Global Water

Instrumentation, Inc.

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Water Level Sensor: WL400

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11/30/09

Global Water
800-876-1172 • globalw.com

Congratulations on your purchase of the Global Water WL400 Water Level Sensor. This instrument has been quality tested and approved for providing accurate and reliable measurements. We are confident that you will find the sensor to be a valuable asset for your application. Should you require assistance, our technical staff will be happy to help.

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I. Sensor Checklist

a. Water Level Sensor

b. Water Level Sensor Manual

II. Inspection

a. The water Level sensor was carefully inspected and certified by Global Water's Quality Assurance Team before shipping. If any damage has occurred during shipping, please notify Global Water Instrumentation, Inc. and file a claim with the carrier involved.

Use the checklist to ensure that everything needed to operate the water Level sensor was received.

III.   Sensor Installation

General

a. Water Level sensors have many applications and therefore many installation options. All the sensors are fully submersible and may be suspended by their waterproof cables in the water to be monitored.

b. **Do not install the water Level sensor in applications that contain solvents**. Over time, many solvents can deteriorate the cable and the sensing element.

c. Install the water Level sensor so that it is easily accessible for calibration purposes. Take care not to kink the cable. This will close the vent tube that the sensor uses to compensate for barometric changes. Also be aware that the sensor may need to removed and reinstalled in the future, so plan ahead!

d. The sensor will not function correctly if mud, silt, leaves, or other debris buries it. Install the sensor in a way that will avoid these conditions.

e. All Global Water water level sensors produce a 4-20 mA output signal. 4-20 mA is an industrial standard signal for process control monitoring. Most PLCs (Programmable Logic Controller), RTUs (Remote Telemetry Unit), and data acquisition systems accept this signal directly.

f. The power wire (red wire) must be connected to positive supply terminal of the data logger or of the battery. The 4-20mA signal wire (black wire) is connected to the data logger's input terminal. If the sensor is equipped with the optional temperature output circuit,

connect the output wire (white wire) to a second input terminal on the logger in the same way as the level output.

g. If the system only accepts voltage signals, the sensor output must be converted to a voltage signal by reading the voltage across a precision resistor in series with the signal wire. Since Ohms Law states that V = IR, if the 4-20 mA signal is dropped across a 250 ohm resistor, the output will be 1 to 5.00volts DC. If the 4-20 mA signal is dropped across a 125 ohm resistor, the output will be halved to 0.5 to 2.50 VDC. The resistor is placed between this input and the ground terminal of the data logger's battery. The optional temperature output produces a 0-10mA output current, generating either 0-2.50 volts or 0-1.25 volts depending on the resistor selected.

h. The sensors may be manually pulsed on or turned on by the logging system prior to taking a reading. Use a warm up time appropriate to the water Level sensor being used to assure that the sensor is fully on. The sensors can run continuously for real time applications. Each sensor draws between 4 and 20mA depending on whether the sensor is reading at the minimum or maximum of its range. The optional temperature output will draw additional current up to the maximum 10mA.

Groundwater

i. The sensor may be suspended in a 2" monitoring well near the well screen.

Surface Water

j. The sensor may be submerged at the monitoring point and hung from its cable. It is recommended to protect the sensor inside a 4" PVC drainpipe that will act as a protective stilling well. Put a cap on the bottom end of the pipe to allow easy water flow past the sensors. Drop the sensor until it touches the bottom of the stilling well and then pull it up slightly and secure the cable.

Sewer Flow Option

k.   The WL400 Sewer Pipe Flow Option includes a level sensor built into a protective "mouse" housing and attached to a 12" stainless steel strap. The sensor/straps can be installed at the invert of a sewer or in a pipe, the cable can be attached to a sewer's stair rungs and run to the data monitoring device.

l.   When installed in a pipe that is under 12" diameter, the steel straps spring into the pipe, holding the sensor in place. Additional fasteners are usually not required for this type of installation.

m. For a sewer pipe over 12" diameter, the sensor's steel straps must be mounted into the pipe. The straps can be secured with molly or concrete bolts, or with marine-grade epoxy.

IV.   WL400 Specifications

Sensing element:

Sensor Element:	Silicone Diaphragm, Wet/Wet Transducer
Range:	0-3', 0-15', 0-30', 0-60', 0-120', 0-250'
	Optional Temp: 32°-122°F (0°-50°C)
Linearity and Hysteresis:	±0.1% FS
Accuracy:	Level: ±0.1% FS at constant temperature
	±0.2% over 32° to 70°F range
	Temp: Smaller of 0.5°F or ±1% of reading
Overpressure:	2 x full scale range
Resolution:	Infinite (Analog)
Outputs:	4-20mA ±1mA at full scale
	Optional Temperature: 0-10mA ±1mA FS
Supply Voltage:	10-36VDC
Current Draw:	Sum of sensor outputs.
Warm Up Time:	10mS Min, 3 sec. recommended
Operating Temperature:	0° (Not Frozen) to +185°F
Compensated Range:	32° to 70°F submerged, automatic barometric compensation

