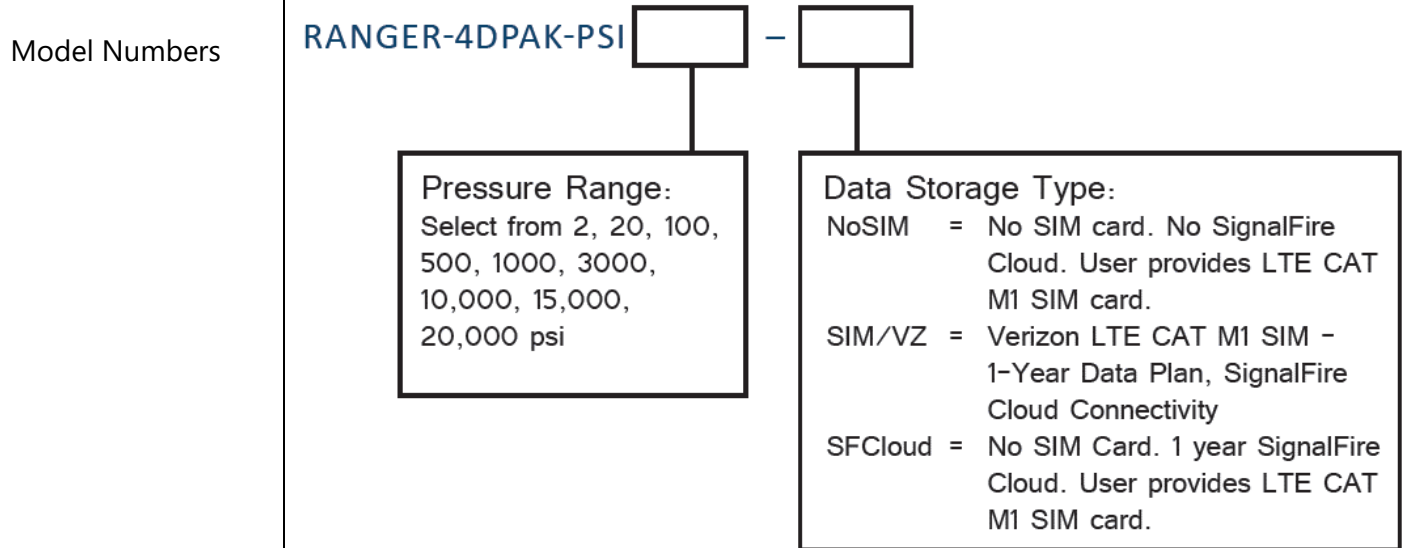# Pressure RANGER Manual

The Pressure RANGER is a self-contained, device that provides pressure readings over an LTE-M1 cellular network.

− Powers integrated pressure sensor available in wide variety of pressure ranges
− Configurable from the SignalFire Cloud website signal-fire.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
− Internal backlog of a minimum of 200 datapoints (200,000 for RANGERs shipF2d 1/27/2022 or later)
− Backlog will be automatically sent when the Pressure RANGER reconnects
− Class 1 Division 2 certified

Enclosure Size	7.1" tall × 4.6" diameter
Power Source	Internal Lithium battery pack (SignalFire Part Number: 4DPak)
Temperature Rating	-40°C to +85°C
Enclosure	IP64 rated. Polycarbonate, ½" NPT or F250C Autoclave fitting
SIM Slot	Nano SIM card (LTE Cat M SIM and data plan required)
Local config port	Standard micro-USB connector
Pressure Sensor	½" Male NPT 316-SS (2, 20, 100, 500, 1,000, 3,000, 5,000, and 10,000 PSI) ½" Male NPT 17-4 (15,000 PSI) F250C Female Autoclave 17-4 (15,000, 20,000 PSI)
Compliance	• Contains FCC ID: 2ANPO00NRF9160 and IC ID: 24529-NRF9160 • 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]
Model Numbers	RANGER-4DPAK-PSI ☐ – ☐ **Pressure Range:** Select from 2, 20, 100, 500, 1000, 3000, 10,000, 15,000, 20,000 psi **Data Storage Type:** NoSIM = No SIM card. No SignalFire Cloud. User provides LTE CAT M1 SIM card. SIM/VZ = Verizon LTE CAT M1 SIM – 1-Year Data Plan, SignalFire Cloud Connectivity SFCloud = No SIM Card. 1 year SignalFire Cloud. User provides LTE CAT M1 SIM card.

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Hazardous Location Certification

The Pressure RANGER is rated Class 1 Division 2 non-incendive when powered by its internal battery pack.

