



# Device Installation Guide

September 2022 – Version 1.3



## Revision Sheet

Release No.	Date	Revision Description
Rev 1	15/08/2022	Update diagrams and antenna
Rev 2	16/09/2022	Update installation options diagrams
Rev 3	19/09/2022	Update diagrams and installation procedures

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# Kurloo Device Installation Guide

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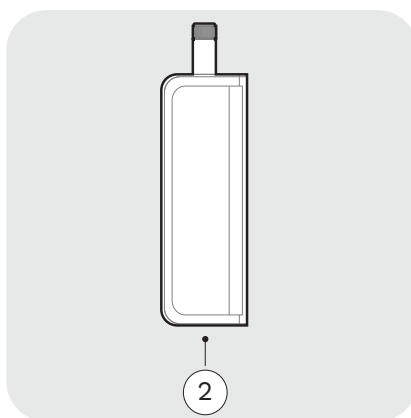
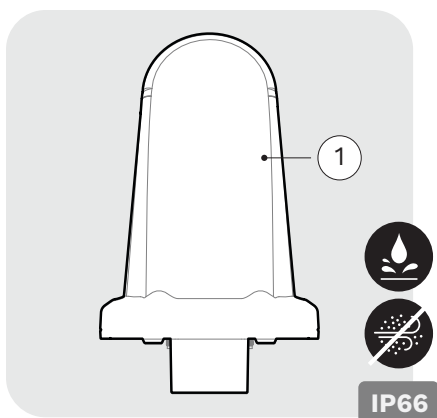
## **1.0 GENERAL INFORMATION**

## 1. GENERAL INFORMATION

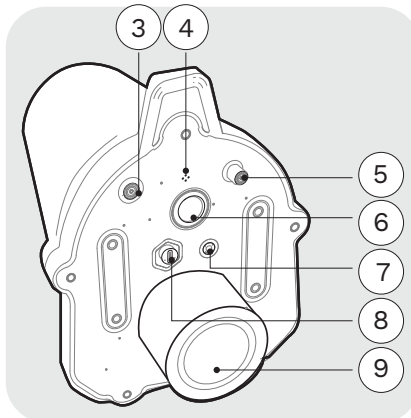
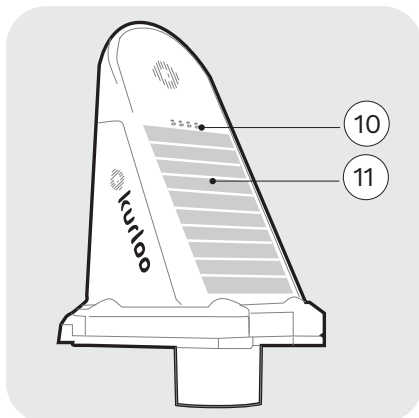
### 1.1. What's included?

Please check the components before installing. It should have:

1. A Kurloo monitoring device
2. LTE-M1 antenna



### 1.2. Device Layout



3. Reserved TNC antenna connector
4. Environment sensor
5. LTE-M1 antenna connector
6.  $\frac{5}{8}$ " x12 female thread
7. Power button
8. USB-Type C
9. Ultrasonic range finder
10. Device status indicators
11. Solar panel



## **2.0 SITE SELECTION**

## 2. SITE SELECTION

### 2.1. Site Consideration and Preparations

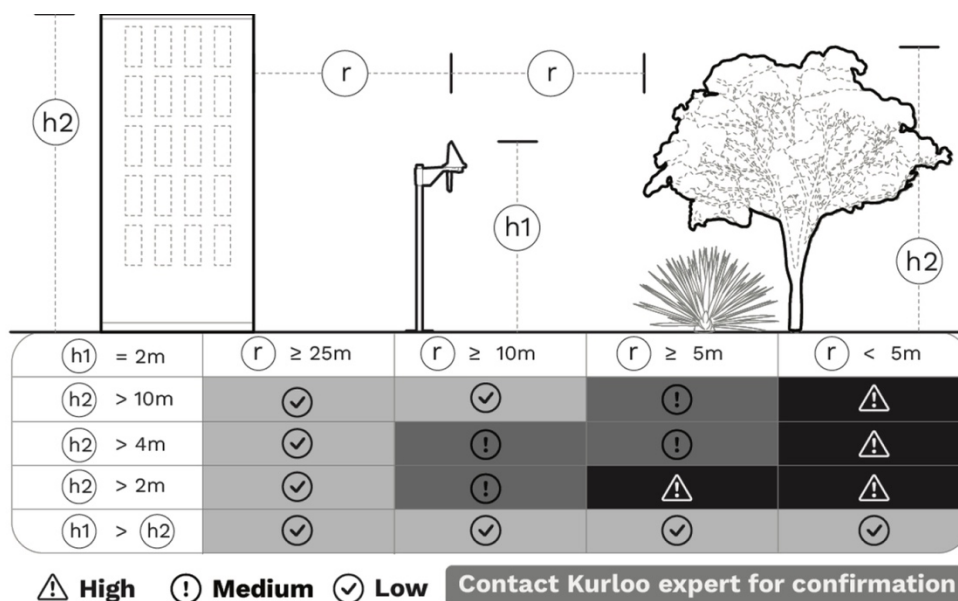
To ensure the best observation results, it's important to choose the right measurement point. Checking these three important factors will help ensure data quality: signal obstacles, stable bases, and baseline distance.

1. **Signal Obstacles:** First, you'll need to ensure there are as few obstructive objects (vegetation, machinery, vehicles, buildings, etc.) surrounding the location you want to measure as possible. These objects could affect how the Kurloo receives and sends signals.

This refers as the obstruction level. Following is provided as a general guide:

1. **Low obstruction level:** No objects higher than the monitoring device within 25-metre radius of the observation point. This is the most ideal.
2. **Medium obstruction level:** Only a few objects (3-5) higher than the monitoring device within 25-metre radius of the observation point. Depending on the type of objects, this may have slight impact your observation results.
3. **High obstruction level:** A large number of objects higher than the monitoring device within a 25-metre radius of the observation point. This will likely negatively impact your observation results.

Also refer to the following diagram when evaluating the obstruction level.



Correctly assessing potential obstacles for the Kurloo signal may require the experience of a surveyor. If you are unsure or have any problems when setting up the Kurloo devices, contact our experts for guidance.

