



PROTECTION & RELIABILITY INSTRUMENTS



LP400 Series Product Manual

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INTRODUCTION

4-20 mA Vibration Monitoring Process Overview

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. It can be used to identify changes in balance, alignment, gears, bearings, and many other potential faults. 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.

LP400 Series Overview

LP400 Series 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 (4-20 mA) and dynamic velocity (100mV/in/sec)

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

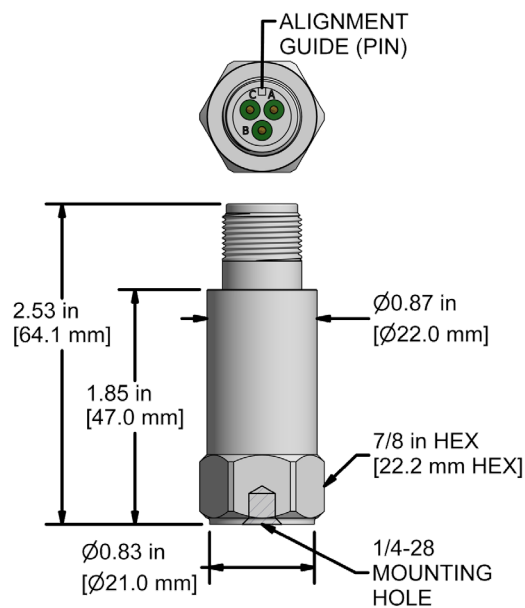
LP404 Series: Overall acceleration (4-20 mA) and dynamic acceleration (100 mV/g)



PRODUCT SPECIFICATIONS

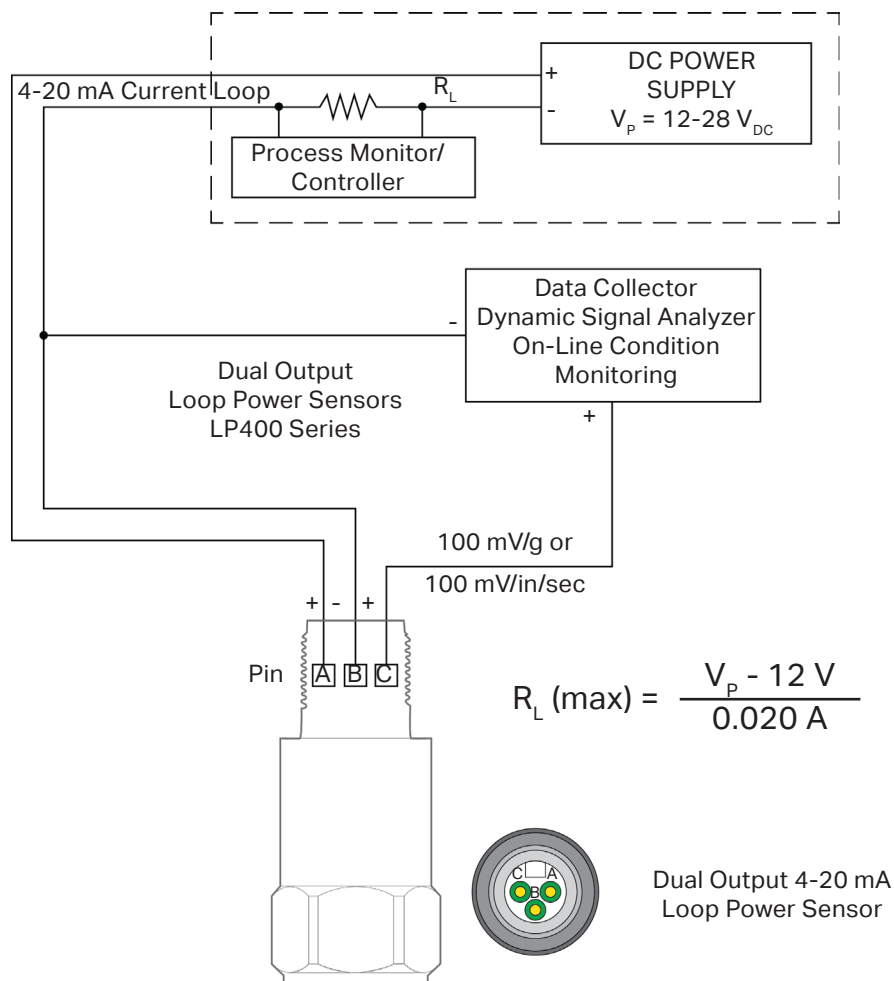
Power Input	12-28 V _{DC} supply voltage required
Band-pass filter	The vibration sensor contains a band-pass filter, consisting of a low-pass and a high-pass.
Analog output	Full scale output of 4-20 mA(DC) Dynamic Velocity (mV _{AC} /IPS) OR Dynamic Acceleration (mV _{AC} /g)
Operation	Filters the signal, and normalizes the output to the specified full-scale output. Performs a true PEAK or RMS conversion and transmits this data in a 4-20 mA format.
Temperature Range	-40 °C to 185 °C (-40 °C to 85 °C)

DIMENSION DRAWINGS



WIRING

Only two wires are required to send the current signal and also supply power to the sensor. A loop supply voltage is used to power the remote sensor. The remote sensor regulates the loop current such that the loop current represents the value of the parameter being measured by the 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.



