



Operation & Installation Manual

Flagship Series Fiber Optic Gyrocompass System

- Flagship-15 Series Master Gyrocompass**
- Flagship-19 Series Master Gyrocompass**
- Power Supply Unit**
- Data Distribution Unit**

Shanghai Flagship Marine Technology Co., Ltd.

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No.	Date	Description	Version
1	2019-06-05	Initial Release	V1.0
2	2021-03-05	1.Added information of high-precision model FLAGSHIP-19A; 2.Added definition of master compass terminal blocks.	V1.1
3	2021-04-15	1.Added/removed partial equipment performance data according to actual requirements; 2. Updated installation requirement: The reference line of the master compass shall be parallel to the ship's fore-and-aft reference line with a tolerance of $\leq 0.1^\circ$.	V1.2
4	2022-12-30	Upgraded power supply unit & data distribute Unit; Updated relevant content.	V1.3
5	2023-06-02	Optimized the description of partial parameter information	V1.4
6	2023-12-18	Optimized and updated content related to the power supply unit & data distribution unit.	V1.5
7	2026-01-25	Document content consolidation and integration of Series 15.	V2.0



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Safety Instructions



Caution

Keep the equipment away from heat sources or direct sunlight. For the safety of the ship's navigation, it is prohibited to arbitrarily turn off the power during navigation.



Warning

Persons not authorized by the manufacturer are not allowed to open the equipment for modification or maintenance.



Alarm

Please ensure that the power switch is turned off before installation. If a fire or smoke is detected, please turn off the power switch immediately.



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FLAGSHIP-15/19 Series Fiber Optic Gyrocompass(FOG)

Operation & Installation Manual

1 Product Overview

FLAGSHIP-15/19(FS-15/19) series fiber optic gyrocompass (FOG) is the inertial navigation device which is the core of the fiber optic gyroscope. It is through from the internal three-axis fiber optic gyroscope and three-axis accelerometer, independently measure the angular and linear motion information of the ship at the current position and calculate the heading, attitude, speed, position and other information, and the information is continuously provided to the outside world through the data transmission and processing system. FS-15/19 series FOG is the best choice of marine navigation, dynamic positioning, and marine engineering motion measurement. It can be applied to the new shipbuilding equipment and suitable for replacement of the old gyrocompass.

1.1 Product Features

FLAGSHIP-15/19 series FOG main features:

- ✧ Stable heading messages output, the highest accuracy is $0.04^{\circ}\text{sec}\Phi(1\sigma, \text{RMS})$
- ✧ Multi-outputs of RS422、RS23, and network interfaces
- ✧ The mooring alignment time is 10 min, and support alignment function in the state of constant speed straight line navigation with 30 min
- ✧ support high latitude navigation
- ✧ small size, light weight, and support ordinary express
- ✧ no mechanical gyroscope, maintenance-free design, and no replacement components
- ✧ Support MRU/ heave measurement and inclinometer function (FLAGSHIP-19 nonsupport the function)

FLAGSHIP-15/19 series FOG complies with standards:

- SOLAS 74 Convention as amended, Regulations V/18 and V/19
- IMO Res. A.424(11)
- IMO Res. A.694(17)
- IMO Res. MSC.191(79), MSC.302(87)
- ISO 8728:2024
- IEC 60945 (2002) incl./Corr. 1 (2008)
- IEC 61162 series: IEC 61162-1 (2024) - IEC 61162-2 ed1.0 (2024) - IEC 61162-3 ed1.2 Consol. with am1 ed. 1.0 (2010-11) and am2 ed. 1.0 (2014-07) - IEC 61162-450:2018,
- IEC 62288 Ed. 3.0:2024
- IEC 62923-1:2018
- IEC 62923-2:2018

For gyro compass for HSC:

- IMO MSC.1/Circ.1349, MSC.36(63), MSC.97(73)
- IMO Res. A.821(19)
- ISO 16328: 2014

1.2 System Composition

FLAGSHIP-15/19 series FOG has three parts that includes master FOG, power supply unit, and distribution unit (PDU). The system composition diagram is as follows Figure 1-1.

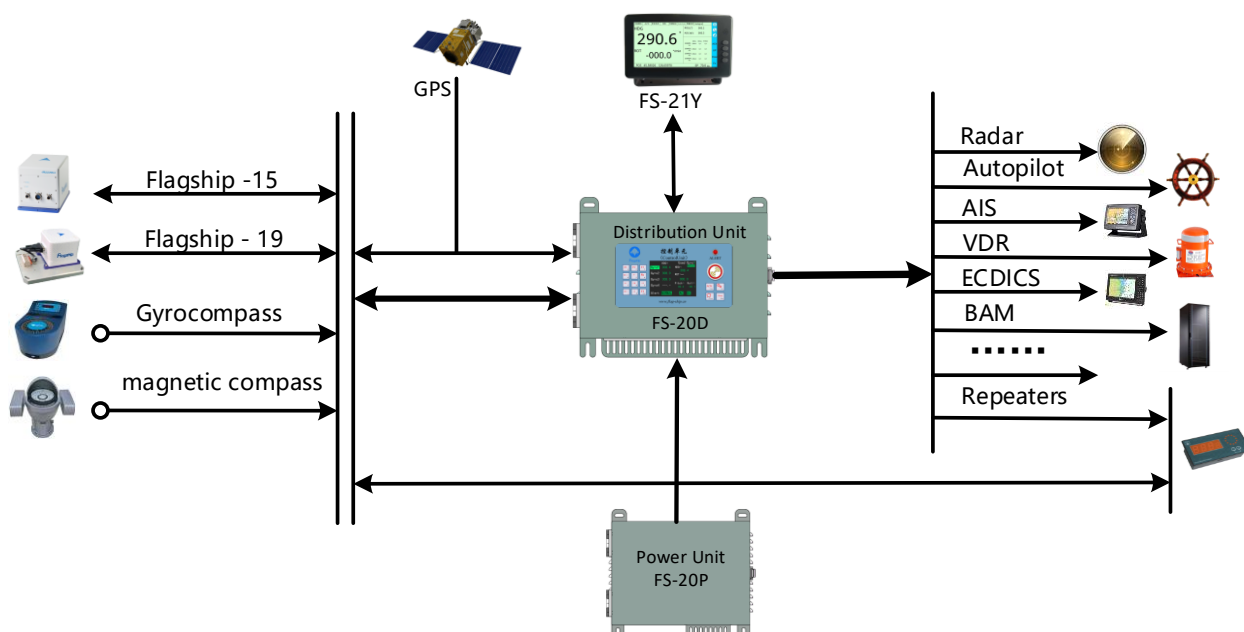


Figure 1-1: FLAGSHIP-15/19 series system composition

1.3 System models and configurations

Table 1-1. FLAGSHIP-15/19 series FOG system models and configurations

S/N	Product	Models	Description	IP Grade
1	master FOG-heading accuracies	FLAGSHIP-19	0.22°secΦ (RMS)	IP32
		FLAGSHIP-19A*	0.1°~0.14°secΦ (RMS)	IP32
		FLAGSHIP-15	0.1°secΦ (RMS)	IP32
		FLAGSHIP-15A	0.04°secΦ (RMS)	IP32
2	master FOG-attitude accuracies	FLAGSHIP-19	0.07° (RMS)	IP32
		FLAGSHIP-19A*	0.01°~0.05° (RMS)	IP32
		FLAGSHIP-15	0.04° (RMS)	IP32
		FLAGSHIP-15A	0.02° (RMS)	IP32
3	Master FOG-heave accuracy	5 cm / 5% (max) (FLAGSHIP-19 nonsupport)		IP32
4	Power Supply Unit	FS-20P	power supply system	IP20
5	distribution unit (DU)	FS-20D	● IN/OUT signals ● Statement protocol match ● alert output	IP20
6	Control unit CU)	● default built-in FS-20D ● far from the operation table/the console installation(optional)	display & control	IP20



S/N	Product	Models	Description	IP Grade
7	LCD control unit (optional)	A8-AP20	Display & control	IP20
8	LCD control unit (optional)	FS-21Y	display & control	IP20

Note : Flagship-15A*/19A* series details of accuracy indexes in APPENDIX B TECHNICAL SPECIFICATIONS

Table 1-2. FLAGSHIP-15/19 series FOG weights, size, and power consumption

S/N	products	models	weights (kg)	dimensions (mm)	power consumption (W)
1	master FOG	Flagship-19	3	138 x 113 x 89	8
2	master FOG	Flagship-19A	3	138 x 113 x 89	8
3	master FOG	Flagship-15	10	272 x 192 x 191	15
4	master FOG	Flagship-15A	10	272 x 192 x 191	15
5	power supply unit	FS-20P	5.6	302 x 259 x 150.3	60~240
6	distribution unit (DU)	FS-20D	4.5(include CU)	322 x 255 x 130	10~60
7	control unit(CU)*	FS-20C	0.7	186 x 100 x 60	5
8	LCD control unit (optional)	A8-AP20	2	207 x 145 x 41	12
9	LCD control unit (optional)	FS-21Y	1.6	213 x195(include the bracket)/153 x82	5

Note: control unit (CU)*, the control unit supports far from installation, and the details of installation and dimensions in APPENDIX E

2 Basic Operations

2.1 Power on / Start up the Equipment

Before starting the equipment, please check that the device connections are correct and there are no abnormalities such as loose cables or structural looseness. Start the system by turning on the power disconnect switch in the power box.

2.1.1 Moored Power on

The FLAGSHIP-15/19 series fiber optic gyrocompass should have initial alignment while the vessel is moored. After powering on, the device receives correct external position and velocity information for initial alignment, and switches to navigation mode after 10 minutes. In navigation mode, the vessel can sail at any time. The FLAGSHIP-15/19 series fiber optic gyrocompass can track the vessel's heading and horizontal motion state in real-time. If the GPS signal is abnormal during startup, it is recommended to restart the device once the GPS signal is normal again.

2.1.2 Navigation Startup

When the vessel is underway, if the FLAGSHIP-15/19 series fiber optic gyrocompass malfunctions due to sudden reasons such as power failure or operator error, the equipment can be restarted by powering it off and then on again. During sea navigation alignment, the vessel should maintain a constant speed and straight course for at least 30 minutes before entering navigation state, after which the vessel can resume normal sailing.

2.1.3 Master Compass Working Status Indicators

The FLAGSHIP-15/19 series master compass has status indicator lights and GPS status indicator lights. These indicators will light up simultaneously after power on. The specific definitions of the indicator states are detailed in section 3.5. The location of the indicators is shown in the figure below:

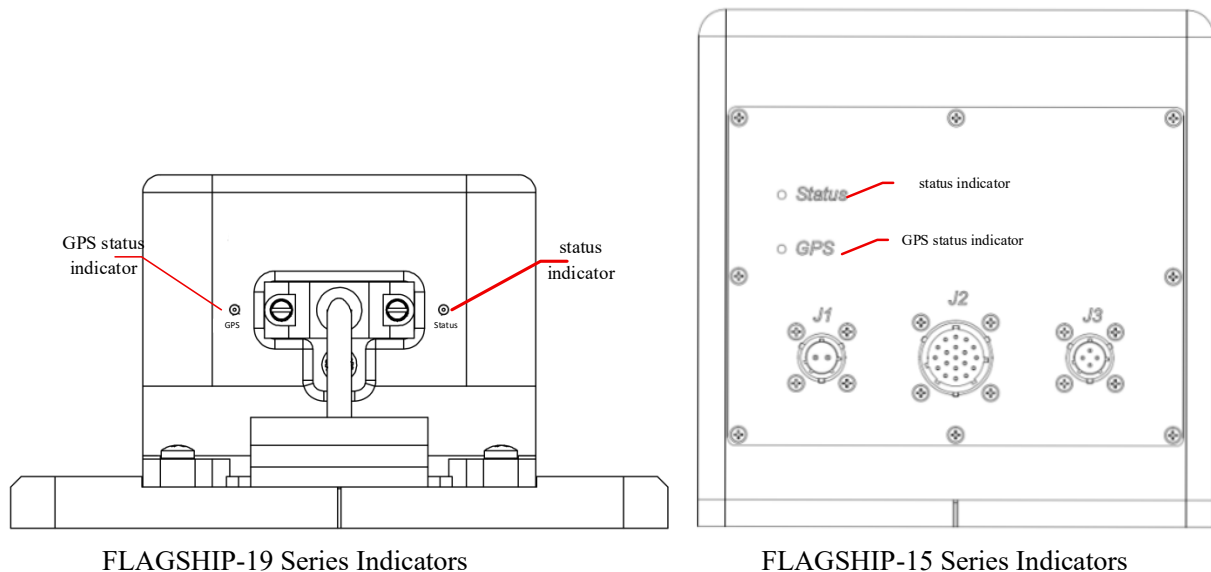


Figure 2-1 Master Compass Working Status Indicator Lights

2.2 Control Unit (CU) Introduction

The Control Unit (CU) connects to the Data Transmitting Unit (DU) and can monitor multiple gyro systems and configure parameters. As shown in the figure below, the control unit panel consists of a keyboard, display screen, indicator lights, and a buzzer.

- ◆ Status Indicator Lights and Buzzer: The indicator lights provide orange and yellow indication light; the buzzer provides a "beep" sound prompt.
- ◆ Control Unit Keyboard: The CU keyboard has two modes: Operation Mode (red label) and Numeric Mode (black label). The keyboard only switches to Numeric Mode via the "OK" key when numeric input is required. Input is finalized and returns to Operation Mode by pressing "Enter" in Numeric Mode.



Figure 2-2 Control Unit (CU) Panel

Table 2-1 Control Panel Description

System Module	Function Description
Keyboard	Input parameters / Configuration selection / Alarm management / Read parameters
Display Screen	Display heading / Parameters / GNSS / Time / Alarms, etc
Indicator Lights	Visual alarm
Buzzer	Audible alarm

2.3 Basic Control Unit Operations

2.3.1 Main Display

"Home" Button: Main (Home) Display;

Display four gyros heading information and pitch/roll information for the Flagship fiber optic gyrocompass, as well as the currently used gyro signal source. Shows alarm status (alarm priority) and power status.

HDG(°)	Used Gyro1
Gyro1 308.4	Manual
Gyro2 308.0	308.4
Gyro3 308.0	ROT (°/min)
Gyro4 ---	000.0
Pitch (°)	Roll (°)
00.4	-00.1
Alert	NORMAL AC DC

Home Page (No Alarm)

HDG(°)	Used Gyro1
Gyro1 308.4	Manual
Gyro2 308.0	308.4
Gyro3 308.0	ROT (°/min)
Gyro4 ---	000.0
Pitch (°)	Roll (°)
00.4	-00.1
Alert	[W] (A) DC Power Loss

Home Page (With Alarm)

2.3.2 Gyro Selection Display

"F1" Button: Gyro signal selection display;

In the gyro selection display, use the "↑" and "↓" keys to choose. Press "OK" to confirm the selection. The selection is only valid if the current signal is valid. When "SELECTED" moves to the position of the chosen gyro, the switch is successful.

