Invisible Systems

Installation Manual

105I/125I 3-Channel Meter

Safety Notice

The non-rechargeable 3.6V lithium thionyl chloride battery used in this product is a hermetically sealed structure. It is not hazardous when used according to the recommendations of the manufacturer.

⚠	DO NOT exceed temperatures of -55°C to +85°C.
⚠	DO NOT short circuit, recharge, puncture, incinerate, crush, immerse, force discharge. Risk of fire or explosion.

Under normal usage conditions, the electrode materials and liquid electrolyte cannot leak to the outside. Risk of exposure only in case of abuse (mechanical, thermal, electrical) which leads to the activation of safety valves and/or the rupture of the battery container.

Storage Conditions

Please store the transmitter and batteries in clean, cool (not over +30°C), dry (less than 30%RH) and well-ventilated conditions. Attempting to operate the device outside of these conditions may result in damage to the transmitters internal components.
Clean with a damp cloth using only water. Do not use any cleaning chemicals on the product as this may affect the sensor accuracy.

Changing the Battery

The non-rechargeable battery is not user replaceable. Since the battery lasts up to ten years, depending on configuration, the user is not expected to change the battery. If new batteries are required, please contact Invisible Systems Ltd for further information.
Batteries must be disposed of safely according to local regulations.

Pre-installation

The transmitters are wireless and use one of the following technologies:

- Long range radio frequency for LoRa and LoRaWAN devices (in the licence free bands)
- Narrowband cellular radio frequencies for NB-IoT devices

Refer to datasheet for operating frequencies.
In either case, the signal is affected by physical barriers such as walls, metallic furniture, and racking, as well as sources of electromagnetic interference such as mains electrical cabling and high-power electrical equipment.

Communications Protocols

The LoRa versions of the transmitter are only compatible with ISL UltraRF GSM Gateways. They use a dedicated encrypted radio protocol.
The LoRaWAN versions of the transmitter are LoRa alliance certified and are compatible with any LoRaWAN certified gateway. Devices will be shipped with default LoRaWAN keys in either ABP or OTAA mode. These are on a removable label attached to the device. Activation keys are fully user configurable via the ISL SetupPro application. This application can be supplied on request. A USB radio dongle will also be required.
The NB-IoT versions of the transmitter are supplied either with an embedded SIM or require a 4FF nano NB-IoT SIM card. They can operate on any mobile network that supports NB-IoT. Invisible Systems can supply pre-fitted with an embedded SIM.

LoRa & LoRaWAN

Prior to installing the transmitters, it is recommended for LoRa and LoRaWAN devices that the gateways are already installed and setup. NB-IoT devices connect direct to the cellular network and need no gateway.

General Advice

When installing the transmitter:

×	Do not place the transmitter in areas where condensation will occur.
×	Do not place this transmitter in an oven, microwave, fridge, freezer, chiller, outdoors or any other extreme environment.
×	Do not place the transmitter inside metal cabinets or trunking, as this will have an adverse effect on radio performance. Keep the transmitter itself as far away from electrical wiring as possible.

Safety

⚠	This device requires installation of current transformers around mains electrical wiring.
⚠	This equipment must be installed and serviced only by a qualified, competent electrician. Compliance with relevant regulations must be ensured.
⚠	Disconnect/isolate all supplies before commencing installation.

Using with Realtime-Online

The transmitter must be added to the Realtime-Online cloud portal before it can be seen. See overleaf for instructions.
It is recommended that transmitters are installed and set up on Realtime-Online simultaneously. Use of the Invisible Systems Sensor Setup app is recommended.

Switching on the Transmitter

During shipment, the unit is in sleep mode to save the battery.
Before installation, 'wake up' the unit by removing the lid and pressing the button on the left marked RESET (see Figure 1). The LED on the bottom-left should flash green. Replace the cover.
Once switched on, the sensor should start to transmit.
Install the transmitter in the desired location - see sections on 'Pre-installation' and 'General Advice'. Use mounting holes or strong double-sided tape.

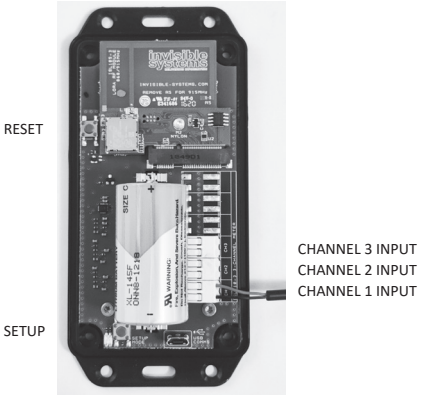

Figure 1: Location of RESET & SETUP buttons

Fitting Current Transformers

The device will come with one or more current transformers pre-fitted. These will need fitting around the current-carrying conductors being monitored.
See 'Safety' section regarding fitting of the current transformers – they should only be installed and serviced only by a qualified, competent electrician. Compliance with relevant regulations must be ensured.

✓	Note that only 0.333V output current transformers should be used.
⚠	Under no circumstances should 5A secondary transformers be used.

The current transformers should be clipped around the correct conductor (see Figure 2). Note, they should only be clipped around a single conductor, not around a live and neutral pair.
Ensure that the current transformer is fully closed, and that the clip on the current transformer has engaged fully. Be careful not to trap the conductor or its insulation when closing the current transformer.

✓	Current transformers should be sized to cover the maximum current that will occur in the circuit being monitored. Note that they are not very accurate at less than 10% of their nominal size.

Figure 2: Fitting of current transformer

Note that the direction in which the current transformer is fitted does not matter. The same is true of the connections to the Channel 1/2/3 inputs.
When installing devices with more than one current transformer fitted, it is important to know which channel is fitted to which circuit being monitored.
Once all current transformers are fitted, make the cabling tidy and secure. Leave the area safe electrically.

Recording Current Transformer Size

When the device is configured on Realtime-Online, the size of the current transformers used will be required, e.g. 5A, 10A, 100A.
The device also assumes a constant mains voltage and power factor. If necessary, a qualified, competent electrician may need to measure these. Record below the values for later use:

Sensor ID		
CT size – Channel 1		A
CT size – Channel 2		A
CT size – Channel 3		A
Voltage – Channel 1		V
Voltage – Channel 2		V
Voltage – Channel 3		V
Power factor – Channel 1		
Power factor – Channel 2		
Power factor – Channel 3		