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CP 440

Bedienungsanleitung

Instruction Manual

Manuel d'Instructions

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1. Introduction

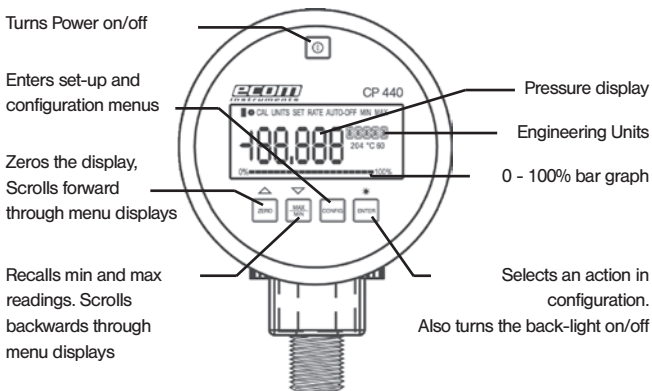
The CP 440 combines the high accuracy of digital electronics with the convenience and ease of use of an analog test gauge. Accurate to $\pm 0.05\%$ FS, the CP 440 can be used as a calibration reference, or in any application where high accuracy pressure measurement is required.

Many user configurable functions have been designed into the CP 440 including sampling rate, TARE, damping, auto shut off, and min-max. Once the gauge is configured, settings can be locked and password protected to prevent unauthorized changes to configuration.

Unpacking:

Check to see that your CP 440 has arrived intact. Batteries are factory installed unless you have purchased the optional 24V powered version, in which case batteries are not supplied or installed.

1.1 CP 440 Display and Controls



2. Operation

Power: The standard CP 440 is supplied with 3 AA batteries installed. If you purchased the optional 24Volt powered version, batteries are not installed. Connect a 24V power supply to the terminal block on the rear of the gauge, noting proper polarity.

Do not install batteries when external power will be used.

Push the power button momentarily to turn the unit on. Push it again to turn it off.

2.1 Set-up and configuration:

Push the CONFIG button to access the user-settable functions on the gauge. Each time the CONFIG button is pressed; the display advances to the next function. Once a function has been set, press ENTER to exit the configuration menu, or CONFIG to continue with further configuration. In order, the configuration menu and operation is as follows:

1. **Engineering Units set.** The unit is shipped configured to display Psi. By pressing the ▼ and ▲ (ZERO and MAX/MIN) keys you can scroll forward and backwards through the 18 standard engineering units plus a one custom unit/scale. When the desired unit is displayed, press ENTER or CONFIG. Pressure will now be displayed in the chosen engineering units.

See the Specifications section of this manual for a list of available engineering units.

See the Supervisory Mode section for details on setting up custom units.

2. **Set Auto Off.** The auto-shut off can be set in 1 minute increments from 1 to 30 minutes or "off" (continuous operation). The unit is shipped set for 30 minutes. Use the ▼ and ▲ keys to set the desired interval. The "off" setting is at the low end of the choices, below 1 minute.
3. **Display battery voltage.** Actual voltage and a percent of life bargraph indicate battery condition

4. **Display actual temperature.** The CP 440 is temperature compensated, this displays the temperature measured by the internal sensor. The value can be set to degrees F or degrees C using the arrow keys.
5. **Set damping.** Choices are “on” and “off” set with the ▼ and ▲ keys. Turning damping on will smooth readings from pulsating pressure sources.
6. **Set sample rate:** This determines how often pressure is sampled and the display is updated. Choices are 0.5, 1, 3, and 10 samples/second. Note that 10/sec provides the fastest response time.
7. **Set TARE.** This allows you to set a constant offset value, which is then subtracted from the measured pressure. For example if a TARE is set at 30 Psi, and the measured pressure is 37 Psi, the displayed value will be 7 Psi. A pressure of 27 Psi would be displayed as -3 Psi.

The tare value is set manually with the ▼ and ▲ keys, and is based on the engineering units and resolution selected for display. TARE value can be set to the maximum range of the gauge.

