

FLOW LOTIC™ INSTALLATION GUIDE

DOCUMENT DETAILS

DOCUMENT VERSION HISTORY AND AMENDMENTS

Version Number	Amended by	Change log	Date
V1.0	Ash Yap	Creation of document	28/01/2022
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DISCLAIMER

Any requirements, eg “Field installer skills prerequisites”, “Components required to complete installation”, “Components / equipment to be provided by the installer”, “Safety Information”, “Transport and storage conditions” and “Important” breakouts must be strictly adhered to and taken into consideration for the functionality, accuracy and protection of the Flow Lotic™ data logger and mechanical meter peripherals. Importantly, safety considerations should be adhered to for the installer and the general public.

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TABLE OF CONTENTS

DOCUMENT DETAILS	2
DOCUMENT VERSION HISTORY AND AMENDMENTS	2
DISCLAIMER	2
COPYRIGHT	2
FLOW LOTIC™ STORAGE, HANDLING AND SUPPORT	4
SAFETY INFORMATION	4
TRANSPORT AND STORAGE CONDITIONS	4
CONTACT SUPPORT	4
PRIOR TO CONTACTING SUPPORT PLEASE HAVE THE FOLLOWING INFORMATION ON HAND	4
FLOW LOTIC™ INSTALLATION GUIDE	5
INTRODUCTION	5
FLOW LOTIC™ UNIT DIAGRAM	6
INSTALLATION OVERVIEW	6
MOBILE NETWORK CONFIGURATION	6
SITE SURVEY	7
FIELD INSTALLER SKILLS PREREQUISITES	7
COMPONENTS REQUIRED TO COMPLETE INSTALLATION	8
COMPONENTS/EQUIPMENT TO BE PROVIDED BY THE INSTALLER	9
PRIOR TO INSTALLATION	10
NFC TAP HOLD AND GO PROCESS	11
STEP-BY-STEP INSTALLATION PROCESS	12
ESTABLISH NFC CONNECTION	12
DEVICE ACTIVATION/PROVISION	12
NETWORK HEALTH CHECK	12
PHYSICAL INSTALLATION	12
CALIBRATION	12
COMPLETING THE WORK	19
POST COMMISSIONING	20
COMMISSIONING UNITS THAT ARE NOT PRE-CONFIGURED	21
INFORMATION YOU WILL NEED	21
TECHNICAL INFORMATION	23

TABLE OF CONTENTS

TECHNICAL DATA SHEET	24
OPERATION	24
WEIGHT	24
PULSE COUNTER INPUT	24
COMMUNICATION	24
LwM2M SUPPORTED RESOURCES	24
LwM2M OBJECT DATA POINTS	24
EVENT DATA DELIVERY	24
CABLE JOIN PROCESS FOR THE RAYTECH BARNEY CONNECTOR	26
ERRORS AND TROUBLESHOOTING	27
LED STATES	27
ERROR LOGS	27
TROUBLESHOOTING	27
ABBREVIATIONS	29

FLOW LOTIC™ STORAGE, HANDLING AND SUPPORT

SAFETY INFORMATION

- Fully sealed unit do not attempt to open
- Lithium battery do not expose to high temperatures over 100°C, naked flames, puncture or crush the battery
- Do not attempt to drill battery or device casing
- Device disposal through a certified electrical recycler
- Avoid dropping device and handle with care

TRANSPORT AND STORAGE CONDITIONS

- +30°C / 86°F Maximum recommended
- Battery characteristics allow for low self-discharge rate (less than 1% after 1 year of storage at +25°C)

CONTACT SUPPORT

Iota Services Pty Ltd
WatersEdge, 101 Wells Street,
Frankston VIC, Australia 3199

Iota is a wholly owned subsidiary of South East Water, an industry leader in smart technology.

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www.iotaservices.com.au

PRIOR TO CONTACTING SUPPORT PLEASE HAVE THE FOLLOWING INFORMATION ON HAND

- How many devices are affected by the issue
- Device details - serial number, telecommunication network, firmware version
- Symptom and issue being experienced - date that the issue started occurring
- What modifications or settings have been changed
- Error messages, log files

FLOW LOTIC™ INSTALLATION GUIDE

INTRODUCTION

The Flow Lotic™ is an Internet of Things (IoT) data logger that enables pulse-data from a mechanical water meter to be transmitted across a network into an IoT platform. Built for accuracy, the device is battery operated, IP68 rated and fully sealed allowing for remote and rugged applications in the field for periods in excess of 10 years.

The Flow Lotic™ unit is installed at the water meter location and connected by cable to pulse sensor, installed on the meter. Captured data is transmitted to a cloud-hosted internet server via NB-IoT LwM2M protocol.

Commissioning the Flow Lotic™ unit to work with individual water meters is completed using an Android smart phone with the Flow Lotic™ Android application installed on it. The phone must have NFC (Near Field Communications) capability and the configuration process is conducted using a sequence of tap, hold and remove procedures - whereby the installer enters information into the ™ application, holds the phone in close proximity to an inbuilt NFC antenna and enters or confirms commissioning data.

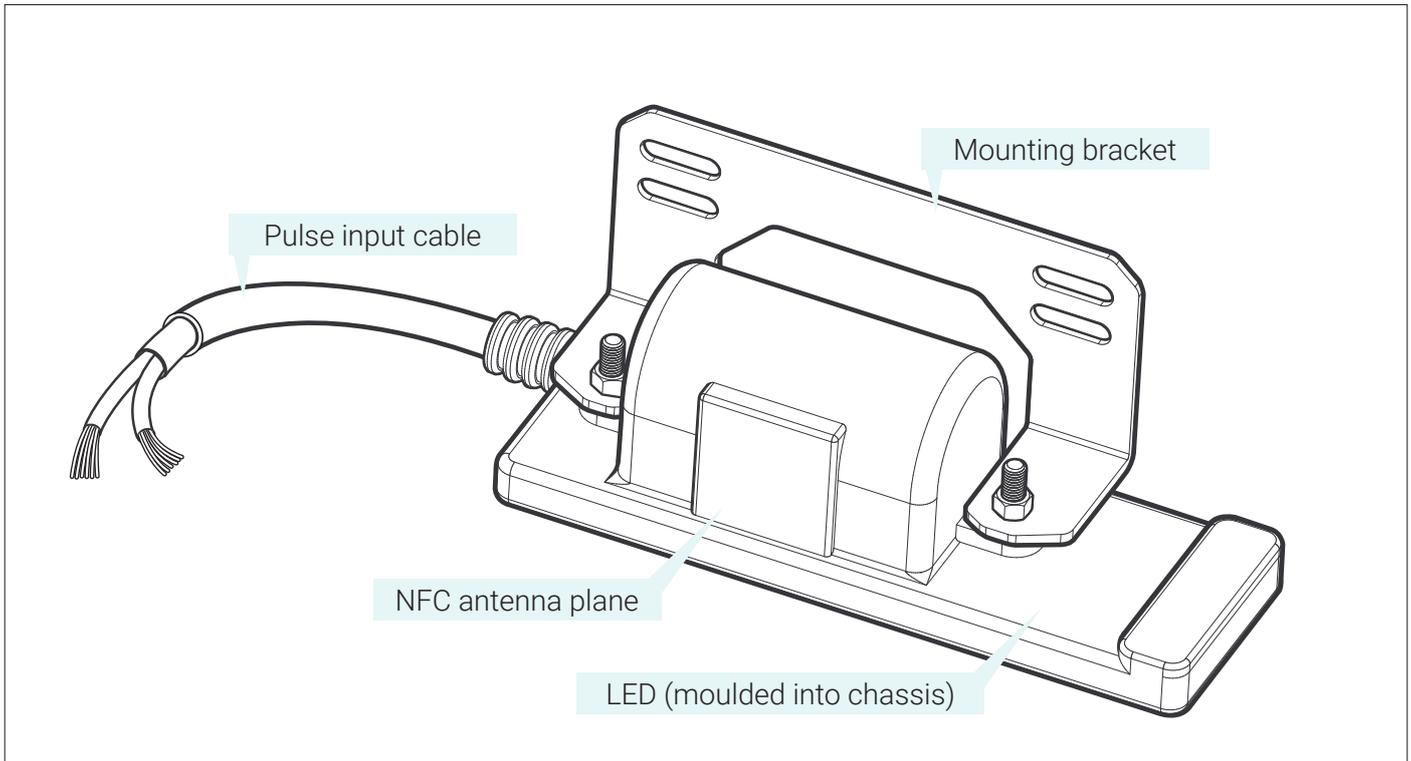
There are two options in configuring the Flow Lotic™ unit for access to mobile data networks, being:

- Units preconfigured for mobile data network access (the most common installation configuration)
- or
- Units configured by the user for mobile data network access

This guide has been created to explain the installation and commissioning process for both configuration options. In most cases, Flow Lotic™ units will be pre-configured by Iota and can be carried out by installers who are familiar with using smart phone applications, understand low-voltage installation procedures and are experienced in modifying or connecting mechanical water meters with pulse sensor accessories. Please refer to the installation guides for installing pulse sensors applicable to specific meter type you will be modifying. This is not covered in this user manual.

Where users opt to configure the mobile data network access and end-point data transmission criteria to suit their own requirements, installers must have a more extensive understanding of Internet Protocol network-related configuration (bootstrapping, DNS, IP address, Band priority). Users commissioning their own units for mobile network access must also ensure the configuration is setup to match the company's telecommunication provider network configuration. Details on this commissioning process are provided in the Commissioning Non-Pre-Configured Units section of this document and the configuration should be completed and tested before units are installed in the field.

FLOW LOTIC™ UNIT DIAGRAM



OVERVIEW

The Flow Lotic™ unit installation process is completed in the following stages:

- Mobile network configuration
- Site survey
- Field installation

MOBILE NETWORK CONFIGURATION

In most cases the Flow Lotic™ unit will be configured by Iota, with the mobile data network access criteria pre-configured for immediate installation. In this case installers should proceed with the site survey.

If the Flow Lotic™ unit is not pre-configured by Iota, please see the *Commissioning Units that are not Pre-Configured* section of this document and complete all network configuration processes before attempting installation.

