4-20 mA

VIBRATION MONITORING

PROTECTION & RELIABILITY INSTRUMENTS
4-20 mA technology can be used to measure temperature, pressure, flow and speed as well as the overall vibration of rotating machines. Adding a vibration sensor/transmitter to the machine provides a critical measure of the machine’s health, and can be used to identify changes in balance, alignment, gears, bearings, and many other potential faults.

**How it works**

The purpose of the 4-20 mA analog current loop is to transmit the signal from an analog vibration sensor over a distance in the form of a 4-20 mA current signal. The current signal generated is proportional to the overall vibration of the equipment or machinery that is being monitored. This output current has a range of 4-20 mA, with 4 representing the minimum and 20 representing maximum amplitudes (within the range of 4-20 mA). The 4-20 mA signal output is proportional to the overall amplitude generated within a defined frequency band. Therefore, the signal does not include data from frequencies outside the frequency band, but includes all vibration (critical and non-critical faults) within that band.

**What We Offer**

CTC offers a wide array of 4-20 mA output solutions for industrial applications. CTC’s standard 4-20 mA loop powered vibration sensors are available with velocity or acceleration, alongside temperature output measurements options. CTC’s loop powered sensor line also includes a dual output option, with both 4-20 mA output and dynamic output configurations in one sensor. Other options include 24 Volt DC powered transmitters that power standard IEPE accelerometers and convert the vibration to a powered 4-20mA signal. These transmitters also offer a 4-20 mA output for temperature when coupled with CTC dual output vibration and temperature sensors.
A loop power vibration sensor/transmitter like the LP200 Series (4-20 mA proportional to vibration measured in velocity) or the LP300 Series (4-20 mA proportional to vibration measured in acceleration) can be mounted on the machine and added to the control loop. As the overall vibration of the machine changes, the 4-20 mA output will vary proportionally.

Only two wires are required to supply power to the sensor and send the current signal. A loop supply voltage is used to power the remote sensor. A series resistor $R_L$ at the loop power supply converts this current to a voltage that can be used by the process monitor/controller to record or distribute the parameter being measured.

$$R_L (\text{max}) = \frac{V_P - 15 \text{ V}}{0.020 \text{ A}}$$
Dual output power sensors provide a secondary output of dynamic vibration. These secondary outputs could be acceleration or velocity and are combined in three different loop power sensor configurations.

LP401 Series – overall velocity (4-20mA) and dynamic velocity (100mV/in/sec)

LP402 Series – overall velocity (4-20 mA) and dynamic acceleration (100 mV/g)

LP404 Series – overall acceleration (4-20 mA) and dynamic acceleration (100 mV/g)
LP200 & LP300 Series

4-20 mA Current Loop
Overall Vibration

PLC, DCS, SCADA

LP400 Series

4-20 mA Current Loop
Overall Vibration
Dynamic Output
Optional Dynamic Vibration Output

PLC, DCS, SCADA
Dual output LP23X and LP33X Series sensors contain an integrated circuit to measure the temperature inside the sensor case. The temperature output is monitored in the form of \( mV_{\text{DC}}/\degree C \) using a voltmeter across pins C & B of the sensor when the circuit is powered by the 4-20mA loop at pins A & B. The DC voltage output is proportional to temperature from \(-40 \degree C \ (0.10 \ V_{\text{DC}}) \) to \(+100 \degree C \ (1.35 \ V_{\text{DC}}) \) or \(-40 \degree F \ (.10 \ V_{\text{DC}}) \) to \(+212 \degree F \ (1.35 \ V_{\text{DC}}) \). This output can be trended in voltage to monitor the change in temperature of the machine.
Signal conditioners can be used in conjunction with standard dynamic accelerometers, piezo velocity sensors, or displacement probes. The Signal Conditioner accepts the dynamic input and converts it to a proportional 4-20 mA output for the PLC, DCS or SCADA system. The Signal Conditioner can be adjusted in the field so that the scaling and filters match your application. The dynamic vibration signal is available from a standard BNC connection on the front of the Signal Conditioner, or as an optional output from the terminal block.

