CE

KODEN

INSTALLATION MANUAL

COLOR ECHO SOUNDER

Broadband DIGITAL

CVS-872D

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CVS-872D Installation Manual

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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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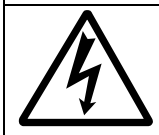
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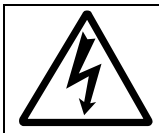
For Your Safe Operation

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

Document Revision History i
Important Notice ii
For Your Safe Operation iii
Contents v
System Configuration vii
Configuration of Equipment viii
Characteristics of Transducer xiii
Dimensions xiv
Specifications xv

Chapter 1 Installation 1-1

1.1 Installation precautions 1-1
1.1.1 Unpacking of components 1-1
1.1.2 Appearance verification of each unit and accessories 1-1
1.1.3 Selection of location for installation 1-1
1.1.4 Laying and connection of cables 1-2
1.1.5 Coordination after installation 1-2
1.2 Installation of CVS-872D Display unit 1-3
1.2.1 Desk-top installation 1-3
1.2.2 Flush-mount installation 1-5
1.3 Installation of transducer 1-6
1.3.1 Cautions on installation of transducer 1-6
1.3.2 Precautions regarding transducer installation 1-7
1.3.3 In the case of inner hull installation 1-8
1.4 Wiring 1-26
1.4.1 Connection of cables to Display unit 1-26
1.5 Connection of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass 1-53
1.5.1 Connection of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass 1-53
1.5.2 Connection of Hemisphere V104s GPS Compass 1-58
1.5.3 Connection of Hemisphere V200s GPS Compass 1-63
1.5.4 Setting of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass 1-68
1.6 List of input/output sentences 1-74
1.6.1 Input sentence 1-74
1.6.2 Output sentence 1-74
1.6.3 Input/Output sentence details 1-75

Chapter 2 Adjustment 2-1

2.1 Setup of transducer 2-1
2.1.1 Setup of type of transducer 2-1
2.2 Setup of frequency and beam angle 2-2
2.3 Setup of Bottom Limit 2-3
2.4 Setup of Draft Set 2-3
2.5 Setup of Gain (TD) for transducer 2-3
2.6 Setup of Output Limit for transmitter 2-4
2.6.1 Display of Output Limit Menu 2-4
2.6.2 Relation of the set value between [Output Limit] and [MENU] - [Echo Adjust] - [TX Power] 2-5

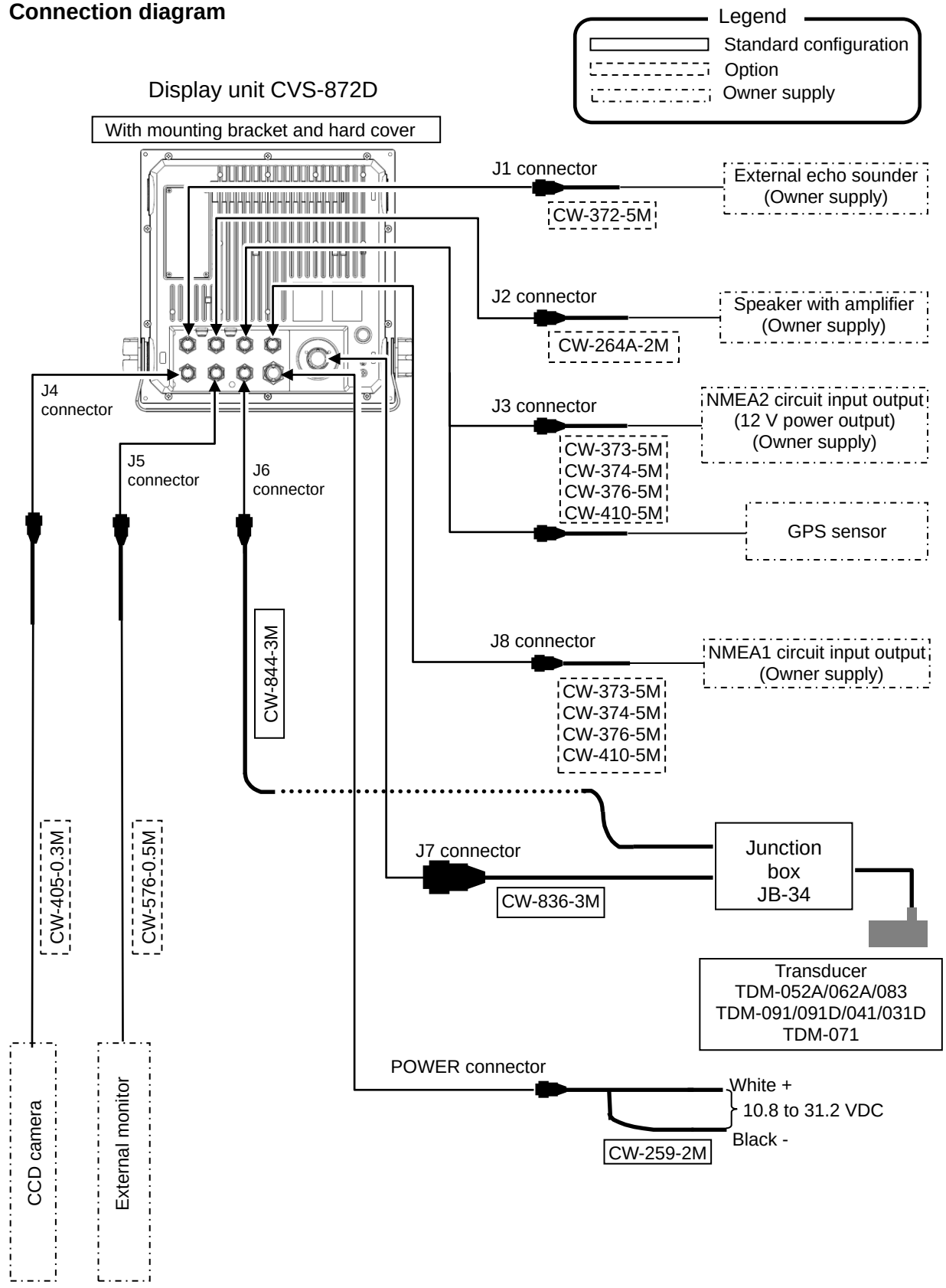
Chapter 3 Maintenance 3-1

3.1 Inspection 3-1
3.2 Cleaning 3-1

3.2.1 Display unit 3-1
3.2.2 Transducer 3-2
3.3 Fuse Replacement 3-2
3.4 Diagnostics of troubles 3-2
3.4.1 Necessary information for requesting repair 3-2
3.4.2 Diagnostics test 3-3
3.4.3 Initialize 3-4
3.4.4 Update of program 3-5
3.5 If you suspect a trouble 3-6

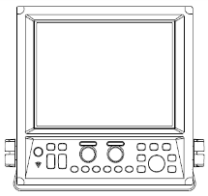
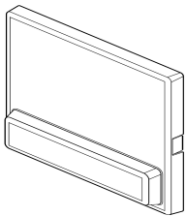
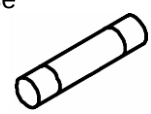
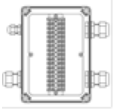
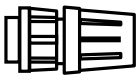
System Configuration

Connection diagram

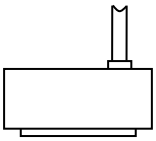
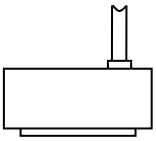
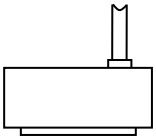
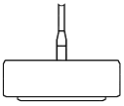
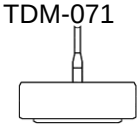


Configuration of Equipment

Standard Equipment Configuration List

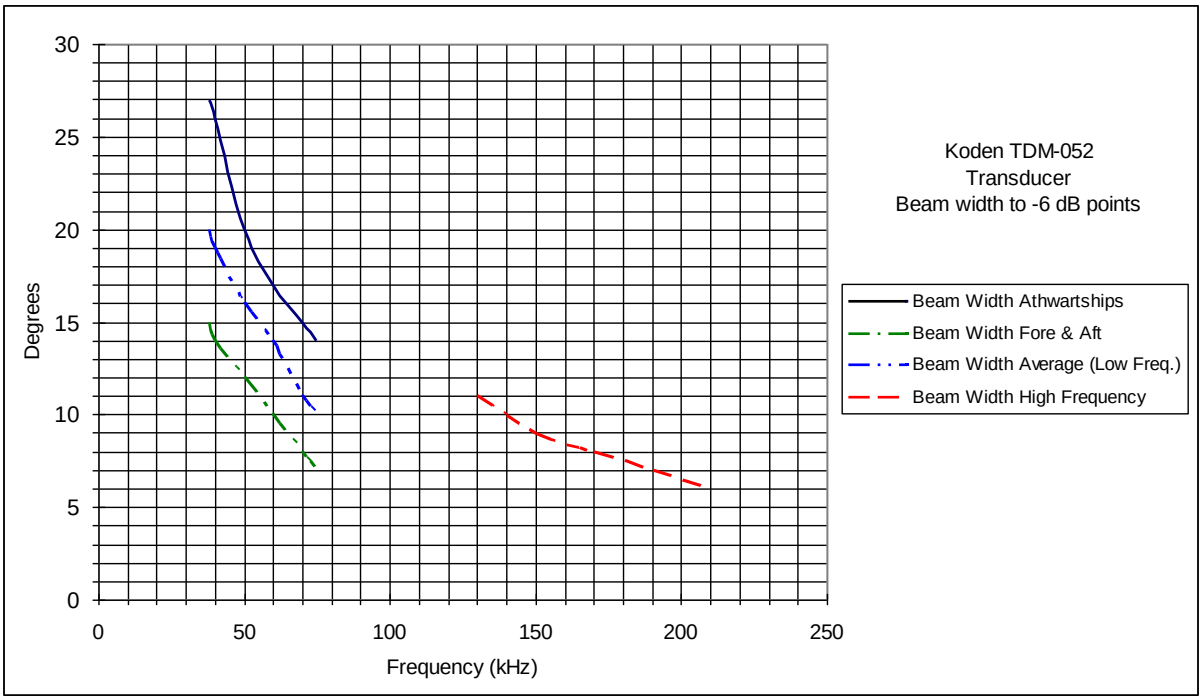
No.	Name of item	Type	Remark	Weight/ Length	Qty
1	Display unit 	CVS-872D	With mounting bracket and knobs	9.1 kg	1
2	Hard cover 	A30MB10250		390g	1
3	DC power cable 	CW-259-2M	With 3-pin connector and one end plain	2 m	1
4	Fuse 	F-7161-10A/ N30C-125 V type(φ6.4 × 30)	Normal fusion type for main power		1
5	Junction Box 	JB-34	Transducer junction box	0.58kg	1
6	Connector 	BD-06BFFA-LL6001	6-pin water resistant connector		2
7	Transducer	Refer to next page “Type of transducer”	Transducer cable		1
8	Basic Operation Manual	CVS-872D.BM.E	English		1
9	Full Menu Reference	CVS-872D.FM.E	English		1
10	Quick Reference	CVS-872D/875D/877D .QR.E	English		1
11	Installation manual	CVS-872D.IM.E	English		1
12	Menu List	CVS-872D/875D/877D .ML.E	English		1
13	Transducer cable	CW-836-3M	With 5-pin connector and one end soldering to insert to JB	3 m	1
		CW-844-3M	For connection of water temp. and XID data.	3 m	1

Type of broadband transducer

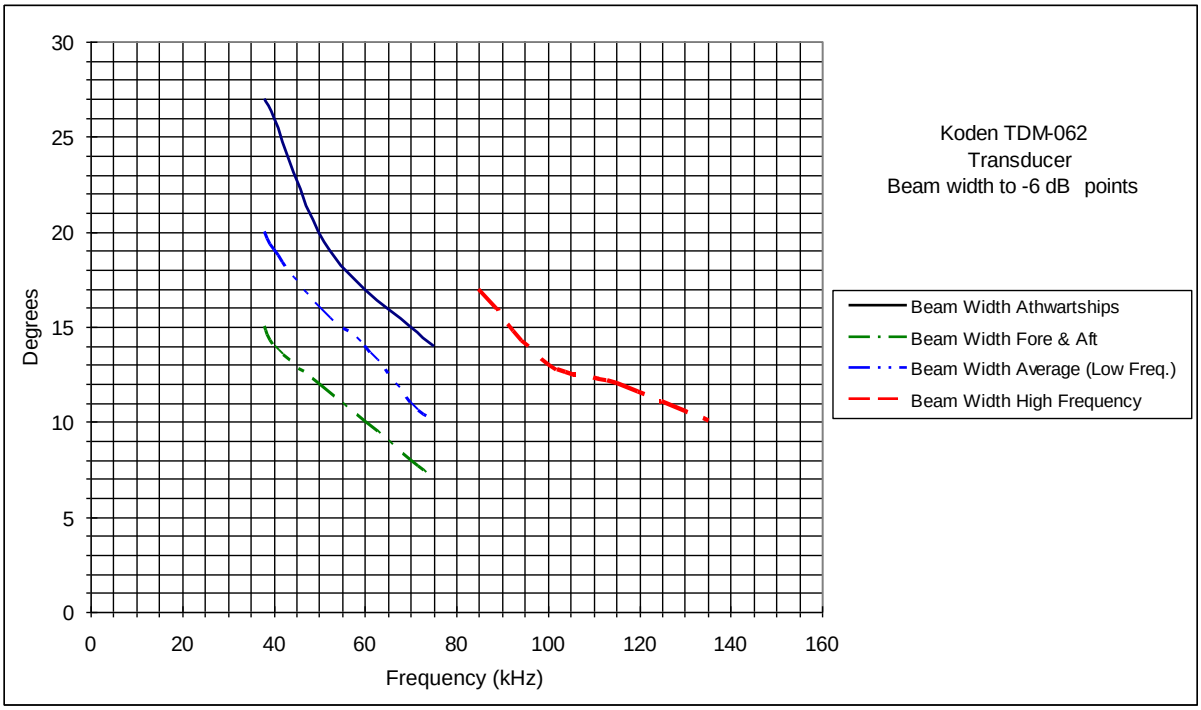
No.	Specification	Frequency output	Material/ Cable length/ Cable diameter	Mounting method	Beam width (- 6 dB) (Right and left x Back and forth)(-6 dB)
1	TDM-052A 	Low frequency 38 to 75 kHz High frequency 130 to 210 kHz	Rubber mold 15 m φ11	Ship's bottom	Low frequency (38 kHz) 27° × 14° (60 kHz) 18° × 10° (75 kHz) 14° × 7° High frequency (130 kHz) 11° (170 kHz) 8° (210 kHz) 7°
2	TDM-062A 	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-083 	Low frequency 28 to 60 kHz High frequency 130 to 210 kHz	Rubber mold 15m φ11	Ship's bottom	Low frequency (28kHz) 31° × 15° (45 kHz) 18° × 10° (60 kHz) 12° × 7° High frequency (130 kHz) 11° (170 kHz) 7° (210 kHz) 6°
4	TDM-091/091D 	Low frequency 42 to 65 kHz High frequency 130 to 210 kHz	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	Low frequency (42 kHz) 35° (65 kHz) 22° High frequency (130 kHz) 14° (210 kHz) 8°
5	TDM-071 	35 to 65 kHz	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	(35 kHz) 31° × 24° (65 kHz) 17° × 13°

Caution: Broadband transducer (TDM-052A, TDM-062A, TDM-083, TDM-091/091D and TDM-071) shall not be operated in the air, as it will be damaged.

TDM-052A Beam Angle

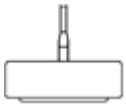
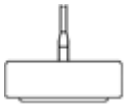


TDM-062A Beam Angle



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	TD-282	28kHz 2kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	40° × 23°
2	TD-401D	40kHz 1KW	Rubber mold 10 m φ11	Ship's bottom/ Ship's side	50° × 158
3	TD-501C	50/200kHz 1kW	Rubber mold 10 m φ11	Ship's bottom/ Ship's side	(50kHz) 58° × 20° (200kHz) 17° × 18°
4	TD-501T-3B	50/200kHz 1kW	Bronze 9 m Φ5	Through hull	(50kHz) 20° × 22° (200kHz) 5° × 5°
5	TD-501B	50kHz 1kW	Rubber mold 10 m φ11	Ship's bottom/ Ship's side	44° × 16°
6	TD-751	75kHz 1kW	Rubber mold 10 m φ11	Ship's bottom/ Ship's side	26° × 10°
7	TD-2001D	200kHz 1kW	Rubber mold 10 m φ11	Ship's bottom/ Ship's side	10° × 10°
8	TD-284 TD-284A	28kHz 3kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	30° × 18°
9	TD-404T	40kHz 3kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	16° × 11°
10	TD-504T	50kHz 3kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	14° × 9°
11	TD-504F	50kHz 3kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	14° × 11°
12	TD-754	75kHz 3kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	14° × 7°
13	TD-66	200kHz 1kW	Rubber mold 20 m φ11	Ship's bottom/ Ship's side	6° × 6°

No.	Specification	Frequency output	Material/ Cable length/ Cable diameter	Mounting method	Beam width (- 6 dB) (Right and left x Back and forth)(-6 dB)
14	TDM-031 	50/200kHz 1kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	(50 kHz) 21° × 15° (200 kHz) 5° × 3°
15	TDM-041/041D 	50/200kHz 1kW	Rubber mold 15 m φ11	Ship's bottom/ Ship's side	(50 kHz) 30° × 30° (200 kHz) 30° × 30°

Option List

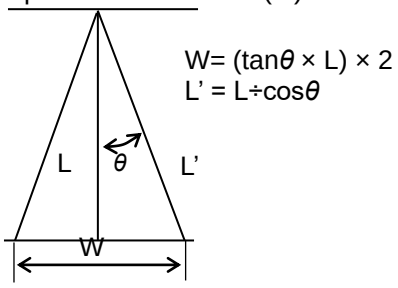
No.	Name of Item	Specification	Remark	Weight/ Length
1	Power rectifier	PS-010	Fuse (5A) 2 pcs.	
2	AC power cable	VV-2D8-3M	Both ends plain.	3 m
3	Transducer extension cable	C44-02	Refer to "Connection of XID-adaptive TD" (page 1-29) for cable configuration.	Specify length at order
4	Grounding cable	OW7/1.6S-3M		3 m
5	Connecting cable	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-410-5M	With 6 pin water resistant connectors both ends (Both 1-pin (shield) are not wired)	5 m
		CW-560-2M	With 15-pin water resistant D-Sub connectors both ends	2 m
		CW-264A-2M	12-pin 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	BD-05BFFA- LL6001	5-pin water resistant connector	
		BD-06BFFA- LL6001	6-pin water resistant connector	
8	Transmission filter	C29EHB004A	Filter against leakage from wireless equipment	

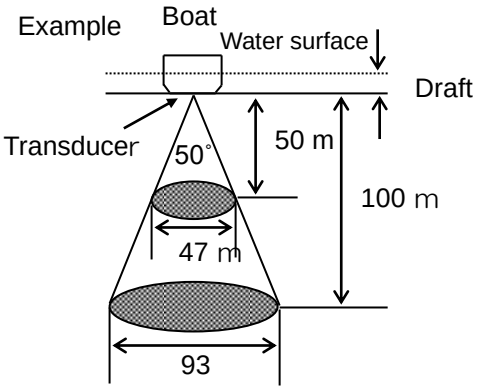
Characteristics of Transducer

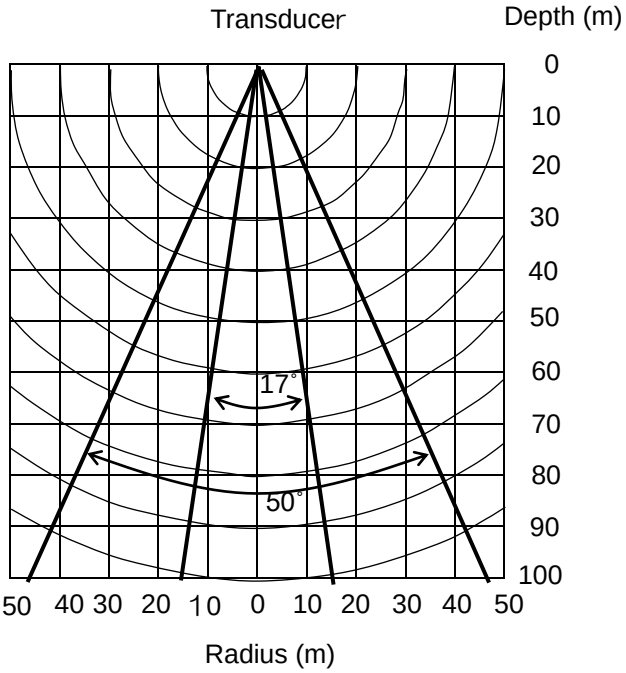
Directivity angle and detecting distance of transducers

The diagrams below are to convert the range to finding area under own boat in meters depending on the spread of directivity angle of a transducer.
For example, when the directivity angle is 50˚, it can be confirmed that you are watching a range with a diameter of 47 m at depth of 50 m, and a range with a diameter of 93 m at depth of 100 m.

Specifications:
W: Irradiated diameter (m)
θ: Half angle of irradiation (˚)
L: Depth from transducer (m)







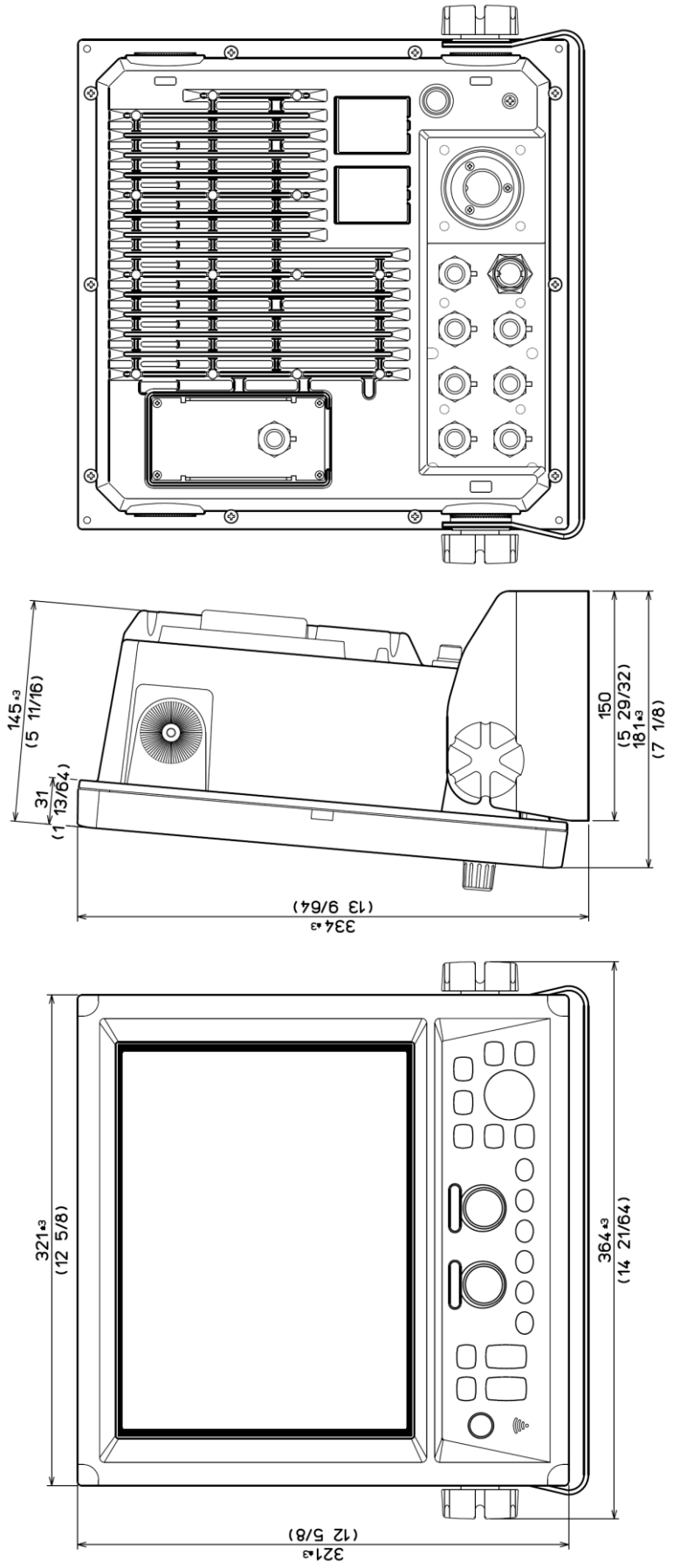
Differences of performance and application of transducers depending on their operating frequencies

Characteristics of transducers vary depending of the operating frequency. The table below shows the differences of performance and characteristics depending on the frequency.

Frequency Performance/application	Low frequency	High frequency
Directivity angle	Wide	Narrow
Detectable depth	Deep	Shallow
Resolution (Capability to find fish school distribution)	Less	More
Influence of air bubble and underwater noise	Considerably affected	Comparatively less affected
Effective application	Search in wide range Finding of sea bottom sediment	Finding of density of fish school. Finding of status of fish school at sea bottom

Dimensions

Unit: mm (inch)



Specifications

Item	Content	
Model	CVS-872D	
Output power (RMS)	3kW	
Transducer	TDM-052A	TDM-062A
Output frequency (Transducer)	38 to 75 kHz and 130 to 210 kHz	38 to 75 kHz and 85 to 135 kHz
Selectable frequency range	24 to 240kHz 0.1kHz step	
Output method	Simultaneous / Alternate	
TX rate	1500 times / minute at maximum (In case of single frequency. Range 2.5m and Interference rejection off.)	
Pulse width	50µs to 3.0ms	
Display size and type	12.1 inch color XGA LCD	
Display resolution	1024x 768 pixels (XGA)	
Basic range	1 to 3000 (m), 5 to 8000 (ft), 1 to 1700 (fm), 1 to 2000 (I.fm) (8 ranges can be set to users choice)	
Zoom range	1 to 260 (m), 5 to 960 (ft), 1 to 140 (fm), 1 to 180 (I.fm)	
Range unit	m, ft, fm ,I,fm	
Shift	Max 3000 (m), 6000 (ft), 100 (fm / I.fm)	
Shift step	Selectable: Numerical value, Range ratio 1/5, Registered value (8 types), Shift digit input, Range dependent	
Presentation modes	High frequency, Low frequency, 1 to 4 frequency, Zoom images (Bottom lock, Bottom discrimination, Bottom Zoom, zoom, Bottom follow zoom), Nav mode, Vertical split, Horizontal split, Mix (7types) A-scope can be displayed at all above modes.	
Presentation colors	64 colors, 16 colors, 8 colors, Monochrome	
Background colors	Marine Blue, Blue, Dark blue, Black, White, Nighttime color, Other 4 colors	
Alarms	Bottom, Fish, Temperature*, Speed**, Arrival**, XTE**	
Image speed	12 steps & stop	
Functions	Interference rejection, Color erase, VRM, Noise reduction, White line, Draft correct, Water temperature correct, Boat speed correct, Store image (500 images), Sona-Tone™, Homing, Event memory, Simple plotter, Panel illumination, Power reduction, External trigger, Detection area display, CM key, Water Temp. graph, Individual range operation, Individual shift operation, Heaving compensation, Display direction	
Auto functions	Range, Shift, TVG, TX Power, White line	
Function registration	A scope, Shift digit input, Interference rejection, Color erase, Nose reduction, White line, Background color, TVG, VRM interval, Image recall, Image swap, Image Title, Sona-Tone™, Nav start, frequency, Event Key Usage, Key Lock, Depth Unit, Color Tone, B.D. Mode	
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.2.0/3.0（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％ (+40°C)
Dimension of equipment (without knob & pedestal)	320.7×320.7×144mm
Dimension of equipment (with knob & pedestal)	330.6×364×180.5mm
Weight	9.1kg

*Requires data from Temp sensor or external Temp data input
**Requires data from GPS

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-872D 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-872D 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)

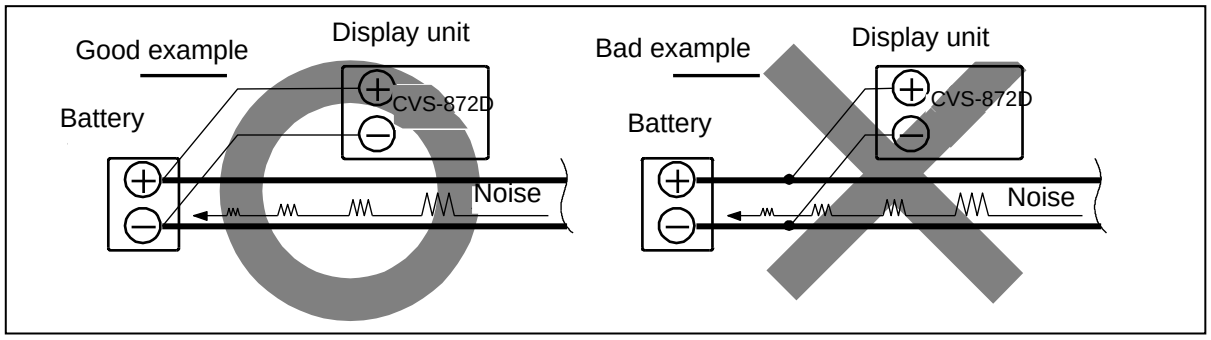


Fig. 1.1 Connection of Power line

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-872D Display unit

CVS-872D 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.

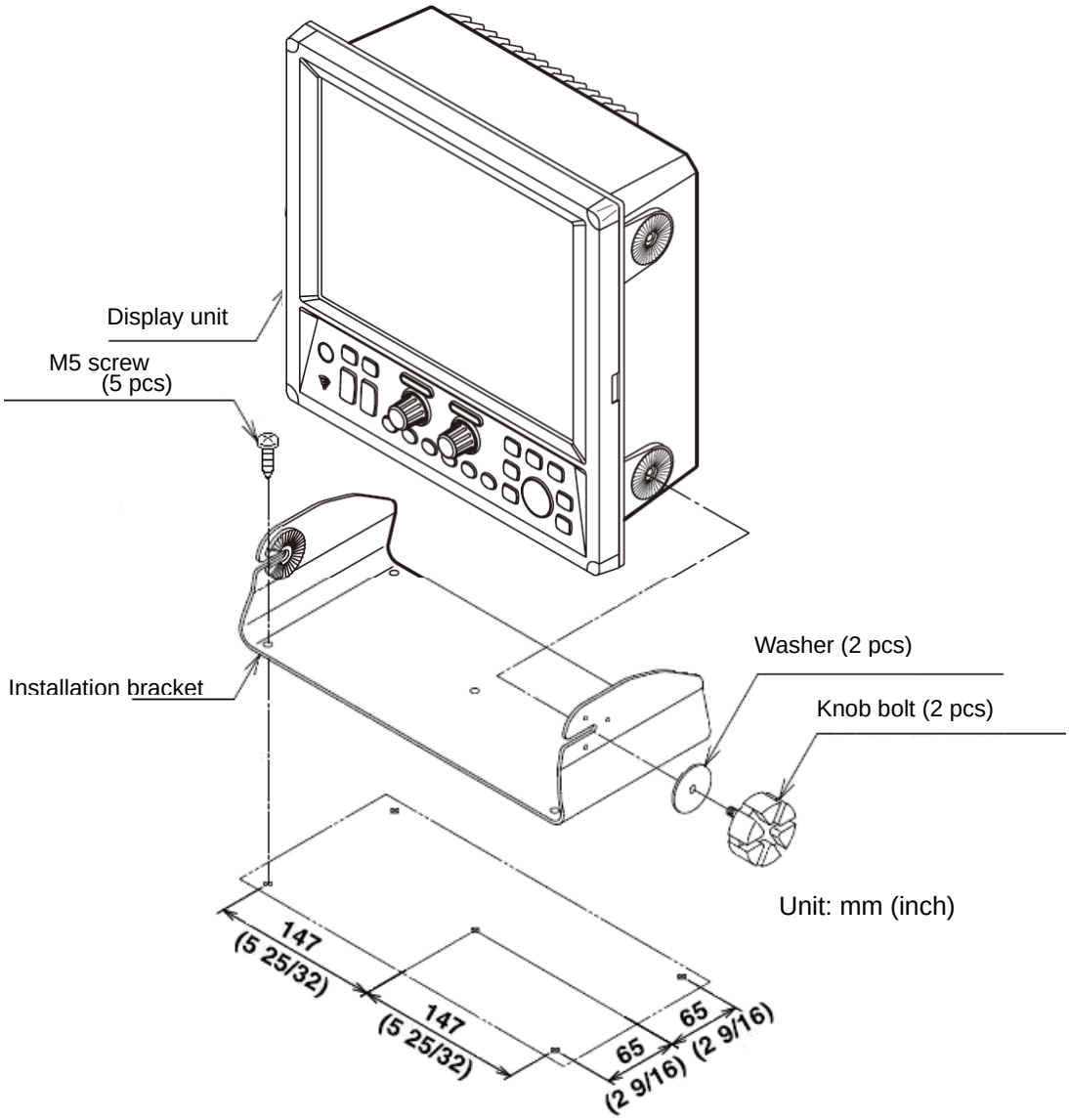
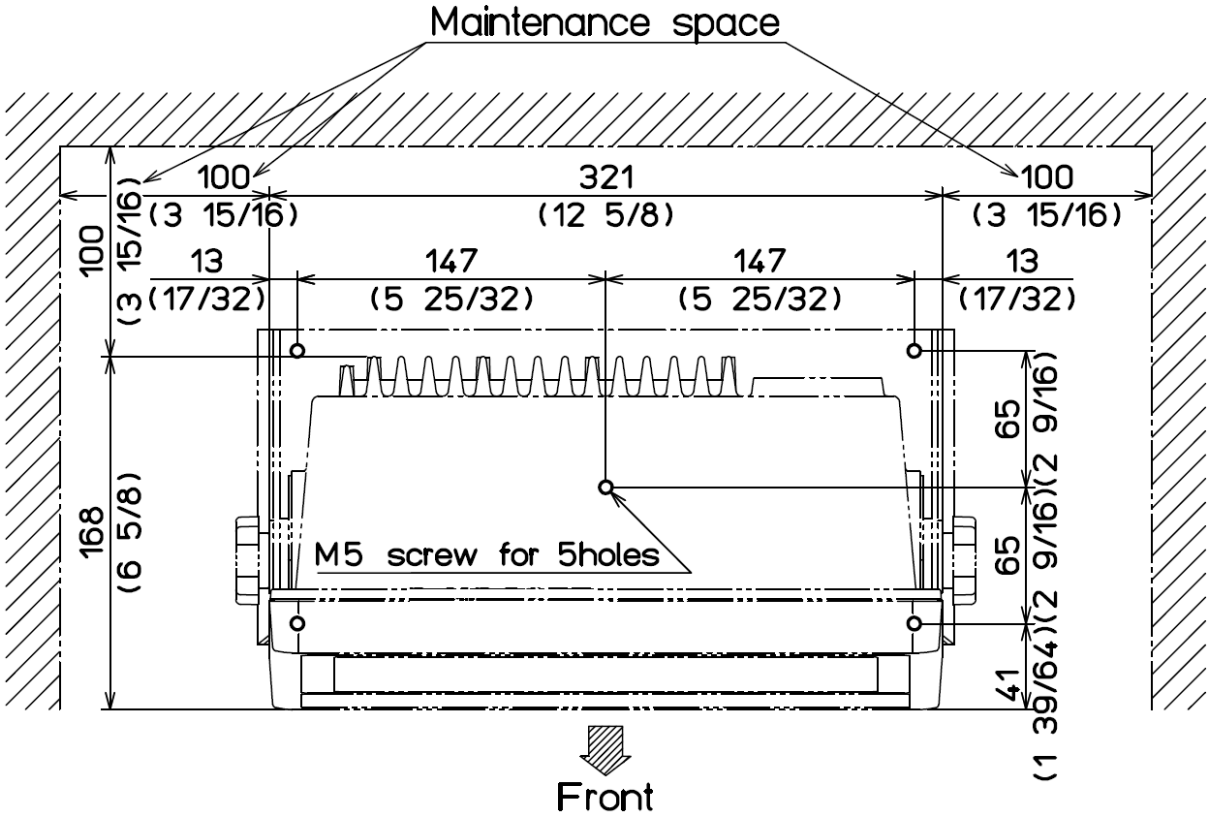


Fig. 1.2 Desk-top installation

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).

