VAISALA

Vaisala MAWS301

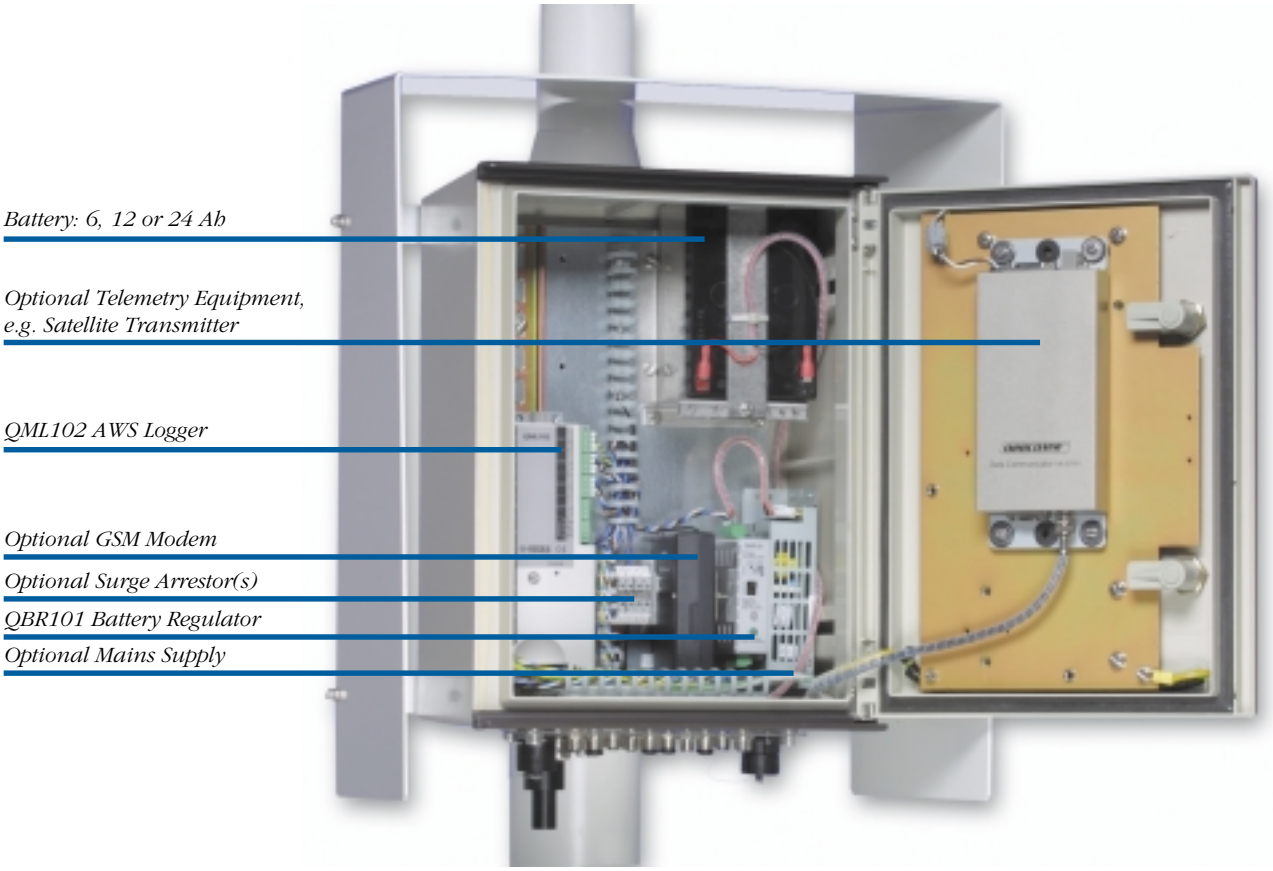
Automatic Weather Station

Easy-to-Use and Expandable Weather Monitoring

An Easy-to-Use and Expandable Solution for Remote Weather Monitoring

The Vaisala MAWS301 is a compact, scalable, robust, low-power system that provides reliable and continuous data of a multitude of meteorological and hydrological parameters.

- Easy to install, configure, and maintain
- Low power consumption for extended remote operation
- Reliable and accurate
- Economical upgrade path
- Extensive software capability
- Multiple serial ports for display, sensor and telemetry options
- Extensive set of sensor and communication options
- Extended data logging capacity on Compact Flash memory cards



The MAWS301 is a modular system with several telemetry and powering options.

