HPC50 系列 操作手册

目录

概述

ⓘ 简介

感谢您选择 Crystal Engineering Corporation 的 HPC50 系列手持式本安型压力校准仪。HPC50 校准仪采用现代化的数码包装，具备活塞压力计的精度，可提供最安全的配件连接。新型的全彩显示屏还具有与 JOFRA ASC-400 系列相似的简单易用型界面。HPC50 既可作为独立的校准仪使用，也可整合在一个完整的泵系统中，它适合在各种各样的应用中使用，无论是简单的工具型作业，还是密闭输送系统中的复杂校准作业。

其精确度高达读数的 0.035% – 一个 HPC40 通常便可取代您一直以来使用的多个仪表或校准仪。HPC50 进行了充分的温度补偿– 在整个操作温度区间内，精度不会有任何变化！

我们可供应从真空到高达 15000 psi / 1000 bar 的单/双压力传感器型号。此外，HPC50 还可以添加一个外部压力端口 (APMi)，以提供多达 3 个压力端口。在随附气压参照（BARO 选件）的情况下，所有压力读数还可作为仪表读数或绝对读数显示。

除了压力测量，HPC50 还提供全套电气连接。HPC50 提供有电流 (mA)、电压、开关测试和温度测量 (ATMi) 的输入。

HPC50 系列测量选项

测量类型	可用的模式（如显示屏上的说明）
压力	P1、P2、APMi1、APMi2、差压、双压
温度	ATMi1, ATMi2
气压	BARO
电流	mA in, mA Out
电压	VDC In
开关测试	开关测试

其他功能包括：

- 用户可配置的信息显示屏
- 百分比误差计算
- 阻尼
- 泄漏测试
- 最小值/最大值保持
- 使用 Crystal 的新型 CPF 配件和软管系统（无泄漏，且可用手指拧紧至10000 psi (700 bar)）

我们希望 HPC50 能满足您的期望，同时欢迎您提出任何意见或建议。请发送至：
crystal@ametek.com 这款产品以及我们其他很多产品的许多功能正是得益于您的意见！

Crystal Engineering 是一家设计、制造和维修 nVision 参照记录仪、XP2i 系列压力计、30 系列压力校准仪以及各种行业特定的压力测量设备的公司。

快速入门

APM 和温度连接

连接到外部 APMi 模块以扩展压力选项，加上一个高精度ATMi 以读取温度。

"无线"键盘

所有输入和输出连接器远离显示屏和键盘放置，为操作提供最大化的自由度

微型 USB 端口

通过免费 CrystalControl 软件自定义设置

功能按钮

屏幕底部清楚地解释了每个按钮的功能。

色彩显示

全新全彩大屏幕结合全新用户界面的高级简化功能，使 HPC40 系列成为最容易使用的压力校准器。

光标键

光标键帮助您在屏幕上导航以执行设置功能和微调数值。

CPF 压力连接

包含可用手指拧紧的专利无泄漏 CPF 连接配件。

独特的"非菜单"式用户界面

简单易用的单层用户界面。无深层菜单结构！可以快速、直观地操作和设置 HPC40 系列来执行任务。

功能
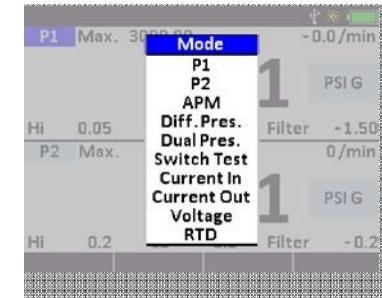
⏻ 开/关

电源按钮

按住（电源）按钮可打开或关闭 HPC40 系列校准仪。

如果在装置设置或 CrystalControl 中定义的时段内 HPC40 没有使用，其将自动切断电源。

自动关闭 - 低功耗模式

CRYSTALCONTROL 要优化电池寿命，可在装置上或通过免费的 CrystalControl 软件调节自动关闭时间（即在未按键情况下的关闭时间）。此功能可调节的时间为 5 分钟至"常开"。

在通过 USB 供应电源的情况下，HPC40 不会采用任何电源管理策略。因此，不会根据 CrystalControl 所定义的设置自动关闭。

导航

箭头按钮

（箭头）按钮的功能取决于具体的操作模式。按四个（箭头）按钮中的任意一个均将进入"导航模式"。在此模式下，用户可在屏幕上直接滚动查看可编辑的字段。任何可编辑的字段均将突出显示 蓝色 。

导航模式：使用四个（箭头）按钮可在所需方向上移动光标。

编辑模式：使用向上和向下（箭头）按钮可滚动查看选项列表。或者，在输入一个数值时，使用向左和向右（箭头）按钮可在所需方向上将光标移动一个字符。

后退按钮

按（后退）按钮可取消选择或返回上一菜单。

输入按钮

按（输入）按钮可查看/接受选定的选项或输入的值。使用（输入）按钮输入某个值时，光标将选定列表中下一个值字段。

置零按钮

按(置零)按钮可激活功能键选项。HPC50 将显示上部和下部显示屏上当前显示的参数。按所要置零参数的(功能)按钮，显示屏将随之快速闪烁所有短划线(------)，表明已被置零。

说明: 如果尝试对施加的压力超过 HPC50（或 CrystalControl）中设置的"置零限制"的仪表置零，此条命令将被忽略，并显示过零限制。

说明: BARO 传感器不能置零。

⚠ 警戒: 本校准仪在连接到压力源时，可能显示零压力！在断开连接前请不要依赖显示屏的指示 - 可能指示的不是真实的压力。切勿在未释放系统压力的情况下断开压力测量仪表！

要清除零值

1 按(置零)按钮以激活可用压力传感器的(功能)按钮。

2 按住要取消置零的传感器的(功能)按钮，直至显示的内容由 (- - - - -) 变为 (---------)。

要清除峰值

1 按(置零)按钮以激活可用压力传感器的(功能)按钮。

2 按峰值的 (功能)按钮，可重置 P1、P2 和 APMi 峰值。

导航典型设置

1 按任意一个(箭头)按钮将进入导航模式。可编辑的字段突出显示 蓝色。

2 使用(箭头)按钮可在上部和下部显示屏中的可配置字段之间移动。选定的字段突出显示 深蓝色。
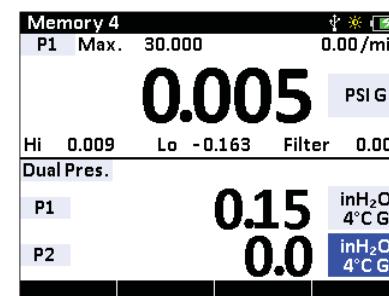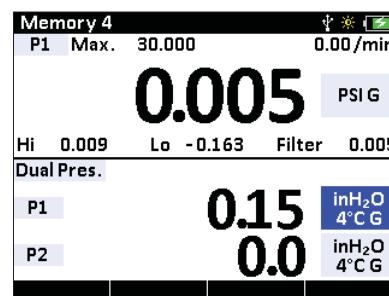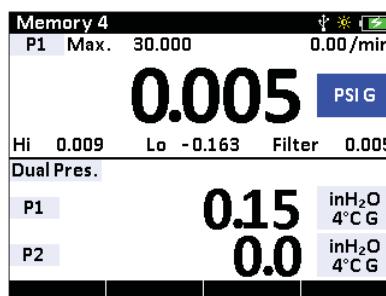
3 使用 (输入) 按钮可选定字段进行编辑。

4 使用向上和向下 (箭头) 按钮以选定一个新值，然后按 (输入) 按钮以选择新的值。
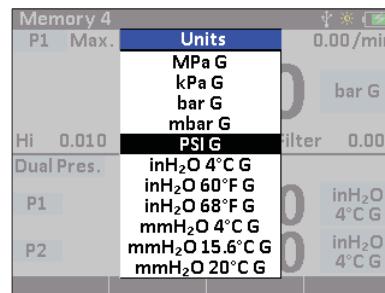
选择一个值...
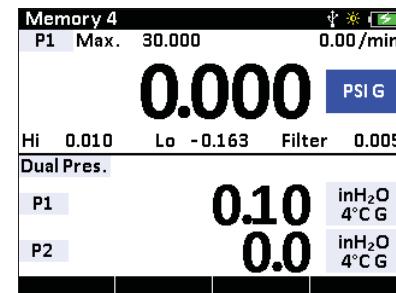
然后按"输入"。

说明: 如要不进行选择便退出导航模式，请按 (后退) 按钮。

▌设置

设置按钮

按 (设置) 按钮将进入系统设置菜单。

调用

用于调用已保存的设置。

保存

用于存储当前的显示设置。通过保存设置可快速加载相同配置供以后使用。这样便于在不同的应用或任务之间切换。最多可存储 5 个设置。

常规

用于查看或编辑以下系统设置：

- 自动关闭时间

- HART 电阻器开/关

- 电池化学性质

- 序列号

- 固件版本

- 部件号

SETTINGS

Settings Button

Press the **(settings)** button to enter the system settings menu.

