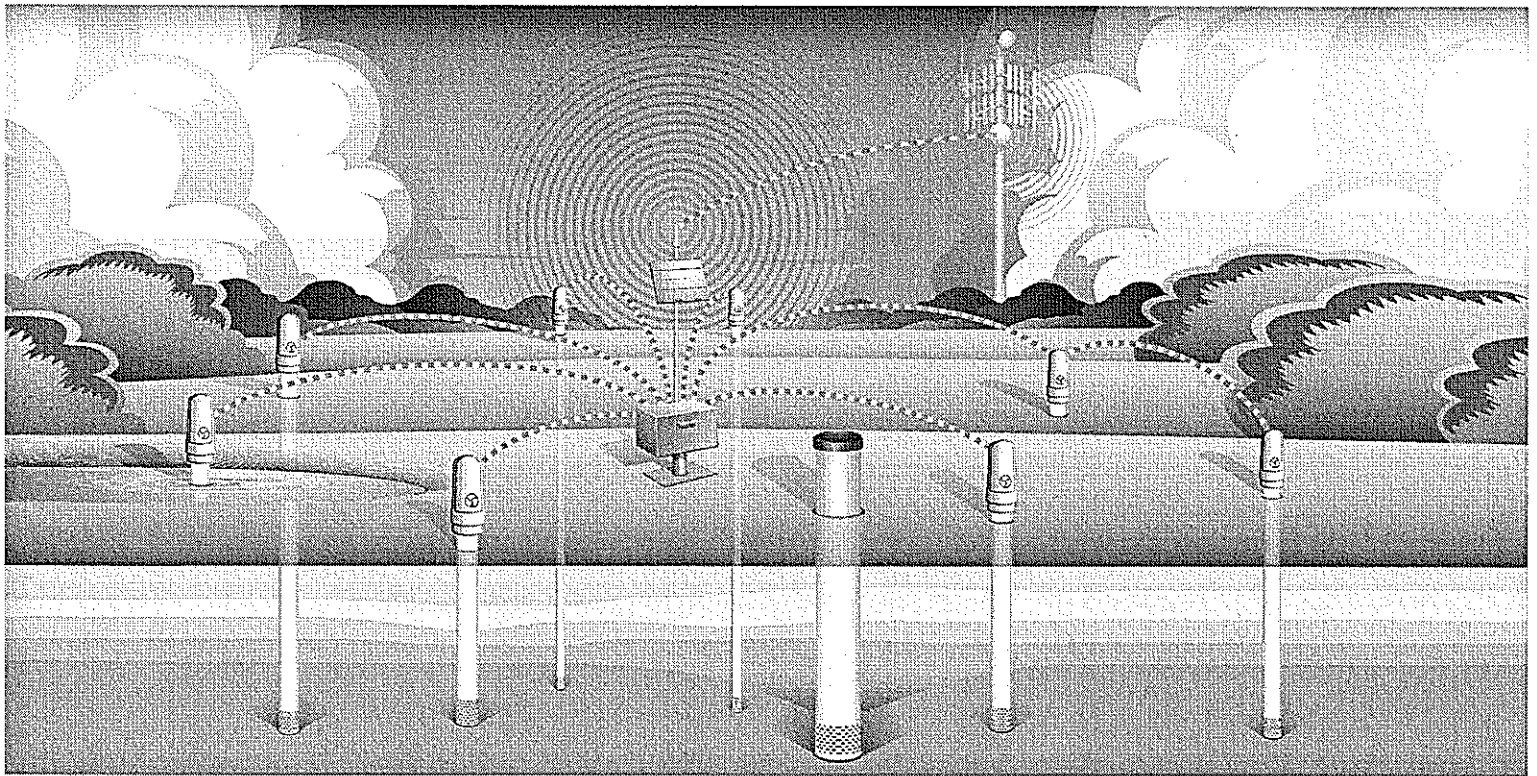


TRUEBLUE™ RMS

REMOTE MONITORING SYSTEM



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FIELD INSTALLATION GUIDE

Ver 1.0, October 2012

TruBlue[™] RMS User's Manual

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1.introduction:

want more info?

You can visit our website at www.meas-spec.com for information on our latest product releases, application notes, product specifications and certifications. We also welcome your questions and comments and strive to reply promptly. Please e-mail us at sales@meas-spec.com.

have questions?

This manual provides extensive guidance for everything from setup through maintenance. If you have questions concerning any of our products, call (757) 766-1500 or 1-800-745-8008 Monday through Friday between 8 a.m. and 5 p.m. Eastern Standard Time to speak with an application engineer for your industry.

need products/accessories?

For your convenience, orders may be placed online by visiting our e-commerce website, www.LevelandPressure.com. You can also call 1-800-745-8008 to speak to a sales representative.

additional manual and guides

This manual is part of a family of TruBlue™ RMS resource documents that includes:

- [TruBlue™ RMS IT User's Manual](#)
- [TruBlue™ RMS Field Guide Installation Guide](#)
- [TruBlue™ RMS Quick-Start Guide](#)

You can download these manuals at www.meas-spec.com, or you can request printed copies by calling 1-800-745-8008.

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2. TruBlue™ RMS Overview

what TruBlue™ RMS can do for you

A TruBlue™ Remote Monitoring System (RMS) implementation (Figure 1) makes gathering essential data on water levels more cost effective and less labor intensive. The TruBlue™ RMS eliminates the need for regular physical visits to individual wells or other monitoring sites. Depending on the nature of the system being replaced, the monetary and labor savings achieved with a TruBlue™ RMS implementation can be significant. Savings and efficiencies are achieved by:

- Allowing users to perform remote readings from Transducers instead of having to physically go to each well or other monitoring site to collect the data
- Enabling consolidation of multiple cell service accounts to just one per Gateway, thus realizing significant savings every billing cycle
- Providing a comprehensive, systematic approach to collecting level data