Loop Resistance Calculations

Maximum loop resistance can be calculated by:

$$R_L (\text{max}) = \frac{V_P - 15 \text{ V}}{20 \text{ mA}} \times \frac{1 \text{ mA}}{0.001 \text{ A}}$$

MEASUREMENT

FULL SCALE MEASUREMENT RANGE	ACTUAL VIBRATION	EXPECTED mA OUTPUT AT 100Hz
0 - 0.4 IPS (0 - 10 mm/s) (LP401, LP402 Series)	0	4
	0.1 (2.5 mm/s)	8
	0.2 (5.0 mm/s)	12
	0.3 (7.5 mm/s)	16
	0.4 (10.0 mm/s)	20
0 - 0.5 IPS (LP401, LP402 Series)	0	4
	0.125	8
	0.25	12
	0.375	16
	0.5	20
0 - 0.8 IPS (0 - 20 mm/s) (LP401, LP402 Series)	0	4
	0.2 (5.0 mm/s)	8
	0.4 (10.0 mm/s)	12
	0.6 (15.0 mm/s)	16
	0.8 (20.0 mm/s)	20
0 - 1.0 IPS (LP401, LP402 Series) 0 - 1.0 g (LP404 Series)	0	4
	0.25	8
	0.5	12
	0.75	16
	1	20
0 - 2.0 IPS (LP401, LP402 Series) 0 - 2.0 g (LP404 Series)	0	4
	0.25	6
	0.5	8
	0.75	10
	1	12
	1.25	14
	1.5	16
	1.75	18
	2	20

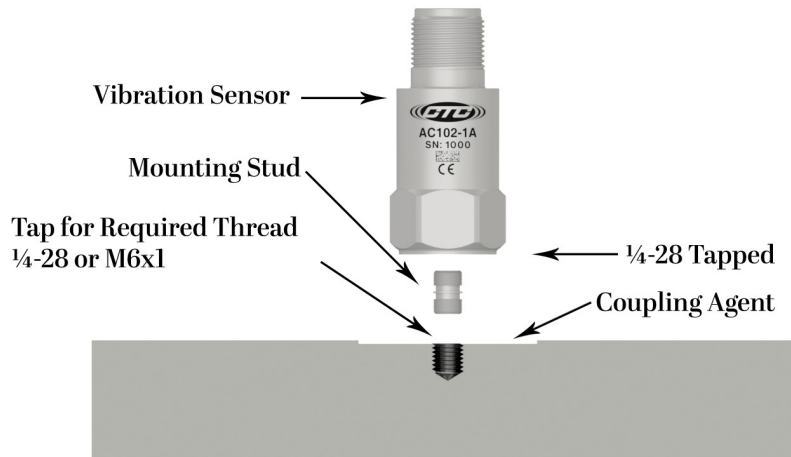


MEASUREMENT

FULL SCALE MEASUREMENT RANGE	ACTUAL VIBRATION	EXPECTED mA OUTPUT AT 100Hz
0 - 5.0 g (LP404 Series)	0	4
	1.25	8
	2.5	12
	3.75	16
	5	20
0 - 10.0 g (LP404 Series)	0	4
	1.25	6
	2.5	8
	3.75	10
	5	12
	6.25	14
	7.5	16
	8.75	18
	10	20
0 - 20.0 g (LP404 Series)	0	4
	2.5	6
	5	8
	7.5	10
	10	12
	12.5	14
	15	16
	17.5	18
	20	20

INSTALLATION

Hand tighten the sensor to the mounting disk and tighten using **2 to 5 ft-lbs of mounting force**.



- The mounting torque is important to the frequency response of the sensor for the following reasons:
 - If the sensor is not tight enough, proper coupling between the base of the sensor and the mounting disk will not be achieved.
 - If the sensor is over tightened, stud failure may occur.
- A coupling agent (such as MH109-2A epoxy) will maximize the high frequency response of your hardware, but is not required.

Permanent/Stud Mounting Surface Preparation

Prepare flat surface using a spot face tool and pilot drill hole using a CTC spot face installation tool.

