High-End Pressure Controller Model CPC8000

Applications

- Industry (laboratory, service shop and production)
- Transducer/Transmitter production
- Pressure gauge manufacturers
- Calibration Labs (sensor manufacturing, health care, nuclear power, general manufacturing)
- Research and development laboratories

Features

- Pressure ranges from -15 psi to 6000 psi or -1 to 400 bar
- Up to 3 removable transducers plus a barometric reference
- Modular design of electrical and pneumatic components
- Positive and negative gauge pressure, absolute pressure
- Control stability 0.002% FS of highest range sensor
- Uncertainty: 0.01%FS, 0.01% IS-50 or 0.008% IS-33 (includes A2LA/NIST calibration certificate)
- Large touch screen user interface
- Precision needle valve regulator

CPC8000 High-End Pressure Controller

Description

Application
The CPC8000 High-End Pressure Controller is our premier pneumatic pressure calibrator/controller, designed to automate testing of pressure transmitters, pressure transducers, field pressure calibrators, pressure gauges and pressure sensors of all kinds.

Design
The CPC8000 has a modern look, modular components, and a large HD color touch screen. A rack mount or desk top version is available. Precision, stable control and quiet operation are achieved with the modular needle valve pressure control system, mounted on a tubeless pneumatic manifold. The CPC8000 delivers a percent of reading accuracy over a wide range with up to three removable transducers and a removable barometric reference. The transducers and the barometer can be calibrated remotely using the optional calibration fixture. Built in safety features, software emulation for drop in compatibility, selectable configurations, extensive setup features and intuitive operation were all designed with the operator in mind.

Functionality
The CPC8000 utilizes an intuitive tab driven operator interface through the HD color touch screen. Access to and interaction with commonly used features, functions and settings quickly becomes routine. Language choices, units, display options, sensor settings, limits and a variety of other setup choices can be easily selected or saved within user defined configurations.

Software
Operators can automate operation of the CPC8000 by using an internal sequence application or by programming a command sequence in an external application. Remote communication is achieved using standard Mensor commands, SCPI commands or a command set emulation mode for drop in compatibility with existing software used to communicate with common industry calibrators. Communication is achieved through IEEE-488, USB, Ethernet or RS-232 remote interface connections.

Test and calibration systems
Mobile carts or stationary rack mounted pressure calibration test sets can be assembled based on customer specifications.

CPC8000 Features

(Front view cut-away)

Three pressure transducers and a Barometer

Up to three removable/interchangeable sensors are available, with uncertainty of 0.01% FS, 0.01% IS-50, 0.008% IS-50 or 0.008% IS-33. The three sensors, in combination with the control valve regulator, provide a wide dynamic range where the operator can choose to control output pressure using a single sensor, or "autorange" control across all three sensors. The three sensor ranges can be chosen to optimize uncertainty levels. Full scale sensor ranges between 1 and 6000 psi are available plus an optional barometric sensor. The percent of reading specifications, plus a proprietary control valve regulator, provides accurate and stable control.

Transducer measuring modes can be gauge, absolute, or bi-directional. A CPC8000 can be equipped with one, two or three transducers of the same mode.

An optional precision barometer can be used to achieve accurate emulation of gauge pressure with an absolute pressure instrument, or used for absolute pressure emulation with a gauge pressure instrument. For full range absolute emulation, the instrument gauge sensors should be ranged down to -15 psig.

Removable Transducers

Removable Barometer

User Interface

The high definition color touch screen and intuitive interface provides for easy control of the pressure output. Entry of set points and system setting becomes second nature through the user-friendly buttons and menus. In addition, the user programmable sequence function provides storage and automated control of standard test protocols.

Instrument Housing

The CPC8000 is housed in a 4U 19" case. The desktop model has side panels with built-in openings for hand-holds. Inside the case there is an enclosed electrical module and a pneumatic module. The modules can be removed after disconnecting cables and removing three screws. Each sensor is removed by disconnecting a cable and removing two screws.

The modular design insures quick and efficient maintenance and a high degree of flexibility in the configuration.

