The P7720 is a solid state gas pressure sensor designed for use with the BCS 7700. The P7720 utilizes a solid state pressure transducer to provide indication of gas pressure. When gas pressure is applied to the P7720, an internal diaphragm flexes, resulting in a low level voltage output proportional to the gas pressure.

The P7720 is Underwriters Laboratories, Inc. component recognized, Canadian Standards Association certified and Factory Mutual approved.

P7720 is for use with natural or LP gas.
P7720 provides both high gas pressure and low gas pressure limit functions.
Four pressure ranges are available:
- 0.1 to 1 psi
- 0.2 to 2 psi
- 0.5 to 5.0 psi
- 1.5 to 15 psi
Upper housing provides wiring enclosure with provisions for 1/2 in. conduit connector.
NEMA 3 rated enclosure.
Pipe fittings, 3/8 in. NPT thread for connection to the main gas supply piping and 1/8 in. NPT thread for vent line connection.
Pressure applied to the P7720 causes internal diaphragm to flex resulting in a low level output voltage proportional to the gas pressure.

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Specifications

ELECTRICAL RATINGS:
Input/Output Leadwires:
Red lead: 8 +/- .05 Vdc (Supply).
Blue lead: 1-6 Vdc (Signal).
Black lead: (Common).
Power Dissipation:
200 milliwatts maximum.

ENVIRONMENTAL RATINGS:
Ambient Temperatures:
Operating: 32°F to 150°F.
Storage: -30°F to 150°F.
Humidity: Operating: 85% RH continuous, non-condensing.
Vibration: 0.5g continuous maximum.
Dimensions: See Fig. 1.

Fig. 1—P7720 Solid State Gas Pressure Sensor dimensional diagrams in in. (mm).

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the Tradeline Catalog or price sheets for complete ordering number, or specify—
1. Order number.
2. Accessories, if desired.
3. Order additional system components and system accessories separately.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:
1. Your local Home and Building Control Sales Office (please check the white pages of your phone directory).
2. Home and Building Control Customer Logistics
Honeywell Inc., 1885 Douglas Drive North
Minneapolis, Minnesota 55422-4386 (612) 951-1000

In Canada—Honeywell Limited/Honeywell Limitée, 740 Ellesmere Road, Scarborough, Ontario M1P2V9. International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.
CONNECTIONS:
3/8 in. NPT male, main gas line pressure.
1/8 in. NPT female, vent line.

APPROVAL BODIES:
Underwriters Laboratories Inc. Component Recognized.
Canadian Standards Association Certified.
Factory Mutual Approved.
ACCESSORIES: Cover Assembly.

<table>
<thead>
<tr>
<th>Model</th>
<th>Scale Range (in wc)</th>
<th>Scale Range (psi)</th>
<th>Scale Range (kpa)</th>
<th>Natural or Lp Gas</th>
<th>Volt Range Signal</th>
<th>Tolerance +/- %</th>
<th>Maximum Sustained Pressure (psi)</th>
<th>Maximum Sustained Pressure (kpa)</th>
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<tbody>
<tr>
<td>P7720A1052</td>
<td>2.8-28</td>
<td>.1 - 1</td>
<td>.69-69</td>
<td>Yes</td>
<td>1-6 Vdc</td>
<td>4%</td>
<td>1.5</td>
<td>10.3</td>
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<tr>
<td>P7720A1094</td>
<td>5.6-56</td>
<td>.2-2</td>
<td>1.4-14</td>
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<td></td>
<td></td>
<td>3.0</td>
<td>20.7</td>
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<tr>
<td>P7720A1060</td>
<td>14-140</td>
<td>.5-5</td>
<td>3.4-34</td>
<td></td>
<td></td>
<td></td>
<td>7.5</td>
<td>51.7</td>
</tr>
<tr>
<td>P7720A1078</td>
<td>42-420</td>
<td>1.5-15</td>
<td>10.3-103</td>
<td></td>
<td></td>
<td></td>
<td>22.5</td>
<td>155.1</td>
</tr>
</tbody>
</table>

Installation

WHEN INSTALLING THIS PRODUCT....
1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to assure the product is suitable for the application.
3. Installer must be a trained experienced flame safeguard service technician.
4. After installation is complete, check out the sensor as provided in these instructions.

