



Technical description

Antenna Control System – ACS 8500

The Antenna Control System (ACS) 8500 Series, developed by Vertex Antennentechnik, is a state-of-the-art controller for antennas and pedestals. It has been particularly designed for antennas tracking low orbit satellites and for scientific and similar applications which require high precision and/or high velocity performance.

The ACS 8500 is VA's next generation servo system, based on the ACU 8100, which is in operation for several decades and has been integrated into more than 250 precision antenna systems worldwide.

The well proven ACU 8100 software basis is used and its functionality elevated on the latest hardware and operating system standards, meeting newest requirements towards Cybersecurity and obsolescencemanagement.

The ACS 8500 can be supplied as part of a fully integrated servo system by Vertex Antennentechnik or retrofitted into an existing servo system to provide enhanced performance and/or operational capabilities.

Hardware Platform

The ACS 8500 is a distributed, EtherCAT based system, which means that the various control and operating elements can be distributed among the antenna, which basically reduces cabling effort and allows to locate the local user interfaces wherever they are required. Only industrial, commercially available, automation components are used.

A 12.1" colour touch screen panel PC is used as the Local User Interface.

The CPU is based on one of the latest processors and runs the real-time automation environment TwinCAT 3 (by Beckhoff). Using such a system allows multitasking, accurate interrupt timing and exhaustive debugging features.

Features

- ✓ Softkey controlled user interface
- ✓ Position control for up to four axes
- ✓ Display of all information related to operational mode
- ✓ Different user levels for parameter adjustment
- ✓ Adjustable parameters for search modes
- ✓ Satellite tracking with orbital elements
- ✓ Time and position offsets
- ✓ Odometer with maintenance alerts
- ✓ Software on non-volatile memory cards
- ✓ Optical isolation of process interface
- ✓ Flexible interfaces

Typical tasks of the ACS 8500

- ✓ Control of operating modes
- ✓ Position readout (encoder interface)
- ✓ Position, velocity and torque control loops (fully digital drive control)
- ✓ Operator interface
- ✓ Time synchronization
- ✓ Pointing error model
- ✓ Refraction correction

Operating Modes

Preset	Movement to predefined position. Active position control is maintained.
Rate	Movement at user-defined constant velocity.
Stow	Movement to survival position.
Sector Scan	A user defined sector is scanned horizontally or vertically. Scan direction, speed and line distance are selectable. 10 sectors can be stored.
Program track	Tracking of an object along a pre-defined path. The path may be defined by a sequence of position/ time samples or by its two-line elements.
Star track	Tracking of astronomical targets.
Sun / moon track	Tracking of the sun or moon.
Two line track	Tracking of a satellite, the trajectory being defined by its NORAD Two-Line elements.
Step track	Tracking of a GEO satellite using beacon or AGC signal provided by a tracking receiver.
Orbit prediction track (opt):	Incorporates Steptrack pointing data to determine satellite's orbital parameters. Minimizes Antenna motion; trajectory model is developed during learning phase. Provides long-term pointing in absence of tracking signal.
Autotrack	Tracking of an object using the tracking error signals of a monopulse tracking receiver. A „lock-on signal“ is required to indicate whether the RF signal strength is sufficient. If it is not, the ACU will automatically switch over to the selected back-up mode.

The operating modes are available separately for each axis. They may be activated at the ACU front panel or by the host computer via the remote Interface.

Available Back-up Modes for Autotrack

Preset	Movement to a selected position.
Position memory	Movement to the last actual position before the lock-on was lost.
Rate memory	The last actual speed is maintained.
Search spiral	A pulsating spiral around the last actual position is performed.
Program track / TLE	A predefined path is tracked (see PROGRAM TRACK mode).
Program track / search spiral	A search spiral is superimposed to the PROGRAM TRACK path.

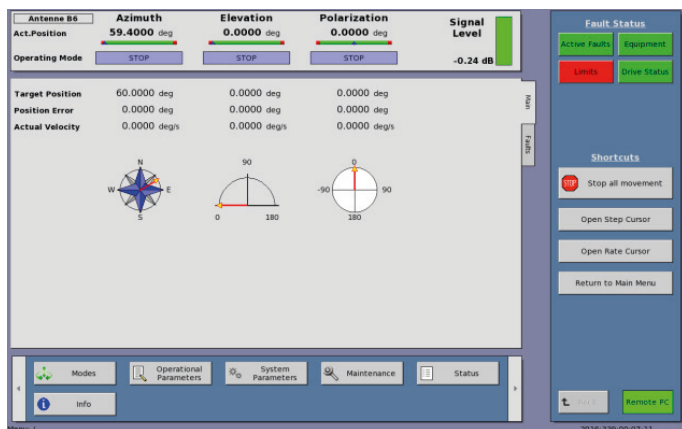
Interface Choices Available

Position transducers	Optical encoders: resolution 12...37 bit interface types SSI, EnDat
Remote control interface	Ethernet TCP/IP optional: RS232 / 422 / 485, CAN
Interface to monopulse tracking receiver	TCP/IP, UDP optional: $\pm 10V$)
Real time synchronisation	NTP optional: IRIG-B, GPS, DCF77, 1 pps, PTP
Interface options for retrofits	For new systems only the EtherCAT bus is used to connect to decentral peripherals and drives. For retrofits nearly all other industrial bus systems and components can be integrated upon request.

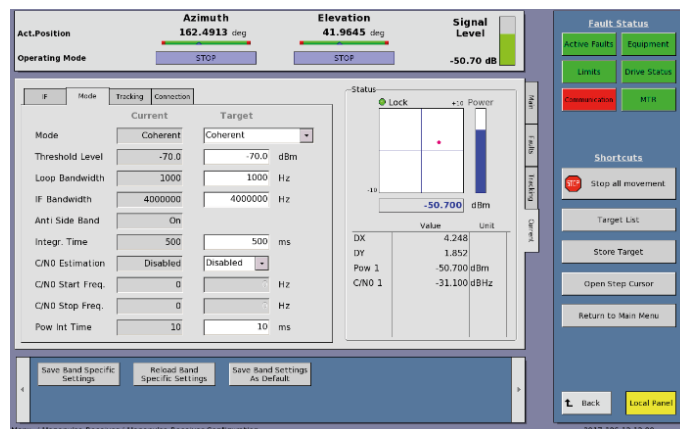
Options

- ✓ Additional customized operating modes
- ✓ Control of antenna tilting mechanism; corresponding coordinate transformation for positions
- ✓ Additional axes, e.g. tilt, polarization, feed indexer, linear axes, etc.
- ✓ Pointing corrections based on metrology sensors
- ✓ Coordinate transformation for antenna mounts other than EL over AZ, e.g. XY, inclined axis, hexapod, etc.
- ✓ Remote service and software download
- ✓ Control of auxiliary drives like motorized stow pins, automatic lubrication systems, etc.
- ✓ Polarization, frequency or band diversity
- ✓ Antenna self-test
- ✓ Other customized options on request

Collection of various Screenshots



Local User Interface Screenshot



Monopulse Tracking Receiver Menu

(for monopulse option with VA MTR 8100 only)

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