▶ **Recall**

Used to recall a saved setup.

▶ **Save**

Used to store the current display setup. Saving a setup allows for quick loading of the same configurations for later use. This makes it easy to switch between different applications or tasks. Up to 5 setups can be stored.

▶ **General**

Used to view or edit the following system settings:

- Auto Off Time

- HART resistor On/Off

- Serial Number

- Firmware Version

- Part Number

▶ **P1, P2, and APMi**
- Mode: Switch between absolute and gauge pressure

- Filter Time

- Zero Limit

- Maximum Resolution: When a resolution less than standard is selected, the displayed number will include an asterisk (*)

- Overpressure Count: Counts the times when pressure has exceeded 110% of the range

- View Calibration Details

- Serial Number

- Part Number

▶ **BARO**

- Maximum Resolution: When a resolution less than standard is selected, the displayed number will include an asterisk (∗)

- View Calibration Details

- Serial Number

- Part Number

▶ **ATMi**

- Maximum Resolution: When a resolution less than standard is selected, the displayed number will include an asterisk (∗)

- Probe Coefficients: Enter and modify RTD coefficients

- View Calibration Details

- Serial Number

▶ **mA In, mA Out (sink) and VDC In**

- Maximum Resolution: When a resolution less than standard is selected, the displayed number will include an asterisk (∗)

- View Calibration Details

- Serial Number

▶ **To Save a Setup**

After you have configured the unit, you can save the setup for future use.

1 Press the (**settings**) button to enter the settings section.

2 Press the (**arrow**) buttons to highlight the Save Setting, and the press the (**enter**) button.

3 Press the (**arrow**) buttons to highlight the setup you want to modify, and then press the (**enter**) button.

4 Use the (**arrow**) buttons to change the name of the saved setup. When finished press the (**enter**) button.

The name is limited to eight characters.
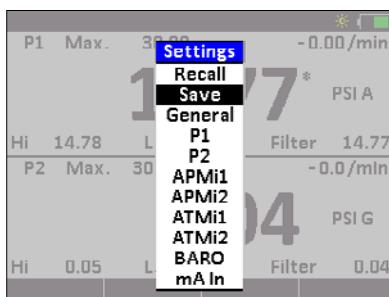
Highlight the settings to modify...   then change the name of the saved setup.
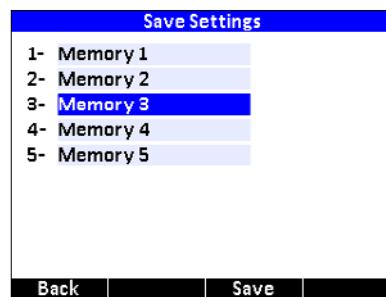
5 Press the (**F3**) function button for Save.

▶ **To Recall a Setup**

1 Press the **(settings)** button to enter the settings section.

2 Press the **(arrow)** buttons to highlight the Recall Setting, and then press the **(enter)** button.

3 Press the **(arrow)** buttons to highlight the setup you want to use, and then press the **(enter)** button.

The name of the setup will appear in the upper-left corner
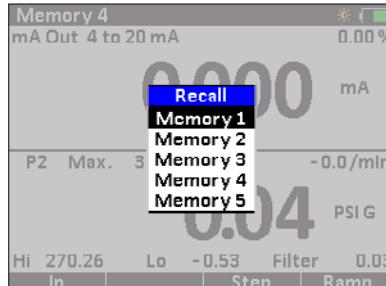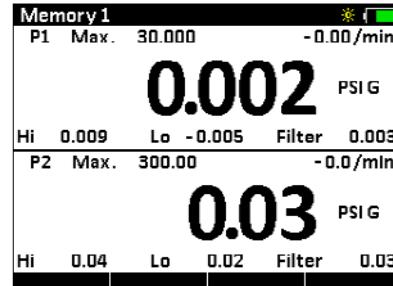
Highlight the setup…   then press enter.

DISPLAY

The display is divided into two sections: the upper and lower displays. The upper display can be configured to show values for Current, Voltage, Temperature, Pressure, BARO, or Switch Test. The lower display can be configured to show values for only Temperature, Pressure, and BARO.

Upper Display (showing Current)

Lower Display (showing Pressure)
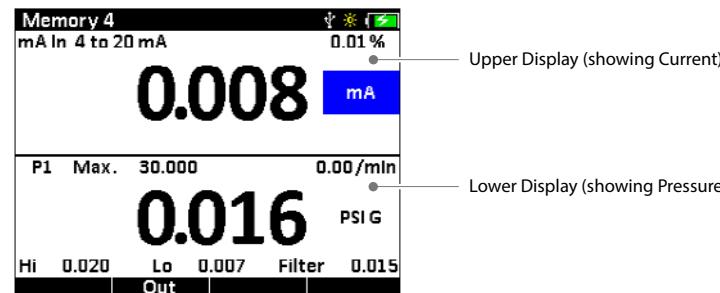
Operation

PRESSURE SENSORS

The HPC50 Series is equipped with one or two pressure sensors. In addition, one or two intrinsically safe APMi (Advanced Pressure Module) or ATMi (Advanced Temperature Module) external modules may also be used. For information on the Crystal external modules, please refer to APMi Modules and ATMi Modules. Be sure to choose the proper sensor based on working pressures and accuracy.

! **WARNINGS:** The following warnings apply to any sensor used with the HPC50 — whether internal or external:

- **Pressure sensors may be damaged and/or personal injury may occur due to improper application of pressure. Please refer to the Ranges and Resolutions table for information on overpressure ratings.**

- **The calibrator will display *+OL* when an inappropriate pressure is applied. If *+OL* is displayed, the pressure should be reduced or vented immediately to prevent damage or possible personal injury.**

  Note: *+OL* is displayed when the pressure exceeds 110% of the nominal range of the sensor.

Pressure Connection

Crystal CPF System: Medium Pressure Female (MPF) (1/4" medium pressure tube system with 7/16-20 threads). See our CPF brochure for further information.

CPF o-ring size and material: AS568A-012, Viton 80 durometer (P/N 3981).

For most applications CPF Fittings can be hand tightened (no tools required). Wrench tightening is recommended (to achieve a metal to metal cone seal) for applications where chemical compatibility of the process fluid and the o-ring are a concern. Cone seals require only moderate assembly torque to seal up to 10 000 PSI (700 bar). We recommend a tightening torque of 120 in-lbs ±20 in-lbs for our CPF fittings. Please note this is only a fraction of the typical torque required to seal a 1/4" NPT fitting. If a torque wrench isn't practical to use, the fittings can be assembled as follows: Hand tighten fitting fully until the cone has bottomed out, then tighten an additional 20° using a hex wrench. Apply a small amount of media-compatible lubricant to the gland threads and male cone to increase fitting life, reduce the likelihood of galling, and promote sealing.

! **CAUTION:** To achieve CPF maximum allowable working pressures no o-ring substitutions are allowed. See our CPF brochure and CES-003 CPF Safety Guide available from the website at ametek.com for further detail.

Measuring Vacuum

All versions of the HPC50 can be used to measure moderate vacuum.

When measuring pressure less than ambient barometric conditions, a minus (-) sign will appear.

! **CAUTION:** The HPC50 is not recommended for continuous use at high vacuum.

Overpressure Conditions

The HPC50 Series will read pressure up to approximately 110% of the rated pressure range. Above 110%, the display will indicate *+OL*, and readings will stop updating. The zero function does not affect when the display will indicate *+OL*, so depending on the zero value it is possible that the display will indicate *+OL* without the maximum pressure being displayed.

