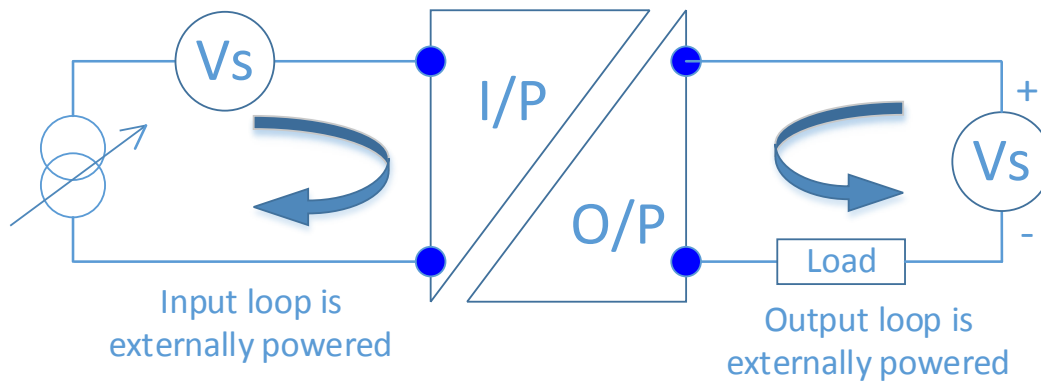


## Simple loop isolation using a SEM1020 loop powered isolator

### Basic block diagram for SEM1020



### The most common uses for the SEM1020

- To provide access to or duplicate an existing loop without introducing any ground loop effects
- To allow connection between:-
  - A sensor with a powered output loop
  - A sensor on a PSU powered loop with an indicator or loop monitoring equipment that is also providing the power to drive the loop from its input pins.
- To isolate and reduce noise being fed into the input of the monitoring equipment.
- To boost a signal over a long run or where the volt drop on the loop for new equipment added would be too much for the loop power supply to drive.



Most analogue (4 to 20) mA loops are grounded at a single point to reduce noise. Problems can occur when there is more than one grounding point because earth potentials will not be the same, and currents will flow between earth points causing errors or noisy signals.

If the (4 to 20) mA signal is connected to multiple instruments which have non isolated inputs this can also cause problems. A simple way to remove ground loops is to use signal isolators.

Sometimes poor isolation or low impedance to earth through sensors can give an undesired path to earth and cause errors. Isolating the temperature transmitter from the monitoring/control equipment such as a PLC or display can help remove this type of problem. This can occur with any type of sensor where some of the loop signal current can find a path to earth.

The terminology used with control loops can become confusing so the following definitions have been used:

**(4 to 20) mA Loop:** A 2 wire (4 to 20) mA signal which is connected between a single sensor and monitoring/control equipment (Display, Trip, PLC, etc.) of which there can be several on the loop circuit. The loop may be powered by the sensor, or one item of the monitoring equipment, or by a separate power supply unit.

### **Sensor outputs**

**Internally powered (Active) output:** A sensor that is supplying the power to drive the loop. This type of loop output cannot be connected to an externally powered loop without use of a signal isolator such as a unit from the SEM1000 series.

