FURUNO

Installation Manual
MULTI FUNCTION DISPLAY
Model TZT19F

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

(Examples of symbols)

⚠ Warning, Caution ⃠ Prohibitive Action ❗ Mandatory Action

⚠ WARNING

ELECTRICAL SHOCK HAZARD
Do not open the equipment unless totally familiar with electrical circuits.

Only qualified personnel should work inside the equipment.

Turn off the power at the switchboard before beginning the installation.

Fire or electrical shock can result if the power is left on.

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or damage the equipment.

If your vessel is configured with an autopilot system, install an autopilot control unit (or emergency autopilot stop button) at each helm station, to allow you to disable the autopilot in an emergency.

If the autopilot cannot be disabled, accidents may result.

⚠ CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Use the proper fuse.

Use of an incorrect fuse may damage the equipment.

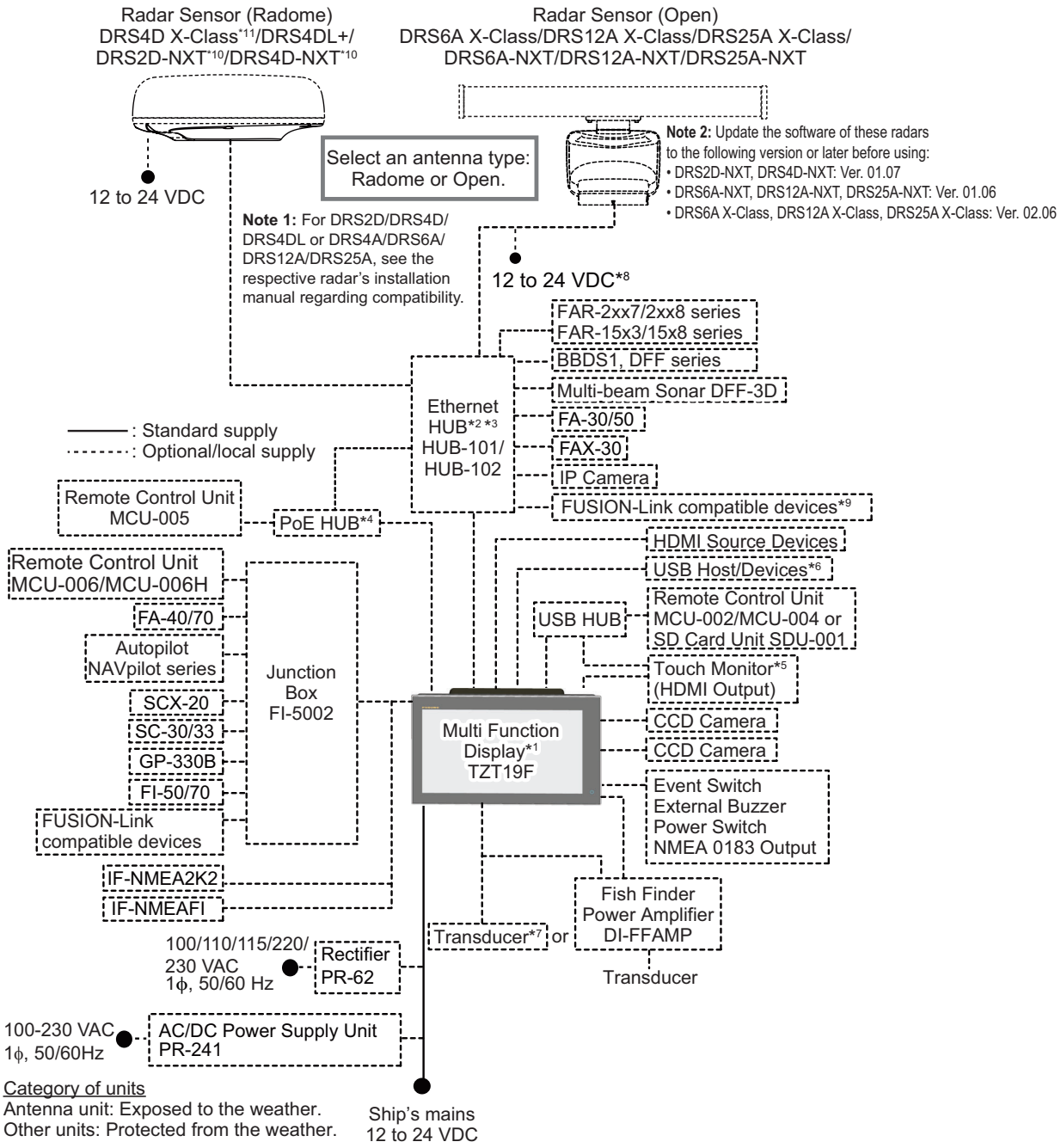
The front panel is made of glass. Handle it with care.

Injury can result if the glass breaks.

Observe the following compass safe distances to prevent interference to a magnetic compass:

Model	Standard compass	Steering compass
TZT19F	0.65 m	0.40 m

SYSTEM CONFIGURATION



*1: This unit has a built-in fish finder as standard.
*2: Use an Ethernet HUB. A maximum of 6 units of NavNet TZtouch series (if TZT2BB is connected, a maximum of 4 units) can be connected. NavNet TZtouch (TZT9/14/BB) cannot be connected. See page iii for TZT series compatible combinations.
*3: For the multi-stage (cascade) connection, a maximum of four units of HUB-101/HUB-102 can be connected to the MFDs.
*4: Use an after-market PoE HUB. The NETGEAR GS108PE is confirmed as compatible. Compatibility tests are limited to general use as part of this configuration and in no way indicates overall capability. Further, FURUNO cannot guarantee the functionality of any after-market HUB.
*5: The HDMI output resolution is fixed to 1920x1080. To use a touch monitor for operation, its output resolution must be 1920x1080 (Aspect ratio 16:9) with HPD (Hot Plug Detection) function.
*6: When using a USB OTG as a USB host device, this equipment operates as a touch operation output device.
*7: Some transducers require connection of a 12-to-10 pin conversion cable.
*8: 12 VDC is only used with DRS6A-NXT. All other open array DRS sensors require 24 VDC.
*9: Applicable when FUSION-LINK compatible device is connected via Ethernet HUB.
*10: DRS2D-NXT and DRS4D-NXT cannot be used in Japan.
*11: DRS4D X-Class is for Japanese market only.

TZT series network connection

The TZT series can be connected on the same network with the following combinations.

	TZtouch: TZT9/14/BB	TZtouch2: TZTL12F/15F/TZT2BB	TZtouchXL:TZT10X/13X/ 16X/22X/24X
TZtouch3:TZT9F/12F/ 16F/19F	No	Yes	Yes

EQUIPMENT LISTS

Standard supply

Name	Type	Code No.	Qty	Remarks
Multi Function Display	TZT19F	-	1	
Installation Materials	CP19-02600	000-037-169	1	
Accessories	FP26-00401	001-175-940	1	

Optional supply

Name	Type	Code No.	Remarks
Operator's Manual	OME-45120-*	001-635-380	
Network HUB	HUB-101	-	
	HUB-102	-	
NMEA Data Converter	IF-NMEA2K2	000-037-670	
Remote Control Unit	MCU-002	000-025-461	
	MCU-004	000-033-392	
	MCU-005	000-035-097	
	MCU-006	000-042-803	
	MCU-006H	000-042-804	
Matching Box	MB-1100	000-027-226	Required for some transducers. See next page.
Junction Box	FI-5002	000-010-765	
Joint Box	TL-CAT-012	000-167-140	For LAN network
Network (LAN) Cable	MOD-Z072-020+	001-167-880	LAN cable, cross-pair, 2 m
	MOD-Z073-030+	001-588-890	LAN cable, straight, 2 pairs, 3 m
	MOD-Z072-050+	001-167-890	LAN cable, cross-pair, 5 m
	MOD-Z072-100+	001-167-900	LAN cable, cross-pair, 10 m
MJ Cable Assy.	MJ-A6SPF0016-005C	001-588-800	For FAX-30
NMEA Cable Assy.	FRU-NMEA-PMMFF-010	001-533-060	1 m
	FRU-NMEA-PMMFF-020	001-533-070	2 m
	FRU-NMEA-PMMFF-060	001-533-080	6 m
	FRU-NMEA-PFF-010	001-507-010	1 m
	FRU-NMEA-PFF-020	001-507-030	2 m
	FRU-NMEA-PFF-060	001-507-040	6 m
	FRU-MM1MF1MF1001	001-507-050	
	FRU-MM1000000001	001-507-070	
	FRU-MF000000001	001-507-060	
External Buzzer	OP03-136	000-086-443	Buzzer: PKB5-3A40
Rectifier	PR-62	000-013-484	100 VAC
		000-013-485	110 VAC
		000-013-486	220 VAC
		000-013-487	230 VAC
AC/DC Power Supply Unit	PR-241	000-037-820	
Ferrite Core	OP86-11	001-594-450	For PR-241

Name	Type	Code No.	Remarks
Cable Assy.	FRU-F12F12-100C	001-560-390	
	FRU-F12F12-200C	001-560-400	
	FRU-F7F7-100C	001-560-420	
	FRU-F7F7-200C	001-560-430	
	FRU-CCB12-DA-10M*3	001-608-450	For transducer extension
Fish Finder Power Amplifier	DI-FFAMP	000-037-174	For 2 to 3 kW Dual-frequency CHIRP transducers
Transducer (for internal fish finder)	520-5PSD*1	000-015-204	600 W
	520-5MSD*1	000-015-212	
	525-5PWD*1	000-038-277	
	525STID-MSD*1	000-011-783	
	525STID-PWD*1	000-011-784	
	520-PLD*1	000-023-680	
	525T-BSD*1	000-023-020	
	525T-PWD*1	000-023-019	
	525T-LTD/12*1	000-023-679	
	525T-LTD/20*1	000-023-678	
	SS60-SLTD/12*1	000-023-676	
	SS60-SLTD/20*1	000-023-677	
	526TID-HDD*1	000-023-021	1 kW
	50/200-1T *10M* *1	000-038-350	1 kW Matching box MB-1100 required for installation of these transducers.
	50B-6 *10M*	000-038-351	
	50B-6B *15M*	000-038-358	
	200B-5S *10M*	000-038-348	
Transducer (Requires DI-FFAMP/DFF3-UHD)	28BL-6HR	000-015-081	2 kW
	38BL-9HR	000-015-083	
	50BL-12HR	000-015-093	
	82B-35R	000-015-087	
	88B-10 *15M*	000-015-025	
	200B-8 *10M*	000-015-030	
	200B-8B *15M*	000-015-032	
	28BL-12HR	000-015-082	3 kW
	38BL-15HR	000-015-092	
	50BL-24HR	000-015-094	
	68F-30H	000-038-355	
	100B-10R	000-027-438	
	150B-12H *15M*	000-015-074	
	88F-126H*2	000-039-088	5 kW
	200B-12H *15M* *2	000-015-069	
Transducer (For CHIRP SideScan)*5	225T-TM904	000-044-573	150 W
	225T-SS904	000-044-574	
	225T-PR904	000-044-575	

Name	Type	Code No.	Remarks
CHIRP Transducer (for internal fish finder)	TM150M	000-035-500	300 W
	B-75L	000-035-501	
	B-75H	000-035-502	600 W
	B-175H	000-035-504	1 kW
	B-175L	000-035-503	
CHIRP Transducer (for internal fish finder)	B265LH-FJ12*4	000-037-609	1 kW
	CM265LH-FJ12*4	000-037-610	
	TM265LH-FJ12*4	000-037-611	
CHIRP Transducer (Requires DI-FFAMP/DFF3-UHD)	PM111LHG	000-027-404	2 kW
	CM599LHG	000-027-406	2 to 3 kW
	CM599LM	000-027-407	
Thru-Hull Pipe	TRB-1100(1)	000-027-409	
	TRB-1000(1)	000-015-215	
	TRB-1100(2)	000-015-218	
	TFB-4000(1)	000-015-205	
	TFB-5000(1)	000-015-206	
	TWB-6000(2)	000-015-207	
	TFB-7000(1)	000-022-532	
	TFB-7000(2)	000-015-209	
	TFB-7000(FJ12)	000-038-453	
Booster Box	BT-5-1/2	001-411-880	For 5 kW and 10 kW transducers
Extension Cable*3	C332 10M	001-464-120	
External KP Kit	OP19-26	001-605-510	

*1: Compatible with ACCU-FISH™, Bottom Discrimination and RezBoost™ Enhanced mode.

*2: Rated power of these transducers is 5/10 kW, but the actual output power from DI-FFAMP/DFF3-UHD is 3 kW.

*3: Use of the extension cable may cause the following problems:
- Reduced detection ability
- Wrong ACCU-FISH™ information (fish length smaller than actual length, fewer fish detections, error in individual fish detection).
- Wrong speed data
- No TD-ID recognition

*4: Compatible with ACCU-FISH™.

*5: Only 230 kHz CHIRP side scan transducers are supported (455 kHz CHIRP side scan transducers are not supported).

1. MOUNTING

1.1 Installation of Multi Function Display

The TZT19F is designed to be mounted in a console.

The installer of this equipment must read and follow the descriptions in this manual. Wrong installation or maintenance can void the warranty.

Mounting considerations

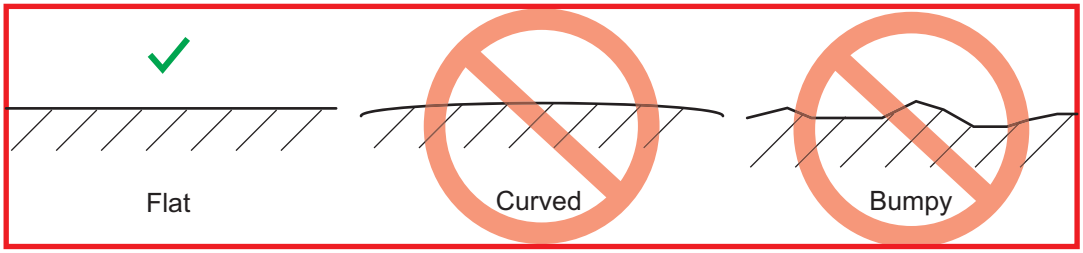
When selecting a mounting location for your TZT19F, keep the following in mind:

- The temperature at the mounting location shall be between -15°C and +55°C.
- The humidity at the mounting location shall be 93% or less at 40°C.
- Locate the unit away from exhaust pipes and ventilators.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal (compliant with IEC 60945 Ed.4).
- Keep the unit away from electromagnetic field generating equipment such as motors and generators.
- For maintenance and checking purposes, leave sufficient space around the unit and leave slack in cables. Minimum recommended space is shown in the outline drawing for the display units.
- Do not mount the unit on an overhead beam/bulkhead.
- A magnetic compass will be affected if the equipment is placed too close to it. Observe the compass safe distances shown in the SAFETY INSTRUCTIONS to prevent disturbance to the magnetic compass.
- Since this unit does not have a built-in GPS antenna and requires an external GPS or other sensor for positioning, an external GPS antenna (such as GP-330B) shall be connected via NMEA 2000.

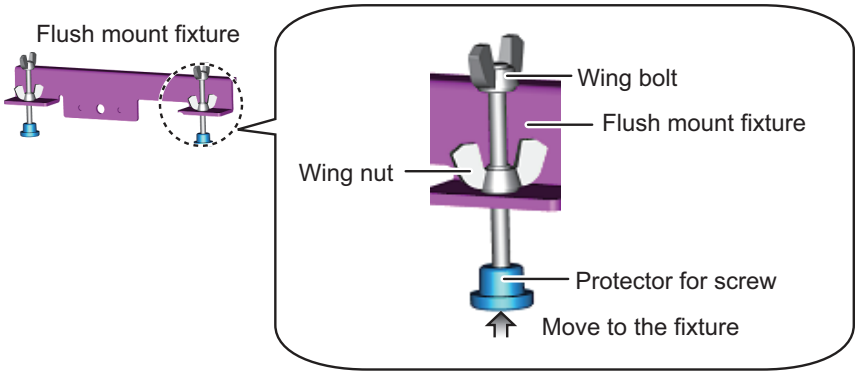
1.1.1 How to install the multi function display

Referring to the figure below, select a flat mounting location. Read the installation instructions before starting installation. Pay particular attention to the notes; failure to follow these instructions may cause damage to the unit.

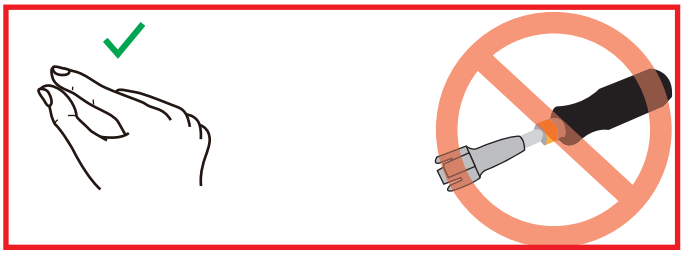
Note: Ensure the mounting location is flat, with no indents or protrusions, to allow a secure fit.



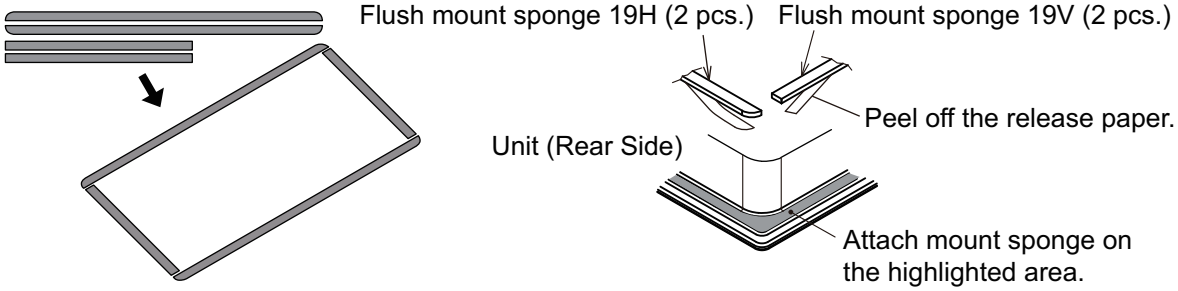
1. Prepare a cutout in the mounting location using the template (supplied) for the TZT19F.
2. Fasten the wing bolts and the wing nuts of the flush mount fixture so that the protector for screw moves to the flush mount fixture.



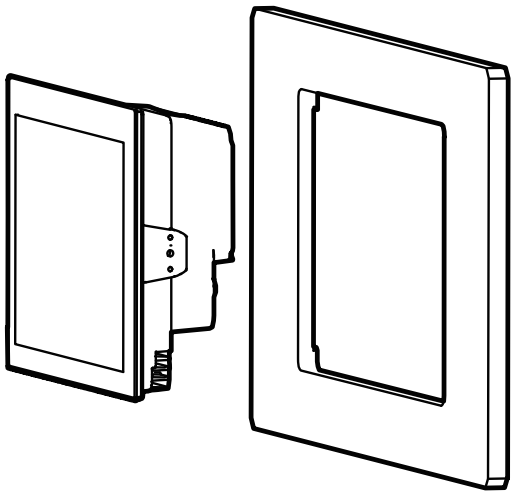
Note: Slowly fasten the four wing bolts evenly with your hand. Do not use a tool to fasten the wing bolts. A tool can be used to fasten the wing nuts; use caution so as not to damage the wings or thread.



