



CYPRESS
ENVIROSYSTEMS



Wireless Gauge Reader

User Manual

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1.0 Introduction

Thank you for purchasing the patent-pending Wireless Gauge Reader, WGR. Please read this guide thoroughly before using the WGR.

The WGR is not a stand-alone product. See Section 3.3, Related Products, for details.

2.0 Safety Precautions

- Do not immerse the WGR in water.
- Always wear personal protective equipment appropriate to the system the WGR is being installed on.
- Do not try to repair yourself as it contains no user-serviceable parts. Contact a qualified service technician for repairs. See Section 10.0, Support, for details.

3.0 Description of the WGR

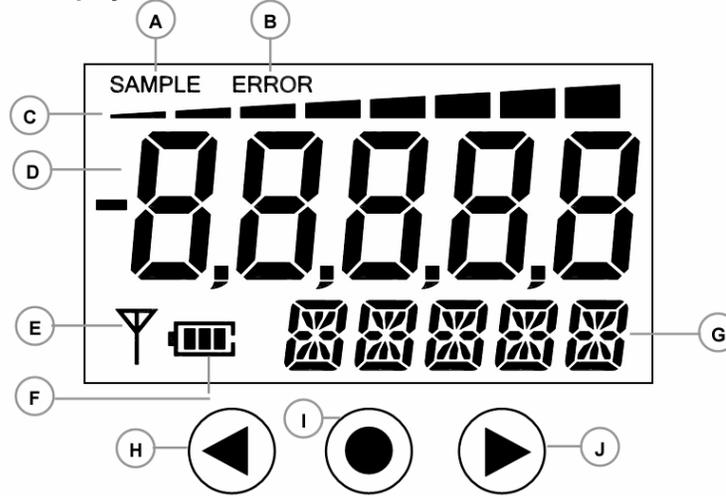
The Cypress EnviroSystems Wireless Gauge Reader, WGR, is designed to read manual gauges and transmit the data to a PC or data acquisition system. The WGR is designed to be non-invasive. It is attached over the face of an existing analog gauge, as shown below. Each WGR comes with an adapter that is sized for the gauge it is reading. Adapters range in size to fit over gauge faces that are 1.5" to 4.6" in diameter.



WGR display

The WGR optically reads the gauge face and wirelessly transmits the reading. This value is displayed locally on the LCD. A representation of the LCD is shown below.

LCD Display and Push Buttons



- | | |
|---------------------------------|--|
| A. SAMPLE Icon | Displayed when a new reading is being captured and converted |
| B. ERROR Icon: | Displayed when an error condition is detected |
| C. Bar Graph | Indicates percent of full-scale reading |
| D. Numeric Display | Displays the converted reading value |
| E. Antenna Icon | Displayed when wireless communication is successful |
| F. Battery Level | Displays percentage of battery life remaining |
| G. Alpha-numeric Display | Displays the reading units or diagnostic messages |
| H. Left Button | Selects alternate display modes |
| I. Center Button | Requests an immediate updated reading |
| J. Right Button | Selects fast update rate diagnostic mode |

The battery operated WGR is specifically configured to the gauge that it is reading. During installation, the WGR is positioned per the owner specifications. The WGR can be positioned at an offset to the gauge. For example, a gauge could be mounted sideways on a system, but the WGR could be positioned upright for easier reading. Once the WGR is in position, it is secured in place for calibration. The range of the gauge, units of measure, and any offsets are entered into the WGR. The WGR is calibrated by a trained installation technician, and ready for use.

3.1 Sample Collection

Samples are collected one of three ways.

Manual instantaneous reading. The user can physically take a reading at the WGR.

Routine data collection. A routine sampling interval between 1 and 65000 seconds can be programmed into the WGR. When the WGR is on, this is the sampling interval that data will be collected.

