

pressure

**JOFRA**<sup>®</sup>  
calibration

» **Wide pressure range**

16 pressure ranges, ranging from 25 mbar (0.35 psi) to 700 bar (10,000 psi) F.S. Absolute, differential and gauge sensors.

» **High accuracy**

±0.025% of reading +0.01% F.S.

» **True field calibrator**

Fully temperature compensated

» **Single or dual sensor versions**

Select HPC500 single or HPC502 dual range calibrators and eliminate the need for 2 separate calibrators.

» **Full set of intelligent features**

Wide selection of useful functions and features. Damping, leak test, % error calculation, min/max, switch test, etc.

» **Thermometer**

High accuracy thermometer, Pt100 sensor.

» **External Pressure Modules**

HPC500/502 can be extended with many different pressure modules, with accuracy up to 0.01% F.S.

## Handheld Pressure Calibrator **Model HPC500 Family**



JOFRA HPC500 calibrators feature deadweight tester accuracy in a modern digital package. The HPC is available as an independent calibrator or in one of 6 ready-for-test systems that are complete and equipped to meet any need for pressure calibration.

The HPC500 may be used in a very broad range of applications from simple tool type jobs to complex calibration jobs in custody transfer systems.

The JOFRA HPC500 calibrators introduce a new generation of AMETEK handheld pressure calibrators. This series has been designed to meet high accuracy pressure calibration applications and facilitate your tasks. The HPC offers features such as user configurable information display, 15 different pressure units, transmitter supply, mA input, % error calculation, voltage measurement, serial communication, and external pressure module capability. The accuracy of the HPC500 calibrators is specified in % of reading to ensure an even better accuracy and wider applicable pressure range. The HPC is temperature compensated from 0 to 50°C / 32 to 122°F for on-site operation. It is a truly superior pressure calibrator for laboratory and field use, bringing laboratory accuracy into the field.

The JOFRA APM series of pressure modules extends the application base of the HPC calibrators by allowing calibrations in additional ranges. The APM modules are compatible with several other JOFRA calibrators.

Calibration of the instrument may be performed locally without returning the HPC unit to the manufacturer. Adjustment software is part of the design - you just need an accurate pressure reference and a PC. If factory calibration is required, the pump and the calibrator are independent units and only the calibrator needs to be returned.

**ISO 9001 Manufacturer**

Specification Sheet  
SS-HPC500

**AMETEK**<sup>®</sup>  
TEST & CALIBRATION INSTRUMENTS

## Clear graphical display

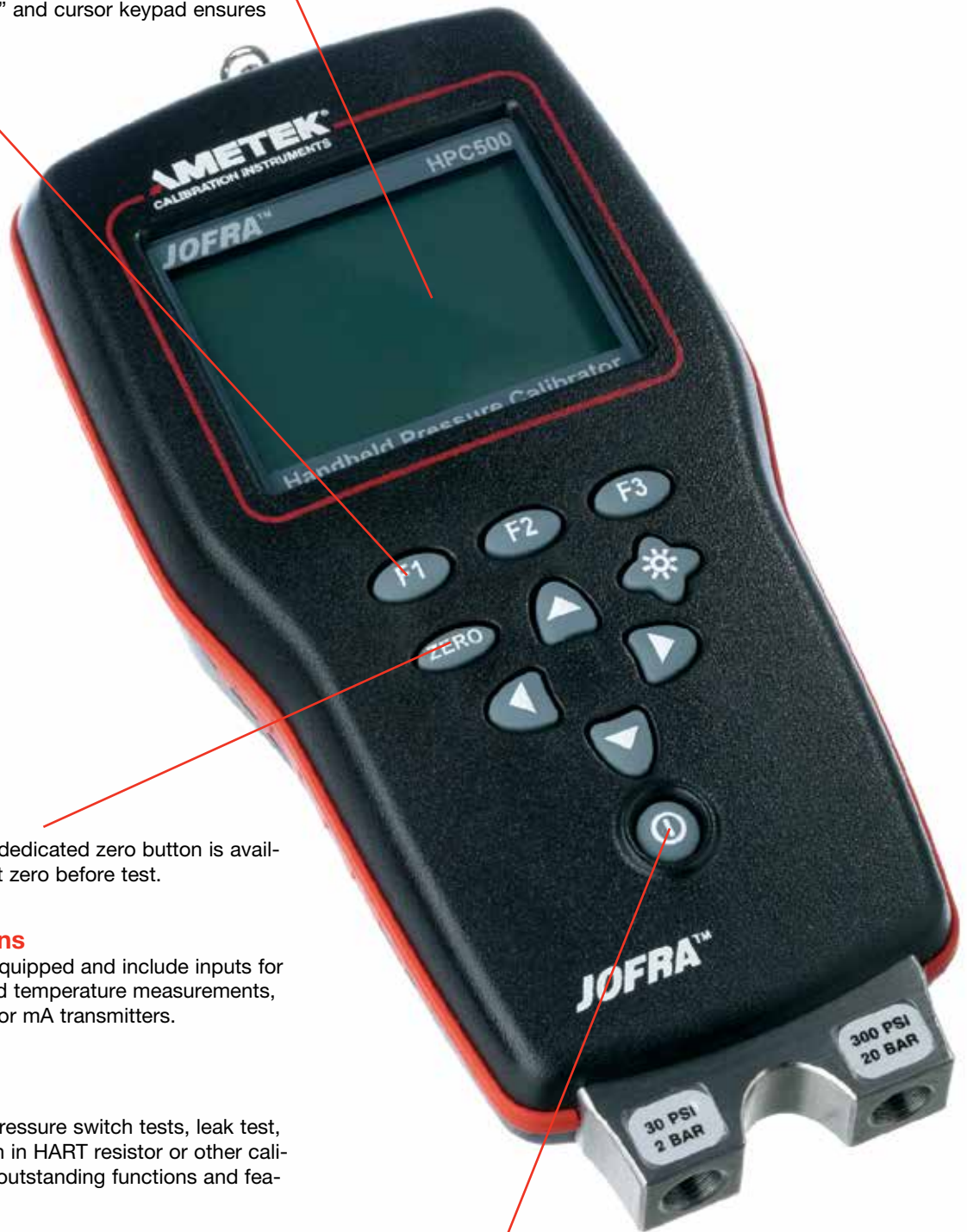
Large backlit graphical display shows current status and mode, 1, 2 or 3 measurement windows, to suit your applications and demands.

## Intuitive menu system

Combination of “soft keys” and cursor keypad ensures easy operation

## Serial interface

Connection for JOFRA APM pressure module and computer.



## Zero

To keep high accuracy, a dedicated zero button is available to provide convenient zero before test.

## Electrical connections

HPC calibrators are well equipped and include inputs for mA, voltage, switches and temperature measurements, including 24 VDC supply for mA transmitters.

## Full set of features

Perform semi-automatic pressure switch tests, leak test, % error calculation, switch in HART resistor or other calibration tasks through the outstanding functions and features of the HPC500.