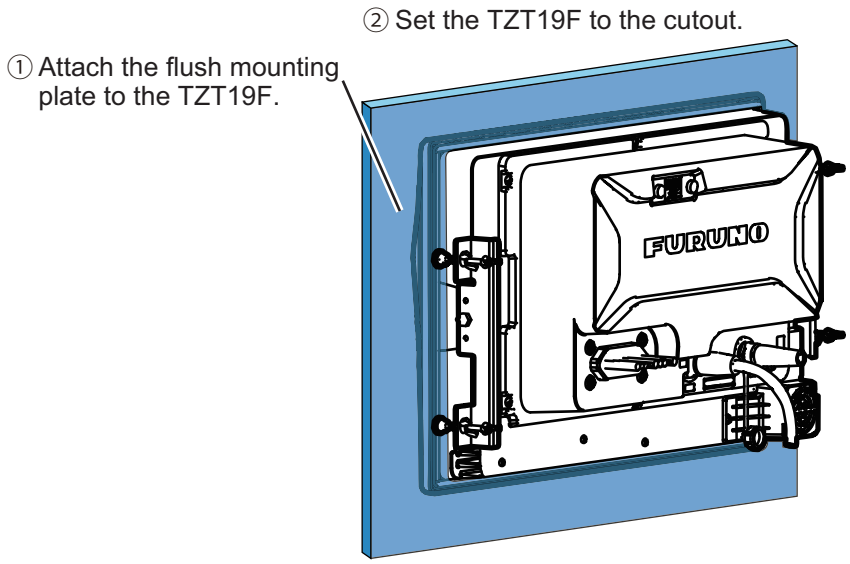
3. Connect all cables at the back of the TZT19F. (See chapter 2.)
4. Attach flush mount sponges to the bezel of TZT19F.



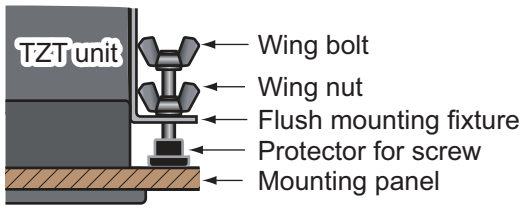
5. Set TZT19F to the cutout made at step 1.



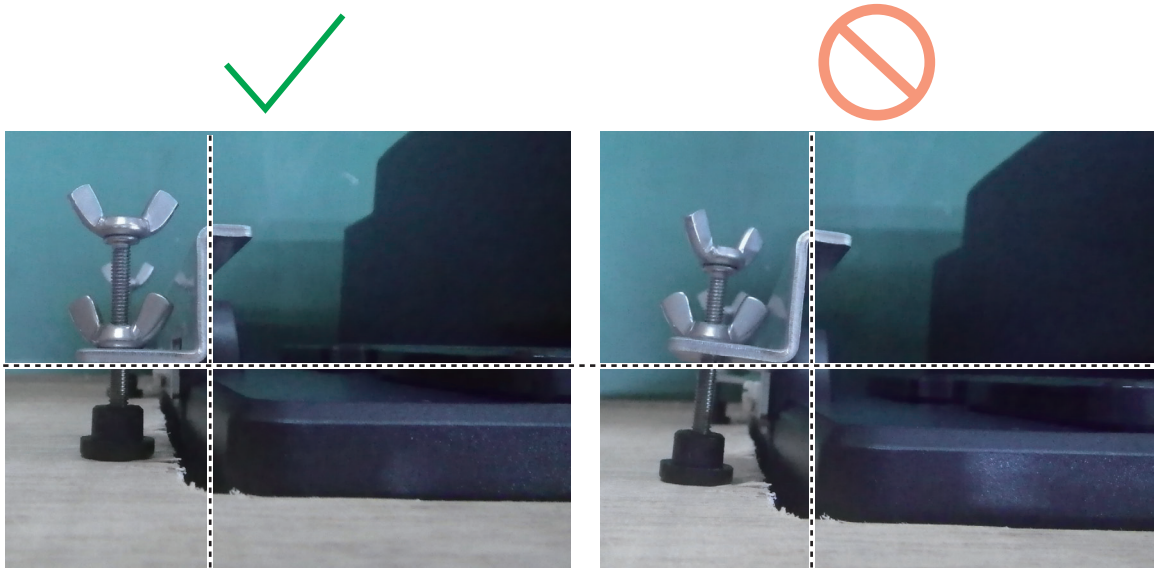
6. Attach the flush mount fixture to the TZT19F with hex bolts.



7. Fasten each wing bolt so that the protector for screw touches the mounting panel.
8. Fasten the wing nuts tightly.



Note: Use of excessive torque when fastening the wing bolts can cause the flush mount fixture to tilt or warp. Check that the flush mount fixtures and wing bolts are not tilted or warped, referring to the following examples.



Flush mount fixture is fixed at right angle.

Flush mount fixture is warped, wing bolts are tilted.

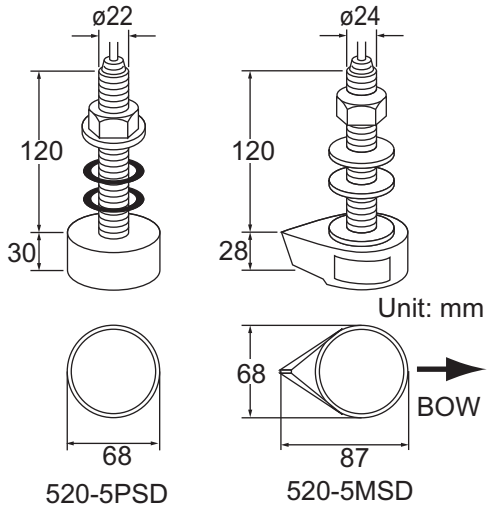
1.2 Installation of Transducers

⚠ CAUTION

Do not cover the transducer with FRP resin. The heat generated when the resin hardens may damage the transducer. CHIRP transducers are especially vulnerable to heat.

Note: For instructions regarding installation of network fish finder transducers, see the respective manual.

There are three methods for installing the transducer on the ship (thru-hull mount, inside the hull and transom mount) and one of those methods is to be selected according to the structure of the ship. The procedure which follows below shows how to install a small transducer (520-5PSD/5MSD) as the representative example of installation.



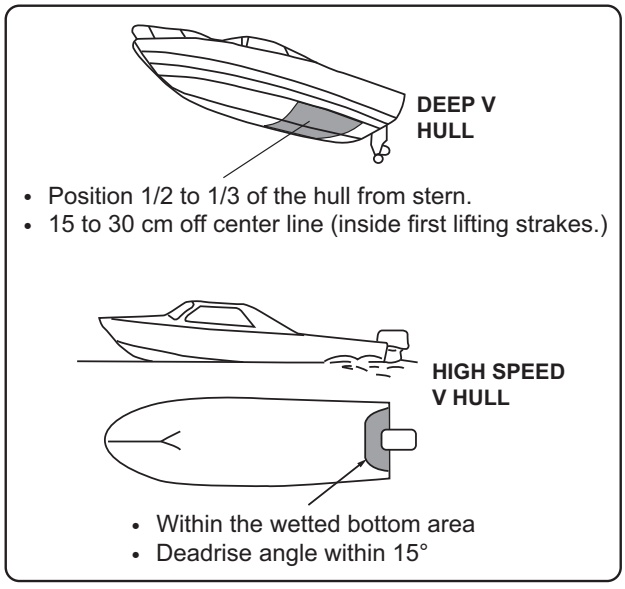
1.2.1 How to mount a transducer through the hull

Transducer mounting location

The thru-hull mount transducer provides the best performance of all, since the transducer protrudes from the hull and the effect of air bubbles and turbulence near the hull skin is reduced. If your boat has a keel, the transducer should be at least 30 cm away from it.

The performance of this fish finder is directly related to the mounting location of the transducer, especially for high-speed cruising. The installation should be planned in advance, keeping the length of the transducer cable and the following factors in mind:

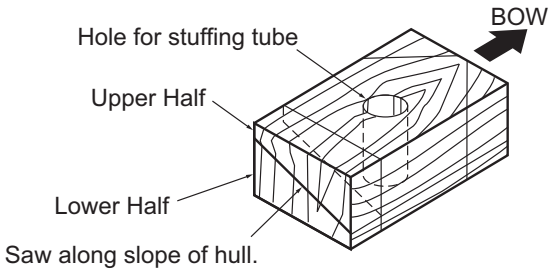
- Air bubbles and turbulence caused by movement of the boat seriously degrade the sounding capability of the transducer. The transducer should, therefore, be located in a position where water flow is the smoothest. Noise from the propellers also adversely affects performance and the transducer should not be mounted nearby. The lifting strakes are notorious for creating acoustic noise, and these must be avoided by keeping the transducer inboard of them.



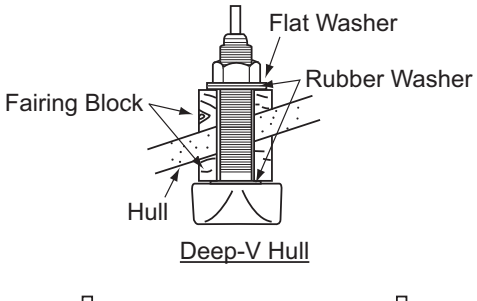
- The transducer must always remain submerged, even when the boat is rolling, pitching or up on a plane at high speed.
- A practical choice would be somewhere between 1/3 and 1/2 of your boat's length from the stern. For planing hulls, a practical location is generally rather far astern, so that the transducer is always in water regardless of the planing attitude.

Installation procedure

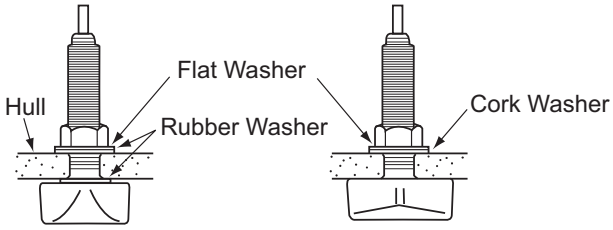
1. With the boat hauled out of the water, mark the location chosen for mounting the transducer on the bottom of the hull.
2. If the hull is not level within 15° in any direction, fairing blocks made out of teak should be used between the transducer and hull, both inside and outside, to keep the transducer face parallel with the water line. Fabricate the fairing block as shown below and make the entire surface as smooth as possible to provide an undisturbed flow of water around the transducer. The fairing block should be smaller than the transducer itself to provide a channel to divert turbulent water around the sides of the transducer rather than over its face.



3. Drill a hole just large enough to pass the threaded stuffing tube of the transducer through the hull, making sure it is drilled vertically.
4. Apply a sufficient amount of high quality caulking compound to the top surface of the transducer, around the threads of the stuffing tube and inside the mounting hole (and fairing blocks if used) to ensure watertight mounting.
5. Mount the transducer and fairing blocks and tighten the locknut. Be sure that the transducer is properly oriented and its working face is parallel to the waterline.



Deep-V Hull



Flat Hull

Note: Do not over-stress the stuffing tube and locknut through excessive tightening, since the wood block will swell when the boat is placed in the water. It is suggested that the nut be tightened lightly at installation and re-tightened several days after the boat has been launched.

1.2.2 How to mount a transducer inside the hull

NOTICE

This installation method affects the ability to detect the bottom, fish and other objects because the ultrasound pulse is weakened when it passes through the hull.
Therefore, refrain from this mounting method for a transducer that supports the RezBoost™ (Enhanced Mode), ACCU-FISH™ and/or bottom discrimination display feature.

Remarks on installation

This method is useful when mounting a transducer inside the hull of FRP ship, however, it affects the ability to detect the bottom, fish and other objects.

- Do the installation with the ship moored at a dock, etc. The water depth should be 6.5 to 32 feet (2 to 10 meters).
- Turn off the engine.
- Do not power the unit with the transducer in the air, to prevent damage to the transducer.
- Do not use this method on a double layer hull.
- Before attaching the transducer to the hull, check that the site is suitable, by following steps 1 to 3 in the installation procedure below.

Necessary tools

The following tools are required:

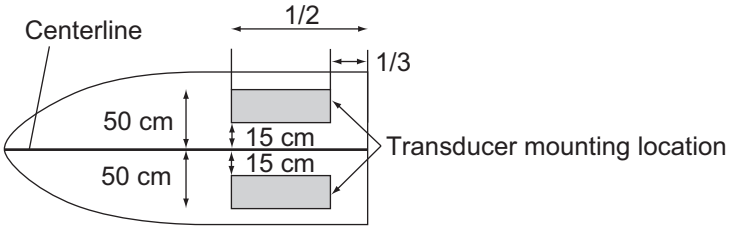
- Sandpaper (#100)
- Marine sealant
- Water-filled plastic bag

Selecting a location to install the transducer

Install the transducer on the hull plate inside of the engine room. The attenuation of the ultrasound pulse varies with the thickness of the hull. Select a location where attenuation is the lowest.

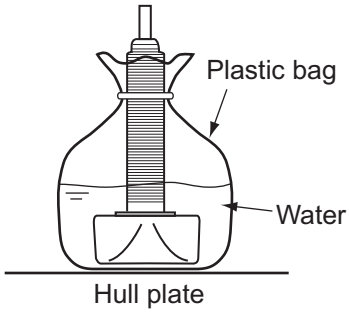
Select 2-3 locations considering the four points mentioned below.

- Mount the transducer at a location 1/2 to 1/3 of the length of your boat from the stern.
- The mounting location is between 15 to 50 cm from the centerline of the hull.
- Do not place the transducer over hull struts or ribs which run under the hull.
- Avoid a location where the rising angle of the hull exceeds 15°, to minimize the effect of the boat's rolling.



Decide the most suitable site from the locations selected with the following procedures.

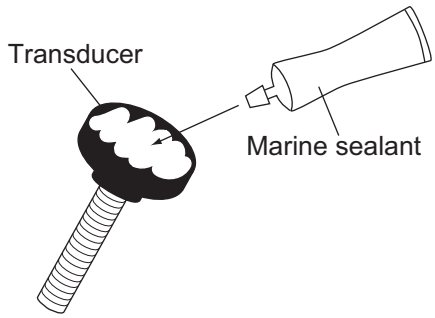
1. Connect the power cable and transducer cable to the display unit.
2. Put the transducer into a water-filled plastic bag. Press the transducer against the chosen site.
3. Tap ⏻ (power switch) to turn the power on.
4. After the startup procedure completes (approx. 90 seconds), the last used display appears. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings. See section 3.3 for how to use the menu.



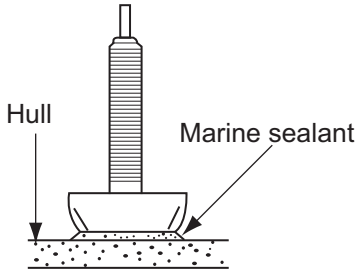
5. Scroll the menu to show [Fish Finder] in the menu, then tap [Fish Finder].
6. Scroll the [Fish Finder] menu to show the [FISH FINDER INITIAL SETUP] menu, then tap [Fish Finder Source].
7. Confirm the available fish finder from the list of available sounders, then tap the appropriate fish finder. For the purpose of this example, the default setting [TZT19F] (internal sounder) is selected as the source.
8. Tap the [<] icon to return to the [Fish Finder] menu.
9. Scroll the [Fish Finder] menu to show the [FISH FINDER INITIAL SETUP] menu, then tap [Transducer Setup].
10. Tap [Transducer Setup Type].
11. Tap [Model].
12. Tap the [<] icon to return to [Transducer Setup] menu.
13. Tap [Model Number], scroll the menu to show your transducer model, then tap the transducer model number.
14. Tap the [<] icon twice to return to the [Fish Finder] menu, then scroll the [Fish Finder] to show the [FISH FINDER INITIAL SETUP] menu.
15. At the [Transmission Power] menu item, set the transmission power to a level of [Max].
16. Scroll the menu to show [Fish Finder Transmit], then tap [Fish Finder Transmit]. Check if the bottom echo appears on the right side of the screen, in the display area.
    If no bottom echo appears, repeat the procedure until a suitable location is found.
17. Turn off the power of the control unit and remove the transducer from the plastic bag and wipe the face of transducer with a cloth to remove water and any foreign material.

Installation procedure

1. Lightly roughen the transducer face with #100 sandpaper. Also, use the sandpaper to roughen the inside of the hull where the transducer is to be mounted. Wipe off any sandpaper dust from the face of the transducer.
2. Dry the face of the transducer and the hull. Coat the transducer face and mounting location with marine sealant. Hardening begins in approx. 15 to 20 minutes so do this step without delay.



3. Attach the transducer to the hull. Press the transducer firmly down on the hull and gently twist it back and forth to remove any air which may be trapped in the marine sealant.



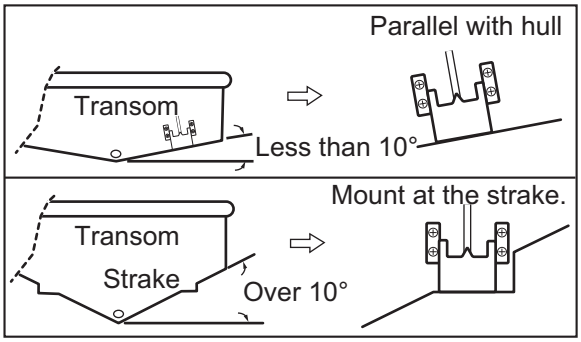
4. Support the transducer with a piece of wood to keep it in place while the sealant is drying. It takes 24 to 72 hours to harden completely.
5. Turn the power on and change the menu setting as shown below. See section 3.3 for how to use the menu.
    1) Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
    2) Scroll the menu to show [Fish Finder] in the menu, then tap [FISH FINDER INITIAL SETUP] menu.
    3) At the [Transmission Power Mode] menu item, set the transmission power to a level of [Max].
    4) Adjust the Bottom Level and Gain Offset settings as shown in the table below.

Menu Item	Setting
Bottom Level HF	-40
Bottom Level LF	-40
Gain Offset HF	20
Gain Offset LF	20

1.2.3 How to install the transom mount transducer

The optional transom mount transducer is very commonly employed, usually on relatively small I/O or outboard boats. Do not use this method on an inboard motor boat because turbulence is created by the propeller ahead of the transducer.

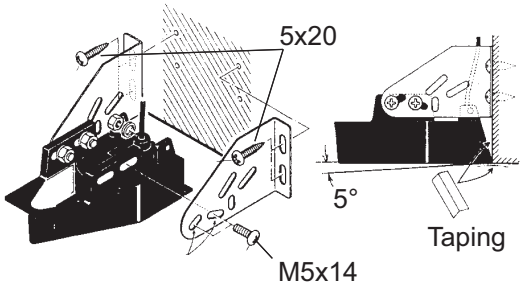
DO NOT over-tighten screws, to prevent damage to the transducer.



