

DPG409 Series High Accuracy Digital Pressure Gauge



User's Guide



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

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NOTES:

Section 1 - Introduction

Please read this manual completely before installing and operating your instrument. It's important to read and follow all notes, cautions, warnings and safety precautions before setting up, installing and operating this unit.

1.1 Precautions

- This device has not been designed, tested or approved for use in any medical or nuclear applications.
- Never operate this device in flammable or explosive environments.
- Never operate with a power source other than the one recommended in this manual.
- Never operate this device outside of the recommended use outlined in this manual.

For models with wireless transmitter option

- No co-location with other radio transmitters is allowed. By definition, co-location is when another radio device or it's antenna is located within 20 cm of your unit and can transmit simultaneously with your unit.
- Never install a wireless unit within 20 cm or less from each other.
- Never install and /or continuously operate your wireless unit closer than 20 cm to nearby persons.
- Never use your wireless unit as a portable device. Your unit has been designed to be operated in a permanent installation only.

NOTE:

There are no user serviceable parts inside your device. Attempting to repair or service your unit may void your warranty.

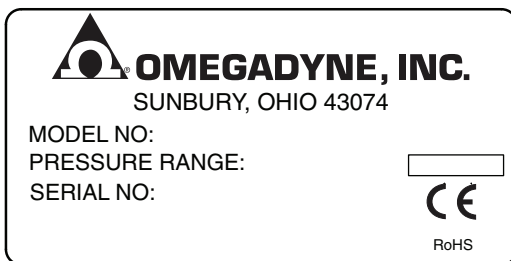


Figure 1-1. Pressure Sensor Label

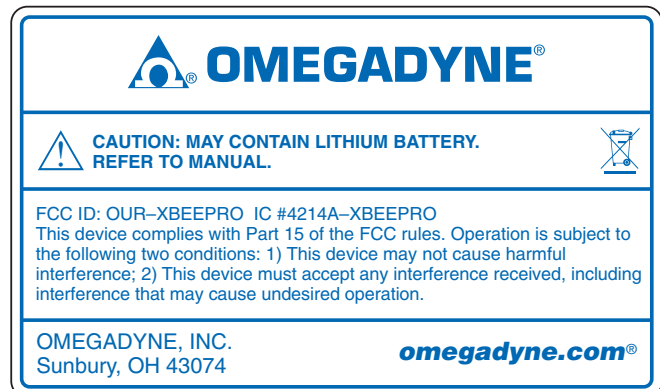


Figure 1-2. Rear Label Wireless

1.2 Statement on FCC and CE Marking

FCC Marking

FCC ID: OUR-XBEEPRO IC #4214A-XBEEPRO

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1.) This device may not cause harmful interference. 2.) This device must accept any interference received, including interference that may cause undesired operation.

CE Marking

It is the policy of OMEGA to comply with all worldwide safety and EMI/EMC regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

1.3 General Description

Omega's DPG409 Series Digital Pressure Gauges incorporate a rugged, 316 Stainless Steel enclosures that are designed specifically for wash-down, sanitary and marine applications. The large backlit LCD display features 1" high digits that make reading at distances up to 35 feet easy. Models are available with integral standard or sanitary pressure sensors that incorporate highly stable silicon wafer technology which is micro-machined to precision tolerances and then has strain gages molecularly embedded.

Standard features include: internal battery, external DC power supply operation, analog output and user programmable alarms. The wireless transmitter option allows for remote monitoring, chart recording and data logging. A variety of user-configurable options and settings include: update rate, units, and backlight.

1.4 DPG409 Models

The DPG409 Series digital pressure gauges are available for a large variation of pressure ranges. The DPG409 Series also has separate models that measure gage pressure and absolute pressure. Below is an outline of the available DPG409 models.

Gage Pressure Models		
Model Number	Range	
	psi	bar
DPG409-10WG	10 in H2O	25 mbar
DPG409-001G	1	69 mbar
DPG409-2.5G	2.5	172 mbar
DPG409-005G	5	345 mbar
DPG409-015G	15	1
DPG409-030G	30	2.1
DPG409-050G	50	3.4
DPG409-100G	100	6.9
DPG409-150G	150	10.3
DPG409-250G	250	17.2
DPG409-500G	500	34.5
DPG409-750G	750	51.7
DPG409-1KG	1000	69
DPG409-1.5KG	1500	103
DPG409-2.5KG	2500	172
DPG409-3.5KG	3500	241
DPG409-5.0KG	5000	345

1.4 DPG409 Models (continued)

Absolute Pressure Models		
Model Number	Range	
	psi	bar
DPG409-005A	5	345 mbar
DPG409-015A	15	1
DPG409-030A	30	2.1
DPG409-050A	50	3.4
DPG409-100A	100	6.9
DPG409-150A	150	10.3
DPG409-250A	250	17.2
DPG409-500A	500	34.5
DPG409-750A	750	51.7
DPG409-1KA	1000	69

Vacuum (Negative Gage) Pressure Models		
Model Number	Range	
	psi	bar
DPG409-10WV	10.00 inH ₂ O	25.00 mbar
DPG409-001V	1.000	69.00 mbar
DPG409-2.5V	2.500	172.0 mbar
DPG409-005V	5.000	350.0 mbar
DPG409-015V	15.00	1.000

Barometric Pressure (Absolute Pressure) Models		
Model Number	Range	
	psi	bar
DPG409-32B	0 to 32.00 inHg	-
DPG409-16B	16.00 to 32.00 inHg	-
DPG409-26B	26.00 to 32.00 inHg	-
DPG409-32HB	-	0 to 1100 hPa
DPG409-16HB	-	550.0 to 1100 hPa
DPG409-26HB	-	880.0 to 1100 hPa

Compound Gage Pressure Models

Model Number	Range	
	psi	bar
DPG409-10WCG	±10.00 inH ₂ O	±25.00 mbar
DPG409-001CG	±1.000	±69.00 mbar
DPG409-2.5CG	±2.500	±172.0 mbar
DPG409-005CG	±5.000	±345.0 mbar
DPG409-015CG	±15.00	±1

1.5 DPGM409 Models

The DPG409 Series digital pressure gauges are also offered with metric fittings, under DPGM409 part numbers. Below is an outline of the available ranges of DPGM409 models.

Gage Pressure Models

Model Number	Range
DPGM409-025HG	0 to 25.00 mbar (hPa)
DPGM409-070HG	0 to 70.00 mbar (hPa)
DPGM409-170HG	0 to 170.0 mbar (hPa)
DPGM409-350HG	0 to 350.0 mbar (hPa)
DPGM409-001BG	0 to 1.000 bar
DPGM409-002BG	0 to 2.000 bar
DPGM409-004BG	0 to 3.500 bar
DPGM409-007BG	0 to 7.000 bar
DPGM409-010BG	0 to 10.00 bar
DPGM409-017BG	0 to 17.50 bar
DPGM409-035BG	0 to 35.00 bar
DPGM409-050BG	0 to 50.00 bar
DPGM409-070BG	0 to 70.00 bar
DPGM409-100BG	0 to 100.0 bar
DPGM409-175BG	0 to 175.0 bar
DPGM409-245BG	0 to 245.0 bar
DPGM409-350BG	0 to 350.0 bar

Absolute Pressure Models

Model Number	Range
DPGM409-350HA	0 to 350.0 mbar (hPa)
DPGM409-001BA	0 to 1.000 bar
DPGM409-002BA	0 to 2.000 bar
DPGM409-004BA	0 to 3.500 bar
DPGM409-007BA	0 to 7.000 bar
DPGM409-010BA	0 to 10.00 bar
DPGM409-017BA	0 to 17.50 bar
DPGM409-035BA	0 to 35.00 bar
DPGM409-050BA	0 to 50.00 bar
DPGM409-070BA	0 to 70.00 bar

Vacuum (Negative Gage) Pressure Models

Model Number	Range
DPGM409-025HV	0 to -25.00 mbar (hPa)
DPGM409-070HV	0 to -70.00 mbar (hPa)
DPGM409-170HV	0 to -170.0 mbar (hPa)
DPGM409-350HV	0 to -350.0 mbar (hPa)
DPGM409-001BV	0 to -1.000 bar

Barometric Pressure (Absolute Pressure) Models

Model Number	Range
DPGM409-1100HB	0 to 1100 hPa
DPGM409-550HB	550 to 1100 hPa
DPGM409-880HB	880 to 1100 hPa

Compound Gage Pressure Models

Model Number	Range
DPGM409-025HCG	±25.00 mbar (hPa)
DPGM409-070HCG	±70.00 mbar (hPa)
DPGM409-170HCG	±170.0 mbar (hPa)
DPGM409-350HCG	±350.0 mbar (hPa)
DPGM409-001BCG	±1.000 bar

1.6 DPG409 Sanitary Models

The DPG409 Series also offers sanitary / clean-in-place digital pressure gauges. Below is an outline of the available ranges of DPG409 sanitary models.

Gage Pressure Models		
Model Number	Range	
	psi	bar
DPG409S[*]-10WG	0 to 10 inH ₂ O	0 to 25 mbar
DPG409S[*]-001G	0 to 1	0 to 69 mbar
DPG409S[*]-2.5G	0 to 2.5	0 to 172 mbar
DPG409S[*]-005G	0 to 5	0 to 345 mbar
DPG409S[*]-015G	0 to 15	0 to 1
DPG409S[*]-030G	0 to 30	0 to 2
DPG409S[*]-050G	0 to 50	0 to 3.5
DPG409S[*]-100G	0 to 100	0 to 7
DPG409S[*]-150G	0 to 150	0 to 10
DPG409S[*]-250G	0 to 250	0 to 17.5
DPG409S[*]-500G	0 to 500	0 to 35
DPG409S[*]-600G	0 to 600	0 to 41

NOTE:

[*] indicates the sanitary fitting size: 15 for 1.5 inch Tri-Grip™; 20 for 2.0 inch Tri-Grip™

Absolute Pressure Models

Model Number	Range	
	psi	bar
DPG409S[*]-005A	0 to 5	0 to 350 mbar
DPG409S[*]-015A	0 to 15	0 to 1
DPG409S[*]-030A	0 to 30	0 to 2
DPG409S[*]-050A	0 to 50	0 to 3.5
DPG409S[*]-100A	0 to 100	0 to 7
DPG409S[*]-150A	0 to 150	0 to 10
DPG409S[*]-250A	0 to 250	0 to 17.5
DPG409S[*]-500A	0 to 500	0 to 35
DPG409S[*]-600A	0 to 600	0 to 41

NOTE:

[*] indicates the sanitary fitting size: 15 for 1.5 inch Tri-Grip™; 20 for 2.0 inch Tri-Grip™

Vacuum (Negative Gage) Pressure Models

Model Number	Range	
	psi	bar
DPG409S[*]-10WV	0 to -10 inH ₂ O	0 to -25 mbar
DPG409S[*]-001V	0 to -1	0 to -69 mbar
DPG409S[*]-2.5V	0 to -2.5	0 to -172 mbar
DPG409S[*]-005V	0 to -5	0 to -345 mbar
DPG409S[*]-015V	0 to -15	0 to -1 bar

NOTE:

[*] indicates the sanitary fitting size: 15 for 1.5 inch Tri-Grip™; 20 for 2.0 inch Tri-Grip™

Compound Gage Pressure Models

Model Number	Range	
	psi	bar
DPG409S[*]-10WCG	± 10 inH ₂ O	± 25 mbar
DPG409S[*]-001CG	± 1	± 69 mbar
DPG409S[*]-2.5CG	± 2.5	± 172 mbar
DPG409S[*]-005CG	± 5	± 345 mbar
DPG409S[*]-015CG	± 15	± 1000 mbar

NOTE:

[*] indicates the sanitary fitting size: 15 for 1.5 inch Tri-Grip™; 20 for 2.0 inch Tri-Grip™

Barometric Pressure Models

Model Number	Range	
	psi	bar
DPG409S[*]-32B	0 to 32 inHg	
DPG409S[*]-16B	16 to 32 inHg	
DPG409S[*]-26B	26 to 32 inHg	
DPG409S[*]-32HB		0 to 1100 hPa
DPG409S[*]-16HB		550 to 1100 hPa
DPG409S[*]-26HB		880 to 1100 hPa

NOTE:

[*] indicates the sanitary fitting size: 15 for 1.5 inch Tri-Grip™; 20 for 2.0 inch Tri-Grip™

1.7 DPG409 Differential Pressure Models

The DPG409 Series also offers digital gauges that measure differential pressure. Below is an outline of the available ranges of DPG409 differential pressure models.

