

Application & Guidance Notes

Signal Conditioning & Process Control Equipment

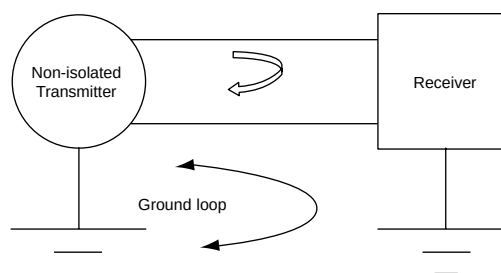
IMO

A brief introduction to common applications

Elimination of Ground Loops and AC Electrical Noise

Ground loops can occur where there are multiple current return paths or multiple connections to 'earth ground'. Ground loops cause problems by adding or subtracting a noise current or voltage from the process signal. The measuring system only sees the affected signal and so returns an inaccurate or unstable reading.

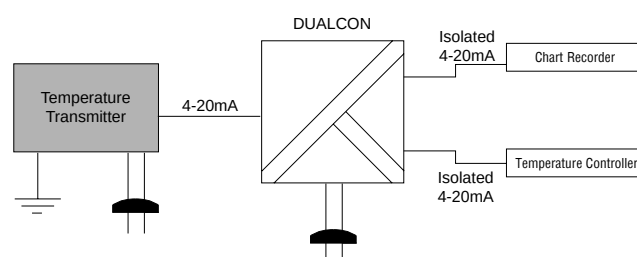
Putting a signal isolator between the earthed devices breaks the galvanic path (dc continuity) between the grounds, but allows the analogue signal through. In addition common mode voltages (ac continuity) generated by ac noise can also be rejected, leading to an electrically 'clean', accurate signal being sent to the measuring instrument.



Earth loops can occur where more than 'earth ground' exists, causing inaccurate signals

Transmitter Sharing and Signal Boosting

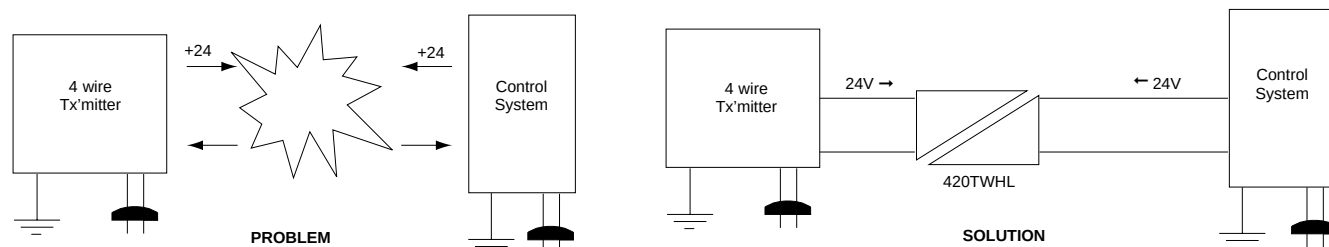
It is quite common for a process temperature transmitter to be connected to several different instruments, such as a temperature controller and a chart recorder. Signal isolators can be used to generate extra drive capability for an existing loop or to generate an extra loop, which can be adjusted using zero and span potentiometers without affecting the existing loop. It is also quite common to require both current and voltage outputs on the same device.



Two isolated loops operated from one transmitter

Bucking Power Supplies

This occurs when an existing loop and the measuring instrument are both attempting to power the same loop. A suitable isolator will accept power on both input and output and provide isolation between the two. A typical example would be where a Control System/PLC with 24Vdc transmitter excitation needs to be connected to a transmitter, which is line powered.



Signal Conversion

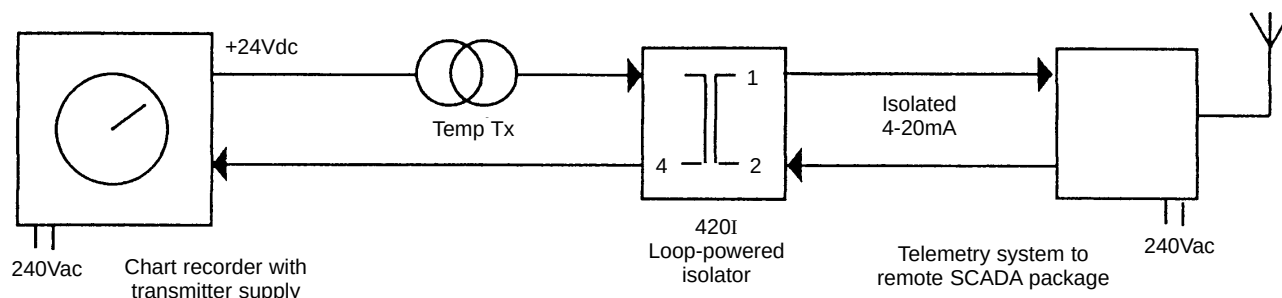
As well as providing isolation between input and output, signal conditioners are used to change an incoming signal into the form required by the control or monitoring system. For example a PLC may require 0-10Vdc input from a field instrument which generates a 4-20mA signal. An isolating signal converter can be used to both maintain the integrity of the 4-20mA signal whilst also providing an isolated 0-10Vdc output for the PLC. As well as changing the signal type, some conditioners can linearise the incoming signal from, say a thermocouple, and provide an output which is proportional to temperature. Other linearising functions available are square-root extraction for flow measurements using a pressure drop and linearisation for tank contents where the tank content is not linear with tank level.

