CE

KODEN

INSTALLATION MANUAL

COLOR ECHO SOUNDER

Broadband

CVS-FX1

This product is specifically designed to be installed on boats and other means of maritime transport. If your country forms part to the EU, please contact your dealer for advice before attempting to install elsewhere.

CVS-FX1.IM.E 0092601112-03

CVS-FX1 Installation Manual

Doc No. 0092601112

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3	0092601112-03	2014/03/10	System Configuration, Configuration of Equipment, Dimensions, Chapter 1, Chapter 2
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When part of the document needs to be revised, the document has advanced revised number. The document No. is indicated at the lower right side on the cover and at the left or right side of the footer region of each page.

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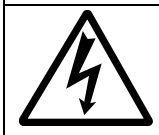
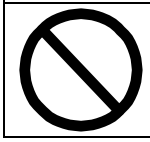
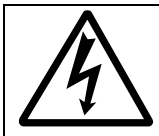
For Your Safe Operation

Symbol used in this Installation Manual

The following graphical symbols are used in this manual. The meaning of each symbols shall be well understood and apply at maintenance and inspection works.

Symbol	Meaning
 Warning	**Mark for warning** This symbol denotes that there is a risk of death or serious injury when not dealing with it correctly.
	**Mark for danger high voltage** This symbol denotes that there is a risk of death or serious injury caused by electric shock when not dealing with it correctly.
 Caution	**Mark for caution** This symbol denotes that there is a risk of slight injury or damage of device when not dealing with it correctly.
	**Mark for prohibition** This symbol denotes prohibition of the specified conduct. Description of the prohibition is displayed near the mark.

Caution items on equipment

	**Be careful of a high voltage inside.** A high voltage, which may risk your life, is used. This high voltage remains in the circuit after you have powered off switch. To prevent touching the high voltage circuit inadvertently, the hard cover is provided to the high voltage circuit and the high voltage caution label is affixed. Ensure to power off switch for your safety and discharge the electricity remaining in the capacity before starting to check. An engineer authorized by our company should inspect and maintain
 Warning	**Be sure to power off in the boat.** If the power switch is inadvertently powered on during work, you will be electrified. To prevent such accident from occurring, ensure to power off in the boat and the power of equipment. Furthermore, it is safer to hang the caution tag described as [Under Work] near the power switch of equipment.
 Warning	**Be careful of dust** Inhaling dust may cause A respiratory disease. When cleaning the inside of equipment, be careful not to inhale dust. Wearing a safety mask is recommended.

 **Caution**	**Caution on location of equipment** Do not install the equipment where it is excessively damp and suffers from excessive water drops.
 **Caution**	**Measures against static electricity** The static electricity may be generated from the carpet on the floor in the cabin or clothes made of synthetic fiber. The static electricity may destroy the electronic parts on the circuit board. Handle the circuit board, taking the measure of static electricity free.
 **Caution**	**Caution at installation of a transducers** Install the transducer at the location where it is not affected by bubble and noise The bubble and noise seriously degrade the performance of this unit.

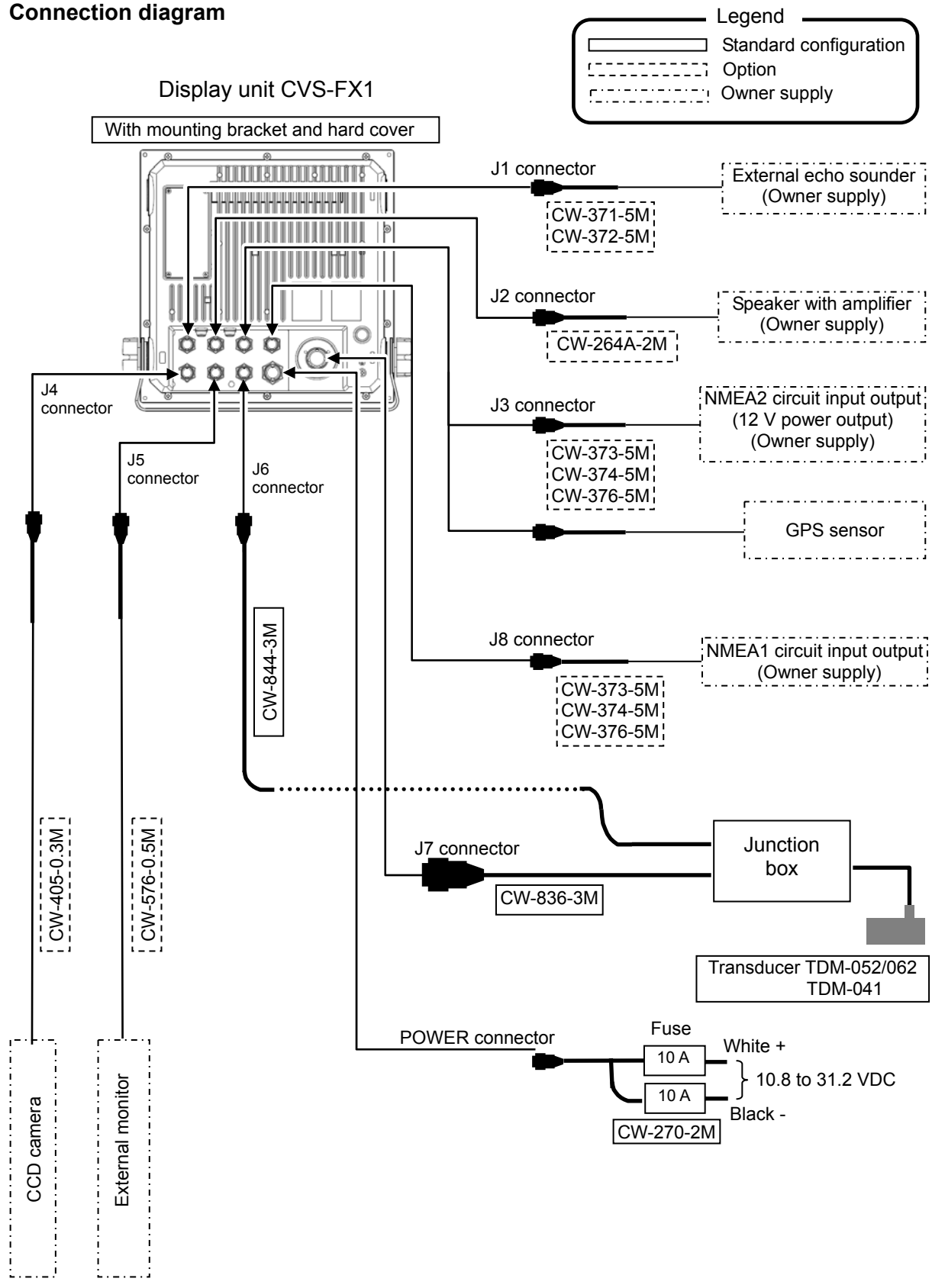
Caution Items on handling

 **Warning**	Do not disassemble or modify. It may leads to trouble, fire, smoking or electric shock. In case of trouble, contact our dealer or our company.
 **Warning**	In case of smoke or fire, boat power off and the power of this unit. It may cause fire, electric shock or damage.
	**Be cautious of remaining high voltage.** A high voltage may remain in the capacitor for several minutes after you have powered off. Before inspecting inside, wait at least 5 minutes after powering off or discharge the remaining electricity in an appropriate manner. Then, start the work.
 **Caution**	The information displayed in this unit is not provided directly for your navigation. For your navigation, be sure to see the specified material.
 **Caution**	Use the specified fuse. If un-specified fuse is used, it may cause a fire, smoke or damage.
 **Caution**	Whenever transmitting, be sure to submerge the transducer in water first. If transmitted without submerging the transducer, it may be damaged.

Contents

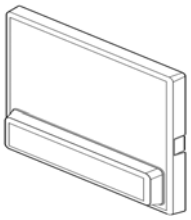
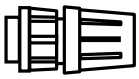
System Configuration

Connection diagram

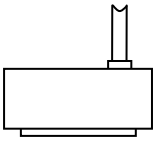
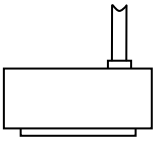
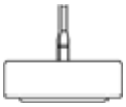


Configuration of Equipment

Standard Equipment Configuration List

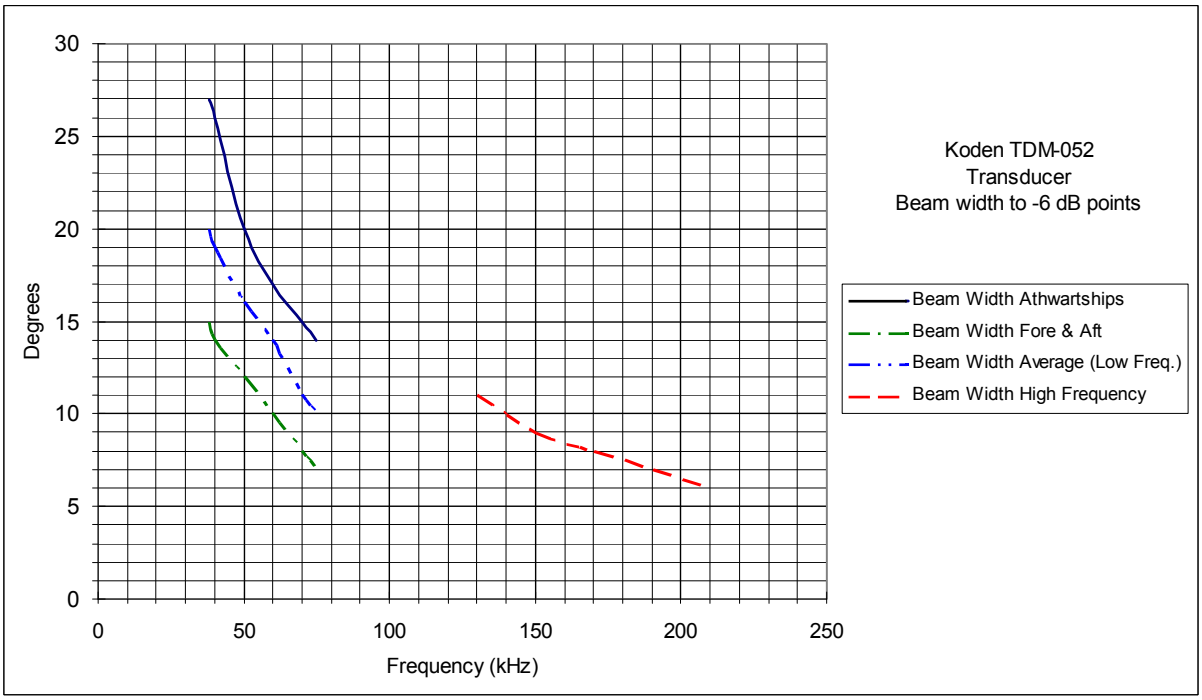
No.	Name of item	Type	Remark	Weight/ Length	Qty
1	Display unit 	CVS-FX1	With mounting bracket and knobs	9.1 kg	1
2	Hard cover 	A30MB10250		390g	1
3	DC power cable 	CW-270-2M	With 5P connector and one end plain	2 m	1
4	Fuse 	F-7161-10A/ N30C-125 V type(φ6.4 × 30)	Normal fusion type for main power		2
5	Junction Box	JB-34	Transducer junction box		1
6	Connector 	LTWBD-06BFFA-L180	6P water resistant connector		2
7	Transducer	Refer to next page “Type of transducer”	Transducer cable		1
8	Basic Operation Manual	CVS-FX1.BM.E	English		1
9	Full Menu Reference	CVS-FX1.FM.E	English		1
10	Quick Reference	CVS-FX1/FX2/FX2BB. QR.E	English		1
11	Installation manual	CVS-FX1.IM.E	English		1
12	Menu List	CVS-FX1/FX2/FX2BB. ML.E	English		1
13	Transducer cable	CW-836-3M	With 5P connector and one end soldering to insert to JB	3 m	1
		CW-844-3M	For connection of water temp. and speed sensors	3 m	1

Type of transducer

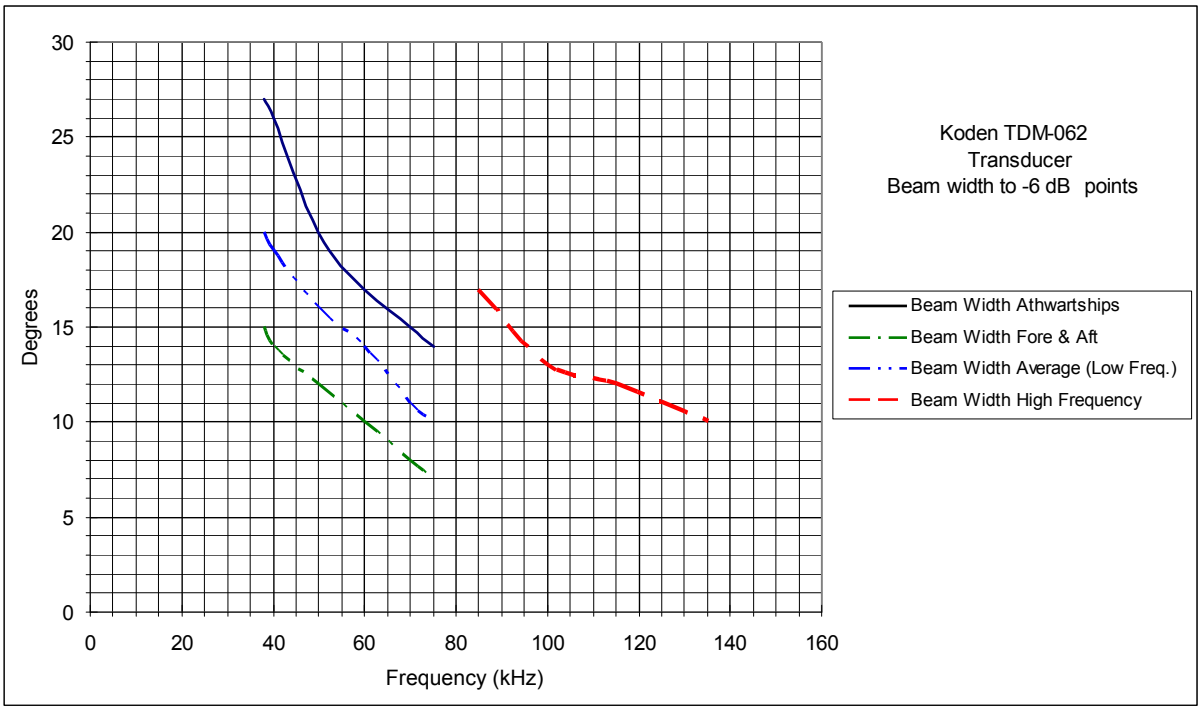
No.	Specification	Frequency output	Material/ Cable length/ Cable diameter	Mounting method	Beam width (- 6 dB) (Right and left x Back and forth)(-6 dB)
1	TDM-052 	Low frequency 38 to 75 kHz High frequency 130 to 210 kHz	Rubber mold 15 m φ11	Ship's bottom	Low frequency (38 kHz) 27° × 14° (60 kHz) 18° × 10° (75 kHz) 14° × 7° High frequency (130 kHz) 11° (170 kHz) 8° (210 kHz) 7°
2	TDM-062 	Low frequency 38 to 75 kHz High frequency 85 to 135 kHz	Rubber mold 15 m φ11	Ship's bottom	Low frequency (38 kHz) 27° × 14° (60 kHz) 18° × 10° (75 kHz) 14° × 7° High frequency (85 kHz) 17° (100 kHz) 13° (135 kHz) 10°
3	TDM-041 	50/200kHz	Urethane mold 15 m φ11	Ship's bottom/ Ship's side	(50 kHz) 30° × 30° (200 kHz) 30° × 30°

Caution: Broadband transducer (TDM-052 and TDM-062) shall not be operated in the air, as it will be damaged.

TDM-052 Beam Angle



TDM-062 Beam Angle

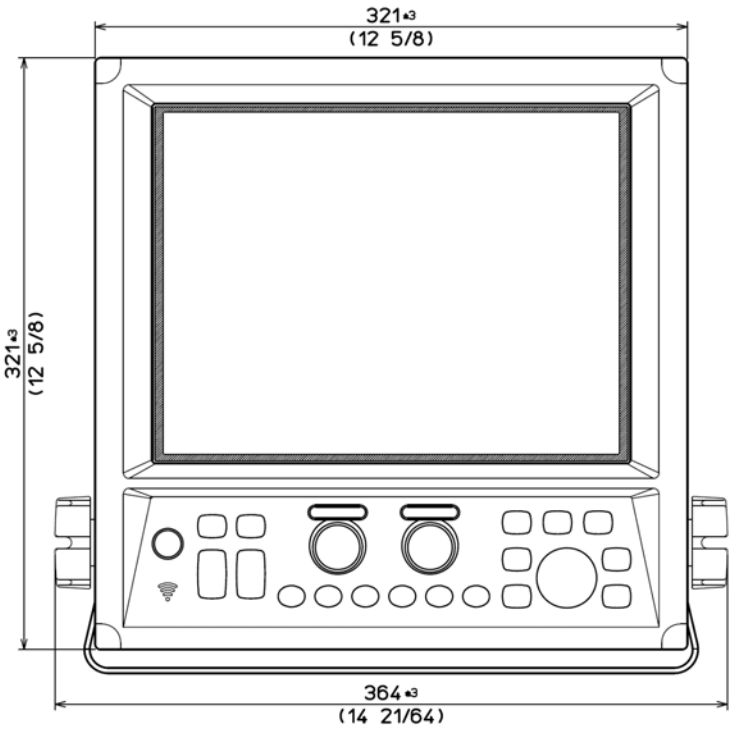


Option List

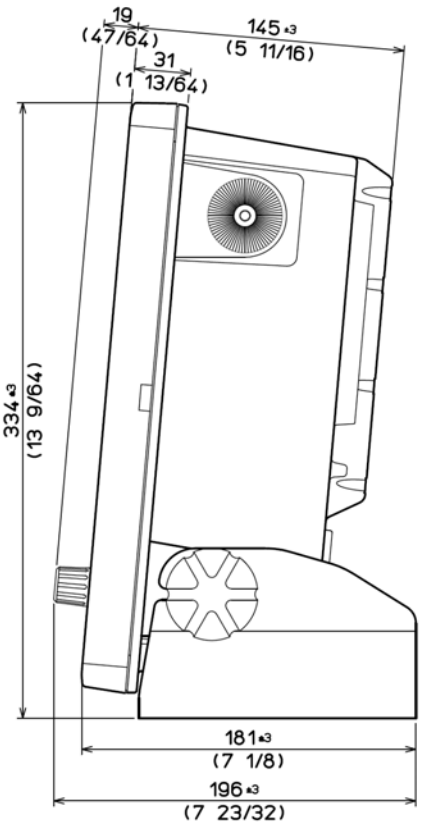
No.	Name of Item	Specification	Remark	Weight/ Length
1	Power rectifier	PS-010	Fuse (5A) 2 pcs.	
2	AC power cable	VV-2D8-3M	Both ends plain.	3 m
3	Transducer extension cable	C44-01	Cable configuration is the same as TDM-052/TDM062. (Refer to “Connection of transducer”, page 1-17)	Specify length at order
4	Grounding cable	OW7/1.6S-3M		3 m
5	Connecting cable	CW-371-5M	With a 5-pin connector & a 5-pin water resistant connector	5 m
		CW-372-5M	With a 5-pin water resistant connector & one end plain	5 m
		CW-373-5M	With 6-pin water resistant connectors both ends	5 m
		CW-374-5M	With a 6-pin connector & a 6-pin water resistant connector	5 m
		CW-376-5M	With a 6-pin water resistant connector & one end plain	5 m
		CW-560-2M	With 15-pin water resistant D-Sub connectors both ends	2 m
		CW-264A-2M	12P waterproof connector at one end / φ3.5 stereo jack at one end	2 m
		CW-405-0.3M	Junction cable for CCD camera	0.3 m
6	Cable for external monitor	CW-576-0.5M	Junction cable for external monitor With a 10-pin water resistant connector & a D-Sub connector	0.5 m
7	Connector	LTWBD-05BFFA-L180	5P water resistant connector	
		LTWBD-06BFFA-L180	6P water resistant connector	
8	Transmission filter	Transmission C29EHB004A	Filter against leakage from wireless equipment	

