Ranger ComKit

Cellular Telemetry Instructions

Seametrics

PROUDLY MADE IN THE USA

Certified Company ISO 9001

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The Ranger is a self-contained, device that provides sensor readings over an LTE-M1 cellular network.

-Powers attached analog (4-20mA / 1-5V) sensor and cellular modem with internal battery

-Dual digital inputs report state, total counts and input frequency. K-Factor configurable for Flow Totalizing

-SPDT Latching relay for local on/off control

-Configurable from the SignalFire Cloud website signalfire.cloud

-SignalFire Cloud allows for data visualization, trending and alarming

-Supports MQTT Sparkplug B communication protocol for connection to other servers

-Compact and simple to install and maintain

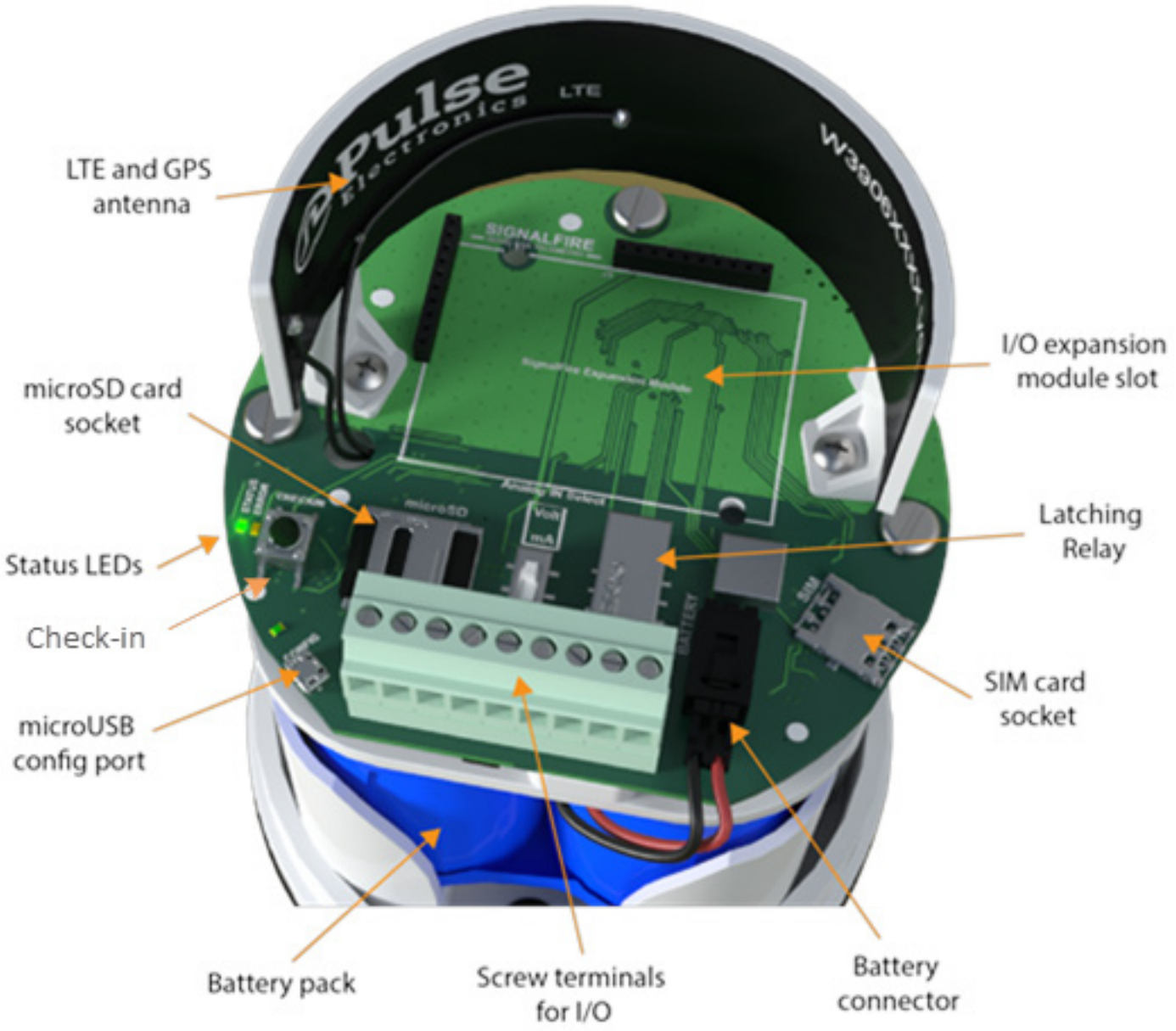
-Local configuration and diagnostics available using the micro-USB port and the SignalFire Ranger ToolKit PC software

-Expansion modules for additional I/O (2AI/1DI, Modbus, HART, SDI-12)

-Internal backlog of a minimum of 200 datapoints in the event of loss of signal. Backlog will be automatically sent when the Ranger reconnects

-Class 1 Division 2 certified

FEATURES



Specifications*

Enclosure Size	7.1″ tall × 4.6″ diameter
Power Source	Internal Lithium battery pack (SignalFire Part Number: 4DPak) Optional solar or external DC power options also available
Temperature Rating	-40°C to +85°C
Enclosure	IP64 rated. Polycarbonate, ½″ NPT fitting
SIM Slot	4FF Nano SIM card (LTE Cat M SIM and data plan required)
Local config port	Standard micro-USB connector
Relay Output	Latching Relay. 2A @ 30VDC, 0.3A @ 110VDC, 0.5A @ 125VAC
Sensor Power Output	Selectable 13V/18V. 60mA max power output
Compliance	Contains FCC ID: 2ANPO00NRF9160 and IC ID: 24529-NRF9160 • PTCRB and Verizon Network Certified • Certified for use in Class I, Division 2, Groups A, B, C, D areas. Temperature Code T5 EXi [EXi] • [UL 121201:2017 Ed.9+R:26Aug2019], [CSA C22.2#213:2017 Ed.3+U1;U2]

** Specifications subject to change • Please consult our website for current data (seametrics.com).*

NOTE: When using a Ranger with a battery powered AG3000, iMAG4700, AG90 or EX90 you will not be able to power the meter externally.

Hazardous Location Certification

The Ranger is rated Class 1 Division 2 non-incendive when powered by its internal battery pack or its internal DC-DC converter. The HCSolar unit is not C1D2 certified so it is for general purpose areas only.

WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE COMPONENTS UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS.

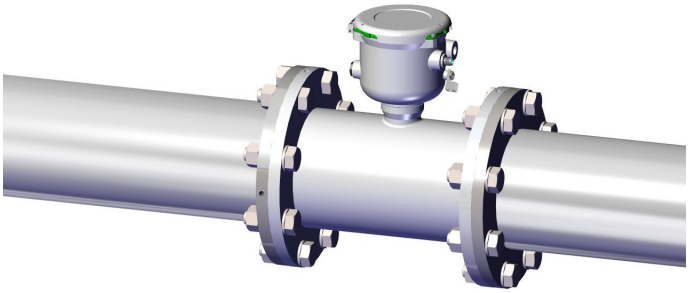
WARNING – EXPLOSION HAZARD Substitution of components may impair suitability for Class I, Division 2

WARNING – EXPLOSION HAZARD Do not disconnect while circuit is live unless area is known to be nonhazardous

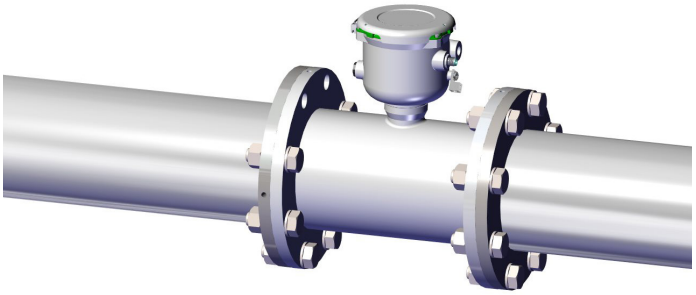
WARNING – All wiring methods must be in accordance with the NEC

WARNING - EXPLOSION HAZARD. Do not remove or replace while circuit is live unless the area is free of ignitable concentrations.

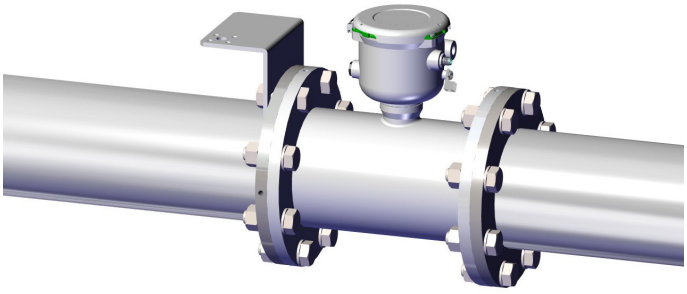
WARNING – EXPLOSION HAZARD. Do not remove or replace lamps, fuses or plug-in modules (as applicable) unless power has been disconnected or the area is free of ignitable concentrations.



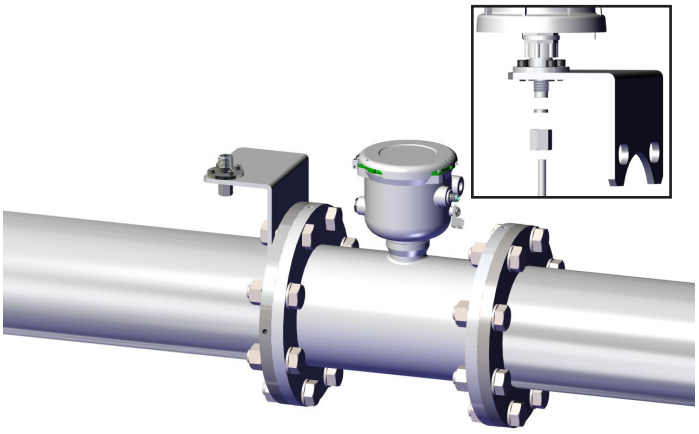
Step 1: Install flanged meter per Installation Instructions, or if already installed, move to step 2.



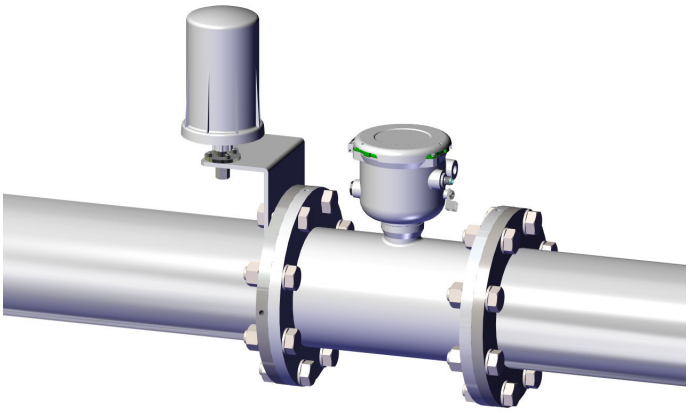
Step 2: Remove two of the meter installation bolts.



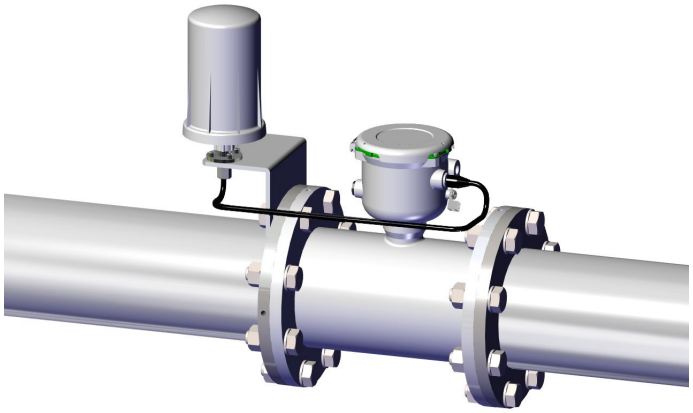
Step 3: Install mounting bracket, as positioned in the diagram, using the same meter installation bolts removed in Step 2.



