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PROGRAMMING GC31 PRESSURE TRANSMITTER TO MONITOR AND CONTROL A HYDRAULIC PRESS

PIP #: TR-PI-104

Applicable to:
GC31

The GC31 differential pressure transmitter is compact, flexible and supports numerous pressure applications including the monitor and control of a hydraulic press.

Figure 1- GC31 Pressure Transmitter

Monitor and Controlling a Hydraulic Press:

This example uses a GC31 pressure transmitter to monitor and control a hydraulic press. The GC31 can be selected with many pressure ranges but for this application a transmitter with 1,000 psi range shall be used, 1-5 V analog output and two NPN switches. The operating pressure shall be 900 psi, switch 1 will activate the solenoid relief valve and sound an audible alarm if pressure reaches 950 psi and shutdown the system if pressure reaches 1000 psi. This will maximize investment by protecting personnel and equipment from accidental pressure buildup. See hydraulic press diagram below for reference.

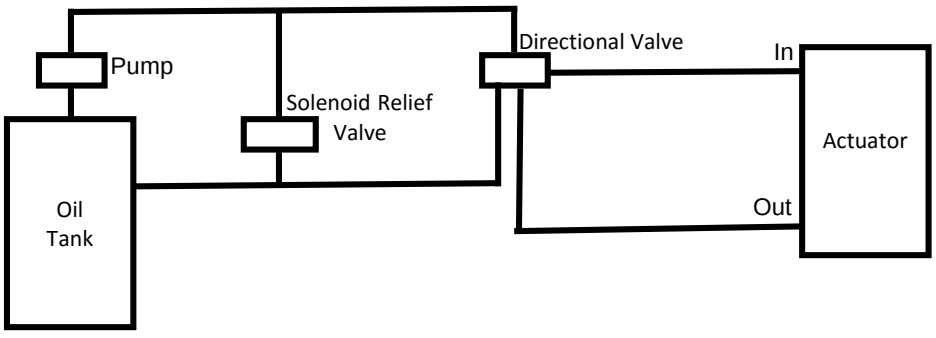

Figure 2-Hydraulic Press Diagram

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Installation:

Connect transmitter, external relays, solenoid relief valve, audible alarm and hydraulic press shutdown system per application, diagrams below and manual instructions.

Cable color

Brown: Power (+)
Blue: Power (–)
Black: Open collector output (OUT1)
White: Open collector output (OUT2)
Orange: 1-5Vdc output (+)