FIGURE 1 | TYPICAL TRUBLEUE™ RMS IMPLEMENTATION

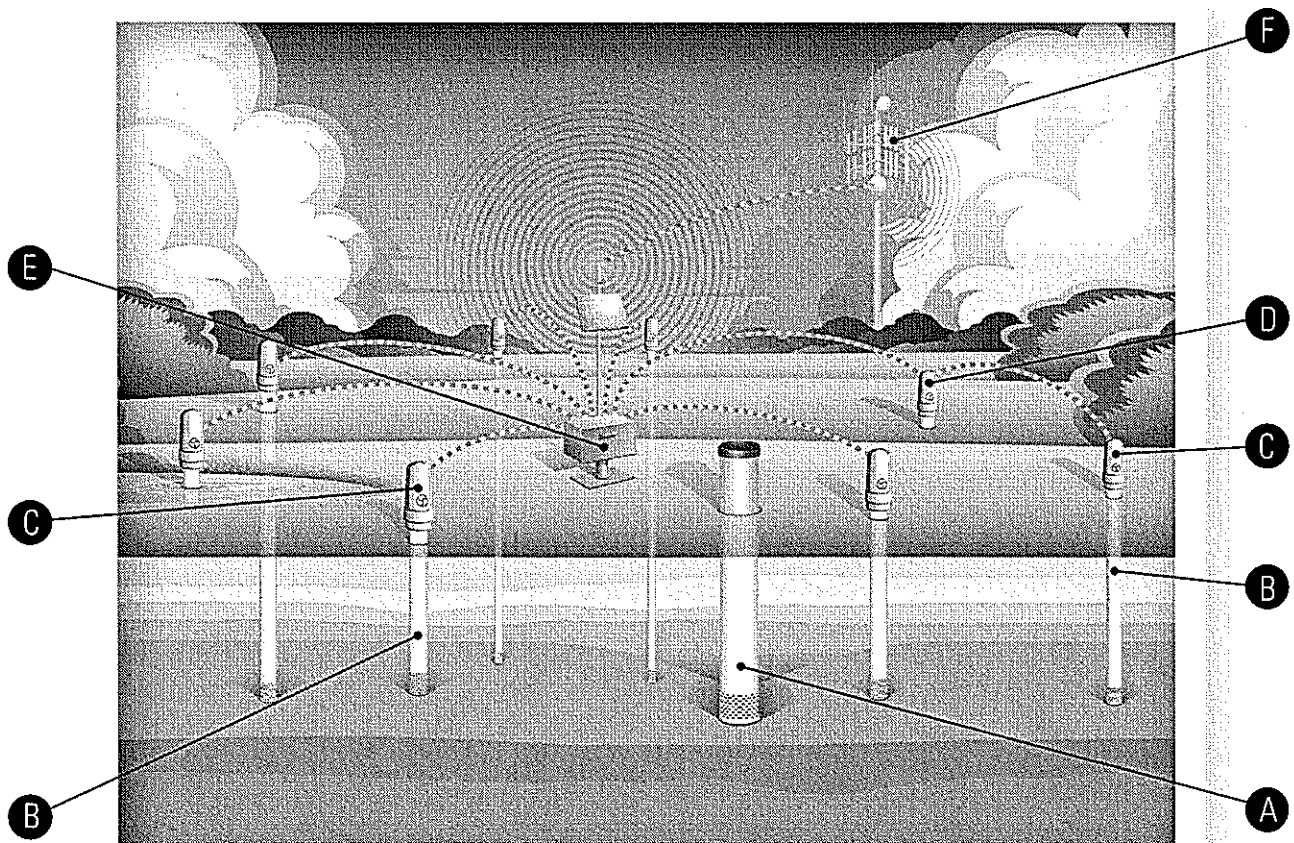


Figure 1: (A) Production well; (B) Wells housing Transducers for monitoring groundwater levels; (C) Nodes; (D) Repeater; (E) Gateway; (F) Cell tower

how it works

The primary TruBlue™ RMS hardware components are the Transducer, the Node and the Gateway. Nodes are fully encased, waterproof devices that are easy to install at the top of the well or body of water. Compatible Transducers, which typically ship with cables of custom length, plug in via serial interface to the bottom of the Node.

Nodes have several functions. First, they power and control up to four connected Transducers. Second, Nodes transmit collected data to the Gateway via a built-in, 900-MHz radio frequency (RF) transceiver operating in the unlicensed ISM RF band.* A built-in, magnet-activated Wi-Fi interface enables on-site technicians (within 10 feet of the Node) to schedule Transducer readings and configure other essential components of the system using a laptop, electronic tablet or other mobile device.

The Gateway acts as a data collection and transfer hub. It receives RF data from multiple Nodes, then transmits the information via cell modem to an Internet-based listener application, where it is stored. The TruTel™ software application is used to access the stored Transducer data.

The Repeater could be considered a fourth RMS hardware component; however, it is actually just a reconfigured Node. Repeaters are used to extend RF signal range where necessary to enable Node data to reach the Gateway. Positioning a repeater between the Node(s) and Gateway may be required in situations where the distance or the terrain between Node(s) and the Gateway result in insufficient RF signal strength.

* This unlicensed ISM band is limited to North American use.

system components

The TruBlue™ RMS comprises four main hardware components:

FIGURE 2 SYSTEM COMPONENTS

component	function	details
Transducer:	Measures temperature, level, and/or conductivity on a schedule as programmed from the Node	- Models for use with RMS are: TruBlue™ Transducers, plus the KPSI 500, 501, 350, 351, 353 & 355 - No onboard memory required because it communicates directly with (and is powered by) the Node
Node:	- Controls, powers and collects data from up to 4 connected Transducers - Transmits data via RF to the Gateway - Provides on-site control with Wi-Fi-capable mobile device	- Powered by 8 internal D cell batteries - Non-volatile flash memory - Built-in RF transceiver - Ad-hoc Wi-Fi network built in, with embedded Web page interface
Repeater:	Positioned to extend radio signal range from nodes to the Gateway	- Optional, used as needed to extend range to gateway - A repeater is just a well Node (the same hardware) that is configured differently
Gateway:	- Receives data via RF from multiple Nodes - Transmits the data via cell modem (or wired connection) to an Internet-based server	Powered externally, typically with solar cells and rechargeable batteries

additional hardware

- Antennas
- Antenna cables (coaxial)
- Lightning or surge suppressors
- Interface cable assemblies for KPSI Model 500, 501, 351, 353, 355 and TruBlue™ family Transducers

tips on designing your TruBlue™ RMS system

Here are some general guidelines to consider when designing your RMS system:

- The Gateway device can be installed with a wide array of options. It can be installed outdoors and bracketed to a pole with access to a suitable power source or solar panels; in most cases near or inside a pump house that would most likely have the necessary power requirements.
- Although the line of sight range is one mile, placing the Gateway inside a building will reduce this distance (unless the antennas are placed outside and fed through the wall to the Gateway). If placing the Gateway inside a building, you can choose to use high-gain antennas, which will assist with signal strength.
- Before placing a Gateway in a pump house or control building it is important to understand the existing wireless radio signals that are in place to detect possible interference.

about the TruTel™ listener software

While this manual focuses on hardware components (field installation and setup), TruBlue™ RMS is a comprehensive solution that includes the TruTel™ Web-based server and data management software. Please see the TruBlue™ RMS IT User's Manual (companion manual to this document) for more information about setting up the server and using the TruTel™ software.

3. preparation for field installation

This section offers practical tips, advice and checklists to help make sure you're fully prepared to proceed with your TruBlue™ RMS field installation.

things to do before Gateway installation

These tasks will help ensure a smooth setup process.

TIP One important piece of information required for configuration of the Gateway is the Internet-visible IP address and port number assigned to the TruTel™ listener software. This will typically be determined by your IT department. Entering this address in the first box of the Gateway Custom Configuration screen, as described in Figure 6 below, allows the Gateway to communicate with the TruTel™ software.

GATEWAY CELL CONFIGURATION:

The TruBlue™ RMS Gateway is available to support both common 3G cell network technologies; CDMA (used by Sprint and Verizon) and GSM (used by AT&T and T-Mobile). The proper Gateway (CDMA or GSM) needs to be specified when you place your TruBlue™ RMS order based on your intended cell provider's network technology. Before your TruBlue™ RMS Gateway can be put into use, the cell modem interface will need to be configured to operate with your selected cellular service provider. In the case of GSM networks, a SIM card provided by your carrier will need to be installed.

INSTALLING THE SIM CARD (GSM NETWORKS ONLY)

1. Disconnect power to the Gateway.
2. Open the clear cover of the Gateway enclosure.
3. On the larger assembly in the Gateway, remove the two black thumb screws found on the right side of the assembly (the end with the 'SIM' label) and the end plate they secure. See Figure 3.

