



User Manual

HY-WDC2E Ultrasonic Anemometer

180322



HongYuv Technology Co.,Ltd

1.FOREWORD

Thank you for purchasing the HY-WDC2E manufactured by HONGYUV.

To achieve optimum performance we recommend that you read the whole of this manual before proceeding with use.

HONGYUV products are in continuous development and therefore specifications may be subject to change and design improvements without prior notice.

The information contained in this manual remains the property of HONGYUV and must not be copied or reproduced for commercial gain.

Regulatory Compliance

HY-WDC2E has CE certification of EU

The electromagnetic compatibility of the HY-WDC2E has been tested in accordance with the following applicable directives:

LVD 2014/35/EU Low Voltage

EMC 2014/30/EU Electromagnetic Compatibility

EMC 2014/35/EU Electromagnetic Compatibility

Our above product has been assessed against the following applicable standards:

EN 61010-1:2010

EN 61326-1:2013

EN 61000-3-2:2014

EN 61000-3-3:2013

EN 60945-1:2003

Warranty

HONGYUV hereby represents and warrants all Products manufactured by HONGYUV and sold here under to be free from defects in workmanship or material during a period of twenty-four (24) months from the date of delivery save for products for which a special warranty is given.

2.INTRODUCTION



HY-WDC2E ultrasonic anemometer is very robust with no moving parts, maintenance free, simultaneously output wind speed and direction. Each unit is factory calibrated in our wind-tunnel testing lab prior to shipping.

HY-WDC2E powers up with 3 ... 30 VDC and outputs serial data with a selectable communication protocol: SDI-12, MODBUS-RTU and NMEA 0183. Four

alternative serial interfaces are selectable: RS-232, RS-485 and SDI-12. The transmitter is equipped with a 4-pin M12 connector for installation.

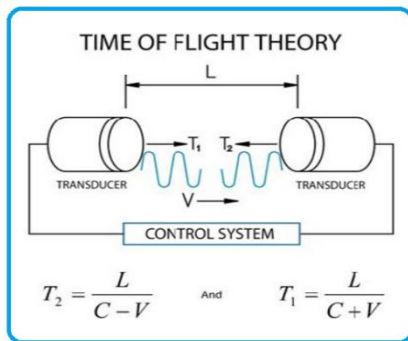
The following options are available:

- Windows XP/WIN7 based testing software, which only support MODUBUS protocol
- USB to RS-232/RS-485 converter cable (1.5m)
- Mounting kits

Our anemometer was made in molded thermoplastic, also known as ASA, which has high outdoor weather ability. ASA is extremely resistant against UV radiation of sun, it is frost and heat resistant, standing all climatically conditions. The product is widely used in the automotive industry as well as several other outdoor applications.

3.WORKING PRINCIPLE

Measure the transmission time of ultrasonic sensors from sensor N to sensor S, and compare with the transmission time of sensor S to sensor N. Similarly, compare the time of W to E and E to W time. (N = north, S = south, E = east, W = west)



For example, if the wind blew from the north, time of ultrasonic from N to S will be shorter than from S to N, and transmission time of it from W to E and E to W is the same. Through calculating the time difference of ultrasonic transmission between two points, the wind speed and direction can be calculated. This calculation

method has nothing to do with other factors such as temperature.

The wind speed is represented as a scalar speed in units m/s. The wind direction is expressed in degrees (°). The wind direction reported indicates the direction that the wind comes from. North is represented as 0°, east as 90°, south as 180°, and west as 270°.

About measurement sampling rate: The ultrasonic probes sample hundreds of times per second, and process those raw data as wind speed and wind direction output every second.

4. TECHNICAL SPECIFICATION

	Range	Accuracy	Resolution
Wind Speed	0 - 40m/s	±5%	0.1m/s
Wind Direction	0 - 359°	±3 °	1°
Digital Output	RS485、RS232、SDI-12		
Analog Output	4-20mA(optional)		
Baud Rate	4800 - 19200 bps		
Communication Protocol	ModBus-RTU、NMEA-0183、SDI-12		
Protection Grade	IP65		
Operating Temperature	-40℃ - +60℃		
Storage Temperature	-50℃ - +80℃		
Working Humidity	0 - 100%		
Power Supply	VDC: 5-30V		
Power consumption	20mA @5V		
Dimension/Weight	ABS: Φ82×108mm 、0.28kg Aluminum alloy: Φ82×125mm 、0.38kg		
Material	ABS engineering plastic or aluminium alloy(cost extra \$50)		

Specifications may be subject to change without prior notice.

