PES
Adjustable Range Hydrostatic Pressure System
with Electronic Compensation
Liquid Level

Installation and Operating Instructions
INTRODUCTION

PROPRIETARY NOTICE
The information contained in this publication is derived in part from proprietary and patent data. This information has been prepared for the express purpose of assisting operating and maintenance personnel in the efficient use of the instrument described herein.

Publication of this information does not convey any rights to use or reproduce it, or to use for any purpose other than in connection with the installation, operation and maintenance of the equipment described herein.

Copyright 1995
Printed by Graphic Zone, Australia
All Rights Reserved.

WARNING
This instrument contains electronic components that are susceptible to damage by static electricity. Proper handling* procedures must be observed during the removal, installation, or handling or internal circuit boards or devices.

* Handling Procedure
1. Power to unit must be removed.
2. Personnel must be grounded, via wrist strap or other safe, suitable means, before any printed circuit board or other internal device is installed, removed or adjusted.
3. Printed circuit boards must be transported in a conductive bag or other conductive container. Boards must not be removed from protective enclosure until the immediate time of installation. Removed boards must be placed immediately in a protective container for transport, storage, or return to factory.

Comments:
This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc.) Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.
**PRINCIPLE of OPERATION**

The **PressureMaster PES** is designed to be directly submerged in liquids compatible with 316 stainless steel and polyurethane jacketed cable. (Teflon sleeving is optional for chemical resistance.) The transducer housing has a sealed design to protect against leaks, including water penetration through the cable jacket. In addition, a 29.0mm diameter makes the **PressureMaster PES** usable in places other sensors cannot reach.

Built-in temperature compensation makes the **PressureMaster PES** extremely accurate for long- and short-term monitoring. Plus, its transducer housing was especially designed to allow for sensor and cable harness serviceability. Adjustment is available on the remote loop powered transmitter for both zero and span. 4-20mA output allows the transmitter to be connected to standard instrumentation equipment, and operate with any excitation voltage between 7 and 30 volts. Designed for industrial field environments such as sewage treatment plants, mines, power plants, paper mills, etc., the 4-20mA output gives high noise immunity and minimizes error related to resistance from long cables. The quality cable design provides shielding and environmental protection (maximum cable length - 500m).

There are 3 levels of immunity against large induced electrical spikes due to lightning.

**SPECIFICATIONS**

**Transducer**

- **Length**
  - 250mm (10.0”)
- **Overall Diameter**
  - 29mm (1.14”) max.
- **Standard Ranges**
  - 5, 15, 30, 50, 100, 200, 300, 500 PSIG (other ranges available)
- **Over Pressure**
  - 2x for the 5-100 PSIG.
  - 1.5x for the 300-500 PSIG.
- **Operating Temperature**
  - -5°C (23°F) to 105°C (221°F)
- **Body Material**
  - 316 Stainless Steel
- **Diaphragm**
  - Gold Plated Ceramic
- **Barometric Compensation**
  - Automatic (Electronic)
- **Cable**
  - 2 conductor and shield with polyurethane jacket. 7mm (0.28”) max. O.D.
- **Electronic Settling Time**
  - 1 sec

**Transmitter**

- **Supply**
  - 4 - 20mA loop powered (7V - 30Vdc)
- **Maximum Load**
  - 750ohm @ 24Vdc - 250ohm @ 12Vdc
- **Excitation**
  - 7V min. to 30Vdc max.
- **Full Scale Output (100%)**
  - 20 mA or 4mA Selectable
- **Zero Pressure (0%)**
  - 4 mA or 20mA Selectable
- **Linearity & Repeatability**
  - 0.15% span.
  - (Factory calibrated to ±0.15% span at 25°C/78°F)
- **Compensated Temperature Range**
  - 0°C (32°F) min. to 70°C (158°F)
The PES measures pressure. The most common application is measuring liquid levels in wells and tanks. In order to do this, the transmitter must be installed below the water level at a fixed depth. The installation depends on the range of the transmitter. 1 psi is equal to approximately 2.31 feet in the water. If you have a 5 psi transmitter, the range is 11.55 feet of water and the transmitter should not be installed at a depth below 11.55 feet. Over pressure is between 1.5 and 2.0 depending upon sensor pressure. If the transmitter is installed below its maximum over pressure range, damage may occur to the transmitter diaphragm and the output reading will not be correct. Over pressure is between 1.5 and 2.0 depending upon sensor pressure.

