Nube-iO
Wireless MicroEdge Sensors
Installation and User Manual

Table Of Contents

Document Summary 3

Product Description 3

Ordering Information 3

Technical Specifications 4
- Physical Attributes 4
- Power Requirements 4
- Physical Inputs and Outputs 4
- Communication 5

Installation and Configuration 5
- Mounting 5
- Power 5
- Sensor Positioning and LoRa Signal Quality 6
- Onboard Reset/Push Button 6
- Onboard DIP Switch Configuration 7
  - Push Rate 7
  - Testing Mode 8
  - Reset Pulse Count 8
  - DIP Switch Configuration Table 9
- Onboard Jumper Configuration 9
  - AI / UI Type Select Jumpers 10
  - Pulse Type Select Jumpers 10
- Physical Input Wiring 11
  - AI / UI Input Wiring 11
    - Digital Inputs 11
    - Analog Inputs 12
  - Pulse Input Wiring 12

Additional References 13
- Nube-iO Documentation References 13
- Other Technology/Service References 14

1. Document Summary

This Installation Manual contains technical specifications, installation instructions, ordering info, and communication guidelines for the MicroEdge Wireless Asset Monitoring Sensors.

2. Product Description

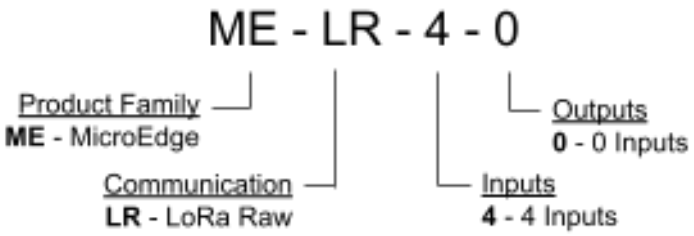
The MicroEdge is Nube-iO's multi-purpose wireless (LoRa) IoT asset monitoring sensor. Designed to interface with low level sensors, pulse sensors (water, electrical, gas, etc.), in a small package, with minimum install time.

LoRa wireless IoT technology provides a very long transmission range that is energy efficient and less susceptible to object interference than other wireless technologies.

The MicroEdge provides 3 Universal Inputs, and 1 Digital Pulse Accumulation Input. Values are sent wirelessly to the gateway controller, making installation hassle free.

Powered by 3 x AA batteries, the MicroEdge sensors have a runtime of 3-5 years depending on the configured push rate. Alternatively the MicroEdge sensor can be powered by wired 24 VAC.

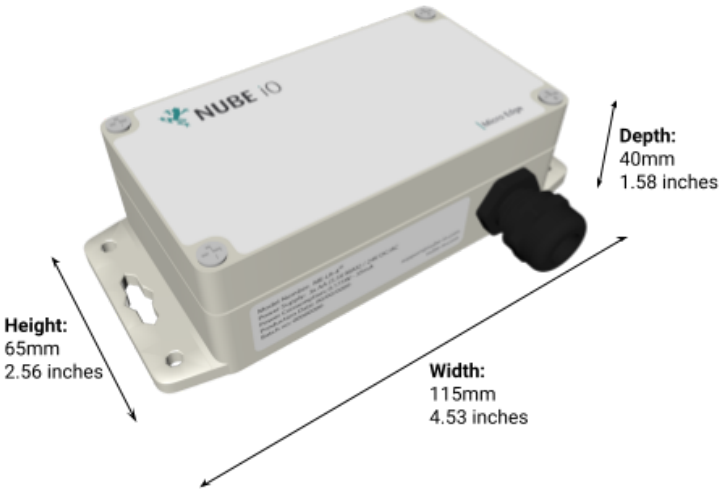
3. Ordering Information



ME-LR-4-0	LoRa RAW Wireless MicroEdge Asset Monitoring Sensor - 3 Universal Inputs - 1 Digital Pulse Input

4. Technical Specifications

4.1. Physical Attributes



Dimensions	**Height:** 65 mm / 2.56 inches
	Width: 115 mm / 4.53 inches
	Depth: 40 mm / 1.58 inches
Operating Temperature	-20°C to 80°C
Enclosure	ABS Plastic, DIN Rail Mount, Waterproof Enclosure IP65 / UL94-V0 Rated