The mounting surface should be clean and free from any residue or paint.

Tap for required thread (1/4 - 28 or M6x1).

Install sensor.

- Suggested Installation Tool Kit: MH117-1B



Adhesive Mounting Installation

Ensure mounting surface is clean and free from any residue or paint to ensure proper bonding of the adhesive.

A smooth, flat mounting surface is desirable, and can be achieved by milling or grinding at the surface where the mounting stud is to be installed.

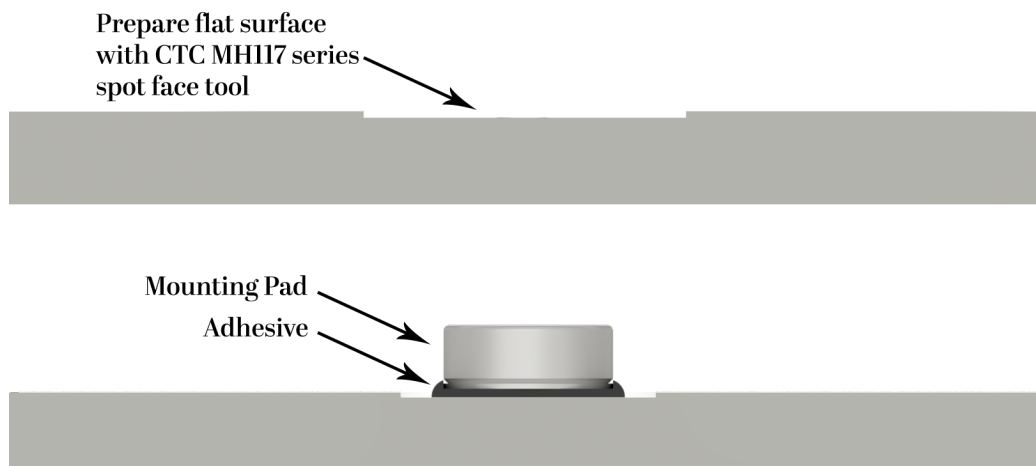
Place a small portion of adhesive on the underside of the mounting base.

Firmly press down the mounting disk to mounting area to force the adhesive out from under the disk.

Hold disk onto surface until the adhesive can support the weight of the mounting disk, ensuring the disk does not move or slide on the adhesive.

Allow for adhesive to fully cure.

Install sensor.



Motor Fin Mount Probe/Pad Installation

Prepare cooling fins on motor for mounting by scraping or grinding any paint or debris between cooling fins.

Clean mounting area with a non-residue spray degreaser that will not leave a thin film lubricating residue.

Mix adhesive.

Apply adhesive to the sides and the bottom of the probe portion of the motor fin mount probe/pad (please note: the area is intentionally roughened to enhance the bonding area).

Place the motor fin mount probe/pad between the motor fins at the desired location.

- The probe must fit in between the motor fins and the bottom of the probe must contact the motor casing.
- For motors that have a space greater than ½ in. between each fin, motor fin mount probe pads with a thickness of ½ in. are available and will reduce the amount of adhesive needed.

Firmly press the motor fin mount probe/pad into place, ensuring the bottom of the motor fin mount probe/pad is touching the motor casing (this contact area is where the vibration is transferred from the motor to the sensor).

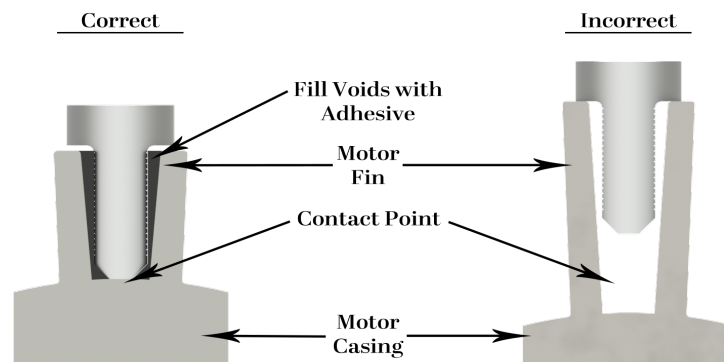
- The tip of the motor fin mount probe/pad should be as flat against the motor casing as possible (See Figure 2A).
- **The motor fin mount probe/pad should not be resting on the top of the fins – if it does, then the bottom of the probe may not be in direct contact with the motor casing** (See Figure 2B).

Use a spatula to redirect any epoxy that has been displaced from the mounting area when pushing the fin mount probe/pad into place.

Fill in any remaining voids with adhesive to ensure the motor fin will be fixed in place.

Allow for adhesive to fully cure.

Install sensor.



WARRANTY & REFUND

Warranty

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.

Refund

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.