If the gyro signal is lost, it will switch to another signal source. When the original signal source recovers, the system will not automatically switch back; manual confirmation and switching are required. When triggering a switch, the signal source priority order is Gyro1 > Gyro2 > Gyro3 > Gyro4.



Select the compass			
Gyro1	308.4	SELECTED	
Gyro2	308.0	<--	
Gyro3	308.0		
Gyro4	---	--	
Type:	FSFgCps	Status:	103
HDG	308.0	ROT	000.0
Pitch	00.1	Roll	-00.2

2.3.3 GNSS Display

“Second press of "F3" button: GNSS information display (GNSS Message Panel).

Displays information for the connected GNSS system.

GNSS Message Panel	
Status:	PPS nUStar: 12
HDOP:	1.5 Speed: 00.0 Knot
Lon (°):	126.682090 Lon (°): 45.77477
GNHDG:	---
UTC:	06:40:50 2023/09/02
Used:	
The Msg From External	

2.3.4 PDU Configuration Information Display

First press of "F3" button: PDU configuration information display; Use "↑" and "↓" keys to page through the current sub-page; Use "←" and "→" keys to switch sub-pages;

Displays configuration information and device status for the DU.

Communication Panel				
	InFr	ErP	ErT	Total
Gyro1	10.0	0	0	5502243
Gyro2	10.0	0	0	5623012
Gyro3	10.0	0	0	5552345
G4/85	00.0	0	0	0
GNSS	06.0	0	0	1066756
BAM	00.0	0	0	0
T-Tim	001-18:45:05 Gongfig Data Got OK!			
	left/right	01/05	up/down	01/02

Communication Status

Communication Panel					
	Type	Auto ROT	HDGErr	Pitch Err	Roll Err
Gyro1	FSFgCps	OFF	0.00	0.00	0.00
Gyro2	FSFgCps	OFF	0.00	0.00	0.00
Gyro3	AllType	OFF	0.00	0.00	0.00
G4/85	AllType	OFF	0.00	0.00	0.00
Left/right 02/05					

Channel Parameters

Ports Config Panel					
Name	Baud rate	Parity	Data bit	Stop bit	Mode
Gyro1	115200	N	8	1	---
Gyro2	115200	N	8	1	---
Gyro3	115200	N	8	1	---
GNSS	004800	N	8	1	---
G4/85	004800	N	8	1	IN_M
Left/right 03/05 up/down 01/03					

Port Physical Parameters

Sentence Config Panel	
OUT 1:	Usedx/ No SW: 4; HEHDT, 50
	FSMAR, 1000; HEHROT, 500; PHTR0, 500;
Left/right 04/05 up/down 01/06	

Output Channel Configuration

About the PDU	
Soft Ver:	micro SD: V2HC
CU1: C1_2204020C	Size: 14.830 GB
DU1: D1_2204021B	14.590 GB
DU2: D2_00040204	NavLog: Saving
Log: 0:/NLGDAT/2601/10000001.dat	
Copyright 2023 FlagShip	
www.flag-ship.cn 7D693	
Left/right 05/05	

Version and Storage Information

2.3.5 Alarm Display

First press of "F2" button: Alarm display (Alert Panel);

Second press of "F2" button: Historical alarm display (Alert History);

Displays the active alarm list and historical alarm list. For details, refer to Chapter 3 Alarm Introduction.



Alert Panel					
1	2	[W] (V) DC IN	26-01-10 (V) 08:59:58	DC Power IN Lose	
2	17	[C] (V) ErG12	26-01-10 (V) 08:59:58	DC Power IN Lose	
ActiveTotal:2					

Active Alarm List

Alert History						07
	AID	NAME	StartTime	EndTime		
1	2	DC IN	251221 085522	251221 090324		
2	2	DC IN	251221 101208	251221 103456		
3	8	G2M	251221 110500	251221 113314		
4	4	DC IN	251221 123006	251221 135244		
5	8	G2M	251222 083928	251222 085346		
6	4	DC IN	251229 085042	251229 120538		
7	1	AC IN	260108 013256	260108 090000		
8						
9						
U/D Move the Row L/R Turn Page						0/ 7

Historical Alarm List

2.4 Control Unit Advanced Settings

In the "Gyro Selection Display", quickly and continuously press the "SET" key, enter the password "82518251" to enter the settings menu:

- ◆ "Ports Config Set"
- ◆ "Output Config Set"
- ◆ "GYROIN Msg Set"
- ◆ "FS FOGCPS Set1"
- ◆ "FS FOGCPS Set2"
- ◆ "PDU_GE_SET"

PDU Setting Menu

Ports Config Set

Output Config Set

GYROIN Msg Set

FS FOGCPS Set1

FS FOGCPS Set2

PDU_GE_SET

UP/DOWN SELECT

2.4.1 Port Parameter Settings (Ports Config Set)

Used to set PDU port parameters (baud rate, data bits, parity, stop bits), as shown in the figure below. PortName corresponds to the target port to be configured, mainly including the following ports: "Gyro1", "Gyro2", "Gyro3", "GNSS", "G4/85", "BAM", "OUT 1", "OUT 2", "OUT 3", "O4/85", "O5/85", "OUT 6", "Dbg" (reserved).

PDU IN Ports Config

PortName: <OUT 1>

BaudRate: <38400>

Parity: <N>

DataBits: <8>

StopBits: <1>

Get

Save

Quit

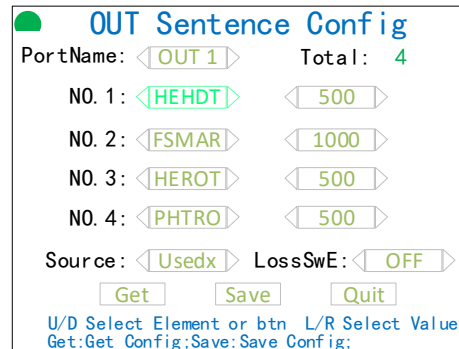
U/D Select Element or btn L/R Select Value
Get:Get Config.Save:Save Config;

2.4.2 Output Config Set

Used to set the output statements and transmission cycle for 6 groups of outputs. OUT1~6 support this setting, with each port supporting up to 10 statements. Total: indicates the number of currently configured valid statements; HEHDT represents the statement name, and the 500 following it indicates the transmission cycle is 500ms. The

Source option is used to select the output signal source; Usedx means using the system-selected signal source; Gyro1-Gyro4 means fixedly using the signal source from that channel. LossSwE: Select "ON" so that when the fixed signal source is lost, it will automatically switch to the Usedx signal source and switch back automatically when the original signal source recovers; otherwise "OFF" for no action.

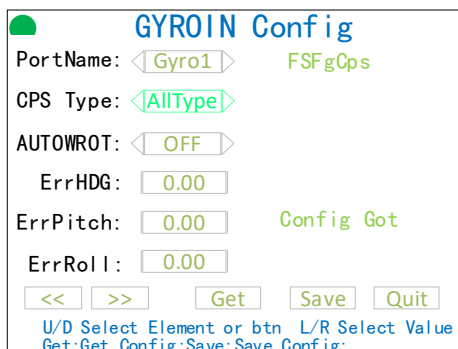
Note: The baud rate limits the total bytes transmitted per second. The total output protocol volume needs to be coordinated with the transmission cycle and baud rate to avoid data down-frequency and lag phenomena.



2.4.3 Input Gyro Information Settings (GyroIn Msg Set)

Used to set the type of input gyro signal. As shown in the figure below:

- ◆ Compass Type (CPS Type) Setting: Includes "AllType" (all types), "FSFgCps" (FLAGSHIP Fiber Optic Gyrocompass), "Fog Cps" (Fiber Optic Gyrocompass), "GyroCps" (Electromechanical Gyrocompass), "Mag Cps" (Magnetic Compass), "GNSSCps" (Satellite Compass, GPS Compass). Statement Recognition: When the input statement does not match the type, the system will choose to parse the statement as follows:
 - ✧ FSFgCps: Supports master compass parameter configuration, parses FSMAR, HEHDT, HETHS, HEROT statements, etc.
 - ✧ Fog Cps、GyroCps: Only parses heading and heading rate information from HEHDT, HETHS, HEROT statements.
 - ✧ Mag Cps: Only parses HDT, THS, ROT heading and heading rate statements from HC, HF. For HDG, HDM statements, heading information parsing priority: THS > HDT > HDG > HDM. HDG will compensate for magnetic variation.
 - ✧ GNSSCps: Only parses HDT, THS, ROT heading and heading rate statements from GP, GN, and HPR satellite statements.
 - ✧ AllType: Parses all statements. Heading statement parsing priority: THS > HDT > HDG > HDM.
- ◆ AUTOWROT: When enabled, if there is no ROT input, it will automatically calculate ROT data using heading information; requires heading statements at no less than 1Hz, otherwise calculation will not occur.
- ◆ Installation Error (ErrHead, ErrPitch, ErrRoll): The error parameters for this gyro stored in the PDU.



GYROIN Config

PortName: FSFgCps

CPS Type:

AUTOWROT:

ErrHDG:

ErrPitch: Config Got

ErrRoll:

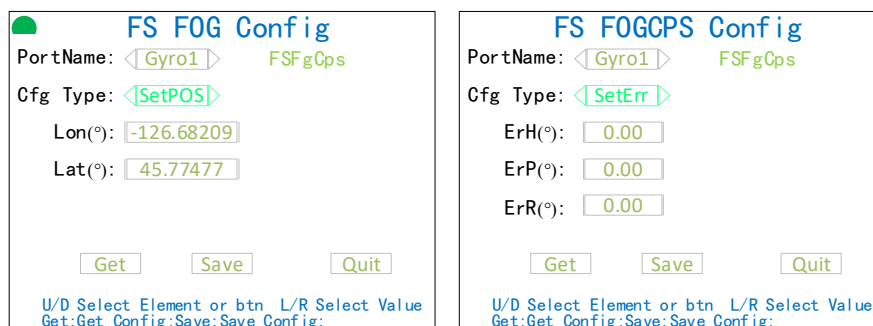
<< >> Get Save Quit

U/D Select Element or btn L/R Select Value
Get:Get Config;Save:Save Config;

2.4.4 FlagShip Fiber Optic Gyrocompass Parameter Settings 1 (FS FOGCPS Set1)

Used for manually entered position and installation error settings for FS fiber optic gyrocompasses. The compass type must be set to "FSFgCps". As shown in the figure below:

- ◆ PortName: Select the input port for the FS fiber optic gyro.
- ◆ Cfg Type is used to switch between the manually entered position and installation error interfaces. When the selection box is on parameters like Lon, Lat, etc., press the "OK" key to enter numeric input, and "Enter" to finish input. It is recommended to first obtain the current parameters during initial writing.



FS FOG Config

PortName: FSFgCps

Cfg Type:

Lon(°):

Lat(°):

Get Save Quit

U/D Select Element or btn L/R Select Value
Get:Get Config;Save:Save Config;

FS FOGCPS Config

PortName: FSFgCps

Cfg Type:

ErH(°):

ErP(°):

ErR(°):

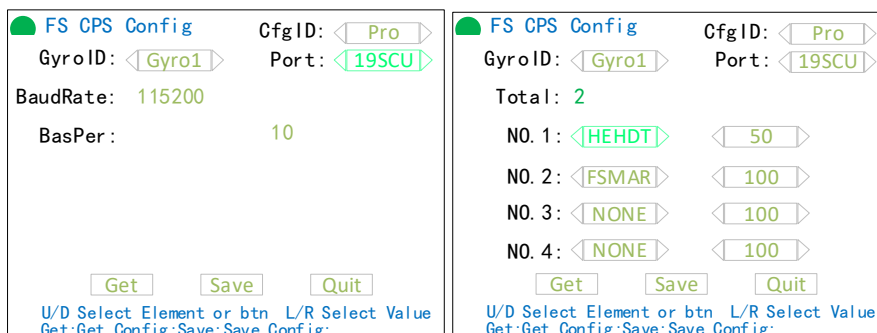
Get Save Quit

U/D Select Element or btn L/R Select Value
Get:Get Config;Save:Save Config;

2.4.5 FlagShip Fiber Optic Gyrocompass Parameter Settings 2 (FS FOGCPS Set2)

Used for FS FOG port parameters, statement, and cycle settings. The compass type must be set to "FSFgCps".

- ◆ CfgID is used to switch between the port parameters and statement/cycle displays.
- ◆ Port includes FS15 gyro ports (15SCU, 15OT1, 15GT2, 15LT3, 15OT4) and FS19 gyro ports (19SCU, 19OT2, 19GPS).
- ◆ GyroID refers to the access port connected to the gyro.
- ◆ BaudRate is the baud rate for the selected port of the FS FOG.
- ◆ BasPer defaults to 10 (ms) here. If the acquired value is not 10ms, it needs to be rewritten. Statement and cycle settings: The setting method is similar to section 2.4.2.



FS CPS Config

CfgID:

GyroID: Port:

BaudRate: 115200

BasPer: 10

Get Save Quit

U/D Select Element or btn L/R Select Value
Get:Get Config;Save:Save Config;

FS CPS Config

CfgID:

GyroID: Port:

Total: 2

NO. 1:

NO. 2:

NO. 3:

NO. 4:

Get Save Quit

U/D Select Element or btn L/R Select Value
Get:Get Config;Save:Save Config;

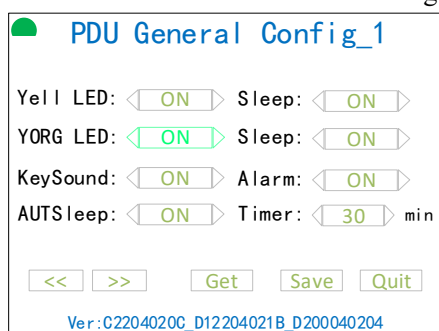
2.4.6 PDU General Settings (PDU_GE_SET)

A. PDU General Config_1, parameter settings:

- ◆ Yell LED: Yellow LED enable (reserved); Sleep: Follows screen off (reserved)
- ◆ YORG LED: Orange LED enable (reserved); Sleep: Follows screen off (reserved)
- ◆ KeySound: Keypress sound enable
- ◆ Alarm: Alarm sound enable (reserved)
- ◆ AUTSleep: Automatic screen off enable; Timer: Automatic screen off time

B. PDU General Config_2, numerical alarm settings:

- ◆ ValueName: Numerical alarm name (see Chapter 3 Alarm Types, Classifications, and Priorities)
- ◆ ENABLE: Alarm function enable
- ◆ LED (Blinker): LED visual alarm enable
- ◆ Sound: Single short beep sound enable
- ◆ ValueL: Level 1 threshold for prompt value range, triggers LED and screen alarm
- ◆ ValueH: Level 2 threshold for warning value range, triggers sound alarm (can be disabled)



PDU General Config_1

Yell LED: Sleep:

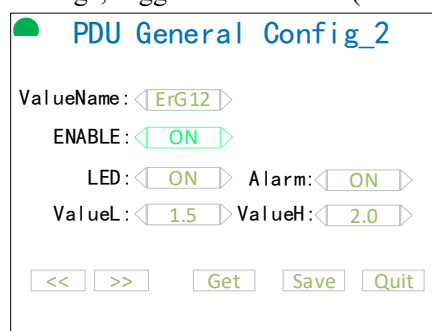
YORG LED: Sleep:

KeySound: Alarm:

AUTSleep: Timer: min

<< >> Get Save Quit

Ver: C2204020C_D12204021B_D200040204



PDU General Config_2

ValueName:

ENABLE:

LED: Alarm:

ValueL: ValueH:

<< >> Get Save Quit

3 System Alert Introduction

3.1 Fiber Optic Gyrocompass Alert Types

The fiber optic gyrocompass system features two major categories of alerts: operating status alerts and parameter prompt alerts.

