

162 VTS 2-WIRE SEISMIC VIBRATION TRANSMITTER

Installation Manual



OVERVIEW

The 162VTS vibration transmitter is ideal for sensing vibration on most plant equipment. It generates a two-wire loop signal proportional to velocity for transfer to a programmable logic controller (PLC), distributed control system (DCS) or other 4-20 mA input devices. Simply mount the transmitter on the machine case, connect the 2-wire loop and read and/or record the vibration.

FEATURES

- Provides 4-20 mA signal proportional to velocity vibration
- Direct connection to PLC, DCS or other recording monitor
- Two wire, loop powered, simplifies field wiring, IPT™ reversible power
- Different top wiring configurations and mounting stud types

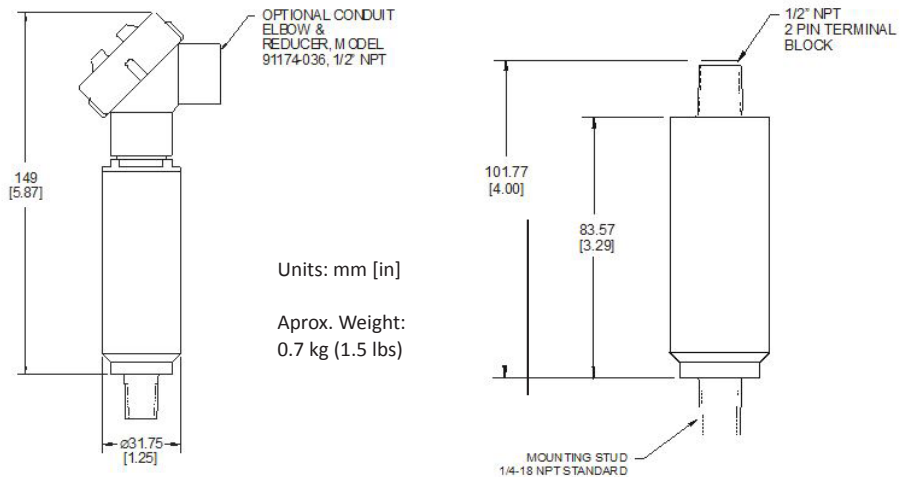
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The Model 162VTS Seismic Vibration Transmitter is part of an established series of transmitters from Metrix. The device incorporates state-of-the-art electronic components and circuits. It also offers several new options in terms of features and configurations. Study the configuration of the transmitter before putting it in service.

The transmitter combines a vibration sensor and signal conditioner in a single package. They provide the ideal solution for sensing machinery vibration level and transmitting a proportional 4-20 mA signal directly to a PLC, DCS, monitor, or computer. Typical applications include low and medium speed machines such as fans, blowers, pumps, motors, and centrifuges. The transmitter can be supplied with optional screw cover elbow fittings for connecting flexible conduit.

The transmitter is all solid state, has no moving parts, and is encapsulated in a stainless steel housing. Each transmitter is factory calibrated to the sensitivity marked on the label (see Metrix datasheet Doc# 1004597 Option "A").

OUTLINE & DIMENSIONS



MOUNTING

It is important the transmitter body be solidly mounted to the machine surface. See "Typical Transmitter Placement". Different machine preparations are required for the two basic transmitter mounting styles; NPT (National Pipe Thread) and machine thread (UNF and Metric). Transmitters with the NPT type mounting stud are secured by the thread engagement and the base of the transmitter does not come in contact with the machine surface. On the other hand, transmitters with the machine thread studs must make contact with the machine surface. The base of the transmitter must make square and direct contact. This requires preparing the surface of the machine with a 1 1/2 inch counter bore (surfacing tool). This tool can be used with a portable drill equipped with a magnetic base but care must be taken so that the tapped and threaded hole is perpendicular to the machined surface. The transmitter must make contact all the way around its base surface. Contact Metrix for more detailed instructions for using a counter bore.