For instance, if a 100 psi range is zeroed when 30 psi is being applied, it will indicate that the overpressure condition has been reached at 80 psi (i.e., 110% x 100 psi – 30 psi = 80 psi).

Overpressure can affect accuracy, but the effect is only temporary unless the sensor has been destroyed. See the Ranges and Resolutions table for maximum allowable overpressure ratings.

Measuring Pressure

▶ **To Measure Pressure**

1 Connect the HPC50 using an appropriate fitting.

2 Select one of the pressure modes: P1 , P2 , APMi1 , APMi2 , BARO , or Dual Pres .

For more information on working in the HPC50 display, see Navigating Through a Typical Setup.

3 From the HPC50 display, select the desired pressure units.
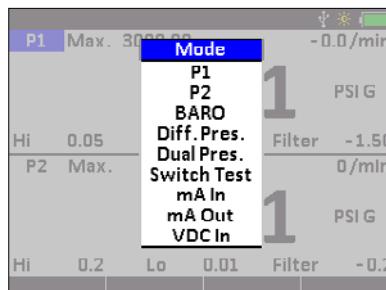
Select a pressure mode...   then select a pressure unit.
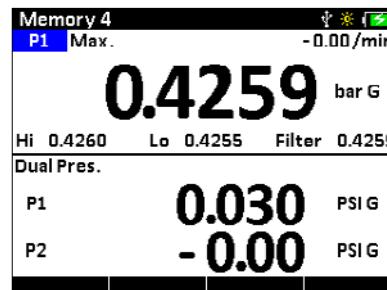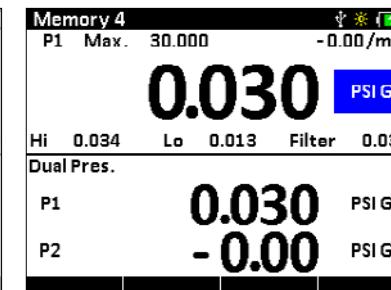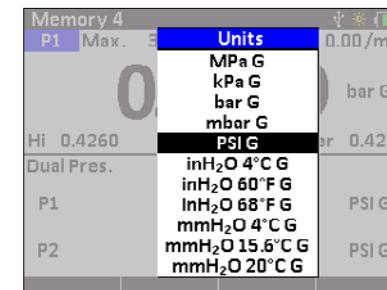
▶ **Absolute Pressure (BARO Option)**

See P1, P2, APMi1 or APMi2 settings to toggle between absolute and gauge pressure.

▶ **To Zero the Calibrator**

1 Press the **(zero)** button to activate the **(function)** buttons for the available pressure sensors.

2 Press the **(function)** button for the sensor that you would like to zero.

The display will change to dashed lines (- - - - -) and the reading will be zeroed.

Memory 4			☀ 🔋
P1 Max.	30.000		0.00/min
	0.044		PSI G
Hi 0.050	Lo 0.033	Filter 0.044	
P2 Max.	300.00		0.0/min
	— — — — —		PSI G
Hi 0.01	Lo -0.01	Filter -0.00	
∅ P1	∅ P2		Peaks

Memory 4			☀ 🔋
P1 Max.	30.000		0.00/min
	0.044		PSI G
Hi 0.050	Lo 0.033	Filter 0.044	
P2 Max.	300.00		0.0/min
	-0.00		PSI G
Hi 0.01	Lo -0.01	Filter -0.00	
∅ P1	∅ P2		Peaks
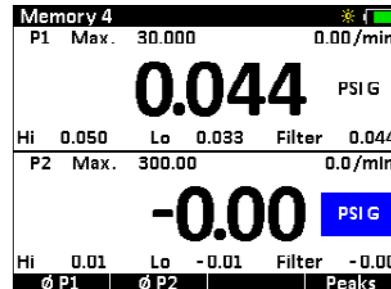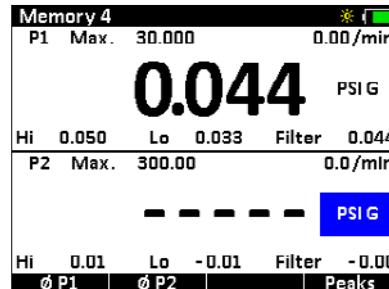
Zeroing the P2 sensor.

▶ **To Clear the Zero Value**

1 Press the **(zero)** button to activate the **(function)** buttons for the available pressure sensors.

2 Press and hold the **(function)** button for the sensor that you would like to unzero until the display changes from (- - - - -) to (-   -   -).

▶ **To Clear the Peaks**

1 Press the **(zero)** button to activate the **(function)** buttons for the available pressure sensors.

2 Press the **(function)** button for *Peaks* to reset the P1, P2, and APM peaks.

3 Press the **(function)** button for the peaks you would like to clear. The *Hi*, *Lo*, and *Filter* will all display (- - - - -).

Note: If you attempt to zero the gauge with more pressure applied than the Zero Limit set on the HPC50 (or with CrystalControl) the command will be ignored, and *Over Zero Limit* will display.

Note: The BARO sensor cannot be zeroed.

❗ **WARNING: This calibrator can display zero pressure when connected to a source of pressure! Do not rely on the display indication before disconnecting— it may not be indicating true pressure. Never disconnect pressure instrumentation without first relieving system pressure!**

Differential Pressure

The HPC50 Series can display differential pressure when 2 or more sensors are installed (including external APMi). The modules do not have to be the same full scale pressure range.

▶ **To Display Differential Pressure**

1 Select *Diff. Pres.* from the Mode section.

2 Choose the two sensors that you want to use for differential pressure.

3 Choose the unit for the differential reading.

For more information on working in the HPC50 display, see Navigating Through a Typical Setup.

**4** Apply pressure to one or both sensors to read the differential.

The two pressure sensors being used can be changed from P1, P2, or APMi.

Differential Pressure Unit

Static Pressure Unit
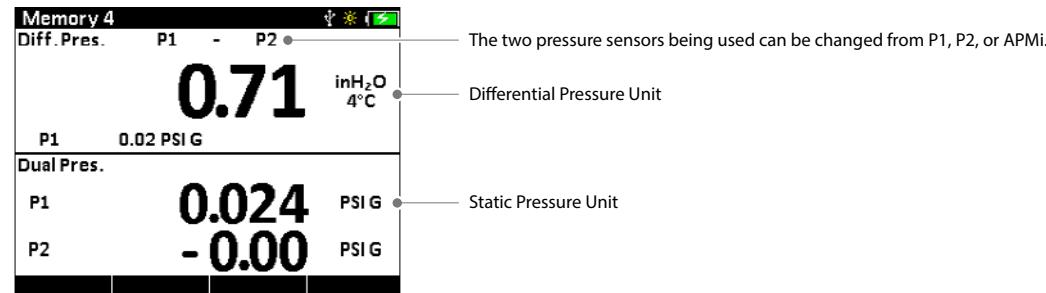
Note: The static pressure is also displayed on the bottom of the window. The unit for the static pressure does not have to be the same as the differential unit.

Tare

Using the Tare function improves your differential measurement uncertainty significantly if used properly. The Tare function equalizes (normalizes) the HPC50's two modules at a non-ambient datum.

If you apply the same static line pressure to both sensors simultaneously, you should have a differential reading of zero. Due to the allowable error tolerance for each module, the reading may not be zero. The Tare function allows you to normalize both readings so that the differential reading is zero. This gives you a more accurate differential reading than if this process were not completed.

Note: Tare should be reestablished every time your measurement conditions change, including vent condition. For instance if your ΔP reading has 8 inH20 of Tare at 1500 psi static, when you return to vent condition this 8 inH20 of Tare will remain in place on your ΔP reading until cleared with the Tare button.

To Tare:

1 Use the **(arrow)** buttons to navigate to the Differential Mode view.

2 Press the **(zero)** button to activate the function button options.

3 Press the **(function)** button for the (∅ Diff ↑) icon.

Note: You will notice that the word *Tare* is now included on the top right of the display to indicate that the sensors have been tared.

4 To clear the Tare value in the Differential Mode, hold the **(function)** button for the (∅ Diff ↑) icon for four seconds until the differential display readings change from (- - - - -) to (- - -). The tare indication will now be removed from the display.