- ◆ Operating status alerts are items related to the reliable operation of the fiber optic gyrocompass system, mainly including main/backup power supply alert, master gyrocompass signal loss alert, and master gyrocompass fault alert. Such alerts will be provided to the BAM system via the BAM interface.
- ◆ Parameter prompt alerts mainly include GNSS status alert, multi-compass heading difference alert, heading angular velocity upper limit alert, pitch angle upper limit alert, roll angle upper limit alert, and GNSS HDOP upper limit alert. The absence of these alerts will not affect the normal operation of the fiber optic gyrocompass system, so they are only indicated on the control unit.

A. Operating Status Alerts

The fiber optic gyrocompass system is Class P equipment, which is equipped with Category B and Warning-priority. The classification and priority of alerts are shown in Table 3-1, and the alert status indication is shown in Table 3-2.

Table 3-1 Alert Classification and Priority

NO.	Alert Identifier	Alert Instance	Alert Name	Alert Category	Priority
1	3022	1	Main Power Failure	Category B	Warning
2		2	Backup Power Failure		
3	3062	7,8,9,12	Sensor Failure		
4		3,4,5,11	Sensor Signal Loss		

Table 3-2 Warning Alert Status

NO.	Status	Visual presentation (LED)	Audible annunciation
1	active – unacknowledged	Yellowish orange flashing I (2Hz)	2 short beeps, repeating every 5 minutes
2	active – silenced	Yellowish orange flashing I (2Hz)	No audible signal and no speech output
3	active – acknowledged	Yellowish orange steady II	No audible signal and no speech output
4	active – responsibility transferred	Yellowish orange steady II	No audible signal and no speech output
5	rectified – unacknowledged	Yellowish orange flashing III (1Hz)	No audible signal and no speech output
6	normal	None	No audible signal and no speech output

B. Parameter Prompt Alerts

All alerts in this category are Caution-level alerts. Only visual prompts are provided by default, and users can enable the audible alert with one short beep as required. These prompt alerts are only displayed and indicated on the control unit and will not be sent to the BAM system. Items 2 to 15 are numerical alerts. A threshold is set for each type of alert, and the corresponding prompt alert will be triggered when the value exceeds the relevant threshold.

Table 3-3 Parameter Prompt Alerts

NO.	Alert Identifier	Alert Instance	Alert Name	Priority	Remarks
1	3062	0x06(6)	GNSS Status	Caution	
2		0x11(17)	Heading Deviation 12		
3		0x12(18)	Heading Deviation 13		
4		0x13(19)	Heading Deviation 23		
5		0x14(20)	ROT 1		
6		0x15(21)	ROT 2		
7		0x16(22)	ROT 3		
8		0x17(23)	Pitch		
9		0x18(24)	Roll		
10		0x19(25)	Hdop		
12		0x1A(26)	Heading Deviation 14		
13		0x1B(27)	Heading Deviation 24		
14		0x1C(28)	Heading Deviation 34		
15		0x1D(29)	ROT 4		

3.2 Alerts Display on the Control Unit

A. Alert Display on the Home Screen

This screen displays the alert status with the highest priority and highest status level (refer to IEC 62923-1) among all alerts.

- ◆ “**W**” Text in black font on an orange background indicates **Warning-level alerts**.
- ◆ “**C**” Text in black font on a yellow background indicates **Caution-level alerts**.
- ◆ “(X)” in black font on an orange background indicates a Warning-level alert **status**, where X represents the status abbreviation: V (Active-Unacknowledged), S (Active-Silenced), A (Active-Acknowledged),



U (Corrected-Unacknowledged).

- ◆ “NORMAL” in black font on a green background indicates normal status.
- ◆ “AC” or “DC” in black font on a green background indicates normal power supply; on an orange background indicates abnormal power supply.

Example: “**[W]**” indicates a Warning-level alert; “**[A]**” indicates alert status (A – Active-Acknowledged); “**[C]**” indicates a Caution-level alert; “**NORMAL**” indicates no alert.

	HDG(°)	Used Gyro1
Gyro1	308.4	HDG(°) Manual
Gyro2	308.0	ROT(°/min)
Gyro3	308.0	000.0
Gyro4	---	Pitch(°) Roll(°)
		00.4 -00.1
Alert	[W] [A]	DC Power Loss

Home

Alert Panel					
1	2	[W] (V)	26-01-10 (V)	DC Power	
		DC IN	08:59:58	IN Lose	
2	17	[C] (V)	26-01-10 (V)	DC Power	
		ErG12	08:59:58	IN Lose	
ActiveTotal:2					

Alert Panel

Alert History					07
AID	NAME	StartTime	EndTime		
1	2	DC IN	251221 085522	251221 090324	
2	2	DC IN	251221 101208	251221 103456	
3	8	G2M	251221 110500	251221 113314	
4	4	DC IN	251221 123006	251221 135244	
5	8	G2M	251222 083928	251222 085346	
6	4	DC IN	251229 085042	251229 120538	
7	1	AC IN	260108 013256	260108 090000	
8					
9					
U/D Move the Row L/R Turn Page 0/ 7					

Alert History

B. Alert Panel - Active Alerts Screen

This screen displays alerts with current active and corrected statuses. When the number of alerts exceeds 4, the hidden content can be viewed using the “↑” and “↓” keys. The active alert list is sorted in the order of highest alert priority, highest status level, and latest time.

C. Alert History - Historical Alerts Screen

Records the alert instance, name, start time and end time of alert instances that have occurred. When the record limit is reached, the earliest records will be cleared. The maximum number of records is 2000. Use the “↑” and “↓” keys to move between displayed rows;

3.3 Automatic Shutdown and Enable of Alerts

- ◆ Power Alerts (Alert Instance ID: 1, 2): Enabled by default and cannot be disabled.
- ◆ Sensor Signal Loss Alerts (Alert Instance ID: 3, 4, 5) and Sensor Fault Alerts (Alert Instance ID: 7, 8, 9): These alerts are automatically initialized within 20 seconds after the fiber optic gyrocompass system starts. If no signal is connected to a channel, the alert for that gyrocompass channel will be disabled; if no signal is connected to all three gyrocompass channels within 20 seconds, only the alert function of the Gyro1 channel will be enabled.
- ◆ GNSS Status Alert (Alert Instance ID: 6): This alert is automatically identified during the 20-second initialization process and will be automatically disabled if no signal is connected.
- ◆ Numerical Alerts: All alerts in Table 3-3 except the first item are numerical alerts.
 - 1) These alerts are automatically disabled by detecting the signal source during the 20-second initialization.
 - 2) The alerts can be disabled via settings.
 - 3) The visual and audible alert prompts can be enabled or disabled via settings.

3.4 BAM-Alert

The DU unit of the Flagship series fiber optic gyrocompass system adopts a two-way four-wire RS422 communication port with the BAM system. The fiber optic gyrocompass system supports the following BAM alert modes:



- ◆ Simple alert mode for HBT/ALC/ALR/ACK
- ◆ Class P equipment alert mode compliant with IEC 62923-1 for HBT/ALC/ALF/ACN/ARC

The fiber optic gyrocompass system outputs HBT and ALC sentences through the BAM port at a 2-second cycle, and receives command sentences such as ACK/CAN/ARC simultaneously. When an alert is generated or upgraded, ALF and ALR sentences will be output to update the alert status.

This fiber optic gyrocompass system indicates the upgrade of Warning-priority alerts by repeated alerts, with an upgrade time of 300 seconds. For detailed sentence formats, refer to Appendix C.

3.5 FLAGSHIP-15/19 Series Master Gyrocompass Indicator Light Status

System Status Indicator:

- Auto Mode (Default):
 - ✧ Red light flashing (1 Hz), Alignment status
 - ✧ Green light flashing (1 Hz), Navigation status
- Zero Velocity Compensation Status:
 - ✧ Red light short on, off, red on, off (1.5 s per cycle), Zero velocity alignment
 - ✧ Green light short on, off, green on, off (1.5 s per cycle), Zero velocity navigation
- Fault Status:
 - ✧ Red light fast flashing (4 Hz), Standby
 - ✧ Red light fast flashing (5 Hz), No IMU signal
 - ✧ Red light flashing with increasing frequency cycle, Component alert

GPS Indicator

- ✧ Green light flashing (1 Hz): Valid GPS signal with satisfactory accuracy received
- ✧ Red light steady on: No signal input
- ✧ Red light slow flashing (1 Hz): GPS signal present but unavailable due to insufficient accuracy
- ✧ Red light fast flashing (5 Hz): Signal input present but invalid positioning
- ✧ Red off and green off alternating fast flashing (2.5 Hz): Positioning valid and available, but no velocity information
- ✧ Green light on/off (0.125 Hz): Only GPS velocity valid
- ✧ Red and green alternating slow flashing (1 Hz): Valid GPS signal with satisfactory accuracy received, but no internal equipment feedback
- ✧ Red short on and green long on (1 Hz, duration 60 s): Manual position setting
- ✧ Red short on 3 times and green on (0.5 Hz): Zero velocity mode

4 Installation

4.1 Requirements

- Keep away from vibration, heat, and electromagnetic interference sources
- Master compass should be installed on the ship's center line or its parallel line
- Master compass is floor mounted, and it should be no less than 500mm maintenance space around for the convenience of operation and maintenance.

- Master compass should be installed on a mounting platform rigidly attached to the hull; For Flagship19 series, installation platform area $\geq 220 \times 260 \text{mm}^2$, for Flagship15 series, installation platform area $\geq 280 \times 200 \text{mm}^2$, levelness $\leq 0.1^\circ$, flatness $\leq 0.3 \text{mm}$, the parallelism between the master compass and the ship's center line $\leq 0.1^\circ$

Note: There are reference line markings on the base plate of the master compass in the Flagship15 series and on the installation base plate of the master compass in the Flagship19 series

- For power unit (FS-20P) and control & data-distribute unit (FS-20D), it should be no less than 500mm maintenance space around for the convenience of operation and maintenance

4.2 Power Supply

- Main power supply: AC 220V 50Hz (compatible with AC 100V~240V, frequency 50Hz/60Hz)
- Emergency power supply: DC24V (18V~30V)
- The default choice is main power supply. When only power to FLAGSHIP system, power must be no less than 65W. It can supply up to 150W power to external devices (DC24V *6.25A), ensuring the system's input power supply remains no less than 240W.

4.3 Interfaces

4.3.1 Interface of FLAGSHIP-19/15 series master compass

1. FLAGSHIP-19 series master compass interface

FLAGSHIP-19 series master compass provides the connection of the terminal through the mounting base plate for the convenience of operation and maintenance.



Fig 4-1 FLAGSHIP-19 Series Master Compass Connection Terminal

Table 4-1 Definition of Master compass Terminal

No.	Pin Definition	Pin No. of Terminal	Pin No. of DB15	Note
1	+24V	1	7, 8	24V input
2	+24V_GND	2	14, 15	24V input GND
3	RX1+	3	4	Default communication interface with control & data- distribute unit (FS-20D)
4	RX1-	4	3	
5	TX1+	5	2	
6	TX1-	6	1	
7	TX2+	7	10	User port, default HEHDT and HEROT message
8	TX2-	8	9	
9	RX2+	9	12	GPS input
10	RX2-	10	11	

2. FLAGSHIP-15 series master compass interface

FLAGSHIP-15 series master compass have 3 interface: Power interface, Communication interface and GPS Signal Input interface.

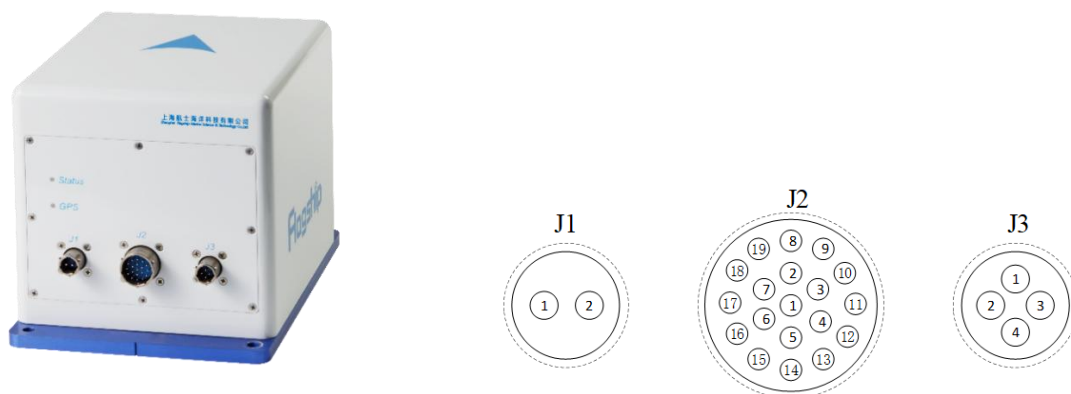

Fig 4-2 FLAGSHIP-15 Series Master Compass Connection Terminal

Table 4-2 FLAGSHIP 15 series master compass Interface

S/N	Interface	Pin Serial
J1	Power	XCB14F2ZD1 (socket) XC14T2KP1(B) (plug)
J2	Communication	XCB24F19ZD1 (socket) XC24T19KP1(B) (plug)
J3	GPS Signal Input	XCB14F4ZD1 (socket) XC14T4KP1(B) (plug)

Table 4-3 Flagship-15 series master compass J1 Pin Description

S/N	Description	XC14T2KP1(B)	Notes
1	+24	1	24V input power supply
2	GND	2	24V input ground power supply

Table 4-4 Flagship-15 series master compass J2 Pin Description

S/N	Description	XC24T19KP1(B)	Notes
1	Tx1+	4	OUT1
2	Tx1-	5	
3	Tx2+	14	OUT2(Consistent with GPS baud rate)
4	Tx2-	12	
5	Tx3+	2	OUT3(Consistent with LOG baud rate)
6	Tx3-	3	
7	Tx4+	8	OUT4
8	Tx4-	6	
9	SCU Tx+	16	Default communication interface with control & data distribute unit (FS-20D)
10	SCU Tx-	18	
11	SCU Rx+	19	
12	SCU Rx-	17	
13	Reserved	1、7、9、10、11、13、15	

Table 4-5 Flagship-15 series master compass J3 Pin Description

S/N	Description	XC14T4KP1(B)	Notes
1	GPS Rx-	1	GPS Input Port
2	GPS Rx+	2	
3	LOG Rx-	3	LOG Input Port (Reserved)
4	LOG Rx+	4	

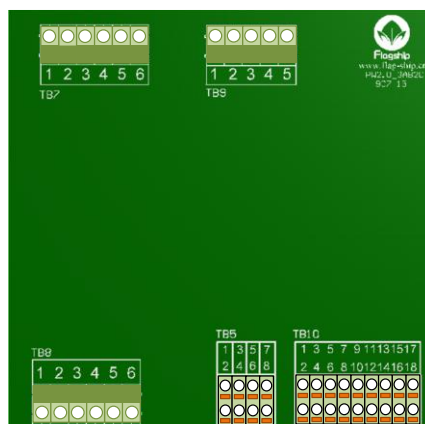
4.3.2 Interface of Power Unit (FS-20P)

Input 1: AC220V;

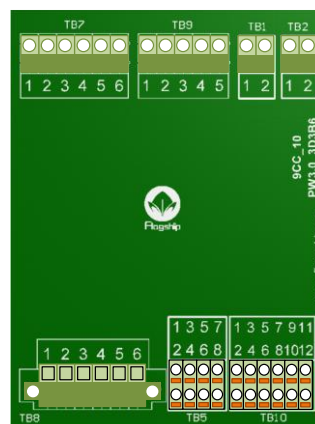
Input 2: emergency power supply DC24V;

Output: 9 channels (PW2.0) or 6 channels (PW3.0) DC24V output.

