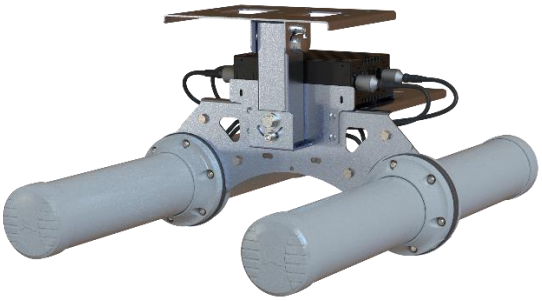
**WiFi:** 2.4 to 2.5GHz 5.0 to 6.0 GHz
**WiFi-6 / LTE / 5G:** 1.7 to 7.2 GHz

Uni-directional Antenna

Bi-directional Antenna



Antenna Assembly (with mounting brackets)

## MiniHELI Series | Circular polarised mine & tunnel antennas

High bandwidth communication systems perform a vital role in the safety and productivity in mining and tunnelling operations, enabling modern underground operations to use communication systems that enable secure voice communications, to locate both people and machines, remote control of vehicles and systems, and site access and security.

In recent years the proliferation on M2M and IoT applications above ground has moved underground and highlighted the requirement for better quality communication in the mines that can seamlessly move to networks above the ground.

Equipment that gets used underground needs to be fit for purpose as the requirements from an electrical and mechanical point of view differs greatly to that for above ground systems. From a Radio Frequency (RF) point of view, the propagation constraints in a mining tunnel are completely different to those above ground.

To ensure industrial grade wireless communications underground, where anti-fragile connectivity & high availability is of utmost importance, the choice of antenna plays just as important role as the Access Point/Radio Nodes and other equipment in the system.

Poynting have expanded their purpose designed mine tunnel antenna to offer the new MiniHELI range of slimline circular polarised antennas. These antennas are designed with a low profile, capable to offer Dualband WiFi and LTE/5G/WiFi-6 connectivity within the same series.



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Poynting
Making wireless happen

**WiFi:** 2.4 to 2.5GHz 5.0 to 6.0 GHz
**WiFi-6 / LTE / 5G:** 1.7 to 7.2 GHz

## KEY FEATURES

- This "slimline" antenna series adds more frequency bands (LTE/5G), WiFi-6 (802.11ax) and dual band WiFi to our existing industry leading range of larger 2.4 GHz helical antennas.
- Like our existing HELI antennas, they offer even lower cross section while providing high gain circularly polarised signals in the tunnel.
- These features have a proven record for delivering exceptional range and lower fading when tested in real life mining tunnels which are often cluttered, irregular tunnels, wall roughness and usually non line-of-sight (NLOS) scenarios.
- Tests show that adding frequency diversity, spatial diversity and MIMO ability, adds to the benefits of circular polarisation and provide increased reliability and data rates while coping even better with irregular tunnel topography, obstacles and obstructions such as vehicles, locomotives and other metallic clutter.
- Bi-directional antennas radiate in both directions down tunnels providing around 40% reduction in access points.
- Left & Right Hand Circular Polarised antennas are available (for MIMO deployment), further enhancing diversity and MIMO abilities.
- Rugged and water/moisture resistant features gained from experience with thousands of existing antennas deployed in mines worldwide.
- Novel patented concepts used in this new range are specially developed for this range.
- Simplified implementation assemblies that mount directly to the tunnel roof or roof bolts, while also housing the radio equipment, reducing implementation time and costs.
- Intrinsically safe version available on request

## KEY IoT/M2M APPLICATION AREAS

- Supplementing fibre /cable networks by providing wireless access in tunnels to enhance mobility and M2M systems.
- Pure or hybrid mesh networks provide high bandwidth reliable backhaul and coverage with self-healing and automatic configuration.
- RF network communications to harsh and inaccessible parts of the mine, including the actual work faces and tunnels under construction.
- Underground telemetry, automation and safety of personnel.
- Seamless connection to personnel using smart devices and tablets for the purpose of safety and reporting.
- Creating of complete underground tunnel wide data networks based on WiFi, LTE, 5G and also WiFi-6 connectivity.
-