Dimensions

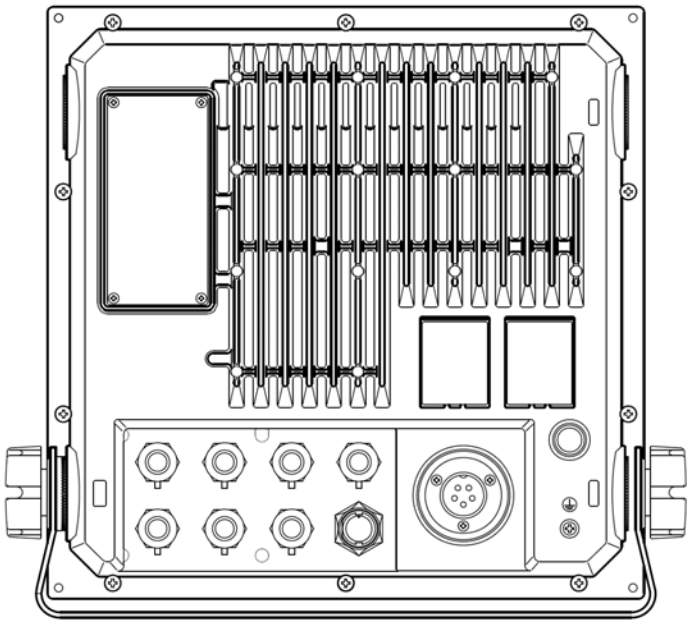
Front view



Side view



Rear view



Unit: mm (inch)

Specifications

Item	Content	
Model	CVS-FX1	
Output power (RMS)	3kW	
Transducer	TDM-052	TDM-062
Output frequency (Transducer)	38 to75 kHz and 130 to 210 kHz	38 to 75 kHz and 85 to135 kHz
Selectable frequency range	24 to 240 kHz 0.1kHz step	
Output method	Simultaneous / Alternate	
TX rate	3000 times / minute at maximum (In case of single frequency, Range 2.5m and Interference rejection off)	
Pulse width	50 µs to 3.0 ms	
Display size and type	12.1 inch color XGA LCD	
Display resolution	1024 × 768 pixels（XGA）	
Basic range	1 to 3000 (m), 5 to 8000 (ft), 1 to 1700 (fm), 1 to 2000 (l. fm) (8 ranges can be set to users choice)	
Zoom range	1 to 260 (m), 5 to 960 (ft), 1 to140 (fm), 1 to 180 (l. fm)	
Range unit	m, ft, fm, l.fm	
Shift	Max 3000(m), 6000 (ft), 1100 (fm / l. fm)	
Shift step	Selectable: 1m, Range ratio1/5, Registered value (8 type), Shift digit input, Range dependant	
Presentation modes	High frequency, Low frequency, 1 to 4 frequency, Zoom image (Bottom lock, Bottom discrimination, Bottom zoom, Zoom, Bottom follow zoom), Nav mode, Vertical split, Horizontal split, Mix A-scope can be displayed at all above modes	
Presentation colors	64 colors,16 colors, 8 colors, Monochrome	
Back ground colors	Marine Blue, Blue, Dark blue, Black, White, Nighttime color, Other 4 colors	
Alarms	Bottom, Fish, Temperature*, Speed**, Arrival***, XTE***	
Image speed	9 steps & stop	
Functions	Interference rejection, Color rejection, VRM, Noise reduction, White line, Draft correct, Water temperature correct, Boat speed correct, Store image (500 images), Sona-Tone TM, Fishing Hot Spot, Event memory, Simple plotter, Panel illumination, Power reduction, External trigger, Detection area display, CM key, Water Temp. graph, Individual range operation, Individual shift operation	
Auto functions	Range, Shift, TVG, TX Power, White Line	
Function registration	A scope, Shift digit input, Interference rejection, Color rejection, Noise reduction, White line, Background color, TGV adjust, VRM interval, Image recall, Image swap, Image Title, Sona-Tone™, Nav start	
Language	English, Japanese, Korean and others	
Input data format and sentences	NMEA0183 Ver.1.5 / 2.0 / 3.0 GGA, GLL, HDT, MTW, MWV, MWD, RMC, VHW, VTG, ZDA	
Output data format and sentences	NMEA0183 Ver.2.0 (DBT : Ver.1.5) DBT, DPT, GGA, GLL, HDT, MTW, MWV, RMC, TLL, VHW, VTG, ZDA	
NMEA ports	Total 2: input and output	
Power supply	10.8 to 31.2 V DC	
Power consumption	60 W or less (24V DC)	
Environmental		
Operating temperature	- 15 °C to + 55 °C	
Water protection	IPX5	
Store temperature	- 30 °C to + 70 °C	
Upper limit of humidity	93 % ± 3 % (At + 40 °C)	
Dimension of equipment (without knob & pedestal)	320.7 × 320.7 × 144 mm	
Dimension of equipment (with knob & pedestal)	330.6 × 364.0 × 180.5 mm	
Weight	9.1 kg	

* Requires data from Temp sensor
** Requires speed data from Speed sensor or GPS sensor
*** Requires data from GPS sensor

Chapter 1 Installation

1.1 Installation precautions

In order to obtain the maximum performance of the echo sounder, this echo sounder should be installed by a qualified engineer in charge of installation and maintenance. Installation procedures include the following:

(1) Unpacking of components

(2) Inspection of composition units, spare parts, accessories and installation materials.

(3) Checking of supply voltage and current capacity

(4) Selection of location for installation

(5) Installation of CVS-FX1 Display unit and transducer

(6) Attachment of accessories

(7) Planning and implementation of cable laying and connection

(8) Coordination after installation

1.1.1 Unpacking of components

Unpack components and check that all the items correspond with the description of the packing list. When a discrepancy or damage has been found, contact the dealer you purchased or our sales company.

1.1.2 Appearance verification of each unit and accessories

Inspect the appearance of each components and accessories and check that no dents or damages exist.

If any dents or damages exist and they are believed to be caused by accident during transportation, contact the transportation and insurance company and consult our sales company or our dealer nearest to you.

1.1.3 Selection of location for installation

In order to obtain the maximum performance of the unit, it is necessary to install in consideration of matters described below:

(1) Install the equipment at a location in a bridge so that its display can be easily seen.

(2) Keep enough space for maintenance. Especially, secure enough space at the rear panel where many cables are connected.

(3) Keep the equipment as far away from wireless transmitter/receivers as possible.

1.1.4 Laying and connection of cables

(1) Keep the transducer and power cable as far away from the cables of other electronic equipment as possible.

(2) The cabinet of CVS-FX1 Display unit shall be securely grounded to the hull, using the grounding terminal on the rear panel.

Caution: The ground side of power input of this equipment is connected to the ground terminal.
In case of + (positive) ground, it cannot be used. The power may short-circuit.

(3) If you connect the power cable directly to the battery, interference from the other electronic equipment is expected to be less. (See Fig. 1.1)

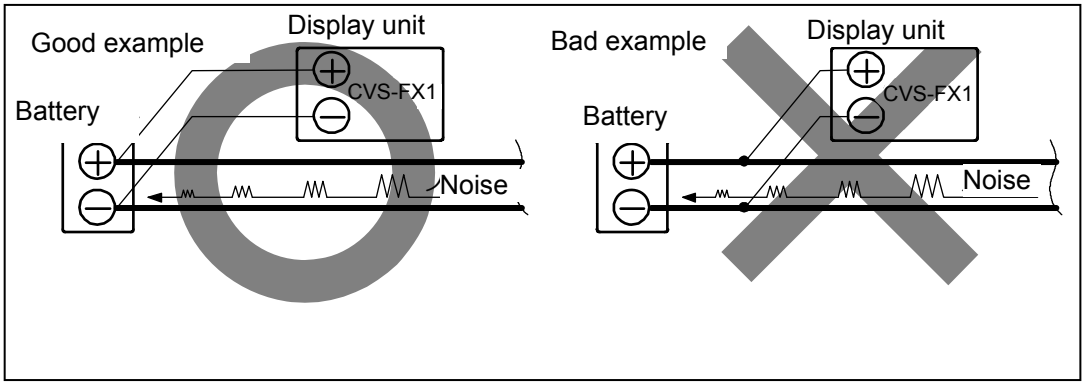


Fig. 1.1 Connection of Power line

1.1.5 Coordination after installation

Be sure to confirm the following points before starting up this equipment. The confirmation is mandatory to operate the equipment normally:

(1) Is the power voltage in the boat within the appropriate voltage range? Is the current capacity enough?
(Voltage range: 10.8 VDC to 31.2 VDC measured at the power connector.)

(2) Is the electric current capacity sufficient?
(Power consumption: 60 W)

(3) Is the wiring of transducer cable correct? Is the wiring shorted?

1.2 Installation of CVS-FX1 Display unit

CVS-FX1 Display unit can be installed either on desk-top or flush-mounted.

Install in the following procedure.

1.2.1 Desk-top installation

(1) Decide the location to install the Display unit and keep the space for the maintenance works as shown in Fig. 1.3.

(2) Place the bracket on the position where the Display unit will be installed and fix the bracket with five 5 mm screws.

(3) Place the Display unit on the installation bracket and fix the Display unit with washers and knob bolts.

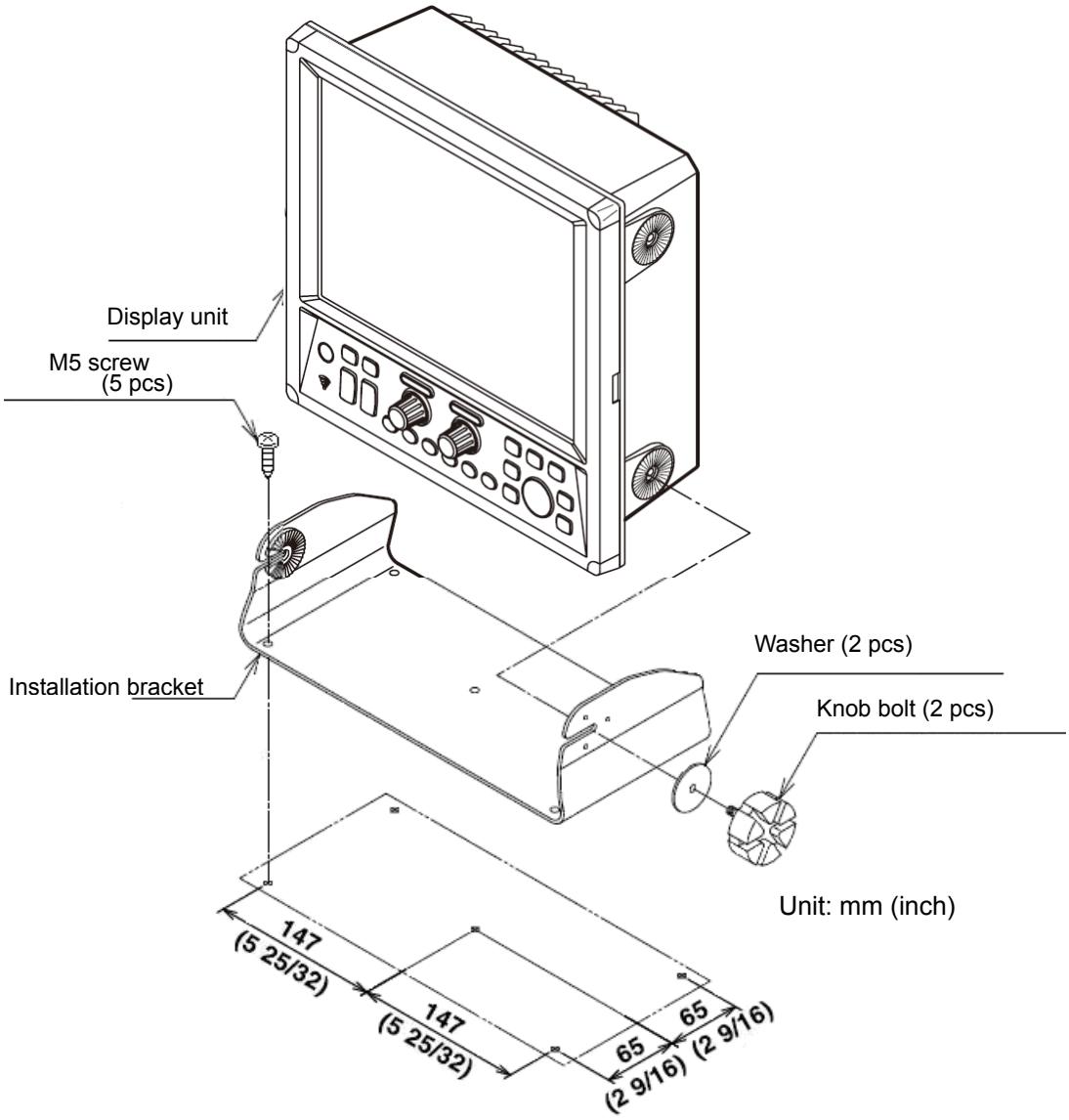
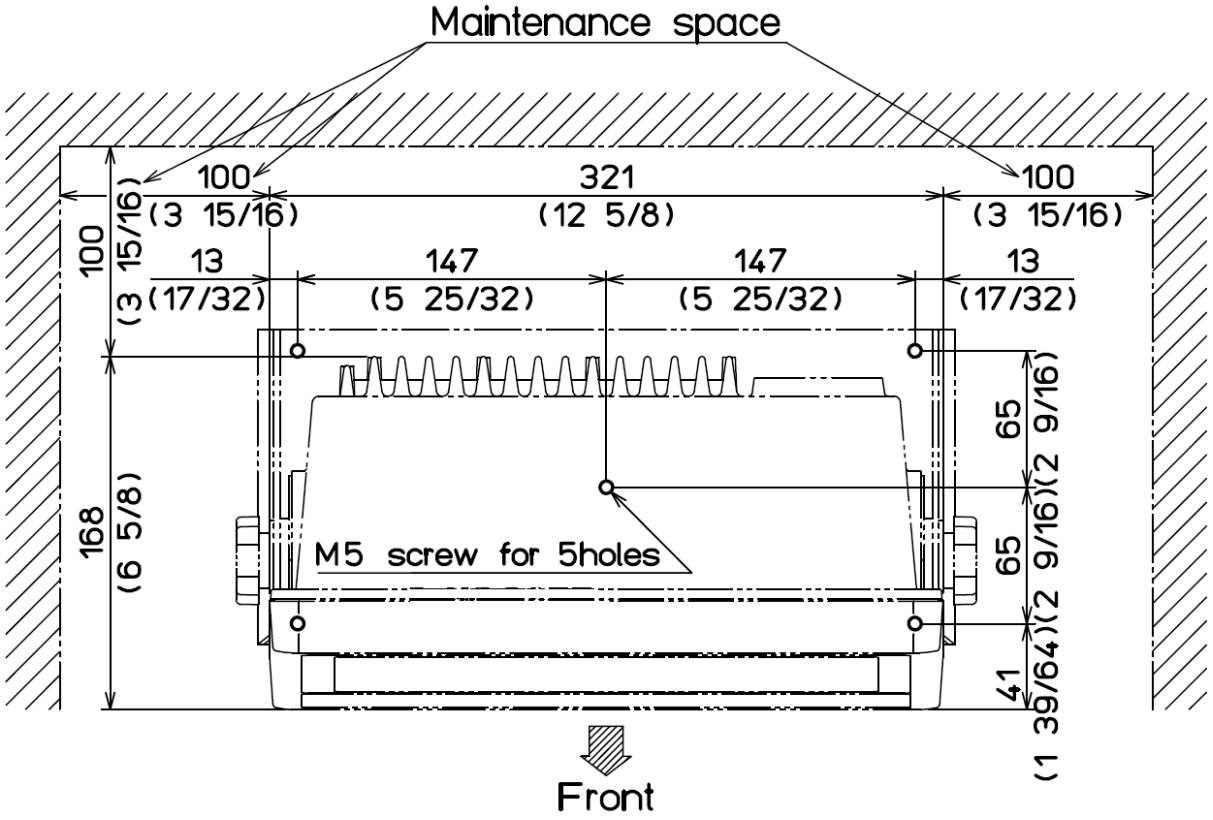


Fig. 1.2 Desk-top installation

Caution: At installing on desktop, keep the maintenance space is required as shown below.



Unit: mm (inch)

Fig. 1.3 Maintenance space

1.2.2 Flush-mount installation

(1) Make a square hole at the location to be installed (See Fig. 1.5)
(2) Remove four plastic corner caps of the Display unit (These can be easily pulled out upwards).
(3) Confirm that the unit matches the square holes. If not matched, correct the square hole.
(4) Connect the connectors for power and transducer to the unit respectively.
(5) Install the Display unit in the installing location (square hole) and fix it with four tapping screws (4mm) (M4 or pan-head). (Prepare 4 mm screws suitable for thickness of installing location.)
(6) Install the corner caps removed in step (2).

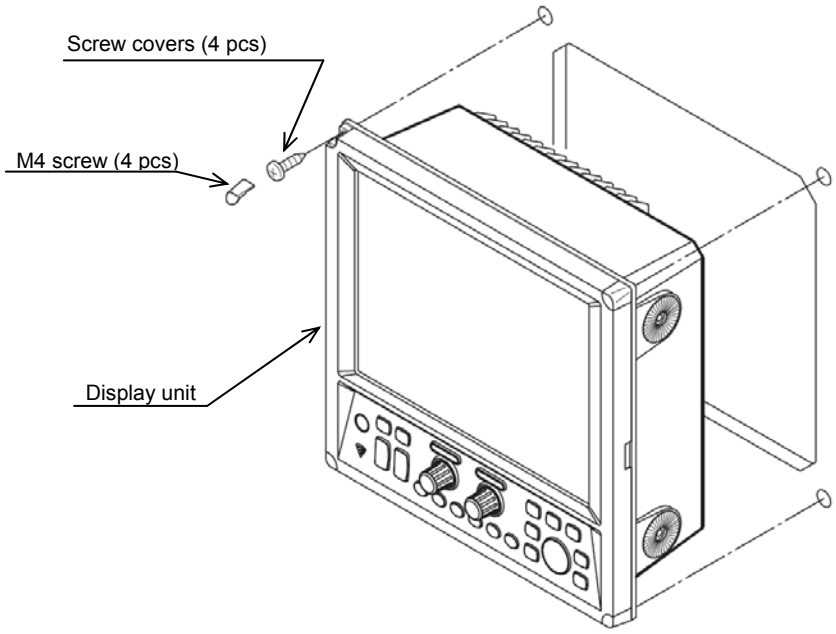
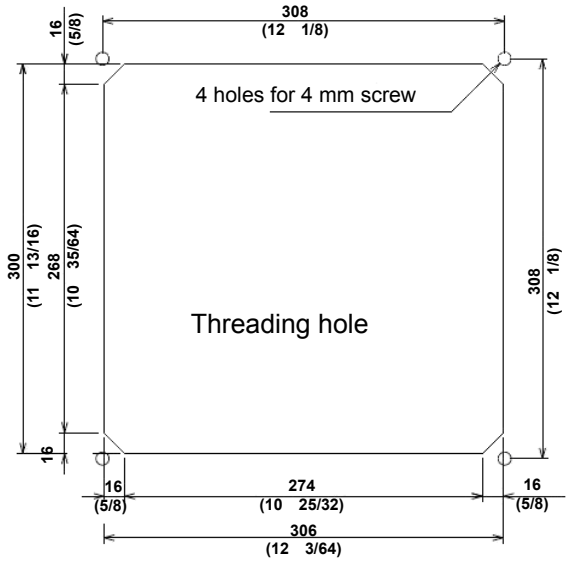


Fig. 1.4 Flush-mount installation



Unit: mm (inch)

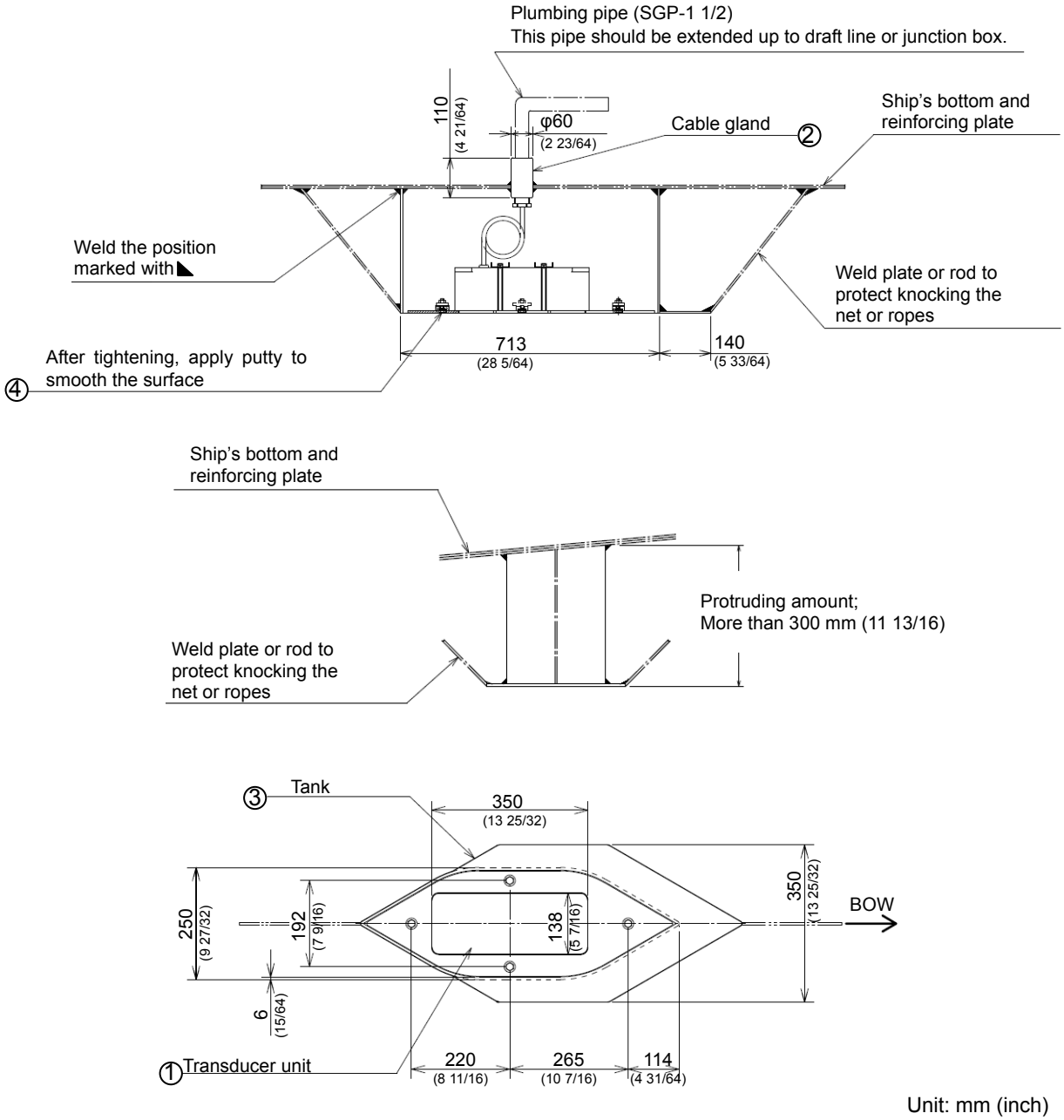
Fig. 1.5 Hole for flush-mount installation of Display unit

1.3 Installation of transducer

1.3.1 In the case of inner hull installation

1) In the case of steel boat

With reference to the figures below, install the transducer at a shipyard.



Unit: mm (inch)

Fig. 1.6 Mounting of a transducer on steel boat

Mounting components of a transducer on steel boat

No.	Name	Material	Qty	Remarks
①	Transducer unit (with bottom plate)		1	
②	Cable gland (CG-1)	SS400B	1	
③	Tank	SS400P	1	By shipyard
④	Mounting bolts	SUS304	4	

TRANSDUCER INSTALLATION:

Caution: 1. Plumbing pipe and welded plate or rod in dotted lines shall be provided by the shipyard after specifying the details.
2. Preferably larger amount of protruding could produce better performance because it is hard to be influenced by bubble.

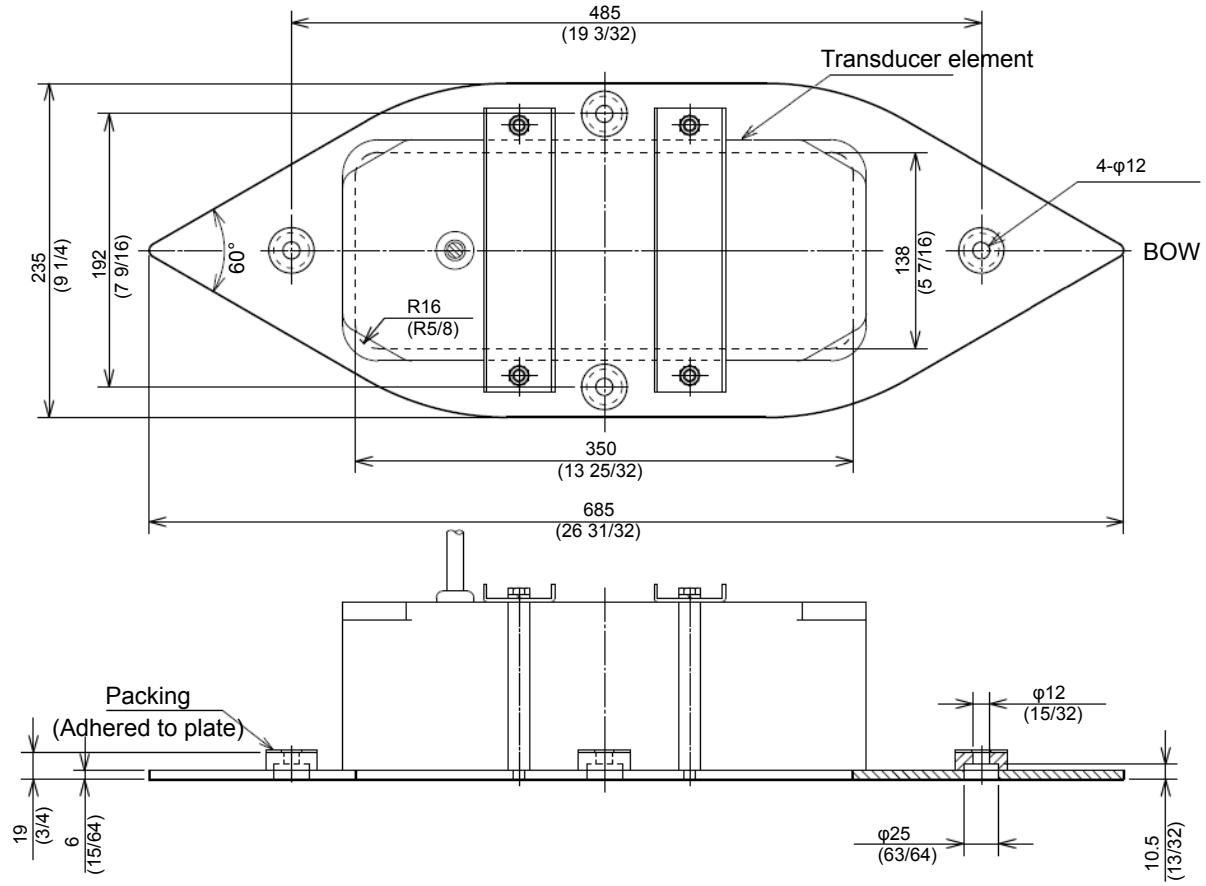


Fig. 1.7 Outline view of a transducer unit on steel boat

Unit: mm (inch)

2) In the case of steel boat (For Anti-resonance)
With reference to the figures below, install the transducer at a shipyard.

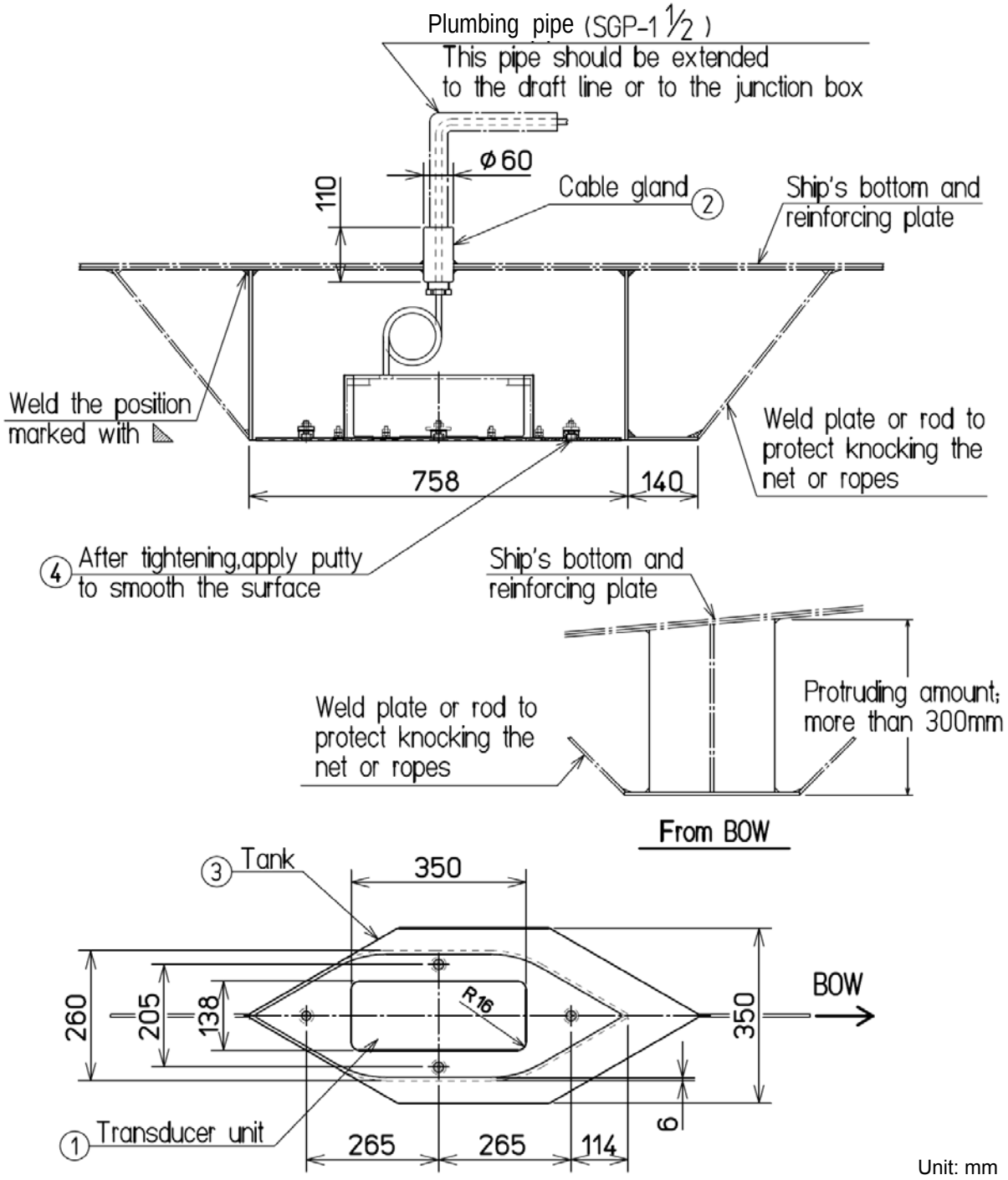


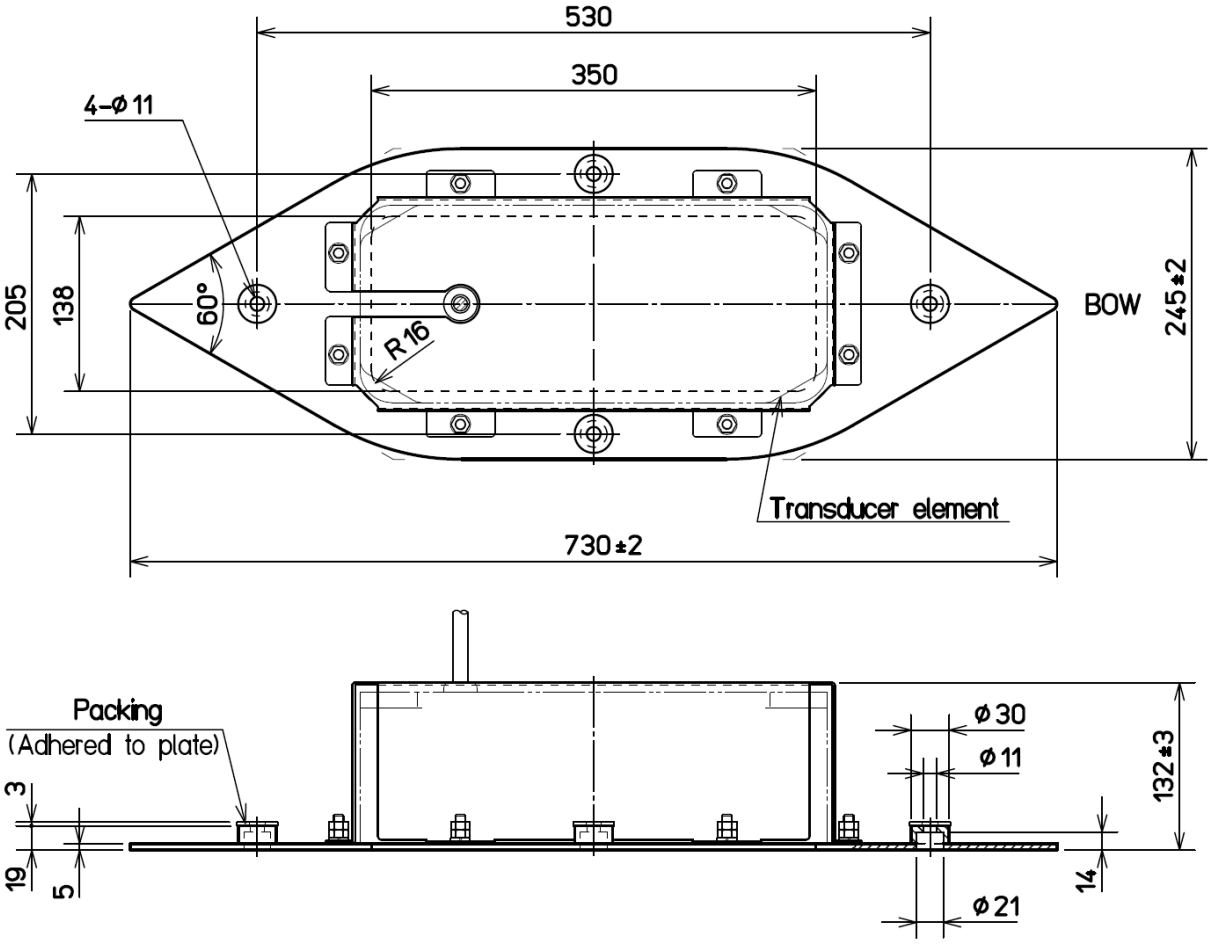
Fig. 1.8 Mounting of a transducer on steel boat (For Anti-resonance)

Mounting components of a transducer on steel boat (For Anti-resonance)

No	Articles	Material	Q'ty	Remarkes
①	Transducer unit	(SUS304)	1	To be supplied by KODEN
②	Cable gland	SS400B	1	
③	Tank	SS400P	1	To be arraged by shipyard
④	Bolts	SUS304B	4	

TRANSDUCER INSTALLATION:

Caution: 1. Plumbing pipe and welded plate or rod in dotted lines shall be provided by the shipyard after specifying the details.
2. Preferably larger amount of protruding could produce better performance because it is hard to be influenced by bubble.

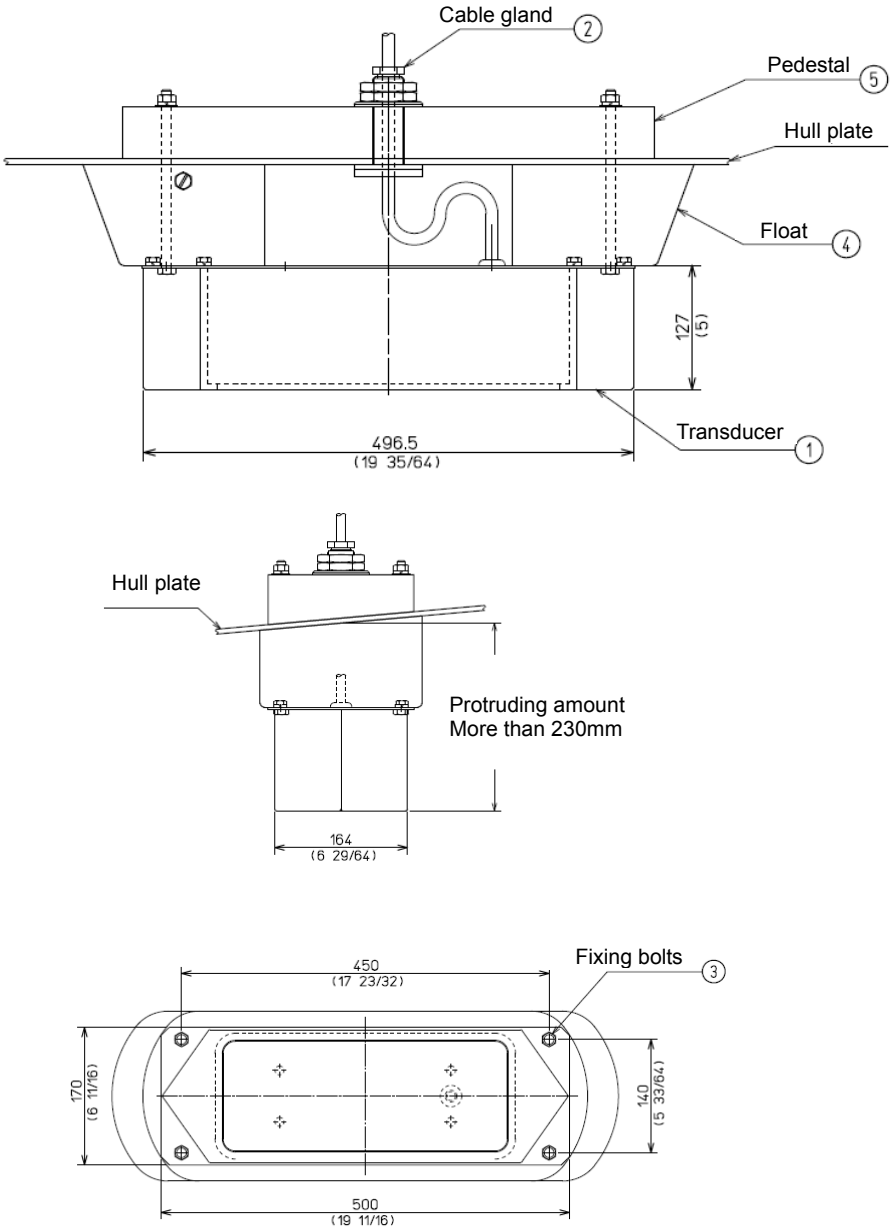


Unit: mm

Fig. 1.9 Outline view of a transducer unit on steel boat (For Anti-resonance)

3) In the case of wooden and FRP boat

With reference to the figures below, install the transducer at a shipyard.



Unit: mm (inch)

Fig. 1.10 Installation of transducer

Parts list for installation of a transducer on FRP and wooden boat

No.	Name	Qty	Remarks
①	Transducer unit (With case, GE)	1	By Koden
②	Cable gland (CG-16)	1	
③	Fixing bolts	4	By shipyard
④	Float	1	
⑤	Pedestal	1	

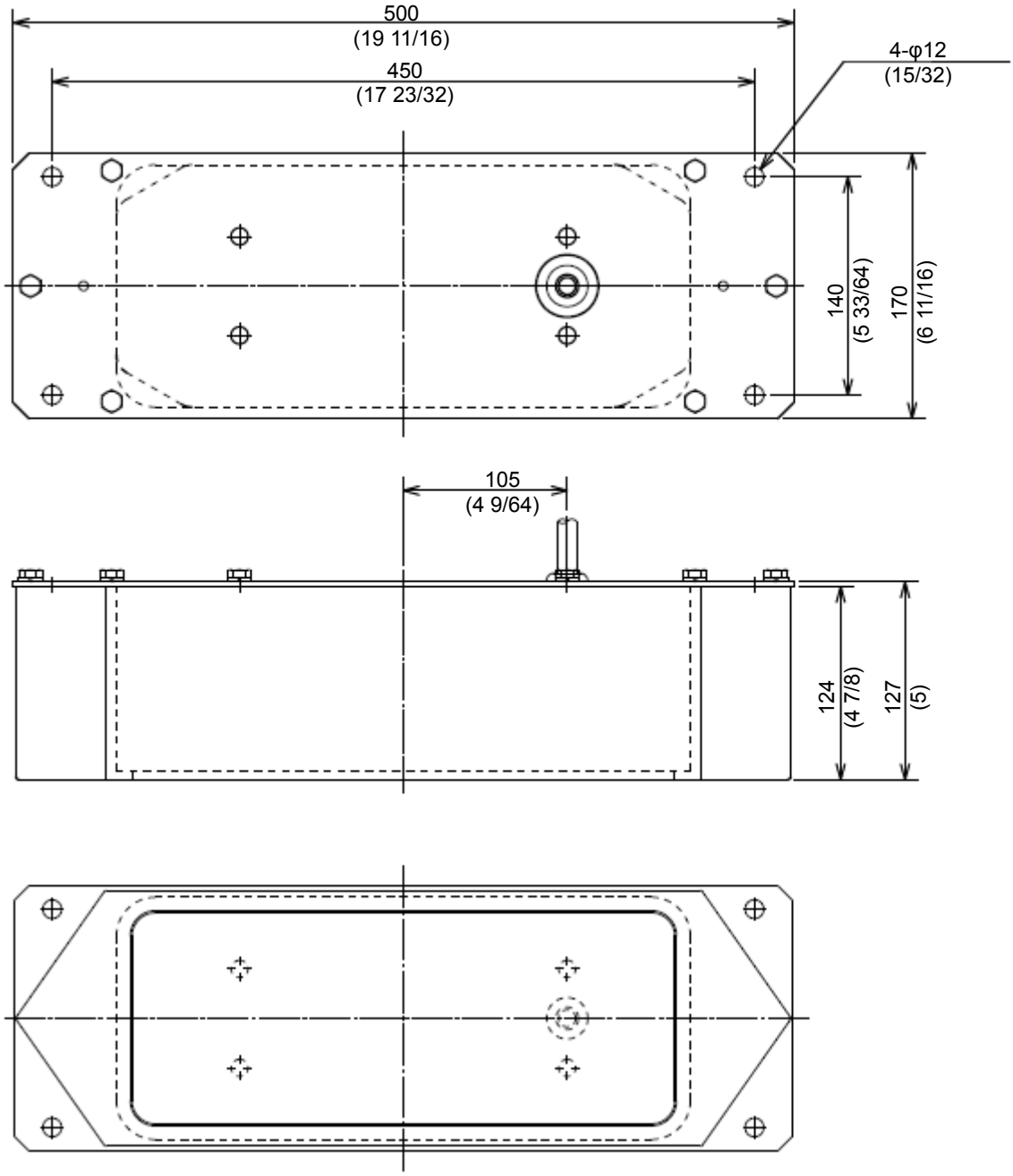
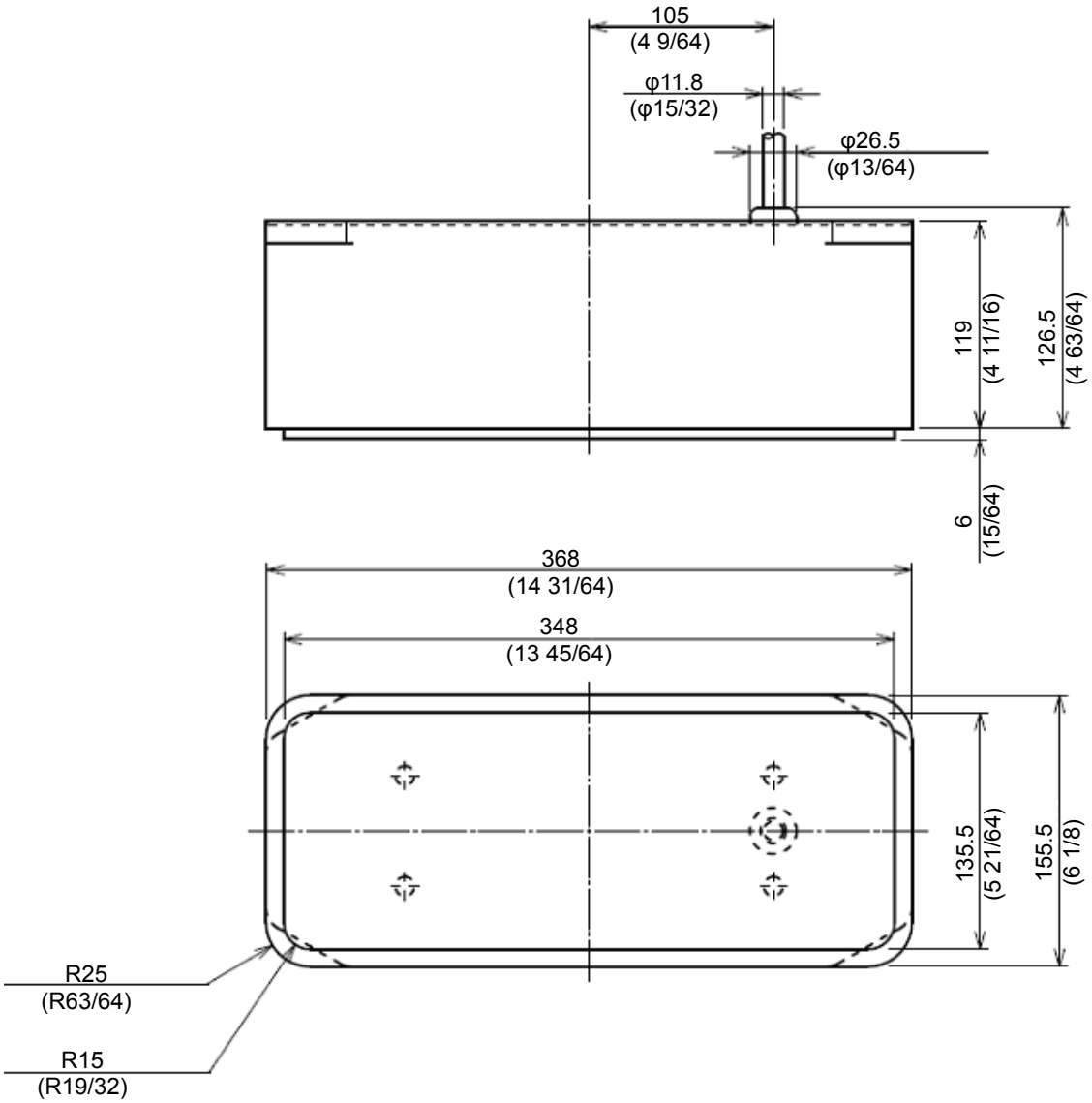


Fig. 1.11 Outline view of the unit on FRP and wooden boat

Unit: mm (inch)

• **Outline dimensions and specifications of transducers (TDM-052 and TDM-062)**



Unit: mm (inch)

Fig. 1.12 Outline dimensions of a transducer (TDM-052 and TDM-062)

Specifications of transducers (TDM-052 and TDM-062)

Cable length: 15 m (590 35/64)	
Weight	TDM-052: 11.0 kg (24,5 lb)
	TDM-062: 11.4 kg (25.2 lb)
Material: Polyurethane mold	

⚠ Caution: 1. Four holes on the upper surface of transducer is for supplemental fixing only. Do not install the transducer only by these holes. These holes are not strong enough to sustain the weight of transducer. Transducer might come off when using it as a hole of the main that installs transducer.

2. Do not activate the transducer out of water, as internal elements may fail.

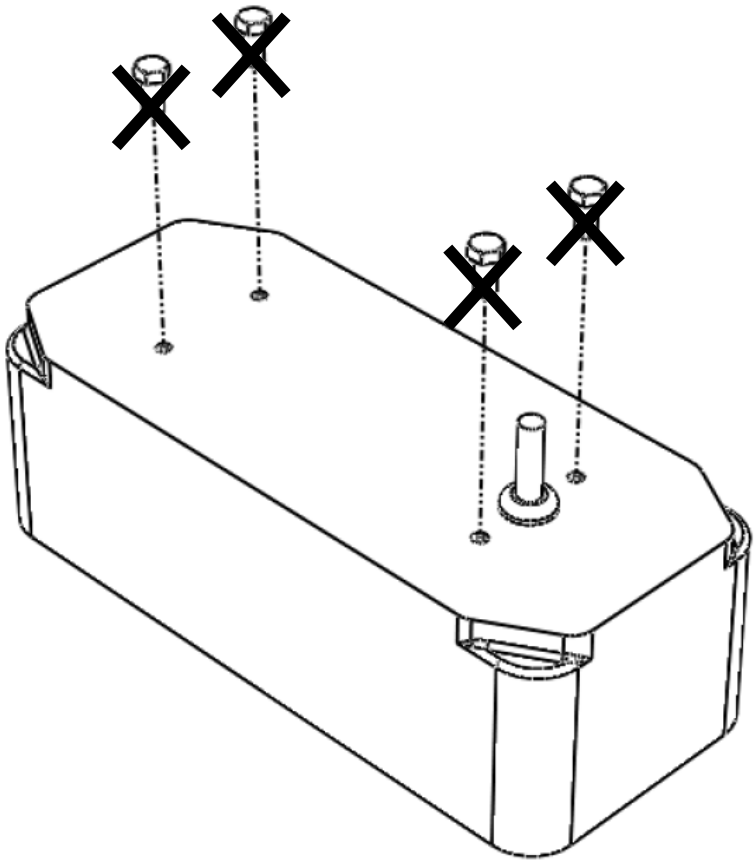


Fig. 1.13 Caution concerning equipment of transducer (TDM-052, TDM-062)

1.4 Wiring

1.4.1 Connection of cables to Display unit

Connect the power cable and cables from the transducer to the connectors on the Display unit.

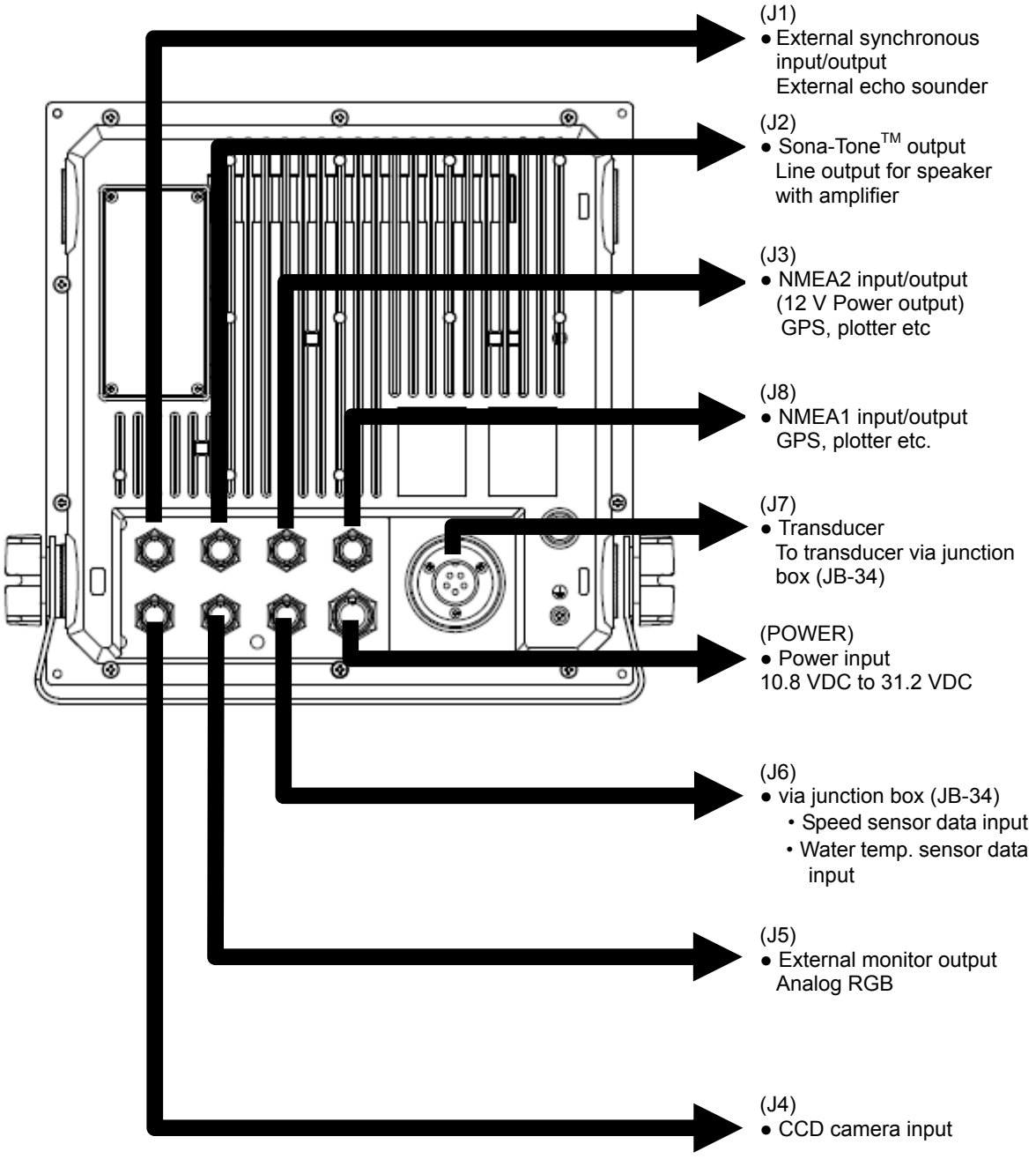


Fig. 1.14 Cable connections

Pin assignment of rear connectors

Pin assignment viewed from the rear of Display unit:

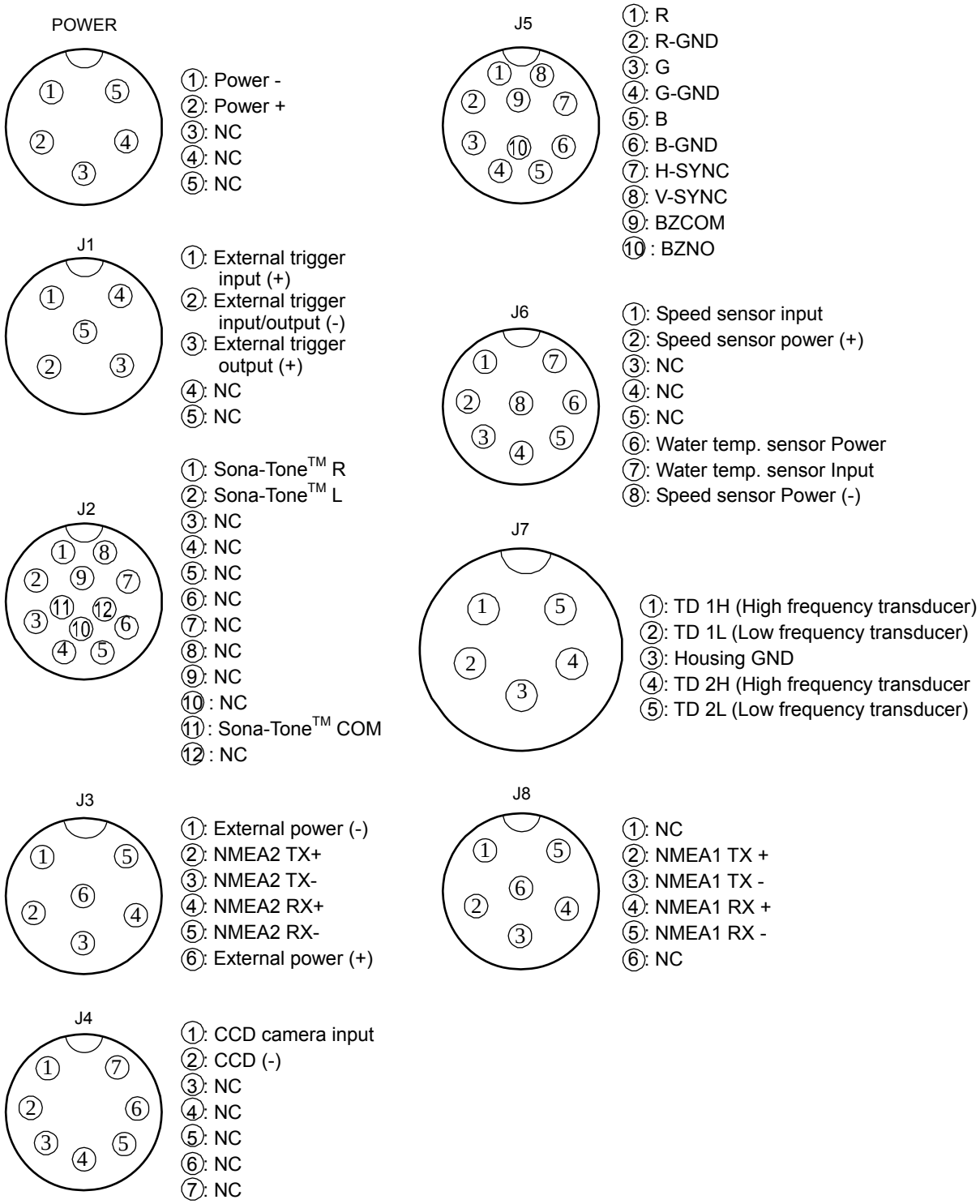


Fig. 1.15 Pins assignment of rear connector

⚠ Caution: Do not connect each wire to ship's earth.

Connection of power cable (CW-270-2M)

Connect the power cable to the [POWER] connector at the rear of the Display unit.

Connection of DC power cable (CW-270-2M)

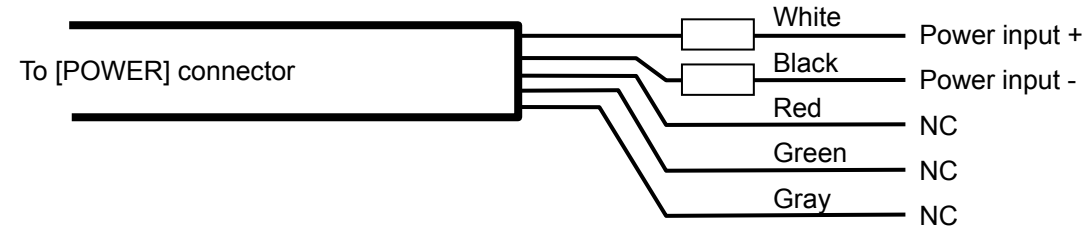


Fig. 1.16 Connection of DC power cable

Caution: Wind the insulation tape around the un-used lead wire for core-wires not to contact each other.

Caution: Confirm the main switch-board off before connecting power cable.

Connection of transducer (TDM-052/TDM-062/TDM-041)

In the case of connection of CVS-FX1 and transducer:

1) Referring to the connection table of transducers, solder CW-836-3M and CW844-3M to the transducer. After soldering is completed, be sure to provide the connected part with water resistance and insulation using self adhesive tape, etc.

2) Connect CW-836-3M after the above processing to J7 connector of CVS-FX1.
Connect CW-844-3M after the above processing to J6 connector of CVS-FX1.

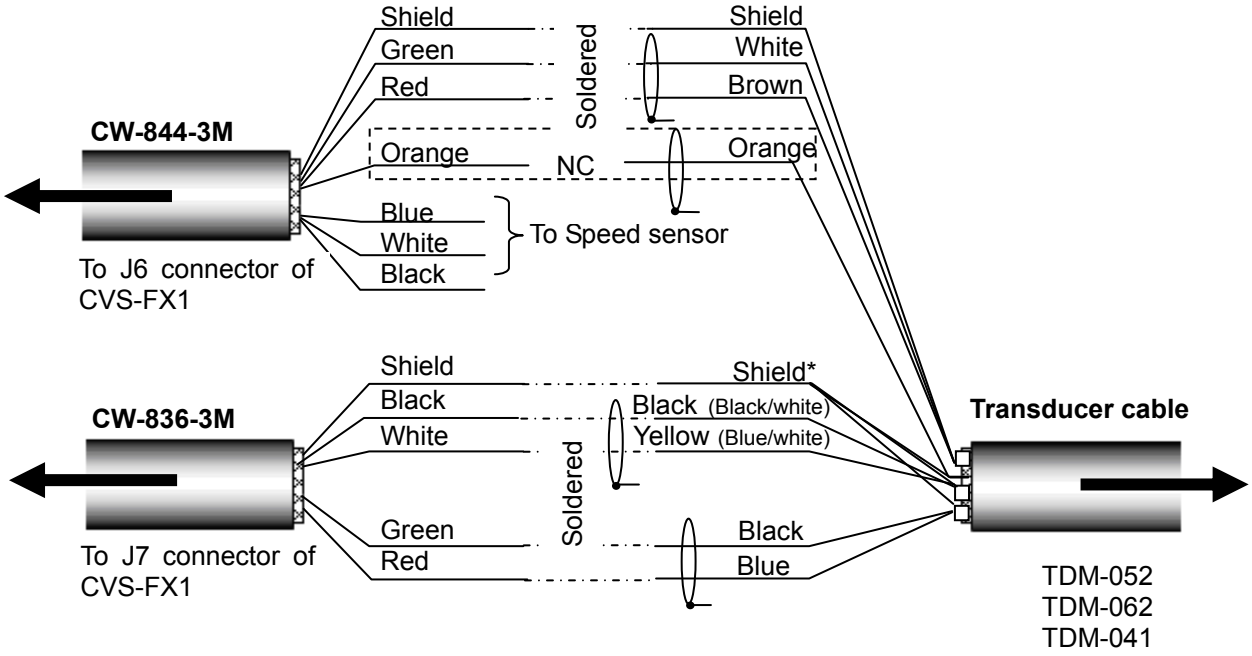


Fig. 1.17 Connection of transducer cable

Connection table of transducer

Connectors to be connected		Connectors to be connected from CW-836-3M J7		Connectors to be connected from CW-844-3M J6		Transducer cable	Note
No.	**J6**	**Color of cable**	**Name of signal**	**Color of cable**	**Name of signal**	**Color of cable**	
4	Shield	-	-	Shield	Shield	Shield	Water temp. sensor
6	Green/ Water temp. sensor power	-	-	Green	Water temp. sensor	White	
7	Red/ Water temp. sensor input	-	-	Red	Water temp. sensor	Brown	
3	Orange/NC	-	-	Orange	-	Orange	NC
1	Blue/Speed sensor input	-	-	Blue	-	-	Speed Sensor
2	White/ Speed sensor power (+)	-	-	White	-	-	
8	Black/ Speed sensor power (-)	-	-	Black	-	-	
No.	**J7**						
3	Shield	Shield	Housing GND	-	-	Shield*	Low frequency
5	Black/TD2L (Low frequency transducer)	Black	TD2L	-	-	Black (Black/White)**	
2	White/TD1L (Low frequency transducer)	White	TD1L	-	-	Yellow (Blue/White)**	
4	Green/TD2H (High frequency transducer)	Green	TD2H	-	-	Black	High frequency
1	Red/TD1H (High frequency transducer)	Red	TD1H	-		Blue	

Caution: Wind the insulation tape around the un-used lead wire for core-wires not to contact each other.

* As for the shield of transducer to be connected with the shield of CW-836-3M, the 3 of outer shield, low frequency shield and high frequency shield shall be bundled and connected.

**For low frequency cable of transducer, there are two combinations of (Black : Yellow) and (Black/White : Blue/White). Connect them with the corresponding cable of CW836-3M and solder them.

In the case of connection via the junction box (JB – 34):
1) Connect CVS-FX1 and the cable connected to the junction box (JB-34)

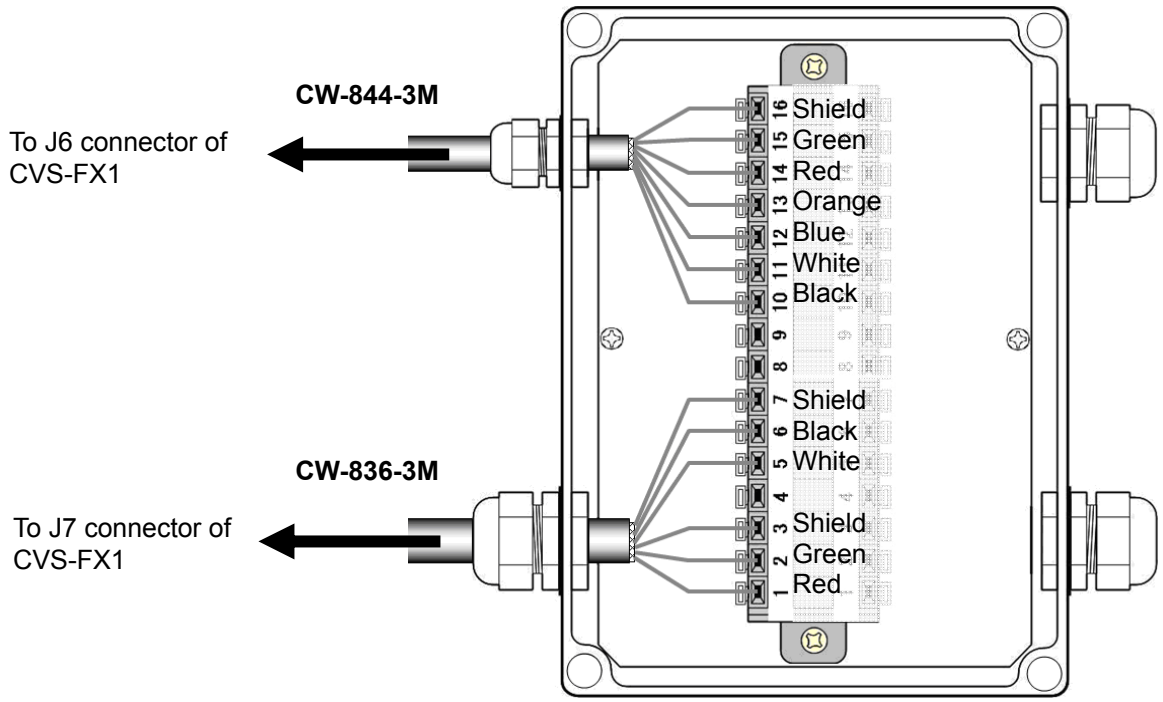


Fig. 1.18 Connection between CVS-FX1 and junction box

Connection list of junction box (JB-34)

Junction box (JB-34)		Cable		CVS-FX1		
Pin No.	Name of signal	Color of cable	Name of cable	Connector		
1	TD1H	Red	CW-836-3M	J7 (5-pin)	1	Red/TD1H (high frequency transducer)
2	TD2H	Green			4	Green/TD2H (high frequency transducer)
3	GND	Shield			3	Shield
4	-	-			-	-
5	TD1L	White			2	White/TD1L (low frequency transducer)
6	TD2L	Black			5	Black/TD2L (low frequency transducer)
7	GND	Shield			-	
8	-	-	-	-		
9	-	-	-	-		
10	Speed sensor power (-)	Black	CW-844-3M	J6 (8-pin)	8	Black/ Speed sensor power (-)
11	Speed sensor power (+)	White			2	White/ Speed sensor power (+)
12	Speed sensor input	Blue			1	Blue/ Speed sensor input
13	-	Orange			3	Orange/NC
14	Water temp. sensor (+)	Red			7	Red/ Water temp. sensor input
15	Water temp. sensor (power)	Green			6	Green/ Water temp. sensor power
16	Shield	Shield			4	Shield

2) Connect the transducer and the junction box (JB-34).

Cable of the transducer is configured as shown in Fig. 1.19.
Referring to Fig. 1.20, connect the cable to the junction box (JB-34).

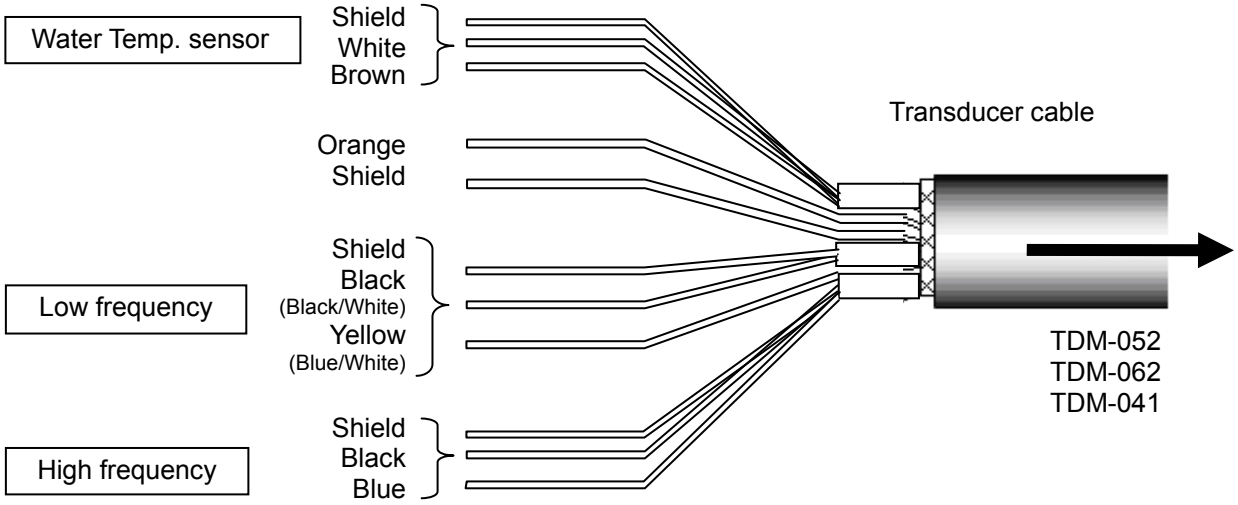


Fig. 1.19 Details of transducer cable

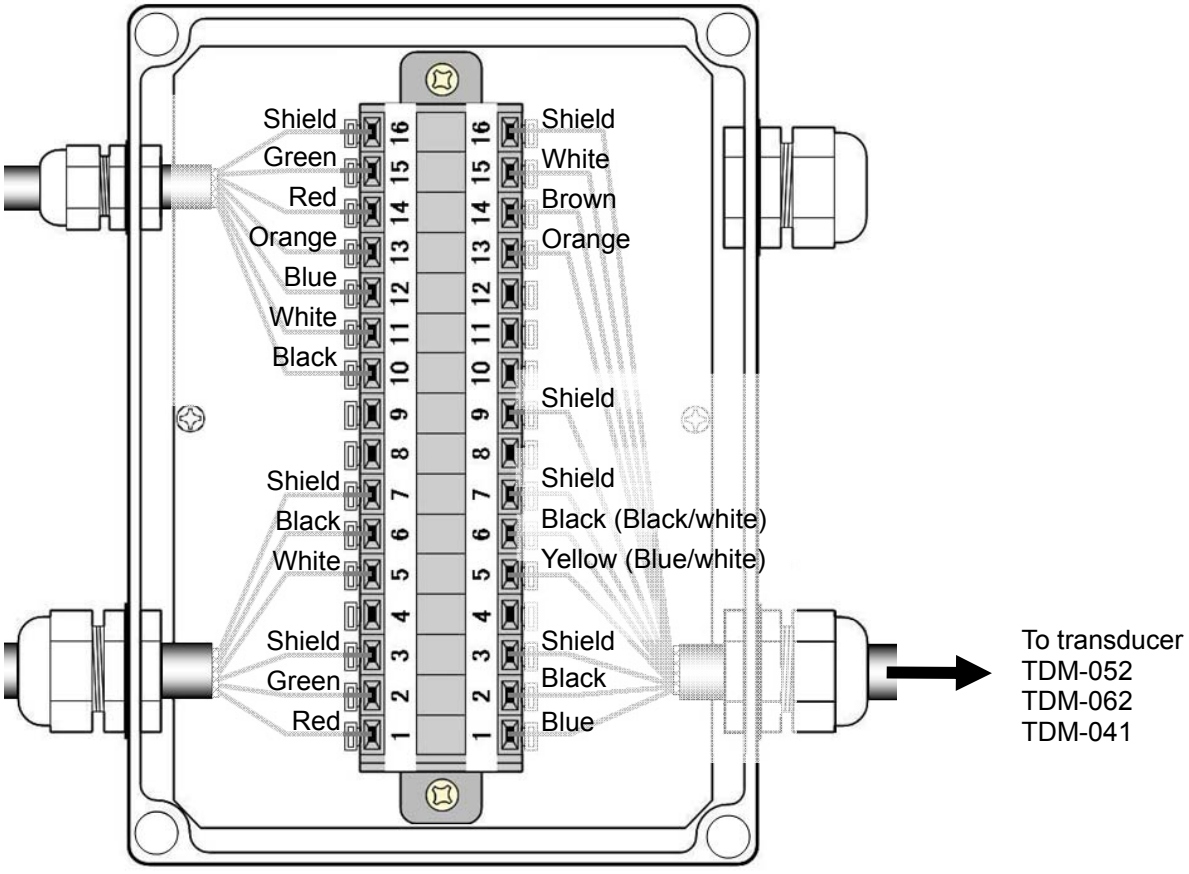


Fig. 1.20 Connection between junction box and transducer

Connection table of transducers

CVS-FX1			Junction box (JB-34)		Transducer	
	No.	Connection to:	Pin No.	Signal name at connection to:	Color of cable	Remarks
J7	1	Red/TD1H (high frequency transducer)	1	TD1H	Blue	High frequency
	4	Green/TD2H (high frequency transducer)	2	TD2H	Black	
	3	Shield	3	GND	Shield	
	-	-	4	-	-	-
	2	White/TD1L (low frequency transducer)	5	TD1L	Yellow (Blue/ white)*	Low frequency
	5	Black/TD2L (low frequency transducer)	6	TD2L	Black (Black/White)*	
	3	-	7	GND	Shield	
	-		8	-	-	-
-	-	-	9	-	Shield	Shield
J6	8	Black/Speed sensor power (-)	10	Speed sensor power (-)	-	Speed sensor
	2	White/Speed sensor power (+)	11	Speed sensor power (+)	-	
	1	Blue/Speed sensor input	12	Speed sensor input	-	
	3	Orange/NC	13	-	Orange	-
	7	Red/Water temp. sensor input	14	Water temp. sensor (+)	Brown	Water temp. sensor
	6	Green/Water temp. sensor power	15	Water temp. sensor power	White	
	4	Shield	16	Shield	Shield	

*For low frequency, there are two combinations of cable colors, (yellow and black) and (blue/white and black/white). Connect the wires to the corresponding pin No.

Connection to external echo sounder

It is likely to observe mutual interference when the transmit frequency of an external echo sounder and CVS-FX1 is the same or close. Interference can be decreased by synchronizing the CVS-FX1 transmission with the trigger of the external echo sounder. Refer to the following for the connection.

Connector	Pin	Remarks
J1	①	External trigger input (+)
	②	External Trigger input/output(-)
	③	External Trigger output (+)
	④	NC
	⑤	NC

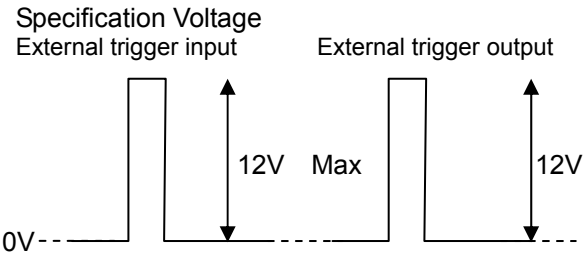


Fig. 1.21 External trigger

Connection with navigation equipment (J3, J8)

The NMEA data can be output from CVS-FX1 to an external navigation equipment, and the NMEA data can be input from an external navigation equipment to CVS-FX1. Refer to the following for the connection.

Connector	Pin	Remarks
J3	①	External Power (-)
	②	NMEA TX +
	③	NMEA TX -
	④	NMEA RX +
	⑤	NMEA RX -
	⑥	External Power (+)

Connector	Pin	Remarks
J8	①	NC
	②	NMEA TX +
	③	NMEA TX -
	④	NMEA RX +
	⑤	NMEA RX -
	⑥	NC

Connection of External Speaker for Sona-Tone™ (J2) [Owner supply]

The ø3.5 stereo jack is provided to the CW-264A-2M cable.
If you connect the speaker with the amplifier to the external, you can clearly hear the Sona-Tone™ sound.
Adjust the volume of speaker with the amplifier equipped to the speaker.

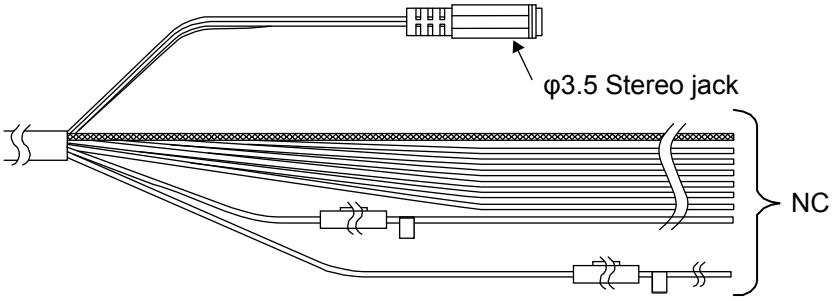


Fig. 1.22 Connection of External Speaker for Sona-Tone™

Connection of External Monitor (J5) [Owner supply]

When installing an external monitor (VGA monitor, analog RGB input), connect it via CW-576-0.5M. For its wiring, refer to the illustration below.
After soldering, perform the waterproof and insulation treatment on the junction with a self-fusion tape.

Structure of CW-576-0.5M

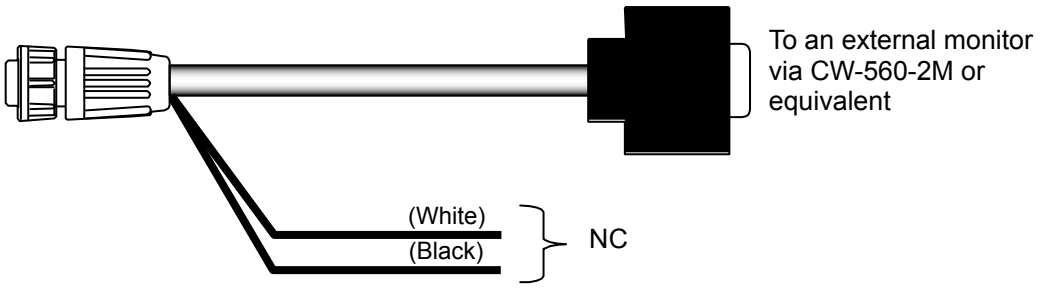


Fig. 1.23 Connection of External Monitor

Connection of CCD camera (J4) [Owner supply]

CVS-FX1 and a CCD camera (NTSC/PAL/SECAM) can be connected via CW-405-0.3M (option). Connect the video output terminal (RCA plug (In most cases, yellow)) of your CCD camera. Perform the waterproof treatment on the junction of the RCA terminal with a self-fusion tape. Refer to the following for the connection.

Connector	Pin	Remarks
J4	①	CCD camera input
	②	CCD (-)
	③	NC
	④	NC
	⑤	NC
	⑥	NC
	⑦	NC

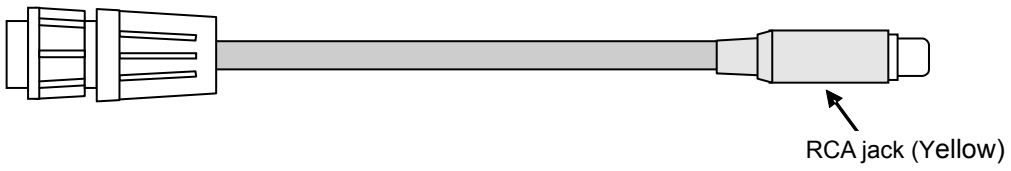


Fig. 1.24 Connection of CCD camera

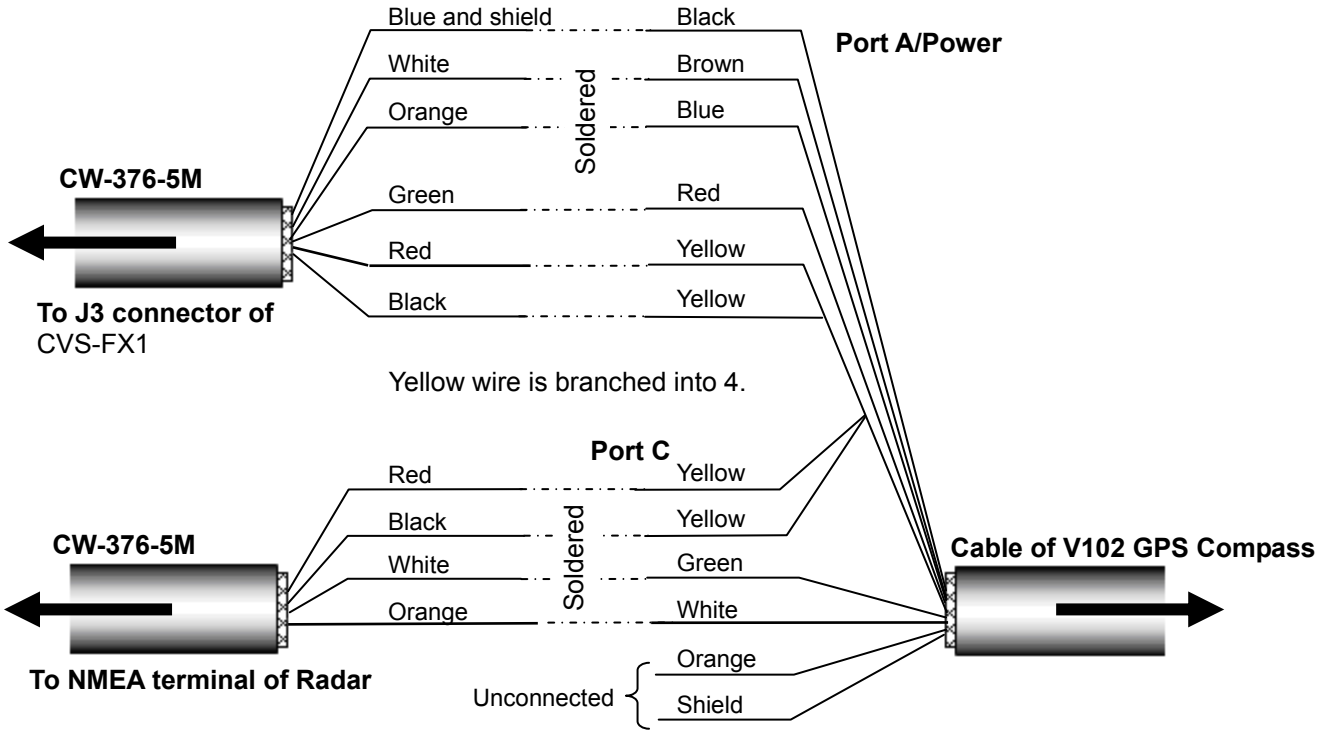
1.5 Connection of Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass

This is to describe the connection of Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass used as GPS compass and Heaving sensor.
Refer to the installation manual of the Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass for details of installation.

1.5.1 Connection of Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass

Connect CW-376-5M by soldering with the cable of Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass. (Hereafter referred to as “V102 GPS Compass”)
Please prepare two CW-376-5M when connecting with Radar as GPS compass.

1) The terminal of the cables of V102 GPS Compass is not processed, and 8 lead wires and 1 shield wire are open. Brown and blue lead wires are connected to TX/RX of Port A, white and green lead wires are connected to TX/RX of Port C, black and red lead wires are connected to +/- of power supply, and yellow lead wire is connected with earth. Orange lead wire and shield wire are unconnected.
   Refer to the **“Connection of V102 GPS Compass”**, and solder CW-376-5M with Port A and power supply of cable of Hemisphere V102 GPS Compass. Please solder another CW-376-5M with Port C, when connecting with Radar as GPS compass. Please branch yellow wire (GND) of the cable of V102 GPS Compass into four, two of which shall be soldered with each black (RX-) and red (TX-) of CW-376-5M. After soldering is completed, be sure to process the connected part by self-adhesive tape etc. to be water resistant and insulated.



Connection of V102 GPS Compass

Connection table of V102 GPS Compass

Connectors to be connected		**CW-376-5M Connected to J3**		**CW-376-5M Connected to Rader**		**V102 GPS Compass cable**		
No.	J3	Color of cable	Signal of cable	Color of cable	Signal of cable	Color of cable	Signal of cable	Port
1	External power supply (-)	Blue and shield	GND	-	-	Black	PWGND	Port A
2	NMEA2 TX+	White	TX+	-	-	Brown	RX1+	
4	NMEA2 RX+	Orange	RX+	-	-	Blue	TX1+	
6	External power supply (+)	Green	+12V	-	-	Red	PWinput	
3	NMEA2 TX-	Red	TX-	-	-	Yellow	SigGND	
5	NMEA2 RX-	Black	RX-	-	-			
No.	NMEA connector of Radar							Port C
3	NMEA TX-	-		Red	TX-			
5	NMEA RX-	-		Black	RX-			
1	NMEA-	-		Blue and shield	-	-	-	
2	NMEA TX+	-		White	TX+	Green	RX2+	
4	NMEA RX+	-		Orange	RX+	White	TX2+	
6	NC	-		Green	-	-		

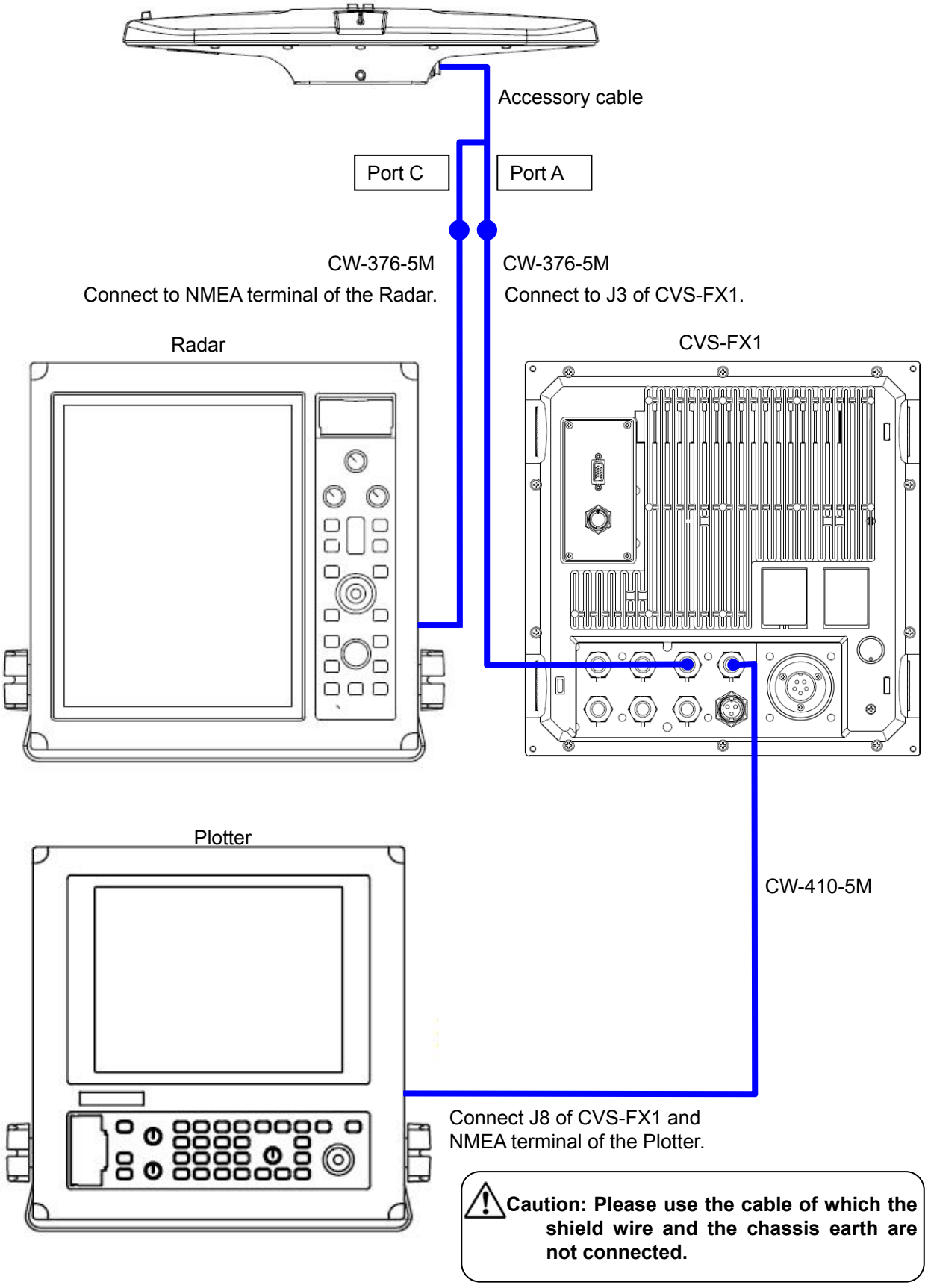
⚠ **Caution: Wind the insulation tape around the unused lead wire to prevent core wires from contacting each other.**

2) Connect CW-376-5M to J3 connector of CVS-FX1 (NMEA terminal with 12V power supply) after soldering with Port A.

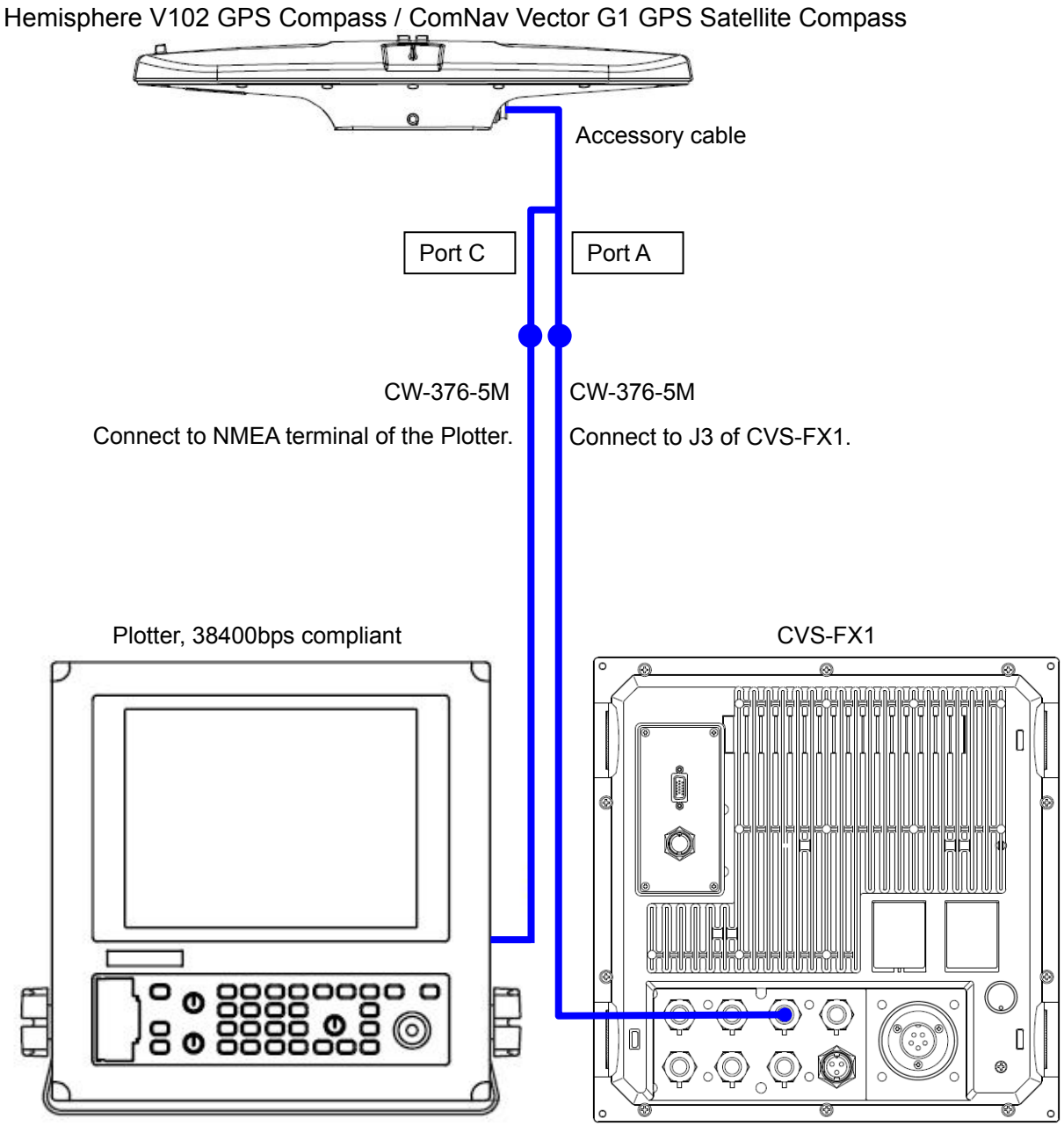
3) Connect CW-376-5M to NMEA terminal of Radar after soldering with Port C when connecting with Radar as GPS compass. Refer to **"The general connection chart 1"**.
Connect CW-376-5M to NMEA terminal of Plotter after soldering with Port C when connecting with the Plotter that can be communicated by 38400bps without Radar. Refer to **"The general connection chart 2"**.
In the other cases, connection with Port C is not necessary. Refer to "**The general connection chart 3"**.

4) Referring to **"The general connection chart 1 to 3"**, connect other equipment to communicate NMEA with the terminal J8 of CVS-FX1.

Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass

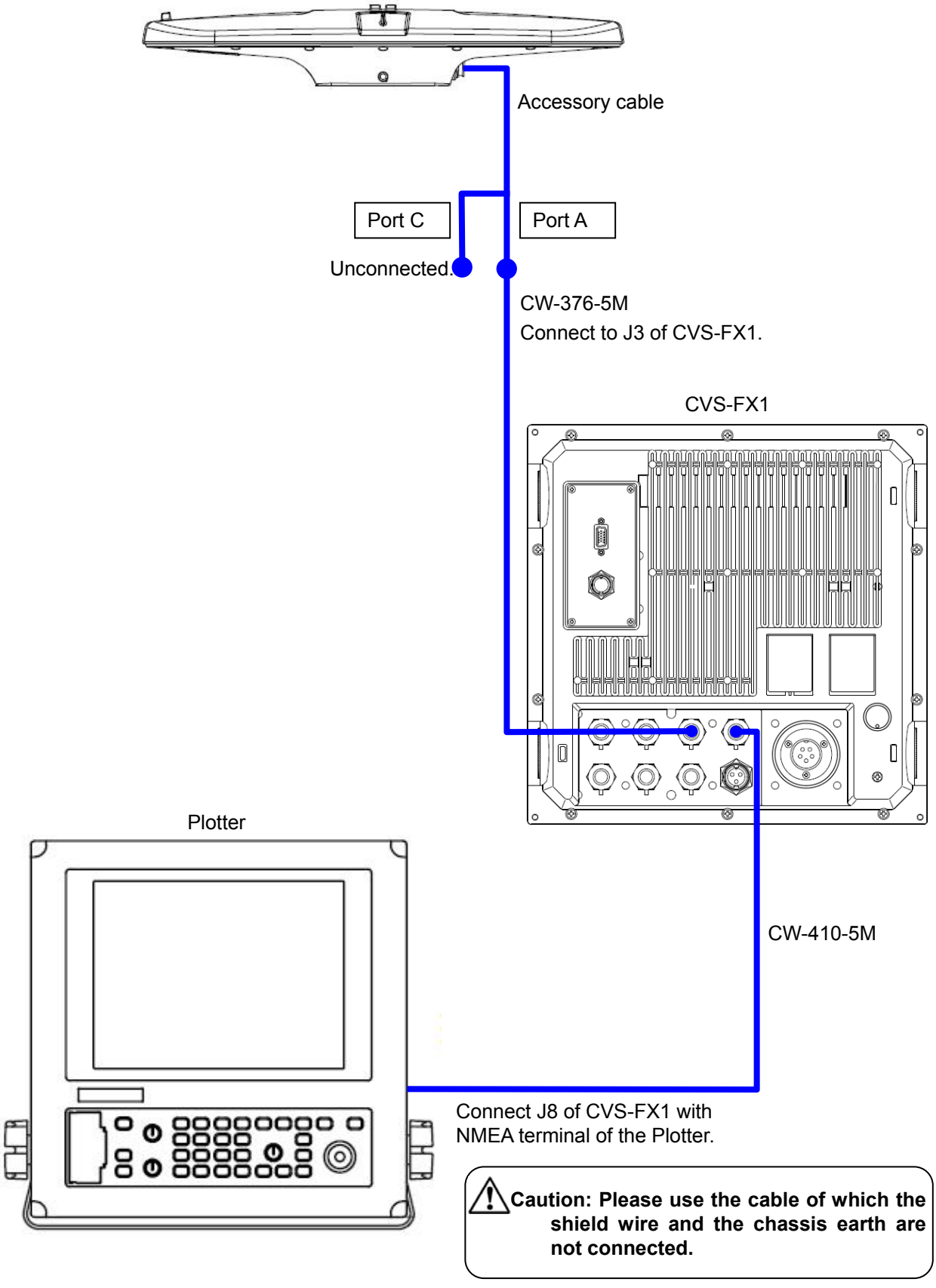


The general connection chart 1



The general connection chart 2

Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass



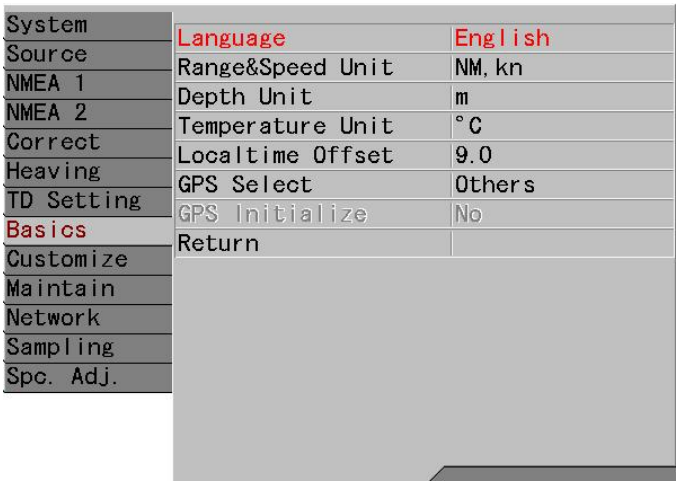
The general connection chart 3

1.5.2 Setting of Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass

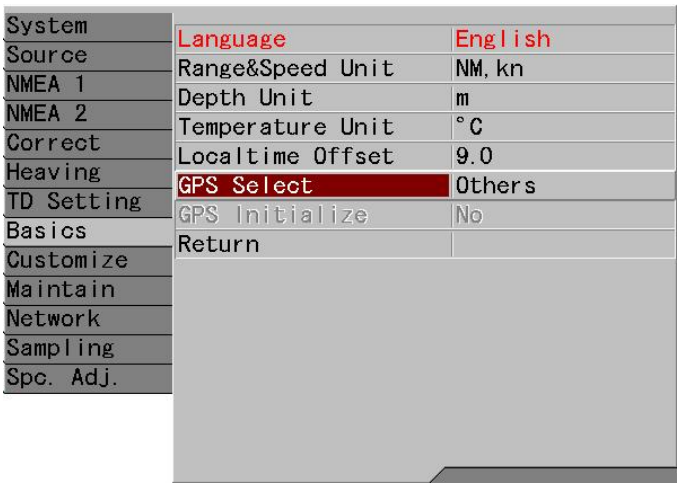
Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass needs to be initialized to generate output data as GPS compass and Heaving sensor.
This can be done by setting by CVS-FX1.
Hereafter, Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass is referred to as “V102 GPS Compass”.

1. To initialize V102 GPS Compass to generate output data as GPS compass and Heaving sensor:

1) Press SUB MENU , and the submenu is displayed.

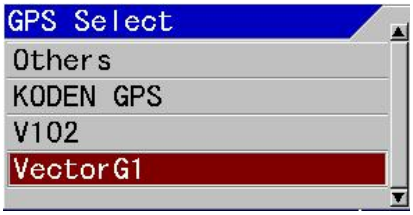


2) Select [Basics] - [GPS Select].



3) **Press [▶] of**  **.**

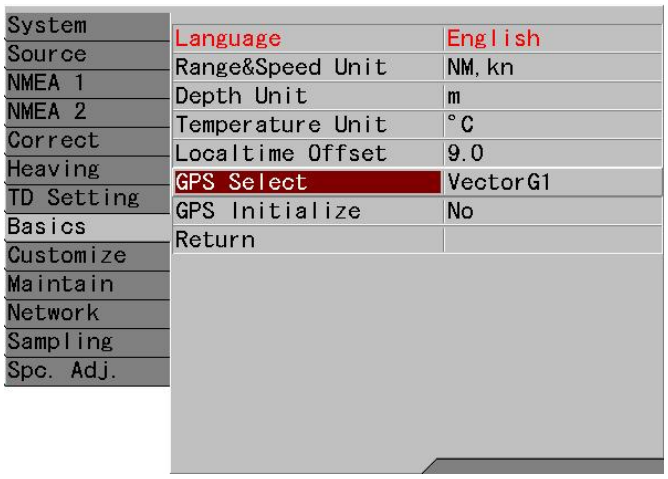
The setup box of [GPS Select] will be displayed.



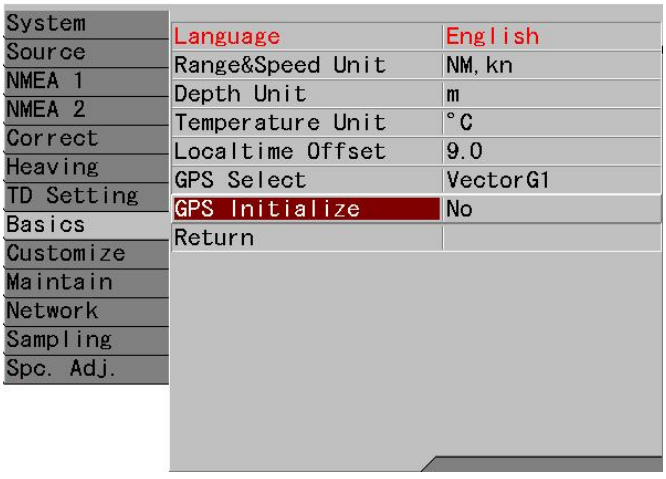
4) **Press [▲] and [▼] keys, and select [V102] or [Vector G1].**

5) **Press** 

to return the [Basics].

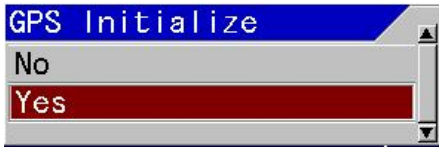


6) **Select [Basics] - [GPS Initialize].**



7) **Press [▶] of**  **.**

The setup box of [GPS Initialize] will be displayed.

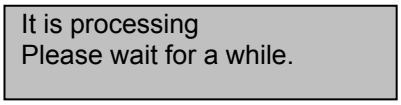


8) **Select [Yes] with [▲] and [▼] keys.**

9) **Press** 

.

The massage box of [It is processing] will be displayed .



10) **Once initialization is completed, the message box disappears and the display returns to the normal screen.**

These steps complete the setup as follows:
The baud rate of NMEA2 (J3) of CVS-FX1 is set to 38400bps.
The baud rate of Port A of V102 GPS Compass is set to 38400bps, and Heaving data output is generated.
The baud rate of Port C of V102 GPS Compass is set to 38400bps, and GPS compass data output is generated.

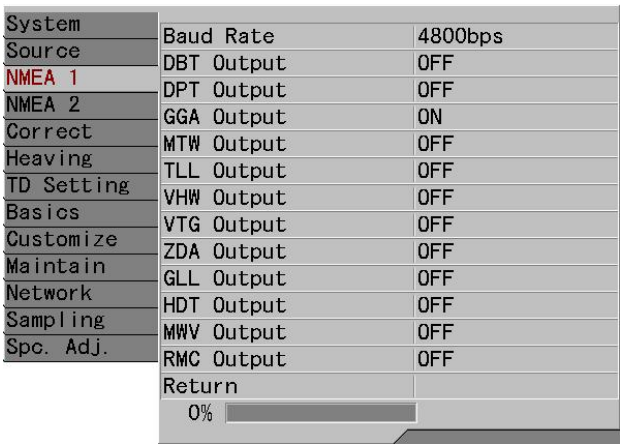
⚠ **Caution: It takes approximately 5 minutes until the heaving data of Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass stabilizes after the start up. During the time, heaving correction may not be done correctly, however, this is not breakdown of the equipment.**

2. This is to setup the output to the equipment to be connected on the NMEA1 (J8) ports of CVS-FX1.

This is to set baud rate of J8 port.
Transmission rate shall match the externally connected equipment.

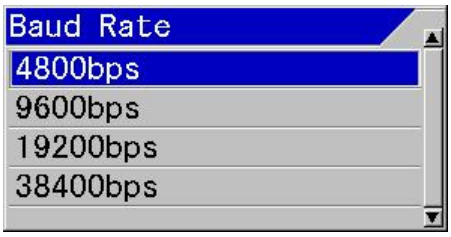
1) Press SUB MENU **.**

2) Select [NMEA1] - [Baud Rate].



3) Press [▶] of  **.**

The setup box of [Baud Rate] will be displayed.

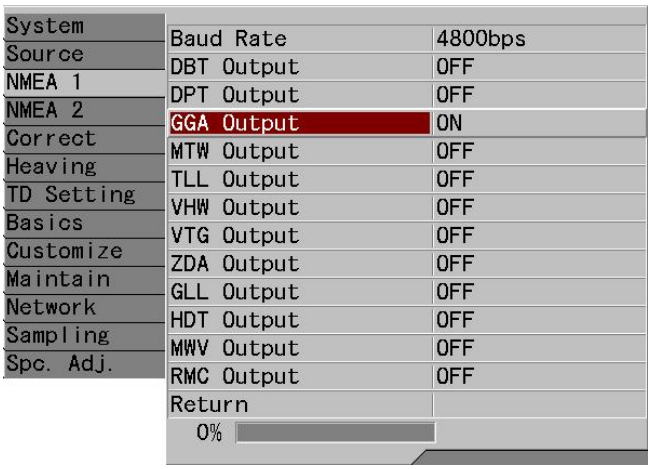


4) Press [▲] and [▼] to select the Baud Rate of NMEA1.

5) Press SUB MENU **to return the [NMEA1].**

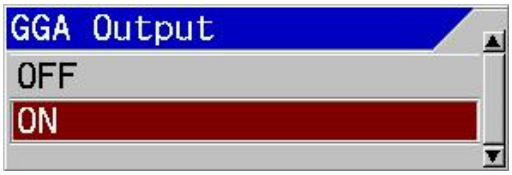
This is to select output data of NMEA1.
Output data shall match the externally connected equipment.

1) Select [NMEA1] - [XXX Output].



2) Press [▶] of  **.**

The setup box of [XXX Output] will be displayed.



3) Select [ON] to enable the output and select [OFF] to disable with [▲] and [▼] keys.

4) Press 

to return the [NMEA1].

5) When another output data is set, repeat 1) to 4).

6) When the setting is completed, press 

to close the [submenu].

Annex
Default value of Hemisphere V102 GPS Compass

Port A

Baud rate	19200bps					
NMEA sentence	GPGGA	GPVTG	GPGSV	GPZDA	GPHDT	GPROT
TX interval	1sec	1sec	1sec	1sec	1sec	1sec

Port C

Baud rate	19200bps					
NMEA sentence	GPGGA	GPVTG	GPGSV	GPZDA	GPHDT	GPROT
TX interval	1sec	1sec	1sec	1sec	1sec	1sec

Default vale of ComNav Vector G1 GPS Satellite Compass

Port A

Baud rate	4800bps					
NMEA sentence	GPGLL	GPVTG	GPZDA	GPDM	GPHDT	GPROT
TX interval	1sec	1sec	1sec	1sec	1sec	1sec

Port C

Baud rate	4800bps		
NMEA sentence	GPHDM	GPHDT	GPVTG
TX interval	0.1sec	0.1sec	1sec

The Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass setting after initialization by CVS-FX1

Port A

Baud rate	38400bps					
NMEA sentence	GPGGA	GPVTG	GPZDA	GPHDT	GPHEV	GPHPR
TX interval	1sec	1sec	1sec	0.1sec	0.1sec	0.1sec

Port C

Baud rate	38400bps					
NMEA sentence	GPGGA	GPVTG	GPZDA	GPHDT	GPGSA	GPGSV
TX interval	1sec	1sec	1sec	0.1sec	1sec	1sec

1.6 List of input/output sentences

1.6.1 Input sentence

The sentences of GGA, GLL, HDT, MTW, MWV, MWD, RMC, VHW, VTG and ZDA can be received.
Possible input formats are: NMEA0183 Ver.1.5, Ver.2.0 and Ver.3.00

Information	Priority Order of sentence	Information	Priority Order of sentence
Latitude, Longitude	GGA > RMC > GLL	Wind Direction	MWV > MWD
Course	VTG > RMC	Wind speed	MWV > MWD
Heading	HDT > RMC > VTG	Date	ZDA > RMC
Ground Speed	RMC > VTG	Time	ZDA > RMC
Water Speed	VHW > RMC > VTG	Water temperature	MTW

1.6.2 Output sentence

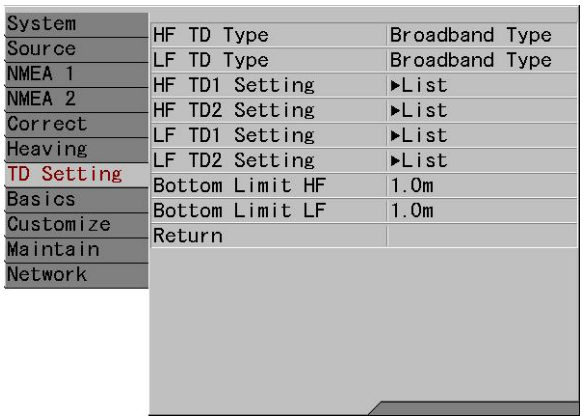
The sentences of DBT, DPT, GGA, GLL, HDT, MTW, MWV, RMC, TLL, VHW, VTG and ZDA can be transmitted.
The output format is NMEA0183 Ver.2.0. However, the DBT output is in Ver.1.5.

Sentence	Information	Sentence	Information
DBT	Depth	MWV	Wind Direction, Wind Speed
DPT	Depth from the transducer	RMC	Latitude/Longitude, Course, Ground Speed, Date
GGA	Latitude/Longitude, Time	TLL	Target Position
GLL	Latitude/Longitude	VHW	Water Speed
HDT	Heading	VTG	Course, Ground Speed
MTW	Water temperature	ZDA	Date, Time

Chapter 2 Adjustment

2.1 Setup of transducer

The frequency and beam angle etc. per transducer will be conformed to those of the transducer to be used, then, the correct information can be provided.



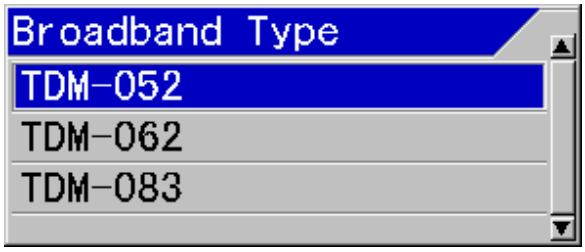
2.1.1 Setup of type of high frequency transducer

TD Setting – HF TD Type

Select the type of transducer to be actually used in high frequency. It has to be adjusted as it has influence on images.

1. Press SUB MENU .
2. Select [TD Setting] - [HF TD Type].
3. Press of [▶] of .

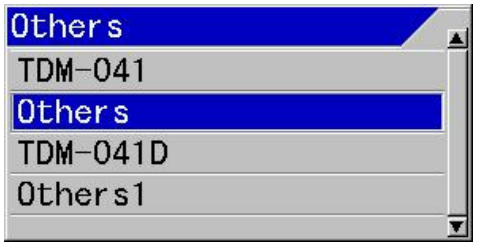
   The setup box of [HF TD Type] will be displayed.



4. When a Broadband transducer is used, press [▲] and [▼] to select [Broadband Type]. When the other transducer is used, select [Others]. When a high frequency transducer is not used, select [OFF].
5. Press [▶].

   When [Broadband Type] is selected, the setup box of [Broadband Type] will be displayed.

When [Others] is selected, the setup box of [Others] will be displayed.



When [Others] is selected, one kind of high-frequency and one kind of low-frequency can be set up.

When [Others 1] is selected, two kinds of high-frequency and two kinds of low-frequency can be set up.

6. Press [▲] or [▼] to select the type of transducer to use.

   The transducer selected as a [Broadband Type] can be reflected to the [Broadband Type] of low frequency side.

7. Press MENU to close the menu.

2.1.2 Setup of type of low frequency transducer

TD Setting – LF TD Type

Select the type of transducer to be actually used in low frequency. It has to be adjusted as it has effect on images.

1. Press SUB MENU .
2. Select [TD Setting] - [LF TD Type].
3. Press [▶] of .

   The setup box of [LF TD Type] will be displayed.

4. When a Broadband transducer is used, press [▲] and [▼] to select [Broadband Type]. When a transducer other than that is used, select [Others]. When a low frequency transducer is not used, select [OFF].
5. Press [▶].

   When [Broadband Type] is selected, the setup box of Broadband Type will be displayed.

   When [Others] is selected, the setup box of others will be displayed.
6. Press [▲] or [▼] to select a transducer to use.

   The TD selected as a [Broadband Type] is reflected to the [Broadband Type] of high frequency side.
7. Press MENU to close the menu.

2.2 Setup of frequency of transducer

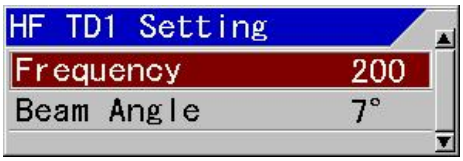
The high or low frequency can be setup for transducer frequency.

2.2.1 Setup of frequency for high frequency transducer

TD Setting – HF TD1 Setting

1. Press SUB MENU .
2. Select [TD Setting] – [HF TD1 Setting].
3. Press [▶] of .

   The setup box of [HF TD1 Setting] will be displayed.



4. Press [▲] or [▼] to select [Frequency].
5. Press [▶].

   The setup box of [Frequency] will be displayed.

6. Press [▲] or [▼] to select [Frequency].
7. Press MENU to close the menu.

TD Setting – HF TD2 Setting

1. Press SUB MENU .
2. Select [TD Setting] – [HF TD2 Setting].
3. Press [▶] of .

   The setup box of HF TD2 Setting will be displayed.
4. Set as the same way as HF TD1 Setting.
5. Press MENU to close the menu.

2.2.2 Setup of frequency for low frequency transducer

TD Setting – LF TD1 Setting

1. Press SUB MENU .
2. Select [TD Setting] – [LF TD1 Setting].
3. Press [▶] of .

   The setup box of [LF TD1 Setting] will be displayed.
4. Set as the same way as [HF TD1 Setting].
5. Press MENU to close the menu.

TD Setting – LF TD2 Setting

1. Press SUB MENU .
2. Select [TD Setting] – [LF TD2 Setting].

3. Press [▶] of  .

   The setup box of [LF TD2 Setting] will be displayed.

4. Set as the same way as [HF TD1 Setting].

5. Press MENU to close the menu.

2.3 Setup of Beam Angle of transducer

The beam angle of the transducer of high and low frequencies can be set.