For the master compass, recommend to use one group of power supply (TB10) for master compass. For multiple compass systems, it is recommended to use different power supply group. The control and data-distribute unit use TB5 power supply.



Power Unit PW2.0



Power Unit PW3.0

Fig 4-3 Definition of Power Unit interface

Table 4-6 Definition of Power Unit interface (PW2.0)

Pin No.	Pin Definition	Note
TB8		
1	L	Main power supply: AC110/220V, 60/50Hz
2	NC	
3	N	
4	PGND(Earth)	Earth
5	DC24V+	Emergency power supply: DC18~30V
6	DV24V-(0V)	
TB5		
1	BDCA	Emergency power supply in-place dry contact signal
2	BDCB	
3	MDCA	Main power supply in-place dry contact signal
4	MDCB	
5	V1	DU Unit power supply detection signal
6	V2	
7	DC24V+	DU Unit power supply
8	DC24V-(GND)	
TB10		
1,3,5	DC24V+	External power supply Group 1
2,4,6	DC24V-(GND)	
7,9,11	DC24V+	External power supply Group 2
8,10,12	DC24V-(GND)	
13,15,17	DC24V+	External power supply Group 3
14,16,18	DC24V-(GND)	

Table 4-7 Definition of Power Unit interface (PW3.0)

Pin No.	Pin Definition	Note
TB8		
1	L	Main power supply: AC110/220V, 60/50Hz
2	NC	
3	N	
4	Earth (PGND)	Earth
5	DC24V(+)	Emergency power supply: DC18~30V
6	0V (DV24V-)	
TB5		
1	BDCA	Emergency power supply in-place dry contact signal
2	BDCB	
3	MDCA	Main power supply in-place dry contact signal
4	MDCB	
5	V1	DU Unit power supply detection signal
6	V2	
7	DC24V+	DU Unit power supply
8	DC24V-(GND)	

Pin No.	Pin Definition	Note
TB10		
1,3	DC24V+	External power supply Group 1
2,4	DC24V-	
5,7	DC24V+	External power supply Group 2
6,8	DC24V-	
9,11	DC24V+	External power supply Group 3
10,12	DC24V-	

4.3.3 Interface of Control & Data-distribute Unit(FS-20D)

The Control & Data-distribute Unit comprises the mainboard, expansion boards, and control unit (CU), where the expansion board is an optional component. Tables 4-8 to 4-10 describe the definitions of the mainboard connectors.

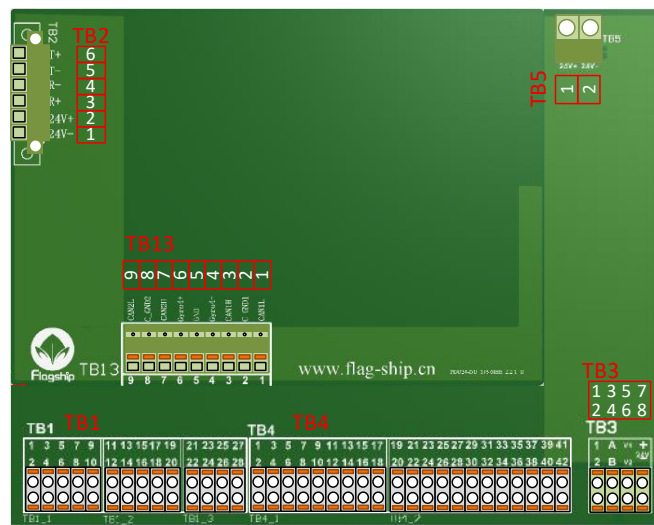


Fig 4-4 Connector location of Control & Data-distribute Unit

Table 4-8 Definition of bidirectional communication interface TB1

Pin No.	Pin Definition	Note
TB1		
1	Gyro1_T+	Communication interface of Compass 1
2	Gyro1_T-	
3	Gyro1_R+	
4	Gyro1_R-	
5	SGNDg1	Communication interface of Compass 2
6	SGNDg2	
7	Gyro2_T+	
8	Gyro2_T-	
9	Gyro2_R+	Communication interface of Compass 3
10	Gyro2_R-	
11	Gyro3_T+	
12	Gyro3_T-	
13	Gyro3_R+	Communication interface of Compass 3
14	Gyro3_R-	
15	SGNDg5	

Pin No.	Pin Definition	Note
16	SGNDg3	Communication interface of BAM
17	BAM_T+	
18	BAM_T-	
19	BAM_R+	
20	BAM_R-	
21	GNSS O2_T+	Relay Interface of GNSS Output
22	GNSS O2_T-	
23	GNSS O1_T+	
24	GNSS O1_T-	
25	GNSS IN_R+	GNSS Input
26	GNSS IN_R-	
27	SGNDg4	
28	NC	

Table 4-9 Definition of output communication interface TB4 and TB3

Pin No.	Pin Definition	Note
TB4		
1	OUT1_1T+	Output Group 1 4 channels output
2	OUT1_1T-	
3	OUT1_2T+	
4	OUT1_2T-	
5	OUT1_3T+	
6	OUT1_3T-	
7	OUT1_4T+	
8	OUT1_4T-	
9	OUT1_GND	
10	OUT6_GND	Output Group 6 4 channels output
11	OUT6_1T+	
12	OUT6_1T-	
13	OUT6_2T+	
14	OUT6_2T-	
15	OUT6_3T+	
16	OUT6_3T-	
17	OUT6_4T+	
18	OUT6_4T-	
19	OUT3_1T+	Output Group 3 4 channels output
20	OUT3_1T-	
21	OUT3_2T+	
22	OUT3_2T-	
23	OUT3_3T+	
24	OUT3_3T-	
25	OUT3_4T+	
26	OUT3_4T-	
27	OUT3_GND	



Pin No.	Pin Definition	Note
28	OUT2_GND	Output Group 2 4 channels output
29	OUT2_1T+	
30	OUT2_1T-	
31	OUT2_2T+	
32	OUT2_2T-	
33	OUT2_3T+	
34	OUT2_3T-	
35	OUT2_4T+	
36	OUT2_4T-	OUT4/485(O4/85)
37	O4/85 A+	
38	O4/85 B-	OUT5/485(O5/85)
39	O5/85 A+	
40	O5/85 B-	Chassis ground
41	PGND(Earth)	
42	485_GND	O4/85, O5/85 ground
TB3		
1	24VO1+	Power supply for expansion boards
2	GND_24V	
3	SysM_A	System alarm dry contact signal
4	SysM_B	
5	V1	AC power detection
6	V2	AC power detection
7	IN24V+	Power input
8	IN24V-	

Table 4-10 Definition of communication interface & CU interface

Pin No.	Pin Definition	Note
TB13		
1	CAN1_L	CAN1
2	CAN_GND(C_GND)	
3	CAN1_H	
4	G4/85B- (485-)	Gyro4IN/485
5	G4/85_GND(GND)	
6	G4/85A+(485+)	
7	CAN2_H	CAN2
8	CAN_GND(C_GND)	
9	CAN2_L	
TB3(DC24OUT)		
1	24V+	DC24V output 2: Power supply for expansion boards
2	24V-	
TB2(DU)		
1	DC24V-	DC24V output 1: Power supply for expansion boards
2	DC24V+	
3	Rx+	DU-CU communication
4	Rx-	
5	Tx-	
6	Tx+	

Pin No.	Pin Definition	Note
TB12 (CU)		
1	DV24V-	DC24V input
2	DC24V+	
3	Tx+	DU-CU communication
4	Tx-	
5	Rx-	
6	Rx+	

4.3.4 Interface of LCD control unit

A. A8-AP20 LCD control unit

The A8-AP20 LCD control unit can be directly connected to the master compass's SCU port, communicate with the master compass and display navigation information. This unit has two interfaces: a 3-pin green socket and a 12-pin green socket.

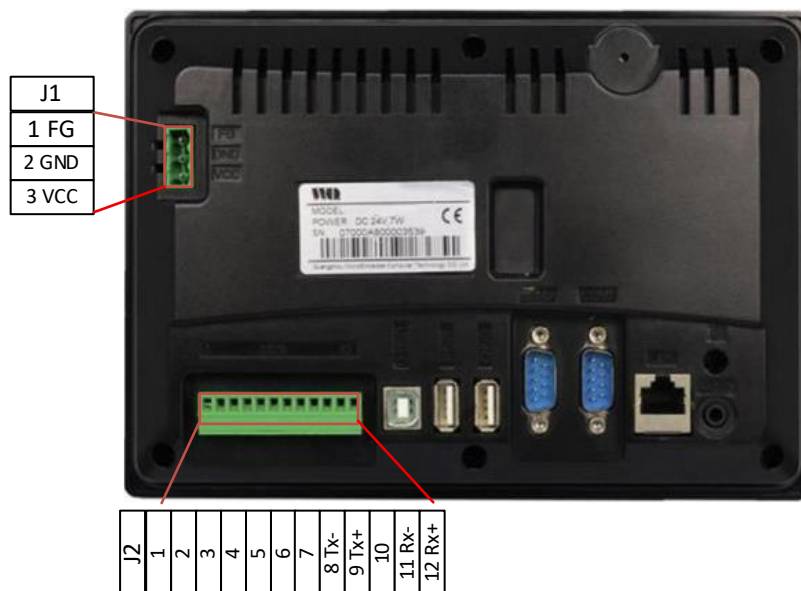


Fig4-5 Connector location of A8-AP20

Table 4-11 Description of power socket (J1,3PIN)

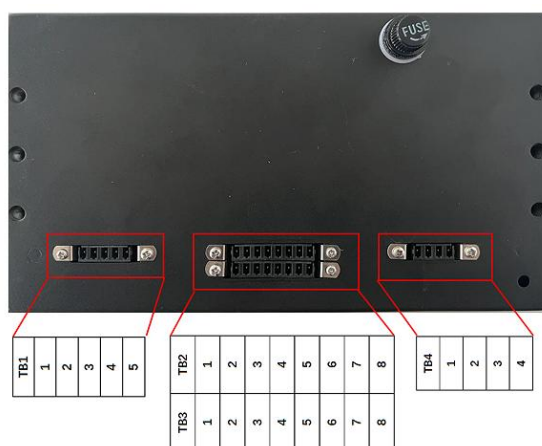
No.	Pin Definition	Pin No.	Note
1	FG	1	PGND
2	GND	2	24V input GND
3	VCC	3	24V input

Table 4-12 Description of data socket (J2,12 PIN)

No.	Pin Definition	Pin No.	Note
1	Tx-	8	A8-AP20 —> Master compass/PDU
2	Tx+	9	
3	Rx-	11	Master compass/PDU → A8-AP20
4	Rx+	12	
5	Reserved	1~7, 10	

B. FS-21Y_CDU LCD control unit

The FS-21Y LCD control unit can be a CDU or a CU. The CDU function as display and control of master compass, and data forwarding; the CU function as an upgraded version of the original control unit (FS-20C).


Fig 4-6 Connector location of FS-21Y
Table 4-13 Description of FS-21Y socket

No.	Pin Definition	Note
TB1		
1	24V	Power supply
2	0V	
3	PE	Chassis ground
4	MDC	CDU: Power supply in-place detection (connected to power unit) DU: Remote switch (reserved)
5	BDC	
TB2(upper 8pin)		
1	TX1+	Port1: 1# compass
2	TX1-	
3	RX1-	
4	RX1+	
5	TX2+	Port2: 2# compass
6	TX2-	
7	RX2-	
8	RX2+	
TB3 (bottom 8pin)		
1	TX3+	Port3: 3# compass /OUT4
2	TX3-	
3	RX3-	
4	RX3+	
5	TX4+	Port4: 4# compass /BAM/OUT3
6	TX4-	
7	RX4-	
8	RX4+	
TB4		
1	A1+	Port5: OUT1
2	B1-	
3	A2+	Port6: OUT2/4# compass
4	B2-	

4.4 Requirements for cables & auxiliary materials & tools

Engineers should prepare cables & auxiliary materials & tools in advance.

Table 4-14 List of cables & auxiliary materials & tools

No.	Requirements	Description	Quantity
1	Fuse of Power Unit	Spare parts are included by default when shipping. For details, please refer to Table 4-14 of the included list in the Power Unit	5
2	Cable 0.75 or 0.5	Internal or external wiring	several meters
3	Crimp terminal VE7510	1cm in length, suitable for Power Unit and Control & Data-distribute Unit wiring strips	50
4	Multimeter	/	1
5	Needle-type terminal crimping pliers	/	1
6	Diagonal cutting pliers	/	1
7	Wire stripper	/	
8	Flat-head screwdriver	different specifications	
9	Phillips screwdriver	different specifications	
10	Cable tie	different specifications	several
11	Label	Label the cables	several
12	Insulating tape	/	several

Table 4-15 the included list in the Power Unit

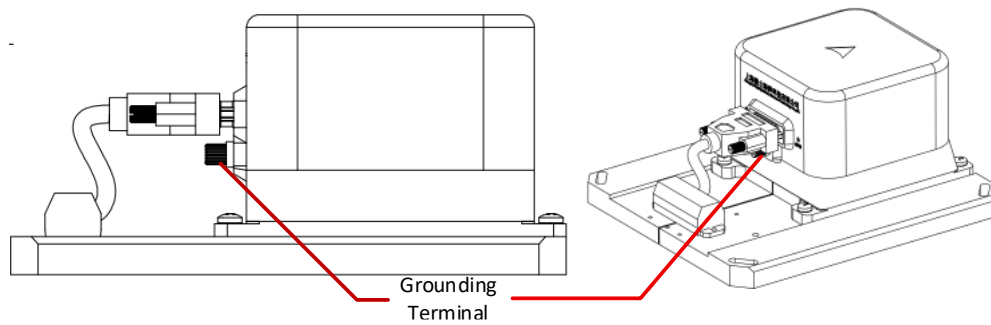
Name	Model	Quantity
Glass tube fuse	5*20mm 3A	2
Socket-type fuse 10A	LITE Medium/Small -10A32V	1
Socket-type fuse 5A	LITE Medium/Small -5A32V	1
Socket-type fuse 3A	LITE Medium/Small -3A32V	1
Tube-type crimp terminal	VE7510	30

4.5 Grounding Requirements

The complete set of products (Master Compass + Power Unit + Control & Data-distribute Unit) all require grounding treatment to prevent equipment malfunctions caused by the electrification of the equipment casing.