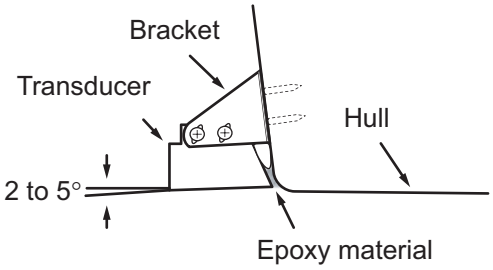
Installation procedure

A suitable mounting location is at least 50 cm away from the engine and where the water flow is smooth.

1. Drill four pilot holes for self-tapping screw (5×20) in the mounting location.
2. Coat the threads of the self-tapping screws (5×14) for the transducer with marine sealant for waterproofing. Attach the transducer to the mounting location with the self-tapping screws.
3. Adjust the transducer position so the transducer faces right to the bottom. If necessary, to improve water flow and minimize air bubbles staying on the transducer face, incline the transducer about 5° at the rear. This may require a certain amount of experimentation for fine tuning at high cruising speeds.



4. Tape the location shown in the figure below.
5. Fill the gap between the wedge front of the transducer and transom with epoxy material to eliminate any air spaces.
6. After the epoxy hardens, remove the tape.



Transducer protrusion

If the hull is not level within 15° in any direction, install the transducer so that it protrudes from the hull, to keep the transducer face parallel with the water line, not with the hull.

This installation method has a merit for avoiding the bubbles by diverting turbulent water around the sides of the transducer rather than over its face. However, it may cause damage to the transducer during trailering, launching, hauling, and storage.

Transducer preparation

Before putting your boat in water, wipe the face of the transducer thoroughly with a liquid detergent. This will lessen the time necessary for the transducer to have good contact with the water. Otherwise the time required for complete "saturation" will be lengthened and performance will be reduced.

DO NOT paint the transducer. Performance will be affected.

1.2.4 How to install a triducer

DO NOT over-tighten screws, to prevent damage to the transducer.

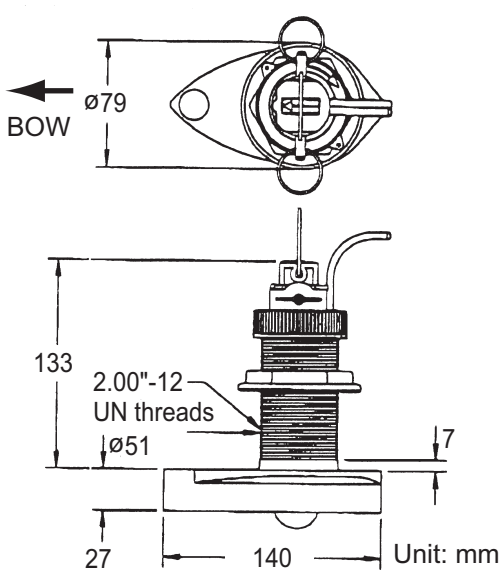
Tools and materials required

- Scissors
- Masking tape
- Safety goggles
- Dust mask
- Electric drill
- Screwdrivers
- Drill bit:
  For bracket holes: 4 mm, #23, or 9/64”
  For fiberglass hull: chamfer bit (preferred), 6 mm, or 1/4”
  For transom hole: 9 mm or 3/4” (optional)
  For cable clamp holes: 3 mm or 1/8”
- Straight edge
- Marine sealant
- Pencil
- Cable ties
- Water-based anti-fouling paint (mandatory in salt water)

525STID-MSD

The optional triducer 525STID-MSD is designed for thru-hull mounting. Note the following points when installing.

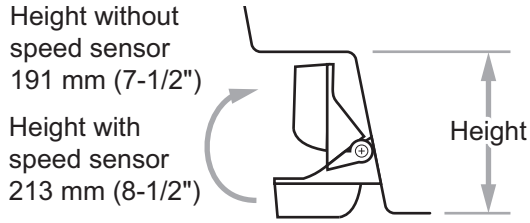
- Select a location where turbulence or bubbles do not occur when cruising.
- Select a location where noises from propellers and stripe lines are lessen.
- The transducer must always remain submerged, even when the boat is rolling, pitching or up on a plane at high speed.



525STID-PWD

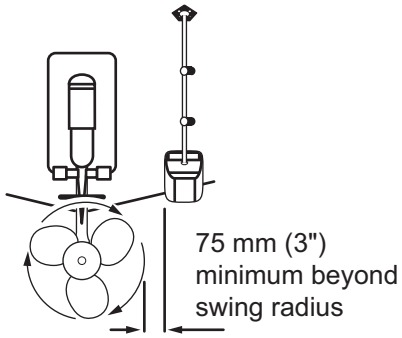
The optional triducer 525STID-PWD is designed for transom mounting.

Select the location where influences from bubbles and turbulences to ensure the best performance. Allow adequate space above the bracket for it to release and rotate the sensor upward as shown in the right illustration.



Mount the sensor close to the centerline of your boat. On slower heavier displacement hulls, positioning it farther from the centerline is acceptable.

For single drive boat, mount on the star-board side at least 75 mm (3") beyond the swing radius of the propeller, as shown in the right figure.



For twin drive boat, mount between the drives.

Note 1: Do not mount the sensor in an area of turbulence or bubbles, near water in-take or discharge openings; behind strakes, struts, fittings, or hull irregularities; behind eroding paint (an indication of turbulence).

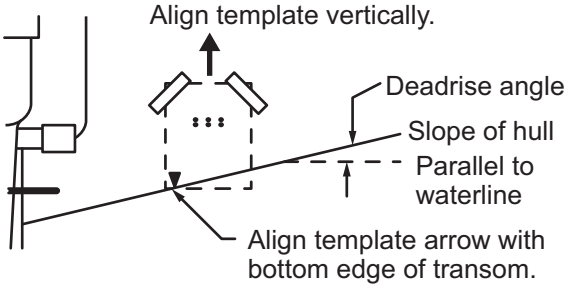
Note 2: Avoid mounting the sensor where the boat may be supported during trailering, launching, hauling, and storage.

Pretest for speed and temperature

Connect the sensor to the instrument and spin the paddlewheel. Check for a speed reading and the approximate air temperature. If there is no reading, return the sensor to your place of purchase.

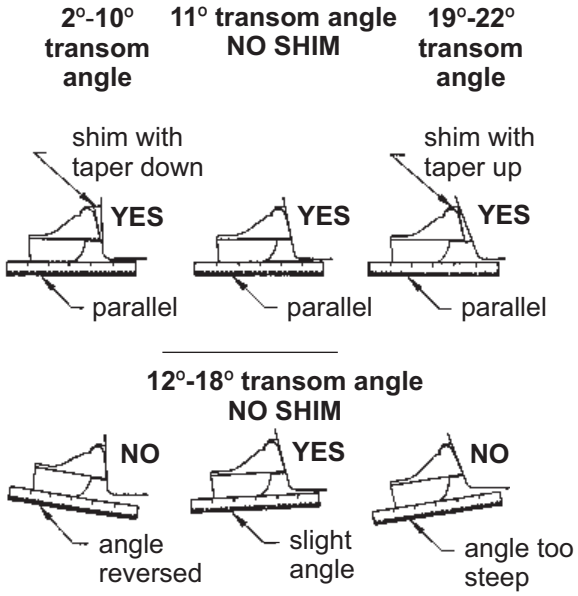
How to install the bracket

1. Cut out the installation template (enclosed with transducer) along the dotted line.
2. At the selected location, position the template, so the arrow at the bottom is aligned with the bottom edge of the transom. Being sure the template is parallel to the waterline, tape it in place.
   Warning: Always wear safety goggles and a dust mask.
3. Using a 4 mm, #23, or 9/64” bit, drill three holes 22 mm (7/8”) deep at the locations indicated. To prevent drilling too deeply, wrap masking tape around the bit 22 mm (7/8”) from the point.
   Fiberglass hull: Minimize surface cracking by chamfering the gelcoat. If a chamfer bit or countersink bit is not available, start drilling with a 6mm or 1/4” bit to a depth of 1 mm (1/16”).



4. If you know your transom angle, the bracket is designed for a standard 13° transom angle.
   11°-18° angle: No shim is required. Skip to step 3 in "Adjustments".
   Other angles: The shim is required. Skip to step 2 of "Adjustments".

If you do not know the transom angle, temporarily attach the bracket and sensor to the transom to determine if the plastic shim is needed.

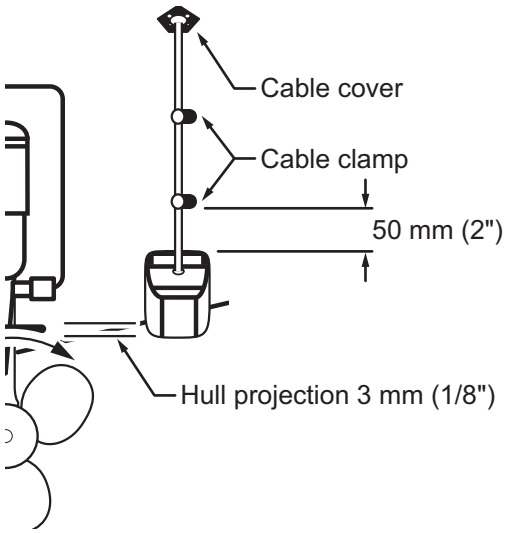


5. Using the three #10 x 1-1/4” self-tapping screws, temporarily screw the bracket to the hull. DO NOT tighten the screws completely at this time. Follow steps 1-4 in "How to attach the sensor to the bracket", before proceeding with "Adjustments".

Adjustments

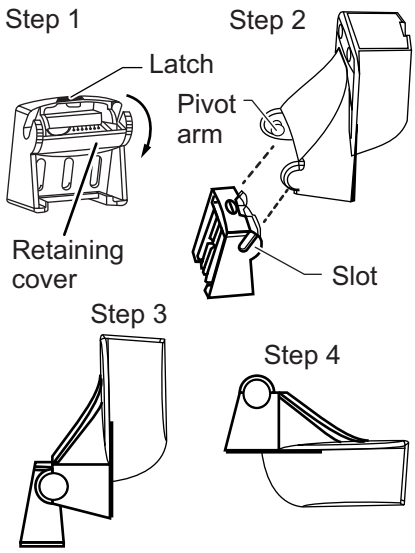
1. Using a straight edge, sight the underside of the sensor relative to the underside of the hull. The stern of the sensor should be 1-3 mm (1/16-1/8”) below the bow of the sensor or parallel to the bottom of the hull.
   Note: Do not position the bow of the sensor lower than the stern because aeration will occur.
2. To adjust the sensor's angle relative to the hull, use the tapered plastic shim provided. If the bracket has been temporarily fastened to the transom, remove it. Key the shim in place on the back of the bracket.
   2°-10° transom angle (stepped transom and jet boats): Position the shim with the tapered end down.
   19°-22° transom angle (small aluminum and fiberglass boats): Position the shim with the tapered end up.
3. If the bracket has been temporarily fastened to the transom, remove it. Apply a marine sealant to the threads of the three #10×1-1/4” self-tapping screws to prevent water seeping into the transom. Screw the bracket to the hull. Do not tighten the screws completely at this time.
4. Repeat step 1 to ensure that the angle of the sensor is correct.
   Note: Do not position the sensor farther into the water than necessary to avoid increasing drag, spray, and water noise and reducing boat speed.

5. Using the vertical adjustment space on the bracket slots, slide the sensor up or down to provide a projection of 3 mm (1/8”). Tighten the screws.



How to attach the sensor to the bracket

1. If the retaining cover near the top of the bracket is closed, open it by depressing the latch and rotating the cover downward.
2. Insert the sensor's pivot arms into the slots near the top of the bracket.
3. Maintain pressure until the pivot arms click into place.
4. Rotate the sensor downward until the bottom snaps into the bracket.
5. Close the retaining cover to prevent the accidental release of the sensor when your boat is underway.



How to route the cable

Route the sensor cable over the transom, through a drain hole, or through a new hole drilled in the transom above the waterline. If a hole must be drilled, choose a location well above the waterline. Check for obstructions such as trim tabs, pumps, or wiring inside the hull. Mark the location with a pencil. Drill a hole through the transom using a 19 mm or 3/4” bit (to accommodate the connector). Always wear safety goggles and a dust mask.

⚠ CAUTION

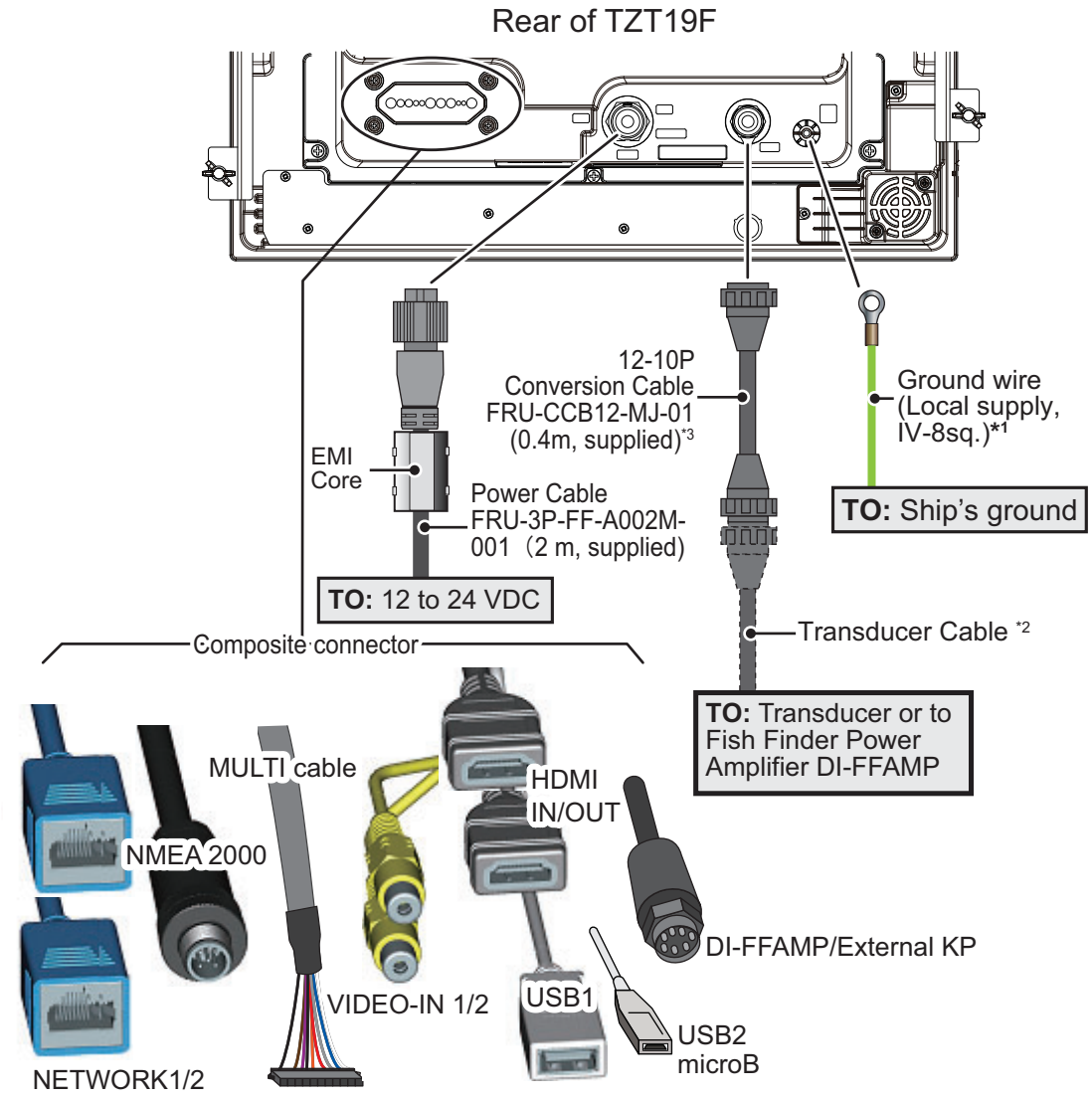
Never cut the cable; this will void the warranty.

1. Route the cable over or through the transom. On the outside of the hull secure the cable against the transom using the cable clamps. Position a cable clamp 50 mm (2") above the bracket and mark the mounting hole with a pencil.
2. Position the second cable clamp halfway between the first clamp and the cable hole. Mark this mounting hole.
3. If a hole has been drilled in the transom, open the appropriate slot in the transom cable cover. Position the cover over the cable where it enters the hull. Mark the two mounting holes.

4. At each of the marked locations, use a 3 mm or 1/8” bit to drill a hole 10 mm (3/8”) deep. The prevent drilling too deeply, wrap masking tape around the bit 10 mm (3/8”) from the point.
5. Apply marine sealant to the threads of the #6 x 1/2” self-tapping screw to prevent water from seeping into the transom. If you have drilled a hole through the transom, apply marine sealant to the space around the cable where it passes through the transom.
6. Position the two cable clamps and fasten them in place. If used, push the cable cover over the cable and screw it in place.
7. Route the cable to the display unit being careful not to tear the cable jacket when passing it though the bulkhead(s) and other parts of the boat. To reduce electrical interference, separate the sensor cable from other electrical wiring and "noise" sources. Coil any excess cable and secure it in place with zip-ties to prevent damage.

2. WIRING

2.1 Interface Connections (Rear of Unit)



*1: Lay the ground wire away from this unit's power cable.
*2: Use of the extension cable (C332 10M) may cause the following problems:
- Reduced detection ability
- Wrong ACCU-FISH™ information (fish length smaller than actual length, fewer fish detections, error in individual fish detection).
- Wrong speed data
- No TD-ID recognition

*3: Depending on the transducer type, 12-10P conversion cable is not required.

2.2 Composite Connector

The composite connector, at the rear of the unit (See the figure on page 2-1), contains connection leads for Video In (two leads), LAN (two leads), HDMI (two leads for input and output), NMEA2000, MULTI, USB port and DI-FFAMP.

Analog video input

The TZT19F can use regular analog video inputs (PAL or NTSC) that connect to the TZT19F directly via the Video Input 1/2 connectors. Analog video can be viewed only on the equipment where the source is connected.

Additionally FLIR cameras may be connected to the TZT19F. Connect the Video Out cable from the camera to the Video In (1 or 2) cable on the TZT19F.

Note: Some camera models may require an adapter for connection.

Cameras may be set up using the appropriate menu item on the [Camera] menu, accessed from the [Settings] menu. For details on camera setup, see the operator's manual (OME-45120-x).

Nerwork1/2

You can connect to an external network device using a LAN cable. Use HUB-101/ HUB-102 (option) when connecting multiple devices. The MCU-005 can be also used by using a PoE HUB.

Video out (external HDMI monitor)

A HDMI monitor can be connected to the TZT19F to repeat the screen at a remote location. The TZT19F is compatible with wide-screen HDMI monitors which meet the following minimum requirements:

Resolution	Vert. Frequency	Horiz. Frequency	Pixel clock
1920 × 1080	60 Hz	67.5 kHz	148.5 MHz

Video in (HDMI Source Devices)

Video data from HDMI source devices can be watched on TZT19F by connecting the device.

