



Series TDT Thermal Dispersion Transmitter

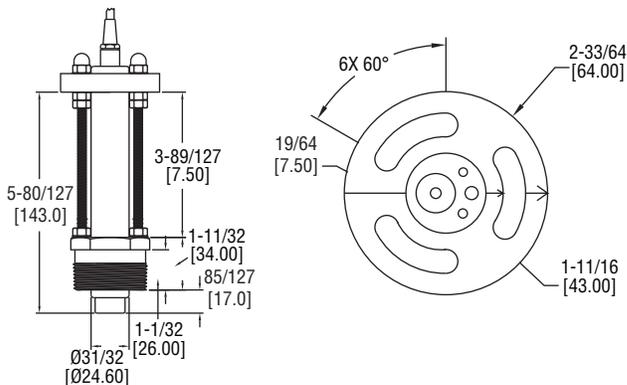
Specifications - Installation and Operating Instructions



SIDE



TOP



Please read carefully: No liability can be accepted for damage caused by improper use of the TDT.

The Series TDT is an excellent alternative to turbine and paddlewheel insertion flow meters, with the ability to deliver high accuracy over a wide range of pipe sizes. This unit has the same insertion mounting into a 1-1/2" NPT but no moving parts to wear, break, or clog. This transmitter has available extensions that can be used for pipes sized up to 75" in diameter. The TDT Dispersion Transmitter measures even very low flow rates due to the applied calorimetric principle, and can be used for the metering of all fluid media such as: water, oil, aggressive media, paste, glue, sludge, grease, etc. Optional titanium allows this transmitter to be used with an even wider range of corrosive media, and the optional output allows the user to measure both flow and temperature. When deciding on the correct length, use the 1/7th law (the TDT's probe length needs to measure 1/7th of the pipe diameter).

PRINCIPLES OF OPERATION

The sensor head of the Thermal Dispersion Transmitter contains two PT-resistors. One of them is measuring the temperature of the media, while the other is heated by an attached heating resistor. The temperature difference between the two PT-resistors is predetermined and a control circuit keeps this temperature difference constant. The flow of the media cools the heated PT-resistor proportional to the speed of the flow, this results in a linear output signal proportional to the flow speed.

Example	TDT	W	S	1	0	1	TDT-WS-101
Series	TDT						Thermal Dispersion Transmitter
Base Type		W L					Water Oil
Wetted Material			S T				316 SS Titanium
Range				1			0 to 1.64 ft/s (0 to 0.5 m/s)
				2			0 to 3.28 ft/s (0 to 1 m/s)
				3			0 to 6.56 ft/s (0 to 2 m/s)
				4			0 to 9.84 ft/s (0 to 3 m/s)
				5			0 to 12.47 ft/s (0 to 3.8 m/s)
Extension				0			None
				1			+10.28" (+261 mm)
				2			+15.75" (+400 mm)
Output						1	1 flow output
						2	1 flow output plus 1 temperature output

SPECIFICATIONS

Service: Water, oil, compatible liquids, paste, glue, sludge and grease.

Wetted Materials: 316 SS, optional titanium.

Flow Range:

Min: 0 to 0.66 ft/s (0 to 20 cm/s);

Max: See model chart.

Temperature Range: (For optional output only) 32 to 212°F (0 to 100°C).

Accuracy: <3% of full range.

Repeatability: <1%.

Response Time: 10 seconds.

Temperature Limits:

Process: 32 to 176°F (0 to 80°C);

Ambient: -4 to 140°F (-20 to 60°C).

Pressure Limits: 261 psi (30 bar).

Process Connections: 1-1/2" male NPT.

Output Signal: 4 to 20 mA for flow, optional 4 to 20 mA for temperature.

Power Requirements: 24 VDC ±10 to 15%.

Resistive Load: 0 to 600 Ω.

Current Consumption: Approx. 100 to 200 mA (max. flow).

Electrical Connection: 6.5 ft (2 m) moulded oilflex cable with three 21 AWG (0.5 sq mm) wires.

Enclosure Rating: NEMA 4X (IP65).

Shipping Weight: 2 lb (907 g).

UNPACKING

Remove the TDT from the shipping carton and inspect for damage. If damage is found, notify the carrier immediately.

INSTALLATION



Insure that the process fluid is compatible with the wetted materials.



Do not exceed the maximum device ratings.



Insure that the system is properly installed BEFORE removing this device or other objects from the system.