4.2. Power Requirements

Battery **OR**	**Power Supply**	**3 x AA Batteries:** 3-5 years runtime depending on configured push rate **Power Terminals:** 24V AC ±10%
Screw Terminals	**Battery Runtime**	3-5 years (depending on configure push rate)

4.3. Physical Inputs and Outputs

Type	Count	Details
Universal Input (UI)	**3**	• 0 - 10 VDC Signal • 10k Thermistor • Digital / Switch / Dry Contact
Digital/Pulse Input (DI)	**1**	• Pulse Accumulation (Dry Contact or 3.3v Logic Level)

4.4. Communication

LoRa	**Lora Raw Wireless**	LoRa wireless IoT technology provides a very long transmission range that is energy efficient and less susceptible to object interference than other wireless technologies. **Supported Frequencies:** AU915, US915, AS232, EU863 **Spreading Factor:** 7 **Bandwidth:** 250 kHz

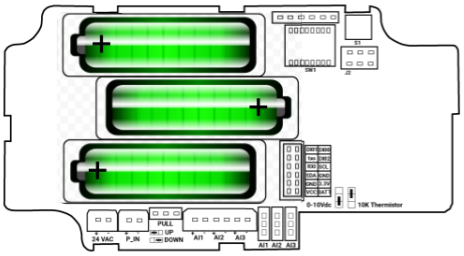
5. Installation and Configuration

5.1. Mounting

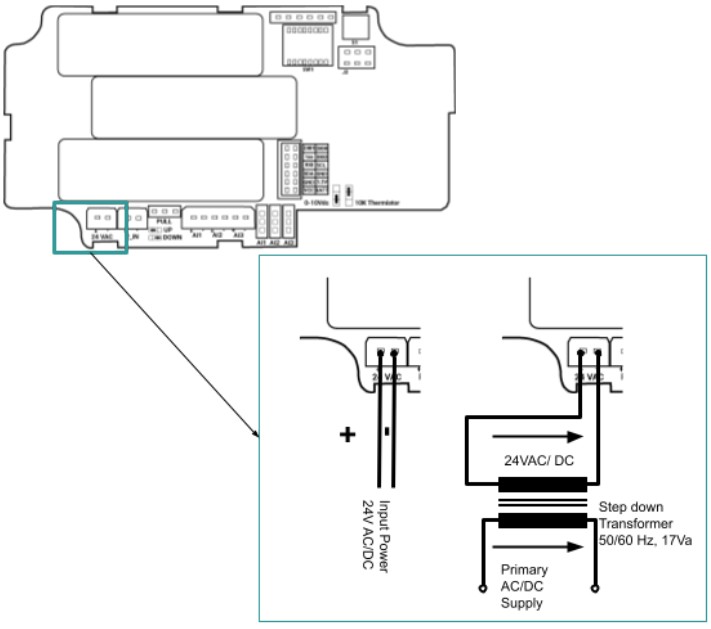
The Nube-iO MicroEdge is 115mm x 65mm. They are designed to be mounted on flat surfaces using external screws. They can be mounted in any orientation. The sensor should always be mounted in a location such that it will not experience very high or low temperatures. When selecting a mounting location, position relative to the LoRa gateway should be considered, see Section for more details

5.2. Power

The Nube-iO MicroEdge is usually powered by 3 x AA Batteries as shown below. Battery runtime should be between 3-5 years depending on the configured push rate (more data pushes means lower battery runtime).



The MicroEdge sensor can alternatively be powered by a 24 VAC power supply by wiring into the **24 VAC +** and **-** terminals. Power wiring shown below.

