microprocessor-based transmitter.

The transmitter detects a differential pressure and a static pressure of a process fluid simultaneously to compensate the density change due to the static pressure change, and converts the differential pressure into an analog output signal of 4 to 20mA, which is proportional to the mass flow (volumetric flow at a reference condition).



# Standard Specifications

| Item | Specifications |
|---|---|
| **Measuring Span (Continuously adjustable)** | 250 to 10000mm$H_2$0 {2.45 to 98.1 kPa} |
| **Setting Range** | -10000 ≤ URV(*1) ≤ 10000mm$H_2$0 {-98.1 ≤ URV ≤ 98.1 kPa}.<br>-10000 ≤ LRV(*2) ≤ 10000mm$H_2$0 {-98.1 ≤ LRV ≤ 98.1 kPa}. |
| **Output (After pressure compensation)** | 4 to 20mA DC |
| **Designed Pressure Setting Range** | 1.7 to 35kgf/cm$^2$ abs. {0.17 to 3.43 MPa abs.} |
| **Accuracy (Output after compensation)** | Percentage with respect to $x$ (mm$H_2$0) that represents the URV or LRV of the calibrated range, or the span-whichever is greatest.<br>Ppref. : Designed pressure (kgf/cm$^2$ abs. ) PPmax. : Maximum process pressure (kgf/cm$^2$ abs. )<br>±0.18% (at differential pressure 2500mm$H_2$0 {24.5 kPa}, designed pressure 5kgf/cm$^2$ abs. {0.49 MPa abs.}, maximum process pressure 6kgf/cm2 abs. {0.59 MPa abs.}).<br>Accuracy % = ± (0.05 + A + B + C + D)<br>A: $0.05\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 1250mm$H_2$O. {11.9 kPa} or greater<br>$0.05\% \times \frac{1250}{x} \times \frac{PP_{max.}}{PP_{ref.}}\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 1250mm$H_2$O {11.9 kPa} or less<br>B: $0.1 \times \frac{PP_{max.}}{35}\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 2500mm$H_2$O {23.8 kPa} or greater<br>$0.1 \times \frac{2500}{x} \times \frac{PP_{max.}}{PP_{ref.}} \times \frac{PP_{mas.}}{35}\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 2500mm$H_2$O {23.8 kPa} or less<br>C: $0.05\% \ldots PP_{ref.}$ is 3.5kgf / cm$^2$abs. {0.34 MPa abs.} or greater<br>$0.05 \times \frac{3.5}{PP_{ref.}}\% \ldots PP_{ref.}$ is 3.5kgf / cm$^2$ abs. {0.34 MPa abs.} or less<br>D: $0.15 \times \frac{x}{PP_{ref.} \times 10000}\%$ |
| **Supply Voltage** | 10.8 TO 45V DC (See Figure 1. ) |
| **Working Pressure Rating** | 35 kgf/cm$^2$ abs. max. {3.43 MPa abs.} (For vacuum pressure, see Figure 2.) |
| **Operating Temperature Range** | Ambient and meter body (process fluid) temperature:<br>Normal operating conditions; -15 to 65°<br>Operative limits; -40 to 70°C<br>Transportation and storage conditions; -50 to +85°C |
| **Operating Humidity Range** | Normal Operating conditions:10 to 90% RH |
| **Temperature Effect (After compensation)** | Percentage with respect to $x$ (mm$H_2$0) that represents the URV or the LRV of the setting range, or the span-whichever is greatest.<br>PPref. : designed pressure (kgf/cm$^2$ abs. ) PPmax. : maximum process pressure (kgf/cm2abs. )<br>Zero shift:<br>±0.20%/30°C (at differential pressure 2500mm$H_2$0 {24.5 kPa abs.}, designed pressure 5kgf/cm$^2$ abs. {0.49 MPa abs.) and maximum process pressure 6kgf/cm$^2$ abs. {0.59MPa abs.})<br>Zero shifts under various conditions are obtained by the following equations:<br>Zero shift%/30°±(0.15+A+B)<br>A: $0.06 \times \frac{1250}{x} \times \frac{PP_{max.}}{PP_{ref.}}$<br>B: $0.08 \times \frac{2500}{x} \times \frac{PP_{max.}}{35} \times \frac{PP_{max.}}{PP_{ref.}}$<br>Combined shift (including zero and span shifts):<br>±0.42%/30°C (at differential pressure 2500mm$H_2$O {24.5 kPa abs.}, designed pressure 5kgf/cm$^2$ abs. {0.49 MPa abs.), and maximum process pressure 6kgf/cm$^2$ abs. {0.59MPa abs.})<br>Combined shifts under various conditions are obtained by the following equations:<br>Combined shift%/30°C = ±(0.2+A+B+C)<br>A: $0.1\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 1250mm$H_2$O abs. {11.9 kPa abs.} or greater<br>$0.1 \times \frac{1250}{x} \times \frac{PP_{max.}}{35}\% \ldots x$ is 1250mm$H_2$O abs. {11.9 kPa abs.} or less<br>B: $0.08 \times \frac{PP_{max.}}{35}\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 1250mm$H_2$O abs. {24.5 kPa abs.} or greater<br>$0.08 \times \frac{2500}{x} \times \frac{PP_{max.}}{PP_{ref.}} \times \frac{PP_{max.}}{35}\% \ldots x \times \frac{PP_{ref.}}{PP_{max.}}$ is 2500mm$H_2$O {24.5 kPa abs.} or less<br>C: $0.1\% \ldots PP_{reft.}$ is 3.5kgf / cm$^2$ abs. {0.34MPa abs.} or greater<br>$0.1 \times \frac{3.5}{PP_{ref.}}\% \ldots PP_{ref.}$ is 3.5kgf / cm$^2$ abs. {0.34MPa abs.} or less |
| **Accuracy and Calibration Accuracy for Differential Pressure Transmitter** | Percentage with respect to $x$ (mm$H_2$0) that represents the URV or the LRV of the setting range or the span-whichever is greatest.<br>Linear Output: $\pm 0.1\% \ldots x$ is 1250mm$H_2$O {11.9 kPa abs.} or greater.<br>$\pm(0.05 + 0.05 \times \frac{1250}{x})\% \ldots x$ is 1250mm$H_2$O {11.9 kPa abs.} or less<br>Square root output: When output is 50 to 100% . . . Same as that of linear output<br>When output is 7.1 to 50% . . .Value of linear output $\times \frac{50}{\text{Square} - \text{root output \%}}$ |