Step 4: Place cable thru nut. Place gasket on cable. Wire cable to Ranger. Place nut (with gasket) on mounting adapter. Tighten

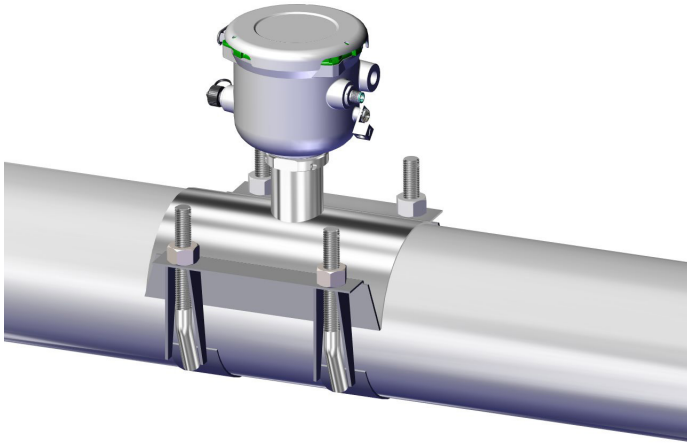


Step 5: Mount the Ranger to the adaptor fitting on the bracket.

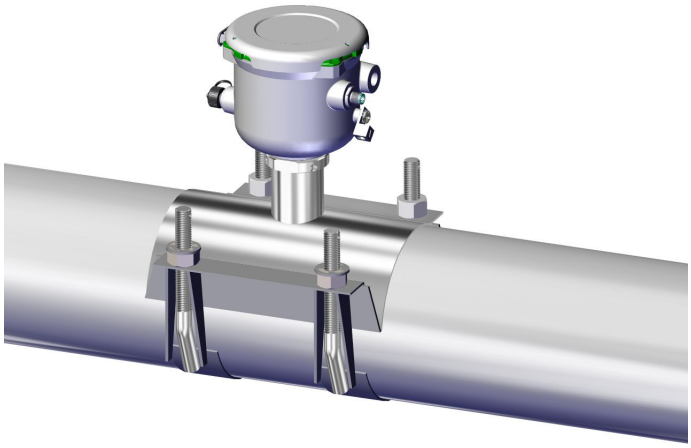


Step 6: Install the cable from the Ranger connector, at the bottom of the unit, to the meter connector as shown in the diagram.

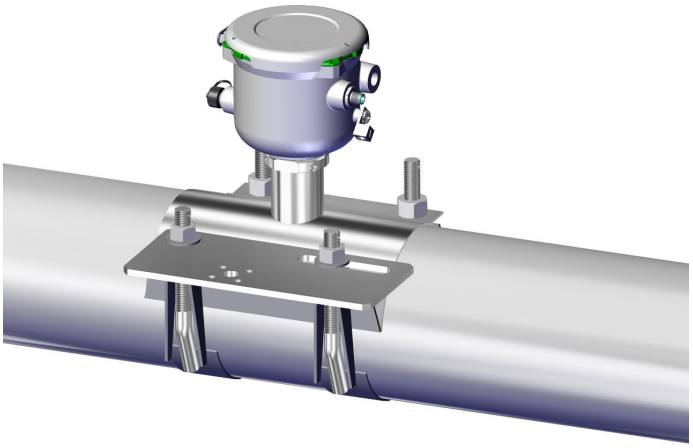
Use Ranger ComKit-1 Part Number 104181-01 for 4" - 12" AG3000/iMAG 4700
Use Ranger ComKit-2 Part Number 104181-02 for 2" - 3" AG3000/iMAG 4700



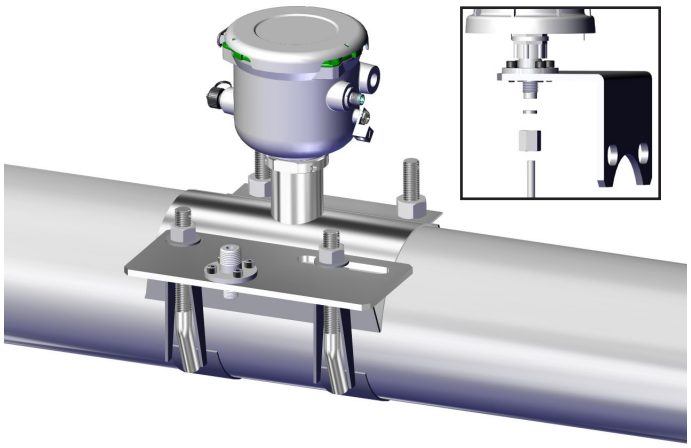
Step 1: Install the insertion meter per Installation Instructions, or if already installed, move to step 2.



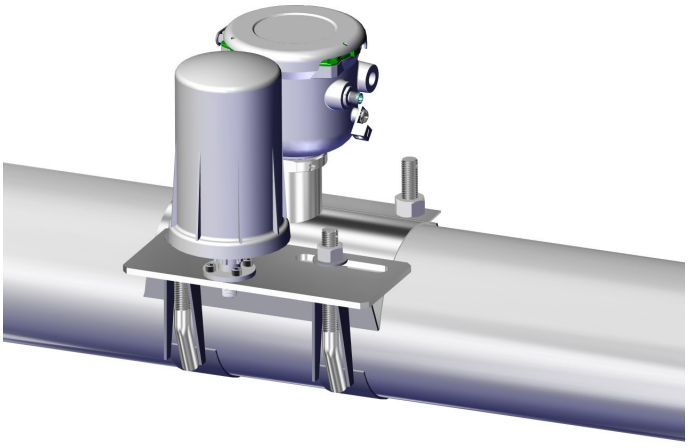
Step 2: Place one of the washers over the saddle bolts, on the same side of the saddle, so that they rest on top of the nuts.



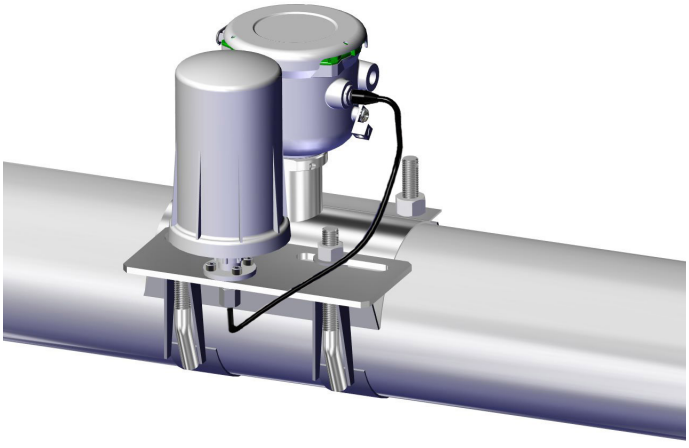
Step 3: Install mounting plate over the bolts and resting on the washers as shown in the diagram. The mounting plate can be adjusted to accommodate different size saddles.