FIGURE 3 GATEWAY ASSEMBLY

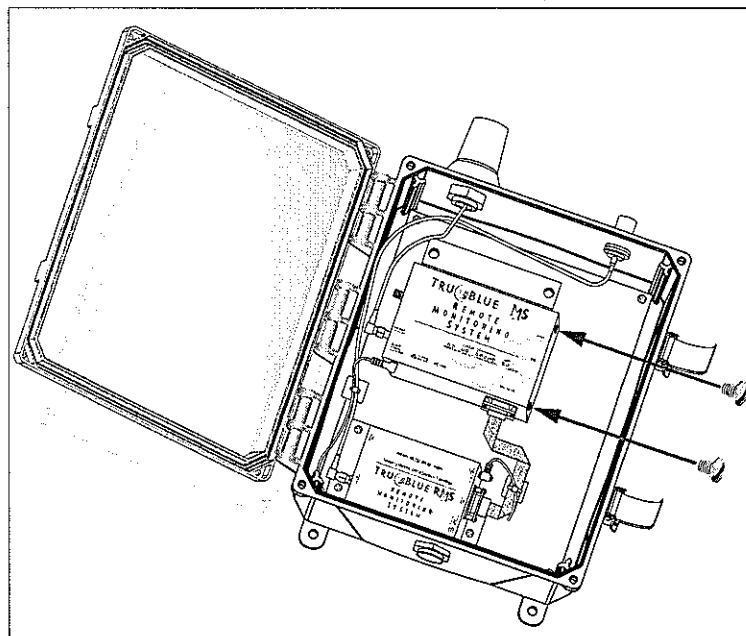
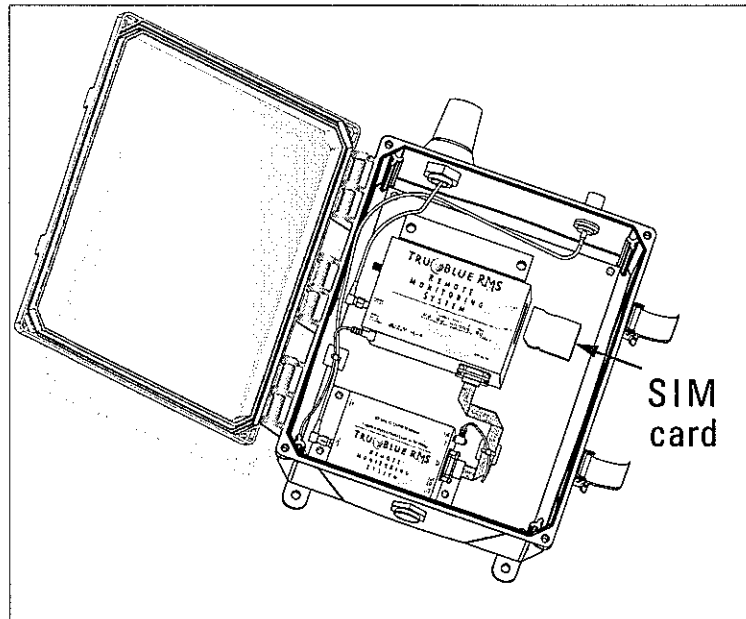


FIGURE 4 SIM CARD INSTALLATION

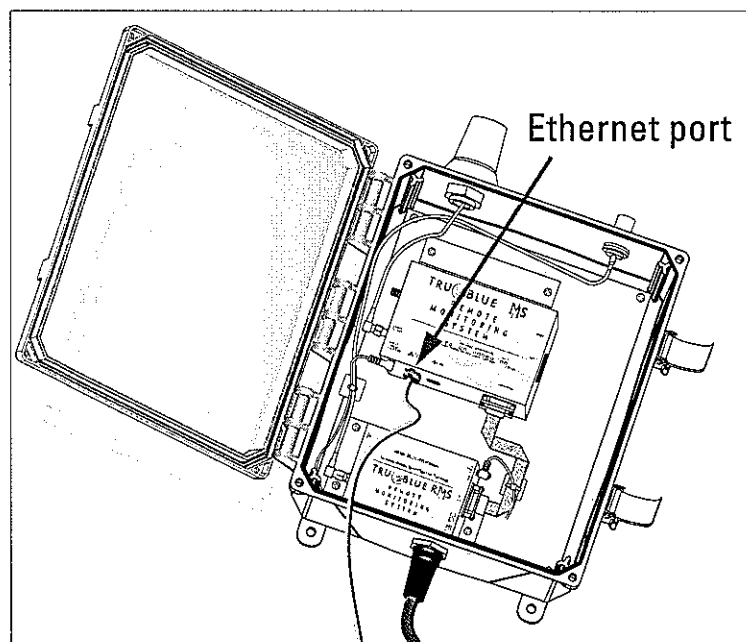
4. Turn the SIM so that the gold electrical contacts are facing DOWN. Install the SIM into the top SIM slot on the side of the case. It will gently snap into the spring-loaded cavity. See Figure 4.
5. Put the end plate back in its proper position and reinstall the thumb screws.



CONFIGURATION

1. Attach an Ethernet cable to the RJ-45 connector port on the bottom side of the larger assembly (labeled ETHERNET on the top label). See Figure 5. The other end of the Ethernet cable should either be plugged directly into your PC/laptop or into your company network connection.
2. Apply power to the Gateway.
3. Run the Gateway Cell Configuration Utility provided on the RMS software CD.

FIGURE 5 ETHERNET CONFIGURATION



GSM

1. When prompted, type in the **APN provided** by your service provider.

CMDA

1. When prompted, type in the **network configuration** parameters provided by your service provider. This will include items described as:
 - Service Programming Code
 - Mobile Directory Number
 - MSID
 - Network Access Identifier (NAI)
 - Password
 - Primary HA
 - Secondary HA
 - HA-SS password
2. Click the **Complete** button and the required configuration settings from your service provider will be programmed into the RMS Gateway.
3. Click the **Test** button to verify proper communications over your cell link.

CONFIGURE THE GATEWAY:

1. If not still connected from the previous step, connect the Gateway to a laptop or desktop computer using an Ethernet cable plugged into the laptop/desktop and the larger module in the Gateway (Figure 5).
2. Use the Gateway Cell Configuration Utility application (provided along with the TruTel™ software) to display the IP address of the Gateway.
3. Open a Web browser. In the address bar, type in xx.xx.xx.xx/custom_ config where xx.xx.xx.xx is the IP address of the Gateway as reported by the Gateway Cell Configuration Utility. The Gateway Custom Configuration page will be displayed by the Gateway in the browser (Figure 6).
4. Enter the settings as outlined below:
 - (A) Gateway Name: Enter a user friendly name to identify the gateway (no spaces).
 - (B) Server URL: Enter the Internet-visible IP address of the TruTel™ listener software provided by your IT department.
 - (C) Server Port: Used for TCP/IP communication. Use the default setting of 9872 unless otherwise instructed by your IT department.
 - (D) Gateway Radio Address: A unique identifier that enables the use of multiple Gateways. (Default setting is 1)
 - (E) Gateway Radio Baud: Data transmission rate for RF transmissions. The default rate of 9600 baud is recommended in order to maximize RF range.
 - (F) IP CONNECTIVITY: Select **Mobile** if using the cell modem.
 - (G) TIME ZONE: Select your correct time zone.
5. Click the **Submit** button (H) to program the changes into the Gateway. Once complete, "Submitted Successfully" will be displayed (Figure 7).

FIGURE 6 GATEWAY CONFIGURATION SCREEN

TRUEBLUE™
Gateway Custom Configuration

Gateway Name	Southside	A
Server URL	98.190.245.141	B
Server Port	9902	C
Gateway Radio Address	1	D
Gateway Radio Baud	9600	E
IP Connectivity	Wired	F
Time Zone	Eastern	G
Log Length	1200	
Log Level	DEBUG	
File Download Error Limit	3	
Gateway MAC	00:40:9D:44:00:9B	
Gateway Firmware Version	2.14.1.6	
Gateway Application Version	1.3.2	
Server Connection Interval	600	
Mobile Signal Strength	-105 dBm	
Mobile Registration Status	0, Not Registered	
Mobile ICCID	unknown	
submit		H
Contact Server		

IMPORTANT Settings (D) and (E) above – Gateway Radio Address (D) and Gateway Radio Baud (E) – must match the equivalent settings entered when configuring the Node (See page 19) in order for the two devices to communicate with each other.

