Weather Station Operation Manual

Model: AM706D

NINGLU

Document: NLT-AM706D-SSEN
Edition: V190626

Quick User Guide

- **Warning function：Power failure, Wind speed (Gust), temperature and humidity alarm.**
- **Mute: Press any button to mute.**
- **Selectable Relative/True speed direction.**
- **Selectable day and night modes.**
- **Direction calibration： After power on, move wind vane toward the ship bow direction, then press the reset button inside junction box.**
- **Independent temperature and humidity sensor.**
- **Barometer sensor inside main unit.**

⚠ Safe Operation

Please carefully read this page before operation in order for safe and convenient operation.

 Warn	 Prohibit	 Attention

Operation Warn	
	**Do not disassemble unit**
	**Do not refit unit privately**
	**Do not operate with water**
	**If water leakage, Power down immediately**

	Be sure no water or rain into unit
Installation Warn	
	**Power off before installation**
	**Be sure the main unit location is IP23**
	**Be sure the wind sensor installed on the ventilated place**

Contents

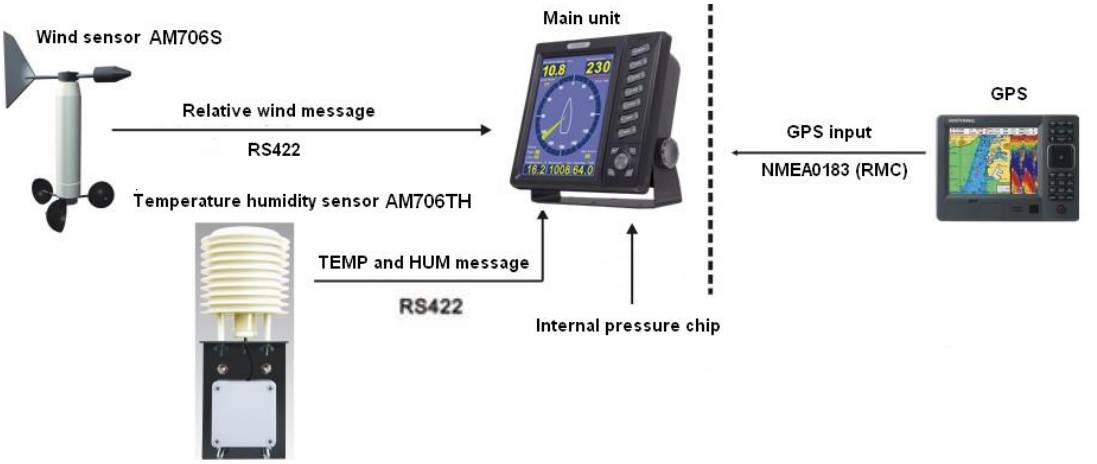
Introduction

Introduction

The marine weather station AM706D is a multi-functonal measuring instrument with wind speed, direction, temperature, humidity and barometric pressure. It can accurately measure and display real-time relative wind speed and direction, true wind speed and direction, air temperature, relative humidity and barometric pressure. In addition, it can regularly print these parameters and time, longitude and latitude, ship speed, and navigational signal. It is important and necessary for observation and safe navigation. AM706D is approved by China Classification Society (CCS).

The main unit AM706D adopts three mounting methods, table, hung and flush mounting. The wind sensor AM706S should be installed on natural ventilated place, such as mast. Please note, big Radar antenna rotation can disturb the wind measurement. The AM706TH is suggested to be mounted on a place there is no direct sunlight and rain drop.

Measurement Principle



Wind sensor sends relative wind direction and speed signal (relative to ship bow and absolute value of angle signal) in digital interface format of RS422 to main unit through junction box.

Temperature and humidity sensor provides air temperature and humidity signal in digital interface format of RS22 to main unit through junction box

Barometric pressure signal is received from internal IC sensor of main unit.

Main unit uses these signals to calculate, display and export.

True speed and direction:

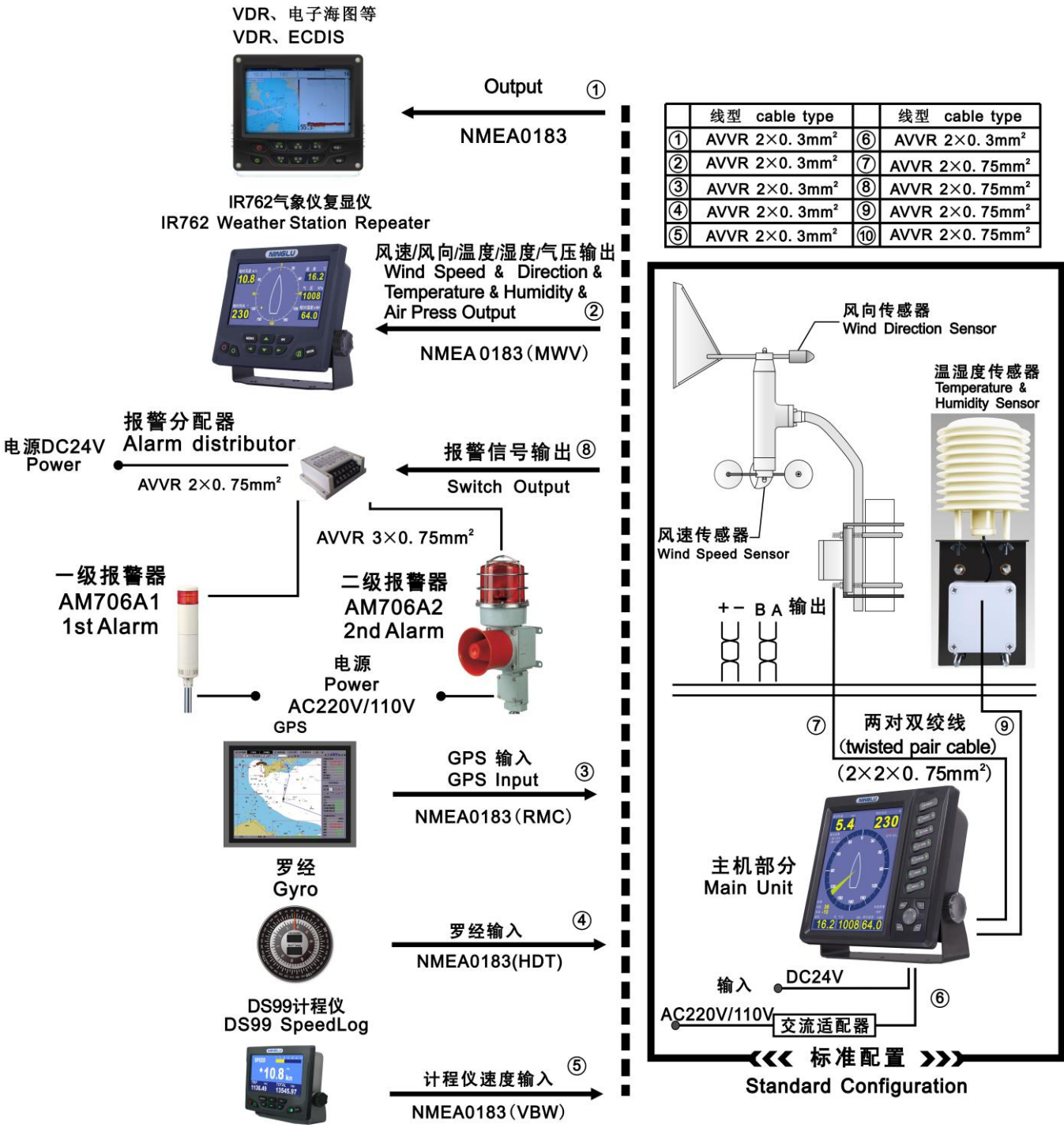
There are two ways to get the true direction and speed.

