

# DPG-6600 Instruction Booklet

*The "Direct Drive Difference" in Digital*

## INTRODUCTION

The 3D Digital Pressure Gauge DPG-6600 is an electronic instrument designed for applications needing high accuracy, excellent long-term stability, trouble-free operation, high performance and long life. The gauge is easy to use; it requires no external electrical connections. It incorporates a large 0.75" four digit, 25 bar LCD display with a four key sealed membrane switch.

The integral pressure transducer is a high quality all stainless steel media-isolated sensor with no internal "O" rings, no silicone oil and no welds. The gauge is intended for use in the measurement of gases and liquids compatible with stainless steel.

The accuracy of the gauge is +/- 0.25% of full scale over a temperature of 0°C to 55°C (32°F to 131°F). Full operating temperature range is -40°C to 85°C (-40°F to 185°F).

The gauge is ideally suited to dynamic process and test applications with features such as an adjustable software filter to stabilize readings where the pressure is fluctuating. The pressure units are selectable and are displayed on the LCD. When a new unit is selected the gauge automatically converts the reading to match the units. A configurable bargraph gives the user a quick visual indication as to where the pressure is relative to low and high values. A maximum high and maximum low pressure reading detection shows the operator the pressure extremes that the process was exposed to. The gauge is powered from an internal "C" size 3.6 volt replaceable lithium cell combined with the latest in micro-controller technology for extremely long continuous battery life. To extend battery life even longer, a programmable power-on timer can be set from 0 to 720 minutes.

The enclosure is the standard 3D 4-1/2" 'Dyna-Mount' ABS case with a special swivel fitting and moveable flange. The gauge can be converted to front or back flange and bottom or back mount in the field with no more than a screwdriver. The digital pressure gauge accepts all of the optional accessories offered in the mechanical gauge line including the metallic GP-140 chemical seal, elastomeric isolator GP-400 and the 316 SS sintered filter RS-380-1 for particulate laden process medias.

And finally, the DPG-6600 is manufactured and serviced by the company that makes THE Premier Pressure Gauge on the market today. **Get The Direct Drive Difference in Digital Today!**



## OPERATING INSTRUCTIONS

The DPG-6600 series digital pressure gauge is shipped with the internal battery installed so that it is ready to use. Press any key and the gauge will power-up. A complete LCD segment test is performed followed by the full scale reading of the gauge in psi units. The gauge may be adjusted to local atmospheric condition using the ZERO/TARE function - see page 3. The full scale reading of the gauge in psi units can be displayed at any time by simultaneously pressing both arrow keys ▲ and ▼.

The DPG-6600 measures “gauge” pressure. “Gauge” pressure measures the input pressure referenced to ambient atmospheric pressure. The gauge will also read vacuum down to absolute zero. The vacuum readings will be displayed as minus in the chosen unit of measure.

Mount the gauge to a suitable flat surface using the flange and hardware supplied. Avoid mounting the gauge with the LCD display facing direct sunlight. The display temperature range is -40°F to +185°F. (-40°C to +85°C)

**NOTE:** Although flange mounting is suggested for high vibration applications, the flange does not have to be used to mount the gauge. Mounting the gauge using its process connection to a pipe is acceptable as long as excessive vibration is not experienced.

Attach the gauge to the pressure fitting using teflon tape or equivalent. Tighten the process connection by hand and continue to tighten 2 to 3 turns using a 9/16" wrench on the stem of the gauge. Do not use the gauge case to tighten pressure fitting.

### WARNINGS AND CAUTIONS:

To ensure safe and accurate operation please comply with the following warnings:

#### WARNINGS:

**HAZARDOUS AREA OPERATION** - The DPG-6600 series gauge is CSA-certified for CLASS I, DIVISION 1, GROUPS A, B, C and D areas intrinsically safe.

**SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.** To prevent ignition of a hazardous atmosphere, batteries must only be changed in an area known to be nonhazardous.

**SEVERE INJURY OR DAMAGE CAN OCCUR THROUGH IMPROPER USE OF PRESSURE INSTRUMENTS.** Do not exceed recommended pressure limits of transducer, tubing and fittings. Be certain all pressure connections are secured.

