sportnav

CHARTPLOTTER OPERATOR'S MANUAL

For KP-25, KP-25A, KP-25F, KP-25X, KP-27, KP-27A, KP-27F and KP-27X MULTI-FUNCTION GPS CHART PLOTTER

CE FC

SAFETY INSTRUCTIONS

Safety Instructions for the Operator

WARNING
Do not open the equipment. Only qualified personnel should work inside the equipment.
Do not disassemble or modify the equipment. Fire,electrical shock or serious injury can result.
Immediately turn off the power at the switchboard if the equipment is emitting smoke or fire. Continued use of the equipment can cause fire or electrical shock. Contact a **SPORTNAV** agent for service.
Use the proper fuse. Use of a wrong fuse can damage the equipment or cause fire.
Be sure the power supply is compatible with the equipment. Incorrect power supply may cause the equipment to overheat.
The useable temperature range -5℃ to 55℃ for the display unit. Use of the equipment out of those ranges may damage the equipment.

Safety Instructions for the Installer

WARNING
Do not open the cover unless totally familiar with electrical circuits and service manual. Improper handling can result in electrical shock.
Turn off the power at the switchboard before beginning the installation. Fire or electrical shock can result if the power is left on.
Be sure that the power supply is compatible with the voltage rating of the equipment. Connection of an incorrect power supply can cause fire or equipment damage.
Use the proper fuse.
Use of a wrong fuse can damage the equipment or cause fire.

CONTENTS

FOREWORD

SPORTNAV Chartplotters are designed to be all-sealed and waterproof, can be rapid position-fixing and resistant to poor environment. The software is powerful by using the advanced processors, can be capable to display faster, and the design for operation is professional and reasonable, can be easy to use. The built-in Large-capacity map storage space provides intuitive and accurate indication to navigation. It's applicable to the navigation and position-fixing of various vessels at sea and rivers, as well as the hydrographic information collection,river management, etc. For the application for different types of the products please refer to the following :

FEATURES

- Easy to operate
- Ultra high brightness LCD, viewable under strong sunlight
- Compatible with multi-mapping system, C-MAP, Navionics, KChart2.0 and KChart3.0
- High resolution LCD
- Built-in Class B+ AIS module(For KP-25A, KP-25X, KP-27A and KP-27X only)
- Selectable NMEA0183 output baudrate and sentences
- Free to use SPORTNAV detail worldwide coverage KChart system
- IPX6 waterproof
- Support NMEA2000(N2K)
- Compatible with optional external SPORTNAV fishfinder module

MAIN PERFORMANCE AND SPECIFICATIONS

Plotter

Waypoint	12000 user waypoints with name, symbol. 3 system waypoints: MOB, Start , Cursor 10 proximity waypoints
Routes:	Max 30 routes, up to 170 waypoints each
Tracks:	8000 points automatic track log; 10 saved tracks (up to 8000 track points each). Let you retrace your path in both directions
Drawing Marks:	1000
Drawing Lines:	2000
Drawing Placename:	1000
Color for drawing:	8
Alarms:	XTE, Anchor drag, arrival, speed, voltage, proximity waypoint, timer and AIS (CPA and TCPA) alarm
Palette:	Normal Daylight exposed to sunlight Night in dark environment NOAA paper chart color
Tides:	Built-in worldwide tide data
Position format:	LAT/LON
Basemap:	Worldwide
External Map:	Compatible K-Chart2.0, K-Chart3.0, C-MAP MAX and Navionics+
User data storage:	Internal backup of user settings or external SD card
Plot Intervals:	5sec to 60minutes or 0.01 to 10nm
Plotting scales:	0.001 to 700nm
Perspective View:	ON/OFF(for C-Map only)
Celestial:	Sunrise/Sunset Moonrise/Moonset

AIS

Max number of AIS targets:	700 AIS targets display
AIS target tracking:	10 Manually saved tracks(300 points each)
AIS alarm:	CPA and TCPA

GNSS receiver

Receiver :	50 parallel channel GNSS receiver continuously tracks and uses up to 50 satellites to compute and update your position
GNSS :	Support GPS, Beidou and GLONASS (For KP-25, KP-25F, KP-27 and KP-27F) Support GPS and Beidou (For KP-25A, KP-25X, KP-27A and KP-27X)
Acquisition time :	Cold start : 29 seconds Hot start : 1 second
Update rate :	1 sec or 0.1 sec. selectable (For KP-25, KP-25F, KP-27and KP-27F) 1 sec. (For KP-25A, KP-25X, KP-27A and KP-27X)
Accuracy :	Position : 3 meters (95%) without S/A Velocity : 0.1 meter/sec. without S/A
Dynamics :	Altitude : 18,000 meters Velocity : 515 meter/sec.
Datum :	WGS84 User define (For KP-25, KP-25F, KP-27 and KP-27F)
SBAS:	Supported (For all models)
QZSS:	Supported (For all models)

ClassB+ AIS module (For KP-25A, KP-25X, KP-27A and KP-27X)

Frequency :	156.026MHz ~ 162.025MHz
Technology :	SOTDMA
Channel Bandwidth :	25KHz
Modulation :	GMSK
Data Rate :	9,600bps
No. of Transmitter :	1
No. of Receiver :	2
AIS Channel 1 :	CH87B (161.975MHz)
AIS Channel 2 :	CH88B (162.025 MHz)
TX Power Output :	5 Watt (37dBm +/-1.5dB)
RX Sensitivity :	<-107dBm @20%PER
RX Message Format :	AIS Class A and B messages
Comply Standard :	IEC-62287 IEC-62287-2 Ed.2.0:2017

HD Fishfinder Characteristics (For KP-25F,KP-25X,KP-27F and KP-27X)

Echo Color — 16 colors (including background color) according to echo intensity. The background color is selectable from blue, white and black.

Basic Range

Meters	5	10	20	40	80	150	200	300	600	1000
Feet	15	30	60	120	200	400	600	1000	2000	3000
Fathoms	3	5	10	20	40	80	100	150	300	600

Range Shift — Up to 1000 meters (3000 feet, 600 fathoms)

Zoom Range — Times 2,3,4,6

Bottom Lock Expansion — 5/10meters,10/20feet, 2/5fathoms

Auto Mode — Automatic adjustment of range and gain

Display Mode — High Frequency (200KHz),Low Frequency (50KHz), Dual (200K and 50K 1/2display on each), Zoom (200KHz and 50KHz zoom) and A-scope Display

Zoom Display — Marker Zoom, Bottom Zoom and Bottom-lock Expansion

Display Advance Speed — (Lines/TX): Freeze, 1/8, 1/4, 1/2, 1/1, 2/1, 4/1, 6/1, 8/1, 10/1

TX Frequency — 50 and 200kHz (alternately transmitted)

Power Output — 600W

Pulse-length/TX rate

Display End Depth (m)	5	10	20	40	80	150	200	300	600	1000
Pulse Length 200K (μs)	120	220	320	520	920	1020	1020	1020	1020	1020
Pulse Length 50K (μs)	170	270	370	570	970	1070	1070	1070	1070	1070
TX Rate (pulse/min)	2000	1333	706	353	171	98	75	53	38	27
TX period (millisecond)	30	45	85	170	350	610	800	1120	1580	2200

Interference Rejecter — Rejects unwanted signals by comparing last and present echoes in strength.

Alarm — Fish and Bottom alarms, Temperature alarm (sensor required)

Power Supply

10.5VDC to 35VDC

Current drain at 12V : < 1.0A

GPS Interface

GPS Data :	RS232/RS422 input / output, NMEA0183 V3.01 and V4.11
GPS Input Baudrate :	Auto scan (4800, 9600, 19200 and 38400)
GPS Output Baudrate :	Selectable among 4800, 9600, 19200 and 38400

AIS Interface

AIS Data :	RS232/RS422 output, VDO, VDM, GGA, GSA, GSV and RMC
AIS Input Baudrate :	38400 from GPS input port (For KP-25, KP-25F, KP-27 and KP-27F only)
AIS Output Baudrate :	38400 (For KP-25A, KP-25X, KP-27A and KP-27X only)

NMEA Sentence supported

INPUT, auto scan baudrate
+ GGA, GLL, GSA, GSV, RMC, HDG, HDM, HDT
+ VTG, ZDA, MTW, VWR, VWT, MWD, VPW, VHW
+ TLL, TTM, VDO, VDM, GNS, MTA
+ RMA, DBT, DPT, MWV, BWC, XTE, ZDL, WPL, AAM, APB, BOD, RMB, DSC, MDA, RPM, XDR.

OUTPUT, Baudrate : Selectable 4800, 9600, 19200, 38400
+ GGA, GLL, RMC, GSA, GSV, AAM, APA, APB, BOD, BWC, BWR, DBT, DPT, HDT, MTW,
+ RMB, TLL, VTG, WPL, XTE, ZDA, ZTG, ZDL, MWD, VPW, VWR, VWT.

outputs for Autopilot: APA, APB, XTE, BOD

NMEA2000 supported PGN

Description	PGN	CONTENT
GNSS	126992	System Time
	129026	COG & SOG, Rapid Update
	129540	GNSS Satellites in View
	129033	Local Time Offset
	129029	GNSS Position Data
	127250	Vessel Heading
	127258	Magnetic Variation
	129025	Position, Rapid Update
	129539	GNSS DOPs
	129291	Set & Drift, Rapid Update
	129044	Datum
AIS	129810	AIS Class B “CS” Static Data Report, Part B
	129809	AIS Class B “CS” Static Data Report, Part A
	129798	AIS SAR Aircraft PositionReport
	129793	AIS UTC and Date Report
	129040	AIS Class B Extended Position Report
	129039	AIS Class B Position Report
	129038	AIS Class A Position Report
	129041	AIS Aids to Navigation (AtoN) Report
	129802	AIS Safety Related BroadcastMessage
	129801	AIS Addressed Safety Related Message
	129794	AIS Class A Static and Voyage Related Data
	129795	AIS Addressed Binary Message
	129797	AIS Binary Broadcast Message
Sounder	128267	Water Depth
Navigation	127237	Heading/TrackControl
	129284	Navigation Data
	129283	Cross Track Error
	127245	Rudder
	127251	Rate of Turn
	128259	Speed, Water Referenced
	128275	Distance Log
Environment	130306	Wind Data
	130310	Environmental Parameters– DEPRECATED
	130311	Environmental Parameters– DEPRECATED
	130312	Temperature – DEPRECATED

Physical

Size :

KP-25 Series :	143.1(H)mm X 215.3mm(W) X 63.1mm(D)
KP-27 Series :	155.1(H)mm X 241.3mm(W) X 62.9mm(D)

Weight :

KP-25 : 0.8 Kg.	KP-25A : 0.9 Kg.	KP-25F : 0.9 Kg.	KP-25X : 1.0 Kg
KP-27 : 0.9 Kg.	KP-27A : 1.1 Kg.	KP-27F : 1.1 Kg.	KP-27X : 1.2 Kg

Display:

KP-25 Series :	5 inches Color TFT day-view LCD 800 X 480 pixels
KP-27 Series :	7 inches Color TFT day-view LCD 800 X 480 pixels
Waterproofing :	Display unit : IPX6
	GPS antenna : IPX6
Temperature range :	Display unit : -15˚C to +55˚C
	GPS antenna : -25˚C to +70˚C

Equipment list :

- Display unit(including installation bracket and ear clamp)
- GPS patch antenna
- Panel Cutout Pattern
- Quick start and installation manual
- Face mask and Panel Installation Sticker
- Standard accessories pack (one 8-core Power/Data Cable ,2 spare fuses, 4 bracket mounting screws , 8 panel mounting screws)

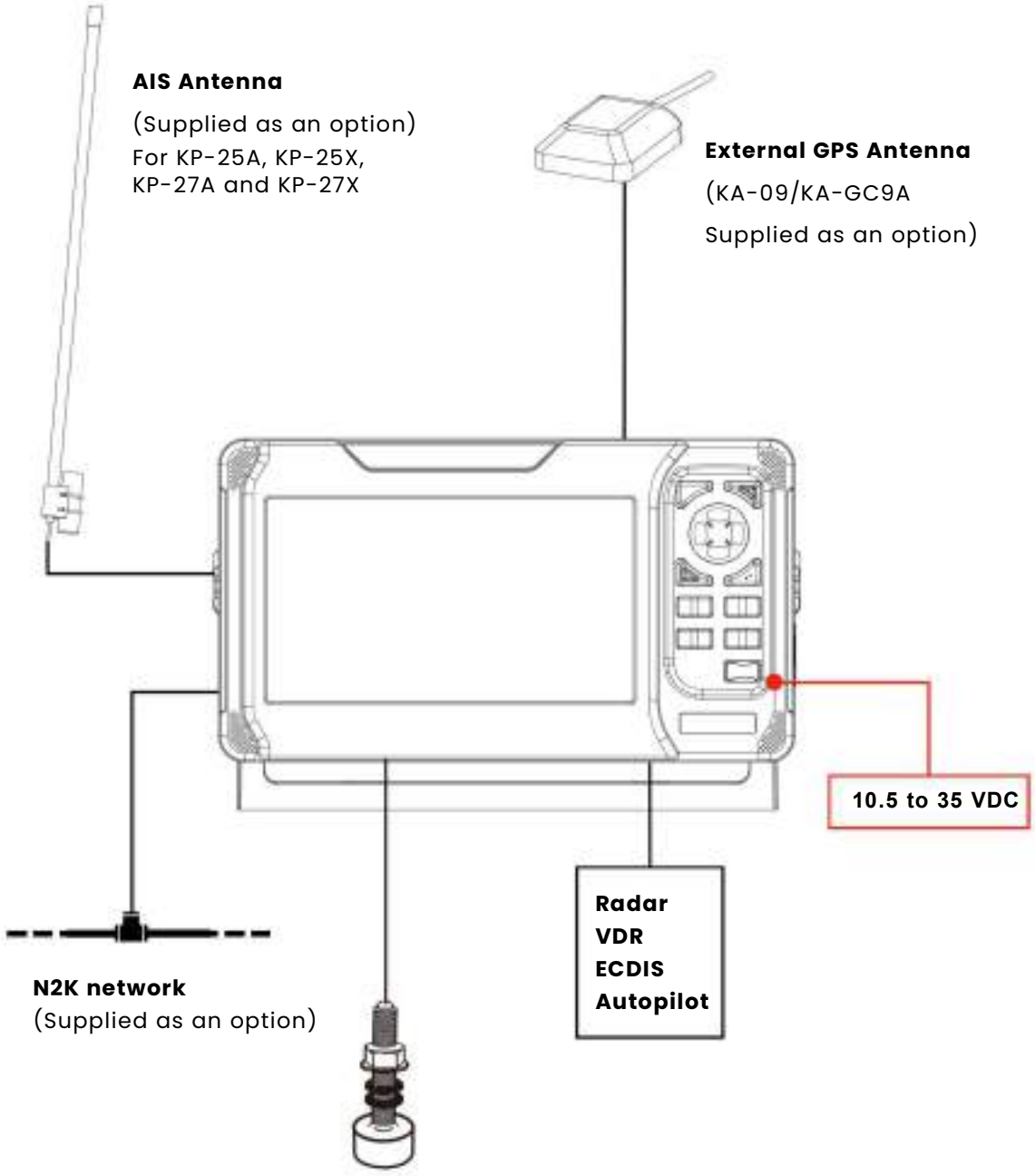
Options :

1) SPORTNAV NMEA2000 converter : KC-2W

2) SPORTNAV ultrasonic weather station: KW-360 and KW-360_mini

Option accessories :

1) Heading/GPS sensor :	KA-GC9A
2) Fishfinder transducer : (For KP-25F , KP-25X , KP-27F and KP-27X)	NBM40-50/200T through hull transducer (Plastic, 600W dual frequency with temperature sensor) NMM40-50/200T through hull transducer (Bronze, 600W dual frequency with temperature sensor) KTD-520 transom mount transducer (Plastic, 600W dual frequency with temperature sensor)


AIS Antenna
(Supplied as an option)
For KP-25A, KP-25X,
KP-27A and KP-27X
External GPS Antenna
(KA-09/KA-GC9A
Supplied as an option)
10.5 to 35 VDC
Radar
VDR
ECDIS
Autopilot
N2K network
(Supplied as an option)
Fishfinder Transducer
(Supplied as an option)
For KP-25F, KP-25X,
KP-27F and KP-27X

1 .OPERATION OVERVIEW

1.1 Keypad instruction

▲ Plotter function: Moving the cursor upward or to change the setting.
Sounder function: Moving the VRM upward.

◀ Plotter function : Move cursor to the left
Sounder function :
Long press – Activate SHIFT range function
Short press – Activate the echoes history marker

▶ Plotter function: Moving the cursor to the right.
Sounder function:
Long Press - Activates feeding rate selection for picture advancement
Short Press - Activate the echoes history marker

MENU Pressing it once displays the menu of the current page, pressing it twice enters the main menu.
Plotter function:
Press once – Plotter menu
Press twice – AIS menu
Press thrice – Main menu
Press and hold to switch track ON/OFF.
Plotter + Sounder Function:
Long press - Activates split ratio selection.
Short Press - Displays the menu of the screen that has >50% screen coverage.

MODE Displaying 9 screen modes available for selection.
Plotter Function: Press and hold to change track color.
Sounder Function: Press and hold to activate sonar mode selection.

✕ Withdraw from an optional operation, or activate graphic mode selection

✓ Confirms the input or data.
Plotter function:
Long Press - Activates Drawing Mark option.
Short Press - Activates waypoint attribute edit window.
Sounder function:
Long Press - To switch from manual gain to automatic gain and vice versa.
Short Press - To adjust gain level.

Plotter and AIS Function: Enlarges the scale of the maps and charts.
Sounder Function: Decreases the depth range for shallow waters.

Plotter and AIS Function: Reduces the scale of the maps and charts.
Sounder Function: Increases the depth range for deeper water.

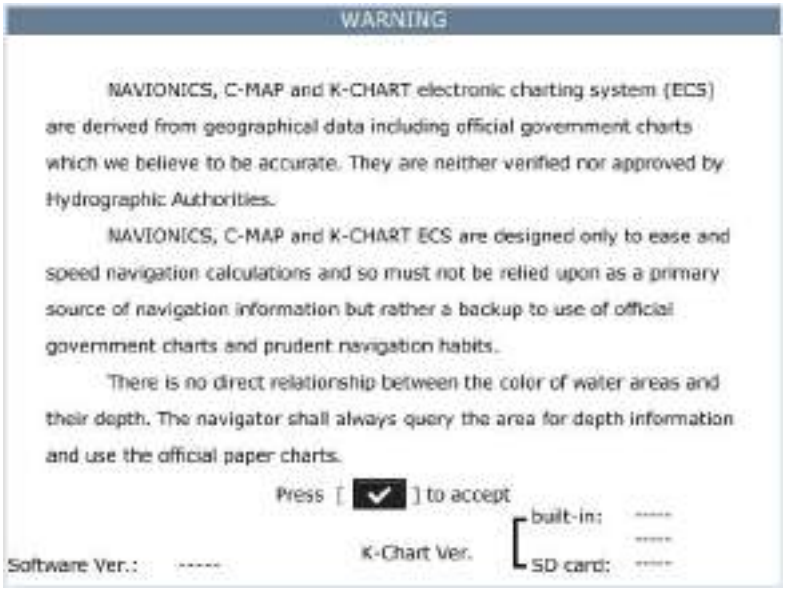
Plotter function: Display other function (GOTO, tide table, search, etc.) menu.
Sounder function: Provides signal level selection. Eliminates low intensity echoes (up to light-blue echoes) each level.

The MOB mark denotes man overboard position.
Long Press - Activate Man Overboard function.
Short Press - AIS detail list

Long press – Turn power ON/OFF
Short press – Adjust the screen brightness and keypad backlight dimmer

1.2 Turning ON and OFF Power

Turning on the power by press key, the unit beeps and displays the "SPORTNAV" logo. Wait for the unit totally boot up to show the below warning page and press to enter working mode.



Turning off the power by press and hold until the screen goes off.

1.3 Brightness adjustment and day/night display mode settings

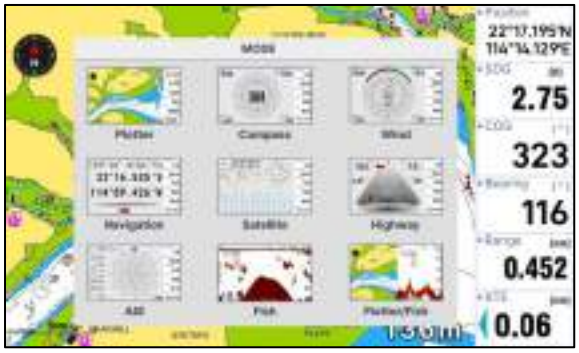
1.3.1 Brightness adjustment

1. Short press the key. The brightness adjusting window appears.

2. Press or to adjust LCD display brightness.
3. Press or to adjust keypad backlight.
4. Press the key to confirm and exit.

1.3.2 Day / night display mode settings

When the brightness adjustment window is open, press the (fx) key to switch between day and night display modes.

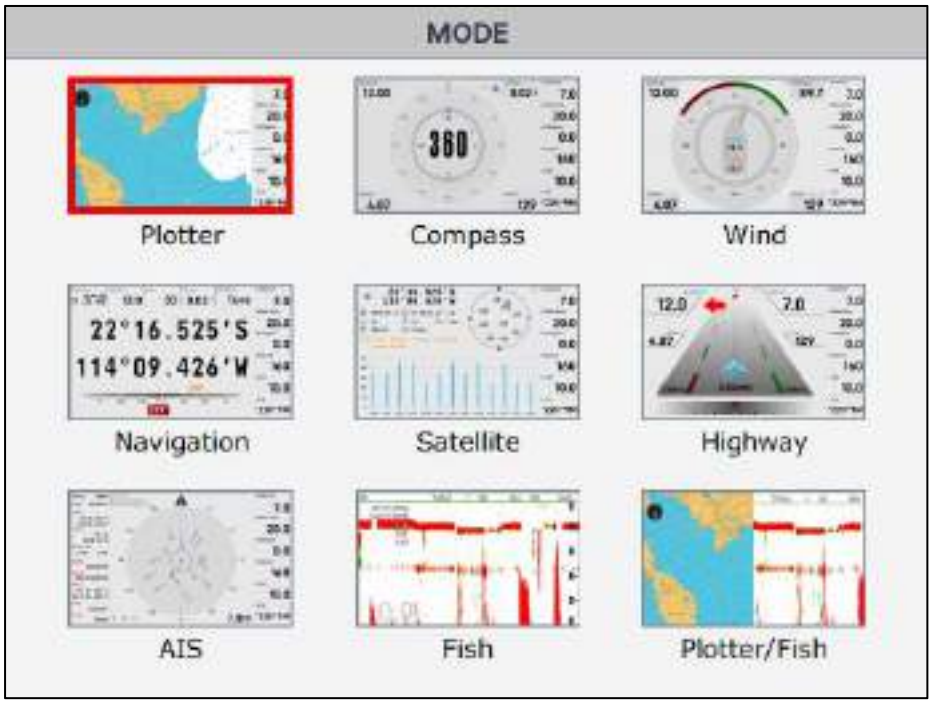


Day mode

Night mode

1.4 How to select display mode

Press the (MODE) or (X) in any display mode an Icon selection window will appear as below.