- The wire diameter of the grounding wire should be greater than 1.5mm²
- The wiring terminals must be securely fixed

Grounding Terminal



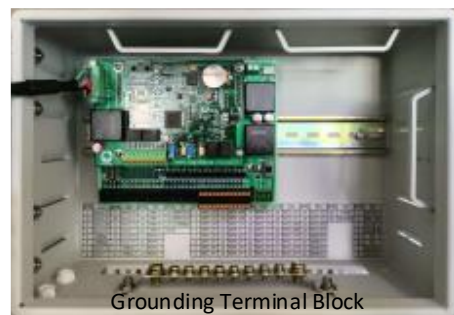
Flagship-19 Series Grounding Terminal of Master Compass



Flagship-15 Series Grounding Terminal of Master Compass Grounding diagram



Grounding Terminal of Power Unit



Grounding Terminal of Control & Data-distribute Unit

Fig 4-7 Equipment grounding

4.6 Debugging Requirements

Product	No.	Requirement
Master Compass	1	First preheating time be more than one hour
	2	GPS and Status indicator lights are flashing normally in green
	3	Restart twice, the heading error should not exceed the product's accuracy after stabilization
Power Unit	1	AC/DC input normal and output normal, with control via a toggle switch
	2	Dry contact signal meets the alarm requirements
	3	With spare fuse, please keep it
Control & Data-distribute Unit	1	Display compass's heading normally (For Flagship FOG compass, display heading and attitude normally)
	2	Compass's installation error can be modified normally
	3	Output (sentences, baud rate, and frequency) meets the peripheral device requirements without any alerts
	4	Different gyrocompass can be switched normally
Engineering Bill	1	The engineering bill documents the configuration parameters of the ports (refer to Appendix D for details)



4.7 Common Faults and Troubleshooting

4.7.1 Master Gyrocompass

A. GPS Indicator Abnormality

1. GPS Status Indicator steady red. Possible causes:
 - No GPS sentence input.
 - GPS signal cable polarity reversed.
 - Incorrect GPS receiving baud rate.
 - GPS communication abnormality results in sentence checksum error.
 - Insufficient GPS signal driving capability; repeater required.
2. GPS status indicator is steady red, accompanied by occasional fast red flashing (5 Hz), slow red flashing (1 Hz) or green flashing (1 Hz) (fast red flashing (5 Hz), slow red flashing (1 Hz) or green flashing (1 Hz) occasionally accompanied by steady red). Possible causes:
 - GPS communication abnormality results in occasional correct sentence checksum.
 - GPS cable loose.
 - Insufficient GPS signal driving capability; repeater required.
3. GPS status indicator fast flashing red (5 Hz): Invalid GPS signal.
4. GPS status indicator slow flashing red (1 Hz): GPS signal present but with insufficient accuracy and unavailable.
5. GPS status indicator fast flashing alternately (red off, green off) (2.5 Hz): Positioning valid and available, but no velocity information.
6. GPS status indicator green long on, short off (0.125 Hz): Only GPS velocity valid.
7. GPS status indicator slow flashing alternately between red and green (1 Hz): GPS valid and available, but no internal feedback.

GPS Troubleshooting: If the GPS is abnormal for a long time, manually set the GPS information. Refer to Section 2.4.4.

B. Operating status indicator abnormality

1. Off: Check the power supply and whether the power output meets the power consumption of the main compass. If it is powered on for the first time, cut off the power immediately and pay special attention to whether the power polarity is reversed.
2. Steady red or fast flashing red: Equipment abnormality. Please contact the maintenance engineer.
3. Slow flashing red: The device is in the alignment process.

C. Navigation data abnormality

1. Large heading error:
 - Switch the radar to the abnormal compass heading, and judge whether the heading is actually abnormal by observing the coincidence degree between AIS and radar reflected targets.
 - GPS loss duration is too long without manual correction. Check the GPS indicator and realign the system after GPS recovery.
 - Check whether the compass Status indicator is abnormal. Try resetting after berthing. If the problem remains after reset, contact the maintenance engineer.
2. Severe attitude angle out of tolerance:



- GPS signal is lost for an excessively long time without manual correction.
- Internal abnormality of the compass. If the problem persists after restarting, please contact the maintenance engineer.

4.7.2 Power supply box (PW)

A. AC Power Alert:

- Check if indicator D7 on the power control board is lit. If it is off, check fuses F11 and F12, as well as the input voltage.
- Check if the indicator on the AC/DC power module is lit. If it is off while D7 is lit, check the output voltage of the AC/DC module and the front-end circuit.
- Check if indicator D2 on the power control board is lit. If it is off while the indicators in the previous two checks are lit, check fuse F1.
- If all the above indicators are lit, check whether the V1 output of TB5 is DC.

B. DC Power Alert:

- Check if indicator D8 on the power control board is lit. If it is off, check fuses F21 and F22, as well as the input voltage.
- Check if indicator D3 on the power control board is lit. If it is off while the indicator in the previous step is lit, check fuse F2.
- If all the above indicators are lit, check whether the V2 output of TB5 is DC24V, and check the continuity of the cable between TB5 and the mainboard V2.
- If the system still cannot work normally after the above troubleshooting, return the power supply box to the factory for repair.

C. No Power Output:

- Check if indicator D4 is off. If it is off, return the power supply box to the factory for repair.
- Check fuses F5, F6, F7 and F8. If the problem persists after replacement, return the power supply box to the factory for repair.

Note: The labels of indicators and fuses are shown in detail on the PCB of the power supply box.

4.7.3 Data Transmitter Box (DU)

1. CU Communication Alert: Check the communication cable between CU and DU.
2. No display for compass or GPS input:
 - Check configuration parameters such as baud rate and compass type.
 - Check if the signal wires are reversed and the cable connections.
3. Heading display fluctuates and changes between two headings:
 - Check the compass type, set it to the matching type, and filter out unnecessary heading sentences.
4. Heading change is jerky or accompanied by signal loss alert:
 - Check the communication status of the compass input and observe the bit error condition. If the bit error is severe, check the cable connection.
5. Refresh frequency alert on devices such as autopilot:
 - Check the output frequency of the signal source. The frequency may be too low; increase the output frequency of the signal source.
6. No heading information received by autopilot, radar and other equipment:



- Check the baud rate and sentence configuration of the output port.
 - Check whether the positive and negative poles of the signal cable are reversed.
 - Check the integrity of the wiring and cables.
7. Alert condition is met but no alert is generated
- Alert items that have not reached the "normal" state will be automatically disabled within 20 seconds after device startup. Therefore, ensure all connected signals are normal within 20 seconds of power-on; otherwise, some alerts may be disabled.
 - Check the configuration parameters to verify whether the alerts or alert actuators have been turned off.

5 Packing, Files, Shipping, and Storage

5.1 Packing Box

A. Packing Labels

The surface of packing box should be had manufacturer's name, product name, model, quantity, mass, boundary dimensions, and other information. Additionally, it should be had shipping labels like "Caution/ lightly up/ handle with care", "Moisture Proof", "Upward" and other shipping labels. Shipping labels should be complied with the provisions of GB191.

B. Packing Box Requirements

- Moisture Proof, Fear Rain, and Dust-proof Protective Layer
- antivibration, Impact-resistant structure, and ensuring the packing intact during shipping process
- The bottom support and frame of suitable shipping, and loading and unloading structures suitable for production and hoisting

5.2 Ancillary Documents

- ✧ Packing list
- ✧ Product certification
- ✧ Inspection certificate of the classification society (according to the customers select)
- ✧ Product installation and maintain manual

5.3 Shipping

5.3.1 Shipping Requirement

The product packing should be accessible by any standardized means of transportation, highways, railways, shipping, and air transportation. It should be protected from rain, water immersion, freezing, strong sunlight, and severe jolting. It should also be kept away from goods with strong magnetic fields such as "audio equipment" during shipping.

5.3.2 Loading & Unloading

The product has never to store in the outdoor after packaging, and has never to store together with in flammable, explosive, radioactive, corrosive, toxic, and harmful chemical substances. It should be avoided drops, impacts, collisions, and mechanical damage during loading and unloading.



5.3.3 Prevent strong magnetic fields

The product should be prevented close to cargo with a strong magnetic field such as "magnets", "medical equipment", "audio equipment" and other magnetic goods after packing during loading, shipping, and unloading.

5.4 Storage

The product should be stored in the place with subject to the condition

- ✧ Temperature $-10^{\circ}\text{C} \sim 55^{\circ}\text{C}$, relative humidity 10% ~ 85%
- ✧ No flammable, explosive, radioactive, corrosive, toxic, and harmful chemical substances
- ✧ No strong mechanical vibration, shock, and strong magnetic field
- ✧ The distance should be at least 10cm between the packing and the land, and the distance should be at least 100cm between the packing and the wall, the heat source, the cold source, the window, and air.



Appendix A ABBREVIATIONS & REFERENCE

1. CCS: China Classification Society
2. DNV: Det Norske veritas
3. BV: Bureau Veritas
4. MED: EU Marine Equipment Specifications
5. EU: European Union
6. AIS: Automatic Identification System
7. GPS: Global Navigation System
8. VDR: Voyage Data Recorder
9. SOLAS: International Convention for the Safety of Life at Sea
10. ITU: International Telecommunication Union
11. IMO: International Maritime Organization
12. MSC: International Maritime Safety Committee
13. IEC: International Electrotechnical Commission
14. GNSS: International Electrotechnical Commission
15. ECDIS: Electronic Chart
16. BNWAS: Bridge Building Navigation Duty Alarm System
17. FOG: Fiber Optic Gyrocompass



Appendix B TECHNICAL SPECIFICATIONS

Performance Capability Operational Characteristics	Settling Time	10min	
	Stabilization point error (Heading Accuracies) Φ is the location latitude	FLAGSHIP-19	0.22°sec Φ (RMS)
		FLAGSHIP-19A	0.14°sec Φ (RMS)
		FLAGSHIP-19P	0.1°sec Φ (RMS)
		FLAGSHIP-19N	0.1°sec Φ (RMS)
		FLAGSHIP-15	0.1°sec Φ (RMS)
		FLAGSHIP-15A	0.04°sec Φ (RMS)
	Pitch & Roll Error (Accuracies)	FLAGSHIP-19	0.07° (RMS)
		FLAGSHIP-19A	0.05° (RMS)
		FLAGSHIP-19P	0.03° (RMS)
		FLAGSHIP-19N	0.007° (RMS)
		FLAGSHIP-15	0.04° (RMS)
		FLAGSHIP-15A	0.02° (RMS)
	Heaving/ Longitudinal/Transverse swing Accuracy	5 cm / 5% (Max) (FLAGSHIP-19 nonsupport)	
	Heading measurement range	0°~360°	
	Roll measurement range	-180° ~ +180°	
	Pitch measurement range	-90° ~ +90	
	ROT Accuracy	0.1°/Min	
	X、Y、Z Dynamic range of Angle Rate	0~600°/s	
	Dynamic range of acceleration	±2g~±5g	
Interfaces	Output physical interfaces	RS422, 18 channels. Other interfaces can be customized according to the user's requirements	
	Output data frequency	1~100Hz (configurable)	
	Output protocols	IEC 61162-1/2, NMEA0183	
	External auxiliary information input interfaces	RS422, GNSS (GGA VTG)	
	Baud rate	4800~115200bps	
Main Power Supply	AC	Voltage:100V~240V Frequency:50 Hz /60 Hz	
	DC	Voltage: 18V~30V	
	Power	The power is more than 65W, the power supply of external devices is less than 150W, the input power supply is more than 240W, and the power is only supplied in the system.	
Ambient Temperature	Ambient temperature, operation	-10°C~55°C	
	Ambient temperature, storage	-30°C~70°C	
	Latitude	FLAGSHIP-19	0°~±75°
		FLAGSHIP-19A/P/N	0°~±80°
		FLAGSHIP-15	0°~±85°
		FLAGSHIP-15A	0°~±87.5°
	Longitude	180°E ~ 180°W	
	Speed	0 ~ 70kn	
	IP Grade	IEC60945	



Appendix C SENTENCE DESCRIPTION

1. HDT Heading turn Message Specific Format (standard NMEA0183 message)

\$HEHDT,x.x,T*hh<CR><LF>

x.x is the true heading in degrees

hh is a checksum

2. ROT Rate of turn Message Specific Format (standard NMEA0183 message)

\$HEROT,x.x,A*hh<CR><LF>

x.x Heading rate of turn , °/min ‘-’ = bow turns to port

A Status: A = data valid; V = data invalid

3. THS True heading and status Sentence

\$HETHS,x.x,a*hh<CR><LF>

x.x is the true heading in degrees

a is Mode indicator

A = Autonomous

E = Estimated (dead reckoning)

M = Manual input

S = Simulator mode

V = Data not valid (including standby)

4. PHTRO (Pitch/Roll) Manufacturer customized Sentence

\$PHTRO,x.xx,a,y.yy,b*hh<CR><LF>

where: x.xx is the pitch in degrees 2 digits after the decimal point

a is ‘M’ for bow up and ‘P’ for bow down

y.yy is the roll in degrees 2 digits after the decimal point

b is ‘B’ for port down and ‘T’ for port up

hh is the checksum

5. PF/FSMAR Statue Sentence

\$PFMAR,h₁h₂h₃,RUNTIME , m₁m₂*hh\r\n

h₁ GNSS signal statue: 0- no signal, 1- location validity and available, 2- location invalidity, 3- location validity with low accuracy, 5- location validity and available without speed information, 6- internal communication failure, 8- zero speed compensation mode

h₂ Reserve

h₃ Master FOG working status: 0- standby, 1~2 -alignment, 3~6- navigation

RUNTIME FOG run time: 0xHHHHHHHH unit: s

m₁m₂ device status: 0x00 normal; otherwise, abnormal

6. HEHBT Heart Beat Sentence, Period is 2 s

Reference of sentence description : IEC 61162-1

e.g: \$HEHBT,2.0,A,2*20

7. HEALC Sentence, Period is 2 s

Reference of sentence description : IEC 61162-1

e.g: \$HEALC,01,01,00,01,,3022,2,01*03



8. HEALF Sentence

Reference of sentence description : IEC 61162-1

e.g: \$HEALF,2,1,1,,B,W,V,,3022,2,4,0,DC IN*40

\$HEALF,2,2,1,,,,,3022,2,4,0,DC Power IN Loss*4B

9. HEALR Sentence

Reference of sentence description : IEC 61162-1

e.g: \$HEALR,,240,V,V,DC Power IN Loss*67

HEARC sentence, is used by reject the BAM command

Reference of sentence description : IEC 61162-1

e.g: HEARC,,0,0,A*0E

Special sentence can be customized according to requirements such as matching MRU sentence.