| Item | Specifications |
|---|---|
| | When output is less than 7.1% . . . Dropout |
| **Calibration Accuracy for Pressure Transmitter** | Percentage with respect to $x$ ($mmH_2O$) that represents the URV or the LRV of the setting range or the span-whichever is greatest.<br>±0.1% . . . $x$ is 3.5kgf/cm$^2$ abs. {0.34 MPa abs.} or greater.<br>$\pm(0.05+0.05\times\frac{3.5}{x})$ % . . . $x$ is 3.5kgf / cm$^2$ abs. {0.34 MPa abs.} or less |
| **Stability Against Supply Voltage Change** | 0.005%FS/V |
| **Dead Time** | Approx. 0.6 sec. |
| **Damping Time Constant** | Adjustable within a range of 0.6 to 32 sec. (at 25°C) |
| **Process Connection** | Rc½, ½NPT, Rc¼, ¼NPT internal thread |
| **Electrical Conduit Connection** | G½ internal thread |
| **Structure** | Waterproof and dustproof structure:<br>JIS C0920 Watertight, JIS F8001 Class 2 Watertight, NEMA 3 and 4X, IEC IP67 |
| **Materials** | Centerbody: SUS316<br>Wetted parts of center body: SUS316 (SUS316L for diaphragm only)<br>Meter body cover (Differential pressure chambers): Carbon steel (SF45A), SUSF316<br>Bolts: SNB7 Nuts: S45C Gasket: Teflon Transmitter case: Aluminum alloy |
| **Finish** | Basket acrylic paint, light beige (Munsell 4Y7.2/1.3) |
| **Installation** | Can be installed on a 2-inch horizontal or vertical pipe. (Can be directly mounted on a process pipe.) |
| **Weight** | Approx. 7.5 kg |

(*1): URV denotes the value for 100% (20mA DC) output.

(*2): LRV denotes the value for 0% (4mA DC) output.