6.PACKING LIST

Item	Quantity
HY-WDC2E Anemometer	1 pcs
4m communication cable with watertight plug	1 pcs
User Manual	1 pcs

PACKING NOTICE

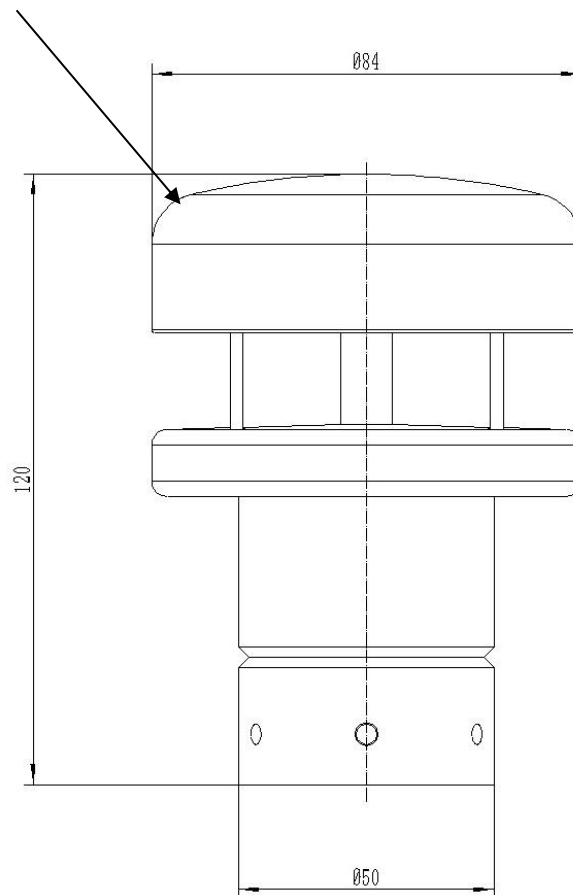
By keeping HY-WDC2E well positioned in ex-work package when it's being transferred to protect it from any potential damage.

7.APPERANCE SKETCH

7.1 Metal Shell

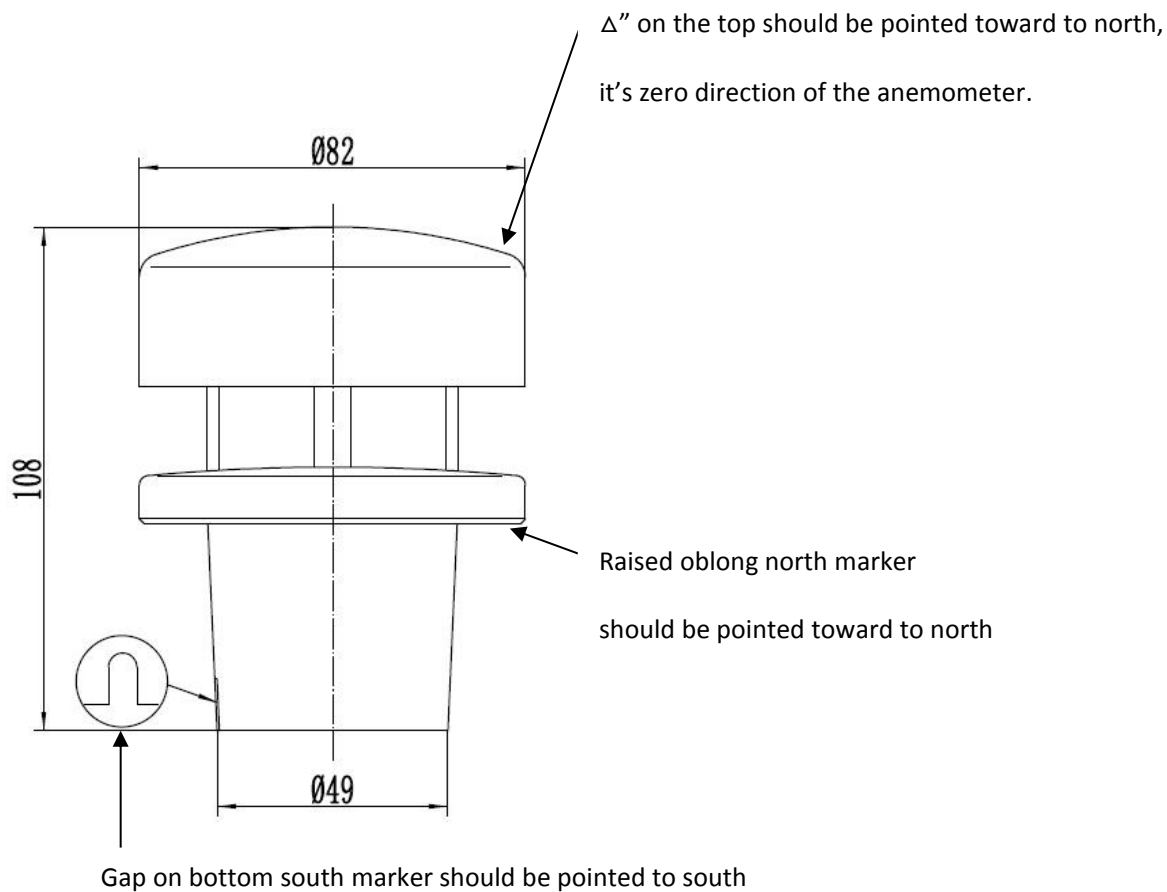
North marker"△" on the top help you align unit toward to north