Appendix D Engineer Bill of FLAGSHIP Company(template)

工 程 单 (Engineering Bill)

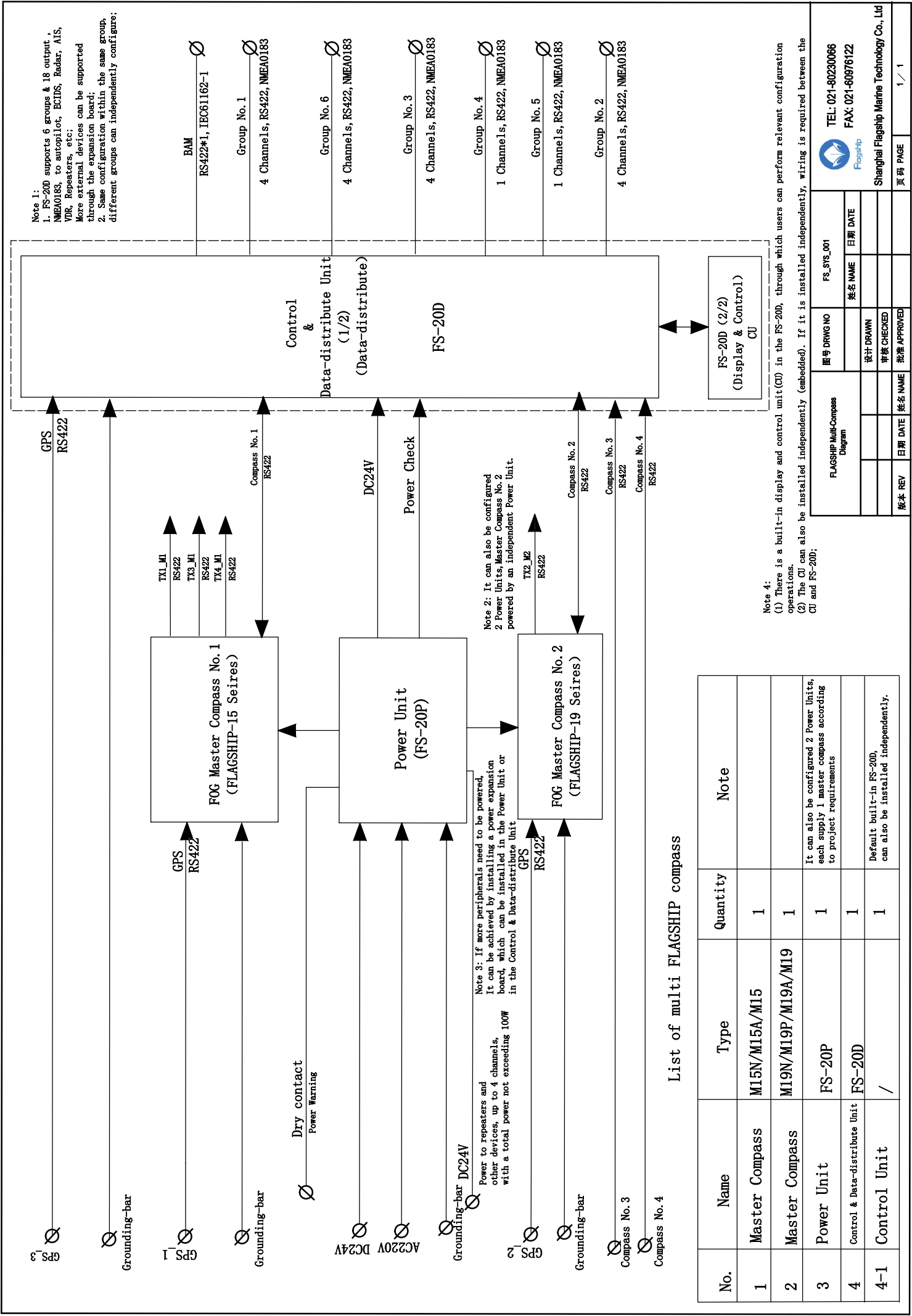
序号 (No.):

船东 (Owner)				船名 (Ship Name)			
船厂 (Shipyard)				船号 (Hull No)			
停泊地点 (Parking Address)				工程日期 (Work Date)			
产品型号 (Product Type)				工程师姓名 (E/R Name)			
产品清单 (Accessory List)		Flagship-19A					
工程内容 (Descriptions Of Work)						备注(Remark)	
安装 调测 Install & Test							
配置 信息 Configu ration Informat ion	端口号 Pin	波特率 Baud rate	频率 Frequency	语句 Sentence		备注 Note	
	3/4/5/6	115200	10HZ	HEHDT/HEROT/PHTRO/ FSMAR		参考 Reference	
	5/6	4800	4HZ	HEHDT/HEROT		参考 Reference	
	7/8	4800	5HZ	HEHDT/HEROT		参考 Reference	
	安装误差 Installation error			0		参考 Reference	
船方签字 (盖章): (Ship's Signature)				施工方签字: (Construction Signature)			
Date: yy/mm/dd 年 月 日				Date: yy/mm/dd 年 月 日			



Appendix E INSTALLATION DRAWINGS

S/N	Drawing No.	Description
1	FS-SYS-001	FLAGSHIP Multi-Compass Diagram
2	FS19_001	FLAGSHIP-19 Series Shapes & Installation Dimensions
3	FS19_002	Flagship-19 series wiring diagram
4	FS15_001	FLAGSHIP-15 Series Shapes & Installation Dimensions
5	FS15_002	FLAGSHIP-15 series wiring diagram
6	FS_PW_001	FLAGSHIP Power Unit (FS-20P) Shapes & Installation Dimensions
7	FS_DU_001	FLAGSHIP Control & Data-distribute Unit (FS-20D) Shapes & Installation Dimensions
8	FS_CU_002	FLAGSHIP Display & Control Unit (CU) Shapes & Installation Dimensions
9	FS_CDU_001	FLAGSHIP Display & Control Unit FS-21Y Shapes & Installation Dimensions
10	FS_CDU_002	FLAGSHIP Display & Control Unit A8-AP20 Shapes & Installation Dimensions



Note 1:
1. FS-20D supports 6 groups & 18 output , NMEA0183, to autopilot, ECDIS, Radar, AIS, VDR, Repeaters, etc;
More external devices can be supported through the expansion board;
2. Same configuration within the same group, different groups can independently configure;

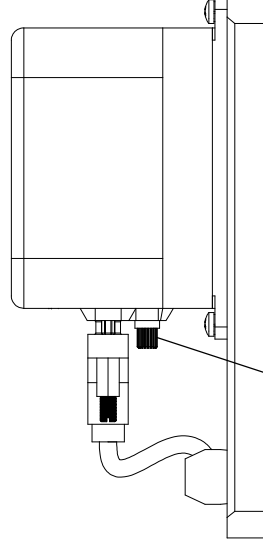
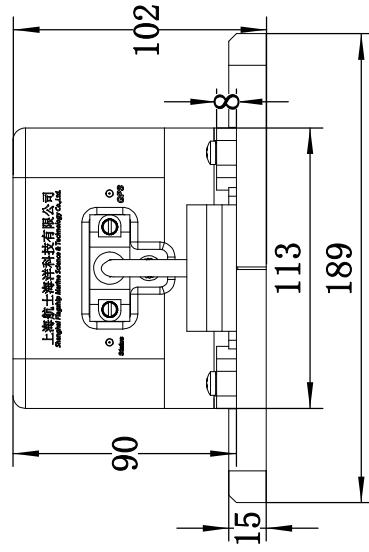
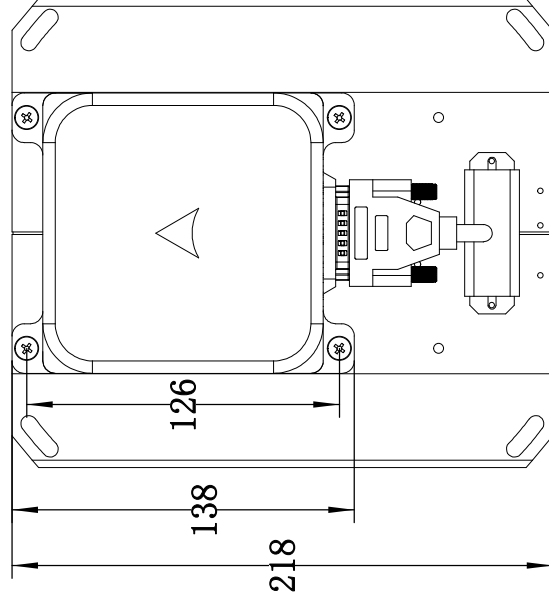
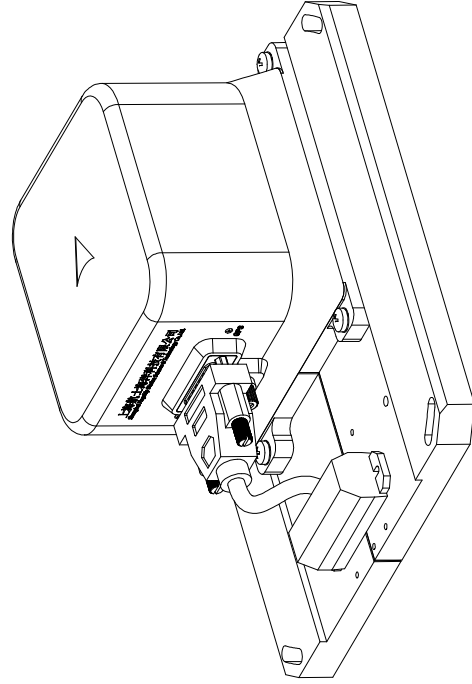
Note 4:
(1) There is a built-in display and control unit(CU) in the FS-20D, through which users can perform relevant configuration operations.
(2) The CU can also be installed independently (embedded). If it is installed independently, wiring is required between the CU and FS-20D;

FLAGSHIP Multi-Compass Diagram				FS_sys_001			
图号	DRWG NO	设计	DRAWN	姓名	NAME	日期	DATE
审核	CHECKED	批准	APPROVED	姓名	NAME	日期	DATE
版本	REV	日期	DATE	姓名	NAME	批准	APPROVED

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Requirements:

- (1) Be installed on the ship's center line or its parallel line. Keep away from vibration, heat, and electromagnetic interference sources
- (2) Be floor mounted, and it should be no less than 500mm maintenance space around for the convenience of operation and maintenance.
- (3) Be installed on a mounting platform rigidly attached to the hull; Installation platform area $\geq 220\text{mm} \times 260\text{mm}$, levelness $\leq 0.1^\circ$, flatness $\leq 0.3\text{mm}$, the parallelism between the master compass and the ship's center line $\leq 0.1^\circ$
- (4) Grounding terminal requires a grounding wire.

FLAGSHIP-18 Series Shapes & Installation Dimensions	图号 DRWG NO	FS19_001	
		姓名 NAME	日期 DATE
	设计 DRAWN		
	审核 CHECKED		
版本 REV	日期 DATE	姓名 NAME	批准 APPROVED



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Build-in display & Control Unit (CU)

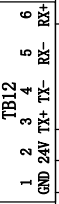
Note 1:
There is a built-in display and control unit (CU) in the FS-20D, through which users can perform relevant configuration operations. The CU can also be installed independently (embedded). If it is installed independently, wiring is required between the CU and FS-20D;

Note 2:

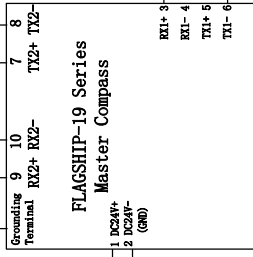
1. FS-20D supports 6 groups & 18 output, NMEA0183, to autopilot, ECDIS, Radar, AIS, VDR, Repeaters, etc; More external devices can be supported through the expansion board;

2. Same configuration within the same group, different groups can independently configure;

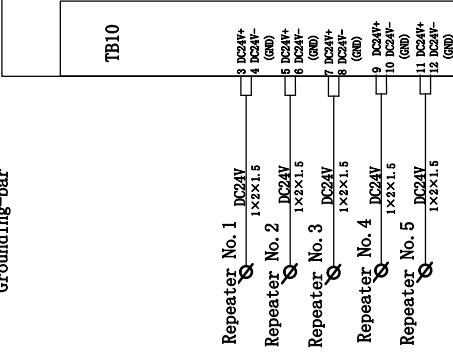
3. TB4: 1~18 Group No. 1 4 channels;
TB4: 11~18 Group No. 6 4 channels;
TB4: 19~26 Group No. 2 4 channels;
TB4: 29~36 Group No. 3 4 channels;
TB4: 37~38 Group No. 4 1 channel;
TB4: 39~40 Group No. 5 1 channel;
refer to the signal table inside the box



Note 3: TX2 can be a Attitude output, to DP and other systems;

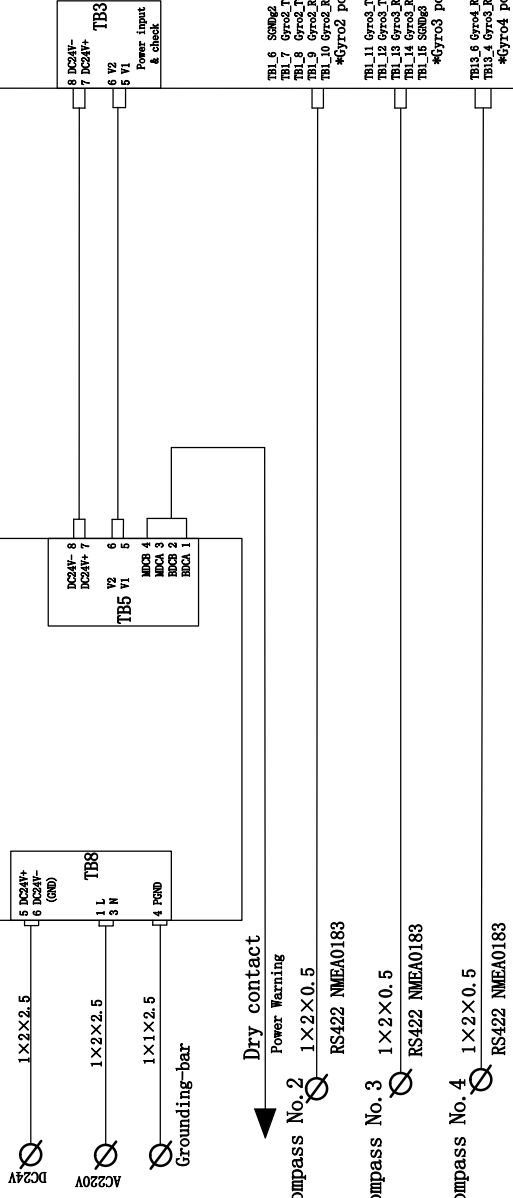


Power Unit (FS-20P)