2. Stable bases: The Kurloo monitoring device and reference station are very sensitive. This helps them provide the most precise data, but it also means ensuring the devices and observation objects are stable and secure is crucial. Ideally, the reference point must be installed at a stable location

We recommend five installation methods, including:

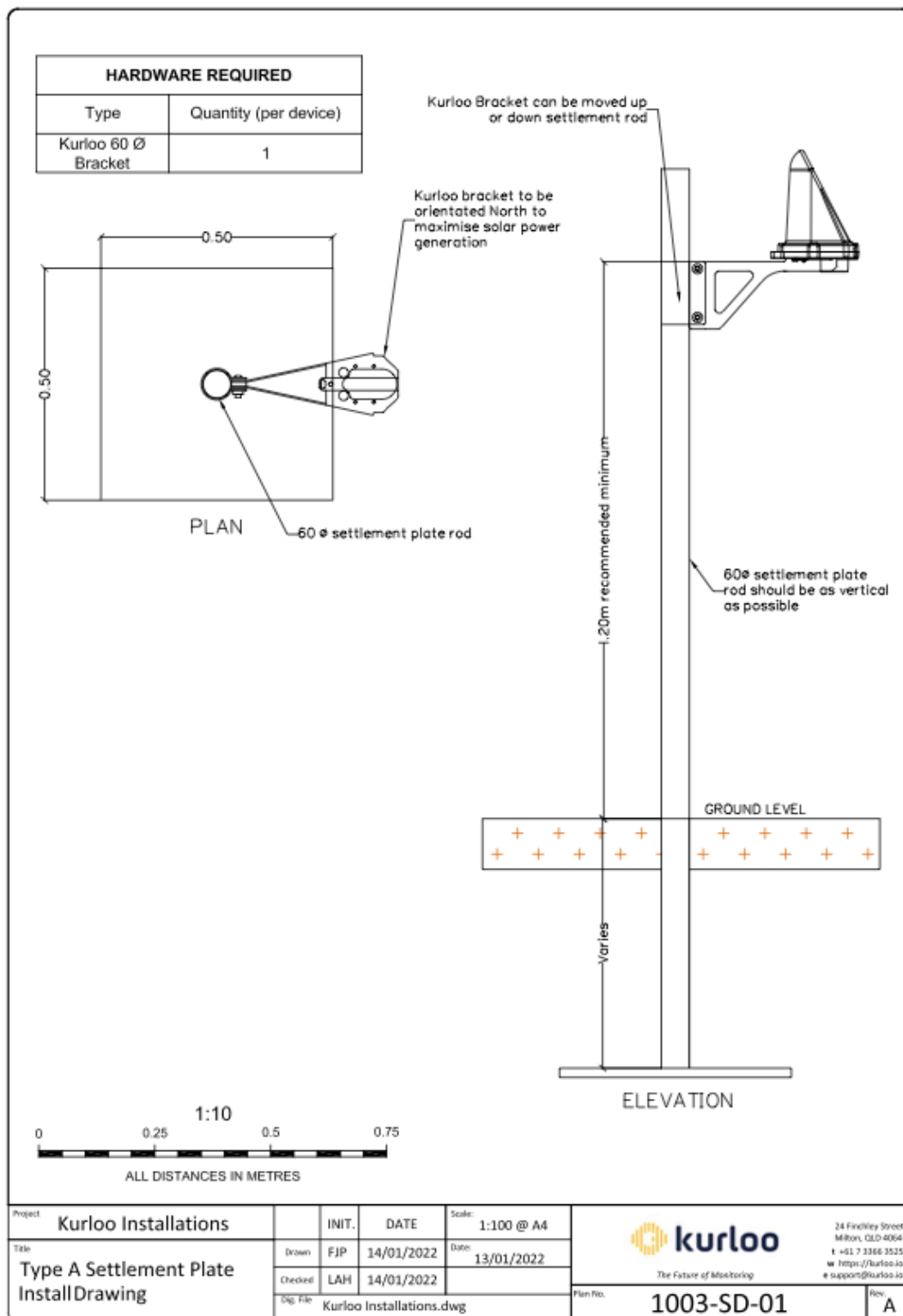
- A. Structured mounted with non-removable  $\frac{5}{8}$ " Whitworth threaded spigot (Ref. Section 3.1: Installation Option 1)
- B. Concrete pillar with  $\frac{5}{8}$ " Whitworth threaded spigot (Ref. Section 3.1: Installation Option 1)
- C. Settlement plate with 60Ø settlement plate rod (Ref. Section 3.2: Installation Option 2)
- D. Surface-mounted post with 60Ø steel post (Ref. Section 3.2: Installation Option 2)
- E. Ground anchor spike with 60Ø settlement rod (Ref. Section 3.2: Installation Option 2)

Refer to the graphics in **Section 2.2** for more on creating a stable base for your Kurloo devices.