CAUTION
Disconnect power supply before beginning installation to prevent possible equipment damage or electrical shock. Note, more than one disconnect may be involved.

IMPORTANT
1. Locate the sensor where the ambient temperature will not exceed 150°F.
2. Use pipe compound sparingly to avoid clogging the hole in the pipe or diaphragm fitting.
3. Do not tighten the sensor by hand or by holding the case.
4. Installation must follow local and national code.
5. Assure sufficient space exists for mounting the P7720, three way Gas Pressure Sensor Test Valve (if required), and connecting a vent line to the 1/8 in. NPT fitting.
6. Place P7720 upstream of the safety shutoff valves with a three-way test valve or downstream of the safety shutoff valves.

Mounting Procedure
1. Shut off the gas supply at the upstream manual shutoff valve.
2. Disconnect power to the BCS 7700 to assure the boiler cannot sequence during installation of the gas sensor.
3. Remove the protective plug caps from the 3/8 in. NPT and 1/8 in. NPT fittings.
4. Make all pipe connections in accordance with approved standards. Apply only a small amount of pipe compound to seal the joints because excess pipe compound can clog the small hole in the fitting and prevent proper sensor operation.
5. Mount the P7720 On the main valve train down stream of the safety shutoff valves or upstream of the safety shutoff valve(s) (see Fig. 3) using the 3/8 in. NPT fitting. When installed upstream of the safety shutoff valves, the gas pressure sensor must be installed utilizing a three-way valve as shown in Fig. 2 The three-way valve blocks gas pressure from reaching the sensing diaphragm until just prior to the ignition trial period; this allows for a Dynamic Sensor Check. This dynamic check assures proper sensor operation prior to each burner cycle. Use a nipple or T fitting for pipe mounting. Assure sufficient space exists for mounting the P7720, three-way Gas Pressure Sensor Test Valve, and connection and routing of the vent line to the 1/8 in. NPT vent fitting. Or mount the sensor downstream of the safety shutoff valve(s). Assure the pressure application downstream allows for proper low pressure limit settings.

IMPORTANT To avoid leaks and case damage use a parallel jaw wrench on the hexagonal part of the case close to the pipe. Make all connections carefully and test for leakage. DO NOT tighten the sensor by hand by holding the case.

6. Complete the main piping.
7. Install other controls in the system. Connect wiring and complete settings and sensor checkout.
Fig. 2—P7720 Gas Pressure Sensor three-way gas pressure sensor test valve mounting.

Fig. 3—Gas valve train layout, three-way test valve application.

**WIRING**

*CAUTION*

Disconnect power supply before connecting wiring to prevent electrical shock and equipment damage, more than one disconnect may be involved.

1. Assure all wiring complies with applicable codes, ordinances and regulations.
2. The upper housing has wiring enclosure with provisions for 1/2 in. conduit connection.
3. Do not overload the sensor; see electrical ratings in the specifications section.
4. Pressure sensors require shielded three wire conductor cable that is UL listed. Select a cable that is rated for the temperatures and voltages of the application. Suggested cables include:
   - Belden 9365, rated for 300 V service at 105°C.
   - Belden 8770, rated for 300 V service at 60°C.
5. Do not connect the shield to anything at the sensor end; tap it to avoid unintended contact with the sensor housing. At the BCS 7700 end ground the shield to the control panel with as short as practical a lead wire length.
6. Do not route sensor leadwires in conduit with line voltage circuits.
7. Avoid routing the sensor leadwires close to the ignition transformer leadwires.
8. Sensor leadwires are low voltage and can be routed outside of conduit if properly supported and protected from damage.
9. The maximum sensor leadwire length is 100 feet.
10. Wire the P7720 as indicated in Fig. 6.
11. Complete required checkout as indicated in the Checkout section and return system to normal operation.
12. Use wire nuts provided.
13. Wire the three-way Gas Pressure Sensor Test Valve (if used) as indicated in Fig. 6. Wire the Test Valve with no. 14 copper conductor that has insulation rated for the voltages and ambient temperatures of the application. Suggested conductor types include: TW (60C), THW (75C), and THHN (90C).