## Temperature measurement

High accuracy temperature measurement port by use of the optional Pt100 sensor. A superb instrument for easy and convenient temperature measurement.

## Pressure connections

1/8" BSP female. 300 series stainless steel.  
1/4" NPT male and 1/4" BSP female adapters are supplied as standard.

## ON / OFF

Auto shut-off to expand battery life time (user programmable).

## Units

15 different engineering units on pressure measurements.



### JOFRA APM pressure module

The JOFRA APM external pressure modules extend the range of the JOFRA HPC. There are many models available with gauge, absolute, differential, and vacuum pressure references, in metric and imperial engineering units.

The modules are engineered for in-plant, field, or laboratory use. They are ready-to-use with the JOFRA HPC and the protocol allows for immediate recognition and use of the module once it is plugged into the calibrator.

| APM Mk.II Type      | Pressure range |       |      |       | 12 month accuracy |        |
|---------------------|----------------|-------|------|-------|-------------------|--------|
|                     | Bar            |       | PSI  |       | %rdg              | %FS    |
|                     | From           | To    | From | To    |                   |        |
| <b>Differential</b> |                |       |      |       |                   |        |
| 025MD               | -0.025         | 0.025 | -0.4 | 0.4   | -                 | 0.100% |
| 075MD               | -0.070         | 0.07  | -1   | 1     | -                 | 0.050% |
| 350MD               | -0.350         | 0.35  | -5   | 5     | -                 | 0.050% |
| <b>Compound</b>     |                |       |      |       |                   |        |
| 001C                | -0.960         | 1     | -14  | 15    | 0.025%            | 0.010% |
| 002C                | -0.960         | 2     | -14  | 30    | 0.025%            | 0.010% |
| 007C*               | -0.820         | 7     | -12  | 100   | 0.025%            | 0.010% |
| 020C*               | -0.820         | 20    | -12  | 300   | 0.025%            | 0.010% |
| 035C*               | -0.820         | 35    | -12  | 500   | 0.025%            | 0.010% |
| <b>Gauge</b>        |                |       |      |       |                   |        |
| 001G*               | 0              | 1     | 0    | 15    | 0.025%            | 0.010% |
| 002G*               | 0              | 2     | 0    | 30    | 0.025%            | 0.010% |
| 007G*               | 0              | 7     | 0    | 100   | 0.025%            | 0.010% |
| 020G*               | 0              | 20    | 0    | 300   | 0.025%            | 0.010% |
| 035G*               | 0              | 35    | 0    | 500   | 0.025%            | 0.010% |
| 070G*               | 0              | 70    | 0    | 1000  | 0.025%            | 0.010% |
| 100G*               | 0              | 100   | 0    | 1500  | 0.025%            | 0.010% |
| 200G*               | 0              | 200   | 0    | 3000  | 0.025%            | 0.010% |
| 350G*               | 0              | 350   | 0    | 5000  | 0.025%            | 0.010% |
| 400G*               | 0              | 400   | 0    | 6000  | 0.025%            | 0.010% |
| 700G*               | 0              | 700   | 0    | 10000 | 0.025%            | 0.015% |
| <b>Absolute</b>     |                |       |      |       |                   |        |
| 001A                | 0.025          | 1.1   | 0.35 | 16    | 0.025%            | 0.010% |
| 003A                | 0.025          | 3.5   | 0.35 | 50    | 0.025%            | 0.010% |
| 007A*               | 0.070          | 7     | 1    | 100   | 0.025%            | 0.010% |
| 020A*               | 0.070          | 20    | 1    | 300   | 0.025%            | 0.010% |

\* Stainless steel isolated pressure sensor

Specified temperature range 23°C ± 5°C / 73°F ± 9°F

F.S. (full scale) is the numerical value of the positive pressure range. Accuracy includes hysteresis, nonlinearity, repeatability and reference standard uncertainty, 1 Year typical long-term stability, operated inside the rated temperature span and pressure range. Requiring frequently zeroing (Gauge/diff.) or entering of reference pressure (Absolute).

**FUNCTIONAL SPECIFICATIONS**

**Pressure; gauge / compound ranges**

|           |                       |
|-----------|-----------------------|
| bar ..... | -0.96 to 1 & 2        |
| psi.....  | -14 to 15 & 30        |
| bar ..... | -0.82 to 7, 20 & 35   |
| psi.....  | -12 to 100, 300 & 500 |

**Pressure; gauge**

|           |                              |
|-----------|------------------------------|
| bar ..... | 70, 200, 350 & 700           |
| psi.....  | 1,000, 3,000, 5,000 & 10,000 |

**Pressure; absolute ranges**

|           |                  |
|-----------|------------------|
| bar ..... | 0.025 to 1.1 & 2 |
| psi.....  | 0.35 to 16 & 30  |
| bar ..... | 0.07 to 7 & 20   |
| psi.....  | 1 to 100 & 300   |

**Pressure; differential ranges (HPC500 only)**

|            |                 |
|------------|-----------------|
| mbar ..... | ±25, ±70 & ±350 |
| psi.....   | ±0.35, ±1 & ±5  |

**Engineering units (built-in)**

User selectable..... 15 units  
(bar, mbar, MPa, kPa, inHg@0°C, mmHg@0°C, kg/cm<sup>2</sup>, mmH<sub>2</sub>O@4°C, mmH<sub>2</sub>O@20°C, psi, inH<sub>2</sub>O@4°C, inH<sub>2</sub>O@20°C, inH<sub>2</sub>O@60°F, cmH<sub>2</sub>O@4°C, cmH<sub>2</sub>O@20°C)

**Pressure accuracy ambient temp. (18 to 28°C / 65 to 82°F)**

|                                 |                           |
|---------------------------------|---------------------------|
| ±25 mbar / 0.35 psi.....        | ±0.10% F.S.               |
| ±70, 350 mbar / 1, 5 psi.....   | ±0.05% F.S.               |
| 700 bar / 10K psi.....          | ±0.025% RDG + 0.015% F.S. |
| All other pressure ranges ..... | ±0.025% RDG + 0.01% F.S.  |
| Vacuum .....                    | ±0.025% F.S.              |

F.S. (full scale) is the numerical value of the positive pressure range.

Accuracy includes hysteresis, nonlinearity, repeatability and reference standard uncertainty, 1 Year typical long-term stability, operated inside the rated temperature span and pressure range.

Requiring frequently zeroing (Gauge/diff.) or entering of reference pressure (Absolute).

**Pressure accuracy ambient temp. (0 to 50°C / 32 to 122°F)**

|                                 |                          |
|---------------------------------|--------------------------|
| ±25 mbar / 0.35 psi.....        | ±0.15% F.S.              |
| ±70, 350 mbar / 1, 5 psi.....   | ±0.10% F.S.              |
| 700 bar / 10K psi.....          | ±0.04% RDG + 0.015% F.S. |
| All other pressure ranges ..... | ±0.04% RDG + 0.01% F.S.  |
| Vacuum .....                    | ±0.05% F.S.              |

F.S. (full scale) is the numerical value of the positive pressure range.