You can use arrow keys to choose a display mode and press (✓) to enter that display mode.

Note : If some display modes cannot be selected (the Icon turns to grey color) please check SETUP menu whether this display mode is turned off.

2. PLOTTER DISPLAY OVERVIEW

2.1 Choosing the Zoom Display Range

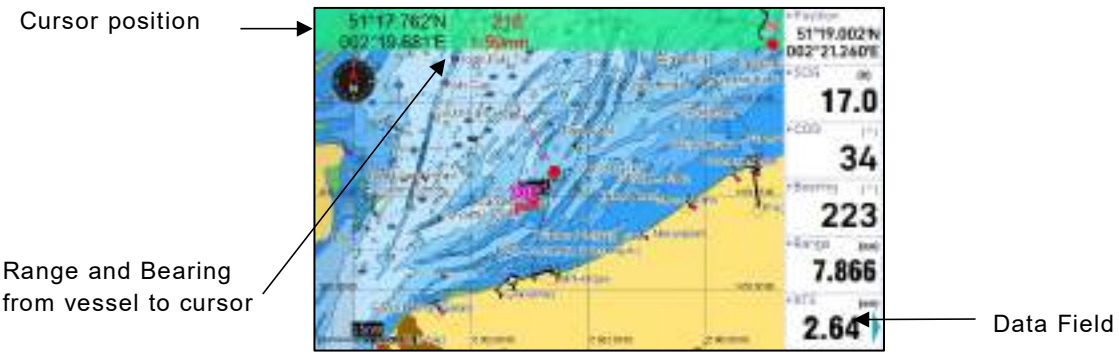
You may press [⊠] to Zoom In and [⊠] to Zoom Out as desired on the PLOTTER display.

2.2 Moving the Cursor

Press the cursor pad to move the cursor. The cursor moves in the direction of the pressed arrow. Whether up [▲], down [▼], left [◄] , right [►] or diagonal [⊠] .

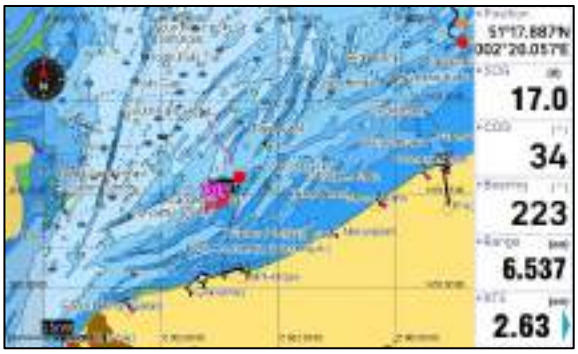
Cursor Position Turned On

Cursor position is displayed in latitude and longitude at the top left corner of the **PLOTTER** display when the cursor is on. The range and bearing from own ship to the cursor appears at the top left corner of the display too.



Cursor Position Turned Off

Press the [X] key to clear the cursor. Cursor position data will disappear when the cursor is off.



2.3 Panning the PLOTTER Display

Using the cursor, pan left, right, up or down on your desired area. Place the cursor at the edge of the screen to start panning. The display shifts in the direction opposite to cursor pad operation.

2.4 Centering Own Ship's Position

Press the (X) key for centering own ship's position.

2.5 Map

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Map** and then press (▶) key to select.
3. Choose the layer **"ON"** or **"OFF"** as desired and then press (✓) key to finish.

(C-MAP)

(K-Chart2.0 / K-Chart3.0)

(Navionics+)

2.6 Perspective View

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Perspective** and then press (✓) key to select.

3. Choose **"ON"** or **"OFF"** as desired and then press (✓) key to finish.

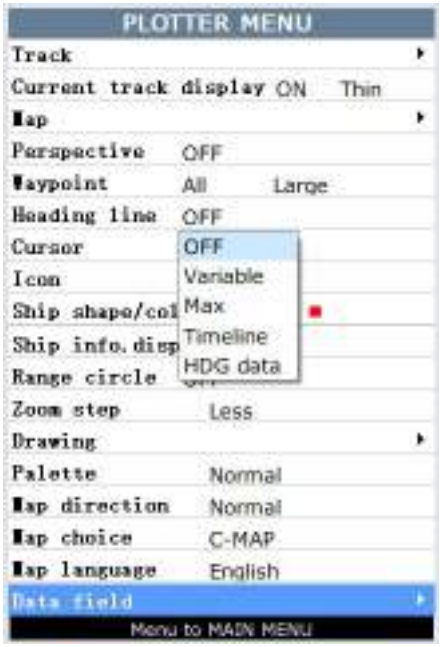
Note: Perspective View only available on C-Map.

4. Choose the layer **"ON"** as desired and then press (✓) key to finish.

5. Choose the layer "**OFF**" as desired and then press (✓) key to finish.

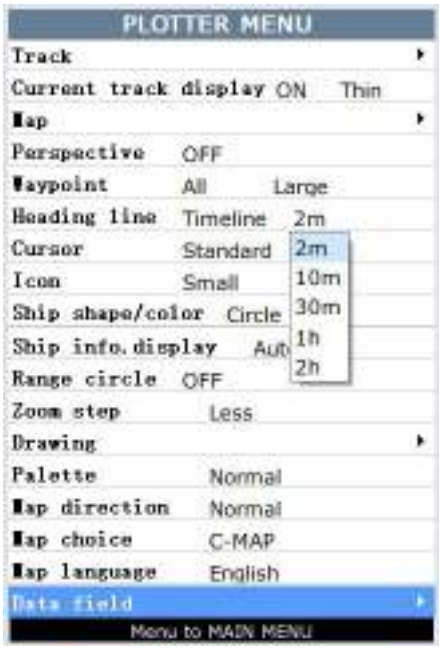
2.7 Heading Line

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Heading Line** and then press (✓) key to select.



3. Choose **"Off", "Variable", "Max"** , "**Timeline**" or **"HDG data"**as desired and then press (✓) key to finish.
4. Heading Line option: "COG Time Line" selection

   The length of heading line will vary according to the SOG to show the estimated point of destination after the set period. Example, if you set the COG Time Line to 10 minutes then the length of the heading line will point to the position that your boat will reach after 10 minutes.



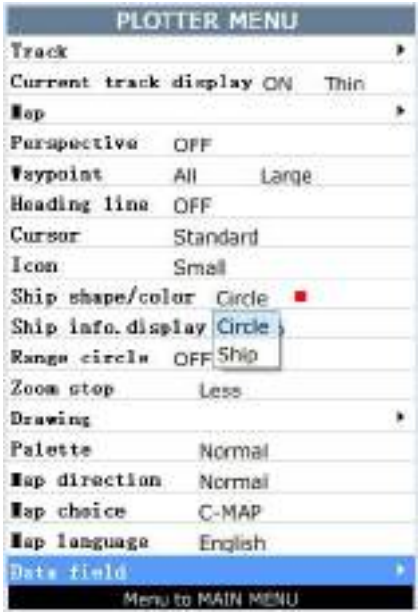
2.8 Cursor

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Cursor** and then press (✓) key to select.

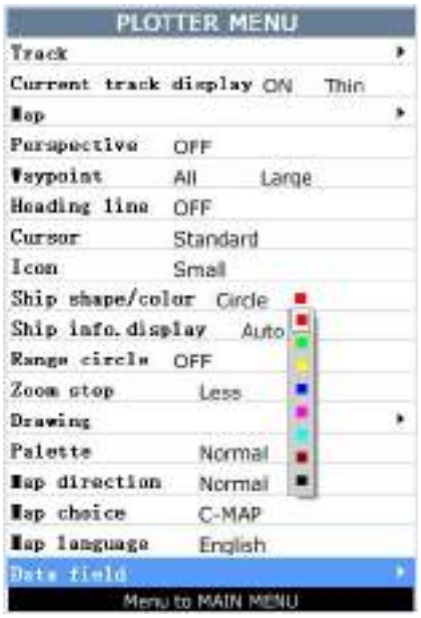
3. Choose **"Standard"** or **"Full Screen"** as desired and then press (✓) key to finish.

2.9 Ship shape/color

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Ship shape/color** and then press (✓) key to select.



Press (▶) key and then press (✓) key.



2.10 Range Circle

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Range Circle** and then press (✓) key to select.

3. Choose "ON" (if you choose "ON", you need to input the radius of the circle manually), or " OFF " as desired and then press (✓) key to finish.

2.11 Drawing

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Drawing** and then press (✓) key to select.
3. Choose "Mark", "Line" or "Place name" as desired and then press (✓) key to finish.
4. User can change the size of User Marks.

5. User can change the size of Drawing Lines.

2.12 Palette

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Palette** and then press (✓) key to select.

3. Choose "Normal", "Daylight", "Night" or "NOAA" as desired and then press (✓) key to finish.

2.13 Map Direction

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Map Direction** and then press (✓) key to select.

3. Choose "Normal", "North Up", "WPT Up", "COURSE Up" or " Head up" as desired and then press (✓) key to finish.

Note :

Normal : *It is similar to North up, map not move only own boat position move*

North up : *North is always on the top of the display, own boat not move only the map move*

WPT up : *Only available on GOTO mode when a waypoint is set as destination. The waypoint is always on the top of the display.*

Course up : *COG (Course over ground) is always on the top of the display*

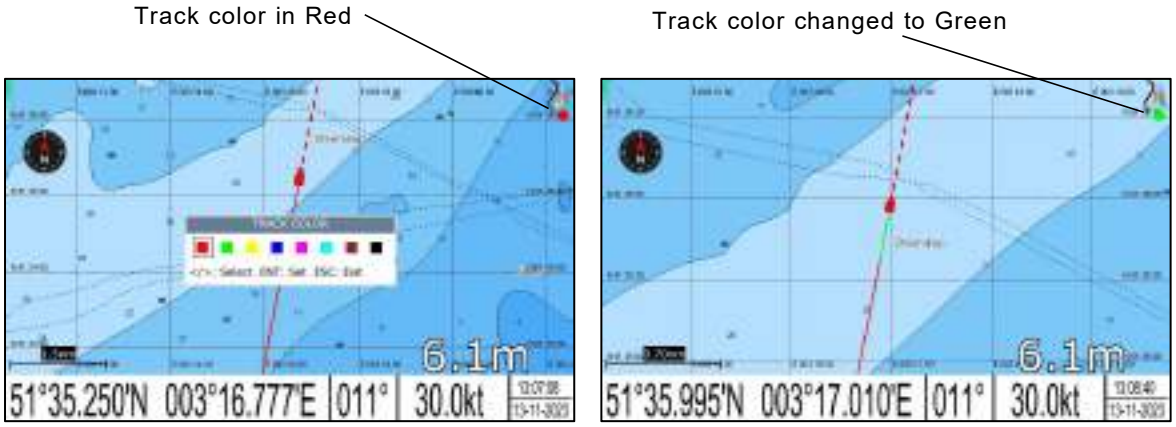
Head up : *The heading of own boat is always on the top of the display. It requires an external heading signal input.*

3. TRACK

In the following it teaches you how to manage the track of your own boat.

3.1 Change the color of current track

Press and hold MODE key on Plotter screen to change the color of current track of your own boat. Take an example : Change the track color from Red to Green.



Press and hold MODE key until you see the track color box appear

3.2 Change plotting intervals of current track

You can choose plotting intervals of the current track for your own boat as below:

Choose MAIN MENU->Track record->Track record mode

Choose the track record interval mode

Choose track record intervals

Track record mode :

-Time : Track is recorded and plotted at the time interval set

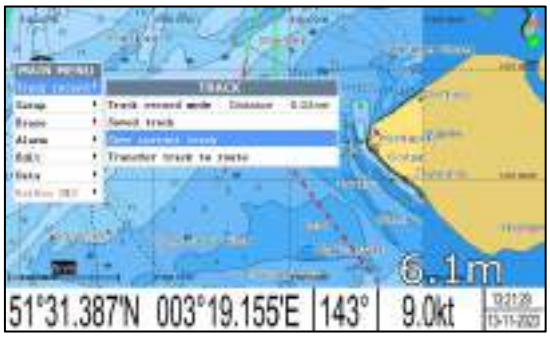
-Distance : Track is recorded and plotted at the distance interval set

-Auto : Plotting and recording interval changes with plotter display range selected

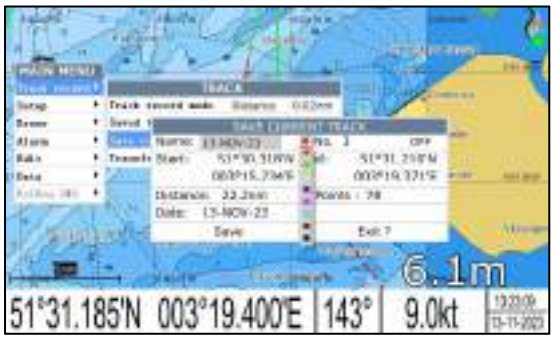
-OFF : Track is neither recorded or plotted

3.3 Save current track

You can save the current track of your own boat for future use.

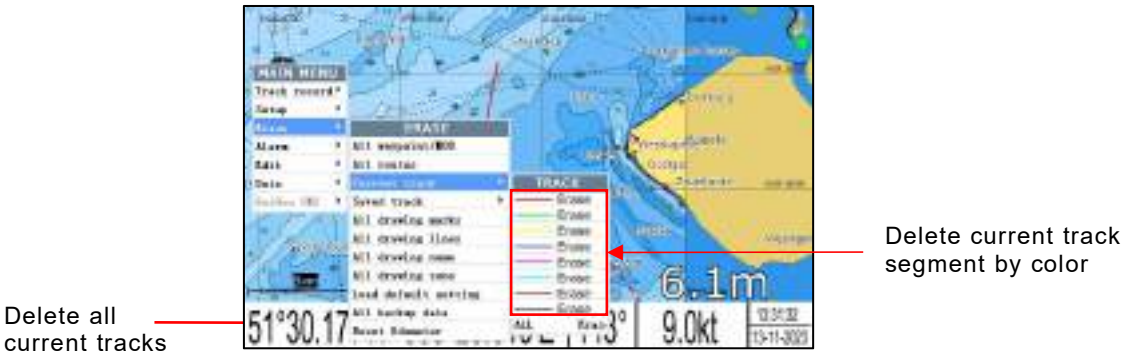


Choose MAIN MENU->Track record->Save current track



You can change the color and the name before save

3.4 Erase current track



Choose MAIN MENU→Erase→Current track

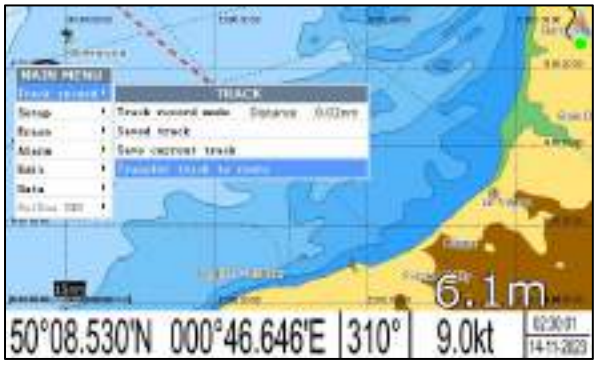
3.5 Erase saved track

You can erase saved track by colors and erase all saved track.

Choose MAIN MENU->Erase->Saved track

3.6 Transfer saved track to route

You can transfer the saved track of your own boat to a route for navigation purpose. You need to choose a starting point and an ending point of a saved track before Transferring any part of the saved track into a route.

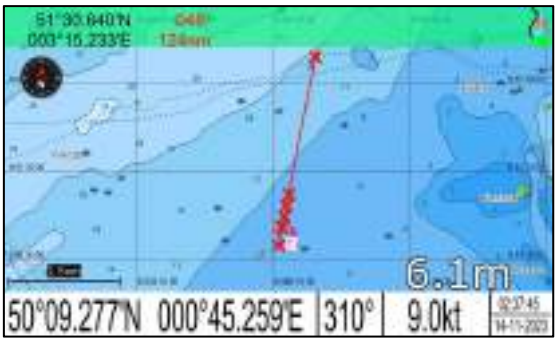


Choose MAIN MENU->Track record->Transfer track to route

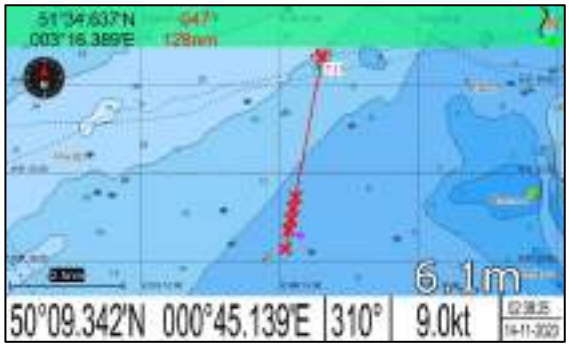
Choose a saved track from the list

After you choose a saved track from the list and press ✓ to confirm. The plotter screen will jump to the location of this saved track and the cursor will change to red color with a "?" beside the cursor then you can carry out selection of starting point.
Note : In any screen if you choose "Transfer track to route" it will jump back to plotter screen automatically.

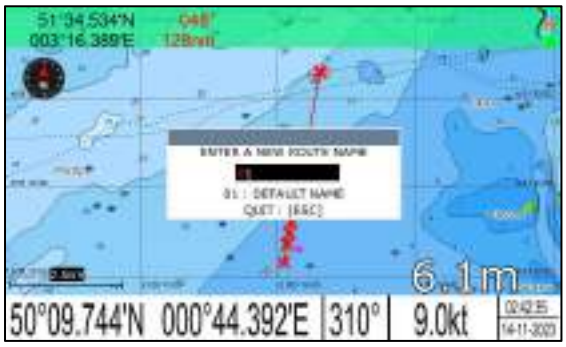
When you move the cursor close to the saved track you will see a number "TXXX" pop up beside the saved track. This number represent a saved track point in the saved track, smaller the number means earlier record.



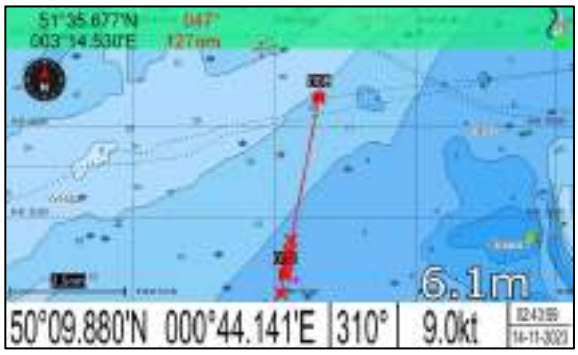
Move the cursor to the starting point and press ✓



Move the cursor to the ending point and press ✓ again



Enter the name of the new route and press ✓ to confirm



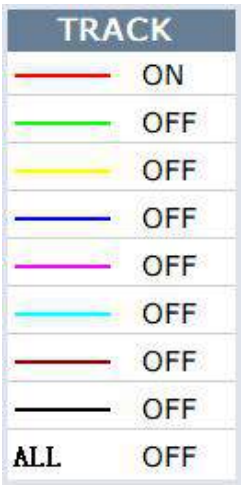
A new route is created

After finish transferring you need to press ✗ to quit the "Transfer saved track to route" function.

***Note** : After it quits from "Transfer saved track to route " function the cursor will turn from RED color back to BLACK color.*

3.7 Display saved track on the plotter screen

1. Press (MENU) key in **PLOTTER** screen.
2. Choose **Track** and then press (▶) key to select.
3. Choose the color and if you want to turn it “ON” or “OFF” .
4. Press (✓) key to finish.



4.1 Entering Waypoints

Waypoints can be entered on the **PLOTTER** display in three ways: by cursor position, at own ship's position, and from the waypoint edit.

Entering a waypoint with the cursor

1. Use the cursor pad to place the cursor on the location desired for a waypoint.
2. Press the ✓ key. The following window appears.

Move the cursor to the location desired for a waypoint

Press ✓ ,choose "SAVE" and press ✓ again

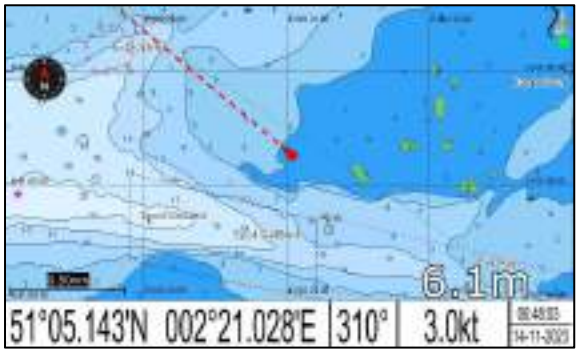
3. This window is where you can rename, edit LON and LAT, choose mark shape and color.
4. Choose **"SAVE"** to finish.

A waypoint is created on the cursor location

Entering a waypoint at own ship's position

1. Momentarily press ✓ key when no cursor is seen. The following window appears.

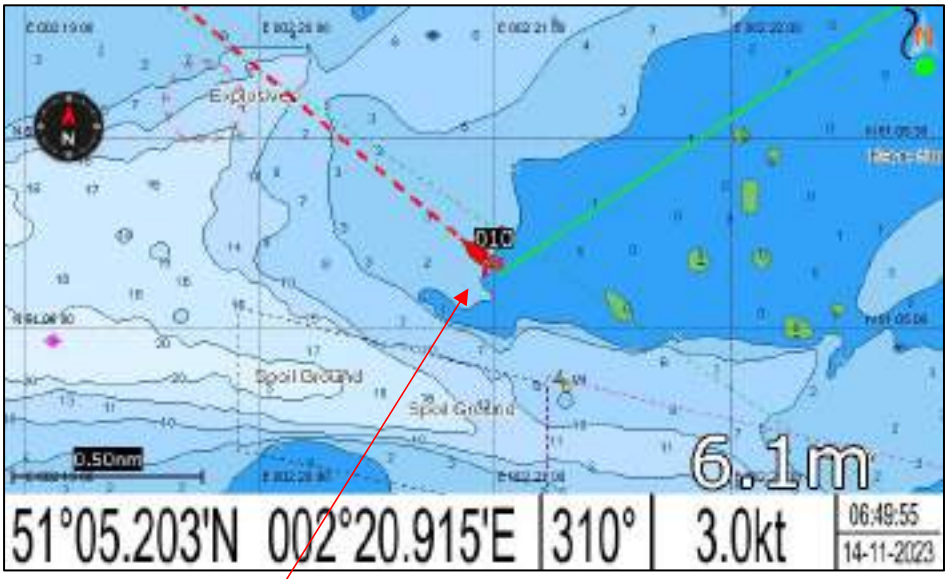
Note: if you see a cursor on the plotter screen you can press ✗ to make it disappear.



