

## Instruction Manual



Pictured:  
A70H-UWSM7

This Manual covers:

A70H-UWSM5- Weather Station, basic, 12-24 VDC, RS485

A70H-UWSM5/S- Weather Station, basic, 12-24 VDC, SDI-12

A70H-UWSM6R - Weather Station, w/ rainfall, 12-24 VDC, RS485

A70H-UWSM6R/S- Weather Station, w/ rainfall, 12-24 VDC, SDI-12

A70H-UWSM6S - Weather Station, w/ solar radiation, 12-24 VDC, RS485

A70H-UWSM6S/S- Weather Station, w/ solar radiation, 12-24 VDC, SDI-12

A70H-UWSM7 - Weather Station, w/ rainfall & solar radiation, 12-24 VDC, RS485

A70H-UWSM7/S- Weather Station, w/ rainfall & solar radiation, 12-24 VDC, SDI-12

DOCUMENT VERSION:  
210503

A70H-UWS is an automatic weather station that can measure wind speed, wind direction, atmospheric pressure, humidity, and temperature; rainfall and solar radiation optional. Wind speed and direction are measured with ultrasonic waves. The optional rainfall detection uses 24G radar, which can quickly detect rainfall and intensity.

-Rainfall and Solar Radiation (Optional) -Rainfall measured with 24G Radar

The

No Moving Parts or Calibration necessary

**SPECIFICATIONS**

	Range:	Resolution:	Accuracy:
<u>Wind Speed -</u>	<u>0-60 m/s</u>	<u>0.01 m/s</u>	<u>±2%</u>
<u>Wind Direction -</u>	<u>0-359°</u>	<u>1°</u>	<u>±3°</u>

instrument does not have any moving parts, needs no maintenance, and no on-site calibration. In order to get the most out of your instrument, we recommend you read this manual carefully before installation.

The instrument can be used with computers, data collectors or other acquisition devices that are compatible with the communication format provided with the specific instrument you have purchased (RS232 or RS485).

**FEATURES**

Temperature -			
<u>Humidity -</u>			<u>40°C to 80°C</u>
<u>Pressure -</u>			<u>0.1°C ±1°C</u>
<u>Precipitation(Rain/Hail/Snow)-</u>			<u>0-100% R.H.</u>
	0.1% R.H.	±3%	
	150-1,100hPa*	0.1 hPa	±1 hPa
	0-200 mm/hr	0.1 mm	±5%(@ wind speed ≤5m/s)
<u>Solar Radiation -</u>	<u>0-2,000W/m<sup>2</sup></u>	<u>0.1W/m<sup>2</sup></u>	<u>±5%(@ vertical irradiation) Illuminance-</u>
<u>0-200,000 lux</u>	<u>0.1 lux</u>	<u>±5%(@ vertical irradiation)</u>	

Electrical: Power Supply: 12-24 VDC  
 Continuous Output (MODBUS-RTU): RS485, RS232, SDI-12  
 Power Consumption: <5W  
 Auto-Heating Power: 9W, (On <5°, Off >7°)

Operating Temperature: -40°C to 80°C

Ingress Protection: IP66

Main Material: ASA, Aluminium alloy base (optional)

EMC: EN61000-6-3, EN61000-3-3, EN61000-3-2, EN61000-6-1

**INSTALLATION RECOMMENDATIONS:**

The A70H-UWS is suitable for use in a wide range of environments and under normal operating conditions does not require field calibration or maintenance. Check regularly to ensure that the unit is not impacted by nearby equipment that may interfere with operation including radar or radio transmitters, marine engines, generators, etc. Maintain a distance of 2m or more from any radar scanner or radio antennas. Use the cables provided with the sensor for optimum performance. If the cable is cut or not properly connected EMC shielding may be compromised. A ground loop is not required if the unit is connected according to installation instructions. Ensure continuous power supply to the A70H-UWS to ensure proper operation.

Avoid installation near obstacles. Mount on the prevailing wind side of structures whenever possible.

