

GaugeCalXP™ PRESSURE COMPARATOR

10000 PSI-700 bar

Operator Instructions

Introduction

Thank you for purchasing a **GaugeCalXP™** Pressure Calibrator from Crystal Engineering. The **GaugeCalXP** is a self contained, precision hydraulic pressure generator intended for the calibration of pressure gauges rated up to 700 bar or 10,000 PSI.

Two pressure ports are provided. Connect a reference grade gauge on one port (we recommend an XP2i from Crystal Engineering) and the gauge to be tested on the second port. Rotate the handle clockwise until the desired pressure is generated. Then, compare the displayed pressure values between the reference gauge and the gauge under test.

Pressure can be set very quickly and precisely. Gauges can be calibrated in less than ten minutes (5 to 10 test points, increasing and decreasing pressure) if you follow the method outlined in this manual. The comparator can be filled with your choice of fluid: water, oil or isopropyl alcohol.

The **GaugeCalXP** is much, much faster to use than a deadweight tester, and it's also faster than most automated pressure controllers, but it costs much less than either. It's so quick and easy to use, it's ideal to calibrate those low cost gauges that are often overlooked for ISO9000 compliance. Please spend a few minutes to read this manual, and learn how you can get the most benefit from your **GaugeCalXP**.



Specifications

Performance

Maximum Pressure 10,000 PSI / 700 BAR
 Minimum Pressure..... 5 PSI / 0.5 BAR
 Burst Pressure >20,000 PSI / 1400 BAR

Materials

Ram/Adapters 316SS
 Body Aluminum
 Seals Buna N (Nitrile)
 Test Media. Water, Oil, or Isopropyl Alcohol

Dimensions

Width (of base) 175mm (6.88")
 Length (of base) 429mm (16.88")
 Length (overall)..... 495mm (19.50")
 Weight 6.4kg (14.2 lbs)

Accessories (included)

Adapters 1/4" and 1/2" NPT std.
 Wrenches 2

Shipping Information

Shipping Weight..... 8.6kg (19 lbs)
 Dimensions 559mm x 305mm x 229mm
 (22.0" x 12.0" x 9.0")

Operation

For safe and reliable operation of your **GaugeCalXP** Pressure Comparator, please spend a few minutes reading the following instructions.

1 Mount the comparator to your bench or table: At higher pressures the force required to rotate the handle may cause the base of the comparator to lift. We recommend that the comparator be bolted to your bench or table. Refer to **Figure 1** for the hole pattern and suggested bolt sizes.

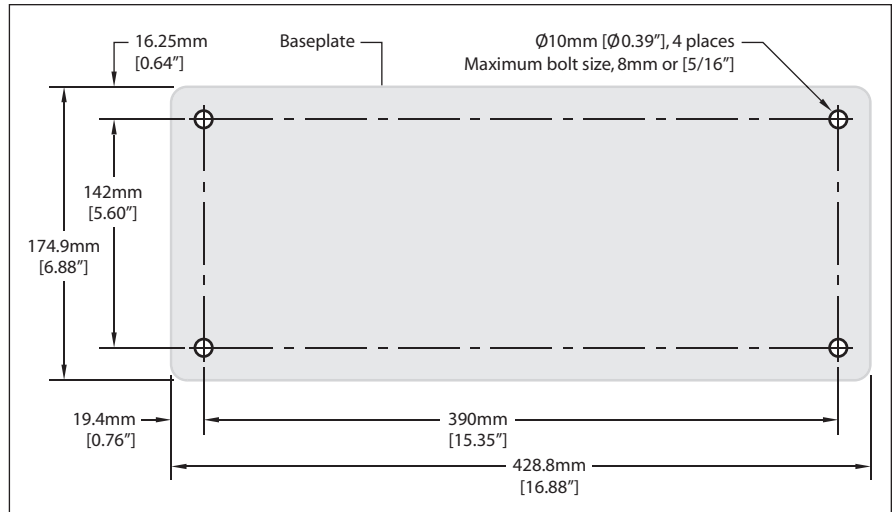


Figure 1. GaugeCalXP Pressure Comparator mounting hole pattern.

2 Install the flange stem or stem adapters:

There are two (2) stainless steel flange bases. Each base has a 1/4" female (tapered) NPT thread. These bases are intended to have either a flange stem (**Figure 2**) or stem adapter (**Figure 3**) for quick connectors installed. It is possible to install an XP2i reference gauge directly into the base, but this is practical if only one XP2i will be regularly used with the comparator.

One flange stem is supplied with the comparator, and installed into a base flange. If testing is limited to 5000 PSI (350 bar) or less, quick connect fittings that eliminate wrenches, thread tape or sealant, may be used. Use PTFE thread tape when installing either the flange stem(s) or the stem adapter(s) into the flange base(s).