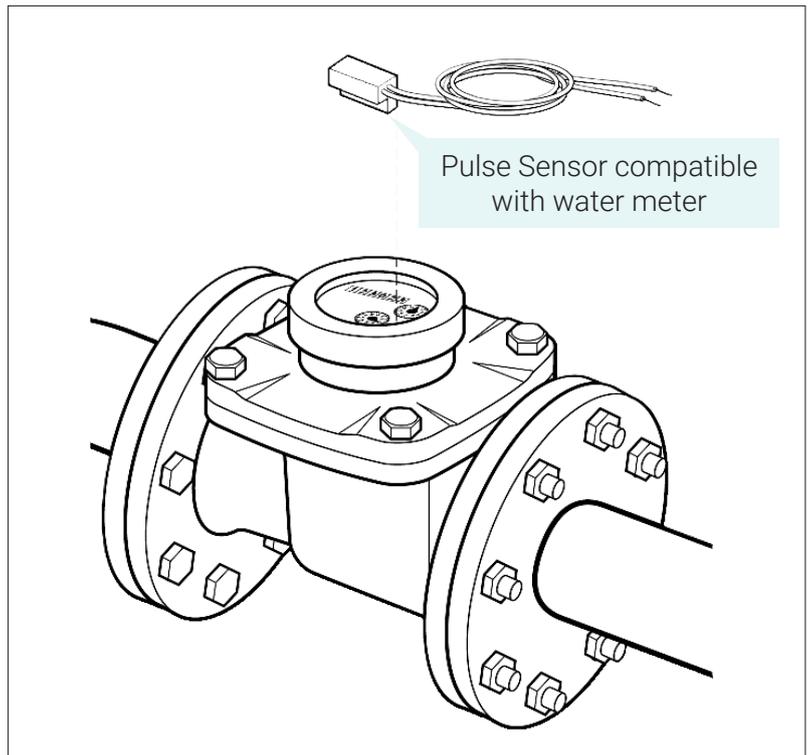
SITE SURVEY

A site survey must be conducted at the intended installation location to determine suitability of the water meter in-situ, access to the meter, space for the Flow Lotic™, with cable connection securely positioned and access to light, power or any other requirements that may impact the installers capability to complete the work.

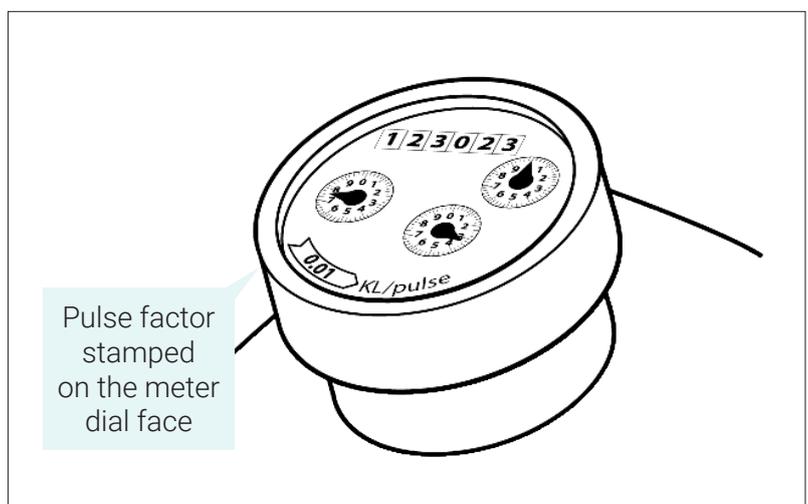
If the location is deemed suitable for installation the site-surveyor should confirm:

- A) That the meter in-situ is pulse enabled or capable of being modified with a pulse sensor – and that the end user or their installer can source the switch and install it.

This guide does not cover installation steps for installing the sensor onto or inside the meter as each meter brand and type is different. Please refer to the meter manufacturers installation guide for installing pulse sensors



- B) Identify the Pulse Factor (KL/Pulse) setting of the meter in-situ. This information is specific to each water meter type and can usually be gleaned from manufacturer information, a compliance plate or is stamped on the meter dial face.



FIELD INSTALLER SKILLS PREREQUISITES

- The installer must have general knowledge of mechanical water meters, specifically understanding the correct sensor installation procedure for the meter in-situ
- The installer must have a basic understanding of downloading and using Android phone applications
- The installer must understand low-voltage installation procedures, including; IP68 rated connections, cable stress management and relevant safety considerations
- The installer should ensure all relevant organisational site safety processes and procedures are followed during the installation of the Flow Lotic™ device

COMPONENTS REQUIRED TO COMPLETE INSTALLATION

Included components provided with the unit

- 1 x Flow Lotic™ data logger unit
- 2 x screw M4x20mm PAN PHIL SS304 [pre-mounted to unit]
- 2 x nut M4 Nylock SS304 [pre-mounted to unit]
- 1x MOUNTING BRACKET SS304 [pre-mounted to unit]
- 2 x stainless steel cable ties
- 2 X UV-rated zip ties

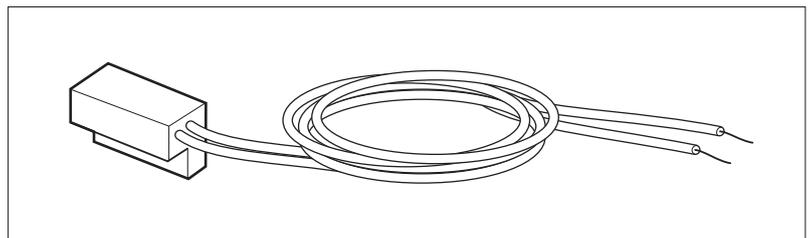
COMPONENTS/EQUIPMENT TO BE PROVIDED BY THE INSTALLER

Installers should ensure they have the following specialist equipment:

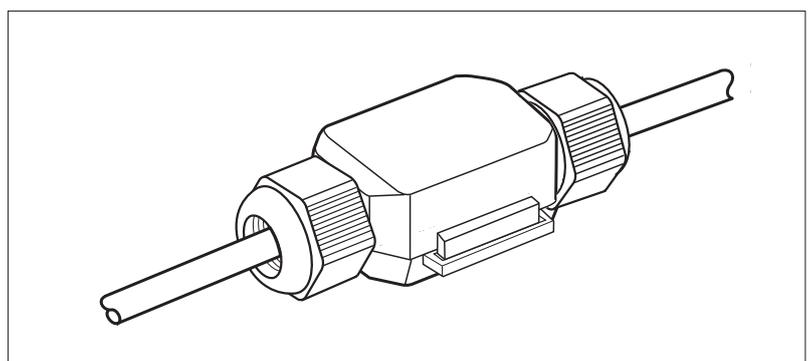
Android smartphone with NFC capability and Lotic™ application installed



Reed switch, hall effect or powered sensor pulse switch. Compatible with the water meter in-situ



Waterproof cable butt connectors that are IP68 rated and Australian standards approved. Iota recommend the Raytech Barney IP68 rated Gel Connector. This connector does not require join soldering or heat-shrink cable seals.



Installers should also ensure they have the following standard electrical installation equipment:

- Wire strippers
- 3mm flat-head screw driver
- Metal cable tie gun
- Pen / pencil and paper or mobile device notepad to record commissioning information

Note# Installers using the Raytech Barney connector will need to include a utility knife or blade to be used in the cable connection process, see the Cable Join Process for the Raytech Barney Connector section for details.

PRIOR TO INSTALLATION

Unpack the Flow Lotic™ unit and confirm all accessories described (previously) in the *Components required to complete installation - Included components* section are provided and that you have the necessary tools to complete the installation. Ensure weather conditions at the intended installation site are dry or sheltered to ensure safety and that cable connections can be completed without exposure to water or damp conditions that may impact the integrity of cable joins.

If your Flow Lotic™ unit is not preconfigured for SIM and network access, please complete the procedures explained in the Commissioning Units that are not Pre-Configured section to commission and test network connectivity prior to site installation.

Ensure the Lotic™ Android application is installed on your phone and you know how to enable the NFC function. For instructions on how to turn NFC on/off please refer to your phone's instruction manual.

Ensure you have received your Lotic™ Android application login PIN credentials, which are supplied with each unit.

Ensure all protective covers, cases or holders are removed from the phone. NFC is susceptible to interference from such cases.

Please note the NFC connection wakes up the Flow Lotic™ device from deep sleep mode. This connection should only be established when the device is ready for infield commissioning, as battery consumption increases when device is active.

It is important the device is activated before installation to ensure network connection is achieved before the device is mounted.