CONFIRM THE CELL LINK

TIP To test your settings, click on the **Contact Server** button (I) at the bottom left of the Gateway Custom Configuration screen. A "Submitted Successfully" message confirms that your settings are configured correctly to allow the Gateway and the TruTel™ software to communicate.

FIGURE 7 SUBMITTED SUCCESSFULLY CONFIRMATION

Submitted Successfully

TRU BLUE™

Gateway Custom Configuration

	Southside
	98.190.245.141
Server Port	9902
Gateway Radio Address	1 :
Gateway Radio Baud	9600 :
IP Connectivity	Wired :
Time Zone	Eastern :
Log Length	1200
Log Level	DEBUG :
File Download Error Limit	3 :
Gateway MAC	00:40:9D:44:00:9B
Gateway Firmware Version	2.14.1.6
Gateway Application Version	1.3.2
Server Connection Interval	600
Mobile Signal Strength	-105 dBm
Mobile Registration Status	0, Not Registered
Mobile ICCID	unknown
submit	

things you'll need when installing the Gateway.

A POWER SOURCE

- Typically a solar-powered rechargeable battery
- A 24 amp-hour battery capacity at 12 volts is recommended
- If you are going to power it from line power, you will need a 12 volt/0.500A power supply
- Average power load is 0.25A at 12V

A CABLE TO CONNECT THE POWER TO THE GATEWAY

- A 3-foot power cable is provided with each Gateway (PN 857-60100)
- You may want to add an extension depending on your setup

A LOCATION AND HARDWARE TO MOUNT THE GATEWAY

- This could be a panel, a baseplate, a wall or other mounting surface
- Preparation of mounting surface could include cutting to size, drilling holes to accept your mounting screws or bolts.

A LOCATION, PLUS CABLES AND REQUIRED HARDWARE, TO MOUNT YOUR ANTENNA

- You will need low loss 50 ohm RF cables that mate to N-type female RF connections found on the Gateway and the 900 MHz antenna (PN 856-61100, 856-61200 and 856-61300)
- You should also install a surge suppressor with the antenna cables to protect the Gateway from lightning damage (PN 800-60100).
- You will also need a panel, wall or pole to mount the antenna on.

things you'll need when installing a Node

- Fully charged cordless drill
- Drill bit -- 5/8" minimum, 3/4" preferred
- Crimp tool for splice terminals (SDI-12 Transducers only)
- 8 D cell batteries per node (if not already installed)
- The provided magnetic dongle for "waking up" the Node's Wi-Fi network (PN 830-60300)
- The provided hitch pin (PN 830-60200)
- A lock to secure the hitch pin (padlock, key lock, etc.)
- A Wi-Fi-capable laptop or other mobile device that supports ad hoc networking* (smart phone, tablet, etc.) and that has a Web browser application
- Selected Transducers with cable
- A docking ring with connecting link
- A cable hanger for each Transducer (PN 12-90-0931+)
- A reducer/converter to reduce from whatever size your well case is to 4"

* At this time all devices using the **Windows®**-based operating system and **Apple®** mobile devices support ad hoc networking.

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Apple® is a registered trademark of Apple Inc.

4.the Gateway

overview

The Gateway serves as the “transmission hub” for all the Nodes within RF range, enabling them to connect to the TruTel™ listener application. It uses an unlicensed 900-MHz RF transceiver to collect the water-level data that is regularly transmitted from one or more Nodes. That data can then be transmitted using the unit’s cell modem to the Internet and the TruTel™ listener application.

REMEMBER *A TruBlue™ RMS implementation is easily scalable in that multiple Nodes can be used in conjunction with a single Gateway unit, and multiple Gateways can be used if warranted by the distances and topography involved.*

install the antennas



WARNING *When installing antennas, do not work near or touch power or utility lines. Make sure antennas are properly grounded. Failure to follow proper precautions when working near utility lines can result in serious injury or death.*

install the Gateway at the field site

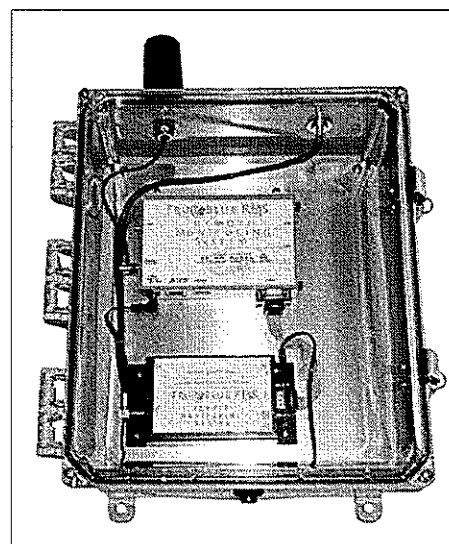
1. Mount the Gateway and 900 MHz antenna as appropriate for your installation. Ensure the Gateway is located so that it has sufficient cell signal levels.
2. Connect the antenna cables along with the surge suppressors and lightning arresters.
3. Attach the power cord to a continuously powered portion of the battery circuit.
4. Attach the power connector on the other end of the power cable to the Gateway.

TIP *To ensure proper power connector attachment:*

1. Rotate as needed until the notches align, allowing the connectors to partially mate.
2. Push on the connector outer ring while rotating clockwise until it aligns properly (the ring will slide forward slightly).
3. Push in the remainder of the connector body to fully engage the pins and sockets.
4. Rotate the outer ring clockwise (about 1/4 turn) until it locks into place.

5. Ensure components in the Gateway are on by verifying power LEDs. Also check the cell signal-strength indicators.

FIGURE 3 GATEWAY



5.theNode

overview

Designed to be easy to use, functional and secure, the TruBlue™ RMS Node is a device that fits on top of the well. It acts as the “brain” for up to four connected Transducers, controlling their sampling schedules and storing the resulting data in non-volatile onboard memory until it is transmitted to the Gateway, also on a regular schedule, and ultimately sent on to the TruTel™ listener software.



WARNING

This equipment is approved only for mobile and base station transmitting devices. Antenna(s) used for this transmitter must be installed to provide a separation distance of at least 30 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

REMEMBER

An RMS implementation is easily scalable in that multiple Nodes can be used in conjunction with a single Gateway unit, and multiple Gateways can be used if warranted by the distances and topography involved.

For purposes of initial setup, maintenance and troubleshooting, the Node can be controlled on-site by a field technician using a Wi-Fi-capable laptop or other mobile device.

Once initial setup is complete, the Node is designed to operate automatically for extended periods of time, and many of its functions (including Transducer scheduling) can be changed by the end user from within the TruTel™ listener software application.

installing the Node's batteries

1. With the hitch pin removed, unscrew the cover from the Node.
2. Install 8 D cell batteries into the Node and secure the velcro straps around them to hold the batteries in place. Make sure the batteries are making contact with each other and with the terminal.
3. Alternatively, if you are using external power, attach the power connector to the bottom of the Node through one of the circular Transducer connector ports. (See Appendix C)
4. Screw the cover back onto the Node. (Make sure it is screwed all the way on to ensure proper magnet alignment when activating the Wi-Fi feature.)