2.3.1 Setup of Beam Angle for high frequency transducer

TD Setting - HF TD1 Setting

1. Press SUB MENU .

2. Select [TD Setting] – [HF TD1 Setting].

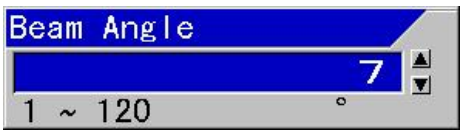
3. Press [▶] of  .

   The setup box of [HF TD1 Setting] will be displayed.

4. Press [▲] or [▼] to select [Beam Angle].

5. Press [▶].

   The setup box of [Beam Angle] will be displayed.



6. Press [▲] or [▼] to set [Beam Angle].

   When [Broadband Type] is selected at the selection of a transducer type, the beam angle will be automatically set at setup of frequency.

7. Press MENU to close the menu.

> **Caution: The setup of beam angle is reflected on the display of detecting range and will not change the actual beam angle.**

TD Setting - HF TD2 Setting

1. Press SUB MENU .

2. Select [TD Setting] – [HF TD2 Setting].

3. Press [▶] of  .

   The setup box of [HF TD2 Setting] will be displayed.

4. Set as the same way as [HF TD1 Setting].

5. Press MENU to close the menu.

> **Caution: The setup of beam angle is reflected on the display of detecting range and will not change the actual beam angle.**

2.3.2 Setup of Beam Angle for low frequency transducer

TD Setting - LF TD1 Setting

1. Press SUB MENU .

2. Select [TD Setting] – [LF TD1 Setting].

3. Press [▶] of  .

   The setup box of [LF TD1 Setting] will be displayed.

4. Set as the same way as [HF TD1 Setting].

5. Press MENU to close the menu.

> **Caution: The setup of beam angle is reflected on the display of detecting range and will not change the actual beam angle.**

TD Setting - LF TD2 Setting

1. Press SUB MENU .
2. Select [TD Setting] – [LF TD2 Setting].
3. Press [▶] of .

   The setup box of [LF TD2 Setting] will be displayed.
4. Set as the same way as [HF TD1 Setting].
5. Press MENU to close the menu.

> **Caution: The setup of beam angle is reflected on the display of detecting range and will not change the actual beam angle.**

2.4 Setup of Bottom Limit

If the Bottom Limit is designated, the depth shallower than the designated water depth is not detected as sea bottom.

2.4.1 Setup of Bottom Limit HF

TD Setting –Bottom Limit HF

To set Bottom Limit of high frequency.

1. Press SUB MENU
2. Select [TD Setting] - [Bottom Limit HF] .
3. Press [▶] of .

   The setup box of [Bottom Limit HF] will be displayed.

4. Press [▲] and [▼] to set a depth.
5. Press MENU to close the menu.

2.4.2 Setup of Bottom Limit LF

TD Setting –Bottom Limit LF

To set Bottom Limit of low frequency.

1. Press SUB MENU
2. Select [TD Setting] - [Bottom Limit LF]
3. Press [▶] of .

   The setup box of [Bottom Limit LF] will be displayed.
4. Press [▲] and [▼] to set a depth.
5. Press MENU to close the menu.

2.5 Setup of Draft Set

Correct - Draft Set

This is to set the depth between the sea surface and the depth of transducer instated. Normally, it is the draft of the boat to be installed.

(Setting range: except for ft: - 10.0 ~ 10.0, in ft: - 30.0 ~ 30.0)

1. Press SUB MENU .
2. Select [Correct] - [Draft Set].
3. Press [▶] of .

   The setup box of [Draft Set] will be displayed.
4. Press [▲] or [▼] to set a draft.
5. Press MENU to close the menu.

2.6 Setup of Gain (TD) for transducer

Correct – Gain (TD)

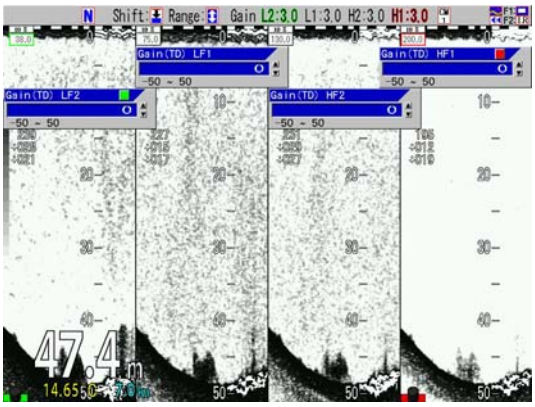
The insufficient gain due to ultrasonic signal attenuation can be corrected. Accuracy of bottom detection is adjusted. Such false recognition can be corrected that a deeper position is recognized as sea bottom than actual, or large fish school is recognized as sea bottom.

It is not necessary to do this gain correction for TDM-052, as the factory default setting is optimized for TDM-052.

> **Caution: In case of inner-hull installation, the set value of gain (TD) varies depending on the materials of bottom of the ship and the processing method. In some cases, low frequency side cannot be used due to too much attenuation of ultrasonic signal at ship's bottom.**

1. Press SUB MENU .
2. Select [Correct] – [Gain (TD)].
3. Press [▶] of .

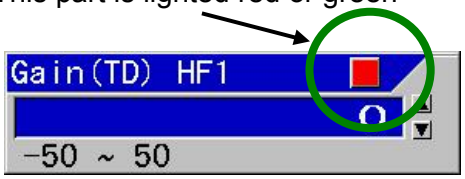
   The screen will turn to the gain (TD) adjustment screen and displays the gain (TD) setup box at the upper side of the screen.



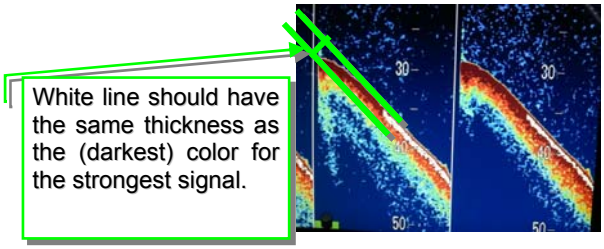
4. Setup the Gain (TD) by turning the gain knob, which are lighted red or green, at the side to be adjusted.

   When a red square mark appears at right side upper corner of the Gain (TD) setup box, the red lighted gain knob shall be operated. When there is a green square mark, turn the green lighted gain knob.

This part is lighted red or green



The gain (TD) setting shall be adjusted in such a way that the white line in sea bottom has the same thickness as that of the strongest signal color area.



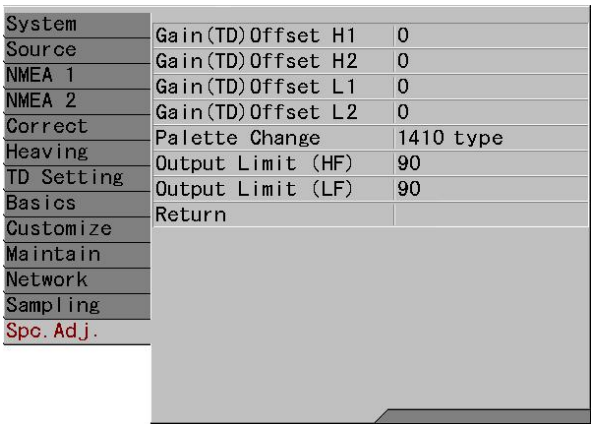
5. Pressing the gain knob at the side to be adjusted a few times, move to the position of the Gain (TD) box to be adjusted. (the red mark at right top side will move)

   When there are more than 2 screens, press the gain knob at the screen to be adjusted. The gain knob pressed will turn red. (The center screen of 3 screens will be the right side screen)

6. Press MENU to close the menu.

2.7 Setup of Output Limit for transmitter

Set the output limit, when you connect a non-standard low output power TD.



2.7.1 Display of Output Limit Menu

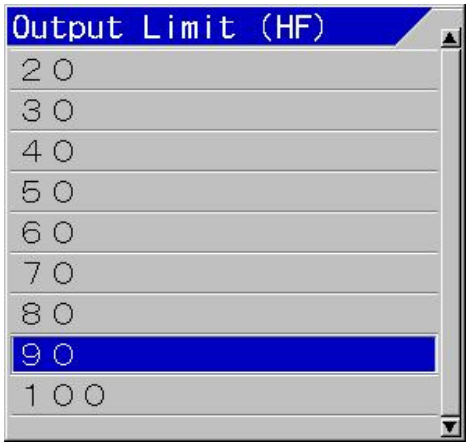
1. If the power supply is ON, turn OFF the power supply by long press of the BRILL key.
2. Press BRILL key, while keeping MENU key, and F1 key at the same time, to turn ON the power supply.
3. Press SUB MENU key after the normal image is displayed.
4. [Spc. Adj.] appears at the bottom of the submenu list.

2.7.2 Setup of Output Limit HF

1. Please display the [Spc. Adj.] at the bottom of the submenu list. (Refer to 2.7.1 Display of Output Limit Menu)
2. Press SUB MENU .

   Select [Spc. Adj.] - [Output Limit HF].
3. Press [▶] of .

   The setup box of [Output Limit HF] will be displayed.



4. Press [▲] or [▼] to set an output limit.

Caution: Set the value at 60 for the transducer of 1kW.

5. Press MENU to close the menu.

2.7.3 Setup of Output Limit LF

1. Please display the [Spc. Adj.] at the bottom of the submenu list.(Refer to 2.7.1 Display of Output Limit Menu)
2. Press SUB MENU .

   Select [Spc. Adj.] - [Output Limit LF].
3. Press [▶] of .

   The setup box of [Output Limit LF] will be displayed.
4. Press [▲] or [▼] to set an output limit.

Caution: Set the value at 60 for the transducer of 1kW.

5. Press MENU to close the menu.

2.7.4 Relation of the set value between [Output Limit] and [MENU] - [Echo Adjust] - [TX Power]

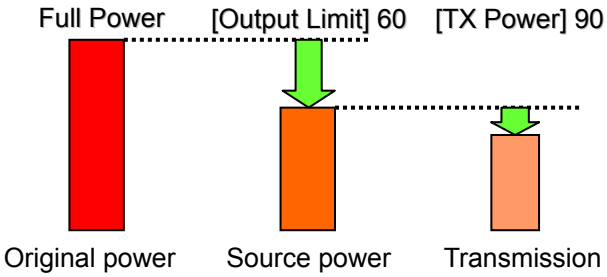
[Output Limit] is a common setting regardless of CM key.

A set value of [TX Power] is applicable individually to each CM key.

[Output Limit] limits the output that becomes the source of [TX power].

The value of [TX Power] represents the percentage out of the value set by [Output Limit] as 100%.

For instance, when the value of [Output Limit] is 60, and the value of [TX Power] is 90, actual output is 90% of the output limited to 60% from the original output power.



Chapter 3 Maintenance

3.1 Inspection

The daily maintenance and inspection extend the life of equipment. To keep the equipment always in the best conditions, implement the periodical inspection shown in the table below.

Item	Inspection item
Connectors at the rear of the Display unit	Check the looseness
Wiring of cables	Check the wiring of cables connecting the equipment and the damage of cable
Grounding of Display unit	Scrape the rust off the ground terminal and keep good contact.

3.2 Cleaning

3.2.1 Display unit

Contamination on the screen may cause faint images. For cleaning the screen, wipe it with soft and clean cloth dipped in diluted neutral detergent. Pay full attention as the screen gets scratched easily. No solvent such as thinner shall be used.

Caution

The display screen has a special coating. Do not use a solvent such as paint thinner, acetone, alcohol, and benzene, etc.
Strong rubbing may cause scratch.

For cleaning the chassis, do not use solvent such as thinner or alcohol. Painting on the surface and characters at the operating unit may be dissolved. After wiping with soft and clean cloth dipped with diluted neutral detergent, wipe away with dry soft and clean cloth.

3.2.2 Transducer

In the case of the through-hull installation, check the surface of opening of transducer (portion from which the ultra-sonic is emitted). If shells or oil adhere, scrub the surface with a wooden or bamboo knife with caution not to damage the surface and remove stuck materials. If you scrub strongly, the surface will be damaged, resulting in deteriorated performance of transducer.

3.3 Fuse Replacement

Warning Use the specified fuse. If you use a fuse other than specified one, it may lead to a serious accident.

Fuse blows out when such a trouble occurs inside at too high input voltage or over current. The fuse is located in the power cable. Please replace with the fuse listed in the list of standard components.

3.4 Diagnostics of troubles

In this section, simple procedures to find out troubles are mentioned to locate the troubles on boat.

3.4.1 Necessary information for requesting repair

Please inform of the following points:

(1) Name of the ship, and telephone number, if a satellite communication system is equipped,

(2) Failed equipment name and type name

(3) Equipment serial number

(4) “Version number. of system software” displayed on “Title screen”

(5) Next calling port and name of sales agent, telephone number., Fax number., e-mail address, etc.

(6) Details of failure (as much as possible) and failure diagnostics results on board, as well as operation conducted, in particular, until the failure or when the failure occurred.

3.4.2 Diagnostics test

As self diagnostics, panel test and LCD test can be performed.

As panel test, the present conditions of the system will be displayed at the upper side of the display screen in addition to confirmation of key inputs.

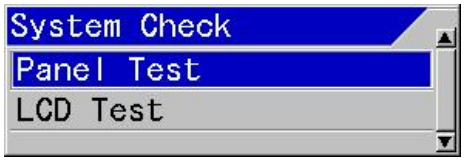
As LCD test, display will be switched over in the order of grid, white, black, red, green and blue each time the key is pressed.

1. Press SUB MENU .

2. Select [Maintain] – [System Check].

3. Press [▶] of .

   The setup box of [System Check] will be displayed.



4. When panel test or confirmation of system conditions is performed, select [Panel Test] with [▲] and [▼] keys. For checking of LCD, select [LCD Test].

5. Press [▶].

   When [Panel Test] is selected, the panel test screen will be displayed.

The system conditions will be displayed as shown in the above figure.

When a key is pressed, the key will be identified and the key on the corresponding screen will change in color. The same key is pressed subsequently, the System Test screen will end and the setup box of [System Check] will be displayed.

> ⚠ **Caution: The LED on panel will turn the color from green to red if the gain knob is rotated to right or left, or one of CM1 ~ CM6 is pressed and one more pressing will turn the color to green. In addition, the internal buzzer will sound when the gain knob is rotated.**

(1) [RAM] displays the result of RAM check. OK if normal, and NG if abnormal, will be displayed.

(2) [ROM] displays the result of ROM check. OK if normal, and NG if abnormal, will be displayed.

(3) [NMEA1] confirms J8 port. As the confirmation will be performed when the panel test screen is displayed, mount the jig before the display of the screen.

"– –" for not yet done, OK for normal case and NG for abnormal case will be displayed.

(4) [NMEA2] confirms J3 port. As the confirmation will be performed when the panel test screen is displayed, mount the jig before the display of the screen.

"– –" for not yet done, OK for normal case and NG for abnormal case will be displayed.

> ⚠ **Caution: For confirmation of [NMEA1] and [NMEA2] ports, the dedicated jig is necessary.**

(5) [Memory] displays the conditions of internal memory.
Ok for normal case and NG for abnormal case will be displayed. The used ratio of memory is also displayed.

(6) [VOLT1] displays the voltage value of + 12 V line.
When the voltage falls in abnormal range, the indication will be in red.

(7) [VOLT2] displays voltage of power input line. When this voltage falls in abnormal

range, alarm will sound and an alarm message will be displayed.

When the voltage falls in abnormal range, the indication will be in red.

(8) [TEMP] displays water temperature of the water temperature sensor.
In the case of non connection, - 30.0 in red will be displayed.

(9) [SPEED] displays the speed of the boat's speed sensor.
In the case of abnormality, display will be in red.

(10) [Version] displays the version No. of the system software.

(11) [IPL] displays the version No. of IPL version.

(12) [Top.ncd] will display the version No. of FPGA data.

(13) [MAC ADDRESS] displays MAC address used in network.

3.4.3 LCD Test

Display the setup box for [System Check] in the same way as for [Panel Test], and select [LCD Test].When [▶] is pressed, the grid will be displayed.

Each time [▶] key is pressed, the color of display will change, and displays finally the setup box of [System Check].

3.4.4 Initialize

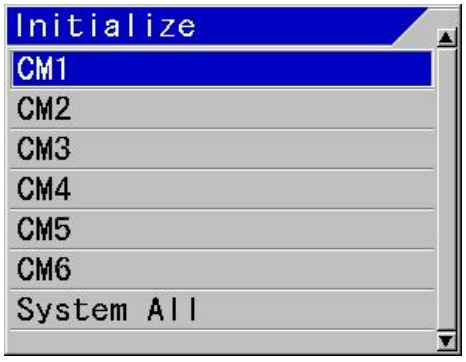
This is to return all setup of each CM or the whole system to the factory default settings. However, waypoint data and image stored data will remain as they are.

1. Press SUB MENU .

2. Select [Maintain] – [Initialize]

3. Press [▶] of .

The setup box of [Initialize] will be displayed.



4. When an allocated CM is to be initialized, select [CM1] to [CM6] with [▲] and [▼] keys. To initialize the whole system, select [System ALL].

   When one of [CM1] to [CM6] is selected, the set values commonly used at each CM such as selected language and units will not be initialized.

   When [System ALL] is selected, all setup values including the values commonly used at each CM will be initialized.

5. Press [▶].

   The setup box of [CM initialize] will be displayed.

6. When initialization is performed, select [Yes] for initialization by pressing [▲] and [▼] keys, and [No] for not to initialize.

7. Press ENT .

   At [Yes], initialization will be performed.
   At [No], the menu will be closed.

> ⚠ **Caution: When [System All] is selected, the display will be in English after initialization.**

3.4.5 Update of program

This is used for program update.
(Please consult your sales agent)

1. Press SUB MENU .

2. Select [Maintain] – [System Program Load].

3. Press [▶] of  .

   The setup box of [System Program Load] will be displayed.

4. When [Yes] is selected, program will be in updating condition and a message “Updating
   Do not Power Off.” will be displayed.

   When [No] is selected, returns to the menu.

5. Press 

.

   When [Yes] is selected, the system turns into program updating and a message “Updating. Do not Power Off.” will be displayed.

   When [No] is selected, the screen returns to the menu.

6. The program will be downloaded from USB ROM writer or PC.

   When downloading has started, [CM] keys will blink red in the order of CM1 to CM6.

   At completion of downloading, the both gain knobs will be lighted red.

7. Pressed 

for about 5 seconds to switch off the power.

Caution: When program updating failed on the way, switch off the power once and switch on again. It will start up in the wait status of downloading. Try again the procedures from step 6 again.

3.5 If you suspect a trouble

Symptom	Possible cause of trouble	Measure
Even with power on, nothing is displayed.	• Fuse is blown. • Power voltage is out of specification (10.8 to 31.2 VDC) • Poor connection between power cable and battery	• Replace the fuse (See “3.3 Fuse Replacement”, page 3-2. • Use a proper power as per specification. • Check the connection between power cable and battery.
After starting up, nothing is displayed	• Poor connection between transducer and Display unit • Failure of LCD display panel	• Check the connection between transducer and Display unit. • Consult a repair shop or sales agent.
Much interference noise	• Improper installation of transducer • Interference from the echo sounder on other boats.	• Check the installed position of transducer (See “1.3 Installation of transducer”, page 1-6. • Implement interference rejection.
Display of water temperature / Speed is abnormal or not displayed.	• Poor connection of sensors connectors • Input sources may be abnormal.	• Check the connection at sensor connectors. • Check the input sources.
Display of present location/course is abnormal or not displayed.	• Poor connection between this unit and navigation equipment	• Check the connection between this unit and navigation equipment.

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