APPLICATION SOLUTION PAXI #02

WELL DRILLING RATE WITH DIRECTION APPLICATION

A well drilling service needs to know the speed and direction of their mobile drill. The direction of rotation of the bit determines whether the bit is drilling deeper or pulling the loose dirt to the top. The speed also needs to be adjusted depending upon the type of material the bit is drilling through. Since the well driller is used outdoors, those conditions should be kept in mind, when selecting products for this application.

PRODUCTS USED: PAXI0010 (DC), PAXCDS30, ZDH0100H

The solution to this application is the PAXI0010 DC Powered Counter/Rate Panel Meter with a PAXCDS30 Quad Setpoint Output Card and the ZDH0100H Quadrature Rotary Pulse Generator. The ZDH is selected because it conforms to NEMA 13 and 4 environmental standards. When it is coupled to the drill, it will give two pulse trains to the PAXI based on the drill speed. The PAXI, NEMA 4X rated, can take these quadrature pulse trains and show rate, and using the PAXCDS30 card setpoint annunciators, direction.

HOW IT WORKS

It is determined that two turns of the ZDH0100H (100 PPR) is one turn of the drill. This means there are 200 pulses per drill revolution. In module 4-rtE, the PAXI is programmed to show rate from Input A. By entering rate display of 60 and rate input of 200.0, the display will show the correct RPM value at all speeds.

Because of the two pulse trains, the counter part of the PAXI can increment or decrement based on the turn direction of the encoder shaft. This is accomplished by programming Counter A for quad 1, in module 1-INP. (Counter A does not need to be displayed so, in module 3-LOC, both A CNt and ASFAC are programmed for LOCK. User 1, in module 2-FNC, is set for PLOC to lock the programming after setup.)

In module 6-SPt, Setpoint 1 is assigned to Counter A with setpoint value of –1. Programmed with the action of Time Out allows the parameter of Counter Auto Reset to Zero at -1. When Counter A goes in the negative (down) direction, SP1 annunciator turns on and auto resets Counter A to zero. As long as the quadrature input indicates down, the value of –1 is constantly reached and SP1 annunciator will not have a chance to turn off. Setpoint 2 is assigned to Counter A with setpoint value of +1. Program with the action of Time Out allows the parameter of Counter Auto Reset to Zero at +1. When Counter A goes in the positive (up) direction, SP2 annunciator turns on and auto resets Counter A to zero. As long as the quadrature input indicates up, the value of +1 is constantly reached and SP2 annunciator will not have a chance to turn off.

DESIGN ADVANTAGES

With the sunlight readable display of the PAXI meter, the operators can now tell the speed and direction of the drill saving time and drill bits.

ADDITIONAL CAPABILITIES

With the PAXCDS30 card, rate setpoint values could be programmed for over speed protection. Counter C could be programmed to show depth of the drill bit with the front RST button programmed for reset Counter C.

DIP SWITCH OR JUMPER SETTINGS

All are at factory settings.

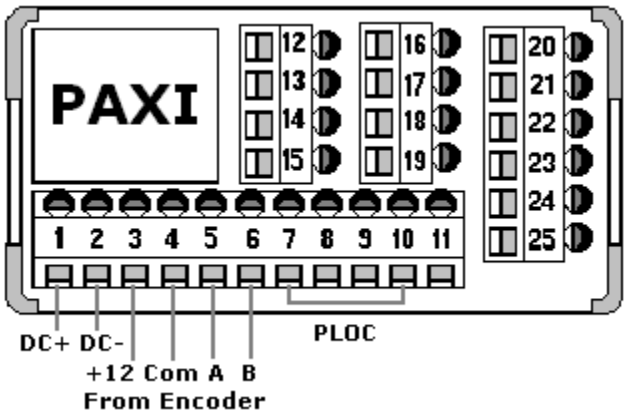
PROGRAMMING (Only non-factory settings shown)

1-INP
A CNt : QuAd1
2-FNC
Usr-1 : PLOC
3-LOC
A CNt : LOC (lock counter display)
ASFAC : LOC
4-rtE
rAtEEN : rAtE-A
rdSP1 : 60 (because per minute)
rINP1 : 200.0 (# of pulses per rev)

6-SPt
SPSEL : SP-1
ACt-1 : tOUt
ASN-1 : A CNt
SP-1 : -1
tOUt-1 : 1.0
AUtO-1 : ZErOAS (auto reset counter)
SPSEL : SP-2
ACt-2: tOUt
ASN-2 : A CNt
SP-2 : +1
tOUt-2 : 1.0
AUtO-2 : ZErOAS (auto reset counter)

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 products supplier or Red Lion Controls Technical Support at 717-767-6511.