TIP You can confirm that the batteries are installed correctly by holding the provided magnet over the small embossed logo once the cover has been fully screwed back on. After 10 to 15 seconds you should hear a beep as the internal Wi-Fi is enabled. If you do not hear a beep, double-check the batteries to make sure they are installed correctly.

mounting the Node in the desired location

1. Place the docking ring at the top of the well case to ensure proper spacing.
2. Put the Node into position on top of the well case/docking ring, making sure that it's firmly in place.
3. Using the two circular cutouts on the Node as a guide, mark the location of the holes on the well casing. Remove the Node and drill holes through the well case (5/8" drill bit minimum, 3/4" preferred).

WARNING Before drilling, remove all Transducers from the well in order to avoid damaging cables.

installing the Transducer(s)

TIP The TruBlue™ RMS works with any Measurement Specialties digital level Transducer, including the TruBlue™ line and KPSI models 500, 350 & 351.

The description that follows is general. Please refer to the manual that came with your Transducer(s) for more detailed instructions and precautions regarding Transducer installation.

1. Remove the Node from the top of the well case. (If it is secured, this will involve unlocking and pulling out the hitch pin.)
2. From underneath, starting with Port 1, attach to the Node the appropriate Transducer interface cable(s) (PN 856-60100 for SDI-12 Transducers and PN 856-60200 for TruBlue™ Transducers).

TIP To ensure proper port connector attachment: 1. Rotate as needed until the notches align, allowing the connectors to partially mate. 2. Push on the connector outer ring while rotating clockwise until it aligns properly (the ring will slide forward slightly). 3. Push in the remainder of the connector body to fully engage the pins and sockets. 4. Rotate the outer ring clockwise (about 1/4 turn) until it locks into place.

3. If not already present, install the cable hanger (12-90-0931+) on the Transducer cable.

WARNING *A cable hanger or other suitable support is required to suspend your Transducer. Never suspend a Transducer only by the Node port connector.*

4. Connect the Node Interface Cable to the Transducer Cable.
 - For SDI-12 products (500, 350, 351) this requires installing butt splice crimps for the three like-colored wires.
 - For TruBlue™ Transducers, simply connect the two mating connectors.
5. Gently lower the Transducer into the well. Be careful to penetrate the water surface slowly and only to the depth necessary.
6. Install the SuperDry™ Vent Filter (Desiccant) or Aneroid Bellows (For Transducers with exposed cable vent tubes).
7. Put the Node back in position on top of the well case, securing it with the hitch pin and padlock. Make sure the bend on the hitch pin is turned up into recess of the Node top to ensure the Node top can not be unscrewed while the hitch pin is installed.

accessing the built-in Wi-Fi network

Each Node is equipped with a built-in Wi-Fi network that enables on-site wireless access to an embedded Web server. The server provides an interface comprising several html pages, viewable on a mobile device with a browser.

This wireless capability is used to:

- Configure and test the Node's radio communication link with the Gateway
- Assess system and battery health
- Configure connected Transducers and access stored sampling data

BEFORE ATTEMPTING TO CONNECT, MAKE SURE YOU HAVE:

- The provided magnetic dangle or fob, which activates ("wakes up") the Wi-Fi network
- A Wi-Fi-capable laptop or other mobile device that supports ad hoc networking* (smart phone, tablet, etc.) and that has a Web browser application

* At this time all devices using the **Windows®**-based operating system and **Apple®** mobile devices support ad hoc networking.

Windows® is a registered trademark of Microsoft Corporation in the United States and other countries.

Apple® is a registered trademark of Apple Inc.

TO ACCESS NODE SETTINGS AND CONTROLS VIA THE NODE Wi-Fi NETWORK:

1. "Wake up" the network by holding the magnet over the embossed logo on the Node casing until you hear a beep.
2. On your mobile device, look for the TruBlue™ RMS network in your list of available Wi-Fi networks.

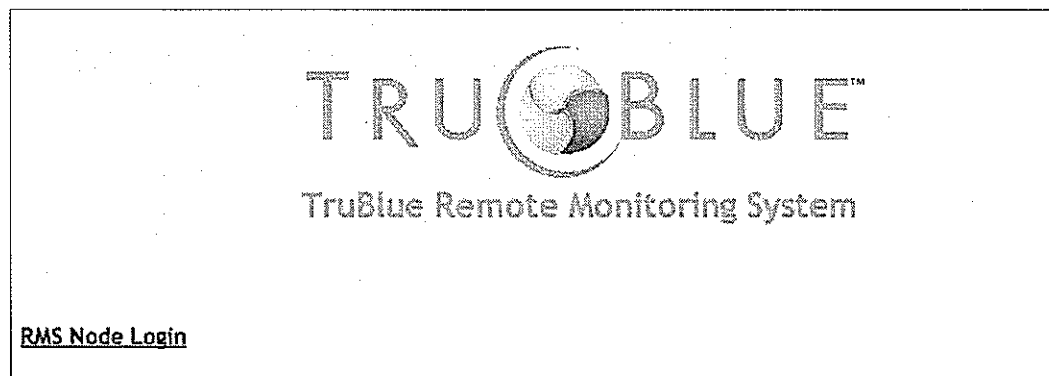
NOTE The network name will always be displayed as "TruBlue RMS (xxxx)" where xxxx will vary based on the Node radio unique hardware ID.

3. Connect to the "TruBlue RMS (xxxx)" WiFi network.
4. Open your browser of choice.
5. Type **192.168.10.10** into the browser address bar. (additional characters such as http:// are not required.)

TIP You may want to "bookmark" this IP address for easy future access. Unlike the Gateway IP address, this Node Wi-Fi IP address never varies.

6. You should now have access to the login page of the the Node interface (Figure 9). To proceed, click on the "**RMS Node Login**" link. If prompted to login, enter a user ID of "TruBlue" and password of "RMS." (This is case sensitive.)

FIGURE 9 THE NODE INTERFACE "LOGIN PAGE"



7. You are now at the "home page" of the Node webpage interface (Figure 10 below). This screen shows information on the Gateway to which the Node reports, and on any attached Transducer(s).

TIP The Transducer information displayed on this screen reflects the last known configuration and may not be accurate if attached Transducer changes have been made.

FIGURE 10 THE NODE Wi-Fi INTERFACE “HOME PAGE”



Remote Monitoring System

Version: 00.01.01.61

TruBlue RMS (731C)

Gateway configuration			
Gateway Address:	1		
Current Time	07-09-2012 11:54:31		
Check-in Interval	00:30	hh:mm	
Battery Level	11.216	Volts	

Gateway Setup

Port	Transducer		
1	Model 500 SN 902337	Setup/View	Calibrate
2	No Transducer Attached	Setup/View	Calibrate
3	No Transducer Attached	Setup/View	Calibrate
4	No Transducer Attached	Setup/View	Calibrate

Transducer Scan Refresh Page

setting up the Node to communicate with the Gateway

1. Access the Node Wi-Fi interface, as described above. After logging in, you will be presented with the interface's "home page" (Figure 10, above)
2. Click on the **Gateway Setup** button to access the Gateway Setup Screen (Figure 11).
3. Enter the settings as outlined below:
 - (A) **GATEWAY ADDRESS** — A unique identifier that enables the use of multiple Gateways (Default setting is 1).
 - (B) **GATEWAY RSSI SIGNAL STRENGTH** — Received Signal-Strength Indicator.
 - (C) **GATEWAY RADIO BAUD** — Data transmission rate for RF transmissions. The default rate of 9600 baud is recommended in order to maximize RF range.