Deviation from these installation instructions may lead to improper operation of the monitored machine which could cause personal injury to operators or other nearby personnel.

#### CAUTION:

**THIS GAUGE CAN DISPLAY ZERO PRESSURE EVEN WITH UP TO 20% OF FULL SCALE PRESSURE APPLIED.** Do not rely on the display indication when disconnecting pressure - it may not be indicating true pressure.

## OPERATING INSTRUCTIONS

### ZERO / TARE

The zero function is used to “zero” the gauge to compensate for any ambient effects that cause an offset at zero pressure. The zero offset is limited to +/-2 psi to +/-10 psi depending on the range of the gauge. To “zero” the gauge, vent the pressure to the gauge to atmosphere (0 psig); press the SETUP key, the gauge will read “ZERO”, press ENTER and the gauge will be zeroed at the current pressure value.

The tare function can be used to offset the zero point of the gauge to any vacuum or positive gauge pressure from 0 to 20% of full range of the gauge. Both the under and over arrows will blink to indicate when tare is used. To access the tare function, press the SETUP key until the display reads “tare”, press ENTER and the gauge will be zeroed at the current pressure value. The tare offset can be canceled at any time by pressing SETUP and then the up or down arrow key then ENTER. The zero offset will return to the original zero reading. Note that offsetting the zero using the tare function can limit the range of the gauge. Using a 0-100 psi gauge as an example, if the tare function is exercised at 20 psi reading, the maximum pressure that can be displayed will be 110% of actual full scale (110 psi minus 20 psi offset = 90 psi displayed).

**CAUTION:** Before disconnecting the gauge from its pressure source make sure that the pressure is at zero psi by canceling the tare function as described above.

### OVER-PRESSURE CONDITIONS

The DPG-6600 series gauge has a displayed range of -14.5 psig (or equivalent) to 110% of gauge range. If these limits are exceeded, the low or high out of range arrows will be displayed and the reading will remain at the limit indicated above.

**NOTE:** If tare was used to offset zero, the max reading will be offset by the zero offset amount. For an explanation, see ZERO / TARE section above.

**IMPORTANT:** The internal pressure transducer in the gauge will withstand a maximum of 2 times the rated pressure without damage. Burst pressure is 5 times or 25,000 psi, whichever is less. If the overload rating is exceeded, failure may occur. Pressure fluctuations may not be displayed, especially if the filter value is set for high dampening. Pressure fluctuations occur in most systems; select the gauge range with a rating high enough to prevent overload by peak pressures of pulsations. It is recommended that a pressure snubber be used which will reduce the peak pressure applied to the gauge. The life of the gauge will be extended with the use of a snubber or pulsation dampener.

### SELECTING UNITS

A number of pressure units are available with the DPG-6600 series gauge; the most common ones are displayed on the LCD. To select a different unit press the SETUP key until the display reads “Unit”, use the ▲ or ▼ (up or down) arrow key to scroll through the displayed available units, select a unit and press ENTER. To configure the gauge for pressure units that are not on the display, select “SPEC” (special) and press ENTER. Using the flowchart on page 8 as a guide, configure the decimal point location and the low and high values. The low value will be the pressure value in the chosen units equivalent to -14.5 psig, and the high value will be the pressure value in the chosen units at 110% of gauge range. The zero and tare offsets are not adjustable when using the “special” configuration.

### MEASURING VACUUM

All ranges of the DPG-6600 can measure vacuum down to -14.5 psig or equivalent in another unit of measure. When measuring a pressure less than ambient barometric conditions, a minus (-) sign will be displayed.



## OPERATING INSTRUCTIONS

If the input goes below -14.5 psig, the display will read -14.5 (or equivalent) and the lower out of range arrow will be displayed. Accuracy of the vacuum readings are dependant on the span of the gauge – consult the Accuracy section on Page 10 for details.