Recommended mounting position is 10 meters above ground in an open area free from any obstructions. Open area is defined as the horizontal distance between the wind sensor and any obstacle being greater than 10 times the height of

the obstacle. If mounted on a building the sensor should theoretically be installed at a height half again the height of the building. The length of a horizontal boom shall place the sensor at least twice the diameter/diagonal of the tower/mast. The boom needs to be mounted on the prevailing wind side of the tower/ mast.

It may not be practical or realistic to meet these recommendations. Do what makes sense. As a minimum, try to mount the sensor at least 10 feet above the highest part of the building and avoid obstacles that may influence the wind speed and/or direction.

For detailed information on best practices for siting of meteorological sensors download this brochure from the World Meteorological Organization:

<https://www.weather.gov/media/epz/mesonet/CWOP-WMO8.pdf>

## LAND (STATIONARY) INSTALLATION:

It is recommended the A70H-UWS be installed on a vertical mast. The sensor itself mounts to the supplied mounting bracket which can then be attached to a 25 – 50 mm (1" – 2") mast or pipe with the supplied U-bolts.

## ALIGNMENT:

There is a raised arrow indicating North on the sensor, with a corresponding red dot on the underside of the sensor to aid in positioning. Use a compass during installation to ensure proper alignment.

For indoor use, the sensor can be installed on any plane to measure wind speed and direction.

## ELECTRICAL CONNECTION:

Align the indent on the wire connector with the ridge in the connector on the base of the sensor. Push in, then screw the outer protective sleeve into place. Excessive force should never be used. Finger tightness is adequate for most applications.

### SDI-12 CONNECTION

RED	BLUE/BLACK	GREEN
DC 12V+	DC 12V-	SDI-12

### RS485 CONNECTION

RED	BLUE/BLACK	YELLOW	GREEN
DC 12V+	DC 12V-	RS485 DA+	RS485 DB-

### RS232 CONNECTION

RED	BLUE/BLACK	YELLOW	WHITE	DC 12V+	DC 12V-	BROWN
RS232TX	RS232GND					RS232RX

## MOBILE INSTALLATION:

The North, or red dot position, should face the forward position (bow or heading) of the vessel. Ensure the sensor is mounted on a vertical mast at least 2 meters away from surrounding objects that may disturb or restrict air flow.

## CLEANING:

If dust collects on the instrument, it can be lightly brushed with a cloth using soft biodegradable lotion. Do not use dissolving reagents or solvents, and carefully clean to avoid scratching the surface of the instrument. Snow or ice should be gently brushed off. Any hard accumulation should be allowed to dissolve away through natural conditions. Do Not use hard tools to remove ice or snow.

## SERVICE:

The instrument has no moving parts, and does not require routine maintenance. If the sensor is opened or the safety seal is damaged, any warranty or calibration service will be voided. If there is any problem with the sensor contact Comptus for troubleshooting assistance, or a return authorization code.

## A70H-UWS Communication Protocol (RS485/232)

Communication parameters: Baud rate: 9600; Data bits: 8; Stop Bits: 1; Parity: Even

When the weather station receives the correct data frame, it replies with the corresponding content. If there is an invalid data frame, the weather station does not reply with any content. No reply is convenient for multiple weather stations to go with 485 bus networking, avoiding data communication conflicts.

Note that some parameters are optional and may not be available on your station.

Registers start at 0. For example: 03 Function code register 1 is 40001 in the actual register.  
Default address is: 01H

## REAL TIME DATA:

Client sends:

01 03 00 00 00 29 84 14

Weather station returns:

01 03 52 BFFF 0038 C28F3CF5 333341E7 66664274 3E144468 000C 0001 66664256 000042F7 0201 0001  
999A 4121 0143 32464125 A59C42CF 00004270 000042C8 4000459C8 4000459C 00004348 399A4559 14084148  
33332429 A2E 14034 D25D

Rainfall unit (Factory Settings)

0x0000:mm/s

0x0001:mm/m

0x0002:mm/h

Rain/Snow

0x0001:Rain

0x0002:Snow

0x0004:solid(such as hail)

Clear Rainfall Acc.

