HDI *CementGage*

Cement Squeeze Manifold
Electronic Pressure Gauge

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Contents

1 Introduction

This manual provides information on operating and maintaining the 2300P electronic pressure gauge. The sections are organized as follows:

2: Description contains an overview of the 2300P.

3: Operation and Maintenance provides operating instructions, software functions, and configuration parameters.

Appendix A: Reference Data supplies reference and specification data.

2 Description

2.0 Overview

The 2300P is a battery powered electronic gauge that measures and displays pressure as both a digital number and as a circular analog bar graph trend indicator. It is intended for measuring manifold pressures in oil well cementing applications. The 2300P standard pressure range is 0 to 16,000 psi. Display resolution is +/- 10 psi with an accuracy of 0.5% of full scale over the temperature range of –10 to +80°C.

The 2300P contains a Guiberson type one-inch 17-4PH stainless steel fitting and a Titanium hammer on wing nut for connection to a pressure line.

All electronic components, including switches, are located inside the case. The Liquid Crystal Display (LCD) is protected from physical damage by a ¼ inch thick clear plastic lens. Removing the rear battery cap allows access to the foam cushioned battery pack and the battery pack power connector. Although designed to run continuously for more than 2 years, the battery connector can be unplugged to turn off power to the gauge.

Figure 1 is a description of the 2300P front panel.

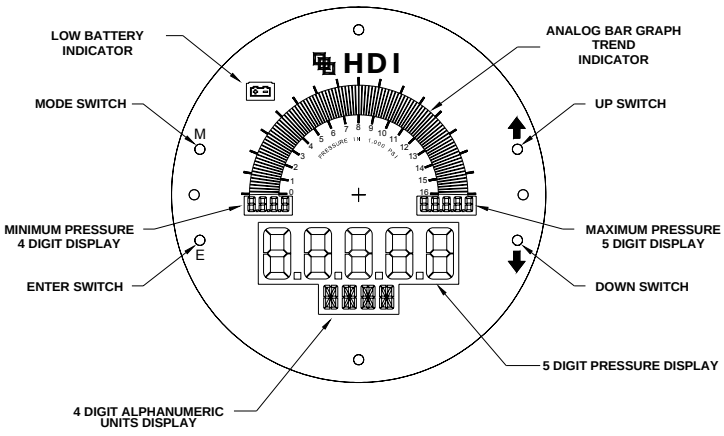


Figure 1 – Front Panel

2.1 Front Panel Access

Access to the front panel is obtained by unscrewing and removing the protective front cap. There are 6 displays and 4 control switches located on the front panel. The switches are recessed and require a toothpick or other small pointer to activate.

2.2 Analog meter simulation

Analog meter movement is simulated with a 101-segment analog bar graph trend indicator. The minimum pressure scale (small 4-digit display) and maximum pressure scale (small 5-digit display) located respectively at the bottom left and bottom right of the analog bar graph present the operating range of the meter.

2.3 Measurement Units

The units of measurement (such as PSIG) are presented by a 4-digit alphanumeric display located at the bottom of the display.

2.4 Digital Pressure Display

The digital pressure measurement is presented by a large 5-digit 7-segment display which is located just above the units of measurement.

2.5 Low Battery Indicator

A low battery indicator icon is located in the upper left corner of the front panel.

2.6 Control Switches

There are 4 control switches located on the front panel. The switches are identified as **M** (Mode), **E** (Enter), ▲ (Up), and ▼ (Down).

2.7 Major Components

Figure 2 is a side view of the gauge.

A 1/4-inch thick polycarbonate protective lens is located at the front of the gauge. This lens is designed to absorb shock and to prevent damage to the internal components.