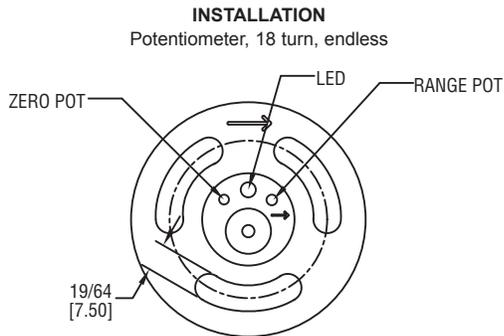


Figure 1

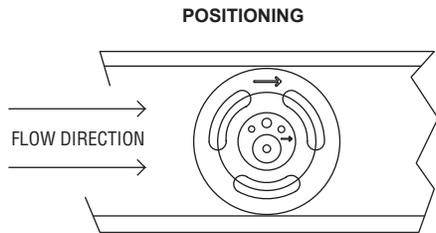


Figure 2

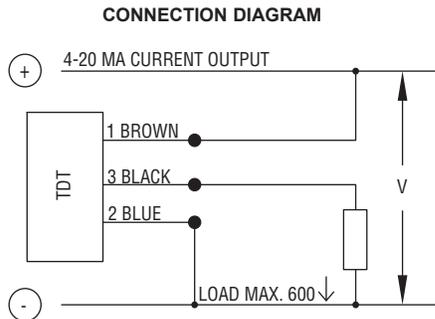


Figure 3

ADDITIONAL TEMPERATURE OUTPUT CONNECTION DIAGRAM

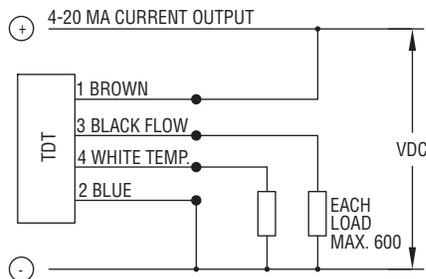


Figure 4

1.0 Items Delivered

- 1.1 Thermal Dispersion Transmitter: TDT
- 1.2 Union nut: 1-1/2" NPT SS
- 1.3 O-ring: 1-1/2" NPT
- 1.4 Miniature flathead screwdriver for adjustment

2.0 Installation Instructions

- 2.1 **Installation depth:** 1/7x inner pipe diameter for pipes sized from 1.5 to 24".
- 2.2 **Orientation to flow:** see Figure 1.
- 2.3 **Fitting position:** preferably in vertical pipes with ascending flow or in horizontal pipes with TDT in horizontal position. For optimal flow, straight pipes should be a minimum of 7x inner pipe diameter, and 5x inner diameter of the pipe after the TDT.
- 2.4 **Mounting:** screw in TDT into the fitting on the pipe side and fix it at the correct insertion depth of 1/7x inner pipe diameter see Figure 5.

2.5 **Initial operation:** connect TDT to 24 VDC according to connection diagram, see Figures 3 & 4, and wait approximately 2 minutes before starting any measurements. The TDT has been calibrated to the specified type related flow rate, see model chart. At customer's plant, signal may vary depending on individual mounting and medium conditions. If re-adjustment is required, refer to point 3.

3.0 Adjustment Procedure

3.1 **Zero point adjustment in stationary medium:** adjust zero point potentiometer after 2 minutes, so that $I_a \approx 4$ mA, i.e:

- at $I_a > 4$ mA turn potentiometer to the left,
- at $I_a < 4$ mA turn potentiometer to the right.

3.2 **Measuring range adjustment at maximum flow:** measuring range is adjustable from 0 to 0.66 ft/s (0 to 20 cm/s) to calibrated flow range depending on the model (see model chart). Accelerate flow of the medium to a point, where the TDT should give an output signal of 20 mA and wait a minimum of 2 minutes. Turn range potentiometer until $I_a = 20$ mA (to the left I_a will be greater, to the right I_a will be smaller). The color of the LED will change from green ($I_a \leq 20$ mA) to red (exceeding measuring range).

3.3 **Fine adjustment of zero point:** after at least 3 minutes of flow standstill, turn zero point slightly, so that I_a is just 4 mA (turning direction as in 3.1).

3.4 **Repeat** adjustment according to 3.2 and 3.3 until the zero point (4 mA) and maximum range setting (20 mA) remains constant.

CALCULATION FOR THE STANDARD HEIGHT FOR
1/7 ID (INSERTION DEPTH)

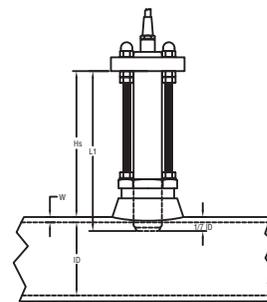


Figure 5

Calculation of the standard height for 1/7 inner pipe diameter (insertion depth)

$$H_s = L_1 - W - (1/7 \times ID)$$

- Hs: standard height
- L1: unit length (see Figure 5)
- W: wall thickness of pipe
- ID: inner pipe diameter

For example:

$$L_1 = 5.63'' (143 \text{ mm})$$

$$W = 0.2'' (5 \text{ mm})$$

$$ID = 2'' (50.4 \text{ mm})$$

$$H_s = 5.63 \text{ to } 0.2'' - (1/7 \times 2'')$$

$$= 5.63 \text{ to } 0.2 \text{ to } 0.29''$$

$$H_s \approx 5.14''$$

or

$$= 143 \text{ mm} - 5 \text{ mm} - (1/7 \times 50.4 \text{ mm})$$

$$= 143 \text{ mm} - 5 \text{ mm} - 7 \text{ mm}$$

$$H_s \approx 131 \text{ mm}$$

MAINTENANCE & REPAIR

Inspect and clean wetted parts with water or damp cloth at regular intervals. Disassembly or modifications made by the user will void the warranty and could impair the continued safety of the product. If repair is required obtain a Return Goods Authorization (RGA) number and send the unit, freight prepaid, to the address below. Please include a detailed description of the problem and conditions under which the problem was encountered.

Dwyer Instruments, Inc.
Attn: Repair Department
102 Indiana Hwy 212
Michigan City, IN 46360