ACCURACY - PRESSURE MEASUREMENT

bar (Gauge Pressure)

- 18 to 28°C
  - 0 to 30% of Range: ±(0.01% of Full Scale)
  - 30 to 110% of Range: ±(0.035% of Reading)
  - Vacuum*: ±(0.05% of Full Scale**)

- -20 to 50°C
  - 0 to 30% of Range: ±(0.015% of Full Scale)
  - 30 to 110% of Range: ±(0.050% of Reading)
  - Vacuum*: ±(0.05% of Full Scale**)

* Applies to 30 bar and lower ranges only.
** Full Scale is the numerical value of the positive pressure range.

barA (Absolute Pressure with BARO Option)

- All absolute accuracies are equivalent to the gauge pressure accuracies, except as noted below.
  - 3 bar Range: Gauge Accuracy + 0.0003 barA
  - 10 bar Range: Gauge Accuracy + 0.0001 barA

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

All models indicate vacuum, but vacuum specification applies to 3, 10, and 30 bar models only.

Not recommended for continuous use at high vacuum. Refer to XP2i-DP data sheet for gauges that are intended for continuous high vacuum use.

The BARO option allows you to toggle between gauge and absolute pressure.

REMOTE PRESSURE MODULE CONNECTION
RTD CONNECTION
SENSOR DIAPHRAGM SURFACE

MINI USB CONNECTOR
Ø 4 mm SHIELDED BANANA JACKS
mA CONNECTIONS
Ø 4 mm SHIELDED BANANA JACKS
7/16-20 MP CPF PORTS
MINI USB CONNECTOR

ADDITIONAL SENSOR LENGTH WITH OPTIONAL FITTING ADAPTERS

1/4 INCH MNPT ADAPTER
1/4 INCH MBSP ADAPTER
M20X1.5 ADAPTER
7/16-20 MP CPF PORTS
MINI USB CONNECTOR
Ø 4 mm SHIELDED BANANA JACKS
mA CONNECTIONS
Differential Pressure

The Tare function can improve differential pressure measurement uncertainties. Requires the use of an equalizing valve.

<table>
<thead>
<tr>
<th>Full Scale Range of Both Sensors</th>
<th>psi</th>
<th>mbar</th>
<th>inH2O</th>
<th>mmH2O</th>
</tr>
</thead>
<tbody>
<tr>
<td>bar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.0005</td>
<td>0.04</td>
<td>0.014</td>
<td>0.4</td>
</tr>
<tr>
<td>10</td>
<td>0.0115</td>
<td>0.10</td>
<td>0.04</td>
<td>1.0</td>
</tr>
<tr>
<td>30</td>
<td>0.05</td>
<td>0.4</td>
<td>0.14</td>
<td>4.0</td>
</tr>
<tr>
<td>100</td>
<td>0.02</td>
<td>1.0</td>
<td>0.4</td>
<td>10.0</td>
</tr>
<tr>
<td>300</td>
<td>0.05</td>
<td>4.0</td>
<td>1.4</td>
<td>n/a</td>
</tr>
<tr>
<td>700</td>
<td>0.2</td>
<td>10.0</td>
<td>4.0</td>
<td>n/a</td>
</tr>
<tr>
<td>1000</td>
<td>0.3</td>
<td>15.0</td>
<td>6.0</td>
<td>n/a</td>
</tr>
</tbody>
</table>

% of DP Reading: 0.035%

Without tare function:

± (0.05% of static line pressure reading)

Pressure Sensor

Wetted Materials:
- (Wrench Tight) 316 stainless steel
- (Finger Tight) 316 stainless steel and Viton® (internal o-ring)

Diaphragm Seal Fluid: Silicone Oil
Connection: Crystal CPF Female

Barometric Reference (BARO)

Accuracy: ± 0.5 mbar, ± 0.00725 psi

Range: 700.0 to 1100.0 mbarA, 10.153 to 15.954 psiA

Units and Resolution:
- psi ............... 0.001
- inHg ............. 0.001
- mmHg ............ 0.01
- mbar ............. 0.1

Pressure Connection: Cylindrical sensor fitting of 5.8mm OD. A flexible 4.8 mm [3/16"] ID tube is recommended to connect for calibration.

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability for one year.

Exposure to environmental extremes of temperature, shock, and/or vibration may warrant a more frequent recertification period.