Wet/Wet Uni-Directional Differential Pressure Models		
Model No. (1/4NPT Male Thread)	Range	
	psi	bar
DPG409-10WDWU	0 to 10.00 inH ₂ O	0 to 25 mbar
DPG409-001DWU	0 to 1.000 psi	0 to 69 mbar
DPG409-2.5DWU	0 to 2.500	0 to 172 mbar
DPG409-005DWU	0 to 5.000	0 to 345 mbar
DPG409-015DWU	0 to 15.00	0 to 1
DPG409-030DWU	0 to 30.00	0 to 2
DPG409-050DWU	0 to 50.00	0 to 3.5
DPG409-100DWU	0 to 100.0	0 to 7
DPG409-150DWU	0 to 150.0	0 to 10
DPG409-250DWU	0 to 250.0	0 to 17.5
DPG409-500DWU	0 to 500.0	0 to 35
DPG409-750DWU	0 to 750.0	0 to 50
DPG409-1KDWU	0 to 1000	0 to 70

NOTE:

Appending a "-W" to the model number indicates a wireless version.

Section 2 – Hardware

It is important that you read this manual completely and follow all safety precautions before operating this instrument.

2.1 Unpacking & Inspection

Remove the packing list and verify that you have received all your equipment. If you have any questions about the shipment, please call our Customer Service Department at 1-800-622-2378 or 203-359-1660. We can also be reached on the Internet at www.omega.com, e-mail: cservice@omega.com. When you receive the shipment, inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE:

The carrier will not honor any damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

2.2 Included Items

The following items are supplied in the box.

- 1 DPG409 / DPGM409 Digital Pressure Gauge Assembly
- 1 User's Guide
- 1 USB Programming Cable
- 1 Digital Gauge Configuration Disc
- 1 Wireless Software Disc (Wireless Model Only)
- 1 Analog Output Cable (9 ft.)
- 2 Ferrite Cores
- Lithium Batteries
(1 for Standard Model, 2 for Wireless Model)
(Omega Replacement Part No. BATT-C-3V)
- Wireless Antenna (Wireless Model Only)
- Antenna Housing (Wireless Model Only)

Section 3 – Setup & Configuration

3.1 Getting Started

This section outlines how to setup and configure your DPG409 Pressure Gauge before installation and use. All configuration settings are set and saved into your meter by connecting the included USB programming cable and running the software utility that was included with your unit on your computer.

3.2 Software Utility

Your computer should meet the following minimum requirements:

- Pentium Class processor
- Hard Drive Space: 210 meg
- Ram: 256 meg or higher
- 1 Available USB Port
- 1 CD-ROM Drive
- Windows 2000, XP, Vista (32bit) Operating System or Windows 7.

3.3 Software Installation

Insert the software CD that was included with your unit into the CD-ROM drive on your PC. Your system should begin the installation process automatically.



Figure 3-1. Software - Welcome Screen

This welcome screen will be visible on your computer. To continue installing the program click the "Next >" button.

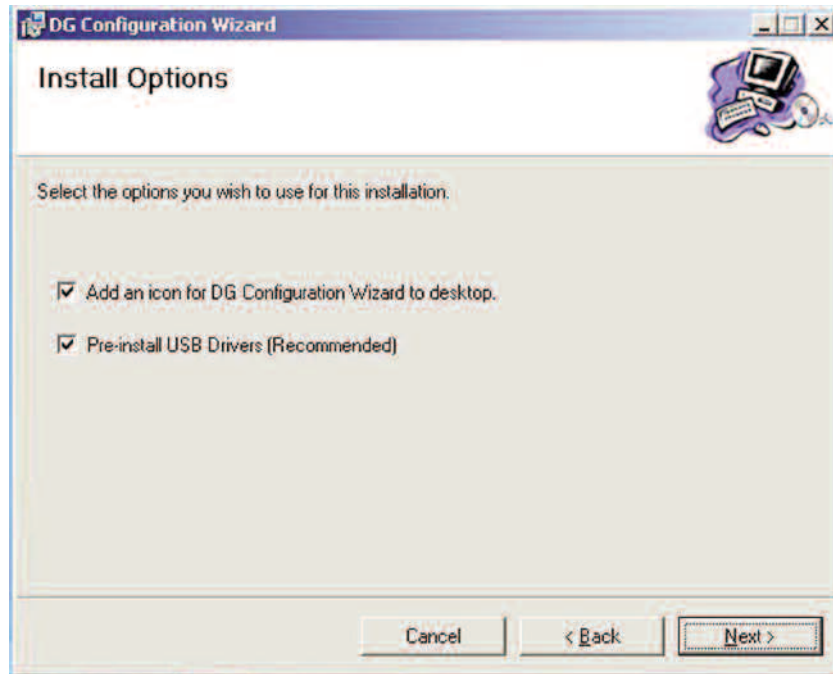


Figure 3-2. Software - Install Options Screen

From this screen you select if you want the program icons to be placed on your desktop and to automatically install the USB drivers. To continue with installing the program click the "Next >" button.

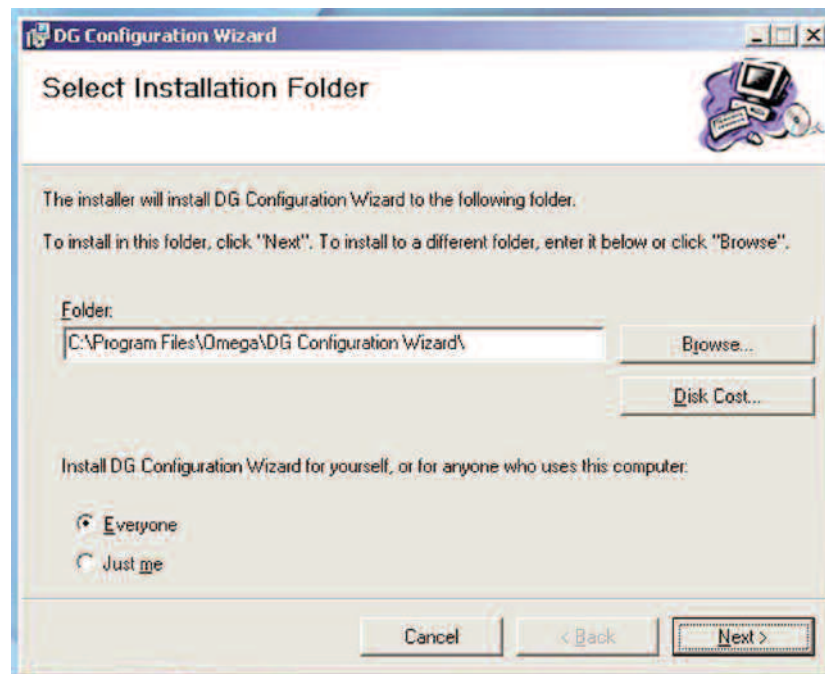


Figure 3-3. Select Installation Folder Screen

From this screen you select the folder where you want the program files installed on your PC. The default setting will install the software under your "Program" folders in a new folder named "Omega". To continue with installing the program click the "Next >" button.



Figure 3-4. Software - License Agreement Screen

From this screen you must select “Agree” to continue installing your program. After making your selection click the “Next >” button. The setup wizard will now complete the process and install the software.

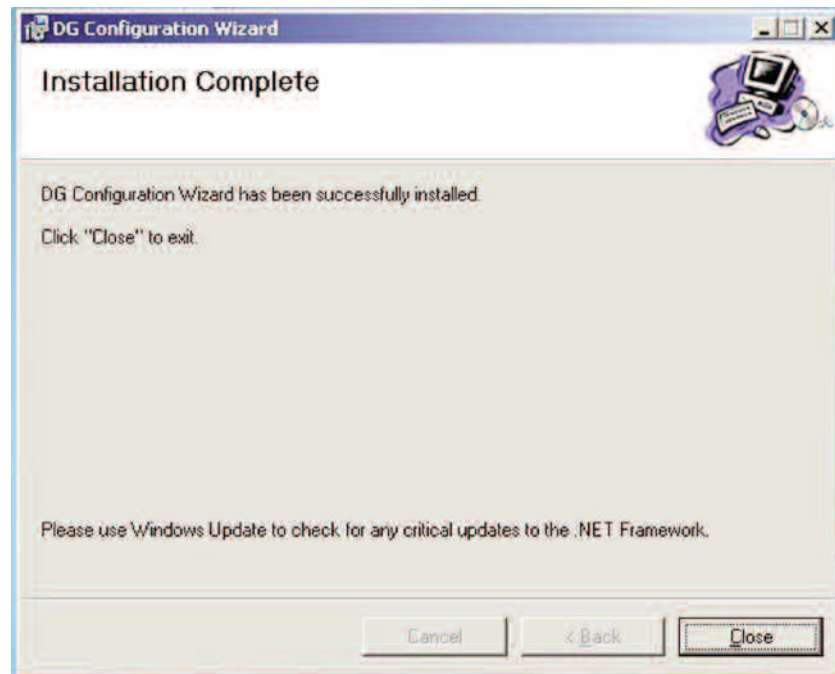


Figure 3-5. Software - Installation Complete Screen

Congratulations! You have just successfully installed the DG Setup Utility Program on your PC. To end installing the program and close the setup wizard click the “Close” Button.

3.4 Configuration

Lid/ Cover Removal

To switch on your unit and access the USB programming connector on your meter, the enclosure lid/cover must be removed. Four screws must be removed. Be careful to not lose or discard these screws. These screws play a vital part in providing the water tight seal on your unit.

CAUTION:

The same four screws removed in this procedure must be re-installed into your meter housing or you will not have the proper water tight seal. Failure to install these screws correctly may result in damage to your unit when the meter is exposed to wet conditions.

NOTE:

When reinstalling enclosure screws they must be tightened to 20 oz in.

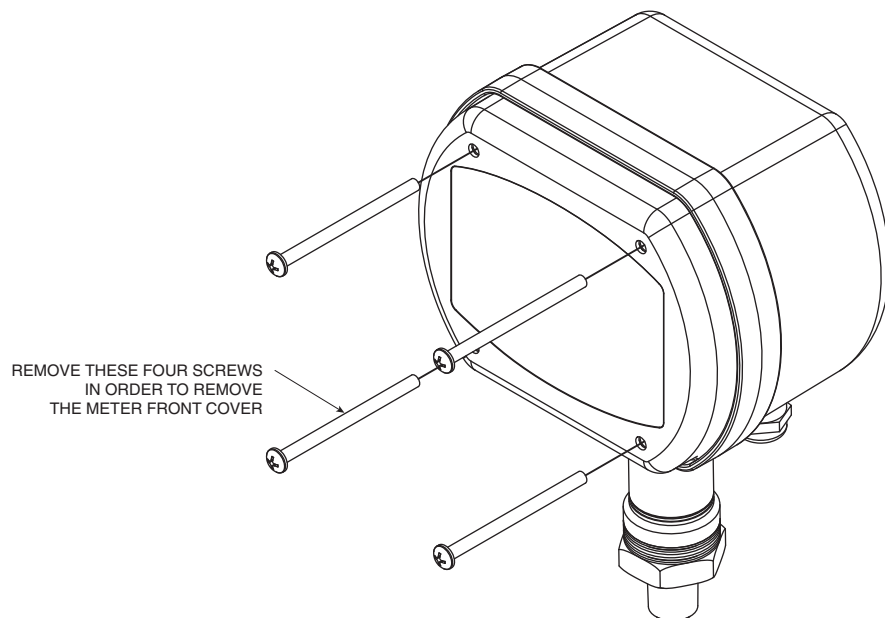


Figure 3-6. Lid/ Cover Removal

Switching On Your DPG409 Meter

Before you connect your USB cable to the USB programming connector on the DPG409, you will need to switch on the unit. Below are directions on how to locate the ON/OFF switch, on the rear of the internal meter assembly.

1. After the lid has been removed, gently separate the screen/battery assembly from the rear stainless steel enclosure.

NOTE:

Be sure not to pull the assembly too far from the stainless steel enclosure, as that may detach the internal cables that run between the PC board and the pressure gauge.