Housing:

Material:	WL400: 304L Stainless Steel
	WL400-S: 316 SS
Size:	WL400: 7.5" long x 0.82" diameter
	WL400-S: 9" long x 1.0" diameter
Weight:	WL400: 110g (4 oz)
	WL400-S: 250g (9oz)

Cable:

Conductors:	4 each 22 AWG
Jacket Material:	87A shore hardness Polyurethane
Optional jacket:	Fluorinated Ethylene Propylene (FEP) Teflon

Cable O.D.:	7.8mm (0.307")
Vent tube:	HD Polyethylene
Shield:	Aluminum Mylar
Temperature range:	-30 to 85°C (-22 to 185°F)
Weight:	~65g/m (0.7 oz/ft)

a. The sensor is a two-wire sensor using the red wire for power and the black wire for the output signal. **Warning: Always connect the sensor with the power turned off.**

b. The water level sensor may be stored without any special provisions. Place the sensor inside a bag to keep the sensor clean and store on a shelf or hang it on a wall.

c. To check the water level sensor calibration the following supplies are needed:

1 column of water (the closer the depth is to the maximum range of the sensor the better the calibration will be)
1 power supply
1 current meter
Connecting wires as necessary

Connect the sensor to the power supply and current meter in the following way. Attach the black wire to the positive input of the current meter. Connect the ground terminal of the power supply to the ground of the current meter. Attach the red wire to the positive terminal of the power supply. See Appendix B. **Warning: Always connect the sensor with the power turned off.**

See Appendix A for the water level calibration worksheet.

V. Maintenance

a. Global Water recommends verifying the sensor's calibration with a sounder or other measuring device once every 6 months.

b. The screen on the end of the sensor must be periodically checked for clogging from mud, sludge, and other debris. Wash the screen with clean water and/or scrub it gently with a toothbrush. Do not insert objects through the screen, as this may cause damage to the sensor.

VI. Trouble Shooting

Issue: Sensor reading incorrectly
a. Verify power source is supplying the correct voltage.
b. Verify that the vent tube has not been kinked or sealed. The sensor uses this tube to compensate for barometric pressure changes.
c. Clean the sensor following the maintenance instructions.
d. Verify the sensor's calibration.

Issue: Water in the vent tube
a. If water gets into the vent tube of the cable place it next to a heater for 24 hours to dry the inside of the cable.

Other issues
a. Call Global Water for tech support: 800-876-1172 or 916-638-3429 (many problems can be solved over the phone). Fax: 916-638-3270 or Email: **globalw@globalw.com**.

When calling for tech support, please have the following information ready;

1. Model #.
2. Unit serial number.
3. P.O.# the equipment was purchased on.
4. Global Water's sales number or the invoice number.
5. Repair instructions and/or specific problems relating to the product.

Be prepared to describe the problem being experienced including specific details of the application, installation, and any additional pertinent information.

b. In the event that the equipment needs to be returned to the factory for any reason, please call to obtain a RMA # (Return Material Authorization). Do not return items without a RMA # displayed on the outside of the package.

Clean and decontaminate the WL400 if necessary.

Include a written statement describing the problems.

Send the package with shipping prepaid to our factory address. Insure the shipment, Global Water's warranty does not cover damage incurred during transit.

XI.   Warranty

a.   Global Water Instrumentation, Inc. warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment from factory. Global Water's obligations under this warranty are limited to, at Global Water's option: (I) replacing or (II) repairing; any products determined to be defective. In no case shall Global Water's liability exceed the products original purchase price. This warranty does not apply to any equipment that has been repaired or altered, except by Global Water Instrumentation, Inc., or which has been subject to misuse, negligence or accident. It is expressly agreed that this warranty will be in lieu of all warranties of fitness and in lieu of the warranty of merchantability.