Remote Calibration Fixture
(includes software and cables, not pictured)

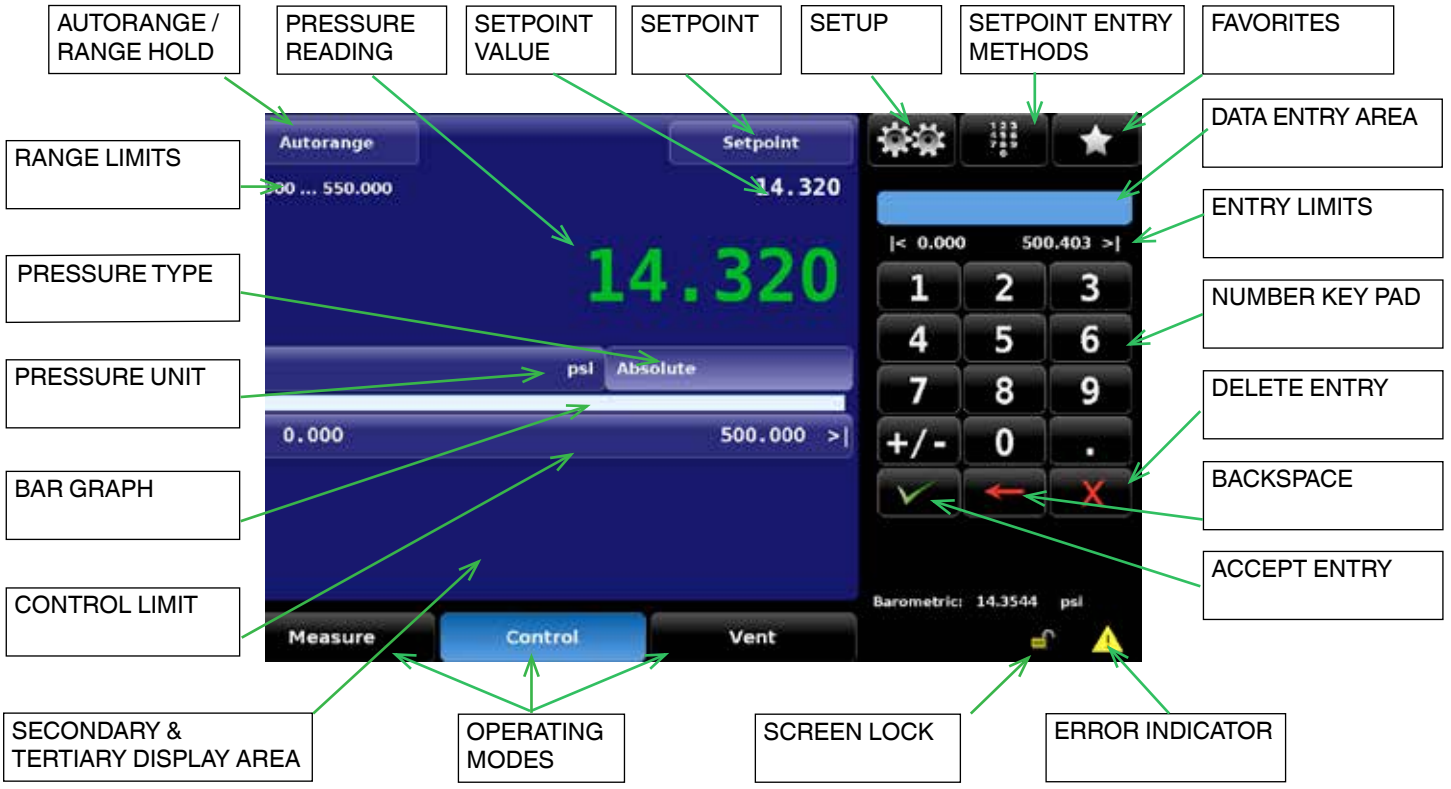
Remote Operation

The CPC8000 is capable of remote operation using IEEE-488.2 (GPIB), Ethernet, RS-232 or USB. Command set emulation of some prior generation Mensor instruments (PCS 200, PCS 400, etc.) as well as many non-Mensor devices, makes the CPC8000 a valuable "drop-in" asset that can be used in production or calibration of pressure transmitters, transducers and instruments.

