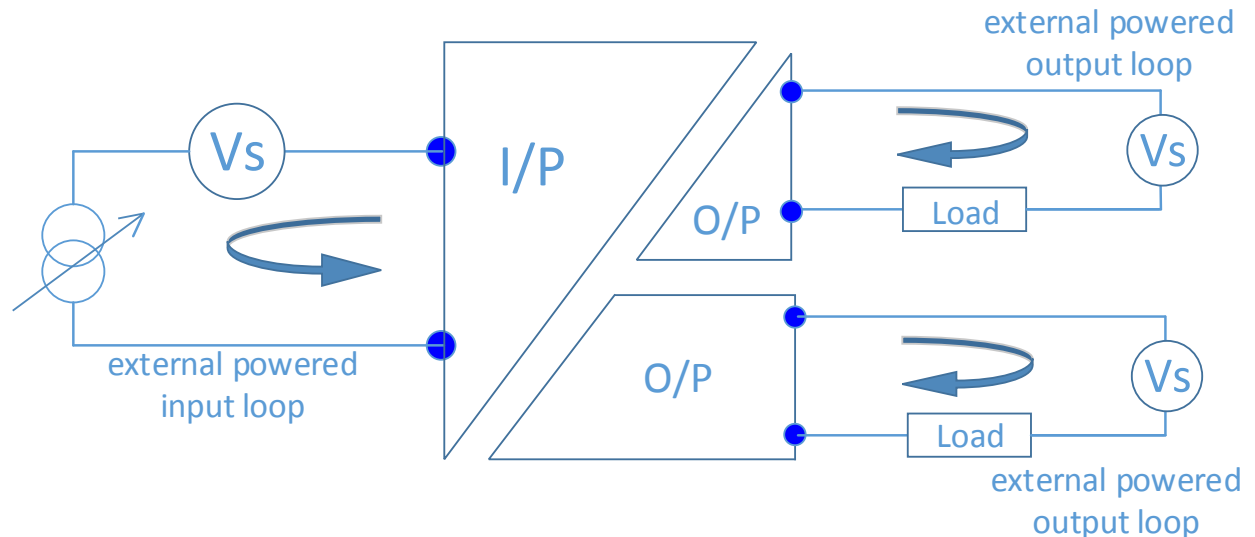


## Simple loop isolation using a SEM1200 loop powered splitter

Basic block diagram for SEM1200



Most analogue (4 to 20) mA loops are grounded at a single point. 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 such as the SEM1200 loop splitter. The SEM1200 can also be used to join monitoring equipment with active input pins onto a powered loop.

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

**Loop:** A 2 wire (4 to 20) mA dc 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.

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

### **SEM1200**

The most common uses for the SEM1200 are given as follows

- To provide access to or to 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 control or loop monitoring equipment that is 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.