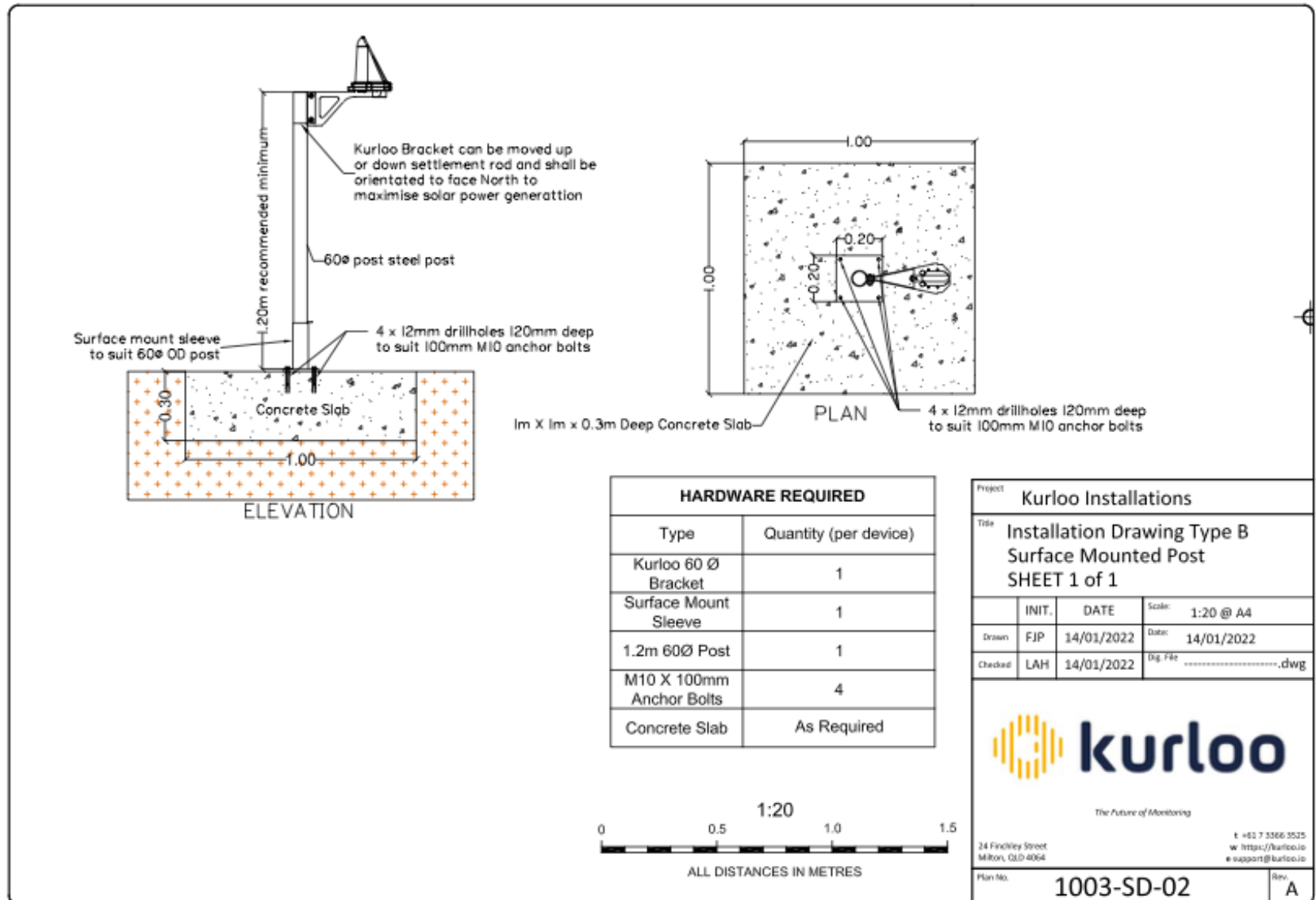
3. Baseline Distance: This refers to the distance between the reference station and the monitoring sensors. Ideally the distance between the reference station and the monitoring sensors should be kept to 1km or below for consistent, quality results.