First way, connecting external GPS (RMC) data input, main unit can calculate true wind direction (relative to North Pole) and speed.

Second way, connecting both Gyro(HDT) and Speed Log(VBW) data, main unit can display the true wind direction and speed.

System Introduction

General View



	线型 cable type		线型 cable type
①	AVVR 2×0. 3mm²	⑥	AVVR 2×0. 3mm²
②	AVVR 2×0. 3mm²	⑦	AVVR 2×0. 75mm²
③	AVVR 2×0. 3mm²	⑧	AVVR 2×0. 75mm²
④	AVVR 2×0. 3mm²	⑨	AVVR 2×0. 75mm²
⑤	AVVR 2×0. 3mm²	⑩	AVVR 2×0. 75mm²

System Overview

Main unit AM706D

Application： Measure Barometric pressure and display values and system control

Dimension： High 264 x width270 x thickness93 mm

Installation： Table, Hanging, Flush mounting

Location： Cab

Wind Direction and Speed Sensor AM706S

Application： Measure relative wind direction and speed, export to Main unit

Dimension： Total high 838mm，max action radius 550mm

Installation： Binding mounting

Location： Ventilated and high outdoor, such as mast

Constitution： Wind direction and speed sensor, holder and junction box

Wind direction sensor： Wind indicator with empennage and weight, and absolute-value angle sensor near axis

Wind speed sensor： Three wind cups located with balanced 120^{o} , photoelectric speed sensor is near axis

Holder： Used to install direction and speed sensor and to fasten junction box

Junction box： Waterproof box and sensor converter

Temperature and Humidity Sensor AM706TH

Application： Measure temperature and humidity, and export to Main unit

Dimension： Total high 400mm

Installation： Bulkhead mounting

Location： Ventilated outdoor，such as top of cab

Constitution： Sensor, junction box and shelter

Technical Requirements

Basic Parameters

Dimension： 10 inch TFT

Display： Wind direction, speed, temperature, humidity, barometric pressure, print interval, alarm setting.

Wind direction simulation range：±180°

Wind direction simulation accuracy： ±1°

Input/output port：	Wind direction/speed input:	1 channel
	DC power input：	2 channels
	Temperature-humidity input：	1 channel
	NMEA0183 input：	3 channels
	NMEA0183output：	2 channels
	Printer output：	1 channel
	Sound-light alarm output：	1 channel

Power supply： DC24V (20~32V)

One channel power through adapter： 110/220V 50/60Hz AC

Environmental Conditions

	Operating temperature	Storage temperature	Relative humidity	Water proof
Main unit	-15°C～+55°C	-20°C～+70°C	10%～90%	IP23
Wind sensor	-15°C～+85°C	-20°C～+85°C	10%～100%	IP56
Temperature humidity sensor	-20°C～+80°C	-20°C～+80°C	0%～100%	IP54

Technical Parameters

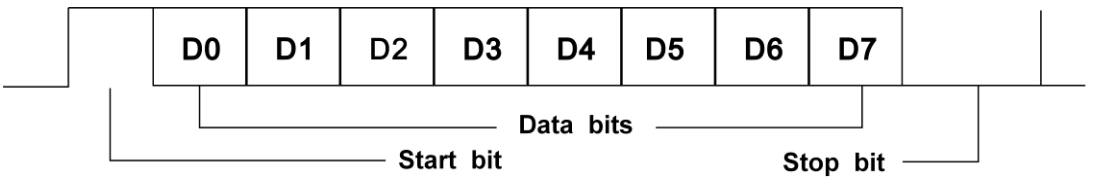
Wind direction range：	0~360°
Wind direction accuracy：	±1°
Wind speed range：	1.2~60m/s
Wind speed accuracy：	±5%（min 0.1m/s）
Min start speed：	≤1.2m/s
Temperature range：	-20~+80°C
Temperature accuracy：	±0.5°C
Humidity range：	0~100%RH
Humidity accuracy：	±4.5%RH
Barometric pressure range：	500~1100hPa
Barometric pressure accuracy：	±4hPa

Input and Output

Data transmission for NMEA0183

Data transmission adpots NMEA0183 format and conforms IEC61162-1 standards.

Date is transmitted in serial asynchronous form. The baud rate is 4800（9600 baud rate is available for GPS data input）, 8-bit data, no parity bit and one stop bit.