### ADJUSTING THE DISPLAY FILTER

The display filter can be used to stabilize the display reading of a pulsating pressure input. The filter value is read-out from 1 to 255; 1 being minimum filter value, 255 being maximum filter value. Below are some typical filter values and their effect on the display reading. Settling values are approximate times in seconds to reach 90% of new reading. To set the filter value press the SETUP key until the display reads "FILT". Press the ENTER key and the display will read the previously set filter value. Use the ▲ or ▼ arrow key to increase or decrease the filter value and press ENTER to save the new filter value.

FILTER VALUE	1	64	96	128
SETTLING, SEC.	1	2	3	4
FILTER VALUE	160	200	210	220
SETTLING, SEC.	6	10	12	16
FILTER VALUE	230	240	245	250
SETTLING, SEC.	21	36	60	96

### LO / HI DETECTION

The DPG-6600 continuously records the lowest and highest filtered pressure applied to the gauge. To view the low and high values, press the SETUP key until the display reads "LO.HI" and press ENTER. The display will read the minimum low value recorded. Press ENTER to read the maximum high value recorded. The lower half of the bargraph will display to indicate the reading is the max low value and the upper half of the bargraph will display to indicate the reading is the max high value. These readings will remain stored if the gauge is powered down.

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### RESETTING RECORDED LO / HI VALUES

To clear the current values, display either the low or high value and press either the ▲ or ▼ arrow key; the display will show "Clrd" and the values will begin new low and high values.

### CONFIGURING THE BARGRAPH

The bargraph shows the gauge pressure in a graph form between two points. The bargraph can be configured to display pressure in different modes. To reach the bargraph menu, press the SETUP key until the display reads "bAr", the previous configuration will be displayed. To change the type of bargraph, press either the ▲ or ▼ arrow key to scroll between the different configurations. Upon selecting the desired bargraph type, press ENTER to save.

"On IIIIII" Bar mode between the two max points. When this mode is selected the low point will be 0 psig or equivalent and the bars will increase to 100% of range.

"On I | I" Single bar between the two max points. When this mode is selected the low point will be 0 psig or equivalent and a single bar will increase to 100% of range.

"On.HL IIIIII" Bar mode between two selected points. When this mode is selected press ENTER and adjust the low point to the desired value. Press ENTER and adjust the high point. The bars will increase from the low point to the high point.

## OPERATING INSTRUCTIONS

"On.HL I | I" Single bar between two selected points. When this mode is selected press ENTER and adjust the low point to the desired value. Press ENTER and adjust the high point. A single bar will increase from the low point to the high point.

"OFF" No bargraph displayed. When selected the bargraph will be off.

### POWER ON TIMER

When received, the power on timer is set to 60 minutes. The gauge will turn on with any key press and will remain on for 60 minutes without a key press. The power on timer, can be set anywhere between 1 and 720 minutes (12 hours). If "0" is entered, the gauge will remain on continuously. To change the timer, press the SETUP key until the display reads "POT", press the ENTER key and the current timer value will be displayed. Press the ▲ or ▼ arrow key to increase or decrease the on time; press ENTER to save.

### BATTERY - LOW INDICATION AND REPLACEMENT

The gauge is designed to give many years of service life with the supplied, high energy density, extra long life lithium battery. When the battery needs replacement, the display will alternate between the pressure reading and "L.BAT". At this time the gauge will continue to work properly. When the "L.BAT" indication displays continuously, the battery is exhausted and must be replaced. Use 1 "C" size 3.6 volt high energy lithium battery, Tadiran models TL-5920 or TL-2200 or Saft model LS26500 or equivalent. See page 12 for battery replacement instructions.

**NOTE:** DO NOT use a 1.5 volt "C" size battery. Such use will void the warranty.



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## CALIBRATION

If adjustment is required, we recommend returning the gauge to the factory.

Factory service offers many benefits. We have the facilities to provide calibration reports that include test data at a variety of temperatures utilizing NIST traceable standards. In addition, upgrades may be available to add or enhance operating features. We designed the product to last, and we support it so that you can get the most from your investment.

