![Pulse Industrial logo]

INDUSTRIAL

Pilot
Installation
Guide

Battery Maintenance

Pulse Industrial steam trap sensors use replaceable, non-rechargeable, AA Lithium Thionyl Chloride (Li-SOCL2) batteries at 3.6v DC that last for up to 7 years. Lithium Thionyl Chloride batteries are not considered hazardous materials or dangerous goods. They are installed in Pulse sensors with a focus on preventing short circuits or generation of heat. **Battery replacement must only be completed by an authorized service provider approved by Pulse Industrial Inc. Do not attempt any maintenance on the** sensors. For sensor or battery replacements, please contact:

+1 866-785-7301

cs@pulseindustrial.com

WARNING: Maintenance and Usage

Any maintenance or modification to Pulse steam trap sensors must be completed by an authorized service provider approved by Pulse Industrial Inc. Do not attempt any maintenance or modification to the sensors. Please contact Pulse if you have any questions or require service to a sensor:

+1 866-785-7301
cs@pulseindustrial.com

WARNING: Damaged Sensor or Gateway

If a sensor or gateway stops transmitting **data, do not attempt any repair or maintenance.** Please contact Pulse Industrial Inc. at:

+1 866-785-7301
cs@pulseindustrial.com

WARNING: Explosives Hazardous Areas

Pulse steam trap sensors are not rated for use in explosion hazardous areas. **Do not install sensor in environments classified as hazardous or explosive.**

WARNING: Installation Environment

The end-user is responsible for making sure that the sensors are installed within specification, in a suitable environment, suitable location, and suitable conditions, and not so hazardous as to damage the monitor or other equipment. Proper conditions and specifications are mentioned in this installation guide and shall be followed to reduce the risk of damage. **Failure to properly install the sensor can result in damage to the** sensor, **damage to equipment, fire, catastrophe, bodily harm, etc.**

WARNING: Installation Personnel

Pulse steam trap sensors must be installed by a qualified technician using professional and customary care. Use industrial standard safety measures when installing or removing Pulse steam trap sensors near hot pipes, steam traps, and other process equipment.

WARNING: Detection Accuracy

Pulse does not guarantee 100% detection accuracy or that 100% of steam trap failures will be detected. As such, a failure may occur on steam traps equipped with a Pulse steam trap sensor(s) without an alert being generated, data shown on the dashboard, or end-user notified. **Pulse Industrial Inc. is not liable for any monetary losses, equipment damage, or bodily harm caused by failed steam traps equipped with Pulse steam trap sensors.**