NMEA 2000 port

TZT19F can be connected to multiple NavNet TZtouch3 using the NMEA 2000 connector (micro type). In that case, connect them all to the same NMEA 2000 backbone cable (Refer to section 2.8 for details).

MULTI port

You can connect to external devices such as buzzers and event switches. See section 2.5 for details.

USB port

The TZT19F has two USB Ver. 2.0 ports which can be used to connect an optional SD card unit or remote control unit, and to be operated from touch device or PC mouse.

DI-FFAMP/External KP port

You can use a high-power transducer by connecting DI-FFAMP, the Fish Finder Power Amplifier. This port is for sending and receiving signals to the DI-FFAMP and connection with external KP cable of DFF-3D. See the INTERCONNECTION DIAGRAM at the back of this manual and installation manual of the DI-FFAMP (IMC-45121-*) for the details.

See the installation guide (C42-02103-*) included with the external KP kit for details of the external KP connections. DI-FFAMP and external KP cable cannot be connected at the same time. When connecting DI-FFAMP, connect the KP cable to the external KP port on DI-FFAMP.

Note: The external KP cable connected to NavNet TZtouch 3 is the cable included in the external KP kit (Model name: OP19-26). It cannot be used for external KP connection of DI-FFAMP.

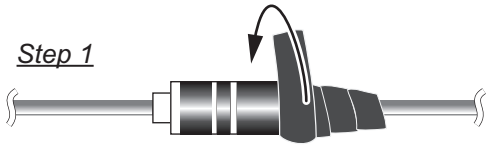
2.3 How to Secure and Waterproof Connections

Where the unit is exposed to water spray or moisture, all the connectors and MULTI cable connections to the TZT19F must have at least IPx6 waterproof rating.

All unused cable ends should be covered for protection.

Securing and waterproofing connections

1. Wrap the connection point in vulcanizing tape, covering at approximately 30 mm of the connecting cable.
2. Wrap the vulcanizing tape with vinyl tape, covering approx. 50 mm of the connecting cable. Bind the tape ends with cable ties to prevent the tape from unraveling.

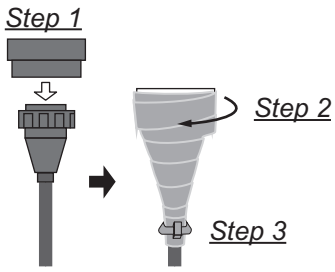


Wrap connection in vulcanizing tape for waterproofing.

Wrap vulcanizing tape in vinyl tape, then secure tape ends with cable ties.

Securing and protecting unused cable connectors

1. Place the cap and cover the cable connector with vinyl tape.
2. Wrap the connector, covering approx. 50 mm of the connecting cable.
3. Bind the tape end with a cable tie to prevent the tape from unraveling.



2.4 Power Cable

Connect the power cable (FRU-3P-FF-A002M-001, 2m, supplied) to the connector. When connecting the power supply, connect the positive and negative terminals correctly.

Note: Turn off the power at the switchboard before beginning the connection.

Ground wire

Connect the ground wire (IV-8sq, local supply) to the ground terminal on the rear panel with the crimp terminal.

2.5 MULTI Cable

Use the MULTI cable for the NMEA0183 equipment, external buzzer, event switch and power switch. The connector has 9 wires and a connector (SMP-11V). Use the table below for reference when connecting the MULTI cable.

Wire color	Function	Pin No.	Remark (Port No.)
White	NMEA-TD-A	1	NMEA0183 Output
Blue	NMEA-TD-B	2	
Gray	EXT_BUZZER	3	External buzzer ON/OFF
Red	+12 V	4	External buzzer power (12 V)
Orange	EVENT_SW	5	Event switch (MOB, etc.)
Black	GND	6	Grounding
Purple	POWER_SW	7	Power switch
Brown	DC_N	8	
Black	DRAIN	11	Grounding

2.5.1 How to set up NMEA 0183 data output

Note: To set up data input from NMEA 0183 equipment, see "NMEA 0183 data input via IF-NMEA2K2" on page 2-7.

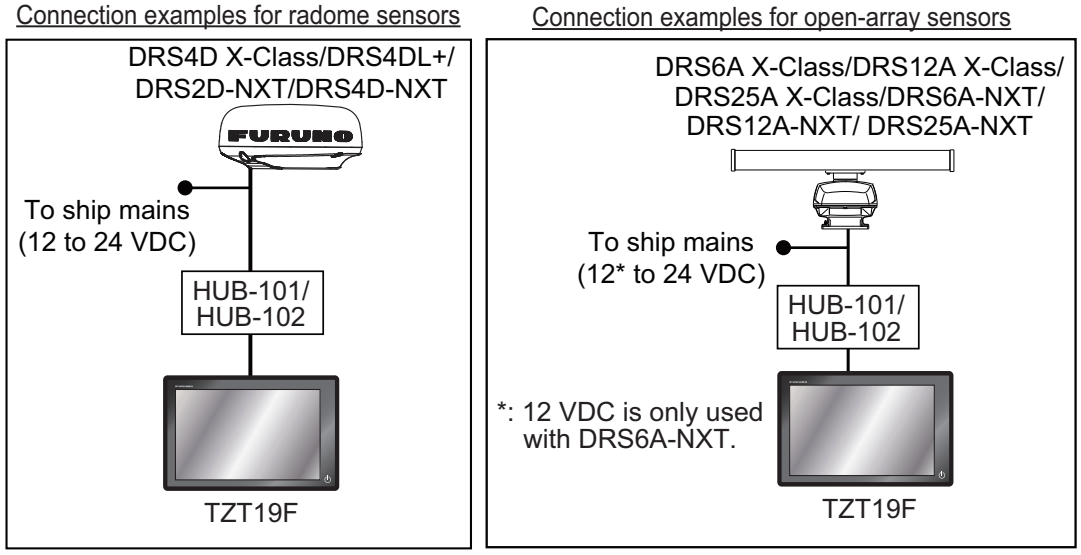
1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings], then scroll the menu to show [Initial Setup]. Tap [Initial Setup].
3. Scroll the menu to show [NMEA0183 Output], then tap [NMEA0183 Output].
4. Tap [Baud Rate] to set the output baud rate. Available options are [4,800], [9,600] and [38,400].
5. Tap the appropriate setting then tap the icon.
6. Tap [NMEA-0183 Version] to set the version. Available options are [1.5], [2.0] and [3.0].
7. Tap the appropriate setting then tap the icon.
8. Tap the flipswitch to set the sentence to [ON].
9. Tap the [Close] icon at the top right of the screen to close the menus.

2.6 DRS Radar Sensor Connections

The figures below show connection examples with radar sensors which are compatible with the TZT19F.

For details regarding connection and cables required for connection with the radar sensor, see the radar sensor's installation manual.

Note: DRS2D-NXT and DRS4D-NXT cannot be used in Japan.
DRS4D X-Class is for Japanese market only.



2.7 Network Connection with Other TZT Series Units

Your TZT19F is equipped with two network connectors (RJ45). Like previous NavNet series equipment, the TZT19F is able to share Radar images and other information, across an Ethernet connection. Up to six NavNet TZtouch units may be connected to the same network at one time (see page iii for the details). However, for configurations with one or more TZT2BB included, the maximum number of networked NavNet TZtouch units is four. For example, a configuration with one TZT19F and one TZT12F can have two TZT2BB units connected.

2.8 NMEA 2000 Connector

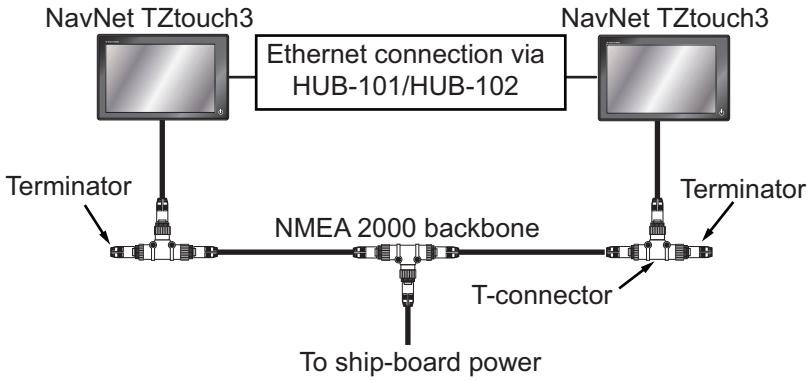
The TZT19F has one NMEA 2000 connector (micro type connector). All TZT19F must be connected to the same NMEA 2000 backbone.

What is NMEA 2000?

NMEA 2000 (also knows as CAN bus) is a communication protocol that shares multiple data and signals through a single backbone cable. You can simply connect any NMEA 2000 devices onto the backbone cable to expand your network on-board. With NMEA 2000, IDs are assigned to all the devices in the network, and the status of each sensor in the network can be detected. All the NMEA 2000 devices can be incorporated into the NMEA 2000 network. For detailed information about NMEA 2000 wiring, see "FURUNO CAN bus Network Design Guide" (Type: TIE-00170).

2.8.1 How to connect the NavNet TZtouch3 to NMEA 2000 equipment

Below is an example of two NavNet TZtouch3 units connected via NMEA 2000 to NMEA 2000 sensors.



Note 1: The NMEA 2000 network requires a dedicated NMEA 2000 power supply. Turn the NMEA 2000 network power on before turning your connected equipment on.

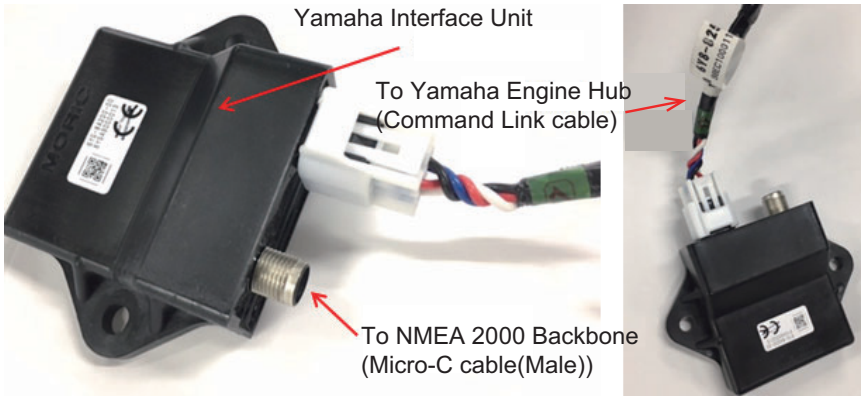
Note 2: Terminators must be installed at both ends of the NMEA 2000 backbone cable.

2.8.2 How to connect Yamaha engine(s)

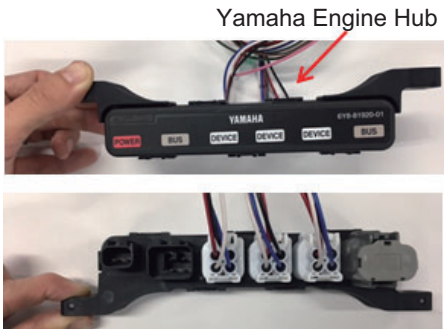
When interfaced with Yamaha outboard engine(s) compatible with Command Link®, Command Link Plus® and Helm Master®, the TZT19F can display engine information on a dedicated Yamaha engine status display.

How to connect the engine

The TZT19F connects to the Yamaha engine network via the Yamaha Interface Unit. Arrange the Yamaha Interface Unit through a local Yamaha representative.

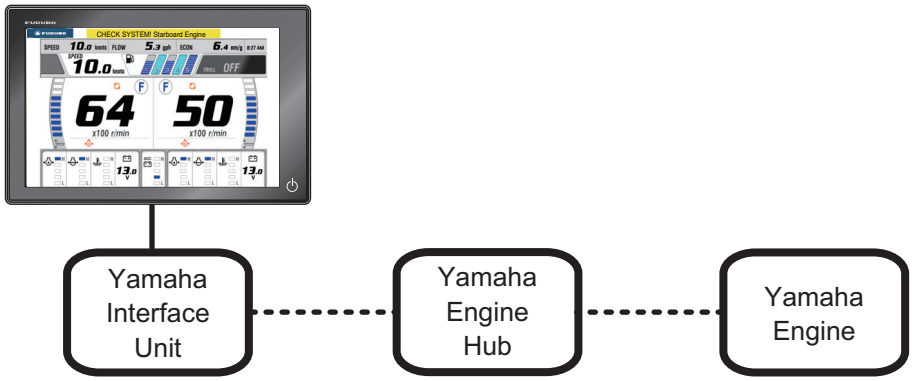


The Yamaha Engine Hub (Yamaha supply), which connects between the engine and the Yamaha Interface Unit, is also required.



Connection to TZT19F

Connect the Yamaha Interface Unit to the Yamaha Engine Hub.



: NMEA 2000

: Command Link@/Command Link Plus@/Helm Master@

How to set up the engine display

Once the TZT19F detects the Yamaha engine network, the engine can be set up on [Settings]→[Initial Setup]→[YAMAHA ENGINE SETUP]. See section 3.3 for details.

2.8.3 NMEA 0183 data input via IF-NMEA2K2

Note: To output NMEA 0183 data, see paragraph 2.5.1.

To connect NMEA 0183 equipment to TZT19F, use the CAN bus network via the optional NMEA data converter IF-NMEA2K2 (or IF-NMEA2K1). This NMEA connection can accept a baud rate of 4800 or 38400.

Heading input to TZT19F allows functions such as Radar Overlay and course stabilization (North up, etc.) in the radar operating modes. The NMEA 0183 heading refresh rate needs to be 100 ms in order for any radar function to work properly. NMEA 0183 heading can be accepted via the IF-NMEA2K2 at a baud rate up to 38400 bps.

Note 1: When using the ARPA function, set the heading refresh rate to 100 ms.

Note 2: For more information on connecting and wiring IF-NMEA2K2, refer to their respective installation manuals.

2.8.4 NMEA 2000 input/output

Input PGN

PGN	Description
059392	ISO Acknowledgment
059904	ISO Request
060160	ISO Transport Protocol, Data Transfer
060416	ISO Transport Protocol, Connection Management - BAM group function
060928	ISO Address Claim
061184	Self Test Group Function
	HID Keyboard/Keypad Usage
	HID Mouse Report Descriptor (Proprietary PGN)
065240	ISO Commanded Address
065280	Heave
126208	NMEA-Request Group Function
	NMEA-Command Group Function
	NMEA-Acknowledge Group Function
126464	PGN List -Transmit PGN's group function
126720	Memory Clear Group Function
	Reset Group Function
	GMM Message
	Interlocking device search
126992	System Time
126996	Product Information
126998	Configuration Information
127237	Heading/Track Control
127245	Rudder
127250	Vessel Heading
127251	Rate of Turn
127252	Heave
127257	Attitude
127258	Magnetic Variation
127488	Engine Parameters, Rapid Update
127489	Engine Parameters, Dynamic
127493	Transmission Parameters, Dynamic
127498	Engine Parameters, Static
127503	AC Input Status
127505	Fluid Level
127506	DC Detailed Status
127508	Battery Status
128259	Speed, Water referenced
128267	Water Depth
129025	Position, Rapid Update
129026	COG &SOG, Rapid Update
129029	GNSS Position Data
129033	Local Time Offset
129038	AIS Class A Position Report
129039	AIS Class B Position Report
129040	AIS Class B Extended Position Report

PGN	Description
129041	AIS Aids to Navigation (AtoN) Report
129291	Set &Drift, Rapid Update
129538	GNSS Control Status
129540	GNSS Satellites in View
129793	AIS UTC and Date Report
129794	AIS Class A Static and Voyage Related Data
129795	AIS Addressed Binary Message
129797	AIS Binary Broadcast Message
129798	AIS SAR Aircraft Position Report
129801	AIS Addressed Safety Related Message
129802	AIS Safety Related Broadcast Message
129808	DSC Call Information
129809	AIS Class B "CS" Static Data Report, Part A
129810	AIS Class B "CS" Static Data Report, Part B
130306	Wind Data
130310	Environmental Parameters - DEPRECATED
130311	Environmental Parameters - DEPRECATED
130312	Temperature - DEPRECATED
130313	Humidity
130314	Actual Pressure
130316	Temperature, Extended Range
130576	Trim Tab Status
130577	Direction Data
130578	Vessel Speed Component
130817	Furuno GNSS Control Status
130818	Heading & Attitude Sensor Control Status
130820	Motion Sensor Status
130822	Unit Division Code
130823	Browser Control Status
130826	Multi Sats In View
130827	NAVpilot General Message
130828	Mark Position Information
130845	Multi Sats in View Extended
130846	Motion Sensor Status Extended
130848	WaterCurrent Layer
130880	Additional Weather Data

Output PGN

The NMEA 2000 output PGN setting (found under the [Initial Setup] menu) is global to the network. Note that only one TZT19F will output NMEA 2000 data on the network at a time: the TZT19F which is powered ON first. If that display is turned OFF, another will take its place to output the data.

