# HASK™

**HITEC ANTENNA SERVO KIT**

HITEC

LUXEMBOURG

## THE HITEC ANTENNA SERVO KIT (HASK™) IS A RELIABLE, SCALABLE, MODULAR SERVO SYSTEM FOR GROUND STATION ANTENNAS

For almost 20 years, HITEC Luxembourg has been developing and building high-precision ground station antennas. In the last few years, there has been an increasing demand to refurbish antenna control systems of 3rd-party ground station antennas, in particular of limited motion antennas, for which HASK™ is the most convenient solution.

To address these needs, HITEC Luxembourg has developed a reliable, precise and modular servo kit based on COTS (commercial off-the-shelf) parts which combines generic and application-specific modules to match customer needs, suitable for azimuth/elevation mount antennas.

Every HASK™ includes one of three different models of the HITEC Antenna Control Unit (HACU®), which can be interfaced with a wide range of compatible tracking receivers, and the HITEC Antenna Drive Unit (HADU™) comprising a HITEC Servo Control Unit (HSCU™), the drive system, a power supply system, a safety loop supervision, a portable maintenance unit and a customer interface.

For application-specific needs, HITEC Luxembourg supplies a series of options including a wide range of motor configurations, encoders with different levels of precision, polarization axis control, a tilt sensor, an advanced portable maintenance control unit, RF switch control, different cable lengths and indoor or outdoor cabinets.

## KEY FEATURES

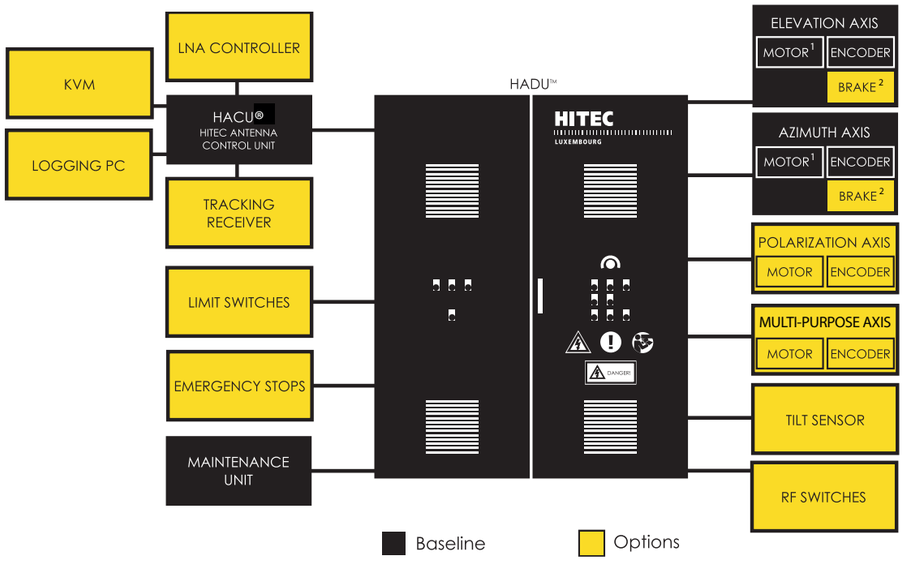
High performance
- High quality and reliability
- Mostly maintenance free

Modular design
- For 3rd-party antennas and refurbishments
- Adaptable to different antenna sizes
- Based on COTS hardware platform
- Compatible to wide range of tracking receivers

State-of-the-art control of the antenna
- Program track, step track and monopulse
- Advanced maintenance unit with display

Out of the box
- Easy to install and to set up

**HITEC Luxembourg S.A.**
**Tel** +352 498478 - 1 **Fax** +352 401303 **Email** antennas@hitec.lu **Web** www.hitec.lu | space.hitec.lu
49, rue du Baerendall - L-8212 Mamer




ADDITIONAL OPTIONS: Extended cable lengths and temperature ranges, redundant 24 V power supply, surge protection, second motor ([1]), brakes ([2]), outdoor cabinet, advanced maintenance unit

DRIVE CABINET: In the baseline configuration, the HITEC Antenna Drive Unit (HADU™) is composed of an indoor cabinet which is ventilated and must be placed in a shelter and which comprises the HITEC Servo Control Unit (HSCU™), the servo drive subsystem, a braking resistor, line filters, power supplies, a user interface (e.g. ON/OFF button) and fuses. It interfaces with the antenna mount components such as the motors and the encoders on the one side and with the HACU® on the other side. As an option a climate controlled outdoor cabinet is available which has the advantage that the cable lengths for encoders, motors and limit switches can be kept short to ensure maximum performance.