The new Vaisala MAWS301 Automatic Weather Station is designed especially for applications where commercial power or communication networks do not exist or are not economical enough. It is based on the latest measurement and communication technology. The MAWS301 interfaces with various telecommunication equipment such as PSTN, GSM and radio modems, as well as satellite transmitters. Embedded with sophisticated, yet easy-to-use technology, the MAWS301 is the ideal choice for a wide range of applications where reliable and accurate meteorological measurements are required at a low cost-of-ownership.

MAWS301 is user-friendly

The MAWS301 is easy to install and set up. Sensors are equipped with ready-made cables and connectors for quick installation. All modules are easily mounted on DIN-rails, allowing easy maintenance. All components fit easily together. No special tools are needed. Sensor measurements, statistical calculations, data logging and data transmissions are performed according to a user-configured program.

The operation of the MAWS301 can be easily modified with the help of the user-friendly MAWS Lizard program. Using ready-made templates, this set-up program guides you through simple set-up routines. It is easy to use, but also offers enough set-up options and advanced features to satisfy even the most demanding user.

Vaisala CT25K Laser Ceilometer

MAWS301 is accurate

The MAWS301 combines Vaisala's proven sensor technology with the new compact data logger design derived from the long-term expertise and field experience in synoptic, climatological and research applications and in demanding industrial use. The use of a 32-bit CPU, a 16-bit A/D conversion and advanced software features, such as data validation, ensure the continuous accuracy of your weather information.

Vaisala PWD11 Present Weather Detector

The accurate measurements begin with the sensors. The MAWS301 architecture is especially designed to support a broad range of sensor types. The basic suite of sensors measures wind, pressure, temperature, relative humidity and precipitation. In addition, measurements can be made on e.g. multilevel soil temperature, soil moisture, solar radiation, net radiation, water level and water temperature. The extended set of sensors also includes smart sensors such as cloud height (with a cloud coverage algorithm), visibility (MOR), present weather and water quality sensors.

MAWS301 is reliable

Compact and rugged, the MAWS301 is capable of operating under demanding conditions and its design is weather-proof. Only materials of highest quality are used. The BOX501 enclosure is robust and incorporates IP66 (NEMA4X) protection. It comes with a white-painted solar radiation shield for additional protection against excessive sun. The cables are made of high-quality polyurethane, with molded connectors that are watertight as according to the IP68 standard. All the inputs have transient protection and the RF inputs are protected with coaxial surge arrestors.

The built-in quality control software checks the sensor data against the user-set climatological limits and step changes between successive measurements. Statistical calculations are made only when the minimum (user-set) number of samples is available. A built-in test program monitors several internal parameters.

This all ensures that the measured data can be relied upon. The design of the MAWS301 ensures reliable operation with low maintenance cost.

MAWS301 is versatile

Data Output

The data output formats of the MAWS301 can be freely and effortlessly configured by the user to suit specific requirements. Data transmission can be self-timed, polled or sent automatically when a measured and/or calculated parameter is exceeding its alarm threshold. Each sensor and calculated parameter has its own user-configurable alarm settings. The configurability of multiple serial channels and telemetry options allow the same equipment to serve several users and applications simultaneously.

Calculations

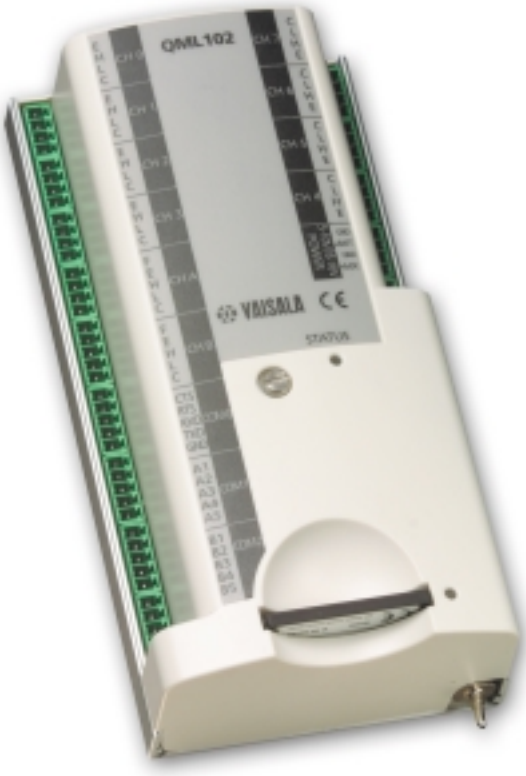
Statistical calculations include minimum, maximum, averages, standard deviation and cumulative values, calculated over user set periods. The interval is also user-configurable for each calculation separately. All extreme values are naturally time-stamped. In addition, a library of ready-made calculations is available including e.g. unit conversions, dewpoint, QNH, QFF, QFE, evapotranspiration, frost point, wind chill, heat stress, sunshine duration, etc.