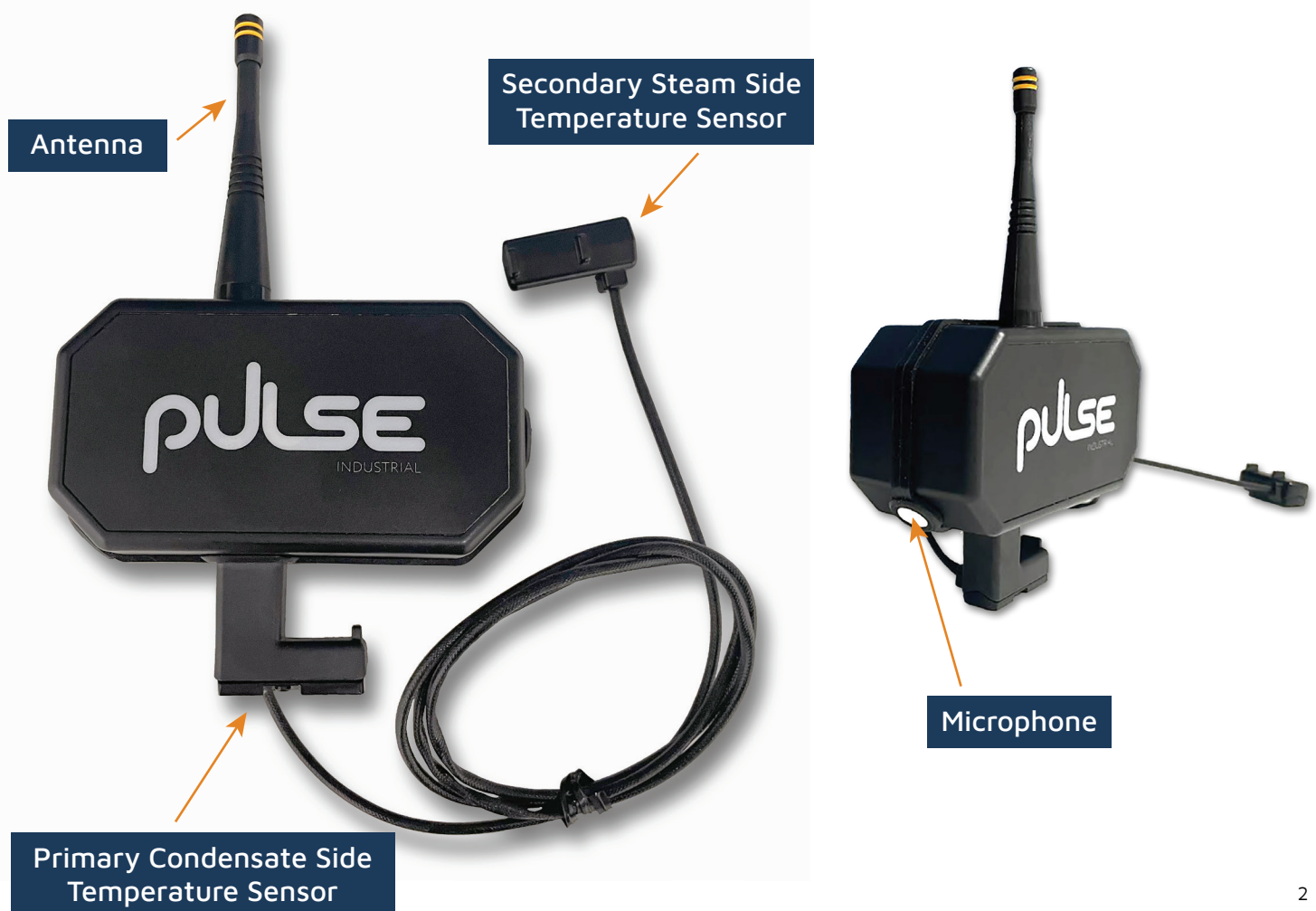### WARNING: Communication Compliance

Pulse steam trap sensors have been subjected to an electromagnetic compatibility radiated pre-scan to verify compliance against FCC / ISED limits for market acceptance in USA and Canada. This ensures that Pulse sensors may not cause harmful interference with existing communication devices on your facility.

Installing Pulse Sensors and Gateway

Preparation: You will need:

• Pulse steam trap sensors (10 included)
• Gateway (included)
• Reset magnet (included)
• 5/16" Hose clamps (large enough to wrap around steam trap pipes)
• Infrared temperature gun
• Ambient temperature reader (such as a heat index meter)
• 5/16" socket drill bit
• Torque wrench or power drill
• Torque limiter attachment (if using power drill)
• PPE (heat resistant gloves, safety glasses, steel-toe boots, etc. as required on site)
• Phone / camera

SENSOR COMPONENTS

Antenna

Secondary Steam Side Temperature Sensor

Microphone

Primary Condensate Side Temperature Sensor

Installing Pulse Gateway

Installation Instructions:

1. Record of installation:
Create a "Steam Trap List" spreadsheet of the 10 steam traps to be monitored with their:

- Tag number
- Location
- Make and model
- Pressure of steam line

2. Gateway preparation.
Choose a location with these attributes:

- Central location near the traps (~within 200m ideally).
- Strong LTE (cellular service) connection.
- Safe location that will not be disturbed.
- Avoid wet or potential wet areas for indoor rated models. Outdoor rated model is specifically rated for wet environments.
- Near a functional 120-Volt power outlet.