Service & Calibration

The CPC8000 can be supplied with an external "Calibration Fixture" (optional) for remote calibration outside of the installed unit. Combined with its modular design, Mensor's world class service and support, the CPC8000 is the best solution for most pressure calibration applications.

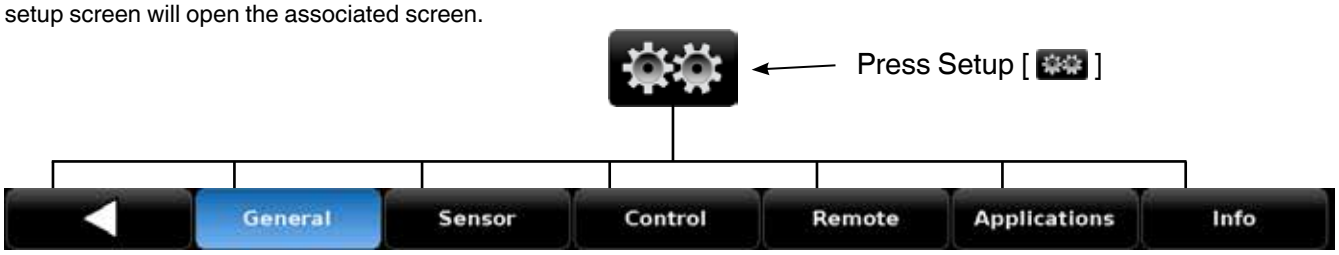
Touch screen user interface - Main screen



Setup [⚙] menus

The CPC8000 setup screens provide way to configure every aspect of the CPC8000's operating environment. The tab driven menu provides easy access to the settings for instrument functions. These settings are General settings, Sensor settings, Control settings, Remote setup, Applications and Information. Access to these areas is controlled by two passwords. The bullet text in blue represent screens that require the "calibration" password to view; those in red require "service" password to view.

Access the setup screens using the setup button [⚙] from the main menu screen. When touched, each tab at the bottom of the setup screen will open the associated screen.



[Back key] Reverts to the previous screen or main screen

- Language
- Secondary Display
- Tertiary Display
- Brightness
- Volume
- Load
- Save

- Filter
- Resolution
- Units
- Rate Units
- Vent Rate
- Vent Limit

- Max limit
- Min limit
- Stable limits
- Stable Delay
- Rate Setpoint

Remote Setup
- Command Set IEEE-488
- IEEE-488 address

Ethernet
- IP
- Netmask
- Gateway
- Port
- DHCP

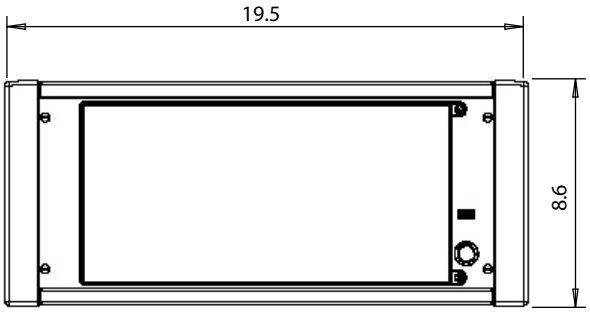
Serial
- Baud
- Data Bits
- Stop Bits
- Parity
- Echo

- 1-Point Cal
- 2-Point Cal
- Linearize
- Head Correction
- Programs
- Favorites
- Digital I/O
- Troubleshoot
- Advanced
- Admin

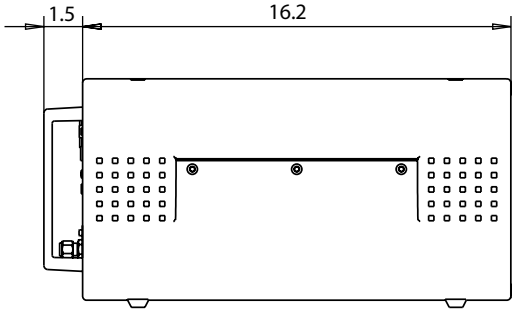
Information about the CPC8000

Dimensions (in inches)