**STANDARD RANGES IN WATER**

<table>
<thead>
<tr>
<th>PSIG Range</th>
<th>Metres</th>
<th>Feet</th>
<th>Bar</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3.5</td>
<td>11.6</td>
<td>0.345</td>
</tr>
<tr>
<td>* 15</td>
<td>10.6</td>
<td>34.6</td>
<td>1.034</td>
</tr>
<tr>
<td>* 30</td>
<td>21.1</td>
<td>69.3</td>
<td>2.067</td>
</tr>
<tr>
<td>50</td>
<td>35.2</td>
<td>115.5</td>
<td>3.445</td>
</tr>
<tr>
<td>* 100</td>
<td>70.4</td>
<td>230.9</td>
<td>6.89</td>
</tr>
<tr>
<td>300</td>
<td>211.3</td>
<td>693.0</td>
<td>20.67</td>
</tr>
<tr>
<td>500</td>
<td>352.0</td>
<td>1155.0</td>
<td>34.5</td>
</tr>
</tbody>
</table>

* Standard available range.

**Other Installations:**

The PES can be installed in any position, however; when it leaves the factory it is calibrated in a vertical position. Strapping the transmitter body with tie wraps or tape will not hurt it. Hawk can provide optional 1/4" NPT input adaptor, which can be interchangeable with the standard end cone for those applications where it is necessary to directly attach the transmitter to a pipe, tank, or other pipe port. If the transmitter is being installed in a fluid environment other than water be sure to check the compatibility of the fluid with the wetted parts of the transmitter. Hawk can provide a variety of seal materials if you are planning to install the PES in an environment other than water.
DIMENSIONS - PES Pressure Sensor

Cable Suspension Version
(with 3x lugs for stainless steel support cable)

Thread Mounted Version

Stainless Steel
(Extension Pipe Version)

Standard Thread Sizes*
1", 1.5", 2" BSP or NPT

Flange Mounted

Standard Flange Sizes *

Set to required specifications.

See Table

<table>
<thead>
<tr>
<th>ANSI</th>
<th>1&quot;</th>
<th>2&quot;</th>
<th>3&quot;</th>
<th>4&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>JIS</td>
<td>25mm</td>
<td>50mm</td>
<td>80mm</td>
<td>100mm</td>
</tr>
<tr>
<td>DIN</td>
<td>25mm</td>
<td>50mm</td>
<td>80mm</td>
<td>100mm</td>
</tr>
</tbody>
</table>

| Thread Mounted Version |

| 20mm (2.0") |
| 250mm (10.0") |
| 29.0mm (1.14") |

| Stainless Steel |

| 1.5" BSP |
| 400mm to 3000mm Max. (15.75" to 118.1") |
| 29.0mm (1.14") |

| Flange Mounted |

| See Table |
DIMENSIONS - PET Pressure Transmitter

Loop Powered Indicator

Pressure Transducer

7-30Vdc loop

Mounting Hole Size

146mm (5.73")
134mm (5.26")
91mm (3.57 ± 0.01)

98mm (3.84")

50mm (1.94")
MOUNTING

Base Mounting Dimensions for Remote enclosure

Remote Mounting Bracket with Remote enclosure
PRESSURE TRANSMITTER SOFTWARE OPERATION

This document describes the operation and use of the pressure transmitter software. It includes details for operating the menu and recommendations on correct use of important features.

General Operation

Power Up

On power up the software still automatically sort operating and will establish an output corresponding to the pressure applied to the pressure sensor. The internal atmospheric compensation may need a minute or two to stabilize.

During startup the software will display some setup information. The following data is displayed:
1. The Software Version. (Example 'PSv1.45')
2. The Serial Number.
3. The Sensor Type. The software has been setup to work with this pressure sensor and expects it to be connected to the amplifier (Example '15 PSI')

Note:
The unit must have the correct range pressure sensor connected. The unit will function with an incorrect range pressure sensor connected, but the output will not be correct.

Menu

Pressing arid releasing the $<sup>®</sup>$ button enters the menu. The unit will maintain the last output while the menu is in operation. The $<sup>®</sup>$ button is used to select or confirm a selection where as $<sup>®</sup>$ will abort the operation including discarding any changes just made.

The user must finally press the $<sup>®</sup>$ button to have the unit resume normal operation. (Continue to update the output due to changing pressure input.)

Setting Span Levels

For best accuracy, the unit should have been operating normally for several minutes. The Measure menu option allows the user to set the span by applying pressure at either setpoint corresponding to 4mA/20mA, and storing these values.