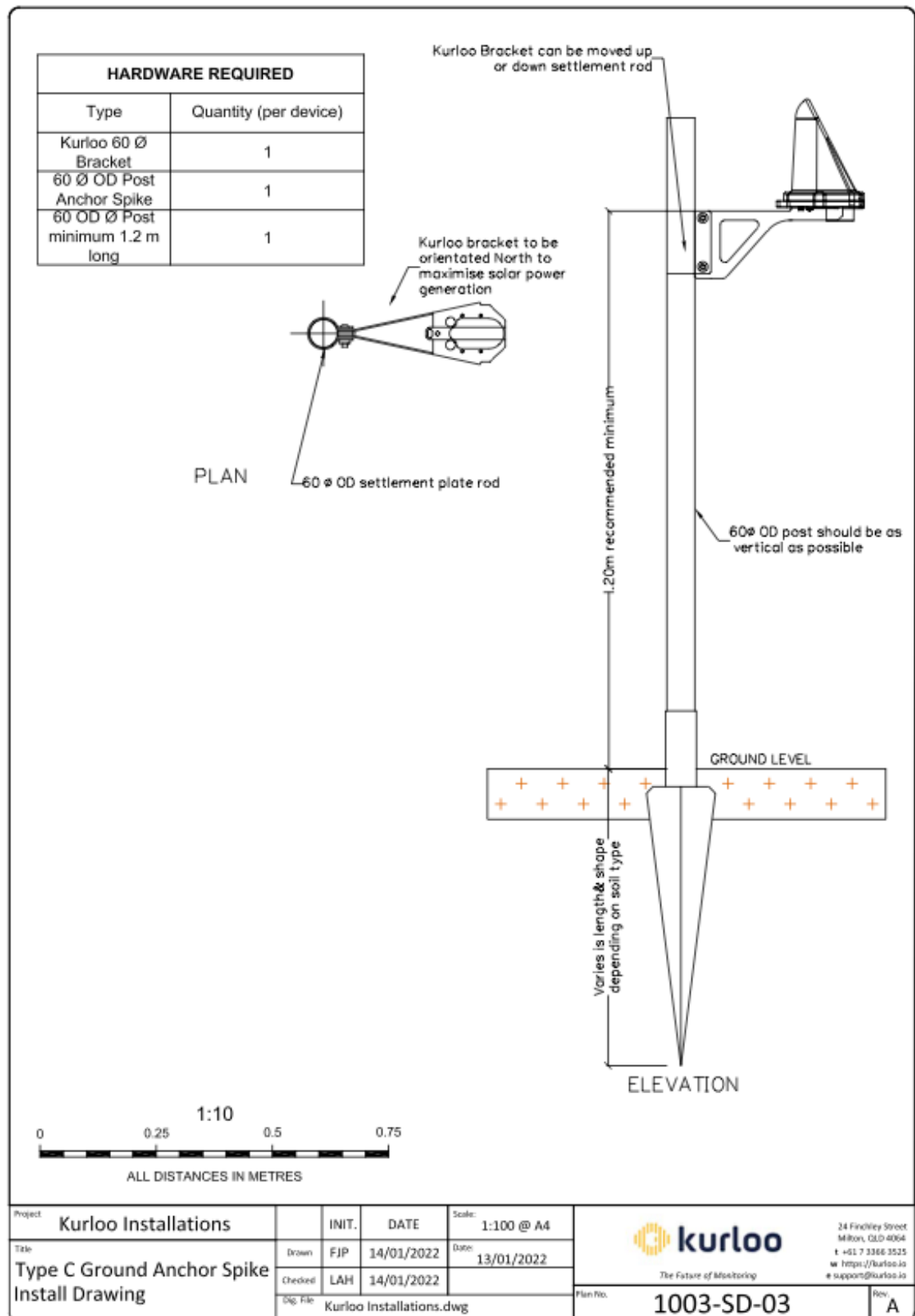


## 2.2 Installation Option Diagrams

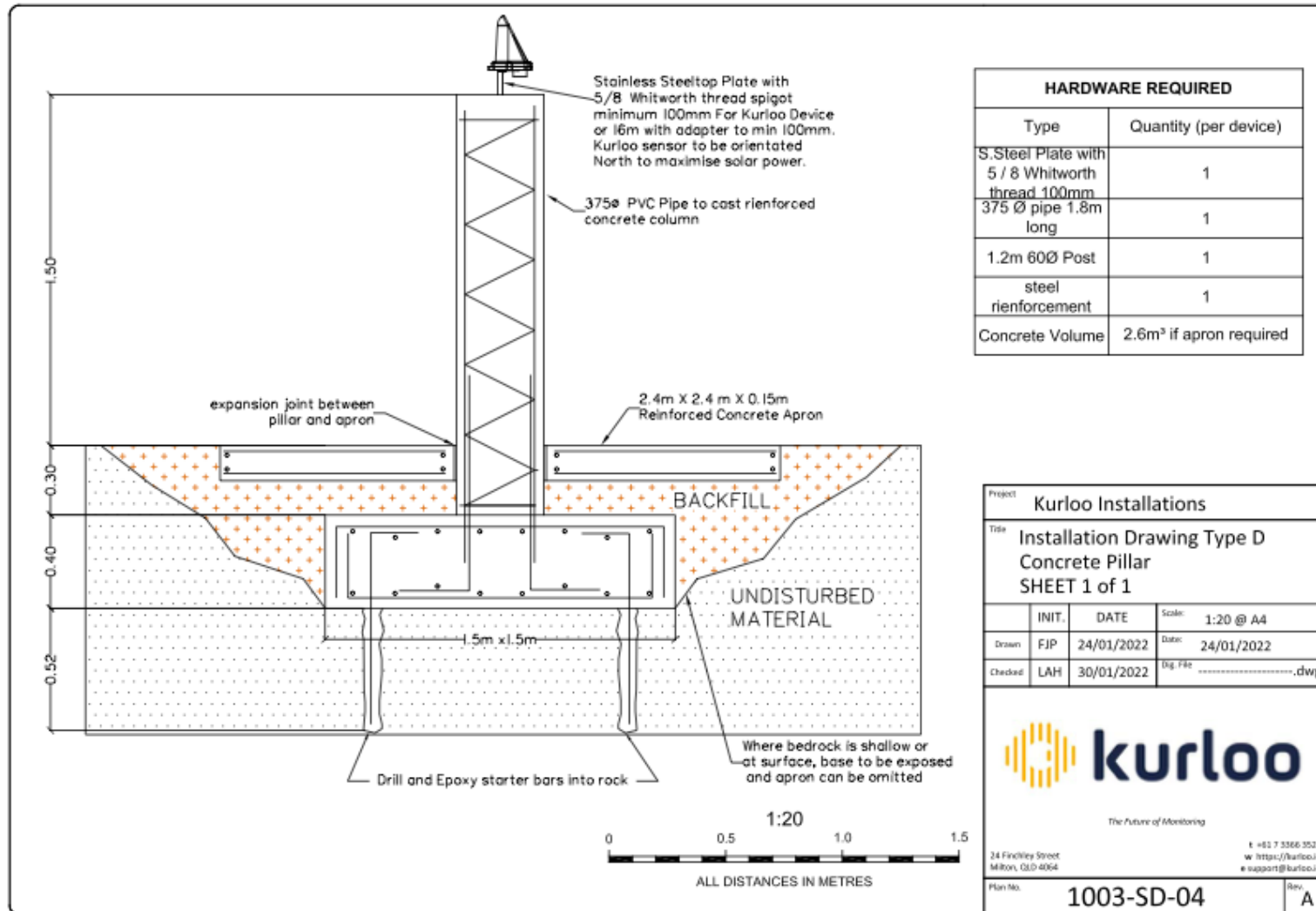


## 2.0 Site selection

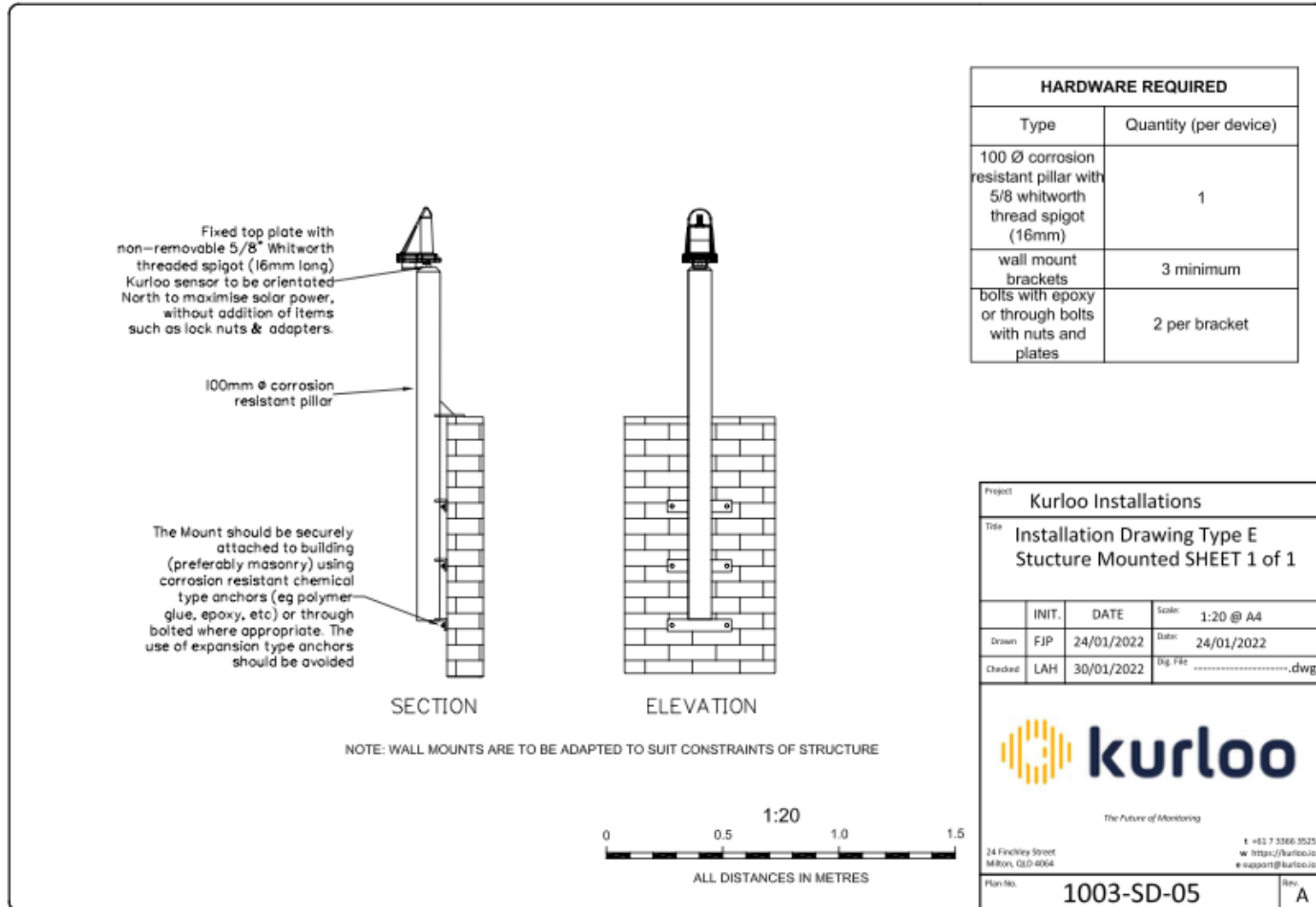




## 2.0 Site selection



## 2.0 Site selection



## **3.0 INSTALLATION**

### 3. INSTALLATION

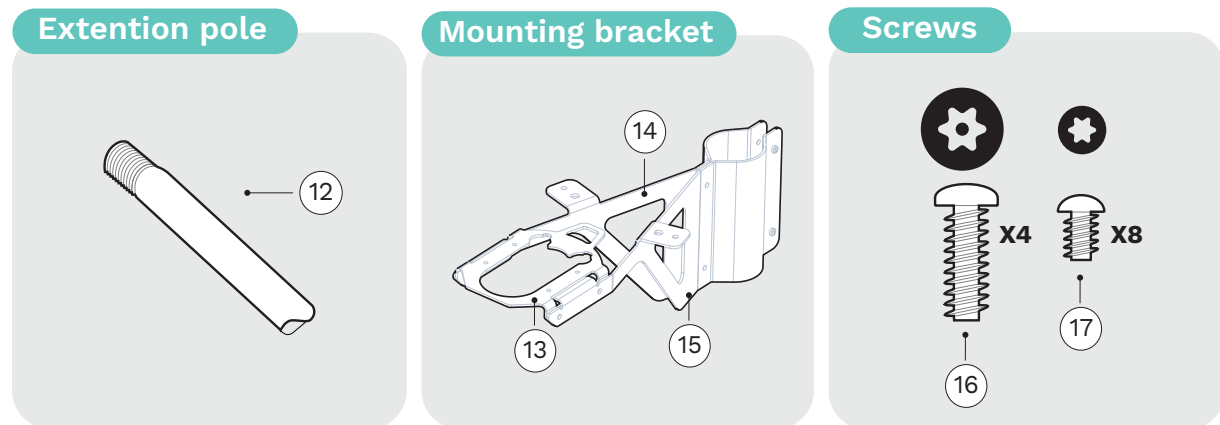
The Kurloo monitoring device is designed to be simple to install. To best cater to the needs of different site environments, we recommend 2 installation options. You can choose whichever option that best suits your use case or contact our team for a professional recommendation.

Option 1: 25cm  $\frac{5}{8}$ " extension pole

Option 2: Mounting bracket

Please check the components before installing. Components included:

1. A Kurloo monitoring device
2. A Bluetooth antenna
3. An LTE-M1 antenna



Components for Option 1 includes:

12. 25cm  $\frac{5}{8}$ " extension pole

Components for Option 2 includes:

13. Mount plate