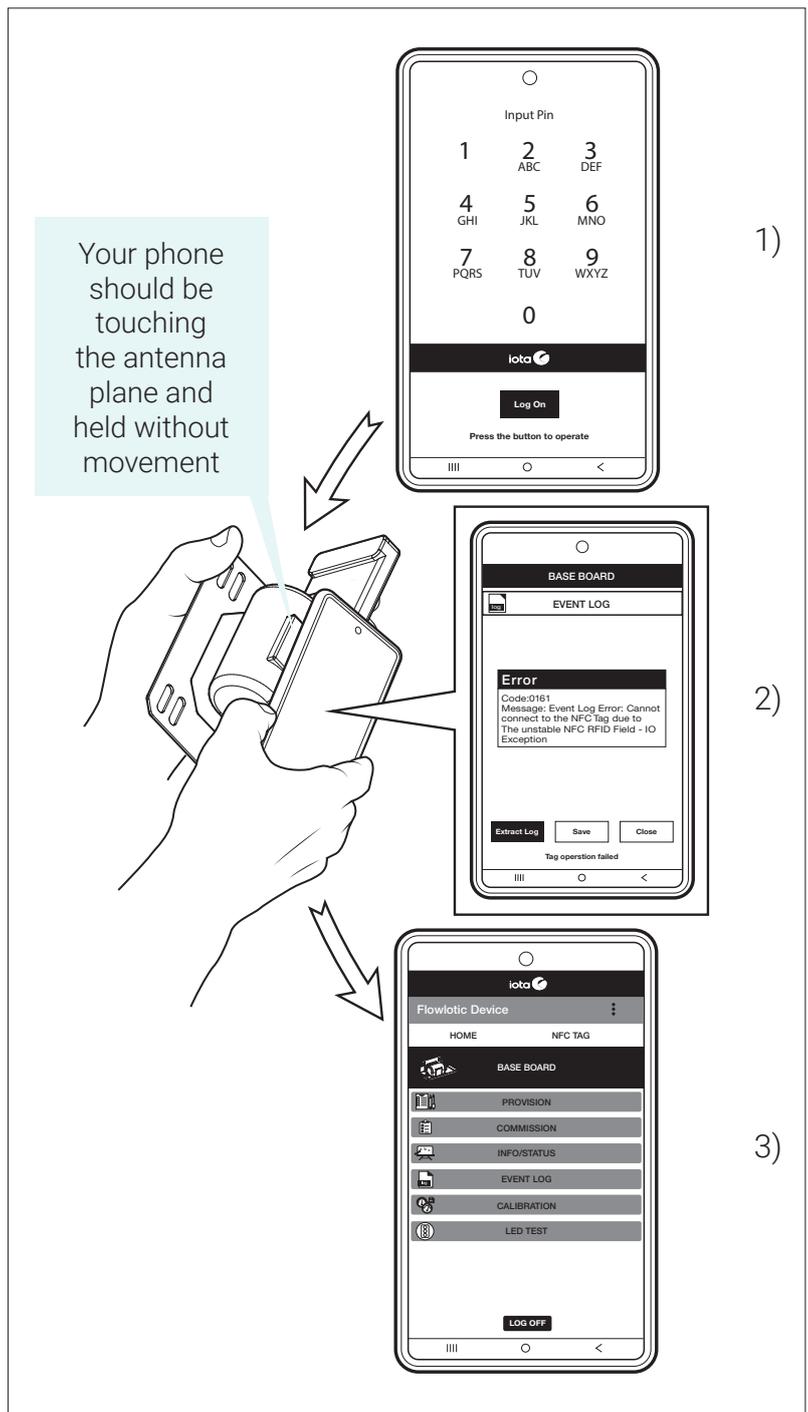
Note: If the Lotic™ phone application has been left Idle for some time, you may need to log out, turn off NFC and turn back on, then log back into the application and reconnect to the Flow Lotic™ Data logger.

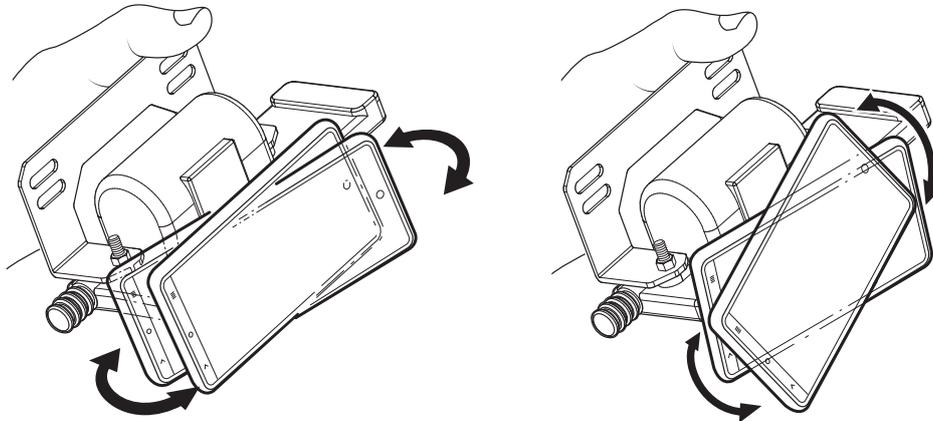
NFC TAP HOLD AND GO PROCESS

The Flow Lotic™ Android application is used throughout the installation process to instigate, confirm and process information you must program into or receive from your Flow Lotic™ unit. It uses Near Field Communications (NFC) technology, which relies on the installer holding their Android phone against an NFC antenna plane with the screen facing up, so that the installer can confirm that an action, update or process has been completed successfully.

The process is typically completed in three actions, being;

- 1) A screen-driven prompt or requirement to input data into a field
- 2) Tapping and holding your Android phone against the Flow Lotic™ unit's NFC antenna plane until confirmation that the unit has processed the information you entered
- 3) Android phone from the NFC antenna plane to complete the next step in commissioning the Flow Lotic™ device or responding to information retrieved from it.

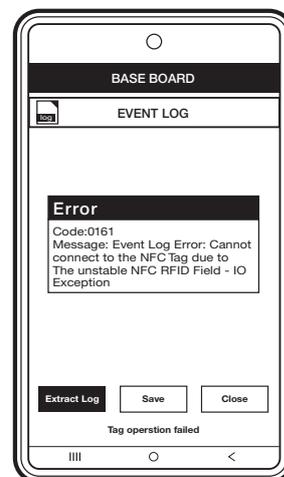




IMPORTANT

It is extremely important that you hold your Android phone steadily against the Flow Lotic™ unit antenna plane without lateral movement or jerking, until a command or confirmation instruction appears on the screen, indicating that the process has been completed successfully.

If you display a “Red Error” message while in the Tap and Hold process it is usually associated with unsteady movement and can be resolved by removing your phone from, the antenna plane and repeating current process.



STEP-BY-STEP INSTALLATION PROCESS

The following process should be used to install the Flow Lotic™ unit and commission it at the installation site. This installation process is broken up into five sections being:



IMPORTANT

If network credentials for setup are to be configured by the user for mobile data network access, complete the steps described in the Commissioning Units that are not Pre-Configured section before attempting installation on-site.

1. ESTABLISH NFC CONNECTION

Ensuring your phone NFC and the Flow Lotic™ device connection is working.

2. DEVICE ACTIVATION/PROVISION

Waking the device from low power mode and connecting to the mobile telecommunications network.

3. NETWORK HEALTH CHECK

Verifies successful connection the mobile network and acceptable signal strength.

4. PHYSICAL INSTALLATION

Attaching the Flow Lotic™ unit and connecting the pulse sensor on site.

5. CALIBRATION

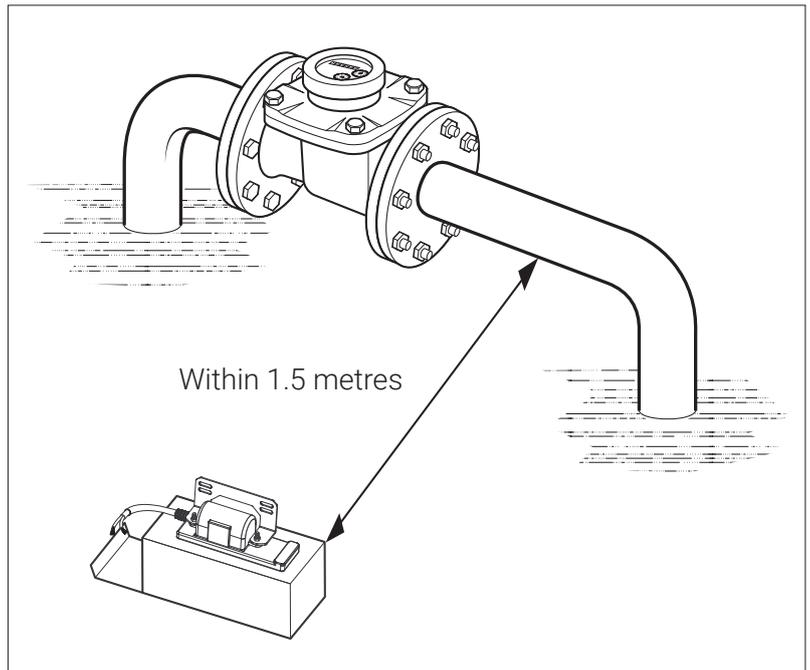
Matches the readings of the Flow Lotic™ device to those on the water meter.

ESTABLISH NFC CONNECTION

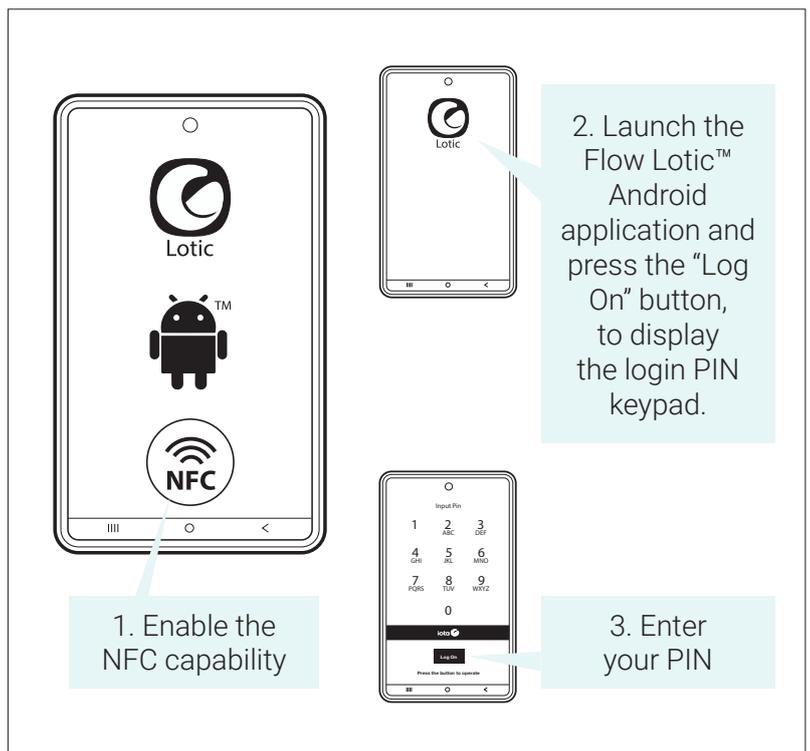
The Flow Lotic™ Android application is used throughout the installation process to instigate, confirm and process information you must program into or receive from your Flow Lotic™ unit. It uses Near Field Communications (NFC) technology, which relies on the installer holding their Android phone against an NFC antenna plane with the screen facing up, so that the installer can confirm that an action, update or process has been completed successfully.

The process is typically completed in three actions, being;

- 1) Place the Flow Lotic™ unit in a dry position within 1.5 metres of the intended installation position.