MEASURING CURRENT

The HPC50 is capable of measuring current in four different modes:

- **mA** Measured current is displayed (mA). The module is capable of measuring inputs up to 55 mA.

- **0-20 mA** Current is displayed as a percentage of the 0-20 mA current range of the module. Where: 0 mA = 0%, and 20 mA = 100%

- **4-20 mA** Current is displayed as a percentage of the 4-20 mA current range of the module. Where: 4 mA = 0%, and 20 mA = 100%

- **10-50 mA** Current is displayed as a percentage of the 10-50 mA current range of the module. Where: 10 mA = 0%, and 50 mA = 100%

▶ **To Measure Current**

1 Select `mA In` .

For more information on working in the HPC50 display, see **Navigating Through a Typical Setup.**

2 In current mode, the numerical value displayed represents the current measured at the test lead inputs. In the top right corner is a percentage value based on whether `0 to 20 mA` , `4 to 20 mA` , or `10 to 50 mA` is selected.

For example, if the measured current is 16 mA and the selected scale is 4 to 20 mA, the percent will display as 75%.
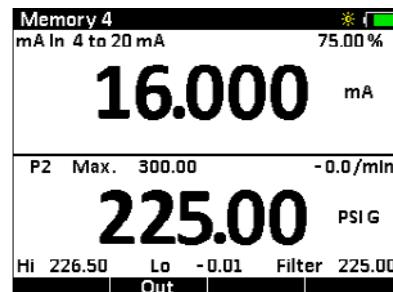
Measuring Current.

3 Connect the HPC50 using the appropriate test leads.

4 The HPC50 will display the measured current.

Note: The display will indicate *+OL* if the measured current exceeds the nominal range of current measurement (55 mA).

Note: For details on % error, % flow, and scaling features see **Percent Error Function.**

SOURCING CURRENT

▶ **mA Sink (External Loop Power Supply)**

1 Select *mA Out*.

2 Select the appropriate range (0-20 or 4-20) if you will be sourcing based on the % of the scale.

3 Choose either *mA* (to output a specific mA signal), *%* (to output based on the % of the mA range) , or *% flow* (to output based on the % of the flow).

4 Connect the HPC50 using the appropriate test lead connections.

5 Enter the desired current in mA, %, or % flow to sink.

▶ **mA Step**

The HPC50 has the ability to automatically or manually step through the mA range at predefined intervals.

1 Select *mA Out*.

2 Select the appropriate mA range (0-20, 4-20).

3 Press the **(function)** button for *Step*.

4 Enter the 0 and 100% mA points. For example, if you're sourcing to a 4-20 mA loop, enter 4 for the 0% point and 20 for the 100% point.

5 Choose the step size from 10%, 20%, or 25%. This is the percent of the mA range that will be increased with each step.

6 Enter the time between each step you would like to use.
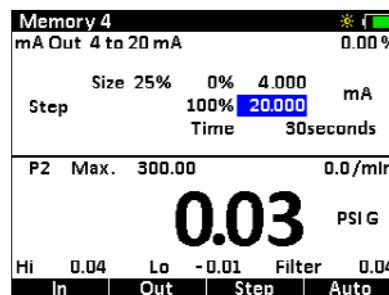
7 Press the **(function)** button for *Auto*, and the HPC50 will automatically start the step process.

8 Press the **(function)** button for *back* when finished. Or, if you would like to pause the step function and increase manually, press *Stop*. If you press *Stop*, new function keys -*Step* (decreasing a single step) and +*Step* (increasing a single step) are now available.

▶ **mA Ramp**

The HPC50 has the ability to provide a consistent ramp throughout the full mA range.

1 Select *mA Out*.

2 Select the appropriate mA range (0-20, 4-20).

3 Press the **(function)** button for *Ramp*.

4 Enter the 0 and 100% mA points.

5 Enter the total time to get from 0 to 100% of the scale.
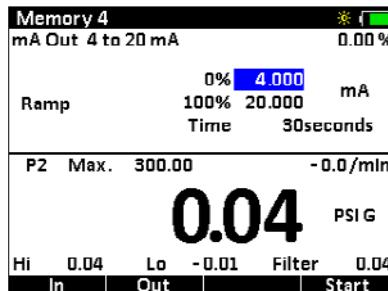
6 Press the **(function)** button for *Start* and the HPC50 will begin the ramp process.

7 Press the **(function)** button for *Stop* to pause the ramp, or *Back* to go back to the ramp setup screen.

MEASURING VOLTAGE

The HPC50 may be used to measure voltages up to 28 VDC. Voltage measurements are limited to the upper display.

▶ **To Measure Voltage**

1 Select **VDC In**.
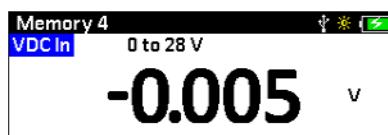
For more information on working in the HPC50 display, see Navigating Through a Typical Setup.

2 Connect the HPC50 using the appropriate test leads.

3 The HPC50 will indicate the measured voltage.

Note: The display will indicate *+OL* if the measured voltage exceeds 30 VDC.

MEASURING TEMPERATURE (ATMi)

Your HPC50 has the ability to measure temperature very accurately using the ATMi "true ohm" technology. True ohm resistance measurement eliminates temperature reading errors by compensating for thermoelectric effects associated with the wires and connections between the ATMi and the RTD.

The HPC50 will also indicate electrical resistance (Ω) to help in troubleshooting your resistance based sensing element.

For details on the ATMi external module, see the ATMi manual.

ATMi External Temperature Modules

❗ **CAUTION:** **ATMi modules must only be used with intrinsically safe probes provided by Ametek.**

▶ **To Measure Temperature**

1 Connect an ATMi with RTD probe to the HPC50 Chassis in either ATMi port.

Connect an ATMi module to either port 1 or 2
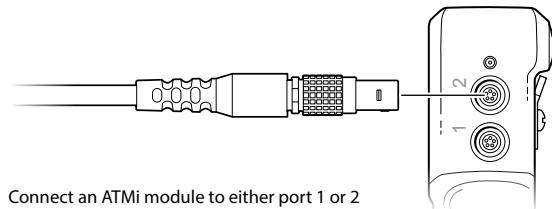
2 Select ATMi1 or ATMi2 .

For more information on working in the HPC50 display, see Navigating Through a Typical Setup.

3 Select the appropriate unit from the list.

4 The HPC50 will display the measured temperature.

Note: *+OL* will be displayed if a probe is not connected to the ATMi, or if the probe resistance is greater than 400 Ohms and/or the calculated temperature is outside the range defined for the probe. Temperature range depends on the probe type.

PERFORMING A SWITCH TEST

Performing a switch test will require the use of both screens. The HPC50 records switch state, and pressure or temperature measurement at the time of switch change. After the test, the result is displayed in a convenient and easy-to-use format.

▶ **To Perform a Switch Test**

1 Select **Switch Test** in the upper display.

2 **FOR A PRESSURE SWITCH**, select *P1*, *P2*, *Diff. Press.*, *APMi1*, or *APMi2* in the lower display.

FOR A TEMPERATURE SWITCH, select *ATMi1* or *ATMi2* In in the lower display.

For more information on working in the HPC50 display, see **Navigating Through a Typical Setup.**

3 Connect the HPC50 to the switch using the terminals on the top of the HPC50. (The polarity of the terminals does not matter.)

4 **FOR A PRESSURE SWITCH**, connect a pump to the HPC50 and then to the switch.

FOR A TEMPERATURE SWITCH, connect an RTD to the ATMi and place the RTD and temperature switch sensor into a temperature calibrator.

5 **FOR A PRESSURE SWITCH** Check that the vent on the pump is open, and zero the calibrator if necessary. Then close the pump vent.

The upper display will show no read outs for the *Closed*, *Opened*, and *Dead band* values.
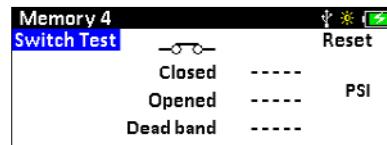
6 Slowly apply pressure or temperature until the switch changes state.

Once the switch state changes, the switch icon will change, and the display will indicate the pressure or temperature, at which the state changed.