MOTORS: The system is compatible with temperature supervised high-precision permanent-magnet servo motors in the range from 4.7 to 15.5 Nm. For axes based on screw jacks, only one motor is used whereas for normal axes, a second motor is available for backlash control. If the antenna has a polarization axis, a polarization stepper motor is added. If requested, an additional multi-purpose axis can be managed by the HASK™. It can be a third axis controlled by a servo-drive (tilt axis) or a second polarization axis for antennas combining circular and linear polarization systems.

ENCODERS: For azimuth and elevation, the customer can choose between high resolution 18-bit or very high resolution 25-bit encoders. A 16-bit polarization encoder can optionally be added to the HASK™.

TILT SENSOR: For very demanding applications, an optional 2-axis tilt sensor is available for measuring the deflection of the antenna pedestal. Its tilt angles are forwarded to the HACU® to apply an error correction to the axis set points.

MAINTENANCE UNIT: In the baseline, a standard portable maintenance control unit (PMCU) connected either to the drive cabinet or at the level of the yoke platform is provided. The PMCU features axis control buttons, a start and a stop button, an emergency stop button, a limit override button, speed switch buttons and a local switch. As an option, an advanced maintenance unit comprising a touch panel display can be supplied which in addition to the standard PMCU also indicates the status and position of the axes and the beacon level.

RF SWITCHES CONTROL & MONITORING: Optionally, the RF-switches can be controlled and monitored via the ACU.

CABLE LENGTHS: Depending on the desired position of the different HASK™ components, different cable lengths between the antenna and the HADU™ and between the drive cabinet and the HACU® can be provided.

ADDITIONAL COMPONENTS: The HASK™ can be interfaced with pre-existing or new components such as limit switches, brakes, emergency stop buttons, hand crank interlocks, stow pins and alarm relays.

HITEC ANTENNA SERVO KIT (HASK™)
SYSTEM

| **DRIVE CABINET** | | | |
|---|---|---|---|
| **Type** | Indoor Cabinet | | |
| **Dimensions (WxDxH)** | 1.2 x 0.4 x 1.8 m | **Weight** | 290 kg |
| **Protection class** | IP54 | | |
| **Temperature range** | +10°C to + 50°C | | |
| **Power supply** | 400 VAC / 50-60 Hz / nominal current depending on selected configuration | | |
| **MOTORS (AZ/EL)** | | | |
| **Rated Torque** | **4.7 Nm** | **10.5 Nm** | **15.5 Nm** |
| **Peak torque** | 6.3 Nm | 13.1 Nm | 24.0 Nm |
| **Rated current** | 3.7 A | 7.2 A | 11.6 A |
| **Rated speed** | 3000 rpm | 3000 rpm | 3000 rpm |
| **Protection class** | IP65 | IP65 | IP65 |
| **Baseline temperature range** | -25°C to +40°C | -25°C to +40°C | -25°C to +40°C |
| **ENCODERS (AZ/EL)** | | | |
| **Type** | **High resolution** | **Very high resolution** | |
| **Resolution** | 18-bit | 25-bit | |
| **Protection class** | IP65 | IP64 | |
| **Accuracy** | ± 10 mdeg | ± 2.78 mdeg | |
| **Temperature range** | -25°C to +85°C | -25°C to +70°C | |