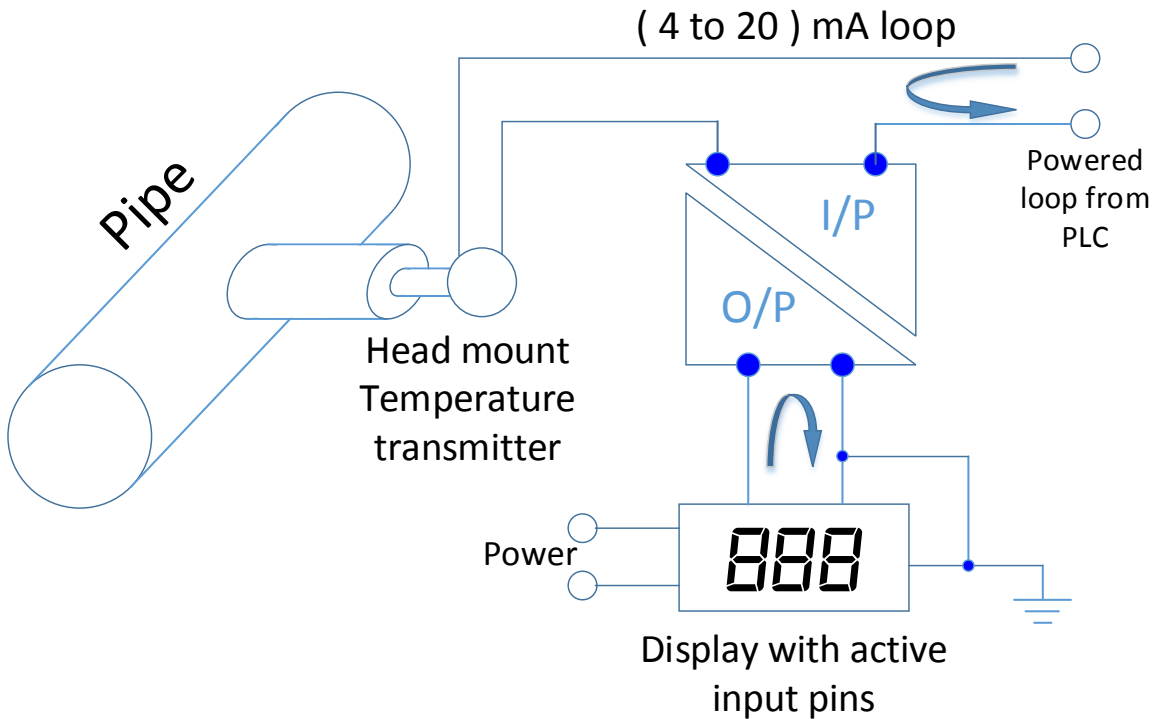
**Externally or loop powered (Passive) output:** A sensor that requires the loop it is connected onto to be powering the sensor.

### **Monitoring/control equipment inputs**

**Internally powered (Active) input:** Equipment that is supplying the power to drive the loop it is monitoring from its input pins. This type of loop input cannot be connected to an external power supply.

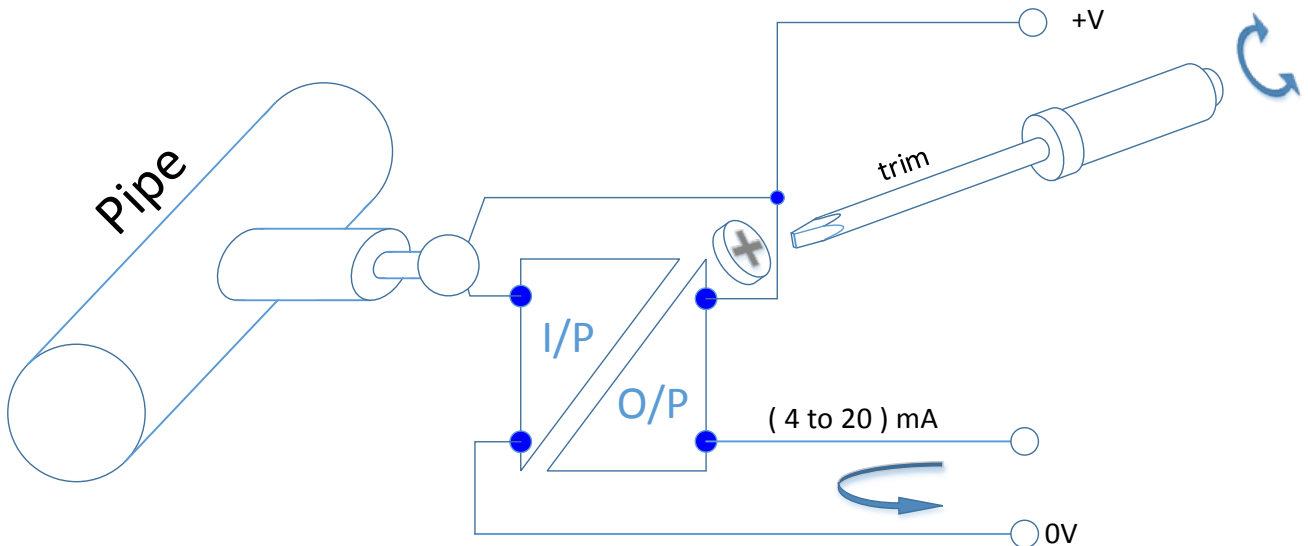
**Externally or loop powered (Passive) input:** Equipment where the loop being monitored must be powered externally from the input pins.