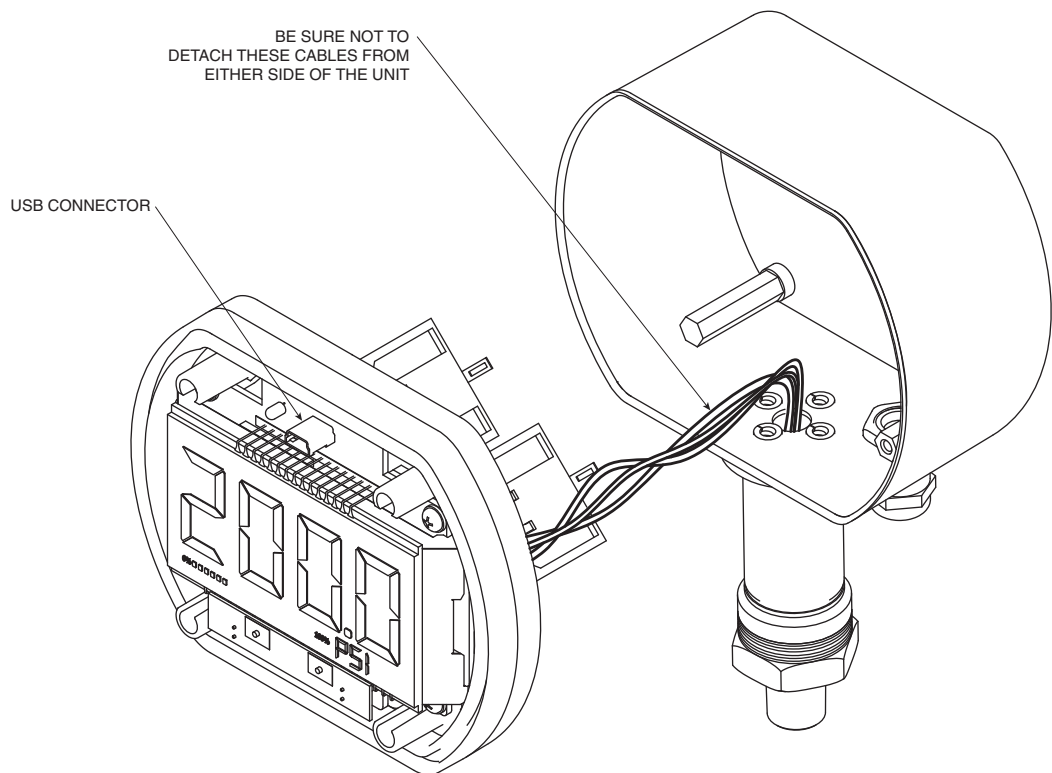


Figure 3-7. Front View of DPG409 with Meter Assembly Separated

2. Turn the screen/battery assembly over so that you are looking at the battery side. Near the top right corner of the batteries, you will see the ON/OFF switch. Shift it to the ON position.

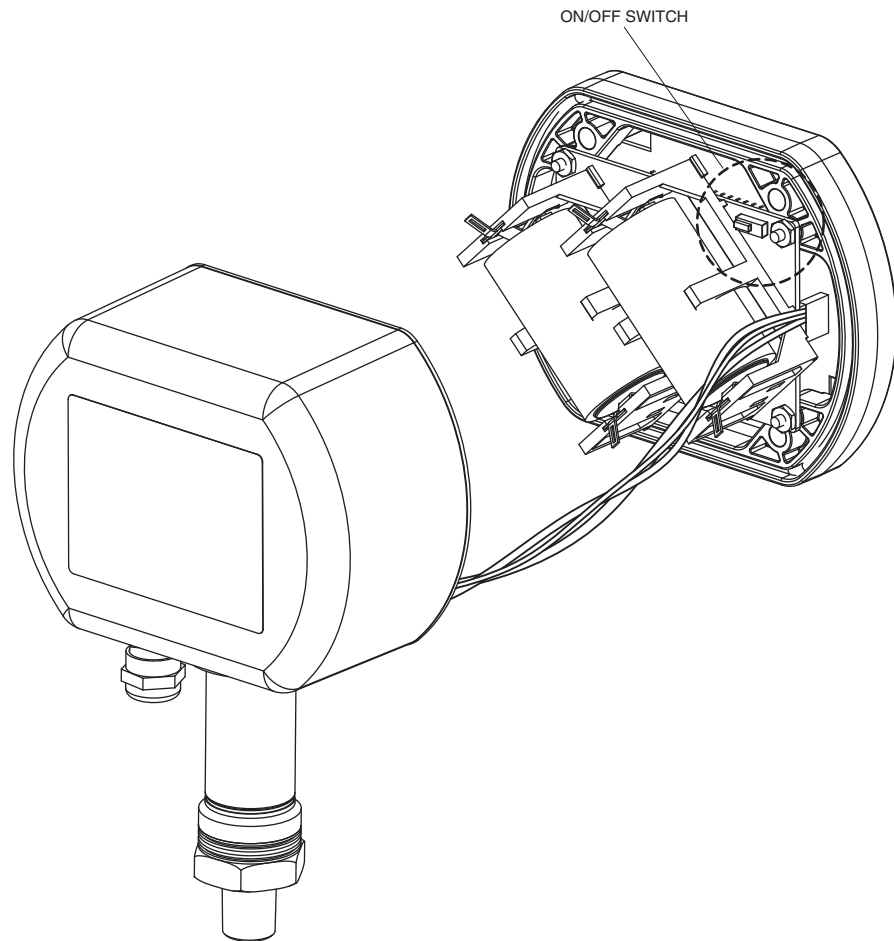


Figure 3-8. Rear View of DPG409 with Meter Assembly Separated

3. After you have turned on the unit, you may return the meter assembly into the rear enclosure.

Connecting Your Meter to Your Computer

A USB Programming cable was included with your unit. This cable is only used during the setup and configuration of your meter.

NOTE:

In order to connect the meter to your computer, do not replace the lid onto the meter; you will need access to the USB connector.

NOTE:

This cable does not remain connected during normal use.

USB Connector

See below for the USB programming cable location on your meter.

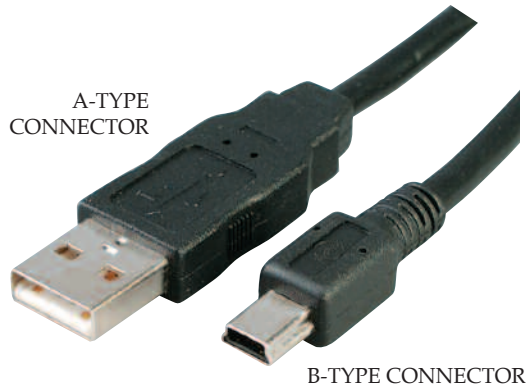


Figure 3-9. USB Programming Cable

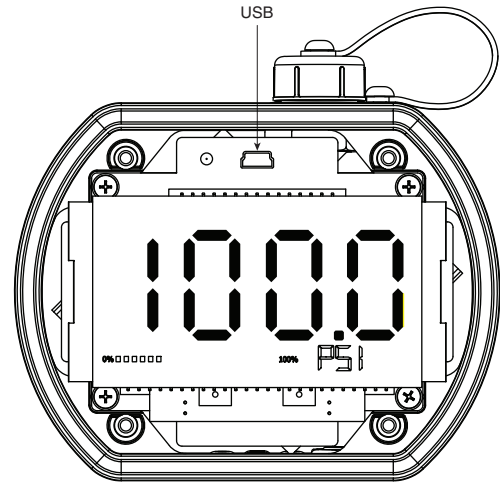


Figure 3-10. USB Connector Location

Connect the A-type connector to your PC and then connect the B-type connector to the USB port on your meter.

Setting Up Your Meter

Now that you have connected your USB cable to your PC and to your meter, you can now complete the following steps to configure your meter before placing the unit into operation. You will be using the configuration software utility that you installed onto your PC. If you have not installed the configuration software utility you should do so now.

STEP 1. Launch setup utility program.

To launch the setup utility program on your PC begin by finding and clicking on the DG program Icon that was placed on your computer desk top when you installed the software.

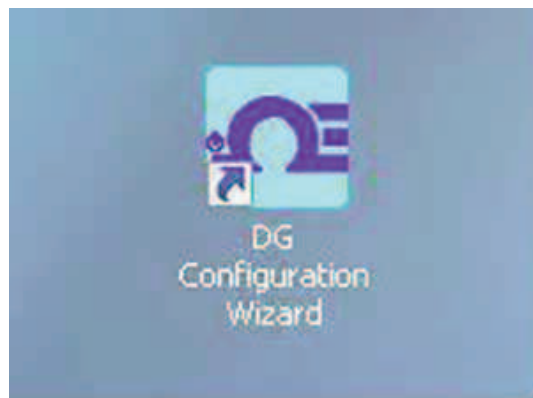


Figure 3-11. Launch Setup Utility Screen

STEP 2. Connecting & communicating with your meter

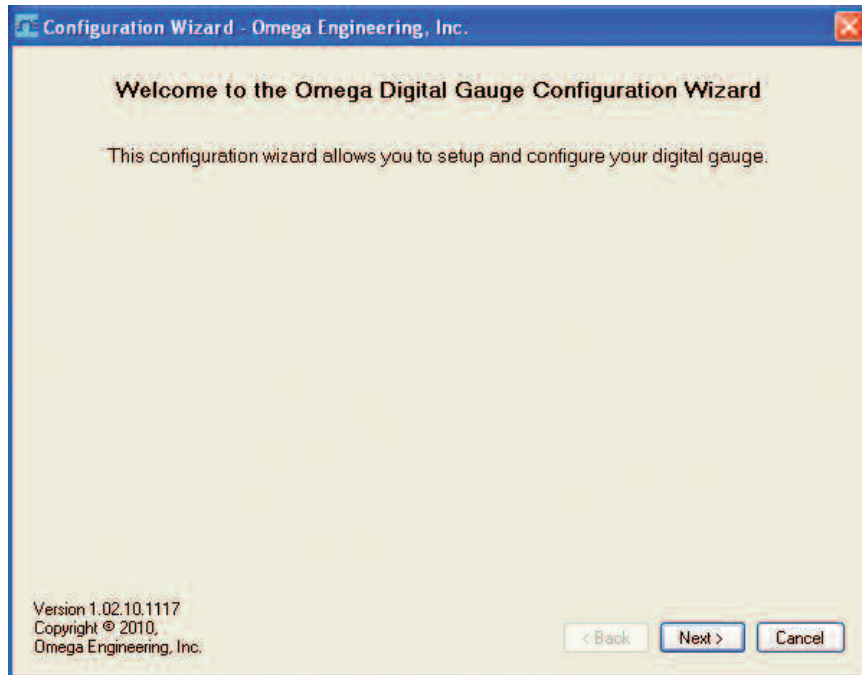


Figure 3-12. Utility Program - Welcome Screen

After starting the setup utility program this will be the first screen you will see. Click the "Next >" button to proceed and continue setting up your meter. Each screen will provide instruction details on how to proceed.

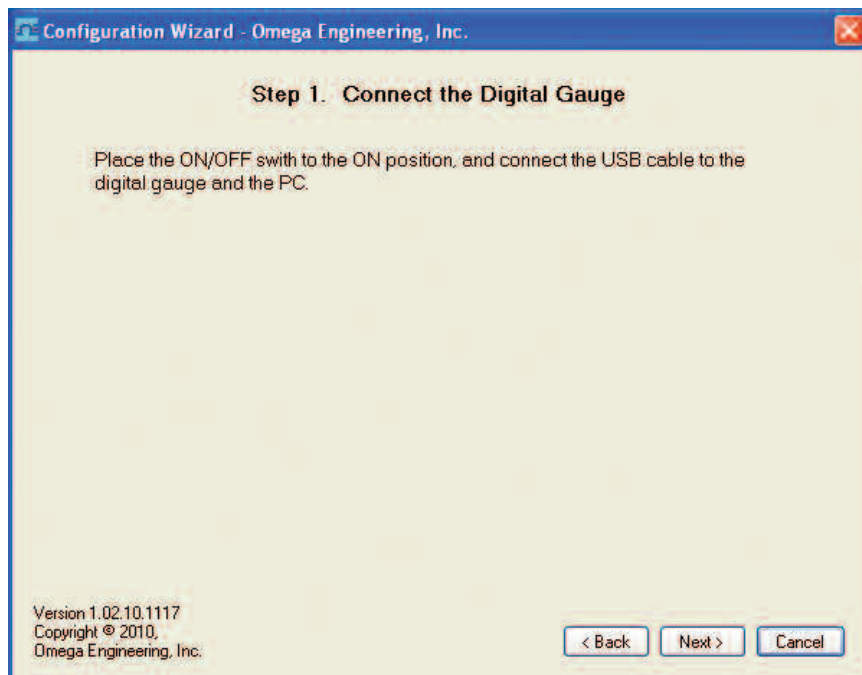


Figure 3-13. Utility Program - Connect To Digital Gauge Screen

If you have not already connected your meter to a USB port on your PC you must do this now before continuing. After your unit has been connected click the "Next >" button to proceed and continue setting up your unit.