3. Gateway Installation.
Remove gateway from packaging and attach antenna to the gateway while its' power is off. Record gateway's LORA NODE (see picture below) in the "Steam Trap List" spreadsheet. Attach gateway to wall approx. 5-7 feet high using double sided tape or screws if possible (should be higher than most sensors).
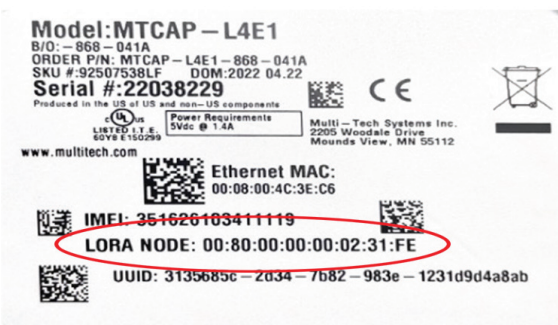
- Place the Gateway's antenna at a 45 degree angle from the vertical, away from the wall, for optimum connectivity.

- Plug the gateway in to power outlet and make sure the top STATUS light (LED #1) of the gateway is blinking. This indicates that the gateway is ON (see image below).
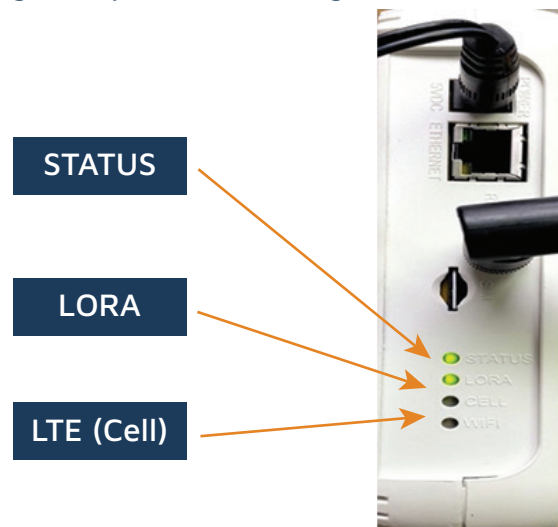
- After the gateway has powered up, observe status lights:

  - Gateway will take time (up to 10 minutes) to start communicating with the sensor devices. When LED#2 (LORA) lights up it indicates that there is sufficient LoRaWAN network connectivity.

  - If LORA LED does not turn on then the gateway is not able to connect to LoRaWAN network and will not receive data from the sensors.

  - If LED #3 (Cell) is blinking the gateway is connected to the LTE (cellular) network.

  - If Cell LED is not blinking the gateway is not connected to the LTE (cellular) network and will not be able to transmit data to the cloud.

  - Once you have installed the gateway and have confirmed LoRaWAN and LTE connectivity, reach out to Pulse's System Engineer and provide gateway LORA NODE# to confirm gateway connectivity with the cloud.

- Record location of gateway in the "Steam Trap List" spreadsheet.

Installing Pulse Sensors

Installation Instructions cont'd:

4. Check viability of traps by taking temperatures for each one.

• Take temperature reading at steam side of pipe. **Note**: If using an infrared temperature gun, reflective surfaces underreport temperature. Thus, take several readings on the least reflective surfaces. Measure the pipe temperature on steam side of steam trap. The maximum permissible temperature of the steam pipe for safe mounting of the secondary sensor is 300°C (572°F). However, due to the variable nature of steam systems, the maximum installation steam temperature shall be 280°C (536°F). If the temperatures measured are **over 280°C (536°F), the sensor should not be installed at this steam trap**. Record the highest temperature measured in the "Steam Pipe" column in the "Steam Trap List" spreadsheet.

• Take temperature reading at condensate side of steam trap. **Note**: If using an infrared temperature gun, reflective surfaces underreport temperature. Thus, take several readings on the least reflective surfaces. The maximum permissible temperature of the condensate side pipe for safe mounting of the primary sensor is 200°C (392°F). However, due to the variable nature of steam systems, the maximum installation condensate temperature shall be 180°C (356°F). If the temperatures **measured are over 180°C (356°F), the sensor should not be installed at this steam trap**. Record the highest temperature measured in the "Condensate Pipe" column in the "Steam Trap List" spreadsheet.

• Confirm the make, model, tag # pressure and location of steam trap in "Steam Trap List spreadsheet".

5. Check viability of sensor locations by taking ambient temperatures for each one.

• This step does not need to be repeated for every steam trap if the ambient temperature around the steam traps is definitely less than 45°C (113°F).

• Using the ambient temperature reader measure the ambient temperature in several general areas, 5-10 cm (2" - 4") from the steam trap on the condensate side, approximately where the sensor will be mounted.