Make sure no cursor is seen on the plotter screen

Press ✓ , choose "SAVE" and press ✓ again

2. If you do not need to change anything, choose "SAVE" to finish.

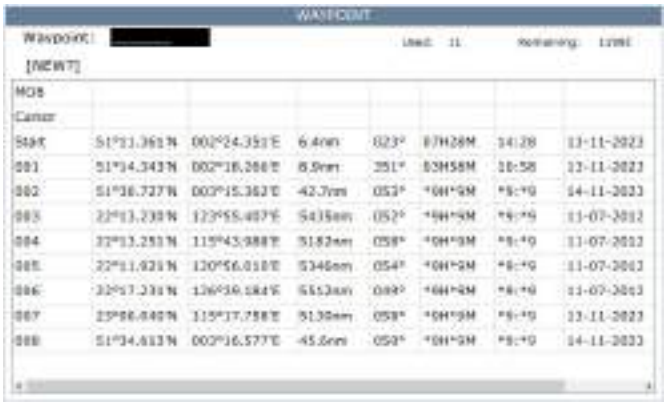


A waypoint is created on your own boat location

Entering a waypoint from the waypoint list

1. Press the (MENU) key twice (Plotter screen: three times) to enter main menu.
2. Choose Edit and then press (►) key to select.

3. Choose Waypoint and then press (✓) key.
   The following window will appear.



4. Choose NEW then press (✓) key.
   The following window appears.

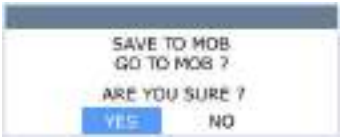
5. If you do not need to change anything, choose "SAVE" to finish.

4.2 Entering the MOB Mark

Only one MOB mark may be entered.

Each time the MOB mark is entered, the previous MOB mark and its position data are over-written.

1. Long press the (◎) key on any display mode. The following display appears.



2. To set MOB position as destination, press (►) to choose "YES" and then press (✓) key. Choosing "NO" saves the position as a waypoint called "MOB".

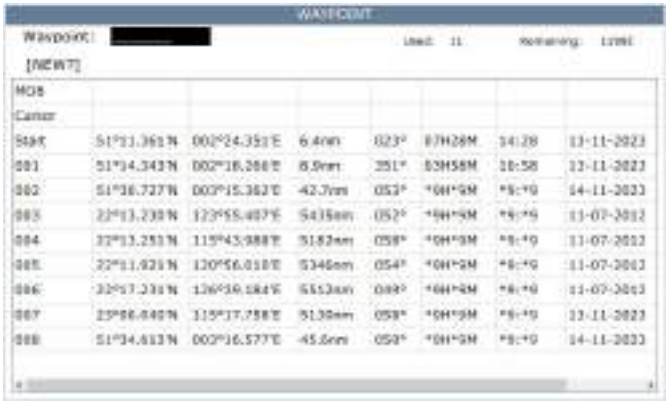
4.3 Displaying Waypoint Name

Please refer to section 2, PLOTTER CONFIG -> Waypoint.

4.4 Operation on the Waypoint Editing

Waypoint position, waypoint name, mark shape, mark color can be edited from the Waypoint Edit.

1. Press the (MENU) key twice (Plotter screen: three times) to enter main menu.
2. Choose Edit and then press (▶) key to select.
3. Choose Waypoint and then press the (✓) key. The following window will appear.

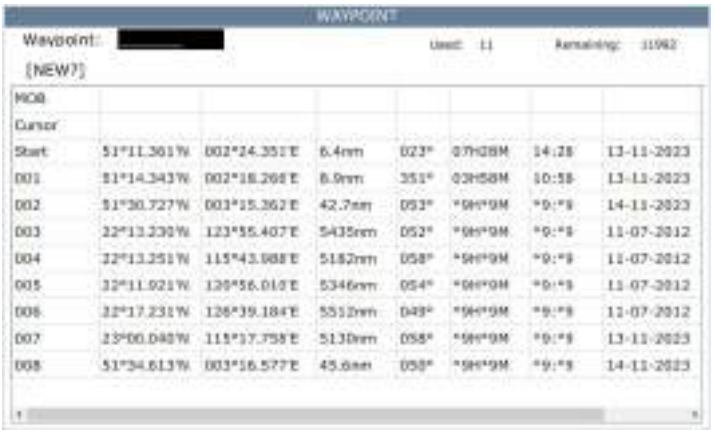


4. Choose waypoint to edit and then press the (✓) key. The following window will appear.

5. Choose the object you want to edit and then press the (✓) key to select.
6. Change name, position, mark shape, mark color.
7. Choose "SAVE" and then press (✓) key to finish.

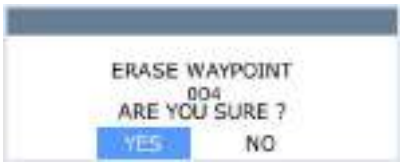
4.5 Erasing Waypoints

1. Press the MENU key twice (Plotter screen: three times) to main menu.
2. Choose **Edit** and then press ▶ key to select.
3. Choose **Waypoint** and then press the ✓ key. The following window will appear.



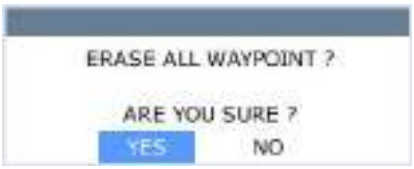
4. Select a waypoint and press ✓ key.
5. The confirm window will appear. Choose "ERASE" and then press ✓ key.

6. Choose "YES" and then press ✓ key to finish.



Erase All Waypoints

1. Press the MENU key twice (Plotter screen: three times) to enter main menu.
2. Choose **Erase** and then press ▶ key to select.
3. Choose **All waypoint/MOB** and then press ✓ key.
   The confirming window will appear.

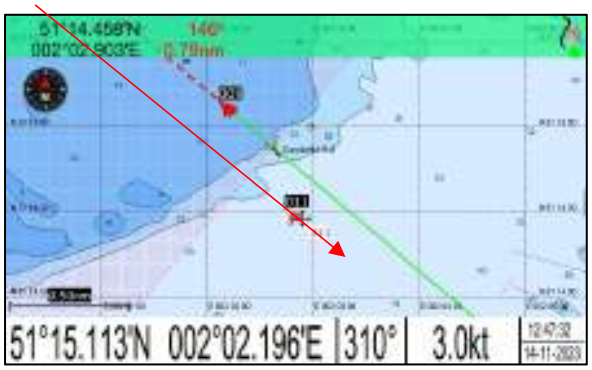


4. Choose "YES" and then press ✓ key to erase all waypoints.

4.6 Editing Waypoints on plotter screen

You can edit Waypoint on plotter screen.

1. Move the cursor close to a Waypoint you want to edit.



You will see a text box pop up with same name of the Waypoint you want to edit

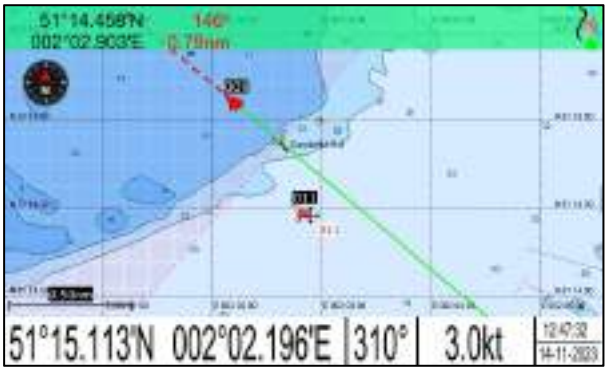
2. Press ✓ to confirm, the confirm window will appear.

3. Choose the object you want to edit and then the ✓ key to select.
4. Change name, position, mark shape, mark color.
5. Choose “SAVE” and then press ✓ key to finish.

4.7 Erase Waypoints on plotter screen

You can erase Waypoint on plotter screen

1. Move the cursor close to the Waypoint you want to erase.



You will see a text box pop up with same name of the Waypoint you want to erase

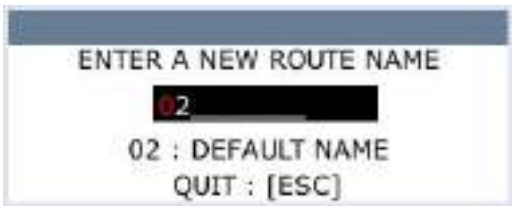
2. Press ✔ to confirm, the confirm window will appear.

3. Choose " ERASE" and then press ✔ key to finish erasing that Waypoint.

5.1 Creating Routes

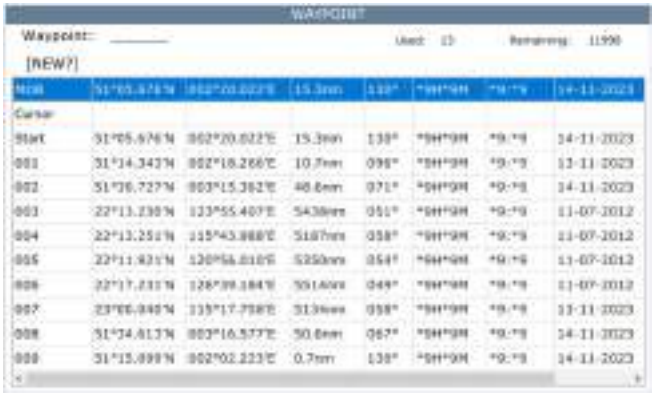
1. Press (MENU) key Two or three times to enter main menu.
2. Choose **Edit** and then press (▶) key to select.
3. Choose **Route** and then press (✓) key.
   The following window will appear.

4. Choose "NEW" and then press (✓) key.
   The following window will appear.



5. Use (▲) or (▼) to enter the route name and then press (✓) key to finish.
   The following will appear.

6. Choose the location (e.g.01) and then press ✓ key.
   A new window will open which will let you choose a waypoint.

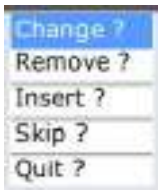


7. Choose the waypoint name that you want to include in the route and then press ✓ key (e.g. 001). You can also create a new waypoint if needed.
8. Repeat step 6 and 7 until the route is complete.

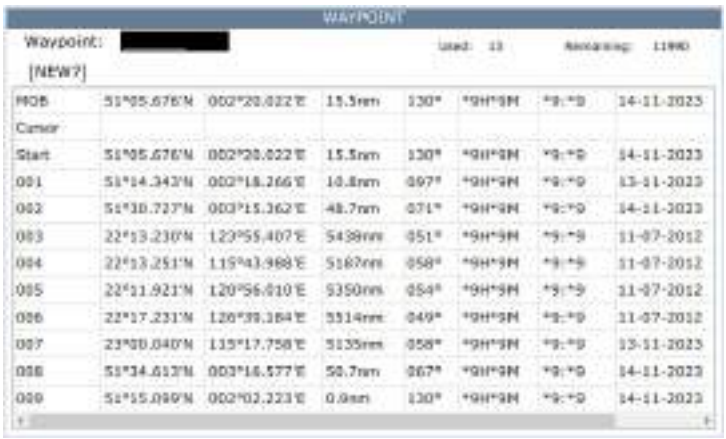
5.2 Editing Routes

Replacing waypoints in a route

1. Press the MENU key twice (Plotter screen: three times) to enter main menu.
2. Choose **Edit** and then press ▶ key to select.
3. Choose **Route** and then press ✓ key to select.
4. Choose the route to edit and then press ✓ key.
5. Place the cursor on the waypoint to replace, press the ✓ key to show the route options.



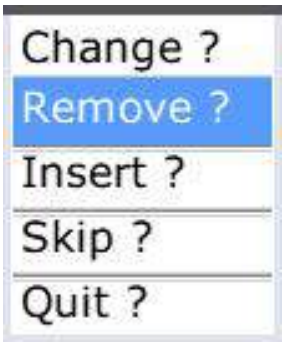
6. Choose "Change" and then press ✓ key.
   The waypoint select window will appear.



7. Choose the waypoint name that you want to include in the route and then press (✓) key.
8. Repeat step 5 to 8 until finish edit.

Permanently deleting a waypoint from a route

1. Press the (MENU) key twice to enter main menu.
2. Choose **Edit** and then press the (▶) key to select.
3. Choose **Route** and then press (✓) key to select.
4. Choose the route desired and then press (✓) key to select.
5. Choose the waypoint you want to delete and then press (✓) key to show the route edit options.



6. Choose "Remove" and then press (✓) key to finish.

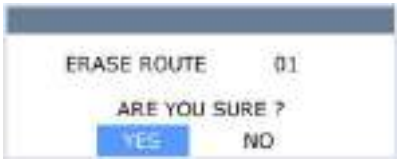
5.3 Erasing Routes

1. Press the (MENU) key twice or three times to enter main menu.
2. Choose **Edit** and then press (▶) key to select.
3. Choose **Route** and then press the (✓) key. The following window will appear.

4. Select a route then press (✓) key.

5. The confirm window will appear. Choose "**ERASE**" and then press ✓ key.

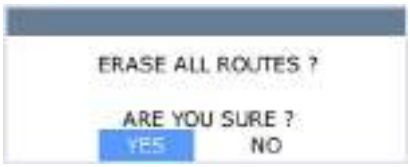
6. Choose "YES" and then press ✓ key to finish.



Erase All Routes

1. Press the MENU key twice or three times to enter main menu.
2. Choose **Erase** and then press ▶ key to select.
3. Choose **All routes** and then press ✓ key.

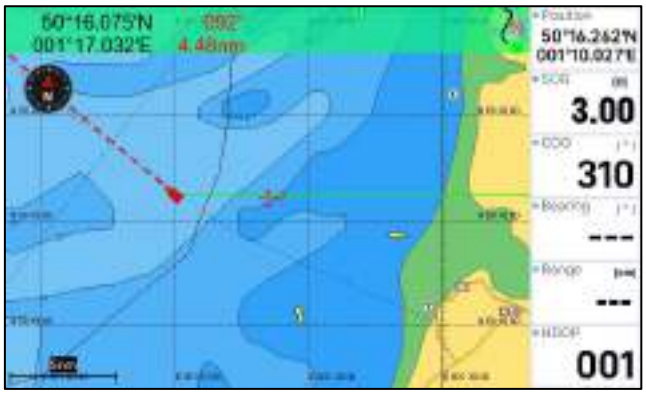
The confirming window will appear.



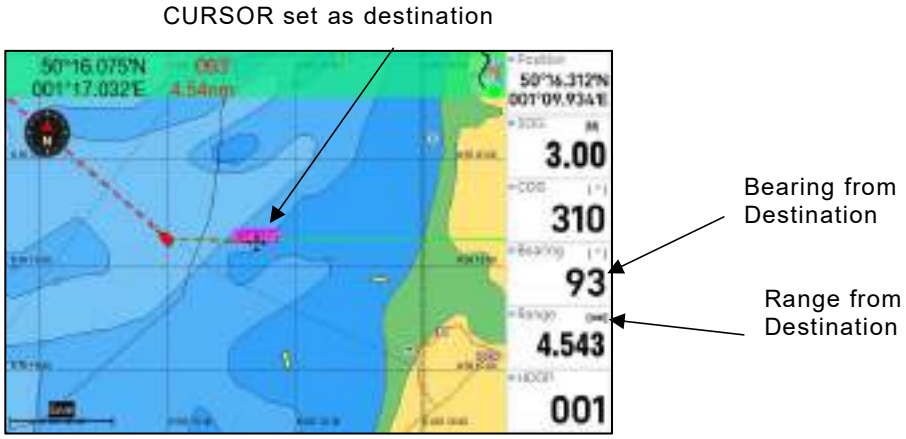
4. Choose "YES" and then press ✓ key to erase all routes.

6.1 Setting Destination by Cursor

1. Press (fx) key to display the **FUNCTION** window.
2. Choose **Goto cursor** and then press (✓) key to select.
3. The cursor appears with "? ".



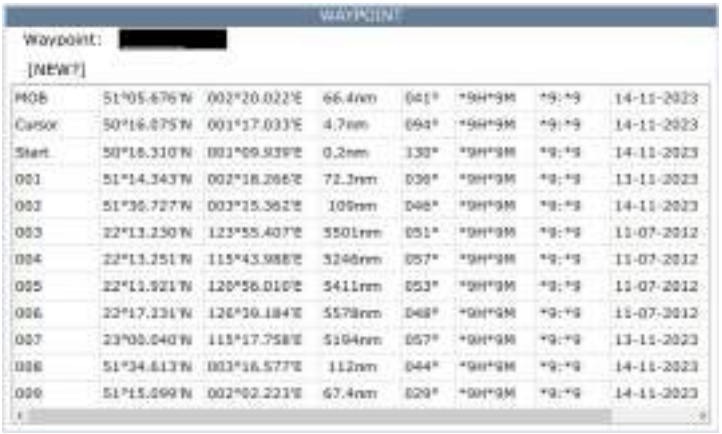
4. Use the cursor pad to place the cursor on the location desired for destination.
5. Press the (✓) key to mark destination.



6.2 Setting Destination by Waypoint (WPT)

1. Press the (fx) key to display the **FUNCTION** window.

2. Choose **Goto WPT** and then press (✓) key to select.
3. The **WAYPOINT** list appears.

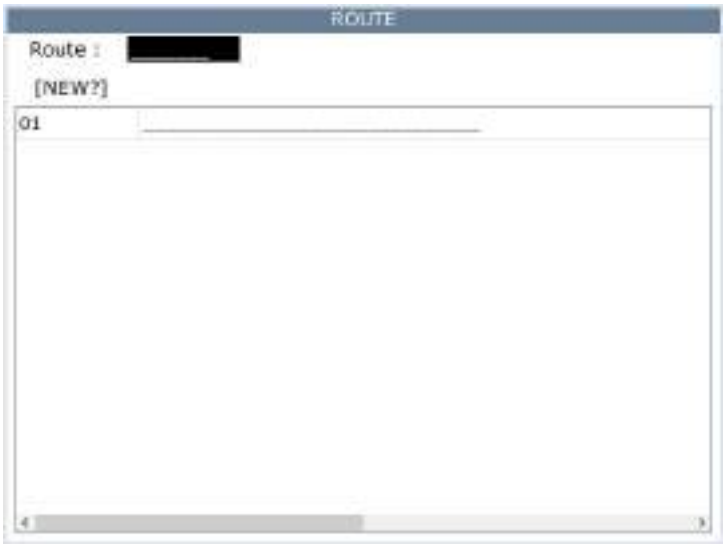


4. Choose a waypoint and then press (✓) key to finish.

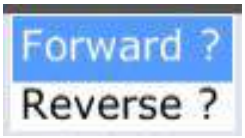
6.3 Setting Route as Destination

1. Press the (fx) key to display the **FUNCTION** window.
2. Select Goto route and then press (✓) key to select.

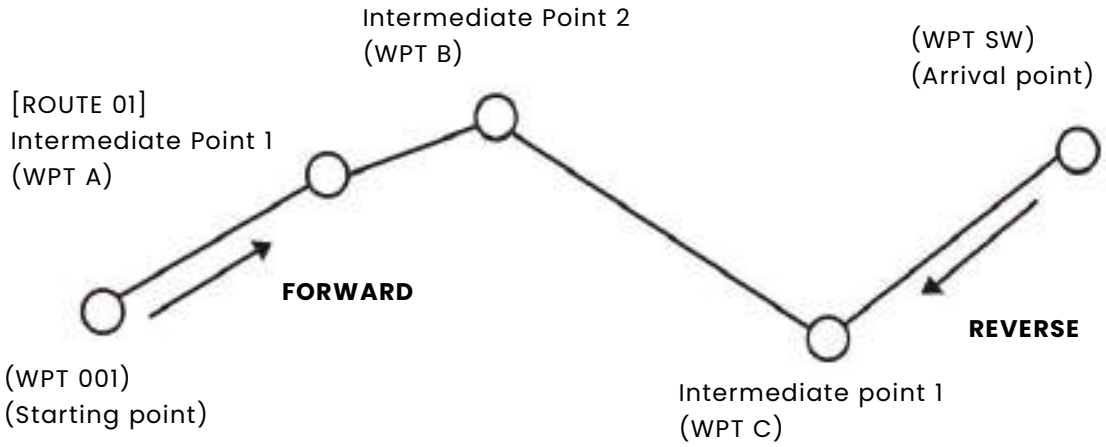
3. The **ROUTE** list appears.



4. Choose a route and then press ✓ key. The following window appears.



5. Choose "Forward" or "Reverse" in order to traverse the waypoints in the route, and then press ✓ key to finish.



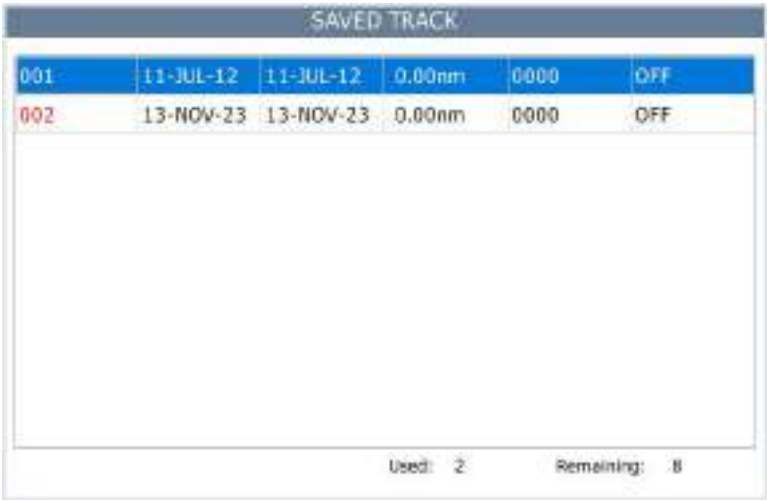
Meaning of forward and reverse

6.4 Setting Track Data as Destination

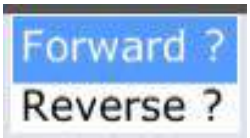
Track Data can be used for navigation.

1. Press the (fx) key to display the **FUNCTION** window.
2. Choose **Goto track** and then press the (✓) key to select.

3. The **SAVED TRACK** window will appear.



4. Choose the track that you want to set as destination, and then press (✓) key.



5. Choose Forward or Reverese to start Goto track navigation.

Once a Goto track has been activated, the track will divide it into segments. Up to 200 temporary waypoints are created (named T1,T2, T3, etc. and END) to mark the most significant features of the track, duplicating your exact path as closely as possible. To get the most out of the Goto track feature, remember

the following tips:

- Always clear the track log at the point that you want to go back to.
- There must be at least two track log points stored in memory to create a track route.
- If the receiver is turned off or satellite coverage is lost during your trip, it will draw a straight line between any point where coverage was lost and where it resumed.
- If your track's changes in distance and direction are too complex, 200 waypoints may not mark your path accurately.

The receiver then assigns the 200 waypoints to the most significant points of your track, and simplifies segments with fewer changes in direction.

6.5 Canceling Destination

You can cancel a destination as follows.

1. Press the (fx) key to display the FUNCTION window.

2. Choose Stop goto and press (✓) key to finish

6.6 Distance

Measure the distance of several points and save it as a route.

1. Press (fx) key in **PLOTTER** screen to display **FUNCTION** window.

2. Select **"Distance"** and press ✓ key to activate the distance measurement function.

Fig.3

Note:

a) LON/LAT is the position of the cursor (point C)

b) BRG is the bearing of cursor to the last point (point B)

c) LEG is the distance of cursor to the last point (point B)

d) DST is the total distance from the cursor to the starting point (AB + BC)

e) M is Magnetic North, T is True North

3. Move the cursor to the starting point (A) and press ✓ to set up starting point. Now all BRG, LEG and DST are display 0.

4. Move the cursor to the next point (B). Now the BRG and LEG display the Bearing and Distance from point A to point B, DST =0.