⚠️ **WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE COMPONENTS UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS FREE OF IGNITIBLE CONCENTRATIONS.**
AVERTISSEMENT : RISQUE D'EXPLOSION. NE PAS RETIRER OU REMPLACER LES COMPOSANTS QUE L'ALIMENTATION EST DÉBRANCHÉ OU ZONE EST LIBRE DE CONCENTRATIONS IGNITIBLE.

⚠️ **WARNING – EXPLOSION HAZARD Substitution of components may impair suitability for Class I, Division 2**
AVERTISSEMENT - RISQUE D'EXPLOSION. La substitution de composants peut rendre ce materiel inacceptable pour les emplacements de classe I, division 2

⚠️ **WARNING – EXPLOSION HAZARD Do not disconnect while circuit is live unless area is known to be nonhazardous**
AVERTISSEMENT - RISQUE D'EXPLOSION. Ne débranchez pas lorsque le circuit est en direct, sauf si la zone est connue pour être nonhazardous

⚠️ **WARNING – All wiring methods must be in accordance with the NEC**
AVERTISSEMENT - Toutes les méthodes de Essorez doivent être en conformité avec la NEC

⚠️ **WARNING - EXPLOSION HAZARD. Do not remove or replace while the circuit is live unless the area is free of ignitable concentrations.**
AVERTISSEMENT - RISQUE D'EXPLOSION. Ne pas enlever ou remplacer pendant que le circuit est vivant à moins que la zone soit exempt de concentrations ignitibles.

⚠️ **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.**
AVERTISSEMENT - RISQUE D'EXPLOSION. Ne retirez ni ne remplacez les lampes, les fusibles ou les modules enfichables (le cas échéant) à moins que l'alimentation ait été coupée ou que la zone soit exempte de concentrations inflammables.

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 Pressure RANGER will blink the Green or Red status LED 3 times to indicate the status of the last transmission to the server. If the Check in button is pressed and held for more than 1 second, the Pressure RANGER will take readings from the attached pressure sensor and send the readings to the server.

Sensor Zero and Calibration
RANGER Toolkit

The pressure sensors are calibrated by the sensor manufacturer. The temperature compensated range lies between 5°F to 150°F (-15°C to +65°C).

Based on the typical stability reported as ±0.25% FS over a year, the proposed zero and gain adjustment is suggested once every year. However, considering specific use-cases, we recommend that each customer determines the most appropriate interval for zeroing and gain adjustments based on their unique operational conditions.