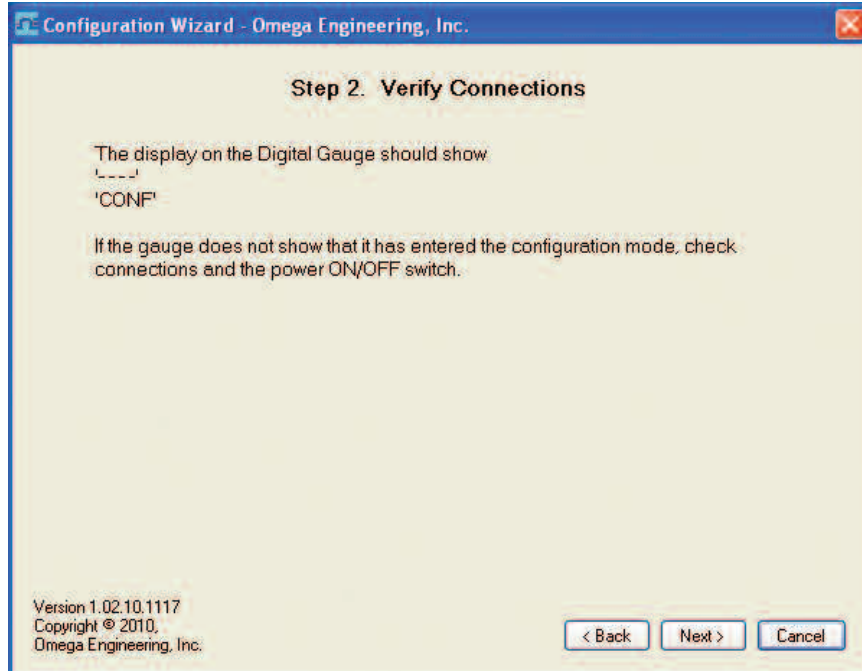


Figure 3-14. Utility Program - Verify Connections Screen

After successful communication between your PC and meter has been established you can click the "Next >" button to proceed and continue setting up your unit. If you did not receive this confirmation of proper communication you should click the "Back" button to try connecting again.

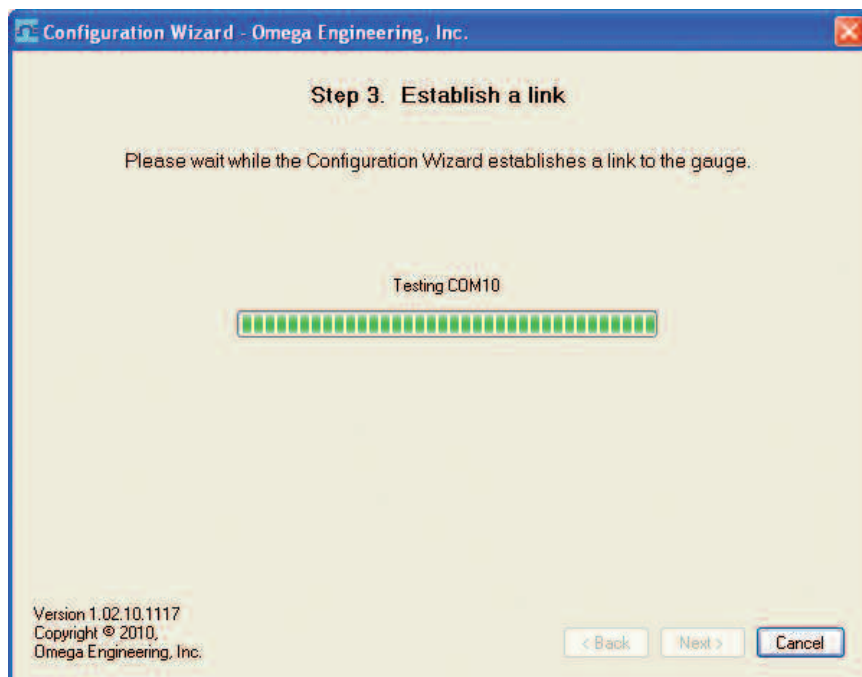


Figure 3-15. Utility Program - Testing Com Port Screen

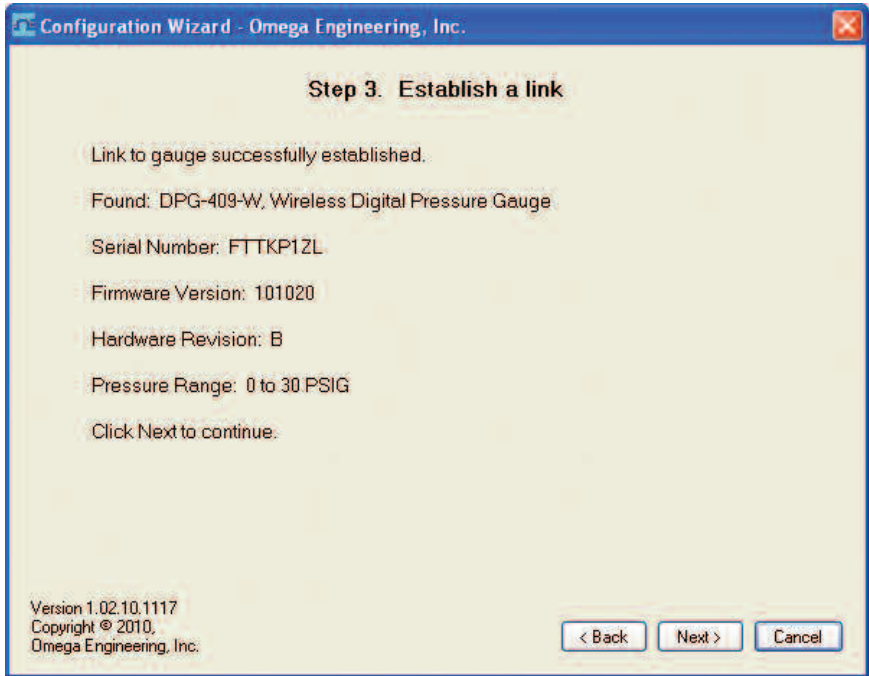


Figure 3-16. Utility Program - Establish Link Screen

Click the “Next >” button to proceed and program your settings into your unit.

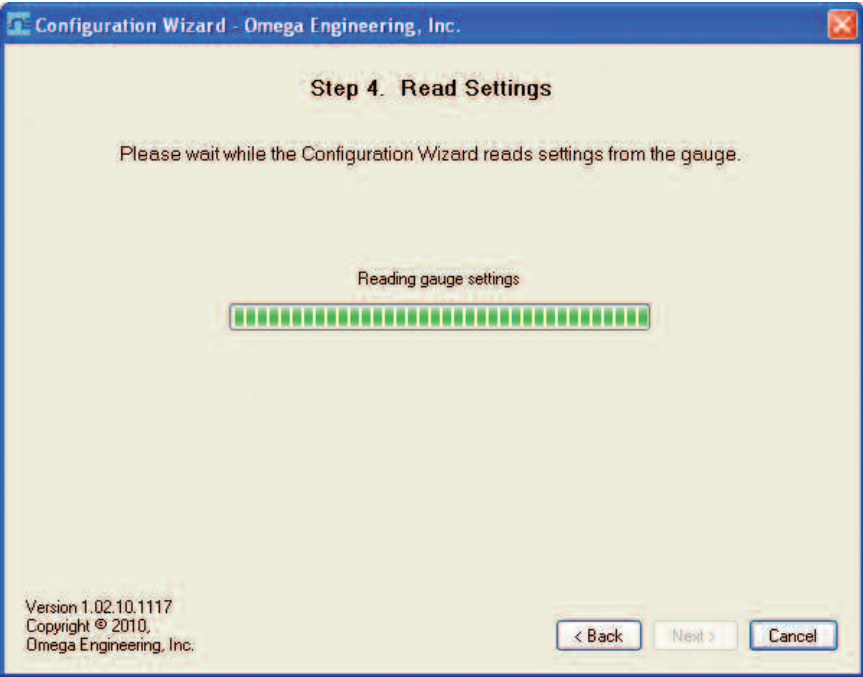


Figure 3-17. Utility Program - Read Settings Screen

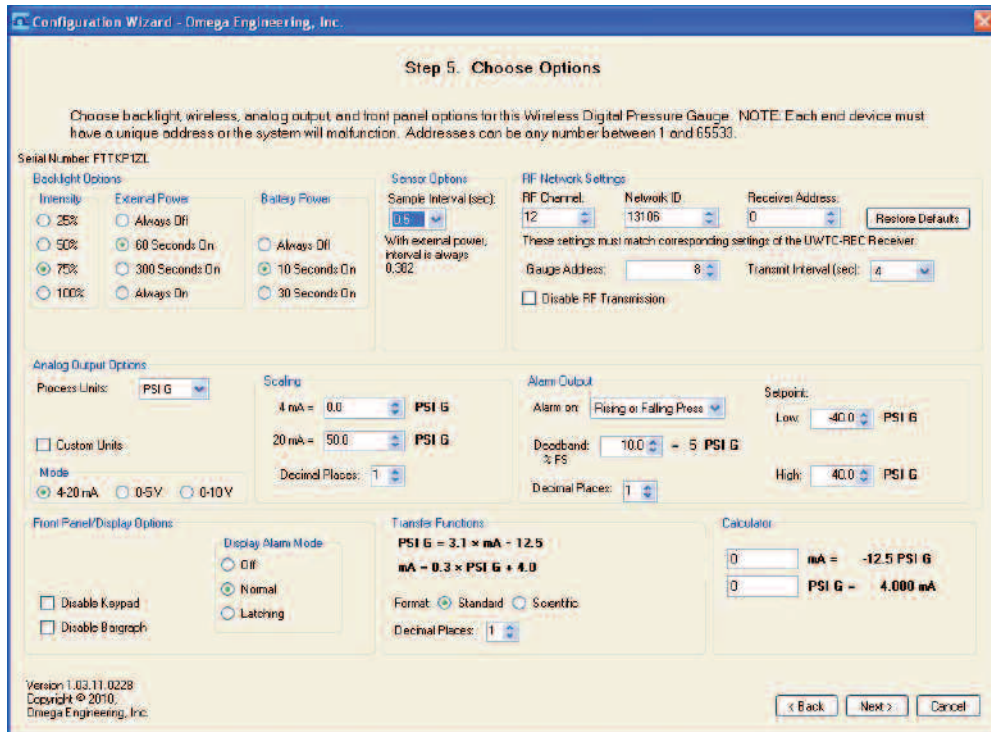


Figure 3-18. Utility Program - Choose Options Screen

(1) Backlight Options

Intensity

Here you can set how bright you want the backlighting to be when on. Keep in mind that when used under battery power the LED brightness has a direct effect on the life of the battery. Keep to the lowest setting possible for your ambient light conditions to conserve battery power.

External Power

Here you can set the amount of time you want the backlighting to stay on when activated and the unit is running on external power. Note that you can only set the backlighting to be "Always On" when the unit is powered by an external power supply. When set to 60 or 300 seconds the backlight will come on and then turn off after the allotted time has expired.

Battery Power

Here you can set the amount of time you want the backlighting to stay on when activated and the unit is running on battery power only. Note that you can not set the backlighting to be "Always On" when the unit is powered by battery power. When set to 10 or 30 seconds the backlight will come on and then turn off after the allotted time has expired. If backlighting is not required it is recommended that you select "Always Off" to preserve battery life.

(2) Front Panel Options

Disable Keypad

Select this option to turn off the front keypad buttons. If selected during setup the buttons will be locked and will not be activated by the magnetic stylus.

Disable Bar Graph

Select this option to remove the bar graph indicator from the display.

(3) Alarm Output

Alarm On

Disabled - The alarm output is disabled and will not operate.

Rising - The alarm output activates ONLY when the pressure meets or exceeds the High Setpoint.

Falling - The alarm output activates ONLY when the pressure meets or falls below the Low Setpoint.

Rising & Falling - The alarm output activates when either the pressure meets or exceeds the High Setpoint OR the pressure falls below the Low Setpoint.

HAL (High Alarm Limit) Setpoint

Set here the high value you want the alarm to activate at.

LAL (Low Alarm Limit) Setpoint

Set here the low value you want the alarm to activate at.

Alarm Deadband

Deadband is an area where no action occurs. The purpose is to prevent oscillation or repeated activation-deactivation cycles. The deadband value is expressed as a percentage of the full scale range of the meter. If your process value will always be very close to your alarm setting you should adjust the deadband to be a small percentage of the full scale range.

