ICT INTERNATIONAL

Automatic Weather Stations Manual

(AWS200, AWS300, AWS500)

Contents

1. Introduction

This manual detailed describes the installation, use and maintenance of the ICT AWS series weather station sensors, including AWS200, AWS300, AWS500 sensors. It also describes the software protocols and common sensor settings for weather station sensors, as well as the hardware connection method and protocol interface.

The AWS Automatic Weather Station Sensor Series

The AWS automatic weather station sensors use the most advanced meteorological sensor technology in the industry, integrating the main meteorological parameters. These include air temperature, humidity, atmospheric pressure, wind direction, wind speed. The IMS (Industrial Meteorological Station) sensor series add to this range the measurements of particulate matter pm2.5, pm10 and noise.

Application areas: traffic, agriculture, meteorology, environmental protection, electricity and water conservancy and many other fields.

2. AWS Safety & Maintenance

2.1 Safety, Designated use and Incorrect Use

Installation and commissioning must only be done by designated qualified professionals:

- Do not measure or touch live parts.
- Attention must be paid to the technical parameters of the device as well as the storage and operating conditions.
- The device must be operated within the specified technical parameters. The operating conditions and purpose of the equipment cannot violate the original intention of the design.
- Modifications or modifications to the device will not ensure their safety and uptime.
- If the device is not installed correctly, it may not work and/or it may become permanently damaged.
- If any equipment falls, there is a risk the fall may cause danger or injury.

2.2 Guarantee

Warranty period is 12 months, effective from the date of delivery. If the user uses the device for an unspecified purpose, the warranty will no longer be valid

2.3 Maintenance

In general, the equipment does not require maintenance. However, it is recommended to perform a functional test once a year. When performing a functional test, please note the following:

- Visually check whether the equipment has sludge
- Issue measurement request signal, check sensor

It is recommended that the humidity sensor be calibrated once a year. Since the customer cannot disassemble and reinstall the humidity sensor, the entire micro weather station must be sent to the manufacturer for testing.

2.4 Repair / Correct Maintenance

Do not open the device and do not repair the device by self under any circumstances. Be sure to contact the manufacturer for inspection and repair of the faulty equipment (if necessary). Regarding product warranty and repair, etc. Please contact:

ICT International Pty Ltd
Phone Number: +61 2 6772 6770
Email: sales@ictinternational.com.au
Website: www.ictinternational.com

3. Instrument Visual Checks & Maintenance

3.1 Selecting the Installation Location

In order to extend the service life of the equipment and to ensure the normal operation of the equipment, please pay attention to the following matters when selecting the installation position of the equipment.

- Sensors should be working in an open environment, where the location is easy to maintain.
- Please note that buildings, bridges, dams and trees may affect the wind speed and other measurement parameters. For example, wind gusts caused by passing vehicle could affect wind measurements.
- The frame or pole to which the sensor is attached should be firm and stable.
- Installation of the sensor should be of a height that is at least 1.5 meters from the ground
- The power supply should be stable and reliable to meet long-term operation requirements.

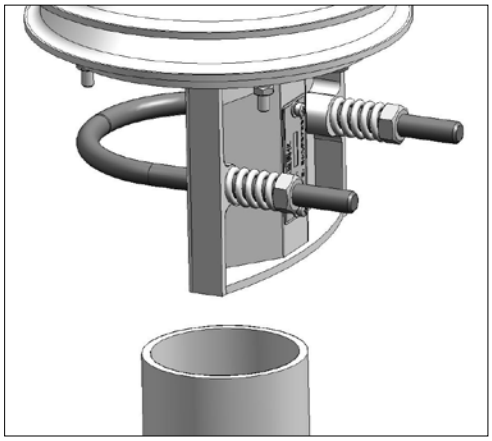
3.2 North Alignment

In order to correctly display the wind direction, the sensors must be aligned to the North; whether the installation is in the Northern or Southern hemisphere. There are multiple arrows on the sensor to indicate the direction, and N arrows indicate the north direction. Note: The magnetic north pole and the geographical north pole indicated by the compass are not exactly the same. Therefore, the deviation (error) of the position must be considered when arranging the sensors.