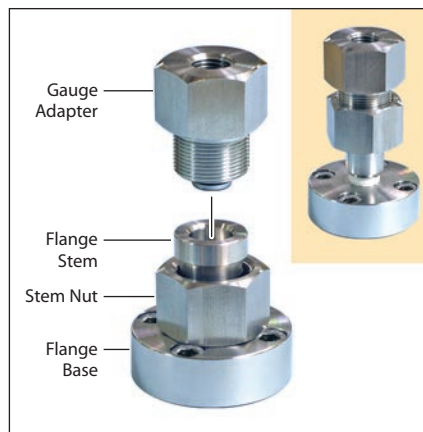


Figure 2. Two stainless steel gauge adapters are supplied with the GaugeCalXP Pressure Comparator.

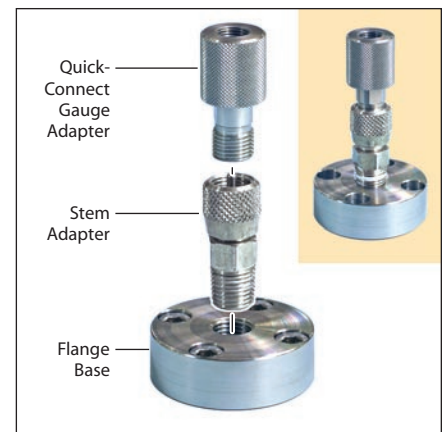


Figure 3. Optional quick-connect gauge adapters allow quick interchange of gauges without the need for sealing tape or wrenches.

3 Fill the reservoir: The reservoir holds the test fluid that fills the system each time you test a gauge. The test fluid can be either water, lightweight hydraulic oil, or isopropyl alcohol. Wind the handle fully counter-clockwise, then clockwise for at least 10 turns (this prevents fluid flow through the comparator and potential fluid spillage). Then fill the reservoir with test fluid to within 6mm (1/4") of the top. Turn the handle counter-clockwise until you see the fluid level in the reservoir drop. This fills the system with fluid and removes any trapped air bubbles. The reservoir cap has an o-ring to allow the GaugeCalXP to be transported with the test fluids in place. Due to the sealing capabilities of the cap, it must be removed or ajar during testing to allow proper equalization of the system.

4 Install the digital gauge: Use a ¼" female NPT gauge adapter (Figure 4). If you are using the flange stem, apply PTFE thread tape to the pressure gauge threads, then screw the gauge into the adapter (PN: 3116). Be sure to use wrenches on both the fitting AND the gauge when tightening the fitting.

CAUTION: Never use wrenches when connecting the gauge adapter to the stem adapter fitting—hand tight is sufficient to insure a leak free connection. The wrenches are intended to help separate the gauge adapter from the stem adapter fitting, if necessary.

If you are using the quick connect adapter (PN 3126), just screw it onto the gauge, finger tight, then onto the stem adapter, also finger tight.

Although wrench flats are provided on the quick connect adapter, these are intended only to help remove the adapter.

CAUTION: Never use a wrench to tighten a quick connect adapter.

5 Install the gauge to be tested: As with the digital gauge, choose the appropriate adapter, either the quick connect or regular gauge adapter (Figure 4).

6 Remove any remaining air from the system: Each time you install a new gauge, air bubbles may be introduced into the Comparator and cause problems with calibration. Check again that the reservoir is full, then turn the handle counter-clockwise until it stops at the full out position. If air bubbles are present in the system, the test fluid level in the reservoir will drop as it flows into the Comparator. If necessary, repeat this step until all trapped air has been removed. Another way to remove air bubbles is to tilt the comparator. Wind the handle fully counter-clockwise, then lift the back of the comparator. Any remaining bubbles will come out the back flange adapter.

7 Set up the digital pressure gauge: Turn on the XP2i, and then select the pressure units required for the gauge to be tested—kg/cm², bar, kPa, or PSI. (Refer to the documentation you received with your Crystal Engineering XP2i for detailed operating instructions.)

8 Start the test: We recommend that you exercise the gauges by applying the full scale pressure of the gauge being tested, one or more times. To apply pressure to the gauges, wind the handle in a clockwise direction. (To decrease pressure to the gauges, wind the handle in a counter-clockwise direction). After decreasing the pressure to zero, re-check the fluid level in the reservoir, and rezero the XP2i, if necessary. You will notice that the application of pressure is non-linear, therefore pressure increases at a more rapid rate at higher pressures.



Figure 4. The GaugeCalXP Pressure Comparator can be configured with an XP2i digital test gauge and a gauge to be tested, in either of the two ports.

Note: If you cannot generate the desired pressure it is because one of two reasons: Either the system has too much air in it, or the volume being pressurized is too large. Repeat step 6 to bleed the system and start again. If this does not solve the problem, the volume is too large, and an auxiliary hydraulic pump is required.

