

## PROGRAMMING THE GC30 DIFFERENTIAL PRESSURE TRANSMITTER TO MONITOR THE CLOGGING OF HVAC FILTER

PIP #: TR-PI-103

Applicable to:  
GC30

The GC30 differential pressure transmitter is compact and flexible instrument that supports many applications and is often used to monitor the clogging of filters. It can be easily programmed to measure the pressure in IWC to monitor and control the clogging on an HVAC filter.



Figure 1 - GC30 Differential Pressure Transmitter

### Monitoring and Controlling HVAC Filter:

This illustration demonstrates the use of GC30 differential pressure transmitter to monitor the clogging of an air filter. Most industrial filters have a pressure drop of 0.170 IWC with industry common practice to replace filters when the pressure drop reaches 0.500 IWC to prevent unnecessary maintenance while protecting the system from failing due to blockage. See principles of operation diagram below for reference.

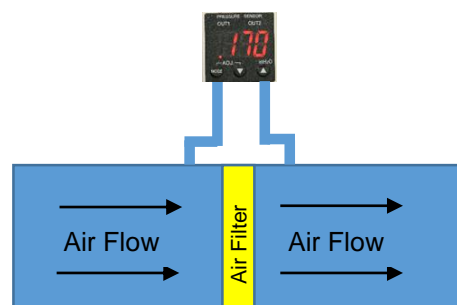


Figure 1 - Filter Monitoring Diagram

## HVAC Filter Monitoring Application:

This example uses a GC30 differential pressure transmitter with 0 to 1.00 IWC range with two NPN switches. The transmitter shall be programmed to activate the audible alarm when differential pressure reaches 0.500 IWC with output 1 switch and to shut down the system if differential pressure reaches 0.750 IWC with output 2 switch by using external relays with normally open contacts for the audible alarm and normally closed for the heating/cooling system. The outputs will reset at 0.200 IWC after the filter is cleaned or replaced.

## Installation:

Connect transmitter, relays, audible alarm and heating/cooling 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 (+)

## NPN Type Switch Function (Wiring to Relay)

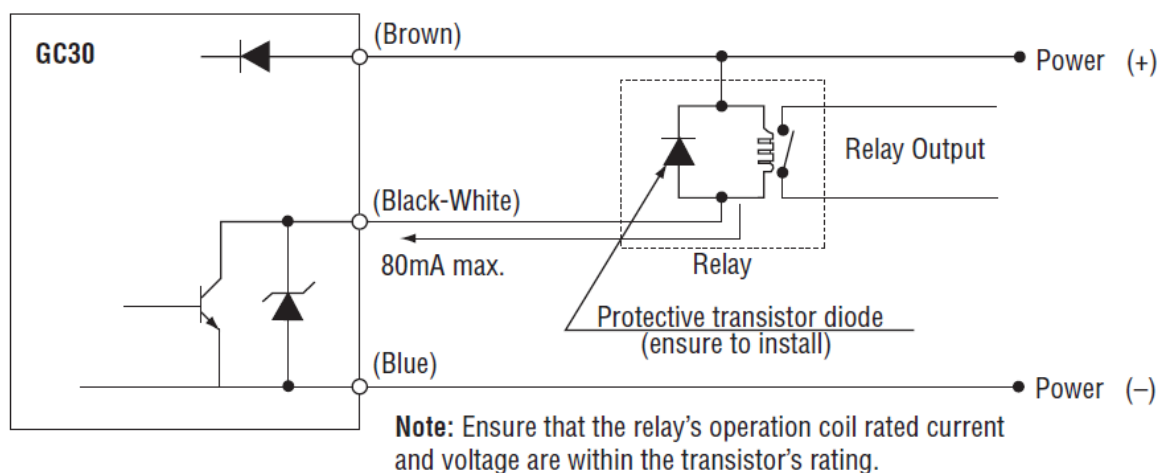








Figure 3 – Switch Schematic





## GC30 Transmitter Output Switches Configuration Method:

Method to program GC30 transmitter set points. Output 1 shall be set at .500 IWC to activate the audible alarm, output 2 set at .750 IWC to shut down the heating/cooling system and both outputs shall reset at .200 IWC by setting the hysteresis of output 1 at .300 IWC and output 2 at .550 IWC.