Vaisala WAS425A
Ultrasonic Wind Sensor

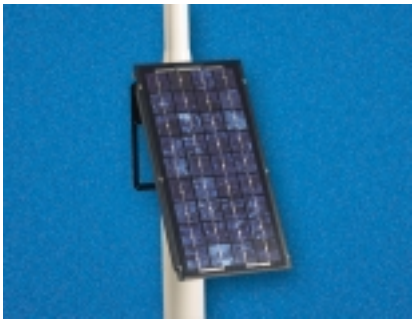
Versatile Data Logging

The MAWS301 provides easy data logging. There are 1.7 MB of secure flash memory available in the CPU for logging measured and calculated data. An optional Compact Flash memory module allows expandable memory capacity, with removable memory cards, up to several dozens of megabytes. These industrial standard cards are easily removed and the data can be further processed on a PC. This secure memory technology does not require regularly changed back-up batteries.

Various statistical calculations can be made on-site, which reduces the amount of data to be transmitted or logged. The logging parameters and schedules are all user-configurable. All data is stored in a time-stamped format. An event trigger can be set to log data only when a parameter value is at an alarm level.



QML102 AWS Logger



12 W Solar Panel

Power Supply Options

The MAWS301 means low power consumption. Typically, only a 12 W solar panel is used for powering the MAWS301 with additional devices for long periods. An optional 24 W solar panel or a mains (AC) power supply are able to power an extended system with communication devices.

There are three models of back-up batteries available, with capacities of 6, 12 and 24 Ah. Larger solar powering systems are designed for special delivery projects.

Communication Options

The MAWS301 has up to 5 serial ports for interfacing with telemetry, terminals and displays. One RS-232 port is the standard. Two optional plug-in modules can be used for enhancing the performance:

- DSI485A – isolated RS-485 for distances up to 1,500 meters
- DSI486 – dual isolated RS-485 module
- DSU232 – dual RS-232 ports
- DMX501 – fixed line modem for longer distances.

In addition to the standard PSTN modems, the BOX501 has space for optional wireless telemetry equipment, such as a GSM data modem, a radio modem and a satellite transmitter. All telemetry equipment is offered complete with all the necessary mounting accessories, coaxial surge arrestors and cables.

Scalability

The MAWS301 can be easily upgraded with new sensors, calculations, output formats and logging schedules. This can be done at any time to accommodate the user's changing requirements. System modifications are made using the MAWS Lizard Set-up program, with new sensors simply connected to free connectors. The large number of sensor and telemetry options, combined with Vaisala's continuous and extensive research and development, guarantees an upgrade path far into the future.

