

Why use direct wire temperature sensors?

On the surface, direct wiring of temperature sensors to a DCS or PLC looks cheaper and easier. But in the long run (especially with long sensor lead-wire runs) it may not be. Use of temperature transmitters to "shepherd" sensor signals along offers a number of advantages. According to Lori Risse, applications specialist for Moore Industries-International Inc. (Sepulveda, Calif.), when properly employed, transmitters can:

- Protect signals for plant noise—transmitters convert a sensor's "weak" low-level signal to a high-level RFI/EMI resistant signal (typically 4-20 mA) that will accurately withstand long distance transmission through a noisy plant.
- Prevent ground loops—a transmitter's built-in input/output/power signal isolation protects against signal inaccuracies caused by ground loops. Additionally, inexpensive 4-20 mA DCS and PLC input cards can be used instead of isolated thermocouple and RTD input cards.
- Enhance measurement accuracy—DCS and PLC systems measure readings over the entire (very wide) range of a sensor. Temperature transmitters can be calibrated to any range within a sensor's capabilities. Using a narrower range produces more accurate measurements.
- Reduce hardware costs and stocking requirements—transmitters convert RTD, T/C, mV, and ohm signals to a

standard 4-20 mA output allowing users can standardize on (and stock) inexpensive 4-20 mA DCS and PLC input cards.

- Cut wiring costs—fragile sensor extension wires cost three times more than the common shielded copper wire used for a temperature transmitter's 4-20 mA signal.
- Avoid lead wire resistance imbalances—temperature transmitters that accept true 4-wire RTD inputs avoid lead wire resistance imbalances resulting from wire corrosion and aging.
- Match the best sensor to the application—today's universal temperature transmitters (PC-programmable and smart) take nearly any RTD and thermocouple input. This lets users specify whatever sensor is best for each particular process point. Direct DCS inputs aren't nearly as flexible because they handle only one type of sensor input per card.
- Lower maintenance time and expense—with "smart" transmitters users can remotely track sensor operation and find sensor failure.
- Simplify engineering and maintenance and prevent miswiring—instead of numerous sensor lead-wire and DCS/PLC input board combinations, control design drawings need to show only a single wire (twisted pair) and input board type (4-20 mA). Simplified systems require easier maintenance and a lesser chance of loop miswiring.