## SEM1200 isolating a sensor from two separate (4 to 20) mA loops

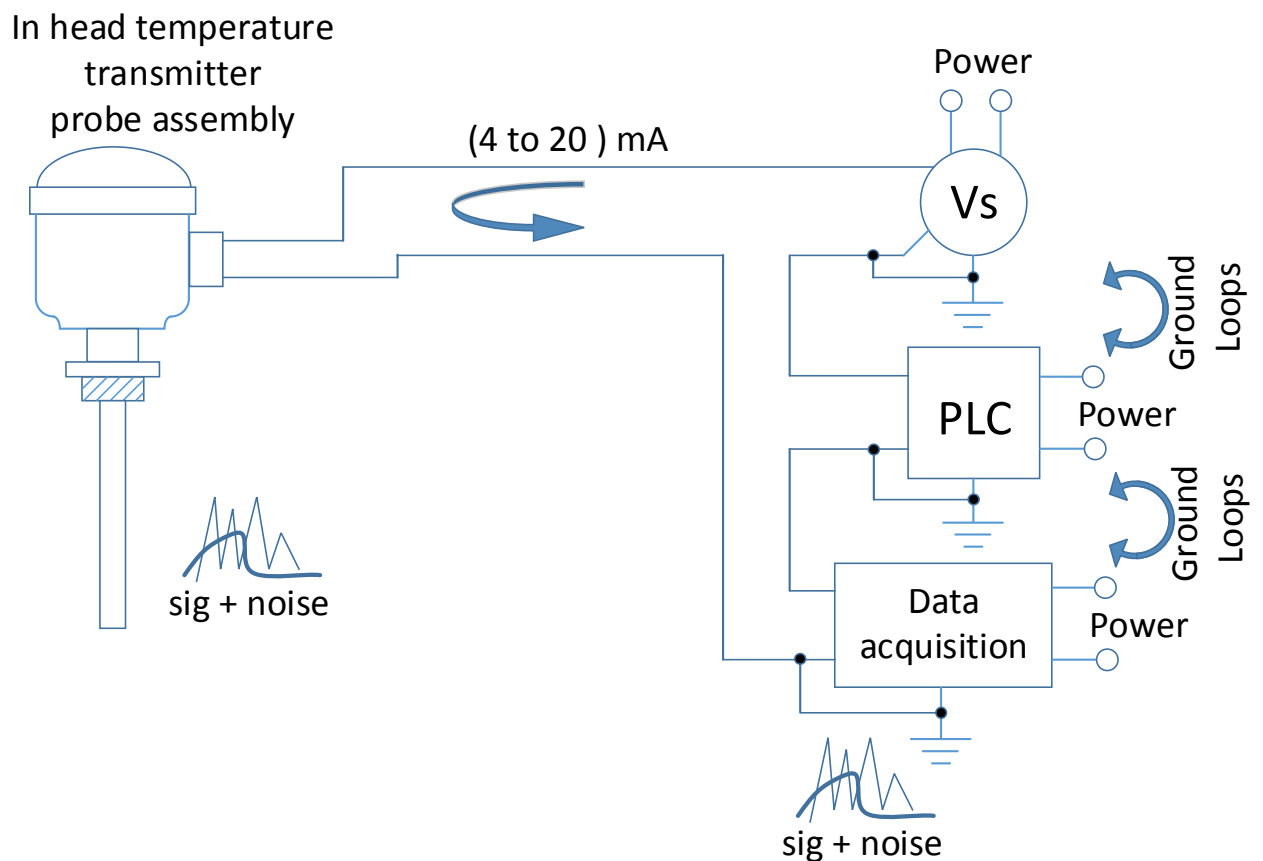
Diag A shows a loop powered temperature transmitter connected to a control system (PLC) and a data acquisition system. In this example a stand alone power supply has been used so the loop devices require passive input pins.

It is also possible for the power to come from one of the loop devices if it has active input pins.

Ground loops may be a problem with this circuit and any noise on the output of the transmitter will be transmitted to the inputs of the loop monitoring devices.

