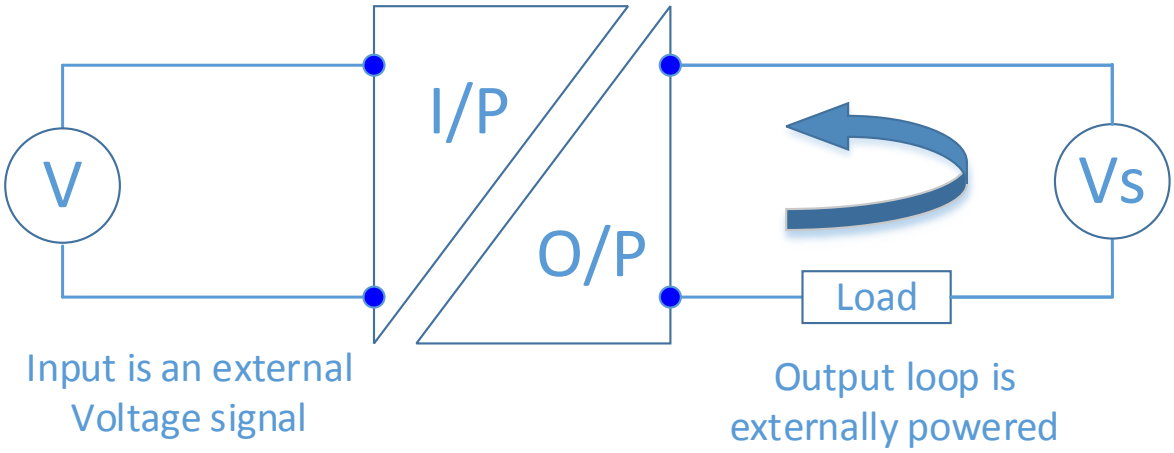
Simple loop isolation using a SEM1015 loop powered isolator

Basic block diagram for SEM1015



The most common uses for the SEM1015

- To allow connection between:-
  - A sensor that gives a voltage output signal
  - Other DC voltage signal with an indicator 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.

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:

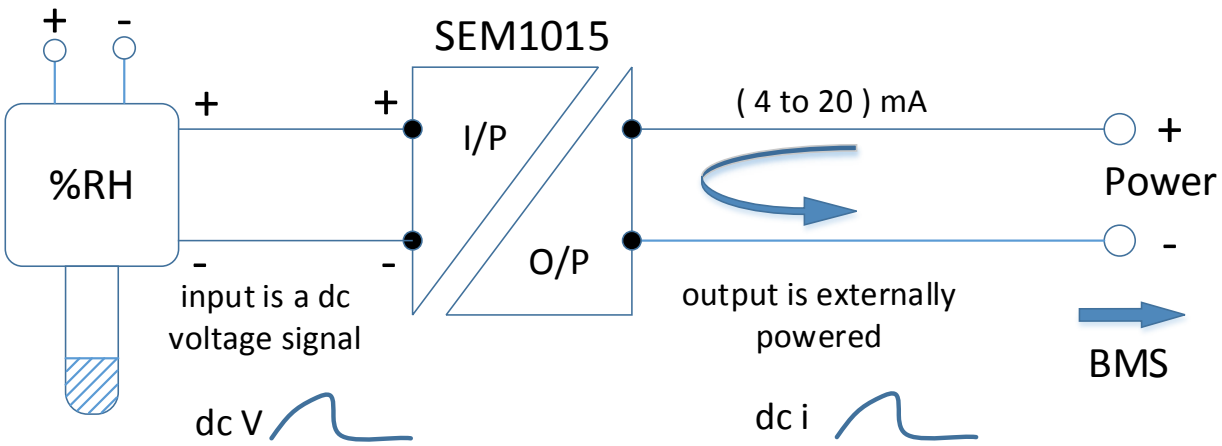
(4 to 20) mA Loop: A 2 wire (4 to 20) mA signal which is connected between a single sensor and monitoring/control equipment (Display, Trip, PLC, etc.) of which there can be several on the loop circuit.
The loop may be powered by the sensor, or one item of the monitoring equipment, or by a separate power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

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.

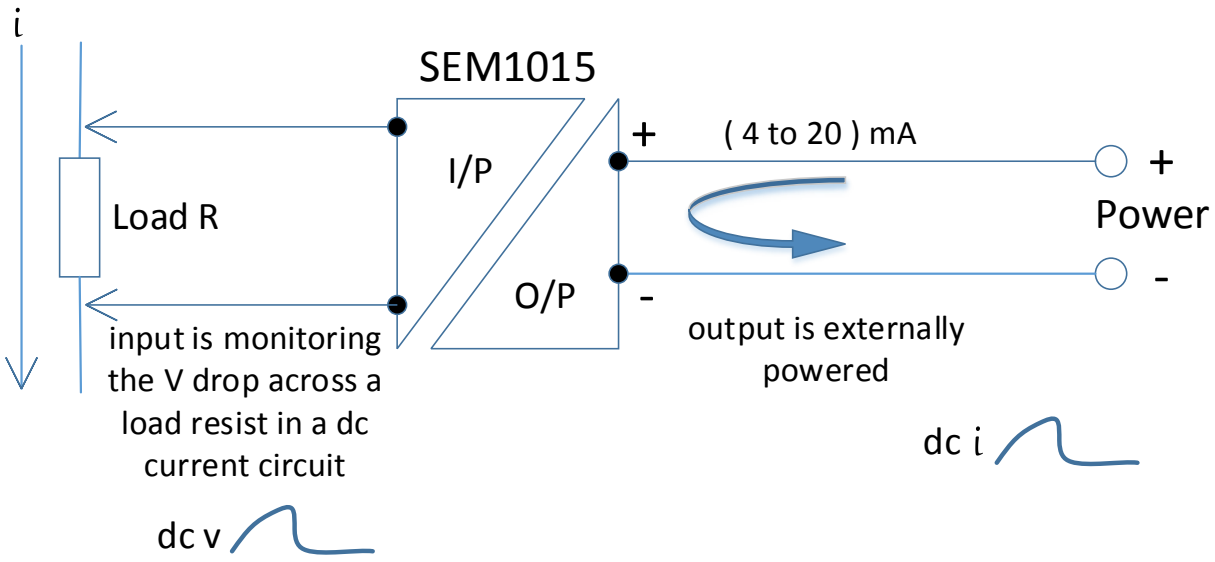
Externally or loop powered (Passive) input: Equipment where the loop being monitored must be powered externally from the input pins.

Connecting a sensor with a voltage output to a (4 to 20) mA control loop



In this example a %RH sensor with a voltage output signal is connected to a control loop via a SEM1015. The unit will provide isolation between the sensor and the control equipment in the building management system.
Note: refer to the data sheet for details.

Voltage detection using a SEM1015



In this example the SEM1015 is used to monitor the voltage dropped across a load in a dc circuit
The SEM1015 will help block ac noise from being transferred to the control system.
Note: refer to the data sheet for details.

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