Although we prefer that you return the DPG-6600 to 3D instruments for calibration, ordinary adjustments may be performed by a qualified person with appropriate equipment.

The calibration standard used should have an accuracy of 0.05% of full scale or better.

**NOTE:** Be sure that the units of the calibrator match the units of the gauge before performing a calibration.

Calibration may be performed many times over the life of the gauge. Calibration can be performed from the front keypad without disassembling the gauge. To calibrate the gauge, use a dead weight tester or the 3D Star Calibrator as the calibration standard. **NOTE:** During calibration, the gauge allows 2 minutes between keystrokes to change or save a new calibration. If 2 minutes lapse without a keystroke, the gauge will automatically return to the normal mode without making any changes. The new calibration information is saved only if the ENTER key is pressed and the gauge reads "SAVE/donE".

**CALIBRATION PROCEDURE** - To calibrate the gauge, press and hold the ▲ arrow key and press the SETUP key until the display reads "CAL", press ENTER; the display will read "CAL.L" for the low or zero calibration value. Adjust the standard

for a reading at zero and press ENTER. After the "bar" timer expires, use the ▲ or ▼ arrow key to increase or decrease the display reading to match the reading of the standard and press ENTER; the display will read "CAL.H" for the high or span calibration value. Adjust the standard for a reading at or near full scale and press ENTER. After the bar timer expires, use the ▲ or ▼ arrow key to increase or decrease the display reading to match the standard and press ENTER. The display will read "SAVE/donE" and return to the normal reading with the new calibration values stored in permanent memory.

The DPG-6600 gauge has a feature that allows a slight adjustment of either the zero or span values individually. This type of calibration can be used to "tweak" the readout to match that of a known value without actually performing a formal calibration procedure.

**NOTE:** This type of adjustment will invalidate calibration settings resulting from the procedures in the above section.

**ZERO ADJUSTMENT ONLY** - To make a small adjustment on the zero calibration value of the gauge, enter the calibration mode, the display reads "CAL", press ENTER; the display will read "CAL.L" for the low or zero calibration value. Adjust the standard for a reading at zero and press ENTER. After the "bar" timer expires, use the ▲ or ▼ arrow key to increase or decrease the display reading to match the reading of the standard and press ENTER. The display will read "CAL.H"; press the SETUP key and the display will read "SAVE/donE" and will return to the normal reading with the new zero calibration value stored in permanent memory.

## CALIBRATION

**SPAN ADJUSTMENT ONLY** - To make a small adjustment on the span point of the gauge, enter the calibration mode, the display reads "CAL", press ENTER; the display will read "CAL.L". Press the SETUP key and the display will read "CAL.H" for the high or span calibration value. With the standard at the desired span value press ENTER and after the "bar" timer expires use the ▲ or ▼ arrow key to increase or decrease the display reading to match the standard and press ENTER. The display will read "SAVE/donE" and will return to the normal reading with the new span calibration value stored in permanent memory.

**SELECTING THE DEFAULT CALIBRATION** - The user can at any time during the life of the gauge return to the factory calibration values. Press and hold the ▲ arrow key and press the SETUP key until the display reads "CAL", now press the SETUP key until the gauge reads "dFLt". Press ENTER and the factory calibration values will be recalled and used for the calibration of the gauge.

## DPG-6600 PART NUMBERING SYSTEM

For the 4½" black ABS plastic case configuration, the product part number for the various pressure ranges are as follows:

### 66544-xxB71

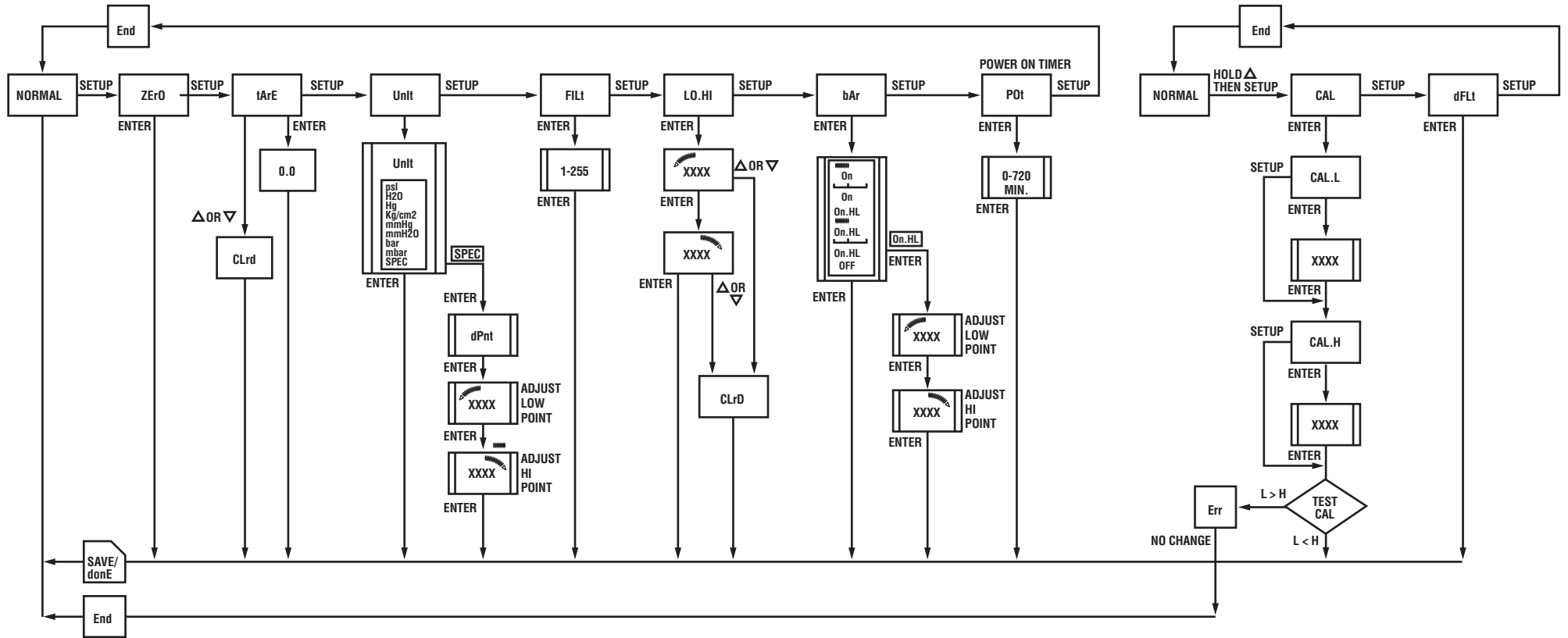
<u>Pressure Range</u>	<u>Code (xx)</u>
50 psig	18
100 psig	23
200 psig	25
500 psig	27
1000 psig	29
2500 psig	47
5000 psig	35
10,000 psig	38

300 Series SS case available. Consult 3D Instruments for details.



# FLOWCHART BATTERY DIGITAL

# DPG-6600 POWERED GAUGE



FLOWCHART KEY | 

psi
xxxx

 Δ DOUBLE BARS- USE UP AND DOWN ARROW KEYS TO SCROLL | 

psi
H2O
Hg
Kg/cm2
mmHg
mmH2O
bar
mbar
SPEC

 DASHED LINES- MAKE SELECTION

PRESS BOTH Δ AND ∇ TOGETHER TO DISPLAY THE FULL SCALE READING OF THE GAUGE.



## SPECIFICATIONS

### ACCURACIES

0 to Full Scale +/- 0.25% of Full Scale  
 Vacuum 0 -100 psig and below:  
 +/- .3 psig; 200 -  
 1000 psig: +/- 1 psig;  
 2500 psig and above:  
 unrated.

**NOTE:** Accuracy specs are for one year and include all effects of linearity, hysteresis, repeatability and temperature, within the specified temperature compensated range.

Exposure to environmental extremes of temperature, shock or vibration may warrant a more frequent re-certification period.

### MEDIA COMPATIBILITY

Liquids and gases compatible with 316 Stainless Steel.