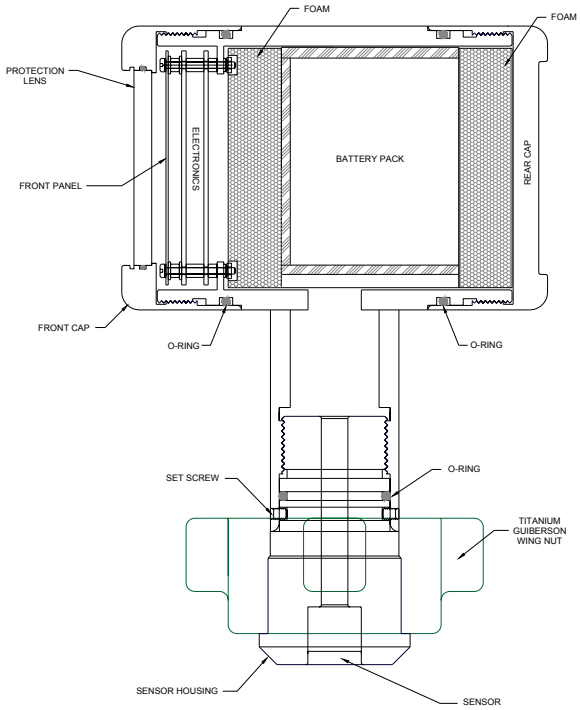


Figure 2 – SIDE VIEW

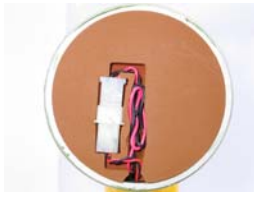
The front panel, display, and electronics assembly are located immediately behind the protective lens.

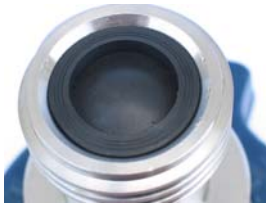
The battery pack is held in place with silicone foam and is accessible from the rear of the gauge.

O-Rings are used to protect the components inside the gauge from the outside atmosphere. These seals are located on the front and rear caps, the protective lens, and the sensor housing.

The sensor housing is attached to the pressure line with a One Inch Guiberson type Wing Nut and the primary diaphragm.

3 Operation And Maintenance





3.0 Installation

The 2300P gauge is supplied with a weatherproof, corrosion resistant carrying case.

The gauge weighs approximately 7.5 lbs (3.41 Kgs).

Check each gauge to be sure power is applied. To apply power, remove the rear cap, connect the battery pack to the power cable, and replace the rear cap. The gauge will operate continuously for 2 years on one standard battery pack. It is not necessary to disconnect battery power unless the gauge will be stored for a period of time greater than 30 days.

If cement is allowed to harden on the 2300P sensor, the sensor will be damaged and require replacement. HDI has provided two levels of protection for the sensor. A primary rubber protection diaphragm is installed at the one-inch fitting while a secondary rubber protection diaphragm is installed directly over the face of the sensor. Both diaphragms are replaceable. It is recommended that both diaphragms be replaced regularly after every 90 days of use. After each use, it is recommended that the diaphragms be thoroughly cleaned and the gauge be returned to its carrying case.

The 2300P is for use on a one-inch Guiberson type fitting. The gauge has a self-contained hammer on wing nut. The wing nut is constructed of Titanium, which has superior strength and corrosion resistance together with being very light weight.

3.1 Operation

The 2300P gauge will power up in the **Run** mode upon connecting the battery cable.

In the **Run** mode, the gauge will display the Engineering Units (PSIG), the measured pressure, and the analog bar trend graph.

In either the **Low** or **Hi Calibration** modes, the factory calibration settings can be changed.

The gauge will enter the **Low Calibration** mode by performing the following sequence:

a. Remove front cap.
b. Press and release the **M** button.
c. Press and release the **M** button a second time.
d. Now the units display will change to read **LCAL**, the pressure display will read **0**, and the bar graph will become inactive.
e. Loosen the hammer union wing nut so that zero pressure is applied to the sensor.

! CAUTION

Unless the transducer is replaced or the system fails, the Calibration mode should not be entered.

It is easy to alter the gauge operating characteristics in this mode leading to incorrect pressure measurement.

f. With zero psi applied, use the ▲ (Up) or ▼ (Down) button to adjust the zero set point, then press the **E** (Enter) button and the new zero psi point will be stored in memory. The gauge will return to normal display mode.