If installing a transmitter with a standard 1/4 inch NPT stud, drill a hole using a 7/16 inch bit, 5/8 inch deep. Then tap using a 1/4 - 18 NPT (tapered pipe tap). Hand tighten the transmitter and then turn an additional 1 to 2 turns using a wrench on the wrench flats. Do not use a pipe wrench as it can apply extreme forces to the body and potentially damage electronic components. A minimum of five (5) threads of engagement should be made. A 1/4 inch to 1/2 inch NPT bushing is available for mounting the transmitter in existing 1/2 inch NPT holes.

Also, a Metrix 7084 Flange Adapter can be used between the transmitter and the machine

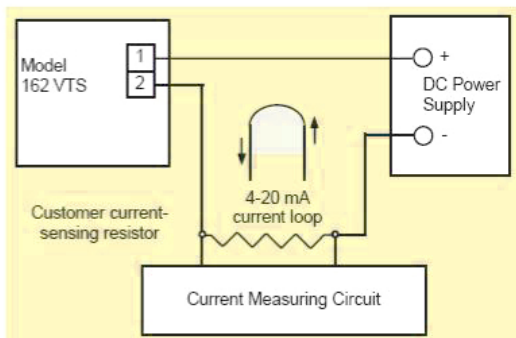


Figure 1

surface when there is not enough surface thickness to drill and tap a hole. The flange adaptor mounts with three small screws. See Accessories.

If installing a transmitter with one of the straight machined thread sizes, follow standard drill and tap procedures. Be sure to not drill a hole larger than the counter bore pilot diameter before using the counter bore to prepare the machine surface. Drill out the hole with the correct tap drill size after preparing the surface.

The sensitive axis of the transmitter is in line with the mounting stud. The transmitter can be oriented in any (0 to 360 degree) position.

ACCESSORIES

Product	Part Number
Conduit Elbow and Reducer	91174-036
Conduit Elbow, Reducer, 3-position terminal block	8200-004
Stainless Steel Flange Mount Adaptor	7084-002 or 7084-005
Two-Wire Cable Assembly	8169-75-002-XXX
Cable Gland	93818-015

TYPICAL TRANSMITTER PLACEMENT

The 162 VTS measures seismic vibration at the attachment point on the machine. Its sensitive direction is through its cylindrical body. It will not measure side to side motion. It measures velocity vibration in ips (inches per second). Velocity vibration is a common measurement for a variety of machinery and some common attachment points are shown in Figure 2. Typical transmitter mounting for casing vibration measurements is in the horizontal direction at the bearing housings. Usually the horizontal direction is more sensitive because of the way machinery is typically mounted.

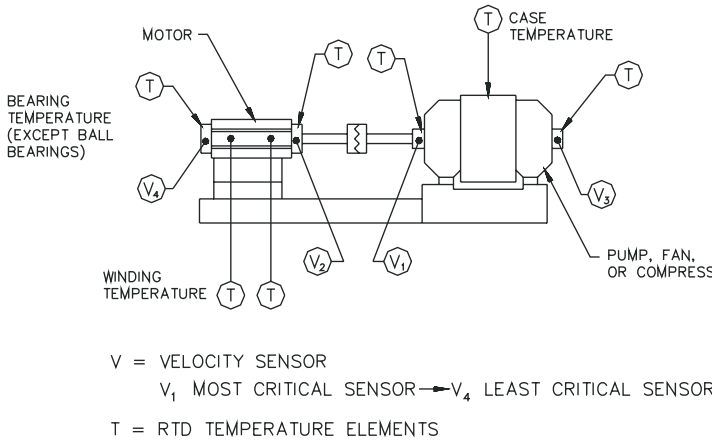


Figure 2: Common transducer mounting points.

WIRING

The 162VTS is connected like any other loop powered transmitter. The following is a summary based on area designations.

1. SAFE AREA INSTALLATION: Connect the field wiring in accordance with the appropriate diagram shown in Figure 3. The 162VTS transmitter requires a minimum of 11 VDC for proper operation. The minimum loop power supply voltage required is 11 VDC plus 1 volt for each 50 Ω of loop resistance.