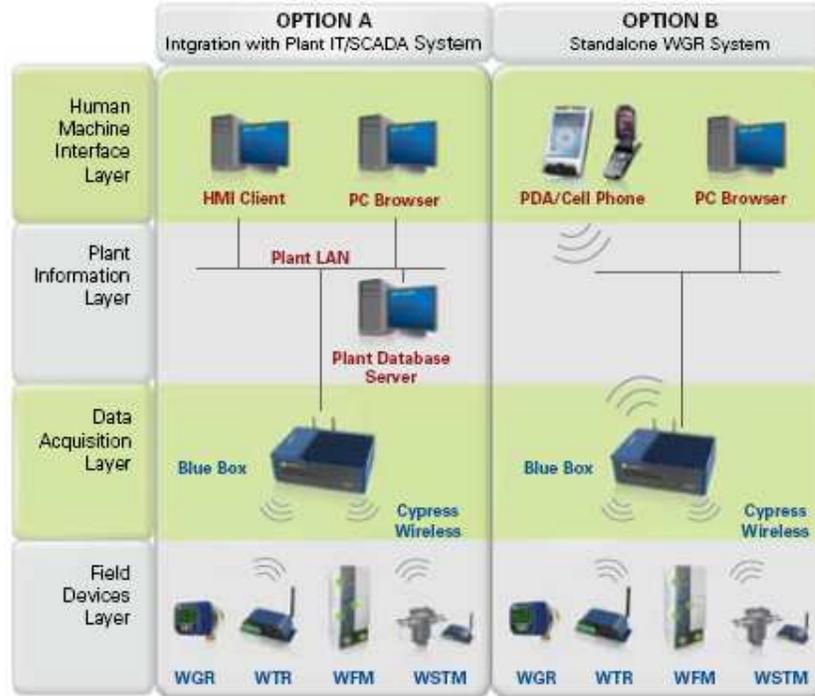
Pre-programmed short term data collection intervals. Each WGR comes with two pre-programmed data collection intervals. These are short term intervals of data collection that override the routine data collection rate. They are intended to be used for troubleshooting, or during known events when the user might want to change the sampling rate for a short period of time.

See Section 5.0, Operation, for detailed instructions.

The reading is transmitted wirelessly through the Cypress Envirosystems Monitoring System.

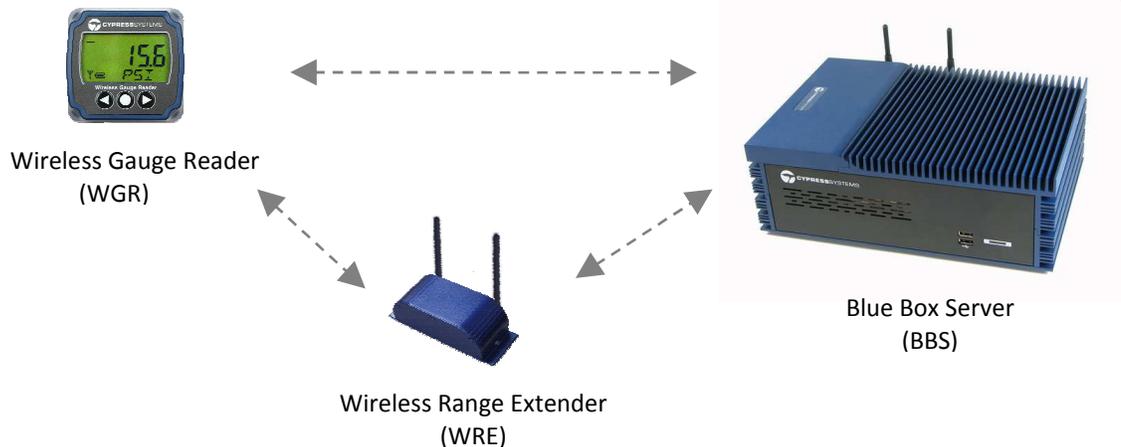
3.2 Cypress Envirosystems Monitoring System

The Cypress Envirosystems Wireless Gauge Reader is part of the Cypress Envirosystems Monitoring System. This system can be setup one of two ways:



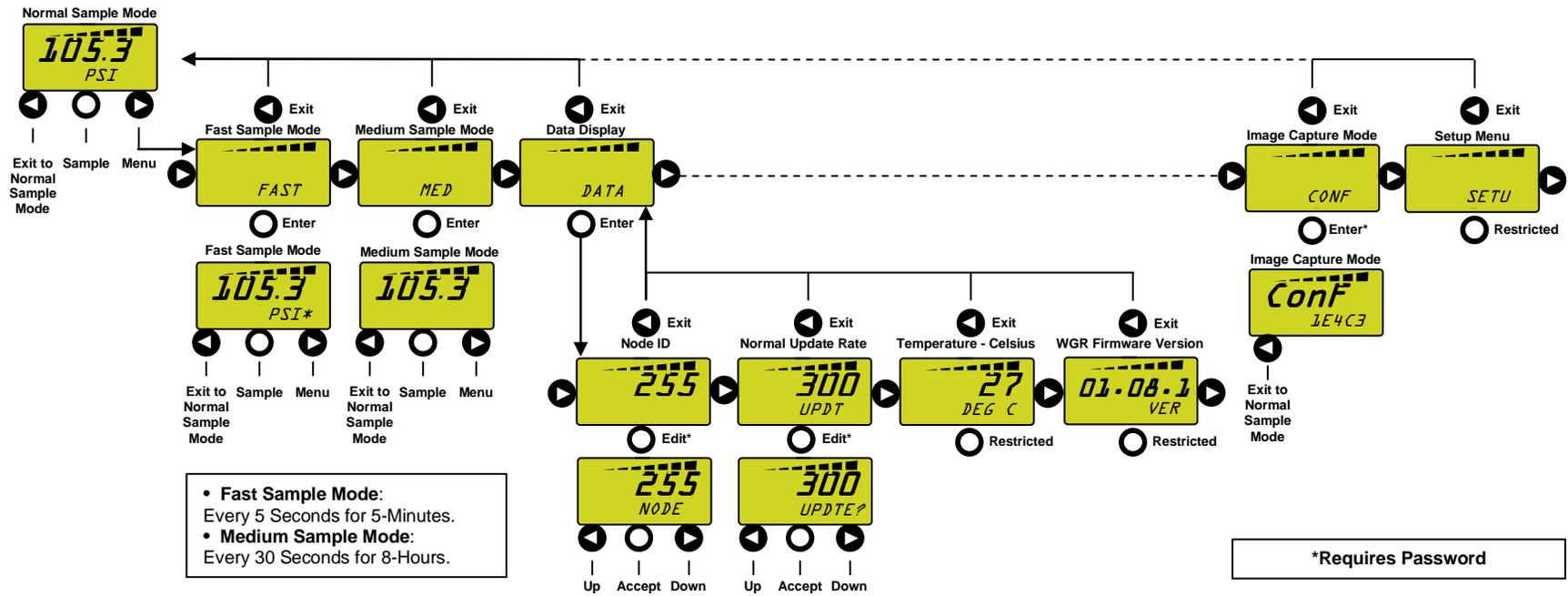
3.3 Related Products

The WGR sends data to the Cypress Envirosystems Blue Box Server, which stores the data in a SQL server. The WGR can communicate directly to the Blue Box Server, or through Wireless Range Extenders.



3.4 WGR LCD Menu Flow Chart

The following flow chart displays all the menu options.



4.0 Setup

4.1 Components

The WGR comes with the following components:



WGR



Adapter



Clamp

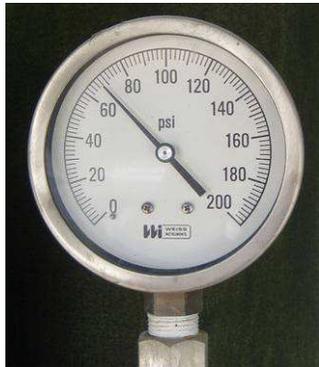
Note: The WGR may come attached to the adapter, or separate, as defined by the part number.

Ensure the adapter is correctly sized for the gauge face. Custom adapters are shipped with WGRs, based on the gauge information provided at the time of purchase.

4.2 Installation Overview

Step 1. Verify gauge functionality

1. Ensure that there are no blockages between WGR and gauge face (stickers, marks, etc.).
2. Use an appropriate cleaning agent, such as isopropyl alcohol to clean the gauge face. Also, make sure there are no deep scratches on the gauge window.
3. For liquid filled gauges, please make sure the gauge is filled completely.



Clean Gauge



Dirty Gauges

Step 2. Verify WGR functionality

Turn on the WGR if it is in deep sleep (if the display is off).

1. Press “●” “●” “▶” “◀” “●” sequence of buttons in succession, within 5 seconds.
2. The WGR display should say BOOT.
3. Once boot-up is complete, display should show 0.0 along with the ERROR icon.

Check functionality of the WGR.

1. Press “●” to take a reading.
2. A red light at the back of the WGR should flash, and the SAMPLE icon on the LCD will briefly flash.
3. The display will still most likely indicate an error (small ERROR icon), since the WGR has not yet been calibrated for a gauge. This is normal behavior.