(4) Analog Output Options

Mode

Select the type of analog output your application requires. You can leave the default setting if you will not be using the analog output feature.

Process Units

The unit supports 6 standard process units: PSI, in-H₂O, in-Hg, hPa, bar, and mbar. The unit may be configured for additional process units by using the Custom Units option. Checking the Custom Units checkbox allows the user to enter a three character label and the conversion factor for a custom process unit. The conversion factor is based on the value required to convert PSI to the custom unit.

(5) Sensor Options

Sample Interval

Here you can set how often the device samples the sensor and updates the LCD.

NOTE:

You must set the wire jumpers located on the back of your meter to match the analog output type you selected here in the setup process.

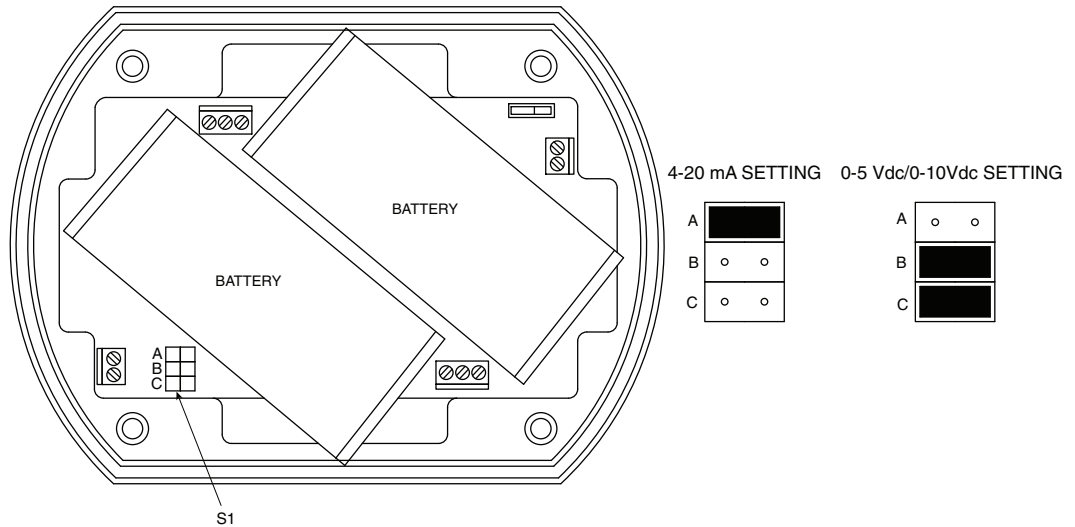


Figure 3-19. Analog Output Options

Scaling

Here you can scale the analog output to correspond to the process reading value.

4-20 mA Example:

This table shows analog output values you should expect if you set 4mA = 0 psig and 20mA = 1000 psig.

Process Reading	Analog Output Value
0 psi	4.00 mA
250 psi	8.00 mA
500 psi	12.00 mA
750 psi	16.00 mA
1000 psi	20.00 mA

0-10 Vdc Example:

This table shows analog output values you should expect if you set 0.0Vdc = 0 psig and 10.0 Vdc = 1000 psig.

Process Reading	Analog Output Value
0 psi	0.00 Vdc
250 psi	2.50 Vdc
500 psi	5.00 Vdc
750 psi	7.50 Vdc
1000 psi	10.00 Vdc



Figure 3-20. Calibration Options Screen - Skip Calibration Option

From this screen you will select a Calibration option. If the unit does not require calibration you should leave the default selected "Skip Calibration" and continue by clicking the "Next >" button.

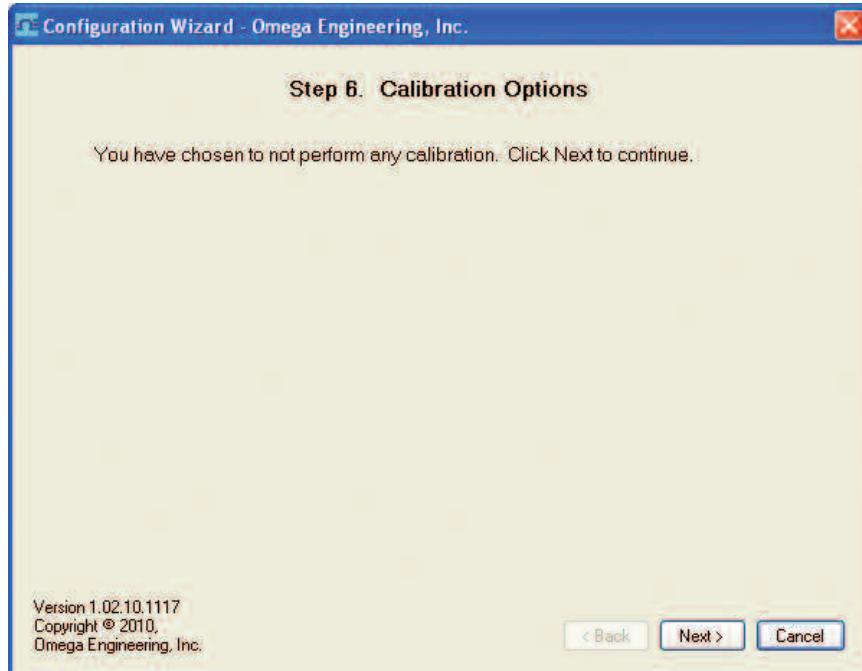


Figure 3-21. Calibration Options Screen - Skip To Next Option

After making your selections click the “Next >” button.

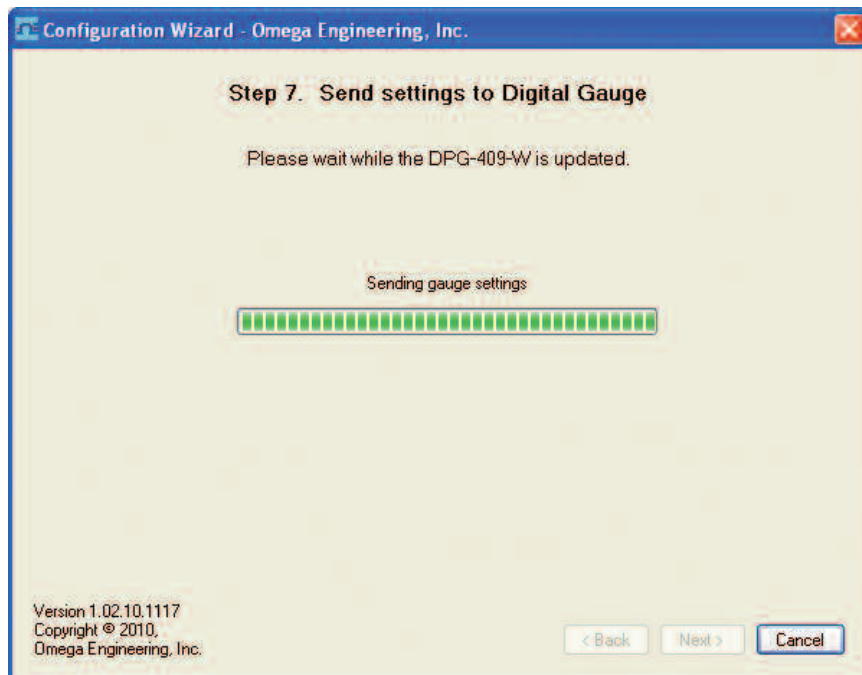


Figure 3-22. Send Settings To Digital Gauge Screen - Progress Bar

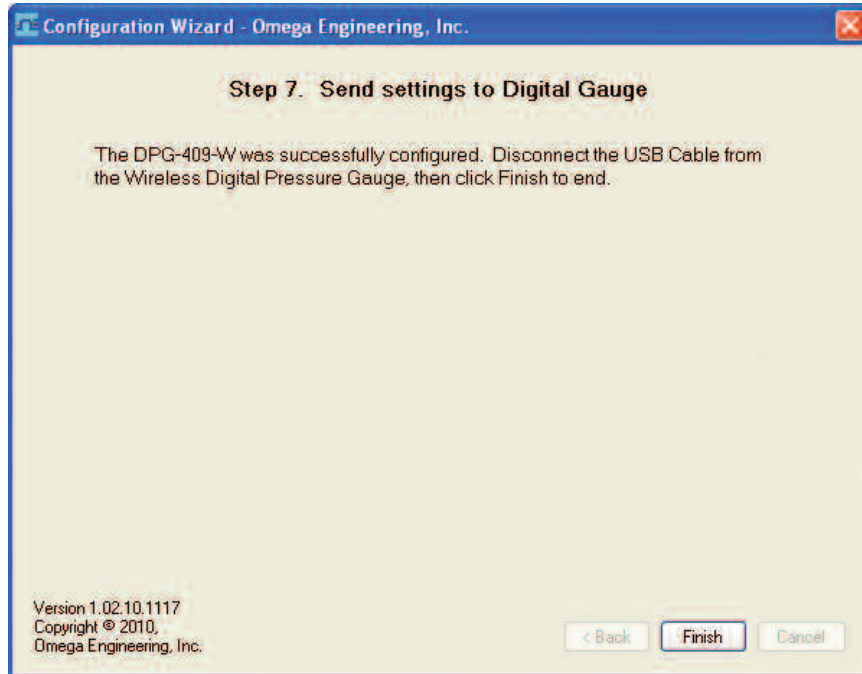


Figure 3-23. Send Settings To Digital Gauge Screen - Finish Option

After your meter has been programmed click the "Finish" button to close the utility program.

Section 4 – Installation, Mounting & Wiring

4.1 Installation

Model DPG409 is NEMA 4X rated (water tight, dust tight, corrosion-resistance - indoor & outdoor use). The pressure gauge can be installed in locations where it will be intermittently exposed to spraying water, rain or high humidity. The meter should never be used under water.

WARNING

This meter is not designed for, tested, approved or certified for use in intrinsically safe applications or for applications where exposition proof instruments are required. Never operate in areas where flammable gases or material are present.

4.2 Ambient Temperature

Your meter should only be installed in locations that maintain an ambient temperature between -18 to 66°C (0 to 150°F).

4.3 General Meter Dimensions

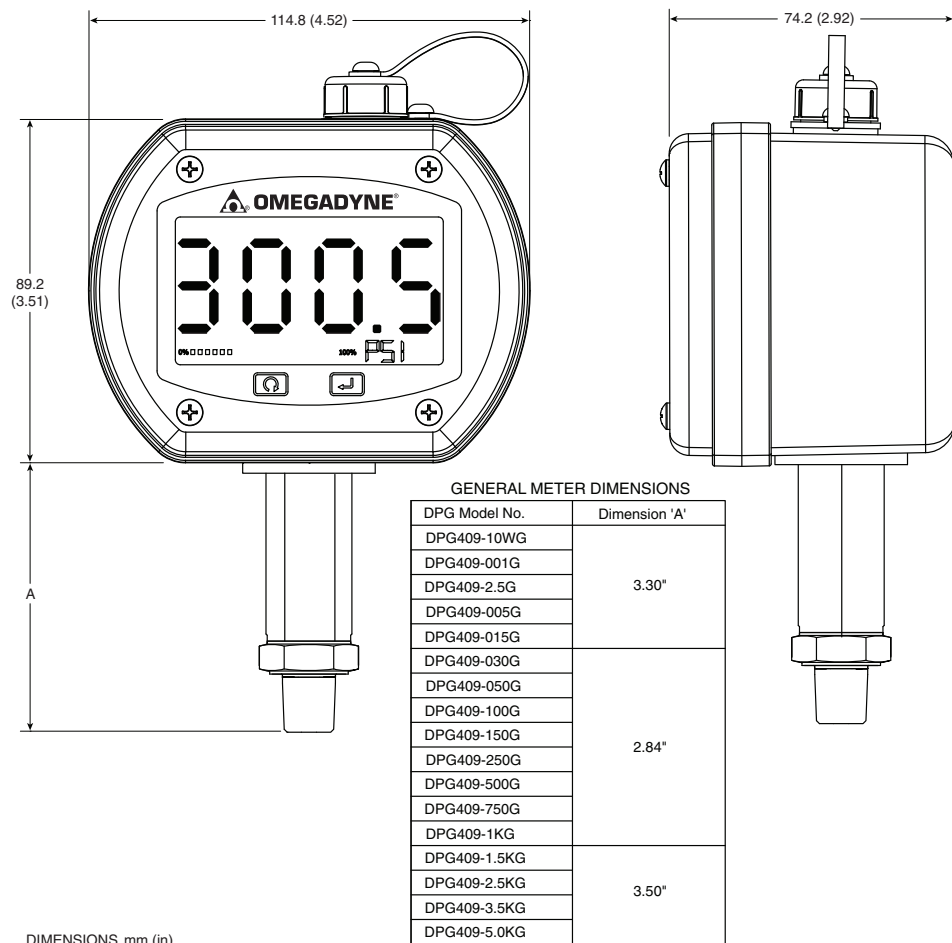


Figure 4-1. General Meter Dimensions

4.4 Battery Installation/Replacement

To install or replace the battery in your DPG409 pressure gauge you must first remove the four screws located on the Lid of the enclosure. This will allow you to remove the meter assembly and access the battery Holders.