5. Press ✓ key, now DST = distance from point A to point B is shown, while BRG and LEG turns to 0.

6. Move the cursor to the next point (C). Now the BRG and LEG displays the Bearing and Distance from point B to point C. DIST displays the total distance from point A to point B.

7. Press ✓ key, now DIST = distance of point AB + distance of point BC is shown, while BRG and LEG turns to 0.

8. Repeat steps 3, 4 and 5 to measure the distance of several points.

9. Press (X) key during the step 3, 4 or 5, the following menu will pop out.

10. You can select :

A) "SAVE" to save the measurement as a route.

B) "QUIT" to quit the distance measurement function without saving.

C) "CANCEL" to continue the distance measurement.

7. ALARM

There are six alarm conditions which generates both audio and visual alarms:Arrival alarm, **Anchor drag alarm, XTE (Cross-Track Error) alarm, Speed alarm, Voltage alarm and Timer alarm.**

When the alarm setting is violated, the buzzer sounds and the name of the offending alarm and the alarm icon appears on the display.

You can silence the buzzer and remove the alarm name indication by pressing any key. The alarm icon remains on the screen until the reason for the alarm is cleared.

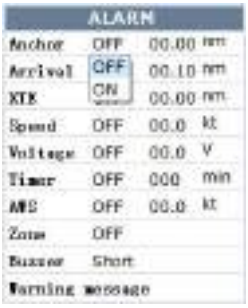
7.1 Anchor Drag Alarm

Anchor Drag Alarm informs you that own ship is moving when it should be at rest and when the ship moves out a certain set range.

1. Press (MENU) key twice to enter main menu.
2. Choose Alarm and then press (▶) key to display **ALARM** menu.

ALARM			
Anchor	OFF	00.00	nm
Arrival	OFF	00.10	nm
XTE	OFF	00.00	nm
Speed	OFF	00.0	kt
Voltage	OFF	00.0	V
Timer	OFF	000	min
AWS	OFF	00.0	kt
Zone	OFF		
Buzzer	Short		
Warning message			

3. Choose Anchor and then press ✓ key. The alarm options appear.



4. Press ▶ key to select the alarm value and then press ✓ key to setup the value.
5. Choose "ON" and then press ✓ key to enable the alarm.

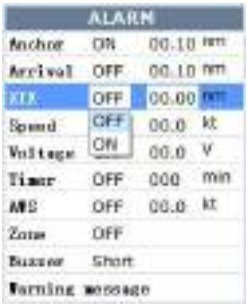
7.2 Arrival Alarm

Arrival Alarm informs you that own ship is approaching your set destination.
1. Press MENU key to enter main menu.
2. Choose **Alarm** and then press ▶ key to display **ALARM** menu.
3. Choose **Arrival** and then press ✓ key. The alarm options appear.

4. Press ▶ key to select the alarm value and then press ✓ key to setup the value.
5. Choose "ON" and then press ✓ key to enable the alarm.

7.3 XTE (Cross-Track Error) Alarm

XTE (Cross-Track Error) Alarm warns you when own ship is off its intended course.
1. Press MENU key twice to enter main menu.
2. Choose **Alarm** and then press ▶ key to display **ALARM** menu.
3. Choose **XTE** and then press ✓ key. The alarm options appear.



4. Press ▶ key to select the alarm value and then press ✓ key to setup the value.
5. Choose "ON" and then press ✓ key to enable the alarm.

7.4 Speed Alarm

Speed Alarm provides visual and aural alerts when the ship's speed is higher or lower than the alarm range set.

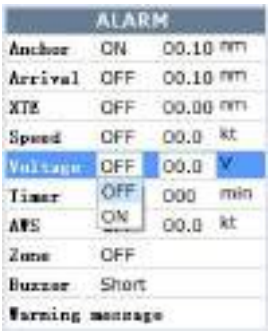
1. Press MENU key twice to enter main menu.
2. Choose **Alarm** and then press ▶ key to display **ALARM** menu.
3. Choose **Speed** and then press ✓ key. The alarm options appear.

4. Press ▶ key to select the alarm value and then press ✓ key to setup the value.
5. Choose "ON" and then press ✓ key to enable the alarm

7.5 Voltage Alarm

Voltage Alarm warns you when the input voltage in the unit is higher than the set value.

1. Press MENU key to enter main menu.
2. Choose Alarm and then press ▶ key to display ALARM menu.
3. Choose Voltage and then press ✓ key. The alarm options appear.



4. Press ▶ key to select the alarm value and then press ✓ key to setup the value.
5. Choose "ON" and then press ✓ key to enable the alarm.

7.6 Timer Alarm

Timer Alarm provides audio and visual alarms when the time set has expired.

1.Press (MENU) key to enter main menu.

2. Choose **Alarm** and then press (▶) key to display **ALARM** menu.

3. Choose **Timer** and then press (✓) key The alarm options appear.

4. Press (▶) key to select the alarm value and then press (✓) key to setup the value.

5. Choose "ON" and then press (✓) key to enable the alarm.

7.7 Buzzer Type Selection

The buzzer sounds whenever an alarm setting is violated.

1. Press the (MENU) key twice to enter main menu.

2. Choose **Alarm** and then press (▶) key to select.

3. Choose **Buzzer** and then press (▶) key to select.

4. Choose buzzer type desired and then press (✓) key to finish.

Short: Two short beeps

Long: Three long beeps

Constant: Continuous beeps

Disabling the alarm

1. Press any key to disable the buzzer of any alarm.

2. The Alarm Icon will not disappear until the reason for the alarm is cleared.

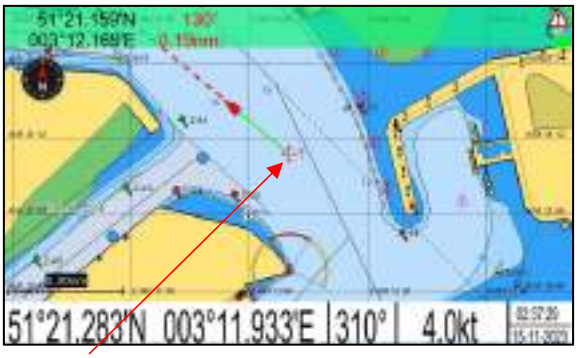
8. DRAWING FUNCTION

You can draw marks, lines and place names on the plotter screen. Press [fx] key and choose " DRAWING" on the function menu.

8.1 Drawing Marks

Choose FUNCTION menu->Drawing->Mark

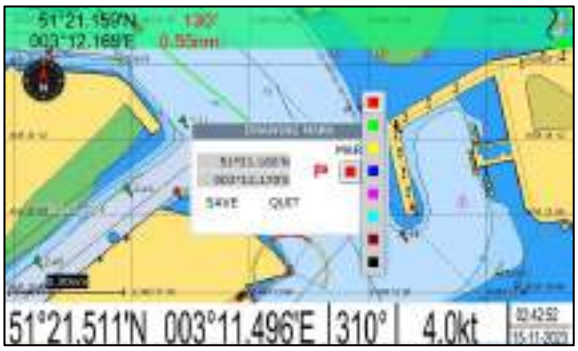
Note : You can also press and hold [✓] key on Plotter screen to enable drawing mark function.



A " ?" symbol will appear beside the cursor and the cursor will turn to red color

Move the cursor to the position you want to put the mark then press [✓] , a DRAWING MARK window will appear as shown

Choose the desire symbol for the drawing mark



Choose the desire color for the drawing mark

Choose [SAVE] to save the drawing mark or choose [QUIT] to exit without save the drawing mark

If you choose [SAVE] then you can see a drawing mark appear on the plotter screen with the symbol and the color you choose

Press (X) after finish drawing mark to quit this function and the cursor will turn back to black color

8.2 Drawing line

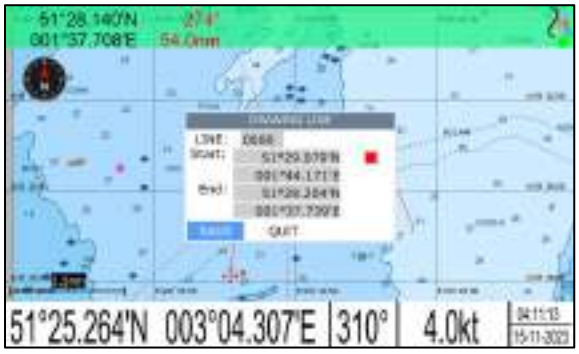
Choose FUNCTION menu->Drawing->Line

A "?" symbol will appear beside the cursor and the cursor will turn to red color

Move the cursor to a starting point of the line you want to draw and press ✓ then move the cursor to the second point and press ✓ again

Continue to move the cursor and press ✓ to draw any shape you like

Press ✗ after you finish drawing lines, a DRAWING LINE window will appear as shown



.Choose [SAVE] to save the drawing line or choose [QUIT] to exit without save the drawing lines

If you choose [SAVE] the cursor will turn back to black color

8.3 Drawing Place name

Choose FUNCTION menu->Drawing->Place name

A "?" symbol will appear beside the cursor and the cursor will turn to red color

Move the cursor to the position you want to put the place name then press ✓ , a DRAWING PLACE NAME window will appear as shown

Move the cursor to the NAME and press ✓ (the column will turn to black color from white) then start to enter the place name by the direction arrow keys

After finish entering place name press ✓ and choose [SAVE to save the drawing place name or choose [QUIT] to exit without save the drawing place name

If you choose [SAVE] then you will see place name appear on the plotter screen

Press ✗ after you finish drawing place name the cursor will turn back to black color

8.4 Erase or edit drawings

After drawing marks, lines or place name on the plotter screen you can erase or edit the drawings as describe below.

8.4.1 Erase or edit drawing mark

Move the cursor close to the mark you want to erase or edit, you will see a pop up text box "User Mark"

Press ✓ to erase or edit the selected mark

8.4.2 Erase or edit drawing line

Move the cursor close to the lines you want to erase or edit, you will see a pop up text box of line's name e.g. "0000"

Press ✓ to erase or edit the selected lines

Move the cursor to any point of the lines and press ✓ to change the location or erase this point from the lines

Or you can move the cursor to " ERASE" as shown to erase all points and lines

After you choose "ERASE" you need to confirm

8.4.3 Erase or edit drawing place name

Move the cursor close to the place name you want to edit or erase, you will see a pop up text box " Place Name"

Press ✓ to erase or edit the selected place name

9. OTHER SETTING

9.1 Map Scale

You can change the map scale display format.

1. Press (MENU) key twice (Plotter screen: three times) to enter main menu.
2. Choose **Setup** and then press (▶) key to select.

3. Choose Map scale and then press (✓) key to select.
4. Choose "Nm" or "Ratio" as desired and then press (✓) key to finish.

9.2 Unit of Measurement

Speed Unit

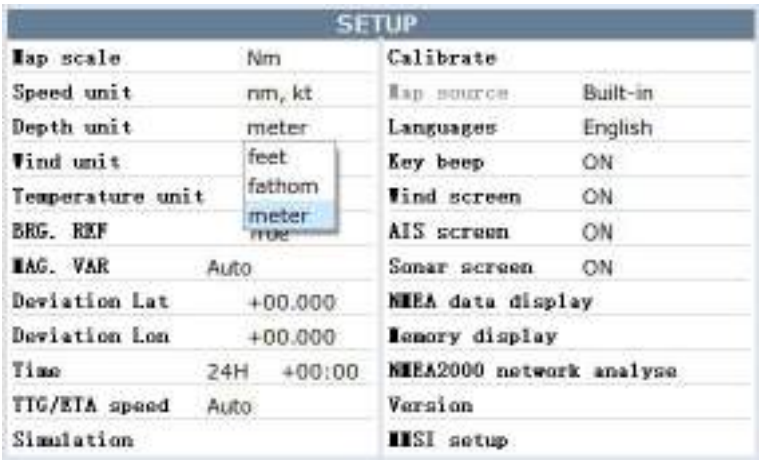
Distance/speed can be displayed in nautical miles/knots, kilometers/kilometers per hour, or statute miles/kilometers per hour.

1. Press (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose **Speed** unit and then press (✓) key to select.

4. Choose "nm, kt", "km, kmh" or "sm, kph" as desired and then press (✓) key to finish.

Depth Unit

1. Press (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose **Depth unit** and then press (✓) key to select.



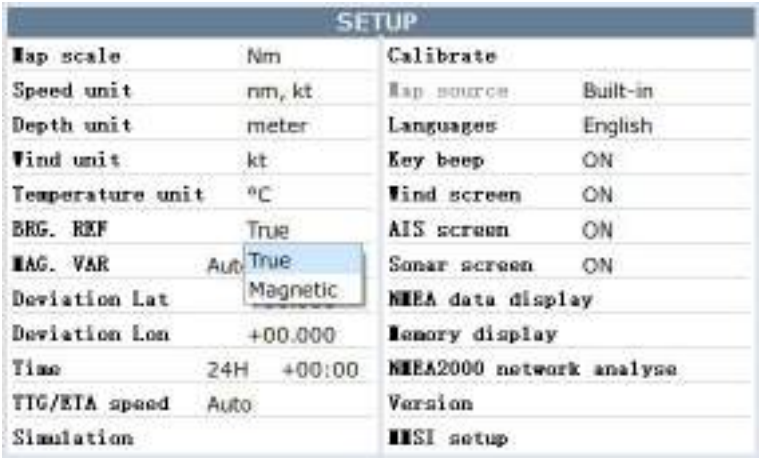
4. Choose "feet", "fathom" or "meter" as desired and then press (✓) key to finish.

9.3 Bearing Reference (BRG. REF)

Ship's course and bearing to a waypoint may be displayed in true or magnetic bearing. Magnetic bearing is true bearing plus (or minus) earth's magnetic deviation.

Use the bearing reference in accordance with the compass interfaced: magnetic for magnetic compass, true for gyrocompass.

1. Press (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose BRG. REF. and then press (✓) key to select.



4. Choose "True" or "Magnetic" as desired and then press (✓) key to finish.

9.4 Magnetic Variation (MAG. VAR)

The location of the magnetic North Pole is different from the geographical North Pole. This causes a difference between the true and magnetic north direction.
This difference is called magnetic variation, and varies with respect to the observation point on earth.

Your unit is pre-programmed with all the earth's magnetic variation. However, you may want to enter variation manually to refine accuracy. Set **BRG. REF** on the **PLOTTER** screen to "Magnetic" to use magnetic variation.

1. Press (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose MAG. VAR. and then press (✓) key to select.

4. Choose "Auto" or "Manual" (if you choose "Manual", you need to input the value manually) as desired and then press (✓) key to finish

9.5 Deviation

You can input the deviation of the ship or map manually to correct the position error from GPS error or map error.

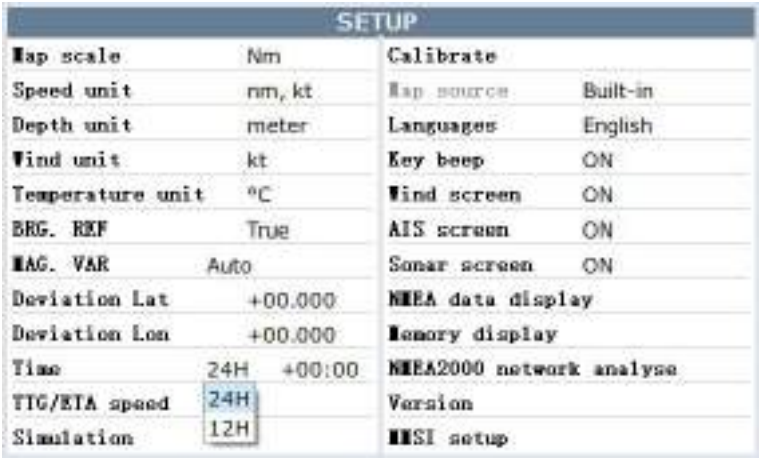
1. Press (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose **Deviation** and then press (✓) key to select.

4. Input the value as desired and then press ✓ to finish. To disable deviation, input "0" into the value.

9.6 Time

GPS uses UTC time. If you would rather use local time, enter the Time difference (range: -13:30 to +13:30) between it and UTC time.
You may display the time in 12 or 24 hour format.

1. Press MENU key twice to enter main menu.
2. Choose **Setup** and then press ▶ key to select.
3. Choose **Time** and then press ▶ key to select.



4. Input the time difference as desired. Choose "24H" or "12H" as desired and then press ✓ key to finish.

9.7 TTG/ETA speed

To calculate time-to-go and estimated time of arrival, enter your speed as below.

1. Press the MENU key twice to enter main menu.
2. Choose **Setup** and then press ▶ key to select.
3. Choose **TTG/ETA speed** and then press ✓ key select.

4. Choose **"Auto"** for automatic speed input (GPS calculated speed), or **"Manual"** for manual input.

9.8 Key beep

you can set the key sound

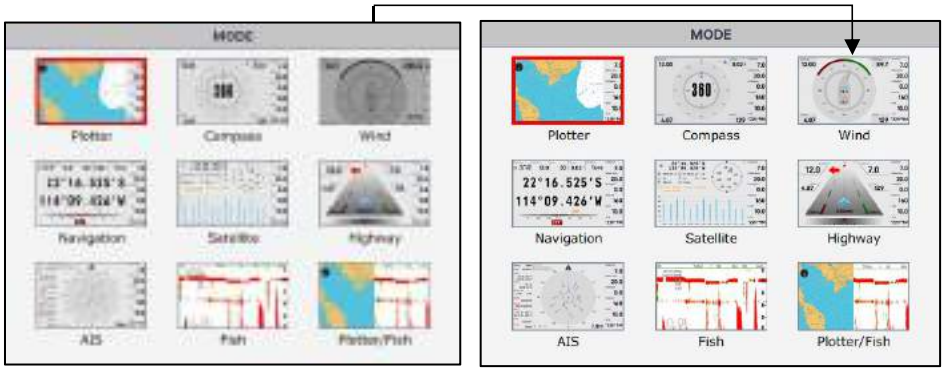
1. Press the (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose **Key beep** and then press (✓) key select.

4. Choose "OFF" or "ON" and then press (✓) key to finish.

9.9 Wind screen

1. Press the (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose **Wind screen** and then press (✓) key select.

4. Choose **ON** and then press (✓) key to finish. The wind screen will become available.



9.10 GPS setting

9.10.1 Choosing GPS output data

The unit's default is using an internal GPS module for position fixing. On the other hand, you can use external GPS data for position fixing.

1. Press (MENU) key on the **SATELLITE** screen.
2. Choose **Output** and then press (✓) key to select.

3. Choose "OFF" , "NMEA0183" or " NMEA0183+AIS" as desired and then press (✓) key .
4. Select any item in the red box area in the picture above and press the (✓) key to select the data you want to output.

9.10.2 Datum setting

1. Press (MENU) on the **SATELLITE** screen.
2. Choose **Datum** and press (✓) key to select.

3. Choose your desired datum and press (✓) key to confirm.

9.10.3 Smoothing

You can setup position smoothing, speed smoothing and course smoothing.

1. Press (MENU) key on the **SATELLITE** screen.

2. Choose **POS** smooth to enter position smoothing data.
3. Choose **SOG** smooth to enter speed smoothing data.
4. Choose **COG** smooth to enter course smoothing data.

Note : For slow vessel such as fishing boat the following smoothing settings are recommended :

POS smooth : 10

SOG smooth : 06

COG smooth : 10

9.10.4 GNSS settings

Global Navigation Satellite System (GNSS) refers to a constellation of satellites providing signals from space that transmit positioning and timing data to GNSS receivers. The receivers then use this data to determine location. SPORTNAV chartplotters are using GNSS module integrated with 3 global navigation systems, GPS, Beidou and GLONASS.

The below items are only able to change in KP-25, KP-25F, KP-27 and KP-27F, for KP-25A, KP-25X, KP-27A and KP-27X the GNSS module is inside the Class B+ AIS module.

In SPORTNAV Class B+ AIS module also use the same GNSS module and programmed the below settings as default :

1. Datum : WGS-1984
2. SBAS : ON
3. GPS update rate : 1Hz
4. GNSS mode : GPS + Beidou

9.10.4.1 SBAS

SBAS uses GNSS measurements taken by accurately located reference stations deployed across an entire continent. All measured GNSS errors are transferred to a central computing centre, where differential corrections and integrity messages are calculated. These calculations are then broadcast over the covered area using geostationary satellites that serve as an augmentation, or overlay, to the original GNSS message.

We have set SBAS to be turned on by default.

9.10.4.2 GPS update rate

When using SPORTNAV chartplotter on a speed boat you might want to increase the update rate of your position when you are riding your boat in high speed. You can change GPS update rate to 10Hz to increase the position update rate by 10 times.

9.10.4.3 GNSS Mode

On some circumstance you might want to use different global navigation system (default is GPS + Beidou).

You can choose the below combination of global navigation systems:

One global navigation system : GPS only, Beidou only or GLONASS only.

Two global navigation systems : GPS + Beidou, GPS + GLONASS, Beidou + GLONASS.

9.11 NMEA data display

1. Press (MENU) key twice to enter main menu.
2. Choose **Setup** and then press (▶) key to select.
3. Choose **NMEA** data display and then press (✓) key.

4. NMEA data display is used during the installation to check whether the NMEA

input and output data to and from other equipment onboard is normal. Press (⛶) key to switch between the input and output ports. Press (✓) key to stop scrolling of NMEA data and press (✓) key again to restart NMEA data scrolling. Press (✕) key to quit the NMEA data display.

10. THE AIS FUNCTION

This chapter is for AIS functions of KP-25A, KP-25X, KP-27A and KP-27X or you already connected AIS input to KP-25, KP-25F, KP-27 and KP-27F.

10.1 Vessels list

1. Press (MENU) on the **AIS** screen.

2. Choose AIS detail list and then press (✓) key. The AIS SHIP LIST window will appear.

10.2 The collision alarm

1. Press (MENU) on the AIS screen.

2. Select CPA Limit or TCPA Limit then press (✓) key to enter a value.
3. Select CPA Alarm or TCPA Alarm then press (✓) key to choose "ON" or "OFF".

10.3 Own ship's information

There are two ways to display "Own Ship Info"

1. Press the (MENU) key to select and enter the '**AIS detail list**,' then choose the first line in the list to check all the information about own ship.
2. Move the cursor to select your AIS Vessel on the chart screen and press the (✓) key.

10.4 Chart Screen

Users can check all AIS vessels being received in real-time on the chart screen, as well as the specific position and track of your own ship on the charts.