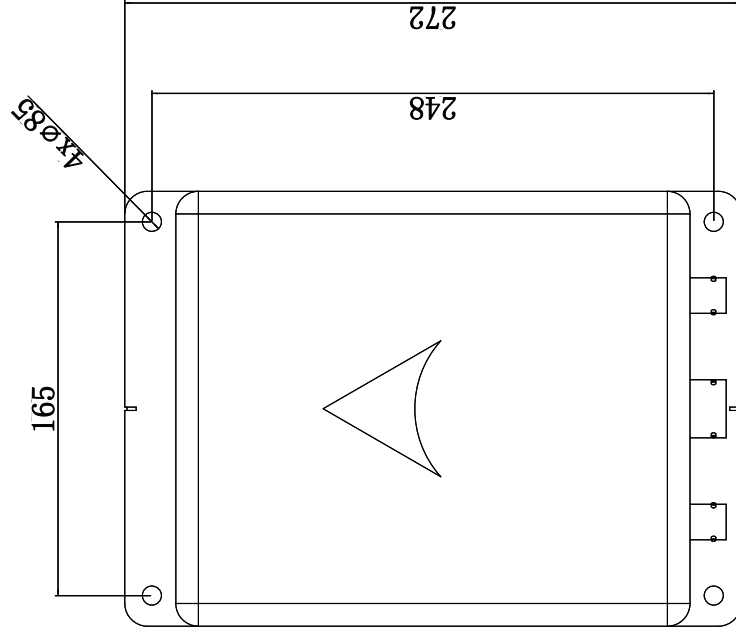


Note 4: If more peripherals need to be powered, it can be achieved by installing a power expansion board, which can be installed in the Power Unit or in the Control & Data-distribute Unit

Control & Data-distribute Unit FS-20D

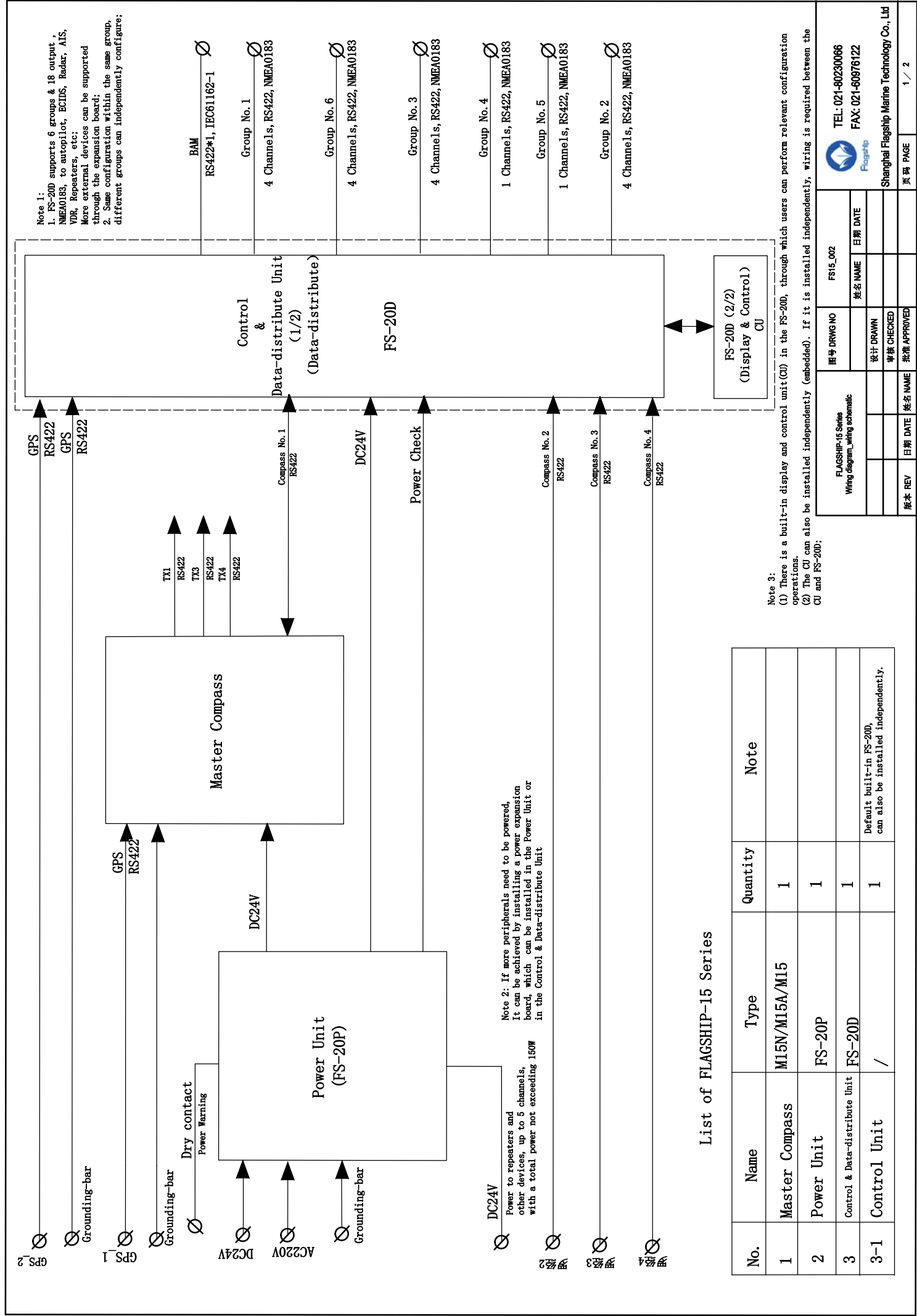


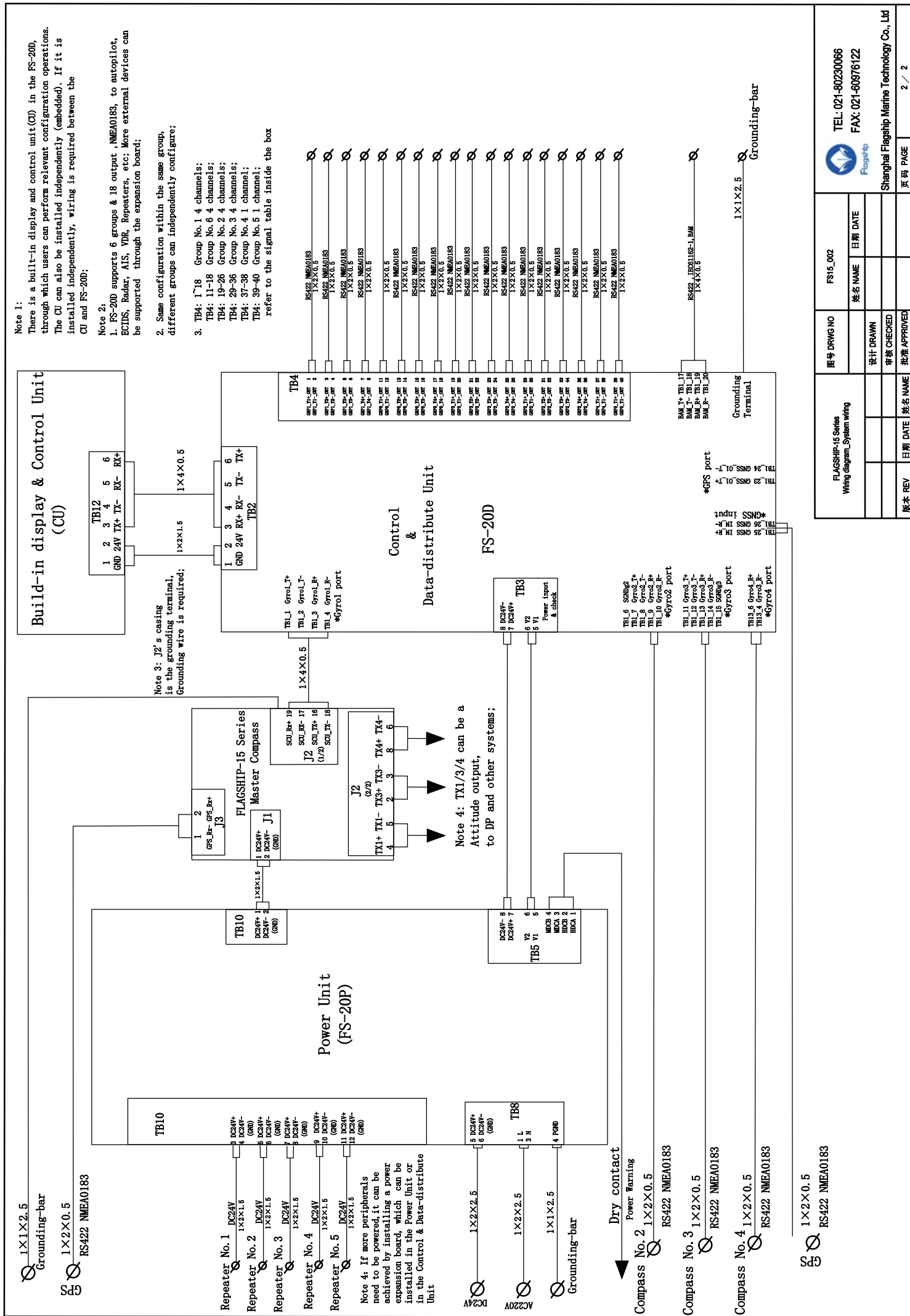
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设计 DRAWN 审核 CHECKED		批准 APPROVED	
版本 REV 日期 DATE		姓名 NAME	
页码 PAGE 2 / 2		上海旗牌艇有限公司 Shanghai Flagship Marine Technology Co., Ltd	

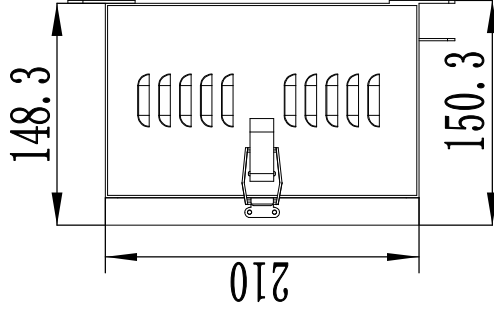
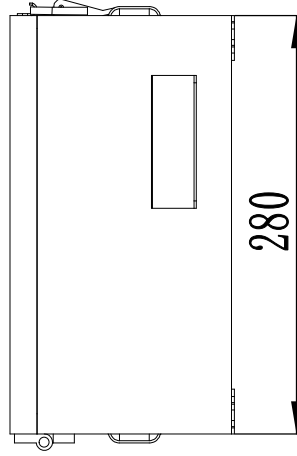
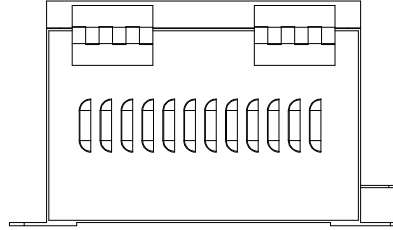
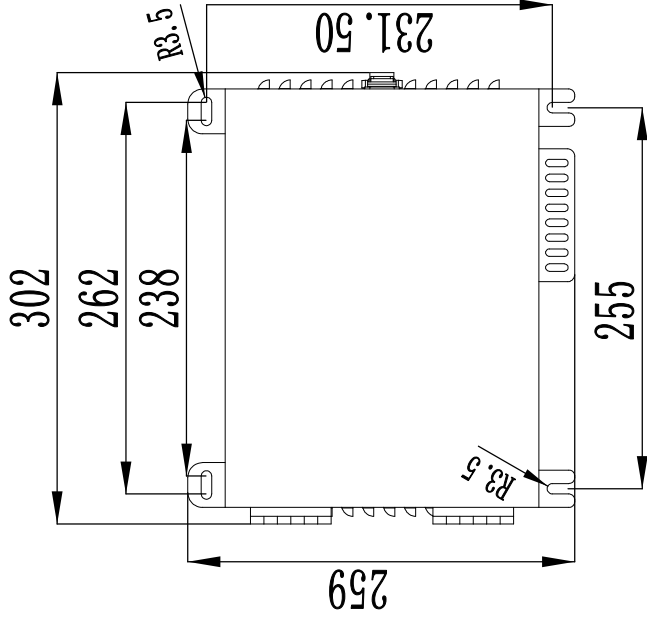
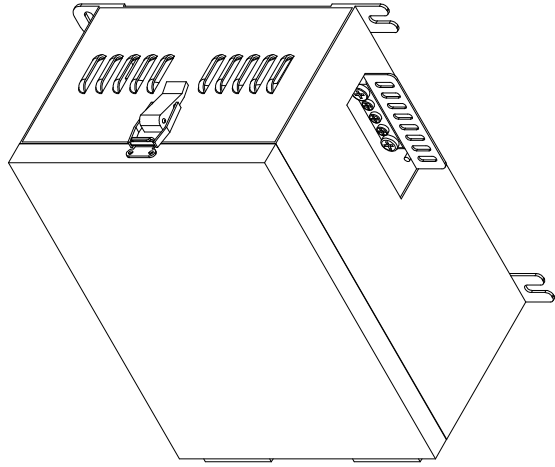


(3) Be installed on a mounting platform rigidly attached to the hull; Installation platform area $\geq 280\text{mm} \times 200\text{mm}$, levelness $\leq 0.1^\circ$, flatness $\leq 0.3\text{mm}$, the parallelism between the master compass and the ship's center line $\leq 0.1^\circ$