Client sends

01 10 00 0F 00 02 04 00 00 00 00 B3 EF

Weather Station Return

01 10 00 0F 00 02 71 CB

## Weather Station Outputs

### Conversions

The wind direction as reported by the weather station is shown in degrees of azimuth. Provided the instrument is properly mounted with the North orientation aligned, the azimuth angles go from 1 degree at just east of north to 359 degrees at just west of north. Use the following table to determine azimuth angle versus traditional compass points.

Angle:	Compass point:	Angle:	Compass point:
1	N	180	S
45	NE	225	SW
90	E	270	W
135	SE	315	NW
180	S	359	N

The weather station provides metric units for the temperature and barometric pressure being measured. Use these conversions to do a quick reality check on the set-up of your weather station.

Temperature reported in C:

Formula:  $F = (C \times 9/5) + 32$

0C = 32F

5C = 41F

10C = 50F

15C = 59F

20C = 68F

25C = 77F

30C = 86F

Pressure reported in millibars (mbars):

Formula:  $mbar/33.864 = in\ Hg$

920 mbar = 27.17 in Hg

950 mbar = 28.05 in Hg

980 mbar = 28.94 in Hg

1010 mbar = 29.83 in Hg

1040 mbar = 30.71 in Hg

1070 mbar = 31.60 in Hg

1100 mbar = 32.48 in Hg

REGISTER	BYTE	CONCEPTION	TYPE	RANGE	LENGTH
1	16	Device Status	Integer	0xA000~0xA03F	
2	16	Wind Direction	Integer	0-359°	
3.4	32	Wind Speed	Float Point	0-60 m/s	
5.6	32	Air Temperature	Float Point	-40° to 80°C	
7.8	32	Air Humidity	Float Point	0-100% R.H.	
9.10	32	Air Pressure	Float Point	150-1100 hPa	
11	16	Electronic Compass	Integer	0-359°	
12	16	Rain / Snow	Integer	0x0000~0x000F	
13.14	32	Rainfall	Float Point	100 mm/hr	
15.16	32	Rainfall Accumulation	Float Point		

# A70H-UWS

17	16	Rainfall Unit	Integer		
18	16	Positioning Status	Integer	0. Not Positioned	
19.20	32	Speed of Ship	Float Point		1. Positioned
21	16	Course	Integer		km/hr
22.23	32	Longitude	Float Point		0-359°
24.25	32	Latitude	Float Point		E - Positive
					W - Negative
					N - Positive
					S - Negative
26.27	32	Dust Concentration	Float Point		ug/m <sup>3</sup>
28.29	32	Visibility	Float Point		m
30.31	32	Illuminance	Float Point		Lux
32.33	32	Radiation (accu.)	Float Point		KJ
34.35	32	Radiation	Float Point		W
36.37	32	Real Wind Direction	Float Point		0-359°
38.39	32	Altitude	Float Point		m

INSTRUMENT INTERNAL REGISTER DESCRIPTION:

# A70H-UWS

Ultrasonic Weather Station

## DESCRIPTION of RETURN DATA FORMAT:

NUMBER	CONCEPTION	BYTE NUMBER	DESCRIPTION	REMARKS
1	Address Block	1	Address(0x01)	0x01
2	Function Code	1	Only read(0x03)	0x03
3	Number of Bytes	1	0x52	82bytes
4	Device Status	2	0xBF 0xFF	Device Status
5	Data Block	2	Wind direction	0x0038 (56°)
		4	Wind speed	0x3CF5C28F(0.03m/s)
		4	Air Temp. Air	0x41E73333(28.9°C)
		4	Humi.	0x42746666(61.1%)
		4	Air pressure	0x4468143E(929.0hPa)
		2	Electronic Compass	0x000C(12°)
		2	Rain/Snow	0x0010 (Rain)
		4	Rainfall	0x42566666 (53.6mm/h)
		4	Rainfall acc.	0x42F70000 (123.5mm)
		2	Rainfall unit	0x0201 (mm/h)
		2	Positioning Status	0x0001(1)
		4	Speed of Ship	0x4121999A(10.1)
		2	Course	0x0143(323)
		4	Longitude	0x41253246(10.324774)
		4	Latitude	0x42CFA59C(103.823456)
		4	Dust Concentration	0x42700000(60.0ug/m3)
		4	Visibility	0x42C80000(100m)
		4	Illuminance	0x459C4000(5000Lux)
		4	Radiation (accu.)	0x43480000(200KJ)
		4	Radiation	0x4559399A(3475.6W)
6	Check Block	4	Real Wind Direction	0x41481408(12.5°)
		4	Altitude	0x42493333(50.3m)
		4	Real Wind Speed	0x4034A2E1(2.82m/s)
		2		0xD2 0x5D