The user should allow enough samples for the reading to become stable (at least 5) before storing the 4mA/20mA use setpoints.
PRESSURE SENSOR – DESCRIPTION

Setting Span Points
There are two methods for setting the pressure levels at which the analog output levels for the 4mA and 20mA points will correspond.

One method allows the user to measure the desired pressure points that they wish there 4mA and 20mA points to occur at. This is simply done by applying the pressure for either point allowing the system to sample and still this level.

The 'Measure Method' may not be applicable to all installations, as it may not be possible to apply the pressure at which you want the 4mA and 20mA points set (Request the factory to do this when calibration of the unit is done.)

The 'User Set' option allows the desired level to be entered manually in the current engineering units. For example, to have the 4mA point at 2.00m, the user would enter this number via the front panels keys until 2.00m showed on the display.

Note: Using the Measure option should give better accuracy when setting the user set points.

Trim
If the analog output for the 4mA or 20mA points are incorrect these can be adjusted in the TRIM option. A current meter will need to be connected to view the change in the analog output. The reading can be adjusted with the keys, while the message 'Setting' is displayed on the LCD. These valves are set at the factory and shouldn't need adjusting.

Zero
If the output of the unit is not zero when no pressure is applied to the sensor, the unit can be zeroed. This will make the output read zero. Do not apply pressure to the unit when using the zero option, otherwise you give the unit an offset. To use this option, have no pressure applied to the sensor, select the zero option and store the value. The order in which things are done here should be followed to make sure the software samples the sensor when no pressure is applied to it.

Factory Settings
It’s possible to restore some settings the unit had when it left the factory. The 4mA and 20mA user setpoints and the zero offset can be reset by choosing to restore the factory defaults using the ‘factory’ option. Choose OK to accept the restoration of the original factory values.

Value/Sample (Put with setting span points under Measure)
When using the measure option to set the user set points by applying pressure. The unit will show the current sample number followed by the pressure reading in the current engineering units. To get an accurate set point reading, the unit displays these samples to allow the user to make sure the pressure is stable. The unit will only sample 20 times before 'timing out' i.e. prompting to accept the sample or not.
WARRANTY

Hawk control products will be replaced, put in good operating condition, or the purchase price refunded, at the option of Hawk, free of charges except transportation, if defective in their manufacture, labeling, packaging, or shipping, and if notice of said defect is received by Hawk within one year from the date of shipment. The cost of such replacement, repair or refund or purchase price shall be the exclusive remedy for any breach of warranty, and Hawk shall not be liable to any person for consequential damages for injury or commercial loss resulting from any breach of any warranty. Hawk makes no warranty of fitness for a particular purpose, and makes no other warranty, express or implied, including implied warranty arising from course of dealing or usage of trade.

PART NUMBERING

MODEL
PE S = Pressure System - Transducer-PEX and Panel Mount Transmitter-PET
PE R = Remote Pressure System - Transducer and Remote Mount Transmitter
PE X = Transducer only

PRESSURE RANGE
15 PSIG
30 PSIG
100 PSIG
150 PSIG
300 PSIG
500 PSIG

DIAPHRAGM MATERIAL
C = Ceramic

UNITS
M = Metric i.e. metres and centimetres
U = Imperial i.e. feet and inches

CABLE or PIPE LENGTH (see below)
Pxxxx = Pipe Length (specify in cm or ft)
Cxxxx = Cable Length (specify in m or ft)

MOUNTING STYLE
S = Stainless Steel Suspension Cable
A = ANSI Flange
D = DIN Flange
J = JIS Flange
B = BSP Thread
N = NPT Thread
Z = Special Request
X = Not Required

MOUNTING SIZE
Flange  BSP  NPT
E  1”/25mm  1”  1”
F  1.5”/38mm  1.5”  1.5”
G  2”/50mm  2”  2”
H  4”/100mm N/A  N/A
X  Not Required
Z  Special Request

FLANGE POSITION (if required)
Specify in mm/in from face of transducer
X = Not Required

Cable options & accessories

#STANDARD CABLE LENGTHS

<table>
<thead>
<tr>
<th>Length</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>5m (16ft)</td>
<td></td>
</tr>
<tr>
<td>15m (50ft)</td>
<td>Custom Length</td>
</tr>
<tr>
<td>23m (75ft)</td>
<td></td>
</tr>
<tr>
<td>75m (246ft)</td>
<td></td>
</tr>
<tr>
<td>110m (360ft)</td>
<td></td>
</tr>
<tr>
<td>220m (720ft)</td>
<td></td>
</tr>
<tr>
<td>360m (1180ft)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Custom length cables will have a longer delivery time.