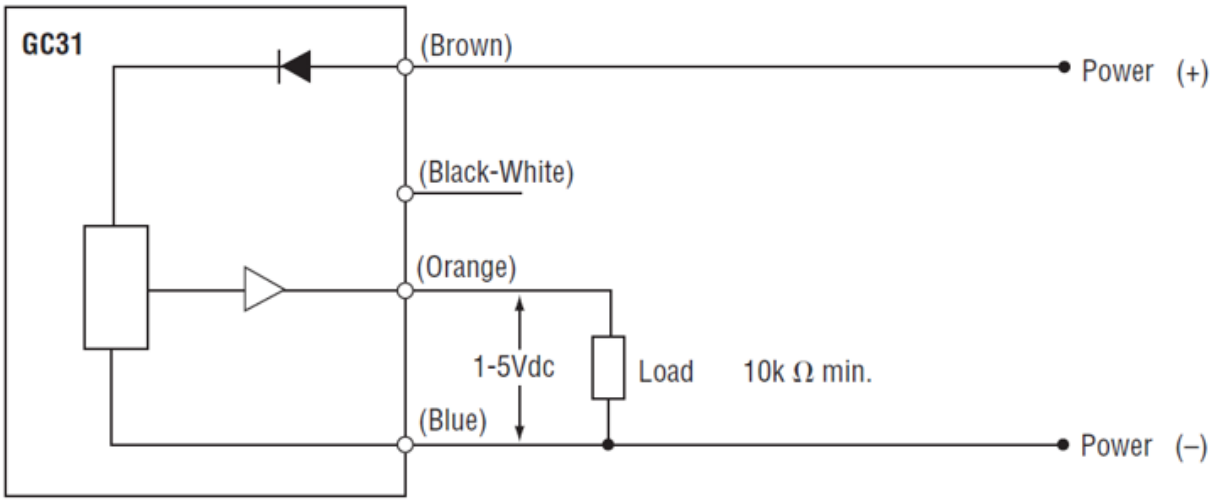

Figure 3 – Analog Output Schematic

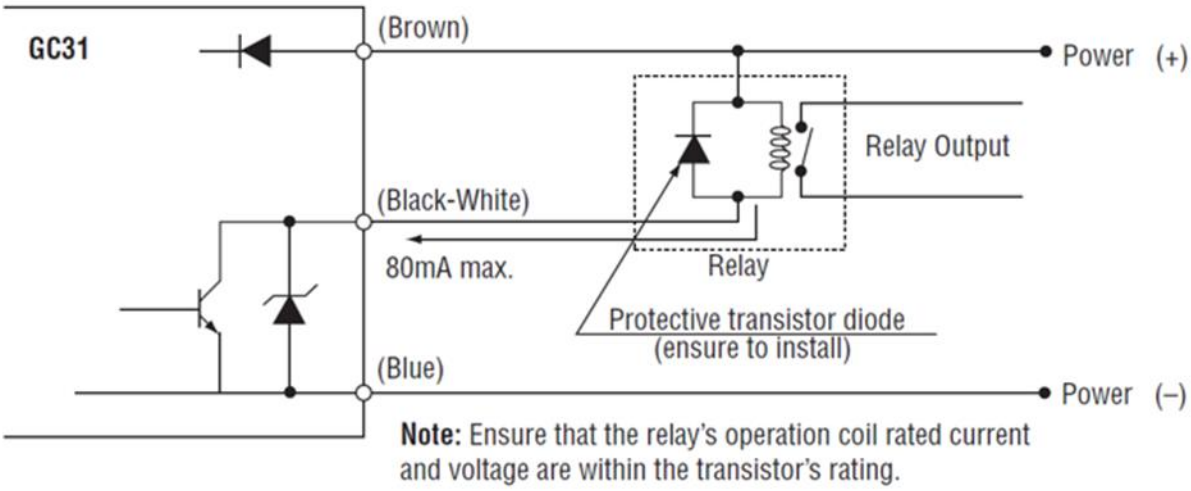

Figure 4 – Wiring to relay NPN Switch schematic

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Hydraulic Press Control and Monitoring Application Programming Method:

Proceed with the steps below to operate and control the hydraulic press at 900 psi by controlling the VFD pump with 1-5 V analog output. Also, to activate solenoid relief valve and the alarm if pressure reaches 950 psi with output 1 switch by using a normally open external relay. As well, to shut down the system if pressure reaches 1000 psi with output 2 switch by using external relays normally closed. Outputs 1 and 2 switches will reset when pressure drops down to 900 psi.

	• Press and hold MODE button for more than three seconds to get into program mode. • Press UP or Down arrow to make changes. • Press and release MODE button to select changes and to walk through the menu. • Continue to step-1 after power-on message. • Press and hold MODE button for more than three seconds to return to measuring mode.	
Step 1	• **CNP** To select hysteresis (HYS) or Window comparator (yin). • Select HYS to enter switches set point, hysteresis, and ON OFF delay time. • Press UP or Down arrow to display HYS. • Press and release MODE button to select and move to the next step.	
Step 2	• **Uni** To select units (PSI, KGF, BAR, MHG, MPA or arbitrary units). • Press Up or Down arrow until PSI is displayed. • Press and release MODE button to select and move to the next step.	
Step 3	• **FiL** To enter filter selection. Filter selection, there are six filter selections (F0 to F5). • Use the filter function to improve analog output and difficult to read display if pressure oscillates. • Select F-2 with option to change if needed to match the process. • Press Up or Down arrow until F-2 is displayed. • Press and release MODE button to select and move to the next step.	
Step 4	• **A-L** To enter analog output zero reference corresponding to 1 V analog output. • Set 0 psi as the zero reference 1 V analog output (0.0% of full range). • Press Up or Down arrow until 0.0 is displayed. • Press and release MODE button to select and move to the next step.	

Step 5	• **A-H** To enter span analog output reference corresponding to 5 V. • The operational range is 900 psi. Set 900 psi as the span 5 V analog output (90.0% of full range). • Press UP or Down arrow until 90.0 is displayed. • Press and hold MODE button for more three seconds to return to measuring mode.	

GC31 Pressure Transmitter Switch Set Points and Dead Band Program

	• Press and hold MODE button less than three seconds to get into program mode. • Press UP or Down arrow to make changes. • Press and release MODE button to select changes and to move to the next step. • Continue to step-1 after once in program mode. • Press and hold MODE button for more than three seconds to return to measuring mode.	
Step 1	• **A-1** To enter output switch 1 set point to activate solenoid relief valve and audible alarm if pressure reaches 950 psi. • Set the switch to change state at 950 psi. • Press UP or Down until 950 displayed. • Press and release MODE button to select and move to the next step.	
Step 2	• **b-1** To enter output 1 switch dead band. • Set the switch to deactivate at 900 psi (50 psi dead band). • Press UP or Down until 50 is displayed. • Press and release MODE button to select and move to the next step.	
Step 3	• **On1** To delay output 1 switch turn on. • Delay output 1 switch turn on shall not be used for this application. • Press Up or Down arrow until 0.00 is displayed. • Press and release MODE button to select and move to the next step.	
Step 4	• **OF1** To delay output 1switch turn off. • Delay output 1 switch turn off shall not be used for this application. • Press Up or Down arrow until 0.00 is displayed. • Press and release MODE button to select and move to the next step.	