### Isolating an additional instrument on a (4 to 20) mA control loop



In this example the SEM1020 is used to connect a display with active input pins to a powered (4 to 20) mA control loop.

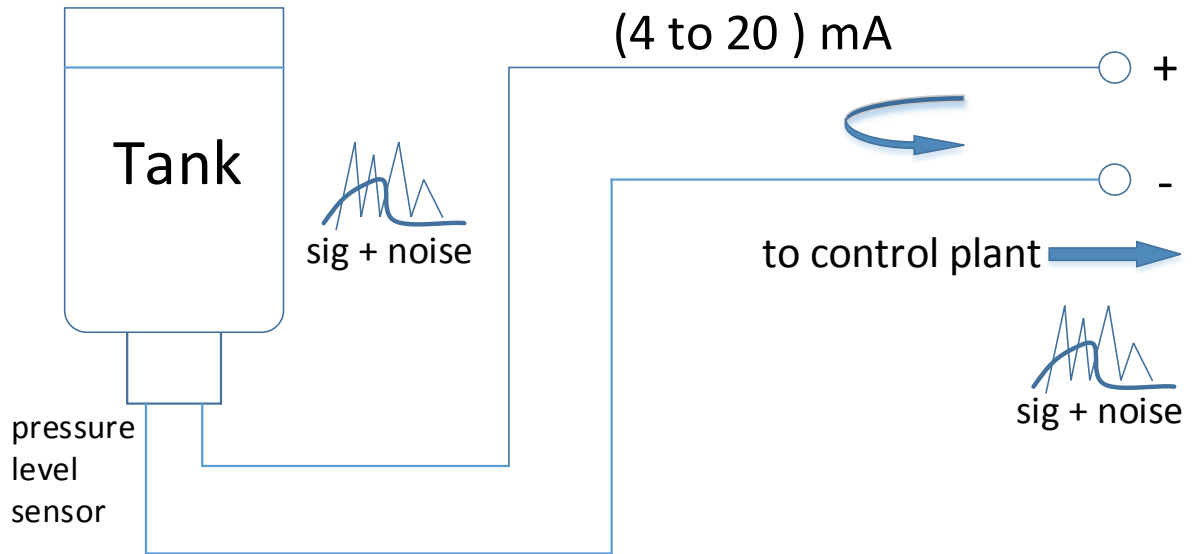
### Fine trim using a SEM1020



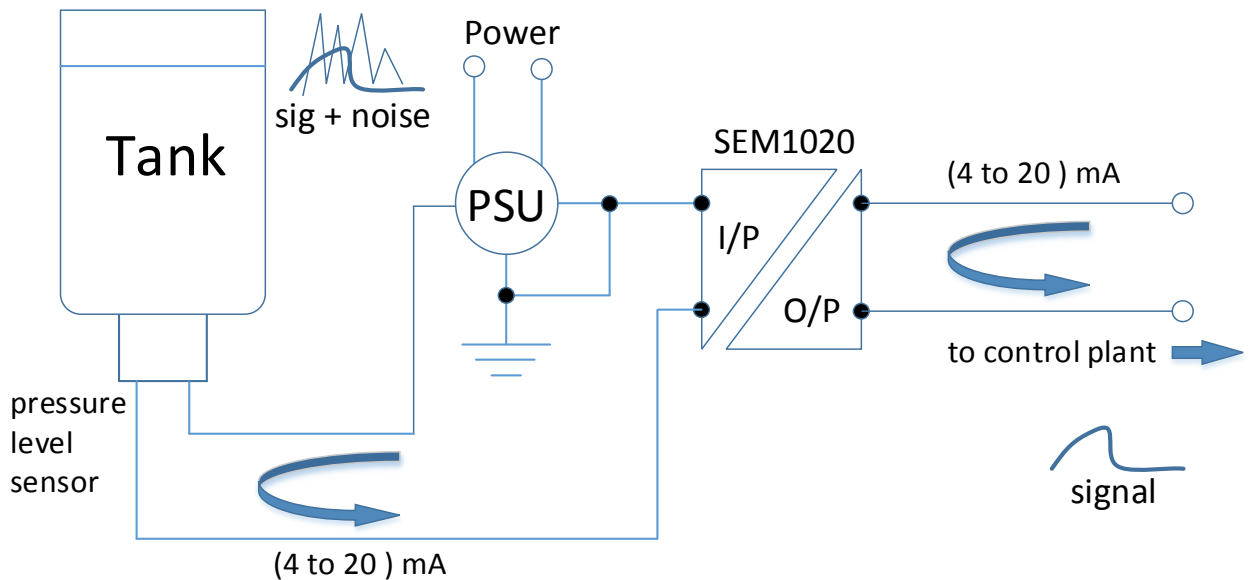
In this example the SEM1020 is used to add a fine trim to the (4 to 20) mA loop control signal from a pressure sensor that has no trim option.