Desk top:

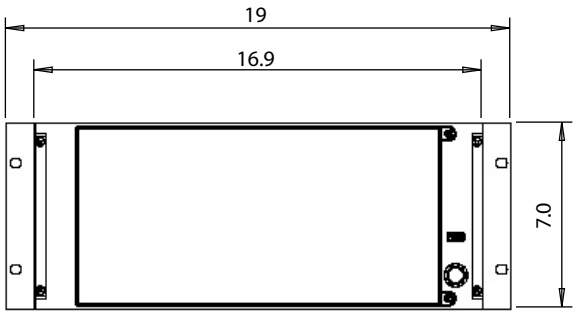


front view

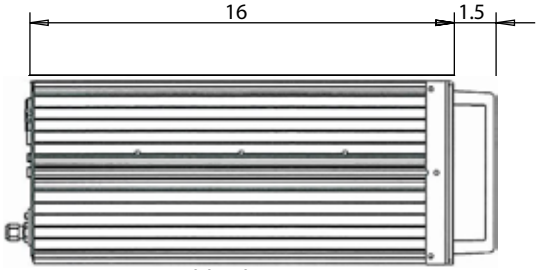


side view

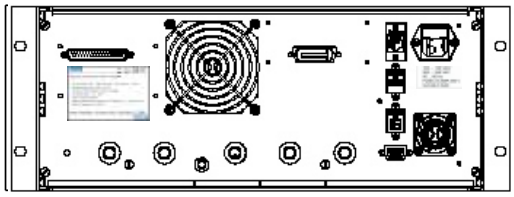
Rack mount:



front view

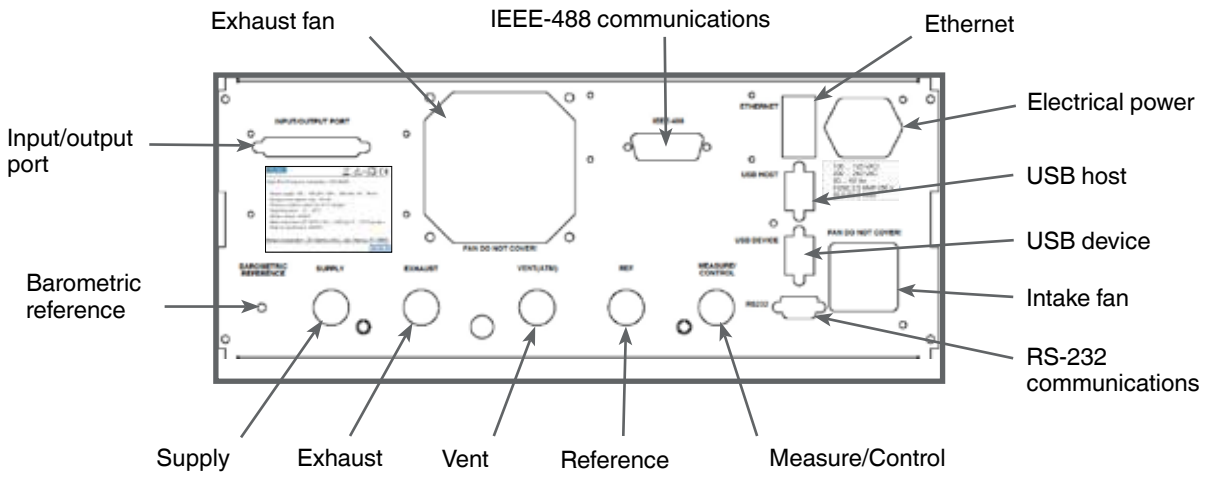


side view


rear view

Pressure fittings are 1/4 inch SWAGELOK® Tube fittings with nuts and ferrules included. The barometric reference connection is a Festo® 6 mm push to connect fitting.