It's also zero direction of the anemometer.



7.2 ABS Shell

There has three north markers on ABS shell for easy observation from downward, front upward.



8.WIRING



For RS485 output, communication cable is four cores, connected as below:

POWER		RS485	
Red	Black	Yellow	Green
V +	GND	RS485 DA+	RS485 DB-

For RS232 output, communication cable is four cores, connected as below:

POWER		RS232	
Red	Black	Yellow	Green
V +	GND /RS232 GND	RS232 RX	RS232 TX

For SDI-12 output, communication cable is three cores, connected as below:

POWER		SDI-12	
Red	Black	Yellow	Green
V +	GND	—	SDI-12

We also have 4-20mA output for your option, it will adopt 8-pin conductors.

Please point out that requirement when order it.

Note:

- 1.Default output is RS485.
- 2.Final definition of cable wiring should be referred to sticker on cable.

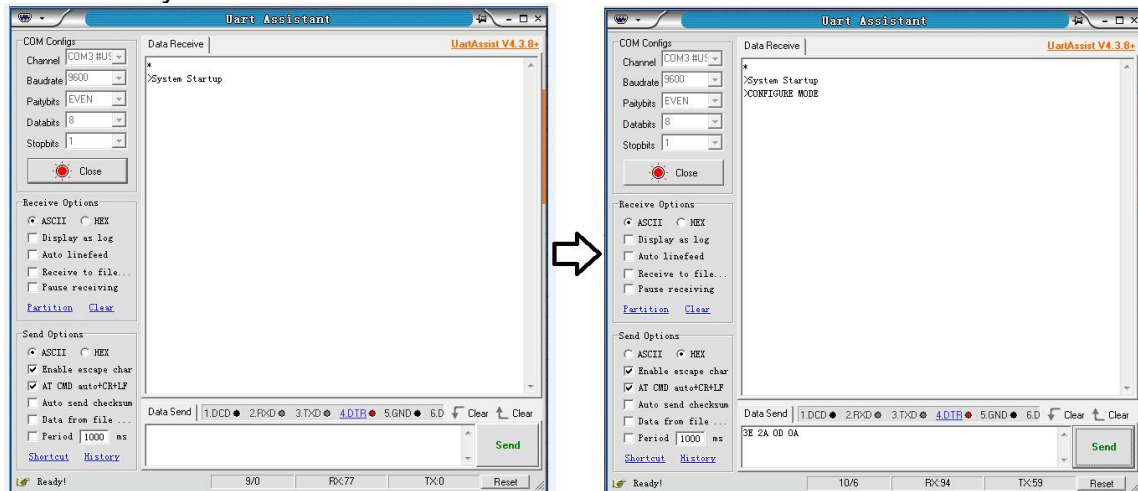
9.Procedure of confirmation of wiring and communication

3 seconds after wiring of our Device and correctly configuring serial communication tool, our instrument will output characters ">System Startup" in ASCII(0A 3E 53 79 73 74 65 6D 20 53 74 61 72 74 75 70 0D 0A in HEX), which indicate that our instrument is powered up.

We can simply test its response by inputting "enter setting mode" command "3E 2A 0D 0A".

Our instrument will immediately respond ">CONFIGURE MODE" in ASCII(3E 43 4F 4E 46 49 47 55 52 45 20 4D 4F 44 45 0D 0A in HEX).

So far, the communication test is finished, device is proven to be communicated successfully.

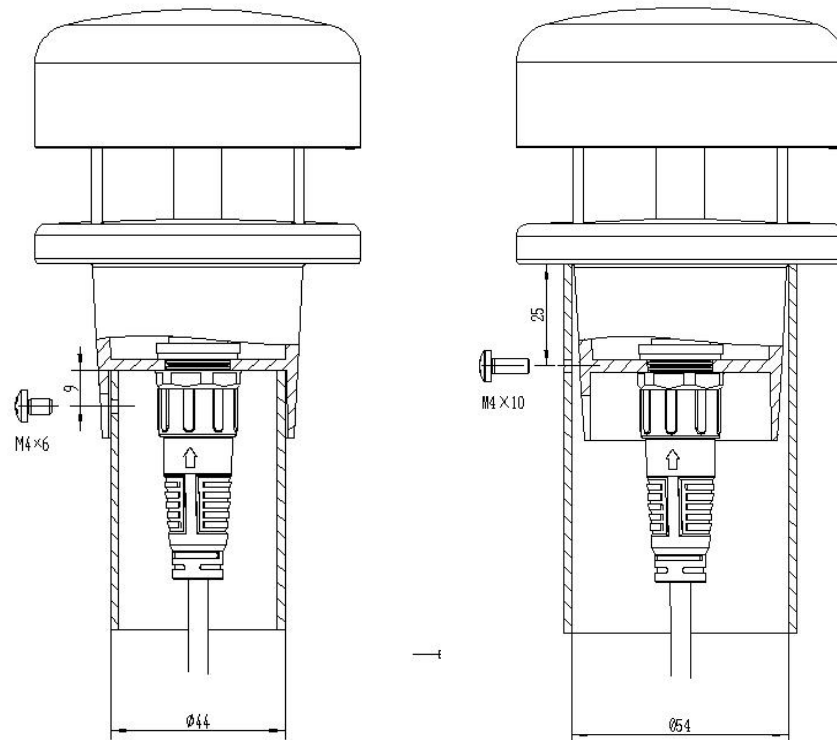


10.INSTALLATION GUIDELINES

10.1 The HY-WDC2E can be mounted on top mast posts, poles, tripods, etc. Depending on the application. Pole should have three 3 equally spaced holes for M5 screw 7.5mm lower than top of pole, put cable(waterproof aerial plug) through pole. HY-WDC2E should be mounted two to three meters above ground.

Note: The user must have proper stress relief on the cable. Turn the plug and press it gently into the socket to connect the plug to the HY-WDC2E outlet. When the plug is connected, turn the outer sleeve clockwise and lock the plug. With 3 stainless steel screws, the HY-WDC2E can be fixed to the mounting pipe (the screw has a maximum installed torque of 4Nm).

(refer to picture on the bottom)



Orientation: Use a standard compass to find correct geographic north direction then align north marker to it, then fix anemometer

10.2 You will need to adjust the anemometer so that it is level. Use a bubble level or other leveling device to ensure the anemometer is level (leveling device not included).

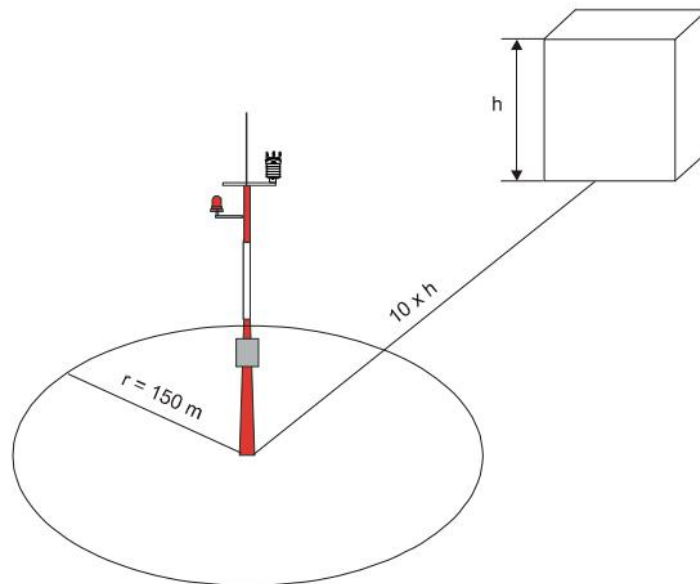
10.3 Customers must ensure that the HY-WDC2E is installed in an open area so as to avoid obstacles to airflow or turbulence in the surrounding buildings.

Do not install HY-WDC2E on the side of a high power radar or radio transmitter.

10.4 Installation Sketch

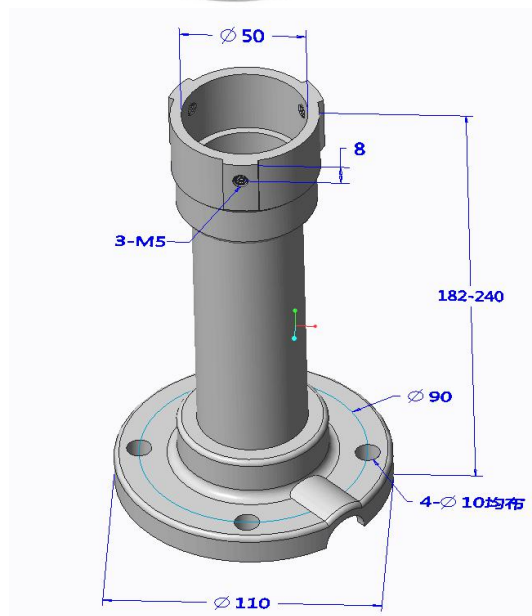
Following World Meteorological Organization (WMO) guidelines, a general recommendation is that there is at least 150 m open area in all directions from the mast. Any object of height (h) does not significantly disturb wind measurement at a minimum distance of 10 times the height of the object.

The recommended minimum length (h) for the mast that is installed on top of a building is 1.5 times the height of the building (H). When the diagonal (W) is less than the height (h), the minimum length of the mast is 1.5 W. However, follow the application specific instructions and local regulations when placing HY-WDC2E.



11.Optional installation pole(Cost extra 20 USD/PCS)

In order to facilitate the installation for users, we specially customized a cast aluminum bracket for users' option, installation way shown as pictures below:



12.CLEANING

If there is any build up of deposit on the unit, it should be gently cleaned with a cloth moistened with soft detergent. Solvents should not be used, and care should be taken to avoid scratching any surfaces. The unit must be allowed to defrost naturally after being exposed to snow or icy conditions, do NOT attempt to remove ice or snow with a tool.

13.AFTER-SALE SERVICE

There are no moving parts or user-serviceable parts requiring routine maintenance.

Opening the unit or breaking the security seal will void the warranty and the calibration.

In the event of failure, prior to returning the unit to your authorised HongYuv distributor, it is recommended that:

1. All cables and connectors are checked for continuity, poor contacts, corrosion etc.
2. You contact your supplier for advice

If you ever need assistance with your HY-WDC2E or have any questions or feedback, there are several ways to contact us. HongYuv has customer service representatives available to speak with you Monday through Friday, between 9 am and 6 pm UTC+8 time.

Note: If you purchased your anemometer through a distributor, please contact them for assistance.

Our email: info@hongyuv.com or stefan@hongyuv.com

14.Calibration

The anemometer calibration is based on fundamental physical principles and does not change with use. Recalibration should therefore not be necessary.

15.INSTRUMENT RETURN

If the instrument needs to be returned, please carefully pack the instrument in the original package and deliver it to the authorized agent of the Hongyuv with the detailed explanation of malfunction.

16.COMMUNICATION PROTOCOL-NMEA-0183(multiple parameters)

1 Physical port definition

- ◆ Start bit——1bit
- ◆ Stop bit——1bit
- ◆ Data bit——8bits
- ◆ Check bit——none
- ◆ Baud rate——9600bps

2 Data-frame format (ASCII)

Wind speed and direction data frame

\$WIMWV,180,R,0.01,M,A*06<CR><LF>

Data segment	E.g.	Format	Name	Description
0	\$WIMWV	String	Fixed frame head	NMEA Wind Protocol Header
1	180	Number	Wind direction	Wind direction reading in °
2	R	Character	Type of wind	R=Relative wind speed and direction
3	0.01	Number	Wind speed	Wind speed reading
4	M	Character	Unit of Wind speed	K =Km/h M=m/s N=knots
5	A	Character	Status of data	A=Valid V=Invalid
6	*06	HEX character	Hex checksum	Checksum, the 2 digit Hex Checksum sum figure is calculated from the Exclusive OR of the bytes between (and not including) the \$ and * characters.
7	<CR><LF>	ASCII character	Line Feed Character	

Commands and Procedures

Following parameters such as communication address or baud rate, system time, precipitation automatic clear period can be set by users.

Commands			Response
Instruction 1	ASCII	>*\r\n	>CONFIGURE MODE\r\n
	HEX	3E 2A 0D 0A	0A 3E 43 4F 4E 46 49 47 55 52 45 20 4D 4F 44 45 0D 0A
Remark	Enter Setting Mode		
Instruction 2	ASCII	>CUS 9600 8-N-1\r\n	>CMD IS SET
	HEX	3E 43 55 53 20 39 36 30 30 20 38 2D 4E 2D 31 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Configure serial port configuration as Baud Rate 9600 bps; Data bits:8 bits; Parity:NONE; Stop bits:1 bit. Inquiry current setting command ASCII: >CUS\r\n HEX:3E 43 55 53 0D 0A		
Instruction 3	ASCII	>ID 2\r\n	>CMD IS SET
	HEX	3E 49 44 20 32 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Configure address of device as 2. Inquiry address command is ASCII: >ID\r\n HEX: 3E 49 44 0D 0A		
Instruction 4	ASCII	>RESET\r\n	System start ok!\r\n
	HEX	3E 52 45 53 45 54 0D 0A	53 79 73 74 65 6D 20 73 74 61 72 74 20 6F 6B 21 0D 0A
Remark	Reboot device		
Instruction 5	ASCII	>!\r\n	>NORMAL MODE\r\n
	HEX	3E 21 0D 0A	3E 4E 4F 52 4D 41 4C 20 4D 4F 44 45 0D 0A
Remark	Save configuration of WDS series and exit setting mode.		
Instruction 6	ASCII	>DEBUGEN\r\n	Usart In Debug Mode\r\n
	HEX	3E 44 45 42 55 47 45 4E 0D 0A	55 73 61 72 74 20 49 6E 20 44 65 62 75 67 20 4D 6F 64 65 0D 0A
Remark	Enter secondary setting mode(only for WDS series, WDC series don't need to enter this mode.)		
Instruction 7	ASCII	>TimeSet:16,03,00,19,05,07,02\r\n	>TimeSet set ok!\r\n
	HEX	3E 54 69 6D 65 53 65 74 3A 31 36 2C 30 33 2C 30 30 2C 31 39 2C 30 35 2C 30 37 2C 30 32 0D 0A	3E 54 69 6D 65 53 65 74 20 73 65 74 20 6F 6B 21 0D 0A
Remark	Set system time as 2019.05.07 16:03:00 Tuesday. "02" means Tuesday, likewise 07 means Sunday. 16:hour; 03:minute; 00:second; 19:year; 05:month; 07:day; 02:Tuesday		
Instruction 8	ASCII	>RainClrTime:360\r\n	>Time of rain clear set ok!\r\n
	HEX	3E 52 61 69 6E 43 6C 72 54 69 6D 65 3A 33 36 30 0D 0A	3E 54 69 6D 65 20 6F 66 20 72 61 69 6E 20 63 6C 65 61 72 20 73 65 74 20 6F 6B 21 20 0D 0A
Remark	Set Accumulated precipitation automatic reset time as 360 days(only for WDS series ordered before 2019.5.22)		
Instruction 9	ASCII	>RainPeriodSet:360\r\n	>Time of rain clear set ok!\r\n
	HEX	3E 52 61 69 6E 50 65 72 69 6F 64 53 65 74 3A 33 36 30 0D 0A	3E 54 69 6D 65 20 6F 66 20 72 61 69 6E 20 63 6C 65 61 72 20 73 65 74 20 6F 6B 21 20 0D 0A
Remark	Set Accum.precipitation automatic reset time as 360 days(for WDS series ordered after 2019.5.22, and all WDC series)		
Instruction 10	HEX	01 10 00 0F 00 02 04 00 00 00 00 B3 EF	01 10 00 0F 00 02 71 CB
Remark	Manually reset accumulated precipitation.		
Notice: 1. Characters "\r\n" is CRLF Carriage-Return Line-Feed, corresponding to HEX (0x0D,0x0A)			

Commands		Content	Response
Instruction 11	ASCII	>ASDM 3\r\n	>CMD IS SET\r\n
	HEX	3E 41 53 44 4D 20 33 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Set 2 minutes average period as 3 seconds, “3” can be set as number from 1~120;		
Instruction 12	ASCII	>ASDS 3\r\n	>CMD IS SET
	HEX	3E 41 53 44 53 20 33 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Set 10 minutes average period as 3 seconds, “3” can be set as number from 1~600;		
Instruction 13	ASCII	>WSUS 3\r\n	>CMD IS SET
	HEX	3E 57 53 55 53 20 33 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Set wind speed unit as kph; “3” can be set as 0~4, 0:m/s; 1:knots; 2:mph; 3:kph; 4:ft/min Command >WSUS\r\n is used to inquiry current wind speed unit.		
Instruction 14	ASCII	>ASGS 3\r\n	>CMD IS SET
	HEX	3E 41 53 47 53 20 33 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Set Gust calculation period. “3” can be set as 1~600;		
Instruction 15	ASCII	>TimeReq\r\n	
	HEX	3E 54 69 6D 65 52 65 71 0D 0A	
Remark	Inquiry system time		
Instruction 16	ASCII	>SaveConfig\r\n	>CMD IS SET
	HEX	3E 53 61 76 65 43 6F 6E 66 69 67 0D 0A	3E 43 4D 44 20 49 53 20 53 45 54 0D 0A
Remark	Save setting for WDC series		
Instruction 17	ASCII	>DEBUGDN\r\n	>USART IN NORMAL MODE
	HEX	3E 44 45 42 55 47 44 4E 0D 0A	3E 55 53 41 52 54 20 49 4E 20 4E 4F 52 4D 41 4C 20 4D 4F 44 45
Remark	Exit secondary setting mode(only for WDS series, WDC series don't need to enter this mode.)		
Notice: 1. Characters “\r\n” is CRLF Carriage-Return Line-Feed, corresponding to HEX (0x0D,0x0A)			

Setting Procedures

No.	Function	Instructions
1	Set Communication Address	WDC,SA:1→3→16
		WDS:1→3→5→4
2	Set Serial Port Parameters	WDC,SA:1→2→16
		WDS:1→2→5→4
3	Set System Time	WDC,SA:7→16
		WDS:1→6→7→17→5→4
4	Set accumulated precipitation automatic clear period	WDC,SA:9→16
		WDS:1→6→9→17→5→4
5	Manually reset Accumulated precipitation(to zero)	10
6	Change 2 minutes calculate period	WDC,SA:1→11→16→4
		WDS:1→11→5→4
7	Change 10 minutes calculate period	WDC,SA:1→12→16→4
		WDS:1→12→5→4
8	Change output wind speed unit	WDC,SA:1→13→16→4
		WDS:1→13→5→4
9	Change Gust calculate period	WDC,SA:1→14→16→4
		WDS:1→14→5→4
10	Inquiry System time	WDC,SA:15
		WDS:1→6→15→17→5→4

Notice:

Above commands are applicable on our weather station.

System time is a key parameter, since accumulated daily solar radiation will be reset to zero at 00:00 by internal system of our device.

Accumulated precipitation automatic clear period is counting down from the moment device is powered on, not from the moment you change accumulated precipitation automatic clear period(Function No.4).

Accumulated precipitation automatic clear period is default set as 30 days.

Accumulated solar radiation is automatically reset as zero at 00:00 every day.

Default precipitation automatic reset period is 3600 days.(sold after 3rd,July,2019.)

Once you enter secondary setting mode, you have to exit it by inputting command 17 or power off-on sensor, otherwise it will keep staying in setting mode where you can't access to any data.