Note: In the switch test mode, the sample rate is increased to ten readings per second to help capture the changing switch state. Even with this enhanced sample rate, changes to the pressure or temperature should be done slowly to ensure accurate readings.

7 Decrease pressure or temperature until the switch state changes.

Once the switch state changes, the icon will change, and the *Closed*, *Opened*, and *Dead band* values will be indicated.
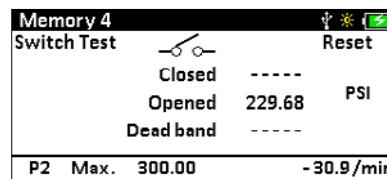
Switch Open
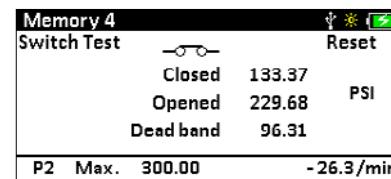
Switch Closed

8 To perform a new test, highlight the reset option and press the **(enter)** button.

The *Closed*, *Opened*, and *Dead band* values will all be blank again.

CALIBRATING A PRESSURE TRANSMITTER

When calibrating a transmitter, both the upper and lower displays are used. Pressure and Temperature Transmitters with ranges of 0 to 20 mA, 4 to 20 mA, and 10 to 50 mA can be calibrated by an HPC50. The example below will use a 4 to 20 mA pressure transmitter.

▶ **To Calibrate a Pressure Transmitter**

1 Select *mA* In in the upper display and *P1* in the lower display.

2 Select 4 to 20mA from the Range list.

3 Connect the HPC50 to the transmitter.

▶ **HART Resistor**

The HPC50 has an internal 250 Ohm HART resistor that can be selected if desired. With the (settings) button, choose General to select HART resistor On or Off.

▶ **Percent Error Function**

The HPC50 can be programmed to calculate a deviation or % error from 4-20 mA output. This eliminates the need for manual calculations and can also be helpful if it becomes difficult to set an exact pressure with an external pump. The HPC50 simultaneously displays pressure, mA, and percent error.

1 Select *% Error* from the mA units selection in the upper window.

2 Use the (arrow) buttons to set the 0 and 100% points for both the mA and pressure ranges of the transmitter.
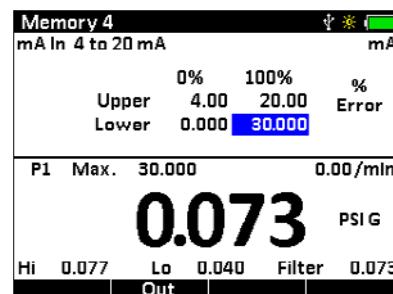
3 Increase pressure to the desired point and the HPC50 upper display will indicate the % error as well as the actual mA value. The lower display will show the measured pressure.

▶ **Percent Flow Function**

The HPC50 can calculate the flow percentage for a differential pressure transmitter. The square root of the differential pressure across an orifice plate is proportional to the flow. The differential pressure is simulated or measured via the mA current and the resultant calculations are then scaled from 0 to 100%.

1 Select *% Flow* from the mA units selection in the upper window.

2 Use the **(arrow)** buttons to set the 0 and 100% points for both the mA and pressure ranges of the transmitter.
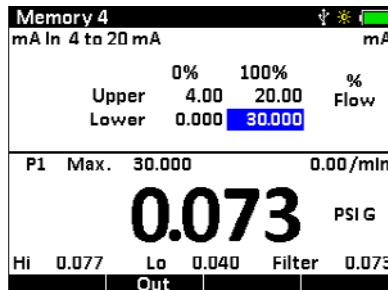
3 Increase pressure to the desired point and the HPC50 upper display will indicate the % error as well as the actual mA value. The lower display will show the measured pressure.

	4-20 Flow	0-20 Flow
0%	4	0
25%	5	1.25
50%	8	5
75%	13	11.25
100%	20	20

▶ **Scaling Function**

The HPC50 has the ability to read current or voltage in the upper display that is scaled to and displayed in the same units as the lower display. This makes it much easier to compare a mA reading to a known accurate pressure reading.

1 Select *Scaling* from the mA units selection in the upper window.

2 Use the **(arrow)** buttons to set the 0 and 100% points for both the mA (or VDC) and pressure ranges of the transmitter.

3 Increase pressure to the desired point and the HPC50 upper display will indicate the equivalent pressure based on the mA reading, as well as the actual mA value. The lower display will show the measured pressure.

Enclosure

INFORMATION

Weight . . . . 567 g (20.0 oz) (Weight is for dual sensor model with protective boot installed, and includes batteries).

Housing . . . . PC/PBT Plastic.

Rating . . . . IP66/67.

Keypad and Labels. . . . . UV Resistant Silicone.

89.0
(3.50)

MINI USB
CONNECTOR

mA CONNECTIONS
Ø 4 mm SHIELDED BANANA JACKS

43.0
(1.69)

APMi and ATMi
MODULE CONNECTIONS

164.0
(6.45)

176.3
(6.94)

HPC50 Series Calibrator
Intrinsically Safe

F1 F2 F3 F4

zero

Crystal
pressure

▼ P1   P2 ▼

7/16-20 MP

SENSOR DIAPHRAGM
SURFACE

22.7
(0.90)

7/16-20 MP
CPF PORTS

36.5
(1.44)

19.1
(0.75)

1/4 INCH MNPT
ADAPTER

1/4 INCH MBSP
ADAPTER

M20X1.5
ADAPTER

29.1
(1.15)

26.1
(1.03)

32.6
(1.30)

ADDITIONAL SENSOR LENGTH WITH OPTIONAL FITTING ADAPTERS

APMi Modules

ACCURACY

psi (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 300 psi / 30 bar / 3 MPa and lower ranges only.
Vacuum Range = -14.5 psi / -1.0 bar / -1MPa.

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

psiA (Absolute Pressure with BARO Option)

All absolute accuracies are equivalent to the gauge pressure accuracies, except as noted below.

15 psi / 1 bar / 100 kPa Range: . . . . . Gauge Accuracy +0.005 psiA

30 psi / 3 bar / 300 kPa Range: . . . . . Gauge Accuracy +0.005 psiA

100 psi / 10 bar / 1MPa Range: . . . . . Gauge Accuracy +0.002 psiA

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.

APMi modules must be exercised and re-zeroed whenever exposed to significant changes in environmental conditions to achieve these specifications. To exercise a module, cycle the module between zero (ambient barometric pressure) and the pressure of interest. A properly exercised module will return to a zero reading (or return to the same ambient barometric reading).

ACCURACY CONTINUED

All models indicate vacuum, but vacuum specification applies only where specified.

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 for the HPC50 Series allows you to toggle between gauge and absolute pressure using the same APMi module.

SENSOR

Wetted Materials. . . . . (wrench tight) 316 stainless steel

(finger tight) 316 stainless steel and Viton® with internal o-ring

(15 psi / 1 bar / 100 kPa) 316 stainless steel and Viton®

Diaphragm Seal Fluid . . . . Silicone Oil

Connection. . . . . Crystal CPF Female

All welded, with a permanently filled diaphragm seal.

Metal to metal cone seal; O-ring can be removed if necessary.

1/4" male NPT adapter is included unless BSP or M20 is specified.

1/4" medium pressure tube system is compatible with HIP LM4 and LF4 Series, Autoclave Engr SF250CX Male and Female Series.

OUTPUT

Pressure Resolution . . . . up to 6 digits

Display Update . . . . up to 10 per second

Pressure resolution and display update are the maximum values available. The resolution of your Crystal device may be different.

PRESSURE OVERLOAD

Overload Alarm. . . . . "+OL" in display at 110% F.S.

OPERATING TEMPERATURE

Temperature Range . . . . -20 to 50° C (-4 to 122° F)

< 95% RH, non-condensing. No change in accuracy over operating temperature range, except as noted in the accuracy specifications. APMi must be zeroed to achieve rated specification.

Applies to all modules.