PGN	Description	Output cycle (msec)
059392	ISO Acknowledgment	
059904	ISO Request	
060928	ISO Address Claim	
061184	Self Test Group Function	
065287	HID Target Status	5000

PGN	Description	Output cycle (msec)
126208	NMEA-Request group function	
	NMEA-Command group function	
	NMEA-Acknowledge group function	
126464	PGN List-Transmit PGN's group function	
	PGN List-Received PGN's group function	
126720	Memory Clear Group Function	
	Reset Group Function	
	GMM Message	
	DSC Call Information for transmitting	
126992	System Time	1000
126993	Heartbeat	60000
126996	Product Information	
126998	Configuration Information	
127250	Vessel Heading	100
127251	Rate of Turn	100
127257	Attitude	1000
127258	Magnetic Variation	1000
128259	Speed, Water referenced	1000
128267	Water Depth	1000
128275	Distance Log	1000
129025	Position, Rapid Update	100
129026	COG &SOG, Rapid Update	250
129029	GNSS Position Data	1000
129033	Local Time Offset	1000
129283	Cross Track Error	1000
129284	Navigation Data	1000
129285	Navigation-Route/WP Information	
130306	Wind Data	100
130310	Environmental Parameters - DEPRECATED	500
130312	Temperature - DEPRECATED	2000
130313	Humidity	2000
130314	Actual Pressure	2000
130316	Temp, Extended Range	2000
130821	NAV Source Select	
130822	Unit Division Code	
130823	Browser Control Status	
130827	NAVpilot General Message (I AM NAV4 SERVER)	
130841	N2K System Setup Information	

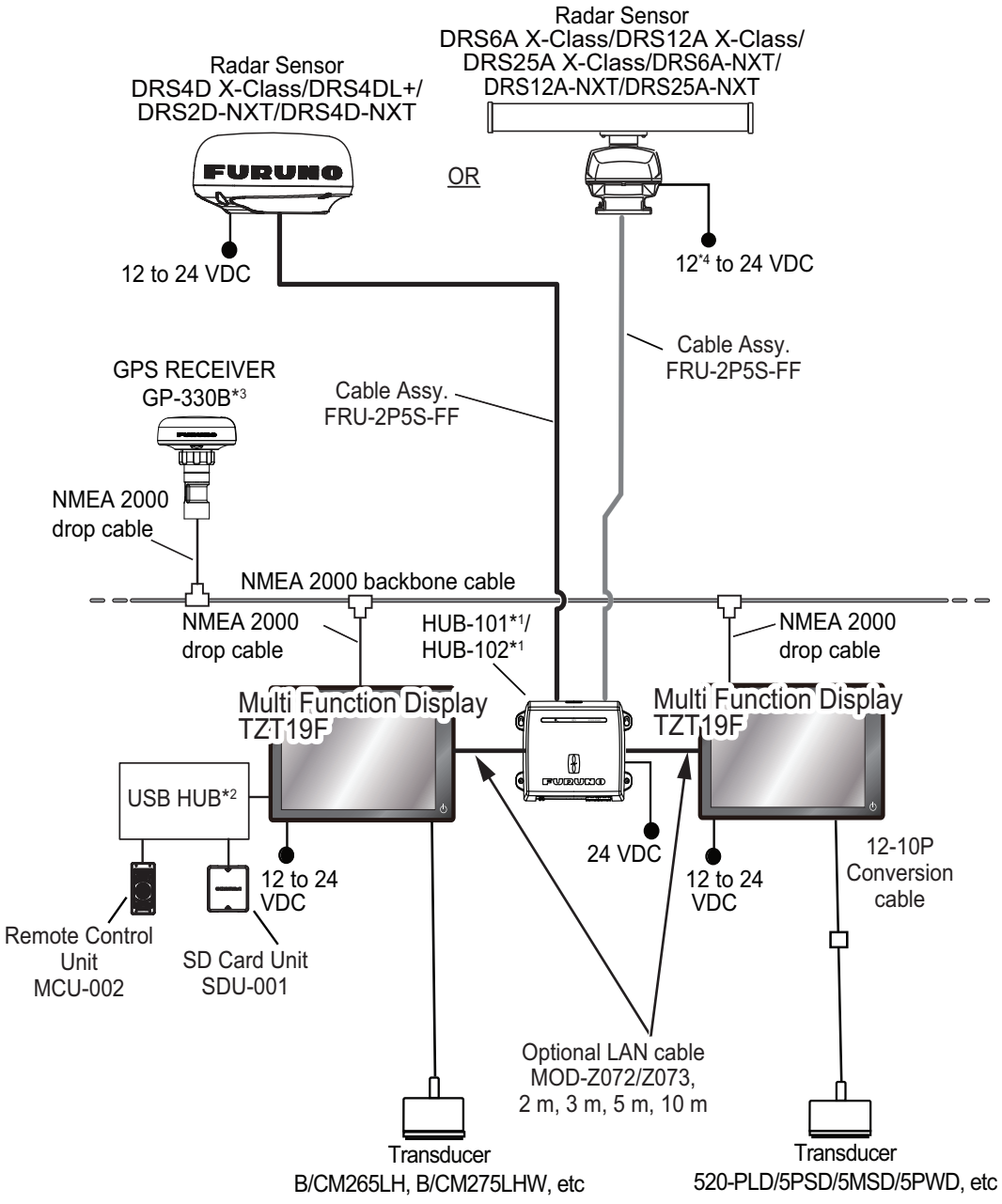
2.9 Transducer (Option)

The 12-10P conversion cable (FRU-CCB12-MJ-01, 0.4m, supplied) is required when connecting a transducer that has a 10-pin connector to TZT19F. Matching Box MB-1100 is also required when connecting a 1kW transducer to TZT19F. See the interconnection diagram for transducer connection. The transducer that has a 12-pin connector does not require the 12-10P conversion cable. Connect its transducer cable directly to the multi function display.

2.10 Example TZT19F System Configurations

Mid/Large-size vessels (external GPS, fish finder, radar)

This is a sample of the chart plotter/radar/fish finder installation. Refer to "SYSTEM CONFIGURATION" on page ii for more details.



*1: The HUB-101/HUB-102 is required when two or more pieces of network equipment are connected to the TZT3 unit.

*2: Local Supply

*3: Backup

*4: 12 VDC is only used with DRS6A-NXT.

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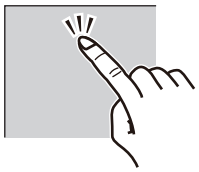
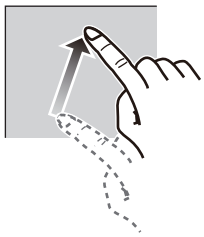
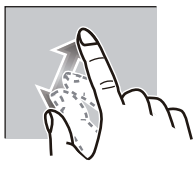
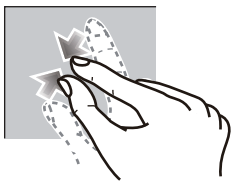
3. HOW TO SET UP THE EQUIPMENT

This chapter shows you how to set up your system according to the equipment you have connected.

Touch control description

The touch control depends on the screen type. The basic operations to use during the installation setup are in the following table.

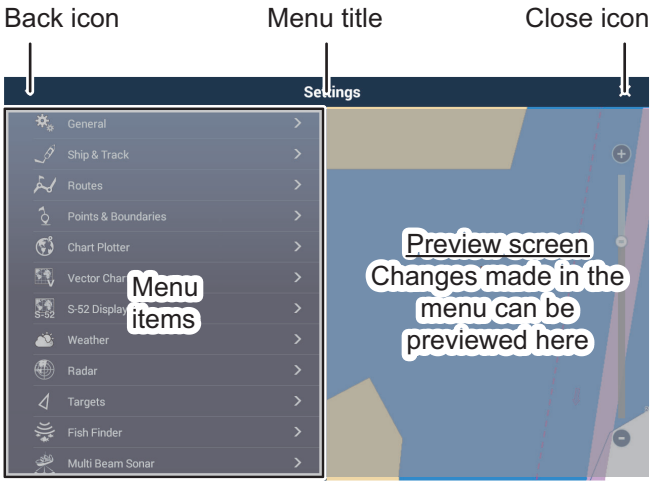
Operating by a finger		Function
Tap		• Select a menu item. • Select a setting option where there are multiple options. • Select an object. • Display the pop-up menu where available.
Drag		• Scroll the menu.
Pinch	 Zoom in  Zoom out	Change the fish finder, plotter and radar range.

How to operate the menus

The following procedure shows how to use the menu system.

1. Tap ⏻ (power switch) to turn the power on.
2. After the startup process completes, the last used display appears and a warning message is displayed. After reading the message, tap [OK].
3. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.

4. Tap [Settings] to open the [Settings] menu.
5. Scroll the menu to show [Initial Setup], then tap [Initial Setup].



6. Depending on the menu item selected, the following operations are available:

   - ON/OFF flipswitch. 

     Tap to switch between [ON] and [OFF] to activate or deactivate the function.

   - Slidebar and keyboard icon. 

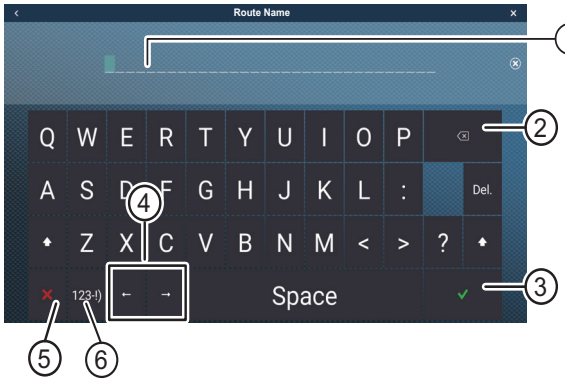
     Drag the slidebar to adjust the setting. Settings may also be adjusted using the software keyboard for direct input.

   - Keyboard icon. 
     Referring to the figure on the following page, use the software keyboard to input alphabet or numeric characters.

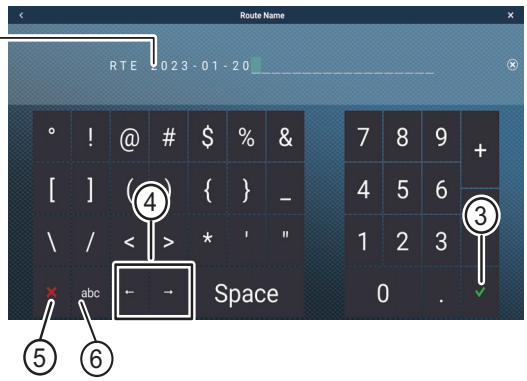
7. Tap [Close] (Indicated as an “X”) at the top right-hand side of the screen to exit.

How to use the software keyboard

Alphabet software keyboard



Numeric software keyboard

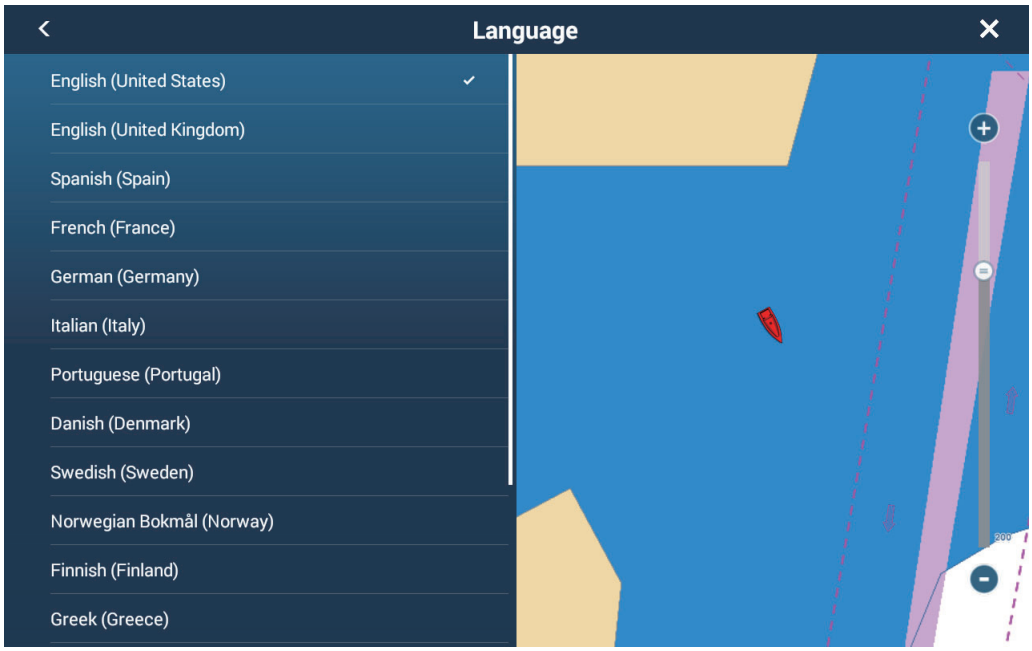


No.	Description
1	Cursor position is highlighted.
2	Backspace/Delete. Tap to erase one character at a time.
3	Enter button. Tap to complete character input and apply changes.
4	Cursor keys. Tap to move the cursor left/right.
5	Cancel button. Aborts character entry. No changes are applied.
6	Tap to switch between alphabet and numeric keyboards (where available).

3.1 How to Set Time Zone, Time Format and Language

Before setting up your equipment, select the time zone, language and units to use on your equipment as shown below.

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings] to show the [Settings] menu.
3. Tap [General] to show the [General] menu..
4. Tap [Local Time Offset], and a numerical keyboard appears..
5. Input the time difference (using 15-minute intervals), then tap [✓].
6. Tap [Time Format] to show its option window..
7. Select how to display time, in 12- or 24-hour format. [Auto] automatically inserts AM, PM indication in 24-hour clock, when the language is English.
8. Tap the [<] at the top left of the screen to return to the [General] menu.
9. Tap [Language] to show the [Language] menu.



10. Tap the appropriate language to use. The unit will display a confirmation message. Tap [OK] to restart the unit and apply the new language settings.This process takes approximately five minutes to optimize the system for the new language setting. When the process is completed (five minutes later), the system restarts automatically.

3.2 How to Set Units of Measurement

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings] to show the [Settings] menu.
3. Scroll the main menu to display [Units], then tap [Units].
4. Referring to the table below, set the units to show on the display.

Menu item	Description	Options
[Bearing Display]	Adjust the bearing display format.	[Magnetic], [True]
[True Wind Calculation Reference]	Set the reference for calculating true wind speed/angle.	[Ground], [Surface]
[Position Format]	Set the display format for position (Latitude/Longitude).	[DDD°MM.mmmm'], [DDD°MM.mmm'], [DDD°MM.mm'], [DDD°MM'SS.ss"], [DDD.dddddd°], [Loran-C], [MGRS]
[Loran C Station & GRI]	Available when [Position Format] is selected to [Loran-C].	Set Loran C station and GRI combination.
[Short/Long Change Over]	Set the distance at which to change between short and long range.	[0.0] to [2.0] (NM)
[Range (Long)]	Set the unit of measurement for long distances.	[Nautical Mile], [Kilometer], [Mile]
[Range (Short)]	Set the unit of measurement for short distances.	[Foot], [Meter], [Yard]
[Depth]	Set the unit of measurement for depth.	[Foot], [Meter], [Fathom], [Passi Braza]
[Height/Length]	Set the unit of measurement for height and length.	[Foot], [Meter]
[Fish Size]	Set the unit of measurement for fish sizes.	[Inch], [Centimeter]
[Temperature]	Set the unit of measurement for temperature.	[Fahrenheit Degree], [Celsius Degree]
[Boat Speed]	Set the unit of measurement for boat speed.	[Knot], [Kilometer per Hour], [Mile per Hour], [Meter per Second]
[Wind Speed]	Set the unit of measurement for wind speed.	[Knot], [Kilometer per Hour], [Mile per Hour], [Meter per Second]
[Atmospheric Pressure]	Set the unit of measurement for atmospheric pressure.	[HectoPascal], [Millibar], [Millimeter of Mercury], [Inch of Mercury]
[Oil Pressure]	Set the unit of measurement for oil pressure.	[KiloPascal], [Bar], [Pound per Square Inch]
[Volume]	Set the unit of measurement for tank volume.	[Gallon] (Gallon & Gallon/hour), [Litre] (Litre & Litre/hour)
[Reset Default Settings]	Restore default unit settings.	[OK], [Cancel]

3.3 Initial Setup

This section shows you how to set your system according to the sensors you have connected.

Note: Some units are set to metric in this section, actual setting ranges vary depending on the unit of measurement set in the [Units] menu.

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings] to show the [Settings] menu.
3. Scroll the main menu, then tap [Initial Setup] to show the [Initial Setup] menu.
4. Referring to the tables on the following pages, set your equipment.

[Initial Setup] menu - [GPS POSITION]

Menu item	Description	Options (setting range)
[Longitudinal (from bow]	Referring to the figure on the right, enter the GPS antenna positioning bow-stern (Longitudinal) and port-starboard (Lateral) position from the origin. 	0 (m) to 999 (m)
[Lateral (-Port)]		-99 (m) to +99 (m) Port-side is negative, Starboard-side is positive.

[BOAT INFORMATION]

Menu item	Description	Options (setting range)
[Boat Length]	Set the length of your boat.	0 (m) to 999 (m)
[Boat MMSI]	Set the MMSI for your boat (used for fleet tracking function only).	
[Boat Name]	Set the name for your boat (used for fleet tracking function only).	
[Size of Static Icon]	Set the size of static (such as own ship) icons.	50 to 150
[Depth Display]	Select the start point for depth measurement.	[Under Keel], [Under Sea Level]
[External Transducer Draft]	Set the draft external transducer. See the instructions below for how to set the draft of other types of transducers. **For internal/network transducers**, set the draft from Home screen→[Settings]→[Sounder]→[Transducer Draft]. **For multi-beam sonars**, set the draft from Home screen→[Settings]→[Multibeam Sonar]→[Initial Setup]→[External Transducer Draft].	0.0 (m) to 99.9 (m)
[Keel Draft]	Set the keel draft.	0.0 (m) to 99.9 (m
[Engine Count]	Set the number of engines.	0 to 6

Engine & Tank, Instruments Setup

Menu item	Description	Options (setting range)
[Engine & Tank Automatic Setup]	See "[Initial Setup] menu - [Engine & Tank Automatic Setup]" on page 3-10.	

Menu item	Description	Options (setting range)
[Engine & Tank Manual Setup]	See "[Initial Setup] menu - [Engine & Tank Automatic Setup]" on page 3-10.	
[Graphic Instruments Setup]	See "[Initial Setup] menu - [GRAPHIC INSTRUMENTS SETUP]" on page 3-9.	

[HOME] Screen Setup

Menu item	Description	Options (setting range)
[Factory Reset]	Click [OK] to restore the [HOME] screen's default settings.	

Manual Fuel Management Setup

Menu item	Description	Options (setting range)
[Total Fuel Capacity]	Enter the total fuel capacity of your tank(s).	0 to 9,999(L).
[Manual Fuel Management]	Set to [ON] for manual fuel management. See the Operator's Manual.	[OFF], [ON].

[Initial Setup] menu - [YAMAHA ENGINE SETUP]

Menu item	Description	Options (setting range)
[Trip & Maintenance]	Reset fuel used, trip distance, engine trip and maintenance hours (trip hour, standard hour, optional hour, total hour).	[Trip Fuel & Distance]: [Fuel Used], [Trip Distance]. [Trip & Maintenance Hours]: [Port], [Starboard].
[Trim Level Calibration]	Trim all engines to fully down position (zero). If trim level is not zero, tap [SET] to set trim level to zero.	–
[Fuel Flow Calibration]	If the fuel flow indication (gph=gallons per hour) is wrong, you can calibrate the indication to show correct flow. Enter a negative value if the indication is higher than actual; a positive value if the indication is lower than actual.	-7 to +7
[Engine Interface Software Ver. & ID]	Display engine interface software version and ID.	–
[Reset Engine Interface]	Reset engine interface.	–
[Reset Engine Instance]	Reset engine instance.	–
[Reset Number of Engines]	Enter number of engines.	[1], [2], [3], [4], [4P], [4S]
[Trouble Codes]	Display trouble codes. For Yamaha engine trouble codes, see the manual for the Yamaha engine.	–

[Initial Setup] menu - [IF-NMEAFI SETUP]

Menu item	Description	Options (setting range)
[Select IF]	Select [IF-NMEAFI] to set the analog data that is input from the IF-NMEAFI. The setting is made after restarting the IF-NMEAFI.	
[Category]	Select the use (category) for this sensor.	[Wind], [ST800_850], [Fuel], [FreshWater], [WasteWater], [LiveWell], [Oil], [BlackWater]
[Resistance Full]	The resistance, in Ohms, when the tank is full.	[0] (ohm) to [500] (ohm)

Menu item	Description	Options (setting range)
[Resistance Mid]	The resistance, in Ohms, when the tank is half full.	[0] (ohm) to [500] (ohm)
[Resistance Empty]	The resistance, in Ohms, when the tank is empty.	[0] (ohm) to [500] (ohm)
[Capacity]	The capacity of the tank.	[0] (G) to [2650] (G)
[Fluid Instance]	Select the NMEA instance for the tank.	[000] to [254]
[Self test]	Test results are displayed.	
[Set Hardware to Factory Default]	Resets the converter selected at [Select IF] to factory default.	[OK], [Cancel]

[Initial Setup] menu - [DATA ACQUISITION]

Menu Item	Description	Options (setting range)
[GP330B WAAS Mode]	Select [ON] to use the WAAS mode for the corresponding GPS antenna.	[ON], [OFF]
[WS200 WAAS Mode]		
[Data Source]	Select the source for each data to input to the system. If two or more sources are connected for a data, select one using the pull-down dialog box. The FURUNO products are shown at the upper part of the list.	
[Sensor List]	Show the information for sensors connected to your equipment. Also, you can set “Nickname” for them here.	
[NMEA0183 Output] **Note:** If the TTM sentence is received at the same time as another sentence, the constraints to communication bandwidth may cause a decrease in the number of TTM targets.	[Port Configuration] - [Baud Rate]: Select the output baud rate.	[4,800], [9,600], [38,400]
	[Port Configuration] - [NMEA-0183 Version]: Select the NMEA0183 version for output.	[1.5], [2.0], [3.0]
	[Sentences]: Select the sentences to output.	[ON], [OFF]
[NMEA2000 PGN Output]	Select [ON] for the PGN's (Parameter Group Number, NMEA 2000 message) to output from the NMEA 2000 port. **Note:** The default setting of some PGNs is “ON”.	
[Sky View]	Show the condition of GPS and GEO (WAAS) satellites. Number, bearing and elevation angle of all GPS and GEO satellites (if applicable) in view of your GPS receiver appear.	