## INSTRUMENT CONFIGURATION

(user can choose ASCII or Hex)

Through the connection with the instrument, some parameters of the instrument can be configured, such as changing the communication address and changing the Baud rate.

Command one: Enter the Settings mode

Sent

(ASCII) >\*\r\n

(Hex) 3E 2A 0D 0A

Response

(ASCII) \n>CONFIGURE MODE\r\n

# A70H-UWS

Ultrasonic Weather Station

(Hex) 0A 3E 43 4F 4E 46 49 47 55 52 45 20 4D 4F 44 45 0D 0A

Command two: Set the serial port configuration

Sent

(ASCII) >CUS 9600 8-N-1\r\n

(Hex) 3E 43 55 53 20 39 36 30 30 20 38 2D 4E 2D 31 0D 0A

Response

(ASCII) >CMD IS SET\r\n

(Hex) 3E 43 4D 44 20 49 53 20 53 45 54 0D 0A

Note:

The CUS is required followed by the serial port parameters that will need to be set. If it is not followed by the parameters, the command becomes the current query configuration.

(such as sent: '>ID\r\n', Response: '\n>COM USART SET : 9600 N-8-1\r\n') Note:

1. There are two spaces in the 'CUS 9600 8-N-1' to note. '8-N-1' separated by '-' contains no spaces

Command three: Set the address

Sent

(ASCII) >ID 2\r\n

(Hex) 3E 49 44 20 32 0D 0A

Response

(ASCII) >CMD IS SET\r\n

(Hex) 3E 43 4D 44 20 49 53 20 53 45 54 0D 0A

Note: This 2 is the address you want to set ( set according to the need, 1-255), which must be in decimal format. If "ID" is not followed by address, the command becomes the current query address (Such as sent: >ID\r\n, Response: ID(HEX) : 02\r\n

Command four: Reset

Sent

(ASCII) >!\r\n

(Hex) 3E 21 0D 0A

Response

(ASCII) \n>NORMAL MODE\r\n

(Hex) 0A 3E 4E 4F 52 4D 41 4C 20 4D 4F 44 45 0D 0A

## INSTRUMENT CONFIGURATION

(user can choose ASCII or Hex)

Command five: Manually exit the Settings mode Sent:

(ASCII) >RESET\r\n (Hex)

3E 52 45 53 45 54 0D 0A

Response:

(ASCII) \n>NORMALMODE\r\n

(Hex) 0A3E4E4F524D414C204D4F44450D0A

Steps:

Set the address



# A70H-UWS

Ultrasonic Weather Station

'Command one' => 'Command three' => 'Command five' => 'Command four'

Set the serial port configuration

'Command one' => 'Command two' => 'Command five' => 'Command four'

Baud Rate	Data Bits	Parity	Stop Bits
2400-115200	N - None	1	2
	8	E - Even	
	O - Odd		

Any configuration changes, such as Command two or Command three must be done after Command one.

Inputs must be entered within 15 seconds or the settings mode will automatically close. After inputs are successfully entered, the reset restart will begin after 15 seconds.

After setting the instrument, "Command five" must be sent to make the instrument soft reset before the new settings can take effect.

