

## Ammonit Wind Farm Monitoring Systems (SCADA)

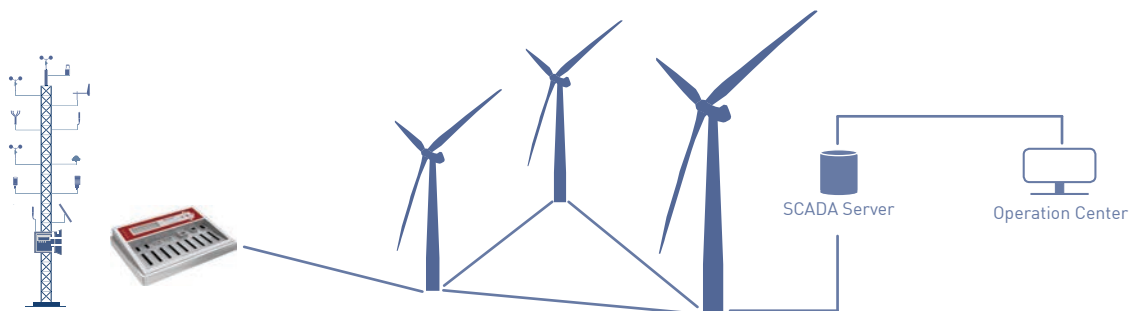


### SCADA wind farm monitoring with Ammonit Meteo-40 data loggers

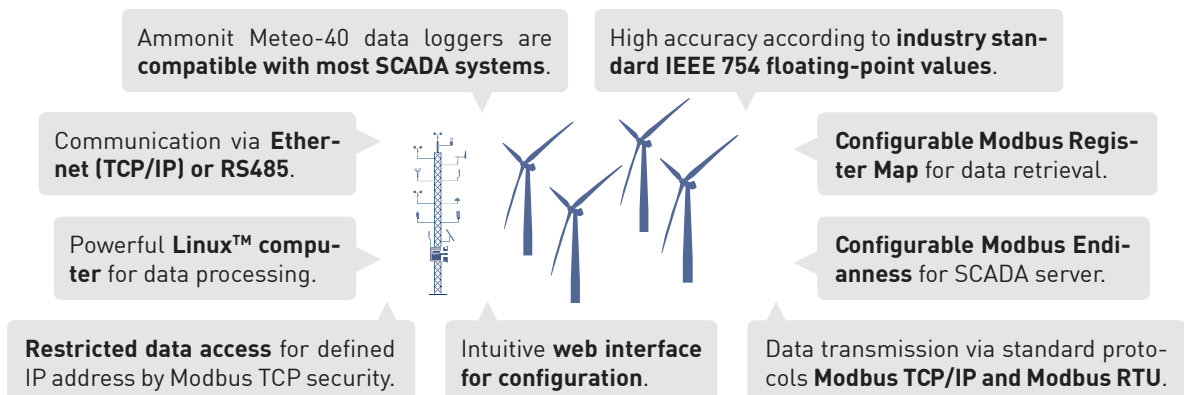
Once the wind farm is set up and running, its best performance has to be ensured. To do so, it is essential to monitor and check its operation. Meteo-40 data loggers can easily be integrated in SCADA (Supervisory Control and Data Acquisition) systems to provide reliable comparative meteorological data. Predictions about the annual energy production of a wind farm can be verified by evaluating Meteo-40 measurement data.

With its configurable Modbus Register Map Meteo-40 is designed for operation in most SCADA systems, e.g., Enercon, Gamesa, Alstom. Meteo-40 data loggers are compatible with all commercial SCADA packages on the market, which are based on Modbus protocol. Additionally, Meteo-40 can be integrated in many other systems by using adapting gateways, e.g., CAN-Bus. The necessary parameters are configured via the user-friendly Meteo-40 web interface.