[Initial Setup] menu - [NMEA2000 LOG]

Menu Item	Description	Options (setting range)
[Enable NMEA2000 Log]	Set to [ON] when using NMEA 2000 log.	[ON], [OFF]
[NMEA2000 Log Storage Location]	Show the location where to store the log.	

[Initial Setup] menu - [SC-30 SETUP]

This menu is only available with SC-30 connection.

Menu item	Description	Options (setting range)
[WAAS Mode]	Select [ON] to use the WAAS mode.	[ON], [OFF]
[Heading Offset]	Enter the offset value for heading.	-180° to +180°
[Pitch Offset]	Enter the offset value for pitching.	-90° to +90°
[Roll Offset]	Enter the offset value for rolling.	-90° to +90°

[Initial Setup] menu - [NETWORK SENSOR SETUP]

The [NETWORK SENSOR SETUP] section allows you to set up compatible FURUNO NMEA 2000 sensors. Calibrations and offsets applied in this menu are also applied to the sensor itself.

Tap the sensor to access its menus and settings. For details regarding the menu structure and set up of each sensor, see the operator's manual supplied with the sensor.

[Initial Setup] menu - [CALIBRATION]

Menu item	Description	Options (setting range)
[Heading]	Offset heading data.	-180.0° to +180.0°
[Speed Through Water]	Calibrate speed data. Enter amount in percentage.	-50% to +50%
[Wind Speed]	Offset wind speed data. Enter amount in percentage.	-50% to +50%
[Wind Angle]	Offset wind angle data.	-180° to +180°
[Sea Surface Temperature]	Offset sea surface temperature data.	-10°C to +10 °C

[Initial Setup] menu - [DATA DAMPING]

Menu item	Description	Options (setting range)
[COG & SOG]	Set data damping time. The lower the setting the faster the response to change.	0 to 59 (seconds)
[Heading]		
[Speed Through Water]		
[Wind Speed & Angle]		
[Rate of Turn]		

[Initial Setup] menu - [FUSION]

Menu item	Description	Options (setting range)
[Connect to Fusion]	Connects to your Fusion equipment.	
[Fusion Auto Volume]	Set to [ON] to allow the TZT19F unit to control the FUSION volume. Volume is adjusted according to vessel speed.	[ON], [OFF]
[Minimum Speed]	Set the minimum speed threshold. Exceeding this speed activates volume auto control.	0.0 (kn) to 98.9 (kn)
[Maximum Speed]	Set the maximum speed threshold.	0.1 (kn) to 99.0 (kn)
[Volume Increase]	Set the amount of extra volume to output when the vessel reaches the [Maximum Speed] setting.	10% to 50%

[Initial Setup] menu - [BROWSER INSTALLATION]

Menu item	Description	Option (setting range)
[FAX-30 Browser]	Show the Facsimile Receiver FAX-30 display.	
[FA-30 Browser]	Show the AIS Receiver FA-30 display.	
[FA-50 Browser]	Show the AIS Receiver FA-50 display.	

[Initial Setup] menu (Other menu items)

Menu item	Description	Option (setting range)
[Chart Master Device]	Set to [ON] to use this unit as the master, [OFF] to use this unit as a slave.	
[System ID]	The system ID for this device within the network.	
[IP Address]	IP address for this unit within the network.	
[Synchronization Log]	Shows synchronization with devices connected to the network.	

Menu item	Description	Option (setting range)
[Quick Self Test]	Displays various details regarding the TZT19F, radar and fish finder.	
[Certification Mark]	Displays relevant certification for this equipment.	
[Service]	For the service technician.	
[Event Input Configuration]	Set the function for the event switch.	[OFF], [Event Mark], [MOB], [Ferry Mode]
[Update Network Equipments]	For the service technician.	
[Remote Controller Configuration]	When there are multiple units in the NavNet network, the Remote Controller MCU-004/MCU-005/MCU-006/MCU-006H can select the display to show on the unit with MCU-004/MCU-005/MCU-006*/MCU-006H* connection. Further, the cycling order of displays can be set. See the Operator's Manual. *: Not applicable to NavNet TZtouch2 units.	
[Sirius Radio Diagnostic]	Check the satellite radio of the FURUNO BBWX SiriusXM weather receiver for proper operation. See the Operator's Manual.	
[Sirius Weather Diagnostic]	Check the weather section of the FURUNO BBWX SiriusXM weather receiver for proper operation. See the Operator's Manual.	
[Reset Default Settings]	Reset the system to default settings.	[OK], [Cancel]

[Initial Setup] menu - [GRAPHIC INSTRUMENTS SETUP]

Menu Item	Description	Options (setting range)
[Maximum Boat Speed]	Set the transducer's maximum detectable speed.	1 (kn) to 99 (kn)
[Maximum Wind Speed]	Set the transducer's maximum detectable speed.	1 (kn) to 99 (kn)

[GRAPHIC INSTRUMENTS SETUP] - [DEPTH]

Menu Item	Description	Options (setting range)
[Minimum Depth]	Set the transducer's minimum detectable depth.	1 (m) to 1999 (m)
[Maximum Depth]	Set the transducer's maximum detectable depth.	1 (m) to 2000 (m)

[GRAPHIC INSTRUMENTS SETUP] - [SEA SURFACE TEMPERATURE]

Menu Item	Description	Options (setting range)
[Minimum Sea Surface Temperature]	Set the transducer's minimum detectable temperature.	0.00°C to 98.99°C
[Maximum Sea Surface Temperature]	Set the transducer's maximum detectable temperature.	0.01°C to 99.99°C

[GRAPHIC INSTRUMENT SETUP] - [PROPULSION ENGINE] or [OTHER ENGINE]

Menu Item	Description	Options (setting range)
[Max. RPM]	Set the maximum rpm of your engine to show on the RPM display.	1 (rpm) to 20,000 (rpm)
[Red Zone Oil Pressure]	Set the starting value for the red zone area of the oil pressure meter.	0 (psi) to 143 (psi)
[Max. Oil Pressure]	Set the maximum oil pressure of your engine.	1 (psi) to 144 (psi)

Menu Item	Description	Options (setting range)
[Min. Temperature]	Set the minimum temperature for your engine.	0.00°C to 99.00°C
[Red Zone Temperature]	Set the starting value for the red zone area of the engine temperature indicator.	0.01°C to 999.00°C

CZone

Menu item	Description
[Add Default CZone Pages]	Create, edit C-Zone pages.
[CZone DIP Switch Settings]	Set this unit's DIP switches. For the serviceman. Do not change the settings.

Menu item	Description	
[Reset Instrument Pages]	Resets all instrument pages to default.	[OK], [Cancel]
[Reset Default Settings]	Resets applicable settings to default.	[OK], [Cancel]

[Initial Setup] menu - [Engine & Tank Automatic Setup]

The TZT19F will automatically detect engines and tanks connected to the same network. This is the recommended method for setting up engines and tanks.

[Initial Setup] menu - [Engine & Tank Manual Setup]

The manual set up method should only be used if the automatic setup did not correctly detect your engines or tanks.

Menu Item	Description	Options (setting range)
[Nickname]	Change the nickname for the engine or tank.	
[Used For Propulsion]	Select which engine/tank is used to calculate the distance which may be traveled using the remaining fuel. [ON] uses the engine/tank for calculations, [OFF] ignores the engine/tank.	[ON], [OFF]
[Reset]	Resets the engine/tank details to default.	

3.4 How to Set Up the Radar

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Radar] from the [Settings] menu.
3. Tap [Radar Source], then select the appropriate radar sensor.
   Note: If a DRS sensor is connected but does not appear in the [Radar Source] list, close the list and open it again. The name of the DRS sensor should appear with a check mark, as in the example below.

4. Scroll the [Radar] menu display the menu item [Radar Initial Setup], then tap [Radar Initial Setup].
5. Referring to the tables which follow, set up the radar.

[Radar] menu - [Radar Initial Setup]

Menu item	Description	Options (setting range)
[Antenna Rotation]	Select the speed of antenna rotation. Not available (greyed out) with DRS4DL+	[Auto], [24 RPM]
[Antenna Heading Align]	See "How to align the antenna heading" on page 3-13.	[-179.9°] to [+180.0°]
[Main Bang Suppression]	If main bang appears at the screen center, slide the circle icon so that the main bang disappears, while watching the radar echo at the left-hand side of the display.	[0] to [100]
[Enable Sector Blanking] [Enable Sector 2 Blanking]	Up to two sectors may be selected for blanking (no transmission). Select [ON] to enable this feature. Set the start and end angles (0° to 359°).	[ON], [OFF]

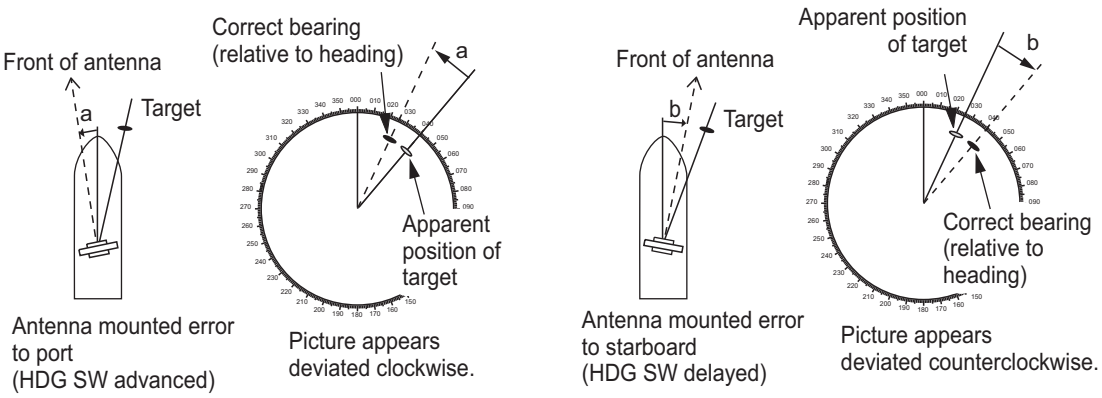
[Radar] menu - [Antenna Position]

Menu item	Description	Options (setting range)
[Longitudinal (from bow)]	Referring to the figure on the right, enter the radar antenna positioning bow-stern (Longitudinal) and port-starboard (Lateral) position from the origin. 	[0] m to [999] m
[Lateral (-Port)]		[-99] m to [+99] m Port-side is negative, Starboard-side is positive.
[Antenna Height]	Select the height of the antenna above the waterline. Not available (greyed out) with the radar sensor DRS4DL+.	[Under 3m], [3m-10m], [Over 10m]
[Auto Tuning]	Enable/disable auto tuning for the connected radar. Not available (grayed out) with DRS4DL+/ DRS2D-NXT/DRS4D-NXT/DRS6A-NXT/ DRS12A-NXT/DRS25A-NXT.	[ON], [OFF]

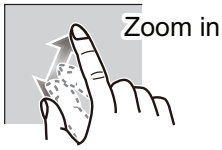
Menu item	Description	Options (setting range)
[Tuning Source]	Select a display in the dual range display to manually tune. Not available (grayed out) with DRS4DL+/ DRS2D-NXT/DRS4D-NXT/DRS6A-NXT/ DRS12A-NXT/DRS25A-NXT.	[Range1], [Range2]
[Manual Tuning]	Manually tune the radar. Not available (grayed out) with DRS2D-NXT/DRS4D-NXT/DRS6A-NXT/DRS12A-NXT/DRS25A-NXT.	[-50] to [50]
[Radar Monitoring]	Display various information regarding the connected radar.	
[Radar Optimization]	Automatically adjust magnetron output and tuning for the connected radar. Available when the [TX/STBY] setting is [ON]. Do not change these settings. Not available (greyed out) with the radar sensor DRS2D-NXT, DRS4D-NXT. **Note 1:** For the service technician only. **Note 2:** Do this function whenever the magnetron is replaced.	
[ARPA Advanced Settings]	For service technician only. Do not change these settings. This item is available when [TX/STBY] is [ON]. Not available (greyed out) with the radar sensor DRS4DL+, and FAR-2xx8 series, FAR-2xx7 series and FAR-15x8 series radar antennas.	
[TX Channel]	Select [1], [2] or [3], the channel where the interference is smallest. See the operator's manual for details. Not available (greyed out) with the radar sensor DRS2D-NXT, DRS4D-NXT.	[Auto], [1], [2], [3]
[Target Analyzer Mode]	You can emphasize rain clutter or target echoes when the target analyzer is active. Select [Rain] or [Target] as appropriate. See the operator's manual for details. Available with the radar sensor DRS2D-NXT, DRS4D-NXT, DRS6A-NXT and DRS12A-NXT.	[Rain], [Target]
[Auto acquire by Doppler]	When selecting [ON], approaching targets (ships, rain clutter, etc.) within 3 NM from own ship are automatically acquired by the Doppler calculated from the radar echo. See the operator's manual for details. Available with the radar sensor DRS2D-NXT, DRS4D-NXT, DRS6A-NXT and DRS12A-NXT.	[ON], [OFF]
[Set Hardware to Factory Default]	Resets the radar selected at [Radar Source] to factory default.	[OK], [Cancel]
[Reset Default Settings]	Resets [Radar] menu settings to default.	[OK], [Cancel]

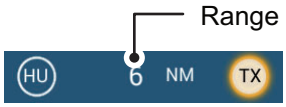
How to align the antenna heading

You have mounted the antenna unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading line (zero degrees).
In practice, you will probably observe some small bearing error on the display because of the difficulty in achieving accurate initial positioning of the antenna unit. The following adjustment will compensate for the error.



1. Set your radar with 0.125 and 0.25 nm range and the head up mode.
   You can select a range by using the pinch action. The range appears at the bottom right of the screen. Range may also be selected using the slide bar displayed on the right-hand side of the radar display area. Drag the bar up to zoom in, or down to zoom out.





Radar indications

2. Turn the vessel's bow toward a target.
3. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
4. Tap [Radar] to show the [Radar] menu.
5. Tap [Antenna Heading Align].
6. Key in an offset value (setting range: -179.9° to -+180°) that puts the target at the very top of the screen, then tap the ✓ icon.
   +: rotate echo in clockwise direction
   -: rotate echo in counterclockwise direction
7. Confirm that the target echo is displayed at correct bearing on the screen.

3.5 How to Set Up the Fish Finder

When using the built-in fish finder of this unit, the NavNet TZtouch series unit in the same network, or connecting a network sounder (BBDS1 or DFF series), set up the sounder as shown in this section.

Note 1: Some menu items are restricted to certain external depth sounders and that some menu items may not be available when using the internal depth sounder.

Note 2: For DFF-3D setup instructions, see the DFF-3D operator's manual.

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings], then tap [Fish Finder]
3. Refer to the table below to set up the fish finder.

Fish Finder Initial Setup menu

Menu item	Description	Options (setting range)
[Zero Line Rejection]	When you turn the zero line (transmission line) rejection on, the line is not shown, which allows you to see fish echoes near the surface. The width of the line changes with the transducer used and installation characteristics. If the width of the line is 1.4 m or more, select [ON]. **Note:** If [Fish Finder Source] is TZTXFF, DFF3, DFF3-UHD, DI-FFAMP connected to a NavNet TZtouch3, set[Zero Line Range].	[OFF], [ON]
[Zero Line Range]	You can set the zero line removal range by turning on [Zero Line Rejection]. Available when [Fish Finder Source]is TZTXFF, DFF3, DFF3-UHD, DI-FFAMP connected to aNavNet TZtouch3. If the tail of the zero line is long, set a large value. If the zero line still does not disappear, reduce the transmission power. The default setting is 2.0	DFF3: 1.4 to 2.5 Other than DFF3: 1.4 to 3.8
[Transducer Draft]	Set the distance between the transducer and the draft line to show the distance from the sea surface.	0.0m to 99.9m
[Salt Water]	Select [ON] if you use this equipment in salt water.	[OFF], [ON]
[Fish Finder Source]	Set the fish finder to use. Select from a network fish finder (BBDS1, DFF1, DFF3, DFF1-UHD, DFF3-UHD), the built-in fish finder of this unit, or NavNet TZtouch series unit in the same network. Setting options for this menu item depend on the equipment connected to this unit.	
[Preset Frequency Setup]	Set to change the TX center frequency and CHIRP width. Please refer to the instruction manual for details. **Note:** This menu is available when DI-FFAMP, DFF3-UHD or a CHIRP transducer is connected. There is a limit to the setting range of each transducer.	[Preset Frequency 1 Setup], [Preset Frequency 2 Setup], [PresetFrequency 3 Setup]
[Transducer Setup]	Setup Transducer and Motion Sensor. See "Transducer Setup menu" on page 3-16.	