FIGURE 11 THE GATEWAY SETUP INTERFACE



Remote Monitoring System

TruBlue RMS (731C)

Gateway Setup

Gateway Address	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	A
Gateway RSSI Signal Strength	-40 dB	B
Gateway Radio Baud	☒ 9600 ☐ 115200	C
Radio Repeater	☐ Repeater	D
Radio Power Level	☐ 1mW ☐ 10mW ☐ 100mW ☐ 500mW ☒ 1W	E
Check-in Interval	(hh:mm) 00:30	F
Change Local Time	(hh:mm) 11:55	G
Change Local Date	(dd:mm:yyyy) 07:09:2012	H

IMPORTANT Settings (A) and (C) above — Gateway Address (A) and Gateway Radio Baud (C) — must match the equivalent settings entered when configuring the Gateway (See pages 10-11) in order for the two devices to communicate with each other.

(D) RADIO REPEATER — Click to put a **checkmark** in this box only if this Node is being used as a Repeater.

(E) RADIO POWER LEVEL — Adjustable 1 watt max.

(F) CHECK-IN INTERVAL — This specifies the frequency for the Node to connect with the RMS Gateway to upload collected Transducer data and check for TruTel™ software initiated configuration changes.

IMPORTANT

Be aware that this setting affects battery life. The shorter the check-in interval, the quicker the batteries will be depleted. Less frequent check-ins will extend battery life. Determining what is the appropriate setting for your implementation means finding the right balance between frequency of data updates and desired battery life/replacement interval. A check-in of once every 15 minutes is a suggested interval.

- (G) CHANGE LOCAL TIME —
- (H) CHANGE LOCAL DATE —

You can manually enter the time and date now; however, the Node will automatically update these settings (from Internet time servers) the first time it checks in with the Gateway.

4. To save your settings, click on the **Modify** button.

verifying your Gateway link

- After entering your settings, check the Gateway RSSI Signal Strength field. If it's returning a number, your Gateway and Node are successfully communicating.

TIP You can click on the **Modify** button any time you want to have the Node test the Gateway link and update the Gateway RSSI field.

- If it's returning the message, "no signal," try these steps:
 1. Make sure the Gateway is on.
 2. If still not communicating, double-check your settings, making sure the Gateway Address and the Gateway Radio Baud match the equivalent settings entered when configuring the Gateway (see page 9).
 3. Make sure the Radio Power Level is set to 1W.
 4. If still not communicating, it may be that the Gateway and Node are too far apart or the radio signals are being blocked. Try temporarily bringing the Node closer to the Gateway. If the RSSI field now returns a number, a Repeater may need to be positioned between them to extend the RF range (see page 26).

scanning for and configuring Transducer(s)

1. If your Transducer(s) are not already connected, do so now.
2. From the Node Wi-Fi interface "home page" (Figure 10 above), click on the **Transducer Scan** button.
3. From the resulting screen (Figure 12), click on either the **Transducer Scan** button and go directly to step 6, or click on the **Advanced Scan Options** button.

TIP The **Transducer Scan** button is simpler but may take a little longer because no fine-tuning of the desired scan has been provided.

FIGURE 12 TRANSDUCER SCAN INTERFACE

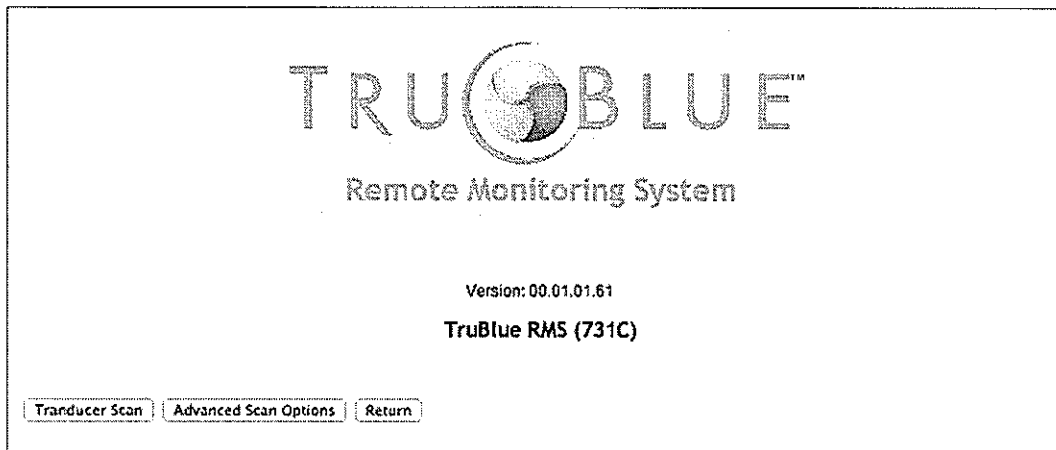


Figure 12: In step 3, clicking *Transducer Scan* enables you to go directly to step 6, while clicking *Advanced Scan Options* takes you to the following screen, where you can control the type of scan you would like to initiate.

4. You can speed up the Transducer discovery process by telling the Node which sensor types are attached to each port and **None** for unused ports. If you are unsure of what type of Transducer is attached, select **Unknown** to have the Node determine the type.

FIGURE 13 TRANSDUCER SCAN INTERFACE

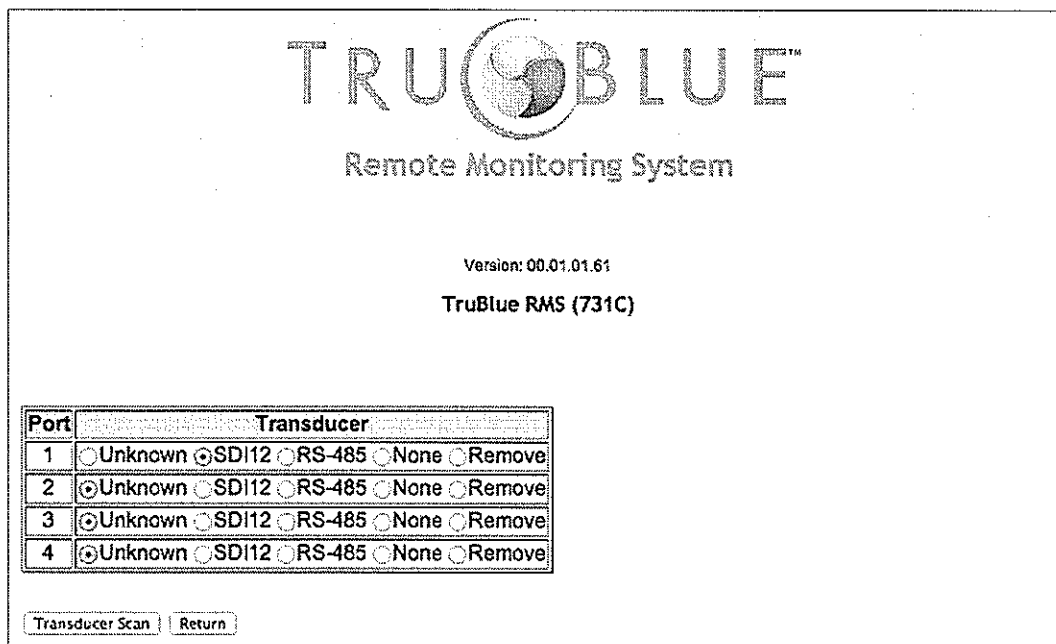


Figure 13: "Advanced Scan Options" allows user to initiate the scan of choice.

TIP Transducers that have flying leads connections on the end of their cables are SDI-12 Transducers. Transducers with connectors on the end of their cable use RS-485 communications.

5. Click on the **Transducer Scan** button to initiate the scan. You will automatically return to the "home page." From the "home page," you will be able to observe the progress of the scan, by periodically clicking the **Refresh Page** button.

FIGURE 14 HOMEPAGESCANNINGFORTRANSDUCERS

TRUBLUE™
Remote Monitoring System

Version: 00.01.01.61
TruBlue RMS (731C)

Gateway configuration		
Gateway Address	1	
Current Time	07-09-2012 11:57:13	
Check-in Interval	00:30	hh:mm
Battery Level	11.216	Volts

Gateway Setup

Port	Transducer		
1	Scanning for Transducer	Setup/View	Calibrate
2	Scanning for Transducer	Setup/View	Calibrate
3	Scanning for Transducer	Setup/View	Calibrate
4	Scanning for Transducer	Setup/View	Calibrate

Transducer Scan Refresh Page

TIP You may need to click on the **Refresh Page** button several times to ensure that the scan is completed across all 4 ports.

6. Once all ports have been scanned for possible attached sensors, a screen similar to the one in Figure 15 will be displayed. Check that all attached Transducers are reflected in the status area of this summary screen. If any expected Transducers are missing from the port-scan summary, verify Transducer wiring and port attachment and repeat the Transducer scan.

FIGURE 15 | THE NODEWI-FI INTERFACE "HOME PAGE"



Remote Monitoring System

Version: 00.01.01.61
TruBlue RMS (731C)

Gateway configuration		
Gateway Address	1	
Current Time	07-09-2012 11:54:31	
Check-in Interval	00:30	hh:mm
Battery Level	11.216	Volts

Gateway Setup

Port	Transducer		
1	Model 500 SN 902337	Setup/View	Calibrate
2	No Transducer Attached	Setup/View	Calibrate
3	No Transducer Attached	Setup/View	Calibrate
4	No Transducer Attached	Setup/View	Calibrate

Transducer Scan Refresh Page

Figure 15: After a scan is complete, make sure all attached Transducers have been detected.

transducer setup

7. Click the **Setup/View** button for an attached Transducer to configure a data sampling schedule. You will be taken to the Transducer Setup screen (Figure 16).

FIGURE 16 THE TRANSDUCER SETUP SCREEN

TRU[®]BLUE[™]
Remote Monitoring System

TruBlue RMS (731C)
Transducer Setup for
Model 500 SN 902337 (A)

Transducer Settings

Measurement	Add Temperature	☐
	Add High-Accuracy Temperature	☐ (B)
	Conductivity	☐
Sample Period	(hh:mm)	0:15 (C)

Modify
Sample Data
Save Data
Return

At the top of the Transducer Setup screen is the model number and serial number of the Transducer with which you're working (A). The Measurement Settings table includes three parameters that you can add to the basic pressure/level reading by checking the **appropriate boxes** (B). In the Sample Period row (C), you can enter a time interval (hours and minutes separated by a colon) that controls how often a reading is taken. You can sample at intervals of anywhere from every 5 minutes (00:05) to every seven days (168:00).

IMPORTANT *Be aware that the Sample Period setting — the time interval between readings — will affect the battery life. A shorter interval means more readings, which means the batteries will be depleted faster. The estimate of a 6-month battery lifespan is based on a Sample Period setting of once every 15 minutes.*

**THE TRANSDUCER SETUP SCREEN ALSO HAS 4 ADDITIONAL
BUTTONS:**

- **Modify** — Click this button to save your settings
- **Sample Data** — Click this button to initiate a real-time reading from the Transducer
- **Save Data** — Click this button to create and download a CSV file containing all the data for the Transducer in the Node's memory
- **Return** — Click this button to return to the "home page"

8. Repeat step 7 for each additional attached Transducer.

When the Node installation and setup is complete, make sure the cap is on tight and that the hitch pin is in place and locked. The Node should be able to operate without further attention for up to six months, when batteries should be checked and replaced as needed.

use as a Repeater

In the event that your installation includes a Node placed outside the range of its Gateway, an additional Node can be placed mid-way between the two devices, and configured as a Repeater in order to transmit signals back and forth.

IMPORTANT *When a Node is operating as a Repeater, it must remain constantly on. Due to the larger power requirements, external power (using a DC power source or rechargeable batteries with a solar panel) is recommended.*

Once the Node/Repeater has been installed/secured in its mid-way location and supplied with external power, all that remains is to configure the device to function as a repeater.

- 1.** Follow the directions above for accessing the built-in Wi-Fi network and proceeding to the Gateway Setup screen, Figure 17 below.
- 2.** Set the Gateway address (A) to a different value than the one used for the end point Nodes and Gateway.
- 3.** Make sure setting (B) — the Gateway Radio Baud — match the equivalent settings for the Gateway and Well Node this repeater will be servicing.
- 4.** Click the **Radio Repeater** checkbox (D) to designate this Node as a Repeater.
- 5.** Click the **desired Radio Power Level** (1W suggested for maximum range).

FIGURE 17 | NODE AS REPEATER CONFIGURATION



Remote Monitoring System

TruBlue RMS (731C)

Gateway Setup

Gateway Address	☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5	A
Gateway RSSI Signal Strength	-40 dB	
Gateway Radio Baud	☒ 9600 ☐ 115200	B
Radio Repeater	☐ Repeater	C
Radio Power Level	☐ 1mW ☐ 10mW ☐ 100mW ☐ 500mW ☒ 1W	D
Check-in Interval	(hh:mm) 00:30	
Change Local Time	(hh:mm) 11:55	
Change Local Date	(dd:mm:yyyy) 07:09:2012	

Figure 17: The Gateway Setup Screen when configuring a Node to function as a Repeater: (A) Gateway Address, (B) Gateway Radio Baud Rate, (C) Radio Repeater Checkbox, and (D) Radio Power Level.

6.warrantyandproductreturnprocedures

product warranty

The TruBlue™ Remote Monitoring System Gateway and Node are warranted for a period of one year commencing from the date of shipment to the original purchaser to be free from defects in material and workmanship, and in operational conformity with Measurement Specialties specifications.

disclaimer

Measurement Specialties' liability under this warranty is limited to replacing or repairing any product returned by Buyer, at Buyer's expense, during the warranty period which does not meet these warranty terms. The decision to repair or replace a non-conforming product is solely within Measurement Specialties' discretion, and does not include going into the field and replacing installed parts. Further, this warranty does not extend to non-conformities or defects resulting from misuse, neglect, improper handling, improper installation, improper repair, improper testing, improper alteration, accident, or defects due to reasonable wear and tear, tampering, improper operation, improper storage, or fault on the part of any person other than Measurement Specialties. Measurement Specialties shall have the right to make the final determination as to the existence and cause of a defect or non-conformity.

Measurement Specialties makes no other warranty and expressly disclaims all other warranties of any kind, express or implied, including any warranty of merchantability, fitness for a particular purpose even if that purpose is known to Measurement Specialties, or any warranty relating to patents, trademarks, copyrights, or other intellectual property. Repair or replacement of the non-conforming product is Buyer's exclusive and sole remedy for breach of these warranty terms. In no event shall Measurement Specialties be liable for collateral, consequential, punitive damages or losses, including lost profits, or any other direct or indirect damages or losses. No agreement extending or modifying these warranty terms shall be binding upon Measurement Specialties unless in writing and signed by a duly authorized company officer.