The bar graph will always display the actual pressure based on the full range of the gauge regardless of the tare setting. This is done for safety to insure that even with a “0” reading that pressure is being applied to the gauge.

8. **Function Lock:** Access to each of the settable parameters above can be turned “off” once set, to prevent unauthorized changes to configuration. This is accomplished through a password protected “supervisory mode”. Press ENTER to access the supervisory mode, or CONFIG to return to normal operation.

3. Supervisory Mode

Press ENTER when “FUnC LOCK” is displayed, 0PWrd will be displayed on the gauge. The password to enter supervisory mode is 101, set using the ▼ and ▲ keys. Holding a key continuously will cause the display to advance more quickly for faster setting. The password is factory set and cannot be changed.

1. Your CP 440 is shipped from the factory with all setting access “unlocked” or available to be changed.
2. In supervisory mode each of the parameters can be locked or unlocked using the ▼ and ▲ keys. Select LOC (lock) for those parameters you do not want to be accessible, and UnLOC (unlock) for those can be accessed.
3. In order, the functions that can be unlocked, locked or accessed are:
 - Zero function (enable/disable)
 - Set pressure units (enable/disable)
 - Auto shutdown adjustment (enable/disable)
 - Damping settings (enable/disable)
 - Sample rate setting (enable/disable)
 - Tare setting (enable/disable)
 - Custom engineering units (set scale factor)
4. Use the CONFIG key to scroll through the above choices, and the ▼ and ▲ keys to lock and unlock features. Press CONFIG to continue scrolling through the parameters, pressing ENTER at any point saves your settings and returns the gauge to normal operation.

When a function is “locked, it cannot be accessed or changed from its current state. To change a locked function, enter the supervisory mode, and unlock the function. Once it is changed, you may enter supervisory mode to lock access again.

5. Setting a custom engineering unit or scale: The last menu choice in supervisory mode is SET FACTR. This allows you to set a multiplier factor from 0.001 to 100, creating a custom scale. The set factor will be multiplied by the Psi measured, the result will be displayed.

For example: 40 Psi is the equivalent of 1000 g of product in a tank. You want to display the product weight, using a 100 Psi gauge. By setting a factor of 25, a 40 Psi pressure would display as 1000 (40 x 25). The engineering unit displayed on the CP 440 will be “Cust”.

4. Normal Operation

Turning the backlight on and off: Press the ENTER button.

Zeroing the display: Press and hold the ZERO button.

MAX/MIN: The CP 440 stores minimum and maximum pressure values in memory. Pressing the MAX/MIN button once will display the minimum pressure from memory. Pressing the MAX/MIN button again will display the maximum pressure from memory. After about 2 seconds, the gauge returns to normal (live display) operation. To clear the MAX/MIN memory registers, press and hold the MAX/MIN button for 2 or more seconds until "CLr" is displayed.

The analog bar graph at the bottom of the display indicates the applied pressure level relative to the full range of the gauge. Keep in mind that if a TARE value has been programmed into the gauge, the displayed pressure will not reflect the true pressure applied.

Changing the Batteries

Grasp the face ring on the CP 440, turn it approximately 1/4 turn counterclockwise and remove. The face of the gauge can now be lifted to expose the battery holder. Install three AA batteries noting proper polarity. Reassemble the case making certain that the face is properly oriented.

If you purchased the optional 24 Volt powered version, the terminals for power input are located on the rear of the gauge. To apply power simply connect 24 volts to the rear terminal block taking care to observe proper polarity.

WARNING

Gauges ordered with the external power option will not come with batteries installed. Batteries **MUST NOT** be installed when operating on external power.

Battery life

Battery life is about 1500 hours (60 days) of continuous use with the backlight off. With intermittent use, batteries could last a year or more. There is a low battery icon in the upper left of the display. It will appear when battery level is low. Replace batteries per recommendations found in the specifications section of this manual.

RS-232 Interface

An RS-232 interface is standard on the CP 440. Serial communication can be used for configuration, calibration, and to transfer measurement data from the gauge.

