APPLICATION SOLUTION PAXP #02

TANK LEVEL CONTROL LINEARIZATION APPLICATION

A company that produces various liquids has a need for an indicator that could display, in gallons, the amount of liquid solvent in a tank. They also want an output to turn on a pump when the level falls to 250 gallons and stops filling at 1900 gallons. Because the liquid is corrosive, an ultrasonic level sensor is used. This sensor outputs a 0-20 mA signal based on the top level of the tank. However, because this tank is round and horizontal to the ground, the level signal measured will not be linear to gallons of liquid in the tank. (There is more volume per inch of depth in the middle of the tank, compared to the top and bottom.)

PRODUCTS USED: PAXP0000, PAXCDS10

The PAXP0000 Process Input Panel Meter with the PAXCDS10 Dual Relay Setpoint Card is best suited to fit this customer's needs. With this meter, up to 16 scaling points can be used to greatly reduce the error induced by the shape of the tank. (Without this feature, the error could be as high as 200 gallons.)

HOW IT WORKS

The customer has choices when scaling the meter in gallons. In the applied method, the meter measures the 0-20 mA signal and automatically enters the input signal for the known gallon amount as the tank is filled. In the key-in method, both the gallon amounts and the signal level are keyed in, so the values have to be known prior to scaling. A third method is using the scaling wizard in the RLC Crimson 2.0 software for PCs. By entering the starting value (0 mA = 0), ending value (20 mA = 2000 gallons) and choosing the tank type, 16 scaling points will be automatically calculated by the software. These values can be keyed-in or downloaded with a serial communication card (PAXCDC2C) in the PAX meter.

Alarm 1 was programmed to begin filling the tank when the level fell to 250 gallons, and to keep filling it until it was at 1900. This was accomplished by programming Setpoint 1 as Absolute low with unbalanced Hysteresis (AU-LO) using a setpoint value of 250 and a hysteresis of 1650.

After the meter is programmed, all parameters can be locked to prevent anyone from changing the settings.

DESIGN ADVANTAGES

With the 16-point scaling, the company found the accuracy of the tank level was within a few gallons. Also, they found the refilling of the corrosive solvent went perfect eliminating a safety issue.

ADDITIONAL CAPABILITIES

With the addition of the PAXCDC2C RS232 communication card, the meter could be programmed with Crimson 2.0 software. With this card, a remote serial display or data logging would be possible.

DIP SWITCH OR JUMPER SETTINGS

All are at factory settings.

PROGRAMMING (Only non-factory settings shown)

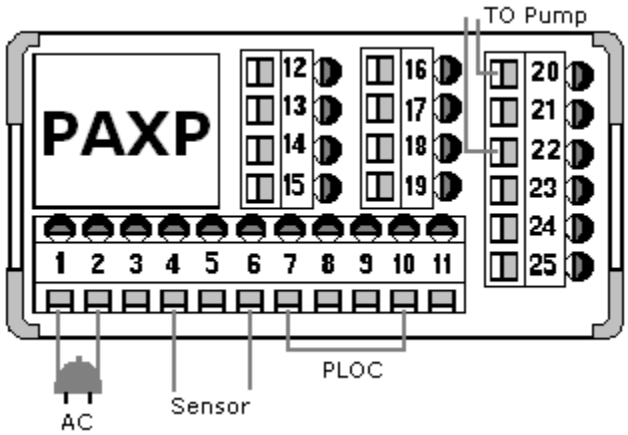
Pro 1-INP
PtS : 16 (number of scaling points)
INP 1 : 0.000
dSP 1 : 0
INP 2 : 0.791
dSP 2 : 22
INP 3 : 1.758
dSP 3 : 75
INP 4 : 2.814
dSP 4 : 155
INP 5 : 3.966
dSP 5 : 262
INP 6 : 5.161
dSP 6 : 389
INP 7 : 6.487
dSP 7 : 545
INP 8 : 7.967
dSP 8 : 732
INP 9 : 10.000
dSP 9 : 1000
INP 10 : 13.512
dSP 10 : 1454
INP 11 : 14.838
dSP 11 : 1610
INP 12 : 16.033
dSP 12 : 1737
INP 13 : 17.185
dSP 13 : 1844
INP 14 : 18.241
dSP 14 : 1924
INP 15 : 19.208
dSP 15 : 1977
INP 16 : 20.000
dSP 16 : 2000

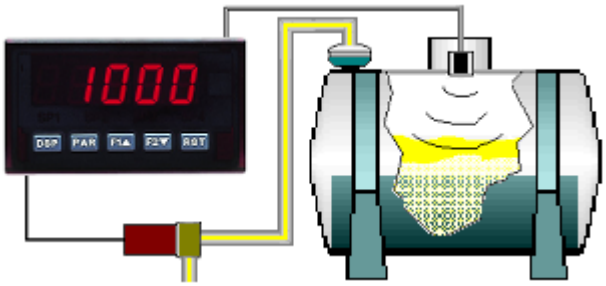
Pro 2-FNC
USr-1 : PLoC

Pro 6-SPt :
SPSEL : SP-1
Act-1 : AU-LO
SP-1 : 250
HyS-1 : 1650 (250+1650=2000)
rSt-1 : Auto (auto stop filling at 2000)

WIRING DIAGRAM

All wiring must be according to the installation guidelines listed in the product's specifications. For the setpoint outputs to function an external isolated voltage source (not shown below) must be connected in series.





This application note is intended to be an example. Your specific application may require changes in products, programming and/or wiring. For specific assistance, you may contact your local Red Lion product supplier or Red Lion Controls Technical Support at 717-767-6511.