Temperature effect -10 to 0°C / 14 to 32°F ±0.005% F.S./°C.

Accuracy includes hysteresis, nonlinearity, repeatability and reference standard uncertainty, 1 Year typical long-term stability, operated inside the rated temperature span and pressure range.

Requiring frequently zeroing (Gauge/diff.) or entering of reference pressure (Absolute).

**Display**

|                         |                        |
|-------------------------|------------------------|
| LCD .....               | Graphical (with light) |
| Display resolution..... | 5 digits               |

Display update ..... 3 times per second

**RS232 communication interface**

|                |   |
|----------------|---|
| Connector..... | LEMO  |
| Serial.....    | 0-5 VDC, 9600 baud, 8 data, no parity, 1 stop |
| Protocol.....  | ASCII command language                        |

**Input / output (18 to 28°C / 65 to 82°F)**

|   |                             |
|---|-----------------------------|
| mA range .....                              | 0 to 24 mA                  |
| mA accuracy .....                           | ±0.015% RDG + 2 µA          |
| Transmitter supply.....                     | 24 VDC ±10%                 |
| Voltage measurement .....                   | 0 to 30 VDC                 |
| Voltage accuracy.....                       | ±0.015% RDG + 2mV           |
| RTD range (ohms) .....                      | 84 to 140 Ω                 |
| RTD accuracy.....                           | ±0.015% RDG + 0.02 Ω        |
| RTD range (temperature).....                | -40 to 155°C / -40 to 311°F |
| RTD accuracy @ 0°C/32°F (temperature) ..... | ±0.10°C / 0.18°F            |
| HART® resistor .....                        | 250 Ω                       |
| Peak hold capture .....                     | 50 milliseconds             |
| Switch test input .....                     | 5V (<1mA)                   |

Temperature effect outside 18 to 28°C / 65 to 82°F ±0.001% F.S./°C.

**Media compatibility**

Nickel plated brass and 316 stainless steel

**Environmental**

|                                 |                           |
|---------------------------------|---------------------------|
| Operating temperature.....      | -10 to 50°C / 14 to 122°F |
| Storage temperature .....       | -20 to 60°C / -4 to 140°F |
| Ingress protection rating ..... | IP54                      |

**Pressure connection**

All calibrators ..... 1/8" BSP female  
Adapters to 1/4" NPT male and 1/4" BSP female are included as standard.

**Pressure overload**

Overload alarm..... "OL" in display at approx. +20% F.S.

**Power supply**

|                             |                              |
|-----------------------------|------------------------------|
| Battery .....               | 4 x 1.5 VDC Alkaline         |
| Battery type.....           | AA, LR6, MN1500, AM3         |
| Battery lifetime .....      | Typically more than 35 hours |
| Low battery indicator ..... | Yes                          |

**Instrument dimensions (LxWxH)**

|                                     |                                |
|-------------------------------------|--------------------------------|
| Calibrator.....                     | 201x99x50 mm / 8.3x3.9x2.0 in  |
| HPC500 weight (incl. battery) ..... | 635 g / 22.4 oz                |
| HPC502 weight (incl. battery) ..... | 665 g / 23.5 oz                |
| Calibrator, shipping .....          | 243x180x80 mm / 9.6x7.1x3.1 in |
| Calibrator weight, shipping .....   | 1.1 kg / 39.5 oz               |

**Miscellaneous**

Compliance: EN 61326 : 2006 & CISPR 11, Edition 5.0 - 2009 Class "B"





| Function / Feature  | HPC500 | HPC502 |
|---|--------|--------|
| Single sensor high accuracy pressure calibrator           | ✓      | ✗      |
| Dual sensor high accuracy pressure calibrator             | ✗      | ✓      |
| mA measurement  | ✓      | ✓      |
| Voltage measurement                                       | ✓      | ✓      |
| 24 VDC transmitter supply                                 | ✓      | ✓      |
| High speed pressure switch test                           | ✓      | ✓      |
| Temperature measurement with external RTD sensor          | ✓      | ✓      |
| JOFRA APM pressure module connection                      | ✓      | ✓      |
| RS232 communication                                       | ✓      | ✓      |
| On-line calculation of sensor error %                     | ✓      | ✓      |
| Automatic leak test timer function                        | ✓      | ✓      |
| High speed min./max. hold                                 | ✓      | ✓      |
| Delta / sum calculation on pressure measurements          | ✓      | ✓      |
| Display contrast adjustment                               | ✓      | ✓      |
| Instrument setup lock                                     | ✓      | ✓      |
| Storage of 5 setups                                       | ✓      | ✓      |
| Setup of automatic off timer                              | ✓      | ✓      |
| Setup of number of display windows / measurement channels | ✓      | ✓      |
| Setup of temperature sensor RTD type                      | ✓      | ✓      |
| Select display high or low resolution                     | ✓      | ✓      |
| Setup of backlight timer                                  | ✓      | ✓      |
| HART resistor on/off                                      | ✓      | ✓      |
| Normal or dampened display update rate                    | ✓      | ✓      |



## JOFRACAL CALIBRATION SOFTWARE

JOFRACAL calibration software ensures easy calibration of RTD's, thermocouples, transmitters, thermoswitches, pressure gauges and pressure switches. JOFRACAL can be used with all JOFRA calibration instruments. When used with ASM-800 signal multi scanner, JOFRACAL can perform a simultaneous semi automatic calibration on up to 24 pressure and/or temperature devices under test in any combination.

JOFRACAL software controls the complete calibration procedure, stores the results and provides a calibration audit trail through hard-copy certificates. All calibration data are stored for each sensor to monitor drift and optimise recalibration intervals. A scheduler feature allows planning of future calibrations.

**HPC500 PRESSURE RANGES**

This table shows the resolutions that can be obtained by the HPC calibrators throughout all engineering units.