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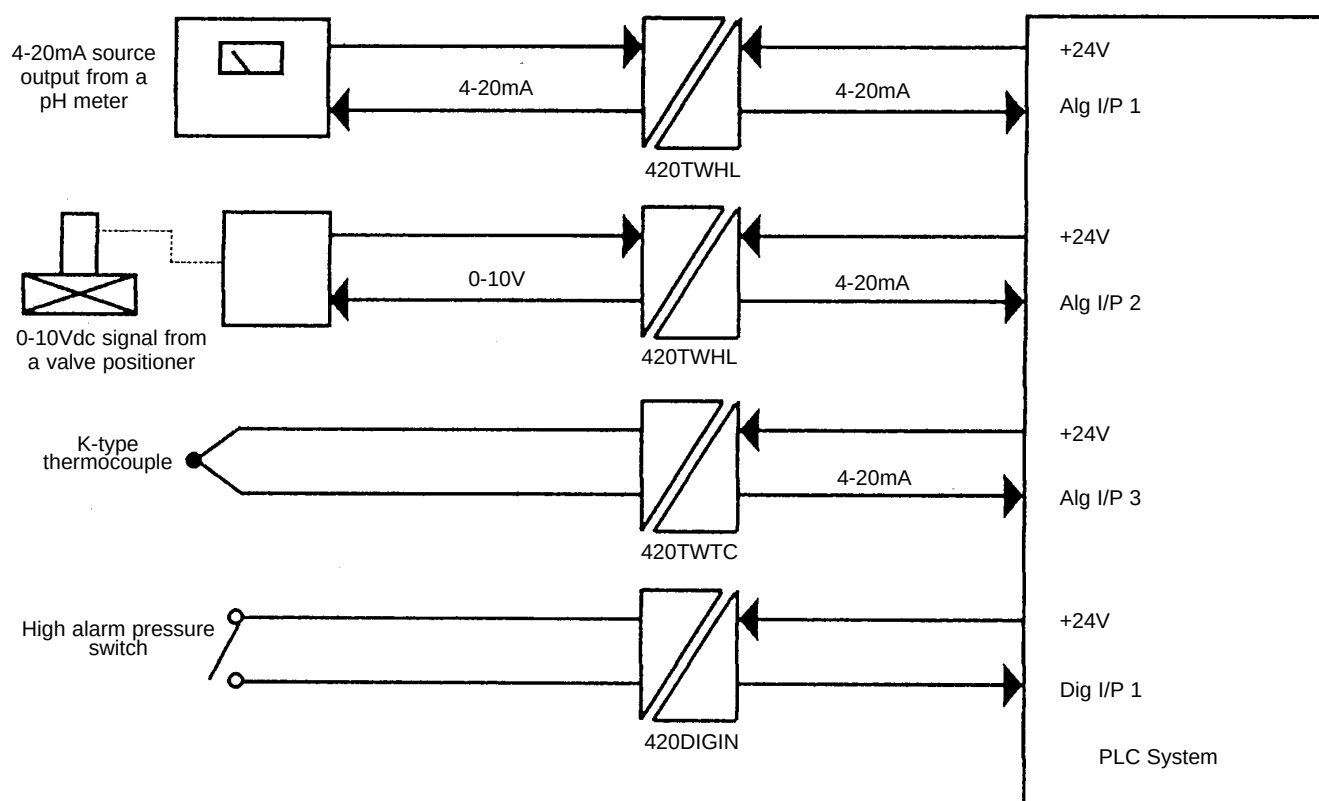
Signal Conditioning & Process Control Equipment (continued)



420I used to provide a second isolated 4-20mA from a single transmitter



The use of the 420TW series eliminates any possibility of stray earth loops and gives RFI protection



DUALCON used to provide complete isolation between 3 devices using the same transmitter