Step 4: Place cable thru nut. Place gasket on cable. Wire cable to Ranger. Place nut (with gasket) on mounting adapter. Tighten



Step 5: Mount the Ranger to the adaptor fitting on the mounting plate.



Step 6: Install the cable from the Ranger connector, at the bottom of the unit, to the meter connector as shown in the diagram.

Use Ranger ComKit-3 Part Number 104181-03 for AG90/EX90

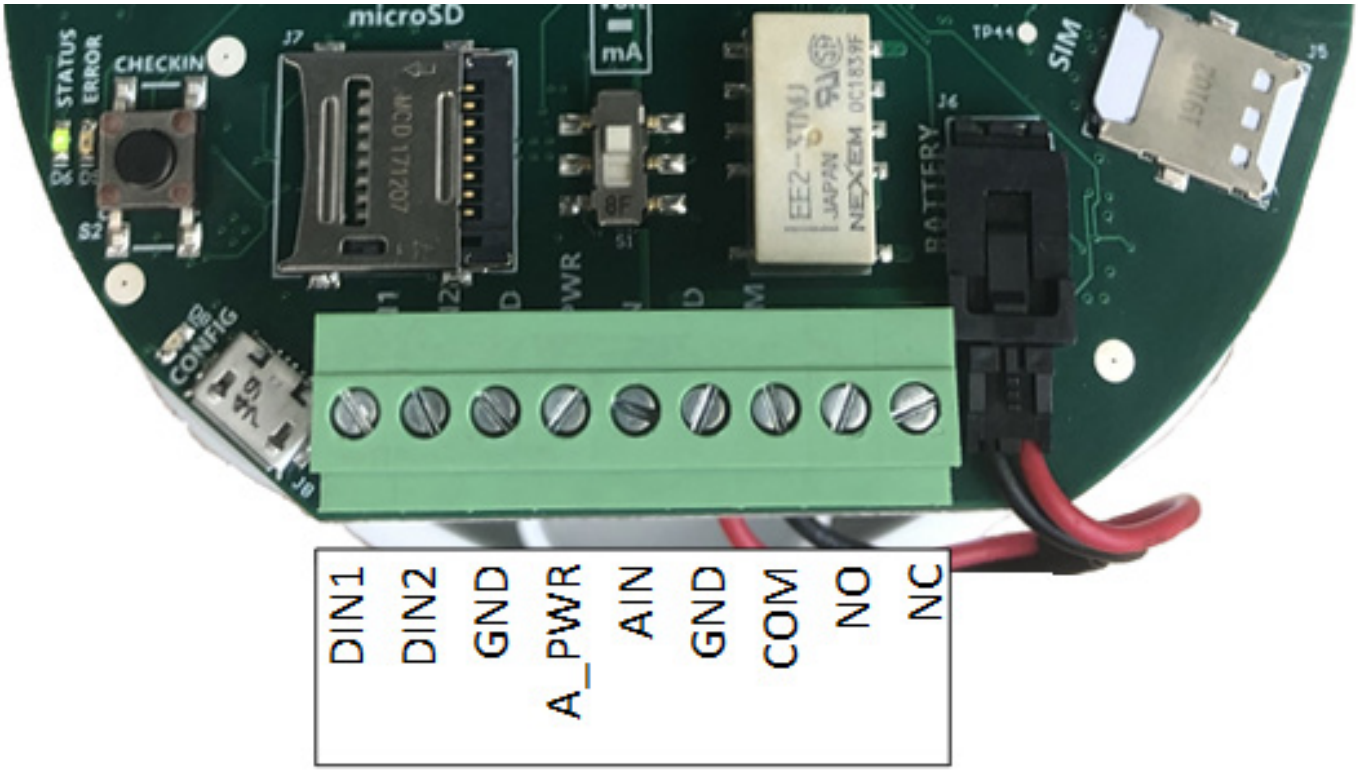
Connections and Components

STATUS LED
The STATUS LED (green) will flash 3 times on a successful data transmission to the server

ERROR LED
The ERROR LED (red) will blink 3 times to indicate that an attempted data transmission failed

Check-in Button
If this button is pressed the Ranger will blink the Green or Red status LED 3 times to indicate the status of the last transmission to the server. If the Checkin button is pressed and held for more than 1 second, the Ranger will take readings from the attached sensors and send the readings to the server.

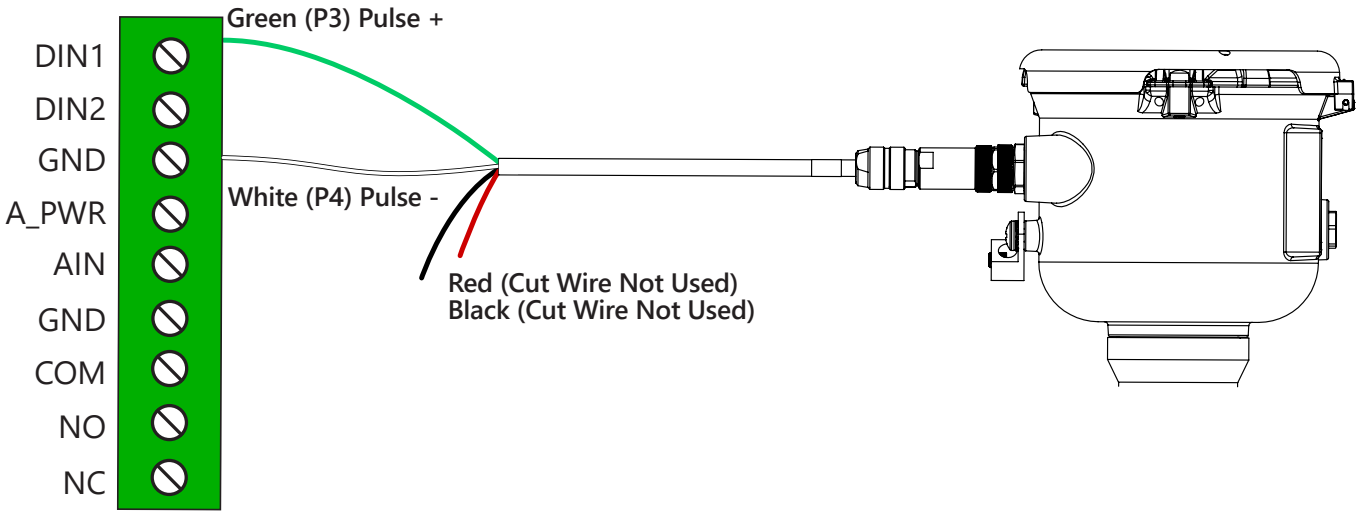
MicroSD Card Slot
The MicroSD card is for future use, it is not yet implemented and should not be installed