Menu item	Description	Options (setting range)
[Transmission Format]	Select whether to transmit high and low frequencies simultaneously or with a time delay. Normally, use [Parallel], which transmits the frequencies simultaneously. If you encounter interference near the bottom, select [SequentialA], [SequentialB] in order to suppress the interference. **Note:** Shown with connection of DFF3-UHD. *: When DFF3-UHD (program version: 0252480-02.04 or later) is connected, select [SequentialA] or [SequentialB]. When self interference occurs, select [SequentialB] and set the interference supression.	[Parallel], [SequentialA], [SequentialB]*
[Transmission Power Mode]	Set the TX power level. See the operator's manual for details.	Internal fish finder: [Min], [Max] DFF1-UHD: [Off], [Min], [Auto] DFF3-UHD, DI-FFAMP: 0 to 10
[External KP]	Select on to synchronize with external sounder's keying pulse.	[OFF], [ON]
[Bottom Level HF]	The default bottom level setting (0) determines that two strong echoes received in sequence are bottom echoes. If the depth indication is not stable in the default setting, adjust the bottom level here. If vertical lines appear from the bottom echo in the bottom lock display, lower the bottom level to erase the vertical lines. If you can not identify the fish near the bottom from the bottom echo, increase the bottom level.	-40 to +40
[Bottom Level LF]		-40 to +40
[Gain Offset HF]	If the gain setting is wrong, or there is a difference in the gain between the low and high frequencies, you can balance the gain for the two frequencies here.	-50 to +50
[Gain Offset LF]		-50 to +50
[Auto Gain Offset HF]	If the auto gain offset is wrong, or there is a difference in the gain between the low and high frequencies, set an offset here to balance auto gain for the two frequencies.	-5 to +5
[Auto Gain Offset LF]		-5 to +5
[STC HF]	Adjust the low (LF) or high (HF) STC frequency. See the operator's manual for details. **Note:** Shown with connection of DFF3, DFF1-UHD, DFF3-UHD, DI-FFAMP.	0 to +10
[STC LF]		0 to +10
[TX Pulse HF]	The pulse length is automatically set according to range and shift, however it can also be set manually. Use a short pulse for better resolution and a long pulse when detection range is important. To improve resolution on zoom displays, use [Short 1] or [Short 2]. • [Short 1] improves the detection resolution, but the detection range is shorter than with [Std] (pulse length is 1/4 of [Std]). • [Short 2] raises the detection resolution, however detection range is shorter (pulse length is about 1/2 of [Std]) than [Std]. • [Std] is the standard pulse length, and is suitable for general use. • [Long] increases the detection range but lowers the resolution (about 1/2 compared to the [Std] pulse length) **Note:** Shown with connection of DFF3, DFF3-UHD, or DI-FFAMP connected to a narrow band width transducer.	[Short1], [Short2], [Standard], [Long]
[TX Pulse LF]		[Short1], [Short2], [Standard], [Long]

Menu item	Description	Options (setting range)
[RX Band HF]	Set the bandwidth for low (LF) or high (HF) frequency. The RX bandwidth is automatically set according to pulse length. To decrease noise, select [Narrow]. For better resolution, select [Wide]. **Note:** Shown with connection of DFF3, DFF3-UHD.	[Narrow], [Standard], [Wide]
[RX Band LF]		[Narrow], [Standard], [Wide]
[Temperature Port]	Set the data source for water temperature. • [MJ Port]: Use the temperature/speed sensor for data. • [Low Frequency]: Use the LF sensor for data. • [High Frequency]: Use the HF sensor for data. **Note:** Shown with connection of DFF3, DFF1-UHD.	[MJ Port], [Low Frequency], [High Frequency]
[Fish Finder Demo Mode]	The demo mode provides simulated operation using data stored in the internal memory. • [Off]: Disable the demo mode. • [Demo 1-4]: Select a demo mode. • [Shallow]: Enable shallow water demo mode. • [Deep]: Enable deep water demo mode. **Note:** Shown with connection of internal fish finder, NAVNET TZtouch series unit, BBDS1, DFF1, DFF3, DFF1-UHD or DFF3-UHD.	TZT2BB/TZT3 internal fish finder: [Off], [Demo 1-4] TZTXFF internal fish finder: [Off], [Demo1-2] BBDS1, DFF1, DFF3,DFF1-UHD: [Off],[Shallow], [Deep]
[Set Hardware to Factory Default]	Reset the external fish finder to its factory default settings.	[OK], [Cancel]
[Restore Default Settings]	Restore all menu settings to default.	[OK], [Cancel]

Transducer Setup menu

For motion sensor related settings, see "Motion sensor menu" on page 3-18.

If [DFF1/BBDS1], [DFF3], [DFF1-UHD], or [DFF3-UHD] is selected for [Fish Finder Source], restart the fish finder after changing this setting.

Note: Make sure that the unit is set to stand-by when setting up the transducer.

Menu item	Description	Options (setting range)
[Transducer Setup Type]	Select the type of transducer connected. When the connected sounder is a DFF1-UHD and the transducer has a compatible TDID, [TDID] is automatically selected. **Note:** When the transducer model is changed or TDID is detected, the frequency and bandwidth set on [Manual] is to be reset. • [Manual]: Manually set up the transducer. • [Model]: Select the appropriate transducer model (for FURUNO or AIRMAR transducers).	[Manual], [Model]
[Model Number]	Select the appropriate model number from the list. **Note:** Only available when [Transducer Setup Type] is set to [Model].	
[High Frequency Min]	Display the high frequency minimum.*	
[High Frequency Max]	Display the high frequency maximum.*	
[Low Frequency Min]	Display the low frequency minimum.*	
[Low Frequency Max]	Display the low frequency maximum.*	

Menu item	Description	Options (setting range)
[Reset Default Settings]	Reset the Transducer Setup menu settings to default.	[OK], [Cancel]

*: Shown with connection of DFF3.

When [Transducer Setup Type] is set to [Model] and connected to DFF3

Menu item	Description
[High Frequency]	Set the frequency (kHz) of the connected high frequency transducer.
[Frequency Adjust HF]	Fine-tune the high-frequency TX frequency to eliminate interference (setting range: -50 to +50). Set to [0] where there is no interference.
[Low Frequency]	Set the frequency (kHz) of the connected low frequency transducer.
[Frequency Adjust LF]	Fine-tune the low frequency TX frequency to eliminate interference (setting range: -50 to +50). Set to [0] where there is no interference.

When [Transducer Setup Type] is set to [Model] and connected to DFF3-UHD

Menu item	Description	Options (setting range)
[TX Mode HF]	Band adjustment mode for center frequency and CHIRP frequency of the transducer connected to the high frequency side.	[Auto CHIRP], [FM (Manual CHIRP)], [CW (Fixed Frequency)]
[High Frequency]	Set the high frequency (kHz) of the transducer connected to the high frequency side.	
[Frequency Adjust HF]	If [FM (Manual CHIRP)] or [CW (Fixed Frequency)] is selected at [TX Mode HF], fine-tune the high-frequency TX frequency to eliminate interference (setting range: -50 to +50). Set to [0] where there is no interference.	
[CHIRP Width HF]	If [FM (Manual CHIRP)] is selected in [TX Mode HF], set the CHIRP frequency band of the transducer connected to the high frequency side.	
[TX Mode LF]	Band adjustment mode for center frequency and CHIRP frequency of the transducer connected to the low frequency side.	[Auto CHIRP], [FM (Manual CHIRP)]*1, [CW (Fixed Frequency)]*2
[Low Frequency]	Set the low frequency (kHz) of the transducer connected to the low frequency side.	
[Frequency Adjust LF]	If [FM (Manual CHIRP)] or [CW (Fixed Frequency)] is selected at [TX Mode LF], fine-tune the low-frequency TX frequency to eliminate interference (setting range: -50 to +50). Set to [0] where there is no interference.	
[CHIRP Width LF]	If [FM (Manual CHIRP)] is selected in [TX Mode LF], set the CHIRP frequency band of the transducer connected to the low frequency side.	

When [Transducer Setup Type] is set to [Manual]

Menu item	Description	Options (setting range)
[High Frequency]	Set the kHz frequency for high frequency. Setting ranges vary depending on the transducer connected. **Note:** Shown with connection of internal fish finder, DFF1, BBDS1, DFF3, DFF1-UHD.	

Menu item	Description	Options (setting range)
[Transducer Power HF]	Set the transmission power for high frequency. **Note 1:** Shown with connection of internal fish finder, DFF1, BBDS1, DI-FFAMP or DFF3-UHD. **Note 2:** For DFF1-UHD users, when the connected transducer TDID is not supported by the DFF1-UHD, the setting is fixed as [1000].	[600], [1000]
[Band Width (HF)]	Set the bandwidth for high frequency. **Note:** Shown with connection of DFF3.	
[Low Frequency]	Set the kHz frequency for low frequency. Setting ranges vary depending on the transducer connected. **Note:** Shown with connection of internal fish finder, DFF1, BBDS1, DFF3, DFF1-UHD.	
[Transducer Power LF]	Set the transmission power for low frequency. **Note 1:** Shown with connection of internal fish finder, DFF1, BBDS1, DI-FFAMP or DFF3-UHD. **Note 2:** For DFF1-UHD users, when the connected transducer TDID is not supported by the DFF1-UHD, the setting is fixed as [1000].	[600], [1000]
[Band Width (LF)]	Set the bandwidth for low frequency. **Note:** Shown with connection of DFF3.	

When [Transducer Setup Type] is set to [Manual] and connected to DFF3-UHD

Menu item	Description
[TX Volt HF]	Not available (grayed out).
[TX Volt LF]	Not available (grayed out).
[High Frequency]	Set the frequency (kHz) of the transducer connected to the high frequency side.
[Low Frequency]	Set the frequency (kHz) of the transducer connected to the low frequency side.
[Transducer ?Power HF]	Set the power of the transducer connected to the high frequency side.
[Transducer ?Power LF]	Set the power of the transducer connected to the low frequency side.

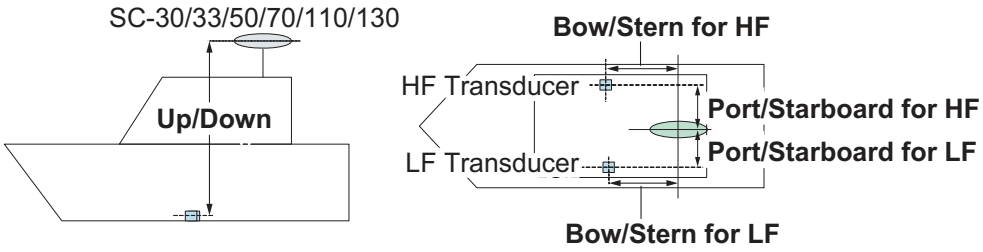
Motion sensor menu

Note 1: For connection of NMEA0183 equipment to the TZT19F, ask your FURUNO dealer to set up the equipment.

Note 2: To use the heaving function, the following settings are required at the satellite compass. For the setting procedure, see the operator's manual for your satellite compass. Settings for SC-30 are done from the [IF-NMEASC] menu, settings for SC-50/110 are done from the [DATA OUT] menu.

	NMEA0183	CANbus
Sentence	ATT, HVE	
Baud rate	38400BPS	
Cycle	25ms	
PGN		Heave: 65280 Attitude: 127257

The [MOTION SENSOR] menu appears in the [Transducer Setup] menu when the [Heaving Correction] is activated in the [Fish Finder] menu. If the satellite compass SC-30 or SC50/110 is connected, set the distance between the antenna unit (or sensor) of the satellite compass and transducer (high and low if connected) here.



Menu item	Description	Options (setting range)
[Motion Sensor Type]	Select the sensor connected to your TZT19F unit. For all sensors other than SC-50 and SC-110, select [NMEA2000]. **Note:** This menu item is not available when [Fish Finder Source] is set to [TZT19F].	[NMEA2000], [NMEA0183]
[Antenna Position Bow/Stern HF (LF)]	Set the distance from the antenna unit to the transducer in the bow-stern direction. If the transducer is located on the fore side, set a positive value.	-99 to +99
[Antenna Position Up/Down HF (LF)]	Set the distance from the transducer to the antenna unit in the vertical direction.If the transducer is located on the bow side, set a positive value.	-0.00 to +99.9
[Antenna Port/ Starboard HF (LF)]	Set the distance from the antenna unit to the transducer in the port-starboard direction. If the transducer is located on the starboard side, set a positive value.	-99.9 to +99.9

Transducer mis-mount correction

If the DFF-3D or a CHIRP side scan compatible transducer is installed 180° in reverse (facing stern), turn on the following item:

- DFF-3D: [Settings]→[Multi Beam Sonar]→[Initial Setup]→[Transducer Set-up]→[Transducer Mis-mount Correction]→[ON]
- CHIRP Side Scan: [Settings]→[CHIRP Side Scan]→[Transducer Mis-mount Correction]→[ON]

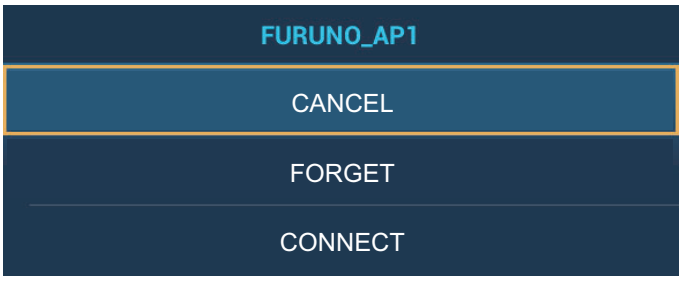
3.6 Wireless LAN Setting

3.6.1 How to join an existing wireless network

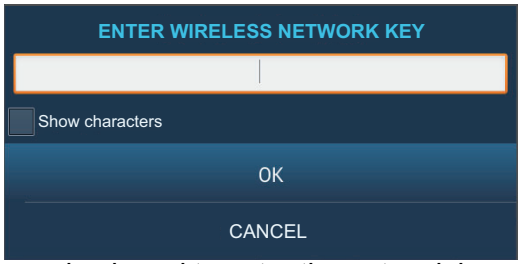
By connecting to an existing network, you may download software updates and weather information from the internet.

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings], then [General].
3. Tap [Wireless LAN Settings].
4. Tap [Wireless Mode].

5. Tap [Connect to existing LAN], then tap the [<] icon at the top left of the display.
6. Tap [Wireless] in the [ENABLE WIRELESS] menu.
7. Tap [Scan] to scan the vicinity for accessible WLAN networks. Available networks are listed. To delete all WLAN networks, select [Forget All Available Networks].
8. Tap the appropriate WLAN network to show the following display.



9. Tap [Connect], and the following display appears.



10. Use the software keyboard to enter the network key, then tap the [OK] button. To see what you have input, check [Show characters].
    Note: If the network key is incorrect, an error message appears. Enter the correct key and tap [OK] again.
11. Tap [X] on the title bar to close the menu.

3.6.2 How to create a wireless LAN network

Smart devices connected to this wireless network may also connect directly to the unit, allowing use of the TZT19F applications.

1. Tap the [FURUNO] icon (FURUNO) to show the home screen and display mode settings.
2. Tap [Settings] then [General], in that order.
3. Tap [Wireless LAN Settings].
4. Tap [Wireless Mode] in the [WIRELESS MODE] menu.
5. Tap [Create Local Network], then tap the [<] icon at the top left of the display.
6. Tap [Name] in the [LOCAL NETWORK SETTINGS] menu.
7. Using the software keyboard, name the unit, then tap the ✓.
8. Tap [Password] in the [LOCAL NETWORK SETTINGS] menu.
9. Using the software keyboard, set the password, then tap the ✓.
10. Tap [Local Network] in the [ENABLE LOCAL NETWORK] menu to activate the wireless network.
11. Your smart device may now be connected to the unit, through the network.
    1) From the smart device, select the network set at step 7.

2) Input the password set at step 9.

12. Tap [X] on the title bar to close the menu.

3.7 Ferry Mode

Note: Only the SC-30, SC-33, SC-70, SC-130 and SCX-20 support the Ferry Mode.

Ferry mode allows the user to change the screen orientation by 180°. Note that all the above heading sensors must support heading offset command from the TZT19F. Both heading sensors and radar sensors must be powered on when the TZT19F sends the command. Both the heading sensor and radar sensor must be powered when the TZT19F sends the heading offset command to them. If TZT19F sends the command and one of the sensors does not receive it, the heading data may be reversed. See "[Event Input Configuration]" of "[Initial Setup] menu (Other menu items)" on page 3-8.

3.8 How to Manage Your Charts

The TZT19F uses the same Mapmedia charts NavNet TZtouch2/3. There are two types of charts: free and paid. When using paid charts, an unlock code is required.

3.8.1 How to set a chart master unit

If there are multiple NavNet TZtouch series* on the network, it is recommended that the unit whose power is always ON be set as the chartmaster. When a chartmaster is set, the system ID is generated for the unit that is set as the chartmaster.When a chartmaster is set, a system ID is generated for the unit set as the chartmaster. The system ID is shared by all units connected to the same network.

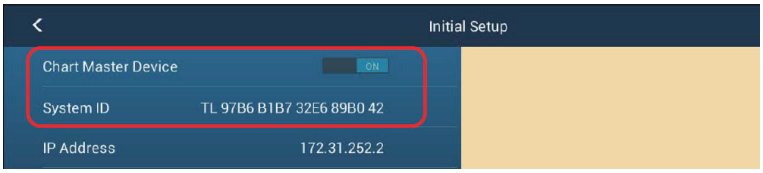
*: See page iii for details.

A separate chart card is required for each unit on the network, however the license(s) and unlock code(s) can be shared. Therefore, only one unlock code is required per vessel.

Note 1: Even if the communication with the chart master is unavailable, the paid chart can be used up to 30 times. A notification message will appear on the screen indicating the number of usages remaining. The number of remaining usages will be reset when communication with the chart master is restored, at which time the notification message will also disappear.

Note 2: When two or more units share an unlock code, you need to get an unlock code again if you change the [Chart Master Device]. For example, if the TZT19F that was used as the “primary” ([Chart Master Device] setting: [ON]) is used as the “secondary” ([Chart Master Device] setting: [OFF]) (and vice versa), the unlock code must be re-acquired.

To share the system ID and unlock code in the network, open the Home screen, then tap [Settings]→[Initial Setup]→[ON] for [Chart Master Device]. The [System ID] (unique to your Chart Master unit; see example figure below) is generated automatically. You will need the System ID when ordering charts from your local FURUNO dealer.



3.8.2 How to update or add charts

Free (USA and NOAA) and for-fee compatible charts are provided by FURUNO and Mapmedia. Go to the URL shown below to download Mapmedia charts. For FURUNO-supplied charts, contact your local FURUNO dealer.

Mapmedia chart data: http://www.mapmedia.com/charts-catalog.html

When you purchase a chart, you will also receive an email with the unlock codes and an attached file: TL_UCPOOL.zuc (automatic chart unlock file).

Download the chart file to your desktop. Unzip the file, then copy it to the root of a microSD card. Insert the card into the SD card slot on the display unit. For the detailed procedure, refer to the instructions on the FURUNO website.

Note: Make sure to unzip the chart file before copying to microSD. The system does not recognize zip files.

A for-fee chart must be unlocked before use, using one of the following methods.

Manually input the unlock code

Go to the Home screen and tap [Charts] to show the [Charts Catalog] display. Tap [Insert Code] then enter the chart unlock code from the software keyboard.

Download the unlock code

Connect to the Internet (see "How to join an existing wireless network" on page 3-19). Go to the Home screen and tap [Charts] to show the [Charts Catalog] display. Tap [Download Codes]. The popup message "CODES DOWNLOADED" appears when the download is complete.

Automatic unlock file

1. Connect a USB flash memory to your PC, then copy the TL_UCPOOL.zuc (attached to same email as the unlock codes) file to the root of the USB flash memory.
2. Turn off the power for the TZT19F that needs charts unlocked.
3. Disconnect the USB flash memory from the PC, then connect the memory to the USB1 port on your TZT19F.
4. Turn on the TZT19F. The unlock code is automatically applied.
5. Turn the power off, then remove the USB flash memory.

3.8.3 How to view your charts

Tap the [FURUNO] icon (FURUNO) to show the home screen, then tap [Charts] to display your charts catalog.