NOTE:

Model DPG409 requires only one battery for normal operation (Battery1). A second battery (Battery 2) can be added to extend operation when on battery power. It is also recommended that the additional battery (Battery 2) be installed for models that include the optional wireless transmitter.

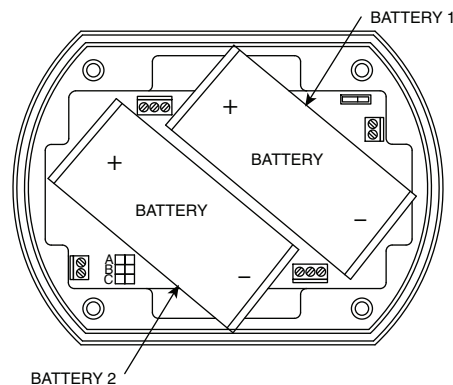


Figure 4-2. Battery Installation/ Replacement

Lithium batteries may get hot, explode or ignite and cause serious injury if exposed to abusive conditions. Be sure to follow the safety warnings listed below:

- Do not use a different battery other than what is specified in this manual or product data sheet.
- Do not discharge the battery using any device except your meter.
- Do not place the battery in fire or heat the battery.
- Do not store batteries with other hazardous or combustible materials.
- Do not install the battery backwards so the polarity is reversed.
- Do not connect the positive terminal and negative terminal of the battery to each other with any metal object (such as wire).
- Do not carry or store the battery together with metal objects.
- Do not pierce the battery with nails, strike the battery with a hammer, step on the battery or otherwise subject it to strong impacts or shocks.
- Do not solder directly onto the battery.
- Do not expose battery to water or salt water, or allow the battery to get wet.
- Do not disassemble or modify the battery.

- Immediately discontinue use of the battery if the battery emits an unusual smell, feels hot, changes color or shape, leaks or appears abnormal in any other way.
- Do not place the battery in microwave ovens or high-pressure containers.

4.5 Wiring (Power, Analog Output, Alarm)

Power Supply Wiring Example

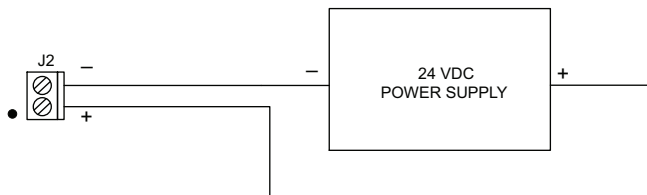


Figure 4-3. Wiring - Power Supply

Analog Output Wiring Example

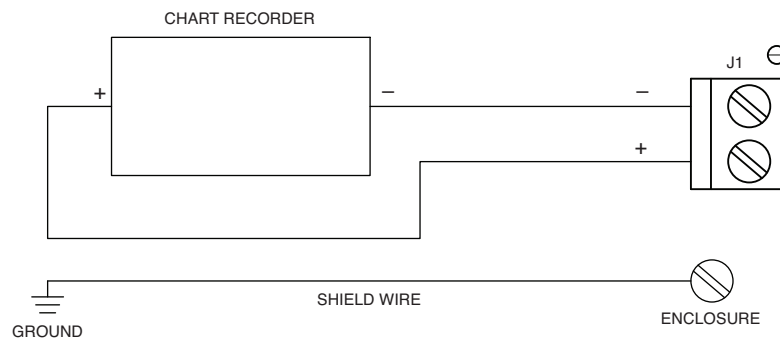


Figure 4-4 . Wiring - Analog Output

See Section 7 for more analog output grounding information.

Alarm Wiring Example

Driving a relay or low impedance input (Open Drain)

NOTE:

Diode required for magnetic relays. Not required for solid state relays or magnetic relays with internal diode.

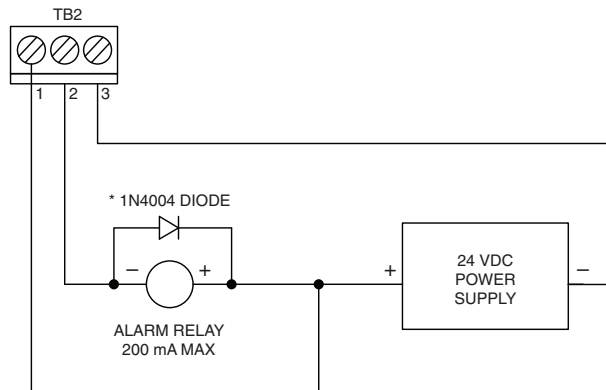


Figure 4-5. Wiring - Alarm

Section 5 – Display Features & Meter Operation

5.1 Display Features

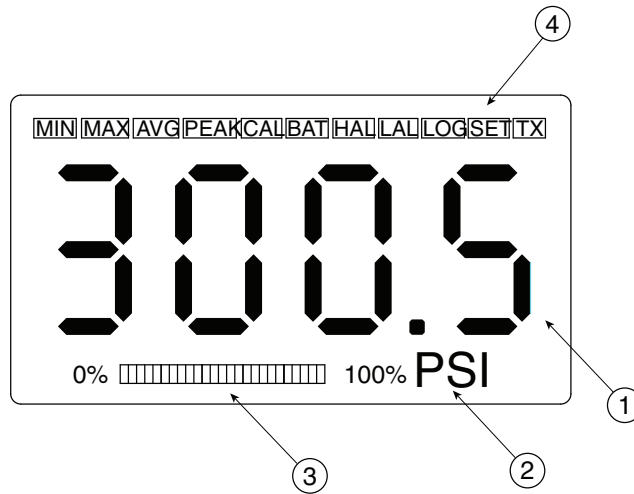


Figure 5-1. Display Features

(1) Process Reading, (2) Units, (3) Bargraph, (4) Status Icons

5.2 Keypad Operation

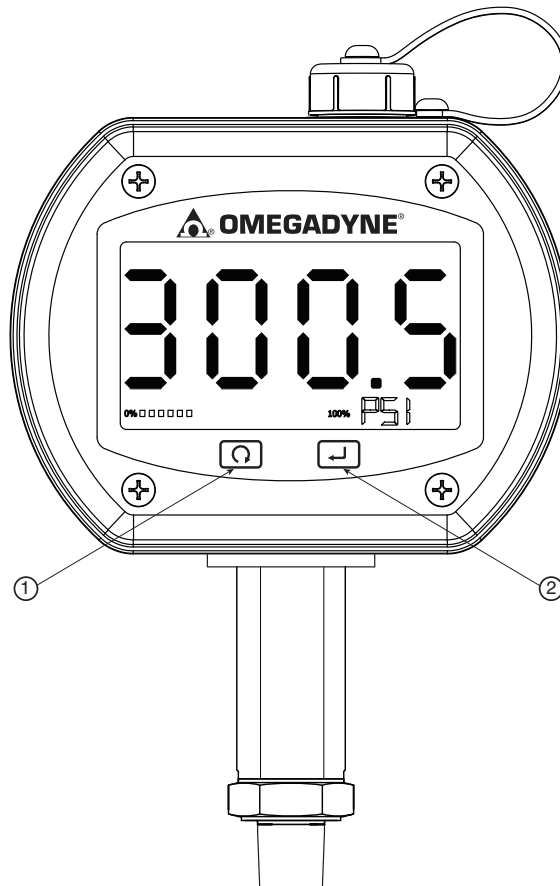


Figure 5-2. Keypad Operations

Magnetic Stylus

A magnetic stylus is attached to your meter. This stylus is used to activate the front buttons on the display. If you do not need to view the “MIN”, “MAX” or “AVERAGE” readings during normal operation, or have a need to turn the backlight on during normal operation you can remove and store this stylus. You will need to select “Disable Keypad” during the setup and configuration process.



Figure 5-3. Magnetic Stylus

Button Operation

The “MODE” and “SET” buttons located on the front display of your meter are activated by waving or tapping the magnetic stylus included with your unit above or onto the keypad button symbol on the front meter label.

Mode Button Operation – To activate the “MODE” button, place the tip of the magnetic stylus over the “MODE” button and hold for three seconds until the unit enters the “MODE” menu. Then move away the magnetic stylus. Each time the magnetic stylus is again placed near the “MODE” button the meter will step through each parameter.

“SET” Button Operation - The “SET” button has two primary functions. Independently the button is used to turn the backlighting on. To activate the “SET” button, place the tip of the magnetic stylus over the “SET” button and hold for three seconds until the backlighting turns on. The backlighting will remain on for the amount of time you selected during the setup and configuration process. Note: if you selected “Always Off” when setting the meter up, then the “SET” button will not turn the backlighting on from the front keypad.

When in the “MODE” menu, the “SET” button is used to turn the wireless transmitter “On” or “Off” and also to select the unit of measurement.