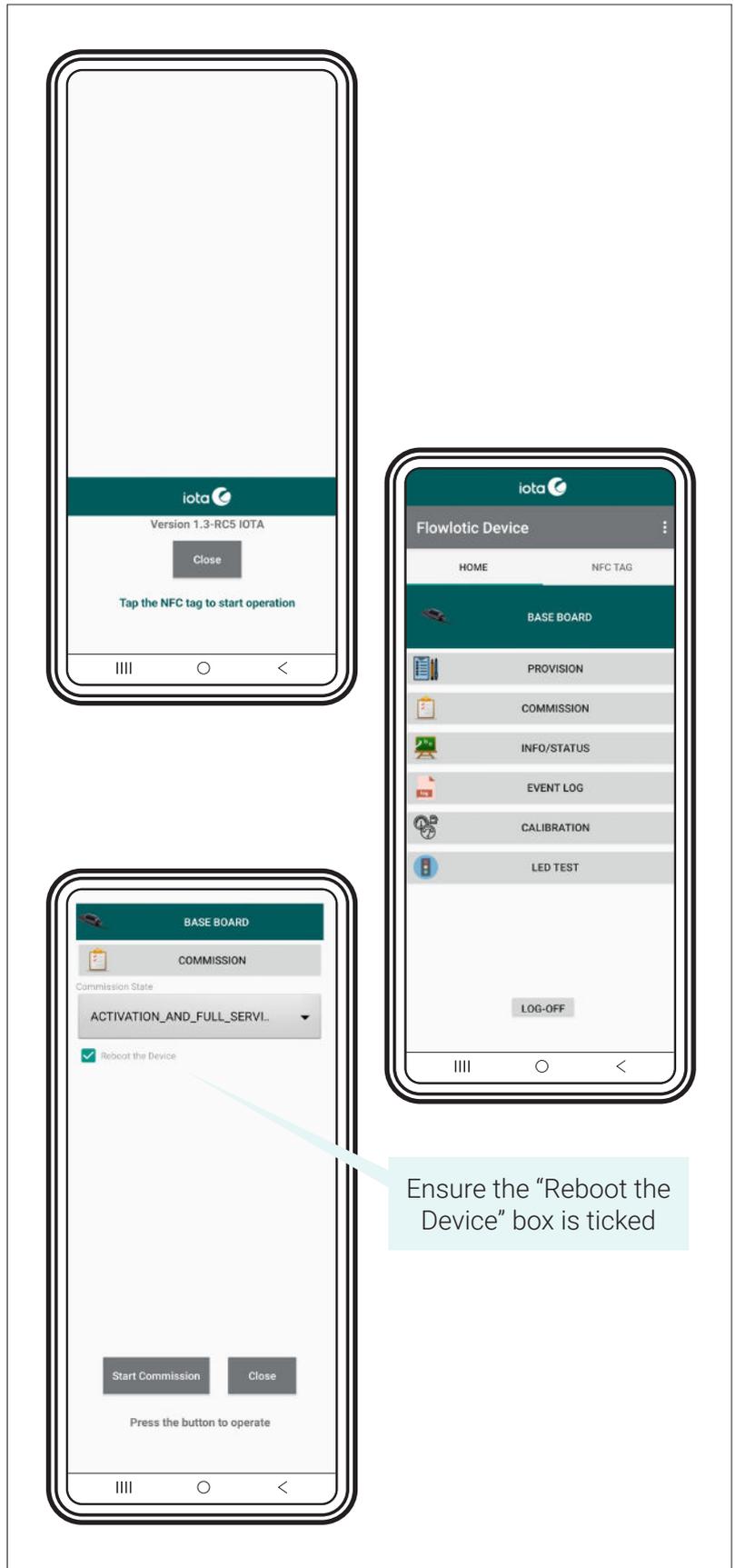
- 2) Enable NFC capability on your Android phone in "Settings" and ensure covers or protective wallets are removed from your phone.



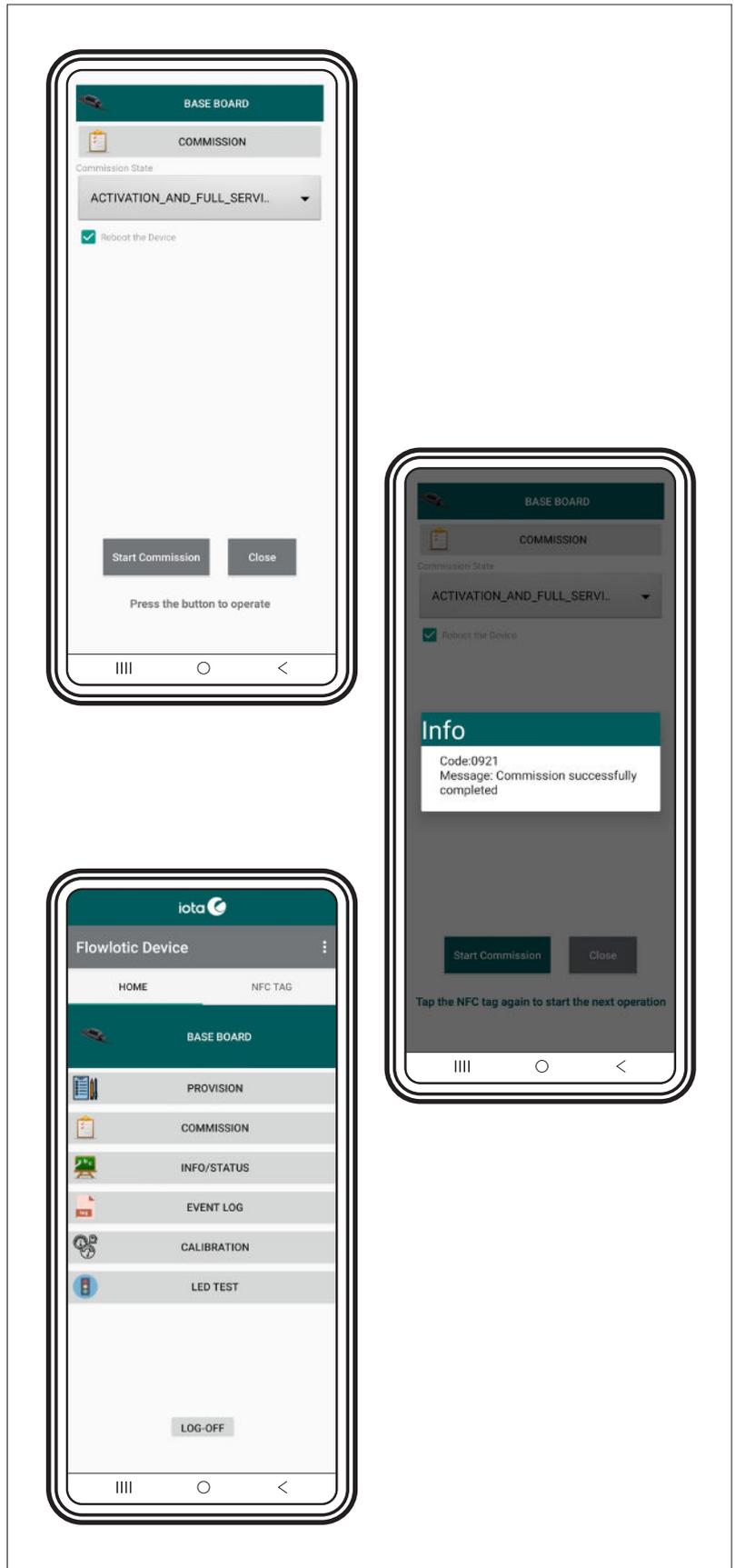
- 3) The “Tap the NFC to start operation” direction will be displayed at the bottom of the screen.
- 4) Tap and hold your Android phone on the Flow Lotic™ unit NFC Antenna plane (with the screen facing up) until the display transitions to the “Home” screen

DEVICE ACTIVATION/ PROVISIONING

- 5) Remove your Android phone from the NFC antenna plane. Select (press) the “Commission” option and ensure the “ACTIVATION_AND_FULL_SERVICE” field option is displayed and the “Reboot the Device” box at the lower left of this field is ticked



- 6) Press the “Start Commission” button.
- 7) Tap and hold your Android phone on the Flow Lotic™ unit NFC Antenna plane (with the screen facing up) until the “Commission Successfully Completed” message appears.
- 8) Remove your Android phone from the NFC antenna plane and press the “Close” button to return to the “Home” screen.