The calibration process for our sensors follows this procedure:
- Connect your computer to the RANGER using the USB cable provided.
- Launch the RANGER toolkit on your system.
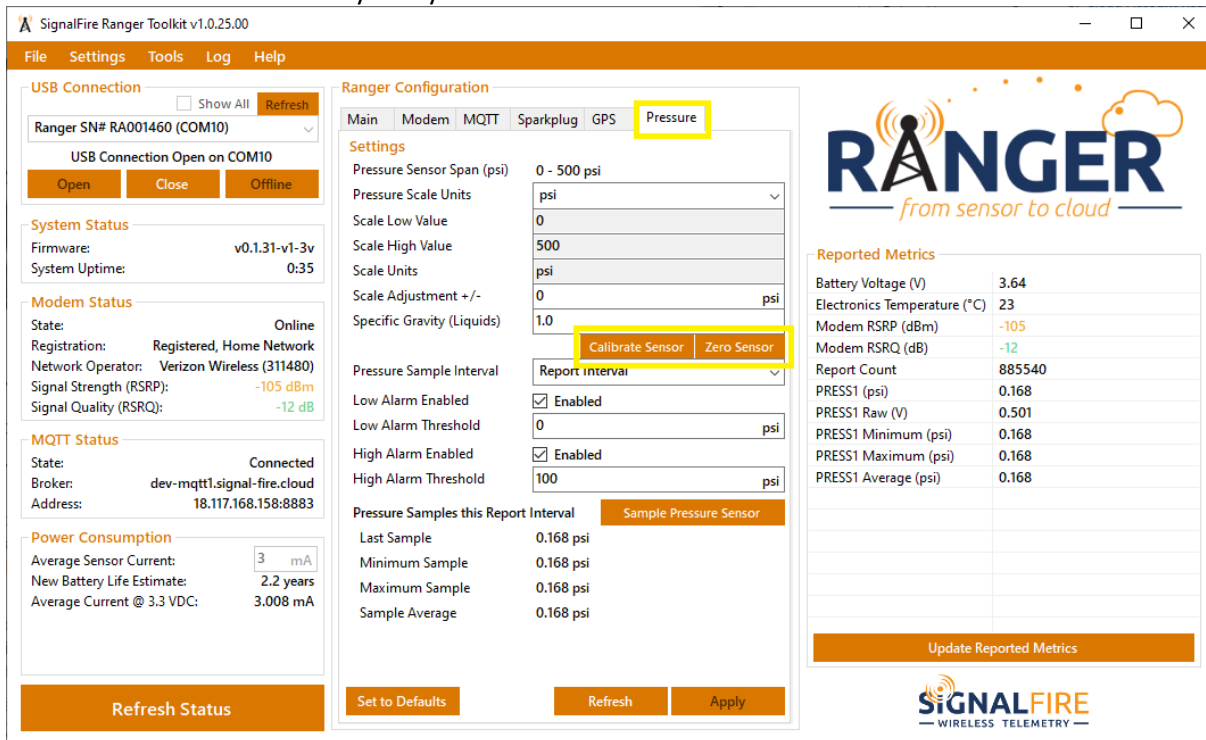
- Navigate to the 'Pressure' tab located within the RANGER configuration.
- Within this tab, you'll find a button labeled 'Zero Sensor'. Clicking this will zero out the sensor. The sensor should be vented to the atmosphere during this process.
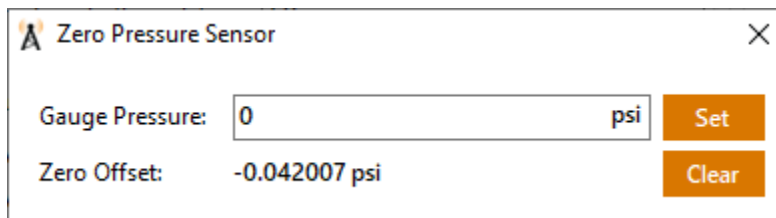
- Next to the 'Zero Sensor' button, there's another button labeled 'Calibrate Sensor'. Clicking this will initiate the 2-point calibration process for the sensor, which provides the most accurate calibration.
- Stable reference pressure is needed to Calibrate the Sensor.

Calibrate Pressure Sensor ☒

Calibrate Low Value

`0`   psi

Set Low Value

1.5648 psi

Calibrate High Value

`500`   psi

Set High Value/Calibrate

Calibration Results

Gain Factor: 1.0039

Offset: -1.975 psi

Set to Defaults

- Enter in the Low Value as 0 psi if you are venting to atmospheric pressure. Otherwise enter your low value from your reference pressure. Click set Low Value.
- Enter in the High Value from your reference pressure. Click set High Value. It is recommended that the high reference pressure be close to the maximum range of the sensor being used and a minimum of half scale.
- The sensor is now calibrated, and you will now see the new Gain Factor and Offsets.

Power Options
Lithium Battery Pack (4DPak)

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

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.

Cloud Setup and Information

Full documentation on using the SignalFire Cloud features and how to remotely configure your RANGER is available in an online knowledge base. The manual provides instructions on user management, configuring alarms, generating reports, and more. Whether you are a new or experienced user, this manual serves as a valuable resource to maximize the platform's capabilities.

https://www.signal-fire.com/cloud-manual/

Link to SF Cloud

Link to SF Cloud Account Creation

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. Please fill out the request form using the button on the right below to set up your company site.

Adding the RANGER to your SignalFire Cloud Group

1. Plug in the battery so the RANGER can connect to the cellular network.

2. Verify that the RANGER is connected to the cellular network by pressing the "CHECKIN" button on the device and observe 3 strobes of the green status light.

3. Login to the SignalFire Cloud with your account login/password

4. From the Home page click "Add Device"

5. Enter the RANGER serial number and click "Claim". The serial number is located on the bottom of the RANGER with a format of "RA" followed by 6 numbers. (e.g. RA123456)

6. A message will be sent to the RANGER to claim it to your group account

7. Within approximately one minute the device will connect to your account, and you will be automatically redirected to the device status page

Technical Support and Contact Information

SignalFire Telemetry
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Marlborough, MA 01749
(978) 212-2868
support@signal-fire.com

Revision History

Revision	Date	Changes/Updates
1.0	9/23/2020	Initial release
1.1	11/30/21	Added detail on reports, dashboards, alarms
1.2	3/4/22	Added OTA (Over the Air) firmware information. Updated screenshots and paragraphs to match the current cloud updates. Simplify user guide for claiming devices.
1.3	3/21/22	Added fast reporting settings
1.4	8/28/23	Added calibration procedure.