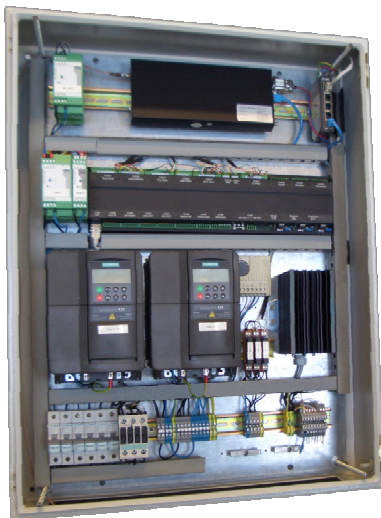
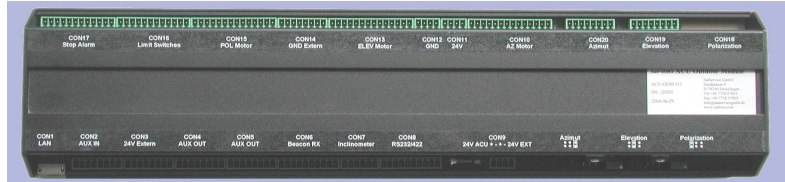


## sat-nms ACU-ODM Antenna Control – Outdoor Module

The **sat-nms** ACU-ODM module (Outdoor Module) is the core module of a complete antenna step track system which tracks precisely any antenna size on the satellite. The software implements the standard step tracking mode as well as an improved Adaptive Tracking algorithm. The ACU-ODM records the tracked positions over several days based on these data and calculates mathematical model to predict the antenna position. This reduces possible step track failures and provides continuous operation in case of a beacon receive failure.

In the third operation mode called "Program Tracking" the antenna follows a path defined by a file that contains time stamped Azimuth, Elevation and Polarization values, which usually has been calculated by external software.



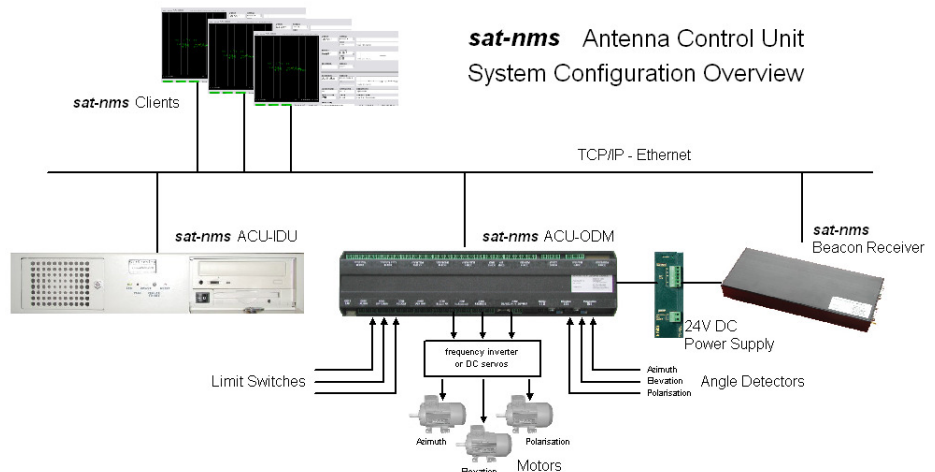
The **sat-nms** ACU-ODM module can also be used as a pure and very cost effective antenna-positioning controller for smaller antennas as in this case the tracking software option has not to be installed.

The DIN rail module provides all necessary interfaces to any antenna. The ACU-ODM module can be very flexible adapted to any type of antenna as the motor controllers can be selected independent.

- Three motor controllers, like DC servos (for smaller antennas or frequency inverters, which are commonly used in larger antennas)
- Limit switches, Alarm circuits
- Angular detectors which measure the azimuth, elevation and polarization angle, three different daughter boards are available which cover most of the angle detectors used in satellite ground stations:
  - Analog resolver, covering the existing antennas
  - Digital angle detectors with SSI interface
  - A/D interface to measure the voltage across a precision potentiometer

The DIN rail module can be directly integrated into a cabinet at the antenna. Together with the **sat-nms** LBRX Beacon Receiver, also available as DIN rail module, it is possible to have a complete step track system integrated into the antenna cabinet.