| <b>HPC500/HPC502 Ranges and Resolutions</b> |        |         |         |        |        |        |        |        |        |         |         |         |          |
|---|--------|---------|---------|--------|--------|--------|--------|--------|--------|---------|---------|---------|----------|
| Range (bar)                                 | 25mbar | 70mbar  | 350mbar | 1      | 1.1    | 2      | 7      | 20     | 35     | 70      | 200     | 350     | 700      |
| Burst pressure (bar)                        | 1.4    | 1.4     | 7       | 20     | 20     | 20     | 70     | 133    | 133    | 677     | 677     | 677     | 1000     |
| Proof pressure (bar)                        | 70mbar | 200mbar | 1       | 2      | 2      | 4      | 14     | 40     | 67     | 200     | 400     | 677     | 1000     |
| Static pressure (bar)                       | 70mbar | 7       | 7       | n/a    | n/a    | n/a    | n/a    | n/a    | n/a    | n/a     | n/a     | n/a     | n/a      |
| Range (psi)                                 | 0.35   | 1       | 5       | 15     | 16     | 30     | 100    | 300    | 500    | 1000    | 3000    | 5000    | 10000    |
| Burst pressure (psi)                        | 10     | 10      | 100     | 300    | 300    | 300    | 1000   | 2000   | 2000   | 10000   | 10000   | 10000   | 15000    |
| Proof pressure (psi)                        | 1      | 3       | 15      | 30     | 30     | 60     | 200    | 600    | 1000   | 3000    | 6000    | 10000   | 15000    |
| Static pressure (psi)                       | 1      | 100     | 100     | n/a    | n/a    | n/a    | n/a    | n/a    | n/a    | n/a     | n/a     | n/a     | n/a      |
| psi   | 0.4000 | 1.0000  | 5.0000  | 15.000 | 16.000 | 30.000 | 100.00 | 300.00 | 500.00 | 1000.00 | 3000.00 | 5000.00 | 10000.00 |
| bar   | 0.0689 | 0.0689  | 0.3447  | 1.0342 | 1.1032 | 2.0684 | 6.8947 | 20.684 | 34.474 | 68.947  | 206.84  | 344.74  | 689.47   |
| mbar  | 27.579 | 68.948  | 344.74  | 1034.2 | 1103.2 | 2068.4 | 6894.8 | 20684  | 344.74 | 689.48  | n/a     | n/a     | n/a      |
| kPa   | 2.7579 | 6.8948  | 34.474  | 103.42 | 110.32 | 206.84 | 689.48 | 2068.4 | 3447.4 | 6894.8  | 2068.4  | 3447.4  | 68948    |
| MPa   | 0.0028 | 0.0068  | 0.0344  | 0.1034 | 0.1103 | 0.2068 | 0.6894 | 2.0684 | 3.447  | 6.8948  | 20.684  | 34.474  | 68.948   |
| kg/cm <sup>2</sup>                          | 0.0281 | 0.0703  | 0.3515  | 1.0546 | 1.1248 | 2.1092 | 7.0307 | 21.092 | 35.153 | 70.307  | 210.92  | 351.53  | 703.07   |
| cmH <sub>2</sub> O@4°C                      | 28.124 | 70.309  | 351.54  | 1054.6 | 1124.9 | 2109.3 | 7030.9 | 21093  | 35154  | 70309   | n/a     | n/a     | n/a      |
| cmH <sub>2</sub> O@20°C                     | 28.173 | 70.434  | 352.17  | 1056.5 | 1126.9 | 2113.0 | 7043.4 | 21130  | 35217  | 70434   | n/a     | n/a     | n/a      |
| mmH <sub>2</sub> O@4°C                      | 281.24 | 703.09  | 3515.4  | 10546  | 11249  | 21093  | 70309  | n/a    | n/a    | n/a     | n/a     | n/a     | n/a      |
| mmH <sub>2</sub> O@20°C                     | 281.73 | 704.34  | 3521.7  | 10565  | 11269  | 21130  | 70434  | n/a    | n/a    | n/a     | n/a     | n/a     | n/a      |
| inH <sub>2</sub> O@4°C                      | 11.072 | 27.681  | 138.40  | 415.21 | 442.89 | 830.42 | 2768.1 | 8304.2 | 13840  | 27681   | 83042   | n/a     | n/a      |
| inH <sub>2</sub> O@20°C                     | 11.092 | 27.730  | 138.65  | 415.95 | 443.68 | 831.89 | 2773.0 | 8318.9 | 13865  | 27730   | 83189   | n/a     | n/a      |
| inH <sub>2</sub> O@60°F                     | 11.083 | 27.708  | 138.54  | 415.61 | 443.32 | 831.23 | 2770.8 | 83123  | 13854  | 27708   | 83123   | n/a     | n/a      |
| mmHg@0°C                                    | 20.686 | 51.715  | 258.58  | 775.73 | 827.44 | 1551.5 | 5171.5 | 15515  | 25858  | 51715   | n/a     | n/a     | n/a      |
| inHg@0°C                                    | 0.8144 | 2.0360  | 10.108  | 30.540 | 32.576 | 61.081 | 203.6  | 610.81 | 1018.0 | 2036.0  | 6108.1  | 10180   | 20360    |

Proof pressure - maximum allowable pressure without a shift in calibration.  
 Burst pressure - sensor damaged or destroyed, some risk of personal injury.  
 Static pressure - Differential units only. Maximum allowed common mode pressure between both points.  
 Compound ranges - the data for the 1 bar range also applies to the -1 to +1 bar compound range, the data for the 2 bar range also applies to the -1 to +2 bar compound range.  
 Absolute ranges - the data for the 1.1, 2, 7 and 20 bar ranges also applies to the absolute pressure versions of those ranges.

**STANDARD DELIVERY (HPC Calibrator)**

- HPC500 or HPC502 calibrator
- Traceable calibration certificate (NIST) with pressure and vacuum calibration points
- 4 x 1.5 volt batteries
- Adapter to 1/4" NPT male from 1/8" BSP male\*
- Adapter to 1/4" BSP female from 1/8" BSP male\*
- 1/8" sealed gasket / washer type
- Test leads: red and black
- Hand strap with clip
- User manual

\* Set for each pressure port



### HPC500, System A

- AXX/0 to 2 bar (0 to 30 psi)
- AHX/0 to 40 bar (0 to 580 psi)



This system includes the HPC calibrator together with one pneumatic hand pump: T-960 and T-970, depending on the chosen pressure range. System A is an easy-to-use single hand operated calibration system. No need for a flat surface to operate the system - just hold it in your hand.

The system comes in a carrying case with cut-outs for fittings, hose, and the complete assembled calibration unit - no time is required to assemble the unit. The calibrator can at any time be used separately for other pressure test jobs.

A special quick connector between the pump and the calibrator makes it possible to separate the system in seconds and swivel the calibrator for easy viewing.

The HPC calibrators used in System A are delivered calibrated in both pressure and vacuum.

#### T-960 and T-970 pumps for system A

Model T-960 pneumatic pressure pump features an extended range volume adjuster for precise control of the pump pressure and a comfortable pistol grip handle.