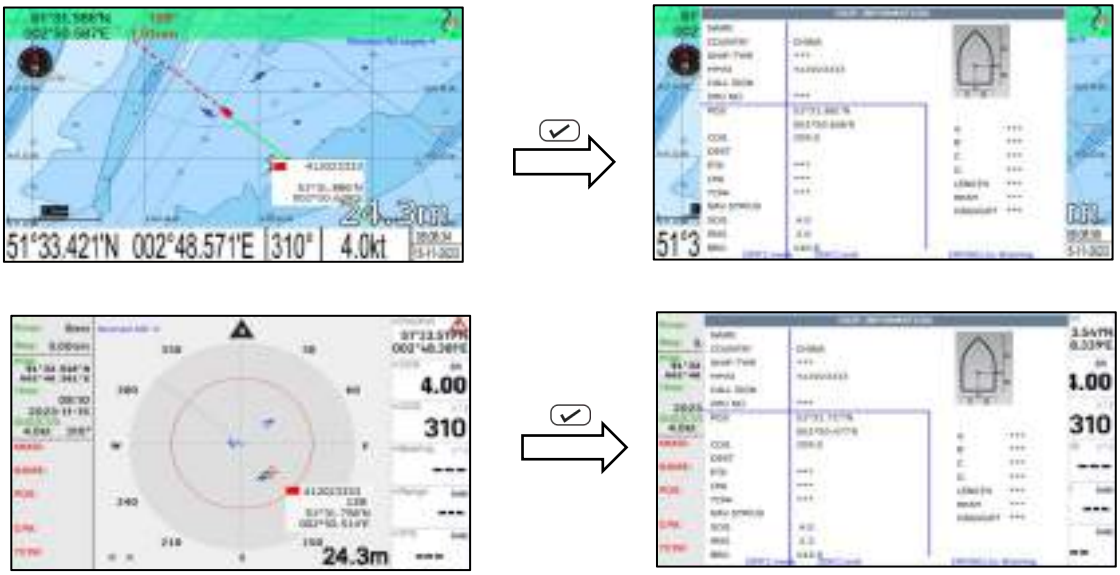
The track length of AIS vessels depends on the equipment memory space, generally not less than 20 track points.

10.5 View AIS vessels' information on Plotter and AIS screen

There are two ways to view AIS vessels' information: one is to move the cursor

to select AIS vessel on the Plotter screen and AIS screen, and press the ✓ key.

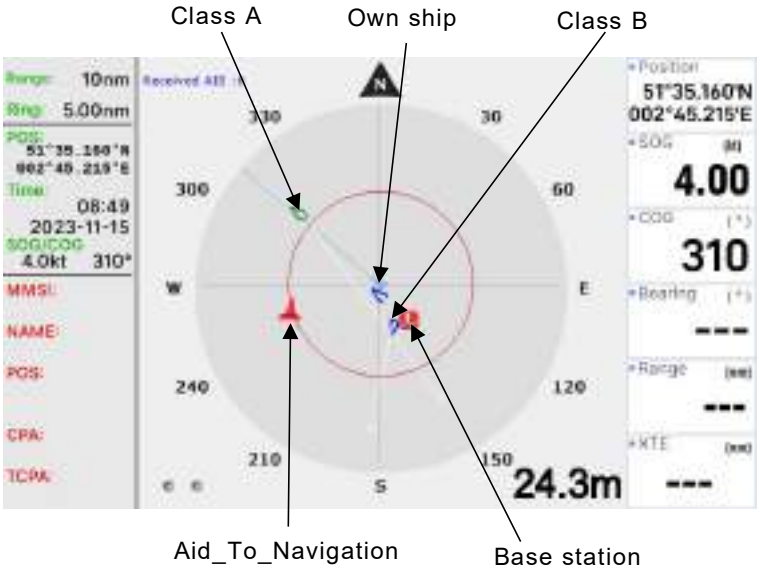
The other is to select the AIS vessel from the AIS vessels list, and press the ✓ key.



10.6 Introduction to AIS objects (AIS screen)

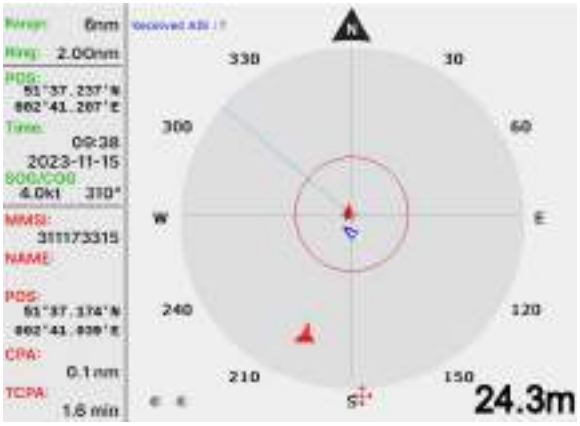
The current location of the own ship is at the center of the map,appearing as a light blue hollow triangle,and the vertex angle of the triangle stands for the current direction of your ownship.The blue hollow triangle stands for the vessels of CLASS B.The green hollow triangle stands for CLASS A vessels.

stands for BASE STATION. stands for Aid_To_Navigation.



10.7 Emergency alarm

The information of the emergency alarm received is displayed on the bottom left corner. The emergency alarm is always available and can not be deleted, if the emergency alarm information is not read, after exiting the alarm menu, the "emergency alarm" window will pop up a little later. The warning ship displayed on the AIS and Plotter screen will be red and flashing.



The relevant data (including the place, the relevant ship's information, etc.) will also be saved by the display terminals. It can be the basis of analysis in the event of any accident.

10.8 Entry/Departure setting

The Entry/Departure setting is for the temporary shut down or restart of the collision alarm. When entering the port, the collision alarm will be temporarily closed. When leaving the port, the collision alarm will be opened.

1. Press the (MENU) key at the **AIS** screen.
2. Choose **Status** then press (✓) key to select.
3. Select **"In Port"** or **"Out Port"** as desired and press (✓) key to finish.

10.9 AIS Vessel

1. User can define the AIS vessel display as either **"Fill"** or **"Line"**.
2. User can also select the size of the AIS Icon to either “Small”, “ Medium” or “ Large” .

Fill Line

10.10 AIS track display

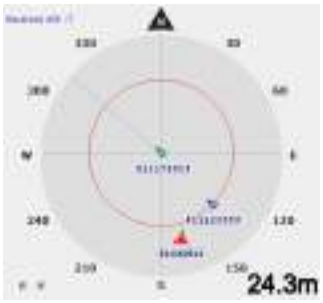
User can enable or disable the display of AIS track on plotter screen.

ON

OFF

10.11 AIS name

1. User can turn on the name of AIS targets on Plotter and AIS screen.
2. User can also adjust the size of AIS target names.



10.12 Plotter AIS display

User can choose to turn ON or OFF AIS targets display on Plotter screen. ***Note: User can also choose to display "NET" which is the SPORTNAV AIS buoy on the Plotter screen.***

10.13 AIS track recording

Manual AIS track record

Under some circumstance you might want to save the track record of an AIS target.

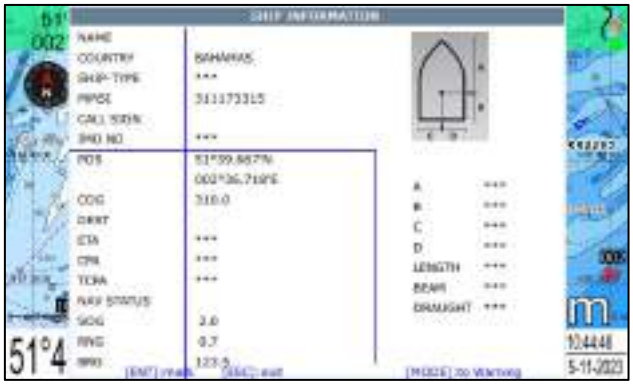
You can mark and save the track record of an AIS target on below screens :

- Plotter screen
- AIS screen
- AIS detail list

The maximum number of Manual AIS saved record is 10 so if the records are full you need to delete some Manual AIS saved record before you can save a new one.

10.13.1 How to do manual AIS track recording

In chapter 10.5 it already mentioned how to view the detail information of an AIS target. In the information box shown below there are a " Mark" function, when you press (✓) then this AIS target is marked and its track is recording.



Once the AIS target is marked you can see a [ ] surrounds that AIS target and you can also see the marked AIS target or targets on the top of the AIS detail list in red color.

On the right top corner of Plotter and AIS screen it will show how many AIS targets are marked.

10.13.2 How to transfer saved AIS track record to a route

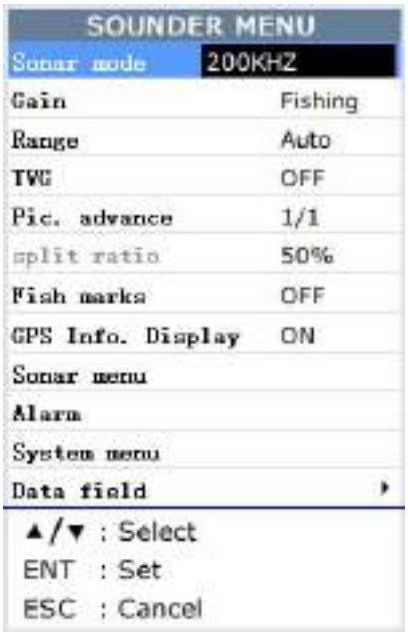
Under some circumstance you might want to turn a saved AIS track record into a route for navigation purpose.

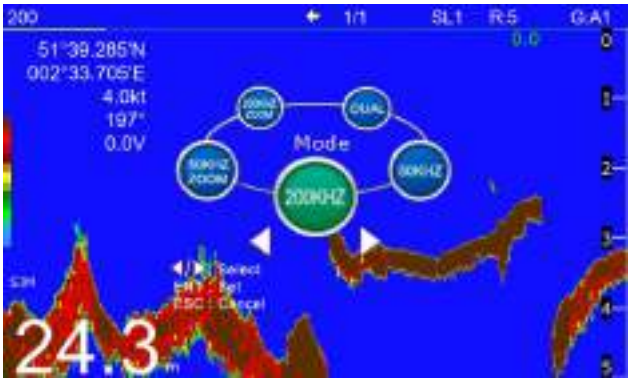
You just need simply select either “Transfer AIS manual track to route” in order to transfer the saved AIS track record into a route. The operation is same as “Transfer saved track to route” in Chapter 3.6.

11. THE FISHFINDER FUNCTION

11.1 Sounder Mode

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar mode** and then press (✓) key or press and hold (MODE) key in the **SOUNDER** screen. The following window will appear.

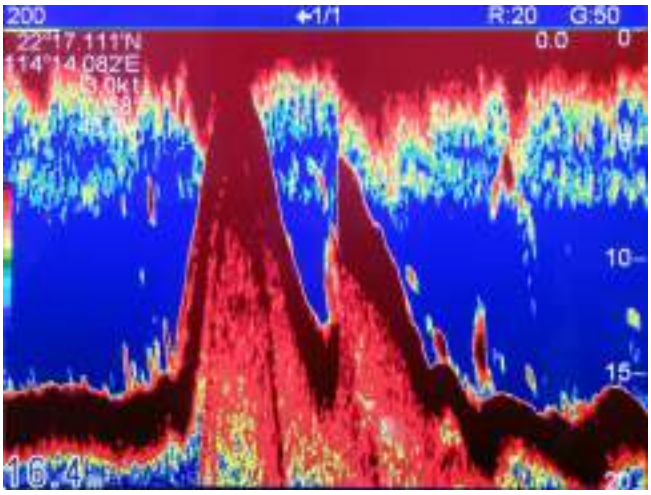




MODE	Function
200KHz	Provides the high frequency (200KHz)normal picture on the full screen.
50KHz	Displays the low frequency (50KHz)normal picture on the full screen.
DUAL	Displays the normal display for high frequency (200KHz) on the right half and low frequency (50KHz) on the left half.
200KHz ZOOM	Shows the normal display of the high frequency (200KHz) on the right half and its zoom display on the left half.
50KHz ZOOM	Provides the normal display of the low frequency (50KHz)on the right half and its zoom display on the left half.

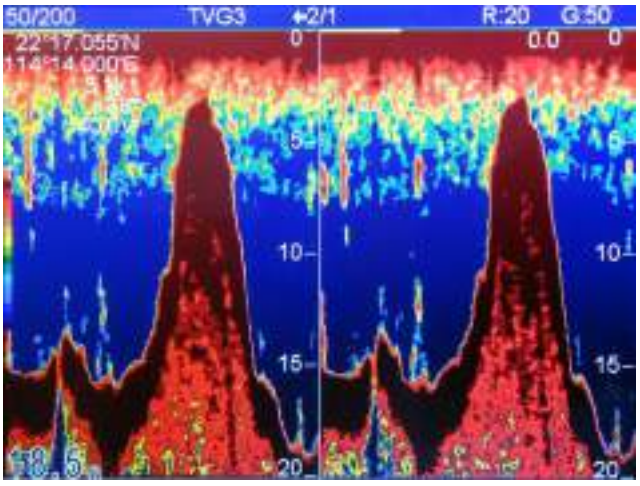
200KHz,50KHz(highfrequency,lowfrequency)mode

The sounder uses ultrasonic pulses to detect bottom conditions. The lower the frequency of the pulse the wider the detection area. Therefore, the 50KHz frequency is useful for general detection and judging bottom conditions, while the 200KHz frequency is useful for detailed observation of fish schools.



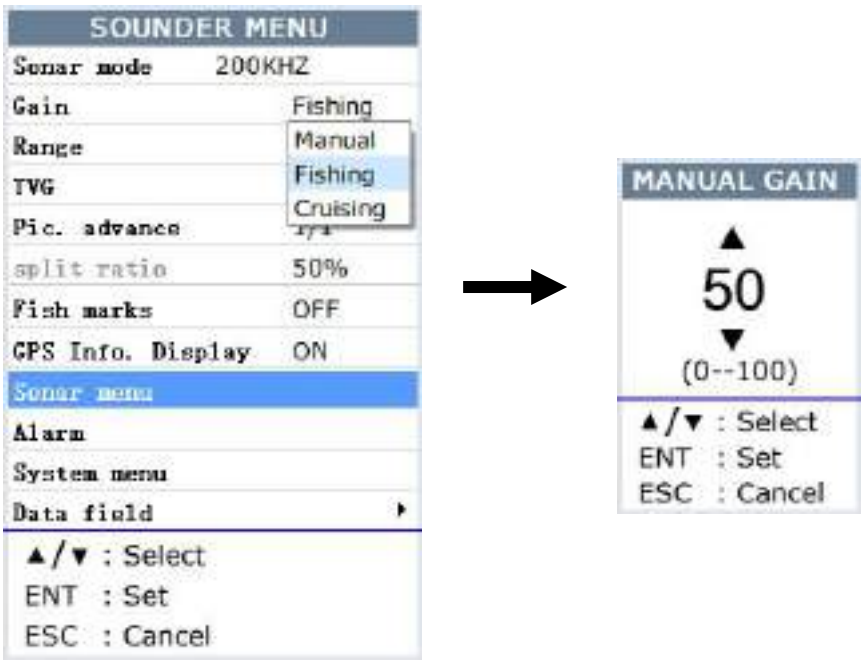
DUAL frequency mode

This mode provides the 50KHz picture on the left-half of the screen and the 200KHz on the right half, and is useful for detecting fish schools which have different reflection characteristics with frequency. For example, a school of tiny fish like minnow returns stronger echoes on a high frequency compared to a low frequency.



11.2 Gain

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Gain** and then press (✓) key, or press (✓) key in the **SOUNDER** screen to adjust gain manually. The following window will appear.



3. Choose Manual, Fishing or Cruising as desired and then press the (✓) key, or press and hold (✓) key in SOUNDER screen. **AUTO 1** (fishing) mode is activated which is for ground fishing with automated gain adjustments. Press (✓) key again to activate the **AUTO 2** (cruising) mode with automatic gain adjustments for cruising. Press and hold (✓) key to return to manual gain mode.

11.3 Range

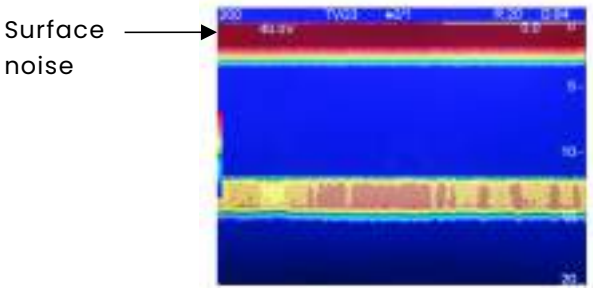
1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Range** and then press (✓) key to select.
3. Choose "**Manual**" or "**Auto**" and then press the (✓) key or when in the **SOUNDER** screen, press and hold (✠) or (✠) to change to Manual or Auto.
4. If you choose Manual, press the (✕) key to return to **SOUNDER** screen. Press (✠) or (✠) to increase or decrease in the depth range.

11.4 TVG

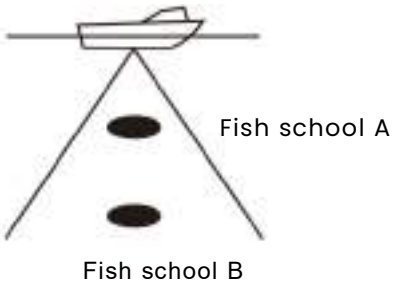
1. Press (MENU) key in **SOUNDER** screen.
2. Choose **TVG** and then press (✓) key. The following window will appear.

3. Choose **"Off"** or **"Manual"** as desired then press (✓) key.

The TVG compensates for propagation loss of sound, so that the echoes from the same fish school size are displayed in the same color. Normally, set it between "0" and "5". Avoid excessive TVG; weak echoes may not be displayed. The TVG is also useful for reducing surface noise.



Appearance of surface noise



How TVG compensates for propagation loss of sound

Note: Surface noise appearing in the range of 0 to 40 m can be reduced by the Clutter function.

11.5 Picture advance

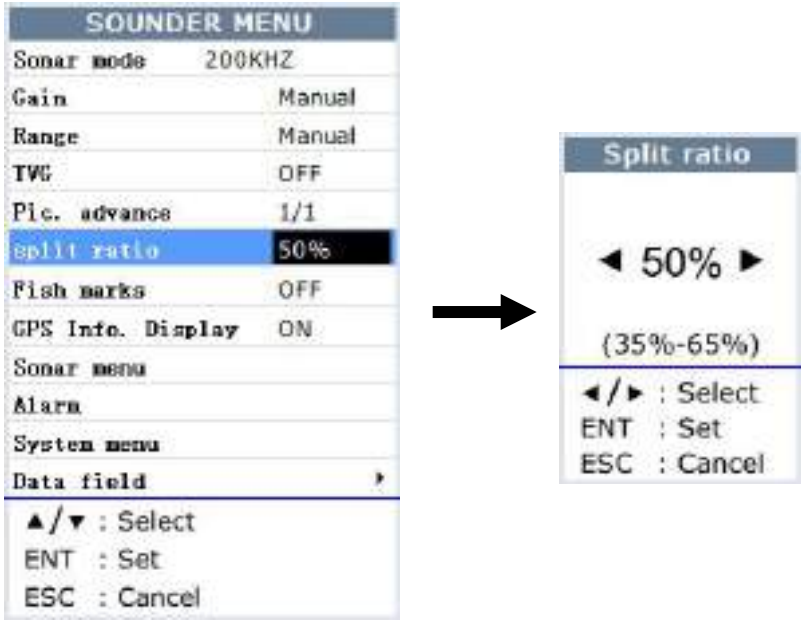
The picture advance speed determines how quickly the vertical scan lines run across the screen.

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Pic. advance** and then press (✓) key or press and hold (►) key in **SOUNDER** screen. The following window will appear.

3. Press the (▲) or (▼) key to select speed: 10/1(FAST), 8/1, 6/1, 4/1, 2/1, 1/1, 1/2, 1/4, 1/8(SLOW) or STOP advance .

11.6 Split ratio

1. When in **PLOTTER+SOUNDER** screen and the **SOUNDER** screen is ≥50%, press (MENU) key.
2. Choose **Split ratio** and then press (✓) key to setup split ratio, or press and hold (MODE) key in the **PLOTTER+SOUNDER** screen. The following window will appear.



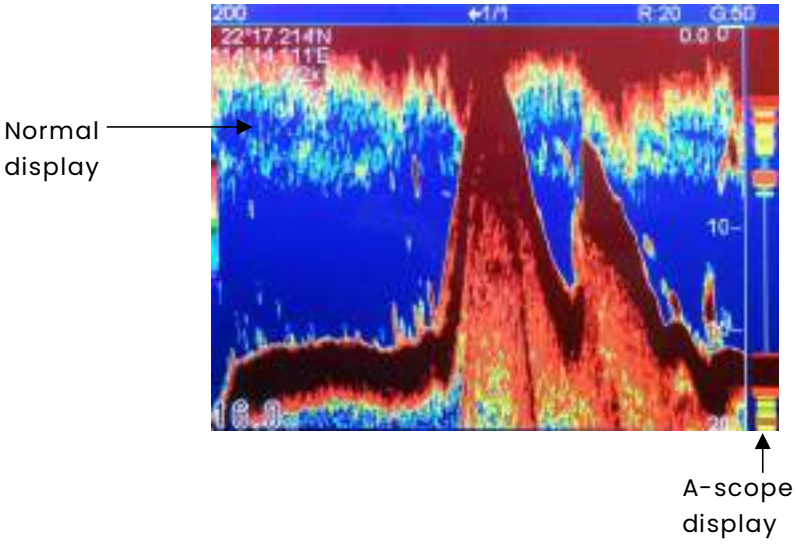
11.7 Sonar Menu

1. Pres (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key. The following window will appear.

11.7.1 A-Scope

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key to select.
3. Choose **A-Scope** and then press (✓) key. The following window will appear.
4. Press the (▲) or (▼) key to enable or disable the A-Scope.

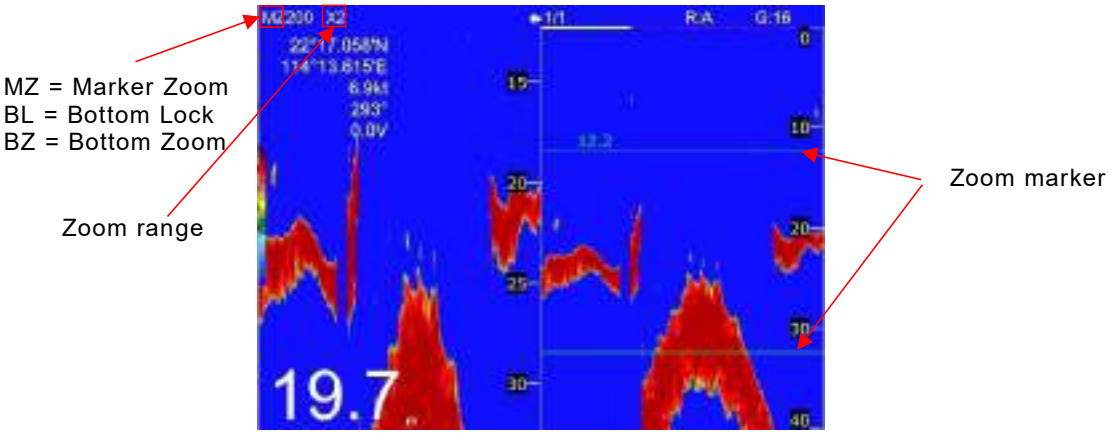
This display shows echoes at each transmission with amplitudes and tone propor- tional to their intensities, on the right 1/4 of the screen. It is useful for estimating the kind of fish school and bottom composition.



11.7.2 Zoom modes

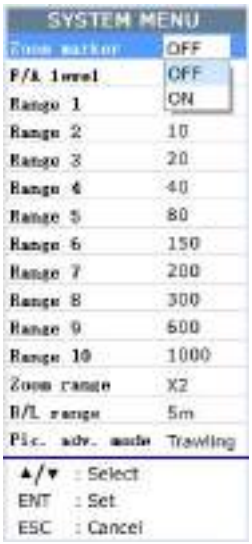
1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key to select.
3. Choose **Zoom mode** and then press (✓) key. The following window will appear.