GPS data input—RMC

$--RMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a*hh<CR><LF>

1 2 3 4 5 6 7 8 9 10 11 12

(1) UTC of position fix
(2) Status, A=data valid, V=navigation receiver warning
(3) Latitude
(4) Latitude, N/S
(5) Longitude
(6) Longitude, E/W
(7) Speed over ground, knots
(8) Course over ground, degree true
(9) UTC date， dd/mm/yy
(10) Magnetic variation, degree, E/W
(11) Mode indicator, A=Autonomous mode
D=Differential mode
E=Estimated（dead reckoning）mode
M=Manual input mode
S=Simulator mode
N=Data not valid
(12) Checksum value

GPS data input—GGA data input

$--GGA,hmmss.sss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,
1 2 3 4 5 6 7

x.x,x.x,M,x.x,M,x.x,xxxx*hh<CR><LF>
8 9 10 11 12 13 14 15

(1) UTC of position
(2) Latitude
(3) Latitude N/S
(4) Longitude
(5) Longitude E/W
(6) GPS quality indicator：0=fix not available or invalid
1= GPS SPS mode, fix valid
2=differential GPS, SPS mode, fix valid
6=Estimated (dead reckoning) mode
(7) Number of satellites in use, 00-12, may be different from the number in view
(8) Horizontal dilution of precision
(9) Antenna altitude above/below mean sea level(geoid)
(10) Units of antenna altitude, m
(11) Geoidal separation
(12) Units of geoidal separation, m
(13) Age of differential GPS data
(14) Differential reference station ID, 0000-1023
(15) Checksum value

GPS data input—VTG

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>
1 2 3 4 5 6

(1) Course over ground, degree true
(2) Course over ground, degree magnetic
(3) Speed over ground, knots
(4) Speed over ground, km/h
(5) Mode indicator， A=Autonomous mode
D=Differential mode
E=Estimated（dead reckoning）mode
M=Manual input mode
S=Simulator mode
N=Data not valid
(6) Checksum value

Speedlog data input--VBW

Water-referenced and ground-referenced speed data

$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11

(1) Longitudinal water speed, Knots
(2) Transverse water speed, Knots
(3) Status：water speed, A=data valid, V=data invalid
(4) Longitudinal ground speed, Knots
(5) Transverse ground speed, Knots
(6) Status：ground speed, A=data valid, V=data invalid
(7) Stern transverse water speed, Knots
(8) Status：stern water speed, A=data valid, V=data invalid
(9) Stern transverse ground speed, Knots
(10) Status：stern ground speed, A=data valid, V=data invalid
(11) Checksum value

Speedlog data input--VHW

The compass heading to which the vessel points and the speed of the vessel relative to the water.

$--VHW,x.x,T,x.x,M,x.x,N,x.x,K*hh<CR><LF>
1 2 3 4

(1) Heading, degrees true
(2) Heading, degrees magnetic
(3) Speed, knots
(4) Speed, km/h

Gyro data input --HDT

$--HDT,x.x,T*hh<CR><LF>
1 2 3

(1) Heading, degree true
(2) T = true
(3) Checksum value

Main unit output--MWV

$--MWV,x.x,a,x.x,a,A*hh<CR><LF>
1 2 3 4 5 6

(1) Wind angle, 0° to359°
(2) Reference, R = relative, T = true
(3) Wind speed
(4) Wind speed units, K=km/h
M=m/s
N=knots
(5) Status, A = data valid V=data invalid
(6) Checksum value

Main unit output --MDA

$--MDA,x.x,I,x.x,B,x.x,C,x.x,C,x.x,x.x,x.x,C,x.x,T,x.x,M,x.x,N,x.x,M*hh<CR><LF>
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

(1) Barometric pressure
(2) Barometric pressure unit, I=inHg
(3) Barometric pressure
(4) Barometric pressure unit, B=bars
(5) Air temperature
(6) Temperature unit, C=degree
(7) Water temperature
(8) Temperature unit, C=degree
(9) Relative humidity, %
(10) Absolute humidity, %
(11) Dew point
(12) Dew point temperature, C=degree
(13) Relative direction
(14) Wind direction unit, degree T=true
(15) Relative direction
(16) Relative direction, degree M=Relative
(17) Wind speed
(18) Wind speed unit, N=knots
(19) Wind speed
(20) Wind speed unit, M=m/s
(21) Checksum value

Main unit output --MHU

$--MHU,x.x,x.x,x.x,C*hh<CR><LF>
1 2 3 4 5

(1) Relative humidity, %
(2) Absolute humidity, %
(3) Dew point
(4) Dew point unit, C=degree
(5) Checksum value

Main unit output --MMB

$--MMB,x.x,I,x.x,B*hh<CR><LF>

1 2 3 4 5

(1) Barometric pressure
(2) Barometric pressure unit, I=inches of mercury
(3) Barometric pressure
(4) Barometric pressure unit, B=bars
(5) Checksum value

Main unit output --MTA

$--MTA,x.x,C*hh<CR><LF>

1 2 3

(1) Air temperature
(2) Temperature unit, C=degree
(3) Checksum value

Operating Instructions

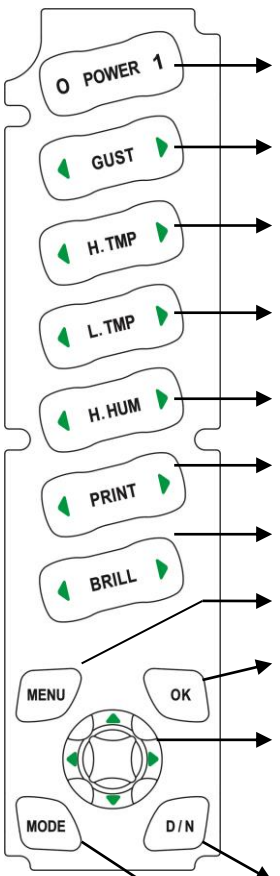
Display

No.	Display	Explanation
1	Current relative/true wind speed	Press [MODE] to switch relative/ true mode. Press [MODE] to switch speed unit.
2	Current relative/true wind direction	Press [MODE] to switch relative or true mode.
3	Power failure alarm	Anyone of two channels power supply failure causes Power Failure Alarm
4	Print set value	Press [PRINT] to select the interval time of printing.