**SETTINGS AND ADJUSTMENTS**

Sensor adjustment is made through the Keyboard Display Module (see Fig. 5). The Keyboard Display Module is the primary user interface to the system. It consists of a keyboard, LCD display and three status LEDs. The module is used to program the BCS 7700 and display boiler operating status and parameters.

Four settings are required for proper P7720 operation: gas pressure sensor range, nominal gas pressure, low gas pressure, and high gas pressure. Default values of +/- 50% of the nominal setting are automatically set for low and high gas pressure limits. To make these settings, refer to the Programming specification form 63-2290.

To ensure proper understanding of the Keyboard Display Module and correct programming of the system, read forms 63-2287 and 63-2290. Failure to read the reference manual results in a higher probability of user error.

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**Fig. 4—Gas pressure sensor electrical enclosures.**

**Fig. 5—Keyboard and display module.**

Fig. 6—BCS 7700 internal block wiring diagram.

WIRING SHOWN FOR INFRARED FLAME DETECTOR FOR C7027
ULTRA-VIOLET FLAME DETECTOR WIRE AS NOTED BELOW
– ULTRA-VIOLET DETECTOR BLUE LEAD - TERMINAL 31
– ULTRA-VIOLET DETECTOR WHITE LEAD - TERMINAL 30
THE ULTRA-VIOLET FLAME DETECTOR WIRING IS POLARITY SENSITIVE, REVERSING THE LEADS WIRE MAY DAMAGE THE SENSOR.
FOR ULTRA-VIOLET C7012E,F WIRE AS NOTED BELOW:
– BLUE LEAD - TERMINAL 31                 – YELLOW LEAD - TERMINAL 29
– WHITE LEAD - TERMINAL 27               – WHITE LEAD - L2
– BLACK LEAD - L1                                  – BLACK LEAD - L2
WIRE THESE TERMINALS WITH SHEIELDED CABLE PER SPECIFICATION.
THE CABLE SHIELD SHOULD NOT BE CONNECTED AT THE SENSOR END
AND SHOULD BE TAPED TO AVOID UNINTENTIONAL CONTACT.
AT THE BOILER CONTROLLER END, THE SHIELD WIRE MUST BE GROUNDED
TO THE CONTROL PANEL WITH AS SHORT AS POSSIBLE A LEAD LENGTH.
POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD
PROTECTION AS REQUIRED.

DO NOT CONNECT WIRES TO ANY UNUSED TERMINALS.
TERMINALS 9, 17, 21, 22, 23, 28, 48 ARE NOT USED.
POWER SUPPLY FOR SYSTEM SENSORS.
FIELD WIRING — INTERNAL CIRCUITRY.
SEE FLAME DETECTOR WIRING FIGURE IN FORM NO 63-2991.
SEE TYPICAL STACK TEMPERATURE SETUP FIGURE
IN FORM 63-2991.
USE 120 OHM TERMINATING RESISTOR ON DEVICE FURTHER REST
FROM BC7700 CHASSIS MODULE (120 OHM TERMINATING
RESISTOR INSTALLED BETWEEN TERMINALS 5 AND 6.)
### Operation and Checkout

**OPERATION**

The P7720 is a solid state gas pressure sensor that incorporates a pressure transducer. The pressure transducer uses a silicon chip, which has an integral sensing diaphragm with four resistors diffused across the diaphragm.

This transducer is powered from the BCS 7700. As pressure flexes the diaphragm, the resistance of the four diffused resistors change, causing a circuit imbalance that results in a voltage output proportional to the pressure causing the diaphragm flexing. The output is amplified to a 1 to 6 Vdc signal and is compared by the BCS 7700 to the programmed values, the system shuts down as noted in Fig. 8.

The BCS 7700 conducts a Dynamic Sensor Check of the P7720 prior to each Ignition Trial period. The three-way valve or safety shutoff valve blocks gas pressure from reaching the gas pressure sensor allowing the Dynamic Sensor check.

The gas pressure settings provide the following functions:

- **Gas pressure sensor range.** (Select the proper range of gas pressure based on the sensor used and application requirements; e.g., 1.5 to 15 psi.)
- **Nominal gas pressure setting.** (Should be set to the gas pressure which the gas pressure regulator controls at the sensor location).
- **High gas pressure.** (Provides high gas pressure limit function.)
- **Low gas pressure.** (Provides low gas pressure limit function.)