4. Choose **"Marker Zoom"**, "Bottom lock" or **"Bottom zoom"** as desired then press (✓) key to finish.



11.7.2.1 How to display zoom marker

If you want Zoom marker appear on zoom modes of sounder screen you need to turn on the Zoom marker in the SOUNDER MENU-> SYSTEM MENU.

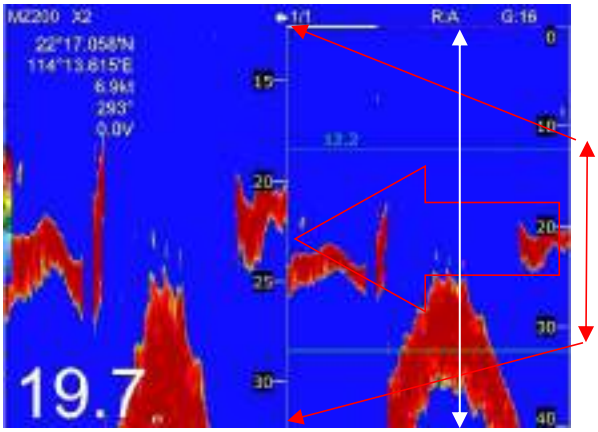


11.7.2.2 How to change the zoom range

You can choose to zoom the selected range to X2, X3, X4 and X6 in the SOUNDER MENU→ Zoom range.

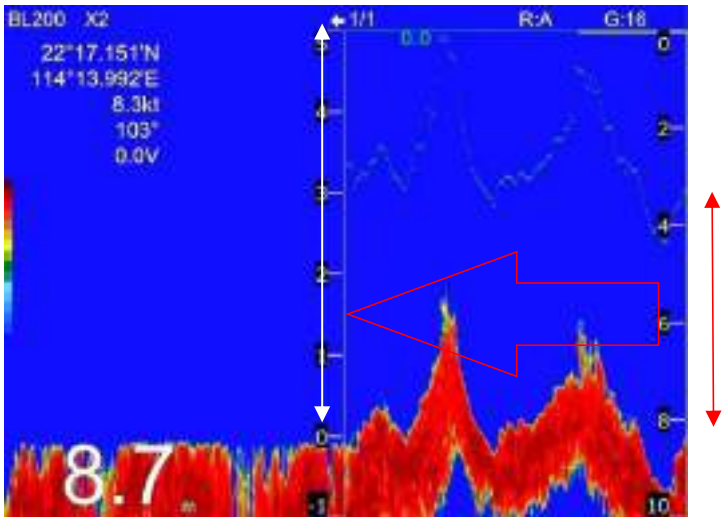
11.7.2.3 MARKER ZOOM

This mode expands selected area of the normal picture to full vertical size of the screen on the left-half window. You may specify the portion to expand with the VRM (Variable Range Marker), which you can shift with ▲ or ▼ key. The area between the VRM and the zoom range marker is expanded. The length of the segment is equal to one division of the depth scale.



11.7.2.4 BOTTOM LOCK

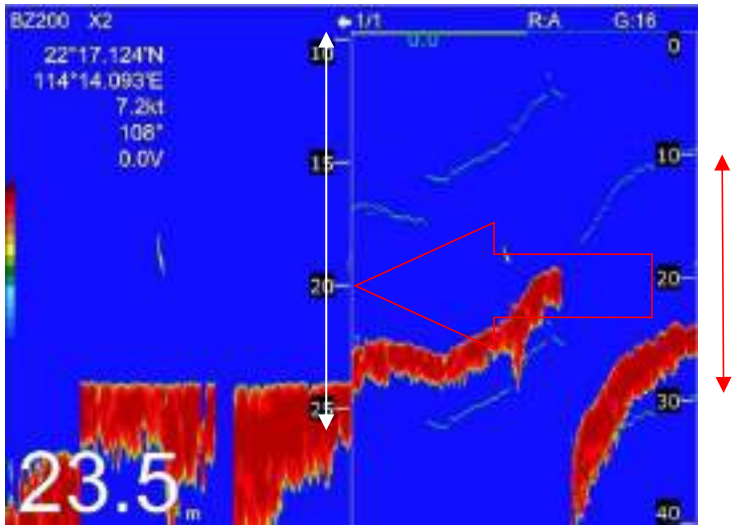
This zoom mode locks the sea bottom depth and zoom the area above the bottom to display on left hand side screen.



11.7.2.5 BOTTOM ZOOM

This zoom mode locks the sea bottom zoom the area including the sea bottom to display on left hand side screen.

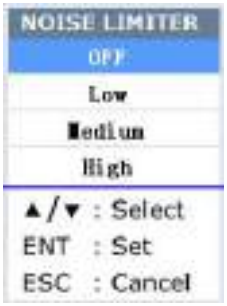
It is useful for determining bottom hardness. A bottom displayed with a short echo tail usually means it is a soft, sandy bottom. A long tail means a hard bottom.



11.7.3 Noise limiter

Light-blue dots may appear over most of the screen. This is mainly due to unclean water or noise. This noise can be suppressed by adjusting Clutter on the menu.

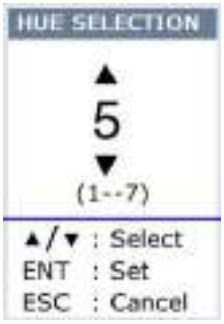
1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key to select.
3. Choose **Noise limiter** and then press (✓) key. The following window will appear.



4. Choose "Off" , "Low" , "Medium" or "High" as desired and then press (✓) key to finish.

11.7.4 Hue Selection

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key to select.
3. Choose **Hue Selection** and then press (✓) key The following window will appear.



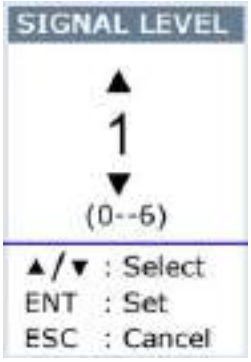
Hue Ho.	Background color	Echo color
1	White/ Black(Day/ Night mode)	16 colors, bottom reddish-brown
2	White/ Black(Day/ Night mode)	16 colors, bottom red
3	White/ Black(Day/ Night mode)	16 colors, bottom reddish-brown
4	White/ Black(Day/ Night mode)	16 colors, bottom red
5	Blue	16 colors, bottom brown
6	Blue	16 colors, bottom red
7	Black	16 colors, bottom Light-yellow

4. Press the (▲) or (▼) key to select the background and press (✓) key to

finish.

11.7.5 Signal level

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key to select.
3. Choose **Signal level** and then press (✓) key. The following window will appear.



4. Press the (▲) or (▼) key to select the signal level and press (✓) key to finish.

Short cut : it can also changes the signal level by press (fx) key on Sounder screen.

11.7.6 Marker

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Sonar menu** and then press (✓) key to select.
3. Choose **Marker** and then press (✓) key. The following window will appear.

4. Choose "VRM" or "WHT" as desired and then press (✓) key to finish.

The white marker functions to display a particular echo color in white. For example, you may want to display the bottom echo (reddish-brown) in white to discriminate fish echoes near the bottom. Note that the bottom must be displayed in reddish- brown for the white marker to function.

11.8 Alarm

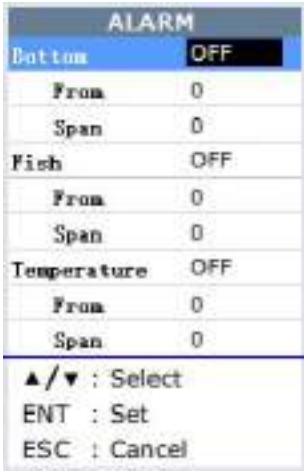
In the fish finder display, after entering the alarm information menu, you can see the options for "From" and "Span":

From: Indicates the depth at which the alarm starts detecting. When fish or other preset
conditions are detected at this depth or deeper, an alarm will be triggered. Users can adjust the starting depth within the range of 0 to 300 meters.

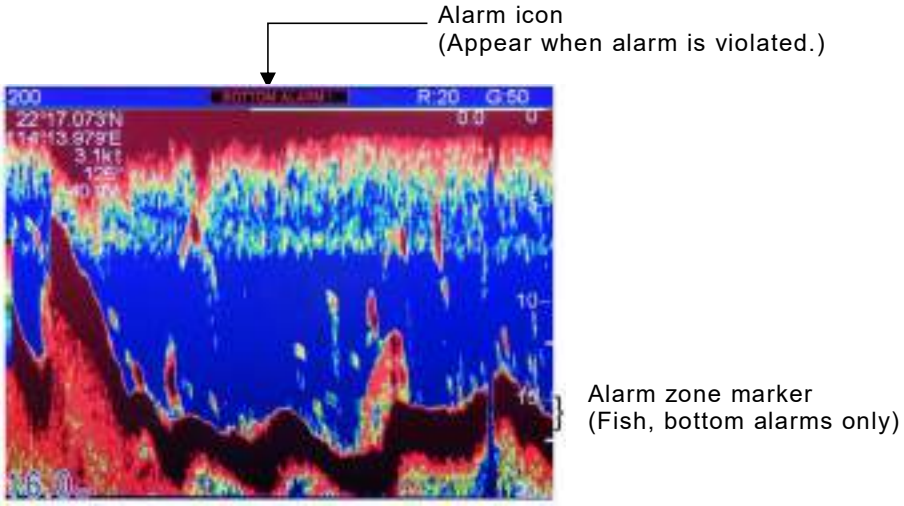
Span: Refers to the depth range extending downward from the starting depth. If fish or other preset conditions are detected within this range, an alarm will be triggered.Users can adjust the span within the range of 1 to 300 meters.

From determines the starting depth for monitoring, while Span determines the depth range extending downward from the starting depth for the alarmmonitoring. By setting these two parameters, users can precisely control the depth range at which the alarm is triggered.

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **ALARM** and then press (✓) key. The following window will appear.



3. Press (▲) or (▼) key to select an alarm.
4. Press (✓) key to select "OFF", "ON", "IN" or "OUT". (For the water temperature alarm, select "IN" to get the alarm when the water temperature is within the alarm zone range, or "OUT" to get the alarm when the water temperature is higher than the alarm zone range.)
5. Choose From then press (✓) key to adjust alarm starting depth. Press (▲) or (▼) to adjust value.
6. Choose Span then press (✓) key to adjust alarm range. Press (▲) or (▼) to adjust value.



7. To deactivate an alarm, select "OFF" at step 4 in the above procedure.

11.9 System Menu

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **System menu** and then press (✓) key. The following window will appear.

SYSTEM MENU	
Zoom marker	OFF
F/A level	Weak
Range 1	5
Range 2	10
Range 3	20
Range 4	40
Range 5	80
Range 6	150
Range 7	200
Range 8	300
Range 9	600
Range 10	1000
Zoom range	X2
B/L range	5m
Pic. adv. mode	Trawling

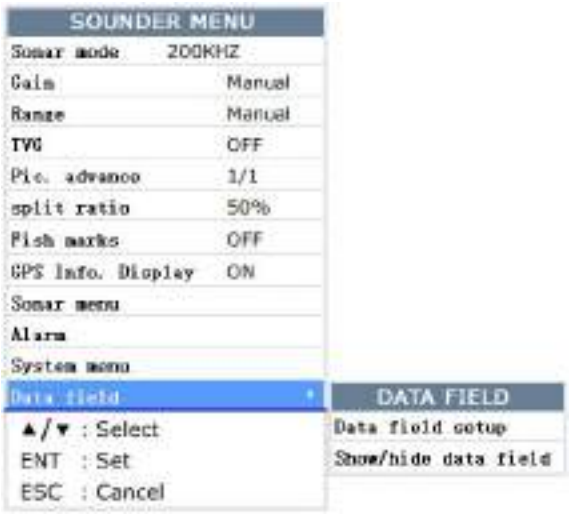
▲/▼ : Select
ENT : Set
ESC : Cancel

RANGE 1- 10: Activates or deactivates specific range scales. Default ranges are 5, 10, 20, 40, 80, 150, 200, 300, 600, and 1000 (meters). Setting area is 2m to 800m.

Note: Ranges must be set in numerical order. For example, if range 1 is 5 m and range 3 is 20m, range 2 should be between 6 and 19 m.

11.10 Data field

1. Press (MENU) key in **SOUNDER** screen.
2. Choose **Data field** and then press (✓) key. The following window will appear.



3. Data field setup

The Data Field will appear on the right-side of the screen. The black area is the data area of which may be changed.

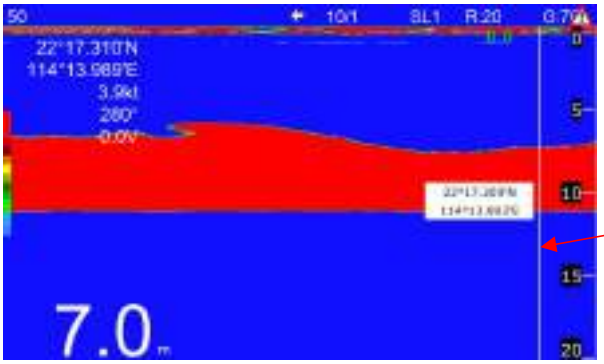
- Press (✓) key and a data table will appear.
- Press the (◄) (►) (▼) or (▲) key to select the one you want to display on the data field, then press (✓) to finish.

4. User can **Show/hide data field** as desired.

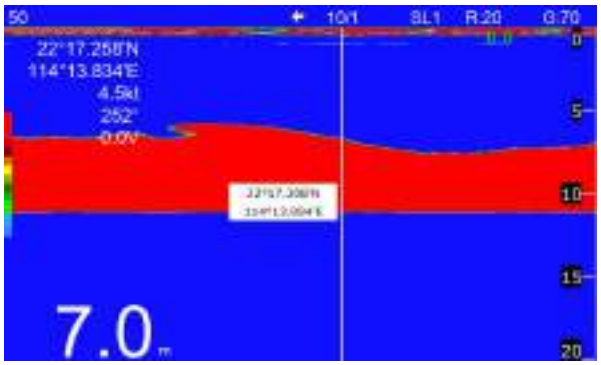
11.11 To save the position of a history echo into waypoint memory

Sometimes you might want to save a fishing ground or a wreck location into a waypoint memory.

1. When you want to save the location of a history echo you just require to slightly press (►) arrow key then you will see a position vertical line appear as shown below :



2. After the Position line appears you can use Left and Right arrow keys to move the position line to the desire location that you want to save.



3. After the position line reach a desire location you can press (✓) key then a message box will pop up as shown below. You can save it into waypoint memory after you edit the options.

4. When you finish you can press (X) to quit this function.

12.N2K FUNCTION

12.1 Overview of Functions

The N2K functionality enables the device to connect to the N2K network,facilitating bidirectional data sharing. The device can function as an N2K transmitter, sharing data with the network, or as an N2K receiver, accepting data shared by other devices.

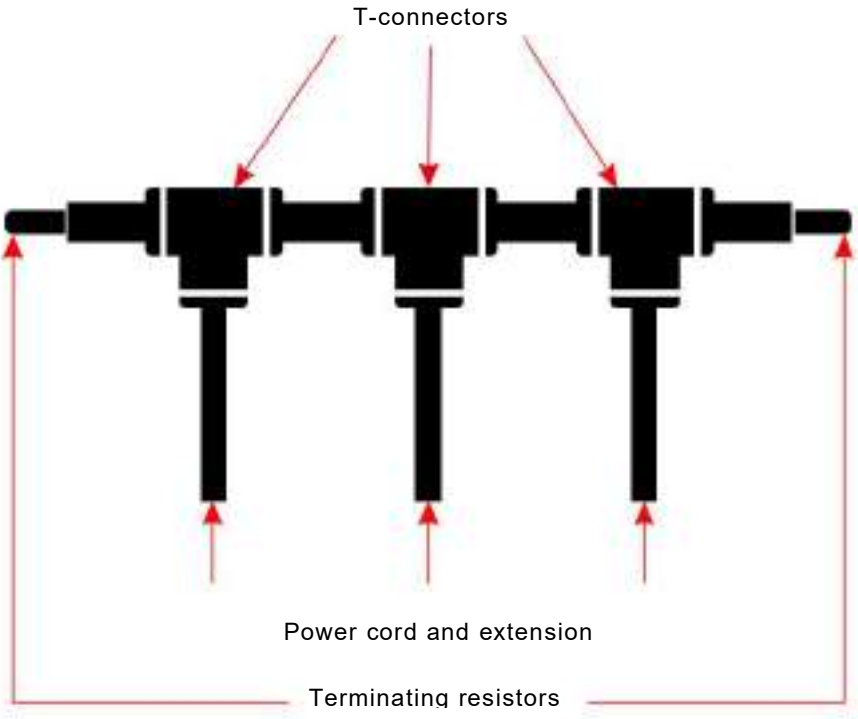
12.2 Connecting to the N2K Network

12.2.1 Description of N2K Network Environment

Basic N2K network requires at least one data sharing end and one data receiving end. Therefore, the following materials are needed at least:

-2 pcs. x terminating resistors
-2 pcs. x extension cables
-3 pcs. x T-connectors
- 1 pcs. x power cord

12.2.2 Cable Connection

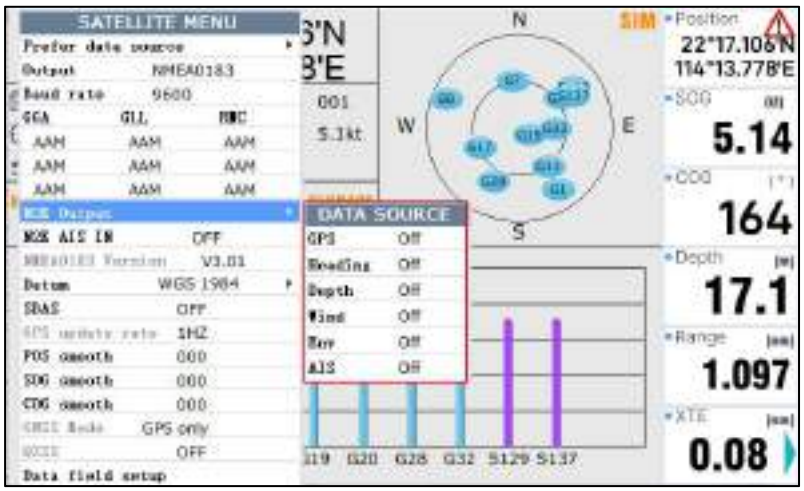


12.3 Data Sharing

The settings for N2K data sharing and reception need to be configured by navigating to the satellite screen and pressing the MENU key.

12.3.1 Data Sharing Settings

There are a total of 6 data types: GPS, Heading, Depth, Wind, Env(Environment), and AIS. You can individually configure whether to share each type of data.



12.3.2 Data Reception Settings

You can configure the reception of five types of N2K data: GPS, Heading, Depth, Wind, and AIS.

For AIS, you can only set whether to receive data from N2K sources—meaning all AIS data within the N2K network.

Setting method: In the "SATELLITE MENU," set "N2K AIS IN" to "ON."

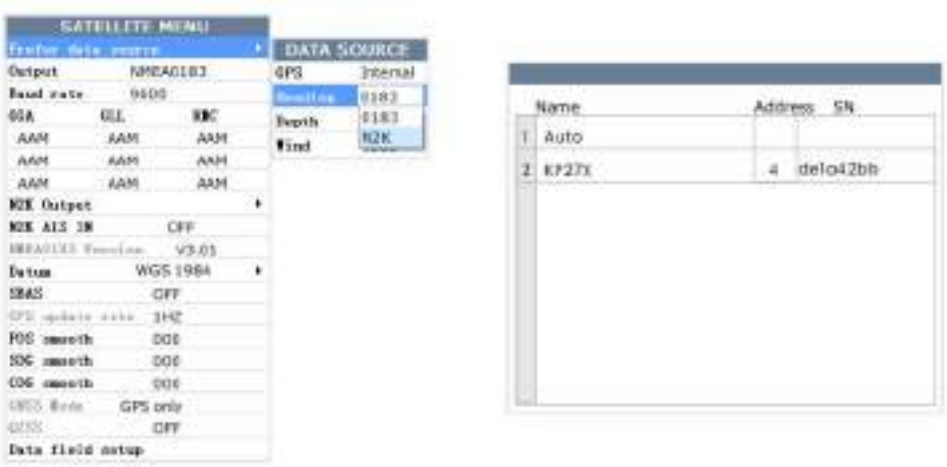
The other four—GPS, Heading, Depth, and Wind—can also be configured by setting a data source priority and specifying a particular device as the source of corresponding data for your device.

Setting method: SATELLITE MENU > Prefer data source >

GPS (or Heading/Depth/Wind) > N2K.

A list of N2K devices will appear, as shown on the right side of the image below.

Use the ▲ ▼ and ✓ keys to select the target device, then press the ✕ key to return.



Explanation: There are three types of devices in the N2K device list, each represented by a different color and status.

Black font: The device is currently sharing the corresponding data.

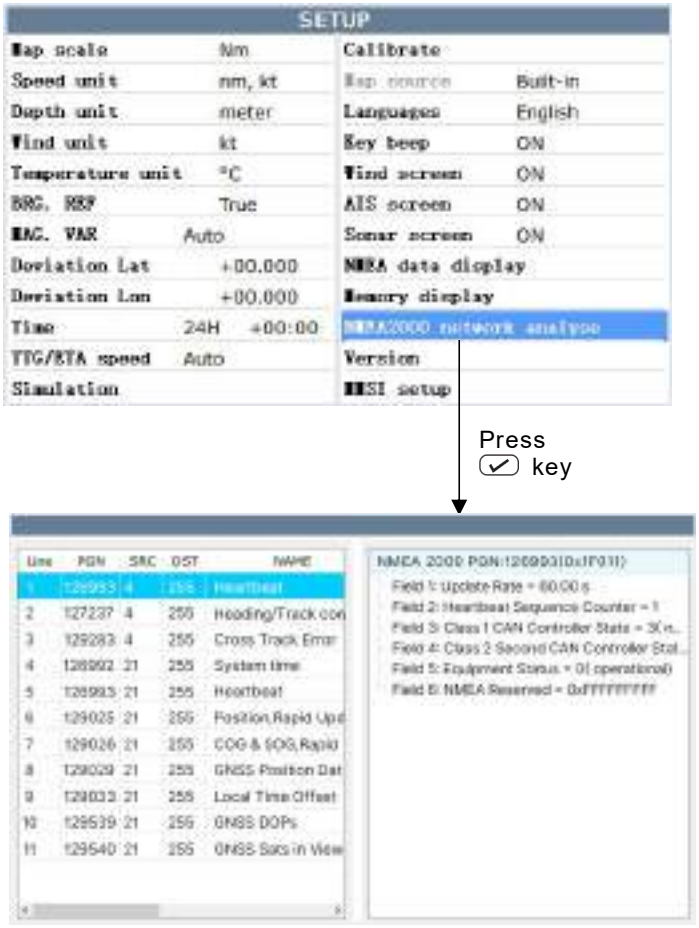
Red font: The device has been selected as the N2K source for corresponding data on your device.

Gray font: The device is currently in the N2K network but does not output or share corresponding data, and it is not selectable.