Model T-970 pneumatic pressure pump is similar to the T-960, but generates pressures up to 40 bar (580 psi).

|                                |   |
|--------------------------------|---|
| Pressure range, T-960.....     | 0 to 2 bar (30 psi)   |
| Pressure range, T-970.....     | 0 to 40 bar (580 psi)   |
| Type.....                      | Pneumatic   |
| Test medium.....               | Air   |
| Operation.....                 | Scissor   |
| “O”-rings .....                | Buna-N  |
| Wetted parts.....              | Aluminum, brass, stainless steel, nylon,<br>Nylatron GS       |
| Connection to test object..... | Hose 0.6 m/24 in with<br>1/4” BSP and NPT female terminations |
| Size.....                      | 21.6x12.1x6.2 cm / 8.5x4.8x2.4 in                             |
| Total system weight .....      | 5.5 kg / 12.2 lb  |

#### Included with System A delivery

- HPC standard delivery (see page 6)
- Hand pump T-960 or T-970 with a 0.6 m / 24 in hose with 1/4” BSP and NPT female terminations
- 3/8” BSP female adapter with 1/4” BSP and NPT female terminations
- Quick connector between pump and HPC calibrator
- 1 roll of Teflon tape
- Protective carrying case

#### Accessories

- Pressure hose for T-960/970, 0.5 meter
- Pressure hose for T-960/970, 1.0 meter
- Pressure hose for T-960/970, 2.0 meter
- Pressure hose for T-960/970, 5.0 meter
- Set of BSP female fittings, Teflon tape, packings  
\* Fitting size : 1x1/8”, 1x3/8”, 1x1/2”
- Set of NPT female fittings, Teflon tape, packings  
\* Fitting size : 1x1/8”, 1x1/4”, 1x3/8” 1x1/2”
- Connections for APM H/S pressure modules
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module
- Fitting 1/4” NPT male to 1/4” NPT male for APM-S pressure module

### HPC500, System B

- BXX/-0.91 to 2 bar (30 psi)
- BHX/-0.91 to 40 bar (580 psi)



This system includes the dual function pneumatic hand pump. With this pump you can calibrate both vacuum and pressure applications. It takes just a few seconds to switch between vacuum and pressure, just push one button (valve) on the T-965 or T-975 hand pump.

The System B comes in a carrying case with cut-outs for fittings, hose and the complete assembled calibration unit - no time required to assemble the unit before use.

The calibrator and the pump are fitted with a special quick connector that makes it possible to separate the system in seconds without any tool. This quick connector also makes it possible to use the assembled system with the calibrator twisted to any angle.

#### T-965 and T-975 hand pumps for system B

Model T-965 and T-975 pneumatic pressure pumps feature both vacuum and pressure generation. A quick switch (valve) makes it easy to switch from vacuum to pressure measurement. A built-in release valve, volume adjuster for fine adjustment and dual pressure output enable a safe and simple operation. The unit offers both metric and imperial threads on the reference connection and the hose.

|                                |   |
|--------------------------------|---|
| Press. range, T-965.....       | -0.65 bar (-9.4 psi) to 2 bar (30 psi)                        |
| Press. range, T-975....        | -0.91 bar (-13 psi) to 40 bar (580 psi)                       |
| Type.....                      | Pneumatic   |
| Test medium.....               | Air   |
| Operation.....                 | Scissor   |
| “O”-rings .....                | Buna-N  |
| Wetted parts.....              | Aluminum, brass, stainless steel, nylon,<br>Nylatron GS       |
| Connection to test object..... | Hose 0.6 m/24 in with<br>1/4” BSP and NPT female terminations |
| Size.....                      | 21.6x12.1x6.2 cm / 8.5x4.8x2.4 in                             |
| Total system weight .....      | 5.5 kg / 12.2 lb  |

#### Included with System B delivery

- HPC standard delivery (see page 6)
- Hand pump T-965 or T-975 with a 0.6 m / 24 in hose with 1/4” BSP and NPT female terminations
- 3/8” BSP female adapter with 1/4” BSP and NPT female terminations
- Quick connector between pump and calibrator
- 1 roll of Teflon tape
- Protective carrying case

#### Accessories

- Pressure hose for T-975, 0.5 meter
- Pressure hose for T-975, 1.0 meter
- Pressure hose for T-975, 2.0 meter
- Pressure hose for T-975, 5.0 meter
- Set of BSP female fittings, Teflon tape, packings  
\* Fitting size : 1x1/8”, 1x3/8”, 1x1/2”
- Set of NPT female fittings, Teflon tape, packings  
\* Fitting size : 1x1/8”, 1x1/4”, 1x3/8” 1x1/2”
- Connections for APM H/S pressure modules
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module
- Fitting 1/4” NPT male to 1/4” NPT male for APM-S pressure module

**HPC500, System C**

- CXX/0 to 200 bar (3,000 psi)
- CHX/0 to 350 bar (5,000 psi)



This system consists of an HPC calibrator together with a hydraulic, high pressure hand pump T-620 or T-620H featuring an oil reservoir to prime the system.

System C is an easy-to-use single hand-operated calibration system. No need for a flat surface (table) to operate the system. The system includes release valve and volume adjuster for fine adjustment to enable a safe and simple operation of the pump.

The System C comes in a carrying case with cut-outs for fittings, hose, and the complete assembled calibration unit - no time adder to assemble the unit before use. Easy and fast connection between pump and calibrator makes it easy to use the pressure calibrator separately for other pressure test jobs.

**AMETEK hydraulic hand pump for system C**

This easy-to-use hand pump is specially designed for high pressure applications. The pump has a built-in reservoir, vent valve, and volume adjuster for fine adjustment. The pump has a dual pressure output - one for the test object and one for the HPC calibrator.

|                                |  |
|--------------------------------|--|
| Pressure range, T-620.....     | 0 to 200 bar (3,000 psi)                                   |
| Pressure range, T-620H.....    | 0 to 350 bar (5,000 psi)                                   |
| Type.....                      | Hydraulic  |
| Test medium.....               | Oil  |
| Operation.....                 | Scissor  |
| Reservoir capacity.....        | 200 ml / 0.42 pint   |
| Operation.....                 | Pistol-grip  |
| “O”-rings .....                | Buna-N   |
| Wetted parts.....              | Aluminum, brass, stainless steel, Lexan                    |
| Connection to test object..... | Hose 0.6 m/24 in with 1/4” BSP and NPT female terminations |
| Size.....                      | 21.6x12.1x6.2 cm / 8.5x4.8x2.4 in                          |
| Total system weight .....      | 5.5 kg / 12.2 lb   |

**Included with System C delivery**

- HPC standard delivery (see page 6)
- Hand pump T-620 or T-620H with a 0.6 m / 24 in hose with 1/4” BSP and NPT female terminations
- 1 roll of Teflon tape
- Protective carrying case

**Accessories**

- Pressure hose for T-620/T-620H pumps
- 1 m hose with 1/4” BSP female termination Max. pressure 350 bar (5,000 psi)
- 2 m hose with 1/4” BSP female termination Max. pressure 350 bar (5,000 psi)
- Oil for T-620 & T-1 pump AAA OIL in 1-QUART CAN
- Oil for T-620 & T-1 pump AAA OIL in 1-GALLON CAN
- Connections for APM H/S pressure modules
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module with system C
- Fitting 1/8” NPT male to 1/8” NPT male for APM-H pressure module with system C
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module
- Fitting 1/4” NPT male to 1/4” NPT male for APM-S pressure module

**HPC500, System D**

- DOX/0 to 350 bar (5,000 psi) oil
- DWX/0 to 350 bar (5,000 psi) water



This system consists of an HPC calibrator with a hydraulic, high pressure screw pump. System D is an easy-to-use calibration system. Place the pump on a flat surface and turn the handle to generate pressure. The calibrator may be adjusted to give the best viewing angle. The system includes a manifold for connection of the test device, a fine adjustment volume adjuster (optional), and a reservoir for extra oil or water (optional).