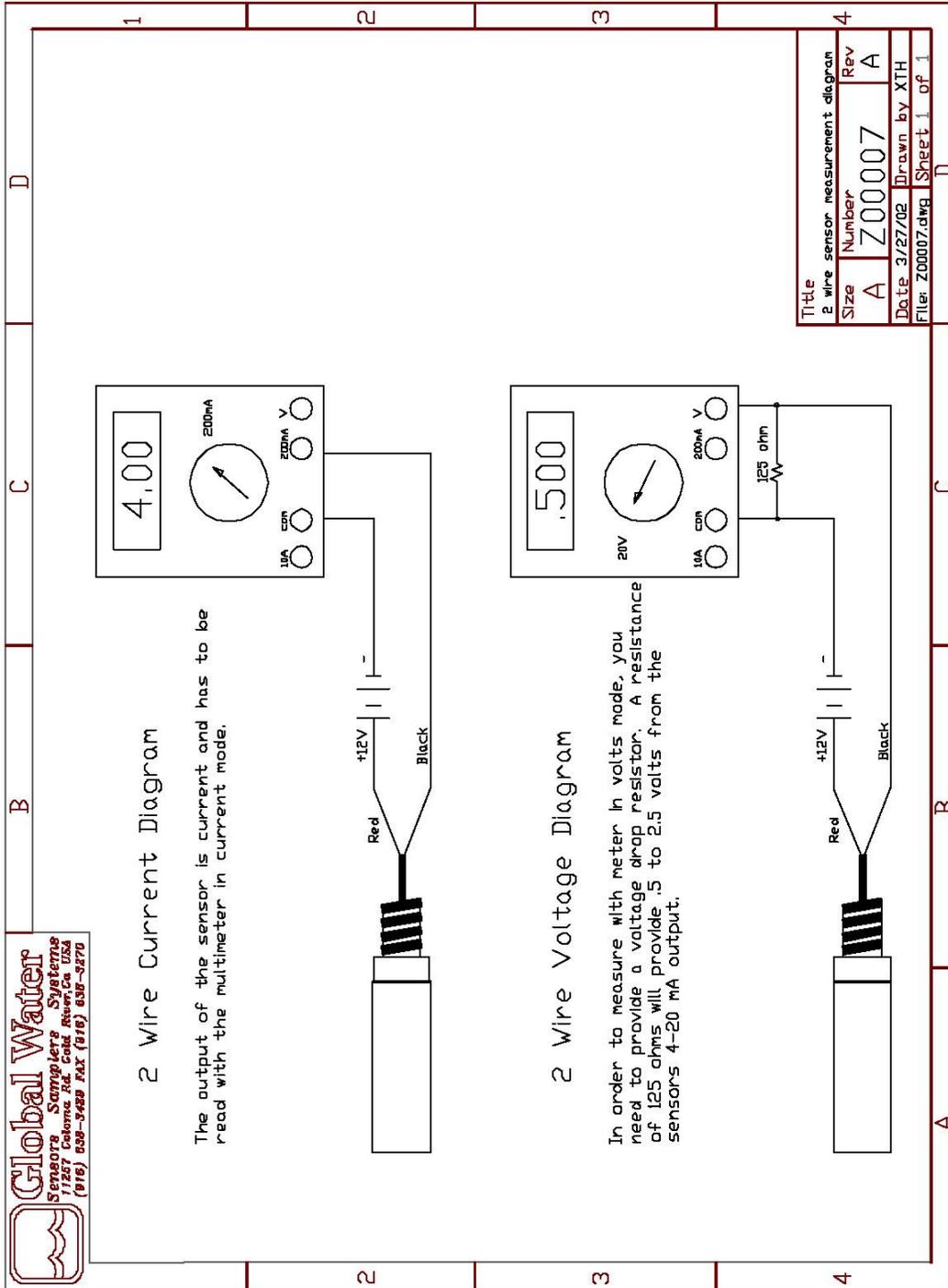b.   The warranty begins on the date of the product's invoice.

XII.   Appendix A: Calibration Procedures

Step 1)   Turn on the power supply and the current meter.

Step 2)   Record the output current of the sensor, I_L = _____.

Step 3)   Place the water level sensor into the column of water.

Step 4)   Record the depth of the sensor (the distance from the tip of the sensor to the top of the column of water, W = _____, and record the output current of the sensor, I_H = _____.

Step 5)   Subtract I_L from I_H, $I_H - I_L$ = _____ = C.

Step 6)   Find the maximum current output for the sensor. (C/W)(Max Range of sensor)+ I_L= _____ = Output current.

Step 7)   Use these new current values to recalibrate the system that is monitoring the sensor output.

XIII.   Appendix B: 2 Wire Sensor Measurement Diagram

2 Wire Current Diagram

The output of the sensor is current and has to be read with the multimeter in current mode.

2 Wire Voltage Diagram

In order to measure with meter in volts mode, you need to provide a voltage drop resistor. A resistance of 125 ohms will provide .5 to 2.5 volts from the sensors 4-20 mA output.

Title	2 wire sensor measurement diagram		
Size A	Number Z00007		Rev A
	Date 3/27/02	Drawn by XTH	
	File: Z00007.dwg	Sheet 1 of 1	

Declaration of CE Conformity

Global Water Instrumentation, Inc.
11390 Amalgam Way
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FAX: 00 1 916 638 3270

Phone: 00 1 916 638 3429

declares that the Product:

Product Name: Water Level Sensor

Model Number: WL400

conforms to the following European Council directives:

Low Voltage Directives: 2006/95/EC; Requirements covering all health and safety risks of electrical equipment operating within certain voltage ranges.
According to the following standards:
EN61010-1: 2001

Electro-Magnetic Directives: 2004/108/EC; Requirements to prevent electrical and electronic equipment from generating or being affected by electromagnetic disturbances.
According to the following standard:
EN 61326-1: 2006

Global Water hereby certifies that the product stated above conforms to all directives and standards required for it to bear the CE mark.

Dale Daniel
Engineering Manager
Global Water Instrumentation, Inc.