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## Product Overview

Poynting have an established history of providing circular polarised antennas for mine tunnels internationally. The MinePoynt (HELI) range of antennas are well established for several years and deployed in many mines in Africa, Australia, Canada and other countries internationally. With the high demand in underground antennas, and also for new technologies such as WiFi-6 and LTE/5G, Poynting have developed a new range of antennas that offer both dualband 2.4/5GHz and LTE/5G mine tunnel antennas in a smaller size enclosure.

This new miniHELI range of mine tunnel antennas are only mini in size relative to their bigger brothers, the already popular HELI-3, HELI-4 & HELI-8 and offer medium to high gain while providing the smallest possible installation height for mounting on the tunnel roof or side wall. This new range of antennas is typically used for the deployment of IoT within the tunnel to provide telemetry and mine automation and can also be used for coverage into the stopes and smaller tunnels.

The MiniHELI range of antennas offer different variants (model numbers) for dual 2.4GHz and 5GHz antennas, or ultra-wideband 1.7GHz to 7.2 GHz for WiFi-6 (802.11ax) and LTE/5G underground. Bi-directional antennas which radiate in both directions of the tunnel and uni-directional antennas are available, where propagation is required in a single direction. The MiniHELI antennas are available in both Left Hand Circular (LHC) & Right Hand Circular (RHC) polarised antenna elements to provide optimal decorrelation within a MIMO deployment, resulting in the best of the two worlds; decorrelation due to the polarisation differences and also spatial diversity to enhance MIMO performance & RF reliability to service the most demanding conditions within an RF hostile mine tunnel. The dualband WiFi, WiFi-6 (802.11ax) and LTE/5G connection propagates around tunnel bends in a non-Line of Sight scenario and provides immunity to many of the signal disrupting objects such as trains and drilling machinery which appear to obscure the tunnel.




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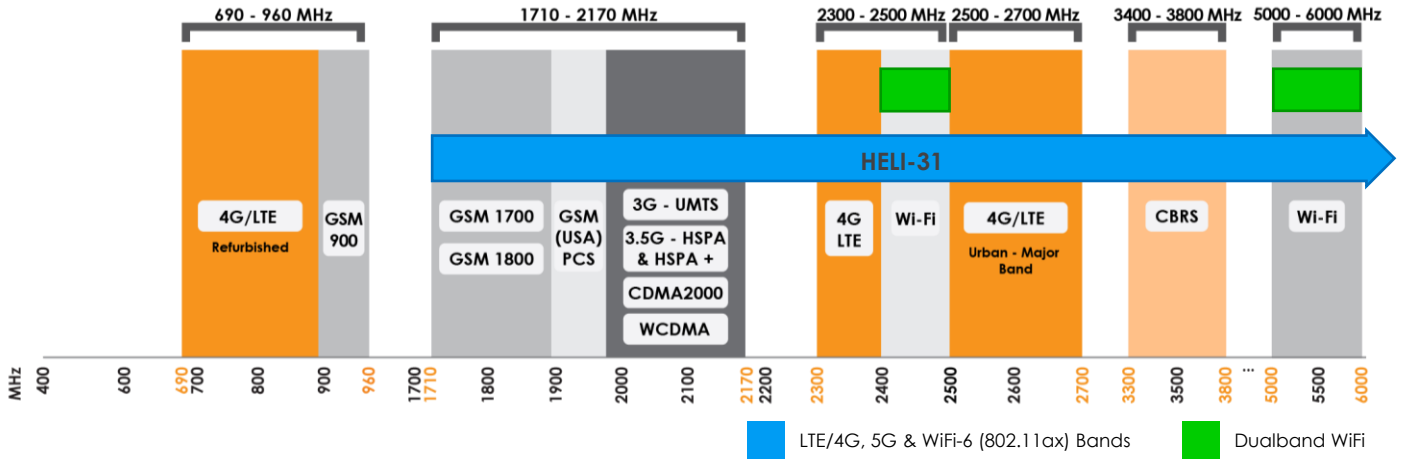
**WiFi-6 / LTE / 5G:** 1.7 to 7.2 GHz

Coverage range of these antennas have been tested to exceed conventionally deployed antennas, with underground measurements of between 400m and 1km achieved, reducing the cost of deploying too many access points / radios.