STORAGE TEMPERATURE

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

ENCLOSURE

Dimensions. . . . . 2.9 x 1.1 in (74.0 x 27.0 mm)

Weight . . . . 0.39 lbs (176.0 g)

7/16-20 MP CPF PORT — STAINLESS STEEL HOUSING
Ø 27 (1.06)
74.0 (2.92)
6 PIN CONNECTION FOR HPC50 SERIES CABLE
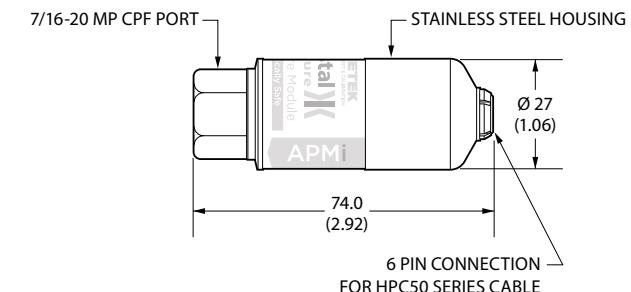
ATMi Modules

TEMPERATURE MEASUREMENT

Accuracy:. . . . .±(0.015% of rdg) + 0.02 Ohm

Range: . . . . .0 to 400 Ohms

Resolution: . . . . .0.01 on all scales

Units:. . . . .°C, K, °F, R, Ω

TCR: . . . . .0.003850 Ω/Ω/°C (IEC 60751)

Wiring: . . . . .4-wire support

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

Combine with part number 127387 for a -45 to 150° C temperature sensor. Contact us to add a calibration certificate.

OUTPUT

Temperature Resolution 0.01

Display Update . . . . .up to 10 per second

Temperature resolution and display update are the maximum values available. The resolution of your Crystal device may be different.

COMMUNICATION

Connector . . . . .6-pin LEMO

Serial . . . . .RS-422, 9600 baud, 8 data,
no parity, 1 stop

Protocol . . . . .ASCII command language

OPERATING TEMPERATURE

Temperature Range. . . . .-20 to 50° C (-4 to 122° F)

< 95% RH, non-condensing. No change in accuracy over operating temperature range. Gauge must be zeroed to achieve rated specification.

Applies to all modules.

STORAGE TEMPERATURE

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

ENCLOSURE

Dimensions. . . . . .2.5 x 1.1 in (63.3 x 27.0 mm)

Weight . . . . .0.31 lbs (141.0 g)

6 PIN CONNECTION FOR REMOTE TEMPERATURE PROBE

Ø 27 (1.06)

63.3 (2.49)

6 PIN CONNECTION FOR HPC50 SERIES CABLE

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.

Temperature °C	HPC50/ATMi Uncertainty		Class A				Class B			
			Class A Uncertainty		HPC50/ATMi + Class A Uncertainty		Class B Uncertainty		HPC50/ATMi + Class B Uncertainty	
	±Ω	±°C	±Ω	±°C	±Ω	±°C	±Ω	±°C	±Ω	±°C
-200	0.02	0.05	0.24	0.55	0.24	0.55	0.56	1.30	0.56	1.30
-40	0.03	0.08	0.09	0.23	0.10	0.24	0.20	0.50	0.20	0.51
0	0.04	0.09	0.06	0.15	0.07	0.17	0.12	0.30	0.12	0.31
50	0.04	0.10	0.10	0.25	0.10	0.27	0.21	0.55	0.22	0.56
100	0.04	0.11	0.13	0.35	0.14	0.37	0.30	0.80	0.31	0.81
150	0.04	0.12	0.17	0.45	0.17	0.46	0.39	1.05	0.39	1.06
200	0.05	0.13	0.20	0.55	0.21	0.56	0.48	1.30	0.48	1.31
400	0.06	0.17	0.33	0.95	0.33	0.96	0.79	2.30	0.79	2.31
600	0.07	0.21	0.43	1.35	0.44	1.37	1.06	3.30	1.06	3.31
800	0.08	0.25	0.52	1.75	0.53	1.77	1.28	4.30	1.28	4.31

Specifications

Gauge Pressure Accuracy (P1, P2, and APMi)

Includes all effects of linearity, hysteresis, repeatability, temperature, and stability with the operating temperature range for one year.

Note: Exposure to environmental extremes of temperature, shock, or vibration may warrant a more frequent calibration period.

The HPC50 Series must be exercised and re-zeroed whenever exposed to significant changes in environmental conditions to achieve these specifications. To exercise a gauge, cycle the gauge between zero (ambient barometric pressure) and the pressure of interest. A properly exercised gauge will return to a zero reading (or return to the same ambient barometric reading).

▶ **Gauge Pressure (psi)**

• **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 300 psi and lower ranges only.
   Vacuum Range = -14.5 psi.

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

❗ **CAUTION:** Not recommended for continuous use below -14.5 psig. Refer to the XP2i-DP data sheet for gauges that are intended for continuous high vacuum use.

▶ **Absolute Pressure with BARO Option (psiA)**

All absolute accuracies are equivalent to the gauge pressure accuracies, except as noted below.

15 psi Range . . . . Gauge Accuracy +0.005 psiA

30 psi Range . . . . Gauge Accuracy +0.005 psiA

100 psi Range . . . . Gauge Accuracy +0.002 psiA

▶ **Differential Pressure**

The Tare function can improve differential pressure measurement uncertainties. Requires the use of an equalizing valve. Use the higher range sensor specification when two different ranges are selected.

Full Scale Range of Both Sensors	The Greater of (+/−)					% of DP Reading
psi	psi	mbar	inH$_2$O	mmH$_2$O		
15	0.00015	0.01	0.004	0.1		
30	0.0005	0.04	0.014	0.4		
100	0.0015	0.10	0.04	1.0		
300	0.005	0.4	0.14	4.0		
1000	0.02	1.0	0.4	10.0	or	0.035%
3000	0.05	4.0	1.4	n/a		
10000	0.2	10.0	4.0	n/a		

Unit is enabled in CrystalControl

• **Without tare function:**

±(0.05% of static line pressure reading)

Barometric Reference (BARO)

Accuracy . . . . ± 0.00725 psi, ± 0.5 mbar

Range . . . . 10.153 to 15.954 psiA, 700.0 to 1100.0 mbarA

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

Accuracy specifications include all effects of linearity, hysteresis, repeatability, temperature, and stability within the specified operating temperature range for one year.

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

Pressure Sensor (P1, P2, and APMi)

Wetted Materials. . . . . (Wrench Tight) 316 stainless steel

(Finger Tight) 316 stainless steel and Viton® (internal o-ring)

(15 psi / 1 bar / 100 kpa) 316 stainless steel and Viton® (internal o-ring)

Diaphragm Seal Fluid:. . . . . Silicone Oil

Connection: . . . . Crystal CPF Female

Pressure Conversions

1 PSI =   27.6806 inches of water column (water at 4°C [39.2°F])

   703.087 millimeters of water column (water at 4°C [39.2°F])

   70.3087 centimeters of water column (water at 4°C [39.2°F])

   2.03602 inches of mercury (mercury at 0°C [32°F])

   51.7149 millimeters of mercury (mercury at 0°C [32°F])

   6.8948 kilopascals

   0.070307 kilograms per square centimeter

   0.068948 bar

   68.948 millibar

   0.0068948 megapascals

Electrical

All accuracy specifications include all effects of linearity, hysteresis, repeatability, temperature, and stability within the specified operating temperature range for one year.

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

Connection . . . . 4 mm jacks
Maximum Voltage . . . . 45 VDC

▶ **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 . . . . 93.3 mA

Resolution . . . . 0.001 mA or 0.01%

Units . . . . mA, scaling, % error, % flow

Input Resistance . . . . < 4.99 Ω

Voltage Burden @ 20mA . . . . < 0.10 V

Voltage Burden @ 50mA . . . . < 0.250 V

HART Resistor . . . . 250 Ω

▶ **Current (mA) Sink**

Accuracy . . . . ± (0.015 of rdg + 0.002 mA)

Range . . . . 0 to 25 mA*

From 0.001 to 0.05 mA, add 0.02 mA to accuracy.

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 28 VDC

Maximum Allowable Voltage . . . . . 30 VDC

Resolution. . . . . 0.001 VDC

▶ **Switch Test**

Switch Type . . . . Dry Contact

Closed State Resistance . . . . < 1K Ω

Open State Resistance . . . . > 100K Ω

Sample Rate: . . . . 10 Hz

Display

Screen. . . . . 320 x 240 pixel graphical display

Display Rate . . . . 3 readings/second (standard)

Operating and Storage Temperature

Operating Temperature Range . . . -20 to 50° C (-4 to 122° F)

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

Power

The HPC50 can be powered by batteries or USB.

