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. Vacuum Range = -1.0 bar.

** 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

ADVANCED PRESSURE MODULES

We offer a range of fully calibrated Advanced Pressure Modules to supplement the HPC40 Series’ built-in pressure sensors. Full scale pressure range is from 3 to 1000 bar, with accuracies from ± 0.025 % rdg, and fully temperature compensated from -20 to 50 °C.

**APM CPF Series Pressure Modules**

*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.*

---

**mA CONNECTIONS**

Ø 4 mm SHIELDED BANANA JACKS

**REMOTE PRESSURE MODULE CONNECTION**

**RTD CONNECTION**

**SENSOR DIAPHRAGM SURFACE**

**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

---

**APM CPF Series Pressure Modules**

*Applies to 30 bar and lower ranges only. Vacuum Range = -1.0 bar.*

** Full Scale is the numerical value of the positive pressure range.

*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.*
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>The Greater of (+/-)</th>
<th>% of DP Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>bar</td>
<td>psi</td>
<td>mbar</td>
</tr>
<tr>
<td>3</td>
<td>0.0005</td>
<td>0.04</td>
</tr>
<tr>
<td>10</td>
<td>0.0015</td>
<td>0.10</td>
</tr>
<tr>
<td>30</td>
<td>0.005</td>
<td>0.4</td>
</tr>
<tr>
<td>100</td>
<td>0.02</td>
<td>1.0</td>
</tr>
<tr>
<td>300</td>
<td>0.05</td>
<td>4.0</td>
</tr>
<tr>
<td>700</td>
<td>0.2</td>
<td>10.0</td>
</tr>
<tr>
<td>1000</td>
<td>0.3</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Unit is enabled in CrystalControl

Without tare function:
\[ \pm (0.05\% \text{ of static line pressure reading}) \]

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: \[ \pm 0.5 \text{ mbar, } \pm 0.00725 \text{ psi} \]

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.

STANDARD DELIVERY

- HPC41 or HPC42
- ISO 17025 Accredited Calibration Certificate, NIST Traceable
- 4 x AA batteries
- Your choice of adapters (NPT, BSP, and M20)
- Protective Boot
- Test Leads, red and black with clips
- Velco strap
- User manual
- Mini-USB Cable

COMPLEMENTARY 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
### CURRENT & VOLTAGE MEASUREMENT

#### Connection:
- 4 mm jacks

#### Maximum Voltage:
- 45 VDC

#### Current (mA) Input
- **Accuracy:** $\pm(0.015\% \text{ of rdg} + 0.002 \text{ mA})$
- **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% mA
- **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:** $\pm(0.015 \text{ of rdg} + 0.002 \text{ mA})$
- **Range:** 0 to 25 mA
- **Step Time:** 1 to 999 seconds
- **Ramp Time:** 5 to 999 seconds

#### Voltage (VDC) Input
- **Accuracy:** $\pm(0.015 \text{ % of rdg} + 2 \text{ mV})$
- **Range:** 0 to 30 VDC
- **Resolution:** 0.001 VDC
- **Input Impedance:** > 1 MOhm

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

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

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

Inputs protected by a resettable fuse.

mA can be displayed as a percentage, where 0 to 100% corresponds to either 0 to 20, 4 to 20, or 10 to 50 mA.

Jacks are compatible with safety sheathed banana plugs.

With internal or external loop supply.

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

**Accuracy:** \( \pm (0.015\% \text{ of rdg}) + 0.02 \text{ Ohm} \)

**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 Calibrator 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>±Ω ±°C</td>
<td>±Ω ±°C</td>
<td>±Ω ±°C</td>
<td>±Ω ±°C</td>
<td>±Ω ±°C</td>
</tr>
<tr>
<td>0</td>
<td>0.02 ± 0.05</td>
<td>0.24 ± 0.05</td>
<td>0.24 ± 0.55</td>
<td>0.56 ± 1.30</td>
<td>0.56 ± 1.30</td>
</tr>
<tr>
<td>200</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>600</td>
<td>0.07 ± 0.21</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>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>

**DATA/COMMUNICATION**

**Digital Interface:** mini-USB

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

**DISPLAY**

**Screen:** 320 x 240 pixel graphical display

LCD readable in sunlight.