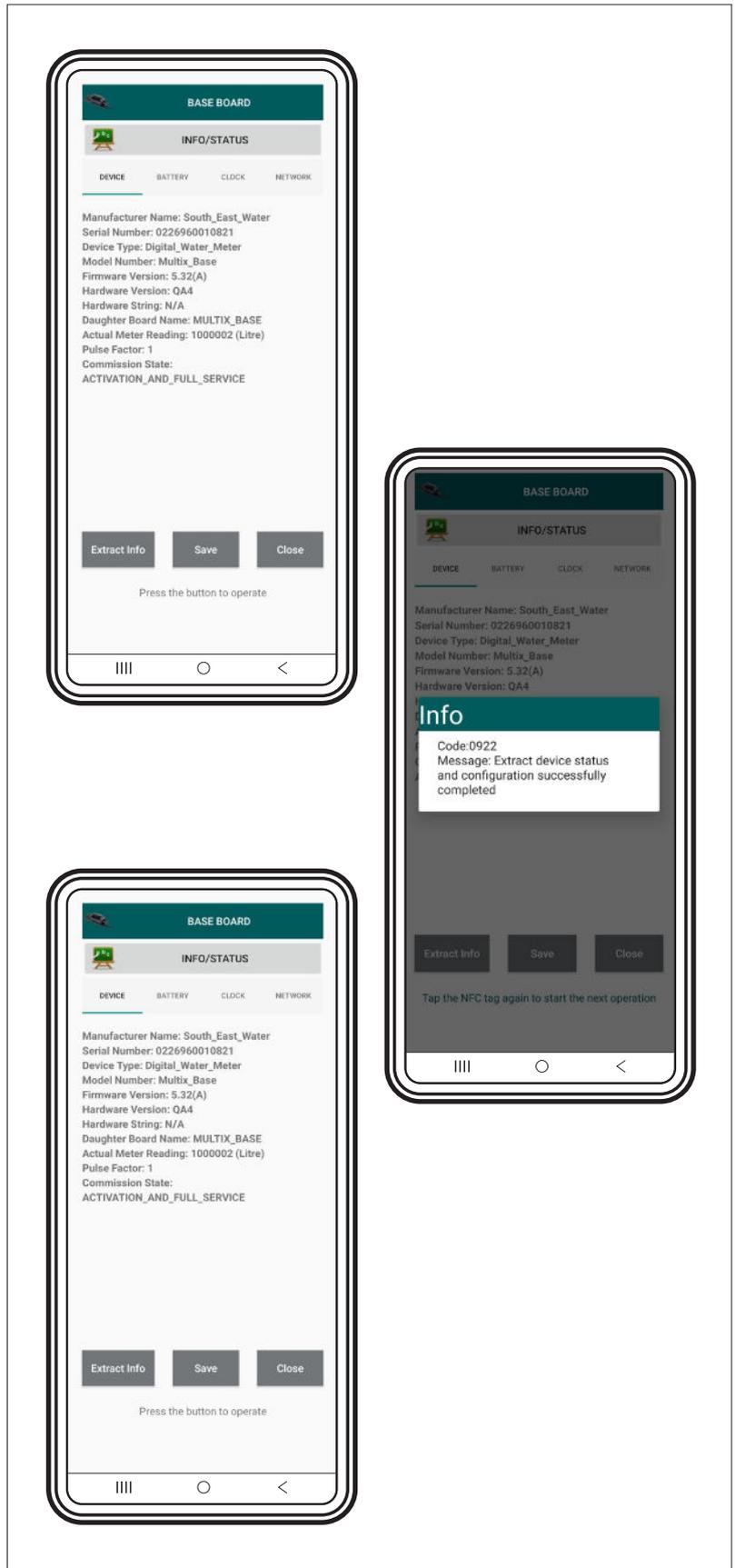
NETWORK HEALTH CHECK

- 9) Select the “Info/ Status” option on the “Home” screen, which will default to the “Device” tab. The Device tab will be underlined and display a list of device information fields. In the bottom left of the screen press the “Extract” button.
- 10) Tap and hold your Android phone on the Flow Lotic™ unit NFC Antenna plane (with the screen facing up) until the “Extract Device Status and Configuration Successfully Completed” message appears.
- 11) Remove your Android phone from the NFC antenna plane and select the underlined “Device” option tab from the upper menu bar on the screen to display information on the commissioning status of the Flow Lotic™ unit as text. The last line of this text should read “Commission State = Activation and Full Service”.

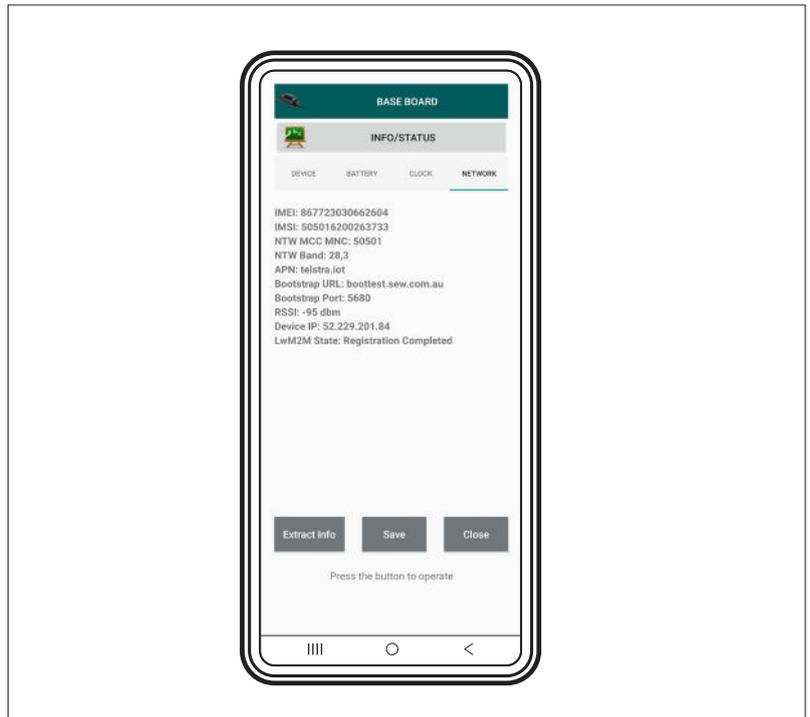


IMPORTANT

If the “Commission State = Activation and Full Service” message is not achieved return to step 8 and try again. If after two attempts the Flow Lotic™ unit still does not connect to the network halt the installation.

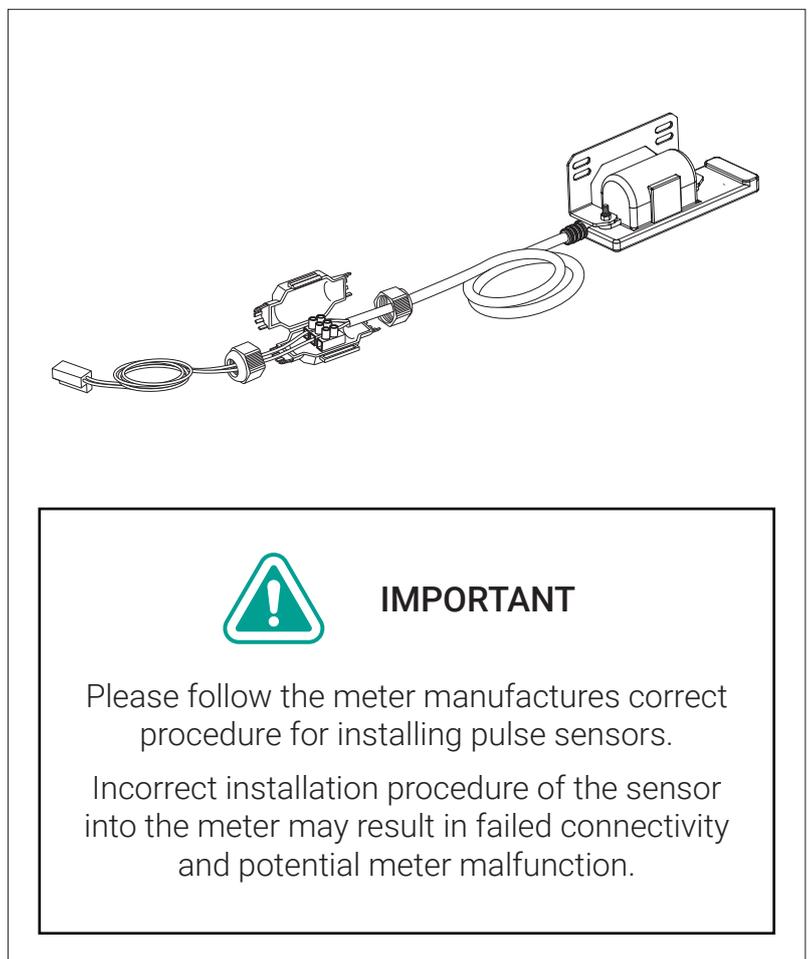


- 12) Select the underlined “Network” option tab from the upper menu bar on the screen to display information on the network status as text. The installer should record the RSSI (signal strength) information in the body of text, ideally it should be greater than -100 dBm (e.g. -70 dBm). If it is less than -100 dBm (e.g. -120 dBm) please report the signal strength to the end user or installation authority. The last line of this text should read “Lw M2M State: Registration Complete”. Put your phone aside and proceed to configure the Flow Lotic™ unit using the water meter compatible pulse sensor.



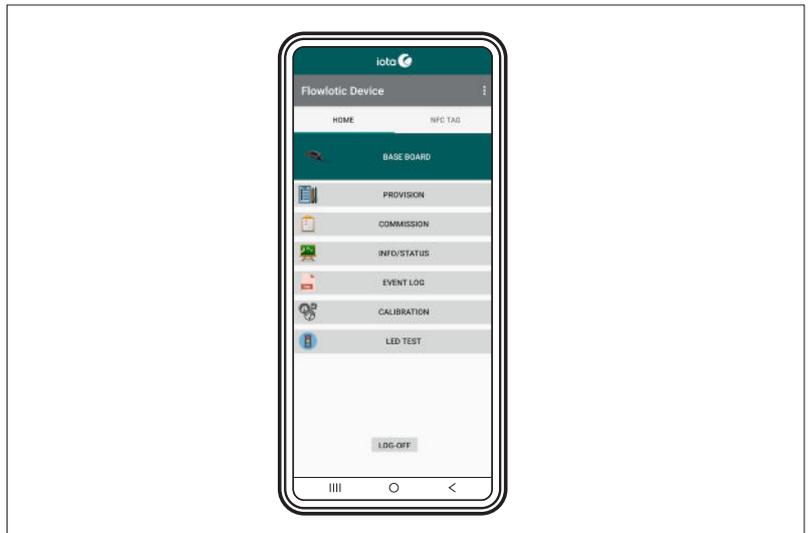
PHYSICAL INSTALLATION

- 13) The cable attached to the Flow Lotic™ device has four wires, coloured; yellow, black, red and white. Only the yellow and black wires are used, strip the cable for appropriate wire length for the yellow and black wires and cut the red and white wires back to the cable sheath. Connect the input control cable attached to the Flow Lotic™ unit to the wires connected to the pulse sensor that will be installed in or on the water meter. There is no consideration for polarity – either wire may be connected to complete the pulse circuit. This process should be completed using all conventions for cable stress management, proper