## Optional Specifications

(The items other than the following are identical with those of the Standard Specifications.)

| Item | Specifications |
|---|---|
| **Built-in Indicating Meter (Class 2.5)** | Ambient temperature:<br>Normal operating conditions - 10 to + 60°C<br>Operative limits (For short period) and Transportation and storage conditions: -40 to +85°C |
| **Corrosion-resistant Finish** | Corrosion-resistant paint (Baked acrylic paint), fungus-proof finish. (Silver paint when meter body cover, adapter flanges, bolts, nuts, and manifold valves are made of carbon steel) |
| **Corrosion-proof Finish** | Corrosion-proof paint (Baked epoxy paint), fungus-proof finish. (silver paint when meter body cover, adapter flanges, bolts, nuts, and manifold valves are made of carbon steel) |
| **Corrosive-resistant Finish (Silver Paint)** | Transmitter case is silver-painted in addition to the above corrosion-resistant finish. |
| **Flameproof-packing type Cable Connecting Adapter** | For electrical connection by the leading-in method of flameproof-packing type for special flameproof structure (Option-2) |
| **Explosion-proof Structure** | JIS C0903 ds2G4 special flameproof structure<br>(Ambient temperature: -10 to +65°C Meter body (Process fluid) temperature: -10 to +65°C) |
| **SFC for pressure compensation:** | SFC 160 (Standard type) SFC 260 (with printer)<br>For details, refer to Specification Sheet (No. SS2-SFC100-0100) |

# MODEL SELECTION

| Basic Model No. | Selection I | | | Selection II | Options | Description | | |
|---|---|---|---|---|---|---|---|---|
| | Material | Fill Fluid | Process Connection | | | | | |
| JTD520 | | | | | | Measuring span: 250 ~ 10000mm$H_2O$ {24.5 to 98.1 kPa} | | |
| | | | | | | Meter body cover | Vent/drain plugs | Wetted parts of center body |
| | -A | | | | | Carbon Steel | SUS316 | Diaphragm : SUS316L<br>Others : SUS316 |
| | -E | | | | | SUSF316 | SUS316 | Diaphragm : SUS316L<br>Others : SUS316 |
| | | 1 | | | | Regular type (Silicone oil) | | |
| | | 2 | | | | For oxygen (Fluorine oil) service | | |
| | | | Q | | | Rc½ | | Top or bottom connection |
| | | | R | | | ½NPT internal thread | | |
| | | | S | | | Rc¼ | | |
| | | | T | | | ¼NPT internal thread | | |
| | | | | -00000 | | No selection | | |
| | | | | | -X | No option | | |
| | | | | | -L | Built-in lightning arrester | | |
| | | | | | -M | Built-in indicating meter<br>(0 to 100% linear and 0 to 10 $\sqrt{\ }$ double scales) | | |
| | | | | | -W | SUS304 bolts and nuts material | | |
| | | | | | -A | Corrosion-resistant finish | | |
| | | | | | -B | Corrosion-proof finish | | |
| | | | | | -D | Corrosion-resistant finish, silver paint | | |
| | | | | | -N | ½NPT internal thread electrical conduit connection<br>(Unavailable combination with "1" of options) | | |
| | | | | | -K | Oil free treatment | | |
| | | | | | -P | One cable adapter with flameproof packing | | |
| | | | | | -Q | Two cable adapters with flameproof packing | | |
| | | | | | -J | Long vent/drain plug | | |
| | | | | | -1 | JIS Special flameproof structure<br>(unavailable combination with "N" of options) | | |