**Display Rate:** 3 readings/second (standard)

10 readings/second (switch test and peak hi/lo modes)

**TEMPERATURE SENSORS**

We offer 2 complete system calibrated temperature sensors for HPC40 series, taking full advance of the “reference thermometer” like RTD input. Both sensors are 4 x 250 mm sensors with handle, cord, and LEMO connector, and ready to use with HPC40 Series.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>HPC40 Series Calibrator 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>T2: -45 to 150 °C</td>
<td>0.02 ± 0.05</td>
<td>0.24 ± 0.05</td>
<td>0.24 ± 0.55</td>
<td>0.56 ± 1.30</td>
<td>0.56 ± 1.30</td>
</tr>
<tr>
<td>T3: -45 to 400 °C</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>
</tbody>
</table>

T2 & T3 options are delivered with 17025 accredited system calibration certificate, combining HPC and temperature sensor uncertainties. Correction factors (CvD) will be calculated, and entered into the HPC40 Series.
**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, except when supplying loop power in mA, Int. Pwr. Mode.

**ENCLOSURE**

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

**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.

**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.

**CERTIFICATIONS**

HPC40 Series complies with the Electromagnetic Compatibility and the Pressure Equipment Directives.

HPC40 Series complies with the Australian Radiocommunications (Electromagnetic Compatibility) Standard 2008.
AMETEK offers a variety of solutions for pressure generation and measurement. Our line of products for pressure generation includes everything from small pneumatic hand pumps to a precision, hydraulic pressure comparator capable of generating up to 15000 psi / 1000 bar / 100 MPa. All of our pumps may be ordered as part of a Pump System, complete with an HPC40 Series and delivered in a sturdy carrying case with custom insert.

**Number of Sensors**

- HPC41 (Single)
- HPC42 (Dual)

**Sample Part Numbers**

- HPC41-100BAR: Single Sensor (100 bar) HPC40 with a 1/4” NPT pressure fitting.
- HPC42-300BAR-700BAR-BARO-BSP-T3: Dual Sensor (300 bar/700 bar) HPC40 with the BARO option, a 1/4” BSP pressure fitting, and STS050 Probe temperature sensor.
- 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.

**RANGE & RESOLUTION TABLE**

<table>
<thead>
<tr>
<th>P/N</th>
<th>Range (bar)</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 H₂O</th>
<th>kg/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>3BAR</td>
<td>3</td>
<td>3.0 x</td>
<td>0.0001</td>
<td>0.1</td>
<td>0.01</td>
<td>0.0001</td>
<td>0.01</td>
<td>0.001</td>
<td>0.01</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<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>0.01</td>
<td>0.001</td>
<td>0.1</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30BAR</td>
<td>30</td>
<td>1.5 x</td>
<td>0.01</td>
<td>0.1</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.01</td>
<td>0.001</td>
<td>0.1</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100BAR</td>
<td>100</td>
<td>1.5 x</td>
<td>0.1</td>
<td>0.001</td>
<td>0.01</td>
<td>0.0001</td>
<td>0.1</td>
<td>0.001</td>
<td>0.1</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300BAR</td>
<td>300</td>
<td>1.5 x</td>
<td>1</td>
<td>0.001</td>
<td>1</td>
<td>0.0001</td>
<td>1</td>
<td>0.001</td>
<td>1</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>700BAR</td>
<td>700</td>
<td>1.5 x</td>
<td>1</td>
<td>0.001</td>
<td>1</td>
<td>0.0001</td>
<td>1</td>
<td>0.001</td>
<td>1</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<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>1</td>
<td>0.001</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Add one digit of resolution for differential mode.)

**ORDERING INFORMATION**

- CPF Adapter Fitting is not included.
- AMETEK offers a variety of solutions for pressure generation and measurement. Our line of products for pressure generation includes everything from small pneumatic hand pumps to a precision, hydraulic pressure comparator capable of generating up to 15000 psi / 1000 bar / 100 MPa.
- All of our pumps may be ordered as part of a Pump System, complete with an HPC40 Series and delivered in a sturdy carrying case with custom insert.