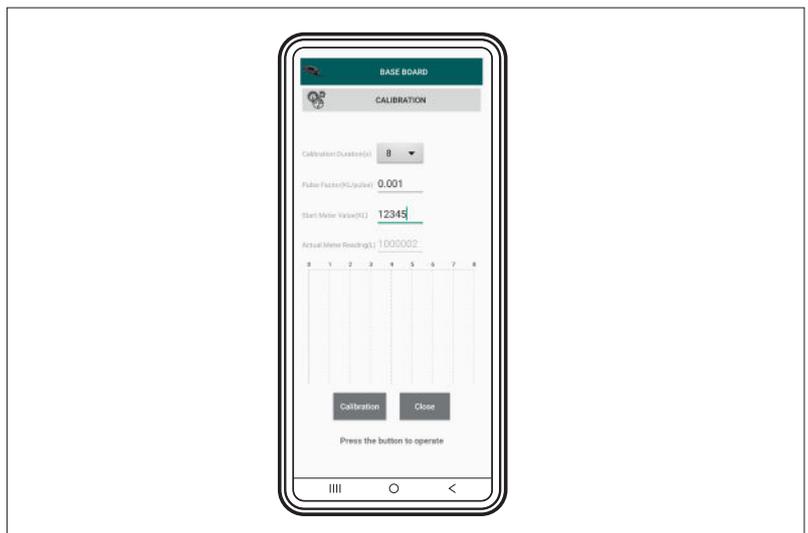


CALIBRATION

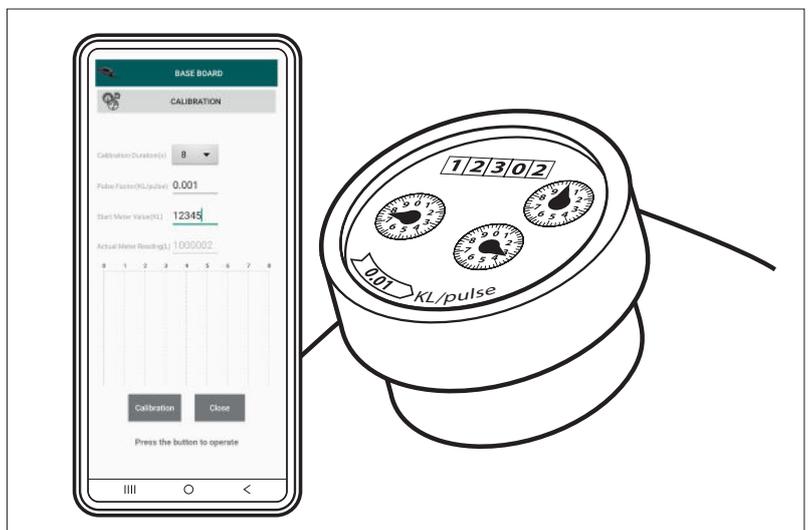
- 14) On the Home screen, select the “Calibration” option.



- 15) In the “Calibration Duration” field select “8”.



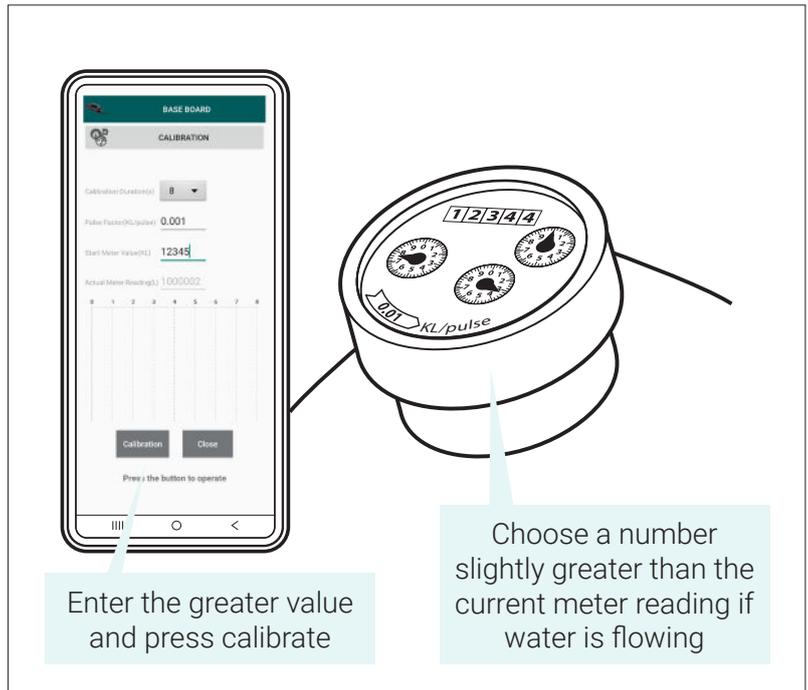
- 16) In the “Pulse Factor (KL/Pulse)” field, insert a number to match the KL/pulse setting on the water meter. This information is specific to each water meter type and can usually be gleaned from manufacturer information, a compliance plate or is stamped on the meter dial face.



- 17) The following process is completed subject to the water flow conditions of the meter in-situ:

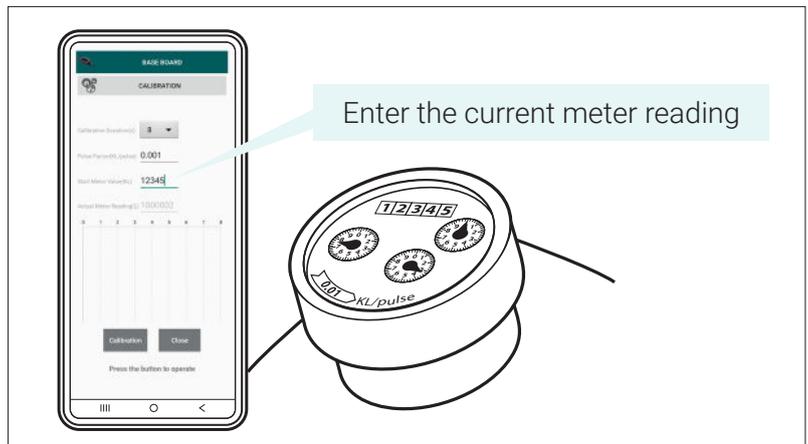
IF WATER IS FLOWING

- a) If the water meter reading is moving (water is flowing through the meter), choose a number slightly greater than the current meter reading. Enter this greater value in to the “Start Meter Value” field and wait until the water meter reading matches the value you have entered, then press the “Calibrate” Button.

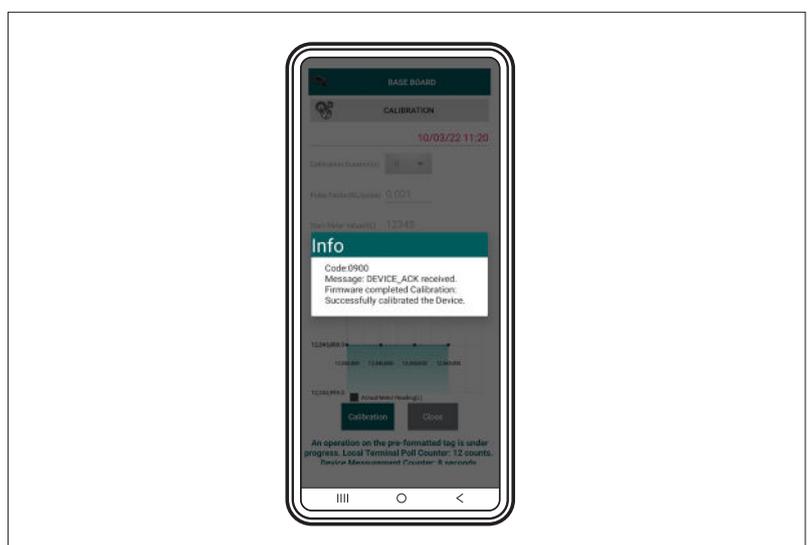


IF WATER IS NOT FLOWING

- b) If no water is flowing, simply set the “Start Meter Value” field to match what is currently shown on the water meter, then press the “Calibrate” Button.



- 18) (TAP and HOLD) your Android phone on the Flow Lotic™ unit NFC Antenna plane until the “ DEVICE_ACK received Firmware completed Calibration: Successfully calibrated the device” message appears and remove your Android phone from the NFC antenna plane.



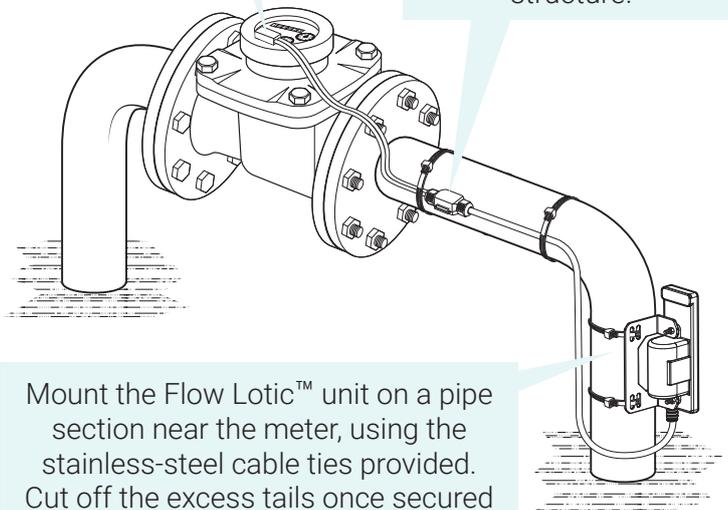
COMPLETING THE WORK

- 19) When all the above steps have been successfully completed the Flow Lotic™ device is ready for operation. To finish the installation:

Re-install all mechanical water meter peripherals to their original state

Please take extreme caution when reinstalling mechanical meter peripherals, ensuring all gaskets, seals and wiring are not compromised.

Fasten all wiring safely, using the provided cable ties. Ensure all excess cable tie length is trimmed off and removed and that the IP68 rated waterproof connector is secured above the ground or floor of pit, ideally against the pipe structure.



Mount the Flow Lotic™ unit on a pipe section near the meter, using the stainless-steel cable ties provided. Cut off the excess tails once secured and fold back the remaining tail straps to minimise sharp edges and fully tighten Flow Lotic™ unit mounting plate against the pipe structure. Please ensure not to over tighten the stainless-steel cable ties. Bending of the bracket can lead to damage of the device.

POST COMMISSIONING

- 20) After several minutes have passed since calibration, navigate back to the HOME screen and repeat steps 9 to 11 to ensure stable connection.