9 Compare pressure readings: Wind the handle clockwise on the comparator so that the needle on the gauge being tested is centered on the first major graduation mark (or first calibration point). These major marks are usually placed at 10% or 20% increments of the full scale of gauge being tested. Hold the pressure for 15 seconds, then compare the pressure on the gauge to be tested to the pressure displayed on the XP2i digital gauge, and record the reading on the XP2i (**Figure 5**).

Normally, pressure will drop at first, as each ascending pressure point is reached. This is due to the residual, trapped gas, first heated by compression, then cooled, so that the compressed gas is at the same temperature as the ambient environment. An equal and opposite effect happens when reducing pressure—the pressure will rise as each new lower pressure is achieved. Waiting for these thermal effects to stabilize can add a lot of time to the calibration.



Figure 5. Checking the accuracy of an analog pressure gauge against the display of the XP2i digital pressure gauge.

10 Quick test method: An alternative method eliminates the time required to wait for thermal pressure stability. Start by setting the XP2i into the Peak “Hi” mode and clearing any stored peak value. As above, increase pressure to the first major graduation on the gauge (or calibration point), but increase pressure slowly, so that you don’t overshoot the mark (or point). The pressure recorded on the XP2i will be the pressure that was applied when the gauge was on the mark—even if actual pressure drops. Just record the reading from the XP2i and continue to the next test point or mark. If you are also checking the gauge for hysteresis, the procedure is the same, except that you start at full scale and set the XP2i to indicate the Peak “Lo”, and then clear the peaks at full scale pressure. The XP2i will record the descending points in the same way.

Eliminating the time required to wait for thermal equilibrium, significantly shortens the amount of time it takes to calibrate a gauge.

Note: Below the rear gauge flange base of the Pressure Comparator are ports for an optional Fine Adjust accessory. The Fine Adjust can be mounted on either side of the manifold block at the rear of the comparator. While the Fine Adjust accessory is helpful for fine pressure adjustments, it is not necessary for general calibration. The Fine Adjust Kit (P/N 3205) can be ordered directly from Crystal Engineering.

Optional Accessories

Kit p/n Individual Component p/n

| GaugeCal ^{XP} Pressure Comparator | |
|--|---|
| 3205 | Fine Adjust Kit for GaugeCal ^{XP} ○ |
| 3143 | Rebuild Kit for GaugeCal ^{XP} |
| 3395 | Rolling Carry Case Kit for GaugeCal ^{XP} ○ |



Up to 10,000 PSI–700 bar

| | |
|------|--|
| 3134 | 1/8" Female NPT Gauge Adapter |
| 3116 | 1/4" Female NPT Gauge Adapter (included) ○ |
| 3117 | 1/2" Female NPT Gauge Adapter (included) |
| 3137 | 1/4" BSPP Gauge Adapter |
| 3135 | 1/2" BSPP Gauge Adapter |
| 3136 | 3/8" BSPP Gauge Adapter |



Up to 5,000 PSI–350 bar

| | |
|------|---|
| 3183 | NPT Quick-Connect Gauge Adapter Kit |
| 3125 | Quick-Connect 1/8" Female NPT Gauge Adapter |
| 3126 | Quick-Connect 1/4" Female NPT Gauge Adapter ○ |
| 3127 | Quick-Connect 1/2" Female NPT Gauge Adapter |
| 3254 | 1/4" Male NPT Stem Adapter ○ |
| 3188 | BSPP Quick-Connect Gauge Adapter Kit |
| 3254 | 1/4" Male NPT Stem Adapter ○ |
| 3184 | Quick-Connect 1/8" BSPP Gauge Adapter |
| 3185 | Quick-Connect 1/4" BSPP Gauge Adapter ○ |
| 3186 | Quick-Connect 3/8" BSPP Gauge Adapter |
| 3187 | Quick-Connect 1/2" BSPP Gauge Adapter |
| 1810 | PTFE Thread Tape, 6mm (1/4") wide |



Warranty

Crystal Engineering Corporation warrants the **GaugeCalXP** Pressure Comparator to be free from defects in material and workmanship under normal use and service for one (1) year from date of purchase to the original purchaser. It does not apply when the product has been misused, altered, or damaged by accident, or abnormal conditions of operation.

For in (or out) of warranty service, we can be reached at:

| | | | |
|------------|--------------------------------|------------------------|----------------|
| Phone..... | (805) 595-5477 | Phone (Toll Free)..... | (800) 444-1850 |
| Email..... | service@crystalengineering.net | FAX | (805) 595-5466 |
| Web..... | www.crystalengineering.net | | |

If calling, have ready the model number, serial number, date of purchase, and reason for return. You will receive instructions for returning the device to Crystal Engineering.

Crystal Engineering will, at our option, repair or replace the defective device free of charge, and the device will be returned, transportation prepaid. However, if we determine the failure was caused by misuse, alteration, accident, or abnormal condition of operation, you will be billed for the repair.

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