### POWER

Battery 1 each 3.6 volt lithium "C" cell, Tadiran model TL-5920 (8.5 Ah), Tadiran model TL-2200 (7.2 Ah) or Saft model LS26500 (7.3 Ah) or equivalent.

**NOTE:** Do NOT use a 1.5 volt "C" size battery.

Battery Life 5 years of continuous operation.

Low Battery Indicator Two indicators -  
**1st:** alternating reading of pressure and L.Bat  
**2nd:** a continuous reading of L.Bat

### DISPLAY UPDATE RATE

1 update per second nominal

### PRESSURE FITTING

1/4" male NPT – 316SS

### ENCLOSURE

Case ABS or optional  
 300 Series SS  
 Hardware Stainless Steel  
 Dimensions Refer to Page 13  
 Weight 514 g (18oz)  
 including battery

### TEMPERATURE

Temperature Compensated Range:  
 0°C to 55°C (32°F to 131°F)  
 Overall Operating Range:  
 -40°C to 85°C (-40°F to 185°F)  
 Storage Range:  
 -40°C to 85°C (-40°F to 185°F)

### HUMIDITY

Temperature Range Humidity  
 0 to 10°C Uncontrolled  
 10 to 30°C 0 to 95° Relative  
 30 to 40°C 0 to 75° Relative  
 40 to 50°C 0 to 45° Relative

### REPLACEMENT PARTS

User replaceable battery - see Page 12.

## SPECIFICATIONS

### PRESSURE CONVERSIONS

1 psi = 27.6806 inches of water column  
 (water at 4°C [39.2°F])  
 1 psi = 2.03602 inches of mercury  
 (mercury at 0°C [32°F])  
 1 psi = 6.8948 kilopascals  
 1 psi = 51.7149 millimeters of mercury  
 (mercury at 0°C [32°F])  
 1 psi = 703.087 millimeters of water  
 column (water at 4°C [39.2°F])  
 1 psi = 0.068948 bar  
 1 psi = 68.948 millibar  
 1 psi = 0.070307 kilograms per square  
 centimeter

### OPTIONS & ACCESSORIES

NIST Certificate of Conformance  
 (standard)

### OPTIONS & ACCESSORIES (Con't)

**GC01:** Calibration Certificate Level #1 - 10 readings done in descending pressure at room temperature  
**GC02:** Calibration Certificate Level #2 - 13 readings in both ascending and descending pressures at room temperature  
**GC03:** Calibration Certificate Level #3 - 13 readings in both ascending and descending pressures done at three distinct temperatures...typically: 22°C, 5°C and 45°C.  
 P/N 8110-300 (Pneumatic Handpump: 0 to 300 psi)  
 P/N 8111-300 (Duplex Handpump: -13.7 to 300 psi)  
 P/N 8112-3000 (Hydraulic Handpump: 0 to 3000 psi)  
 P/N RS380-1 (Stainless Steel Filter)  
 P/N GP140KT-B/X (Metallic Diaphragm Seal)  
 GP1007 Sanitary 1 1/2" Ladish Tri-clamp  
 GP1002 Sanitary 2" Ladish Tri-clamp  
 P/N 2230-0003 3.6 VDC Lithium Cell