Other units available depending on the installed modules.
# CURRENT & VOLTAGE MEASUREMENT

<table>
<thead>
<tr>
<th>mA CONNECTIONS</th>
<th>Ø 4 mm SHIELDED BANANA JACKS</th>
</tr>
</thead>
</table>

## Current (mA) Input
- **Accuracy:** 
  - ±(0.015% of rdg + 0.002 mA)
- **mA Range:** 0 to 55 mA
- **Percent Range:** 0-20, 4-20, 10-50
- **Max Allowable Current:** 60 mA
- **Resolution:** 0.001 mA or 0.01%
- **Units:** mA and %
- **Input Resistance:** < 17.2 Ω
- **Voltage Burden @ 20mA:** < 0.35 V
- **Voltage Burden @ 50mA:** < 0.86 V
- **HART Resistor:** 250 Ω

## Current (mA) Output
- **Accuracy:** 
  - ±(0.015 of rdg + 0.002 mA)
- **Range:** 0 to 25 mA
- **Step Time:** 1 to 999 seconds
- **Ramp Time:** 5 to 999 seconds

## Voltage (VDC) Input
- **Accuracy:** 
  - ±(0.015 % of rdg + 2 mV)
- **Range:** 0 to 30 VDC
- **Resolution:** 0.001 VDC
- **Input Impedance:** > 1 MOhm

## Loop Power
- **Fixed Output:** 24 VDC
- **Voltage Output Accuracy:** ± 10%
- **Maximum Output Current:** 25 mA

## Switch Test
- **Switch Type:** Dry Contact
- **Closed State Resistance:** < 1 KΩ
- **Open State Resistance:** > 100K Ω
- **Sample Rate:** 10 Hz
# TEMPERATURE MEASUREMENT

**Accuracy:** ±(0.015% of rdg) + 0.02 Ohm  
**Range:** 0 – 400 Ohms  
**Resolution:** 0.01 on all scales  
**Units:** °C, K, °F, R, Ω  
**TCR:** 0.003850 Ω/Ω/°C (IEC 60751)  
**Wiring:** 2-, 3-, and 4-wire support  
**Connection:** Lemo Plug, 1S Series, 304 insert configuration

The proper selection of the RTD sensing element is very important as the error associated with this device is the majority of the overall system measurement uncertainty. IEC 751 is the standard that defines the temperature versus resistance for 100Ω, 0.00385 Ω/Ω/°C platinum RTDs. IEC 751 defines two classes of RTDs: Class A and B. Class A RTDs operate over the -200 to 630°C range versus -200 to 800°C for the Class B elements. For example, the Class A uncertainty is about half that of the Class B elements as illustrated in the following table.

<table>
<thead>
<tr>
<th>Temperature °C</th>
<th>HPC40 Series Uncertainty</th>
<th>Class A Uncertainty</th>
<th>HPC40 + Class A Uncertainty</th>
<th>Class B Uncertainty</th>
<th>HPC40 + Class B Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>-200</td>
<td>±0.02 ±0.05</td>
<td>±0.24 ±0.55</td>
<td>±0.24 ±0.55</td>
<td>±0.56 ±1.30</td>
<td>±0.56 ±1.30</td>
</tr>
<tr>
<td>0</td>
<td>±0.04 ±0.09</td>
<td>±0.06 ±0.15</td>
<td>±0.07 ±0.17</td>
<td>±0.12 ±0.30</td>
<td>±0.12 ±0.31</td>
</tr>
<tr>
<td>200</td>
<td>±0.05 ±0.13</td>
<td>±0.2 ±0.55</td>
<td>±0.21 ±0.56</td>
<td>±0.48 ±1.30</td>
<td>±0.48 ±1.31</td>
</tr>
<tr>
<td>400</td>
<td>±0.06 ±0.17</td>
<td>±0.33 ±0.95</td>
<td>±0.33 ±0.96</td>
<td>±0.79 ±2.30</td>
<td>±0.79 ±2.31</td>
</tr>
<tr>
<td>600</td>
<td>±0.07 ±0.21</td>
<td>±0.43 ±1.35</td>
<td>±0.44 ±1.37</td>
<td>±1.06 ±3.30</td>
<td>±1.06 ±3.31</td>
</tr>
<tr>
<td>800</td>
<td>±0.08 ±0.25</td>
<td>±0.52 ±1.75</td>
<td>±0.53 ±1.77</td>
<td>±1.28 ±4.30</td>
<td>±1.28 ±4.31</td>
</tr>
</tbody>
</table>

**OPERATING TEMPERATURE**

**Temperature Range:** -20 to 50°C (-4 to 122°F)  
< 95% RH, non-condensing. No change in pressure, electrical, or temperature accuracy over operating temperature range. Gauge must be zeroed to achieve rated specification.