14. Mounting bracket (L)
15. Mounting bracket (R)
16. Torx M8\*25mm screws
17. Torx M5\*8mm screws

### 3.1. Option 1

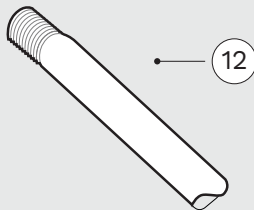
25cm  $\frac{5}{8}$ " extension pole – Best for installation type A and B (see section 2.1) use case scenario

Components for Option 1 includes:

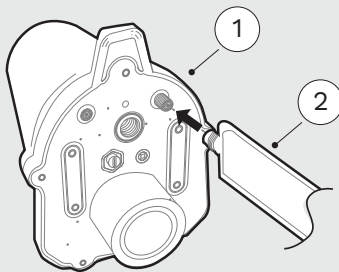
1. 25cm  $\frac{5}{8}$ " extension pole

1. Place the device on a safe surface with the screen face down and the bottom of the device facing the installer.
2. Align one end of the Bluetooth sensor with the receiving port (left port) and fasten it clockwise
3. Align one end of the LTE M1 sensor with the receiving port (right port) and fasten it clockwise
4. Slowly rotate the 25cm  $\frac{5}{8}$ " extension pole into the  $\frac{5}{8}$ " hole until the pole can't be rotated.
5. Securely place the 25cm  $\frac{5}{8}$ " extension pole to the object to be measured.
6. Complete the Installation Record Form