#### Advanced technology for flexible and convenient operation.



### Your advantages of using Ammonit Meteo-40 data loggers for SCADA applications



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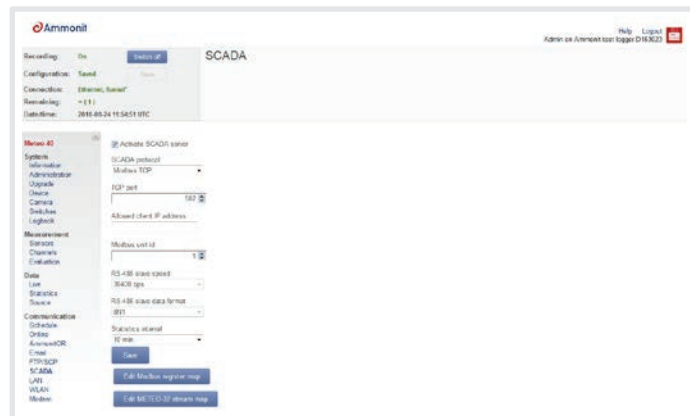
### Conveniently integrate Meteo-40 in your SCADA system

To integrate the Ammonit Meteo-40 data logger in your SCADA system, just connect the data logger via **RS485** or **Ethernet (TCP/IP)** to the wind farm network. Meteo-40 uses the standard protocols **Modbus TCP/IP** and **Modbus RTU** for data transmission. You can conveniently retrieve data via the **Modbus Register Map**.

Just by accessing the Meteo-40 web interface, you can easily configure SCADA details. After selecting the SCADA protocol and entering the required parameters, the Modbus Register Map can be edited.

**Live data** of all active channels and switches as well as **statistical data** can be accessed. By editing the Modbus register map, you can conveniently assign register numbers to each value. All entries are **checked for plausibility**.

If required, you can **cascade two or more Meteo-40 data loggers**. Thus you can multiply the available measurement channels.



### Meteo-40 and Modbus

Measurement values can be represented in different formats (16-bit or 32-bit), including **single precision IEEE 754 floating-point standard**. Date and time values are available as **local time** as well as **Unix time** - for both live and statistic data.

The configurable **Modbus Register Map** includes Input and Holding Registers.

- **Input Registers** include **live data of all active channels and switches as well as statistical data**. Additionally, certain **internal values of the data logger** are available in the Input Registers, e.g., internal voltage and current.
- **Holding Registers** can be used to retrieve **stored data from the selected interval**. It is also possible to synchronize the data logger by writing a time-stamp in the previously configured holding register.

To configure the Meteo-40 register tables, you only have to **define unique register addresses** to the selected data. By selecting the **Modbus Endianness**, you can decide about the byte and word sequence of transmitted data.

**User-friendly and to the point for more efficiency.**

Input Registers										
Measurement	Live	Avg	Max	Min	SDv	Sum	MinD	Val	Type	Factor
Top Anemometer, Wind Speed (m/s)									float (IEEE754 32-bit)	1
Top Wind Vane, Wind Direction (°)									float (IEEE754 32-bit)	1
Temp. / Humidity, Humidity (%)									float (IEEE754 32-bit)	1
Temp. / Humidity, Temperature (°C)									float (IEEE754 32-bit)	1
Air Pressure, Air Pressure (mbar)									float (IEEE754 32-bit)	1
A1 (V)									float (IEEE754 32-bit)	1
A2 (V)									float (IEEE754 32-bit)	1
A3 (V)									float (IEEE754 32-bit)	1
C3 (I)									float (IEEE754 32-bit)	1
D1									float (IEEE754 32-bit)	1
Int. Voltage (V)									float (IEEE754 32-bit)	1
Int. Current (mA)									float (IEEE754 32-bit)	1
Int. Temperature (°C)									float (IEEE754 32-bit)	1
Live Date/Time		Year	Month	Day	Hour	Minute	Second		ushort (16-bit)	
Statistics Date/Time									ushort (16-bit)	
Switches									ushort (16-bit)	
Unix Time		Live	Start	End					ulong (32-bit)	

Holding Registers
Set Date/Time
Stored Data Request
Retrieved Unix Time
Register Offset for Retrieved Data
Modbus Endianness
Byte endianness
Big (most significant first)