**DISPLAY**

**Screen:** 320 x 240 pixel graphical display  
**Display Rate:** 3 readings/second (standard)  
10 readings/second (switch test and peak hi/lo modes)  
LCD readable in sunlight.
**POWER**

<table>
<thead>
<tr>
<th>Type</th>
<th>Cell Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaline</td>
<td>1.5 V</td>
</tr>
<tr>
<td>NiMH</td>
<td>1.2 V</td>
</tr>
<tr>
<td>Lithium</td>
<td>1.5 V</td>
</tr>
</tbody>
</table>

Battery Life: 
- >12 hours non-sourcing
- >8 hours when sourcing 12 mA

Recharge Time: 16 hours* (Using Eneloop 2100 mA/hr)

* Charging is done through USB.

**DATA/COMMUNICATION**

Digital Interface: mini-USB

The mini USB will power the HPC40 Series with or without the batteries installed.

**ENCLOSURE**

- Weight: 689 g (24.3 oz)
- Rating: IP65
- Housing: Machined Aluminum
- Keypad and Labels: UV Resistant Silicone

**STORAGE TEMPERATURE**

Temperature Range: -40 to 75°C (-40 to 167°F)

Batteries should be removed if stored for more than one month.

**SPECIAL FEATURES**

The following requires the use of our free CrystalControl software

- Remove: Unwanted pressure units.
- Auto Off: Adjust automatic shutoff settings.
- Calibration: Calibrate the modules and enter new Calibrated On and Calibration Due dates.
- User Defined Unit: Define and display any pressure units not included, or to use the gauge to display force, level or other pressure related parameters.
## RANGE & RESOLUTION TABLE

<table>
<thead>
<tr>
<th>Display Resolution</th>
<th>P/N Range</th>
<th>Over-pressure</th>
<th>bar</th>
<th>mbar</th>
<th>kPa</th>
<th>MPa</th>
<th>psi</th>
<th>in H₂O</th>
<th>in Hg</th>
<th>mm H₂O</th>
<th>mm Hg</th>
<th>kg/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>3BAR</td>
<td>3</td>
<td>3.0 x</td>
<td>0.0001</td>
<td>0.1</td>
<td>0.01</td>
<td>0.001</td>
<td>0.001</td>
<td>0.01</td>
<td>1</td>
<td>0.0001</td>
<td></td>
</tr>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>10BAR</td>
<td>10</td>
<td>2.0 x</td>
<td>0.0001</td>
<td>0.1</td>
<td>0.01</td>
<td>0.0001</td>
<td>0.001</td>
<td>0.1</td>
<td>0.1</td>
<td>1</td>
<td>0.0001</td>
</tr>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>30BAR</td>
<td>30</td>
<td>2.0 x</td>
<td>0.001</td>
<td>1</td>
<td>0.1</td>
<td>0.001</td>
<td>0.01</td>
<td>0.1</td>
<td>0.01</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>100BAR</td>
<td>100</td>
<td>2.0 x</td>
<td>0.01</td>
<td>1</td>
<td>0.001</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>300BAR</td>
<td>300</td>
<td>1.5 x</td>
<td>0.01</td>
<td>1</td>
<td>0.001</td>
<td>0.1</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>700BAR</td>
<td>700</td>
<td>1.5 x</td>
<td>0.01</td>
<td>1</td>
<td>0.001</td>
<td>1</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RANGE &amp; RESOLUTION TABLE</td>
<td>1KBAR</td>
<td>1000</td>
<td>1.3 x</td>
<td>0.01</td>
<td>1</td>
<td>0.001</td>
<td>1</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Add one digit of resolution for differential mode.)