No.	Display	Explanation
5	Menu	Press [MENU] to open window Use direction keys to set up parameters Press [OK] to save settings and exit Automatically save settings and exit without operation in 10s
6	Relative wind direction analog display	Analog display the relative direction of wind and ship bow
7	H.HUM alarm Set Value	Press [H.HUM] to set alarm value or turn off
8	Current relative HUM	Display current relative humidity

9	Current Barometric pressure	Press [MENU] to switch Barometric pressure unit
10	Current TEMP	Press [MENU] to switch temperature unit
11	H/L TEMP Alarm Value	Press [H.TMP] or [L.TMP] to set alarm value or turn off
12	Gust Alarm	Press [GUST] to set alarm value or turn off
13	Input Signal Window	Press [MENU] to open the window and observe input signal

Key Introduction



Switch on/off：0-OFF,1-ON

Gust Alarm：OFF、1~25m/s

High Temperature Alarm：-20~80℃、OFF

Low Temperature Alarm：OFF、-20~80℃

High Humidity Alarm：OFF、1~99%RH

Print Setup：off、5s、15s、30s、60s

Brightness：Adjustable 8 levels，dim ~ bright

[MENU]：Open menu and automatically save/exit

[OK]：In menu, press [OK] to save settings

Direction Key：In menu, up/down keys for options and left/right keys for parameters

[D/N]：Switch day and night display

[MODE]：Switch relative and true mode

[POWER] Power On/Off

Press[POWER 1]to turn on the system，software version is shown at the top left top corner and then the main display.

Power Failure Alarm

After turning on, it self-checks the both channels of power supply. Anyone channel is disconnected, it will cause Power Failure alarm. When power failure alarm is triggered, the main unit buzzer provides long tone alarm (external alarm will not be on when power failure) and red words ‘Power Failure’ are flashing.

Alarm Mute

When alarm is triggered, press any button to mute the alarm (Buzzer and external alarm), but flashing words are still on (External light alarm is also on). When the alarm is triggered again, the system will give the alarm again.

Flashing words (External light alarm) disappear when alarm is turnoff or removed.

[GUST] Gust Alarm

There are two levels of Gust Alarm, 1st Alarm with low frequency and 2nd Alarm with high frequency.

Press left and right arrow of [GUST] key heads to set gust the alarm limits. Press [OK] to select 1st Alarm or 2nd Alarm and the default value is OFF.

Gust Alarm	Setting Value	Unit
1st Alarm	OFF、1~2nd Alarm	m/s
	OFF、1~2nd Alarm	km/h
	OFF、1~2nd Alarm	kn
2nd Alarm	OFF、1st Alarm ~60	m/s
	OFF、1st Alarm ~216	km/h
	OFF、1st Alarm ~116	kn

When current relative/true wind speed is over alarm limits, main unit buzzer and external alerter are turned on, and the value color of the current wind speed becomes yellow to red and continuously flashing.

[H.TMP] High Temperature Alarm

Press left/right arrows of [H.TMP] to set the high temperature alarm and factory setting is OFF.

Set Value	Unit
L.TMP ~80、OFF	℃
L.TMP ~176、OFF	℉

H.TMP limit should be higher than L.TMP limit

When current temperature is higher than alarm limits, main unit buzzer and external alerter are turned on, temperature value color turns yellow to red and continuously flashing.

[L.TMP] Low Temperature Alarm

Press left/right arrows of [L.TMP] to set the low temperature alarm and factory setting is OFF.

Set Value	Unit
OFF、-20 ~ H.TMP	℃
OFF、 -4 ~ H.TMP	℉

H.TMP limit should be higher than L.TMP limit

When current temperature is lower than alarm limits, main unit buzzer and external alerter are turned on), temperature value color turns yellow to red and continuously flashing.

[H.HUM] High Humidity Alarm

Press left/right arrows of [H.HUM] to set the high humidity alarm and factory setting is OFF.

Settings：OFF、1~99%RH

When current relative humidity is less than alarm limits, main unit buzzer bells, humidity number color becomes from yellow to red and continuously flashing.

[BRILL] Adjustable Brightness

Press left and right arrows of [BRILL] to adjust the screen brightness (8 levels) for different ambient brightness.

[PRINT] Printer Setup

Press left and right arrows of [PRINT] to set print functions. Factory setting value is OFF (print off).

Set value：OFF、5s、15s、30s、60s，which is the interval time of auto print. For example, when print setup is 30s, the connected DPU-414 printer will automatically print corresponding data every 30 seconds.

DPU-414 Printer Setup

Dip SW-1
- 1 (OFF):Input=Serial
- 2 (ON):Printing Speed=High
- 3 (ON):Auto Loading=ON
- 4 (OFF):Auto LF=OFF
- 5 (ON):Setting Command=Enable
- 6 (OFF):Printing
- 7 (ON):Density
- 8 (ON):=100%

Dip SW-2
- 1 (OFF):Printing Columns=80
- 2 (ON):User Font Back-up=ON
- 3 (ON):Character Select=Normal
- 4 (ON):Zero=Normal
- 5 (ON):International
- 6 (ON):Character
- 7 (ON):Set
- 8 (OFF):=U.S.A.

Dip SW-3
- 1 (ON):Data Length=8 bits
- 2 (ON):Parity Setting=No
- 3 (ON):Parity Condition=Odd
- 4 (ON):Busy Control=H/W Busy
- 5 (ON):Baud
- 6 (OFF):Rate
- 7 (OFF):Select
- 8 (OFF):=4800 bps.

DPU-414 Printer Printing Contents

1. Relative Wind:250° 5.4m/s True Wind:321° 3.2m/s

Relative wind direction and speed Absolute wind direction and speed

2. Temperature:16.2℃ Humidity:64.0%RH Barometer:1008hPa

Temperature Relative humidity Air pressure

3. 03:08 32° 01.2524N 118° 42.0208E Heading:190.4° Speed:0.0Knots

Time N Northern latitude S Southern latitude E East longitude W West longitude Heading Speed

*Note：Do not print the messages on the third line when no GPS or course and speed information input

[MODE] Mode Switch

Press [MODE] to switch the two wind display modes:

relative wind speed/direction and true wind speed/direction.

[D/N] Day and Night

Press [D/N] to switch the two screen palettes:

black background for night and blue background for daytime.

[MENU]

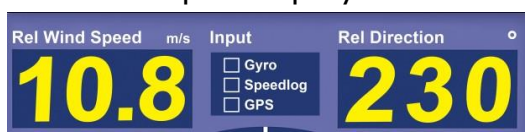
Press [MENU] to open menu window

Press up/down arrow buttons for main options and left/right buttons for settings. Press [OK] to save the set values and exit or automatically save and exit without operation in 10s.