The system comes in a carrying case with cut-outs for fittings and the complete assembled calibration unit - no time adder to assemble the unit before use. Easy and fast connection between pump and calibrator makes it easy to use the pressure calibrator separately for other pressure test jobs.

**AMETEK spindle pump for system D**

The spindle pumps are designed for easy generation of high pressure. The spindle pumps have a 4-connection manifold. Fine adjustment, extra fine volume adjuster, liquid reservoir, and fittings are optional. Spindle pumps may be delivered for 2 different test media: hydraulic oil or water.

|                                |                                     |
|--------------------------------|-------------------------------------|
| Pressure range .....           | 0 to 350 bar (5,000 psi)            |
| Type.....                      | Hydraulic                           |
| Test medium.....               | Hydraulic oil, water                |
| Operation.....                 | Spindle pump                        |
| Reservoir capacity.....        | 250 ml / 0.53 pint                  |
| “O”-rings .....                | Buna-N                              |
| Wetted parts.....              | Aluminum, brass, stainless steel    |
| Connection to test object..... | 4 x 1/4” BSP female                 |
| Size.....                      | 36.6x19.5x10.5 cm / 14.4x7.7x4.1 in |
| Total system weight .....      | 11 kg / 24.3 lb                     |

**Included with System D delivery**

- HPC standard delivery (see page 6)
- Spindle pump for hydraulic oil or for water
- 10 x 1/4” bonded seals
- Allen key 6 mm
- 2 x 1/4” NPT female adapters
- 1 roll of Teflon tape
- Protective carrying case

**Accessories**

- Extra fine adjuster, volume adjuster
- Reservoir set with seals, valve and bonded seal
- 1 m Pressure hose (Max. 350 bar / 5,000 psi)<sup>1</sup>
- 2 m Pressure hose (Max. 350 bar / 5,000 psi)<sup>1</sup>
- 1.5 m Pressure hose (Max. 700 bar/10,000psi)<sup>1</sup>
- 5 m Pressure hose (Max. 700 bar / 10,000 psi)<sup>1</sup>
- Extension tube 120 mm (Max. 350 bar/5,000 psi)<sup>1</sup>
- Quick connector set, female 1/4” BSP to 1/4” BSP
- Connections for APM H/S pressure modules
- Fitting 1/4” BSP male x 1/4” BSP male for APM-S pressure module with system D
- Fitting 1/4” BSP male to 1/4” NPT female for APM-H pressure module with system D
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module with system D
- Fitting 1/4” NPT male to 1/4” BSP female for APM-S pressure module with spindle pump alone
- Fitting 1/8” NPT male to 1/4” BSP female for APM-H pressure module with screw pump alone

<sup>1</sup> 1/4” BSP female to 1/4” BSP male



## HPC500, System E

- EXX/0 to 700 bar (10,000 psi)

This system consists of an HPC calibrator together with a rugged, hydraulic, high pressure pump.



System E is an easy-to-use calibration system. The hydraulic pump makes it very easy to prime the system. The calibrator can be adjusted to fit the best viewing angle. The system includes a manifold for connection of two test devices and the fine adjustment volume adjuster is standard.

The System E comes in a carrying case with cut-outs for fittings and the complete assembled calibration unit - no time adder to assemble the unit before use. Easy and fast connection between pump and calibrator makes it easy to use the pressure calibrator separately for other pressure test jobs.

### AMETEK high pressure hydraulic oil pump for system E

The hydraulic pump is designed for high pressure applications. The pump has a 4-connection output manifold and a fine adjustment volume adjuster.

|                                |                                     |
|--------------------------------|-------------------------------------|
| Pressure range .....           | 0 to 700 bar (10,000 psi)           |
| Type.....                      | Hydraulic                           |
| Test medium.....               | Oil                                 |
| Operation.....                 | Jack pump                           |
| Reservoir capacity.....        | 500 ml / 1 pint                     |
| “O”-rings .....                | Buna-N                              |
| Wetted parts.....              | Aluminum, brass, stainless steel    |
| Connection to test object..... | 4 x 1/4” BSP female                 |
| Size.....                      | 36.5x20.0x14.2 cm / 14.4x7.9x5.6 in |
| Total system weight .....      | 13 kg / 28.7 lb                     |

### Included with System E delivery

- HPC standard delivery (see page 6)
- Hydraulic pump
- 10 x 1/4” bonded seals
- Allen key 6 mm
- 2 x 1/4” NPT female adapters
- 1 roll of Teflon tape
- Volume adjuster for fine adjustment
- Protective carrying case

### Accessories

- Volume adjuster for fine adjustment
- 1.5 m Pressure hose, (Max. 700 bar/10,000 psi)<sup>1</sup>
- 5 m Pressure hose, (Max. 700 bar/10,000 psi)<sup>1</sup>
- Quick connector set, female 1/4”BSP to 1/4” BSP
- Connections for APM H/S pressure modules
- Fitting 1/4” BSP male x 1/4” BSP male for APM-S pressure module with system E
- Fitting 1/4” BSP male to 1/4” NPT female for APM-H pressure module with system E
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module with system E
- Fitting 1/4” NPT male to 1/4” BSP female for APM-S pressure module with system E
- Fitting 1/8” NPT male to 1/4” BSP female for APM-H pressure module with Jack-pump alone

<sup>1</sup> 1/4” BSP female to 1/4” BSP male

## HPC500, System F

- FOx/0 to 700 bar (10,000 psi) oil
- FWx/0 to 700 bar (10,000 psi) water

System F is an easy-to-use calibration system. The hydraulic pump makes it very easy to prime the system. The pump contains 1.23 l of liquid.



The system includes a manifold for connection of two test devices and the volume adjuster for fine adjustment is standard. System F comes in a protective carrying case with cut-outs for fittings. Easy and fast connection between pump and calibrator makes it easy to use the pressure calibrator separately for other pressure test jobs.

The pump is designed for high pressure applications up to 15,000 psi (1,000 bar). The pump and system may be ordered with either oil or a water/alcohol mixture as pressure medium. The pump is constructed of 300 series stainless steel and Monel allowing for the use of other hydraulic media. There are three available seal packages for the system: Buna-N, Viton®, and EPT.

