Plant Safety Monitoring Using Honeywell Smart Multivariable Transmitters With the Multivariable Trip Switch

Using digital in a non-digital environment.

Problem: A small corner of a digitally integrated refinery needed warning of runaway process conditions.

Many engineers and managers assume that because a manufacturing plant or refinery is “digitally integrated” with the latest in control technology, every corner of the plant is connected in one form or another with the control system. This is not always the case particularly when the plant covers a large area or has been upgraded unevenly during its existence. In these cases, it is not unusual to have a remote process area all but ignored by improvements in control technology. It may be prohibitively expensive to upgrade these areas until the project can be incorporated into a larger overall improvement program.

In one case, a refinery had such a remote location which needed to protect personnel working in the process area from possible runaway process conditions. A small treatment process needed to be monitored for gas flow, pressure, and temperature. Although there was a small control room in the area, this had not been upgraded since the 1970's

Safety alarms exist in the process area but these were manually tripped by plant personnel in the event that a danger is perceived by the technicians.

Recently, safety inspections have identified this process area as a potential hazard due to lack of up to date automatic alarm capability as well as out of date process control.

Solution: The Honeywell Smart Multivariable Transmitter with Multivariable Trip Switch.

The plant needed an inexpensive, simple method for monitoring the process for flow, pressure, and temperature. Also needed was a technique for automatically setting off safety alarms in the event of a hazardous condition.

The Smart Multivariable Transmitter (SMV3000) provides measurement of differential pressure across a primary flow element such as an orifice or pitot tube, a process (static) pressure measurement and a process temperature using either an RTD or thermocouple. As the fourth process variable, the SMV3000 provides a compensated flow measurement based on the first three process variables. To meet the needs of the refining and other industries, the SMV3000 has a variety of flow units available for the flow process variable including cubic feet per minute (CFM) for volumetric readings and kilograms per minute (Kg/min) for mass flow measurements.

The Multivariable Trip Switch (MTS) manufactured by Vektron Corp. is a device which accepts a multivariable digital signal from Honeywell DE transmitters such as the SMV3000. Depending on the configuration of the MTS, the device selects one of the process variables to continuously monitor. An internal relay is tripped if a preset process variable limit is exceeded. This relay closure can be used to operate a heavier relay, which in turn is connected to an audible alarm or other safety device. The MTS is designed to be located in a control area behind a safety barrier. In the example of the refinery, the pressure process variable was monitored and in the event the

pressure exceeded the safe limit of the main pressure vessel, a relay was set to be tripped in the MTS thereby activating the main safety sirens.

Because the signal between the SMV3000 and the MTS is digital, this protocol can be used to ensure secure communications over long distances with no signal degradation. Greatly increased safety for the process area is thereby ensured with no need for multiple installations to increase reliability. False alarms are NOT A PROBLEM with the SMV3000/MTS combination.

Benefits

Installation of the SMV3000 with a Vektron MTS provides:

- Secure digital communications between the SMV3000 and the MTS
- Reliable alarming capability with no need for redundancy.
- Accurate measurement of the process flow through compensation for pressure and temperature variations.
- Significant dollar savings through the use of a single transmitter and relay trip to provide process area security
- The safety system can be expanded to provide relay closure for valve shut off through the addition of another MTS to the installation

Other Uses of the SMV3000 with Vektron Products:

The SMV3000 can also be used with a Vektron Multivariable Analog Interface (MVA) in the event that the four process variables must be accepted by an analog-only control system. Maintaining DE protocol between the SMV3000 and the MVA preserves the advantage of secure communication over two wires over long distances. Inside the control room, the 4 analog outputs of the MVA are directed to the control system over short cable runs where interference is less of a problem.

The SMV3000 can be used to measure the flow of virtually any liquid, or gas for which a primary flow element exists to provide differential pressure measurement. Examples include gas flows (nitrogen, hydrogen, natural gas), and liquid flows (acids, hydrocarbon feed stocks, bases, solvents, monomers, and polymers).

Process Monitoring and Safety System Solution Detail

Description	Model
Smart Multivariable Transmitter SMV3000 (gauge pressure) with stainless steel hardware and diaphragms, lightning protection, custom calibration, MC option (factory configuration) and stainless steel tag	SMG170-E2A-0000-LP,CC,MC,TG,F1C3+XXXX
Multivariable Trip Switch (MTS) with PV2 (pressure) used to alarm for hazardous condition at 100% of range. One analog output, 2 relays, and CE compliance	MTS-112-E

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