162VTS Example:	Signal wire resistance	= 10 Ω
	Resistance of receiver	= 250 Ω
	Total loop resistance	= 260 Ω

$$\text{Minimum supply voltage} = 260 \Omega (1V/50 \Omega) + 11V = 16.2 \text{ VDC}$$

The maximum loop power supply voltage that may be applied is 30 VDC ($RL_{\max} = 950\Omega$). The maximum loop resistance (R_L) is calculated by the equation:

$$R_L = 50 \Omega/V (VS - 11V) \Omega$$

$$\text{Example: } R_L = 50 \Omega/V (24V - 11V) = 650 \Omega \text{ for 24 VDC loop supply.}$$

2. EXPLOSION-PROOF INSTALLATION IN HAZARDOUS LOCATIONS

162VTS transmitters are CSA certified explosion-proof, Class I (B, C & D); Class II (E, F & G,). Connect the field wiring in accordance with the appropriate diagram shown in Figure 3. Refer to “Safe Area Installation” paragraph on Page 4 for loop voltage and resistance requirements. All conduit and junction boxes must be certified explosion-proof for the class, division and group required by the application. Installation of the transmitter must meet all of the explosion-proof installation requirements of the local governing agency and facility safety procedures.

3. ELECTROMAGNETIC COMPATIBILITY

To meet the requirements of electromagnetic compatibility in areas of high electromagnetic interference, the field wiring must be:

1. Shielded twisted pair cable enclosed in grounded metallic conduit, or
2. Double shielded twisted pair cable with a metallic body cable gland fitting and with the outer shield grounded to earth.
3. To improve RFI immunity include ferrite core (see doc # 100459).

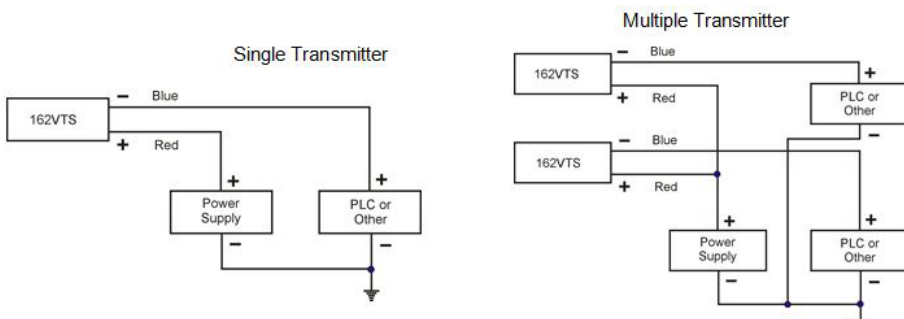


Figure 3: Explosion-proof wiring diagram.

Use standard two-conductor, twisted pair, shielded wiring for the long run to the instrumentation enclosure. The transmitter is connected like any other loop powered end device.

CONNECTION TO PLC OR OTHER INDICATING INSTRUMENT

The first step in configuring the PLC, DCS, or other recording instrument is to determine the source of power. The 162VTS requires loop power be supplied to it. Some Analog Input channels, on a PLC or DCS, for example, provide this power from within. If they do not provide power, an external power supply must be provided. Connect the transmitter field wiring using standard instrumentation practices.

Scaling of the display is on the basis of the range of the transmitter. The measurement parameter name is “vibration” and the units are “ips” (inches per second) or “mm/s” (millimeters per second). The example below is based on a standard 1.0 ips transmitter.

Vibration Level	Transmitter Output	PLC (or other) Scale
None	4mA +/- 0.1mA	0.00 ips
1.0 ips	20mA +/- 0.4mA	1.00 ips

To prevent nuisance alarms due to transient operating conditions, program a time delay into the alarm. Momentary “jolts” that can occur at start-up or during some operating condition changes, do not reflect a machines steady state operating condition. The indicated vibration level must cross the threshold level and stay above it for a preset time before any alarm action is taken. A 2- to 3-second delay is normally applied to most machinery. Consult Metrix if you have a question about your machines operating characteristics.

