PROPERTIES OF ASTROSE®

- Designed for 110 kV, 220 kV and 420kV AC operation
- Data captured every 15 minutes
- Autonomous power sourcing
- Ice load monitoring
- Line ampacity forecasting
- Automatic relaunch of the sensor grid after longer outages
- Redundancy in the communication system
- Available communication protocols: LoRa, LoRaWAN®, Bluetooth

BENEFITS OF ASTROSE®

- ASTROSE® is the basis for weather-aware grid operations
- AI-based data analysis
- Fast installation of the wireless sensor nodes
- Low weight of the wireless sensor node: 4 kg
- ASTROSE® requires no additional infrastructure for communication
- ASTROSE® works in windless conditions
- Reliable monitoring even with deenergized lines
- Cloud access by web interface

ASTROSE®
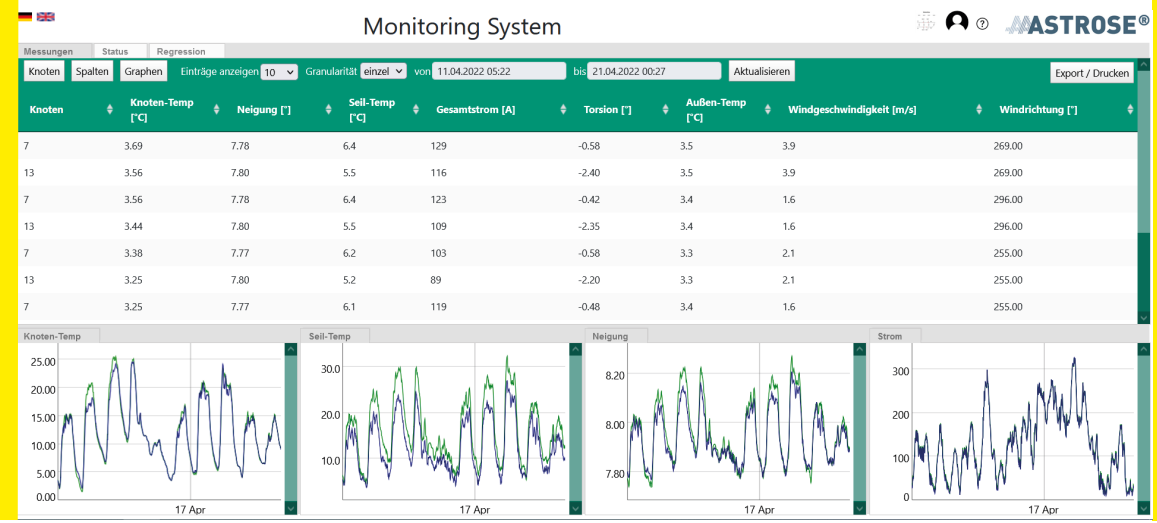
POWER LINE MONITORING

Fraunhofer
IZM

IOT
MADE IN GERMANY

Knoten	Knoten-Temp [°C]	Neigung [°]	Seil-Temp [°C]	Gesamtstrom [A]	Torsion [°]	Außen-Temp [°C]	Windgeschwindigkeit [m/s]	Windrichtung [°]
7	3.69	7.78	6.4	129	-0.58	3.5	3.9	269.00
13	3.56	7.80	5.5	116	-2.40	3.5	3.9	269.00
7	3.56	7.78	6.4	123	-0.42	3.4	1.6	296.00
13	3.44	7.80	5.5	109	-2.35	3.4	1.6	296.00
7	3.38	7.77	6.2	103	-0.58	3.3	2.1	255.00
13	3.25	7.80	5.2	89	-2.20	3.3	2.1	255.00
7	3.25	7.77	6.1	119	-0.48	3.4	1.6	255.00

MONITORING POWER LINES WITH ASTROSE®

ASTROSE® is a tried and tested IoT system for high and ultra-high voltage power line monitoring with wireless sensor nodes.

By providing a continuous stream of data, grid operators can optimize the current-carrying capacity of their power lines, spot any critical states and track operating data over time. The many unique capabilities of ASTROSE® promise substantial commercial benefits when operating or managing power grids.

ASTROSE® is an autonomous ultra-low power system designed to be highly efficient and effective in the following applications:

- Increasing the current-carrying capacity of the line (ampacity)
- Detection of ice load
- Detecting active hazards, including downed lines and earth faults
- Allowing video surveillance of operating equipment and line routes

ASTROSE® provides a comprehensive technical portfolio of sensor capabilities for the granular monitoring of relevant properties of the lines and electrical systems:

- Conductor temperature
- Current through the conductor
- Inclination of conductor
- Torsion of conductor

The captured data can be transmitted by several secure means of communication:

- LoRaWAN®
- LoRa technology for sensor-to-sensor communication chains
- Bluetooth

Control centres can receive the individual or aggregate measurements by SCADA communication protocol:

- IEC60870-5-101/104

WIRELESS SENSOR NODE

The ASTROSE® wireless sensor nodes are weather and high-voltage-proof devices with secure wireless communication to the base station. They are designed for no-maintenance operation and harvest their needed power directly from the electrostatic field around the conductor. No minimum current is required for operation. The nodes can be installed in the immediate proximity of the isolators without need for specialized tools.

SERVER

The ASTROSE® server is an industry-grade PC that stores all data from the monitoring system in a dedicated database. A range of software modules is available for the application-specific and AI-enhanced processing of this data.

The system can dispatch emails to establish a proprietary warning system to help initiate relevant measures in the grid.
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WIRELESS BASE STATION

The base stations receive the data collected by the sensor nodes and pass it on to the ASTROSE® server. They can be located in grid substations, transformer stations or directly on pylons.

AMPACITY MONITORING

The actual line capacity can be calculated by the system, using the CIGRE method on dedicated computing units produced by LTB Leitungsbau GmbH and seamlessly integrated into the ASTROSE® ecosystem.

ICE LOAD DETECTION

The ASTROSE® system recognizes ice load on the conductor by AI, combining changes in the inclination of the sensor nodes with live weather information.