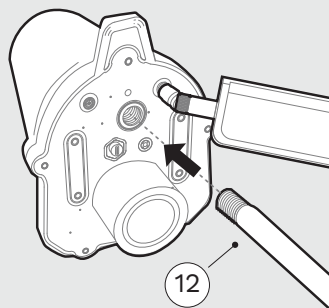
#### Extention pole



#### Step 1



#### Step 2





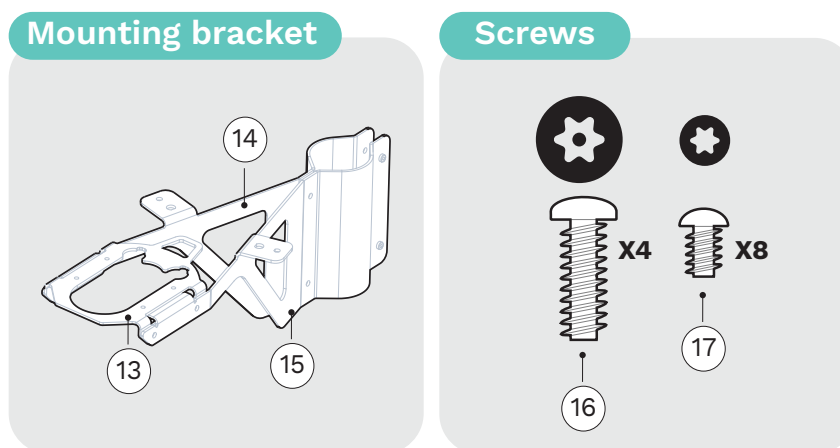
### 3.2. Option 2

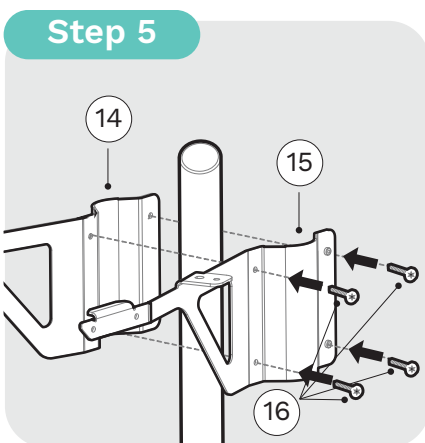
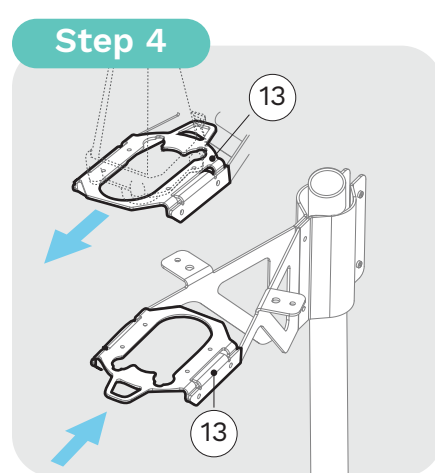
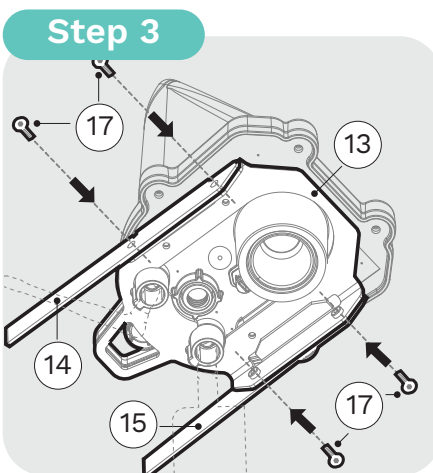
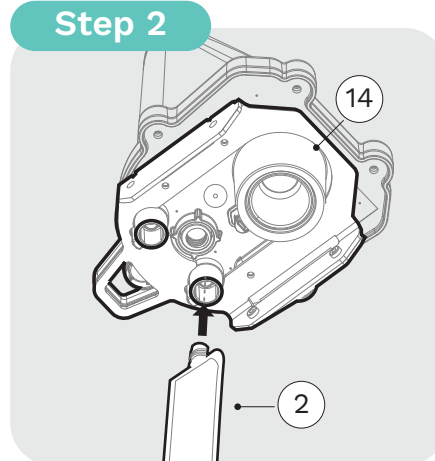
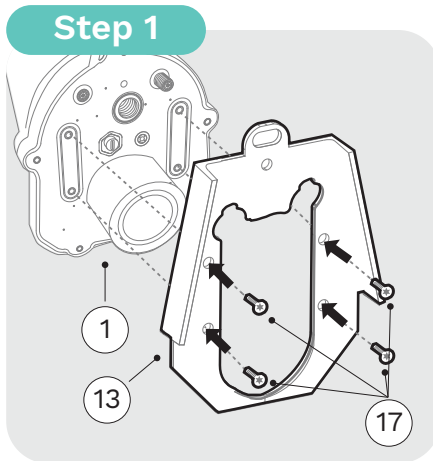
**60mm OD Vandal proof / GL mounting bracket** – Best for installation type C, D and E (see section 2.1) use case scenario

**Tools needed:** A specialty Torx Security Bit/Key set

Components for Option 2 includes:

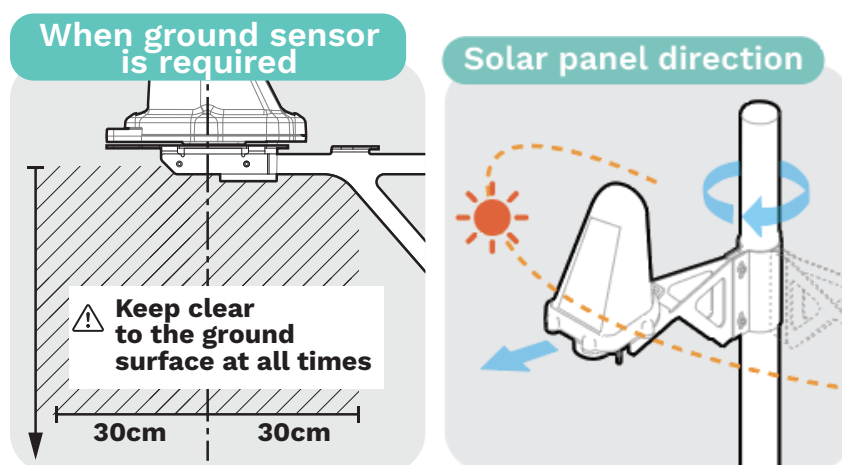
1. Mount plate
  2. Mounting bracket (L)
  3. Mounting bracket (R)
  4. Torx M8\*25mm screws
  5. Torx M5\*8mm screws
1. Place the device on a safe surface with the screen face down and the bottom of the device facing the installer.
  2. Align the **60mm OD Vandal proof / GL mounting plate (13)** with the screw holes on the bottom of the machine and fasten the **M5 x 8mm T25 Torx Security Screws (17)**.
  3. Align one end of the LTE M1 sensor (2) with the receiving port (right port) and fasten it clockwise
  4. Fasten and lock the **bracket Left (14) and right (15)** to the **mounting plate (13)** with **M5 x 8mm T25 Torx Security Screws (17)**. The mounting plate can be mounted in two directions.
  5. Fasten and lock the **60mm OD Vandal proof / GL mounting bracket** to the settlement rod with **M8 x 25mm T40 Torx Security Screws (16)** and point the bracket toward the North. Steadily place the settlement rod on the object to be measured.
  6. Complete the Device Installation Record Form