**Sample Part Numbers**

- HPC41-100BAR: Single Sensor (100 bar) HPC40 with a 1/4” NPT pressure fitting.
- HPC42-300BAR-700BAR-BARO-BSP-T3: Dual Sensor (300 bar/700 bar) HPC40 with the BARO option, a 1/4” BSP pressure fitting, and STS050 Probe temperature sensor.
- 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.

**SUMMARY**

- AMETEK offers a variety of solutions for pressure generation and measurement.
- Our line of products for pressure generation includes everything from small pneumatic hand pumps to a precision, hydraulic pressure comparator capable of generating up to 15000 psi / 1000 bar / 100 MPa.
- All of our pumps may be ordered as part of a Pump System, complete with an HPC40 Series and delivered in a sturdy carrying case with custom insert.

**ORDERING INFORMATION**

- No Pump… (omit)
- System A…-AXX Aluminum… (omit)
- System A…-AHX Waterproof…-W
- System B…-BXX
- System C…-CHX
- System C…-CXX
- System D…-DOX
- System D…-DXW
- System E…-EOX
- System F…-FOV
- System F…-FWV
- System G…-GOX
- System G…-GWX
- System H…-HOX

(Refer to the following page for a more detailed description of each pump system.)

**Display Resolution**

- P/N: Range (bar)
- Over-pressure: bar, mbar, kPa, MPa, psi, in H₂O, in Hg, mm H₂O, mm H₂O, kg/cm²

**Display Resolution**

- P/N: Range (bar)
- Over-pressure: bar, mbar, kPa, MPa, psi, in H₂O, in Hg, mm H₂O, mm H₂O, kg/cm²

**Display Resolution**

- P/N: Range (bar)
- Over-pressure: bar, mbar, kPa, MPa, psi, in H₂O, in Hg, mm H₂O, mm H₂O, kg/cm²
# PUMP SYSTEMS OVERVIEW

<table>
<thead>
<tr>
<th>Pump System</th>
<th>Part Number</th>
<th>Pressure Range</th>
<th>Pneumatic</th>
<th>Hydraulic</th>
<th>Hand Pump</th>
<th>Bench Top</th>
<th>Included Pump</th>
<th>Case Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>System A</td>
<td>AXX</td>
<td>0 to 30 psi / 2 bar</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>T-960-CPF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AHX</td>
<td>0 to 580 psi / 40 bar</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>T-970-CPF</td>
<td></td>
</tr>
<tr>
<td>System B</td>
<td>BXX</td>
<td>-25 inHg to 30 psi / -0.85 to 2 bar</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>T-965-CPF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BHX</td>
<td>-27 inHg to 580 psi / -0.91 to 40 bar</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>T-975-CPF</td>
<td></td>
</tr>
<tr>
<td>System C</td>
<td>CXX</td>
<td>0 to 3000 psi / 200 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>T-620-CPF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHX</td>
<td>0 to 5000 psi / 350 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>T-620H-CPF</td>
<td></td>
</tr>
<tr>
<td>System D</td>
<td>DOX</td>
<td>0 to 5000 psi / 350 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>P-018-CPF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DWX</td>
<td>0 to 5000 psi / 350 bar</td>
<td>(Water)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System E</td>
<td>EOX</td>
<td>0 to 10000 psi / 700 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>P014-CPF</td>
<td></td>
</tr>
<tr>
<td>System F</td>
<td>FOV</td>
<td>0 to 15000 psi / 1000 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>T-1-CPF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FWV</td>
<td>0 to 15000 psi / 1000 bar</td>
<td>(Water)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System G</td>
<td>GOX</td>
<td>0 to 15000 psi / 1000 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>GaugeCalHP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GWX</td>
<td>0 to 15000 psi / 1000 bar</td>
<td>(Water)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>System H</td>
<td>HOX</td>
<td>-27 inHg to 580 psi / -0.91 to 40 bar</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>T-975-CPF (and)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0 to 5000 psi / 350 bar</td>
<td>(Oil)</td>
<td></td>
<td></td>
<td></td>
<td>T-620H-CPF</td>
<td></td>
</tr>
</tbody>
</table>