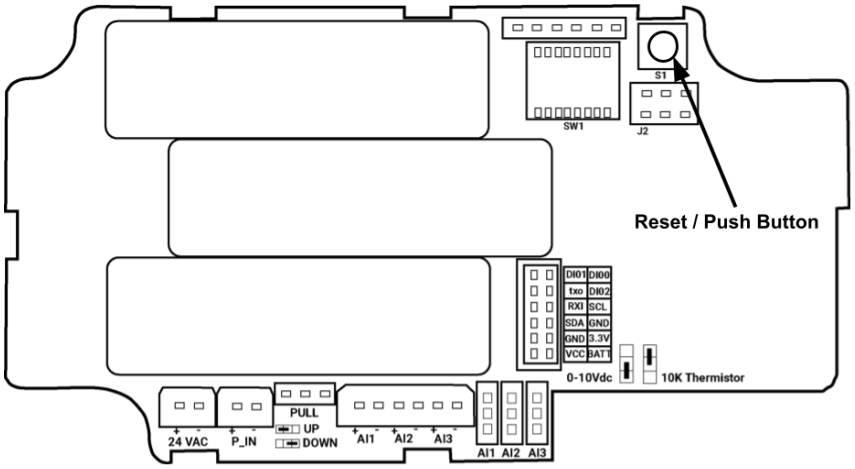


5.3. Sensor Positioning and LoRa Signal Quality

MicroEdge sensors utilize LoRa IOT Wireless radio technology. This wireless system features long range, and good object penetration. However, care still must be taken to position sensors such that they have a good communication signal with the LoRa Gateway. The quality of the communication signal depends on the **distance from the LoRa Gateway**, and the **objects between the Microedge sensor and the LoRa Gateway**. For a detailed description of the factors involved in designing and troubleshooting LoRa network positioning, see the LoRa Installation Best Practices documentation (link in Section 6.1)

5.4. Onboard Reset/Push Button

Nube-iO MicroEdge sensors have a small Reset Button within the sensor. This Reset Button is used to trigger a data push. This function is frequently used when deploying and testing MicroEdge sensors. The Reset Button is also used in some configuration steps. The Reset / Push Button location is shown below.

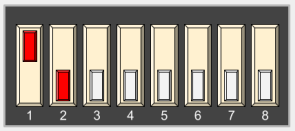
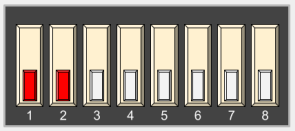
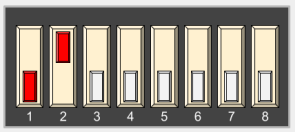
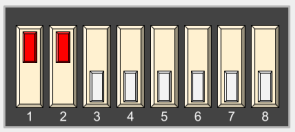


5.5. Onboard DIP Switch Configuration

MicroEdge sensors have a bank of 8 small DIP switches within the sensor. These DIP switches are used to configure the functionality of the sensor. These DIP switches are located near the batteries on the sensor PCB. Open the sensor cover to find the DIP switches within. DIP switches are ON/1 when pushed UP, and they are OFF/0 when they are pushed down. DIP switches 5-8 have no function, they should remain in the OFF/0/DOWN position.

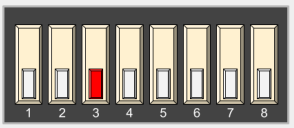
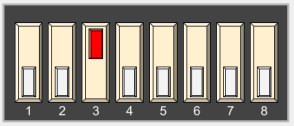
5.5.1. Push Rate

DIP switches 1 and 2 are used to set the push rate of the Droplet sensor. The sensor will send the sensor data at the configured period as configured by these first 2 DIP switches.

Push Rate	DIP Switch Configuration (RED Switches Only)
5 Minutes	
15 Minutes	
30 Minutes	
1 Hour	

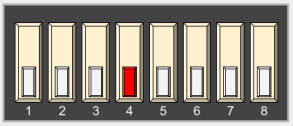
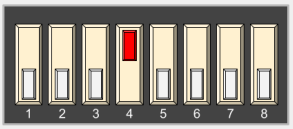
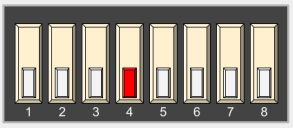
5.5.2. Testing Mode

DIP switch 3 is used to set the MicroEdge sensor in Testing Mode. In Testing Mode the MicroEdge will temporarily self-assign a known Sensor ID and send a Data Push every 8 seconds. Testing Mode is enabled when DIP switch 3 is ON/1/UP. Testing Mode aids in identifying and positioning the MicroEdge sensor.