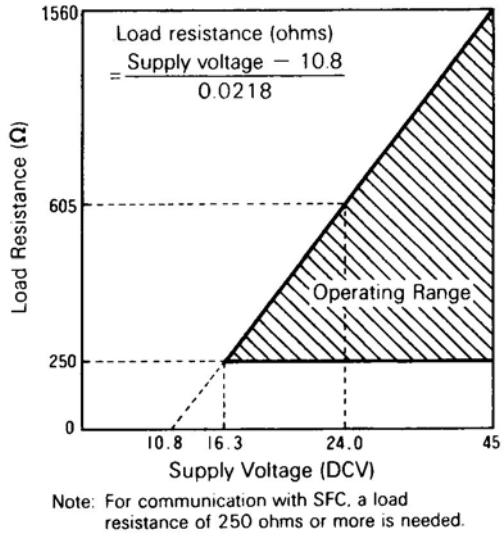



**Fig.1 Supply Voltage vs. Load Resistance Characteristics**

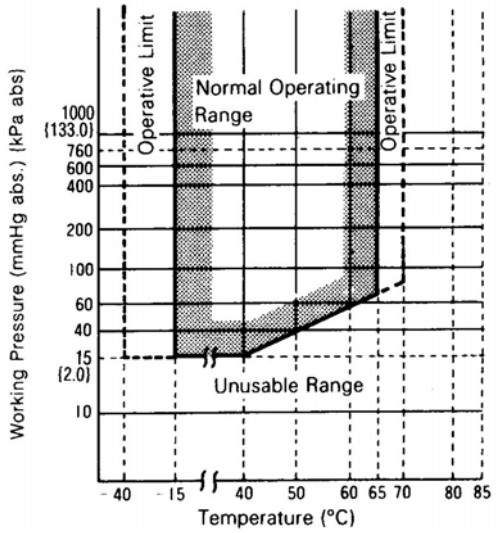
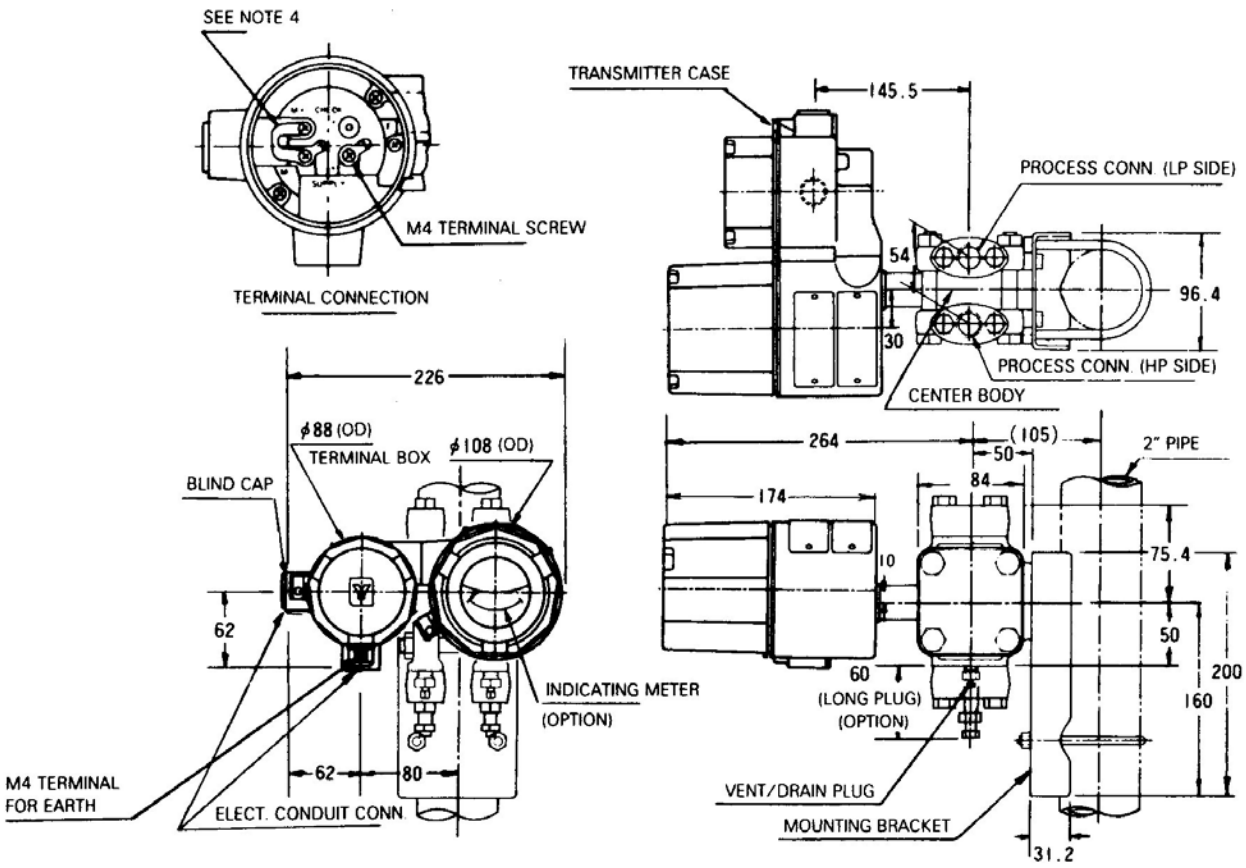



**Fig.2 Working Pressure and Temperature of Wetted Parts Section**

## DIMENSIONS




Notes: 1) The process connection can be made in any of two positions of top or bottom.
When connection is changed, replace the vent/drain plug.
2) This transmitter can be mounted in various ways using the holes of the mounting bracket.
(The above drawing shows an example of typical mounting.)
3) Mount the transmitter vertically.
4) To use an external indicating meter, disconnect the jumper bar from the M terminals and connect in its place the lead-wires of the external indicating meter.

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