! **WARNING:** **Do not use the USB port in a hazardous area.**

▶ **Power Icon States**

The HPC50 battery icon indicates how much battery life is remaining.

| 100% | 50% | 0% |
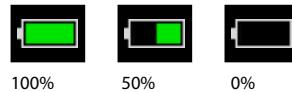
▶ **Battery Power**

The HPC50 uses three(3) size AA (LR6) alkaline batteries.

Note: If the batteries discharge too deeply, the calibrator will automatically shut down to avoid battery leakage and false measurements.

▶ Approved Batteries

Approved Battery Type	CSA		ATEX & IECEx	
	Temperature Class	Ambient Temperature	Temperature Class	Ambient Temperature
Rayovac Max Plus 815	T3	-20 to 50° C	T4	-20 to 50° C
Energizer E91*	T4	-20 to 40° C		
Duracell MN1500	T3	-20 to 40° C	T3	-20 to 50° C
Energizer EN91*				

Replace batteries with approved type in non-hazardous locations only.

* Energizer is manufactured by Energizer Holdings, Inc., and the Eveready Battery Company, Inc.

▶ **Battery Life**

Battery life is listed for chassis only, with no APMi or ATMi modules connected.

Backlight Off . . . . 24 hours

Backlight On. . . . . 6 hours

▶ **Battery Replacement**

The HPC50 uses three AA batteries. Unscrew the four flathead screws to gain access to the battery compartment. Replace the batteries taking care to note polarity for their proper installation. Failure to properly seal the battery compartment may allow water damage that could permanently compromise the HPC50.

RANGES AND RESOLUTIONS

psi	bar	kPa/MPa	Overpressure	psi	kg/cm2	inHg	inH20	mmHg	mmH20	kPa	bar	mbar	MPa
15PSI			3.0 x	0.0001	0.00001	0.001	0.01	0.01	0.1	0.001	0.00001	0.01	
	1BAR		3.0 x	0.0001	0.00001	0.001	0.01	0.01	0.1	0.001	0.00001	0.01	
		100KPA	3.0 x							0.001	0.00001	0.01	
30PSI			3.0 x	0.001	0.0001	0.001	0.01	0.01	1	0.01	0.0001	0.1	0.00001
	3BAR		3.0 x	0.001	0.0001	0.001	0.01	0.01	1	0.01	0.0001	0.1	0.00001
		300KPA	3.0 x							0.01	0.0001	0.1	0.00001
100PSI			2.0 x	0.001	0.0001	0.01	0.1	0.1	1	0.01	0.0001	0.1	0.00001
	10BAR		2.0 x	0.001	0.0001	0.01	0.1	0.1	1	0.01	0.0001	0.1	0.00001
		1MPA	2.0 x							0.01	0.0001	0.1	0.00001
300PSI			2.0 x	0.01	0.001	0.01	0.1	0.1		0.1	0.001	1	0.0001
	30BAR		2.0 x	0.01	0.001	0.01	0.1	0.1		0.1	0.001	1	0.0001
		3MPA	2.0 x							0.1	0.001	1	0.0001
1KPSI			2.0 x	0.01	0.001	0.1				0.1	0.001		0.0001
	100BAR		2.0 x	0.1	0.001	0.1				0.1	0.001		0.0001
		10MPA	2.0 x							0.1	0.001		0.0001
3KPSI			1.5 x	0.1	0.01	0.1				1	0.01		0.001
	300BAR		1.5 x	0.1	0.01	0.1				1	0.01		0.001
		30MPA	1.5 x							1	0.01		0.001
10KPSI			1.5 x	0.1	0.01					1	0.01		0.001
	700BAR		1.5 x	0.1	0.01					1	0.01		0.001
		70MPA	1.5 x							1	0.01		0.001

Resolutions shown are the maximum resolutions available. The resolution of your Crystal device may be different.

* CPF adaptor fitting is not included. 1/4" medium pressure tube system is compatible with HIP LM4 and LF4 Series, Autoclave Engr SF250CX Male and Female Series. See our CPF data sheet for additional adapter fittings.

▶ **Ordering Information**

Number of Sensors	—	1st Pressure Range **P/N**	/	2nd Pressure Range **P/N**	—	BARO Option	—	Adapter
_____		_____		_____		_____		_____
HPC51 . . . (Single)						No . . . . (omit)		1/4 NPT . . . . (omit)
HPC52 . . . . (Dual)						Yes… **-BARO**		G 1/4 B. . . . . **-BSP**
								M20x1.5 . . . **-M20**
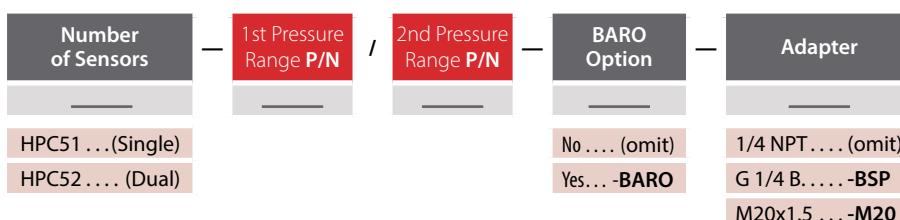
SAMPLE PART NUMBERS

HPC51-1KPSI . . . . Single Sensor (1000 psi) HPC50 with a 1/4" male NPT pressure fitting.

HPC52-3BAR-700BAR-BSP-BAR0 . . . . . Dual Sensor (3 bar/700 bar) HPC50 with a 1/4" male BSP pressure fitting and BARO option.

Safety & Certifications

HAZARDOUS LOCATIONS

Every HPC50 Series calibrator includes the following Intrinsic Safety approvals:

Ex ia IIC T4/T3 Ga
FTZU 18 ATEX 0043X

Ex ia IIC T4/T3 Ga
IECEx FTZU 18.0012X

Exia Intrinsically Safe and Non-Incendive for Hazardous Locations:
Class I, Division 1, Groups A, B, C, and D; Temperature Code T4/T3. Class I, Zone 0, AEx ia IIC T4/T3 Ga.

Sécurité intrinsèque et non incendiaire pour dangereux Lieux:
Classe I, Division 1, Groupes A, B, C, and D; Code de température T4/T3. Classe I, Zone 0, AEx ia IIC T4/T3 Ga.

Entity Parameters

mA/V port	APMi/ATMi ports
Ui = 28 V	Uo = 4.95 V
Ii = 94 mA	Io = 731 mA
Pi = 654 mW	Po = 880 mW
Ci = 3 nF	Ci = 83.5 µF
Li = 0	Li = 32.2 µH
	Co = 9.2 µF
	Lo = 12 µH

WARNINGS: The following warnings apply to the HPC50 Series:

- **Do not use the USB connector in hazardous locations.**
- **Replace batteries in non-hazardous locations and with approved types only.**
- **Do not mix battery types or manufacturers.**
- **T4 or T3 Temperature Class is based on selection of approved battery. See Approved Batteries.**
- **Special conditions for safe use:**
  The equipment shall not be installed in a location where external conditions are conducive to the buildup of electrostatic charge.

CERTIFICATIONS

The HPC50 Series has been tested and certified to comply with a variety of international standards.

This HPC50 complies with the Australian Radiocommunications (Electromagnetic Compatibility) Standard 2008.

Crystal Engineering declares that the HPC50 is in accordance with the ATEX Directive, the Electromagnetic Compatibility Directive, and the Pressure Equipment Directive per our declaration(s).

This HPC50 is approved for use as a portable test instrument for Marine use and complies with DNV GL Rules for Classification of Ships, High Speed & Light Craft, and Offshore Units.

MULTI-LANGUAGE SAFETY INSTRUCTIONS

English (English)

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

▶ **Safety Instructions for Hazardous Locations**

- Do not use the USB connector in a hazardous location.
- Replace batteries in non-hazardous locations, with approved batteries, only. Do not mix battery types or manufacturers.
- It is the users responsibility to understand the proper application of this product in potentially explosive atmospheres.