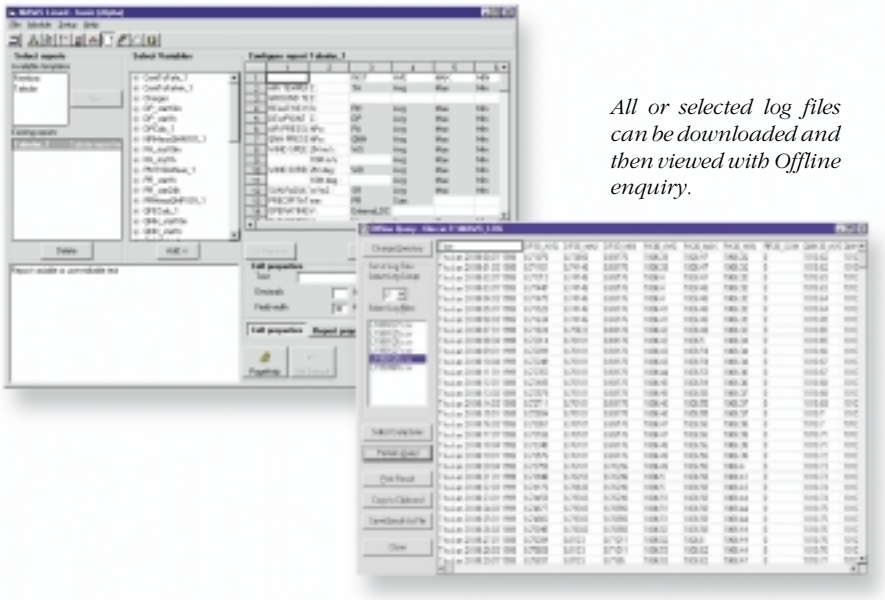
All connectors are labelled. The suite of connectors is easily expanded to meet the user's future requirements.

MAWS Lizard - The MAWS set-up software

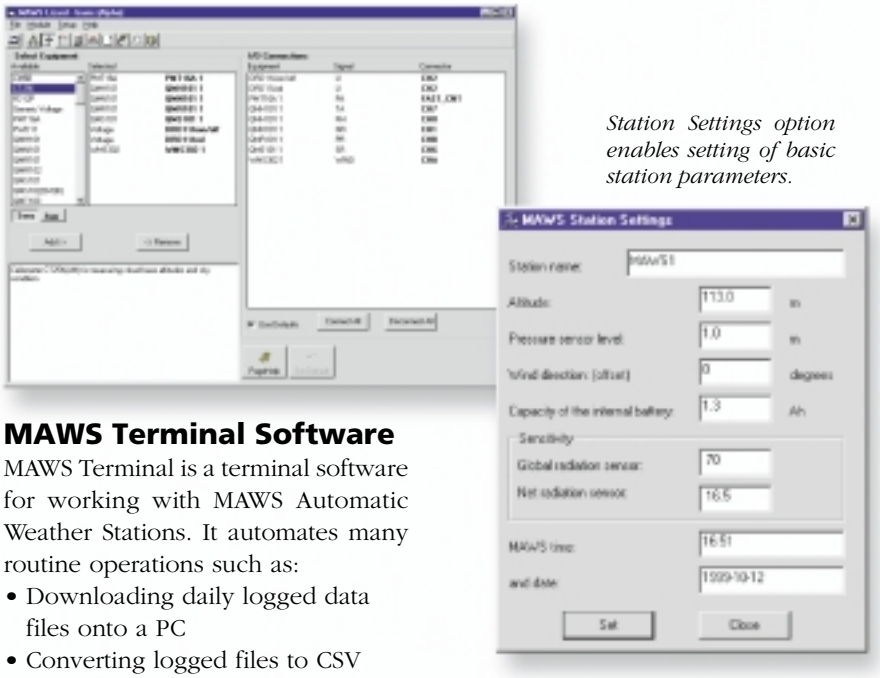
The MAWS Lizard Set-up software provides straightforward, basic set-up procedures. If necessary, though, settings can be further modified by the user. The software has a graphical user interface with icons, pop-up and pull-down menus, and dialog boxes. No programming language knowledge is required of the user. The Lizard software facilitates:

- Selecting the sensors and measurement sequences
- Setting up data validation parameters
- Selecting calculations formulae from the library
- Setting statistical calculations
- Defining data formats for output
- Setting up multiple alarms when necessary
- Defining serial port parameters, including handshake and check-sum methods
- Building communication events: polled, self-timed or alarm-activated
- Organizing multiple data logging schedules

The context-sensitive Help-function gives guidance during the configuration work. The MAWS Lizard is the MAWS wizard for the quick and trouble-free setting up of an entire weather station. The software is included in each MAWS301 system, free of charge.



All or selected log files can be downloaded and then viewed with Offline enquiry.