	<ul style="list-style-type: none"> <li>Press and hold MODE button for more than three seconds to get into program mode.</li> <li>Press UP or Down arrow to make changes.</li> <li>Press and release MODE button to select changes and to walk through the menu.</li> <li>Continue to Step-1 after power-on message.</li> <li>Press and hold MODE button for more than three seconds to return to measuring mode.</li> </ul>	
Step 1	<ul style="list-style-type: none"> <li>Press and hold MODE button for more than three seconds to get into program mode.</li> <li><b>CNP</b> To select hysteresis (HYS) or Window comparator (yin).</li> <li>Select HYS to enter switches set point, hysteresis, and ON OFF delay time.</li> <li>Press UP or Down arrow to display HYS.</li> <li>Press and release MODE button to select and move to the next step.</li> </ul>	
Step 2	<ul style="list-style-type: none"> <li><b>Uni</b> To select units (H2O, mmHG, KPA or arbitrary units)</li> <li>Press Up or Down arrow until H2o is displayed.</li> <li>Press and release MODE button to select and move to the next step.</li> </ul>	
Step 3	<ul style="list-style-type: none"> <li><b>FIL</b> To enter filter selection, six filter selection options (F0 to F5).</li> <li>Use the filter function to improve analog output and difficult to read display if pressure oscillates.</li> <li>Select factory default filter since pressure fluctuation is not expected.</li> <li>Press UP or Down arrow to display F0.</li> <li>Press and release MODE button to select and move to the next step.</li> </ul>	
Step 4	<ul style="list-style-type: none"> <li><b>A-L</b> To enter analog output zero reference corresponding to 1 V analog output.</li> <li>This application does not use the analog output.</li> <li>0.0 is displayed. That is the transmitter default analog output at 0% FS (1 Vdc at .000 IWC).</li> <li>Press and release MODE button to select and move to the next step.</li> </ul>	

Step 5	<ul style="list-style-type: none"> <li>• <b>A-H</b> To enter span analog output reference corresponding to 5 V analog output.</li> <li>• This application does not use the analog output.</li> <li>• 100.0 is displayed. That is the transmitter default analog output at 100% FS (5 V at 1.00 IWC).</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
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## GC30 Transmitter Switch Set Point and Dead Band Set Up Method:

	<ul style="list-style-type: none"> <li>• Press and hold MODE button less than three seconds to get into program mode.</li> <li>• Press UP or Down arrow to make changes.</li> <li>• Press and release MODE button to select changes and to move to the next step.</li> <li>• Continue to Step-1 after once in program mode.</li> <li>• Press and hold MODE button for more than three seconds to return to measuring mode.</li> </ul>	
Step 1	<ul style="list-style-type: none"> <li>• <b>A-1</b> To enter output 1 switch audible alarm set point when differential pressure reaches .500 IWC.</li> <li>• Press UP or Down until .500 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
Step 2	<ul style="list-style-type: none"> <li>• <b>b-1</b> To enter output 1 switch dead band.</li> <li>• Set dead band to .300 IWC to deactivate switch at .200 IWC.</li> <li>• Press UP or Down until .300 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
Step 3	<ul style="list-style-type: none"> <li>• <b>On1</b> To delay output 1 switch turn on.</li> <li>• Delay output 1 switch turn on shall not be used for this application.</li> <li>• Press Up or Down arrow until 0.00 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	









Step 4	<ul style="list-style-type: none"> <li>• <b>OF1</b> To delay output 1 switch turn off.</li> <li>• Delay output 1 switch turn off shall not be used for this application.</li> <li>• Press Up or Down arrow until 0.00 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
Step 5	<ul style="list-style-type: none"> <li>• <b>A-2</b> To enter output 2 switch shutdown set point .750 IWC.</li> <li>• Press UP or Down until .750 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
Step 6	<ul style="list-style-type: none"> <li>• <b>b-1</b> To enter output 2 switch dead band.</li> <li>• Set dead band to .550 IWC to deactivate switch at .200 IWC.</li> <li>• Press UP or Down until .550 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
Step 7	<ul style="list-style-type: none"> <li>• <b>On2</b> To delay output 2 switch turn on.</li> <li>• Delay output 2 switch turn on shall not be used for this application.</li> <li>• Press Up or Down arrow until 0.00 is displayed.</li> <li>• Press and release M button to select and move to the next step.</li> </ul>	
Step 8	<ul style="list-style-type: none"> <li>• <b>OF2</b> To delay output 2 switch turn off.</li> <li>• Delay output 2 switch turn off shall not be used for this application.</li> <li>• Press Up or Down arrow until 0.00 is displayed.</li> <li>• Press and release MODE button to select and move to the next step.</li> </ul>	
Step 9	<ul style="list-style-type: none"> <li>• <b>LoP</b> Loop check mode allows program and switches verification with the transmitter pressurized or non-pressurized. It simulates the process and allows for troubleshooting.</li> <li>• Press Up or Down arrow to simulate pressure values.</li> <li>• After verification press and hold MODE button for more than three seconds to return to measuring mode.</li> </ul>	







## Switching Verification:

Ensure switches wiring per figure 3 diagram or installation and maintenance instructions. Switching 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 Audible Alarm When Differential Pressure Reaches .500 IWC