▶ Approved Batteries	CSA		ATEX & IECEx	
Approved Battery Type	Temperature Class	Ambient Temperature	Temperature Class	Ambient Temperature
Rayovac Max Plus 815	T3	-20 to 50° C	T4	-20 to 50° C
Energizer E91	T4	-20 to 40° C		
Duracell MN1500	T3	-20 to 40° C	T3	-20 to 50° C
Energizer EN91				

The T4 or T3 temperature class is based on the selection of the approved battery.

▶ **Special Conditions for Safe Use**

The equipment must not be installed in a location where external conditions are conducive to electrostatic charge build-up.

Français (French)

Si l'équipement est utilisé d'une manière non spécifiée par le fabricant, la protection fournie par l'équipement peut être altérée.

▶ **Instructions de sécurité pour les Zones Dangereuses**

- Ne pas utilisez le connecteur USB dans une Zone Dangereuse.
- Remplacez les piles dans des Zones non-dangereuses, avec les piles appropriées, uniquement. Ne mélangez pas les types de piles ni les fabricants.
- Il est de la responsabilité de l'utilisateur de bien comprendre l'application appropriée de ce produit en atmosphères explosives.

▶ Piles Approuvées	CSA		ATEX & IECEx	
Type de Pile Approuvé	Classement Température	Température Ambiante	Classement Température	Température Ambiante
Rayovac Max Plus 815	T3	-20 to 50° C	T4	-20 to 50° C
Energizer E91	T4	-20 to 40° C		
Duracell MN1500	T3	-20 to 40° C	T3	-20 to 50° C
Energizer EN91				

La classe de température T4 ou T3 est basée sur la sélection de la pile approuvée.

▶ **Conditions spéciales pour une utilisation en toute sécurité**

L'équipement ne doit pas être installé dans un endroit où les conditions extérieures sont propices à l'accumulation de charge électrostatique.

Support

TROUBLESHOOTING

The HPC50 Series is a very high performance calibrator. Due to the high resolution of this product, you may observe conditions that appear to be defects in the product, but are in fact a result of being able to read and measure pressure to a degree not possible with other instruments.

Noisy or unstable reading when used with fluids

When calibrating or comparing the indicated pressure from an HPC50 against a hydraulic deadweight tester or piston gauge, the reading on the HPC50 may appear unstable—the least significant digit jumps up and down several counts.

▶ **Reason**

Gas (usually air) is trapped in the line between the HPC50 and the deadweight tester. What is actually happening is the mass is oscillating up and down, and the combination of gas and fluid is acting like a spring. At higher pressures (above 2000 psi, typically) this may eventually diminish, as the gas dissolves into the fluid.

▶ **Solution**

Evacuate all tubing with a vacuum pump before introducing fluid into the system.

Non-repeatability of pressure measurements

When checking the calibrator against a hydraulic deadweight, increasing pressure measurements do not match decreasing pressure measurements.

▶ **Reason**

As in the previous note, gas has dissolved into the hydraulic fluid. When decreasing the pressure, the dissolved gas then leaves the fluid, but at an uneven rate, so a small pressure differential (due to fluid head pressure) may exist between the reference deadweight and the gauge being tested.

▶ **Solution**

Evacuate all tubing with a vacuum pump before introducing fluid into the system.

Slow return to zero and/or non-repeatability of pressure measurements

▶ **Reason**

Pressure port is obstructed.

▶ **Solution**

Clean with low pressure fluid. Do not touch diaphragm as damage will result.

CALIBRATION

If adjustment is required, we recommend returning the HPC50 to the factory. Factory service offers benefits you won't find anywhere else. Factory calibration tests your HPC50 at a variety of temperatures utilizing NIST traceable standards, resulting in calibration certificates that provide performance data over temperature. Our calibration facilities are A2LA accredited (cert #2601.01) to ISO 17025:2005 & ANSI/NCSL Z540-1-1994. A2LA is internationally recognized as an accreditation body by the International Laboratory Accreditation Cooperation, ILAC. Furthermore, upgrades may be available to add or enhance operating features. We designed the product to last, and we support it so that you can get the most from your investment.

Under normal operating conditions, we recommend the HPC50 be calibrated on an annual basis. Your quality system may require more or less frequent calibration, or your experience with the gauge, or operating environment may suggest longer or shorter intervals.

Although we prefer that you return the HPC50 to us for calibration, ordinary recertification and/or adjustments may be performed by any qualified personnel with appropriate training and equipment. The following instructions are ONLY intended for such qualified personnel with appropriate test equipment. We recommend that the calibration standards used have a minimum rated accuracy of 0.008% of reading, or equivalent in terms of percent of full scale. This level of accuracy requires the use of piston (deadweight) gauges or very high performance pressure controllers.

(CRYSTALCONTROL) There are no internal potentiometers. Each of the HPC50's sensors has a "span factor" (userspan), set to approximately 1 (as shipped from the factory). As components age this may need to be changed to a value slightly higher or lower, to slightly increase or decrease all readings. This adjustment can be made with a computer through CrystalControl.

Calibration of P1 and P2

(CRYSTALCONTROL) "Zero" the HPC50, then record displayed pressure for two or more pressure points. Determine if the HPC50 would benefit from an overall increase or decrease of the indicated pressures. Adjust userspan accordingly and validate results.

Calibration for Barometric Reference Module (BARO)

(CRYSTALCONTROL) The BARO module can be calibrated by selecting the Edit Calibration Data button while within the BARO Config screen. Enter Userspan and Offset information directly, or you can use the Calibration Wizard to calculate the optimum values for a 1 or 2 point calibration.

1 Remove the mounting bracket on the back of the HPC50, exposing the barometric sensor port.

2 Connect a flexible 4.8 mm [3/16"] ID tubing from your clean pneumatic calibration reference to the BARO sensor.
You can also order the BARO calibration kit (P/N 4547), which includes the tubing.

! CAUTION: Do not subject the BARO sensor to pressures less than 700 mbarA (10.153 PSIA), or greater than 1100 mbarA (15.954 PSIA), as this may cause permanent damage. Use only clean a clean dry pneumatic source.

! CAUTION: Direct contact with the surface of the BARO sensor may cause permanent damage. Direct sunlight on exposed BARO sensor may affect readings slightly.

ACCESSORIES AND REPLACEMENT PARTS

P/N 104203 Test Lead Kit
Lead Kit, Red and black test leads with clips. (Included as standard)

P/N 6215 Protective Boot
Static dissipative protective boot. (Included as standard)

P/N 3951 Mini-USB Cable
The durable and high-speed Micro-USB cable enables data transfer in the most convenient form. (Included as standard)

P/N 3009 Hard Carrying Case
Aluminum carrying case with molded eggshell foam interior.

P/N 2888 Waterproof Carrying Case
Hard plastic carrying case with molded eggshell foam interior.

MPM-1/4MPT CPF Male to 1/4" Male NPT Fitting
(Included as standard)

MPM-1/4BSPM CPF Male to 1/4″ Male BSP Fitting
(Included with -BSP)

MPM-M20x1.5M CPF Male to M20 Male Adapter
(Included with -M20)

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* 通过 ISO 17025 认证的校准实验室 (A2LA #2601.01)。 * 通过 DIN EN ISO / IEC 17025 认证的校准实验室。 * 通过 DANAK EN ISO/IEC 17025 认证的校准实验室。

在致电时请提供型号、序列号、购买日期和返回原因。您将收到有关如何将设备返还给我们的说明。

保修

Crystal Engineering Corporation 保证 HPC40 系列校准仪在常规使用和维护下，自原始购买者购买之日起的一 (1) 年内不会存在材质和工艺上的缺陷。此保修不适用于电池或滥用、改装产品以及因意外或异常的操作条件导致损坏的情形。

Crystal Engineering 将酌情免费修理或更换有缺陷的设备，并且我们将预付运费将其返回。但是，如果经我们确定是因滥用、改装、意外或异常的操作条件导致的故障，则修理费用由您自理。

CRYSTAL ENGINEERING CORPORATION 不对上述有限保修之外的情况做任何担保。所有担保（包括对适销性或对任何特定用途适合性的暗示保证）仅限于自购买之日起一 (1) 年内。CRYSTAL ENGINEERING 不对任何特殊、连带或间接损害负责（无论是在合同、侵权还是其他方面）。

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pressure

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TEST & CALIBRATION INSTRUMENTS

ISO 9001:2008 17025:2005