• Record the average ambient temperature in the "Ambient Temperature" column of the "Steam Trap List"spreadsheet.

• If the ambient temperatures measured are **over 45°C (113°F), the sensor must not be installed at this steam trap.**

6. Ensure that each steam trap is functioning correctly.

• Have a trained person complete a manual inspection of each trap prior to installing a sensor on it.

• Putting a sensor on a failed trap could result in inaccurate data from monitors.

• If trap is already failed, note that on the trap data sheet and arrange for repair or replacement as soon as possible.

• Once trap is replaced manually audit trap again before updating data on sheet and initializing pulse system monitoring.

Installing Pulse Sensors

Installation Instructions cont'd:

7. Prepare sensor.

Remove Pulse sensor from packaging. Find the sensor ID on the back of the primary device. Record the sensor ID under the "Sensor ID" column of the "Steam Trap List" spreadsheet.
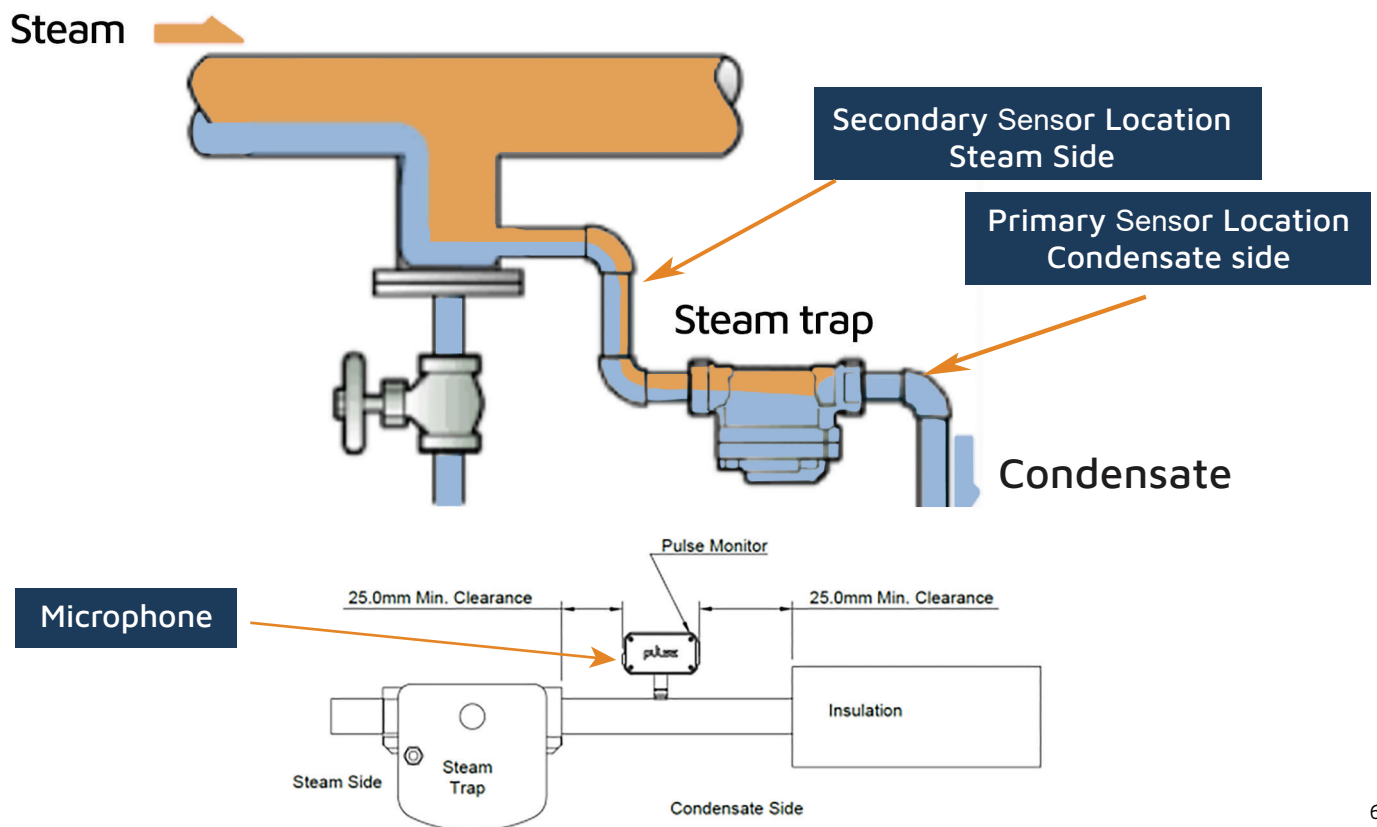
- Put on heat-resistant gloves.
- Determine placement and orientation of the **primary sensor** which is the larger part of the unit and base on the pipe on the **condensate side** of the steam trap.
- Ensure orientation of the microphone is correctly facing the steam trap (refer to photo of sensor on page 2 to confirm location of microphone and diagram below for orientation).
- Determine placement of the **secondary sensor** which is the smaller sensor at the end of attached wire on the pipe on the **steam side** of the steam trap.