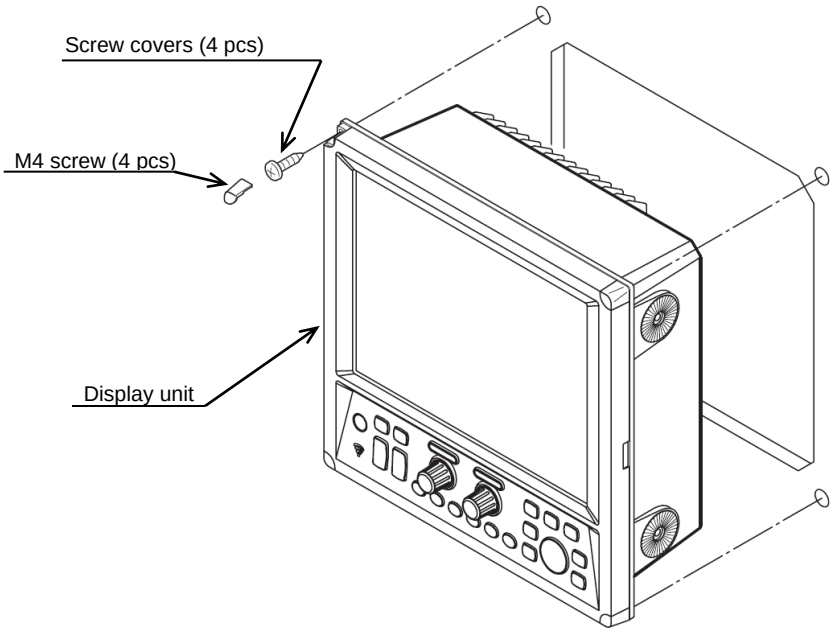
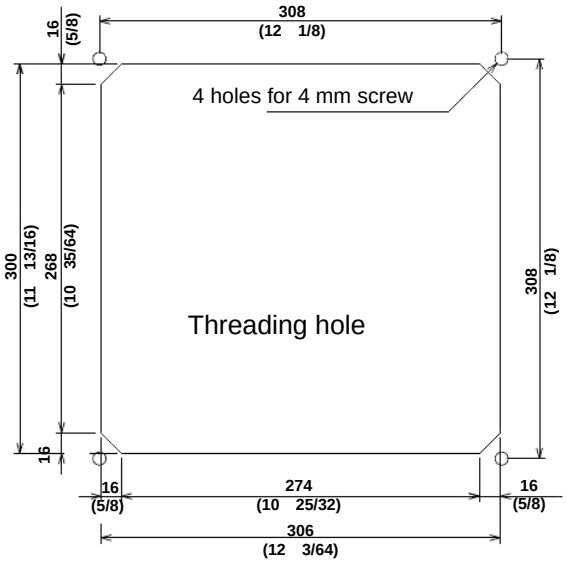


Fig. 1.4 Flush-mount installation



Unit: mm (inch)

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

1.3 Installation of transducer

The installation method of transducer is mainly two methods, ship's side installation and bottom hull installation. The installation method differs depending on the type of boat (steel, wooden and FRP). The quality of the transducer installation method affects the performance of the echo sounder. Therefore, ask a technical dealer to install the transducer.

1.3.1 Cautions on installation of transducer

1. Not affected by air bubbles

   If the transducer is installed incorrectly, air bubbles may adhere to the radiation surface of the transducer when the ship sails, making it impossible to receive ultrasonic wave. To exclude the influence of air bubbles, it is effective to increase the protruding of the transducer from the bottom of the ship. It is also effective to move the installed position of transducer away from the keel line.

2. Not receive noise from screws

   Noise may be displayed on the screen when the screw speed is increased. In this case, replace the screw or install the transducer away from the screw.

3. Not receive noise from the engine

   If the echo sounder receives noise from the engine, move the installed position of transducer away from the engine.

Cautions on installation XID-adaptive TD[*1]

Broadband transducer (TDM-052A/TDM-062A/TDM-083/TDM-091/TDM-091D/TDM-071) and Dual frequency transducer (TDM-031D/TDM-041/TDM-041D) are XID-adaptive TD [*1].

Pay attention to the following when installing XID-adaptive TD.

-Transducer MUST be installed in pocket, external tank only.
Active face of transducer must be immersed in seawater to cool the transducer unit.

-DO NOT cover with FRP. DO NOT install inside a yellow tank.
The transducer may overheat, leading to failure.

-DO NOT install in the engine compartment or other hot place.
The transducer may fail if the temperature of the sea water in the external tank becomes high.

-Always operate the transducer in water.
Operating in air will allow the transducer to overheat resulting in failure.

The CVS-872D monitors the internal temperature of the transducer to protect it from failure due to overheating. When XID-adaptive TD [*1] is connected, CVS-872D controls the transmission output so that the transducer does not become hot by monitoring the internal temperature of the data received from the transducer.

Caution: If the internal temperature of the transducer becomes high, the temperature control may temporarily reduce the sensitivity of the image. For safe use, consult your dealer if temperature control is activated frequently.

[*1] XID-adaptive TD: Transducer with a function to output internal information (internal temperature, element characteristics, etc.).

1.3.2 Precautions regarding transducer installation

Cut a PF1 1/2 pipe parallel screw (P = 2.3091) in the 1 1/2 inch pipe, screw in the transducer, and fix it with the lock bolt.

Attach the pipe receiving bracket and tightening bracket to the ship's side so that this bolt can be moved up and down and removed.

Raise the pipe above sea level to avoid water pressure during the voyage. When using it, lower it as deeply as possible so that it is not affected by air bubbles.

During use, fix the front and back of transducer with a rope so as not to turn by water pressure.

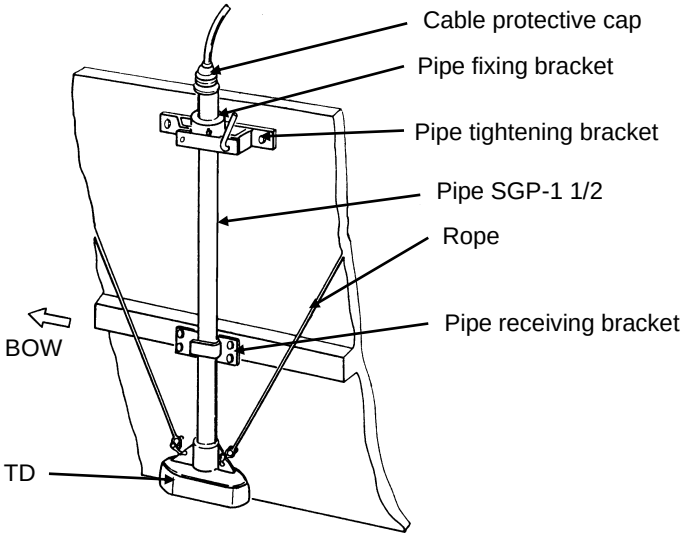


Fig.1.6 TD ship side installation diagram

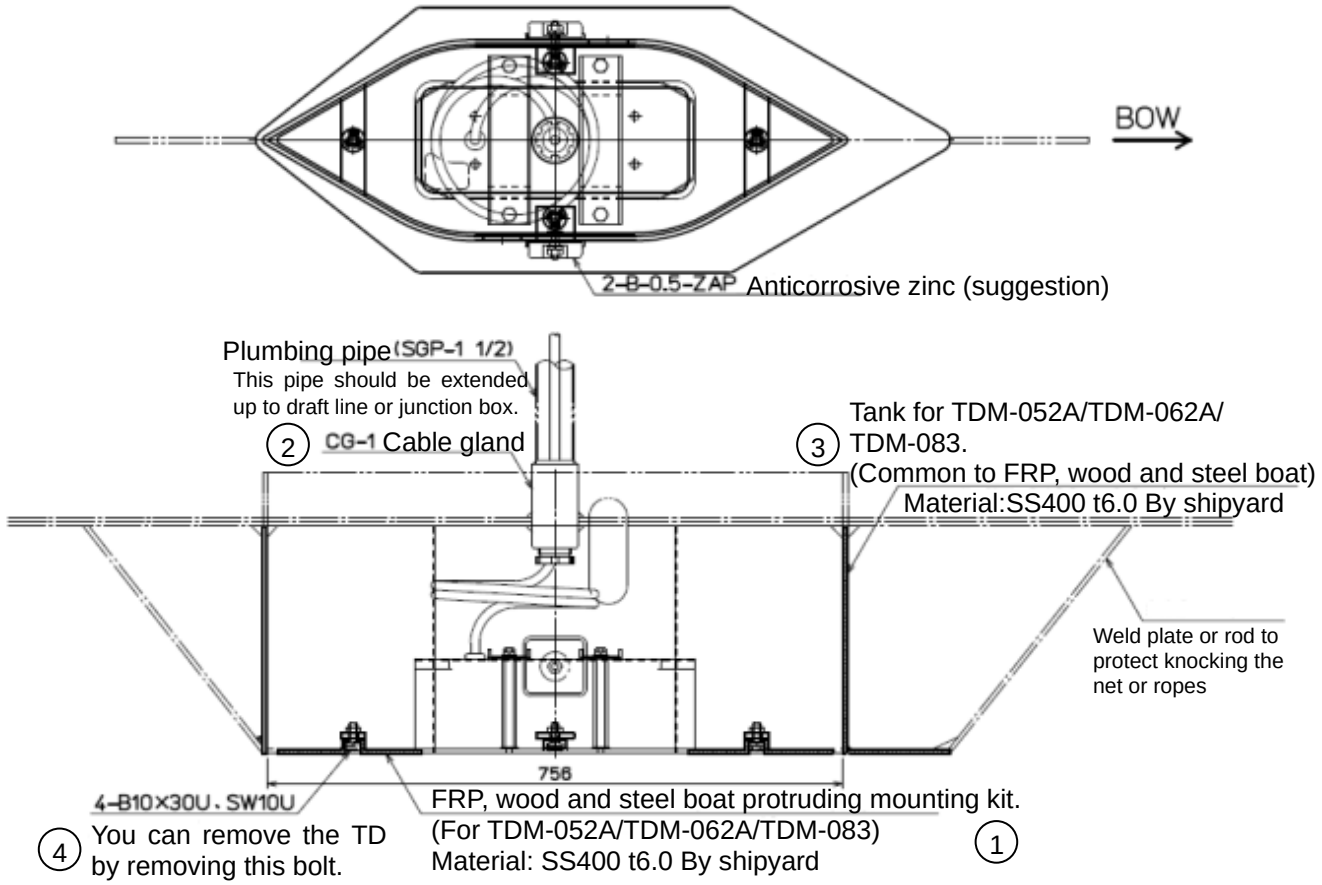
1.3.3 In the case of inner hull installation

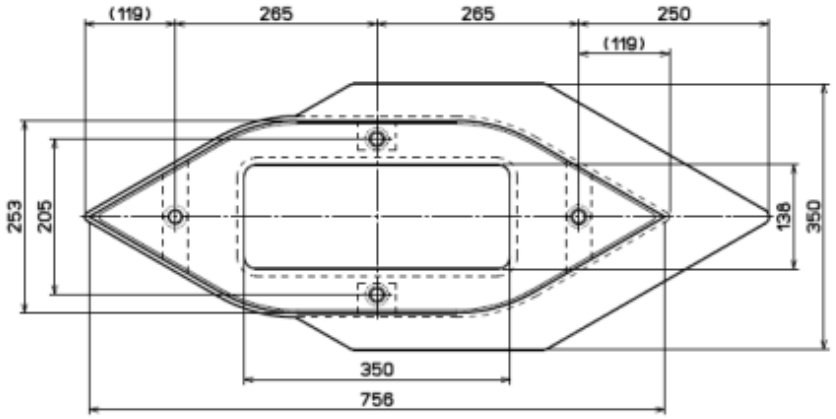
1.3.3.1 TDM-052A/TDM-062A/TDM-083

1) In the case of steel boat

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

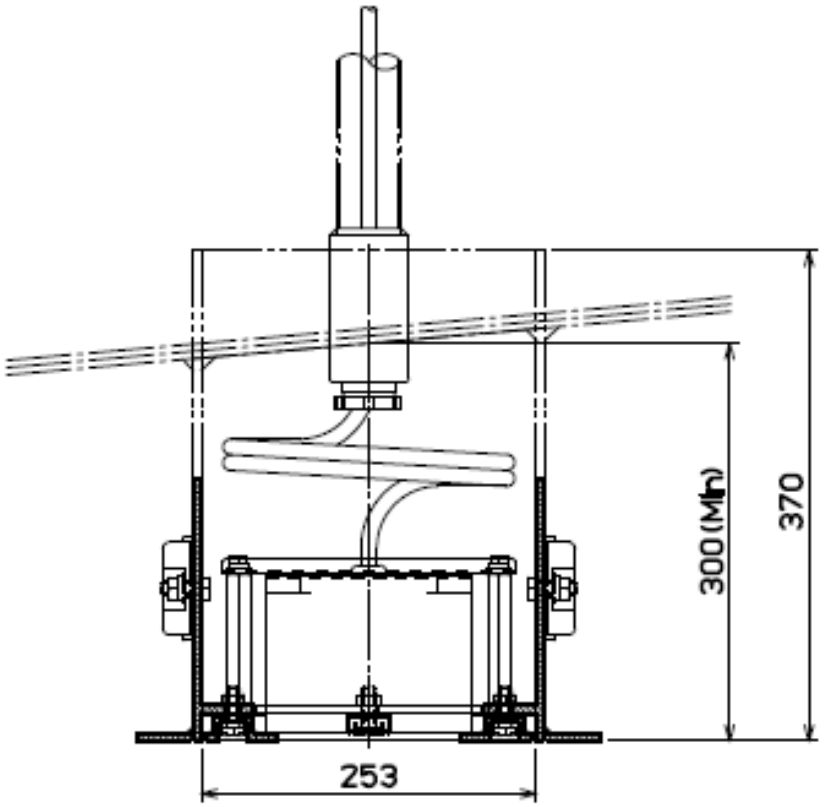
Unit: mm

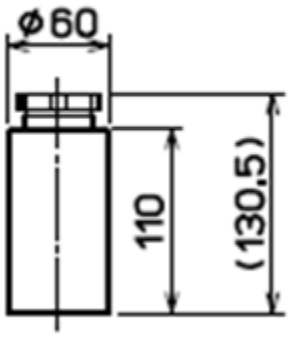




Mounting components of a transducer on steel boat

No.	Name	Material	Qty	Remarks
①	Transducer unit (with bottom plate)		1	
②	Cable gland (CG-1)	SS400	1	
③	Tank	SS400	1	By shipyard
④	Mounting bolts	SUS304	4	





CG-1 **Cable gland**

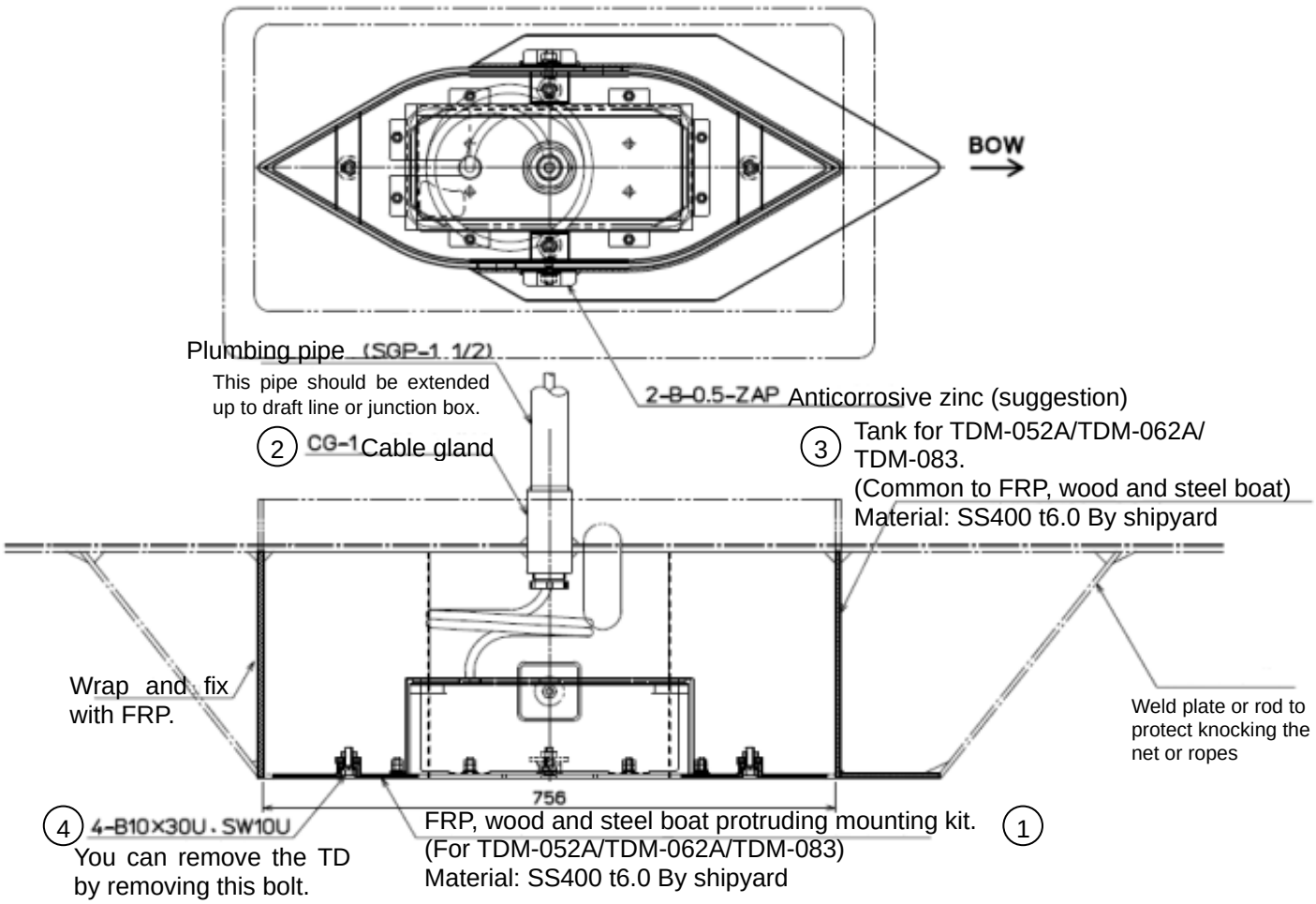
Unit: mm

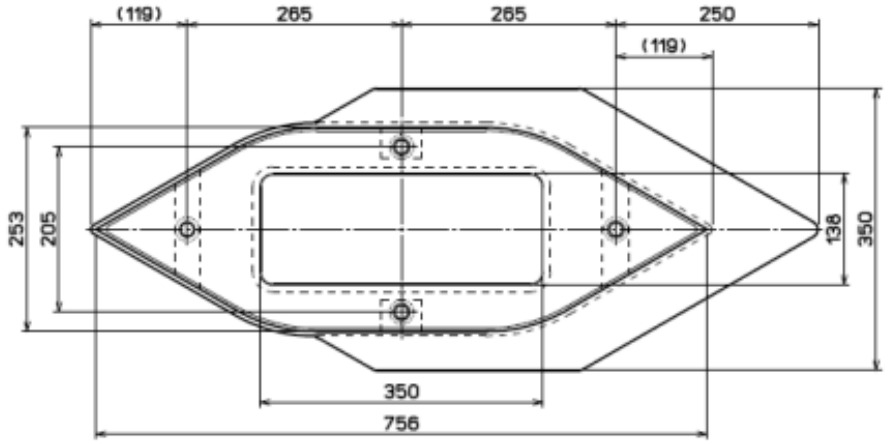
TRANSDUCER INSTALLATION:

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.

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

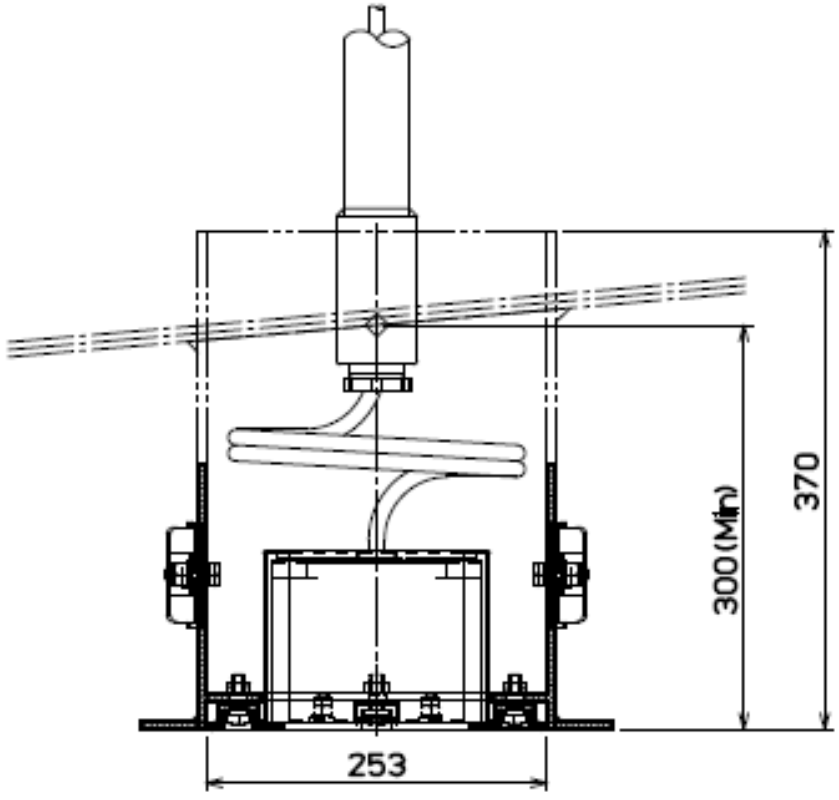
Unit: mm

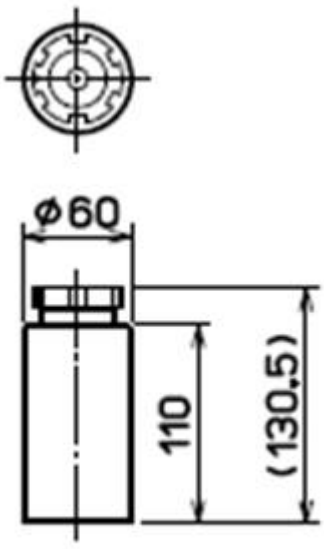




Mounting components of a transducer on steel boat

No.	Name	Material	Qty	Remarks
①	Transducer unit (with bottom plate)		1	
②	Cable gland (CG-1)	SS400	1	
③	Tank	SS400	1	By shipyard
④	Mounting bolts	SUS304	4	





CG-1 **Cable gland**

Unit: mm

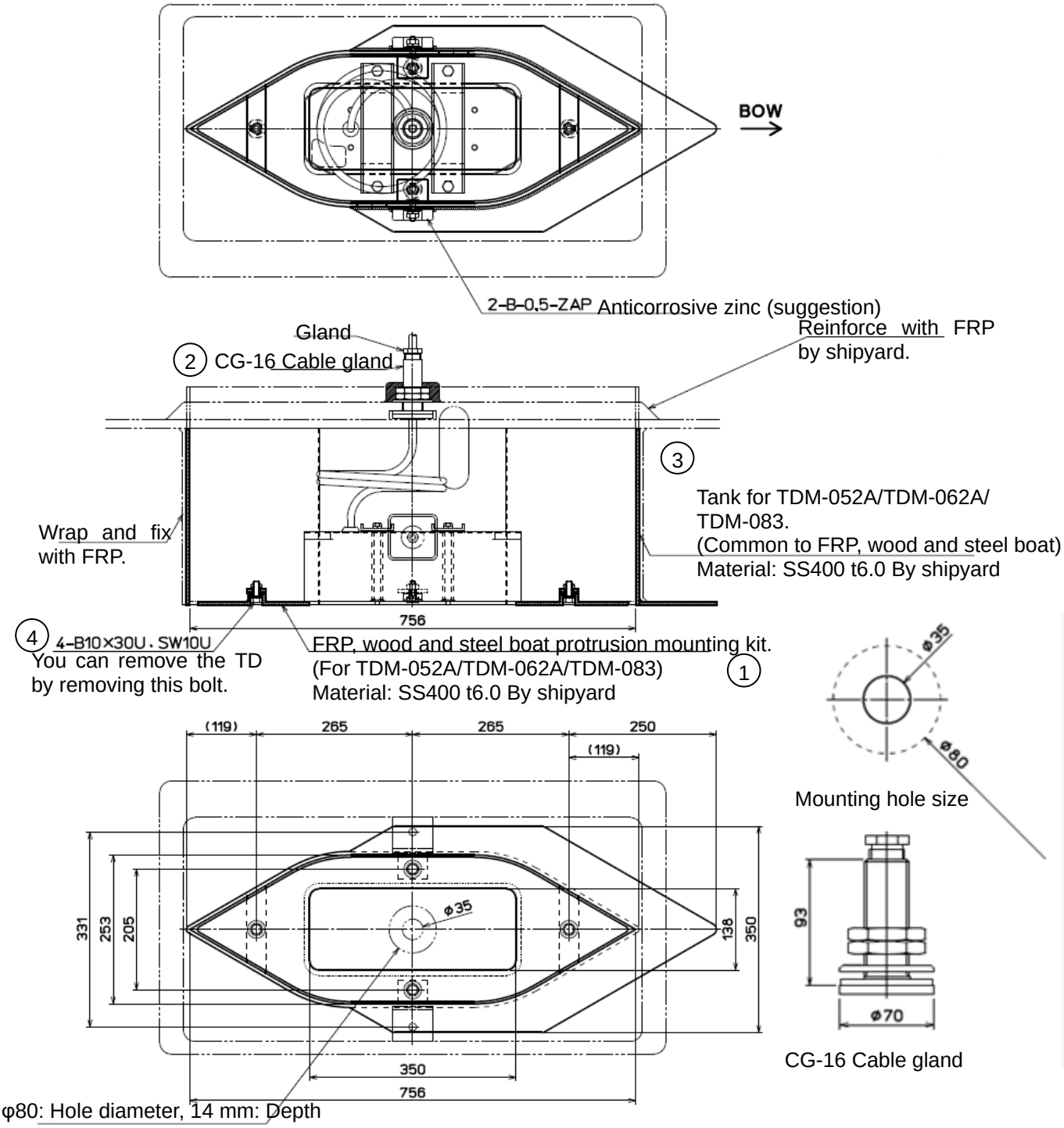
TRANSDUCER INSTALLATION:

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.

3) In the case of wooden and FRP boat

Unit: mm

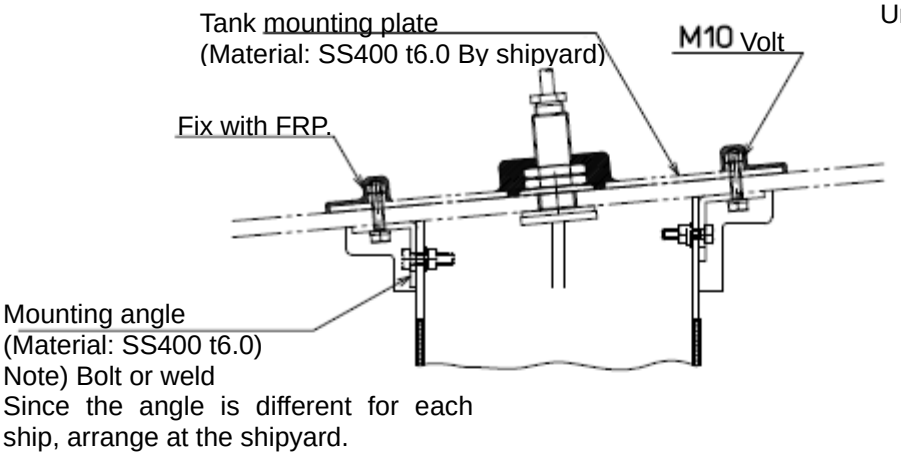
With reference to the figures below, install the transducer at a shipyard.



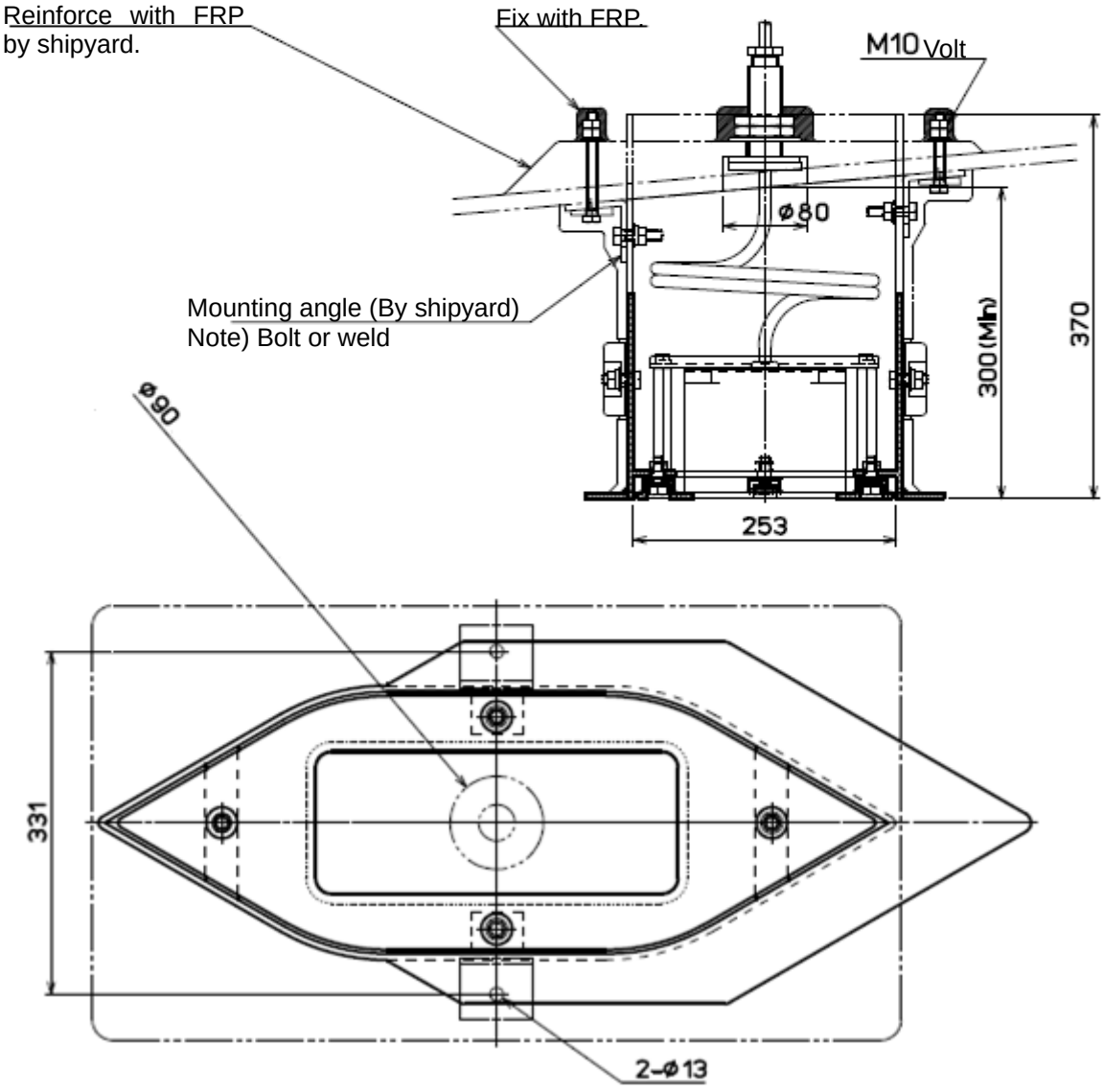
Mounting components of a transducer on steel boat

No.	Name	Material	Qty	Remarks
①	Transducer unit (with bottom plate)		1	
②	Cable gland (CG-16)	SS400	1	
③	Tank	SS400	1	By shipyard
④	Mounting bolts	SUS304	4	

Unit: mm

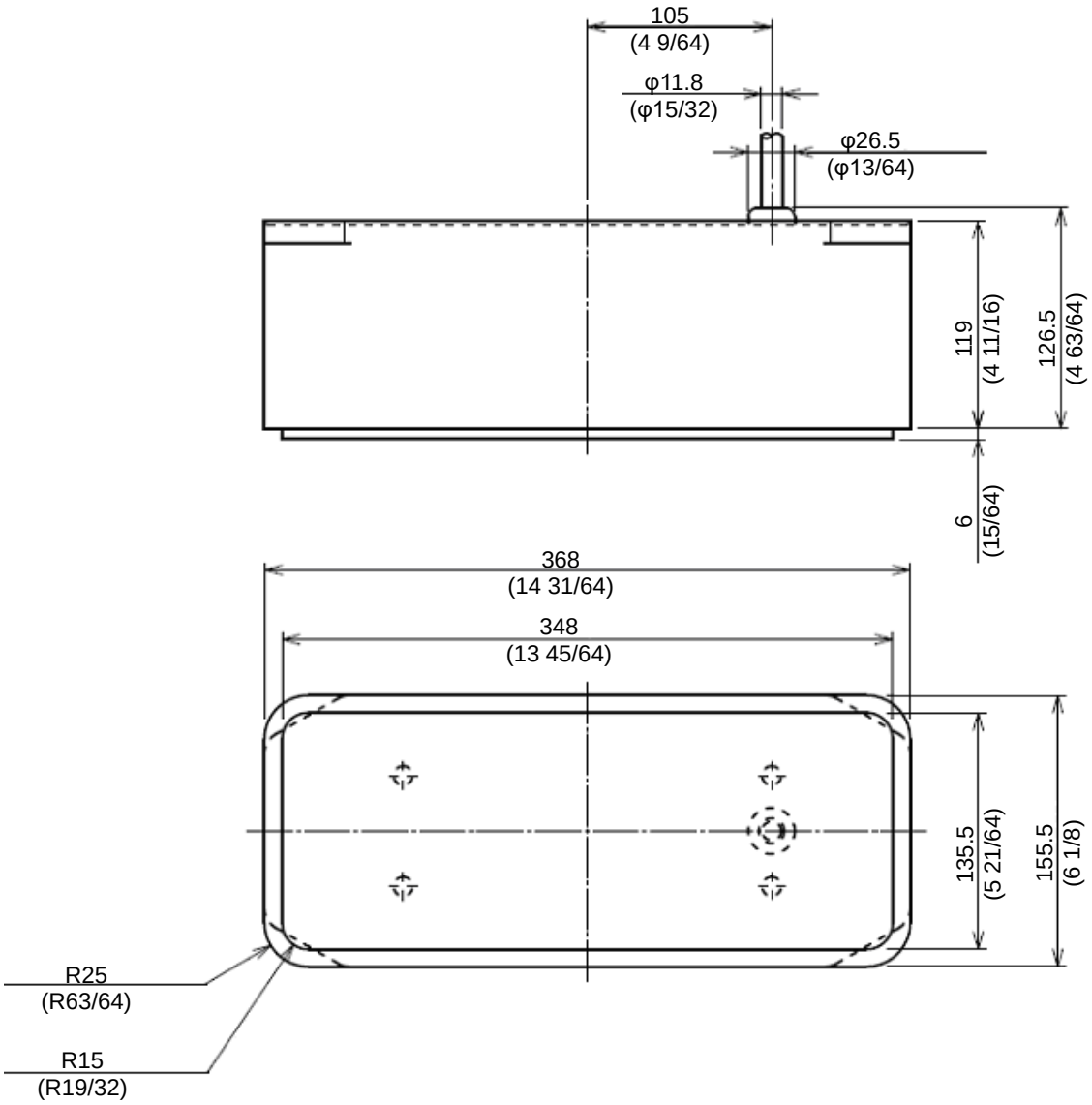


When fixing with a tank mounting plate



When fixing with a tank mounting plate

• **Outline dimensions and specifications of transducers (TDM-052A/TDM-062A/TDM-083)**



Unit: mm (inch)

Fig. 1.13 Outline dimensions of a transducer (TDM-052A/TDM-062A/TDM-083)

Specifications of transducers (TDM-052A/TDM-062A/TDM-083)

Cable length: 15 m (590 35/64)	
Weight	TDM-052A: 11.0 kg (24.5 lb)
	TDM-062A: 11.4 kg (25.2 lb)
	TDM-083: 13.9 kg (30.7 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.

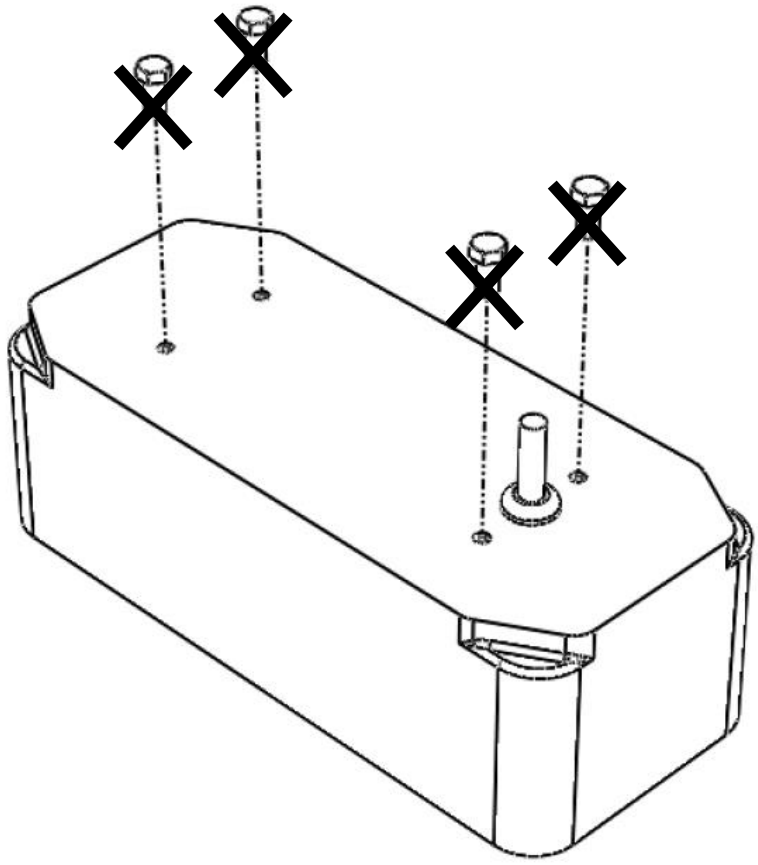
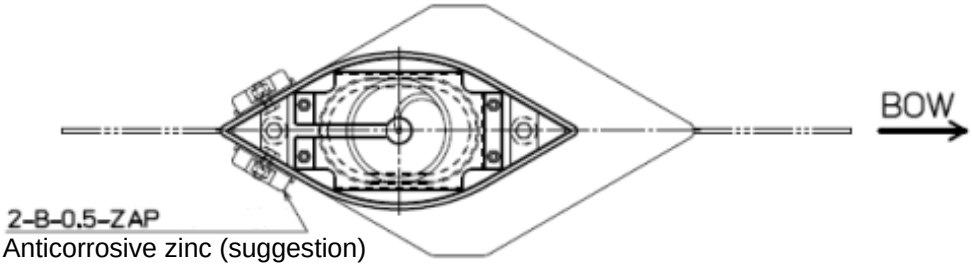


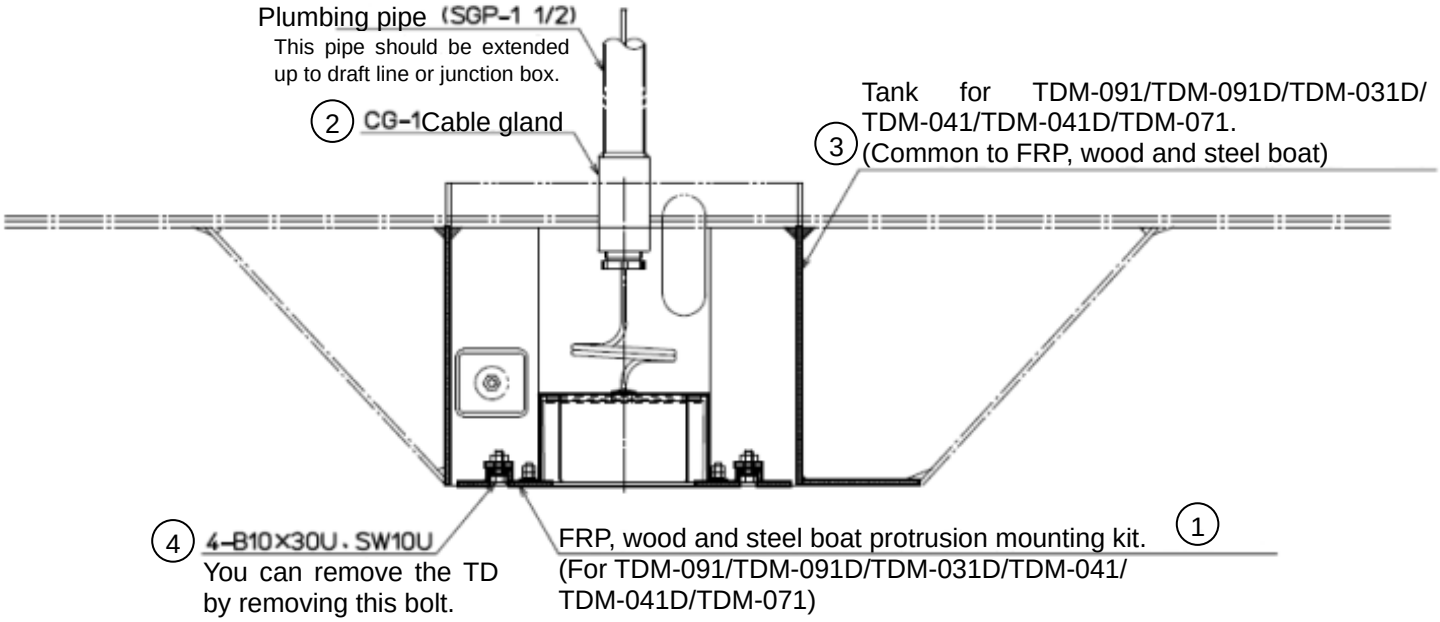
Fig. 1.14 Caution concerning equipment of transducer (TDM-052A/TDM-062A/TDM-083)

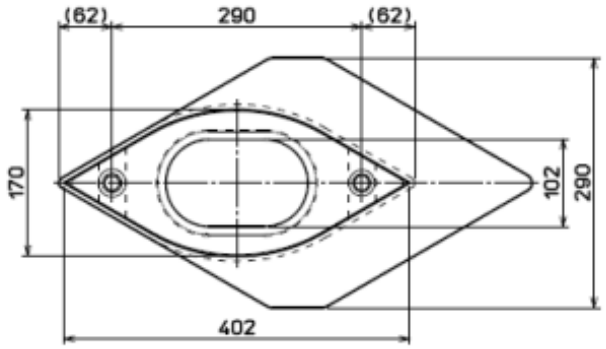
1.3.3.2 TDM-091/TDM-091D/TDM-031D/TDM-041/TDM-041D/TDM-071

1) In the case of steel boat

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

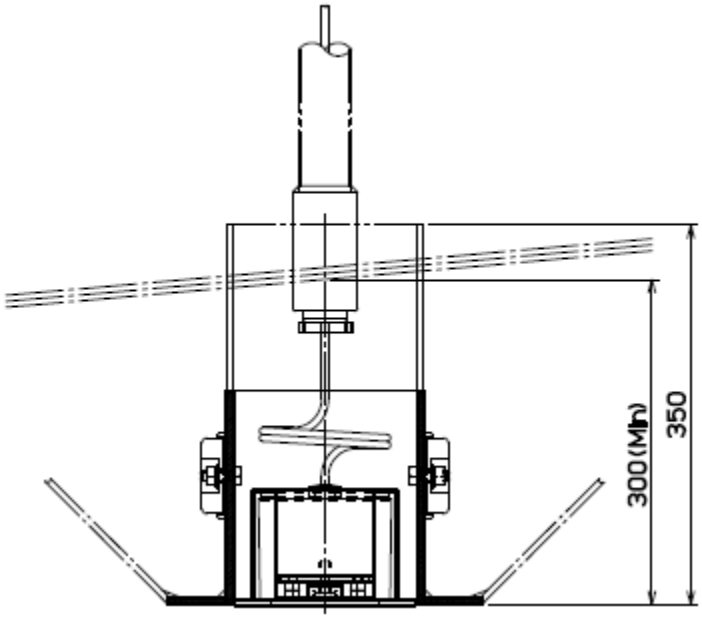




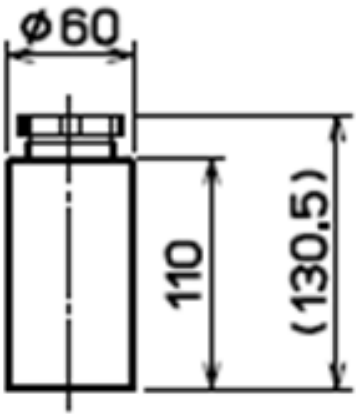


Mounting components of a transducer on steel boat

No.	Name	Material	Qty	Remarks
①	Transducer unit (with bottom plate)		1	
②	Cable gland (CG-1)	SS400	1	
③	Tank	SS400	1	By shipyard
④	Mounting bolts	SUS304	4	







CG-1 **Cable gland**

Unit: mm

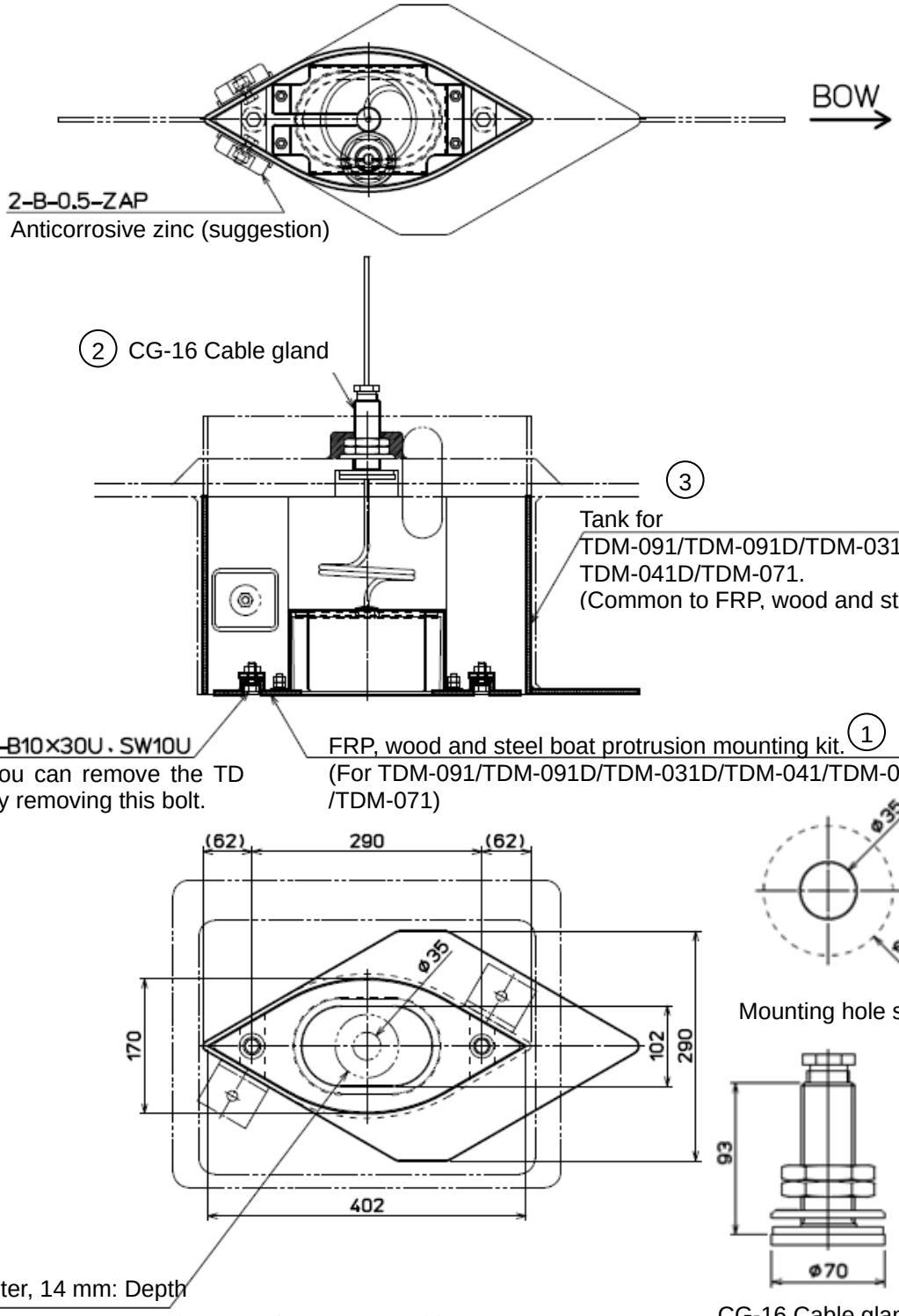
TRANSDUCER INSTALLATION:

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

2) In the case of wooden and FRP boat

Unit: mm

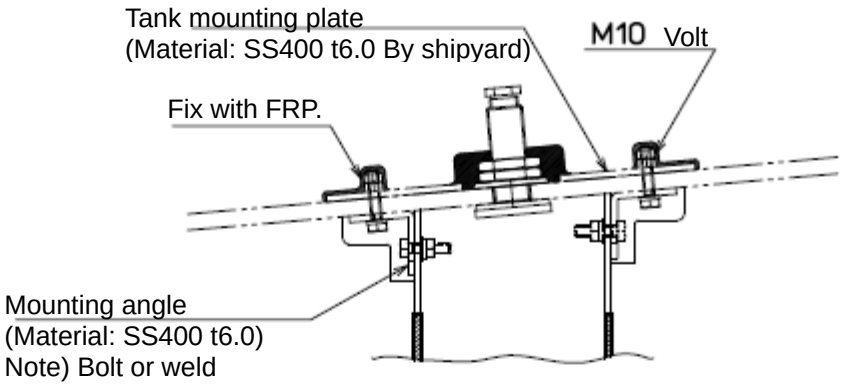
With reference to the figures below, install the transducer at a shipyard.



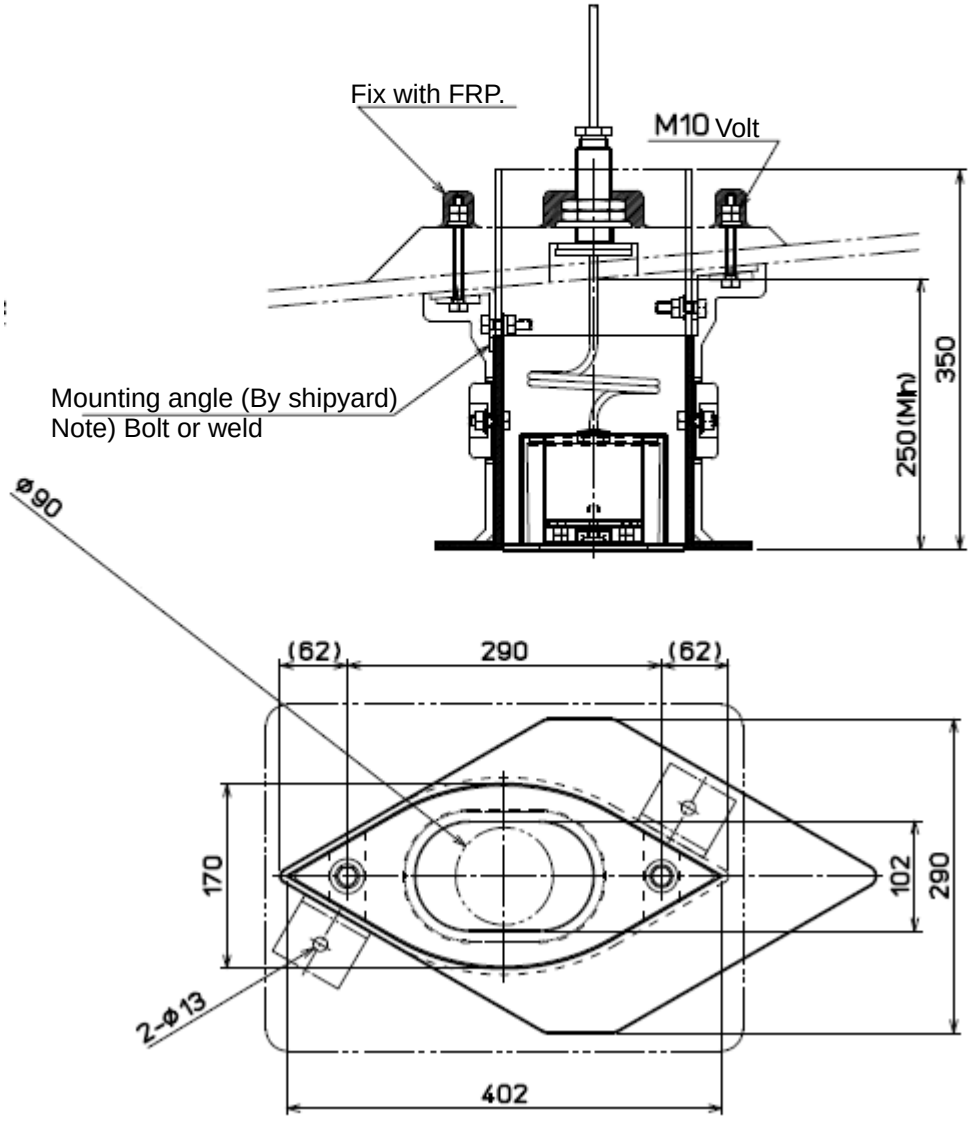
Mounting components of a transducer on steel boat

No.	Name	Material	Qty	Remarks
①	Transducer unit (with bottom plate)		1	
②	Cable gland (CG-16)	SS400	1	
③	Tank	SS400	1	By shipyard
④	Mounting bolts	SUS304	4	

Unit: mm



When fixing with a tank mounting plate



When fixing with a tank mounting plate

• Outline dimensions and specifications of transducers (TDM-091/TDM-091D/ TDM-031D/TDM-041/TDM-041D/TDM-071)

Unit: mm (inch)

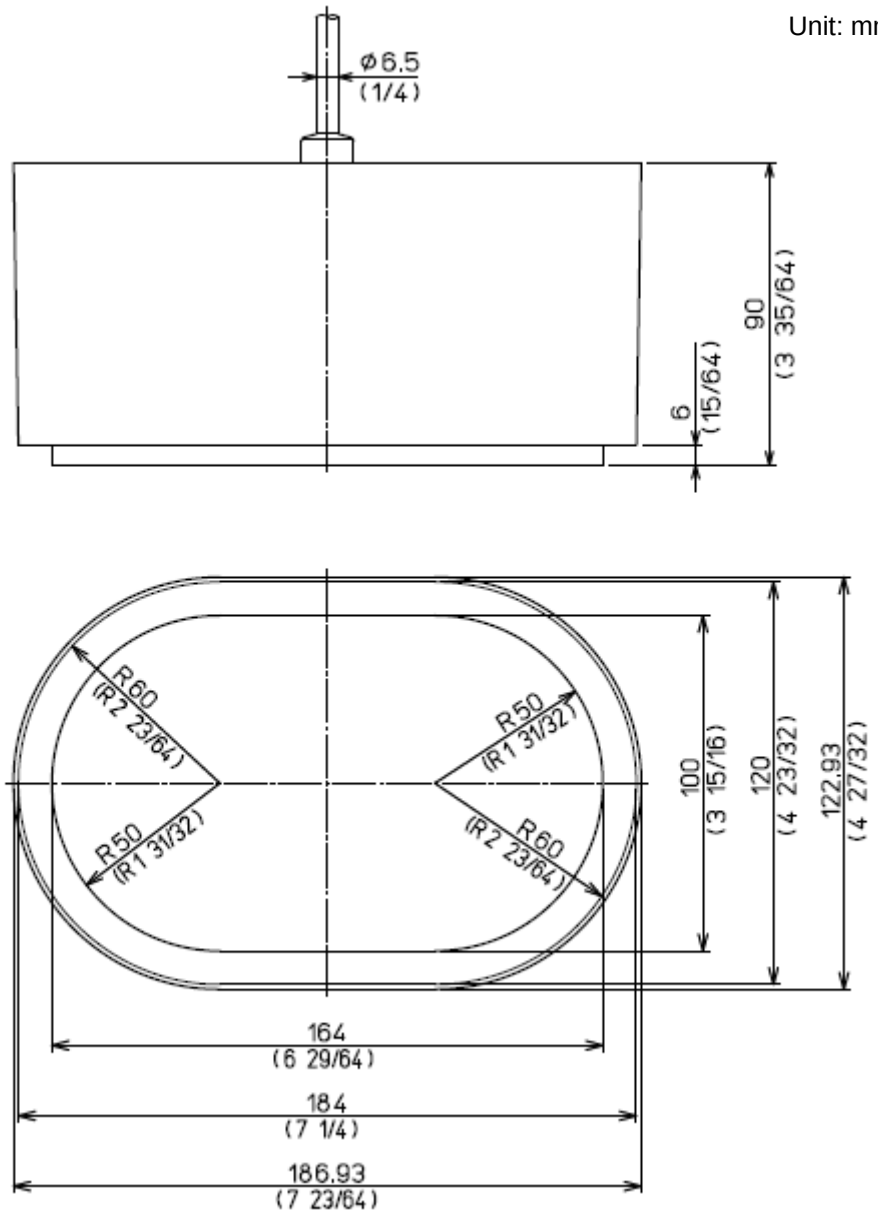


Fig. 1.15 Outline dimensions of a transducer (TDM-091/TDM-091D/TDM-031D/TDM-041/ TDM-041D/TDM-071)

Specifications of transducers (TDM-091/TDM-091D/TDM-031D/TDM-041/TDM-041D/ TDM-071)

Cable length: 15 m (590 35/64)	
Weight	TDM-091: 5.28kg (11.62lb)
	TDM-091D: 5.28kg (11.62lb)
	TDM-031D: 4.60kg (10.14lb)
	TDM-041: 5.38kg (11.85lb)
	TDM-041D: 4.20kg (9.27lb)
	TDM-071: 1.38kg (9.64lb)
Material: Rubber mold	

1.3.3.2 Outline dimensions and specifications of other transducers

• Outline dimensions and specifications of transducers (TD-501C/TD-501B/TD-751/ TD-2001D)

Unit: mm (inch)

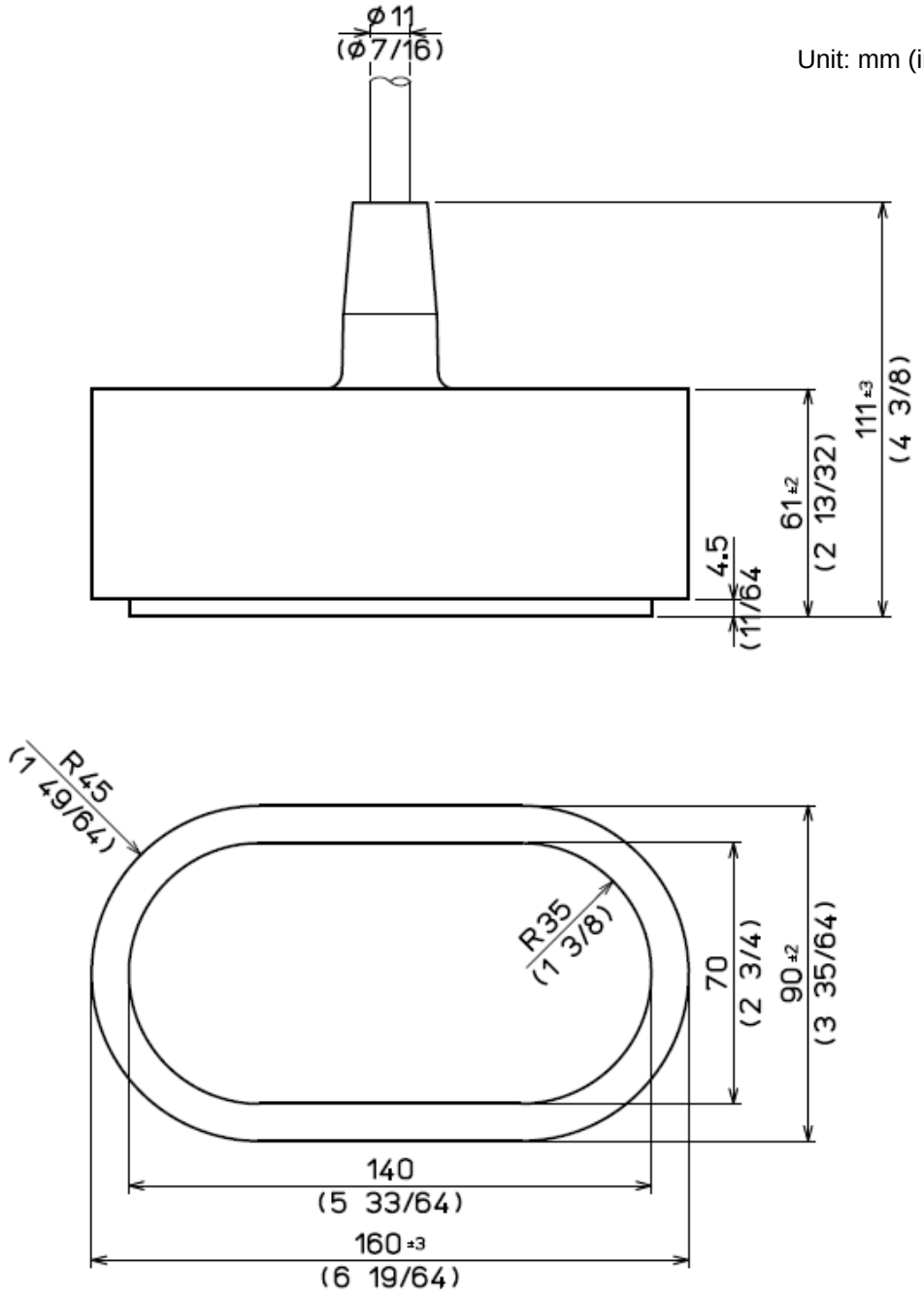


Fig. 1.16 Outline dimensions of a transducer (TD-501C, TD-501B/TD-751/TD-2001D)

Specifications of transducers (TD-501C/TD-501B/TD-751/TD-2001D)

Cable length: 10 m (393 45/64)	
Weight	TD-501C: 4.2kg (9.3lb)
	TD-501B: 4.2kg (9.3lb)
	TD-751: 4.2kg (9.3lb)
	TD-2001D: 4.2kg (9.3lb)
Material: Rubber mold	

- **Outline dimensions and specifications of transducers (TD-501T-3B)**

Unit: mm (inch)

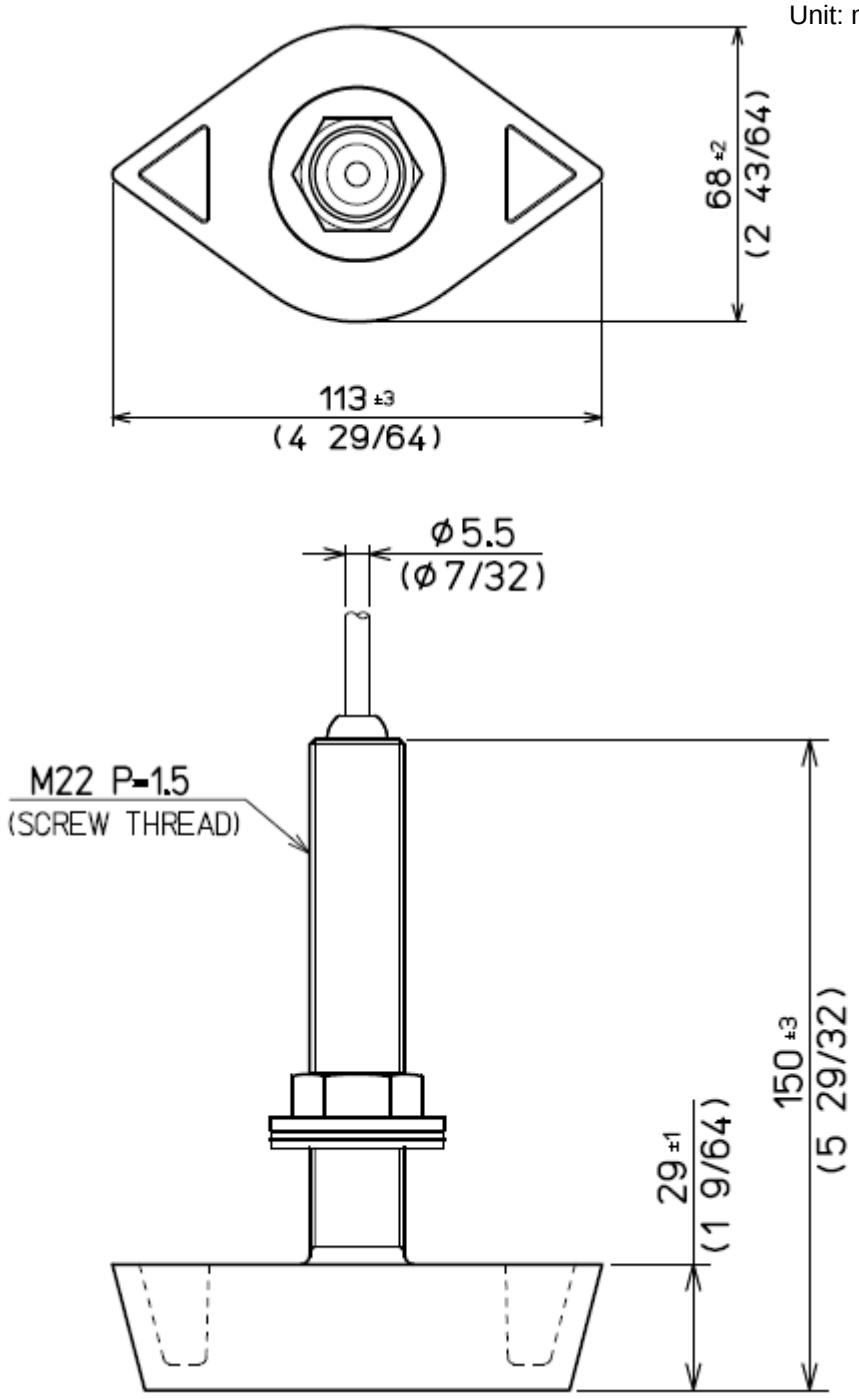


Fig. 1.17 Outline dimensions of a transducer (TD-501T-3B)

Specifications of transducer (TD-501T-3B)

Cable length: 9 m (354 5/16)	
Weight	TD-501T-3B: 1.3kg (2.9lb)
Material: Bronze	

• Outline dimensions and specifications of transducers (TD-284/284A/TD-404T/ TD-504T/TD-504F)

Unit: mm (inch)

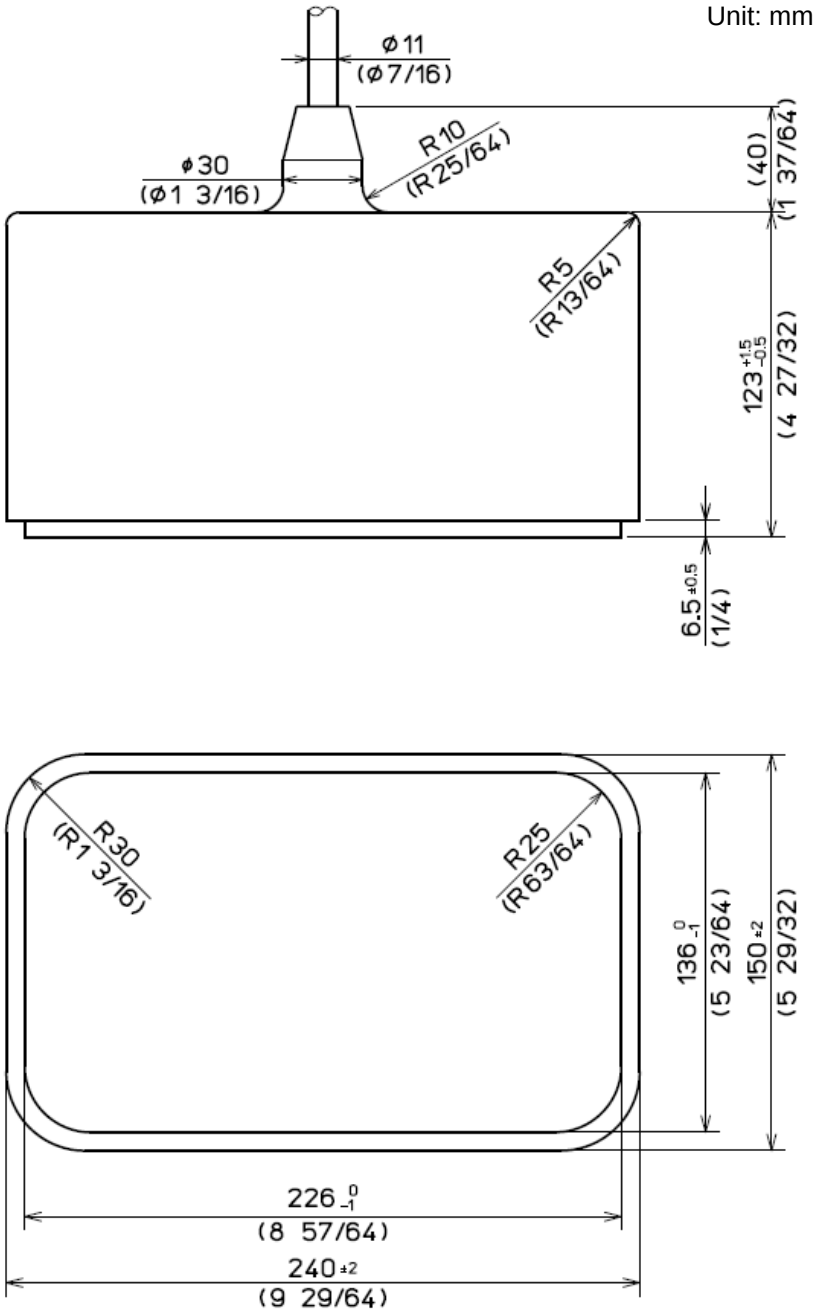


Fig. 1.18 Outline dimensions of a transducer (TD-284/284A/TD-404T/TD-504T/ TD-504F)

Specifications of transducers (TD-284/284A/TD-404T/TD-504T/TD-504F)

Cable length: 15 m (590 35/64)	
Weight	TD-284: 11.0kg (24.3lb)
	TD-284A: 11.0kg (24.3lb)
	TD-404T: 11.0kg (24.3lb)
	TD-504T: 11.0kg (24.3lb)
	TD-504F: 11.0kg (24.3lb)
Material: Rubber mold	

- **Outline dimensions and specifications of transducers (TD-754)**

Unit: mm (inch)

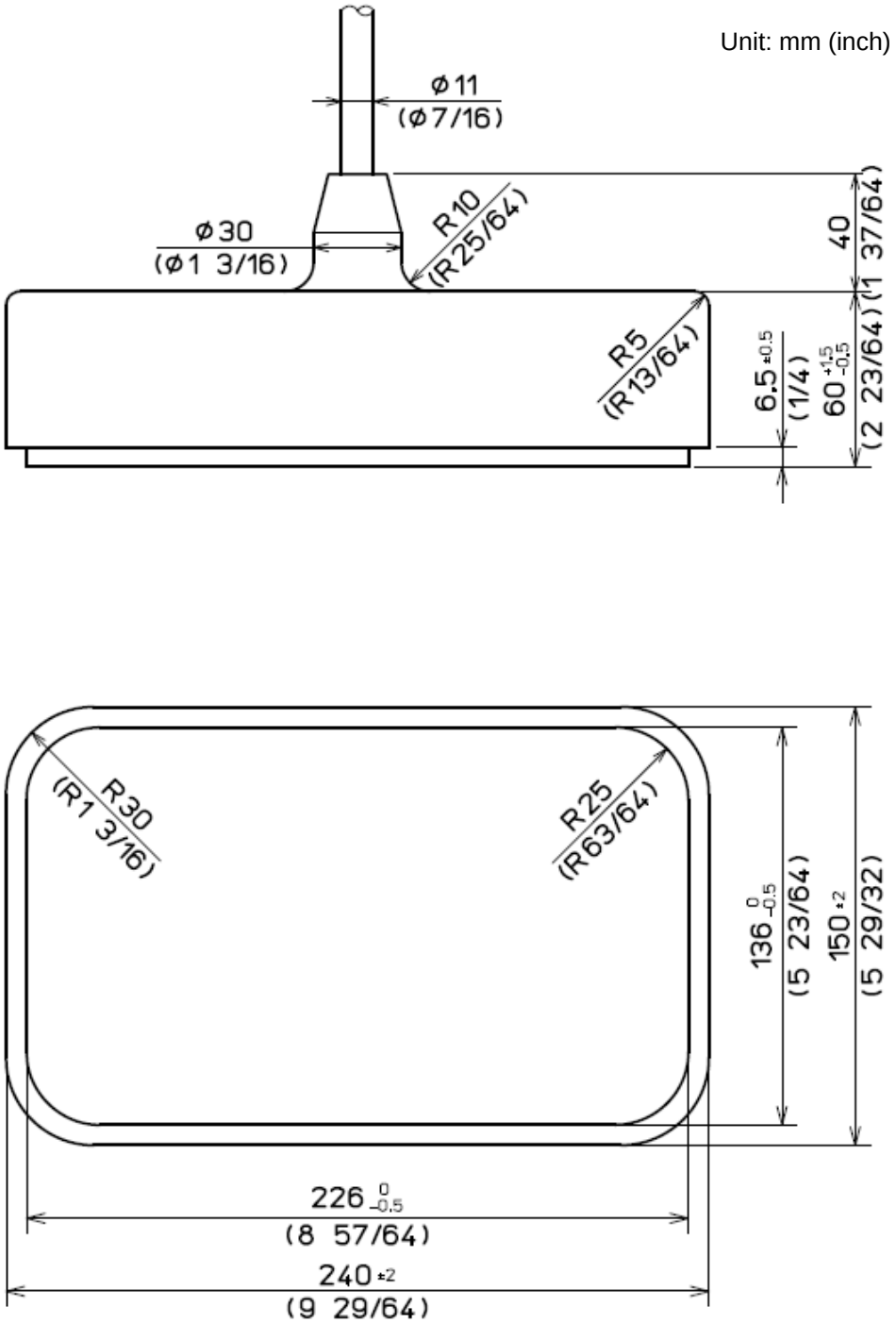


Fig. 1.19 Outline dimensions of a transducer (TD-754)

Specifications of transducer (TD-754)

Cable length: 15 m (590 35/64)	
Weight	TD-754: 6.5kg (14.3lb)
Material: Rubber mold	

• **Outline dimensions and specifications of transducers (TD-66)**

Unit: mm (inch)

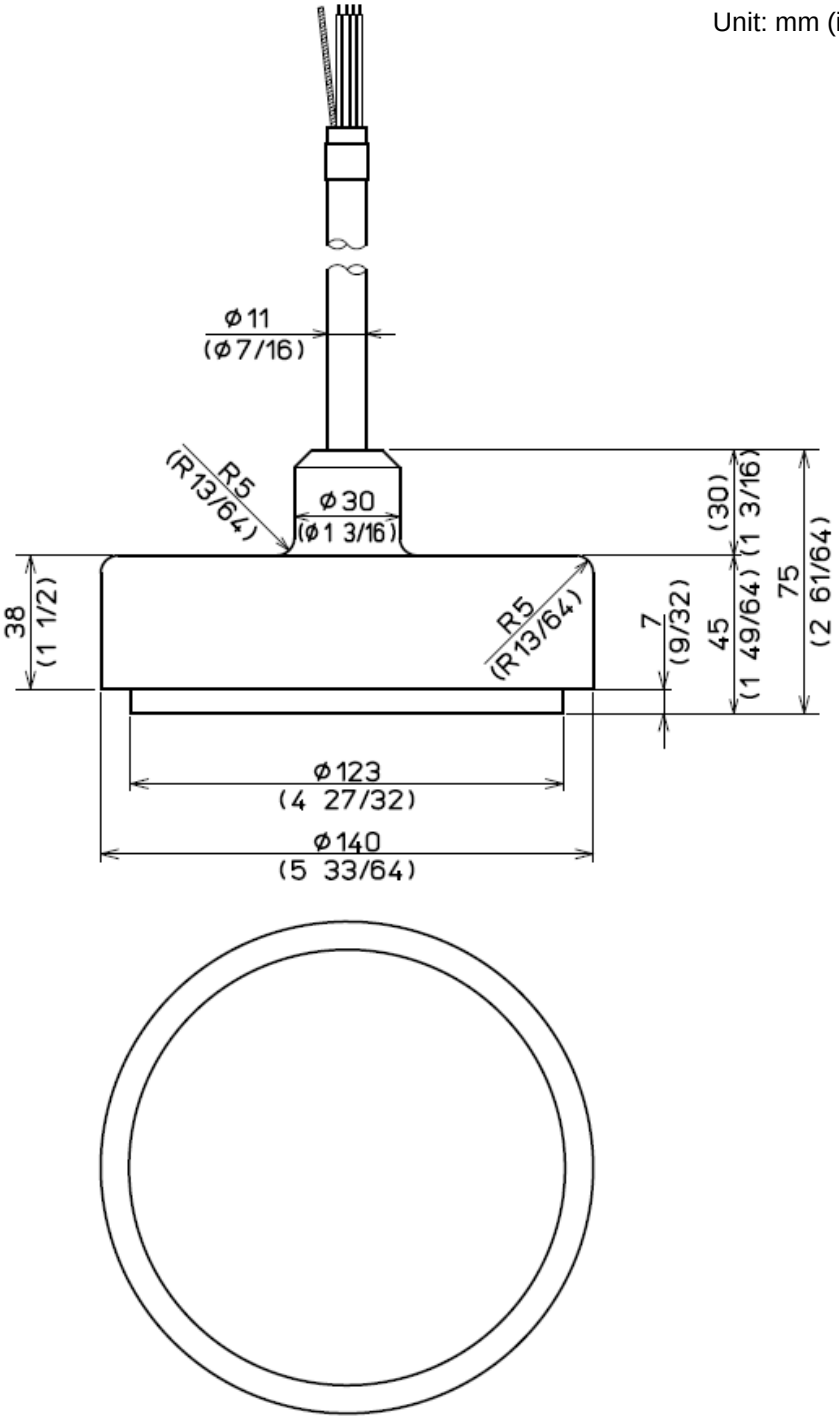


Fig. 1.20 Outline dimensions of a transducer (TD-66)

Specifications of transducer (TD-66)

Cable length: 20 m	
Weight	TD-66: 4.5kg (9.39lb)
Material: Rubber mold	

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.

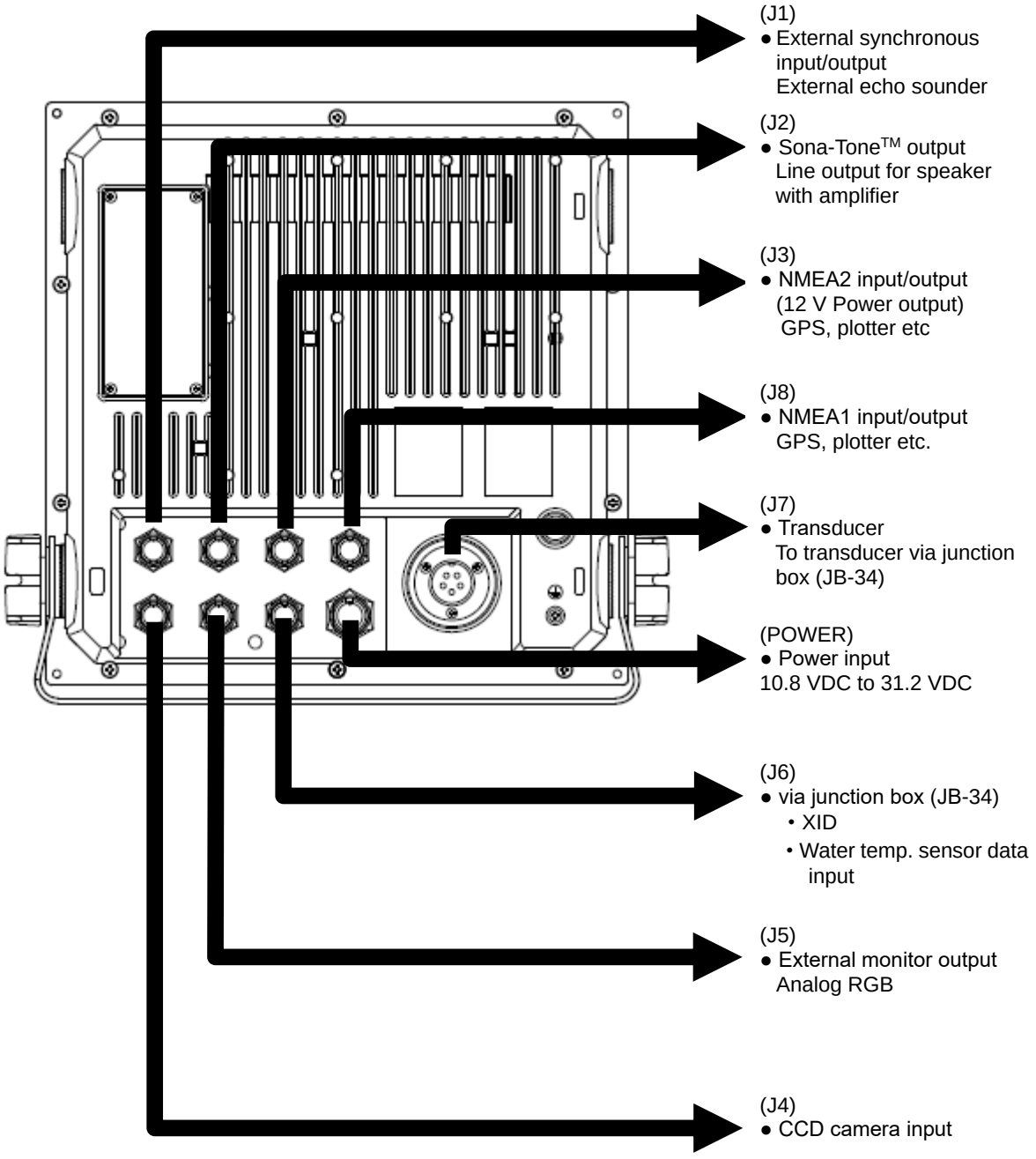


Fig. 1.21 Cable connections

Pin assignment of rear connectors

Pin assignment viewed from the rear of Display unit:

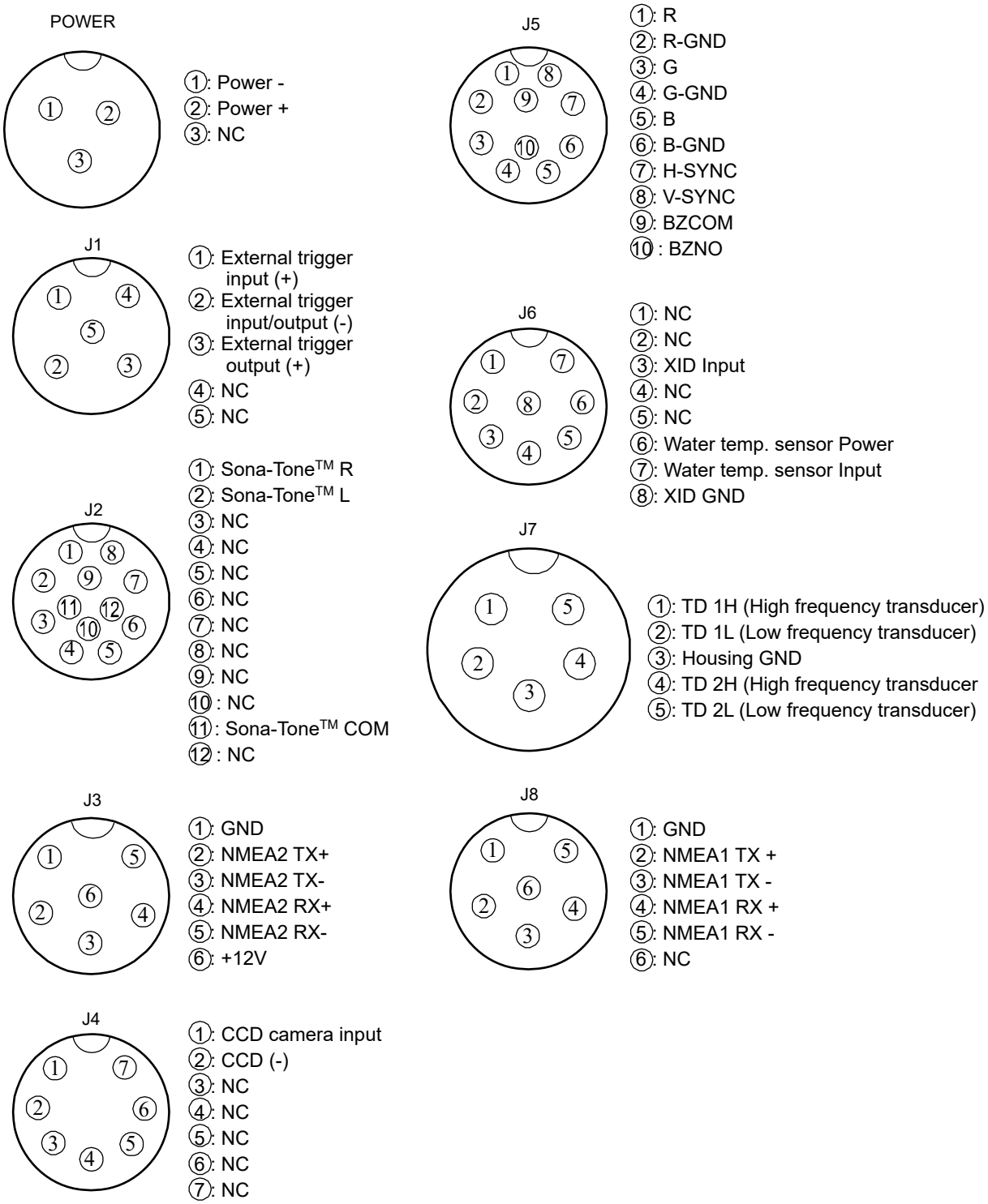


Fig. 1.22 Pins assignment of rear connector

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

Connection of power cable (CW-259-2M)

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

Connection of DC power cable (CW-259-2M)

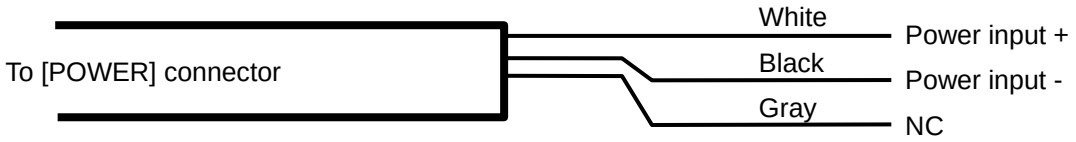


Fig. 1.23 Connection of DC power cable

⚠ **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 XID-adaptive TD

In the case of connection of CVS-872D and transducer (TDM-052A/TDM-062A/TDM-083):

1) Refer to the connection table of transducers, solder CW-836-3M and CW-844-3M 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-872D.
Connect CW-844-3M after the above processing to J6 connector of CVS-872D.

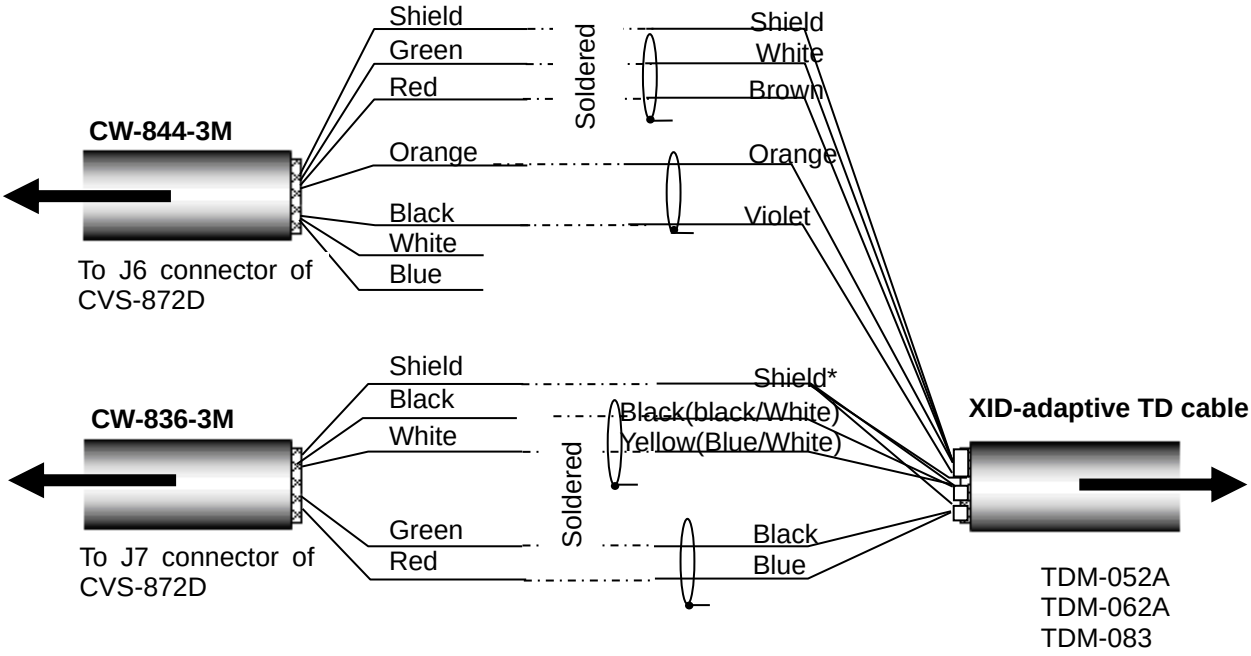


Fig. 1.24 Connection of transducer cable

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/ XID data	-	-	Orange	-	Orange,	XID
1	Blue/NC	-	-	Blue	-	-	
2	White/NC	-	-	White	-	-	
8	Black/XID GND	-	-	Black	-	Violet	XID
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 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 CW-836-3M and solder them.

In the case of connection of TDM-052A/TDM-062A/TDM-083 via the junction box (JB-34):

1) Connect CVS-872D and the cable connected to the junction box (JB-34)

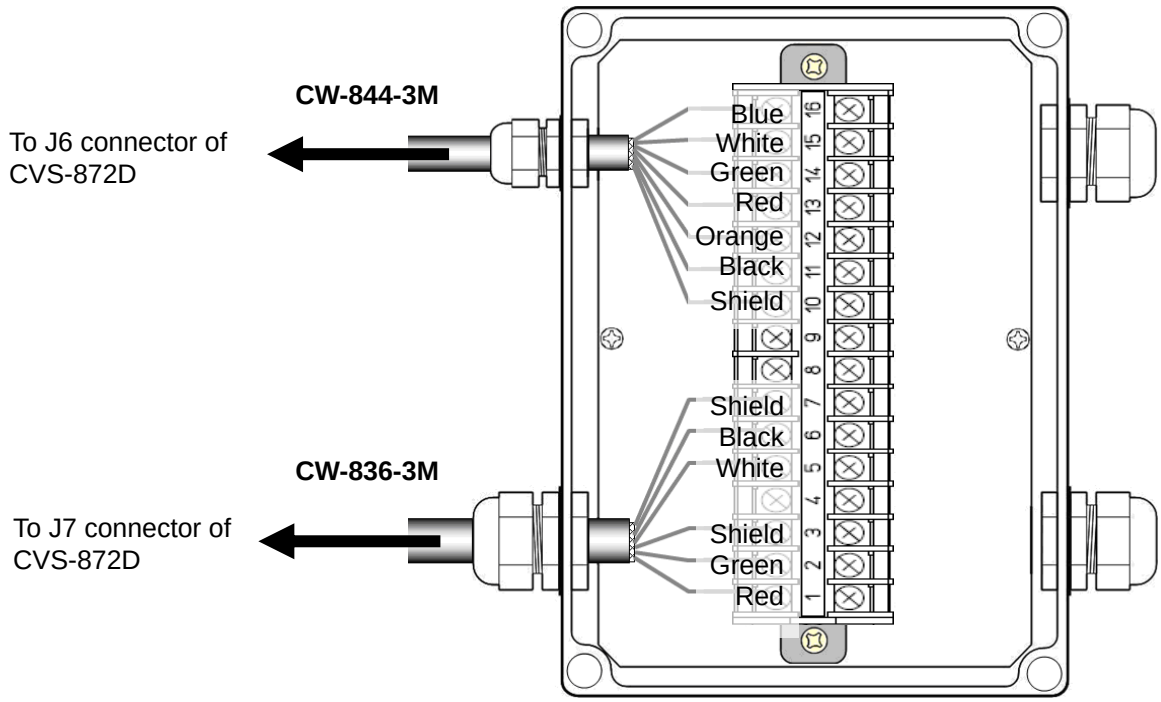


Fig. 1.25 Connection between CVS-872D and junction box

Connection list of junction box (JB-34)

Junction box (JB-34)		Cable		CVS-872D		
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	Shield	Shield	CW-844-3M	J6 (8-pin)	4	Shield
11	XID GND	Black			8	Black / XID GND
12	XID Data	Orange			3	Orange / XID data
13	Water temp. sensor (+)	Red			7	Red/ Water temp. sensor input
14	Water temp. sensor (power)	Green			6	Green/ Water temp. sensor power
15	NC	White			2	White / NC
16	NC	Blue			1	Blue / NC

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

Cable of the transducer is configured as shown in Fig. 1.26.
Refer to Fig. 1.27, connect the cable to the junction box (JB-34).

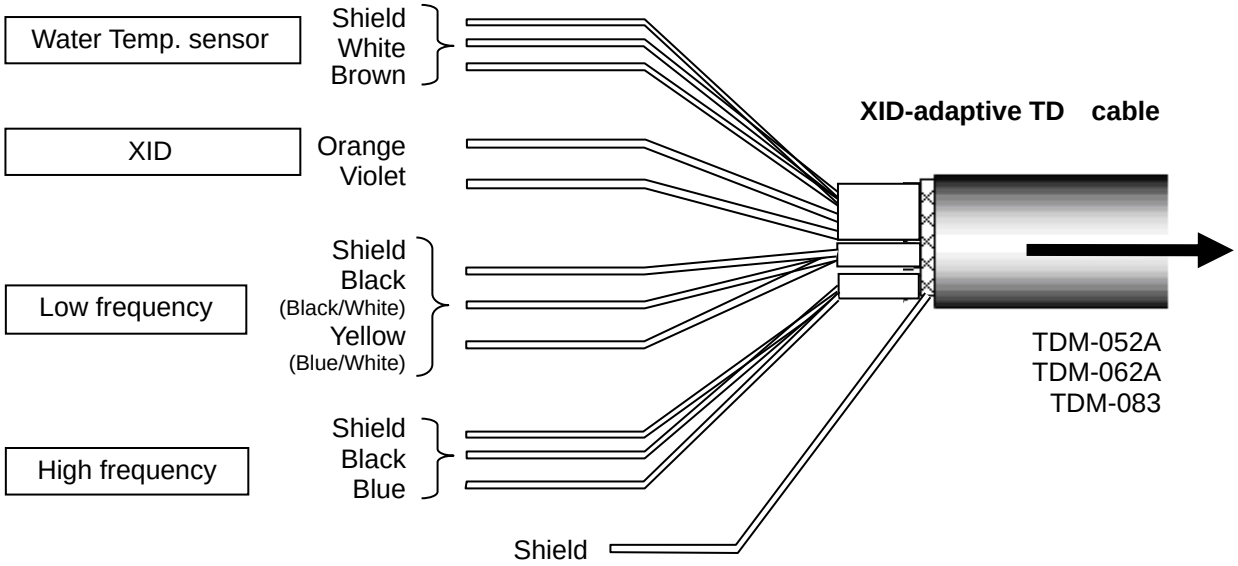


Fig. 1.26 Details of transducer cable

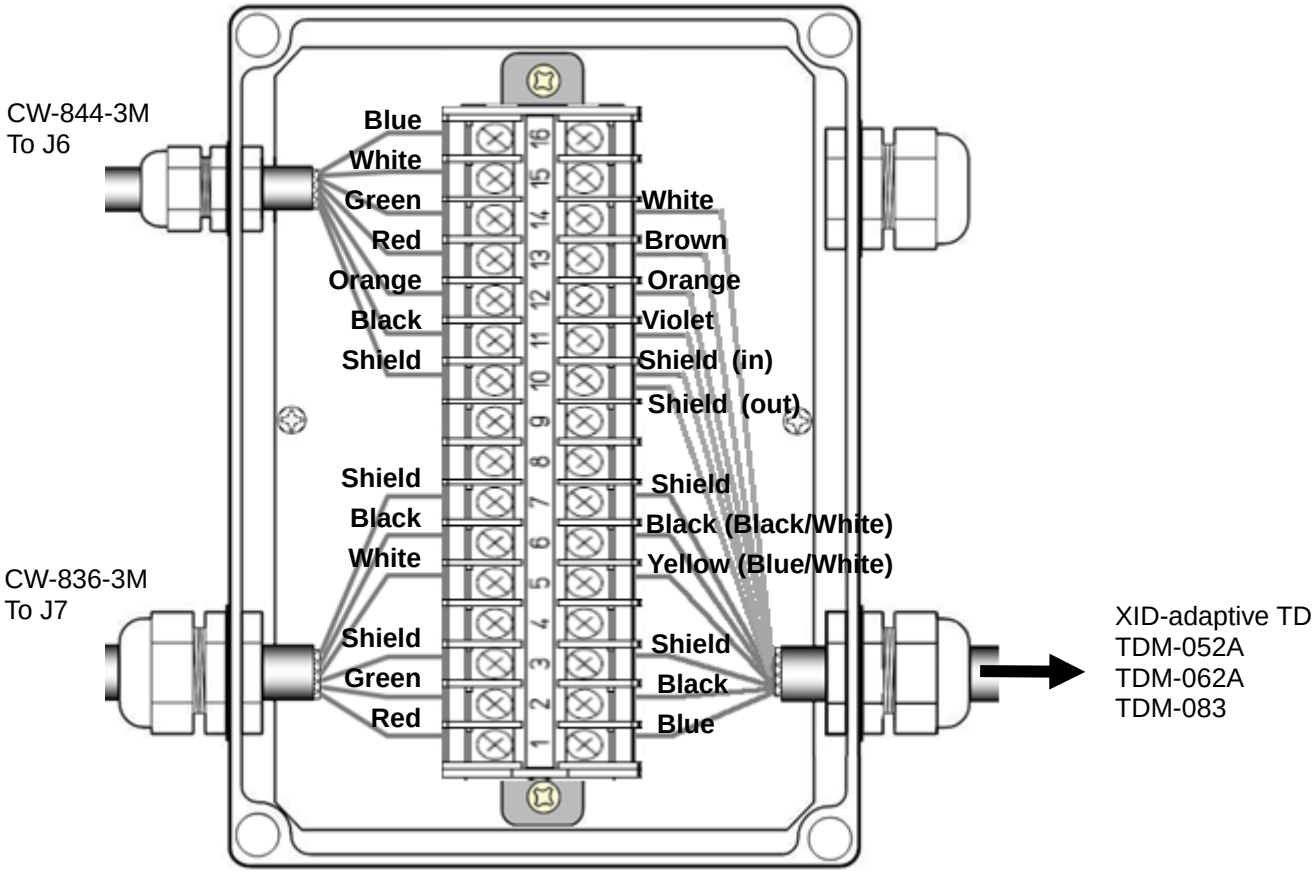


Fig. 1.27 Connection between junction box and transducer

Connection table of transducers

CVS-872D			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	-	-	-
J6	4	Shield	10	Shield	Shield	Shield
	8	Black / XID GND	11	XID GND	Violet	XID
	3	Orange / XID data	12	XID Data	Orange	
	7	Red/ Water temp. sensor input	13	Water temp. sensor (+)	Brown	Water temp. sensor
	6	Green/ Water temp. sensor power	14	Water temp. sensor (power)	White	
	1	-	15	-	-	
	2	-	16	-	-	

*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 number.

In the case of connection of CVS-872D and transducer (TDM-091/TDM-041):

1) Refer to the connection table of transducers, solder CW-836-3M and CW-844-3M 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-872D.
Connect CW-844-3M after the above processing to J6 connector of CVS-872D.

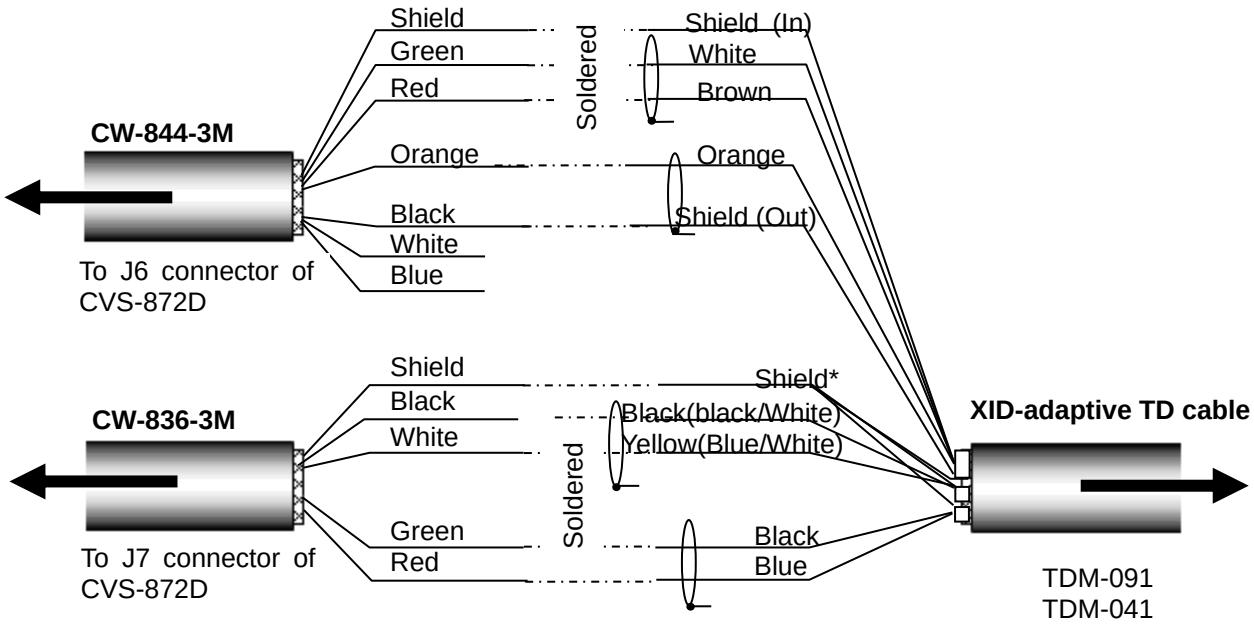


Fig. 1.28 Connection of transducer cable

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 (In)	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/XID Data	-	-	Orange	-	Orange,	XID
1	Blue/NC	-	-	Blue	-	-	
2	White/NC	-	-	White	-	-	
8	Black/XID GND	-	-	Black	-	Shield (Out)	XID
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 CW-836-3M and solder them.

In the case of connection of TDM-091/TDM-041 via the junction box (JB-34):
1) Connect CVS-872D and the cable connected to the junction box (JB-34)

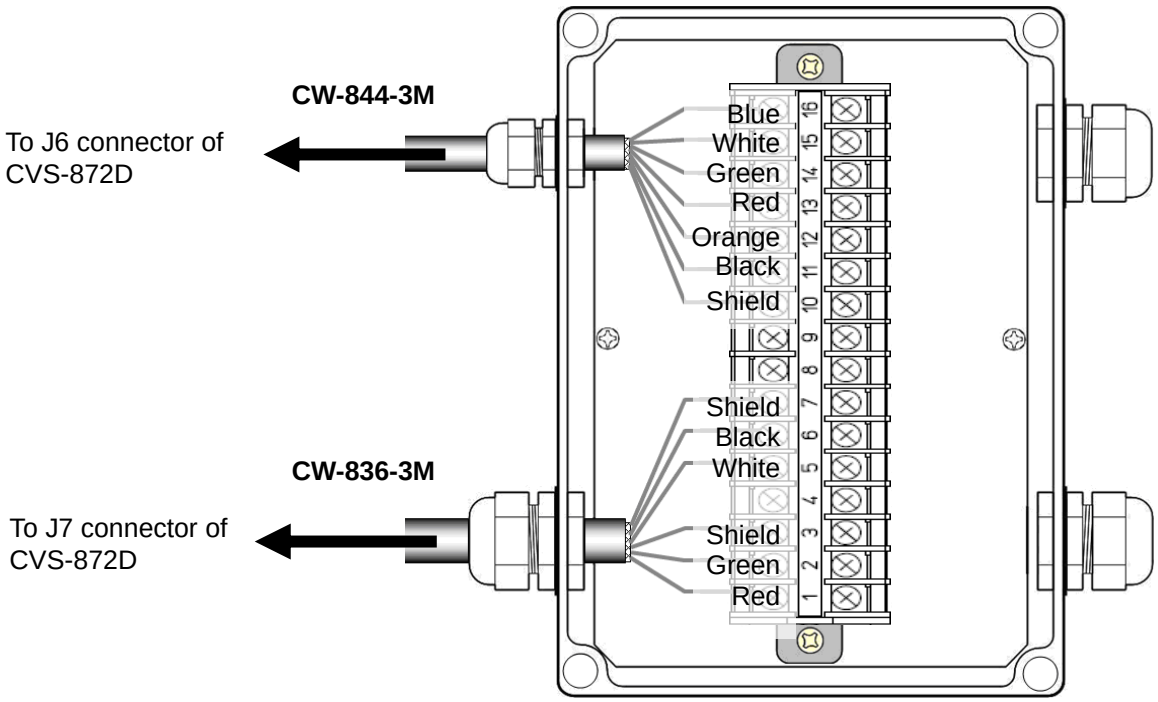


Fig. 1.29 Connection between CVS-872D and junction box

Connection list of junction box (JB-34)

Junction box (JB-34)		Cable		CVS-872D		
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	Shield	Shield	CW-844-3M	J6 (8-pin)	4	Shield
11	XID GND	Black			8	Black / XID GND
12	XID Data	Orange			3	Orange / XID data
13	Water temp. sensor (+)	Red			7	Red/ Water temp. sensor input
14	Water temp. sensor (power)	Green			6	Green/ Water temp. sensor power
15	NC	White			2	White / NC
16	NC	Blue			1	Blue / NC

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

Cable of the transducer is configured as shown in Fig. 1.30.
Refer to Fig. 1.31, connect the cable to the junction box (JB-34).

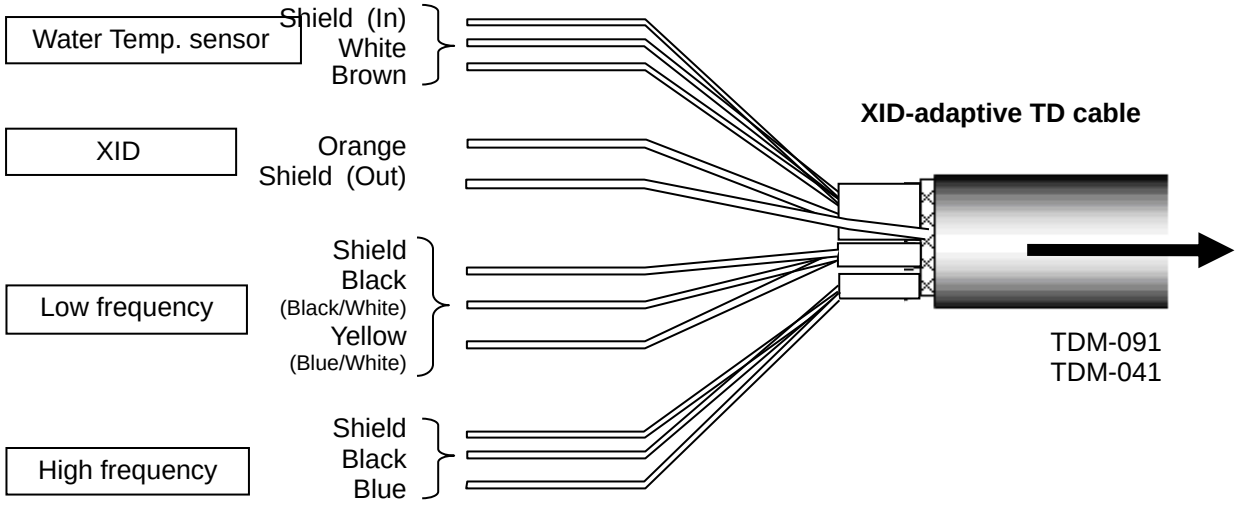


Fig. 1.30 Details of transducer cable

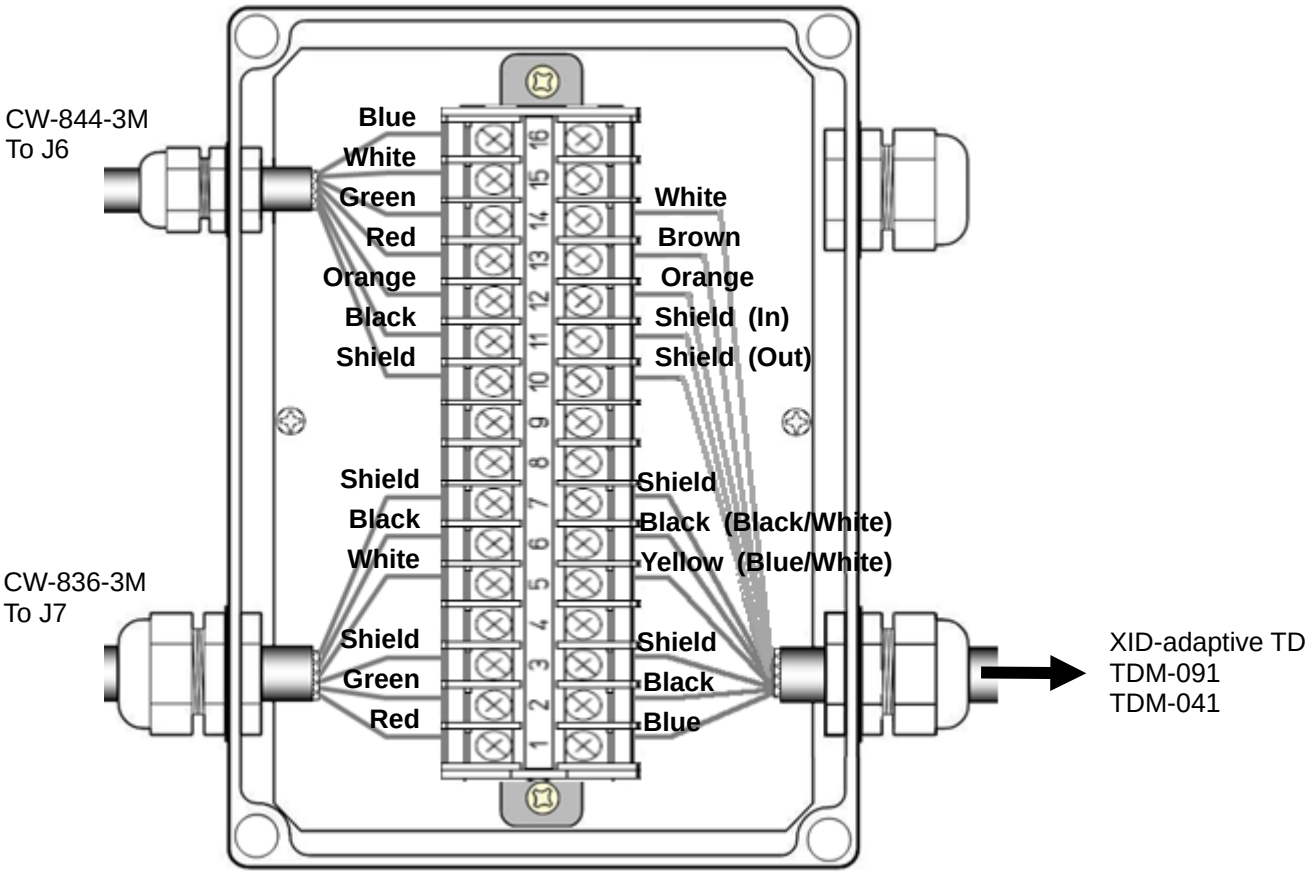


Fig. 1.31 Connection between junction box and transducer

Connection table of transducers

CVS-872D			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	-	-	-
J6	4	Shield	10	Shield	Shield (In)	Shield
	8	Black / XID GND	11	XID GND	Shield (Out)	XID
	3	Orange / XID data	12	XID Data	Orange	
	7	Red/ Water temp. sensor input	13	Water temp. sensor (+)	Brown	Water temp. sensor
	6	Green/ Water temp. sensor power	14	Water temp. sensor (power)	White	
	1	-	15	-	-	
	2	-	16	-	-	

*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 number.

In the case of connection of CVS-872D and transducer (TDM-091D/TDM-031D/ TDM-041D/TDM-071):

1) Refer to the connection table of transducers, solder CW-836-3M and CW-844-3M 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-872D.
Connect CW-844-3M after the above processing to J6 connector of CVS-872D.

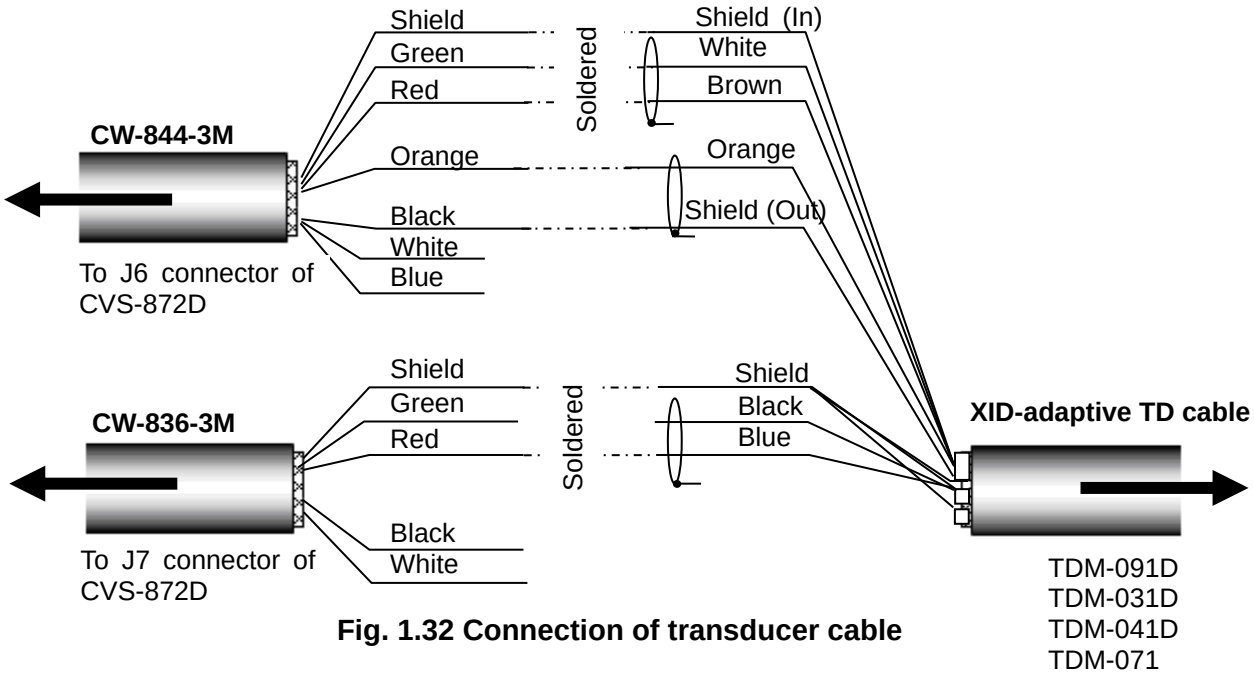


Fig. 1.32 Connection of transducer cable

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 (In)	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/XID Data	-	-	Orange	-	Orange,	XID
1	Blue/NC	-	-	Blue	-	-	
2	White/NC	-	-	White	-	-	
8	Black/XID GND	-	-	Black	-	Shield (Out)	XID
No.	**J7**						
3	Shield	Shield	Housing GND	-	-	Shield	
5	Black/TD2L (Low frequency transducer)	Black	TD2L	-	-	-	
2	White/TD1L (Low frequency transducer)	White	TD1L	-	-	-	
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.

In the case of connection of TDM-091D/TDM-031D/TDM-041D/TDM-071 via the junction box (JB-34):

1) Connect CVS-872D and the cable connected to the junction box (JB-34)

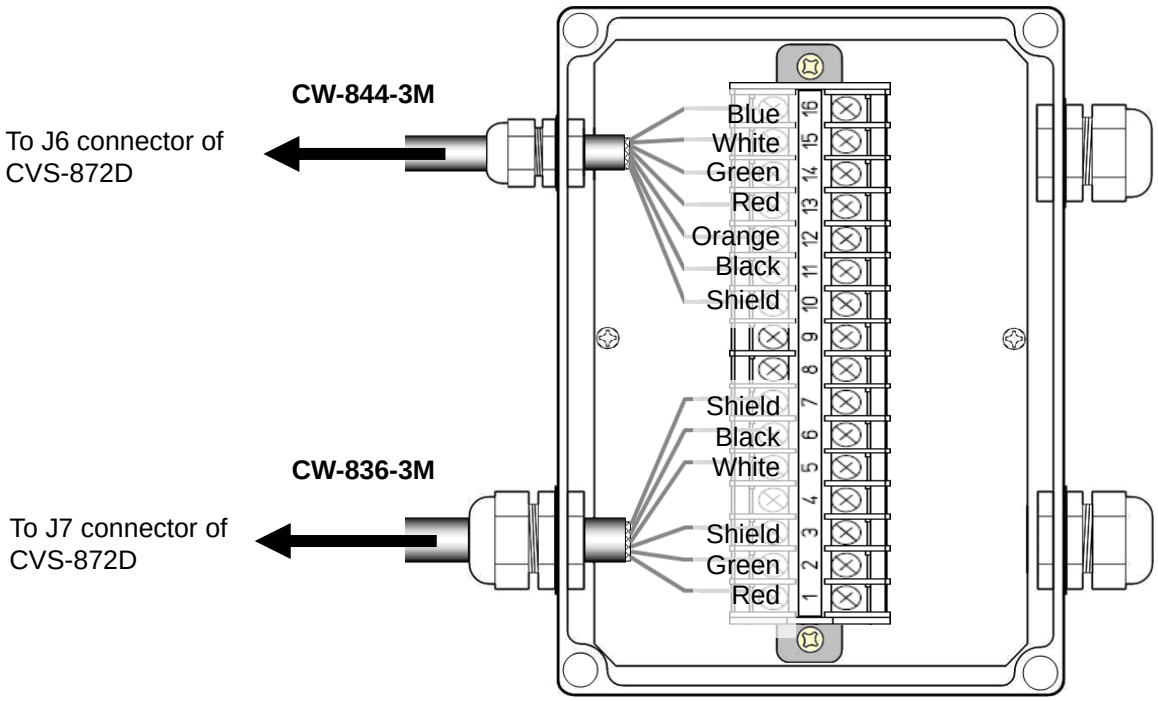


Fig. 1.33 Connection between CVS-872D and junction box

Connection list of junction box (JB-34)

Junction box (JB-34)		Cable		CVS-872D		
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	Shield	Shield	CW-844-3M	J6 (8-pin)	4	Shield
11	XID GND	Black			8	Black / XID GND
12	XID Data	Orange			3	Orange / XID data
13	Water temp. sensor (+)	Red			7	Red/ Water temp. sensor input
14	Water temp. sensor (power)	Green			6	Green/ Water temp. sensor power
15	NC	White			2	White / NC
16	NC	Blue			1	Blue / NC

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

Cable of the transducer is configured as shown in Fig. 1.34.
Refer to Fig. 1.35, connect the cable to the junction box (JB-34).

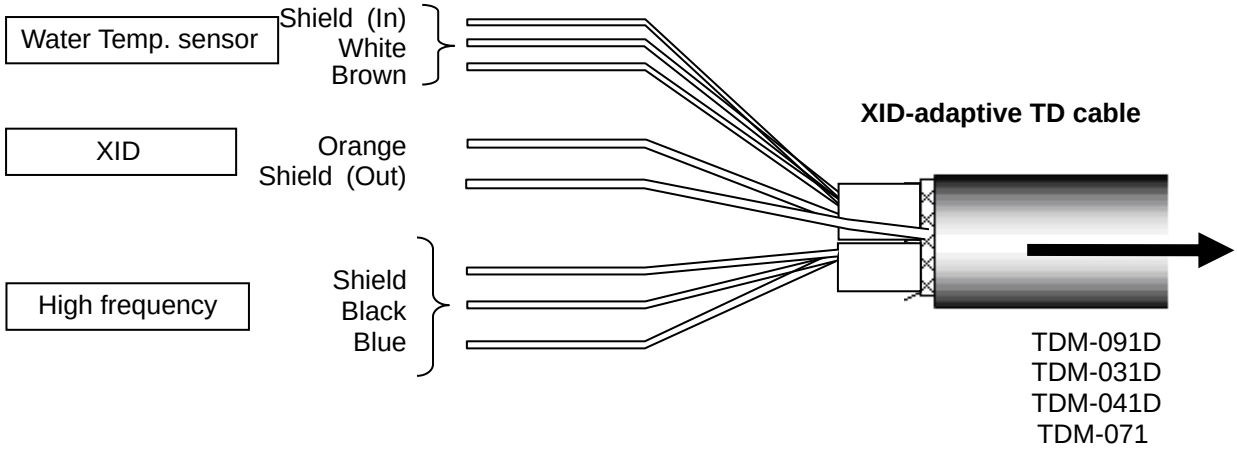


Fig. 1.34 Details of transducer cable

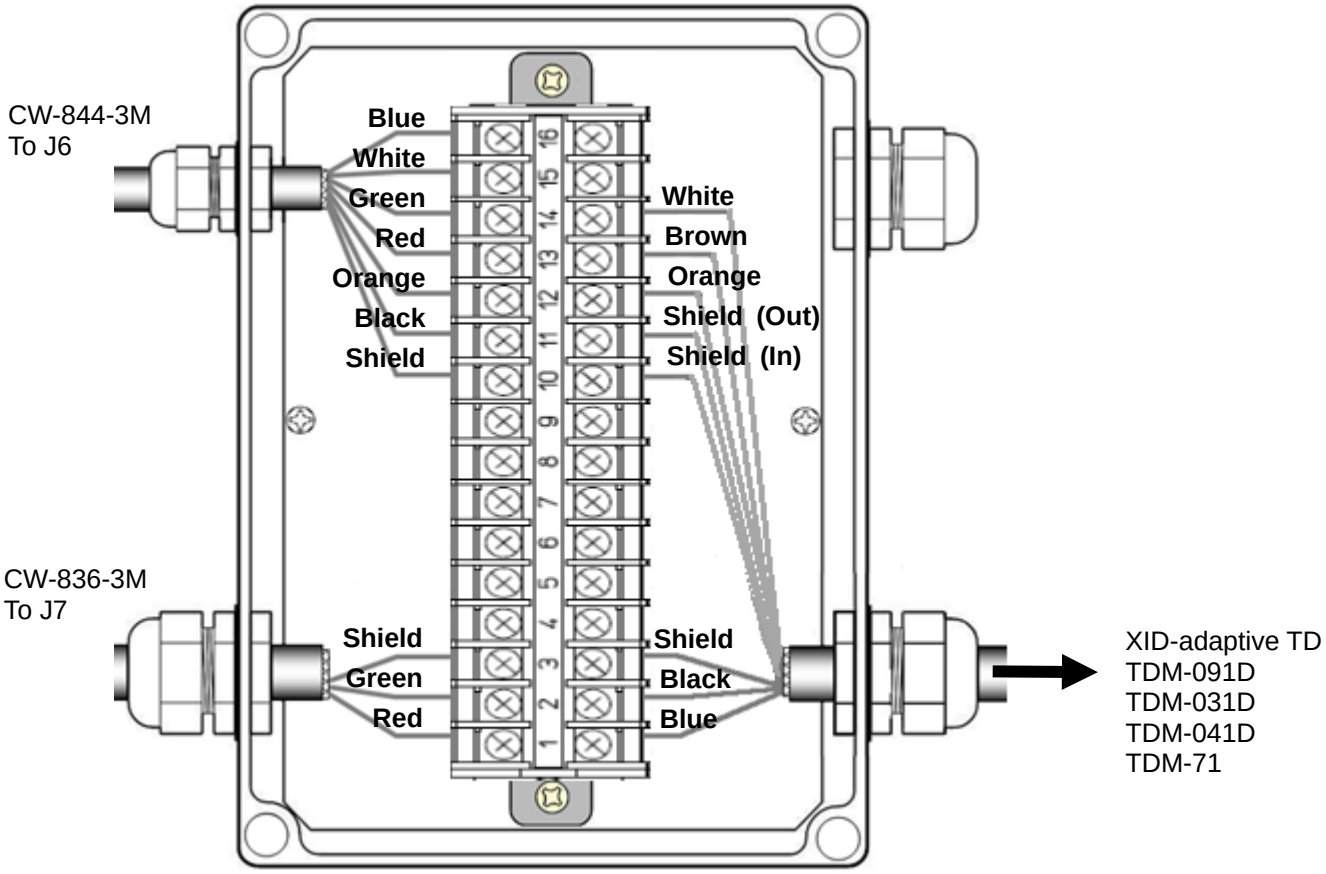


Fig. 1.35 Connection between junction box and transducer

Connection table of transducers

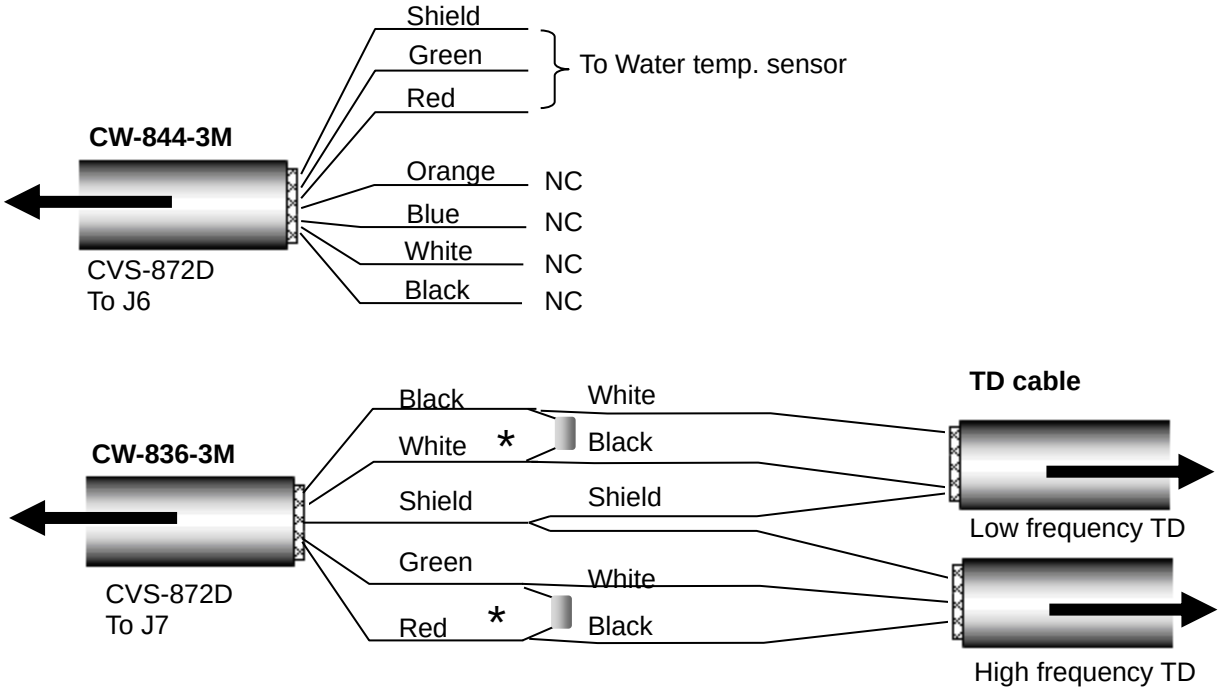
CVS-872D			Junction box (JB-34)		Transducer	
	No.	Connection to:	Pin No.	Signal name at connection to:	Color of cable	Remarks
J7	1	Red/TD1H (high frequency transducer)	1	TD1H	Blue	High frequency
	4	Green/TD2H (high frequency transducer)	2	TD2H	Black	
	3	Shield	3	GND	Shield	
	-	-	4	-	-	-
	2	White/TD1L (low frequency transducer)	5	TD1L	-	-
	5	Black/TD2L (low frequency transducer)	6	TD2L	-	
	3	-	7	GND	-	
	-		8	-	-	-
-	-	-	9	-	-	-
J6	4	Shield	10	Shield	Shield (In)	Shield
	8	Black / XID GND	11	XID GND	Shield (Out)	XID
	3	Orange / XID data	12	XID Data	Orange	
	7	Red/ Water temp. sensor input	13	Water temp. sensor (+)	Brown	Water temp. sensor
	6	Green/ Water temp. sensor power	14	Water temp. sensor (power)	White	
	1	-	15	-	-	-
	2	-	16	-	-	-

Connection of Single frequency type Transducer

In the case of connection of CVS-872D and single frequency type transducer:

1) Refer to the connection table of transducers, solder CW-836-3M and CW-844-3M 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-872D.
Connect CW-844-3M after the above processing to J6 connector of CVS-872D.



*The ferrite transducer should be connected to the resonance capacitor.

Fig. 1.36 Connection of transducer cable

Connection table of Water temp. sensor

CVS-872D J6		**Cable CW-844-3M**	Remarks
No.	Signal name	Wire color	
4	Shield	Shield	For Water temp. sensor
6	Water temp. sensor power	Green	
7	Water temp. sensor input	Red	
3	NC	Orange	NC
1	NC	Blue	
2	NC	White	
8	NC	Black	

Connection table of transducer

CVS-872D J7		**Cable CW-836-3M**		Remarks
No.	Signal	Wire color	Signal name.	
5	TD2L(Low frequency2)	Black	TD2L	Low frequency
2	TD1L(Low frequency1)	White	TD1L	
3	Shield	Shield	Housing GND	Common GND
4	TD2H(High frequency2)	Gree	TD2H	High frequency
1	TD1H(High frequency1)	Red	TD1H	

*The ferrite transducer should be connected to the resonance capacitor.

Transducer	Capacitance value
TD-284A	0.1μF
TD-504F	0.047μF

⚠ Caution: Please consult a dealer of Koden or Koden about another type of transducer.

In the case of connection of Single frequency type TD via the junction box (JB-34):

1) Connect the CW-836-3M to the junction box (JB-34).

2) Connect the CW-836-3M to J7 connector of CVS-872D.

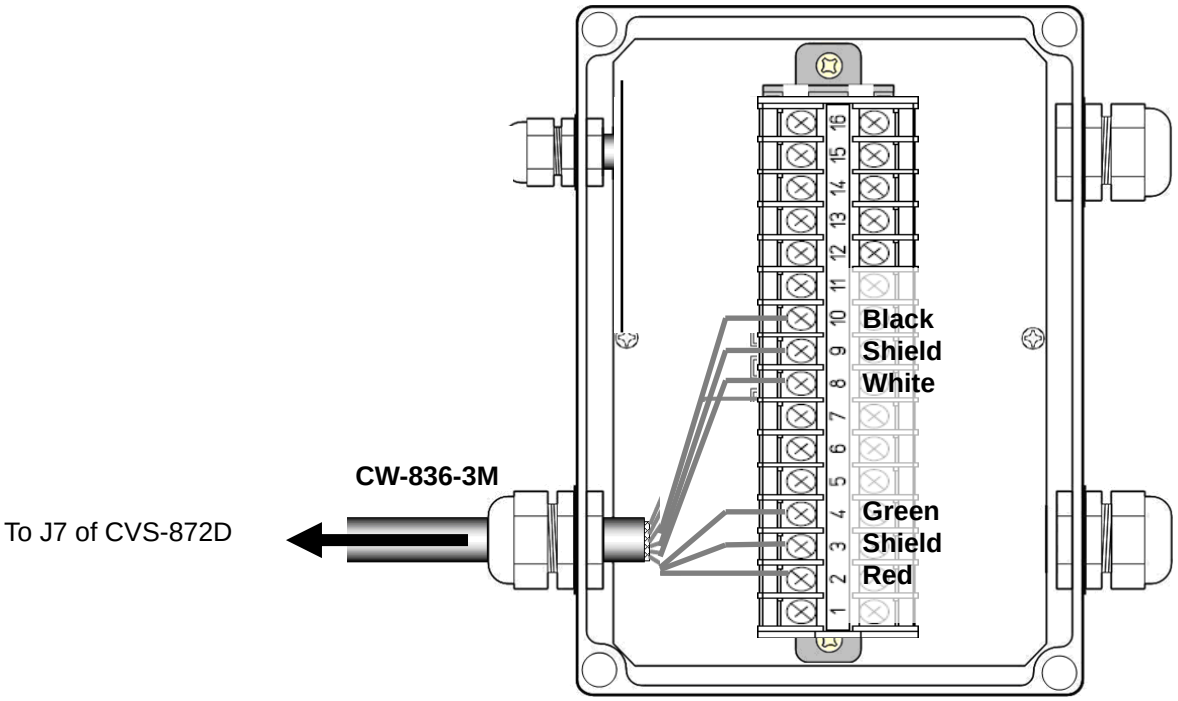


Fig. 1.37 Connection between CVS-872D and junction box

Connection list of junction box (JB-34)

CVS-872D		**Cable CW-836-3M**	**Junction Box (JB-34)**	
Connector		Color of cable	Pin No.	Signal name
J7	1	Red	1	TD1H (High frequency1)
			2	
	3	Shield	3	GND
	4	Green	4	TD2H (High frequency2)
			5	
			6	-
	2	White	7	TD1L (Low frequency1)
			8	
	3	Shield	9	GND
	5	Black	10	TD2L (Low frequency2)
			11	
			12	
			13	
			14	
			15	
			16	

3) Connect the Transducer to the junction box (JB-34).
• In case of TD-284A and TD-504F
Refer to Figure 1.38 and connect the cable to the junction box (JB-34).

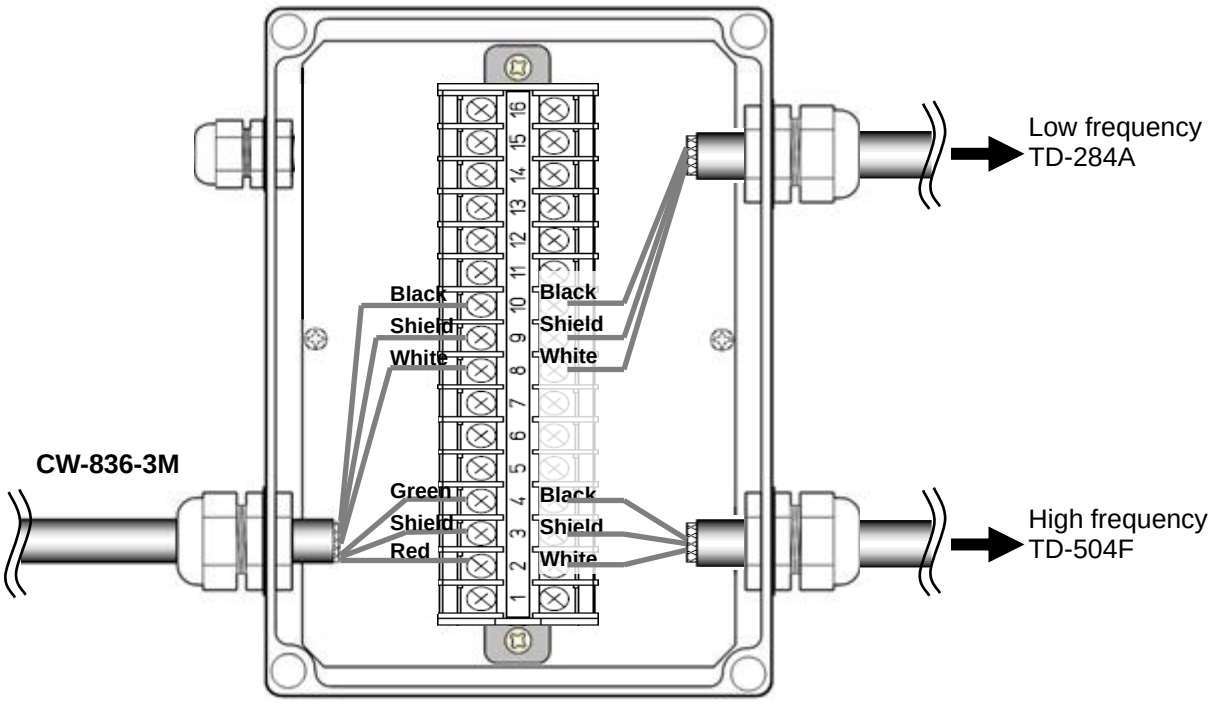
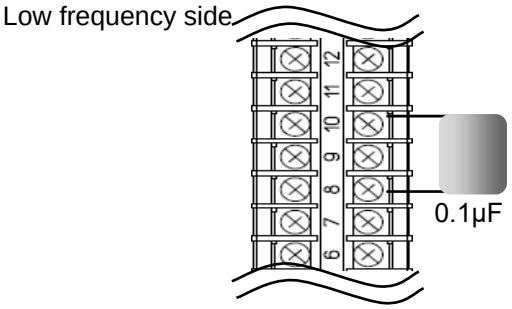


Fig. 1.38 Connection between junction box and transducer

Connection of the resonance capacitor (Be sure transducer cable is connected to avoid damaging the system with capacitor only.)
•TD-284A



•TD-504F (Connect to the High frequency side whenTD-284A is connected.)

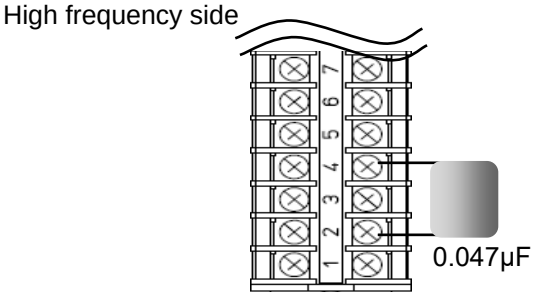


Fig. 1.39 Connection between junction box and capacitor

⚠Caution: Do not transmit with capacitor only as internal circuit may be damaged.

• In case of TD-504F and TD-66
Refer to Figure 1.40 and connect the cable to the junction box (JB-34).

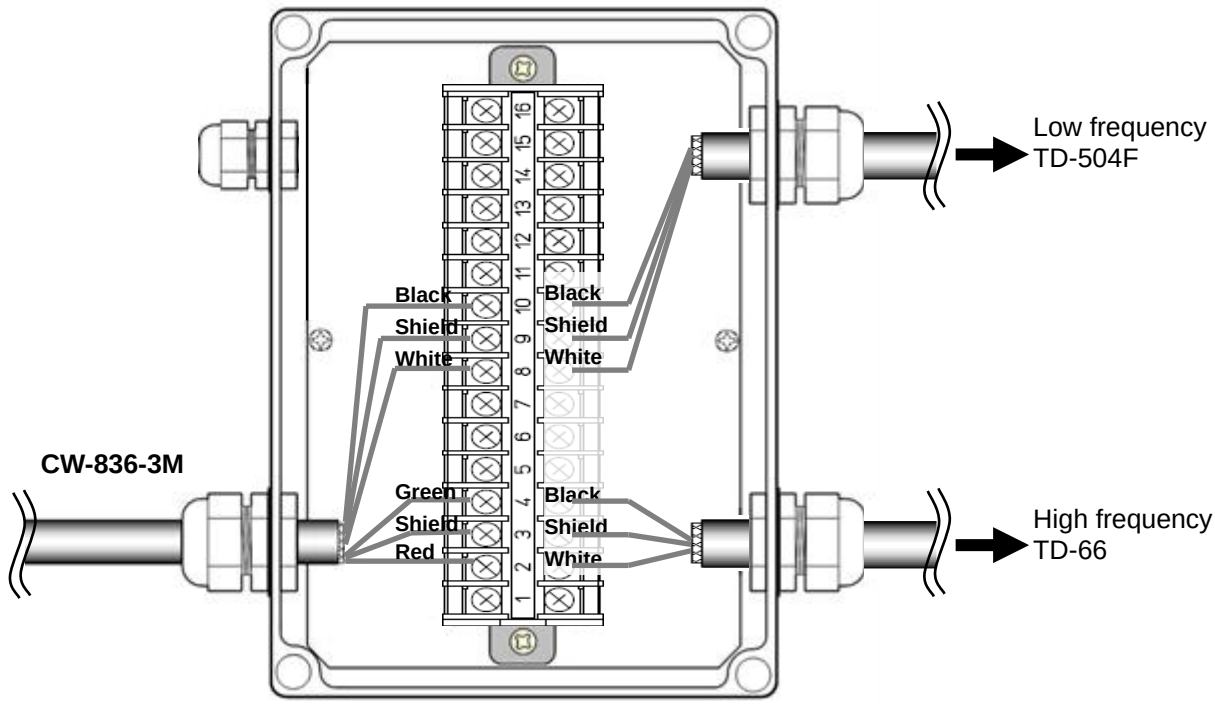


Fig. 1.40 Connection between junction box and transducer

Connection of the resonance capacitor (Be sure transducer cable is connected to avoid damaging the system with capacitor only.)
•TD-504F (Connect to the Low frequency side whenTD-66 is connected.)

Low frequency side

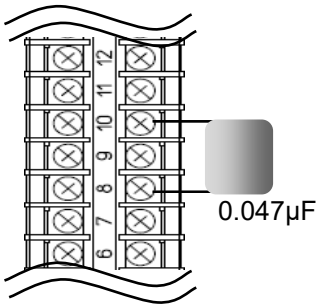


Fig. 1.41 Connection between junction box and capacitor

⚠ Caution: Do not transmit with capacitor only as internal circuit may be damaged.

Connection of dual frequency type Transducer with diplexer

In the case of connection of CVS-872D and dual frequency type TD with diplexer:

1) Refer to the connection table of transducers, solder CW-836-3M and CW-844-3M 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-872D.
Connect CW-844-3M after the above processing to J6 connector of CVS-872D.

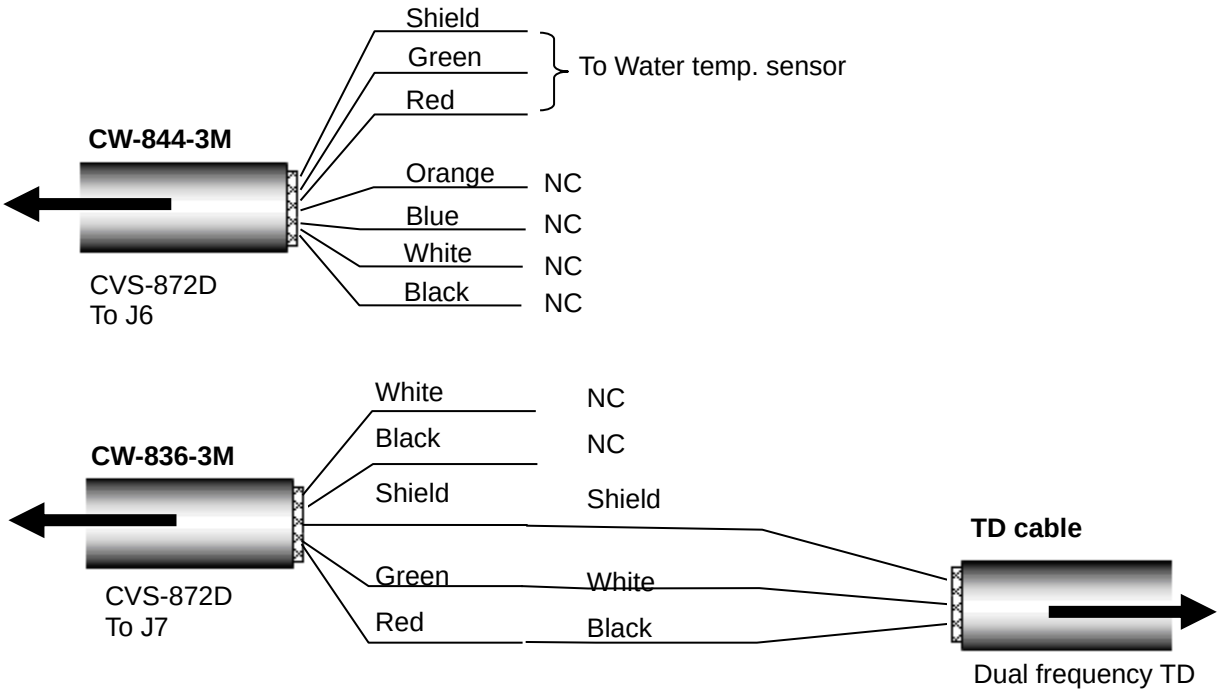


Fig. 1.42 Connection of transducer cable

Connection table of Water temp. sensor

CVS-872D J6		Connecting cable CW-844-3M	Remarks
No.	Signal name at connection to	Color of cable	
4	Shield	Shield	Water temp. sensor
6	Water temp. sensor power	Green	
7	Water temp. sensor input	Red	
3	NC	Orange	NC
1	NC	Blue	
2	NC	White	
8	NC	Black	

Connection table of transducer

CVS-872D J7		Connecting cable CW-836-3M		Remarks
No.	Signal	Wire color	Signal name	
5	TD2L(Low frequency2)	Black	TD2L	Low frequency
2	TD1L(Low frequency1)	White	TD1L	
3	Shield	Shield	Housing GND	Common
4	TD2H(High frequency2)	Gree	TD2H	High frequency
1	TD1H(High frequency1)	Red	TD1H	

In the case of connection of dual frequency type TD with diplexer via the junction box (JB-34):

1) Connect the CW-836-3M to the junction box (JB-34).

2) Connect the CW-836-3M to J7 connector of CVS-872D.

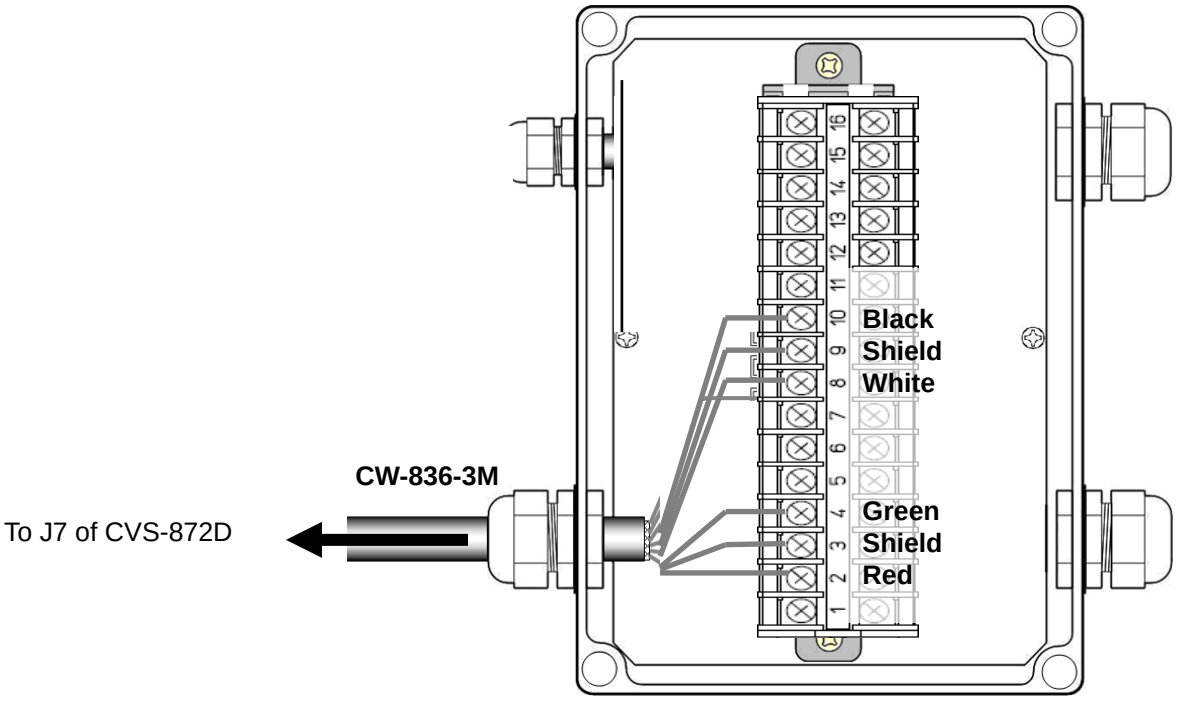


Fig. 1.43 Connection between CVS-872D and junction box

Connection list of junction box (JB-34)

CVS-872D		**Cable CW-836-3M**	**Junction Box (JB-34)**	
Connector		Color of cable	Pin No.	Signal name
J7	1	Red	1	TD1H (High frequency1)
			2	
	3	Shield	3	GND
	4	Green	4	TD2H (High frequency2)
			5	
			6	-
	2	White	7	TD1L (Low frequency1)
			8	
	3	Shield	9	GND
	5	Black	10	TD2L (Low frequency2)
			11	
			12	
			13	
			14	
			15	
			16	

3) Connect the Transducer to the junction box (JB-34).
• In case of TD-501C
Refer to Figure 1.44 and connect the cable to the junction box (JB-34)

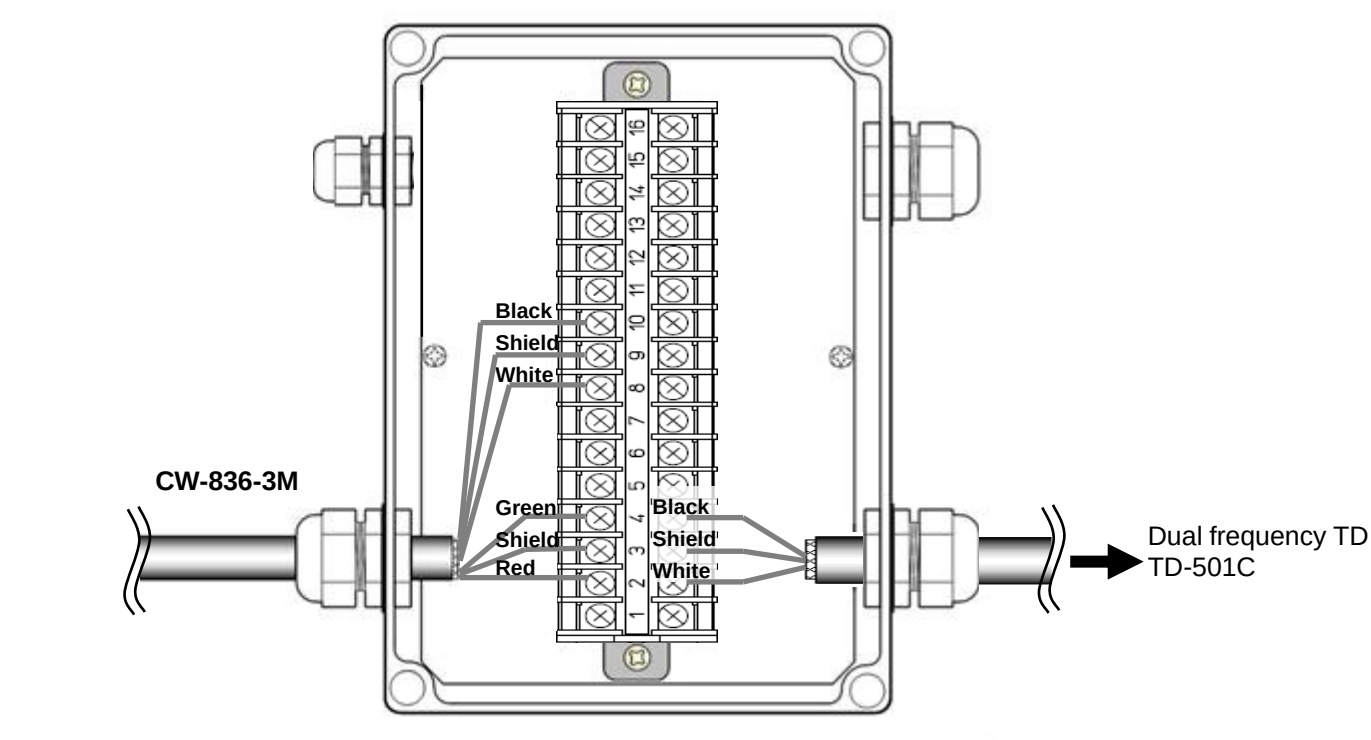


Fig. 1.44 Connection between CVS-872D and junction box

Connection to external echo sounder

It is likely to observe mutual interference when the transmit frequency of an external echo sounder and CVS-872D is the same or close. Interference can be decreased by synchronizing the CVS-872D 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

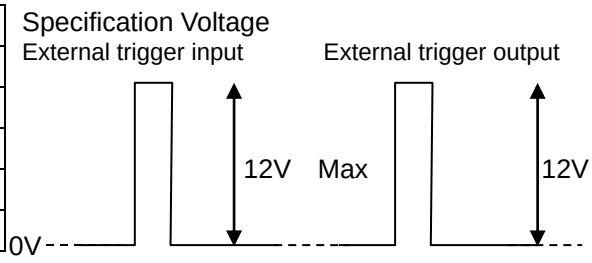


Fig. 1.45 External trigger

Connection with navigation equipment (J3, J8)

The NMEA data can be output from CVS-872D to an external navigation equipment, and the NMEA data can be input from an external navigation equipment to CVS-872D. Refer to the following for the connection.

Connector	Pin	Remarks
J3	①	GND
	②	NMEA TX +
	③	NMEA TX -
	④	NMEA RX +
	⑤	NMEA RX -
	⑥	+12V

Connector	Pin	Remarks
J8	①	GND
	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.

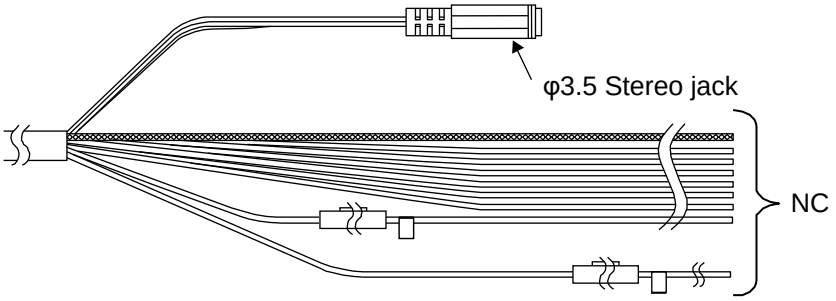


Fig. 1.46 Connection of External Speaker for Sona-Tone™

Connection of External Monitor (J5) [Owner supply]

When installing an external monitor (XGA monitor, analog RGB input), connect it via CW-576-0.5M to J5 connector. Refer to the illustration below for the wiring.
After soldering, perform the waterproof and insulation treatment on the junction with a self-fusing tape.

Structure of CW-576-0.5M

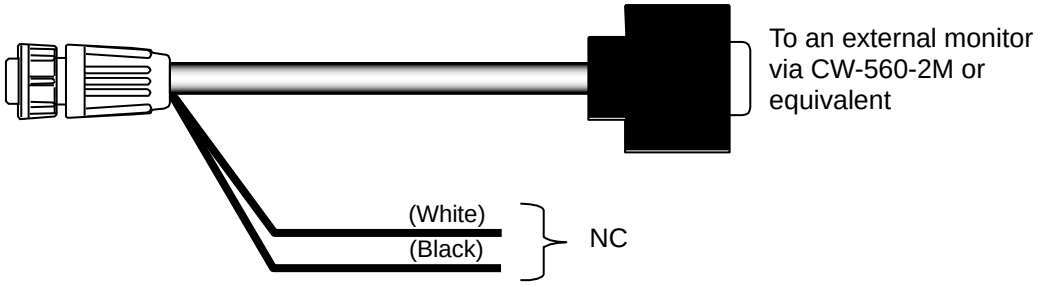


Fig. 1.47 Connection of External Monitor

Connection of CCD camera (J4) [Owner supply]

CVS-872D and a CCD camera (NTSC/PAL/SECAM) can be connected via CW-405-0.3M (option). Connect the video output terminal (RCA plug; yellow in most cases) of your CCD camera. Perform the waterproof treatment on the junction of the RCA terminal with a self-fusing 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. 1.48 Connection of CCD camera

1.5 Connection of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass

This is to describe the connection of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass used as GPS compass and Heaving sensor.
Refer to the installation manual of the Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass for details of installation.

1.5.1 Connection of Hemisphere V102/V104s/V200s 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.

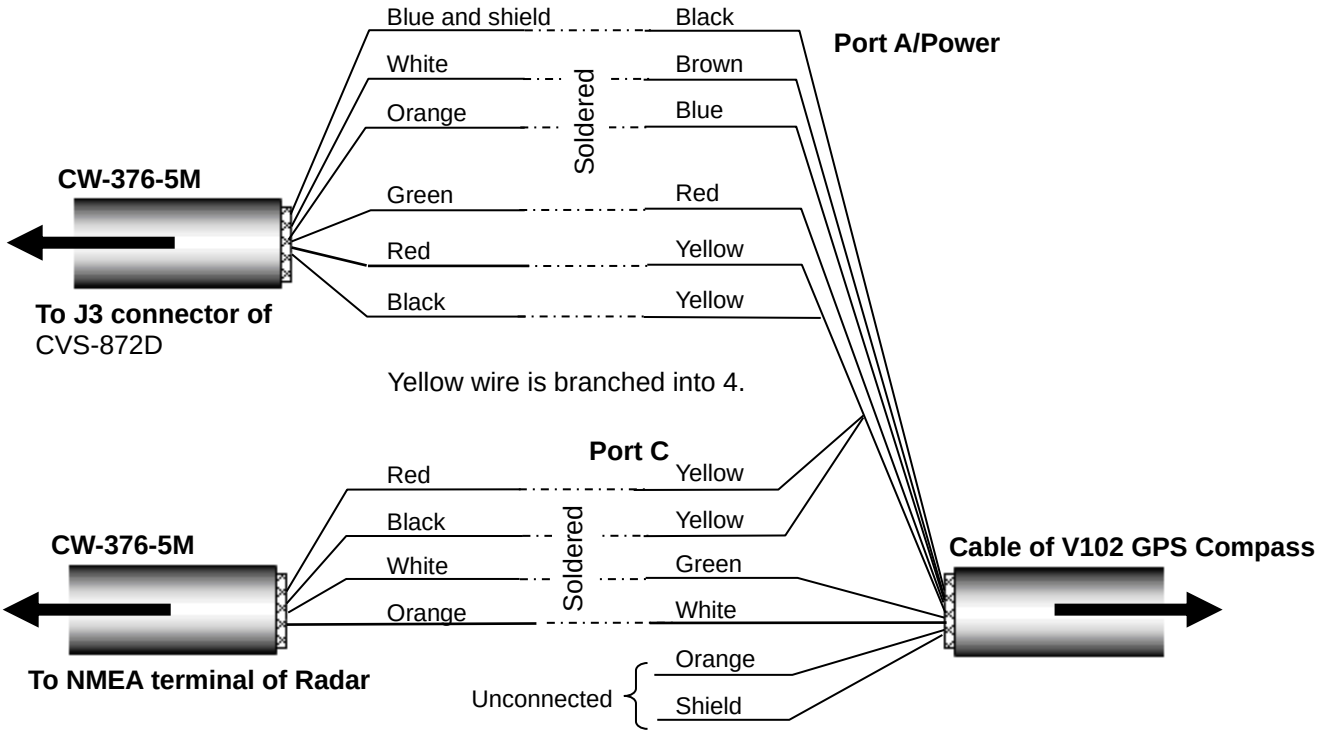


Fig. 1.49 Connection of V102 GPS Compass

Connection table of V102 GPS Compass

Connectors to be connected		**CW-376-5M Connected to J3**		**CW-376-5M Connected to Radar**		**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 un-used lead wire for core-wires not to contact each other.**

2) Connect CW-376-5M to J3 connector of CVS-872D (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 **"Fig. 1.50 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 **"Fig. 1.51 The general connection chart 2"**.
   In the other cases, connection with Port C is not necessary. Refer to "**Fig. 1.52 The general connection chart 3"**.

4) Refer to **"Fig. 1.50 The general connection chart 1 to Fig. 1.52 The general connection chart 3"**, connect other equipment to communicate NMEA with the terminal J8 of CVS-872D.

Hemisphere V102 GPS Compass / ComNav Vector G1 GPS Satellite Compass

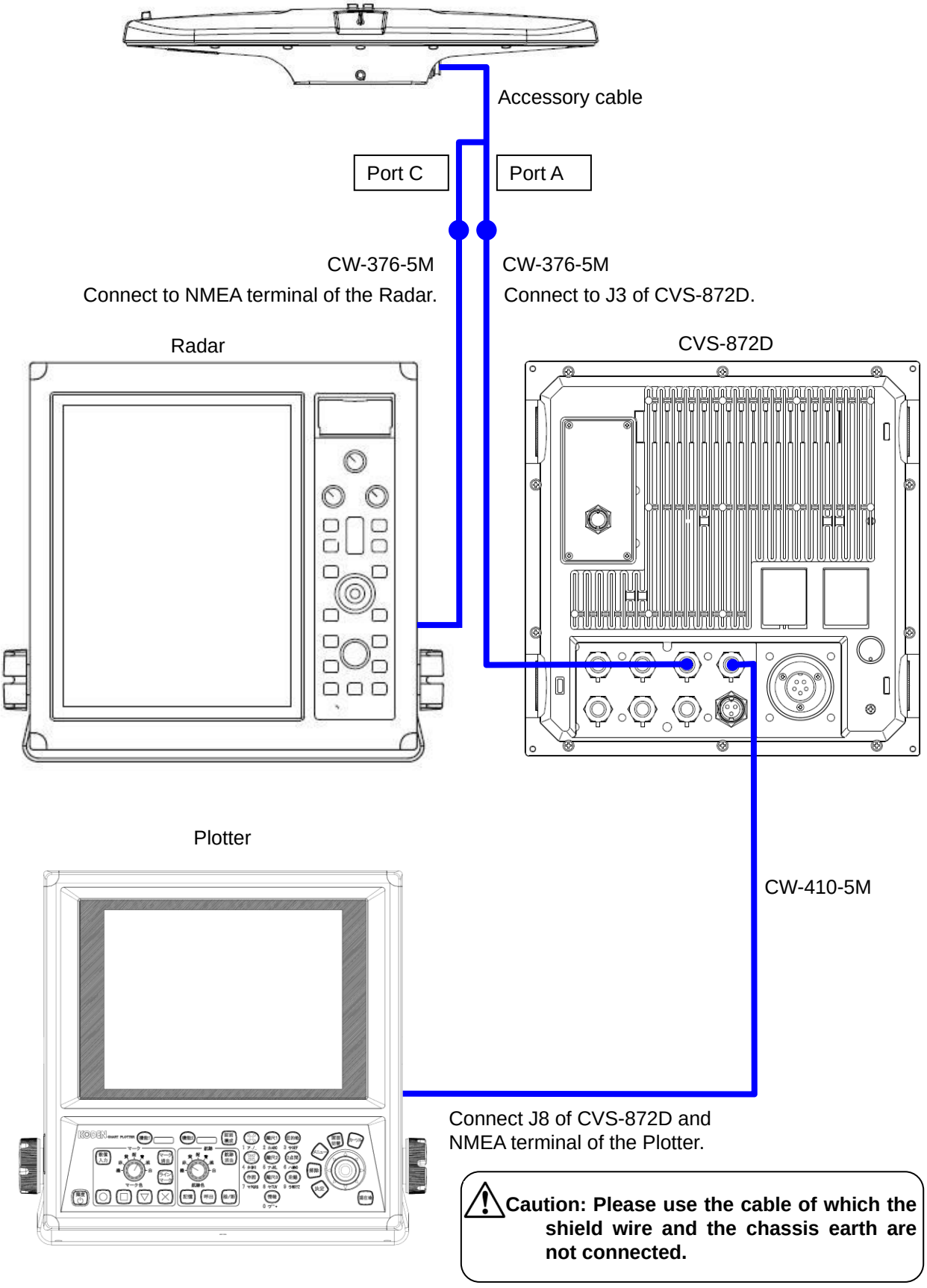


Fig. 1.50 The general connection chart 1

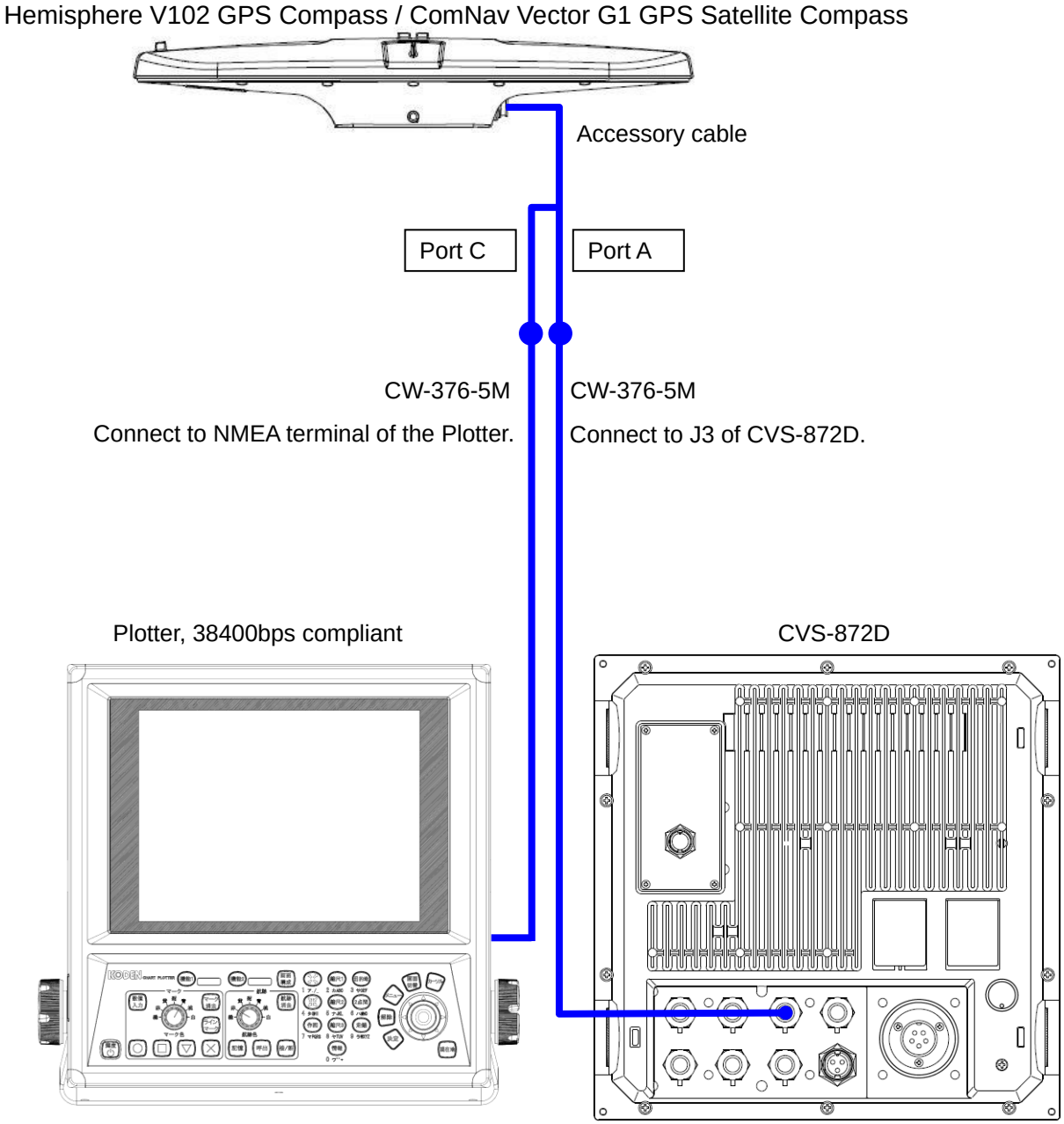


Fig. 1.51 The general connection chart 2

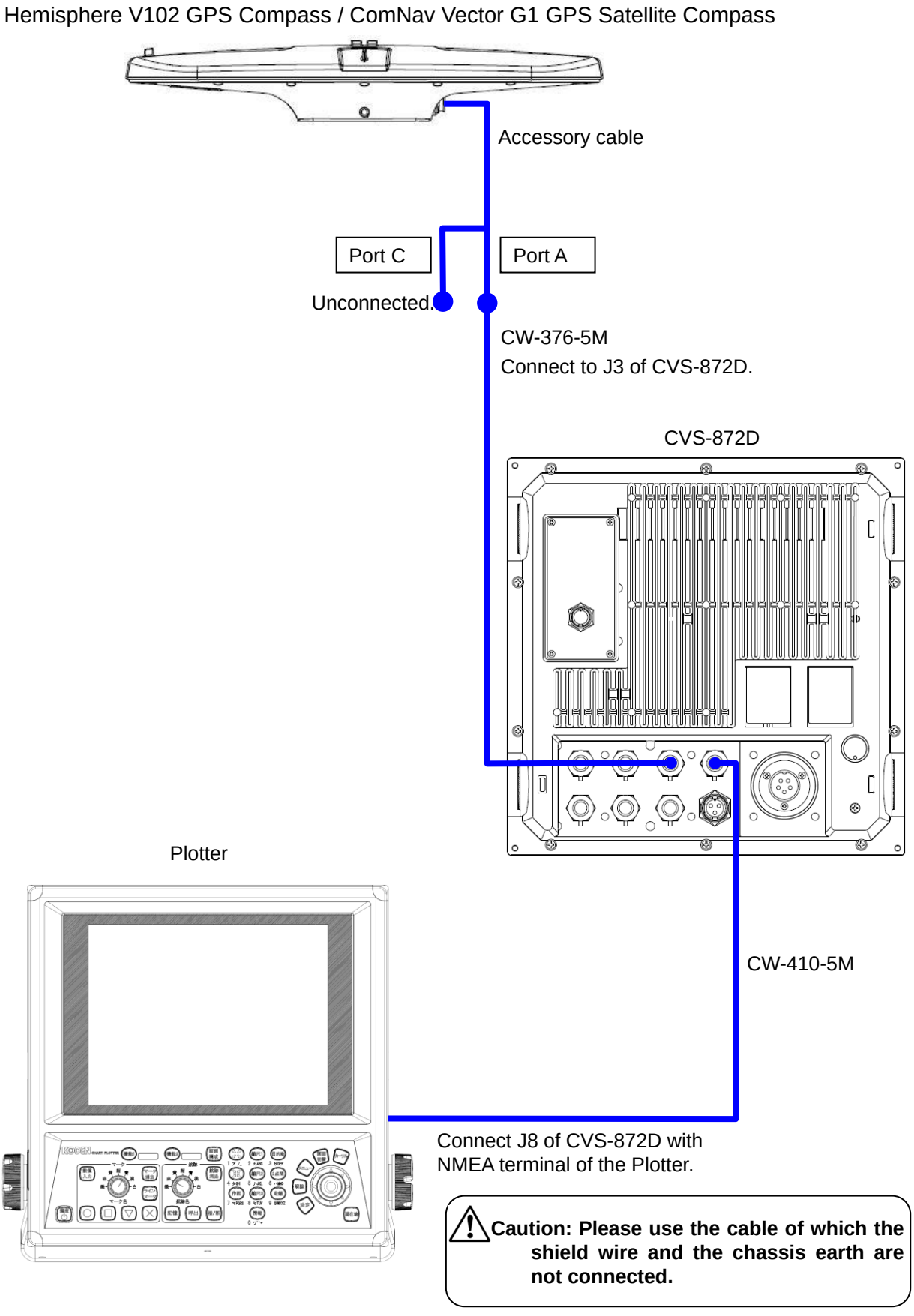


Fig. 1.52 The general connection chart 3

1.5.2 Connection of Hemisphere V104s GPS Compass

Connect CW-376-5M by soldering with the cable of Hemisphere V104s GPS Compass. Please prepare two CW-376-5M when connecting with Radar as GPS compass.

1) The terminal of the cables of V104s GPS Compass is not processed, and 8 lead wires and 1 shield wire are open. Orange and violet lead wires are connected to TX/RX of Port A, blue and green lead wires are connected to TX/RX of Port B, black and red lead wires are connected to +/- of power supply, and brown lead wire is connected with earth. Yellow lead wire and shield wire are unconnected.
   Refer to the **"Connection table of V104s GPS Compass"**, and solder CW-376-5M with Port A and power supply of cable of Hemisphere V104s GPS Compass. Please solder another CW-376-5M with Port B, when connecting with Radar as GPS compass. Please branch brown wire (GND) of the cable of V104s 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.

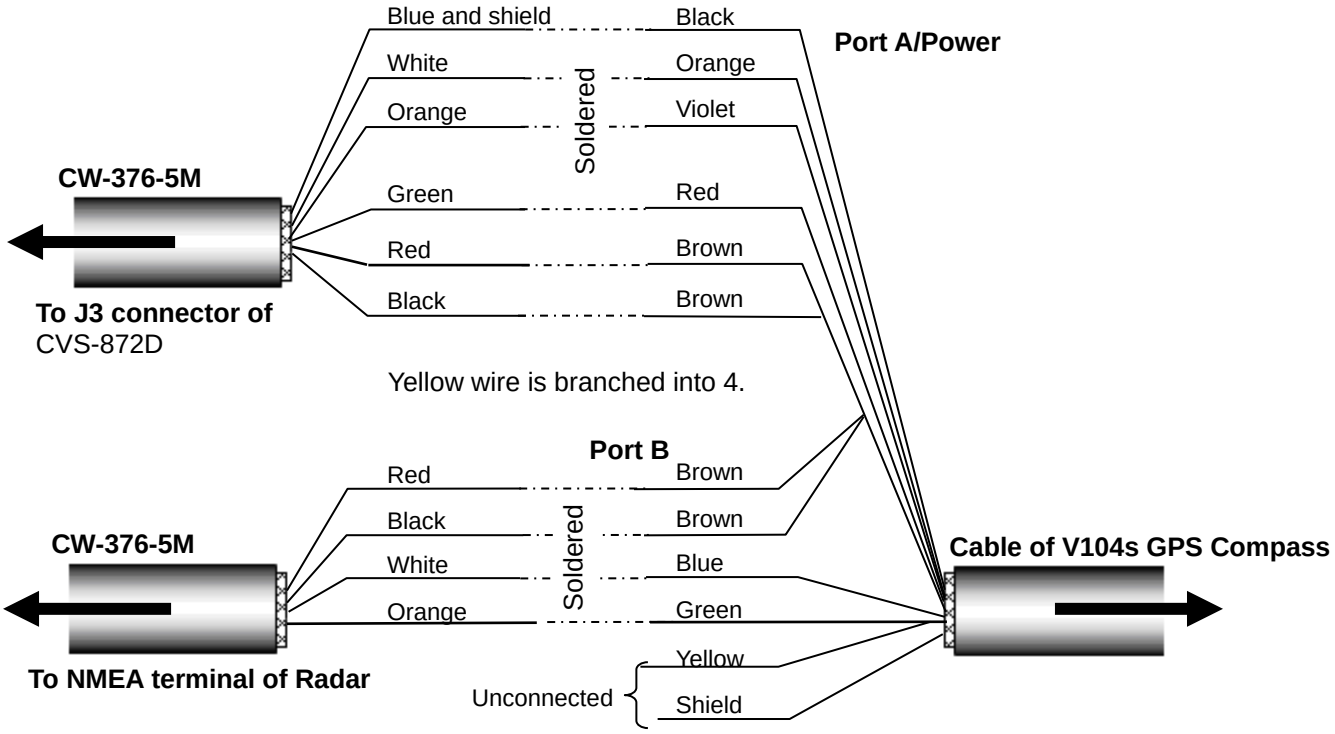


Fig. 1.53 Connection of V104s GPS Compass

Connection table of V104s GPS Compass

Connectors to be connected		**CW-376-5M Connected to J3**		**CW-376-5M Connected to Radar**		**V104s 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+	-	-	Orange	RXA	
4	NMEA2 RX+	Orange	RX+	-	-	Violet	TXA	
6	External power supply (+)	Green	+12V	-	-	Red	PWinput	
3	NMEA2 TX-	Red	TX-	-	-	Brown	SigGND	
5	NMEA2 RX-	Black	RX-	-	-			
No.	NMEA connector of Radar							Port B
3	NMEA TX-	-		Red	TX-			
5	NMEA RX-	-		Black	RX-			
1	NMEA-	-		Blue and shield	-	-	-	
2	NMEA TX+	-		White	TX+	Blue	RXB	
4	NMEA RX+	-		Orange	RX+	Green	TXB	
6	NC	-		Green	-	-		

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

2) Connect CW-376-5M to J3 connector of CVS-872D (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 **"Fig. 1.54 The general connection chart 4"**.
   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 **"Fig. 1.55 The general connection chart 5"**.
   In the other cases, connection with Port C is not necessary. Refer to "**Fig. 1.56 The general connection chart 6"**.

4) Refer to **"Fig. 1.54 The general connection chart 4 to Fig. 1.56 The general connection chart 6"**, connect other equipment to communicate NMEA with the terminal J8 of CVS-872D.

Hemisphere V104s GPS Compass

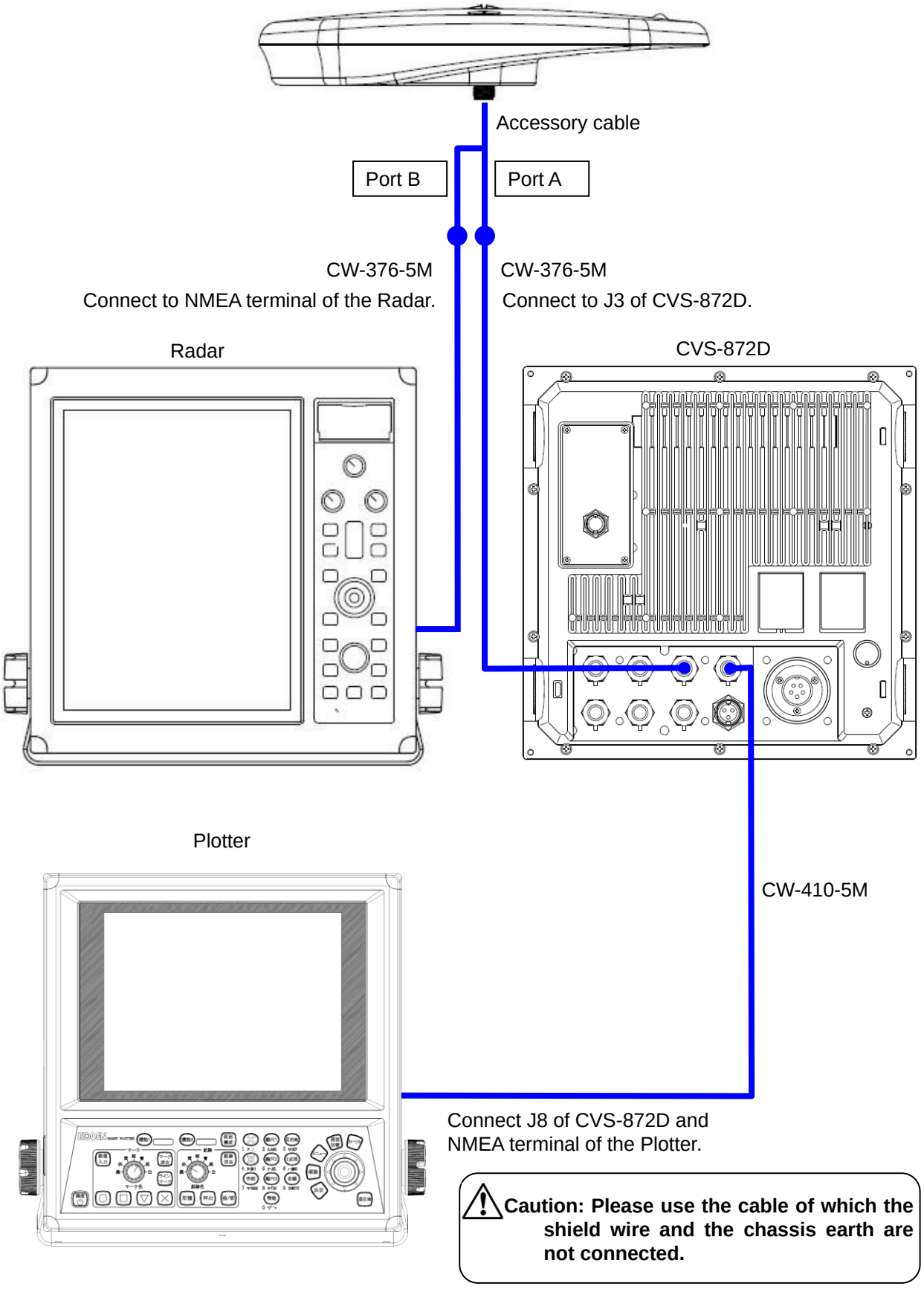


Fig. 1.54 The general connection chart 4

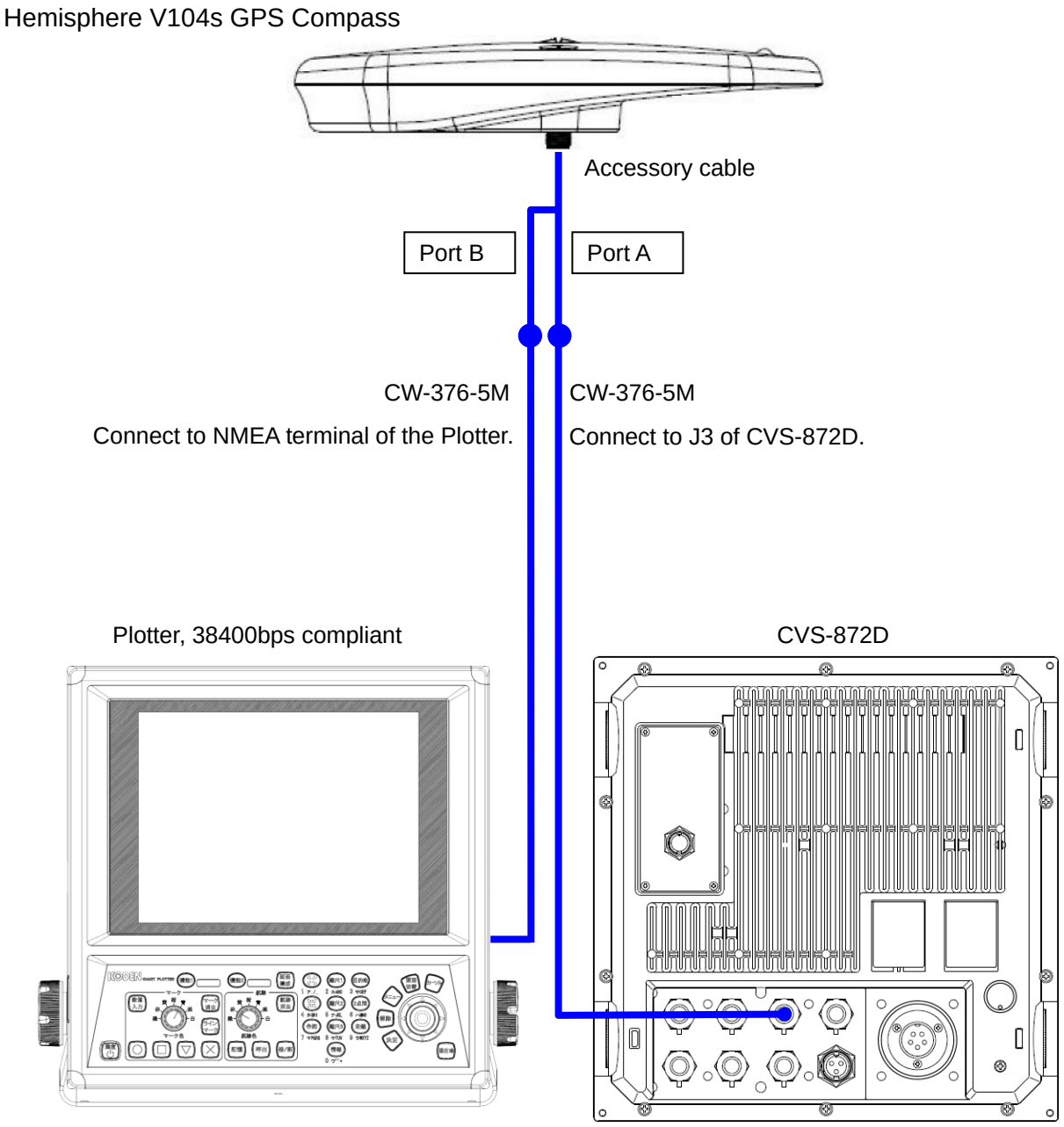


Fig. 1.55 The general connection chart 5

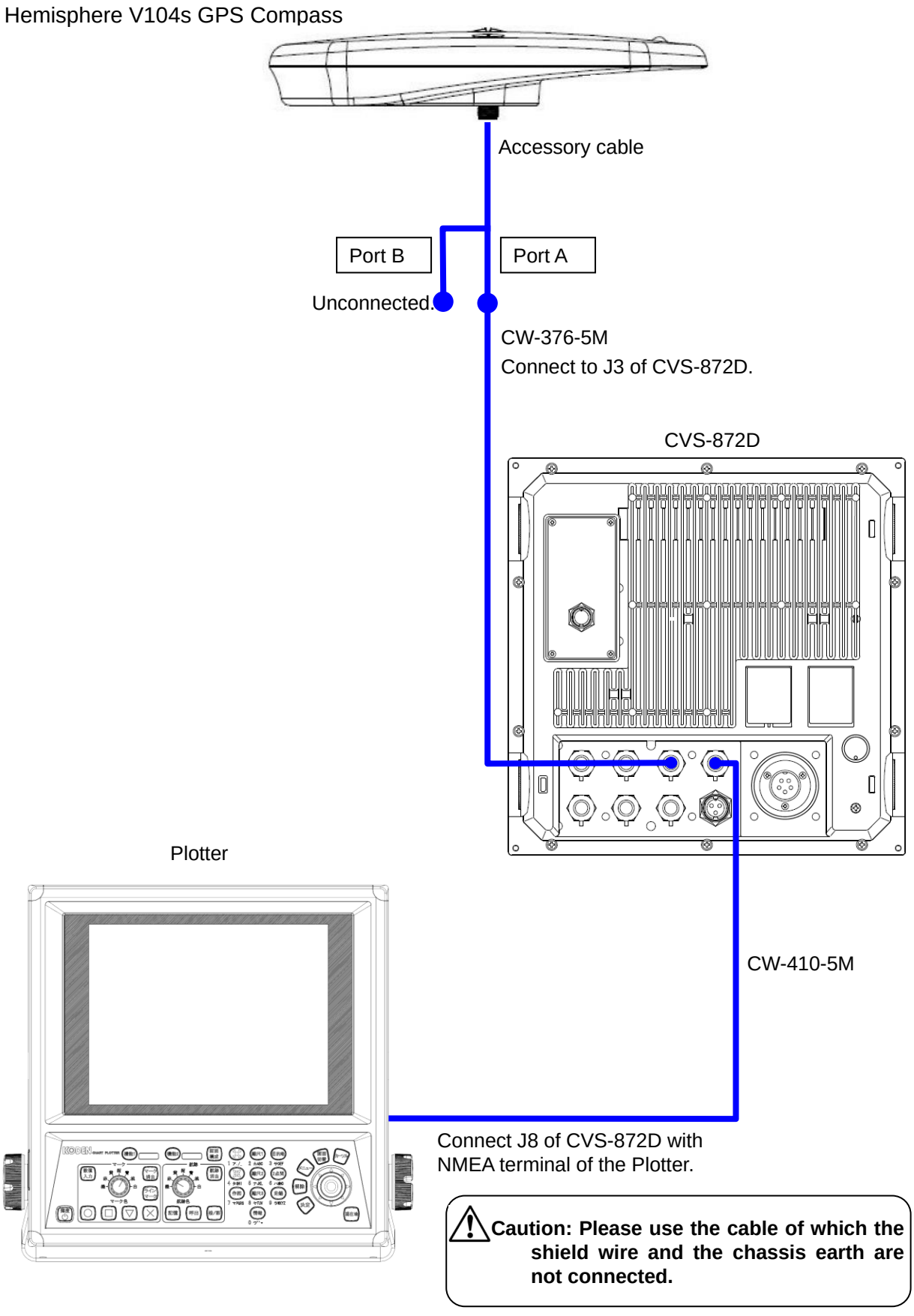


Fig. 1.56 The general connection chart 6

1.5.3 Connection of Hemisphere V200s GPS Compass

Connect CW-376-5M by soldering with the cable of Hemisphere V200s GPS Compass. Please prepare two CW-376-5M when connecting with Radar as GPS compass.

1) The terminal of the cables of V200s 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 B, black and red lead wires are connected to +/- of power supply, and yellow lead wire is connected with earth. Violet and gray lead wire are unconnected.
   Refer to the **"Connection table of V200s GPS Compass"**, and solder CW-376-5M with Port A and power supply of cable of Hemisphere V200s GPS Compass. Please solder another CW-376-5M with Port B, when connecting with Radar as GPS compass. Please branch yellow wire (GND) of the cable of V200s 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.

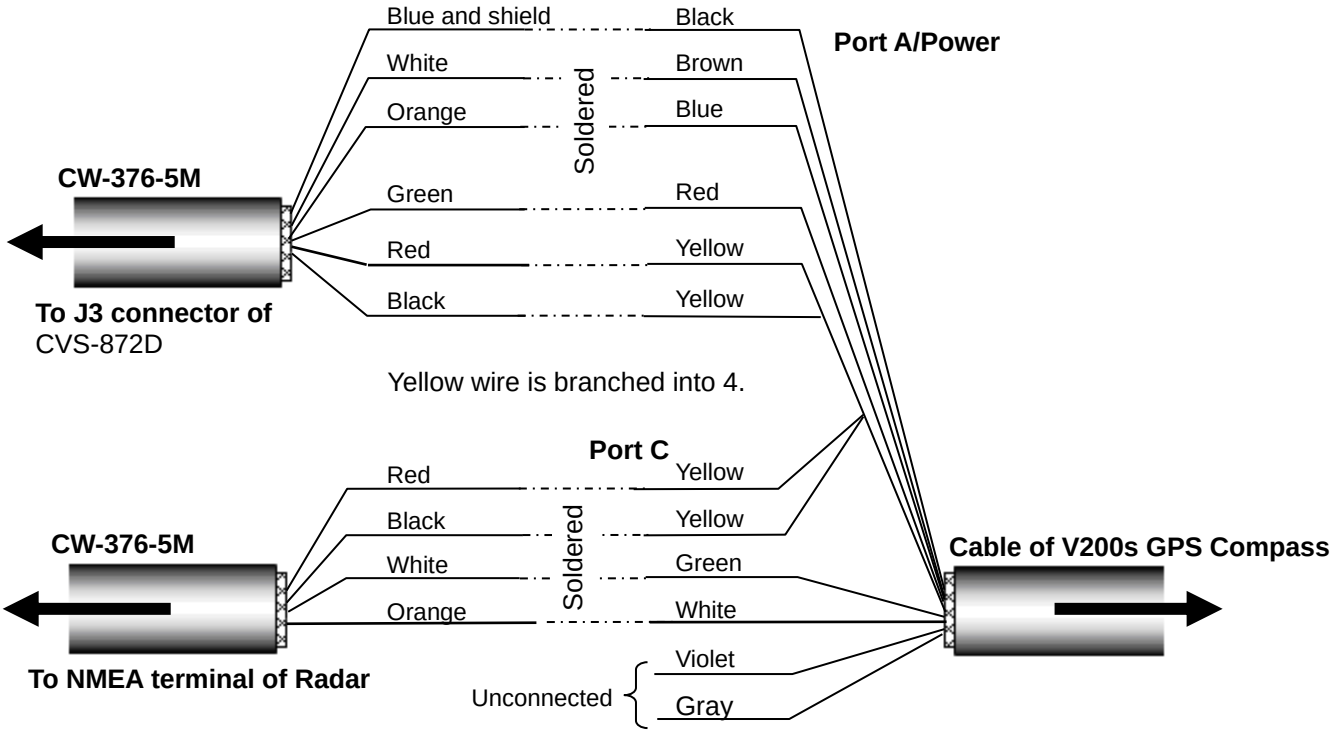


Fig. 1.57 Connection of V200s GPS Compass

Connection table of V200s GPS Compass

Connectors to be connected		**CW-376-5M Connected to J3**		**CW-376-5M Connected to Radar**		**V200s 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	RXA	
4	NMEA2 RX+	Orange	RX+	-	-	Blue	TXA	
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 B
3	NMEA TX-	-		Red	TX-			
5	NMEA RX-	-		Black	RX-			
1	NMEA-	-		Blue and shield	-	-	-	
2	NMEA TX+	-		White	TX+	Green	RXB	
4	NMEA RX+	-		Orange	RX+	White	TXB	
6	NC	-		Green	-	-		

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

2) Connect CW-376-5M to J3 connector of CVS-872D (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 **"Fig. 1.58 The general connection chart 7"**.
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 **"Fig. 1.59 The general connection chart 8"**.
In the other cases, connection with Port B is not necessary. Refer to "**Fig. 1.60 The general connection chart 9"**.

4) Refer to **"Fig. 1.58 The general connection chart 7 to Fig. 1.60 The general connection chart 9"**, connect other equipment to communicate NMEA with the terminal J8 of CVS-872D.

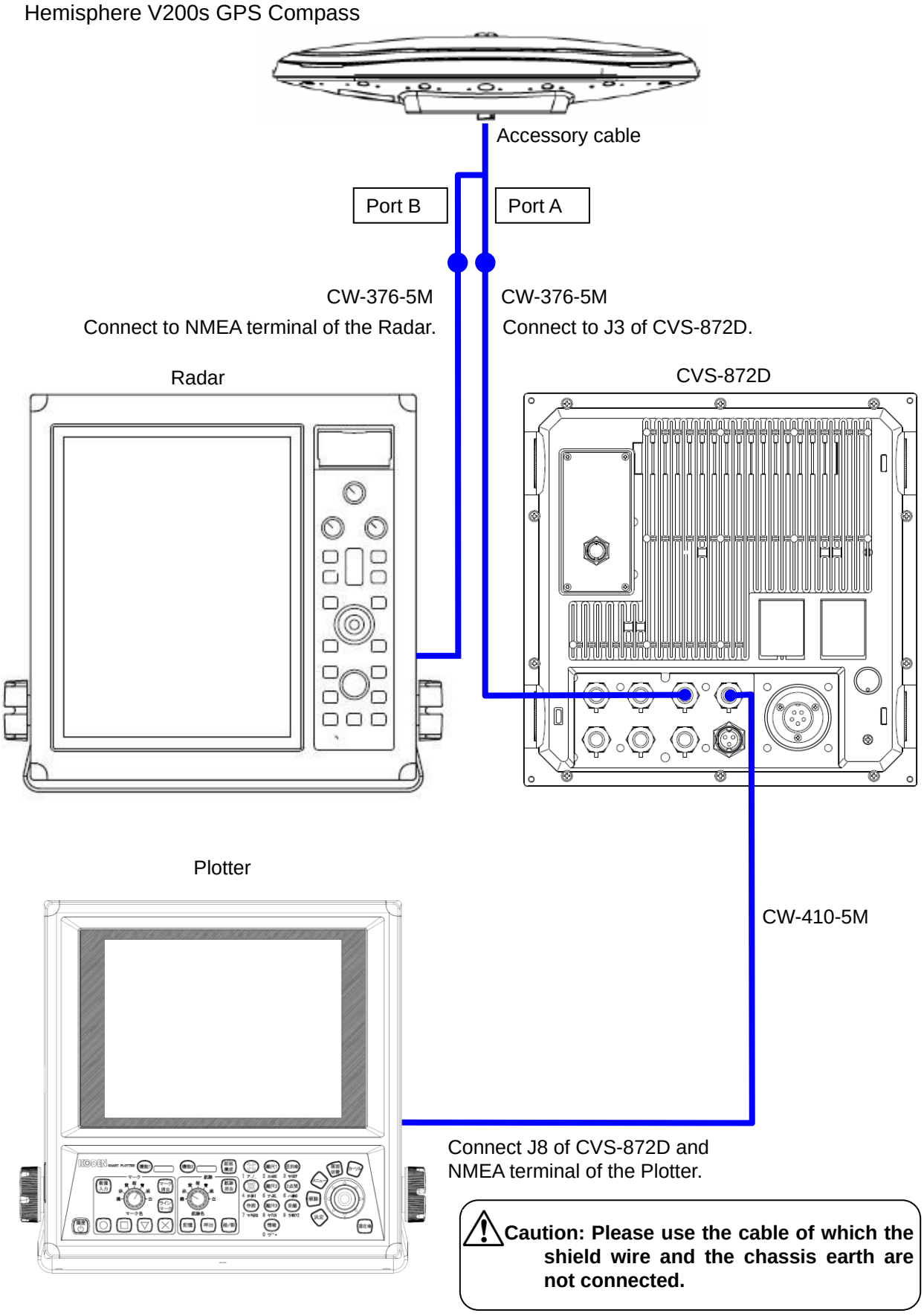


Fig. 1.58 The general connection chart 7

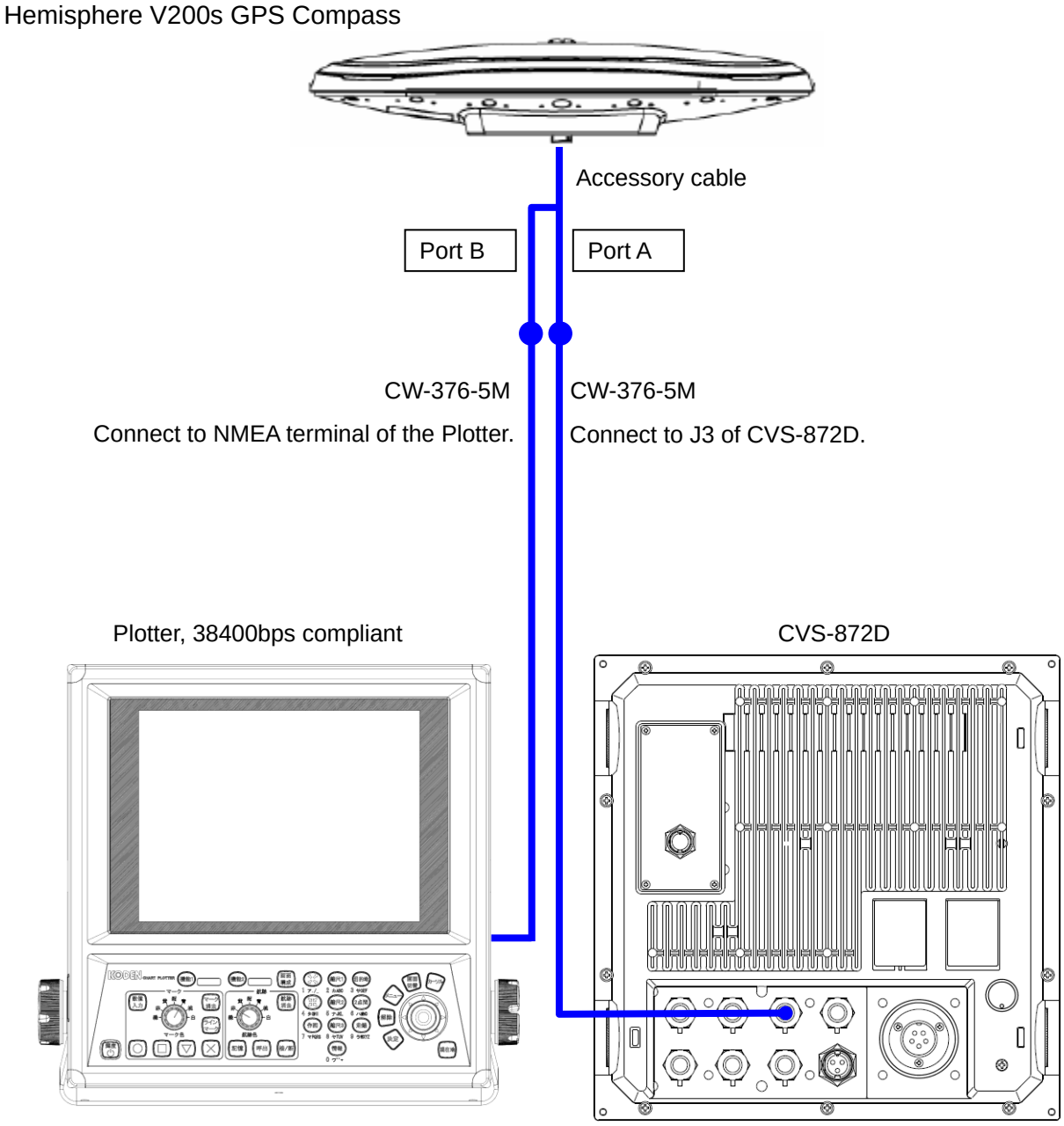


Fig. 1.59 The general connection chart 8

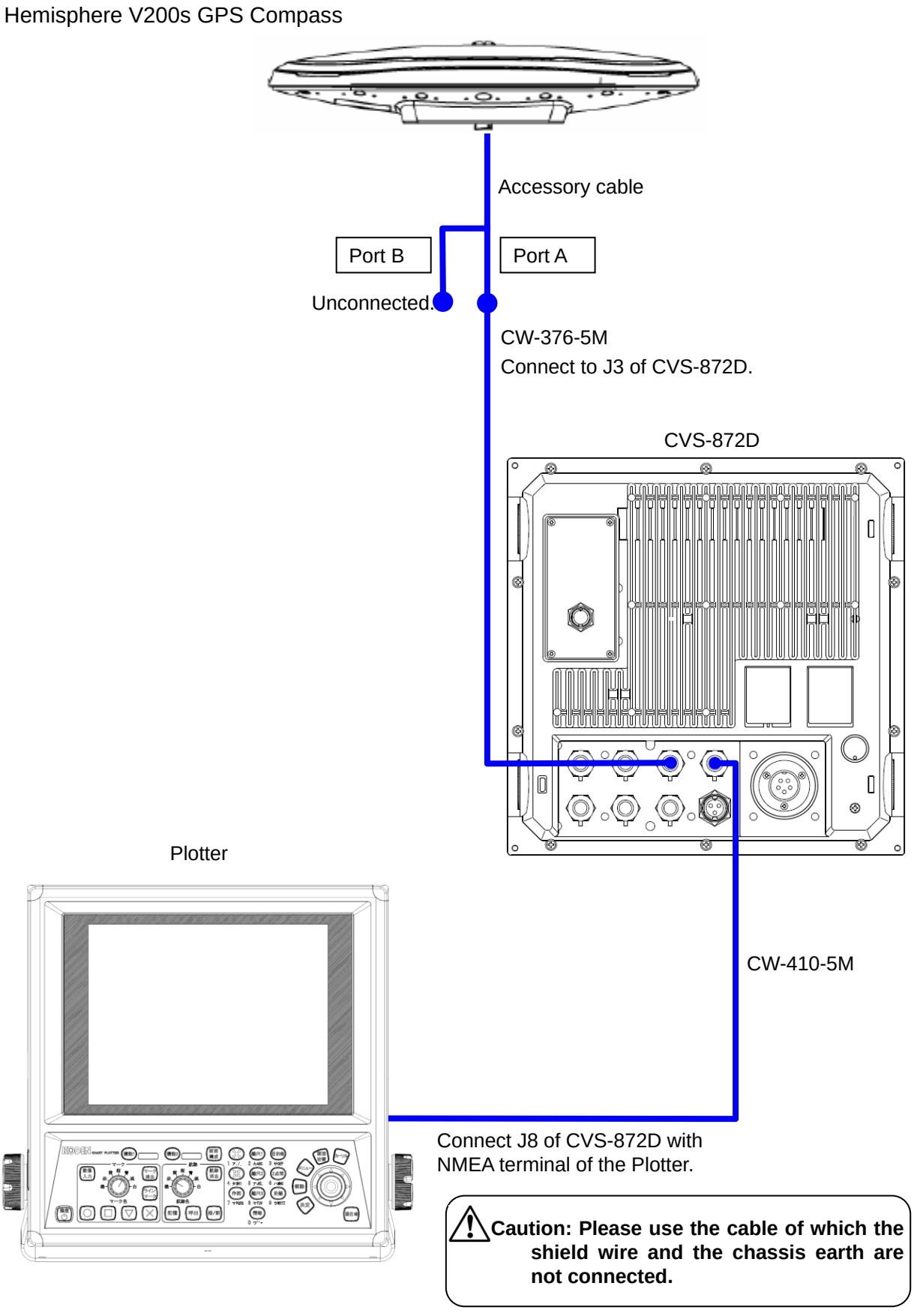


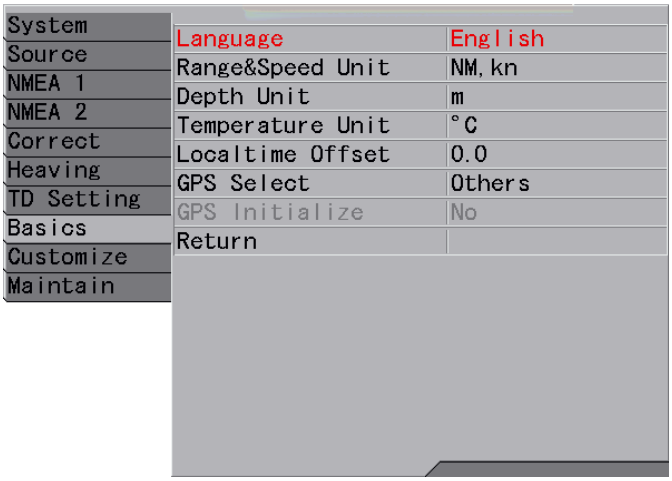
Fig. 1.60 The general connection chart 9

1.5.4 Setting of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass

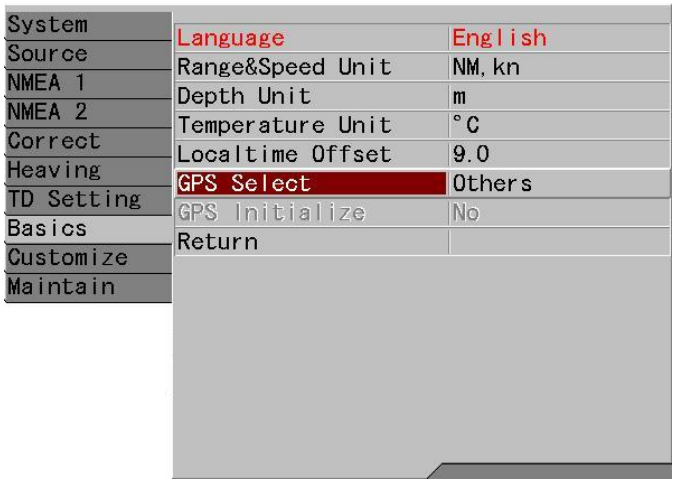
Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass needs to be initialized to generate output data as GPS compass and Heaving sensor.
This can be done by setting by CVS-872D.
Hereafter, Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass is referred 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.

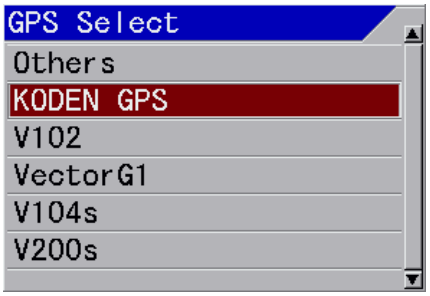


2) Select [Basics] - [GPS Select].



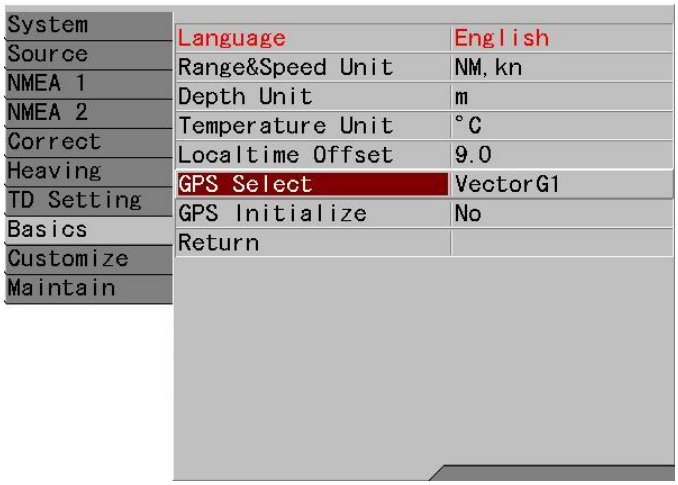
3) Press [▶] of .

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

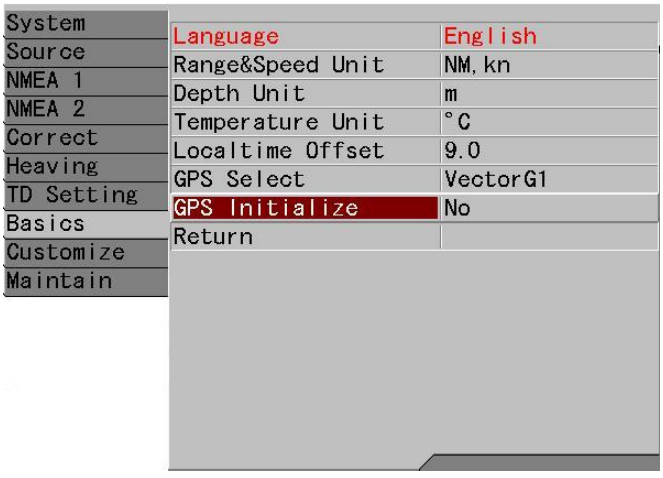


4) Press [▲] and [▼] keys, and select [V102], [Vector G1], [V104s] or [V200s].

5) Press SUB MENU to return the [Basics].

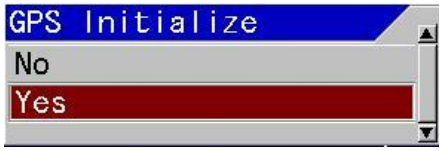


6) Select [Basics] - [GPS Initialize].



7) Press [▶] of  **.**

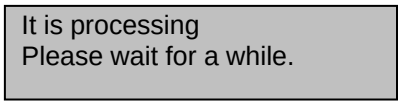
The setup box of [GPS Initialize] will be displayed.



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

9) Press  **.**

The massage box of [It is processing Please wait for a while] 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-872D 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.

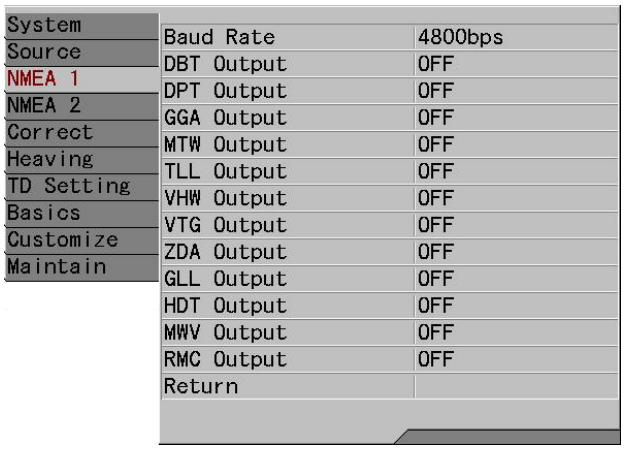
Caution: It takes approximately 5 minutes until the heaving data of Hemisphere V102/V104s/V200s GPS Compass / ComNav Vector G1 GPS Satellite Compass stabilizes after the start up. During the time, heaving correction may not be done correctly, however, this is not breakdown of the equipment.

2. This is to setup the output to the equipment to be connected on the NMEA1 (J8) ports of CVS-872D.

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

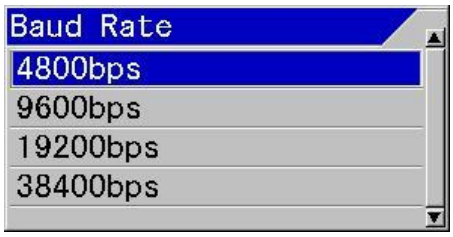
1) Press SUB MENU .

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



3) Press [▶] of .

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

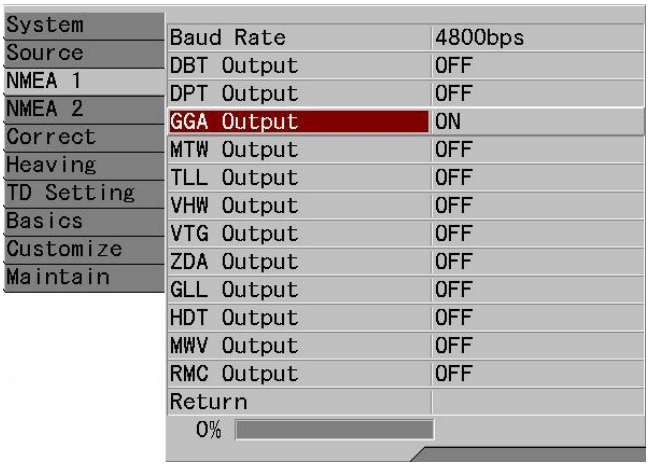


4) Press [▲] and [▼] to select the Baud Rate of NMEA1.

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

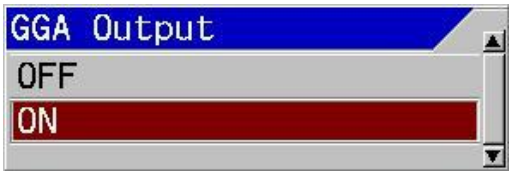
This is to select output data of NMEA1.
Output data shall match the externally connected equipment.

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	GPDTM	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-872D

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.1.5/2.0/3.0

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

1.6.2 Output sentence

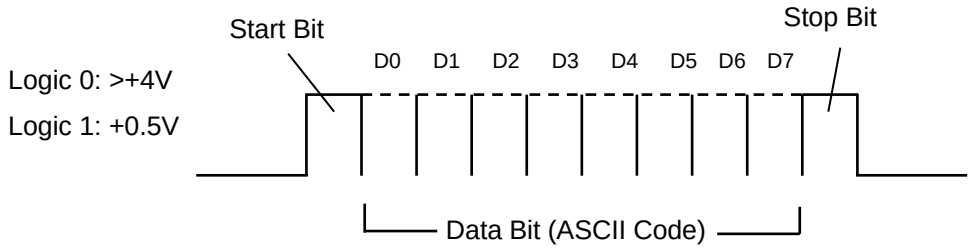
The sentences of DBT, DPT, GGA, GLL, HDT, MTW, MWV, RMC, TLL, VHW, VTG and ZDA can be transmitted.
The output format is NMEA0183 Ver.2.0/3.0. However, the DBT output is in Ver.1.5.

Sentence	Information	Sentence	Information
DBT	Depth from the transducer	TLL	Target Position
DPT	Depth from the transducer, Draft	VHW	Water Speed
GGA	Latitude/Longitude, Time	VTG	Course, Ground Speed
GLL	Latitude/Longitude	ZDA	Date, Time
HDT	Heading	PKODS, 4	Depth, Bottom Hardness
MTW	Water temperature	Olex	For Olex data
MWV	Wind Direction, Wind Speed	Nobeltec	For Nobeltec data
RMC	Latitude/Longitude, Course, Ground Speed, Date		

1.6.3 Input/Output sentence details

Data format: IEC 61162-1 (NMEA-0183 Ver. 1.5/2.0/3.0)

1.6.3.1 Data structure



NOTE: A parity bit is not provided.

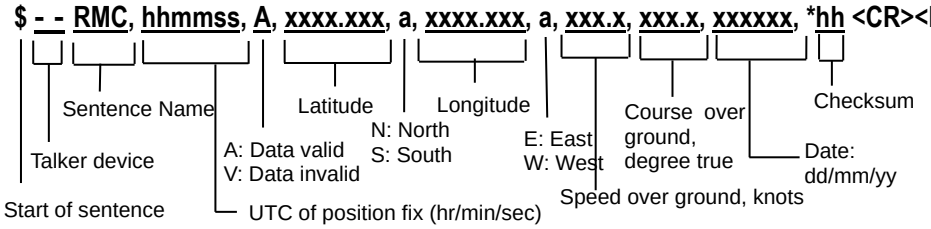
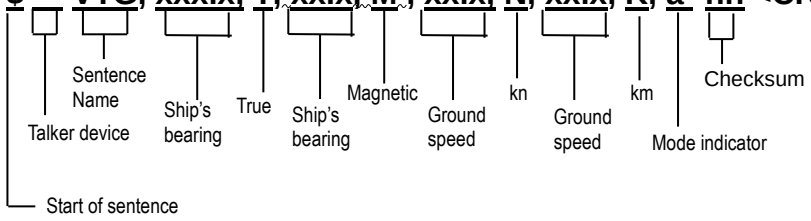
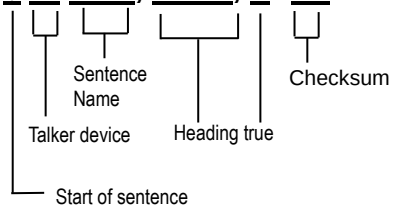
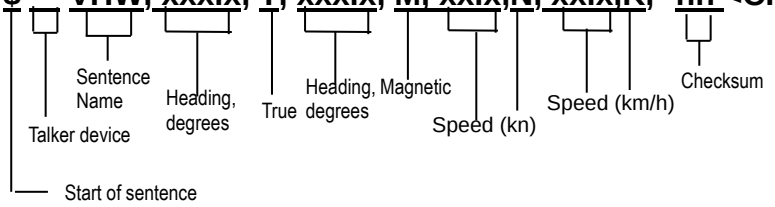
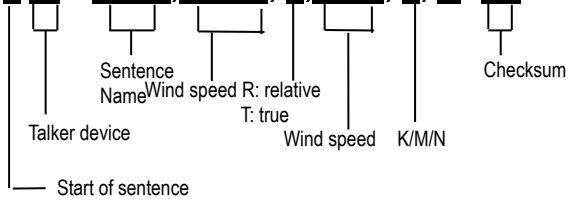
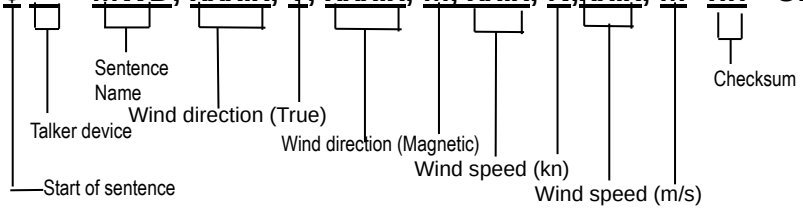
1.6.3.2 Output signal specification

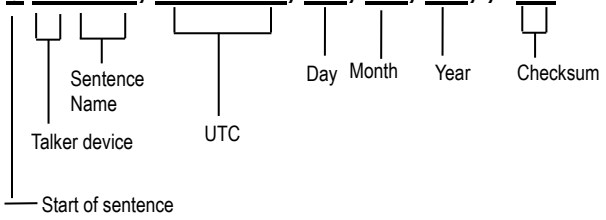
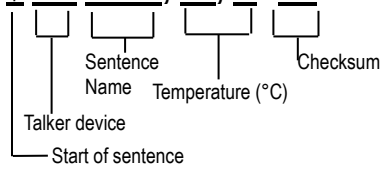
Baud rate	Output signal level	Output current	Output sentence	Update rate
4800 to 38400bps	TTL	Max 40mA	DBT+DPT+MTW+TLL	1sec

1.6.3.3 Details of input data sentence

NOTE: *Checksum is a total sum of EX-ORed data that are put between the $ and asterisk (*) signs.*

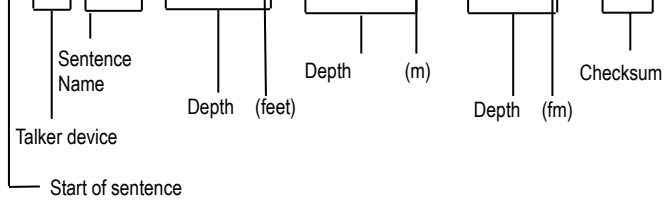
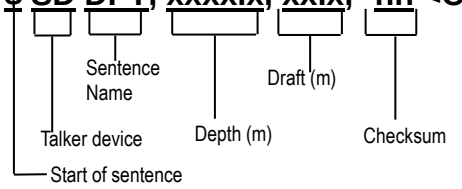
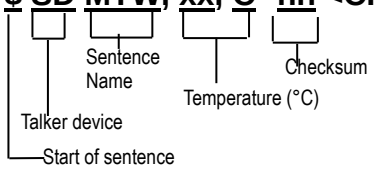
Name & Version	Data name
GGA Ver.1.5/2.0	GPS Position data **$ - - GGA, , xxxx.xxx, a , xxxxx.xxx, a , x , , , , , , , , *hh <CR><LF>** Sentence Name Latitude Longitude Checksum N: North S: South E: East W: West This field is not used This field is not used Talker device code Start of sentence GPS signal quality 0: Positioning unable 1: GPS positioning 2: DGPS positioning 3 – 8: Not acceptable
GLL	Geographic position
Ver.1.5/2.0	**$ - - GLL, xxxx.xxx, a , xxxxx.xxx, a , , A, a *hh <CR><LF>** Sentence Name Latitude Longitude Checksum N: North S: South E: East W: West This field is not used Mode identifier A: Valid Talker device code This field is not used Start of sentence

RMC Ver.1.5/2.0	Recommended minimum specific GPS data **$ - - RMC, hhmmss, A, xxxx.xxx, a, xxxx.xxx, a, xxx.x, xxx.x, xxxxxx, *hh <CR><LF>** 
VTG Ver.2.0	Course and water speed **$ - - VTG, xxx.x, T, xx.x, M , xx.x, N, xx.x, K, a *hh <CR><LF>** 
HTD Ver.2.0	Heading true **$ - - HDT, xxx.x, T *hh <CR><LF>** 
VHW Ver.2.0	Water speed and heading **$ - - VHW, xxx.x, T, xxx.x, M, xx.x,N, xx.x,K, *hh <CR><LF>** 
MWV Ver.2.0	Wind direction and speed **$ - - MWV, xxx.x, a, xx.x, a, A *hh <CR><LF>** 
MWD Ver.2.0	Wind direction and speed **$ - - MWD, xxx.x, T, xxx.x, M, xx.x, N,xx.x, M *hh <CR><LF>** 

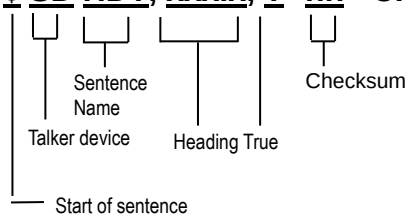
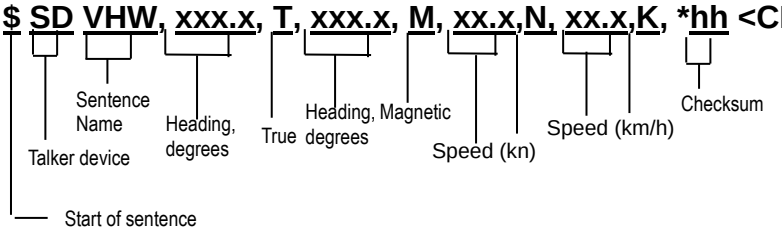
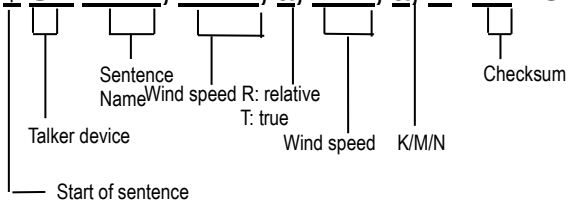
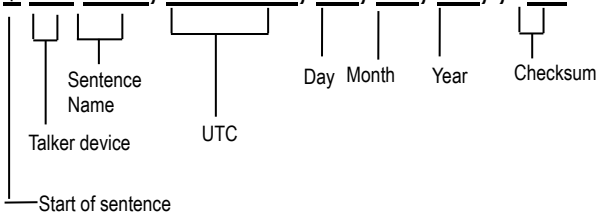
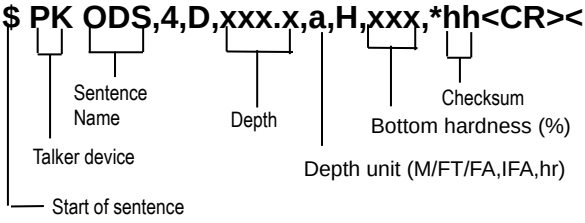
ZDA	Time and date
Ver.2.0	**$ - - ZDA, hhmmss, XX, XX, XX, , *hh <CR> <LF>** 
MTW	Water temperature
Ver.2.0	**$ SD MTW, xx, C *hh <CR><LF>** 

1.6.3.4 Details of output sentence

NOTE: *Checksum is a total sum of EX-ORed data that are put between the $ and asterisk (*) signs.*

Name & Version	Data name
DBT Ver.2.0	Depth from the transducer **$ SD DBT, xxxx.x, f, xxxx.x, M, xxx.x, F *hh <CR><LF>** 
DPT	Depth from the transducer and Draft
Ver.2.0	**$ SD DPT, xxxx.x, xx.x, *hh <CR><LF>** 
MTW	Water temperature
Ver.2.0	**$ SD MTW, xx, C *hh <CR><LF>** 

TLL	Target latitude and longitude
Ver.3.0	**$ SD TLL, xx, xxxx.xxx, a, xxxxx.xxx, a, , hhmmss, a, a *hh <CR><LF>** Sentence Name Talker device Start of sentence Target Number "00" fix Latitude N/S Longitude E/W Target Name NC UTC Target status "0" fix Reference target "T"fix Checksum
GGA	GPS Position data
Ver.1.5 Ver.2.0	**$ SD GGA, , xxxx.xxx, a , xxxxx.xxx, a , x , , , , , , , *hh <CR><LF>** Sentence Name Latitude Longitude Checksum N: North S: South E: East W: West This field is not used This field is not used Talker device code Start of sentence GPS signal quality 0: Positioning unable 1: GPS positioning 2: DGPS positioning 3 – 8: Not acceptable
GLL	Geographic position
Ver.1.5 Ver.2.0	**$SD GLL, xxxx.xxx, a , xxxxx.xxx, a , , A, a *hh <CR><LF>** Sentence Name Latitude Longitude Checksum N: North S: South E: East W: West This field is not used Mode identifier A: Valid Talker device code This field is not used Start of sentence
RMC	Recommended minimum specific GPS data
Ver.1.5 Ver.2.0	**$ SD RMC, hhmmss, A, xxxx.xxx, a, xxxx.xxx, a, xxx.x, xxx.x, xxxxx, *hh <CR><LF>** Sentence Name Latitude Longitude Checksum Talker device A: Data valid V: Data invalid N: North S: South E: East W: West Course over ground, degree true Date: dd/mm/yy Start of sentence UTC of position fix (hr/min/sec) Speed over ground, knots
VTG	Course and water speed
Ver.2.0	**$ SD VTG, xxx.x, T, xx.x, M , xx.x, N, xx.x, K, a *hh <CR><LF>** Sentence Name Talker device Ship's bearing True Ship's bearing Magnetic Ground speed kn Ground speed km Mode indicator Checksum Start of sentence

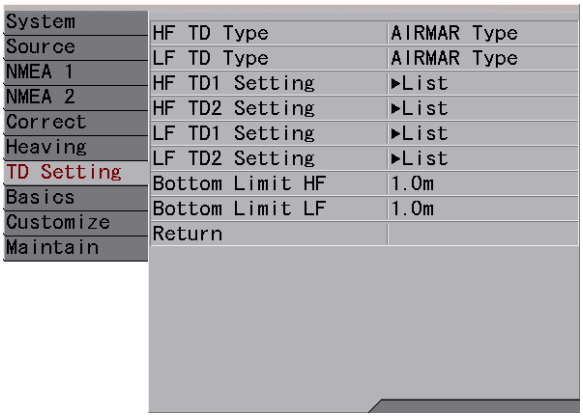
HDT	Heading true
Ver.2.0	**$ SD HDT, xxx.x, T *hh <CR><LF>** 
VHW	Water speed and heading
Ver.2.0	**$ SD VHW, xxx.x, T, xxx.x, M, xx.x,N, xx.x,K, *hh <CR><LF>** 
MWV	Wind direction and speed
Ver.2.0	**$ SD MWV, xxx.x, a, xx.x, a, A *hh <CR><LF>** 
ZDA	Time and date
Ver.2.0	**$ SD ZDA, hhmmss, XX, XX, XX, , *hh <CR> <LF>** 
PKOD S,4	Depth and bottom hardness
	$ PK ODS,4,D,xxx.x,a,H,xxx,*hh<CR><LF> 

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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 transducer

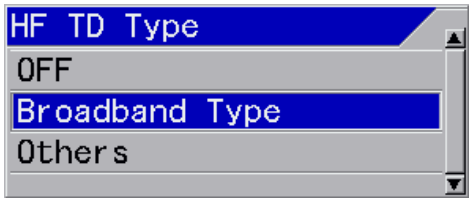
TD Setting – HF TD Type

TD Setting – LF TD Type

Select the type of transducer to be actually used. Be adjusted as it has influence on images.

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

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

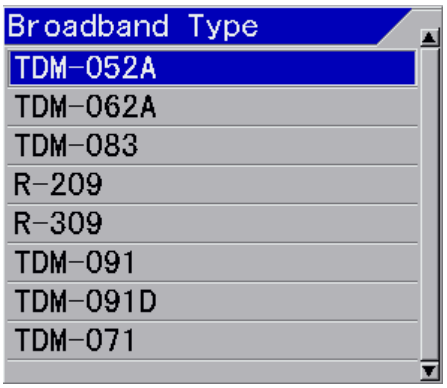


4. Press [▲] and [▼] to select TD type of XF.

   When a Broadband transducer is used, select [Broadband Type]. When the other transducer is used, select [Others]. When transducer is not used, select [OFF].

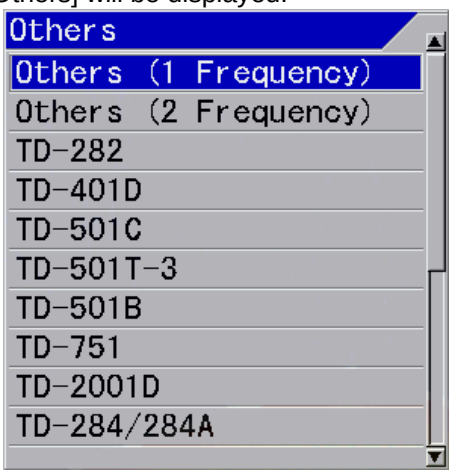
5. Press of [►] of .

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



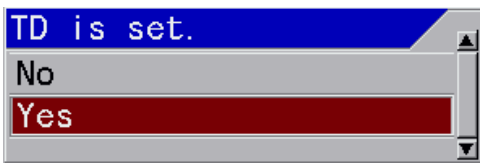
6. Press [▲] or [▼] to select the type of transducer to use.

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



7. Press [▲] or [▼] to select the type of transducer to use.
8. Press ENT key.

The setup box [TD selection] will be displayed.



9. Press [▲] or [▼] to select [YES].
10. Press ENT key.

The following message is displayed and the TD is set.

.

```
It is processing.
Please wait a while.
```

It will return to TD Setting – XF TD Type in a few seconds.

The TD selected in [Broadband Type] is also set in both [Broadband Type] high frequency and low frequency.

The [Frequency], [TX power], and [Beam Angle] of the selected TD are set automatically.

The [Frequency], [TX power], and [Beam Angle] of the TD selected in [TD-XXX] of [Others] are also set automatically.

When the name of TD to use is unknown, select [Others (1 Frequency)] or [Others (2 Frequency)].

Select [Others (1 Frequency)] when using a single frequency TD.

Select [Others (2 Frequency)] when using the 2-frequency alternating transmission TD.

⚠ **Caution:**
When [Others (1 Frequency)] or [Others (2 Frequency)] is selected, [Spc. Adj.] - [Output limit XF] is set to "70" (2kw equivalency).
After this setting, set it according to the TX power of the TD to use.
For details on the settings, refer to "2.6 Setup of Output Limit for transducer".

2.2 Setup of frequency and beam angle

TD Setting – HF TD1 setting

TD Setting – HF TD2 setting

TD Setting – LF TD1 setting

TD Setting – LF TD2 setting

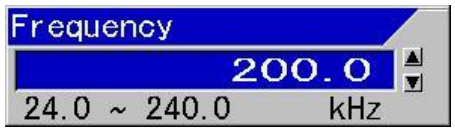
1. Press SUB MENU
2. Select [TD Setting] - [XF TDX Setting]
3. Press [▶] of .

The setup box of [XF TDX Setting] will be displayed.



4. Select [Frequency] for changing of frequency, and [Beam angle] for changing of beam angle with [▲] and [▼] keys.
5. Press [▶].

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



When [Beam Angle] is selected, the setup box of beam angle will be displayed.



6. Setup frequency or beam angle with [▲] and [▼] keys.

When [Broadband Type] is selected in 2.1.1, 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. (As for beam angle, refer to [Type of transducer] in Configuration of Equipment)**

2.3 Setup of Bottom Limit

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

TD Setting - Bottom Limit HF

TD Setting - Bottom Limit LF

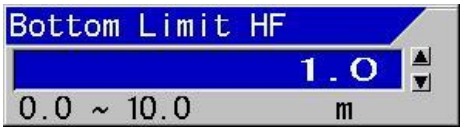
To set Bottom Limit.

1. Press SUB MENU.

2. Select [TD Setting] - [Bottom Limit XF].

3. Press [▶] of .

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



4. Press [▲] and [▼] to set a depth.

5. Press MENU to close the menu.

2.4 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 to 10.0, in ft: - 30.0 to 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.

2.5 Setup of Gain (TD) for transducer

Correct – Gain (TD)

It corrects the attenuation due to the depth of ultrasonic waves and adjusts the accuracy of sea bottom detection.

This correction prevents to identify incorrectly of the seabed for large fish schools and to identify incorrectly of the seabed for position deeper than the actual.

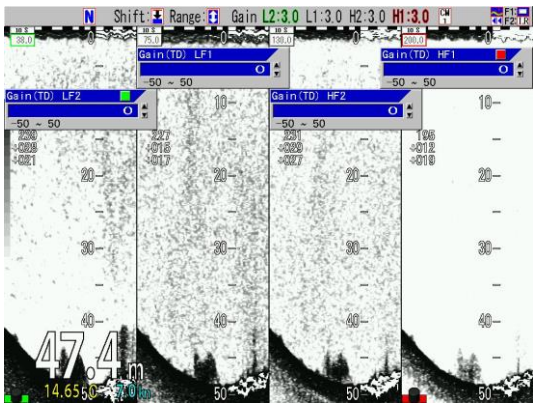
This setting does not need to be changed if the TD installation is done properly.

1. Press SUB MENU.

2. Select [Correct] – [Gain (TD)].

3. Press [▶] of .

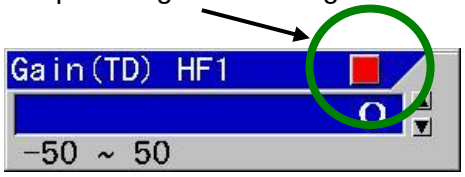
   The screen will turn to the gain (TD) adjustment screen and displays the gain (TD) setup box at the upper side of the screen.



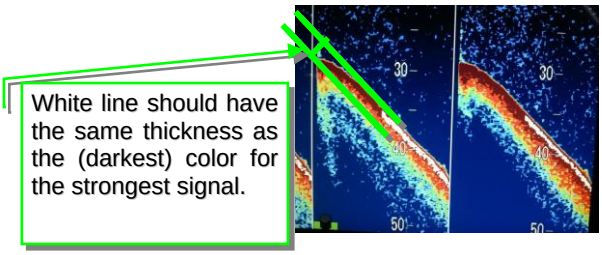
4. Setup the Gain (TD) by turning the gain knob, which are lighted red or green, at the side to be adjusted.

   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.



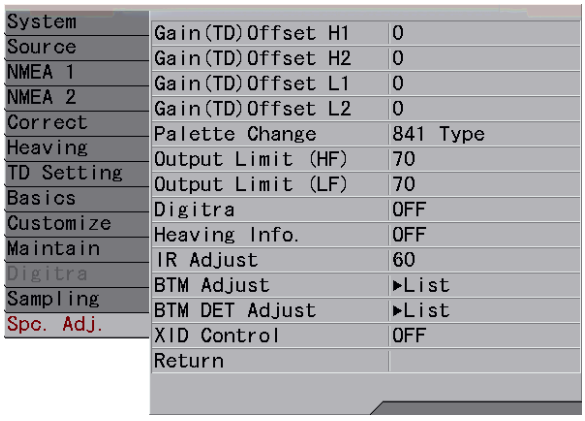
5. Pressing the gain knob at the side to be adjusted a few times, move to the position of the Gain (TD) box to be adjusted. (The red mark at right top side will move)

   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.

2.6 Setup of Output Limit for transmitter

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



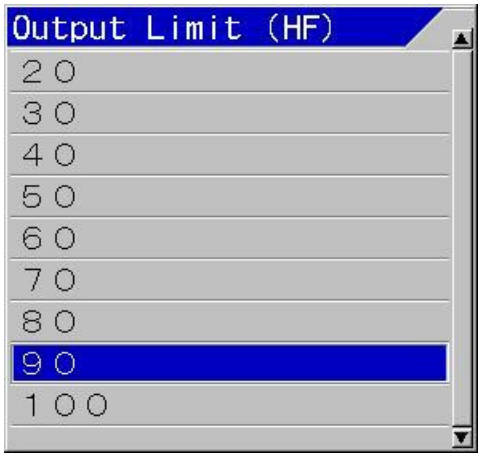
2.6.1 Display of Output Limit Menu

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.

   Select [Spc. Adj.] - [Output Limit XF].

5. Press [▶] of .

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



6. 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.

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

[Output Limit] is enabled only when [TD Setting] in the submenu is set to [Others (1 Frequency)] or [Others (2 Frequency)].

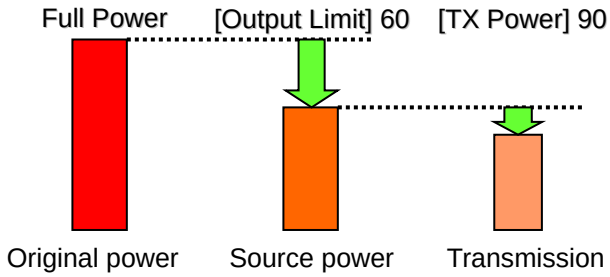
[Output Limit] is a common setting regardless of CM key.

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.



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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.

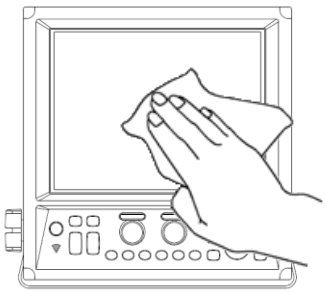
3.2 Cleaning

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, LCD test and XID check 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.

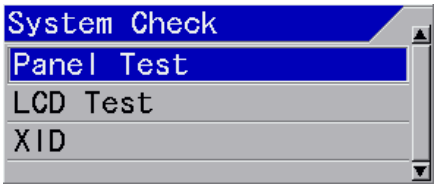
[XID] can check the received data from the XID adaptive TD

1. Press SUB MENU .

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

3. Press [▶] of .

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

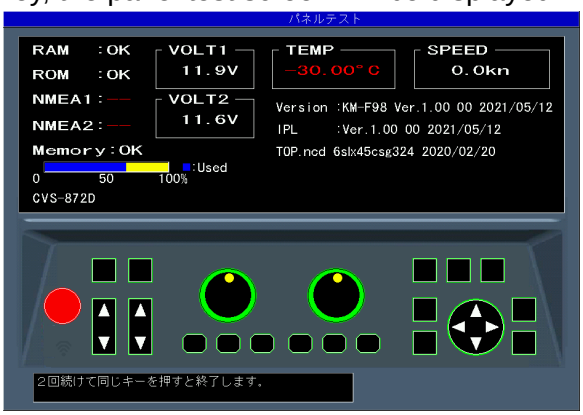


4. When panel test or confirmation of system conditions is performed, select [Panel Test] with [▲] and [▼] keys. For checking of LCD, select [LCD Test]. For checking of XID, select [XID].

3.4.2.1 Panel Test

The panel test confirms the key input and system status.

When [Panel Test] is selected and press [▶] key, 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] is always displayed as 0.0kn.

(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.

3.4.2.2 LCD Test

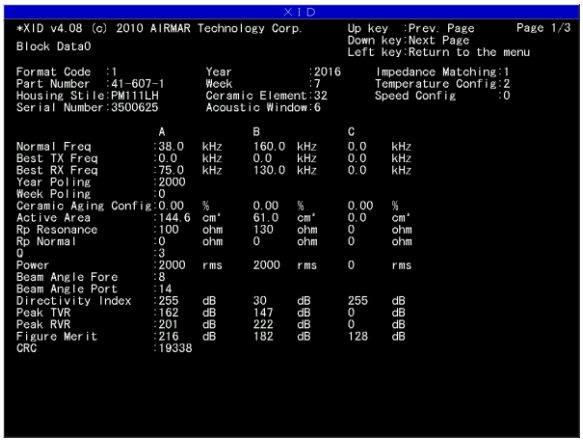
When [LCD Test] is selected, grid will be displayed. Each time [▶] key is pressed, the color of display will change, and the setup box of [System Check] will be finally displayed.

3.4.2.3 XID

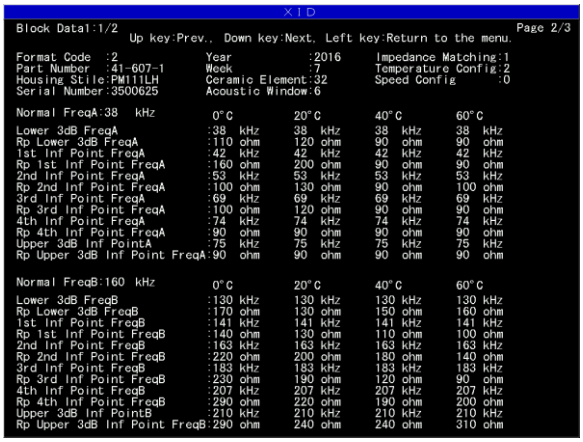
All data received from the XID adaptive TD is displayed.

Select [XID] in the [System Check] settings box.

Press [▶] key to display the 1 / 3rd page of the XID data.



You can see the TD model name, serial number, etc.
Press the [▼] key to display 2/3 page and then 3/3 page.



Press MENU to close the menu.

3.4.3 Initialize

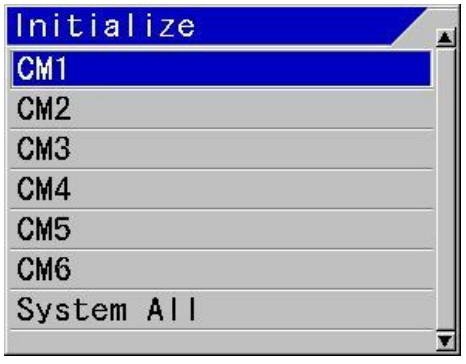
This is to return all setup of each CM or the whole system to the factory default settings. However, waypoint data and image stored data will remain as they are.

1. Press SUB MENU .

2. Select [Maintain] – [Initialize]

3. Press [▶] of .

The setup box of [Initialize] will be displayed.



4. When a specified 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.**

3.4.4 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 program is to be updated, select [Yes] and is not to be updated, select [No] with [▲] and [▼] keys.

5. Press ENT .

   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.

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 BRILL 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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