### Type T pump for system F

The Type T pump features a dual pressure output manifold, volume adjuster (up to 200 bar / 2,900 psi), relief valve, and dual volume control for rapid pressure increase at lower pressures and easier pumping at higher pressures.

|                               |  |
|-------------------------------|--|
| Pressure range .....          | 0 to 1,000 bar (15,000 psi)  |
| Type.....                     | Hydraulic  |
| Test medium.....              | Hydraulic oil, water   |
| Operation.....                | Jack pump  |
| Reservoir capacity.....       | 1.23 l / 2.6 pint  |
| “O”-rings .....               | Buna-N (standard) or EPT/Viton (Optional)                              |
| Wetted parts.....             | Stainless steel, Monel   |
| Connection to test object.... | 1/4” and 1/2” BSP terminations<br>1/4” and 1/2” PT female terminations |
| Size.....                     | 79.4x22.9x50.8 cm / 31.3x9x20 in                                       |
| Total system weight .....     | 18 kg / 39.7 lbs   |

### Included with System F delivery

- HPC standard delivery (see page 6)
- Hydraulic pump
- 2 x 1/4” bonded seals
- Allen key 6 mm
- 1 roll of Teflon tape
- Protective carrying case

### Accessories

- 1.5 m Pressure hose (Max. 700 bar/10,000 psi)<sup>1</sup>
- 5 m Pressure hose (Max. 700 bar/10,000 psi)<sup>1</sup>
- Oil for T-620 & T-1 pump AAA OIL in 1-GALLON CAN
- Oil for T-620 & T-1 pump AAA OIL in 1-QUART CAN
- Connections for APM H/S pressure modules
- Union Body 1/4” NPT female for manifold pump T
- Fitting 1/8” NPT male to 1/4” NPT male for APM-H pressure module
- Fitting 1/4” NPT male to 1/4” NPT male for APM-S pressure module

<sup>1</sup> 1/4” BSP female to 1/4” BSP male

**ORDERING INFORMATION**

| Order number            | Description  |
|-------------------------|--|
| HPC                     | Type   |
| 500                     | Model  |
| NONE                    | No calibrator, pressure system only  |
|                         | <b>Pressure range</b>  |
| 25MD                    | ±25 mbar / 0.35 psi differential   |
| 70MD                    | ±70 mbar / 1 psi differential  |
| 350MD                   | ±350 mbar / 5 psi differential   |
| 001A                    | 0.025 bar / 0.35 psi to 1.1 bar / 16 psi absolute  |
| 001C                    | -0.96 bar / -14 psi to 1 bar / 15 psi gauge/compound   |
| 002A                    | 0.025 bar / 0.35 psi to 2 bar / 30 psi absolute  |
| 002C                    | -0.96 bar / -14 psi to 2 bar / 30 psi gauge/compound   |
| 007A                    | 0.070 bar / 1 psi to 7 bar / 100 psi absolute  |
| 007C                    | -0.82 bar / -12 psi to 7 bar / 100 psi gauge/compound  |
| 020A                    | 0.070 bar / 1 psi to 20 bar / 290 psi absolute   |
| 020C                    | -0.82 bar / -12 psi to 20 bar / 290 psi gauge/compound   |
| 035C                    | -0.82 bar / -12 psi to 35 bar / 500 psi gauge/compound   |
| 070G                    | 0 to 70 bar / 1,000 psi gauge  |
| 200G                    | 0 to 200 bar / 2,900 psi gauge   |
| 350G                    | 0 to 350 bar / 5,000 psi gauge   |
| 700G                    | 0 to 700 bar / 10,000 psi gauge  |
|                         | <b>Calibration certificate</b>   |
| G                       | NIST traceable calibration certificate   |
|                         | <b>Accessories (Optional)</b>  |
| B                       | Rechargeable battery pack  |
| C                       | Soft case  |
| I                       | Interface Kit LEMO to RS232  |
| T                       | Temperature sensor Pt100   |
|                         | <b>Pressure system</b>   |
| IND                     | Calibrator only  |
| AXX                     | Syst. A, T-960 pump ranges up to 2 bar/30 psi  |
| AHX                     | Syst. A, T-970 pump ranges up to 35 bar/500 psi  |
| BXX                     | Syst. B, T-965 pump ranges up to 2 bar/30 psi  |
| BHX                     | Syst. B, T-975 pump ranges up to 35 bar/500 psi  |
| CXX                     | Syst. C, T-620 pump ranges up to 200 bar/2,900 psi OIL   |
| CHX                     | Syst. C, T-620H pump ranges up to 350 bar/5,000 psi OIL  |
| DOX                     | Syst. D, 65-P016 pump ranges up to 350 bar/5,000 psi OIL   |
| DWX                     | Syst. D, 65-P017 pump ranges up to 350 bar/5,000 psi WATER   |
| EXX                     | Syst. E, 65-P014 pump ranges up to 700 bar/10,000 psi OIL  |
| FWB                     | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi WATER/Buna-N   |
| FWV                     | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi WATER/VITON  |
| FWE                     | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi WATER/EPT  |
| FOB                     | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi OIL  |
| FOV                     | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi OIL/VITON  |
| FOE                     | Syst. F, T.1 pump ranges up to 700 bar/10,000 psi OIL/EPT  |
|                         | <b>Sample order number</b>   |
| HPC 500 035C G BCIT BHX | HPC500, -0.82 to 35 bar, NIST traceable certificate, rechargeable battery package, soft case, interface kit, temperature sensor, system B T-975 pump |