Some rough starting machinery may also need a start-up time lockout for alarms. A start-up lockout is different than a time delay. Both may be needed. The standard lead length is 24 inches. We recommend using the “Y” conduit elbow because it prevents the conduit from extending too far away from the transmitter, limiting the likelihood of getting snagged while working near the machinery. If a 1 inch to 3/4 inch reducer is used at the elbow, a smaller diameter flexible conduit can be used. It is always a good idea to limit the mass that “hangs” on the transmitter. The flexible conduit should make a bend in order to be sure any rigid conduit motion can not feed into the transmitter body.

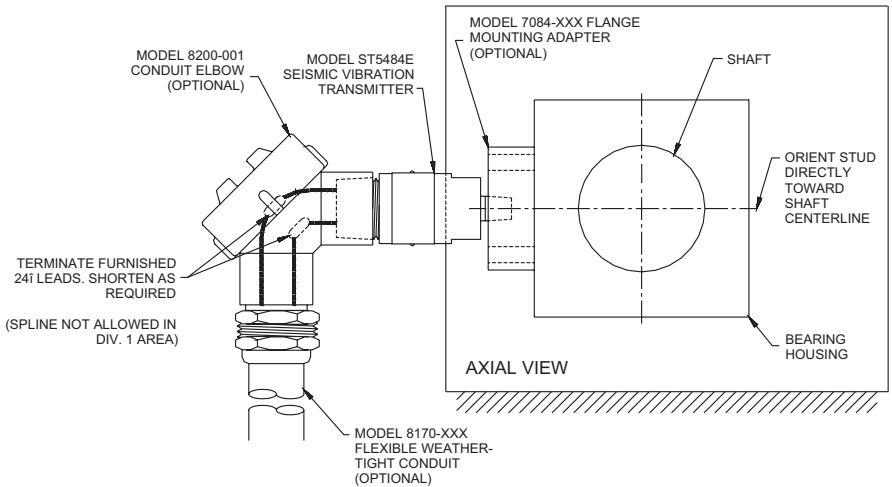


Figure 4: Mounting diagram

CALIBRATION

The 162VTS transmitter has been factory calibrated for the full scale vibration level marked on the label (see datasheet Doc#1004597 Option "A"). If the calibration is in doubt the unit can be verified in the field by following the procedures outlined below. Note that there are no Zero and Span adjustments on the transmitter.

1. Zero Verification

In the absence of vibration the output current should be $4 \text{ mA} \pm 0.1 \text{ mA}$. If the ambient vibration is more than 2% of full scale, the transmitter should be removed from the machine and placed on a vibration free surface for this measurement. Often a piece of foam can be used to isolate the transmitter from external motion.

2. Span Verification

Subject the transmitter to a known vibration within the full scale range marked on the label. If using a portable vibration shaker where it can be tested at full scale, the output should be $20 \text{ mA} \pm 0.4 \text{ mA}$. If using another reference, like a similar machine, calculate the current value on a proportional basis.

The output level can also be compared to a vibration level read on a portable vibration meter. This reading should be taken as close to the transmitter location as possible.

If you shake the transmitter by hand you can produce a high output as long as there are no high pass filters. Check the configuration for filters. There is no way of knowing the expected output when shaking it by hand.

ENVIRONMENTAL INFORMATION



This electronic equipment was manufactured according to high quality standards to ensure safe and reliable operation when used as intended. Due to its nature, this equipment may contain small quantities of substances known to be hazardous to the environment or to human health if released into the environment. For this reason, Waste Electrical and Electronic Equipment (commonly known as WEEE) should never be disposed of in the public waste stream. The “Crossed-Out Waste Bin” label affixed to this product is a reminder to dispose of this product in accordance with local WEEE regulations. If you have questions about the disposal process, please contact Metrix Customer Services.

info@metrixvibration.com
www.metrixvibration.com
8824 Fallbrook Dr. Houston, TX 77064, USA
Tel: 1.281.940.1802 • Fax: 1.713.559.9421
After Hours (CST) Technical Assistance: 1.713.452.9703