3.3 Sensor Mounting and Pole Fixture

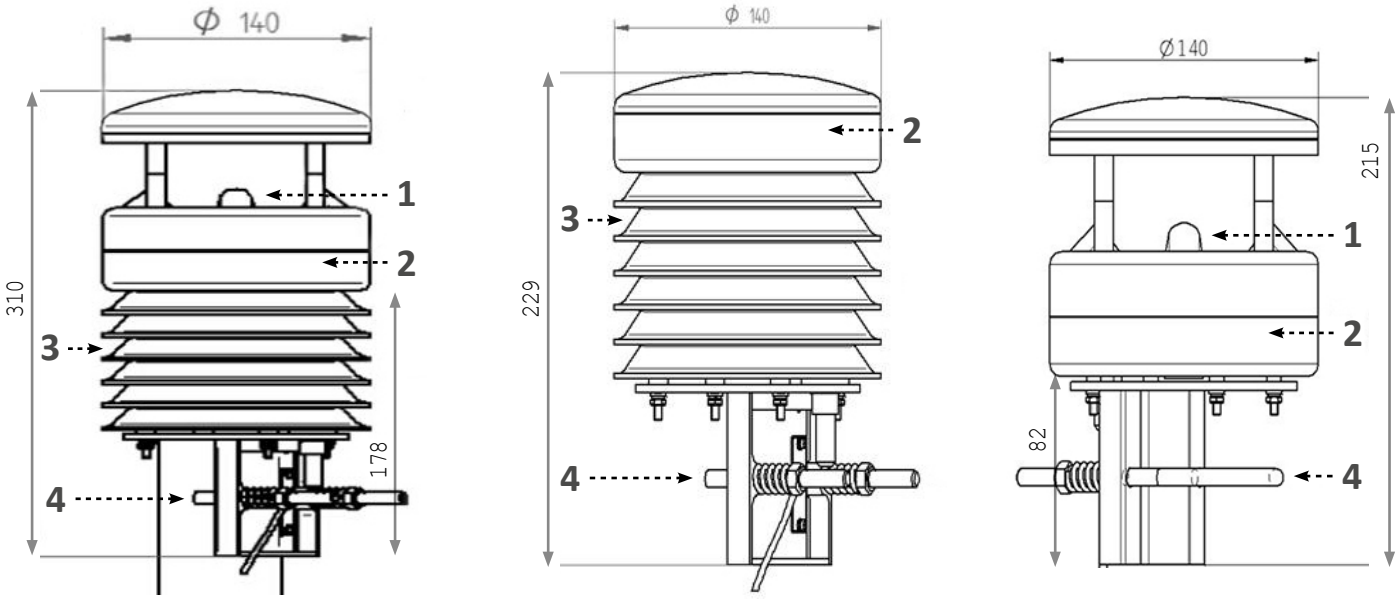
The sensor bracket is designed to be mounted on a mast with an outside diameter of between 48-75mm. The following tools are required for installation:

- Open end wrench or plum wrench - ½" imperial spanner
- Compass, used to adjust the N to point to the north, for wind direction measurement accuracy.



5. AWS Components, Parameters, Power

5.1 Automatic Weather Station Components



AWS500 **AWS300** **AWS200**

Model	Description
AWS500	Wind Direction & Speed (1), Atmospheric Pressure (2), Air Temperature & Relative humidity (3), Pole Fixture (4)
AWS300	Atmospheric Pressure (2), Air Temperature & Relative humidity (3), Pole Fixture (4)
AWS200	Wind Direction & Wind speed (1), Pole Fixture (4)

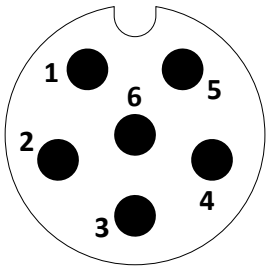
5.2 AWS Technical Parameters

Dimensions	**Diameter:** 178mm; **Height:** AWS200=215mm, AWS300=229mm, AWS500=310mm; **Weight:** about 1.5 kg;
Wind Direction	**Principle:** ultrasonic; **Measuring range:** 0 to 360°; **Accuracy:** ± 3°; **Sampling frequency:** up to 10Hz;
Wind Speed	**Sensor Size:** 100; **Principle:** Ultrasonic; **Measuring range:** 0 to 60 m/s; **Accuracy:** ±0.3m/s or ±3%; **Sampling frequency:** up to 10Hz;
Atmospheric Pressure	**Measuring range:** 10 to 1300 HPa; **Accuracy:** ±1 hPa;
Air Temperature	**Measuring range:** -40 to 60°C (extension: -50 to 80°C); **Accuracy:** ±0.3°C; **Long-term stability:** ±1°C/Year;
Relative Humidity	**Measuring range:** 0 to 100%RH*; **Accuracy:** ±2%RH*; **Long-term stability:** ±1%RH*/Year; *RH=Relative Humidity;
Operating Range	**Temperature:** -30 to 60°C; **Humidity:** 0 – 100%