Testing Mode Function	DIP Switch Configuration (RED Switches Only)
Testing Mode: OFF **Sensor ID:** Individual Sensor ID **Push Rate:** As Configured by DIP Switches 1-2	
Testing Mode: ON **Sensor ID:** AAAAAAAA **Push Rate:** 8 Seconds	

5.5.3. Reset Pulse Count

DIP switch 4 will reset the Pulse Count Accumulation value to 0. Follow the below instructions to reset the Pulse Count Accumulation:

Procedure Step	Description	DIP Switch Configuration (RED Switches Only)
1	Normal Operation	
2	Set DIP switch 4 to the ON/1/UP position.	
3	Push the Reset Button. Wait 10 Seconds.	See Section 5.4 for Reset Button Location.
4	Set DIP switch 4 to the OFF/0/DOWN position.	
5	Push the Reset Button. Wait 10 Seconds.	See Section 5.4 for Reset Button Location.
6	Pulse Count Accumulation Value should be reset to 0.	

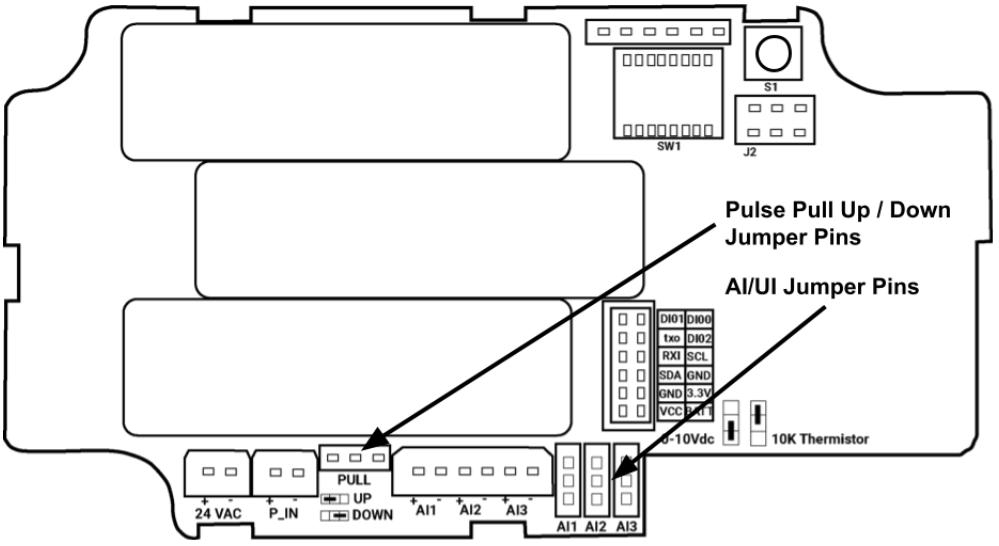
5.5.4. DIP Switch Configuration Table

<table>
<tr><th colspan="2">DIP Switch Settings</th></tr>
<tr><td>DIP Switches 1-2
Data Interval/Push Rate</td><td>
<table>
<tr><td>Interval</td><td>5 min</td><td>15 min</td><td>30 min</td><td>1 hour</td></tr>
<tr><td>Switches 1,2,3</td><td>10</td><td>00</td><td>01</td><td>11</td></tr>
</table>
</td></tr>
<tr><td>DIP Switch 3
Testing Mode</td><td>When ON/1 this mode will override other Push Rate settings and assign a fixed Sensor ID (AAAAAAAA) and send data at an 8 second Push Rate. When OFF/0, the device will use its configured push rate, and self assigned Sensor ID.</td></tr>
<tr><td>DIP Switch 4
Reset Pulse Count</td><td>To reset the Pulse Count: Set DIP 4 ON/1; Push the Reset Button; Wait 5 seconds; Set DIP 4 OFF/0; Push the Reset Button.</td></tr>
<tr><td>DIP Switch 5-8
Not Used</td><td>These switches have no function, leave DIP 5-8 OFF/0/DOWN.</td></tr>
</table>