If the N2K device list is empty, it means there are no other devices in the current N2K network or your device is not in the N2K network.

12.3.3 Overview of Received N2K Data in the Network

In any screen, press the MENU key (press 3 times for chart screen, 2 times for other screens), and the 'MAIN MENU' will appear. Choose the 'Setup' menu,then select 'NMEA2000 Network Analyze' and open it with the ✓ key. Here, you can view all the N2K data currently received by this device. Use the ▲ ▼ keys to navigate and inspect the details of each specific data entry.



13.1 How to connect output data to external equipment

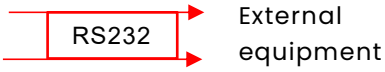
13.1.1 Output navigation data

The below NMEA0183 sentences can be selected output to external equipment : GGA, GLL, RMC, GSA, GSV, AAM, APA, APB, BOD, BWC, BWR, DBT, DPT, HDT, MTW, RMB, TLL, VTG, WPL, XTE, ZDA, ZTG, ZDL, MWD, VPW, VWR, VWT.
The below output baudrate can be selected : 4800, 9600, 19200 and 38400

13.1.1.1 Wiring output to external equipment

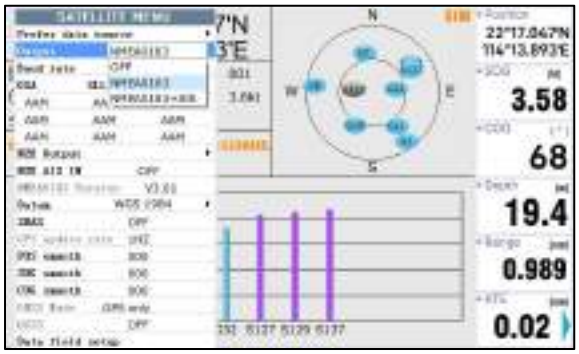
Connect pin5+ (Green) and pin6- (BROWN) to the input of external equipment as shown:

⑤ NMEA 0183 OUT + (GREEN)
⑥ NMEA 0183 OUT - (BROWN)

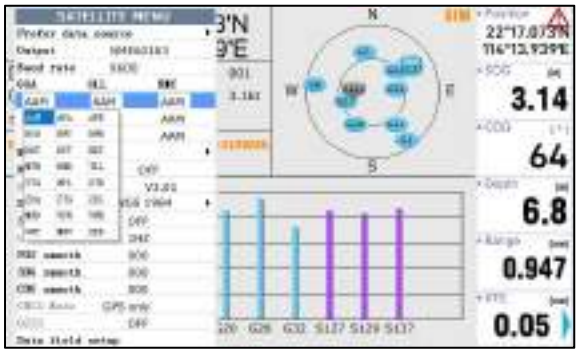


13.1.1.2 Select output sentences

Firstly you need to turn on the output in Satellite menu as shown in picture 13.1.1.2_1:



Picture 13.1.1.2_1



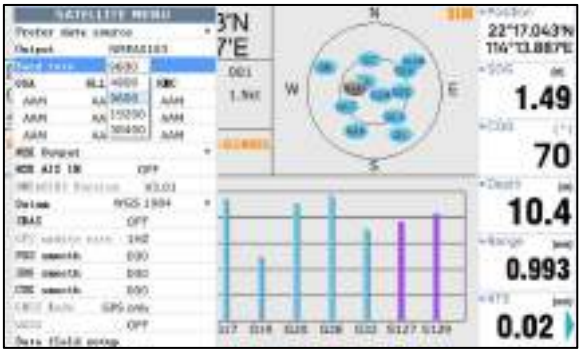
Picture 13.1.1.2_2

Then scroll the cursor to one of "AAM" below to select the desire output NMEA 0183 sentences.

Note : There are 3 default output sentences , GGA, GLL and RMC

13.1.1.3 Select output baudrate

There are 4 different baudrate provided for selection, 4800, 9600, 19200 and 38400.



13.1.2 Output AIS data (For KP-25A, KP-25X, KP-27A and KP-27X)

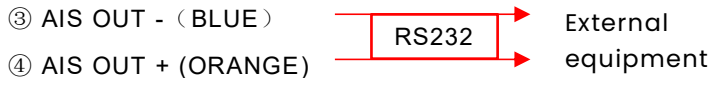
You can connect the AIS data output to external equipment as shown below. There are no require any menu selection for AIS data ouput, once you connect AIS data output to external equipment you can find the AIS data appear on external equipment if the connection is correct and your external equipment can accept AIS data input.

13.1.2.1 AIS data sentences

The below NMEA0183 sentences output from AIS OUT port as default :
GGA, GSA, GSV, RMC, VDM, VDO
The baudrate from AIS OUT port : 38400

13.1.2.2 Wiring output to external equipment

-For KP-25A, KP-25X, KP-27A and KP-27X
Connect pin4+ (Orange) and pin3- (Blue) to input of external equipment as shown:



13.2 How to connect NMEA0183 sentences from external equipment

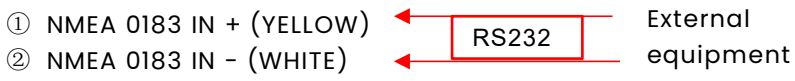
13.2.1 Input navigation data

The below NMEA0183 sentences can be accepted input from external equipment :
GGA, GLL, GSA, GSV, RMC, HDG, HDM, HDT, VTG, ZDA, MTW, VWR, VWT, MWD, VPW, VHW, TLL, TTM, VDO, VDM, GNS, MTA, RMA, DBT, DPT, MWV,
BWC, XTE, ZDL, WPL, AAM, APB, BOD, RMB, DSC, MDA, RPM, XDR.

The below input baudrate is auto scan so no setting is required.
Supported auto scan baudrate : 4800, 9600, 19200, 38400

13.2.2 Wiring input from external equipment

Connect pin1+ (Yellow) and pin2- (White) to the output of external equipment as shown:



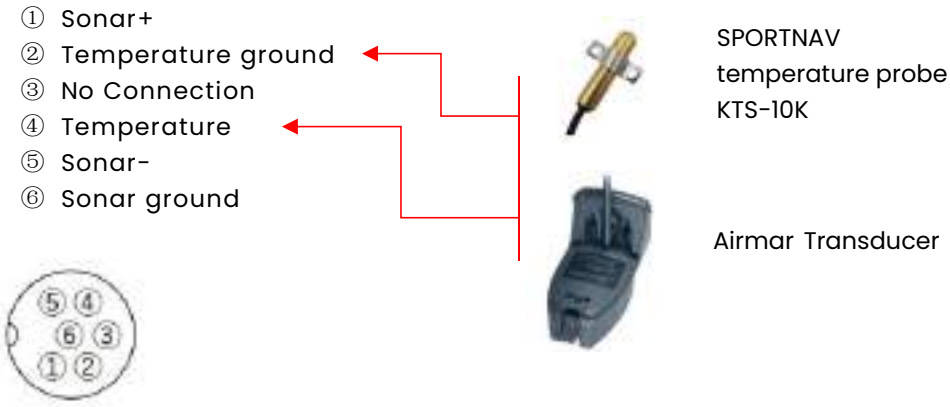
13.3 Connecting a temperature probe

A SPORTNAV 10K (10K resistance at 20°C or 68° F) temperature probe or Airmar temperature sensor can be connected to the chartplotter as shown below to display temperaure on sounder screen and data box.

13.3.1 Wiring of temperature probe

- For KP-25F, KP-25X, KP-27F and KP-27X

Connect a temperature probe to pin 2 and pin 4 as shown:

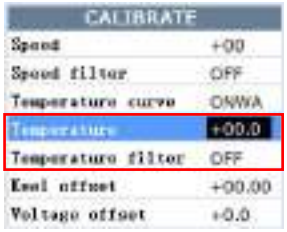


13.3.2 Selection of temperature probe

In order to select correct temperature probe after installation you need to access MAIN MENU-> SETUP->Calibrate->Temperature curve.

13.3.3 Calibrate temperature accuracy

No matter SPORTNAV temperature probe or Airmar temperature sensor it just provides a reference temperature reading. In some condition you might need to adjust the temperature accuracy or apply temperature filter.



13.4 Import and Export user data

All user data, such as waypoint, route, track, drawing mark, drawing line and drawing place names, can be import or export from SPORTNAV chartplotter through a SD card.

13.4.1 Basic mode

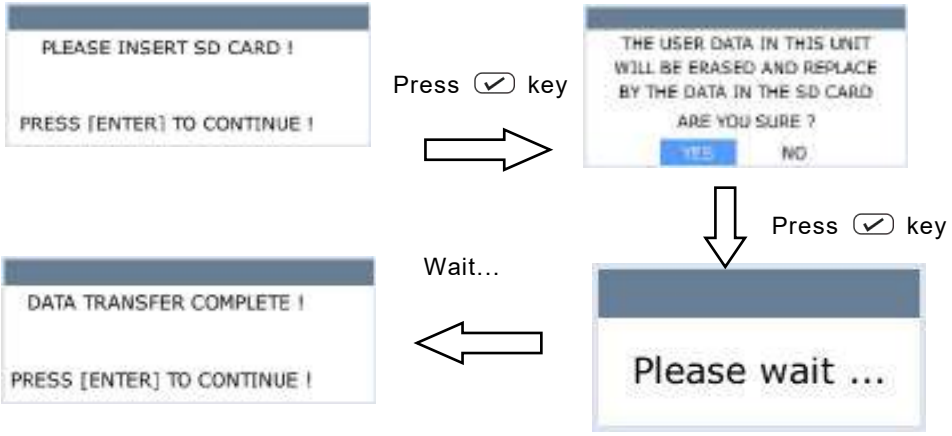
The format of import and export user data is (ODF). You can import one type of user data, example : waypoint, or combine all user data into one file by using merging function of KDX PC software.

For the export function, all user data will be merged into one ODF file. You can convert ODF to GPX format (Google Earth format) by using KDX PC software.

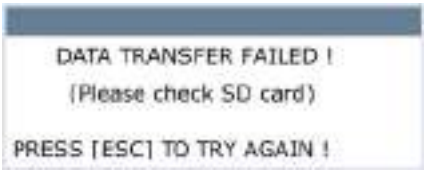
13.4.1.1 Import data in basic mode

Insert SD card contains user data (waypoint, routes etc.) in ODF format you want to transfer into chartplotter.

In any screen press (MENU) × 2 -> MAIN MENU -> Data -> Data In.

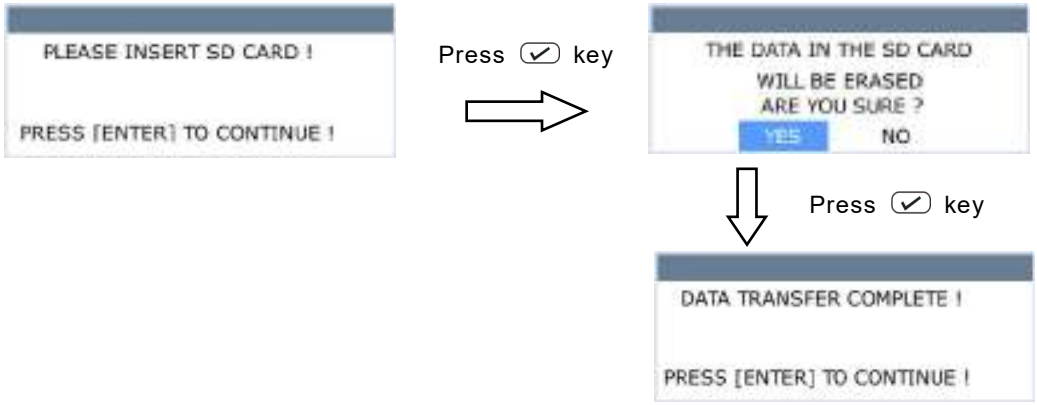


In case of import failed, appear the below message. It is either no ODF data in your SD card or SD card is not detected in the SD card slot. Please check and try again.

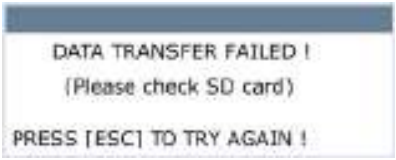


13.4.1.2 Export data in basic mode

Insert a SD card onto your chartplotter.
In any screen press (MENU) × 2 - > MAIN MENU -> Data -> Data Out.



In case of export failed, appear the below message. Please check the SD card and try again.



13.4.2 Advance mode

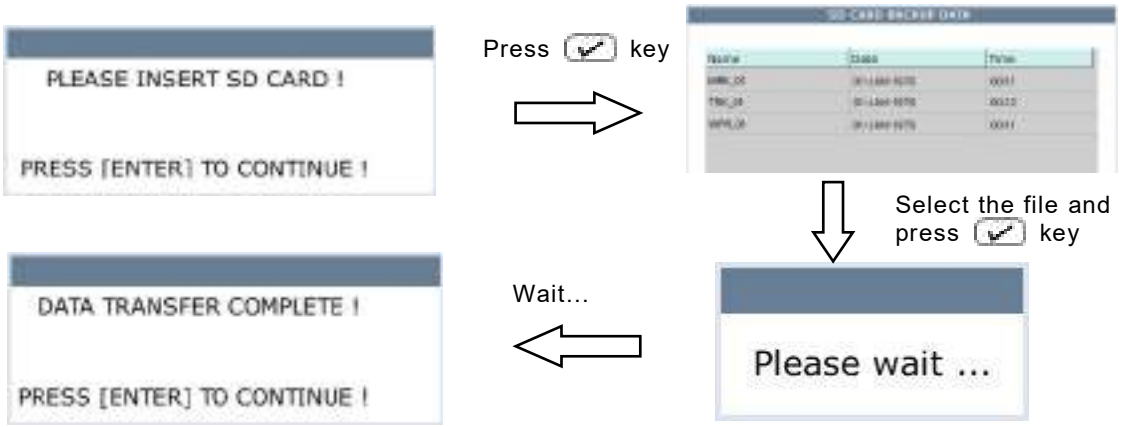
In advance mode, beside direct export the user data you can add condition on export user data.

Instead of export all user data on basic mode, advance mode provides selection of user data types and range of data creation date.

13.4.2.1 Import data in advance mode

Insert SD card contains user data (waypoint, routes etc.) in ODF format you want to transfer into chartplotter.
In any screen press (MENU) × 2 -> MAIN MENU -> Data -> Data In.

The ODF files in the SD card will show up as below :

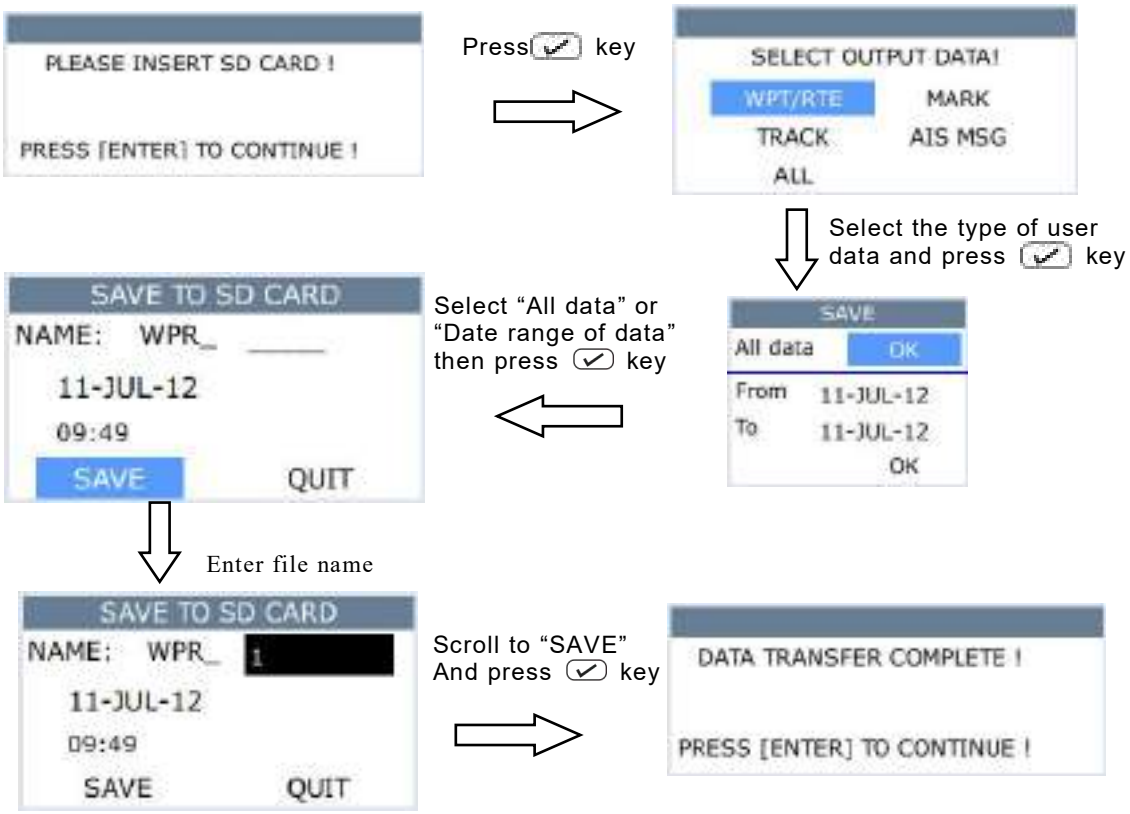


Note : The Import data in advance mode only accept filename with prefix of WPR (waypoints and routes), TRK (tracks) and MRK (drawing mark, drawing lines and drawing place names)

13.4.2.2 Export data in advance mode

Insert a SD card onto your chartplotter

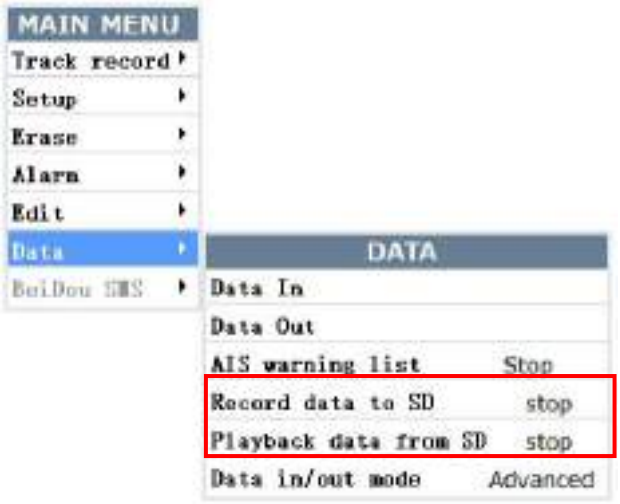
In any screen press (MENU) × 2 -> MAIN MENU -> Data -> Data Out



13.5 Record and Playback

In some condition you might want to record all navigational data, such as position, SOG, COG, AIS data and depth data, over a voyage or a certain period.

You can use the " Record data to SD" function to record the above navigational data in a SD card and you can use " Playback data from SD" function to playback the recorded navigational data at anytime you want.



14. INSTALLATION

14.1 Verifying the contents

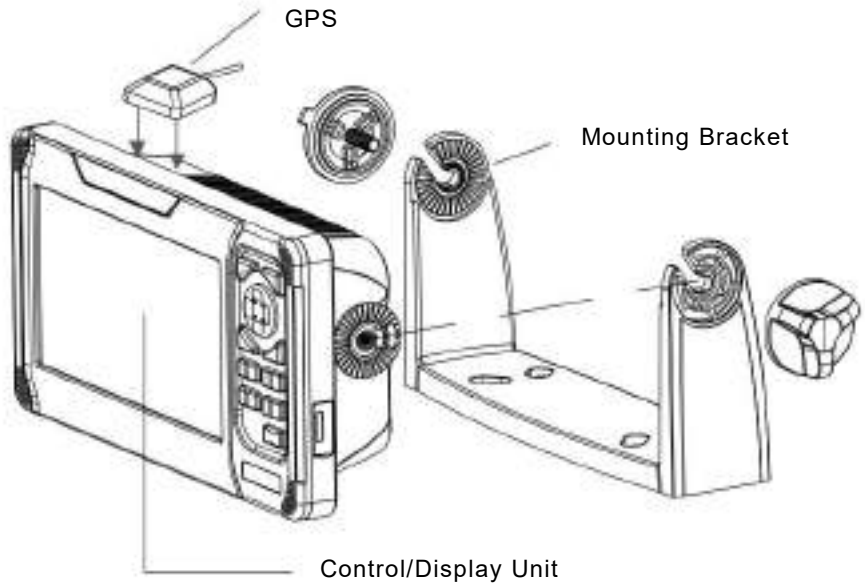
When you first time open the box of your plotter please confirm you have following items inside the box :

- Display unit(including installation bracket and ear clamp)
- GPS patch antenna
- Panel Cutout Pattern
- Quick start and installation manual
- Face mask and Panel Installation Sticker
- Standard accessories pack
  8-core Power/Data Cable*1
  Fuses*2
  bracket mounting screws*4
  panel mounting screws*8

14.2 Installing the unit

There are three methods for installing fixed equipment: desktop stand mounting, suspension mounting, and embedded panel mounting.

14.2.1 Desktop stand mounting

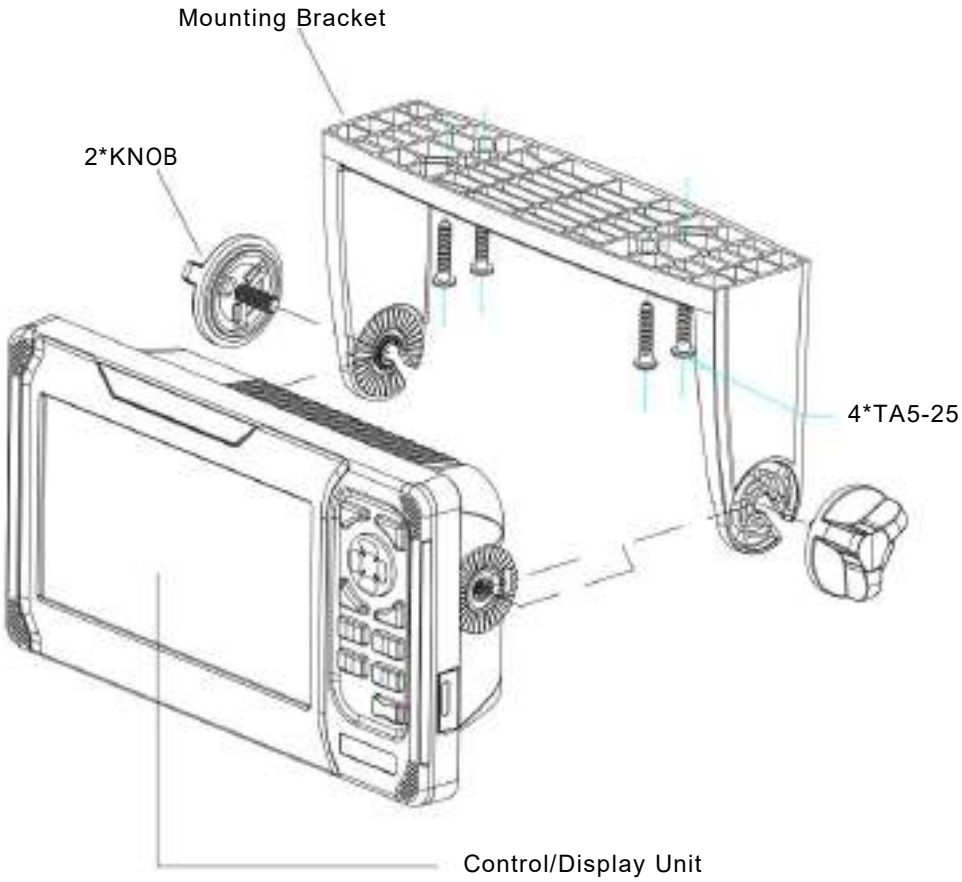


Notice: The unit should be mounted on a flat, solid surface for maximum stability. Be sure to fix the mounting bracket with screws. Otherwise, the display unit may fall down by the boat's pitching and rolling that may lead to fire or injury.