5. Specifications

All specifications cover the temperature range from 0°C to +50°C, unless otherwise noted.

Available Input Ranges

See page 26 for a table of available ranges in psi plus equivalent ranges and resolution for all engineering units

Accuracy

Positive Pressure: $\pm 0.05\%$ FS

Vacuum: $\pm 0.25\%$ FS (500 psi gauge ranges and below)

For gauges with full scale ranges equal to, or less than 30 psi (2 bar), vacuum operation is limited to -5psi (-350 mbar) for operating temperatures above 30° C.

Over Pressure Protection:

Ranges from 15 psi to 500 psi:	3x input pressure range
1,000, 3,000, and 5,000 psi ranges:	2x input pressure range
10,000 psi:	1.5x input pressure range

Temperature Compensation

0°C to +50°C (32°F to +122°F) to rated accuracy

Standard Engineering Units

psi, bar, kg/cm², inH₂O (4°C, 20°C or 60°F), ftH₂O (4°C, 20°C or 60°F), cmH₂O (4 °C and 20 °C), mH₂O (4°C and 20°C), kPa, mbar, inHg, mmHg, Torr

One custom unit (user programmable)

Media Compatibility

Liquids and gases compatible with 316 stainless steel

Environmental

Operating Temperature -10 °C to +55 °C (14°F to 131°F)

Storage -20 °C to +70 °C (-4 °F to +158 °F)

Mechanical

Dimensions 4.5" (diameter) x 2.2" (depth) x 5" (height)

Pressure Connection: 1/4" NPT Male

Housing: Stainless steel, meets NEMA 4/IP65

Display

5-1/2 Digits, 0.65" (16.53 mm) high

20-Segment bar graph, 0 to 100%

Power

Battery three (3), size AA alkaline batteries, optional 24 VDC power.

Battery Life 1,500 hours without backlight

2,000 hours at slow sample rate

Low Battery Indicator icon is displayed near the end of battery life

Approvals

CE approved

6. Appendix 1: CP 440 Calibration Procedure

Overview

Calibration adjustment of the CP 440 is performed electronically via internal software with the case closed. There are no mechanical adjustments; all calibration commands and adjustments are done via the keypad, using the display to guide the user through the calibration process.

Eight calibration points are used in the adjustment program, working from full scale to zero at pressures equaling 100%, 87.5%, 75%, 62.5%, 50%, 37.5%, 25%, 12.5%, and 0% of full scale plus vacuum.

Note: This is an ambient temperature calibration, and should be performed at an ambient temperature of 23°C ± 3°C (72° F ± 5° F). Calibration outside this temperature range will invalidate the temperature compensation program in the CP 440.

Calibration Interval

You should check performance of the unit at the interval required by your calibration program. We recommend adjustment when measurement deviates by more than 75% of the specified accuracy, or 0.04%

Test Equipment

Verification and calibration of the CP 440 requires pressure and/or vacuum standards able to produce and indicate pressures from vacuum to the full-scale range of the unit under test. In order to maintain the specified accuracy of the CP 440, standards should have a TUR of 4:1 or better.

Connections:

The PI uses a 1/4 NPT male connection in the pressure input port. Various adapters may or may not be needed to connect to the pressure standard. Always make sure the hose, tubing, and fittings etc have a rated working pressure at or above the pressure of the unit. Also it is important that there be no leaks when performing calibration; use Teflon tape where appropriate.

Entering Calibration Mode:

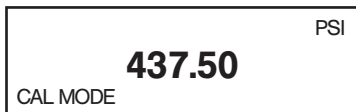
After you have made your connections, turn the power on while holding the CONFIG key. Use the arrow keys to enter the password. The password is 101. If you have entered calibration mode correctly the display should look as shown below. The pressure value displayed will be the full-scale value of the gauge.

Procedure:

Screens shown in this manual represent the displays shown with a 500 psi Gauge. The CP 440 will prompt the technician for the appropriate pressure at each calibration point.



Use the Pressure Standard to output 500.00 psi (100%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown in the illustration that follows.



