PROTECTION & RELIABILITY
OPTIMIZATION INSTRUMENTS

WIRING

Connecting & Powering Loop Power Sensors

CONNECT TO CONFIDENCE

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Lifetime Warranty on Materials & Workmanship

PRO will repair or replace any of our products under warranty so long as the product was not subjected to misuse, neglect, natural disasters, improper installation or modification which caused the defect

4 - 20 mA Loop Power Sensors:

The measurement of our industrial processes such as temperature, pressure, flow, and speed has always used some form of instrumentation as an aid. An early and simple measurement of temperature was accomplished with a thermometer and recorded manually on paper indicating not only the temperature, but also the time it was taken. Circular charts, pneumatic meters, and strip chart recorders became a standard means for process measurements, and evolved into an early form of process control that included amplitude and time dependent data that could be trended or analyzed. The instruments of ***Yesterday*** have given way to modern control schemes of ***Today*** like the PLC, DCS, and SCADA systems integrating multiple sensors, inputs, and outputs in operations centers. Today's modern systems offer flexibility in sensor selection, and use standard 4-20 mA current loops for most applications. Process control provides a wide variety of monitoring options, time based trending, and control applications to keep machines performing efficiently and running at their required capabilities. 4-20 mA current loops are inherently low in noise and signals can be transmitted over long distances making an ideal combination for industrial applications. Loop Power Sensor outputs are proportional to current with 4 mA representing a zero level, and 20 mA representing a maximum level over a given range. Basically, they regulate the current flowing in the loop, and have 4 – 20 mA outputs proportional to Acceleration or Velocity. As the vibration of the machine increases, the current output from the sensor increases. Adding a Loop Power Sensor to the machine provides a critical measure of the machines health, and can be used to identify changes in balance, alignment, gears, bearings, and many other potential faults that may not be currently detected. Monitoring machine vibrations can prevent undetected catastrophic failures from occurring, and at the same time require minimal human interaction to provide continuous machine protection.

Loop Power Sensors are a two wire technology where Pin A is positive and Pin B is negative. Please reference **Figure #4**. Typical loop power sensors are the:

- 4-20 mA proportional to Velocity = LP202 series, LP204 series, LP252 series, LP254 series, LP285 series, and LP284 series
- 4-20 mA proportional to Acceleration = LP302 series, LP304 series, LP352 series, and LP354 series

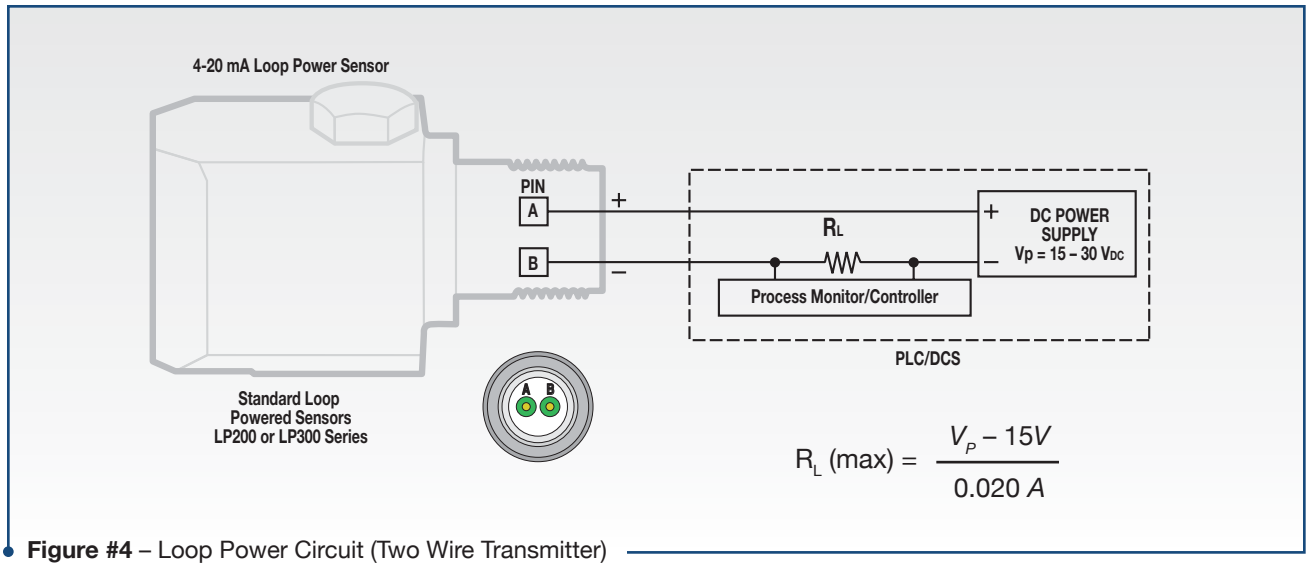

Figure #4 – Loop Power Circuit (Two Wire Transmitter)

Wiring 4 - 20 mA Loop Power Sensors:

Relative to **Figure #4**, for a two wire Loop Power Sensor, the positive wire would be connected to Pin A, and the negative wire would be connected to Pin B. The measurement device (R_L) will be placed in series with the negative wire between the Loop Power Sensor and the negative terminal of the power supply. In this configuration, the Process Monitor or Controller can measure the 4 – 20 mA current flowing in the current loop.