(1) The mounting bracket should be fixed with 5mm screws.
Do not install the unit at the places that are affected by vibration or might be affected with spray or rain.
Avoid the places where there is sunlight because visibility might be limited and the unit will be exposed to heat too much.
Be sure that the space between the rear side of the unit and the wall is more than 10cm.

(2) Fix the unit to the mounting bracket firmly with the knobs so as to prevent it to get out of the bracket while running.

14.2.2 Suspension mounting



Step 1: Secure the bracket to the chosen installation position using the provided four screws.

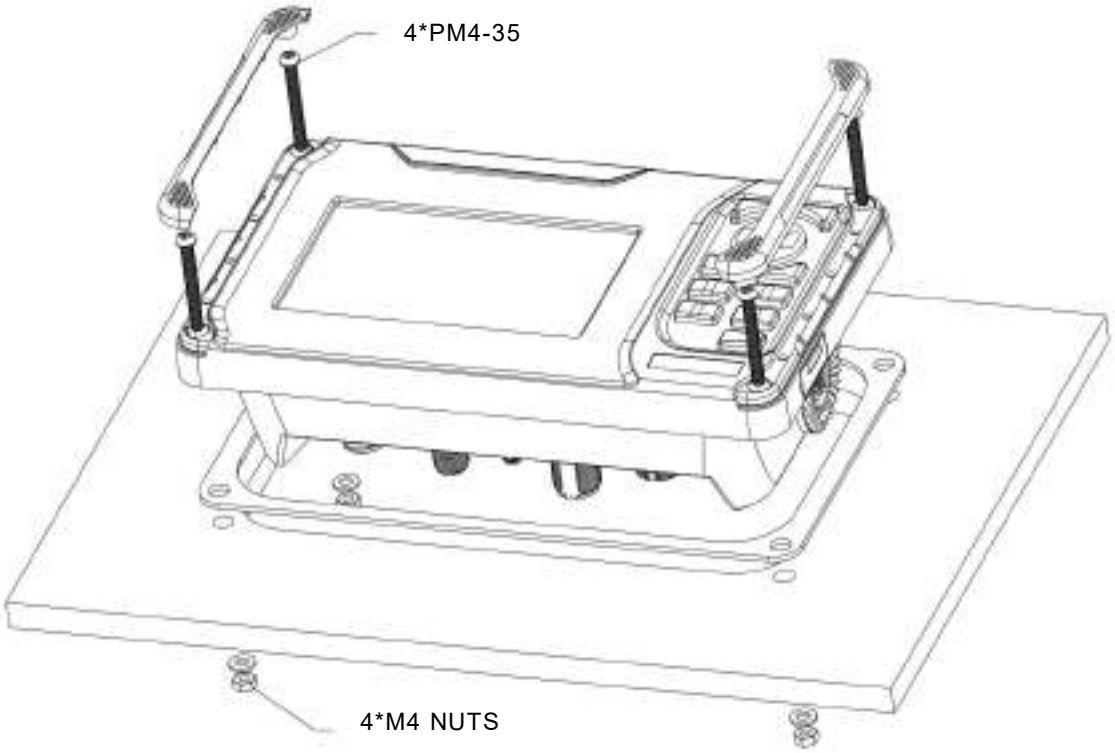
Step 2: Attach the chartplotter to the bracket using the provided two knobs.

Notice:

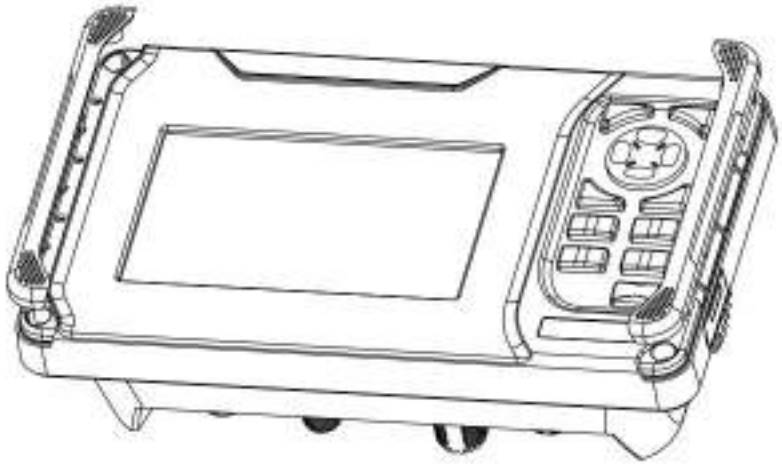
1. Ensure that the hanging position of the unit can bear the weight of the device and is installed securely and steadily.

2. Ensure that the unit is securely fastened to the bracket and thoroughly check to prevent any accidental dropping or injury.

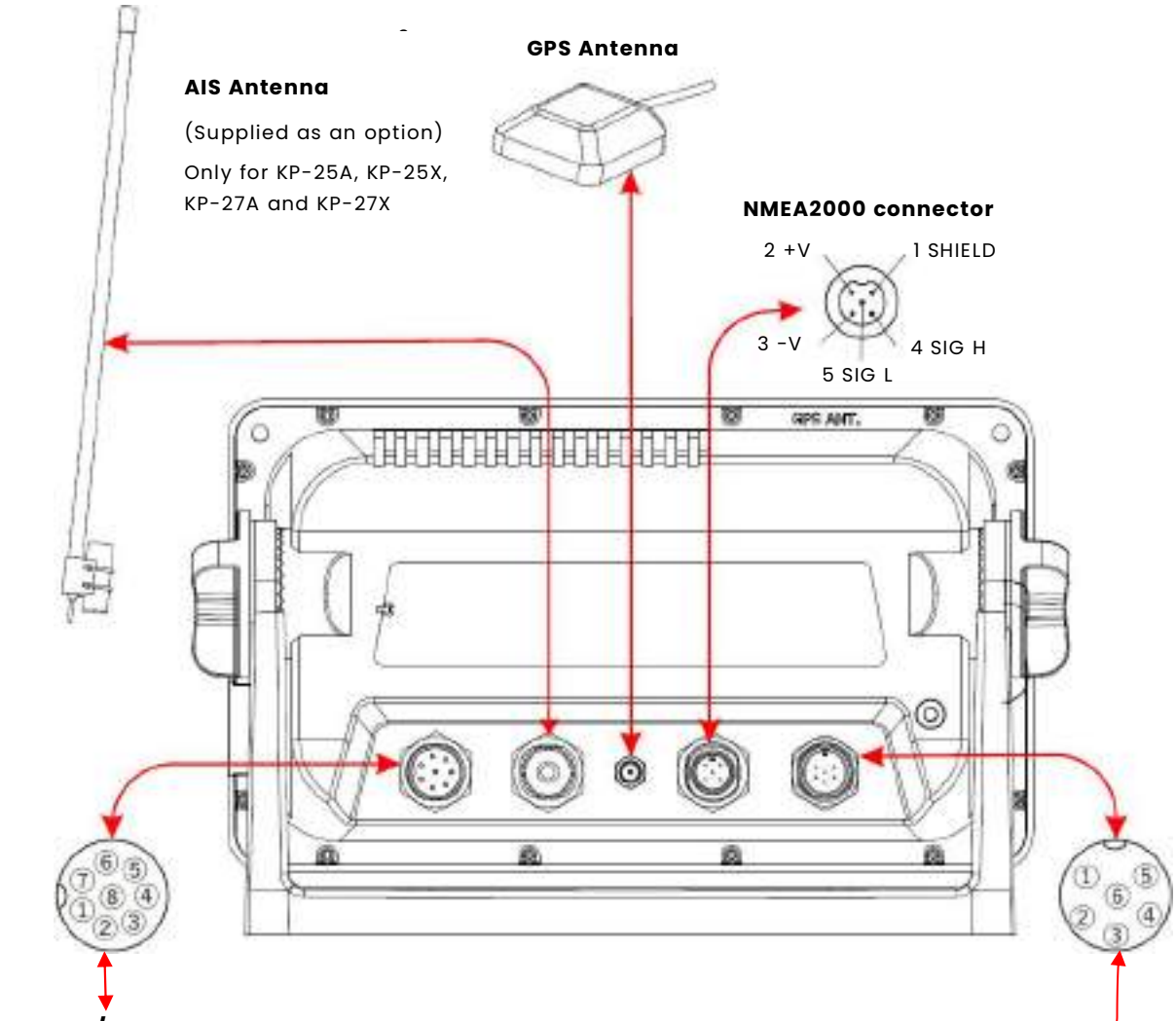
14.2.3 Embedded panel mounting



Step 1: Open a hole on the panel according to the provided flush mount template and Panel Installation Sticker
Step 2 : Remove the 2 strips on the facial panel of KP-25 (or KP-27)
Step 3 : Place the KP-25 (or KP-27) into the hole prepared in Step 1
Step 4 : Fix the unit by the 4 supplied screws
Step 5 : Place back the 2 strips that removed in Step 2

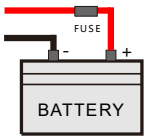


15. INTERCONNECTION DIAGRAM



POWER/DATA

①	NMEA 0183 IN+	GPS/AIS data from external equipment
②	NMEA 0183 IN-	
③	AIS OUT -	AIS data to external equipment (Only for KP-25A, KP-25X, KP-27A and KP-27X)
④	AIS OUT +	
⑤	NMEA 0183 OUT +	GPS data to external equipment
⑥	NMEA 0183 OUT -	
⑦	Power+	
⑧	Power-	



XDUCER

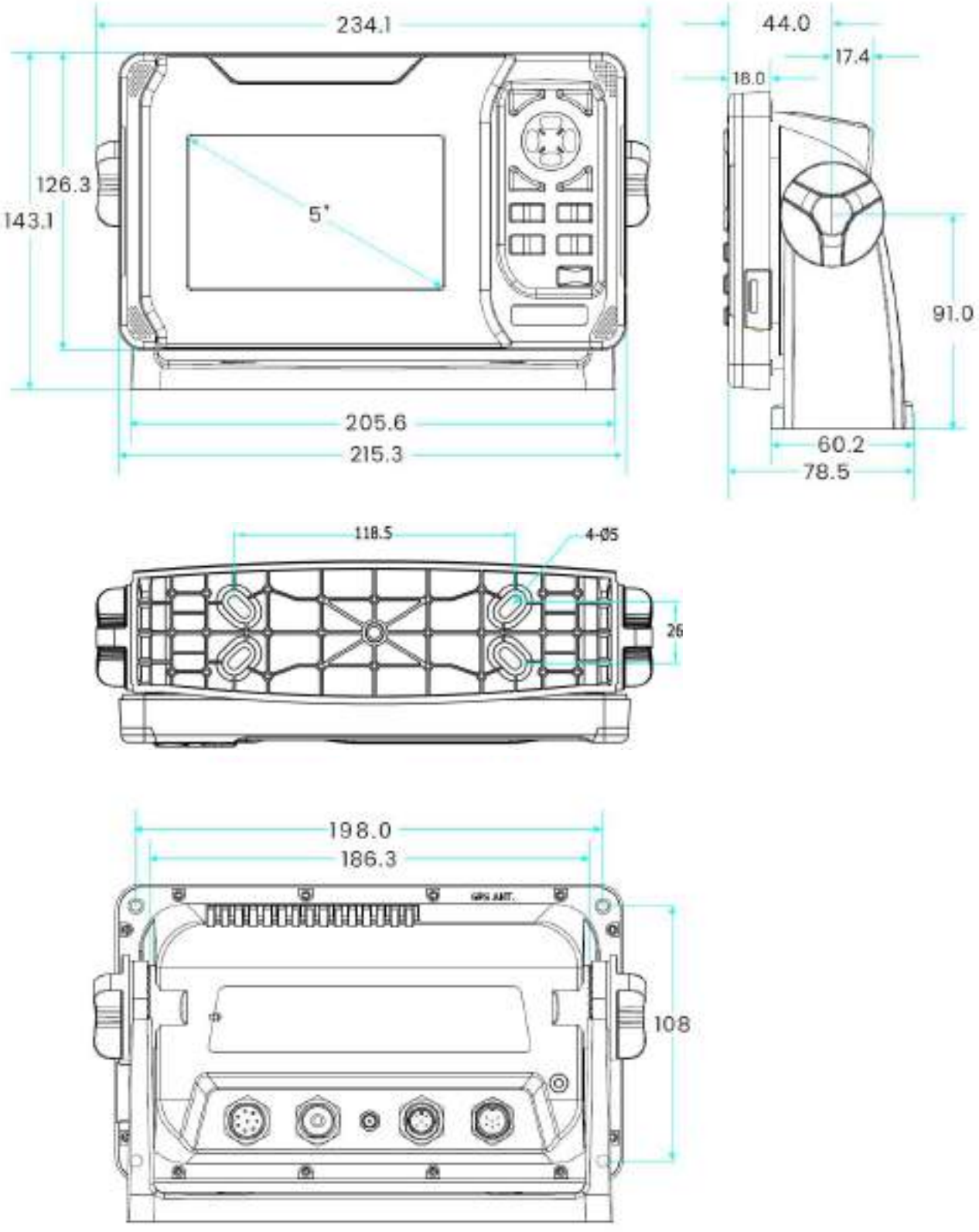
① Sonar+
② Temperature ground
③ No Connection
④ Temperature
⑤ Sonar-
⑥ Sonar ground

TRANSDUCER
(Supplied as an option)

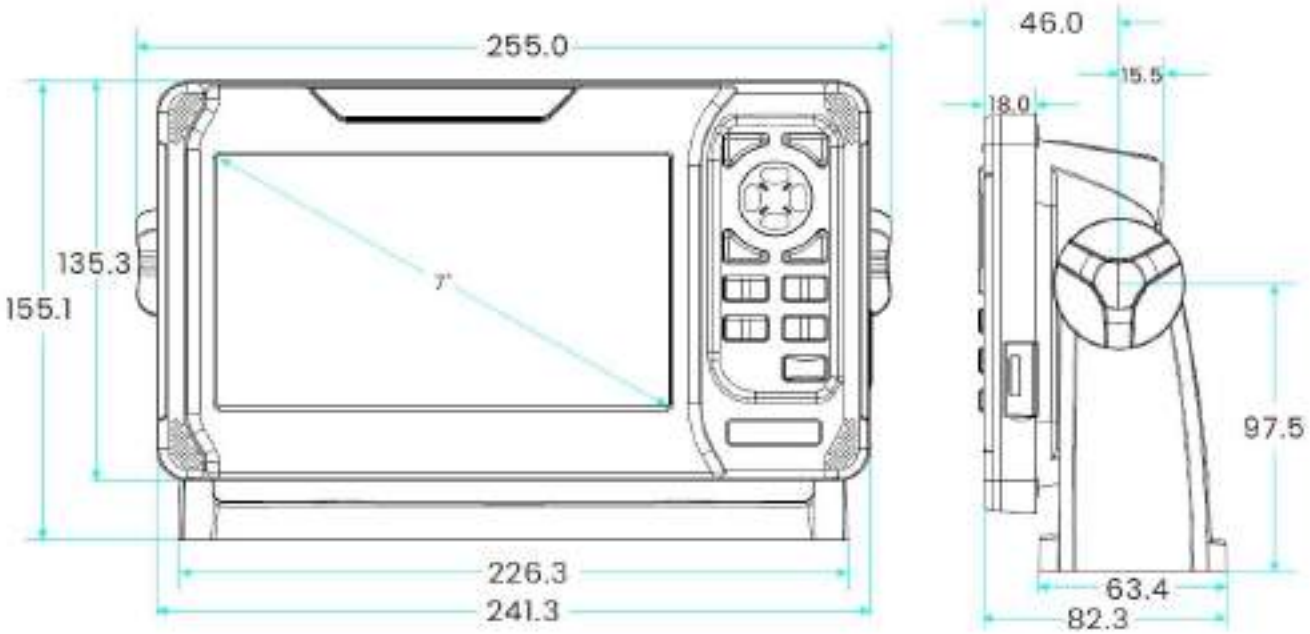
Only for KP-25F,KP-25X,
KP-27F and KP-27X

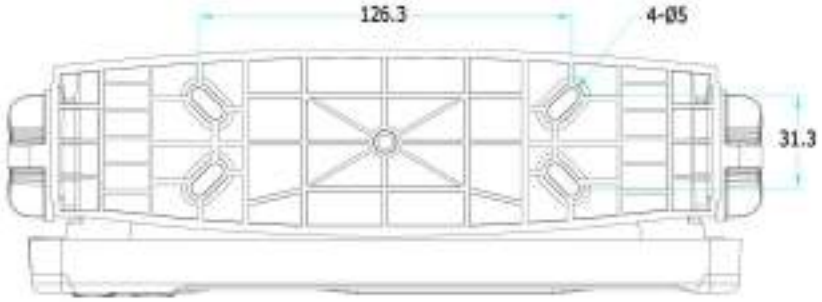
16. DISPLAY SIZE

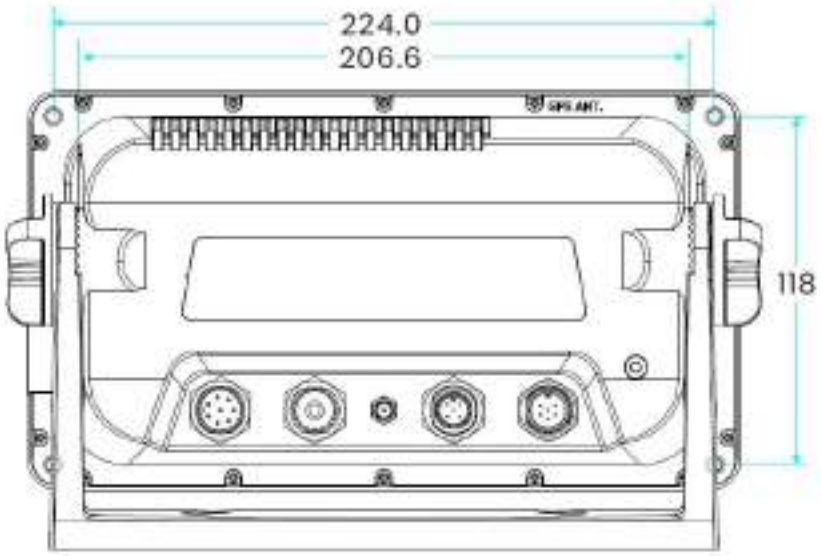
KP-25 Series



KP-27 Series


255.0
135.3
155.1
7"
226.3
241.3
46.0
15.5
18.0
97.5
63.4
82.3


126.3
4-Ø5
31.3


224.0
206.6
GPS ANT.
118

17. SHORTCUTS

Shortcuts in Plotter screen

1) Press and hold (MODE) to change the track color.
2) Press and hold (MENU) to turn track recording ON/OFF.
3) Press and hold (✓) to activate the User Mark drawing function.

Shortcuts in Fishfinder (Sounder) screen

1) Press and hold (MODE) to change the Sonar mode, 50KHz, 200KHz, DUAL, 50KHz/ZOOM and 200KHz/ZOOM.
2) Press and hold (✓) key to switch between Auto and Manual gain.
3) On manual gain slightly press (✓) key to adjust manual gain.
4) On auto gain slightly press (✓) key to switch between Auto-1 and Auto-2 mode.
5) Press and hold either (⛶) or (⛶) key to switch between Auto and Manual range.
6) Slightly press (f_x) key to change Signal Level.
7) Press and hold (▶) key to adjust picture advance speed.
8) Slightly press(◀) (▶) key to shift range.
9) Slight press(▲) (▼) key to move VRM.
10) Slight press (▶) to activate position line.

Shortcuts in Plotter/Sounder mode

1) Press and hold (MENU) key to change the **PLOTTER** and **SOUNDER** screen split ratio.
2) When **SOUNDER** screen is ≧50%, all key functionalities are the same as in SOUNDER screen only.
3) When **PLOTTER** screen is ＞50% all key functionalities are the same as in **PLOTTER** screen only.

Shortcuts in All modes

1)Press and hold (✕) to enable graphic selection mode.

18. ABBREVIATIONS

Abbreviations	Word
ESC	Escape
ENT	Enter
SBAS	Satellite-based augmentation system
POS	Position
SOG	Speed Over Ground
COG	Course Over Ground
AWS	Apparent Wind Speed
AWA	Apparent Wind Angle
TWS	True Wind Speed
TWA	True Wind Angle
TWD	True Wind Direction
VMG	Velocity Made Good
INFO	Information
LAT	Latitude
LON	Longtitude
TTG	Total Time to Go
ETA	Estimate Time of Arrival
XTE	Cross Track Error
HDOP	Horizontal Dilution of Precision
TVG	Time Variable Gain
PIC	Picture
B/L	Bottom Lock
F/A	Fish Alarm
MAG.VAR.	Magnetic Variation

19. GLOSSARY

ACA	(AIS) Regional Assignment Channel Assignment Message
ACK	Acknowledgement
ACS	(AIS) Channel management information source messages
AFSK	Auto frequency-shift keying
ALR	(AIS) Alarm Message
A to N	Aid to Navigation
AIS	Automatic Identification System
BIIT	Built In Integrity Testing
BNC	Bayonet fitting type Therefore connector
COG	Course over Ground
CR	Carriage Return
CS	Carrier Sense
CSTDMA	Carrier Sense Time Division Multiple Access
DC	Direct Current
DGNSS	Differential Global Navigation Satellite System
DSC	Digital Selective Calling
GLONASS	Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GMSK	Gaussian Minimum Shift Keying
GPS	Global Positioning Satellite / System
HF	High Frequency
IMO	International Maritime Organization
IEC	International Electro technical Commission
LED	Light Emitting Diode
LF	Line Feed
LNA	Low-noise Amplifier
MF	Medium Frequency
MKD	Minimum Keypad and Display
MMSI	Maritime Mobile Service Identity
MPE	Maximum Permissible Exposure
NMEA	National Marine Electronics Association
PC	Personal Computer

PI	Presentation Interface
RF	Radio Frequency
RTCM	Radio Technical Commission for Maritime Services Commission
RX	Receive or Receiver
RFI	Radio Frequency Interference
SAR	Specific Absorption Rate
SELV	Separated Extra Low Voltage
SMS	Short Message System
SOG	Speed over Ground
SRM	Safety Related Message
TDMA	Time-division Multiple Acces
TNC	Threaded type RF connector
TX	Transmit or Transmitter
UTC	Universal Time Co-ordinated
VDM	(AIS)VHF Data Link Messages
VDO	(AIS)VHF data link own vessel messages
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio