IMS4 AMS 111 II M

Automatic Mobile Weather Station for military usage

The MicroStep-MIS AMS 111 II system is designed for standard or mobile meteorological stations, as well as for the applications in areas where the commercial power or communication networks are limited or do not exist.

Military class equipment

Military design optional

Radiation and environmental monitoring

Climatological observation

Aviation weather observation

The AMS 111 II interfaces with various sensors and telecommunication devices. Embedded with the state-of-the-art software, AMS 111 II is a reliable and cost-effective solution for meteorological and environmental monitoring.

Consisting of the building blocks interconnected by a RS-485 system bus, AMS 111 II serves as a modular and flexible platform for construction of various measuring and logging systems, which include AMS 111 II modules, intelligent sensors, displays and PCs.

System flexibility allows wide application range from simple compact systems to multipurpose stations. 24-bit A/D conversion and software features such as data validation and quality control ensure the accuracy of the measured data.

System supports data output to RS-232/485 lines, modems and cellular phones (SMS, GPRS), radio modems and satellites.

PPP protocol support makes AMS 111 II Internet-ready. User-friendly software applications allow easy and comfortable system configuration, setup and maintenance also remotely via modem / PPP connection.

Modular design
The AMS 111 II data logger system may be supplied with or without touch screen graphics display, and optionally with GSM (wireless) or PSTN modem - depending on user's requests. Two sizes of special housing boxes are optional.

Addressable RS-232/485 converters allow to integrate AMS 111 II with intelligent sensors, displays and computers to common virtual monitoring station with individual components located within 1 km. Handy secure digital memory cards allows easy distribution of data, configuration or firmware updates between AMS stations, as well as from/to the managing PC systems.

Basic AMS 111 II module

PL-MBDA2	mainboard - the board for interfacing sensors and/or communication devices

Optional extension modules

PL-DSP	touchscreen display (128 x 64 graphic display with 32-button touch screen)
PL-SR21	2 x RS-232, 1 x RS-485
PL-PSTN	modem module (leased line/dial-up modem)
PL-GSM	modem module (wireless GSM/GPRS modem)

The typical AMS 111 II is usually housed in weather-proof enclosure, which includes mainboard, display (optional), sensor-connection terminal, AC adapter or battery power supply (optional), backup battery (optional), and pressure sensor (optional).

The AMS 111 II Data Logger board is running the MicroStep-MIS multi-tasking real-time executive. The add-on external secure digital card with the data capacity up to 2 GB is sufficient for the several months in the typical applications.

Analog inputs

- 22 x precise differential inputs, ±2.5 V to ±19.5 mV
- Resolution: 24 bit
- Measurement period: from 1 s

Accuracy

- Voltage meassurement 0.031 %
- Resistance meassurement 0.042 %
- 5 x additional analog inputs 0 to 5 V / 0 to 2.5 V (optional)
- ±2.5 mV or other range (on special request)

Digital inputs

- 12 x digital input, 0 V to 20 V
- (log0 < 6.2 V log1 > 7.1 V) or 0-5 V TTL (optional)
- 1 counter up to 500 kHz
- >10 counters up to 5 kHz

Digital outputs

- 4 x digital output, open collector 35 V / 1 A

Power outputs

- 4 x switching power supply up to 1.5 A

Battery charger

- Integrated automatic battery charger
- Digital configuration of battery parameters
- Maximal charging current 2 A
- Battery monitoring with full charge state and cut off voltage

Memory and RTC

- Internal 1 MB Flash memory
- Internal 1 MB SRAM memory
- Internal SD card 128 MB (up to 2 GB)
- External SD card up to 2 GB
- Real time clock (backup with Lithium battery)

Processors

- Main processor 32 bit ARM
- Slave processor 8 bit AVR

Communication I/O ports

- RS-232 port (baud rate: 300 to 115200)
- RS-485 port
- UART in 3.3 V
- Ethernet 10/100 Mbit
- USB
- SDI-12
- 2 x RS-232, 1 x RS-485 (optional)
- **Supported protocols:**
  FTP server, FTP client, HTTP server, telnet, SMTP, SMTPS, MODBUS RS-485, MODBUS Ethernet
- TCP connections limit: 20
- Data compression (optional): .gz

Power supply

Voltage	3.5 to 18 V
Consumption max	1.9 W (160 mA @ 12 V all peripherals on, Ethernet connected, without optional modules)
Consumption midle	180 mW (15 mA @ 12 V without Ethernet, RS-485, modem and display)
In sleep mode	400 µW (30 µA @ 12 V without modem and display)

Touchscreen display

Monochrome graphics display (128 x 64 pixels) - with 32-button touch screen matrix - optional user interface for previewing of measured values, adjusting system time, set- ting system variables and more - directly on the logger.

Power consumption	102 mW (17 mA @ 6 V)
In sleep mode	180 µW (30 µA @ 6 V)

PSTN modem (optional)

PSTN modem is suitable for dial-up or leased-line connec- tion. It supports V.34bis, V.34, V.32bis, V.32, V.22.bis, V.22A/B, V.23, V.21, BELL 212A, BELL 103 com. protocols (opt. V.90). and AT command set with extensions.

Supported speeds	300 bps to 14400 bps, 28800 bps, 33600 bps
Error correcting	V.42 LAMP, MNP 2 to 4 and MNP 10
Data compression	V.42 bis and MNP 5

GSM modem (optional)

GSM modem for wireless communication via GSM network.

Specification

- Dual Band GSM/GPRS modem E-GSM 900/1800
- Class 4 (2 W at 900 MHz)
- Class 1 (1 W at 1800 MHz)
- Data, SMS
- Fax and data transmission without extra hardware

Power supply

- 310 mA average in GSM 900 at Tx power max 2 W
- 410 mA average in GSM/GPRS 900
- At Tx power max 2W
- 13 mA in idle mode in GSM 90

Operating temperature range: −20 °C to +55 °C (limited operation in range: −30 °C to +70 °C).

Environmental conditions

Operating temperature range	−40 °C to +70 °C
Operating humidity range	0 to 100 %
Degree of protection	IP 65 (EN 60529) IP 67 (when installed in junction box)

Sensors and monitoring devices

Wind direction

Range	0 to 360°
Accuracy	±3° (@12 m/s)
Resolution	1°
Response time	0.25 seconds

Wind speed

Range	0 to 60 m/s (116 knots)
Accuracy	±2 % (@12 m/s)
Resolution	0.01 m/s (0.02 knots)
Response time	0.25 seconds
Threshold	0.01 m/s

Outputs

Digital outputs	4 x digital output, open collector 35 V / 1 A
Power outputs	4 x switching power supply up to 1.5 A
Battery charger	Integrated automatic battery charger. Maximal charging current 2 A. Battery monitoring with full charge state and cut off voltage.

Environment

Protection class	IP 65
Operating temp. Windsonic **Windsonic M**	−35 °C to +70 °C (without heating) −40 °C to +70 °C (with heating)
Storage temp.	−40 °C to +80 °C
Operating humidity	<5 % to 100 %RH

Relative humidity

Sensor	**RHT175**
Measurement range	0 to 100 %RH
Resolution	0.05 %RH, 0.01 °C
Accuracy (@ 25 °C)	±1 %RH

Temperature

Sensor	**PT100 1/5 DIN**
Measurement range	−65 °C to +70 °C
Resolution	depends on data logger
Accuracy	±0.1 °C

Pressure sensor

Digital barometer	**MSB181**
Pressure range	600 to 1100 hPa
Accuracy	±0.3 hPa (−40 °C to +60 °C)
Resolution	0.01 hPa
Long-term stability	±0.2 hPa/year
Wake-up from sleep mode	<1 s
Response time	< 100 ms
Minimum pressure limit	0 hPa
Maximum pressure limit	1500 hPa

Pressure sensor - optional

Digital barometer	**MSB780X**
Pressure range	500 to 1100 hPa
Accuracy @ 20°C	0.10 hPa (−40 °C to +60 °C)
Total accuracy	0.15 hPa
Resolution	0.001 hPa
Long-term stability	±0.1 hPa/year
Overpressure limit	4000 hPa (not affecting sensor calibration)
Burst pressure limit	7000 hPa

Rain gauge

Aperture	200 mm^2
Sensitivity	0.2 mm 0.1 mm optional
Voltage for heating (MR2H only)	40 to 46 V AC

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Performance of heating elements (MR2H only)	48 to 57 W
Operating temperature MR2 MR2H	0 °C to +60 °C (without heating) −30 °C to +60 °C (with heating)
Accuracy (at rainfall intesnity*)	<1 % (20 mm/h) <2 % (60 mm/h) <10 % (200 mm/h) <2 % (500 mm/h) MR2HC only**

* Above mentioned accuracy is valid for liquid precipitation only.

** This option is possible when calibration curve of error versus precipitation is applied

Visibility and present weather sensor

Visibility measurement range	10 m to 75 km
Measurement error	≤ 4.5 % at 600 m ≤ 5.0 % at 1.500 m ≤ 5.1 % at 2 km ≤ 12.5 % at 15 km ≤ 20 % at 30 km
Measurement principle	forward scatter meter with 39° to 51° angle
Precipitation detection resolution	Rain: 0.015 mm/hr Snow: 0.0015 mm/hr
Maximum rain rate	500 mm/hr
Rain intensity accuracy	≤15 %
Operating temperature	−40 °C to +60 °C
Measures	• Visibility, present and past weather • 39 WMO 4680 codes

Laser ceilometer

Measurement range up to 3 layers	0 to 7 500 m / 0 to 25 000 ft
Measurement interval	15, 30, 60, 120 s (selectable)
Resolution	10 m / 30 ft
Accuracy	greater of ±10 m (30 ft) or ±1 % of height (against reflector)
Laser safety	class 1 laser product (SS-EN60825)
Power supply	230 V, 50 Hz, 30 V A, 200 V A (heater)
Outputs	RS-232C, V.23 alt.V.21, Bell 103 alt. Bell 212
Operating temp.	−40 °C to +55 °C

Portable mast

Unfolded dimensions	1.5 m base, 2 m height
Packed dimensions	110 x 20 x 20 cm
Weight	2.5 kg (without accessories)
Cross arms	arm for wind sensors arm for meteorological sensors
Accessories	solar panel holder, antenna holder
Material	aluminium alloy

Field PC

Small, high-reliable laptop-class personal computer with special shock-resistant construction, recommended for usage in places where frequently field transportation or working in ex- treme weather conditions is necessary.

MicroStep - MIS

PT100 1/5 DIN

Windsonic

MSB181

MSB780X

Rain Gauge

Visibility and Present Weather Sensor

Laser Ceilometer

Portable Mast

Field PC

Meteorological Sensors   **Data Logger AMS 111 II**   **Data Collection PC**

Digital Barometer Backup Battery

Automatic Mobile Station Example