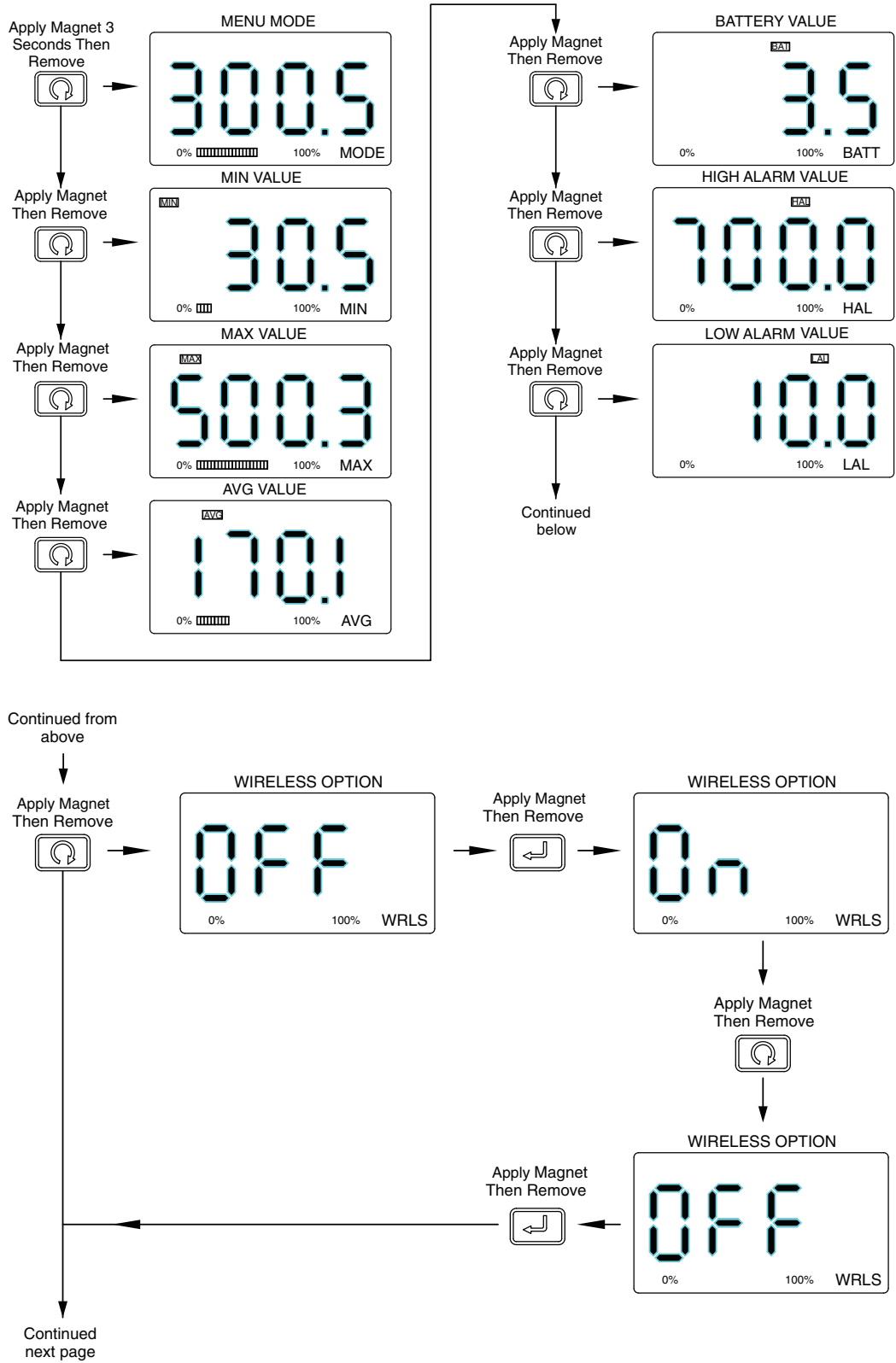


Figure 5-4. Menu Button Operation

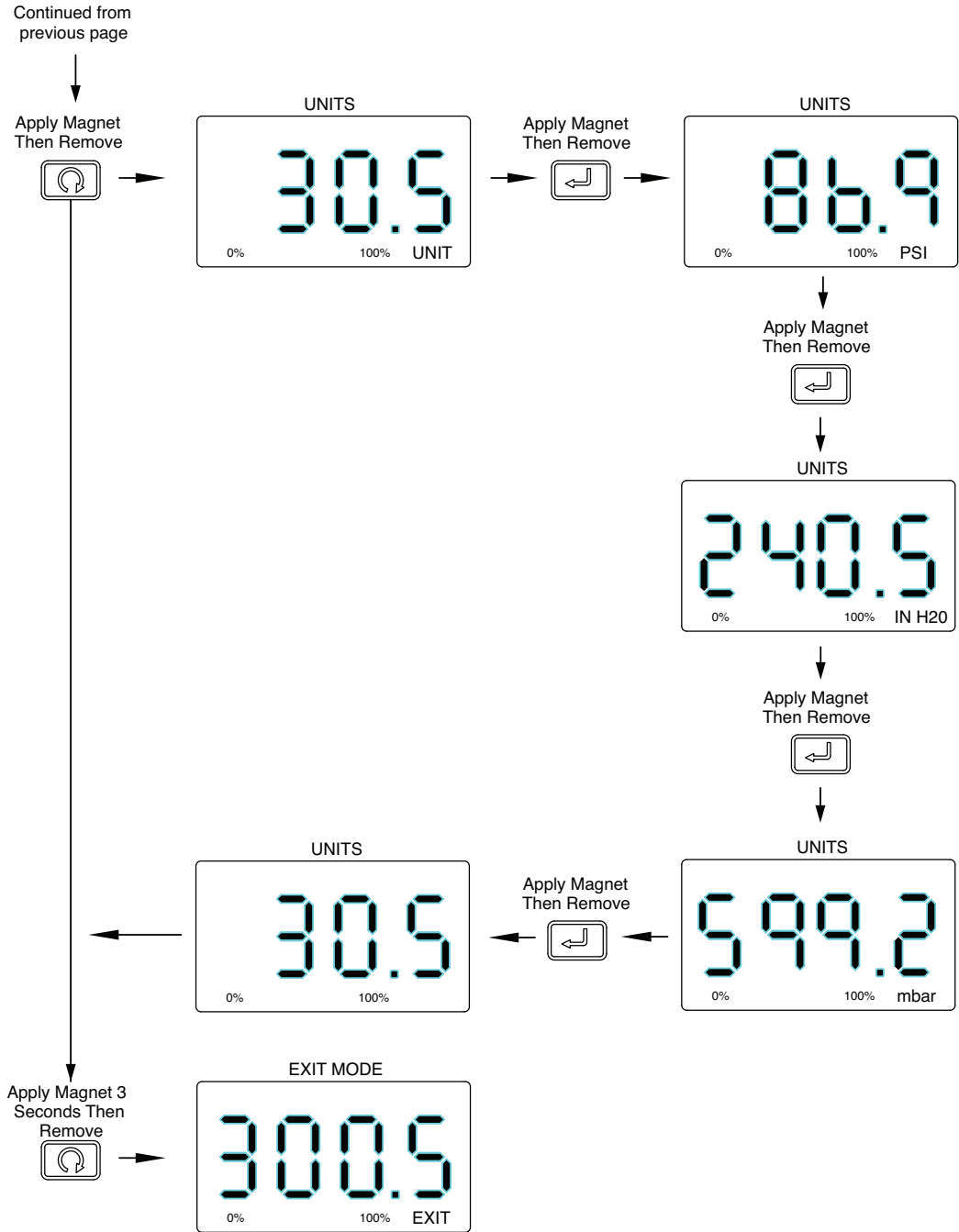


Figure 5-4. Menu Button Operation Continued

Backlighting Operation

The front keypad “Set” Button can be used to activate the backlighting feature. When activated, the backlighting will remain on for the period of time you selected during the setup and configuration in Section 3.

Apply Magnet 3
Seconds To Activate
Backlight

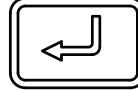


Figure 5-5. Front Keypad Set Button

Section 6 – Optional Wireless Transmitter Operation

6.1 Introduction

Compared to a wired connection, a wireless meter provides much simpler installation. Based on the physical principle of the propagation of radio waves, certain basic conditions should be observed. The following simple recommendations are provided to ensure proper installation and correct operation of your wireless meter.

6.2 RF Communication Basics

Your wireless transmitter sends wireless transmissions to a receiver. The receiver checks the incoming data for accuracy and processes this data for use by the measurement software on your PC. Radio signals are electromagnetic waves, hence the signal becomes weaker the further it travels. While radio waves can penetrate some solid materials like a wall, they are dampened more than when a direct line-of-sight between the transmitting and receiving antenna exists.

6.3 Basic System Overview

A basic wireless system is comprised of only two main components; a signal conditioner with a built-in battery powered 2.4GHz radio transmitter, and a USB powered 2.4GHz radio receiver.

Installation

When installing your meter it is important to position the unit in such a way as to optimize the antenna location within what's known as the "Fresnel Zone".

The Fresnel Zone can be thought of as a football-shaped invisible tunnel between two locations that provides a path for RF signals between your meter and your receiver.

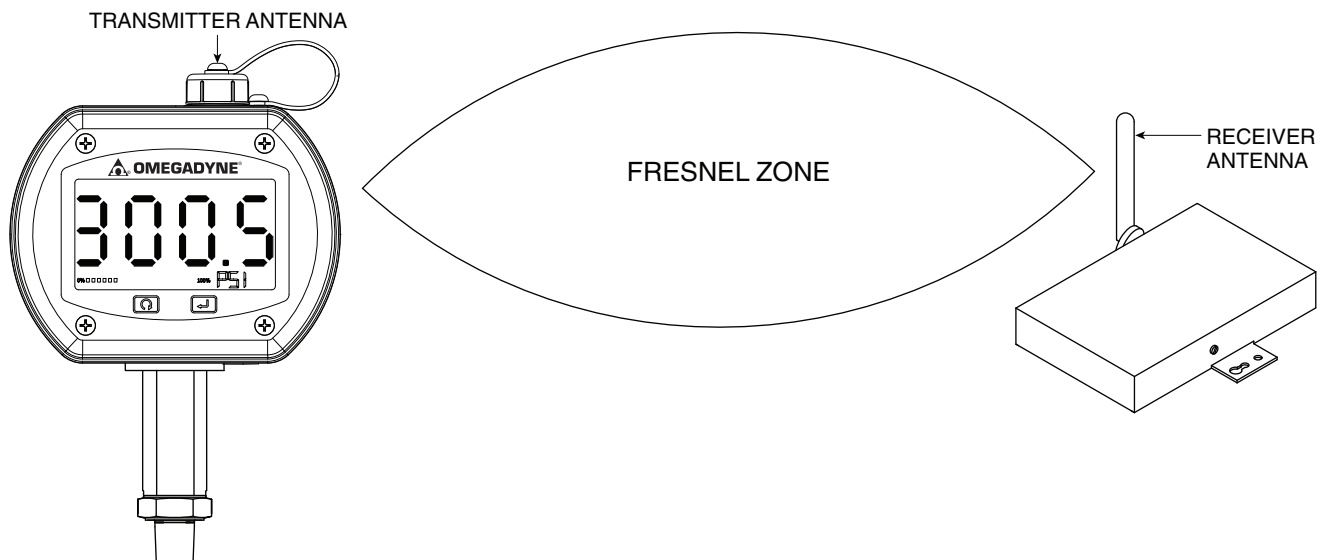


Figure 6-1. Fresnel Zone

In order to achieve maximum range, the football-shaped path in which radio waves travel must be free of all obstructions. Obstacles in the path (especially metal) will decrease the communication range between your meter and receiver.

Also, if the antennas are mounted just barely off the ground, over half of the Fresnel zone ends up being obstructed by the earth resulting in significant reduction in range. To avoid this problem, the antennas should be mounted high enough off of the ground so that the earth does not interfere with the central diameter of the Fresnel zone.

NOTE:

It is important to understand that the environment may change over time due to new equipment or machinery being installed, building construction, etc. If new obstacles exist between your meter and receiver, the devices can be raised on one end or on both ends to clear the Fresnel Zone of obstructions.

CAUTION:

Installing your meter in an application where the unit will be exposed to ambient temperatures above or below the operating limits specified in this manual will damage your unit and cause the unit to malfunction and produce incorrect operation.

NOTE:

Your meter has been shipped to you with a standard approved antenna. Use of any other antenna than what's supplied with your meter will void all FCC, IC and CE regulatory compliance.

Environment

Omega's wireless end devices and receiver units have been designed to be fixed mounted and operated in a clean and dry indoor environment. Care should be taken to prevent the components of your wireless system from being exposed to moisture, toxic chemicals and extreme cold or hot temperature that are outside the specifications listed in this manual.

The following is a list of basic good practice you should apply when operating your wireless system.

- Never operate your wireless device or receiver outside the recommended environmental limits specified in this manual.
- Never operate your wireless end device or receiver in flammable or explosive environments.

- Never use your wireless end device or receiver in medical, nuclear or other dangerous applications where an interruption of readings can cause damage or harm.
- Never operate your end device or receiver with any other battery or power source than what's specified in this manual or on the battery compartment label.
- No co-location with other radio transmitters is allowed. By definition, co-location is when another radio device or it's antenna is located within 20 cm of your end device and can transmit simultaneously with your end device.
- Never install end devices within 20 cm or less from each other.
- Never use your end device as a portable device. Your unit has been designed to be operated in a permanent installation.
- Never install and/or operate your end device closer than 20 cm to nearby persons.
- Never operate your end device with any other antenna than what is supplied or listed here in this manual for approved use.

6.4 Transmit Rate vs. Battery Life

Many factors such as ambient temperature conditions and transmitting rate can have a big effect on the life of the battery used in your DPG409 Digital Pressure Gauge. Transmitting data places a big demand of the battery in your unit. The transmit rate is the single most contributing factor in the life of the battery. The slower the transmit rate you set, the longer the battery in your device will last. The tables below give some estimates on how long the battery should last vs. some sample transmit rates you can select when you set up your meter and operate under normal conditions.

6.4.1 DPG409 Battery Life – Standard Model

Table 1: DPG409 - Standard Model - Battery Life

DPG409	Estimated Battery Life		
	Batteries:	4.8Ah x 1	4.8Ah x 2
	Sec/Sample:	Weeks	Weeks
	0.38	15.0	30.0
	0.5	18.7	37.3
	1	29.7	59.5
	2	42.3	84.5
	3	49.2	98.4
	4	53.6	107.1
	5	56.6	113.2
	10	63.8	127.6
	15	66.6	133.3
	30	69.7	139.4

6.4.2 DPG409-W Battery Life – Wireless Model

For the DPG409-W wireless digital pressure gauge, the battery life of the device is controlled by three variables – the battery capacity, the analog output rate, and the wireless transmission rate. The battery capacity is 9600 mA hours (using 2 of the 4.8Ah capacity batteries). Below is a table showing the battery life estimates in both scenarios, at various analog output rates.

**Table 2: DPG409-W - Wireless Model – Battery Life
(2 x 4.8Ah Batteries)**

DPG409-W Estimated Battery Life				
(2 x 4.8Ah Batteries: 9600 mA Hours)				
Analog Seconds/ Sample:	.5	5	15	30
Seconds per Wireless Transmission:	Weeks	Weeks	Weeks	Weeks
2	22.2	38.5	40.7	41.3
3	25.3	49.2	52.9	53.9
5	28.6	63.4	69.6	71.4
10	31.7	80.8	91.3	94.3
15	32.9	89.0	101.8	105.7
30	34.2	99.0	115.2	120.1
45	34.6	102.8	120.4	125.8
60	34.9	104.9	123.2	128.8
120	35.2	108.5	127.7	133.7
RF OFF	37.3	113.2	133.3	139.4

NOTE:

To purchase a replacement battery for your DPG409 unit, order Omega Part Number BATT-C-3V.