**Fig. 7—Gas pressure sensor limit.**

<table>
<thead>
<tr>
<th>SENSOR RANGE</th>
<th>PRESSURE, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Gas Limit</td>
<td>&lt; 10%</td>
</tr>
<tr>
<td>Nominal Range</td>
<td>10% to 100%</td>
</tr>
<tr>
<td>High Gas Limit</td>
<td>&gt; 90%</td>
</tr>
</tbody>
</table>

The Low Gas Limit setting must be within the value of 10% of the sensor range up to the nominal gas pressure setting, i.e., if the sensor range is 15 psi and the nominal gas pressure setting is 7.5 psi, the low gas limit has a range of 1.5 psi minimum to 7.5 psi maximum.

The High Gas Limit setting must be within the value of the nominal gas pressure setting and the gas pressure range, i.e., if the sensor range is 15 psi and the nominal gas pressure setting is 7.5 psi, the high gas pressure limit has a range of 7.5 psi minimum to 15 psi maximum.

The Nom Gas Press setting must be within the value of 10% to 100% of the gas pressure sensor range, i.e., for a 15 psi sensor, the nominal gas pressure setting has a range of 1.5 psi to 15 psi. The default value for this example would be 3.75 psi.

**Fig. 8—Gas pressure sensor response.**

<table>
<thead>
<tr>
<th>SEQUENCE STATUS</th>
<th>PM7700A1052</th>
<th>PM7700A1075</th>
<th>PM7700A1069</th>
<th>PM7700A1067</th>
</tr>
</thead>
<tbody>
<tr>
<td>StandBy</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
</tr>
<tr>
<td>Prepurge Drive To Purge Rate</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
</tr>
<tr>
<td>Prepurge Drive To Low Fire</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
<td>Do Not Monitor Gas Pressure</td>
</tr>
<tr>
<td>Prepurge-Ignition Transition</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
</tr>
<tr>
<td>Pilot Ignition</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
<td>Must Be 0 Psi; If Not 0 Psi Will Lockout</td>
</tr>
<tr>
<td>Main Ignition</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
</tr>
<tr>
<td>Run</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
</tr>
<tr>
<td>Postpurge</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
<td>Pressure Must Be Within Limits</td>
</tr>
</tbody>
</table>

**CHECKOUT**

For detailed troubleshooting and programming procedures, read the troubleshooting and programming specifications, forms 63-2291 and 63-2290.

1. Place the system in normal operation by adjusting any settings to the required values, closing the burner switch, and opening the manual shutoff valves.
2. Initiate a boiler startup sequence. Using the Keyboard Display Module, display the gas pressure level when the system is in the run mode.
3. Using the Keyboard Display Module, determine what voltage signal is being detected by the BCS 7700 from the P7720.
4. Compare the voltage signal to the gas pressure with the graphs in Fig. 9-12. Select the appropriate voltage output to gas pressure graph, based on the sensor range being used. Assure these values are within +/- 4%. If these values are found to be out of range, follow the troubleshooting instructions outlined in form 63-2291.
5. Return the boiler to normal operation.
Fig. 9—Pressure to voltage 0.1-1.0 psi range.

SOLID STATE GAS PRESSURE SENSOR
PRESSURE VS VOLTAGE
0.1 - 1.0 PSI RANGE

INPUT - 8.0 VDC LIMITED SUPPLY

Fig. 11—Pressure to voltage 0.5-5.0 psi range.

SOLID STATE GAS PRESSURE SENSOR
PRESSURE VS VOLTAGE
0.5 - 5.0 PSI RANGE

INPUT - 8.0 VDC LIMITED SUPPLY

Fig. 10—Pressure to voltage 0.2-2.0 psi range.

SOLID STATE GAS PRESSURE SENSOR
PRESSURE VS VOLTAGE
0.2 - 2.0 PSI RANGE

INPUT - 8.0 VDC LIMITED SUPPLY

Fig. 12—Pressure to voltage 1.5-15 psi range.

SOLID STATE GAS PRESSURE SENSOR
PRESSURE VS VOLTAGE
1.5 - 15 PSI RANGE

INPUT - 8.0 VDC LIMITED SUPPLY