Several SEM1200 signal splitters can be put on a single loop if required

Diag A

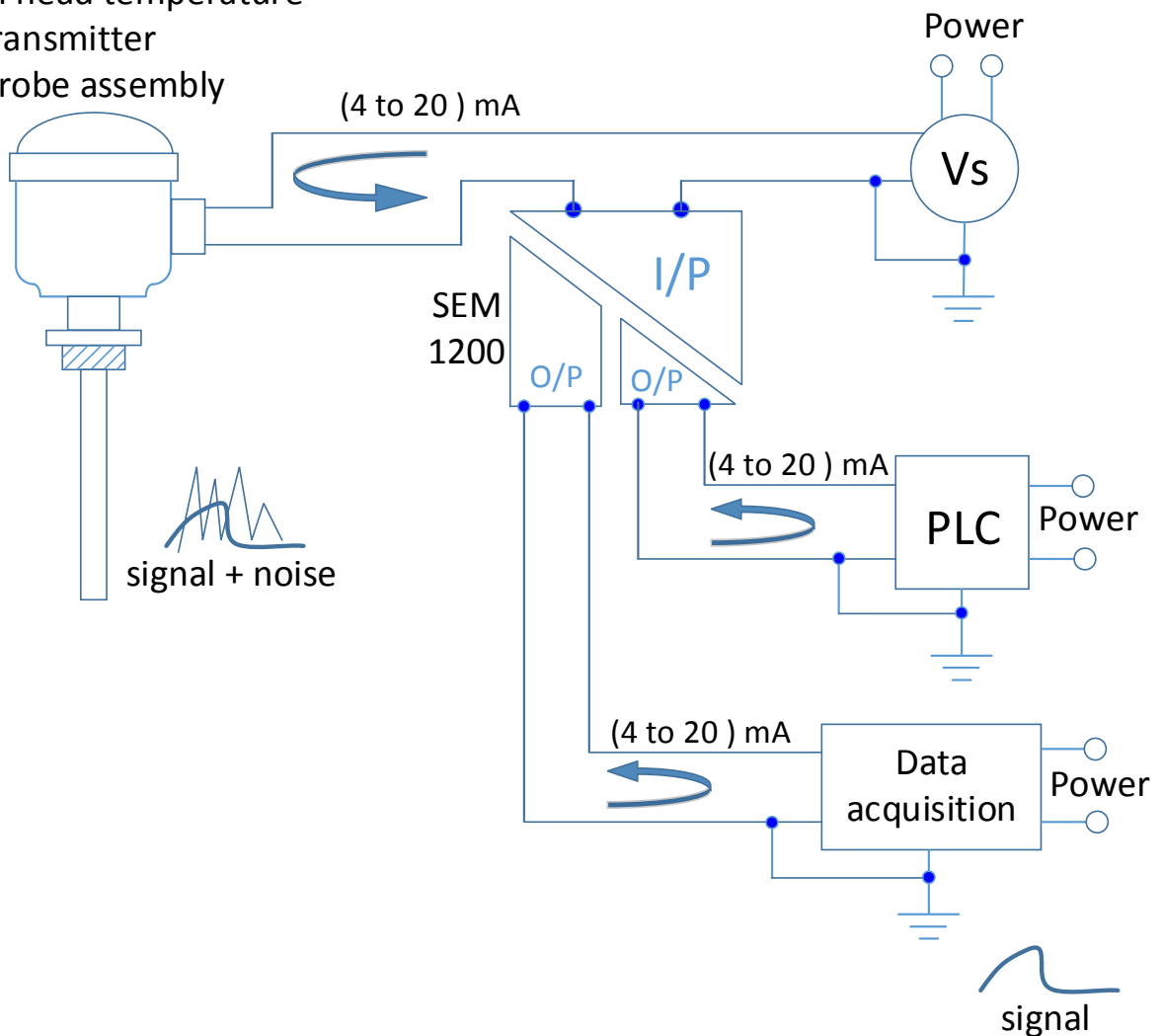


Diag B shows how a SEM1200 can be used to isolate the control/monitoring loops from each other: this will remove the ground loop path and block AC noise.

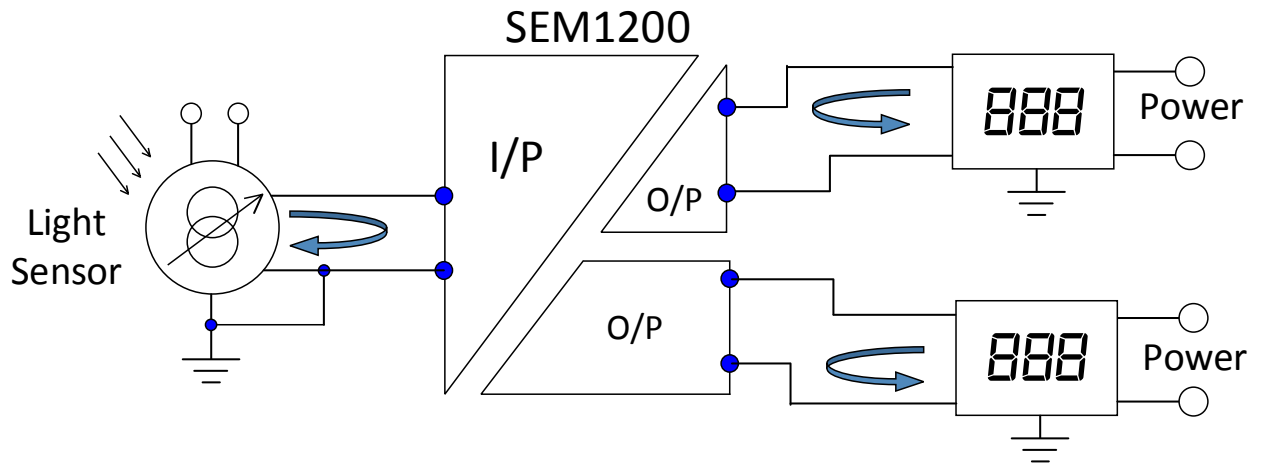
*Note: The (4 to 20) mA loop will now need to connect to the control/monitoring equipment via active input pins. If the equipment does not have active input pins, an additional power supply will be required to drive the loop.*

Diag B

In head temperature  
transmitter  
probe assembly



SEM1200 connecting a sensor with active output pins to two separate control devices with active input pins.



#### 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  
SEM1750  
SEM1720