Rear Panel



Specifications

Measure Specifications

Uncertainty [1]	Standard transducer 0.01% Intelliscale-50[2] (0.01% IS-50) -or- Standard transducer 0.01% Full Scale (0.01%FS)[3] Optional (premium transducer) 0.008% Intelliscale-33[4] (0.008% IS-33) -or- Optional (premium transducer) 0.008% Intelliscale-50[5] (0.008% IS-50) Gauge and absolute emulation modes add or RSS the additional uncertainty of the barometric transducer (0.01% of reading).
Compensated temperature range	15 to 45 ^{o}C
Pressure ranges	0 ... 14.5 psia to 0 ... 6015 psia 0 ... 5 psig to 0 ... 6000 psig -15 ... 145 psig to -15 ... 6000 psig (0.01%IS-50 Uncertainty[2]) -15 ... +14.5 psig to -15 ... 145 psig bi-directional (0.01%Full Span[3]) See page 7 for list of available Transducer Type, Range, Mode & Uncertainty Maximum ratio between highest and lowest range is 10:1 Exact ranges are selectable by the customer. The primary sensor must be a higher range than the secondary sensor and the secondary sensor must be a higher range than the tertiary sensor.
Measurement units	psi, inHg@0C, cmHg@0C, mmHg@0C, inH2O@4C, 20C, bar, mbar, cmH2O@4C and 20C, hPa, kPa, Pa, MPa, kg/cm sq, and 2 user-defined units. All above in rate (per second, per minute and per hour).
Resolution	1 to 10 PPM depending on range and units
Calibration adjustments	Customer accessible and Mensor internal Zero adder and Span multiplier, up to 11 point linearization for each sensor
Calibration interval	365 days with periodic rezeroing
Calibration data storage	The calibration data is stored on the sensor
Measurement filters	Off, low, normal (default), high

Definitions: Max = the maximum value of a range, also known as the full scale value. Example, for a range of –15 ... 145, Max = 145
Min = the minimum value of a range. Example, for a range of –15 ... 145, Min = –15
Full Span = Max – Min. Example, for 0 ... 145 the Full Span is 145, for –15 ... 145 the Full Span is 160
Reading = The value of the sensor output

(1) Total Uncertainty (k=2) includes hysteresis, linearity, repeatability, reference standard, drift and temperature effects over the calibrated range for the calibration interval specified, with periodic re-zeroing.
(2) 0.01% Intelliscale-50 (0.01% IS-50): Uncertainty from Min to 50% of Max = (0.010% x 50% x Max) or 0.010% of reading from 50% to 100% of Max for 365 days.
(3) 0.01% Full Span (0.01% FS) = Uncertainty of 0.01% of the Full Span for 365 days.
(4) 0.008% Intelliscale-33 (0.008% IS-33): Uncertainty from 0 to 33% of Max= (0.008% x 33% x Max) and 0.008% of Reading from 33% to 100% of Max for 365 days.
(5) 0.008% Intelliscale-50 (0.008% IS-50): Uncertainty from 0 to 50% of Max = (0.008% x 50% x Max) and 0.008% of Reading from 50% to 100% of Max for 365 days.

Control Specifications

External pressure requirements	Source Requirements – 10% over range of highest pressure transducer Exhaust Requirements – Vacuum source required for any control below atmosphere
Control stability	0.002% FS of highest range sensor
Minimum control pressure	0.05% FS or .025 psi over exhaust pressure, whichever is greater
Pressure control rates	0.001% of range/sec to 10% of range/sec
Control time	60 seconds to stable flag for a 10% pressure change into 150cc volume. Larger volumes can lengthen this time. Controlling to pressures less than 0.5 psia will lengthen this time.
Supply consumption	<2.5 scfh in steady-state control.
Overshoot	<0.1%

Digital Input rating	3.3VDC or 5VDC, current limited by 330 ohm resistor
Digital Output contact rating	0.5 A at 125 VAC; 1 A at 24 VDC
External volume	Maximum: 60 cu.in. (1,000 cc). Minimum: 3 cu.in. (50 cc)