5.6. Onboard Jumper Configuration

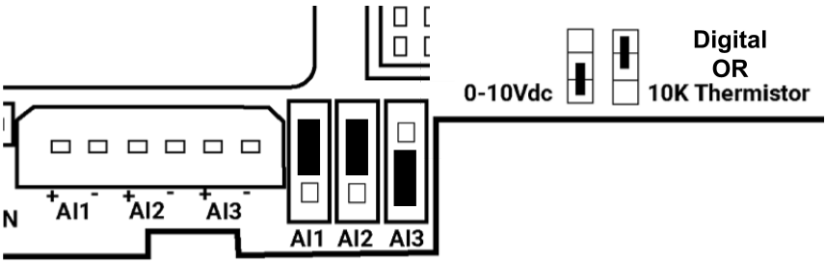
MicroEdge sensors have 4 sets of small jumper pins within the sensor. These jumper pins are bridged to configure the functionality of the sensor inputs. These sets of jumper pins are located near the batteries on the sensor PCB. Remove the sensor cover to find the jumper pins within.

Jumper pins are bridged using a small plastic jumper bridge, there should be 1 jumper bridge per set of 3 jumper pins. Jumper bridges are connected between the center pin and one of the outside pins of each set of jumper pins.



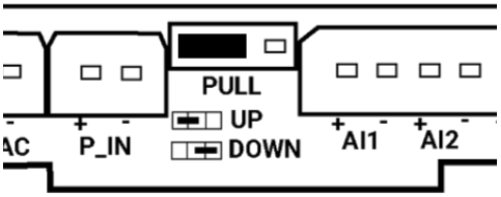
5.6.1. AI / UI Type Select Jumpers

There are 3 sets of AI/UI Type Select Jumper Pins, 1 set for each AI/UI. There are 2 possible configurations for each jumper pin set. Jumper positions are shown on the diagram below. AI1, and AI2 are set with the jumper bridge installed in the position for Digital OR 10k thermistor. AI 3 is set with the jumper bridge installed in the position for 0-10VDC. There is a legend for these jumper settings on the PCB.



5.6.2. Pulse Type Select Jumpers

There is 1 set of Pulse Type Select Jumper Pins. There are 2 valid configurations for this jumper pin set. Jumper positions are shown on the diagram below. The jumper pin set labeled `PULL` is used to set the input type of the Pulse input. In the diagram below, the PULL jumper bridge is set to the UP position. Please reference the below table for the input types that correspond to each jumper bridge position.



PULL Jumper Position	Use For Pulse Input Types
UP	**Dry Contact:** Open/Closed circuit (no voltage) **Signal Low:** 3.3v signal goes to 0v when pulsed.
DOWN	**Signal High:** Signal goes to 3.3v when pulsed.

5.7. Physical Input Wiring

This section describes how to connect/wire physical inputs to the MicroEdge sensor. There are Input Type Select Jumpers that must be installed to select the correct type of input; see Section 5.6 for Jumper Position Settings.

5.7.1. AI / UI Input Wiring

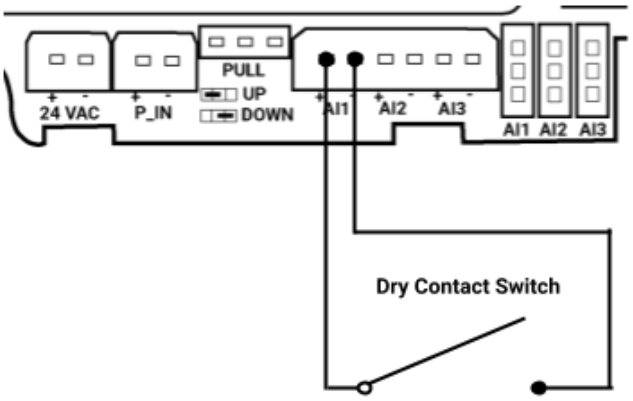
Wired Inputs consist of wired sensors or wired signals from other devices. They are wired to the Universal Input (AI/UI) terminals.

Wired Inputs are grouped into 2 main groups:

1. **Digital** - Only 2 possible states: either an open circuit or a closed circuit. Includes: simple switches/buttons, relays, and other types of dry contact (ex. status signals from other devices).
2. **Analog** - Many possible states based on Voltage, Resistance, or Current. Includes: Temperature, Humidity, Pressure, CO2, Position Feedback, etc…

5.7.1.1. Digital Inputs

Digital Inputs are connected between the Ground(GND) terminal and the selected UI terminal. There is no polarity for Digital Input wiring (ie. input wires can be swapped).