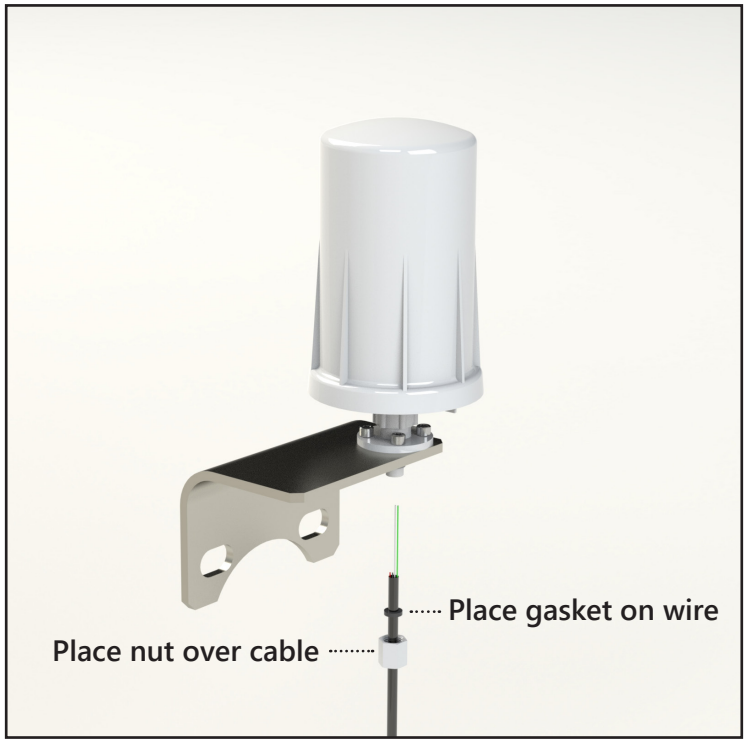


Screw Terminal Connections

Connections for Ranger Telemetry Unit

When connecting to an AG or iMAG flow meter, you must enter a SETP value in the menu of your meter. See meter instruction manual for specific details.





NOTE: When using a Ranger with a battery powered AG3000, iMAG4700, AG90 or EX90 you will not be able to power the meter externally.

Power Options

Lithium Battery Pack (4DPak)

The internal lithium battery pack is the default power source for the Ranger, simply plug the battery pack into the Ranger PCB battery connector to power the Ranger on.

DC-DC converter

In situations where DC power is available, the Ranger can be ordered with an internal DC-DC converter that accepts 9-36VDC from an external source. The DC-DC converter is installed in the battery compartment of the Ranger and has a pigtail cable to connect to the Ranger PCB. Simply connect your DC power source to the "GND" and "Vin" screw terminals on the converter to power on the system.

HC-Solar System

SignalFire offers a solar system that consists of a bracket containing a solar panel and integrated battery and solar charger assembly. The solar system is connected to the Ranger PCB using the battery connector.

Setup

Devices purchased with the SignalFire Cloud service come with a pre-installed SIM card. Customers will require a login to access the SignalFire Cloud server (signal-fire.cloud). Fill out the request form here: https://signal-fire.com/lte-m1-cellular-products/cloudregister/ to setup your company site.

Provisioning

1. Plug in the battery so the Ranger can connect to the cellular network
2. Login to the SignalFire Could with the account login/password provided
3. From the Home page click "Add Device"
4. Enter either the Ranger serial number or IMEI number and click "Send Request". The serial number is located on the bottom of the Ranger with a format of "RA" followed by 6 numbers. The IMEI is located on a label inside the Ranger on the back of the antenna bracket.
5. A message will be sent to the Ranger to "claim" it to the customer site, and a wait screen with appear.
6. Within approximately one minute the device will connect to your account and you will be automatically redirected to the device status page

Ranger Settings

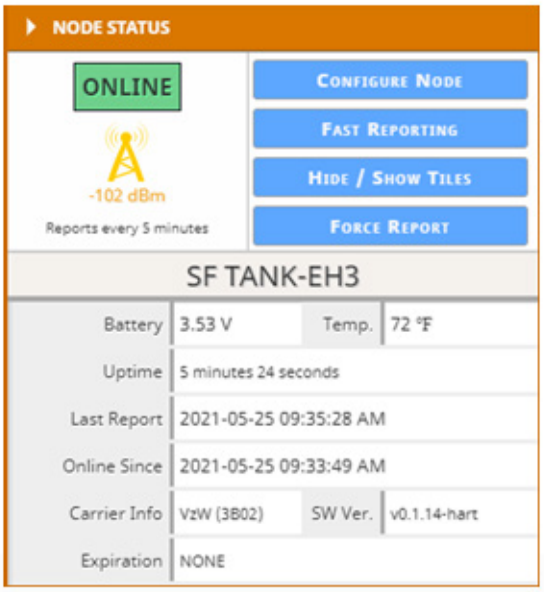
Select a Ranger from the list on the Home tab to see the device status, sensor readings and settings.
The detail display is organized as a "tile" view with each tile representing a specific input or function. Each tile with configurable settings has a "Configure" button that will bring up the related settings.

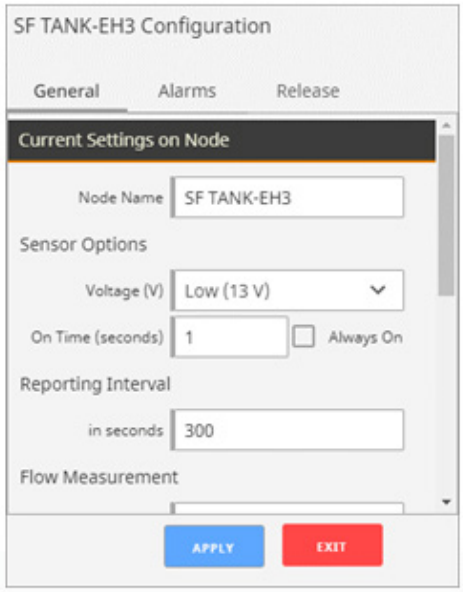
The Node Status Tile

The Node status tile contains general information about the ranger and allows setting the Ranger system parameters.

