

Your Next Weather Station

M_AWS

Automatic Weather Stations



There are products that turn visions into reality.

Vaisala, the leader in meteorological instrumentation, now introduces a low-cost, compact, and easy-to-use Automatic Weather Station (AWS) for the next millennium of meteorology.

The MAWS series of small weather stations are new-generation AWSs for both permanent installations as well as for those applications requiring portability. MAWS features high performance fitted into a very compact package. Imbedded with sophisticated technology, yet easy to use, MAWS is the ideal choice for a wide range of meteorological applications requiring reliable and accurate meteorological measurements and low cost-of-ownership.

- Compact, portable, and light-weight
- Easy to install, configure, and maintain
- Low power consumption for extended operation
- Reliable and accurate
- Extensive software capability
- Multiple serial ports for display and telemetry options.

MAWS IS USER FRIENDLY.

MAWS is easy to set up. All sensors are equipped with ready-made cables and connectors for easy installation. All components fit together with ease. No special tools are needed. Once assembled, simply connect the power and MAWS will be fully operational. Sensor measurements,

calculations, data logging, and data transmission will be performed according to the user-configured program.

The operation of MAWS can be easily modified with the help of the user-friendly "Lizard" program. Using the ready-made templates, this set-up program guides you through the simple set-up routines. Not only is it easy to use, but there are enough set-up options to satisfy even the most demanding user.

MAWS IS ACCURATE.

Utilizing Vaisala's recognized expertise and field-proven design, MAWS provides the user with features previously seen only in larger systems. The



The very steady tripod includes ground stakes, and a sand bag for installation on hard terrain.

accurate measurements begin with the sensors. The basic suite of sensors measures wind, pressure, temperature, relative humidity, and precipitation. In addition, measurements can be taken of, e.g., soil/water temperature(s), solar radiation, net radiation and water level. The MAWS's sensors are derived from the same field-proven instruments that Vaisala has developed and used successfully over the past 60 years.

The use of a 32-bit CPU, a 16-bit A/D conversion, and advanced software ensure the continuous accuracy of your weather information.

MAWS 201 — Weather Data on the Move

New-generation Mobile AWS

- Military support
- Civil defense
- Temporary airstrips and remote AWS
- Environmental impact studies
- Emergency response
- Waste management
- Research

The MAWS201 is a highly portable AWS with a lightweight aluminum tripod for rapid and easy deployment. Each leg is adjustable making installation easy even on uneven terrain. With 5 basic sensors, a solar panel, and an internal battery, the total weight is only 15 kg. Thanks to its simple design, only a few minutes are needed to set up a MAWS system.



LIZARD — THE MAWS SET-UP PROGRAM

The MAWS series of small AWSs has a low power consumption, while at the same time high processing capacity in the same logger. It conserves energy when idle, but when the need arises, it can be really swift. The Windows-based configuration program provides very straightforward, basic set-up procedures, but if necessary, details can be modified even further by the user. No time is wasted on non-relevant options. Like real lizards – MAWS quickly and efficiently adapts to the situation and it even regulates the amount of capacity. **Lizard** is the MAWS Wizard for the quick and simple setting up of an entire weather station!