Step 3. Mounting the WGR

1. For a panel mounted gauge, you must first adhere a panel mount adapter to the panel.
 - a. Ensure that the WGR mounting adapter and the panel mount adapter are the proper size for the gauge.
 - b. Clean the panel surface with isopropyl alcohol to ensure there is no dirt or oil that would prevent good adhesion.
 - c. Remove the backing from the Dual-Lock ring on the panel mount adapter.
 - i. Make sure that both sides of the dual-lock rings are still fastened to the adapter, for easier installation.
 - ii. Do not peel the Dual-Lock ring off of the adapter and attempt to install it separately from the panel mount adapter.
 - d. Carefully line up the panel mount adapter centered around the gauge, and press it onto the panel for several seconds applying pressure to create a good bond.
 - e. If required, the adapter can be removed from the panel by separating the Dual-Lock material, but it is better to avoid this since it may weaken the VHB adhesive bond, and may weaken the Dual-Lock bond.
2. Ensure that the proper size mounting adapter is fastened to the WGR main housing by holding it up to the gauge or panel mount adapter collar.
 - a. Loosen the clamp to make sure it is not prematurely compressing the adapter mounting fingers
 - b. Determine if silicone bands or “shims” will be required for the adapter to properly grasp the gauge.
 - i. No silicone bands should be used when fastening to a panel mount adapter.
 - ii. Better adhesion is obtained if at least one thin silicone band is used to mount to a free standing gauge.
 - iii. Some gauges have a very narrow lip around their face, and it is helpful to build up 1-2 silicone bands next to the lip to give the WGR adapter a wider surface to grasp securely.
 - c. The fingers of the adapter should not have to flex outward very far in order to fit around the gauge, since this configuration is not very secure.
 - i. Select a larger adapter, if this is the case.
3. Using the adapter, place the WGR over the analog gauge or panel mount adapter.
 - a. The adapter should be slid onto the gauge at least 1cm (3/8 in) past the front face of the gauge to ensure a secure grasp around the circumference of the gauge body.
 - b. If using a panel mount adapter, the mounting adapter should be slid completely onto the panel mount adapter collar.
 - c. Position the WGR as desired, typically with the LCD oriented perfectly horizontal for easy human readability.
 - d. The WGR does not need to be directly aligned with the direction of the gauge. For example, a gauge that is mounted sideways can have a WGR mounted vertically so that the LCD display can be read easily.



WGR being placed on gauge that is facing sideways

4. Tighten the clamp around adapter to secure the WGR to the gauge or panel mount adapter.
 - a. The clamp should be even with the edge of the adapter for optimal performance.
 - b. Be careful not to over tighten the clamp.
 - c. Ensure that the WGR is securely mounted before proceeding to the next step.

CAUTION: Always wear appropriate PPE when working on live lines.

5.0 Operation

There are various functions that can be performed both through the web interface and at the WGR. This section describes how to perform functions at the WGR.

5.1 Configuration

Configuration of the WGR must be performed by a qualified service technician. See Section 10.0, Support, for details.

The service technician will configure and calibrate the WGR to the specific gauge parameters (range and units). The WGR supports the following units.

- PSI, bar, mbar, kPa, MPa, inHg, mmHg, inH₂O, ftH₂O, cmH₂O, mmH₂O, kg/cm²
- Deg F, Deg C
- Volts, mVolts, uVolts
- Amps, mAmps, uAmps
- Blank

Additional units can also be supported as needed. Please contact us for more information.

5.2 Turning the WGR On and Off

On

1. Press “●” “●” “▶” “◀” “●” sequence of buttons.
2. WGR display should read BOOT.
3. Once boot-up is complete, display should show 0.0.

Off

1. Press “▶” to access menu.
2. Press “▶” until the bottom right side of the display reads SETUP.
3. Press “●” to select this option. The next screen should ask for the password and read PSWD?.
4. Press “●” “●” “▶” “◀” “●” sequence of buttons. The bottom right side of the display should read SHIP.
5. Press “●” to select this option. The LCD should read SHIP briefly, and then turn off.

5.3 Setting Sampling Rates

Manual instantaneous reading

To take a one-time reading, press the “●” button. The WGR will show SAMPLE in the top left corner. When SAMPLE disappears, the reading on the LCD will be updated.

Routine data collection

Whenever the WGR is on, it samples based on the routine data collection rate. This rate is between 0 and 65535 seconds, or approximately 18 hours. This value is defined by the user, and can be changed at the WGR.