Force Report

Causes the Ranger to take a new sensor reading and send the data to the server on its next "ping" interval. This can take up to 40 seconds.



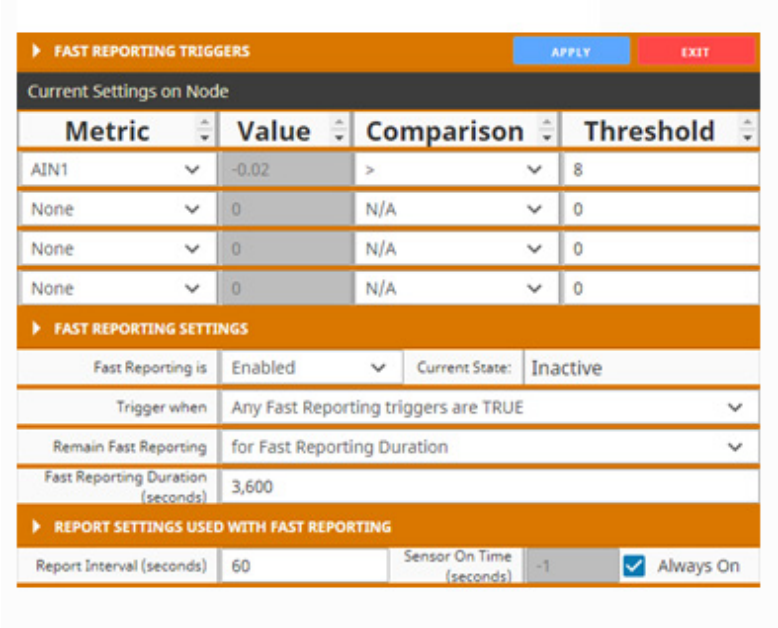


Node Name

The Node name is a user configurable string used to easily identify the Ranger.

Report Interval

The setting controls the interval at which the Ranger will apply power to the attached sensor and forward the sensor readings to the Cloud. Clicking on "**Fast Reporting**" will open up the Fast Reporting Interval window.



Fast Reporting

Clicking on 'Fast Reporting', the Ranger can be configured such that if certain inputs cross a threshold, the Ranger will temporarily update at an increased rate. Fast Reporting can trigger when one or all conditions are met, and can stay on for the entire time the input(s) are above the threshold, or a set time. In the above example, if Analog Input 1 goes above 8mA, the Ranger would begin reporting its sensor values every 60 seconds, for 3,600 seconds (1 hour).

Sensor Voltage

Sets the output voltage applied to the analog sensor output. It is user configurable to 13V or 18V.

Sensor on Time

Configures the amount of time the Sensor Voltage is applied to the sensor prior to taking the reading.
This needs to be long enough for the attached sensor to power on and stabilize, but should be minimized to optimize battery life. If the Ranger is not powering a sensor or if the sensor is powered externally, set this value to 0.

Flow Measurement

By default, the two digital inputs report input state (open/closed) and input frequency. Optionally one or both digital inputs can be configured for Flow Measurement Mode. This is used for connection to a flow meter with a pulse output and allows the user to configure a pulse k-factor and see the flow rate and total in volume units.

When connecting to an AG or iMAG flow meter, you must enter a SETP value in the menu of your meter. See meter instruction manual for specific details

The analog input can also be used for flow measurement, where a current/voltage corresponds to a flow rate. The Ranger can do a rough approximation of a flow total by assuming that the flow rate stays constant between report samples.

The Alarm Group ID

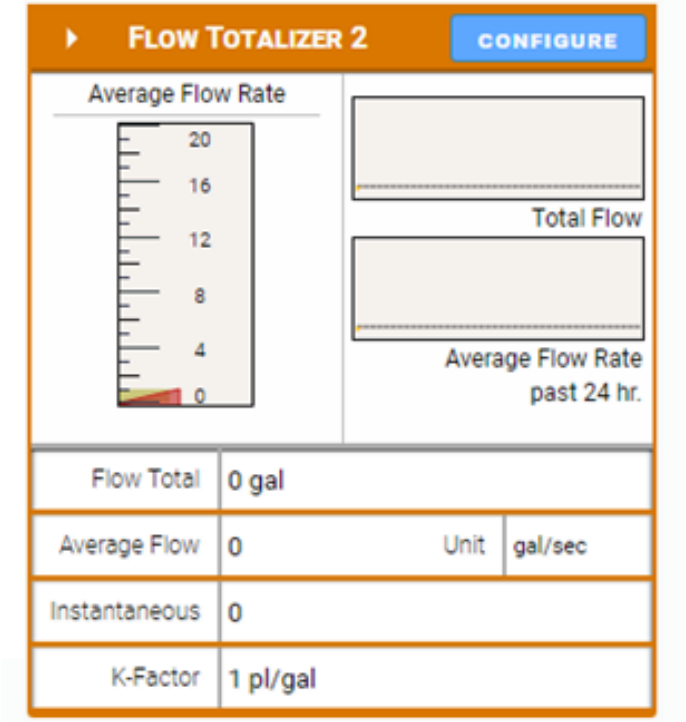
This defines which alarm group will receive alarms from this device. Each user configured in the Users tab can be assigned an alarm group number. Any users with a matching alarm group will receive alarms from this Ranger. Multiple alarm groups may be entered separated by commas and all groups entered will receive alarms.