COMMISSIONING UNITS THAT ARE NOT PRE-CONFIGURED

This section describes the process for Flow Lotic™ users to commission the unit if it has not been pre-configured with mobile network credentials by Iota. Installers must have a more extensive understanding of Internet Protocol network-related configuration (bootstrapping, DNS, IP address, Band priority) and must also ensure the configuration is setup to match the company's telecommunication provider network configuration.

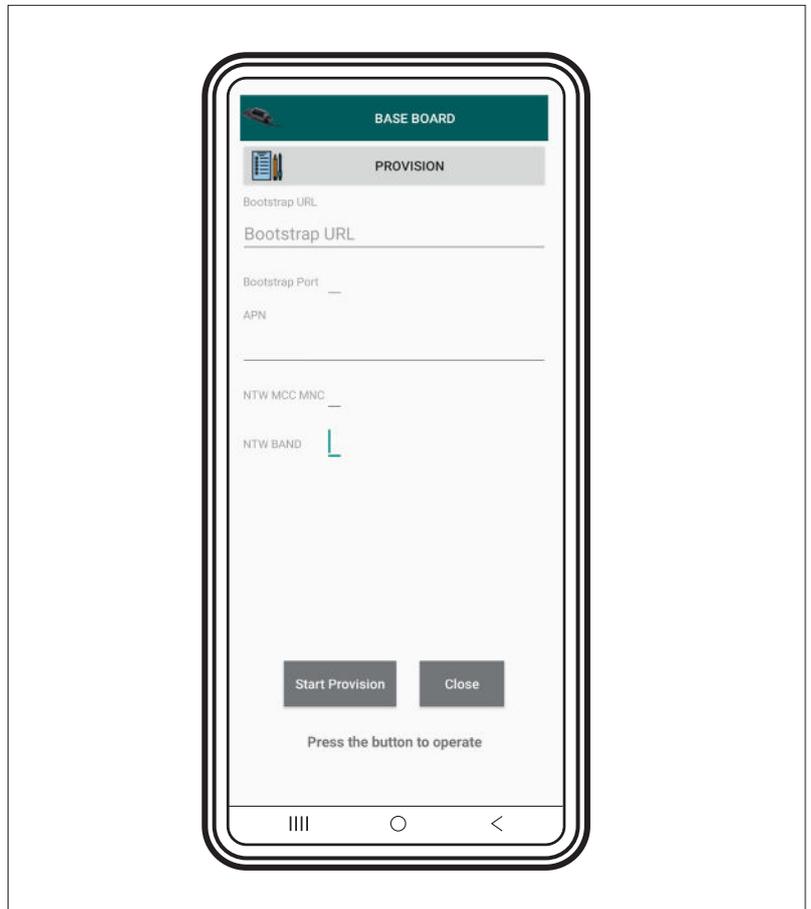
Information you will need:

Prior to completing manual network provisioning of your Flow Lotic™ unit, you must obtain the following information from your mobile data network provider:

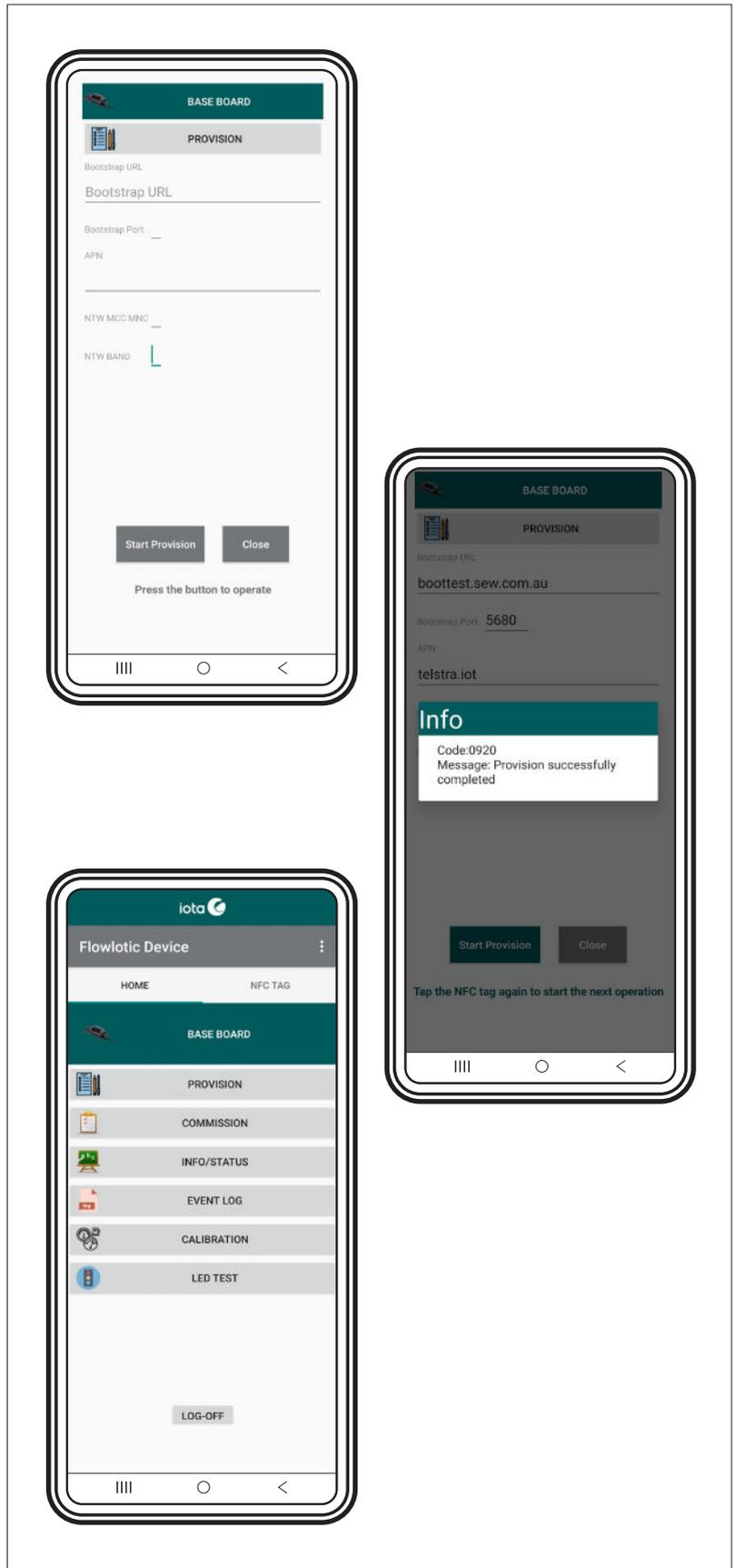
- Bootstrap URL
- Bootstrap Port
- APN
- NTW MCC MNC
- NTW BAND

With these details confirmed by your network provider, complete the following steps:

- 21) From the “Home” screen select the “Provisioning” field from the menu bar. The screen will transition to a show a heading “Base Board”, with a sub-heading “PROVISION” - and underlined input fields for the required credentials (Bootstrap URL, Bootstrap Port, APN, NTW MCC MNC and NTW BAND).



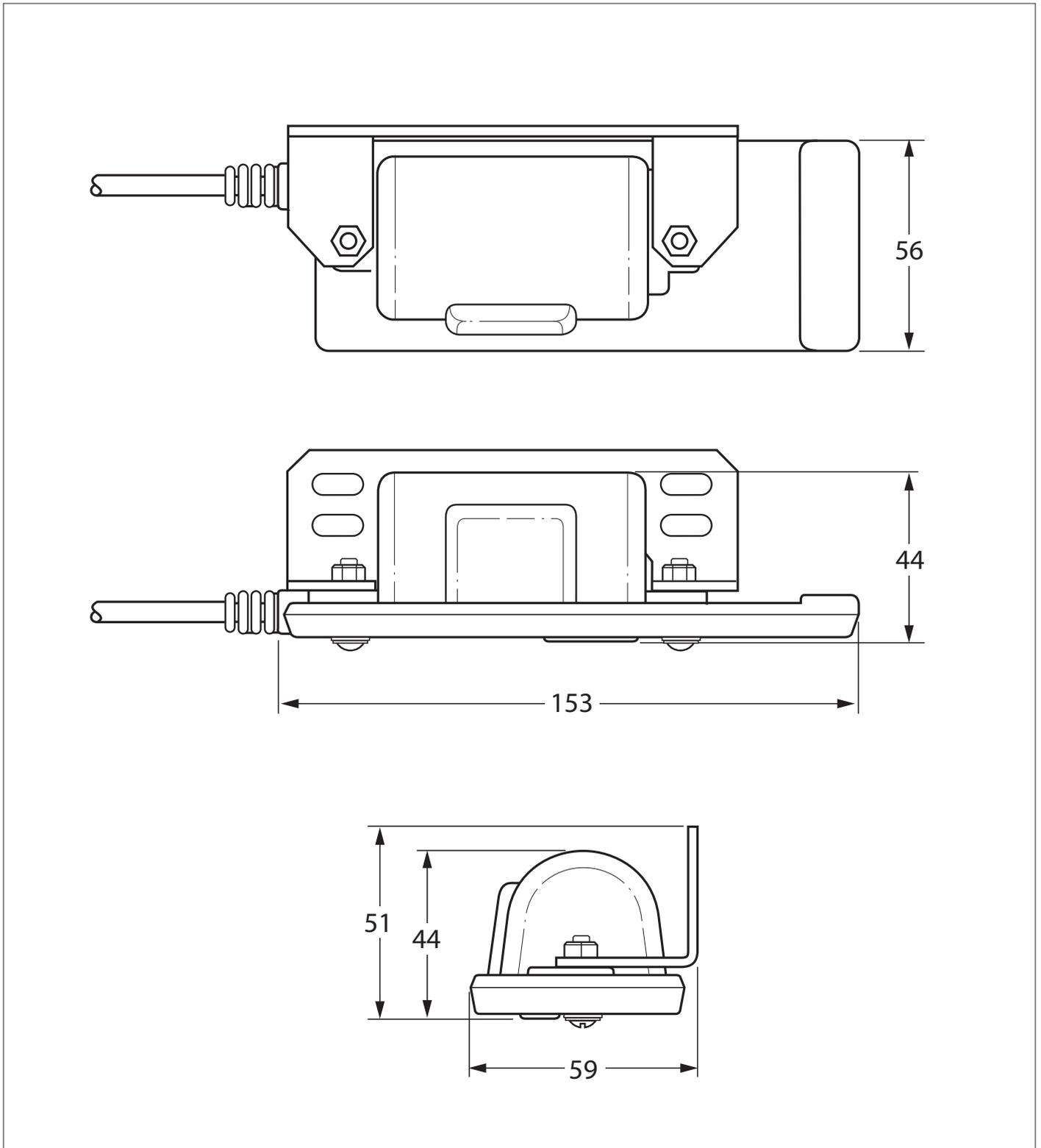
- 22) Populate the fields with the information provided by your mobile data network provider and press the "Start Provision" button.
- 23) Tap and hold your Android phone on the Flow Lotic™ unit NFC Antenna plane until the "Provision Successfully Completed" message appears.
- 24) Remove your Android phone from the NFC antenna plane and press the "Close" button in the bottom right of your screen.