<ul style="list-style-type: none"> <li>For test purpose a 290 ohms resistor shall be used as the switch load (wire switch per manual instructions or figure above).</li> <li>Press the Up or Down arrow until .200 is displayed or apply .200 IWC.</li> <li>Output 1 switch in normal state (OFF).</li> <li>Place voltmeter leads across resistor and verify voltage reading (0 V dc).</li> </ul>	 <p>Pressure sensor display showing .200 IWC. The display has 'PRESSURE SENSOR' at the top, 'OUT1' and 'OUT2' labels, and 'inH<sub>2</sub>O' at the bottom. It features an 'ADJ.' button with a left arrow and a 'MODE' button with a right arrow.</p>	 <p>Digital voltmeter display showing 0.00 V.</p>
<ul style="list-style-type: none"> <li>Press the Up arrow until .500 is displayed or increase pressure to .500 IWC.</li> <li>Output 1 switch turns ON.</li> <li>Verify voltmeter reading (28 VDC).</li> <li>External relay energizes.</li> <li>Relay normally open closes</li> <li>Audible alarm turns ON.</li> </ul>	 <p>Pressure sensor display showing .500 IWC. A red indicator light is visible next to the 'OUT1' label. The display has 'PRESSURE SENSOR' at the top, 'OUT1' and 'OUT2' labels, and 'inH<sub>2</sub>O' at the bottom. It features an 'ADJ.' button with a left arrow and a 'MODE' button with a right arrow.</p>	 <p>Digital voltmeter display showing 0.28 V.</p>
<ul style="list-style-type: none"> <li>Press the Down arrow until .200 is displayed or decrease pressure to .200 IWC.</li> <li>Verify voltage reading (0 V dc).</li> <li>Output 1 switch changes to normal state (OFF).</li> <li>Audible alarm turns OFF.</li> </ul>	 <p>Pressure sensor display showing .200 IWC. The display has 'PRESSURE SENSOR' at the top, 'OUT1' and 'OUT2' labels, and 'inH<sub>2</sub>O' at the bottom. It features an 'ADJ.' button with a left arrow and a 'MODE' button with a right arrow.</p>	 <p>Digital voltmeter display showing 0.00 V.</p>

## Output 2 Switch Set Point to Shut Down Heating/Cooling System When Differential Pressure Reaches 0.750 IWC

<ul style="list-style-type: none"> <li>For test purpose a 290 ohms resistor shall be used as the switch load (wire switch per manual instructions or figure above).</li> <li>Press the Up or Down arrow until .200 is displayed or apply .200 IWC.</li> <li>Output 2 switch in normal state (OFF).</li> <li>Place voltmeter leads across resistor and verify voltage reading (0 V dc).</li> </ul>	 <p>A digital display for a pressure sensor. It shows 'PRESSURE SENSOR' at the top, 'OUT1' and 'OUT2' below it. The main display shows '.200' in red. Below the display are buttons for 'MODE', 'ADJ.' (with left and right arrows), and 'inH<sub>2</sub>O' (with up and down arrows).</p>	 <p>A digital voltmeter display showing '000' with a 'V' symbol at the bottom right.</p>
<ul style="list-style-type: none"> <li>Press the Up arrow until .750 is displayed or increase pressure up to .750 IWC.</li> <li>Output 2 switch turns ON (Out 1 is ON since differential pressure reached .500 IWC).</li> <li>Verify voltmeter reading (28 VDC).</li> <li>External relay energizes.</li> <li>Relay normally closed switch opens, heating/cooling system shuts down.</li> </ul>	 <p>A digital display for a pressure sensor. It shows 'PRESSURE SENSOR' at the top, 'OUT1' and 'OUT2' below it. The main display shows '.750' in red. Below the display are buttons for 'MODE', 'ADJ.' (with left and right arrows), and 'inH<sub>2</sub>O' (with up and down arrows). Red indicator lights are visible above 'OUT1' and 'OUT2'.</p>	 <p>A digital voltmeter display showing '028' with a 'V' symbol at the bottom right.</p>
<ul style="list-style-type: none"> <li>Press the Down arrow until .200 is displayed or decrease pressure to .200 IWC.</li> <li>Verify voltage reading (0 V dc).</li> <li>Switch changes to normal state (OFF).</li> </ul>	 <p>A digital display for a pressure sensor. It shows 'PRESSURE SENSOR' at the top, 'OUT1' and 'OUT2' below it. The main display shows '.200' in red. Below the display are buttons for 'MODE', 'ADJ.' (with left and right arrows), and 'inH<sub>2</sub>O' (with up and down arrows).</p>	 <p>A digital voltmeter display showing '000' with a 'V' symbol at the bottom right.</p>