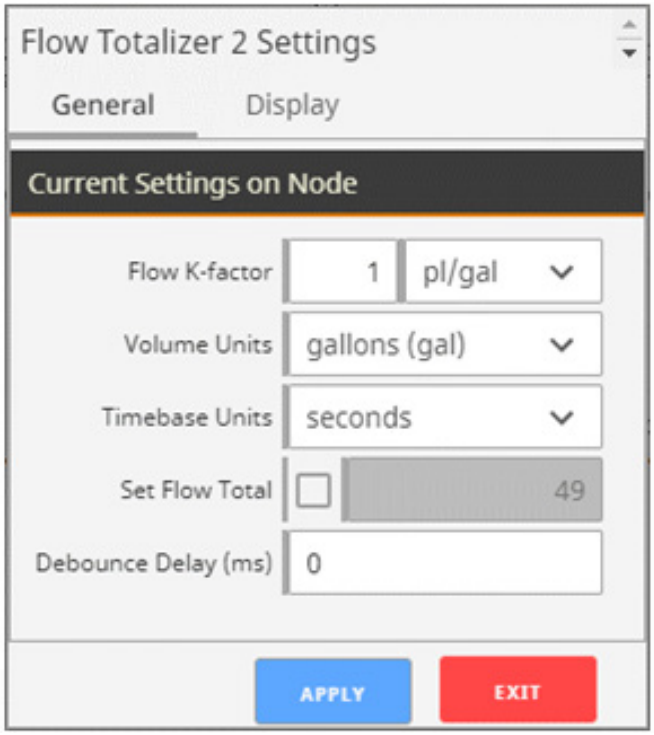
Offline Alarm

The Ranger will send an alarm if the device is offline for more the then configured 'Offline Threshold" setting.

Release

If the Ranger has been added to the wrong group and needs to be claimed under a different group, the Ranger can be released through the Release tab of the "Configure Node" window.





The Flow Totalizer Tile

If a digital input is configured for Flow Mode, the flow totalizer tile will replace the default Digital Input tile. When in flow mode the Ranger will display the flow rate and total flow volume. The Average Flow is the average flow rate over the configured Ranger Report Interval, while the Instantaneous Flow rate is the flow rate calculated over the 2 seconds immediately before the report.

Flow K-Factor

Enter the number of pulses per unit volume that the flow meter outputs. The volume pulse units can be selected

Volume Units

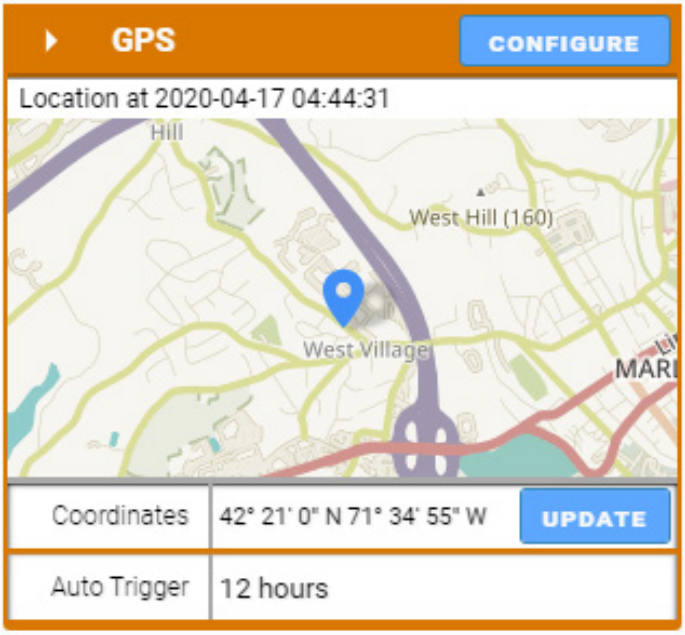
The Volume Units is used to select the volume units to use for the flow rate and total volume calculations

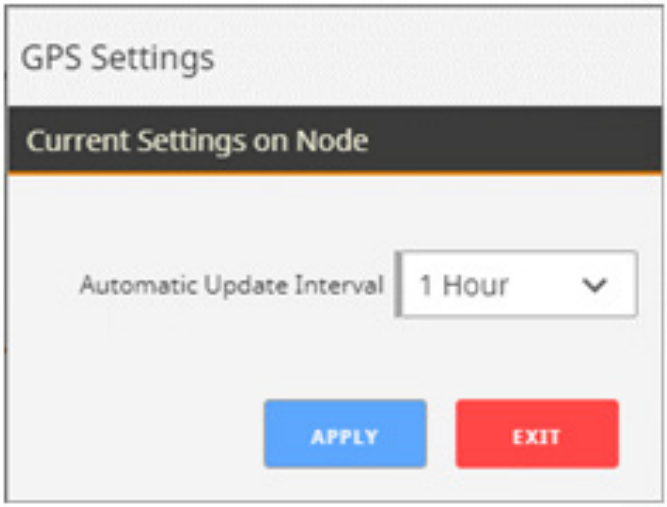
Timebase Units

The Time base units select the time units for the flow rate calculations

Set Flow Total

The allows the user to set or reset the total volume measured. Click the checkbox then enter the volume



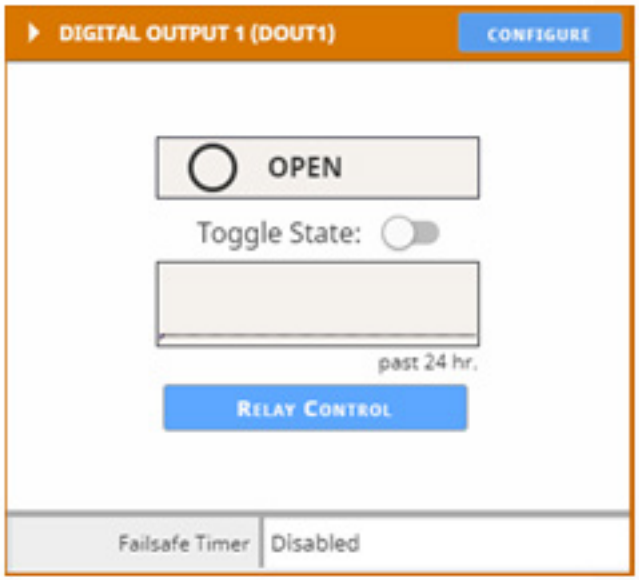


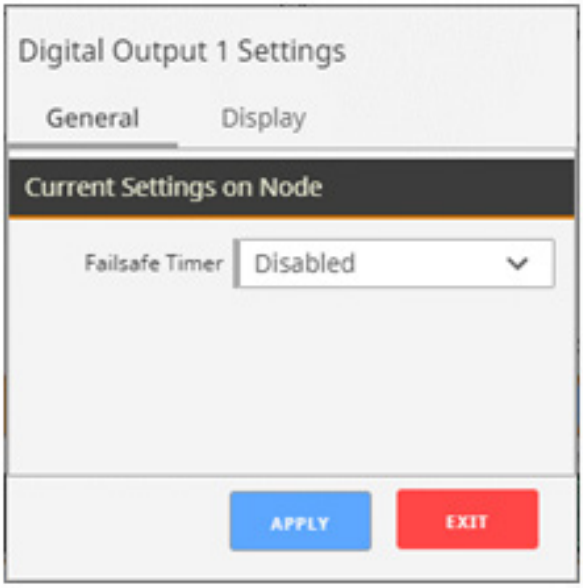
GPS Tile

The Ranger has an internal GPS receiver/antenna to provide location data to the server. The Ranger requires a clear view of the sky for the GPS functionally. GPS will often not work inside even if the Ranger is near a window.