"\r\n" is the carriage return line feed, corresponding to the HEX (0x0D, 0x0A)

# A70H-UWS



## A70H-UWS Communication Protocol (SDI-12)

Communication Parameters: Baud rate 1200 Data bits 7bits EVEN.

Command	Sensor Return	Command Name
?!	0!	Read sensor address
a!	014HONGYUV 1000002.3000	Distinguish sensor
aAb!	b!	Change the address, Change address a to b
aM!	00015<CR><LF>	Start measuring wind direction, speed, Real wind direction, speed, Value status <sup>①</sup>
aD0!	0+056+00.03+012.5+02.82+1111<CR><LF>	Address +wind direction+ wind speed+ Real wind direction+ Real wind speed <sup>②</sup> + Value status
aM1!	00013<CR><LF>	Start measuring
aD0!	0+028.90+061.1+11<CR><LF>	Address+temperature+humidity+ Value status
aM2!	00013<CR><LF>	Start measuring
aD0!	0+0929.0+000050.3+11<CR><LF>	Address+ pressure+ Altitude+ Value status
aM3!	00013<CR><LF>	Start measuring
aD0!	0+012+1.000+11<CR><LF>	Address+ Electronic compass angle+ Snow thickness +Value status
aM4!	00014<CR><LF>	Start measuring
aD0!	0+001+053.6+00123.5+111<CR><LF>	Address+ Falling state+ Rainfall+ Cumulative rainfall+ Value status
aM5!	00016<CR><LF>	Start measuring
aD0!	0+1+103+0.823456+010+0.324774<CR><LF>	Address+ Positioning state+ longitude+ latitude
aD1!	0+00010.1+323+1111111<CR><LF>	Address+ speed of ship + course + value status
aM6!	06008<CR><LF>	Start measuring
aD0!	0+00.23+01.78+00.13<CR><LF>	Address+10 minutes relative wind speed average+10 minutes relative wind speed maximum+10 minutes relative wind speed minimum +Value status
aD1! <sup>③</sup>	0+015+332+004+03.78+1111111<CR><LF>	Address +10 minutes relative wind direction average+10 minutes relative wind direction maximum value+10 minutes relative wind direction minimum+3 seconds gust +value status
aM7!	00015<CR><LF>	Start measuring
aD0!	0+0060.0+1000+1000+000100+1111<CR><LF>	Address +dust concentration+PM1.0+PM10+ visibility+value status
aM8!	00016<CR><LF>	Start measuring
aD0!	0+005000.0+0200.0+003475.6<CR><LF>	Address+ illuminance+ solar radiation+ daily radiation
aD1!	0+2000.00+15+11111<CR><LF>	address+ UV radiation +UV index+ value status
aM9!	06007<CR><LF>	Start measuring
aD0!	0+00.73+03.26+01.93<CR><LF>	Address+ 10 minutes real wind direction average+10 minutes real wind direction maximum+10 minutes real wind direction minimum +Value status

aD1!	0+003.0+176.0+088.0+111111<CR><LF>	Address+10 minutes real wind speed average+10 minutes real wind speed maximum+10 minutes relative wind speed minimum +Value status
------	------------------------------------	--

1.)Value status: 0 means the value is invalid, 1 means the value is valid, from left to right  
 2.)Real wind direction and Real wind speed are only effective if there is an electronic compass and GPS function  
 3.)The maximum length of the returned data is 35 bytes, so some need to send 2 requests to get all of the data.

# A70H-UWS



Ultrasonic Weather Station

Clear accumulated rainfall:

Command	Sensor Return	Command name
aX001!	0<CR><LF>	Clear accumulated rainfall

Range:

Measurements	Range
Relative wind direction, average, maximum, minimum	0-359°
Relative wind speed, average, maximum, minimum	0-60m/s
Real wind direction	0-359.9°
Real wind speed	0-60m/s
Temperature	-40-120° C
Humidity	0-100%
Air pressure	150-1020 hPa
Altitude	0-9,999m

Installation Questions and Troubleshooting  
 Contact sales@comptus.com  
 Call +1 603-726-7500  
 1307 NH Rte 175  
 Campton, NH 03223