TECHNICAL INFORMATION

MECHANICAL SPECIFICATIONS

Diagram and dimensions of device.



TECHNICAL DATA SHEET

OPERATION

- Maximum frequency of 100 Hz and a constant pulse width of 10 ms
- Internal battery voltage 3.6V
- Internal battery capacity 19Ah
- Internal memory storage 10 days (rolling number of days) – Pulse count data
- Average power consumption (Non RF transmission) <3.6mW
- Maximum power consumption (RF transmission) <1W
- Operating temperature range -5°C to +80°C
- IP rating IP68

WEIGHT

- Internal antenna 333g
- External antenna 335g

PULSE COUNTER INPUT

- Maximum rated input voltage 1.9V
- Maximum frequency 100Hz, 50% duty cycle
- ESD protection Class 3 (> 16kV) per Human body model
- Minimum Open resistance 3MΩ
- Maximum Closed resistance 100KΩ

COMMUNICATION

- Cellular NB IoT LwM2M
- Local NFC for device commissioning and local configuration

LwM2M SUPPORTED RESOURCES

</1/0>,</3/0>,</4/0>,</5/0>,</11/0>,</17/0>,</10262/0>,</10263/0>,</10264/0>,</10266/0>,</10266/1>,</10270/0>,</10271/0>,</10281/0>,</10283/0>,</10284/0>

Xml files for these resources can be downloaded at the open mobile alliance website OMA LightweightM2M (LwM2M) Object and Resource Registry.

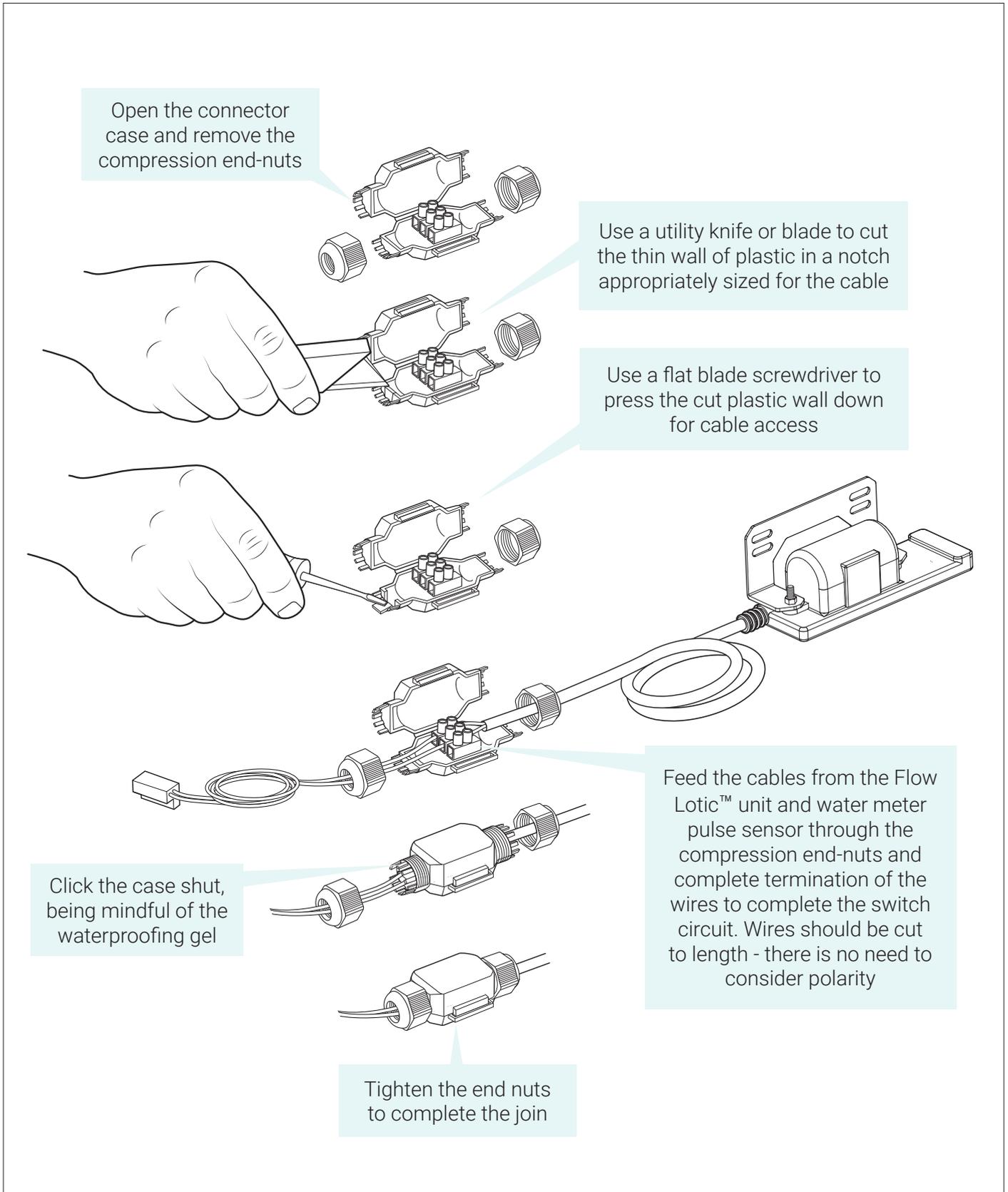
LwM2M OBJECT DATA POINTS

- Interval Data Delivery 10262
- 10270/0 – Battery information
- 10271/0 – Communications activity time (restricted to 24hrs reporting)
- 10266/0 – Accumulated flow (total flow) in KL (restricted to 24hrs reporting)
- 10266/1 – Interval flow has to be in multiples of 5min. Minimum 5minutes up to 24hrs
Default 30min

EVENT DATA DELIVERY 10263

- 10283/0 – Device reboot
- 10281/0 – Low battery alarm
- 10284/0 – Time Synchronisation

CABLE JOIN PROCESS FOR THE RAYTECH BARNEY CONNECTOR



ERRORS AND TROUBLESHOOTING

LED STATES

A sealed LED is situated in the flat surface of the Flow Lotic™ unit at the end opposite to the cable. The LED is used as an indicator of NFC processes and configuration status.

LED STATES	DESCRIPTION
	Bootloader executed (blink once)
	Bootloader can't find a valid application (solid)
	Application executed (blink once)
	NFC Acknowledge (blink once)

ERROR LOGS

These errors can be found in the Events Log if applicable. The Events Log can be shown by pressing the EVENT LOG option of the menu bar on the Lotic™ Application Home screen, pressing the EXTRACT LOG button and completing a "tap and hold" process with your Android phone against the Flow Lotic™ device NFC antenna.

The following is a table of errors and responses:

ERROR	RESPONSE
Upgrade error	Upgrade was not successful, please try again
Hard Fault	Hardware fault detected, reset device via NFC
Low battery	Replace device
DNS reso failed	DNS query could not be resolved Check bootstrapping settings
Modem low rssi	Low network signal strength. Try to locate device in clear location without obstruction
Bootstrap failed	Check bootstrap settings
Modem reset	Could not communicate with management server Reset device via NFC app

TROUBLESHOOTING

The following depicts actions you should take in response to problems in the installation or commissioning process.

SYMPTOM	REASON	SOLUTION
After initiating a command and tapping the phone to the data logger, nothing happens.	Phone Application and Data logger connection may have timed out.	Log out of phone application, turn off and on NFC on mobile phone. Try again.
Attempting to log in, receiving error message 'Invalid git data, check your device'.	NFC connection disrupted whilst establishing connection.	Ensure phone is placed onto data logger NFC tag and is held very still until Application home page appears.
'Cannot connect to the NFC TAG due to the unstable NFC RFID Field – IO Exception'.	Unstable movement of mobile phone device or obstacle such as phone case in the way.	Ensure phone is placed onto data logger NFC tag and is held very still. Remove any phone covers, cases or metal objects that may disrupt the NFC connectivity. If problem persists restart NFC on android device.
Pulse check step. Value is not increasing when mechanical meter flow is increasing.	Check that wiring is secured and properly connected. If this doesn't resolve. Check to see if device is faulty. This can be done by tapping the yellow and black wires together. Doing this creates a pulse that is sent back to the device.	<p>Solution: In the home page of the phone application, select INFO/ STATUS tab.</p> <p>When ready, press the 'Extract Info' button.</p> <p>Tap and hold phone up to NFC antenna on the Flow Lotic™ device. Hold the phone still until 'Extract device status and configuration successfully completed' message is displayed.</p> <p>Under the 'DEVICE' tab, take note of the 'Actual Meter Reading' value.</p> <p>Tap Yellow and Black wires together to bridge a brief connection.</p> <p>Repeat the above step and see if the 'Actual Meter Reading' value has increased. If it has not increased, please contact Iota services.</p>

ABBREVIATIONS

NFC	Near Field Communications
LwM2M	Light Weight M2M protocol
NB-IoT	Narrow Band Internet of Things
KL	Kilolitres
APN	Access Point Node
RSSI	Received Signal Strength Indicator



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