Menu item	Set Value	Explanation
Input Display	OFF ON	Turn on/off input signal window, observe gyro, speedlog, GPS signal input situation *
Speed Unit	m/s km/h kn	Gust alarm and current measured values automatically convert with speed unit conversion
Temperature Unit	°C °F	H/L TEMP alarm and current measured values automatically convert with temperature unit conversion
Barometric pressure Unit	hPa bar mmHg	Current measured values automatically convert with barometric unit conversion
Language	English 中文	Select display language

* Note: Input display OFF

* Note: Input display ON



Maintenance

Main Unit

The main unit is maintenance-free.

If doing the cleaning, use soft cloth and mild detergent, and avoid water drop.

Sensor Part

When there is ice or dirt on sensor to disturb the normal work, please clear in time.

Regularly check external mounting bolts to avoid looseness and the abrasion and ageing of cables

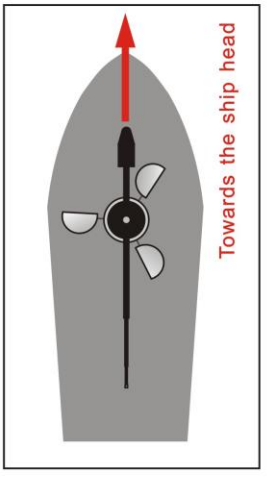
When the equipment breaks down, please contact our engineers of after-sale service department in time. Please do not do the service by yourself.

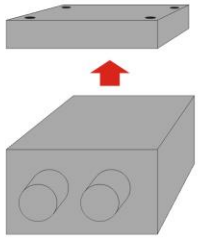
Calibration

Calibration of AM706 wind vane after finishing the installation.

Wind Direction Calibration
风向校准

1. Press POWER key to turn power on.
按主机上的开关键开机





2. Assistant goes up to hold the vane towards the ship head(Fore direction). And open the waterproof junction box.
请助手爬上桅杆将风向标箭头扶正指向船头(正前方),并打开防水接线盒。

3. Press button inside the waterproof junction box, the relative direction towards ship head.
Close the box in the end.
风向标指向船头的同时,按下防水接线盒的按钮。
最后关上防水接线盒。

Installation

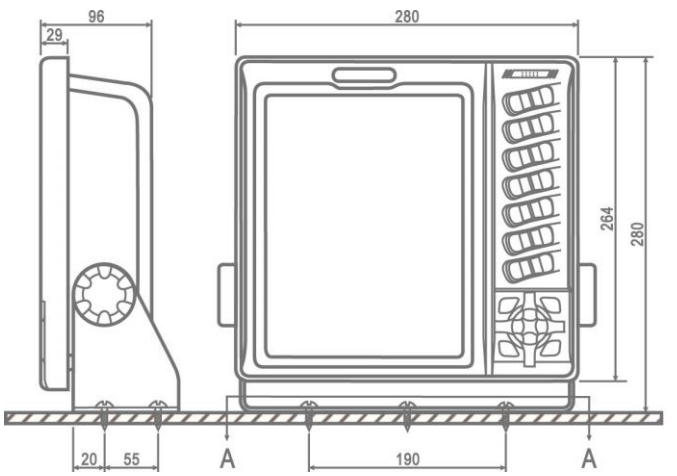
Main unit Installation AM706D

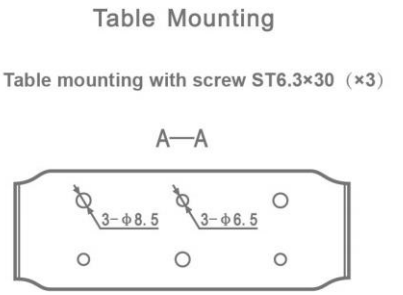
The Main unit has three mounting methods, table, hanging and flush mounting.

Table and Hanging Mounting

The holder supplied by original factory setting is used in table and hung mounting.

Unit：mm



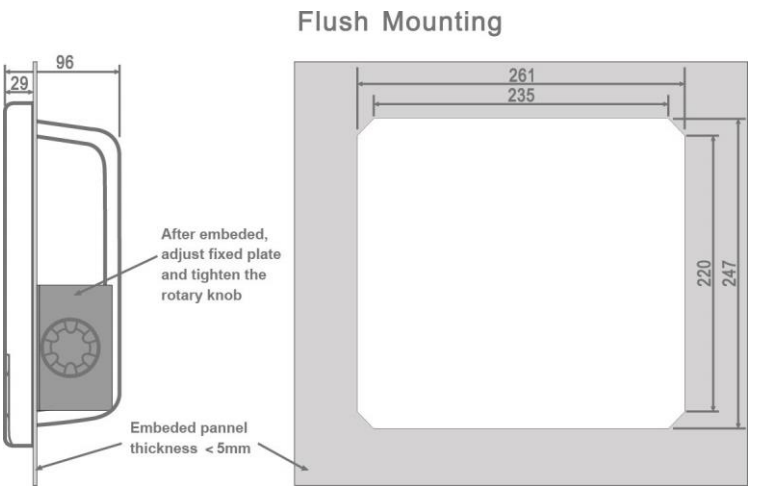


Flushing Mounting

The holder supplied by original factory setting should be used in flushing mounting.

Embed the main unit into the bridge control panel (the dimension is shown below) and tighten the rotary knob to fix the main unit.

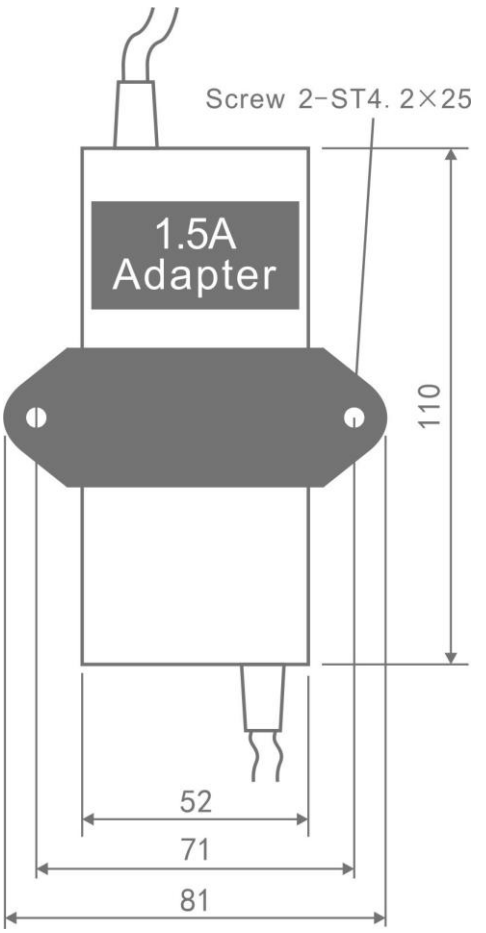
Unit：mm



Power Adapter Installation

Power adapter（GA-240150），AC220/110V to DC24V，adapter holder and screws.