1. Press “▶” to access the WGR menu.
2. Press “▶” until the bottom right side of the display reads DATA.
3. Press “●” to select this option. Press “◀” if you need to cancel and return to the main screen.
4. Once in the DATA menu, press “▶” until you reach the UPDTE submenu.

5. Press “●” to edit the update rate. ** This feature is password protected. **
6. Enter the WGR password.
7. The bottom right side of the display should read UPDTE?
8. Use the “◀” and “▶” to change the update rate and press “●” to save the change and return to the UPDTE menu.

Preprogrammed short term data collection intervals.

In addition to the routine data collection rate, there are two pre-programmed short term data collection intervals associated with the WGR, FAST and MED (medium).

FAST

The FAST sample mode collects data at a 5-second interval for a 5-minute duration. While the WGR is in the FAST sample mode, the units of data will have an “*” at the end.

1. Press “▶” to access the WGR menu. The bottom right side of the display should read FAST.
2. Press “●” to select this option. Press “◀” to cancel and return to the main screen.
3. Press “●” during the modified sample mode to cancel and return to the normal sample mode.

MED

The MED sample mode collects data at a 30-second interval for an 8-hour duration. While the WGR is in the MED sample mode, the units of data will have an “m” at the end.

1. Press “▶” to access the WGR menu.
2. Press “▶” again. The bottom right side of the display should read MED.
3. Press “●” to select this option. Press “◀” to cancel and return to the main screen.
4. Press “●” during the modified sample mode to cancel and return to the normal sample mode.

5.4 Accessing Node Identification Data

Each WGR has a unique NODE ID identifier. This NODE ID is a value between 0 and 255 and is used to identify the data within the database and the web interface. The NODE ID is assigned when the WGR is configured. Changing the NODE ID at the WGR will impact the ability to collect data at the server. However, viewing the NODE ID of the WGR will make it easy to differentiate one WGR from another, should they get mixed up.

1. Press “▶” to access the WGR menu.
2. Press “▶” until the bottom right side of the display reads DATA.
3. Press “●” to select this option.
4. The NODE ID will show on the display.
5. Press “●” to edit the NODE ID. ** This feature is password protected. **
6. Enter the WGR password.
7. The bottom right side of the display should read NODE?
8. Use the “◀” and “▶” to change the NODE ID and press “●” to save the change and return to the NODE menu.

5.5 Accessing Informative Data Parameters in the WGR

Several data parameters can be viewed, but not edited in the WGR’s DATA menu. The following parameters are available:

1. Node ID
2. Firmware Version
3. Internal Temperature

Follow these steps in order to access the parameters in the DATA menu:

1. Press “▶” to access the WGR menu.
2. Press “▶” until the bottom right side of the display reads DATA.
3. Press “●” to select this option.
4. Press “▶” to scroll through different data parameters until you reach VER.
5. The firmware version of the WGR will show on the display.
6. Press “◀” to exit the menu and return to the normal operating display screen, or if no button is pressed for 10 seconds, the WGR will automatically return to the normal operating display screen.

5.6 Configuration and Setup Menus

The CONFIG and SETUP menus are primarily restricted and for use by qualified service technicians to configure and install the WGR. With the exception of turning off the WGR, both menus are access restricted.

6.0 Care and Maintenance

6.1 Calibration

Calibration is performed when WGR is configured during installation. Calibration is performed based on the position of the WGR with respect to the gauge face.

Re-calibration not required if the WGR is not removed from gauge or the position of the WGR with respect to the gauge face is not shifted.

If the WGR is removed from gauge face, contact a service technician to re-calibrate the WGR. Simply repositioning the WGR on the gauge may result in erroneous readings. See Section 10.0, Support, for contact information.

6.2 Battery Life

Each WGR comes with two lithium batteries. Battery status can be monitored on the LCD of the WGR, or through the user interface connected to the Blue Box Server. Battery change-out must be performed by a qualified service technician. See Section 10.0, Support, for contact information.

The battery life of the WGR is dependent on the sampling frequency. Typical ranges are listed below.

<u>Sampling Frequency</u>	<u>Estimated Battery Life</u>
1 sample per 5 minutes	1 year
1 sample per 15 minutes	2 years
1 sample per hour	3 years
1 sample per day	3.5 years

7.0 Troubleshooting

The WGR will not turn on.

Please contact a qualified service technician. See Section 10.0, Support, for contact information.