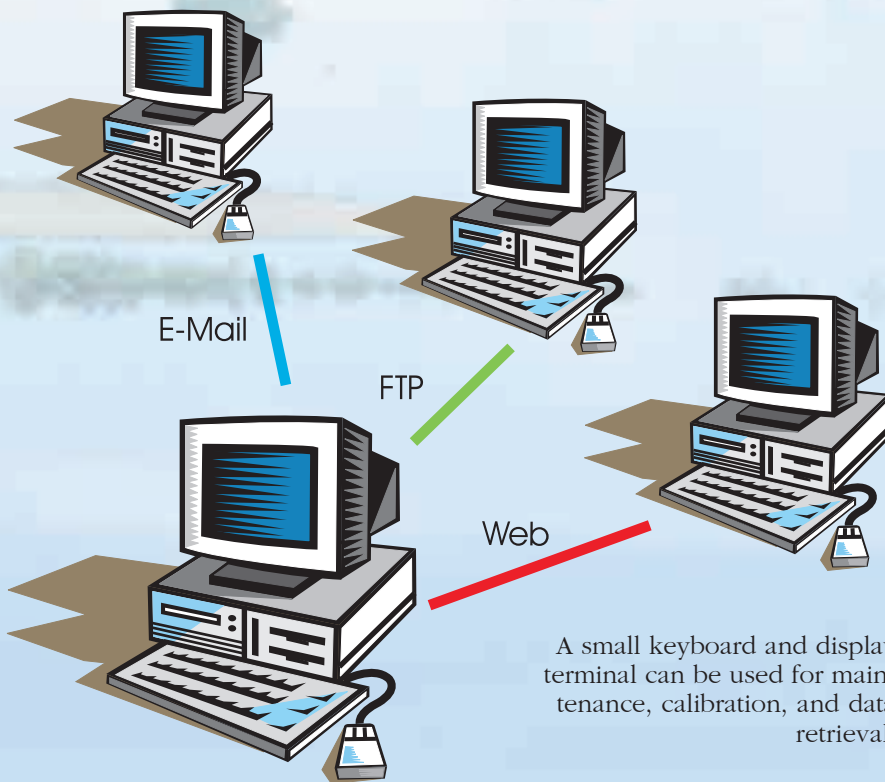
MAWS 101 — User-Friendly Measurements

New-generation Mini-AWS

- Climatological measurements
- Precipitation networks
- Energy production and management
- Building automation
- Hydrology
- Agriculture
- Web-AWS
- Sport and leisure

MAWS101 saves you time and money when installing, using, and maintaining a basic AWS. Due to its compact design and light weight, there is no need for a large concrete foundation to install MAWS.

The MAWS101 comes either by itself in its compact enclosure or with a mast design of a total height of 3 meters. By itself it is ideal for customer-specific installations where the standard tripod or mast installations are not viable solutions. The basic suite of sensors and accessories is the same as with the MAWS201.



YourVIEW Graphical User Interface software displays the data graphically as well as transfers display snapshots and animations onto the Web. The data messages and files can also be sent automatically via e-mail and FTP transfers.

A small keyboard and display terminal can be used for maintenance, calibration, and data retrieval.



MAWS stations also interface with the UHF and Spread Spectrum radios.



M AWS

Sensors



COMBINED WIND SENSOR WMS302

The WMS302 Combined Wind Sensor monitors both the speed and direction of wind with excellent linearity and fast response. A single compact sensor, it is ideal for low-power applications. Direction is detected using an axial symmetric rotating potentiometer with two slides, thus providing a full range from 0 to 360°, while speed is converted into pulses using dual reed relay. The materials are carefully selected for optimum performance under both light winds and severe weather conditions where there are extreme winds.



RELATIVE HUMIDITY AND TEMPERATURE SENSOR QMH101

The QMH101 Relative Humidity and Temperature Sensor is based on Vaisala's field-proven HMP45D probe and comes with a special cable and connector. For humidity measurements, the HUMICAP sensor is highly accurate and offers excellent long-term stability in a wide range of environments. Temperature measurements are taken by an accurate Pt-100 IEC 751, 1/3 Class B. Field calibration is easy with one or two references. The replacement is simple; the probe head containing the electronics can be quickly removed from the probe body, while a replacement is installed and the measurement continues. Meanwhile the other probe head is calibrated.

The probe is installed in a naturally aspirated shield made of injection moulded UV stabilized plastic. The shield has multi-plate design providing the necessary shielding from solar radiation and precipitation.

PRESSURE SENSOR PMT16A

The PMT16A Silicon capacitive Pressure Sensor has excellent accuracy, repeatability, and long-term stability over a wide range of operating temperatures. The fine adjustment and calibration of the sensor are handled according to the electronic working standards, which are traceable to international standards. The PMT16A is located on the CPU board. Being of silicon design it is also ideal for portable applications.



PRECIPITATION SENSORS QMR101 AND QMR102

The QMR101 Precipitation Sensor is an economical and accurate rain gauge made of plastic material which is highly resistant to UV-radiation and even frostproof. QMR101 has a self-emptying tipping spoon of 0.2 millimeters capacity. Due to its small size, lightweight and rugged design, it is especially suitable for portable applications and temporary installations. QMR101 is installed on the sensor cross arm, and has ready-made cable with the connector.

The QMR102 Precipitation Sensor is an aerodynamically shaped rain gauge designed to minimize the wind originated airflow reducing the catch. Manufactured from UV-radiation resistant plastic, it is a very rugged instrument. The collected rain is measured in a well-proven tipping bucket mechanism of 0.2 millimeters. The QMR102 is installed on the ground and it comes with a ground plate, a 6-meter cable, and a connector.



PYRANOMETERS QMS101 AND QMS102

For measuring global solar radiation, the QMS101 Pyranometer is an economical sensor. QMS101 uses a photodiode detector for creating a voltage output proportional to the incoming radiation. Due to the unique design of the diffusor, its sensitivity is proportional to the cosine of the angle of incidence of the radiation, thus allowing accurate and consistent measurements. QMS101 has a ready-made cable with a connector, and is easily installed on the sensor cross arm.

The QMS102 Pyranometer is an ISO-classified Second Class pyranometer. The precision optical glass dome acts as a filter, with a spectral bandpass that permits the full solar spectrum to pass through to the sensor. The sensor is a high-quality blackened thermopile with a flat spectral response. Heating of the sensor by incoming solar radiation produces a signal in the microvolt range.

Each pyranometer is provided with a calibration certificate showing the calibration factor.



NET RADIATION SENSOR QMN101

The QMN101 Net Radiation Sensor is designed for routine measurements of net radiation, which is the balance between incoming and outgoing radiation in outdoor conditions. The sensor consists of two teflon-coated, weather-resistant black conical absorbers and is based on a thermopile. The voltage output is proportional to the net radiation. QMN101 does not require fragile plastic domes, making it virtually maintenance-free.



SOIL/WATER TEMPERATURE PROBE QMT103

The QMT103 Soil/Water Temperature Probe is particularly well suited for precision measurement of ground and soil temperatures. All materials have been carefully selected to withstand various types of environmental stress and a wide range of temperatures.

The measurement accuracy and stability of the temperature probe are based on a Pt-100 type sensor element, which is specified to a level of preciseness of 1/4 DIN 43760B. The probe includes a 5-meter cable with a black, weather-resistant polyurethane (PUR) sheath, which can tolerate both abrasive wear and extreme temperatures. Molded to the other end of the cable there is a 5-pin watertight connector, which allows instant assembly and replacement.



WATER LEVEL SENSOR QMV101

The QMV101 Water Level Sensor determines water level by measuring the water pressure above the submerged sensor in reservoirs, lakes, rivers and offshore. The piezoresistive sensing element is protected by a stainless steel membrane.

QMV101 is supplied with a 25-meter cable, cable holder, junction box with pressure equilibration, and a connector.

WMS302 COMBINED WIND SENSOR

	Anemometer	Wind vane
Measurement range	0.5 ... 60 m/s	0 ... 360 °
Performance (accuracy)	± 0.3 m/s (< 10 m/s) < 2 % (> 10 m/s)	< ± 3 °
Threshold	< 1.0 m/s	< 1.0 m/s
Distance constant	2 m	
Delay distance		0.6 m
Operating temperature range		-40 ... +55 °C
Dimensions (height x width)		265 × 360 mm
Weight		360 g
Ordering	QMW101: WMS302 with 1 m cable and connectors	
	QMW101: WMS302 with 10 m cable and connectors	

QMH101 RELATIVE HUMIDITY AND TEMPERATURE SENSOR

	T	RH
Range	-40 ... +60 °C	0 ... 100 %
Performance (accuracy)	< ± 0.3 °C	± 2 %, 0 ... 90 % ± 3 %, 90 ... 100 %
Ordering	QMH101: HMP45D probe with a special cable and connector	

PMT16A PRESSURE SENSOR

Performance (accuracy)	± 0.3 hPa incl. one year drift (with factory calibration)
Pressure range	600 ... 1100 hPa
Temperature range	-40 ... +60 °C (operating)

QMR101 AND QMR102 PRECIPITATION SENSORS

	QMR101	QMR102
Funnel diameter	159.6 mm	254 mm
Orifice	200 cm ²	500 cm ²
Sensitivity	0.2 mm	0.2 mm
Capacity	144 mm/h	120 mm/h
Performance (weather dependent)	< ± 5 % < ± 10 %	< 24 mm/h < 120 mm/h
Cable	incl.	6 m and connector incl.
Weight	380 g	1000 g (w/o inst. plate)

QMS101 AND QMS102 PYRANOMETERS

	QMS101	QMS102
Sensitivity	100 μV/W/m ² (nominal)	10 ... 35 μV/W/m ²
Spectral range	0.4 ... 1.1 micron	0.3 ... 2.8 micron (50% of points)
Response time	< 1 second	18 seconds (95 %)
Range	2000 W / m ²	2000 W/m ²
Temperature dependence	+ 0.15 %/°C	6 % (-10 ... +40 °C)
Non-stability	< +2 % per year	< 1 % per year
Non-linearity	< 1 % up to 1000 W/m ²	+ 2.5 % up to 1000 W/m ²

QMN101 NET RADIATION SENSOR

Sensitivity (nominal)	10 μV/W/m ²
Spectral range	0.2 – 100 micron
Response time (1/e)	20 s nominal
Range	-2000 to + 2000 W / m ²
Stability	< ± 2 % per year
Non-linearity	< 1 % up to 2000 W/m ²
Operating temperature	-30 ... +70 °C

QMT103 SOIL/WATER TEMPERATURE PROBE

Sensor Type	Pt-100 type RTD element
Performance (accuracy)	Better than +0.08 °C at 0 °C, conforms to 1/4 DIN 43760B
Sensitivity	0.385 ohm/°C (DIN 43760)
Dimensions	Ø 6 mm, length 150 mm
Material	Stainless steel, AISI 316
Environmental	Watertight from 0.1 to 4 bar
Cable	PUR black, 5 × 0.5 mm ² Cu, 5 m
Ingress protection	IP68 (connector)

QMV101 WATER LEVEL SENSOR

Measuring range	0 to 1 bar (0 to 10 m) (other ranges by special order)
Performance (accuracy)	0.5 % of F.S.
Output signal	4 – 20 mA, 2-wire
Response time	10 seconds max.
Operating temperature	0 ... +50 °C
Storage temperature	-20 ... +80 °C
Housing	Stainless steel, IP68
Vented cable	Shielded compound cable with pressure-equalizing tube and hard PVC outer jacket
Included	25 m cable; Connection block (IP65) Protection against overvoltage

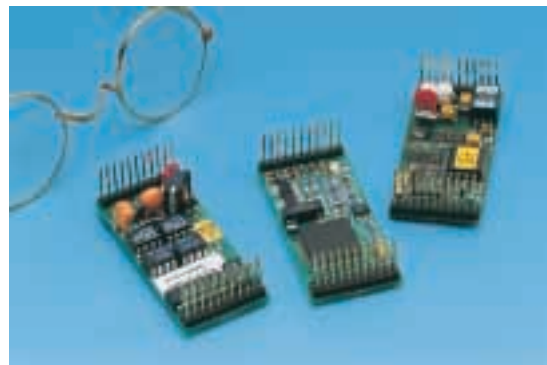
**MAWS IS
RELIABLE.**

MAWS is compact and rugged. Furthermore, it is tolerant of operating under difficult conditions and its design is weather-proof. MAWS is made of corrosion-resistant anodized aluminum, with double O-ring seals used on the enclosure. The cables are of high-quality polyurethane, with molded connectors that are watertight as according to the IP68 standard.

The built-in quality control software checks the sensor data against the user-set climatological limits and step changes between successive measurements. This ensures that the measured data can be relied upon.

The design of MAWS ensures reliable operation with low maintenance cost.