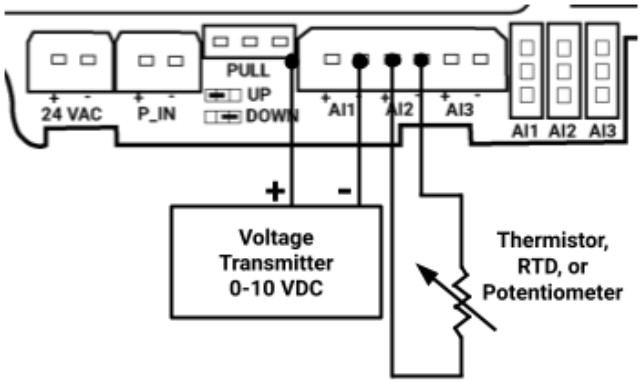


5.7.1.2. Analog Inputs

Analog Inputs are connected between the Ground(GND) terminal and the selected AI/UI terminal. There is usually a correct polarity for Analog Inputs (ie. correct wire must be on the correct UI terminal).

There are 2 main types of Analog Inputs:

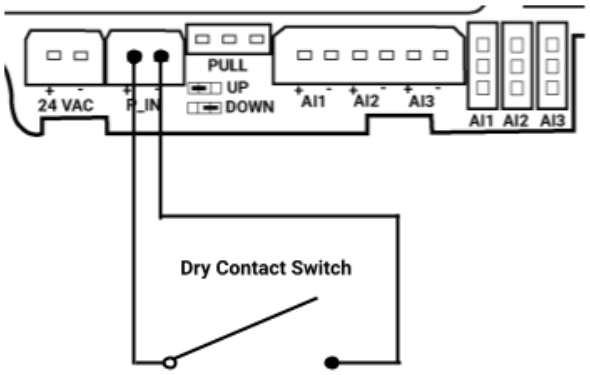
1. **Resistance** - Input is based on resistance. The most commonly used resistance input is **Thermistor** temperature sensors where resistance varies with change in temperature. There is no polarity for Resistance inputs (ie. input wires can be swapped).
2. **0-10vdc** - Input is based on DC voltage signal over the range of 0v to 10v. This voltage range is related to a defined range on the device that produces the 0-10v signal.



Pulse Input Wiring

Pulse Inputs consist of wired pulse signals from other devices. They are wired to the Pulse Input (P_IN) terminals. There are 3 supported types of pulse inputs:

1. **Dry Contact / Switch** - Open/Closed circuit (no voltage). Wire as shown below.
2. **Signal Low:** 3.3v signal goes to 0v when pulsed. Signal wire should be connected to the **P_IN +** terminal.
3. **Signal High:** Signal goes to 3.3v when pulsed. Signal wire should be connected to the **P_IN +** terminal.



6. Additional References

This section provides additional information for your reference.

6.1. Nube-iO Documentation References

Name/Code	Explanation	External Reference
Rubix Compute	Gateway Controller	Link
Edge28	Edge IO Programmable Controller	Link
Droplet	Wireless Environmental Sensor	Link
MicroEdge	Wireless Low Level Asset Monitoring Device	Link
Rubix Wires	Browser Based Flow Programming Interface	Link
Rubix Platform	Browser Based Device/Data Management Interface	
LoRa Installation Best Practices	Technical document describing the factors involved in designing, installing, and troubleshooting LoRa networks.	
Modbus RS485 Installation Best Practices	Technical document describing the factors involved in designing, installing, and troubleshooting wired Modbus RS485 networks.	

6.2. Other Technology/Service References

Name	Description	External Reference
GCP	Google Cloud Platform	Link
Edge	Edge computing is a distributed computing paradigm	Link
IO (Input/Output)	Communication process between a computer or device	Link
VPN	A virtual private network (VPN) extends a private network across a public network	Link
BACnet	BACnet is a building automation protocol	Link
MQTT	A lightweight messaging protocol for small sensors	Link
Modbus	Modbus is a building automation protocol	Link
LoRa	LoRa is a long range, low power wireless chipset and protocol	Link
LoRaWan	LoRaWan is the network layer on LoRa	Link
Haystack	Standardize semantic data models for IoT data	Link
API	Application programming interface	Link