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Step 5	• **A-2** To enter output 2 switch shutdown set point 1000 psi • Set the switch to change state at 1000 psi. • Press UP or Down until 1000 is displayed. • Press and release MODE button to select and move to the next step.	
Step 6	• **b-1** To enter output 2 switch dead band. • Set the switch to deactivate at 900 psi (100 psi dead band). • Press UP or Down until 100 is displayed. • Press and release MODE button to select and move to the next step.	
Step 7	• **On2** To delay output 2 switch turn on. • Delay output 2 switch turn on shall not be used for this application. • Press Up or Down arrow until 0.00 is displayed. • Press and release M button to select and move to the next step.	
Step 8	• **OF2** To delay output 2 switch turn off. • Delay output 2 switch turn off shall not be used for this application. • Press Up or Down arrow until 0.00 is displayed. • Press and release MODE button to select and move to the next step.	
Step 9	• **LoP** Loop check mode allows program and analog output and switches verification with the transmitter pressurized or non-pressurized. It simulates the process and allows for troubleshooting. • Press Up or Down arrow to simulate pressure values. • After verification press and hold MODE button for more three seconds to return to measuring mode.	

Function Verification:

The GC31 **loop-check** allows the verification of analog output and switches ON and OFF with the transmitter pressurized or non-pressurized.

Analog Output Verification:

Confirm analog output wiring per figure 3 and 4 diagrams or installation and maintenance instructions. Analog output can be tested during loop check mode or measurement mode. Change loop check value or apply equivalent pressure to test the analog output (see results below for reference).

Analog Output Verification:

• Connect voltmeter per manual instructions or diagram above. • Press the Up or Down arrow until 0 is displayed or apply 0 psi. • Verify amp meter reading (1 V). • 0 psi corresponds to 0% FS analog signal (1 V at 0 psi).		
• Press the Up or Down arrow until 450 is displayed or apply 450 psi. • Verify voltmeter reading (3.00 V). • 450 psi corresponds to 50% FS analog signal (3V at 450 psi).		
• Press the Up arrow until 900.0 is displayed or apply 900 psi. • Verify voltmeter reading (5 V). • 900 psi corresponds to 100% FS analog signal (5V at 900 psi).		

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Switching Verification:

Ensure switch wiring per figure 3 and 4 diagrams or installation & maintenance instructions. Switch verification can be tested during measurement mode or loop check. Change loop check value or apply equivalent pressure (see results below for reference).

Output 1 Switch Set Point to Activate Solenoid Relief Valve and Audible Alarm If Pressure Reaches 950 PSI

• For test purpose a 290 ohms resistor shall be used as the switch load (wire switch per manual instructions or figure above). • Press the Up or Down arrow until 900 is displayed or apply 900 psi. • Output 1 switch in normal state (OFF). • Place voltmeter leads across resistor and verify voltage reading (0 V dc).		
• Press the Up arrow until 950 is displayed or increase pressure to 950 psi. • Output 1 switch turns ON. • Verify voltmeter reading (28 VDC). • External relay energizes. • Relay normally open closes - solenoid relief valve opens and audible alarm turns ON.		
• Press the Down arrow until 900 is displayed or decrease pressure to 900 psi. • Verify voltage reading (0 V dc). • Output 1 switch changes to normal state (OFF). • solenoid relief valve closes and audible alarm turns OFF.		

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Output 2 Switch Set Point to Shut Down Hydraulic Press if Pressure Reaches 1000 PSI

• For test purpose a 290 ohms resistor shall be used as the switch load (wire switch per manual instructions or figure above). • Press the Up or Down arrow until 900 is displayed or apply 900 psi. • Output 2 switch in normal state (OFF). • Place voltmeter leads across resistor and verify voltage reading (0 V dc).		
• Press the Up arrow until 1000 is displayed or increase pressure to 1000 psi. • Output 2 switch turns ON (Output 1 turned ON ever since pressure reached 950 psi). • Verify voltmeter reading (28 VDC). • External relay energizes. • Relay normally closed switch opens and hydraulic press shuts down.		
• Press the Down arrow until 900 is displayed or decrease pressure to 900 psi. • Verify voltage reading (0 V dc). • Switches change to normal state (OFF). • Hydraulic press returns to normal operation.		

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