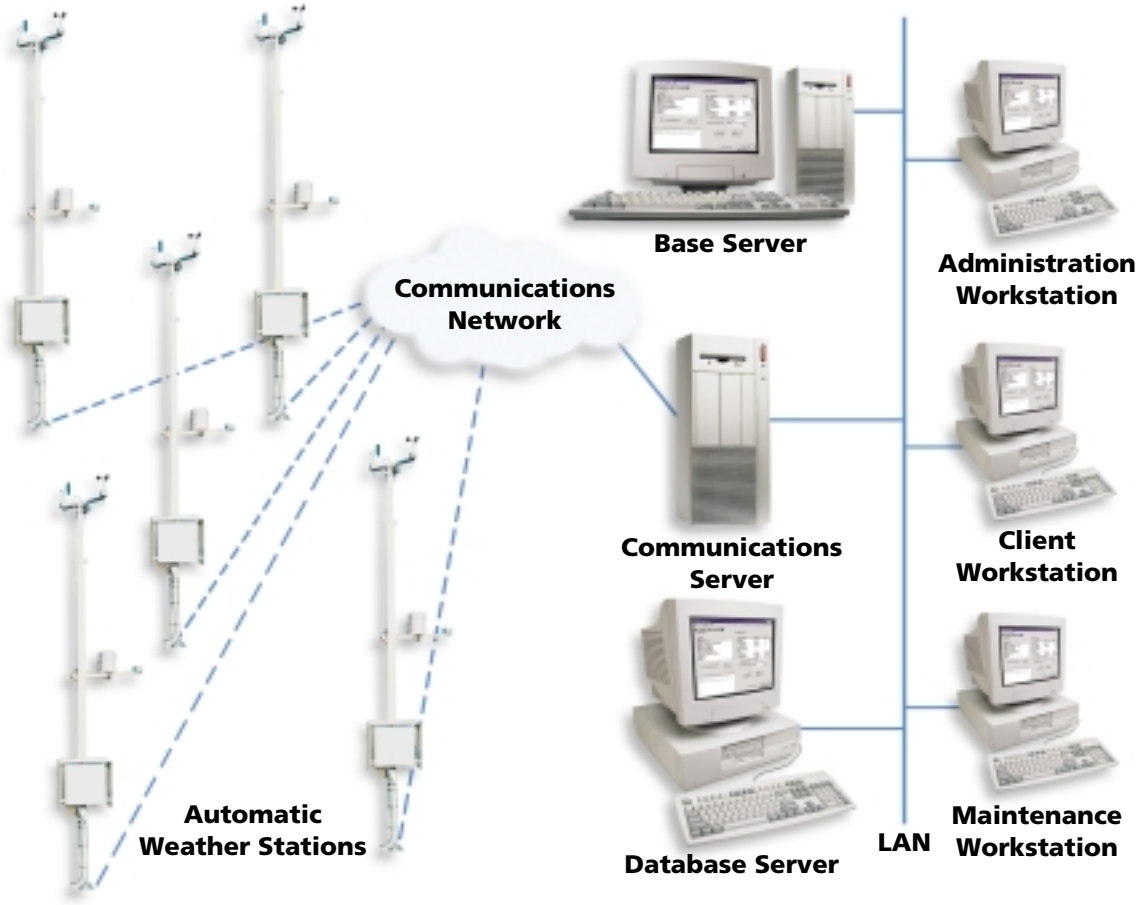
Station Settings option enables setting of basic station parameters.

MAWS Terminal Software

MAWS Terminal is a terminal software for working with MAWS Automatic Weather Stations. It automates many routine operations such as:

- Downloading daily logged data files onto a PC
- Converting logged files to CSV (comma separated value) format, e.g. for MS-Excel and other standard software
- Uploading new station set-up files to MAWS, also remotely via modem
- Setting station parameters, also remotely
- Offline enquiries into logged files, e.g. combining values from several daily files

Networking with MetMan



Comprehensive meteorological data management with MetMan

The data collected by Vaisala MAWS Automatic Weather Systems is compatible with the Vaisala MetMan product family, a new Meteorological Data Management System software. MetMan is an efficient tool for gathering and managing surface weather data from automatic weather stations and intelligent sensors, serving the needs of national meteorological services and other organizations making surface weather observations. MetMan consists of a database and several independent applications. It communicates with automatic weather stations (AWSs) and also provides efficient configuration tools for maintaining station networks.