Communication modules are a convenient way of adding new serial I/O ports to the MAWS system.



**MAWS IS
VERSATILE.**

DATA OUTPUT

The data output formats of MAWS can be configured by the users. You can conveniently select from the pre-formatted data messages or freely format the data yourself for your application. Alarm messages are automatically sent whenever a user-set alarm threshold has been exceeded. Each sensor and calculated parameter has its own alarm settings.

VERSATILE DATA LOGGING

MAWS provides easy data logging. 2 MB of secure flash memory is available for the logging of measured and calculated data and complete reports. There can be several logging schedules, all user selectable. Various statistical calculations can be made on-site, thus reducing the amount of data to be transmitted or logged.

POWER SUPPLY OPTIONS

MAWS means low power consumption. Using the standard 2.2 W solar panel and 1.3 Ah/6 V battery, MAWS can operate independently for extended periods of time with standard sensors. An extra solar panel and batteries as well as a mains power supply are all optional.

COMMUNICATION OPTIONS

MAWS 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 versatile performance:

- DSI485 – isolated RS-485 for distances up to 1,500 meters
- DSU232 – dual RS-232 ports
- DMX501 – fixed line modem for longer distances.

Data can be accessed on-site on a PC or handheld terminal, or else remotely with use of a PC card or radio modem.

CALCULATIONS

Statistical calculations include minimum, maximum, averages, standard deviation, and cumulative values, calculated over user set intervals. In addition, a library of the ready-made calculations is available including, e.g., unit conversions, dew point, QNH, QFF, QFE, evapotranspiration, wind chill, and heat stress.

UPGRADING

The design of MAWS enables the system to be easily upgraded with new sensors, calculations, output formats, and logging schedules at any time to accommodate the user's changing requirements. The software modifications are made using the Lizard set-up program with new sensors simply connected to the free connectors.



GENERAL

Processor	32-bit Motorola
A/D conversion	16-bit
Accuracy	
Resistance measurements (Pt-100)	< ±0.05 % F.S.
Voltage measurements	< ±0.2 % F.S.
Data logging memory	2 MB internal flash
Inputs	10 analog inputs (diff.) 2 counter/frequency inputs
	Internal channel for PMT16A pressure transducer
Serial communication	RS-232 standard, optional up to 5 pcs with two (2) plug-in slots for communication modules Baud rate 300 ... 9600 bps

POWERING

Voltage	8 ... 14 VDC recommended (30 V max.)
Standard internal battery	1.3 Ah/6 V
Power consumption	
Typically *	< 10 mA/6 V
Solar panel	2.2 W/6 V
Optional	2 pcs 2.2W/6 V panels
Mains power (outdoor)	WHP151

ENVIRONMENTAL

Temperature	
Operating	-35 ... +55 °C
Storage	-50 ... +70 °C, without battery
Humidity	0 ... 100 % RH
Wind	
With tripod mast	up to 35 m/s
With pole mast	up to 60 m/s
EMI and ESD protection	
Emissions	CISPR 22 class B
Immunity	RF immunity IEC 61000-4-3 EFT immunity IEC 61000-4-3 ESD immunity IEC 61000-4-2
Electromagnetic compatibility	IEC-801-4

*) basic set of 5 sensors, 10 min measuring interval

OPTIONS AND ACCESSORIES

- Communication modules
- Mains power supply
- Carry cases for MAWS201
- Extra 1.3 Ah rechargeable battery
- 35 Ah lithium battery pack (non-rechargeable)
- Hand-held terminal
- Spread Spectrum radio (remote)
- Spread Spectrum radio (base)
- YourVIEW display software, standard version

For the latest list of MAWS options, please bookmark Vaisala's Web site at www.vaisala.com.

PHYSICAL

Weight	Example: portable system with 3 m tripod (pressure, temperature/humidity and wind sensors; 2.2 W solar panel)	15 kg
Basic enclosure		
Material		anodized aluminum
Ingress protection		NEMA 4X, IP66
Dimensions		dia. 120 mm, height 420 mm
Weight		3.0 kg



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