## ORDERING INFORMATION

<table>
<thead>
<tr>
<th>Number of Sensors</th>
<th>1st Pressure Range P/N</th>
<th>2nd Pressure Range P/N</th>
<th>BARO Option</th>
<th>Adapter</th>
<th>CPF* Fitting Kits</th>
<th>Pump System**</th>
<th>Liquid (Systems C-H)</th>
<th>Carrying Case**</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPC41 … (Single)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>HPC42 … (Dual)</td>
<td>—</td>
<td>—</td>
<td>No … (omit)</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>HPC41-100BAR</td>
<td>…</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>HPC42-300BAR-1KBAR-BARO-BSP</td>
<td>—</td>
<td>—</td>
<td>Yes--BARO</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>HPC42-100BAR-700BAR-GWX-W</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

** SAMPLE PART NUMBERS **

- **HPC41-100BAR** Single Sensor (100 bar) HPC40 with a 1/4" NPT pressure fitting.
- **HPC42-300BAR-1KBAR-BARO-BSP** Dual Sensor (300 bar/1000 bar) HPC40 with the BARO option and a 1/4" BSP pressure fitting.
- **HPC42-100BAR-700BAR-GWX-W** Dual Sensor (100 bar/700 bar) HPC40 with a 1/4" NPT pressure fitting; a System G pump system; and a waterproof carrying case.

▶ Ordering a Pump System Only

Any pump system, carrying case, and connection fittings for an HPC40 Series calibrator may be ordered separately from the gauge. Enter HPC40-NONE followed by the Pump System part number and the Carrying Case option code.

** SAMPLE PART NUMBERS **

- **HPC40-NONE-GWX-W** System G pump system with a waterproof carrying case.

---

** CPF Fitting Kits can only be ordered as part of a Pump System. All fittings are rated to 700 bar, with the exception of the MPF-1/2QTF rated to 350 bar.**

** Refer to the following page for a more detailed description of each Pump System.**

** The Waterproof Case is an option for Systems A, B, and C. Only the Waterproof Case is the only option for Systems G and H.**

---

**AMETEK TEST & CALIBRATION INSTRUMENTS**

5488 A HPC40 Series bar Data Sheet Page 6 of 7
PUMP SYSTEMS

All pump systems for the HPC40 Series include 1/4 NPT and BSP female fittings and a carrying case with custom insert. Additional fittings and accessories included with individual systems are listed below.

- **Systems A**... AXX (T-960), AHX (T-970)
  MPH-1 hose, bonded seals, o-ring kit, and teflon tape.

- **Systems B**... BX (T-965), BHX (T-975-CPF)
  MPH-1 hose, bonded seals, o-ring kit, and teflon tape.

- **Systems C**... CX (T-620), CHX (T-620H-CPF)
  MPH-1 hose, MPF-CAP, MPM-PLUG, bonded seals, and teflon tape.

- **Systems D**... DOX and DWX (P-018-CPF)
  Bonded seals and teflon tape.

- **Systems E**... EOX (P014)
  Bonded seals and teflon tape.

- **Systems F**... Fov and FW (T-1-CPF)
  Bonded seals and teflon tape.

- **Systems G**... GOX and GWX (GaugeCalHP)
  Carrying case hold-down straps.

- **System H**... HOX (T-975-CPF and T-620H-CPF)
  MPF-CAP, MPM-PLUG, bonded seals, o-ring kit, and teflon tape.

CPF FITTING KITS

- **NPT Kit**... -N (4013)
  Includes MPF-1/8QTF, MPF-1/4QTF, and MPF-1/2QTF.

- **BSP Kit**... -B (4015)
  Includes MPF-1/8BSPF, MPF-1/4BSPF, MPF-3/8BSPF, and MPF-1/2BSPF.

STANDARD DELIVERY

- HPC41 or HPC42
- Traceable calibration certificate with data at five temperatures
- 4 x AA batteries
- Your choice of adapters (NPT, BSP, and M20)
- Protective Boot
- Test Leads, red and black with clips
- Velcro strap
- User manual
- Mini-USB Cable

COMPLIMENTARY PRODUCTS

Crystal Engineering offers a wide range of products that work with the HPC40 Series:

- Fittings that connect without tools, safely and without leaks
- Lightweight, super flexible high pressure hoses
- Fitting kits and adapters
- Pneumatic hand pumps
- Hydraulic hand pumps
- Portable pressure comparators