General Specifications

Size	See page 4.
Weight	~49 lbs (~22.2 kg) with all internal options.
Mounting	Standard: desk top case with integrated side panel hand-holds. Optional: 19” rackmount kit
Power input requirements	100 – 120 VAC / 200 – 240 VAC, 50 – 60 Hz
Energy consumption	Max 130 VA
Pneumatic interfaces	7/16-20 female SAE threaded ports for Measure/Control, Exhaust, Reference, and Supply. Hose barb for barometer. 1/4 or 6 mm tube fitting adaptors included.
Particle filters	The instrument has 20-micron filters on all pressure ports through the manifold. The barometer has no filters
Pneumatic overpressure protection	Each sensor is protected with pneumatic relief valves set to ~10% over the maximum transducer pressure.
Operating temperature range	0 to 50 °C.
Storage temperature range	0 to 70 °C.
Local user interfaces	9” color LCD display with glass capacitive touch screen
Remote user interface	Ethernet, RS-232, USB, and IEEE.488.2
Warm-up	15 minutes to rated accuracy
Reading rate	32+ readings/second, unique readings/second is sensor dependent.
Response time	< .33 seconds after a 0-FS step.
Orientation effects (Tilt)	Negligible, can be removed with re-zeroing. (Calibration in a horizontal position).
Shock / vibration	2 G’s Max
Metals in contact with media	6000 series Aluminum, 316 SS, Brass
Non-metals in contact w/ media	Teflon, Urethane, Silicone, RTV, Silicone grease, PVC, Epoxy, Ceramics
Operating environment	0-95% RH, non-condensing
CE-mark	Conformity certificate. Complies with EN50081, EN50082, and EN61010-1.
Calibration certificate	Includes calibration certificate(s). The Mensor calibration laboratory is accredited in accordance with the recognized Internal Standard ISO/IEC 17025:2005 and also meets the requirements of ANSI/NCSL Z540-1-1994. Accreditation is by the American Association for Laboratory Accreditation (A2LA).
Warranty	Two year warranty
Options	■ 0.008% IS-33 sensor option ■ Transport Case ■ Barometric Reference Transducer ■ Spare Primary, Secondary or Tertiary Transducer ■ 19” Rack Mount Kit

WARNING! This is class A equipment for emissions and is intended for use in industrial environments. In other environments, e.g. residential or commercial installations, it can interfere with other equipment under certain conditions. In such circumstances the operator is expected to take the appropriate measures.

Ordering information

There are many choices to consider when configuring your CPC8000 Controller; we recommend that you consult your local Mensor representative or contact the Mensor factory during this process. The primary consideration when choosing a CPC8000 configuration is the Needle Valve Regulator (NVR) range, transducer range / type, and uncertainty. Standard transducers are available in absolute or gauge mode. Premium transducers are available in absolute mode.

Follow the guidelines below when configuring the CPC8000:

- Choose a Needle Valve Regulator (NVR) range that is greater than your current or expected future max pressure transducer range.
- Choose 1, 2 or 3 transducers (standard **or** premium type, but not a mix of both).
- Choose either absolute **or** gauge mode transducers, but not a mix of both.
- The ratio of the full scale range of the highest to the lowest sensor should not exceed 10:1.
- A barometric reference is optional and is used for barometric pressure indication or to emulate gauge pressure from native absolute sensors or absolute from native gauge sensors. When emulating absolute from native gauge sensors, the gauge sensors should have a negative (sub atmospheric / bidirectional) component in order to emulate an equivalent sub atmospheric absolute pressure.

Sensors can be chosen to take advantage of the percent of reading accuracy of each sensor. For example, a 6000 psi primary sensor, a 3000 psi secondary sensor and a 1500 psi tertiary sensor can be chosen from the Standard sensor ranges to give a percent of reading down to 750 psi.

The needle valve regulator (NVR) is configured and charactorized at the factory relative to the full scale range of the primary sensor, if it is anticipated that a higher range transducer will be purchased in the future, consult the factory for help with choosing an appropriate regulator.

A calibration sled can be purchased with the CPC8000 in order to calibrate each removable sensor outside of the instrument. Extra sensors can be staged, with a fresh calibration to replace internal sensors that require calibration, to virtually eliminate down time.