## ORDERING INFORMATION

| Order number |        | Description                         |  |   |      |     |  |
|--------------|--------|-------------------------------------|--|---|------|-----|--|
| HPC          |        | Type                                |  |   |      |     |  |
| 502          |        | Model                               |  |   |      |     |  |
| NONE         |        | No calibrator, pressure system only |  |   |      |     |  |
|              | Port 1 | Port 2                              | Pressure range (Port 1 - lowest pressure, Port 2 - highest pressure) |   |      |     |  |
|              | 001A   | 001A                                | 0.025 bar / 0.35 psi to 1.1 bar/ 16 psi absolute                     |   |      |     |  |
|              | 001C   | 001C                                | -0.96 bar / -14 psi to 1 bar / 15 psi gauge/compound                 |   |      |     |  |
|              | 002A   | 002A                                | 0.025 bar / 0.35 psi to 2 bar /30 psi absolute                       |   |      |     |  |
|              | 002C   | 002C                                | -0.96 bar / -14 psi to 2 bar / 30 psi gauge/compound                 |   |      |     |  |
|              | 007A   | 007A                                | 0.070 bar / 1 psi to 7 bar / 100 psi absolute                        |   |      |     |  |
|              | 007C   | 007C                                | -0.82 bar / -12 psi to 7 bar / 100 psi gauge/compound                |   |      |     |  |
|              | 020A   | 020A                                | 0.070 bar / 1 psi to 20 bar /290 psi absolute                        |   |      |     |  |
|              | 020C   | 020C                                | -0.82 bar / -12 psi to 20 bar / 290 psi gauge/compound               |   |      |     |  |
|              | 035C   | 035C                                | -0.82 bar / -12 psi to 35 bar / 500 psi gauge/compound               |   |      |     |  |
|              | 070G   | 070G                                | 0 to 70 bar / 1,000 psi gauge  |   |      |     |  |
|              | 200G   | 200G                                | 0 to 200 bar / 2,900 psi gauge                                       |   |      |     |  |
|              | 350G   | 350G                                | 0 to 350 bar / 5,000 psi gauge                                       |   |      |     |  |
|              | 700G   | 700G                                | 0 to 700 bat / 10,000 psi gauge                                      |   |      |     |  |
|              |        | Calibration certificate             |  |   |      |     |  |
|              |        | G                                   | NIST traceable calibration certificate                               |   |      |     |  |
|              |        | Accessories (Optional)              |  |   |      |     |  |
|              |        | B                                   | Rechargeable battery pack  |   |      |     |  |
|              |        | C                                   | Soft case  |   |      |     |  |
|              |        | I                                   | Interface Kit LEMO to RS232  |   |      |     |  |
|              |        | T                                   | Temperature sensor Pt100   |   |      |     |  |
|              |        | Pressure system                     |  |   |      |     |  |
|              |        | IND                                 | Calibrator only  |   |      |     |  |
|              |        | AXX                                 | Syst. A, T-960 pump ranges up to 2 bar/30 psi                        |   |      |     |  |
|              |        | AHX                                 | Syst. A, T-970 pump ranges up to 35 bar/500 psi                      |   |      |     |  |
|              |        | BXX                                 | Syst. B, T-965 pump ranges up to 2 bar/30 psi                        |   |      |     |  |
|              |        | BHX                                 | Syst. B, T-975 pump ranges up to 35 bar/500 psi                      |   |      |     |  |
|              |        | CXX                                 | Syst. C, T-620 pump ranges up to 200 bar/2,900 psi OIL               |   |      |     |  |
|              |        | CHX                                 | Syst. C, T-620H pump ranges up to 350 bar/5,000 psi OIL              |   |      |     |  |
|              |        | DOX                                 | Syst. D, 65-P016 pump ranges up to 350 bar/5,000 psi OIL             |   |      |     |  |
|              |        | DWX                                 | Syst. D, 65-P017 pump ranges up to 350 bar/5,000 psi WATER           |   |      |     |  |
|              |        | EXX                                 | Syst. E, 65-P014 pump ranges up to 700 bar/10,000 psi OIL            |   |      |     |  |
|              |        | FWB                                 | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi WATER/Buna-N       |   |      |     |  |
|              |        | FWV                                 | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi WATER/VITON        |   |      |     |  |
|              |        | FWE                                 | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi WATER/EPT          |   |      |     |  |
|              |        | FOB                                 | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi OIL                |   |      |     |  |
|              |        | FOV                                 | Syst. F, T-1 pump ranges up to 700 bar/10,000 psi OIL/VITON          |   |      |     |  |
|              |        | FOE                                 | Syst. F, T.1 pump ranges up to 700 bar/10,000 psi OIL/EPT            |   |      |     |  |
|              |        | Sample order number                 |  |   |      |     |  |
| HPC          | 502    | 035C                                | 350G   | G | BCIT | BHX | HPC502, port 1: -0.82 to 35 bar, port 2: 0 to 350 bar, NIST traceable certificate, rechargeable battery package, soft case, interface kit, temperature sensor, system B T-975 pump |

## ACCESSORIES

### Rechargeable battery kit - Option B

The HPC500 is available with a set of 4 rechargeable AA batteries and a charger.

### Useful soft case - Option C

The HPC500 can be delivered with a soft case as an option. The handy soft case is designed for protection during transport. The soft case has separate compartments for HPC500 (w/Velcro strap), test leads, test hoses, temperature probe, and JOFRA APM pressure module. A shoulder strap ensures convenient transportation when climbing ladders, etc. and the handy strap on the back makes it possible to hang the instrument on a valve, ladder etc. The manual and calibration documents fit into a pocket on the front of the soft case.

### Interface kit - Option I

Special LEMO to Sub D, RS232 interface cable for HPC500 and HPC502.

### Temperature sensor - Option T

To utilize the thermometer utility of the HPC500 family, a ruggedized handheld temperature sensor is available. The sensor comes as a ready-to-use probe with handle and coiled cable with LEMO connector for HPC500 and HPC502. The sensor is built with a high accuracy Pt100 element, accuracy  $\pm 0.05^{\circ}\text{C}$  /  $\pm 0.27^{\circ}\text{F}$ . Sensor dimensions, without handle and cable,  $\varnothing$  4x200 mm/stainless steel.

### Complete calibration systems

The HPC500 is available as a calibrator only or one of 6 ready-for-test systems that are complete and equipped to meet your pressure calibration needs.



Option C



#### AMETEK Test & Calibration Instruments

A business unit of AMETEK Measurement & Calibration Technologies Division offering the following industry leading brands for test and calibration instrumentation.

#### JOFRA Calibration Instruments

##### Temperature Calibrators

Portable dry-block calibrators, precision thermometers and liquid baths. Temperature ranges from  $-90^{\circ}\text{C}$  ( $-130^{\circ}\text{F}$ ) to  $1205^{\circ}\text{C}$  ( $2200^{\circ}\text{F}$ ). Temperature sensors for industrial and marine use.

##### Pressure Calibrators

Convenient electronic systems ranging from  $-25$  mbar to 1000 bar - fully temperature-compensated for problem-free and accurate field use.

##### Signal Instruments

Process signal measurement and simulation for easy control loop calibration and measurement tasks.

#### M&G Pressure Testers & Pumps

Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading. Pressure generators delivering up to 1,000 bar.

#### Lloyd Instruments

Materials testing machines and software from Lloyd Instruments guarantees expert materials testing solutions. The comprehensive program also covers Texture Analysers to perform rapid, general food testing and detailed texture analysis on a diverse range of foods and cosmetics.

#### Davenport Polymer Test Equipment

Allows measurement and characterization of moisture-sensitive PET polymers and polymer density.

#### Chatillon Force Measurement

The hand held force gauges and motorized testers have earned their reputation for quality, reliability and accuracy and they represent the de facto standard for force measurement.

#### Newage Testing Instruments

Hardness testers, durometers, optical systems and software for data acquisition and analysis.

**AMETEK**<sup>®</sup>  
TEST & CALIBRATION INSTRUMENTS

**UK**  
AMETEK Calibration Instruments  
Tel +44 (0)1243 833 302  
jofra@ametek.co.uk

**France**  
AMETEK S.A.S.  
Tel +33 (0)1 30 68 89 40  
general.lloyd-instruments@ametek.fr

**Germany**  
AMETEK GmbH  
Tel +49 (0)2159 9136 510  
info.mct-de@ametek.de

**Denmark**  
AMETEK Denmark  
Tel +45 4816 8000  
jofra@ametek.com

**USA**  
AMETEK Mansfield & Green  
Tel +1 (800) 527 9999  
cal.info@ametek.com

**India**  
AMETEK Instruments India Pvt Ltd.  
Tel +91 22 2836 4750  
jofra@ametek.com

**Singapore**  
AMETEK Singapore Pte Ltd  
Tel +65 6484 2388  
jofra@ametek.com

**China**  
AMETEK Inc. - Shanghai  
Tel +86 21 5868 5111  
AMETEK Inc. - Beijing  
Tel +86 10 8526 2111

AMETEK Inc. - Guangzhou  
Tel +86 20 8363 4768  
jofra.sales@ametek.com.cn

[www.jofra.com](http://www.jofra.com)