Use the Pressure Standard to output 437.50 psi (87.5%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 375.00 psi (75%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 312.50 psi (62.5%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 250.00 psi (50%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 187.50 psi (37.5%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 125.00 psi (25%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 62.50 psi (12.5%). After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.



Use the Pressure Standard to output 0.00 psi. After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the screen should look as shown below.

	PSI
-12.00	
CAL MODE	

Use the Pressure Standard to output -12.00 psi. After the output has stabilized, press the ENTER key to continue. As the unit takes readings, the screen will show -----. When the readings are complete the unit will reset and power up in normal mode.

7. Available Ranges and Resolution by Engineering Unit

psi Range	15	30	100	300	500	1000	3000	5000	10000
Engineering Unit									
psi	15.000	30.000	100.00	300.00	500.00	1000.0	3000.0	5000.0	10000
bar	1.0342	2.0684	6.8947	20.684	34.474	68.947	206.84	344.74	689.47
mbar	1034.2	2068.4	6894.8	20684	34474	68948	NA	NA	NA
kPa	103.42	206.84	689.48	2068.4	3447.4	6894.8	20684	34474	68948
kg/cm ²	1.0546	2.1092	7.0307	21.092	35.153	70.307	210.92	351.53	703.07
cmH ₂ O@4°C	1054.6	2109.3	7030.9	21093	35154	70309	NA	NA	NA
cmH ₂ O@20°C	1056.5	2113.0	7043.4	21130	35217	70434	NA	NA	NA
mH ₂ O@4°C	10.546	21.093	70.309	210.93	351.54	703.09	2109.3	3515.4	7030.9
mH ₂ O@20°C	10.565	21.130	70.434	211.30	352.17	704.34	2113.0	3521.7	7043.4
inH ₂ O@4°C	415.21	830.42	2768.1	8304.2	13840	27681	83042	NA	NA
inH ₂ O@20°C	415.95	831.89	2773.0	8318.9	13865	27730	83189	NA	NA
inH ₂ O@60°F	415.61	831.23	2770.8	8312.3	13854	27708	83123	NA	NA
mmHg@0°C	775.73	1551.5	5171.5	15515	25858	51715	NA	NA	NA
inHg@0°C	30.540	61.081	203.60	610.81	1018.0	2036.0	6108.1	10180	20360
ftH ₂ O@4°C	34.601	69.202	230.67	692.02	1153.4	2306.7	6920.2	11534	23067
ftH ₂ O@20°C	34.662	69.324	231.08	693.24	1155.4	2310.8	6932.4	11554	23108
ftH ₂ O@60°F	34.634	69.269	230.90	692.69	1154.5	2309.0	6926.9	11545	23090
Torr	775.73	1551.5	5171.5	15515	25858	51715	NA	NA	NA

8. Warranty and Liability

Under the general terms and conditions of business, ecom instruments GmbH offers a 2-year warranty for function and materials on this product under the specified operating and maintenance conditions. Not covered are all wearing parts (e.g. batteries, sensors, displays, lamps, etc.) as well as calibrations.

This warranty does not extend to products that have been used improperly, altered, neglected, damaged by accident or subjected to abnormal operating conditions or improper handling. In the event of a warranty claim, the faulty device should be sent in. We reserve the right to readjust, repair or replace the unit.

The above warranty terms represent the sole rights of the purchaser to compensation and apply exclusively and in place of all other contractual or statutory warranty obligations. ecom instruments GmbH does not accept liability for specific, direct, indirect, incidental or consequential damages or losses, including the loss of data, regardless of whether they are caused by breach of warranty, lawful or unlawful actions, actions in good faith or other actions.

If in certain countries the restriction of statutory warranty and the exclusion or restriction of incidental or consequential damages is unlawful, then it may be possible that the above restrictions and exclusions do not apply for all purchasers. If any clause in these warranty terms should be found to be invalid or unenforceable by a competent court, then such a judgement shall not affect the validity or enforceability of any other clause contained in these warranty terms.



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