



# HACU-3000

State-of-the-art Antenna Control Unit  
Monopulse Model

## KEY FEATURES

Software-based design guaranteeing:

- Comfortable installation
- Efficient use as refurbishment system

Modular design:

- Easy customisation
- Interfaces with various COTS Digital Tracking Receivers
- Extensive logging capabilities

Running on COTS hardware platform

Robust and high precision monopulse algorithm

High resilience to tracking signal loss due to adaptive tracking mode

Development based on Industry requirements and backed by the European Space Agency (ESA)

HACU-3000 IS A STATE-OF-THE-ART ANTENNA CONTROL UNIT (ACU) OFFERING HIGHEST TRACKING ACCURACY AND RELIABILITY, PERFECTLY SUITED FOR GEO AND NON-GEO APPLICATIONS IF COMBINED WITH THE ZENITH PASS HANDLING OPTION.

HACU-3000 is part of a product series of ACUs providing a wide variety of control modes and an enhancing set of optional features. Its robust and high-precision monopulse algorithm complemented with the adaptive track algorithm offers high resilience to signal propagation disturbances and fades. Therefore, it is ideally suited for highest operational requirements.

The ACU is designed as a software-based and modular package to ensure future-proof solutions fitting the specific requirements of our worldwide client base. The modular approach allows for easy customization and offers the possibility to interface with various COTS Digital Tracking Receivers according to customer needs and preferences.

The software is running on a COTS hardware platform that can be selected following specific customer requirements. HACU-3000 is remotely controllable via an easy to use M&C interface. Other products from the HACU product family offer program track and step-track only modes.



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# ANTENNA CONTROL UNIT CHARACTERISTICS: HACU-3000

## AXES

Controls Azimuth, Elevation and Polarisation axes

## MODES

Standby	Antenna brakes are applied
Pointing	Pointing to angles directly entered into the ACU
Slew	Movement according to angular speeds directly entered into the ACU
Program Track	Movement along pre-defined path specified in terms of antenna pointing elements, which can be of different types
Scan	Search for a signal according to pre-defined patterns centred about a pointing, slew or program track position. Scan patterns include circular and rectangular spirals as well as raster patterns
Step Track	Automatic periodic maximization of the signal strength by performing small movements around the current position. In-between optimization cycles, the tracking error is minimized by using a trajectory fitted to the measured positions. Used for geostationary or geosynchronous applications
Monopulse Track	Automatic tracking of targets based on error signals received from the RF chain. To be used for GEO and non-GEO applications.
Adaptive Track	Tracking of a target according to an automatically learned orbit. The target's orbit parameters are periodically updated by using current measurements obtained via one of the tracking modes.
Automatic Mode Switching	Automatic handling of different modes based on events occurring on the RF signal

## PROGRAM TRACK MODES

Tabular Track (\*), TLE Track, Sun Track (\*), Star Track (\*)

## ADDITIONAL FEATURES

Atmospheric Refraction correction (*)	Automatic correction of the refraction applied by the atmosphere onto the electromagnetic waves
Pointing Error correction (*)	Automatic correction of the mechanical pointing errors by application of 2-dimensional error correction lookup tables

Command Pre-processing (\*) Transformation of the pointing angle trajectories such that no speed or acceleration limits imposed by the drive system are exceeded

Zenith-Pass Handling (\*) Followed trajectory is modified so that the tracking error is minimized during the zenith pass

## INTERFACES

M&C Interface	TCP/IP based text protocol, in conjunction with the optional ACU client application
Logging Interface	TCP/IP based binary protocol, in conjunction with the optional logging application
Time Reference	IRIG-B based interface for the reception of precise time signals
SCU Interface	Profinet based interface
DTR Interface	Analog and TCP/IP

## DEFAULT HARDWARE

Industrial PC  
Redundant power supplies and cooling-systems  
Redundant and hot-swappable hard-drive (\*)

## ENVIRONMENTAL CONDITIONS

Power supply	110 / 220V, 50 / 60Hz
Temperature	Operational: 10-35°C (in-door operation)
Humidity	10-85% non-condensing

## SAFETY

CE marking

## RELATED SOFTWARE PRODUCTS

ACU Client Application	User-friendly GUI-based client application for configuring and monitoring the ACU (locally or remotely) via its M&C interface
Logging Application	High-performance logging application allowing very fast logging of all relevant ACU and antenna parameters over long periods of time
Antenna Simulation Application	User-friendly GUI-based application simulating a complete antenna system including RF and mechanical aspects
Scenario Sender Application	Basic application allowing sending pre-defined sequences to command and requests to the ACU via its M&C interface

(\*) optional

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