The **sat-nms** ACU-ODM module includes an integrated web server and provides its operator interface via web browser. The **sat-nms** ACU-ODM includes also http and ftp for remote diagnosis and support. The system is easy to maintain. All support can be performed remotely and the interface to high-level M&C systems is provided via Ethernet and TCP/IP.



### Key Features

- Web-based, user-friendly operator interface
- Step track algorithm as option available
- Together with **sat-nms** LBRX a complete step-track system in cabinet at the antenna
- Outdoor Unit: high quality frequency converters for AZ and EL drive speed control
- HTTP protocol for external M&C interface

### Contact Information

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## Technical Specification

### Positioning

Operational Modes	Manuel Mode (Positioning) Step Track Adaptive Tracking, takes into account last days history Program Tracking, based on time stamped file data 99 (including beacon receiver configuration of LBRX) Resolver, digital SSI and potentiometer
PRESETS, storage of ACU system configuration	
Position Encoding with three different interfaces via daughter boards	
Quantization Error	Resolver 16bit: 0,0055° SSI 13bit: 0,044°, 16bit: 0,0055°, 17bit: 0,0028°, 19bit: 0,0007° 0,001°
Display Position Resolution	sat-nms LBRX or analog voltage input 0 to 10V
Interface to beacon receivers selectable	
Analog voltage input	
Option Tracking Accuracy	Better than 10% of receive 3dB beamwidth (RMS). The encoder coupling and alignment error should not exceed 0.003° to achieve the specified tracking accuracy. The influence of antenna structure thermal error is not considered. 1°/sec
Maximum travel rate of each antenna axis	

### System Interfaces

Interfaces connectors	Mini Combicon MCV1,5/XX-G-3,5
To M&C and ACU-IDU	Ethernet or RS232
To 6 limit switches	Opto-coupler input for azimuth, elevation and polarization
Interlock and motors-off switches	Opto-coupler input
3 angular detectors	Resolver, SSI or A/D input
Motor driver interface for frequency inverter, DC servos etc.	Via opto coupler inputs and outputs: Motor on/off and direction (output) Low and high speed selection (output) Reset driver (output) Driver fault (input)

### M&C Interface Specification

Ethernet interface for M&C and user interface	10-Base-T, Via http GET requests
RS232 M&C Interface	Mini Combicon MCV1,5/10-G-3,5
Summary fault indication	Mini Combicon MCV1,5/12-G-3,5

### Electrical and Mechanical Specification, Environmental Conditions

Supply voltage	22V to 28V unregulated DC, 500mA
Temperature range	5° to 50° C
Humidity	Up to 90% non condensating
DIN rail module	425x105x60mm

The screenshot shows the 'Antenna Setup Parameters' page for a 1.8m antenna. The interface is divided into several sections:

- Navigation:** Pointing, Target, Tracking, Test, Setup, Info, Help.
- General:** Note (1.8m), Axes control mode (PAR).
- Azimuth:** AZ Antenna diameter (1.8 m), AZ Position sensor type (RES), AZ Calibration offset (0.00), AZ Calibration scale (0.00), AZ Sense invert (NOR), AZ Lower limit (100).
- Elevation:** EL Antenna diameter (1.8 m), EL Position sensor type (RES), EL Calibration offset (35.000°), EL Calibration scale (0.120000), EL Sense invert (NORMAL), EL Lower limit (0.000°).
- Polarization:** (Partially visible).
- Status Panel (Right):**
  - Target name: Telecom 2D
  - Tracking mode: OFF
  - Beacon level: -95.56 dBm (var 0.00 dB)
  - Temperature: 42.7 °C
  - ACU Faults: (empty)
  - Tracking Faults: (empty)
  - AZ Tracking State: M=NONE A=0% J=0%
  - EL Tracking State: M=NONE A=0% J=0%
  - Time: 2006-06-06 12:47:06
- Current Values (Top Right):**
  - Azimuth: 114.681°
  - Elevation: 46.844°
  - Polarization: -60.700°
- Target Values (Middle Right):**
  - Az. target value: 114.686°
  - El. target value: 46.845°
  - Pol. target value: -60.300°
- Status:** MOVING