MetMan retrieves measurement data from the AWSs or sensors and stores it reliably in a database and/or ASCII files. With the versatile data displays, measurement data can be viewed both in real time and in station history mode. SYNOP messages are created either automatically or manually with the SYNOP Editor application.

MetMan offers a scalable meteorological data management solution that grows from a weather station observation console to a system covering the data collection and storage needs of an entire automatic weather station network. There are three versions of MetMan: MetMan Observation Console is for single-point applications, whereas MetMan 100 is the mid-range solution for a network of up to 100 weather stations. Lastly, MetMan 400 supports even the largest weather station networks.

Efficient data processing and management

The easy-to-use MetMan software runs on a PC with the Microsoft® NT™ 4.0 operating system. All MetMan products are based on the same system platform and vary by the number of included modules and processing capability. MetMan utilizes a standard relational database, which benefits the end user in many ways. All MetMan products utilize a Base Server which is a PC running the basic data collection modules. They all support communication with weather stations using serial lines, dial-up modems, or LAN / WAN.

Technical Information

QML102 AWS Logger

Processor	32-bit Motorola
A/D conversion	16 bit
Data logging memory	
Internal	1.7 Mbytes internal Flash memory
Optional	Up to 160 Mbytes on Compact Flash memory card
Sensor inputs	
Analog	10 Analog inputs (20 single ended inputs)
Frequency	2 Counter/frequency inputs
	Internal channel for PMT16A pressure transducer
Accuracies over the operating temperature range (-35 °C - +50 °C)	
Temperature (Pt-100) measurements	
Typical accuracy accross measured temperature range -50 °C - +80 °C	Better than ± 0.06 °C
Maximum error across measured temperature range -35 °C - +50 °C	Less than ± 0.12 °C
Maximum error at 0 °C	Less than ± 0.06 °C
Voltage measurement	
±2.5 V range	Better than 0.08% F.S. ±150 µV
±250 mV range	Better than 0.18% F.S. ±15 µV
±25 mV range	Better than 0.18% F.S. ±3 µV
±6.5 mV range	Better than 0.18% F.S. ±3 µV
Frequency measurements	0.003 % + resolution 241 nsec. (up to 2 kHz)
Common mode range	+5 V / -4 V
Real-time-clock	
Standard	Better than 20 sec/month
With GPS option	Configurable, default 5 sec/month
Serial communication	
Standard	One RS-232
Optional	Two (2) optional plug-in slots for communication modules for increasing the number of serial I/O channels up to 5 pcs
Speed	300 ... 19, 200 bps
Parameters	Configurable speed, start bits, data bits, stop bits, parity, XON/XOFF and check sum
External powering	
Voltage	8 ... 14 VDC recommended (30 V max.)
Optional internal battery	1.3 Ah/6 V
Power consumption	
< 10 mA/6 V (typically with basic 5 sensors)	
Solar panel/batteries	
Panel options	12 W/12 V and 24 W/12 V
Back-up battery options	6, 12 or 24 Ah rechargeable, sealed lead acid, maintenance free
Mains power	
Optional module BWT15SX-Assy,	85 … 264 VAC

Environmental

Temperature	
Operating	–35 ... +55 °C
Storage	–50 ... +70 °C
Humidity	0 ... 100 % RH
Emissions	CISPR 22 class B (EN55022)
Immunity	
ESD immunity	IEC 61000-4-2
RF field immunity	IEC 61000-4-3
EFT immunity	IEC 61000-4-4
Surge (lightning pulse)	IEC 61000-4-5
Conducted RF immunity	IEC 61000-4-6

Sensors

Wind	WMS302, WAA/WAV151, WAS425A
Pressure	PMT16A
Temperature, Relative Humidity	QMH102
Solar Radiation	QMS101, QMS102, CM6B, CM11, QMN101
Sunshine Duration	DSU12
Precipitation	QMR102, DRD11A (Detection)
Soil/Water Temperature	QMT103, QMT107
Soil Moisture	ML2x
Snow Height	DCU7210
Leaf Wetness	QLW101
Water Level	QMV101, QMV102, DCU7110
Water Quality	MiniSonde4A

Optical Sensors

Cloud Height	CT25K
Visibility	FD12
Present Weather	FD12P, PWD11

CE

VAISALA

Measuring the Environment

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