## PRESSURE RANGE/DISPLAY RESOLUTION CHART

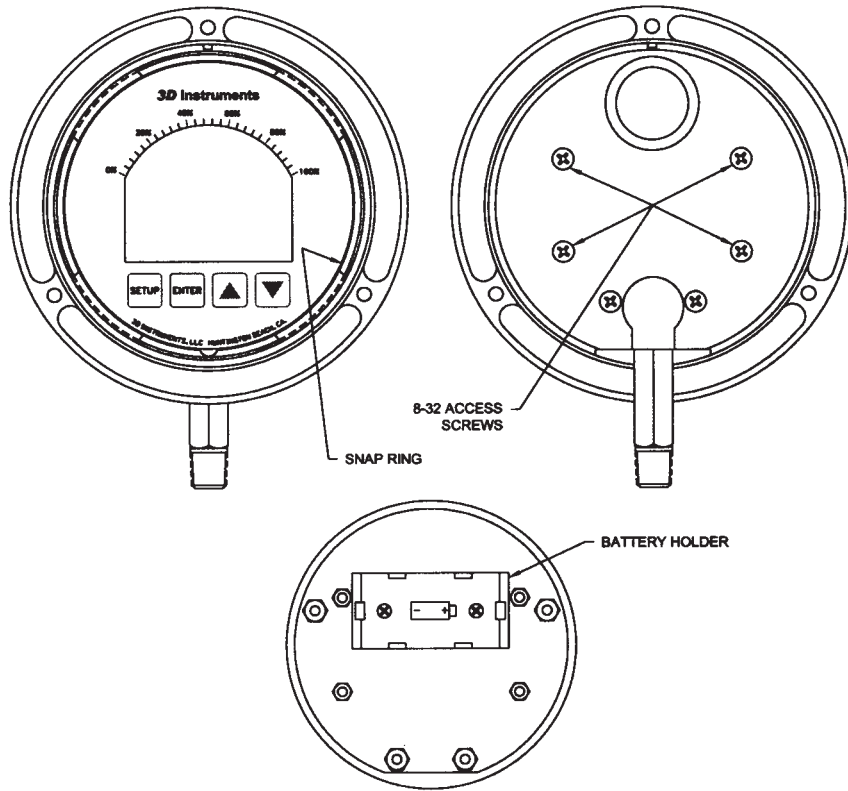
Available Pressure Ranges & Display Resolution									
Pressure Range	Max Over Pressure	Display Resolution							
		Available Units							
psig	psig	psig	In H <sub>2</sub> O	In Hg	mm H <sub>2</sub> O	mm Hg	bar	mbar	Kg/cm <sup>2</sup>
-14.5 – 50	100	0.1	1	0.1	1	1	0.001	1	0.001
-14.5 – 100	200	0.1	1	0.1	1	1	0.01	1	0.01
-14.5 – 200	400	0.1	1	1	1	1	0.01	1	0.01
-14 – 500	1,000	1	1	1	—	1	0.01	1	0.01
-14 – 1,000	2,000	1	1	1	—	1	0.1	1	0.1
0 – 2,500	5,000	1	—	1	—	—	0.1	—	0.1
0 – 5,000	10,000	1	—	1	—	—	0.1	—	0.1
0 – 10,000	20,000	1	—	1	—	—	1	—	1

#### Notes:

1. Measured pressure range is -14.5 to 110% of Full Scale for pressure ranges 200 psi and below and -14 to 110% of Full Scale for pressure ranges from 200-1000 psi.
2. Burst pressure is 5X or 25,000 psi, whichever is less.
3. Display maximum is 9999 regardless of engineering unit.



## BATTERY REPLACEMENT

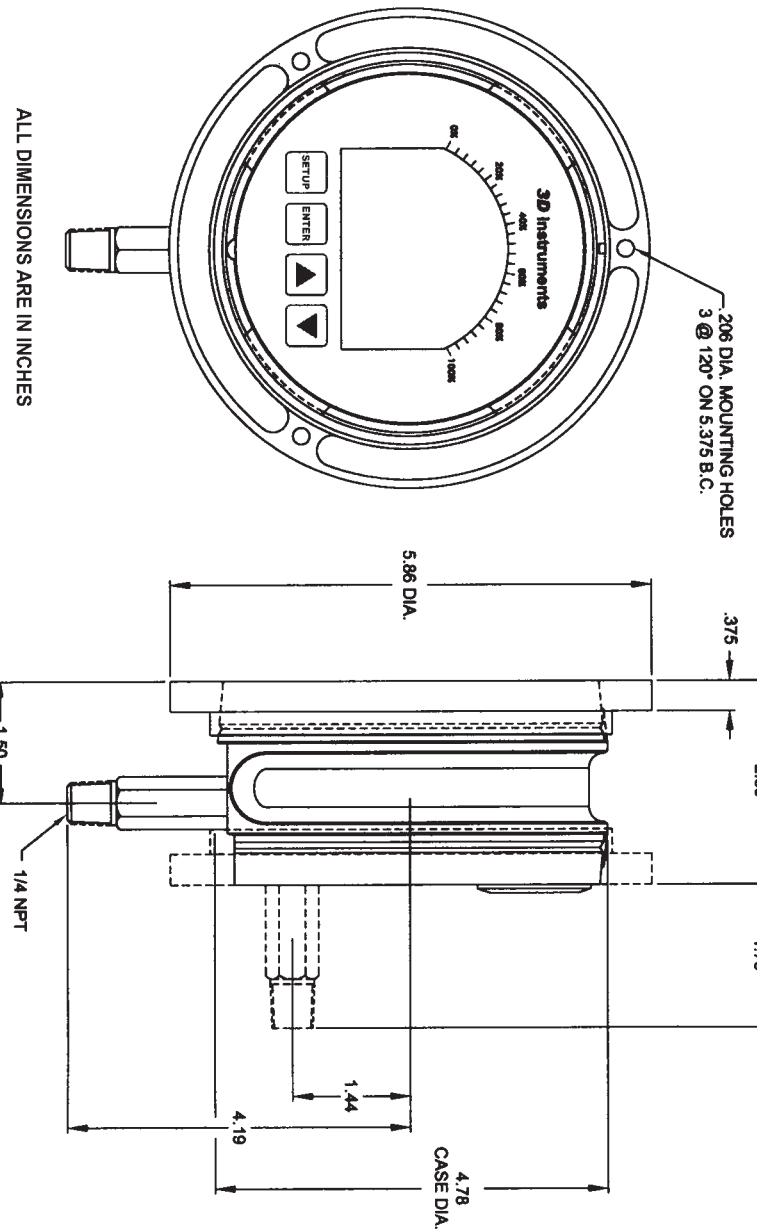


**WARNING:** TO PREVENT IGNITION OF A HAZARDOUS ATMOSPHERE, BATTERIES MUST ONLY BE CHANGED IN AN AREA KNOWN TO BE NONHAZARDOUS.

Use 1 "C" size 3.6 volt high energy lithium battery, Tadiran models TL-5920 or TL-2200 or Saft model LS26500 or equivalent.

**NOTE: DO NOT** use a 1.5 volt "C" size battery.

1. Remove the four access screws on the back of the gauge as shown.
2. Remove snap ring from the front of the gauge.
3. Carefully separate the front of the gauge from the back housing.
4. Install battery as indicated on battery holder.



DIMENSIONAL DRAWING



## WARRANTY

3D Instruments, LP warrants the DPG-6600 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 to batteries or when the product has been misused, altered or damaged by accident or abnormal conditions of operation.

Within one (1) year from date of purchase, 3D Instruments will, at our option, repair or replace a 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.

**3D INSTRUMENTS, LP MAKES NO WARRANTY OTHER THAN THE LIMITED WARRANTY STATED ABOVE. ALL WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, ARE LIMITED TO A PERIOD OF ONE (1) YEAR FROM THE DATE OF PURCHASE. 3D INSTRUMENTS, LLC SHALL NOT BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, WHETHER IN CONTRACT, TORT OR OTHERWISE.**

**For warranty or non-warranty service, we can be reached at:**

Phone.....714•399•9200

Email .....info@3dinstruments.com

Address .....3D Instruments, LP  
Attn: Accu-Cal Plus Service Department  
2900 E. White Star Avenue  
Anaheim, CA 92806  
U.S.A.

Web.....www.3dinstruments.com

Return Authorization is not required for servicing. Please return, Freight Prepaid, to the address above and include a Contact Name, Address, Phone and Fax Number. If you wish to be notified of the charges before any service is done, 3D Instruments will contact you after evaluating the unit. Units evaluated but not serviced are subject to an evaluation charge. Defective units need to be returned to 3D Instruments, LP within 90 days of identification of a problem.

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*The "Direct Drive Difference" in Digital*