The Signal Conditioner is also compatible with the TA102, TA104, TA131, TA133, TA135 and TA184 series dual output vibration and temperature sensors. The signal conditioner in combination with any of these sensors will provide one 4-20 mA output proportional to vibration, and a second 4-20 mA output proportional to temperature.
**XE150 Series: Dynamic Output for Analysis**
- 1-8 channel signal conditioner enclosure
- Provides 4-20 mA signals & dynamic powered output
- Link to PLC /DCS Systems
- Available in Fiberglass or Stainless Steel
- For use with accelerometers, dual output, piezo velocity sensors & proximity probes

**PMX1000**
- 1-2 channel process control enclosure with display and relay or display only
- Relays trigger alarm or shutdown
- 4-290 mA output

**MVR1000**
- 4 channel compact vibration monitoring system
- Dynamic external links
- Sunlight viewable display
- SPDT (Form C) 2 relays each
- For use with accelerometers, piezo velocity sensors & proximity probes

**RXE150**
- Multi-channel vibration switch
- PLC, DCS, SCADA Connectivity
- 24/7 Monitoring with Shutdown Alarm
- Field Configurable
- Dynamic outputs for vibration analysis

**XE550 & XE650 Series Ethernet Enclosures**
- Ethernet output enabled SC200 series signal conditioner enclosure
- Available in Fiberglass or Stainless steel
- Standard and dual output options available
- No inputs and outputs provided
VP Series

ViPR vibration protection and relay system to protect critical machinery from excessive vibration and catastrophic failure.

The VP series protection and relay system will display the vibration level from a signal conditioner or a loop power sensor with the capability to trigger alarms and shutdown machinery based on the amplitude of the overall vibration within a selected frequency range. Dual output versions display both vibration and temperature.

- Sunlight viewable display of vibration levels: IPS, G’s, mils, or customized scale
- Protect critical equipment with relays to trigger alarms or shutdowns
- 4-20 mA retransmission for use with PLC, DCS, or SCADA systems
- Pre-wired for turnkey solution – just wire Sensors and Output Into Easily Accessible screw terminals
CTC is the world leader in the design and manufacture of industrial accelerometers, piezo velocity transducers, 4-20 mA vibration sensors, and proximity probes as well as all related mounting hardware, cabling, and junction boxes. Our products enable efficient vibration monitoring for predictive maintenance in a wide variety of industries. Industries served include cement, mining, petrochemical, food & beverage, auto, steel, wind, paper & pulp, power generation, water & wastewater treatment, pharmaceutical, hospitals, bottling, and more. Our mission is to offer the widest variety of accelerometers and vibration hardware products, which are compatible with data collectors and online monitoring systems, as well as the tools for installation.

The CTC product line features vibration analysis hardware for heavy industry. All CTC products are backed by our unconditional, lifetime warranty. If any CTC product should ever fail, we will repair or replace it at no charge.

The PRO line offers 4-20mA vibration monitoring solutions and proximity probes. All PRO products are backed by a lifetime warranty on materials and workmanship. PRO will repair or replace any of our products as long as the product was not subjected to misuse, neglect, natural disasters, improper installation, or modification.

The TMP line features vibration analysis hardware for research and development. All TMP products are backed by a five year warranty on materials & workmanship for standard sensors and a two year warranty for all accessories, cables, connectors, and custom & private labelled products.

All stock products qualify for a full refund if returned in new condition within 90 days of shipment. Build to order products qualify for a 50% refund if returned in new condition within 90 days of shipment. Custom products are quoted and built specifically to the requirements of the customer, which may include completely custom product designs or private labeled versions of standard products for OEM customers. Custom products ordered are non-cancellable, non-returnable and non-refundable.