IMBQ-HP V2 Tracking Pedestal

Technical Datasheet *REV 1.0*

Specifications

Overall Pointing Accuracy (pedestal referenced)	**13 arc-seconds (0.0036 deg)**
Encoder Resolution	20 bit
Pan-Tilt Positioner Mass	75kg
Payload Mass, Maximum	100kg
Range, Elevation	-20 to +190°
Typical operation	-20 to +90°
Range, Azimuth	+/- 360°
Typical operation	+/- 179°
Tracking Dynamics	
Angular Rate, Azimuth	90°/s
Angular Rate, Elevation	90°/s
Angular Acceleration, Azimuth	$180°/s^2$
Angular Acceleration, Elevation	$180°/s^2$
Environmental	
Temperature Range, Operational	-20° to +45°C
Temperature Range, Storage	-20° to +70°C
Humidity	0 to 95%, non-condensing
Heater, Enclosure (thermostatically controlled)	100W
Sealing	IP66
Environment	Terrestrial/Marine
Finish	High Gloss Epoxy over Zinc Chromate
Power Supply Input	120/220/240VAC, 50/60Hz
Power Consumption	Typical 250W, Peak 500W
Set Up and Tear Down (incl. mounting)	30 minutes with 2 people
Head Dimensions	
Height	77 cm (30.3 in.)
Width	51 cm (20 in.)
Depth	36 cm (14.2 in.)

Figure 1: IMBQ-HP V2 Tracking System

***System is shown configured with the FLIR RS6700 Infrared camera and a multi-CCD camera enclosure.**

System Accuracy

The Imago IMBQ-HP V2 pan/tilt and camera system can be mathematically leveled to 1 arc-second resolution by surveying in the system to known reference points. System accuracy is the envelope of all errors. The overall pan/tilt and camera system pointing accuracy is ±13 arc-seconds as measured with respect to a stationary ground based survey.

Figure 2: Front View

Figure 3: Side View

Figure 2 and 3 show two views of the IMBQ-HP V2 tracking platform.

Points to note regarding system accuracy:

1. The CCD NFOV camera is mounted on top and the CCD WFOV camera below. The NFOV camera is assumed to be the primary tracking camera due to the long range to the target.
2. The CCD NFOV camera sensor is centered directly over the azimuth axis of rotation and centered on the elevation axis. There is no orbit.
3. The IR camera is centered directly over the azimuth axis of rotation. There is no orbit in azimuth.
4. The payload is well balanced over the axis of rotation. There is no wobble induced by payload velocity.
5. Dual encoders are used on both the azimuth and elevation axes.
6. Typically, the payload can be dumped (depending on configuration).

Parallax Errors

IMAGO's IMBQ platform supports the main tracking camera at the intersection of azimuth and elevation axes of rotation to avoid parallax errors. In other systems, optics are offset from the axes of rotation, so parallax must be considered.

Parallax errors created by offset camera positioning can be very large with respect to pointing accuracy requirements. In fact, these errors can be much larger than the required pan/tilt accuracy. They can be largely but not completely removed, even with a two tracker or laser ranging system. They ARE important to consider when precise pointing accuracy is needed or position measurements are needed where range data is not possible.

As an example, let us consider the errors induced by a 10-inch (0.25 meter) offset:

Range (km)	Star calibration Parallax Error (arc-sec)	Calibration using survey points at 1 km range Parallax Error (arc-sec)
1	51.6	0.0
2.5	20.6	30.9
5	10.3	41.2
10	5.2	46.4
20	2.6	49.0

IMAGO's IMBQ mounts the main tracking camera's optical sensor at the intersection of the azimuth and elevation axes to eliminate this major source of error.

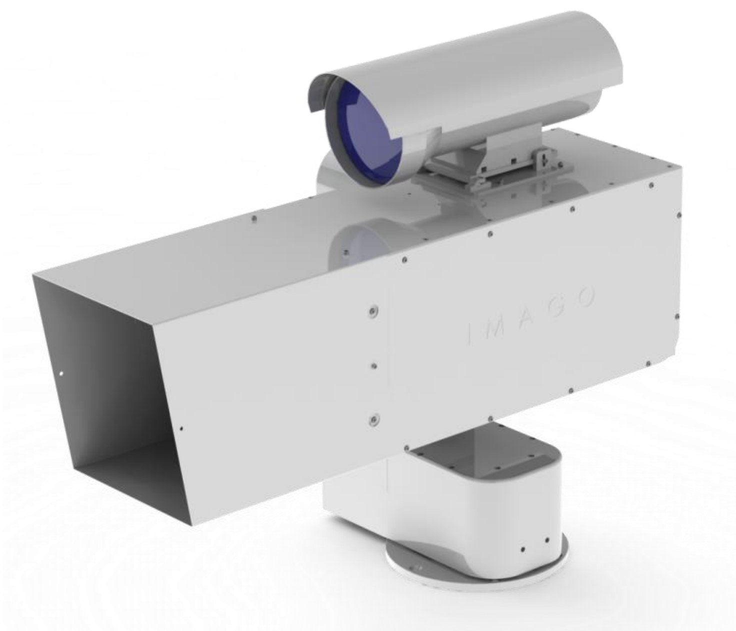

Figure 4: Isometric View