In many cases, R_L will be a 250Ω resistor. In this scenario, Ohm's Law ($E = IR$) will provide:

- a zero value of 1 V_{DC} ($E = 0.004\ A \times 250\Omega$)
- a maximum value of 5 V_{DC} ($E = 0.020\ A \times 250\Omega$)
- When $R_L = 250\Omega$, and Vp ≤ 24 V_{DC}, then R_L should be ½ watt
- When $R_L = 250\Omega$, and Vp > 24 V_{DC}, but ≤ 30 V_{DC}, then R_L should be 1 watt

Dual Output 4 - 20 mA Loop Power Sensors:

Dual output loop power sensors also 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:

1. LP401 Series – Overall Velocity (4 – 20 mA), and Dynamic Velocity (100 mV/in/sec)
2. LP402 Series – Overall Velocity (4 – 20 mA), and Dynamic Acceleration (100 mV/g)
3. LP404 Series – Overall Acceleration (4 – 20 mA), and Dynamic Acceleration (100 mV/g)

Dual Output 4 - 20 mA Loop Power Sensors are a three wire technology where Pin A is the positive 4 – 20 mA power, Pin B is a shared common, and Pin C is a positive dynamic vibration. Please reference **Figure #5**.

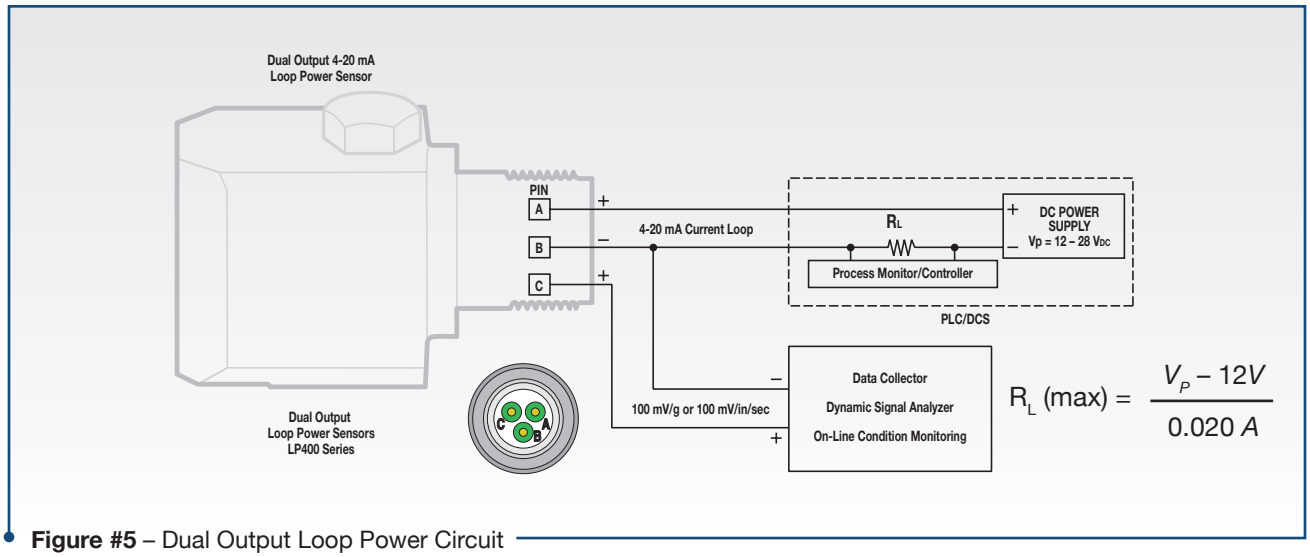

Figure #5 – Dual Output Loop Power Circuit

Wiring Dual Output 4 - 20 mA Loop Power Sensors:

Relative to **Figure #5**, for a three wire Dual Output Loop Power Sensor, the positive 4 – 20 mA wire would be connected to Pin A, the negative wire would be a shared common connected to Pin B, and the positive Dynamic Vibration wire would be connected to Pin C. The 4 – 20 mA measurement device (R_L) will be placed in series with the negative wire between the Loop Power Sensor and the negative terminal of the power supply. In this configuration, the Process Monitor or Controller can measure the 4 – 20 mA current flowing in the current loop. The Data Collector, Dynamic Signal Analyzer, or On-line Condition Monitoring System will measure the Dynamic Vibration (100 mV/g or 100 mV/in/sec) across Pin C (+) and Pin B (-). **The 4 – 20 mA loop power provides all of the power for the sensor, including the Dynamic Vibration.**

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