Frequency bands of the 2.4 & 5GHz miniHELI antennas are shown in green, while the ultra-wideband HELI-31 antenna frequency band is indicated in blue.




## Antenna Models Overview

The following models are available in this series:

| Antenna Model Number | 2.4 to 2.5 GHz | 5 to 6 GHz | 1.7 to 7.2 GHz (WiFi-6 & LTE) | Number of N-Type Connectors (ports) | Technology | Directionality |
|---|---|---|---|---|---|---|
| **HELI-0011**-V2-01 | ✓ | - | - | 1 | WiFi | Uni-directional |
| **HELI-0012**-V2-01 | - | ✓ | - | 1 | WiFi | Uni-directional |
| **HELI-0013**-V2-01 | ✓ | ✓ | - | 2 | WiFi DUALBAND | Uni-directional |
| **HELI-0017**-V2-01 | ✓ | - | - | 1 | WiFi | Bi-directional |
| **HELI-0018**-V2-01 | - | ✓ | - | 1 | WiFi | Bi-directional |
| **HELI-0019**-V2-01 | ✓ | ✓ | - | 2 | WiFi DUALBAND | Bi-directional |
| **HELI-0031**-V2-01 | ✓ | ✓ | ✓ | 1 | WiFi 6 802.11ax, 4G LTE, 5G READY | Uni-directional |



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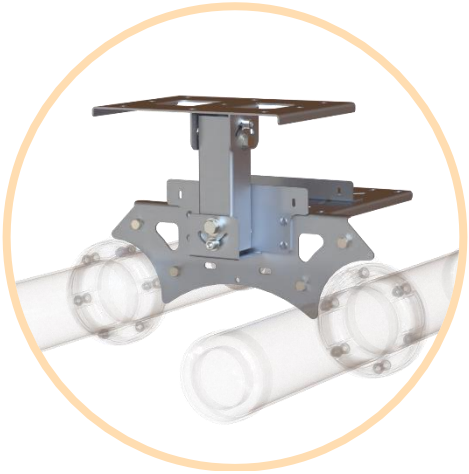
## Mounting Possibilities

A roof mounting bracket (BRKT-045-V2-01) is available, which can be used to mount 1x, 2x or 3x antennas. This bracket is made of Stainless Steel to survive the harsh, wet and corrosive environments underground. The bracket is made to mount via rawl bolts (or other type of bolts) directly to the tunnel roof. The bracket can be partially disassembled and connected to a pole, by using a U-Bolt. A BRKT-047-V1-01 is also available which can be used to attach the BRKT-045-V2-01 to an existing 20mm mine tunnel roof bolt.

| Bracket Models | Description |
|---|---|
| **BRKT-045**-V2-01 | Mining Tunnel Roof Mount Bracket for 2x or 3x mini-HELI Antennas with Node/AP mounting |
| **BRKT-047**-V1-01 | Mining Tunnel Roof Bolt Mount Bracket attachment for abovementioned BRKT-45 |