### 3.3. Installation requirements

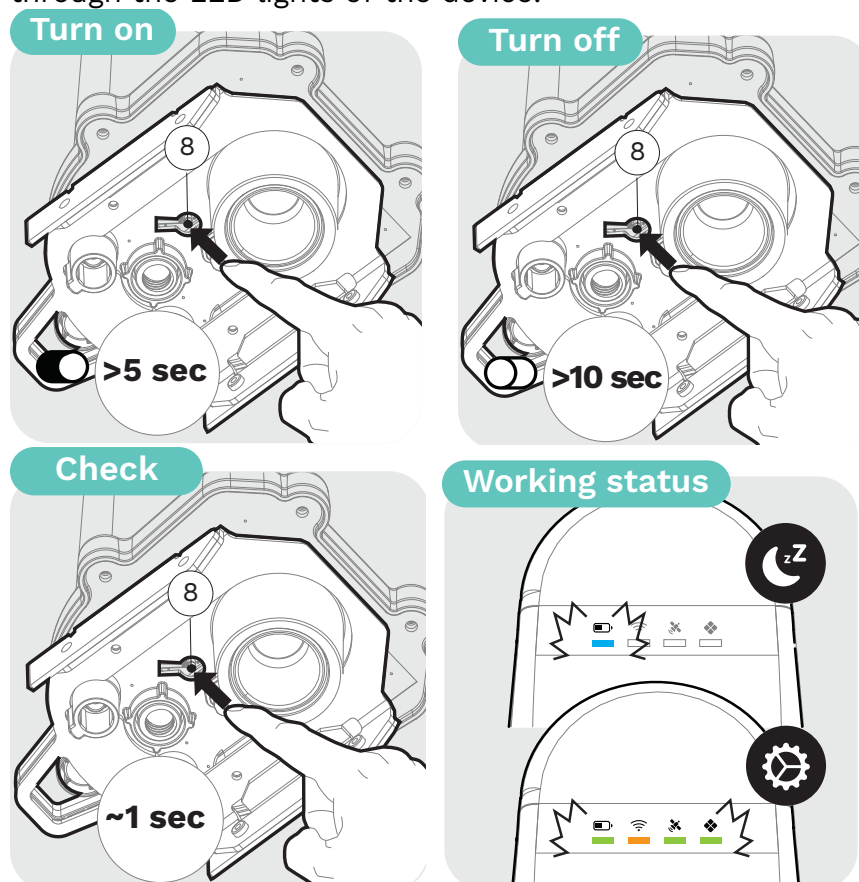
- Kurloo is a very powerful monitoring device right out of the box. The device does not require an external power supply, however, in order to ensure a stable power supply to the device, we recommend paying attention to the installation direction of the device.
  - Please make sure the Kurloo monitoring device's solar panels toward as north as possible. (Faces south if in the northern hemisphere)
  - Please make sure the top of the device is clear.
- Within a 30-centimetre radius of the device, make sure there are no obstacles between the bottom of the device and the ground
- The unit design is rigorously tested and IP66 compliant, so monitoring can be maintained even in bright sun or heavy rain.



### 3.4. Device Activate/Deactivate Process

- Check device operation status:  
Click the power button to check the device status. The device indicators should flash a blue light if in a low-power mode.
- Activate the device:  
Press and hold the power button for 5 seconds will turn on the device from shipping mode / deep sleep mode. The device will initiate an installation process to check all electronic components, as well as the communication conditions and GPS location. LED will be flashing based on the health state. After 2 minutes, the device will proceed into low power mode, no LED will be flashing during idle period. The device will wake up at regular interval (default of 30 minutes) to make periodic status update to Kurloo system.
- Turn off the device:  
Press and hold the power button for 10 seconds. During the turning-off process, the LED indicators will flash in RED light and then shut down the device.

Refer to the following table to help you correctly read the status of the device through the LED lights of the device:



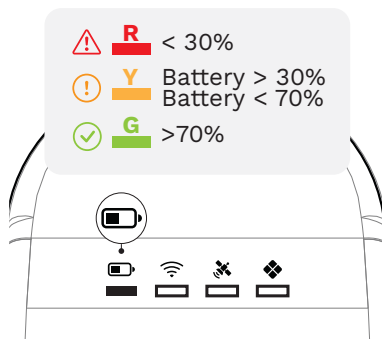
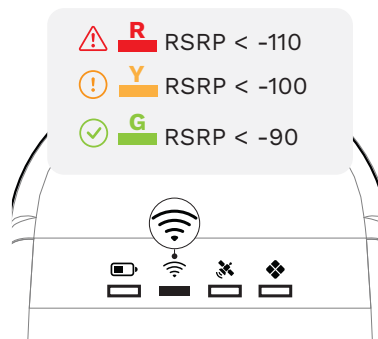
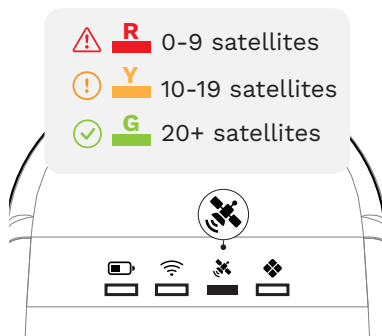
### 3.5. Reading device status:

To better understand your device and its status, it is crucial to know how to read the status indicators. The Kurloo system checks and confirms the device status with reporting of a straightforward 3 colours LED to indicate the severity on each status index. This helps to rapidly diagnose, respond, and adjust the device for better monitoring outcomes. The LED colours can be interpreted as followed:

1. **Red:** Alarm. This means the subsystem is in non-operational state. Contact the Kurloo support team for more detail.
2. **Yellow:** Warning. The device may have experienced a minor disruption or non-critical failure. You may need to pay attention for any further changes.
3. **Green:** Good. This means the device is at optimal operating status for the best quality data.

The Kurloo device highlights 4 types of status indexes including battery life, Reference Signal Received Power and Quality (RSRP and RSRQ), GNSS, and System. It is suggested to aim for good status (Green) for each index when installing a device. You can check the following table for a more detailed description of each index.

	Alarm	Warning	OK
Battery	< 30%	70% > state > 30%	>70%
Modem / Kurloo-Nest Reference Signal (RSRP)	During LTE network search state  RSRP < -110	RSRP < -100	RSRP < -90 Kurloo message exchanged
GNSS	0-9 satellites	10-19 satellites	20+ satellites
System	Critical device error (eg unable to reach sensor)	Non-critical component (environmental sensors) failure	All good

**Battery status****RSRP\* status****GNSS\* status****System status**

### 3.6. Record installation detail

Congratulations! Once you have installed a device successfully and adjusted the device to the best state, you are ready to collect the precise data with our Kurloo advanced technology. Before installing the next device or leaving the field, you should always remember to record the installation detail of each device. Please use the following table to record your device's installation detail and sign off when you are all set:

**Installation Record Form**

	Check item	Record	Note
<b>Site selection/ Device installation/</b>	Project name		
	Installation date	____(D)/____(M) / ____ (Y)	
	Device ID		
	Obstruction level	Low / Medium / High	
<b>Device operation status (LED status indicators)</b>	Battery	Green / Yellow / Red	
	RSRP and RSRQ	Green / Yellow / Red	
	GNSS	Green / Yellow / Red	
	System	Green / Yellow / Red	
<b>Proof of done</b>	Have taken a photo of installed device ( Yes / No )		
<b>Comments</b>			
<b>Installer sign off</b>			



## **4.0 ACCESSORIES**

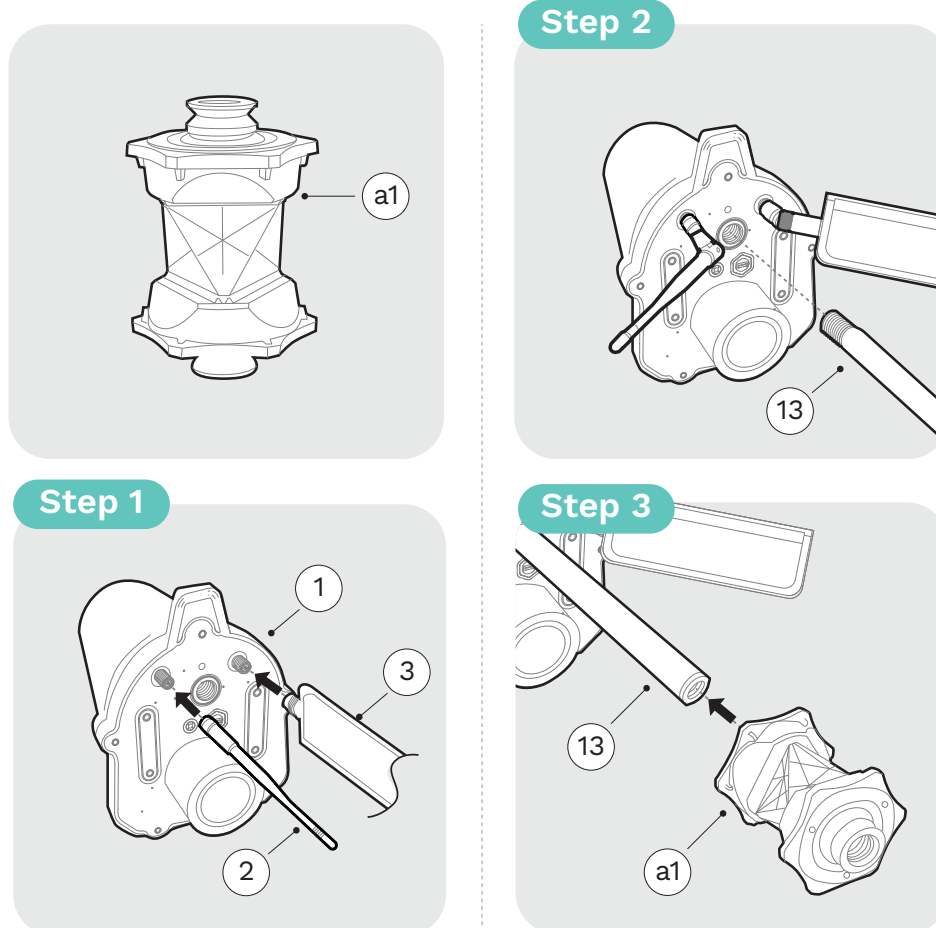


## 4. INSTALLATION – KURLOO ACCESSORIES

We know how important it is to support monitoring gadgets you like. The Kurloo device is designed to be compatible with major commonly used monitoring connector threads, and widely known tools within the surveying industry. The Kurloo device has an industry standard  $\frac{5}{8}$ " Whitworth female port that can expand your favourite device to the next level. Here are some cool accessories you may want to check out:

### 4.1. 360 Degree Prism

This reflector is recommended for all total station work where you wish to use Kurloo as a dynamic reference target. The 360-degree prism can be fitted to the  $\frac{5}{8}$ " female internal thread when using the kurloo pole mounting bracket.





## **5.0 TROUBLESHOOTING**

## **5. TROUBLESHOOTING**

### **5.1. Issue Report**

Each Kurloo unit is inspected by professionals before leaving the factory to ensure the stability of data transmission and the operation of the machine. However, under special circumstances, unexpected issues may still occur. If the unit fails, please contact the Kurloo team for further assistance [support@kurloo.io](mailto:support@kurloo.io)