**The SEM1020 can be used to block noise from being transferred to the control system**

Without a SEM1020



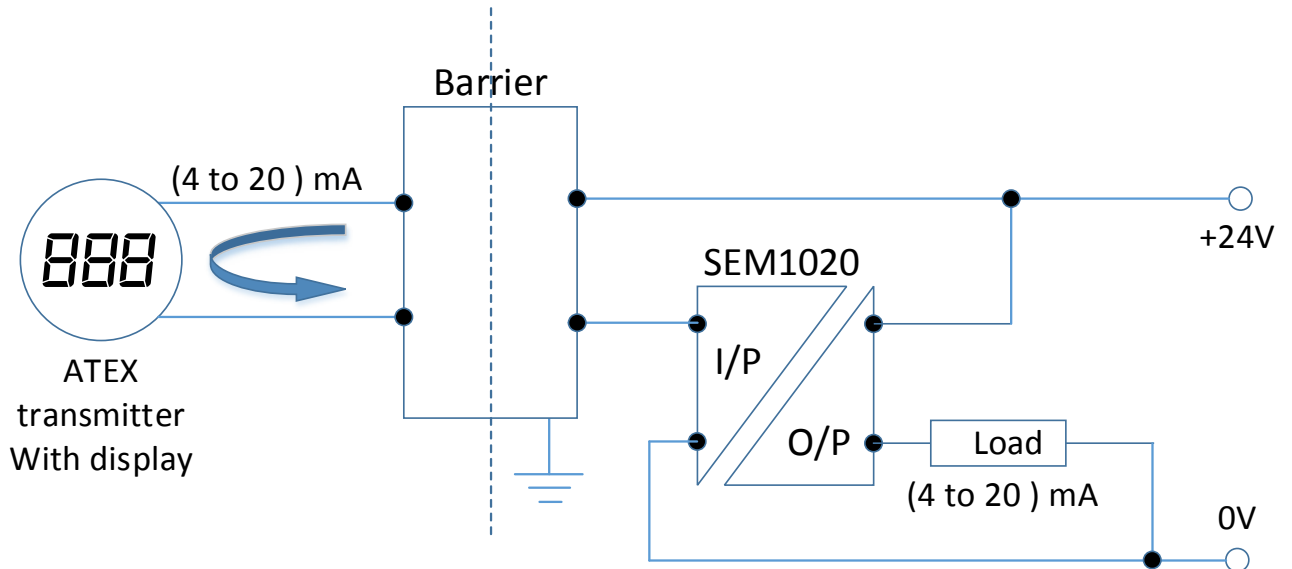
With a SEM1020



In this example the SEM1020 unit is connected between a sensor on a PSU powered loop and a control system with active input pins.

*Note: refer to the data sheet for details.*

**IS circuit using a SEM1020 to boost load capacity in the safe area.**



Some intrinsically safe circuits only have approximately 17 volts available for the transmitter and the load from a 24 Vdc supply; this is due to the barrier resistance. The SEM1020 in this circuit allows for higher loads in the safe area

**Alternatives**

Status Instruments has a range of isolators and signal conditioners to meet a large variety of conditions. Please see our website for the full list, or call and ask for assistance with choosing the correct instrument for your application.

See also the  
 SEM1600 range  
 SEM1700 range  
 SEM1200  
 MEDACS range