**BRKT-045-V2-01**

**BRKT-047-V1-01**



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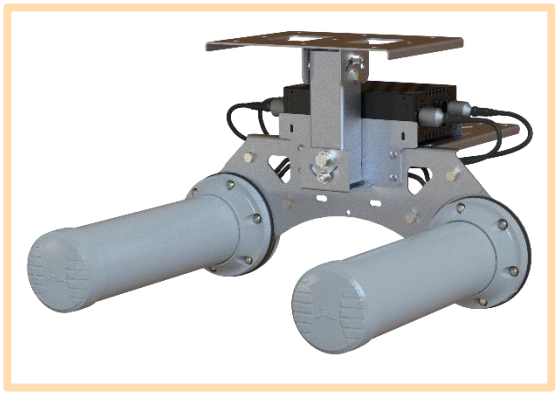
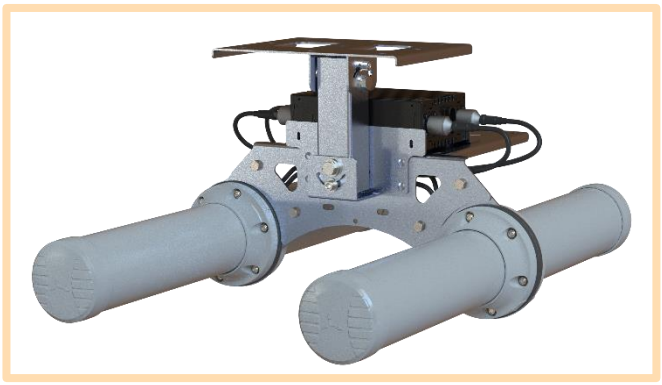
## Antenna Assemblies

A preconfigured set of antenna assemblies are available for ease of ordering. These assemblies consist of BRKT-045-V2-01 and two antennas with both Left Hand Circular (LHC) Polarised and Right Hand Circular (RHC) polarised antennas as follows:

| Antenna Assemblies | With HELI-13 | With HELI-19 | Includes BRKT-045-V2-01 | Includes BRKT-047-V1-01 |
|---|---|---|---|---|
| HELI-0021-V2-01 | 2 (1x LHC, 1x RHC) | - | ✓ | - |
| HELI-0021-V2-02 | 2 (1x LHC, 1x RHC) | - | ✓ | ✓ |
| HELI-0022-V2-01 | - | 2 (1x LHC, 1x RHC) | ✓ | - |
| HELI-0022-V2-02 | - | 2 (1x LHC, 1x RHC) | ✓ | ✓ |