A complete warranty disclaimer is available for review on-line at:

<http://www.meas-spec.com/warranty.aspx>

merchandise return procedures

Contact the Measurement Specialties Applications Engineering (757) 766-4398 if system components are not operating properly. Consultation for troubleshooting is available during normal working hours, Eastern time. Available personnel will work with you to troubleshoot the problem and, if necessary, provide authorization to Customer Service to issue a Returned Merchandise Authorization (RMA) Number. *Please do not ship until you have obtained a RMA Number and instructions from a Customer Service Representative.*

Be prepared to supply the following information when requesting the RMA:

- Component Part number
- Component Serial number
- Complete description of problems/symptoms
- "Bill to" and "Ship to" addresses
- Purchase order number (not required for warranty repairs)
- Customer contact and telephone number

The above information, including the RMA number, must be on the customer's shipping documents that accompany the equipment to be repaired. Measurement Specialties also requests that the outside of the shipping container be labeled with the RMA number to assist in tracking the repairs. All equipment should be sent to the following address:

ATTN: REPAIR DEPARTMENT (7-digit RMA number)
Measurement Specialties
1000 Lucas Way
Hampton, Virginia 23666

Prior to returning to Measurement Specialties, tany Transducer and cable must be cleaned per instructions provided on the cleaning certificate supplied when the Transducer was delivered. The certificate can also be found on Measurement Specialties Website at:

<http://www.meas-spec.com/rma-form.aspx>

The completed certificate must accompany the Transducer when shipped to Measurement Specialties. If the Transducer has been used in media other than potable water, Measurement Specialties customer service must be notified at the same time an RMA number is requested.

Measurement Specialties reserves the right to reject any shipment deemed to be unsanitary or environmentally unsafe to handle. If these guidelines are not met, the package will be sent back unopened and at the customer's expense.

Measurement Specialties will return warranty items prepaid via UPS GROUND. If the customer desires another method of return shipment, Measurement Specialties will prepay and add the shipping charges to the repair bill. Incoming freight charges are the customer's responsibility. The customer is also responsible for paying shipping charges to and from Measurement Specialties for any equipment not under warranty.

Once the return is received, it typically takes 5-10 working days for the technician to make a fault determination.

Appendix A: precautions in working with vented cable

The Measurement Specialties transducers and TruBlue™ datalogger used with the TruBlue™ Remote Monitoring System are custom ordered, and will ship with the correct length of vented cable required for each transducer already attached. For many products this cable is permanently connected to the transducer at the factory in a way that prevents moisture intrusion. The vented cable termination end is also specially prepared at the factory to eliminate future moisture migration. It may be noticed where the lead wires emerge from under the jacket, that potting material plus a shrink tube "boot" have been added. Every effort should be made to leave this feature intact. Should the cable be longer than is needed for your installation, it is recommended that the excess length be accommodated in a service loop and that the potted end of the cable NOT be shortened.

FIGURE 18 VENTED CABLE

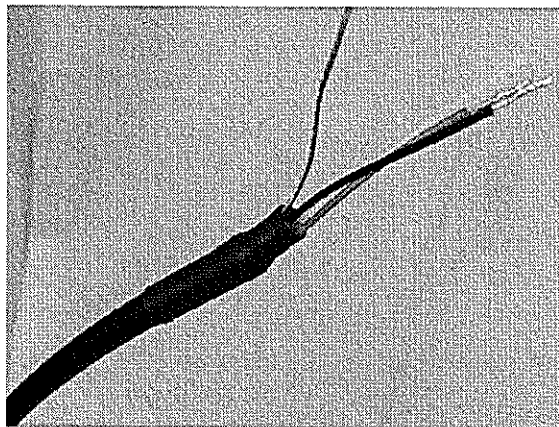


Figure 18: Do not cut the vented cable to shorten it. Instead, loop and secure any excess cable.

The cable attached to your transducer is specifically engineered for submersible applications. The outer jacket provides long term reliability under most conditions. The cable should be handled carefully as the jacket may be subject to cutting should it be "raked" over extremely sharp edges. To guard against water incursion should an inadvertent cut occur we have incorporated an exclusive "water block" feature immediately beneath the jacket. This feature makes the cable "selfsealing" in all but the most extreme cases.

Our polyurethane jacketed cables are quite flexible. Care needs to be taken to ensure that when bending the cable to suit your installation you do not crimp the vent tube inside the cable. To avoid this crimping, do not bend your cable tighter than a radius of 1 inch. Crimping the vent tube from tight bends or crushing it within the cable can result in measurement offset errors since the reference pressure port of the transducer's internal sensor will now be blocked.

Appendix B: Transducer maintenance

TRANSDUCER

Maintenance should be performed on the Transducer at least every six months to ensure that it continues meeting accuracy specifications. Typical maintenance includes:

1. Checking the wiring to make sure it is not corroded or frayed.
2. Checking the vent filter.
3. Checking the atmospheric vent tube to make sure it is intact and leak free.
4. Checking or setting the field calibration offset.

The offset can be checked by venting the Transducer to the atmosphere and taking a reading from the Transducer. It's important to perform this procedure anytime the Transducer has been subjected to more than its maximum pressure.

DESICCANT

If you use a desiccant vent filter, you should establish a regular maintenance schedule. Follow these guidelines:

1. You should change your vent filter when it is 75% spent (pink color) — replacement filters are available at a nominal cost from the factory.
2. Do not remove the old vent filter until a new one is available.
3. Also, always remove the filter's protective cap when in use.

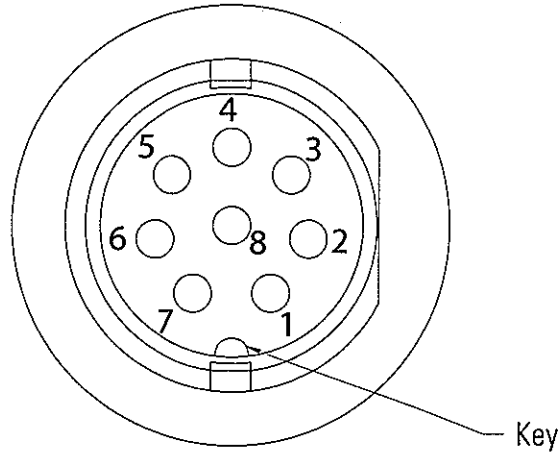
Measurement Specialties' improved 810 SuperDry™ Vent Filter is designed to be effective for at least one year before requiring replacement.

DRYING PROCEDURE

If you suspect water in the vent tube or Transducer:

1. Remove the cable assembly from your Transducer.
2. Coil the cable and Transducer in a pan and place the pan in an oven at 50°C (122°F) for a minimum of 2 hours.
3. Make sure the oven does not exceed this temperature or you may damage both the Transducer and cable.
4. Reattach the cable to the Transducer.

Appendix C: connector pin assignments



View Into Connector

pin	SDI-12 Transducer	TruBlue™ Transducer	Node/Gateway external power
1	Transducer Power Return		
2		RS-485 A	
3		RS-485 B	
4	SDI-12 Data		
5	Not Used		
6			Power Return
7			Power (8-16 VDC)
8	Transducer Power		

Appendix D:regulatoryinformation

the following devices comply with the regulatory standards listed below:

610-00100 – TruBlue™ Remote Monitoring System Gateway Module (contains FCC ID MCQ-9XTENDB, MCQ-XBEEPRO2 and QIPMC75I or QISGOBI3000)

610-00200 – TruBlue™ Remote Monitoring System Gateway Module (contains FCC ID MCQ-9XTENDB, MCQ-XBEEPRO2 and QISGOBI3000)

610-01100 – TruBlue™ Remote Monitoring System Node Module (FCC ID Q9H-TRMSNA)

FCC certifications and regulatory information (USA only)

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operated the equipment under FCC rules.

The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any inter-ference received, including interference that may cause undesired operation.

Industry Canada (IC) certification

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

RF exposure

WARNING

This equipment is approved only for mobile and base station transmitting devices. Antenna(s) used for this transmitter must be installed to provide a separation distance of at least 30 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