| **POLARIZATION AXIS** | | | |
|---|---|---|---|
| **MOTOR** | | **ENCODER** | |
| **Holding torque** | 1.7 Nm | **Resolution** | 16-bit |
| **Rated current** | 0.9 A | **Protection class** | IP65 |
| **Step size / microstepping** | 1.8 deg / 0.036 deg | **Accuracy** | 100 mdeg |
| **Temperature range** | -25°C to 60°C | **Temperature range** | -40°C to 80°C |

| **MULTI-PURPOSE AXIS** |
|---|
| Can be configured for customer needs as a third motion axis (tilt axis) or a second polarization axis |
| Characteristics of main motion axis or polarization axis applicable |

| **2-AXIS TILT SENSOR** | | | |
|---|---|---|---|
| **Resolution** | 1 µradian | **Repeatability** | 4 µradians (static) |
| **Temperature range** | -25°C to + 70°C | | |

| **RF SWITCHES** | | | |
|---|---|---|---|
| **Max. number of supported switches** | 16 | **Standard electrical interface per switch** | 24 VDC - 1 A |

| **LNA MONITORING** | |
|---|---|
| Monitoring of the telemetry LNA via an LNA controller | Monitoring of a tracking LNA via a dry contact |

| **CABLE LENGTHS BETWEEN MODULES** | | |
|---|---|---|
| | **Baseline** | **Extended range** |
| **HACU® - HADU™** | < 100 m | < 230 m |
| **HADU™ - antenna** | < 50 m | < 150 m |
| **Standard maintenance unit - HADU™** | < 150 m | - |
| **Advanced maintenance unit - HADU™** | < 50 m | < 150 m |

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# HITEC ANTENNA CONTROL UNIT (HACU®)
# OVERVIEW

The HACU® software is running on an industrial PC which requires 2 rack units and must be placed in a server rack in a shelter. The HACU® core software can be operated and configured both locally and remotely via a user-friendly client software. Depending on the required tracking modes of the antenna, HITEC Luxembourg can supply the HACU® with three different software versions: HACU® 1000, 2000 and 3000. Please use the table below to select the software version best suited for your application.

For very critical applications, HITEC Luxembourg can equip the HACU® with redundant power supplies and/or redundant hard disks. As time reference the ACU can use NTP or can be equipped with an IRIG-B compatible time reference card. Furthermore, LNA monitoring is available on the HACU® 2000 and HACU® 3000 models.

Optionally, a 1U rack-mountable KVM can be provided. The HACU® can be complemented by a logging PC, which performs logging of all relevant ACU and antenna parameters over long durations and at sampling rates of up to 20 samples/s.

| | HACU® 1000 | HACU® 2000 | HACU® 3000 |
|---|---|---|---|
| **Standby mode** | x | x | x |
| **Pointing mode** | x | x | x |
| **Slew mode** | x | x | x |
| **Program track mode** | x | x | x |
| **Scan mode** | | x | x |
| **Step track mode** | | x | x |
| **Monopulse mode** | | | x |
| **Monopulse calibration mode** | | | x |
| **Adaptive track mode** | | x | x |
| **Autotrack mode** | | x | x |
| **Stow/unstow mode (optionally stow pin control)** | x | x | x |
| **Manual mode (PMCU)** | x | x | x |
| **Mechanical error correction (e.g. from tilt sensor)** | x | x | x |
| **Atmospheric refraction error correction** | x | x | x |
| **LNA monitoring** | x | x | x |
| **RF switches monitoring and control** | x | x | x |
| **Polarization axis control** | x | x | x |

| **HACU®** | | | |
|---|---|---|---|
| **Power supply** | 100/240 VAC (autorange) 50/60 Hz | **Temperature range** | 5°C to 50°C |
| **Rack Space** | 2U | **Protection class** | IP20 (rear) / IP41 (front) |
| **Depth** | 444 mm | **Net weight** | 17 kg |

**For more information, please refer to HACU® datasheet.**

For more information contact your HITEC Luxembourg representative:
**Tel** +352 498478 - 1 I **Fax** +352 401303 I **Email** antennas@hitec.lu
**Web** www.hitec.lu - space.hitec.lu I 49, rue du Baerendall - L-8212 Mamer



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