**Uni-directional Assembly**
**HELI-0021-V2-01**



**Bi-directional Assembly**
**HELI-0022-V2-01**



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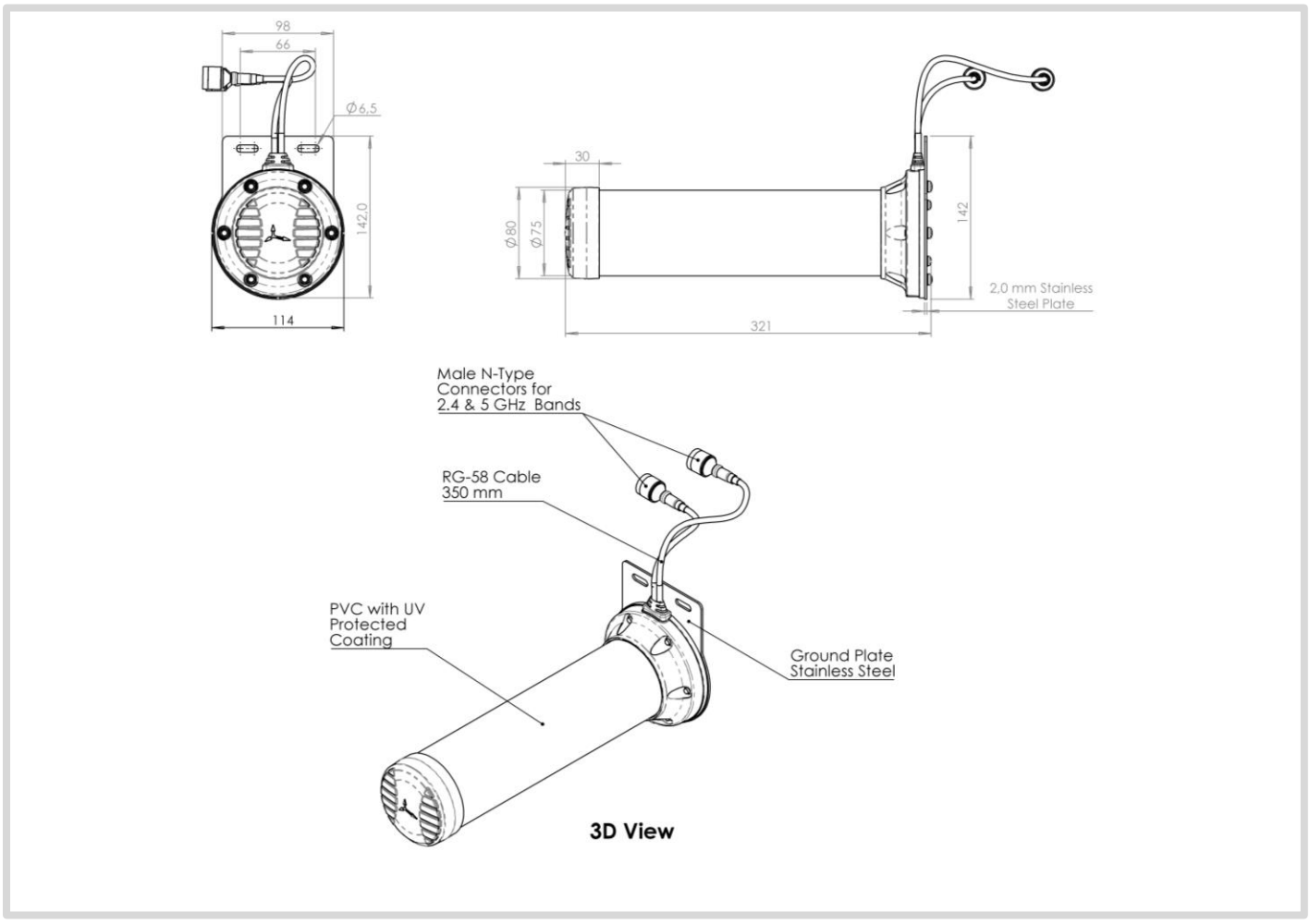
## Dimension Drawings: Uni-directional HELI-11, 12 & 13:



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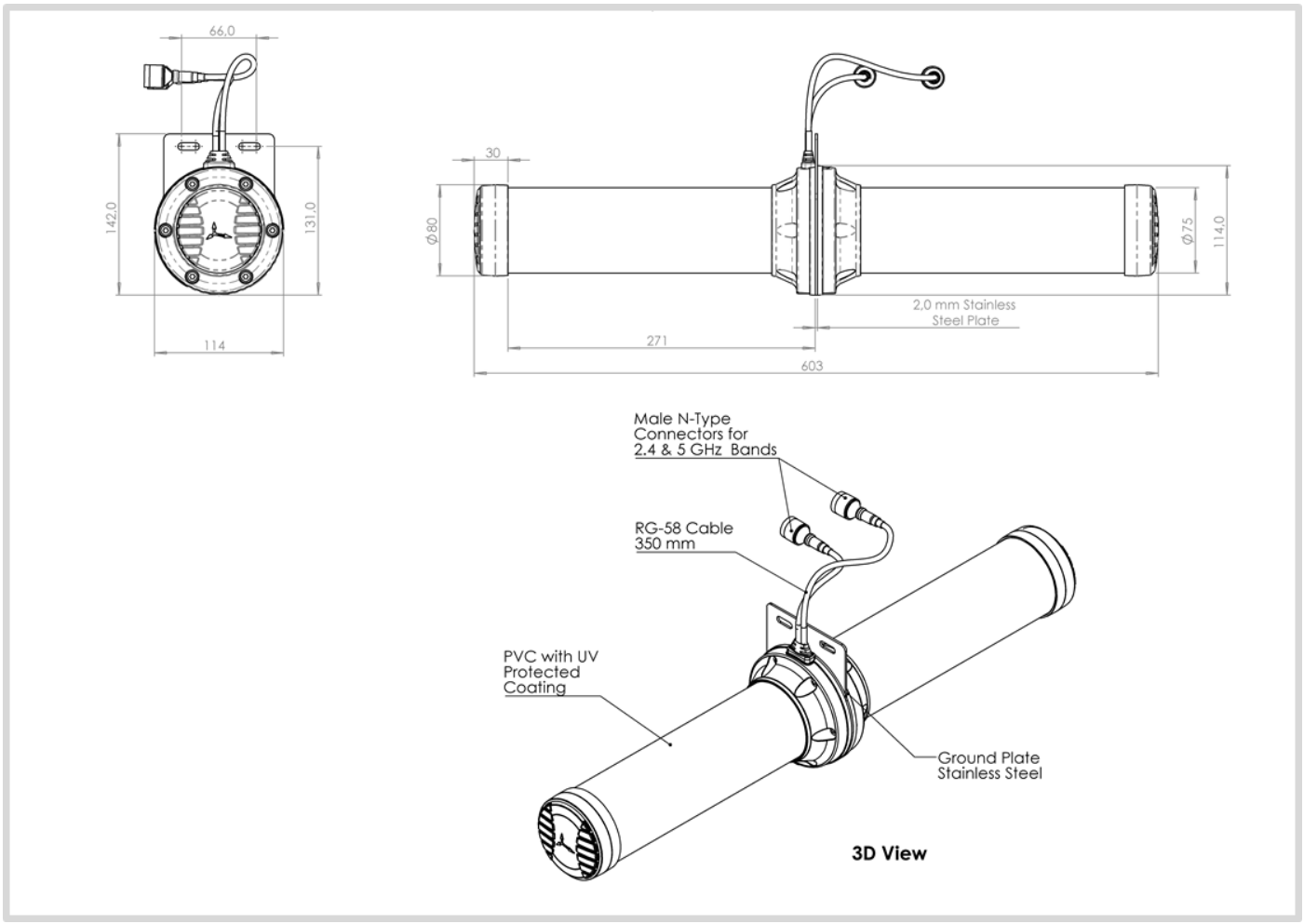
## Dimension Drawings: Bi-directional HELI-17, 18 & 19:



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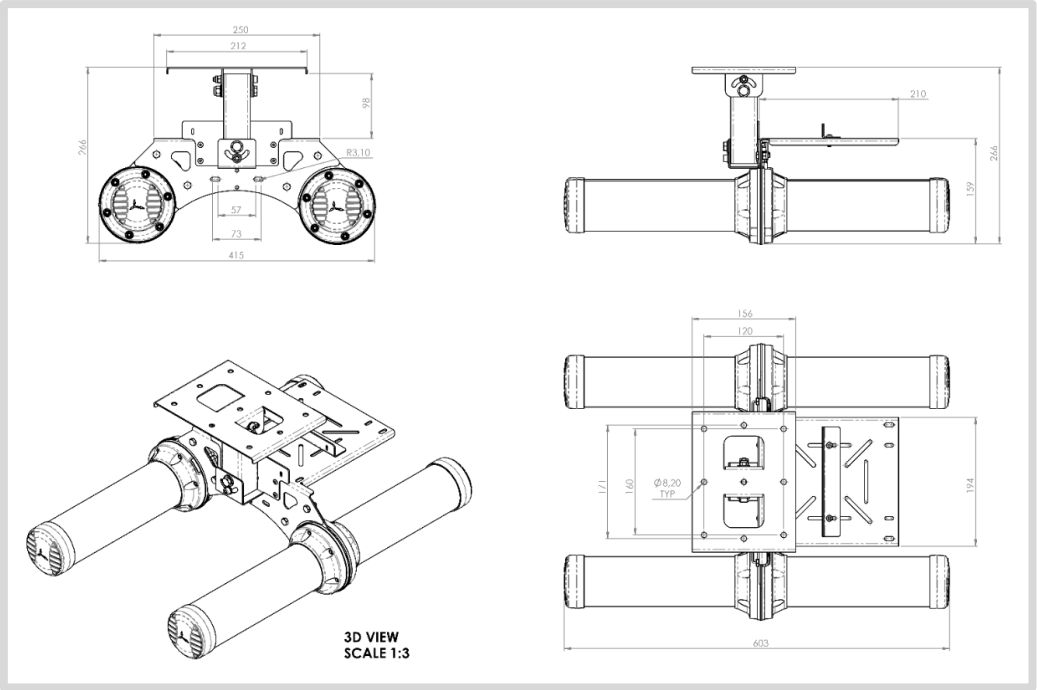
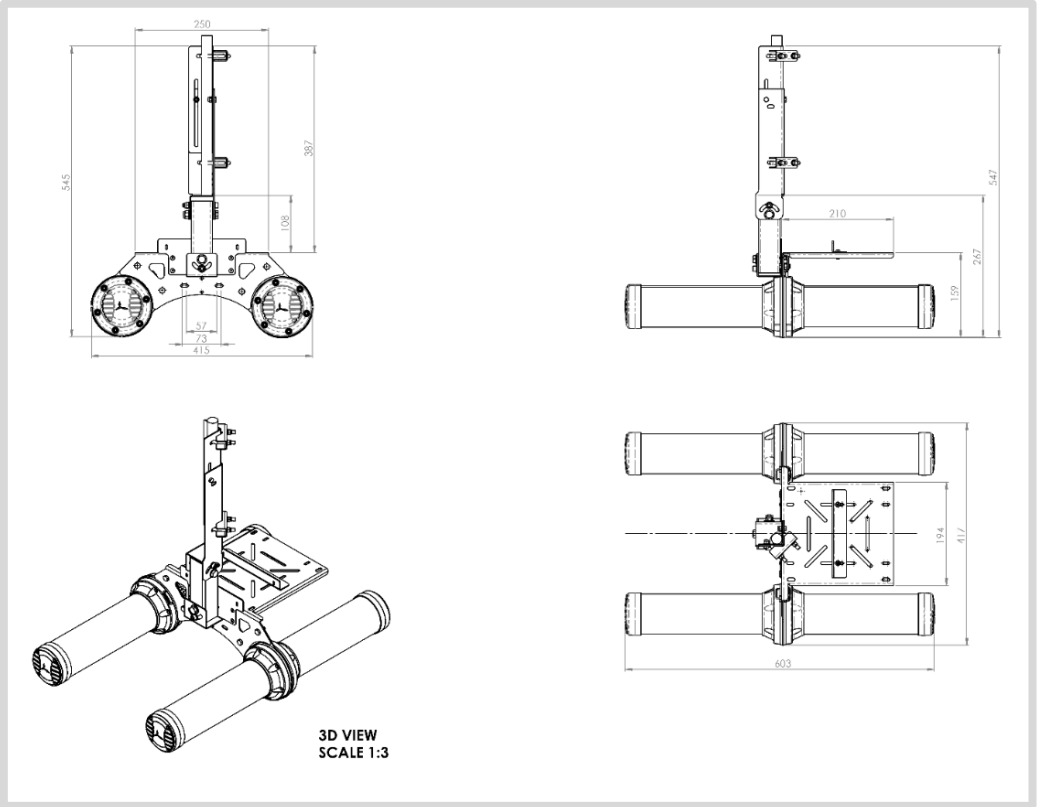
## Dimension Drawings: Complete Antenna Assembly:

### A-HELI-0022-V2-01




### A-HELI-0022-V2-02



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