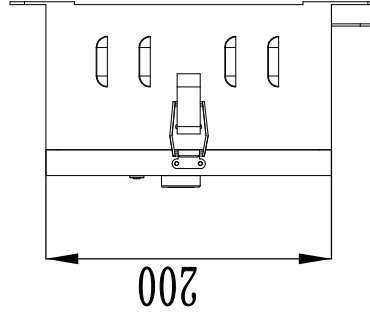
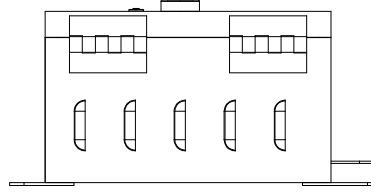
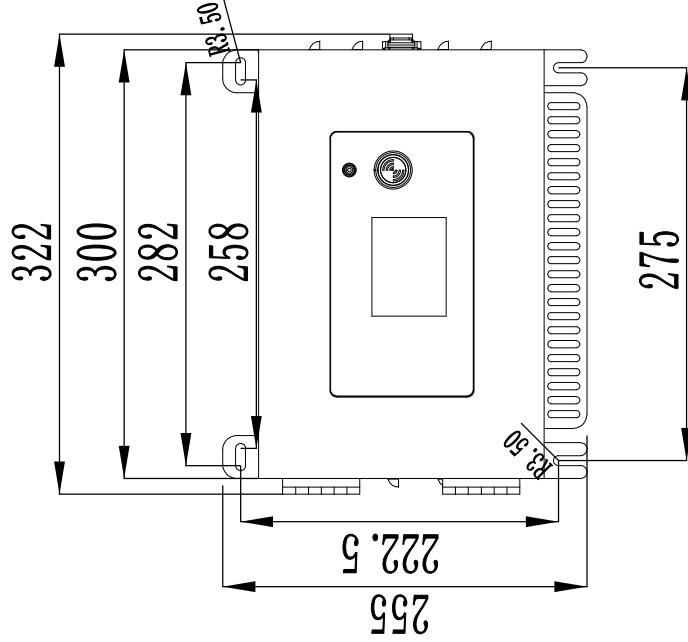
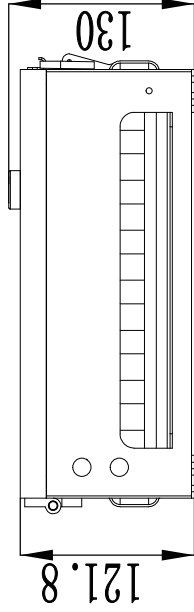
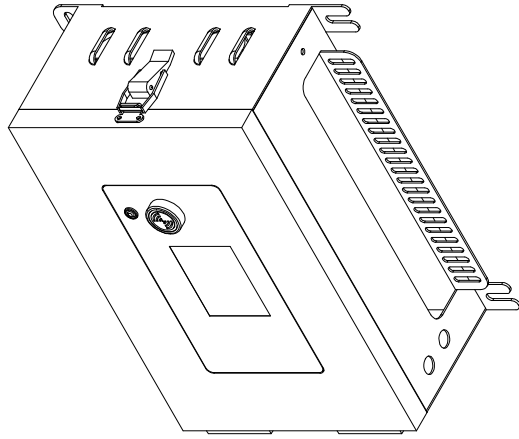
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		批准		
版本 REV	姓名 NAME	日期 DATE	 上海旗牌海洋技术有限公司 TEL: 021-80230066 FAX: 021-80976122	
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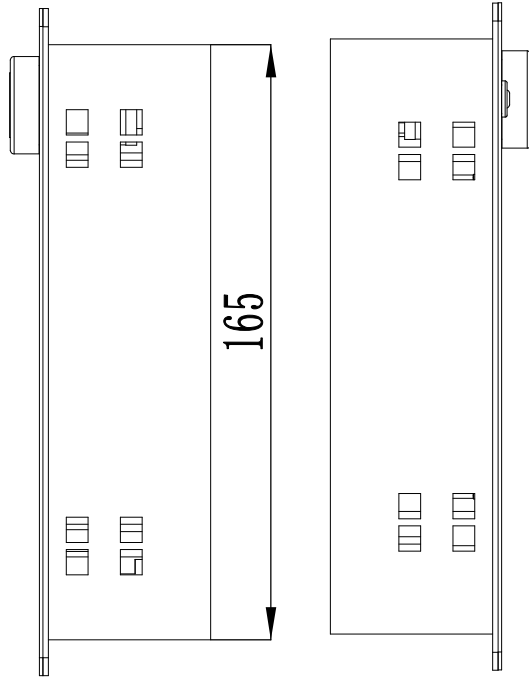
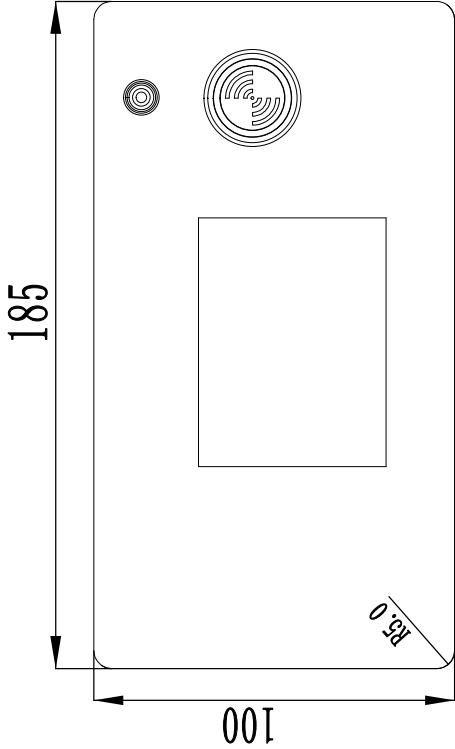
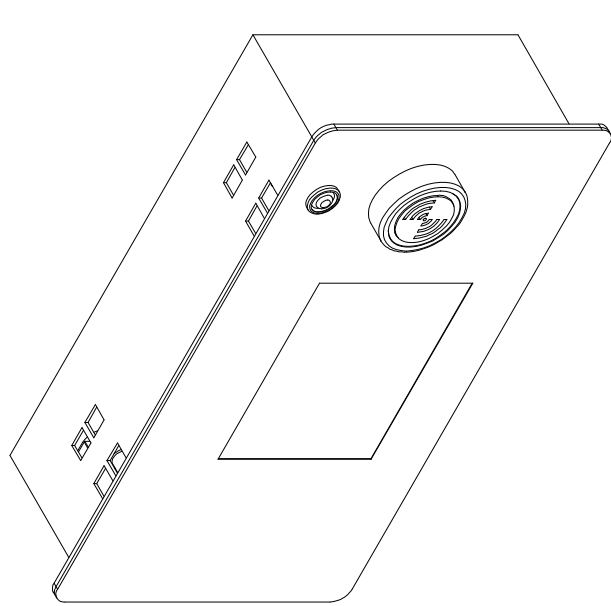




FLAGSHIP Power Unit (FS-20P) Shapes & Installation Dimensions		图号 DRWG NO		FS_PU_001		TEL: 021-80230066 FAX: 021-80976122		Shanghai Flagship Marine Technology Co., Ltd	
版本 REV	日期 DATE	姓名 NAME	批准 APPROVED	设计 DRAWN	审核 CHECKED	姓名 NAME	日期 DATE	页码 PAGE	1 / 1



FLAGSHIP Control & Data-distribute Unit (FS-200) Shapes & Installation Dimensions		图号 DRWG NO	FS_DUL_001	TEL: 021-80230066 FAX: 021-60976122	
版本 REV	日期 DATE	姓名 NAME	日期 DATE	Shanghai Flagship Marine Technology Co., Ltd	
设计 DRAWN	审核 CHECKED	批准 APPROVED	1 / 1	PAGE	



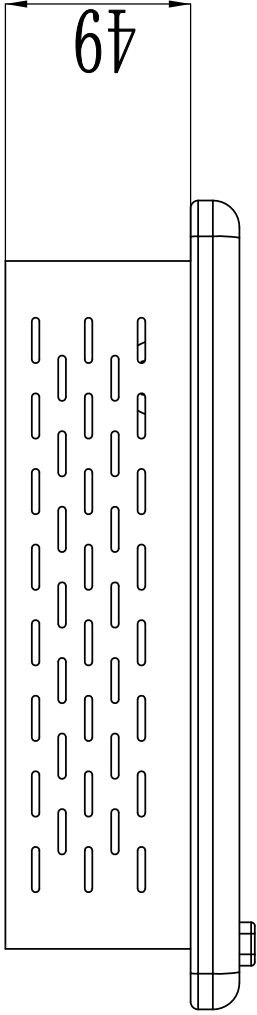
Note:

- (1) There is a built-in display and control unit(CU) in the FS-20D;
- (2) The CU can be installed inside the FS-20D, or installed remotely and independently (embedded). The cables and brackets required are different for the two installation methods;
- (3) If remote independent installation is required, the remote installation requirements need to be informed in advance: an additional baffle for FS-20D is needed;
- (4) When installing remotely and independently, Method No.1: - the cable between FS-20D and CU shipped by FLAGSHIP (the cable length is set to 3 meters by default. If the length exceeds this, prior notification is required);
- (5) When installing remotely and independently, Method No.2: the cable between FS-20D and CU be laid on-site, especially for projects like new shipbuilding, if the cable between FS-20D and CU need operations such as passing through cabins, the on-site pre-wiring method must be chosen

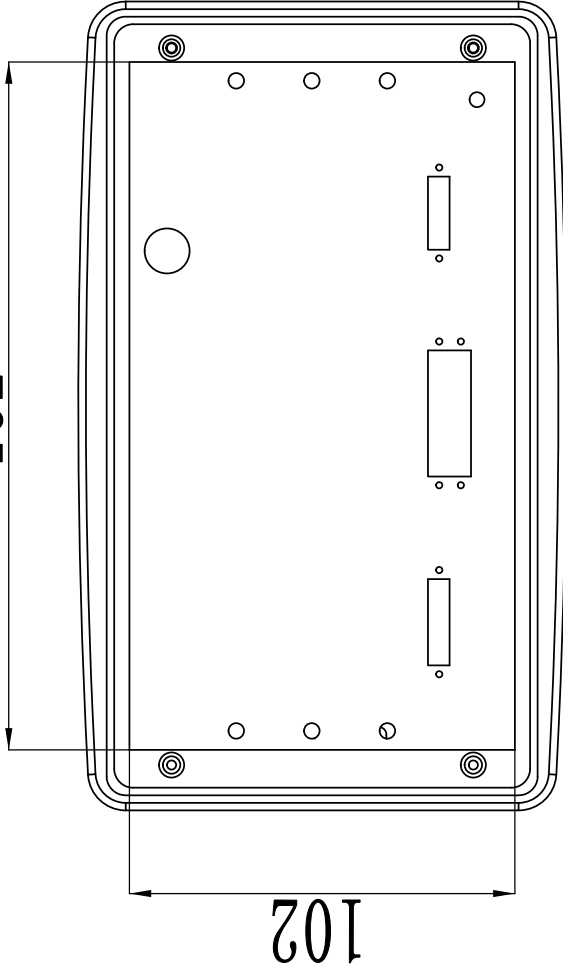
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版本 REV	日期 DATE	姓名 NAME	设计 DRAWN	审核 CHECKED	批准 APPROVED	页码 PAGE
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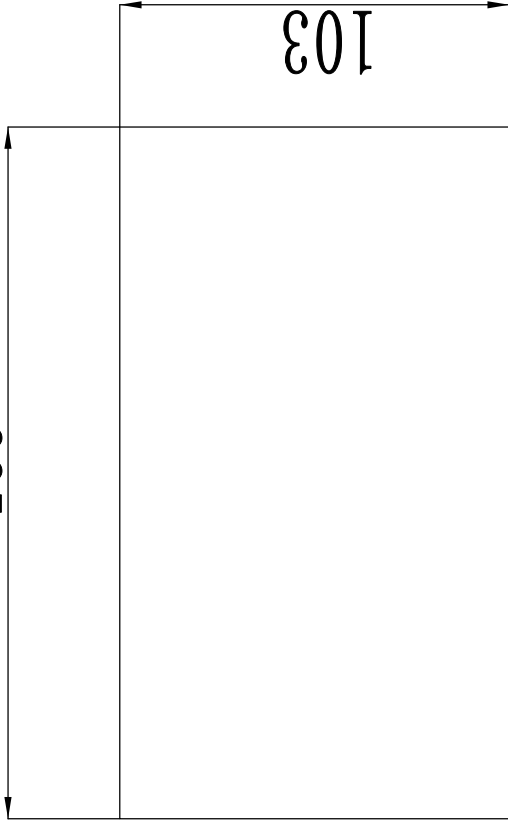
Shanghai Flagship Marine Technology Co., Ltd



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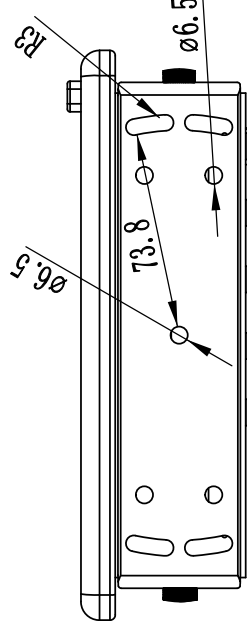
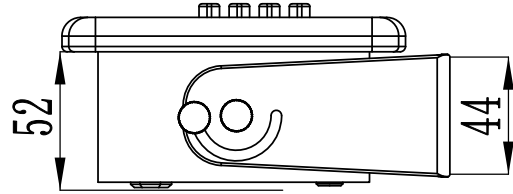
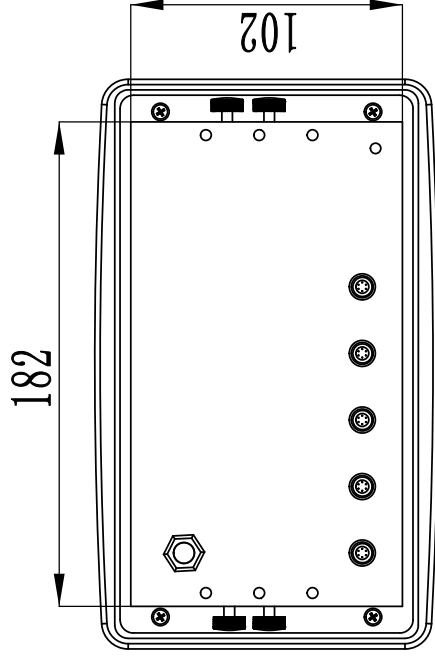
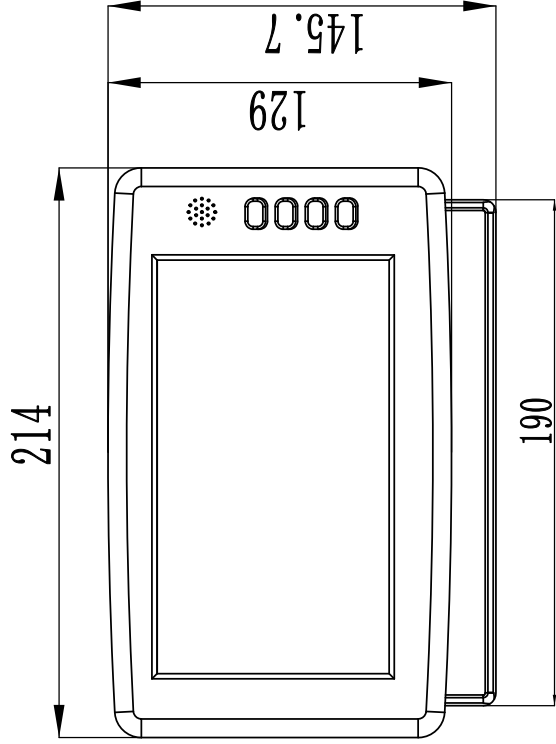


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Suggested hole size

FLAGSHIP Display & Control Unit FS-24Y Shapes & Installation Dimensions (Inch added)		图号 DRWG NO	FS_QDU_001		TEL: 021-80230066 FAX: 021-80976122	
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		批准 APPROVED				



FLAGSHIP		图号 DRWG NO		FS_QDU_001		TEL: 021-80230066	
Display & Control Unit		姓名 NAME		日期 DATE		FAX: 021-60976122	
Shapes & Installation Dimensions		设计 DRAWN		审核 CHECKED		Shanghai Flagship Marine Technology Co., Ltd	
(Bracket)		姓名 NAME		日期 DATE		页码 PAGE	
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