Unit：mm

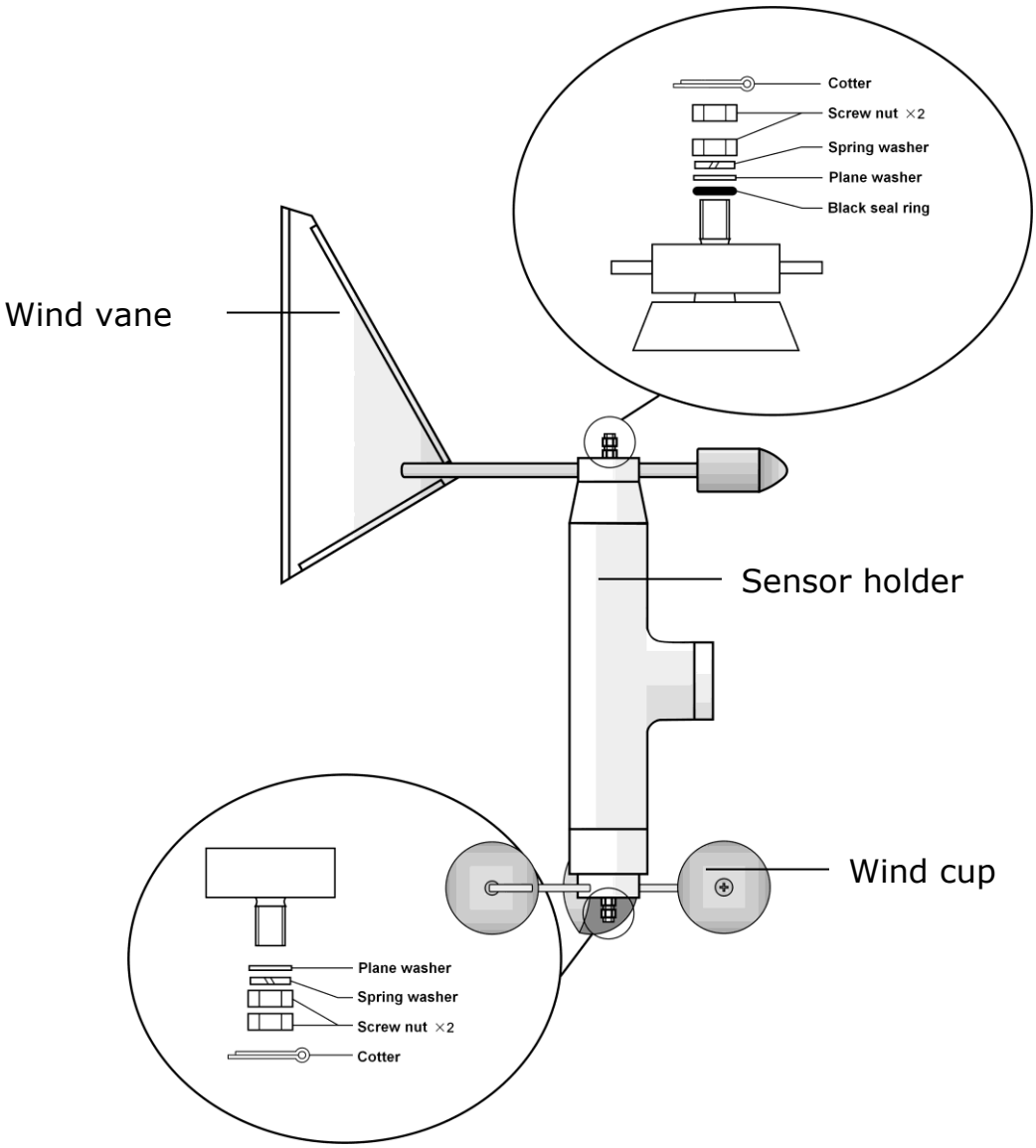


Installation of Wind sensor AM706S

Wind Vane and Wind Cup Installation

[Wind Vane] Wind vane is installed on the top of sensor holder, successively into black seal ring, plane washer, spring washer and 2 screw nuts. The two screw nuts should be tightened and then insert the cotter.

[Wind Cup] Wind cup is installed on the bottom of sensor holder, successively into plane washer, spring washer and 2 screw nuts. The two screw nuts should be tightened and then insert the cotter.



Integral Installation

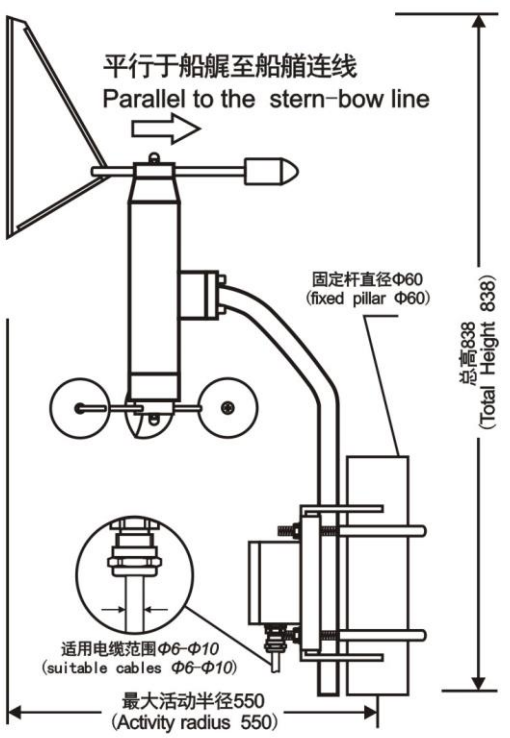
[Space and location] The total height of wind sensor is 838mm. It should be horizontally installed on the ventilated place of ship and the action radius of wind indicator and wind cup is over 550mm.

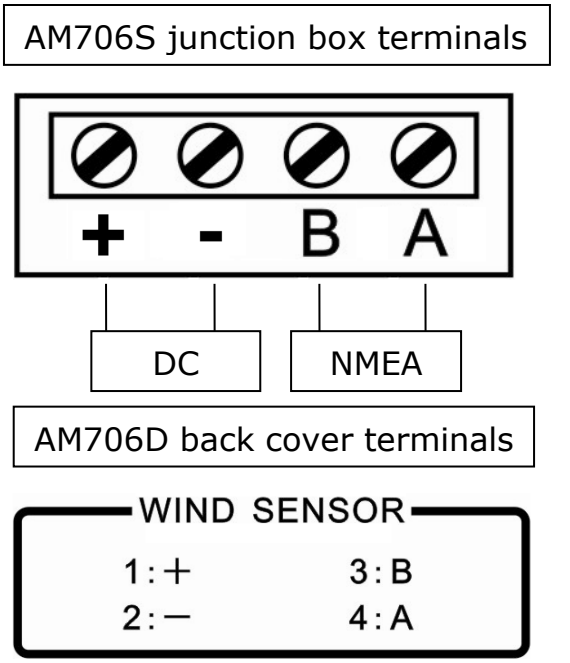
Please note, big Radar antenna rotation can disturb the wind measurement. Find a location away from Radar.

[Integral fixation] Use U-bolt in the accessory to fix wind sensor and the best option of supporting tube diameter is 60mm.

[Wiring] 4-core screened cable with external diameter 4mm~6mm is connected with 4 terminals +、-、B、A through glands of junction box. Please pay attention on wire colors and sequence in order to correctly connect the wiring terminals of back cover, 1+ 2- 3B 4A.

[Calibration] After the installation of main unit of wind sensor, do the calibration of wind direction based on Calibration.





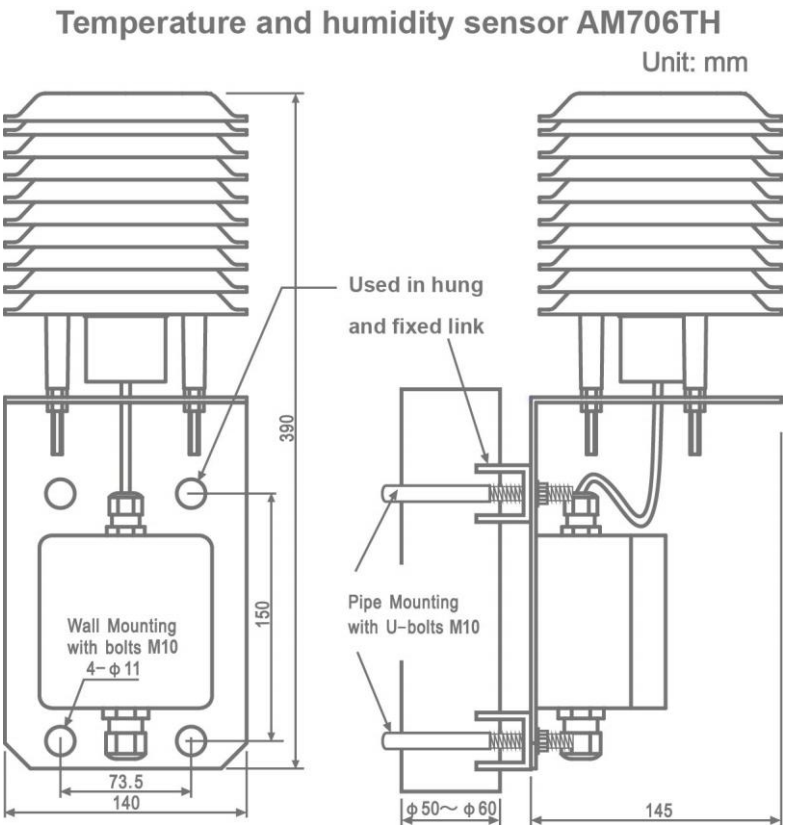
Temperature and Humidity Sensor Installation

Temperature and Humidity Sensor AM706TH

Temperature and humidity sensor AM706THcan be installed in hung and fixed link mounting methods.

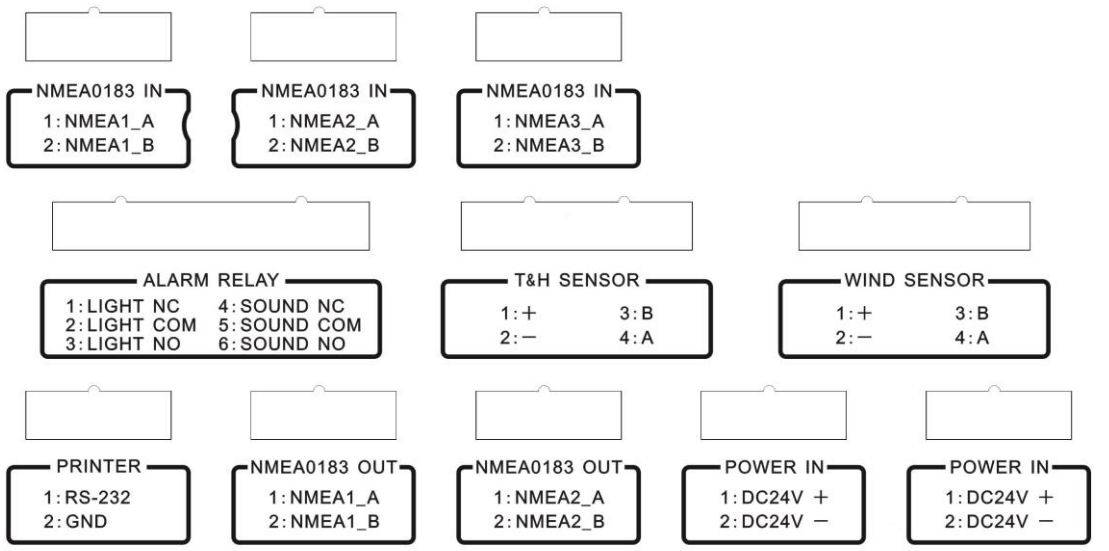
AM706TH with M10 bolt is installed on the vertical wall or with U-blot M10 is installed over vertical pipe fitting.

Unit：mm



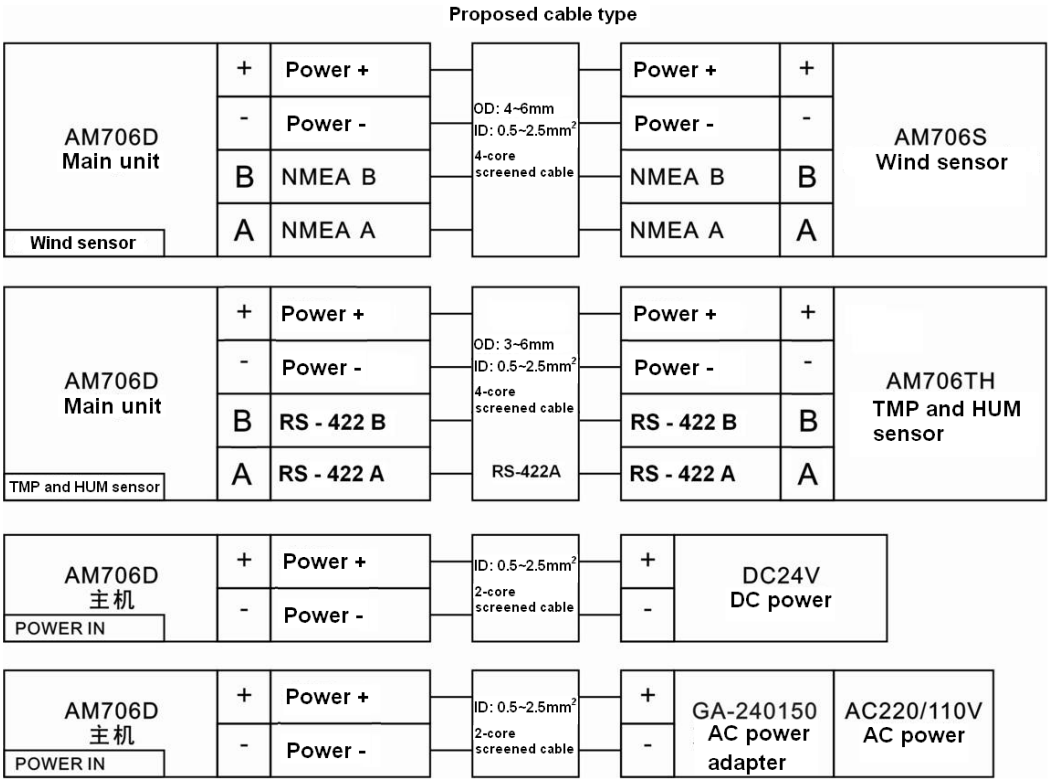
Wiring explanation

Wiring diagram of AM706D back cover



System internal connection

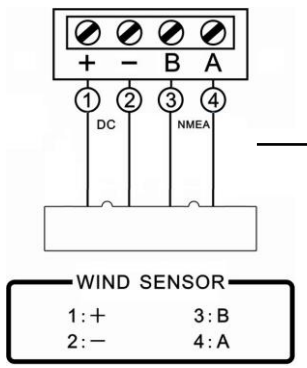
System internal wiring diagram



Wind sensor AM706S - Main unit AM706D

4-core screened cable with external diameter 4mm~6mm is connected with 4 terminals +、-、B、A through glands of junction box. Please pay attention on wire colors and sequence in order to correctly connect the wiring terminals of back cover, 1+ 2- 3B 4A.

AM706S internal terminals



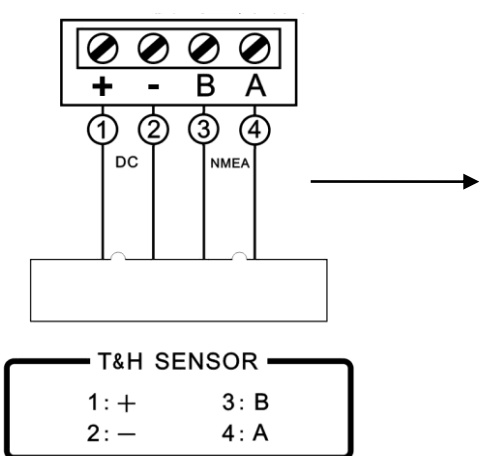
4-core screened cable with external diameter 4-6mm

AM706D back cover terminals

TMP and HUM sensor AM706TH-Main unit AM706D

4-core screened cable with external diameter 3mm~6mm is connected with 4 terminals +、-、B、A through glands of junction box. Please pay attention to wire colors and sequence in order to correctly connect the wiring terminals of back cover, 1+ 2- 3B 4A.

AM706TH internal terminals

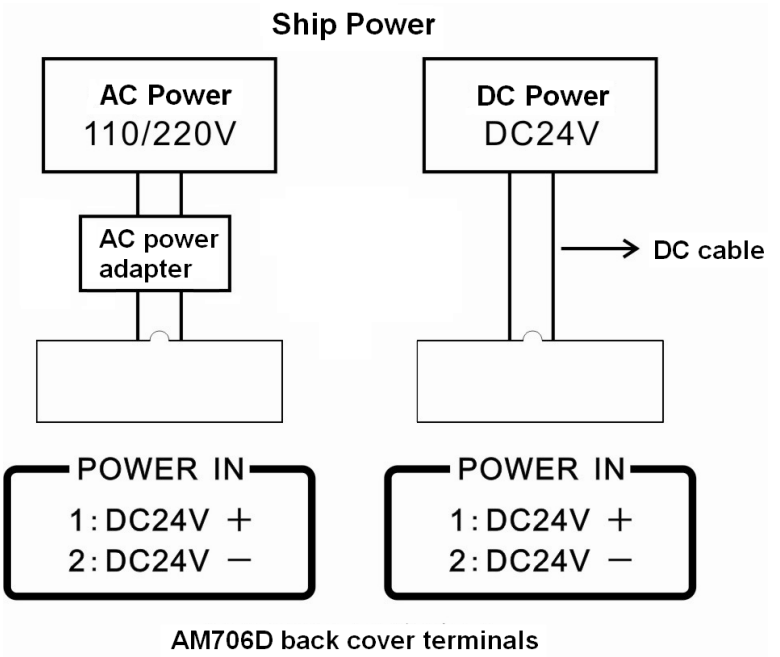


4-core screened cable with external diameter 3-6mm

AM706D back cover terminals

Main unit AM706D Power in

Connect DC cable and ac power adapter (GA-240150) with ship power.



AM706D back cover terminals

System external connection

System external wiring diagram