A GPS update may be triggered on demand, or an automatic location update interval between 1 and 12 hours can be configured. For an on-demand location update, click the "UPDATE" button. Note that an initial "cold" GPS fix may take up to 5 minutes.

While the GPS receiver is active commands sent to the Ranger my take up to 80 seconds to be delivered.





The Digital Output Tile

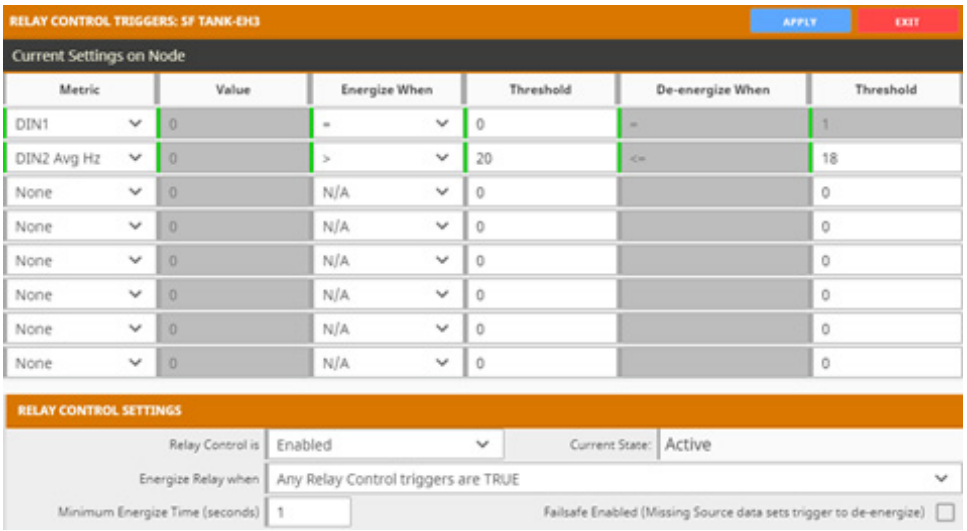
The relay output can be toggled by setting the Toggle State switch. The command will reach the Ranger on its next "ping" interval which can take up to 40 seconds. The Toggle State switch will change to blue and the OPEN/CLOSED indicator will change once the message has reached the Ranger.

The relay output also has an optional failsafe timer. If this is configured, the relay will go to the open (failsafe) state if the Ranger loses connection to the server for the configured time.

Relay Control

The digital output on the Ranger can be configured to energize and de-energize based on its other inputs. This control logic is run locally in the Ranger and does not depend on cellular connectivity. First, the "Relay Control is" field should be Enabled. The trigger logic can be entered by specifying which input to control the relay off of, and then specifying which values of that input energize and de-energize the relay.

If the relay is being triggered off of multiple inputs, the user can select whether all the triggers need to be true (Boolean AND), or any of the triggers need to be true (Boolean OR). The Minimum Energize Time field determines the amount of time the relay, once energized, will stay on even if the de-energize condition becomes true.



OPERATION

Historical Data View

The server maintains a database containing the historical data view of all reported readings. The data may be viewed as a graph or a table view. Select which data values to display and the time range to view. The selected data for the configured time interval may be exported to a .csv file by clicking the “Export” button.

Default View

A user can configure the default trend view they wish to see when they open the view for a Ranger. Simply configure the desired data to display and the desired default time display and click the “Set as Default” button. This view will be saved and be the default view for your account for that Ranger device.

USER SETTINGS

Selecting your username in the upper right allows you to select your User settings. This will allow you to configure your email address and phone number for text messages.

Adding Users

If an account is configured with User Admin rights, you may add additional users by selecting the Users Menu and clicking Create New User. It is recommended that an email address is used for the Username.
User Roles
There are four user roles that control access to various features. Each role allows access to a specific feature of the SignalFire Cloud. More than one role can be assigned to a user and an administrator would typically have access to all roles.

User Admin

The role allows a user to be able to add additional users.

Device Admin

This role allows a user to configure the settings on a Ranger and to control its digital output

Alarm Admin

This role allows a user to configure the alarm settings for the Ranger

Alarm Ack

This role allows a user to acknowledge active alarms

Report Admin

This role allows a user to configure automated reports

Mounting and Care

The Ranger unit comes with an integrated ½" NPT fitting with leads for connection to the meter or sensor. It is important to mount the Ranger so it is vertically oriented with the NPT fitting facing down.

Junction Box

The Ranger can also be purchased with a junction box to make wiring more convenient for the base or 2AI/1DI models. Shown below are the Ranger and Junction Box assembled, as well as the interior of the junction box. The inside cover of the junction box contains a wiring color-code guide. Note this color-code is targeted only towards the base and 2AI/2DI model, and not the Modbus or HART models.

Internal Lithium Battery Replacement

Battery Packs can be changed with the node in place.

1. Unscrew the cover from the base.
2. Unplug the battery from the PCB, by depressing the locking clip on the connector.
3. Loosen the three screws that attach the circuit board assembly to the base.
   Do not remove the two screws that attach the antenna assembly
4. Remove/replace battery
5. Re-install circuit board assembly. Do not overtighten the screws
6. Connect the battery to the main PCB battery connector.
7. Install the enclosure cover.
8. The used batteries must be disposed of by a **certified hazardous waste dsposal facility** per the disposal information below.

Lithium Thionyl Battery Disposal Information

Proper Shipping Name: Waste Lithium Batteries	UN Number: 3090
Hazard Classification: Class 9 (Misc.)	Packing Group: II
Labels Required: MISCELLANEOUS, HAZARDOUS WASTE	Waste Disposal Code: D003

Technical Support and Contact Information

Seametrics
19026 72nd Avenue South
Kent, Washington 98032
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www.seametrics.com