The gauge will enter the **High Calibration** mode by performing the following sequence:

a. Remove front cap.
b. Press and release the **M** button.
c. Press and release the **M** button a second time.
d. Press and release the **M** button a third time.
e. The units display will now read "HCAL", the pressure display will display the maximum psi set point (typically 16,000 psi), and the analog bar graph will be inactive. Pressurize the gauge to full scale (16,000 psi) pressure and use the ▲ (Up) or ▼ (Down) button to adjust the set point to maximum psi. Now press the **E** (Enter) button and the new maximum psi point will be stored in memory.

Install front and rear caps to return to service.

! CAUTION

After the customer performs the re-calibration described above, HDI will no longer guarantee the accuracy of the gauge.

Restoring Factory Calibration

The 2300P gauge has the capability to retrieve its factory settings for zero set point and maximum set point.

The gauge will retrieve its **Low** and **High Calibration** settings by performing the following sequence:

a. Remove front and rear caps.
b. Disconnect the battery.
c. Press and hold the **E** button while reconnecting the battery.
d. Once the gauge powers up, release the **E** button.

Factory settings have now been restored.

Install front and rear caps to return to service.

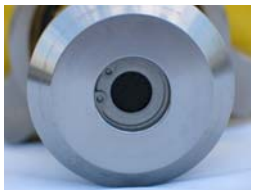
3.2 Maintenance

Cleaning The Protective Plastic Lens

The 2300P gauge front protection lens is manufactured from Lexan. Avoid contact with liquids such as adhesives, paints, solvents, benzene, gasoline, acetone, or carbon tetrachloride. The lens can be cleaned with lexan cleaner or dishwashing liquid.

Battery Replacement

Remove the rear cap using hand pressure or, if extra tight, using a strap wrench. The battery connector will then be visible and can be disconnected. Remove the rear foam vibration isolator and pull the HDI battery pack out the rear of the case. Replace with a new HDI battery pack. Replace the rear foam vibration isolator and reconnect the battery. Lubricate the rear cap threads with Lubriplate or similar type grease and replace.



Primary and Secondary Diaphragm Replacement

The secondary protection diaphragm should be replaced every 90 days. Remove the retaining ring and washer. Carefully remove the rubber diaphragm using a toothpick or similar device. Do not apply force to the sensor diaphragm. Install a new rubber diaphragm by carefully slipping it onto the sensor diaphragm. Replace the stainless steel washer and retaining ring. Replace the primary diaphragm as needed.

Front Protection Lens Replacement

The front protection lens will offer many years of carefree operation. There may be occasions when the lens becomes damaged. To replace the front lens, remove the front cap. Remove the spiral retaining ring that holds the lens in place. Push the lens out by pressing on the back side of the lens. Remove the o-ring.

Apply grease or dishwashing soap to the new o-ring and install it in the o-ring groove. Press the new lens into place. Install the new spiral retaining ring.

Appendix A: Reference Data

HDI

Replacement Parts - **HDI** *CementGage* - Model 2300P

Part No.	Description
KIT 1	Sensor Protection Primary Diaphragm
KIT 2	Sensor Protection Secondary Diaphragm Replacement Kit
KIT 3	Sensor Replacement Kit - 16,000 psi
KIT 4	Sensor Replacement Kit - 10,000 psi
KIT 5	Sensor Replacement Kit - 5,000 psi
FAB2300-M969-UNI-ON	Wing Nut - One Inch Guiberson Hammer Union - Titanium
KIT 6	Front Protection Lens Replacement Kit (Lens, O-Ring, Retainer)
KIT 7	Front Cap Kit (Front Cap, Lens, O-Rings, Retainer)
KIT 8	Rear Cap Kit (Rear Cap, S/N Tag, O-Rings)
KIT 9	Battery Pack Foam Replacement Kit
2300P43	HDI Battery Pack - 2 Year Life
2300P47	HDI Battery Pack - 3 Year Life
2300P48	HDI Battery Pack - 4 Year Life
KIT 10	Sensor Housing Replacement Kit (Hsng, O-Ring, Set Screws)
KIT 11	Case Replacement Kit (Case, O-Rings, Set Screws)
2300P16-K	Electronics Display Front Lens Kit - 16,000 psi
2300P10-K	Electronics Display Front Lens Kit - 10,000 psi
2300P5K	Electronics Display Front Lens Kit - 5,000 psi
KIT 12	Electronics Assy Kit (Lens, Display, Electronics, Mtg Hardware)

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