NVR Range - Transducer Type/Range/Mode/Uncertainty

Needle Valve Regulator (NVR) Range
LP-NVR (90 psig or 105 psia)
MP-NVR (1000 psig or 1015 psia)
SP-NVR (2000 psig or 2015 psia)
HP-NVR (3000 psig or 3015 psia)
EP-NVR (6000 psig or 6015 psia)

A transducers range must fall within the limits given in the table to the right.

For example, a 0 to 10 psia (0 ...10 psia) standard transducer range can be chosen, because 0 ... 10 psia falls within the limits given (0 ... 5 to 0 ... <14.5 psia).

For a Premium Transducer, a 0-30 psia range can be chosen because it falls within the limits 0 ... 18.4 to 0 ... 33 psia

Standard Transducer Ranges		Mode	Uncertainty
0 ... 0.36 to 0 ... <1		Gauge	0.03%FS – 180 days
0 ... 1 to 0 ...<14.5 psig		Gauge	0.01% FS – 180 days
0 ... ≥14.5 to 0 ... 6000 psig		Gauge	0.01% IS-50 – 365 days
0 ... 5 to 0 ... <14.5 psia		Absolute	0.01% FS – 180 days
0 ... ≥14.5 to 0 ... 6015 psia		Absolute	0.01% IS-50 – 365 days
Min span	**Max span**		
-0.18 ... +0.18 psi	-0.5 ... +0.5 psi	Bidirectional	0.03% FS – 180 days
-0.5... 0.5 psi	-5 ... +14.5 psi	Bidirectional	0.01% FS – 180 days
-5 ... >14.5 psi	-15 ... <145 psi	Bidirectional	0.01% FS – 365 days
-15 ... 145 psi	-15 ... +6000 psi	Bidirectional	0.01% IS-50 – 365 days
Premium Transducer Ranges		**Mode**	**Uncertainty**
0 ... 12 to 0 ... 16.5 psia		Absolute	0.008% IS-33 – 365 days
0 ... 18.4 to 0 ... 33 psia		Absolute	0.008% IS-33 – 365 days
0 ... 36 to 0 ... 49.5 psia		Absolute	0.008% IS-33 – 365 days
0 ... 80 to 0 ... 110 psia		Absolute	0.008% IS-33 – 365 days
0 ... 160 to 0 ... 220 psia		Absolute	0.008% IS-33 – 365 days
0 ... 240 to 0 ... 500 psia		Absolute	0.008% IS-33 – 365 days
0 ... 700 to 0 ... 1100 psia		Absolute	0.008% IS-50 – 365 days
0 ... 1400 to 0 ... 3300 psia		Absolute	0.008% IS-50 – 365 days
0 ... 4200 to 0 ... 6015 psia		Absolute	0.008% IS-50 – 365 days

Included in shipment

- CPC8000 High-end pressure controller
- 1.5m power cord
- Operating instruction manual
- Quick start guide
- Calibration certificate

Options

- 0.008% IS-33 sensor option
- Transport/travel case
- Barometric reference transducer
- Additional sensors
- 19" rack mount kit
- Customer-specific system

Accessories

- Calibration fixture for external calibration of transducers
- Interface cable
- Pressure port fittings

Products and services

- A2LA accredited calibration services for pressure
- Portable pressure measuring devices for test and calibration
- Precision pressure measuring units and pressure controllers
- Primary standards for pressure
- Testing technology system solutions
- Custom Systems for pressure calibration and testing

Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing. Modifications may take place and materials specified may be replaced by others without prior notice.

All standard Mensor products are provided with a calibration certificate traceable to NIST. The calibration program at Mensor is accredited to both ISO/IEC 17025:2005 and Z540-1-1994 by A2LA. Mensor is certified to ISO9001:2008.

Represented by:

Mensor
201 Barnes Drive
San Marcos, Texas 78666
Toll Free: 800-984-4200
Tel: 512-396-4200
Fax: 512-396-1820
Email: sales@mensor.com
Web site: www.mensor.com