Note: The sensor should **not** be:

- Touching the steam trap.
- Mounted on insulation.
- Touching equipment other than the pipe / pipe union surface they are mounted on.
- Touching any metal objects or thick concrete.

Note: The sensor **should** be:

- Mounted with microphone in line of sight of steam trap.
- Positioned so that antenna is pointing up and toward the gateway for optimal connectivity.
- Installed between 2.5cm - 12cm (1" - 5") away from steam trap (see diagram below).

Steam

Secondary Sensor Location
Steam Side

Primary Sensor Location
Condensate side

Steam trap

Condensate

Microphone

Pulse Monitor

25.0mm Min. Clearance

25.0mm Min. Clearance

Insulation

Steam Side

Steam Trap

Condensate Side

Installing Pulse Sensor

Installation Instructions cont'd:

8. Attaching the clamps.
- Set the torque limiter to between 60 and 70 cN.m (tighten to within this range).
- Attach the torque limiter to the power drill or socket screwdriver.
- Attach a 5/16 socket bit to the power drill or socket screwdriver.
- Completely loosen a pipe clamp using screwdriver or power drill.
- Choose a clamp (or combine clamps to create a clamp) large enough to wrap around the pipe section where primary device will be mounted -- with extra room.
- Wrap clamp around the pipe where primary device will be installed.
- Slightly tighten the clamp using the screwdriver or drill such that there is enough room to slide in the primary device's mount between the pipe and the clamp (~2cm or 1").
- Slide in the primary device into position and ensure correct orientation of microphone and placement of the monitor relative to steam trap.
- Tighten the clamp using the screwdriver or drill while holding the primary device and pipe clamp in place until clamp and mount are securely fastened to the pipe.

Note: **Do not overtighten** - Ensure use of the torque limiter and adjust the power drill settings to prevent over tightening and damaging monitor mount.

- Ensure the monitor is stable by checking if the monitor is secure on pipe or indicating any damage/breakage of mount.
- Repeat for the secondary monitor on the steam side of the steam trap.
- Ensure the wire connecting the primary and secondary monitors is not a tripping hazard (consider using a zip tie).

Installing Pulse Sensors and Gateway

Installation Instructions cont'd:

9. Reset device.

- After installing the sensor, hold the included reset magnet to the back of the monitor for 10 seconds to reset (see picture below).

10. Complete the Documentation.

- Record the time of installation under the "Time of Install" column of the "Steam Trap List" spreadsheet.
- Take a photo of the installation with Steam trap and both primary and secondary sensor in frame as well as a clear view of what the sensors are mounted on (pipe / pipe union).
- Insert photo in appropriate row under the "Photo of install" column of the "Steam Trap List" spreadsheet.

11. Repeat steps for each steam trap

If you have any questions reach out to:

+1 866-785-7301
cs@pulseindustrial.com

12. Inform Pulse staff at completion of the installation.

Share the "Steam Trap List" spreadsheet with Pulse staff at cs@pulseindustrial.com. They will set up a call to go through how to log in and use the Pulseview dashboard and answer any other questions you may have.

13. Pulse staff will review and send confirmation that the sensors are reliably sending data to the gateway. The check that the sensors are working properly will be completed remotely by Pulse staff.

14. Rest easy knowing that those 10 steam traps are being monitored for failure by the most accurate and easy to install solution on the market!