Interface SDI-12	**Baud Rate:** 1200;
Power Supply Voltage	9 to 30VDC;
Average Current	(AWS500) is less than 10mA, maximum 20mA (12VDC)
Operating Humidity Range	0~100%RH
Operating Temperature	-40 to 60 ° C (standard), extended to: -50 to 80 ° C
Protection	IP66

5.4 Electrical Interface

There is a 6-pin electrical connector underneath the unit that allows for the breakout of power supply. SDI-12 and RS485 and various interfaces via the supplied cable. (The cable marking is in accordance with DIN 47100). The 6-pin diagram shows the cable end of the pin assignment:



1 (Red) -	Supply voltage positive
2 (Black) -	Supply voltage negative / Data Ground
3 (Yellow) -	RS485_A
4 (Blue) -	RS485_B
5 (Green) -	SDI-12
6 Unassigned	

6. SDI-12 Commands (ASCII Protocol)

6.1 Configuration Commands & Returns

The AWS Automatic Weather Station series is compatible with SDI-12 version 1.3 as described in the documents on http://sdi-12.org/archives.php, except for continuous measurements (aR0 - aR9 or aRC0 - aRC9). The following tables list the relevant Measurement (M), Concurrent (C) and Data (D) commands, when necessary. Please note: The first character of all commands and responses is always a device address. The last character of a command is the "!" character, which terminates each command. In some interfaces, after a command is processed and/or the information is returned by the device, the device signals the response is complete by returning with <cr><lf>. These last two bytes of a response are a carriage return <cr> and line feed <lf>.

6.1.01 Debug / Reset Command – areset!

Example Command Input: `0reset!`

Parameter Term	Fixed Character Length	Example	Return Order	Description
areset!	7	0reset!	(command)	This command is used to reset or reboot the sensor (a = device address, reset = command).

6.1.02 Ask for address Command – ?!

Example Command Input: `?!`
Example Response/Return: `0`

Parameter Term	Fixed Character Length	Example	Return Order	Description
?!	2	?!	(command)	This command is used to query the address of the device on the bus (a = the device address).
a	1	0	1	Returns device address (a = the device address; example: the device address is '0').

6.1.03 Device Online Confirmation Command – a!

Example Command Input: `1!`
Example Response/Return: `1`

Parameter Term	Fixed Character Length	Example	Description
a!	2	1!	This command is used to confirm whether the device with the device address is currently on the bus (where a = the address of the device to be confirmed).
a	1	1	If the device is online, returns device address (where a = the device address; example: the device at address '1' is confirmed as being on the bus).

6.1.04 Change Address Command – aAb!

Example Command Input: `2A4!`
Example Response/Return: `4`

Parameter Term	Fixed Character Length	Description
`aAb!`	4	This command is used to change the device address, where a = address of the device (Example device at address '2' was requested to be modified to address '4')
`a`	1	This response confirms the new device address, where a = address of the device (Example new device address = '4'). It can also be used to confirm a command such as an address has been modified.

6.1.05 Each Element Measurement Data Report Command – aR0!

Example Command Input: `0R0!`
Example Response/Return: `0R0,DM=000D,Sm=000.0M`

Parameter Format	Fixed Character Length	Description
`aR0!`	4	This command is used to get the measured values of multiple elements (a = device address, R0 = command for collective reporting of all device-components' measurement data).
`Variable`	Variable	Returns all of the measured values available in a message format of aR0, where a = device address. Example = Device at address '0' returns the following available values: <u>For AWS200:</u> Dm (average wind direction) = 000 degrees; Sm (average wind speed) = 000.0 m/s; <u>For AWS300:</u> Pa (atmospheric pressure) = 993.5 hPa; Ta (atmospheric temperature) = 13.2 °Celsius; Ua (atmospheric relative humidity) = 35.8% Rh; <u>For AWS500:</u> Dm (average wind direction) = 000 degrees; Sm (average wind speed) = 000.0 m/s; Ta (atmospheric temperature) = 13.2 °Celsius; Ua (atmospheric relative humidity) = 35.8% Rh; Pa (atmospheric pressure) = 993.5 hPa;

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