6.5 Wireless Transmitter Setup

After connecting the USB cable and running the configuration software as outlined in Section 3, you will complete the following steps to configure your wireless transmitter before placing the unit into operation. You will be using the configuration software utility that you installed onto your PC in Section 3. If you have not installed the configuration software utility you should do so now.

During this procedure you will be setting the following parameters in your transmitter.

RF Channel

This setting determines the operating channel on which RF connections are made between the transmitter and receiver. The transmitter must be set to the same channel as the receiver in order for them to communicate.

Network ID

This sets the ID of the Network that the transmitter will be joining. It must match the setting of the receiver in order for them to communicate.

Receiver Address

This sets a unique address number for your receiver. Later, when you set up your receiver you will again set the same number to receive readings from the corresponding transmitter unit(s). Each receiver must be set for a different number for your system to operate correctly.

NOTE

If you will be using more than one receiver unit in your area it is important to set the transmitter address numbers to be a corresponding number in your TC-Central software. See Examples below.

For the First Receiver:

Set the address on your transmitters to 101, 102, 103, 104, etc. Then set the address in your TC-Central software to match.

For the Second Receiver:

Set the channels on your transmitters to 201, 202, 203, 204, etc. Then set the address in your TC-Central software to match.

This numbering scheme can be expanded to match the number of receivers you are using.

Gauge Address

This sets a unique address number into your transmitter. Later, when you set up your measurement software you will use this address setting to receive readings from the corresponding unit(s). Each transmitter must be set for a different address for your system to operate correctly.

Wireless Transmission Rate

This will program your device to transmit 1 data reading to your receiver at a specified time interval. Available settings are 2, 3, 4, 5, 10, 15, 20, 25, 30, 45, 60, 75, 90, 105, or 120 seconds.

Section 7 - DPG409 Design for CE Conformity

7.1 DPG409 Analog Output Grounding

The DPG409 is supplied with an analog output cable and accompanying grounding hardware. The figures below specify the wiring and procedure required to properly ground your DPG409 unit.

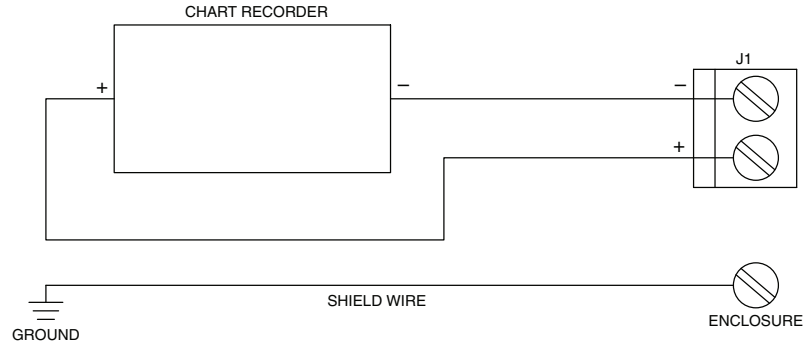


Figure 7-1. Analog Output Wiring Example

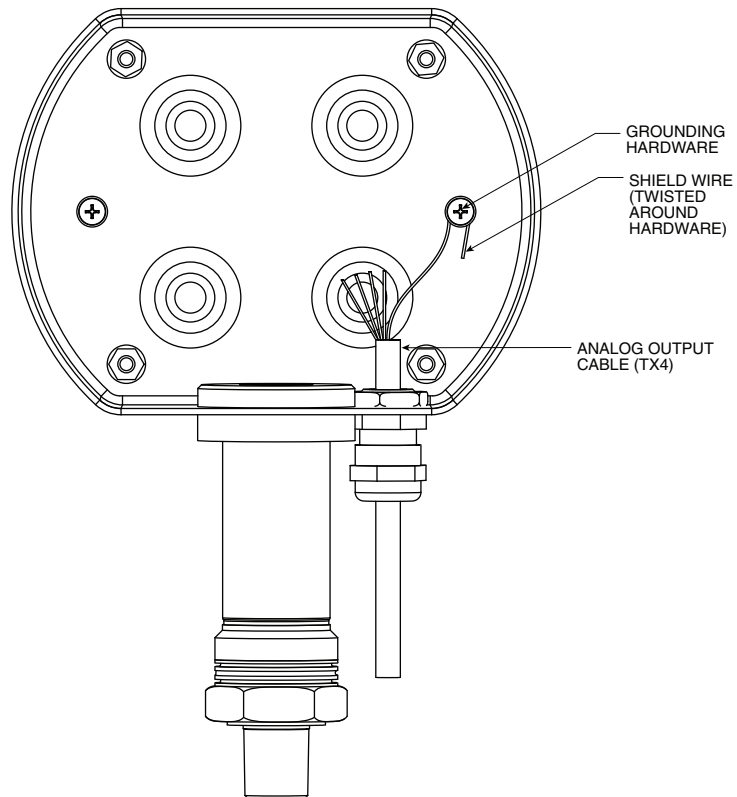


Figure 7-2. Analog Output Grounding Example

1. Slide the cable through strain relief and tighten the compression fitting in order to seal the cable.
2. Locate the screw and washer on the hole and tighten them enough to establish a thread engagement.
3. Twist the grounding wire around the screw and under the washer.
4. Tighten the screw in order to secure the wire.

7.2 Ferrite Cores

All models of the DPG409 Digital Pressure Gauge have been designed to meet requirements as outlined in European Community EMC Directive EN50081-1/EN50082-1. Two ferrite cores are included in your DPG409 package; you must install both ferrite cores in order to meet radiated immunity specifications. Refer to Figure 7-3.

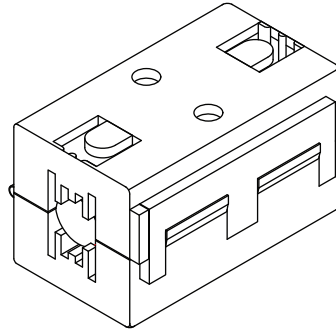


Figure 7-3. Ferrite Core

In order to conform to CE standards, the ferrite cores must be attached to the output cable of the DPG409 as shown in Figure 7-4.

NOTE:

The ferrite cores **MUST** be secured on opposite ends of the output cable.

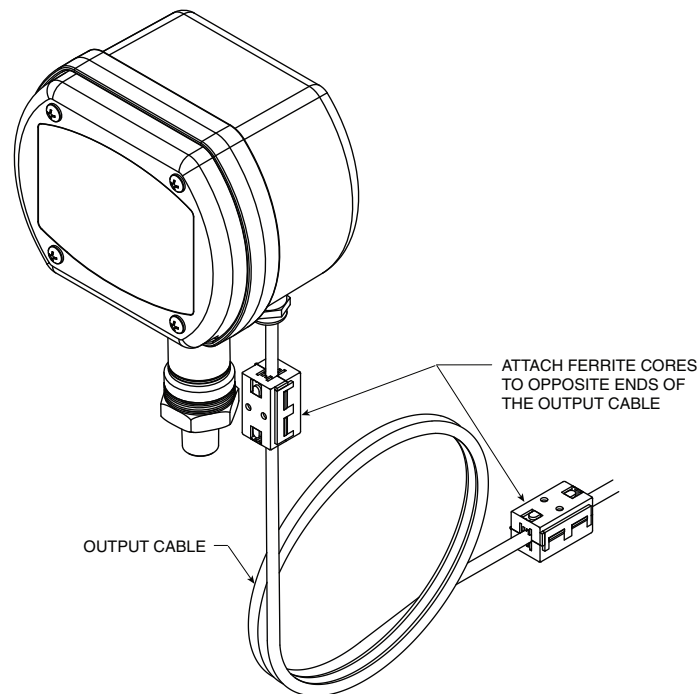


Figure 7-4. Ferrite Core Installation

Section 8 – Service & Calibration

Your DPG409 Pressure Sensor has been built, tested and factory calibrated to meet or exceed the specifications listed here in this manual. Information is provided below on how to have your unit returned for service.

If your meter requires service or factory re-calibration, please call our Customer Service Department at 1-800-872-3963. They will assist you in arranging the return of your meter. We can also be reached on the Internet at www.omegadyne.com, e-mail: info@omegadyne.com.

Section 9 – Specifications

GENERAL

Accuracy:	±0.08% BSL Includes Linearity, Hysteresis, and Repeatability (±0.15% for analog output)
Ranges:	10 inH ₂ O through 5000 psi
Storage Temp:	-40 to 82°C (-40 to 180°F)
Operating Temp:	-18 to 66°C (0 to 150°F)
Temp Corrected:	Yes
Overpressure Gage Pressure:	10-in H ₂ O: 10 times span
1 psi:	6 times span
2.5 psi to 3500 psi:	4 times span
5000 psi:	15,000 psi max
Overpressure Absolute Pressure:	5 psia: 6 times span
2.5 psia to 3500 psia:	4 times span
5000 psia:	15000 psi max
Secondary Containment Gage/ Diff/ Vac/ Compound:	10 in-H ₂ O to 5 psi: To 1000 psi
15 to 1000 psi:	To 3000 psi
1500 to 5000 psi:	To 15,000 psi
Absolute/ Barometric:	5 to 1000 psi: To 6000 psia
1500 to 5000 psi:	To 15,000 psia
Display Type:	LCD with selectable backlight
Display Digits:	4 digits, 9999 counts
Character Height:	25.4 mm (1.0")
Computer Interface:	USB (one programming cable included)
Sample/ Display Rate:	1/second default, user adjustable from 1/0.38 sec to 1/30 sec.
Power:	One 3.6V lithium, 4.8 Ah capacity (C-cell) included (Two with wireless model) (Omega Replacement Part No. BATT-C-3V)
Battery Life (Typical):	See Section 6.4
Analog Output:	User Selectable 0-5 Vdc, 0-10 Vdc, 4-20 mA (Requires external power supply to operate)
Enclosure:	316 Stainless Steel Housing, ABS Center Gasket
Enclosure Finish:	Electropolished
Enclosure Rating:	NEMA 4X
Wetted Parts:	316 SS
Pressure Port Size:	1/4-18 NPT Male
Connection:	Lower

WIRELESS OPTION SPECIFICATIONS

Transmit Sample Rate:	User programmable from 1 sample / 2 minutes to 1 sample / every 2 seconds
Radio Frequency (RF) Transceiver	
Carrier:	ISM 2.4 GHz
RF Output Power:	10dBm (10 mW)
Range of RF Link:	Up to 120 m (400') Outdoor line of sight. Up to 40 m (130') indoor / urban
Software (Included Free):	Requires Windows 2000, XP or Vista (32 bit)
Internal Battery:	Two 3.6V lithium, 4.8 Ah capacity (C-cell) included
Data Transmitted to Host:	Pressure reading, ambient temperature reading, RF transmit strength and battery level

SETTINGS (USB/ SOFTWARE)

Units:	psi, inHg, inH ₂ O, bar, mbar, hPa
Lock:	Allows for front button "lock-out"
Alarms:	User selectable "high" and "low" alarm limits
Analog Output:	User selectable scaling
Backlight:	On/Off, 10 sec, 30 sec, 1 min, 5 min
Wireless Transmitter: (Optional)	Channel number, transmission rate, alarms, sensor offset, chart recording, data logging
Calibrate:	Zero and span

Section 10 – Approvals, Regulatory Compliance

NOTE:

All approvals outlined in this manual are based on testing that was done with antennas that are supplied with your meter. Removing and/or installing a different antenna will void the product compliance demonstrated in these documents.

10.1 FCC (Domestic Use)

For United States: FCC ID: OUR-XBEEPRO

For Canada: IC #4214A-XBEEPRO

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1.) This device may not cause harmful interference. 2.) This device must accept any interference received, including interference that may cause undesired operation.

WARNING:

To satisfy FCC RF exposure requirements for mobile transmitting devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during device operation. To ensure compliance, operations at closer than this distance is not recommended. The antenna used for this transmitter must not be co-located in conjunction with any other antenna or transmitter.

10.2 International Usage & CE Marking

NOTE:

It is your (the user's) responsibility to insure that these products are operated within the guidelines here in this manual and in conformance with all local, state, federal or national regulations and laws of the country they are being operated in.

NOTE:

Transmitting Power - Your Wireless Series System Components have been designed, manufactured and tested so that the transmitting power of your wireless meter will not exceed 10 dBm.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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- ☑ Immersion & Band Heaters
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- ☑ Industrial Water & Wastewater Treatment
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