The WGR display shows ERROR in the upper left corner.

The ERROR message appears on the LCD when the WGR is having a problem obtaining a reading from the gauge. Common causes for this are:

- i) The WGR has been moved from its configured position.

- (1) If you think the WGR has been moved or knocked out of place, contact a qualified service technician to re-calibrate the WGR.
- (2) If the WGR is installed on equipment that is prone to vibration, the WGR may have slipped out of place. Contact a qualified service technician to re-secure and re-calibrate the WGR.
- ii) There WGR is having difficulty reading the gauge due to obstruction or vibration
 - (1) If the gauge is installed outdoors, condensate buildup inside the gauge itself may impact the WGR from obtaining a good reading. If possible, install a liquid-filled gauge and have the WGR re-installed and re-calibrated.
 - (2) If the gauge has multiple needles, the WGR may have an issue identifying which needle to read. Try to install a gauge with only one needle. This issue should be raised by the service technician during installation.
 - (3) If the gauge only has one needle, but there is nothing to distinguish one end of the needle from the other, the WGR may have problems obtaining a reading. If possible, install a gauge that has a different type of pointer. This issue should be raised by the service technician during installation.
 - (4) If the equipment that the gauge is monitoring causes the gauge needle to vibrate very rapidly (such as some compressors), then the WGR may have difficulty capturing a clean reading from the gauge. In this case, please replace the gauge with a dampened or liquid-filled gauge to slow the motion of the needle. Then have the WGR re-installed and re-calibrated by a qualified service technician.
- iii) The pointer of the gauge has broken.

In some cases, gauges that are installed on equipment that are prone to vibration can break needles. If you suspect this is the problem, contact a qualified service technician. If you remove the WGR yourself to determine if this is the issue, you will still need to have the WGR re-calibrated.
- iv) The wireless connectivity of the WGR to the server is weak.

In some cases, the wireless signal strength of a WGR to the server is affected by facility changes. Weak connectivity from the WGR to the server will cause an error message. The ERROR message should also be associated with a missing ANTENNA icon in the lower right hand corner of the LCD. Contact a qualified service technician if this problem occurs.

If you have additional problems, please contact us. See Section 10.0, Support, for contact information.

8.0 Technical Specifications

Gauge Compatibility	Most gauges from 1.5" to 4.64" (38mm to 114mm) diameter
Gauge Mounting	Adapters with removable clamps
Data Capture Rate	User-configurable: 1 sample per 5 seconds to 1 sample per 18 hours
Accuracy	± 1.5% of full scale gauge reader (e.g. ± 1.5 psi for 0 to 100 psi pressure gauge)
Wireless Frequency	2.4GHz Direct Sequence Spread Spectrum, 50mW peak output
Wireless Range	Up to 1150 ft (350 m), high interference immunity, extendable with repeaters
Wireless Protocol	Cypress Semiconductor's highly optimized industrial DSSS radio and protocol. Integrates robust security, antenna and frequency diversity, optional encryption and minimal interference with existing wireless systems (for additional details, please see FAQ at www.cypressenvirosystems.com)
Approvals	FCC Class B compliant, RoHS, ETSI compliant
Power Supply	Two 3V lithium batteries
Battery Life	>1 year @ 1 sample per 5 min, >3 years at 1 sample/hour (approximate)
Vibration	Up to 4G rms
Humidity	10-99%RH, non-condensing
Operating Temperature	-4°F to 158°F (-20°C to 70°C)
Storage Temperature	-40°F to 176°F (-40°C to 80°C)
Enclosure	IEC IP66 compliant (outdoor, water resistant)

Housing Material	ABS with UV inhibitors
Display	LCD display (for manual reading)
Dimensions	2.6" x 2.6" x 1.3" (65mm x 65mm x 33mm)
Weight	0.33lbs (150g) including batteries

9.0 Product Disposal

The WGR is recycled by Cypress EnviroSystems. Contact a service technician or Cypress EnviroSystems headquarters to recycle the WGR. See Section 10.0, Support, for details.

10.0 Support

For additional support, including configuration, maintenance, and troubleshooting, please contact us.

Cypress EnviroSystems
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+1 888 987 3210
Email: cys_support@cypress.com

11.0 Warranty Information

Every product comes with a full one-year parts and labor warranty. Cypress EnviroSystems monitoring of battery status, product status, and potential communications packets are included during this period, so that proactive service can be provided to our customers.