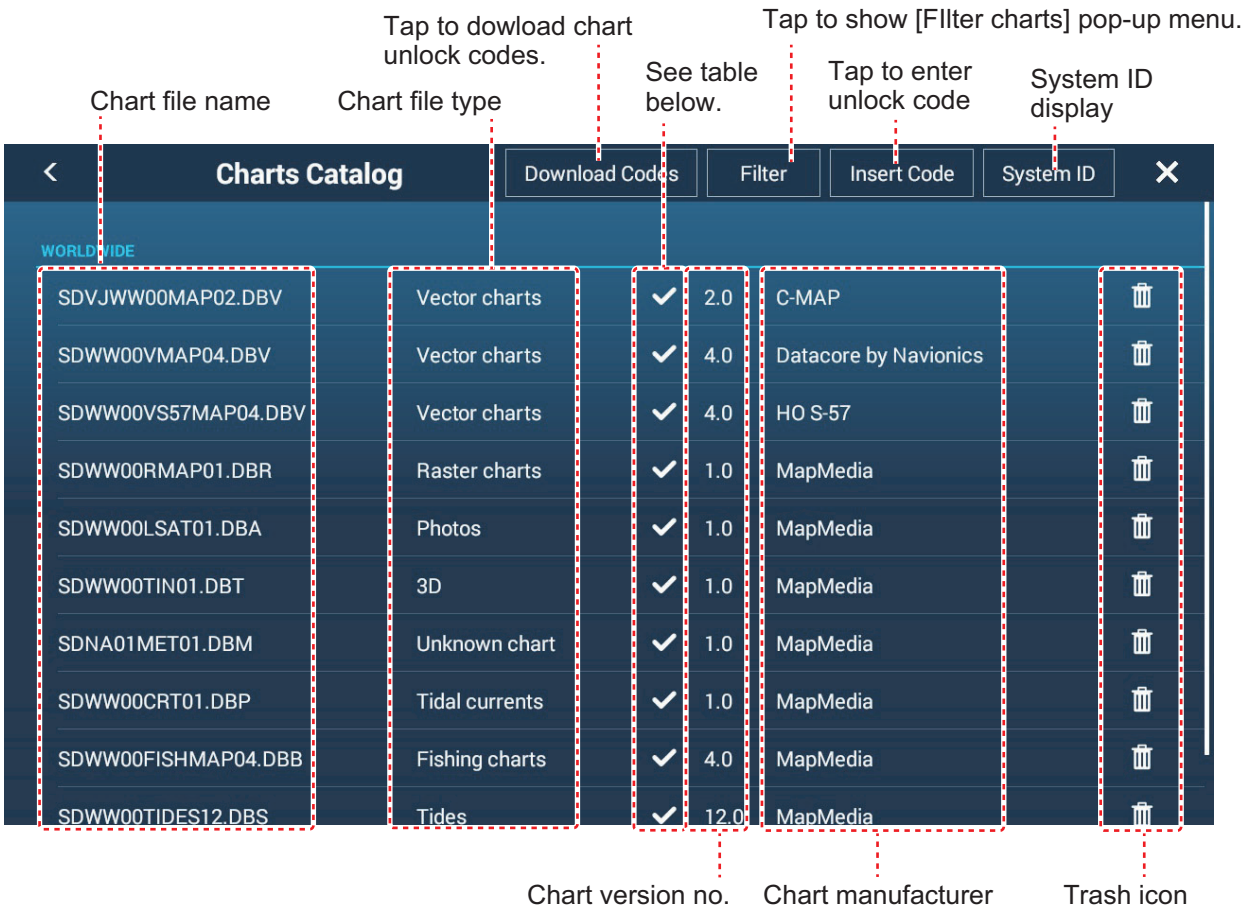
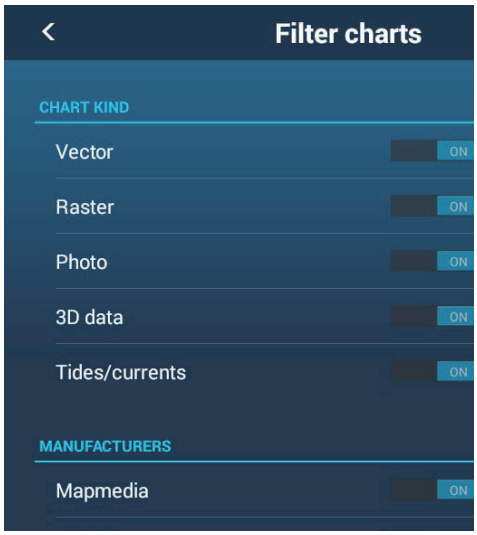


Chart status icon	Meaning	Chart status icon	Meaning
	Free chart. An unlock code is not necessary.		Paid chart. Unlock code entered.
	Paid chart. Unlock code is necessary to use the chart. Tap [Insert Code] at the top of the [Charts Catalog] screen. Enter the unlock code then tap [✓] to finish.		Chart cannot be used because it is corrupted.

How to hide unnecessary charts on the chart catalog list

1. Tap [Filter] on the chart catalog list title bar to show the [Filter charts] window.
2. Select [OFF] for the items that you want to hide. The factory setting shows all charts. To restore all charts, tap [Reset Filters].
3. Tap < on the title bar to return to the chart catalog list. [Filter] on the title bar changes to [Change Filter].
4. Tap the close button to close the chart catalog list.



3.8.4 How to delete charts

Before replacing a chart, you should delete the old chart data on every NavNet TZtouch2/3 and TZT9F unit. Only delete the chart data that you intend to replace or no longer require.

Open the charts catalog. Tap the trashcan icon of the chart to delete. You are asked "ARE YOU SURE YOU WANT TO DELETE THIS FILE?" Tap [OK] to delete the file.

3.9 IP Camera Setup

When connecting one or more IP camera (maximum 4), the following settings are required at the camera.

- IP Address: 172.31.xxx.xxx
- Subnet Mask: 255.255.0.0

APPX. 1 TRANSDUCER INSTALLATION GUIDE

OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

Transom Mount
Side Scan Transducer

09/26/22

Model: **TM904**

102642-rev.1

D-20990-rev.1

Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Always wear safety glasses, a dust mask, and ear protection when installing.

WARNING: When the boat is placed in the water, immediately check for leaks around the screws and any other holes drilled in the hull.

CAUTION: Never pull, carry, or hold the sensor by the cable as this may sever internal connections.

CAUTION: Never strike the transducer with anything except the palm of the hand. Never strike the paddlewheel.

CAUTION: Never use solvents. Cleaner, fuel, sealant, paint and other products may contain solvents that can damage plastic parts, especially the transducer's face.

IMPORTANT: Please read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

Applications

- Not recommended for boats with inboard engine(s).
- Not recommended for a stepped hull
- Adjusts to *transom* angles from 0°–30°
- Vertically orients sound beam on hull with *deadrise* angle up to 28°
- Recommended for boats capable of speeds up to 30kn (35MPH). Optimal speed is 1.5 - 8.5 kn (2 - 10MPH).

Tools & Materials

Safety glasses
Dust mask
Ear protection
Pencil
Electric drill
Drill bits and hole saws:

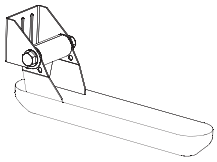
Bracket holes	5mm, #4, *or* 7/32"
Transom hole (optional)	2mm *or* 1/16" larger than connector Ø
Cable clamp holes	3mm *or* 1/8"

Masking tape
Angle finder
Grommets (some installations)
Marine sealant (suitable for below waterline)
Socket wrench
Torque wrench
Screwdrivers
Straight edge
Cable ties
Water-based anti-fouling paint (**mandatory in salt water**)

Record the information found on the cable tag for future reference.

Part No:_____Serial No:_____

Date_____Frequency_____kHz



Mounting Location

CAUTION: Do not mount the sensor in line with or near water intake or discharge openings; or behind strakes, struts, fittings, or hull irregularities that will disturb the water flow.

CAUTION: Do not mount the sensor in a location where the boat may be supported during trailering, launching, hauling, or storage.

- For the best performance, the sensor must be in contact with smooth water. To identify an area of "clean" water, observe the water flow off the transom while the boat is underway.
- Mounting the sensor on the side of the transom where the propeller blades are moving downward is preferred (Figure 1).
- Mount the sensor as close to the centerline (keel) of the boat as possible to ensure the transducer's face remains in the water when the boat is turning.

Boat Types

- **Single drive boat**—Mount a minimum of 15cm (6") beyond the swing radius of the propeller (Figure 1).
- **Twin drive boat**—Mount between the drives a minimum of 15cm (6") beyond the swing radius of the propeller.
- **Trim tabs**—Mount inside the trim tab, space permitting.
- **Stepped transom**—Mount the transducer on the lowest step.

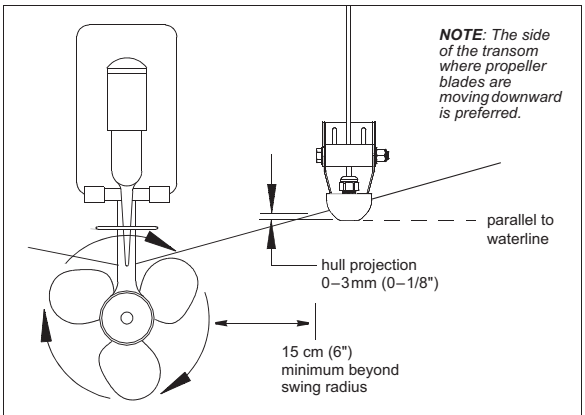


Figure 1. Mounting location on single drive boat

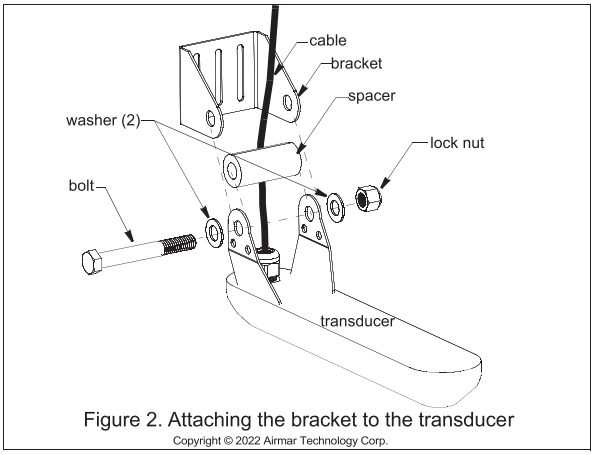


Figure 2. Attaching the bracket to the transducer

Installation

Attaching the Bracket to the Transducer

1. Slide a washer onto the bolt (Figure 2).

2. Align the bracket to the transducer and insert the bolt through the upper hole in the transducer. Slide the spacer onto the bolt and push the bolt through the remaining hole in the transducer and the bracket. Ensure the cable passes between the bracket and the spacer.

3. Slide the remaining washer onto the bolt and hand tighten the lock nut onto the bolt.

Hole Drilling

CAUTION: To prevent drilling too deeply, wrap masking tape around the bit 22mm (7/8") from the point.

NOTE: Fiberglass hull—*Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.*

1. At the selected location position the transducer, so it projects 3mm (1/8") below the bottom edge of the transom (Figure 1).

2. *Be sure the bottom of the transducer is parallel to the waterline.*

3. Mark the screw holes with an “X” in the *center* of each slot in the bracket.

4. Using a 5mm, #4, or 7/32" drill bit, drill three holes 22mm (7/8") deep at the marked locations.

Mounting the Bracket

CAUTION: Metal hull—The stainless steel bracket must be isolated from a metal hull to prevent electrolytic corrosion. Place non-metal insulating washers between the bracket and the metal hull.

1. Remove the bracket from the transducer.

2. Apply marine sealant to the threads of the three hex-washer-head screws to prevent water seepage into the transom. Screw the bracket to the hull using a socket wrench. *Do not tighten the screws at this time.*

3. Reinstall the transducer to the bracket (Figure 2).

Checking the Sensor Angle & Projection

CAUTION: Do not position the leading edge of the sensor deeper in the water than the trailing edge because aeration will occur.

CAUTION: Do not position the sensor deeper into the water than necessary to avoid increasing drag, spray, and water noise and reducing boat speed.

1. Using the vertical adjustment space in the bracket slots, slide the assembly up or down until the bottom inside corner of the transducer projections 0–3mm (0–1/8") below the bottom of the hull (Figure 1). When you are satisfied with the position of the transducer, tighten the three bracket screws. For clear access to the screws, remove the transducer assembly from the bracket (Figure 2). *When reattaching, be sure to include the spacer.*

2. With the transducer in the operational position, use a straight edge to sight the underside of the transducer relative to the underside of the hull (Figure 3). The trailing edge of the transducer should be 1–6mm (1/16–1/4") below the leading edge. When you are satisfied with the position of the transducer, use a torque wrench to tighten the lock nut to 40ft lbs.

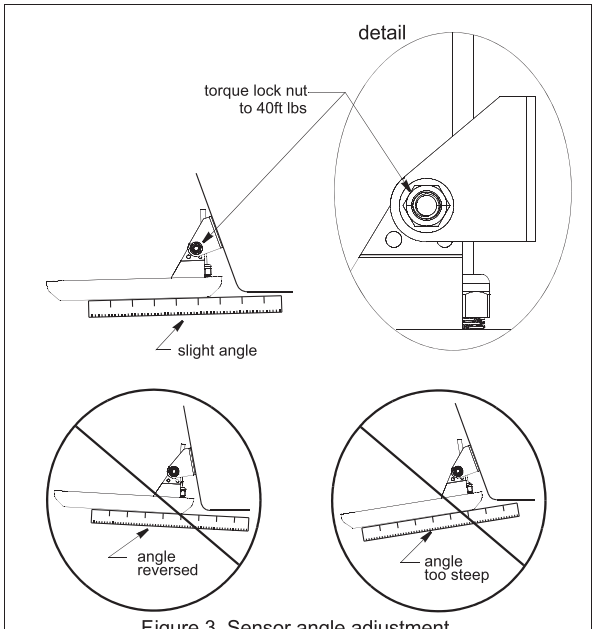


Figure 3. Sensor angle adjustment

Testing on the Water

1. Become familiar with your echosounder's performance at a speed of 4 kn (5MPH).

2. Gradually increase the boat speed and observe the gradual decline in performance due to turbulent water flowing under the transducer's face.

3. If the decline in performance is sudden (not gradual), identify the boat speed at which the onset occurred. Return the boat to this speed, then gradually increase speed while making moderate turns in both directions.

4. If the performance improves while turning to the side on which the sensor is installed, the transducer's position probably needs adjustment. The transducer is probably in turbulent or aerated water.

   To improve performance, try the following one at a time in the order given, in small increments.

   a. Increase the sensor's angle in the water. Review "Checking the Sensor Angle & Projection: and see Figure 3.

   b. Move the sensor deeper into the water in increments of 3mm (1/8") (Figure 4).

   c. Move the sensor closer to the centerline of the boat. Fill unused screw holes with marine sealant.

NOTE: *Optimal operating speed for a side scan transducer is 1.5 - 8.5 kn (2 - 10MPH).*

Cable Routing & Connecting

CAUTION: Do not remove the connector to ease cable routing. If the cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.

Route the sensor cable over the transom, through a drain hole, or through a new hole drilled in the transom **above the waterline.**

1. If a hole must be drilled through the transom, choose a location **well above the waterline** (Figure 4). Check for obstructions such as trim tabs, pumps, or wiring inside the hull. Mark the location with a pencil. Drill a hole using the appropriate size bit to accommodate the connector.

2. Route the cable over or through the transom.

3. On the outside of the hull, secure the cable against the transom using the cable clamps. Position a cable clamp 15cm (6") above the bracket and mark the mounting hole with a pencil.

4. Position the second cable clamp halfway between the first clamp and the cable hole. Mark this mounting hole.

5. If a hole has been drilled in the transom, open the appropriate slot in the cable cover. Position the cover over the cable where it enters the hull. Mark the two mounting holes.

6. At each of the marked locations, use a 3mm or 1/8" bit to drill a hole 10mm (3/8") deep.

7. Apply marine sealant to the threads of the #6 x 1/2" self-tapping screws to prevent water from seeping into the transom. If you have drilled a hole through the transom, apply marine sealant to the space around the cable where it passes through the transom.

8. Position the two cable clamps and fasten them in place. If used, push the cable cover over the cable and screw it in place.

9. Route the cable to the instrument being careful not to tear the cable jacket when passing it through the bulkhead(s) and other parts of the boat. Use grommets to prevent chaffing. To reduce electrical interference, separate the sensor cable from other electrical wiring and the engine(s). Coil any excess cable and secure it in place with cable ties to prevent damage.

10. Refer to your echosounder owner's manual to connect the sensor to the instrument.

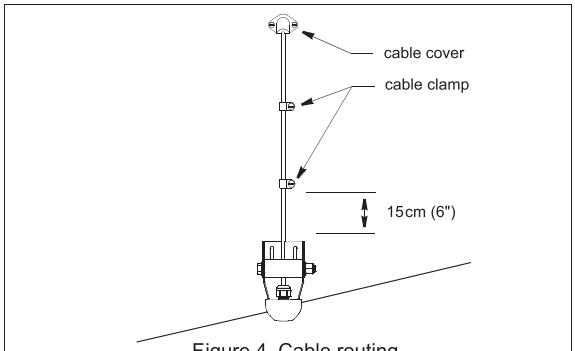


Figure 4. Cable routing

Checking for Leaks

When the boat is placed in the water, **immediately** check for leaks around the screws and any other holes drilled in the hull. Note that very small leaks may not be readily observed. Do not leave the boat in the water unchecked for more than three hours.

Operation & Maintenance

Anti-fouling Paint

Surfaces exposed to salt water that *do not interlock*, must be coated with anti-fouling paint. Use **water-based** anti-fouling paint only. Never use ketone-based paint, since ketones can attack many types of plastic possibly causing damage to the transducer. Reapply paint every 6 months or at the beginning of each boating season.

Cleaning

Aquatic growth can accumulate rapidly on the sensor's surface reducing performance within weeks. Clean the transducer's face with a Scotch-Brite® scour pad and mild household detergent taking care to avoid making scratches. If the fouling is severe, lightly wet sand with fine grade wet/dry paper.

Sensor Replacement & Parts

The information needed to order a replacement sensor is printed on the cable tag. Do not remove this tag. When ordering, specify the part number, serial number, date, and frequency in kHz. For convenient reference, record this information on the top of page one.

Lost, broken or worn parts should be replaced immediately. Obtain parts from your instrument manufacturer or marine dealer.

Gemeco	USA Tel: 803-693-0777 email: sales@gemeco.com
Airmar EMEA	Europe, Middle East, Africa Tel: +33.(0)2.23.52.06.48 email: sales@airmar-emea.com

AIRMAR® TECHNOLOGY CORPORATION
35 Meadowbrook Drive, Milford, New Hampshire 03055-4613, USA
•www.airmar.com

OWNER'S GUIDE & INSTALLATION INSTRUCTIONS

Sidescan Transducer

with Anti-rotation Hardware

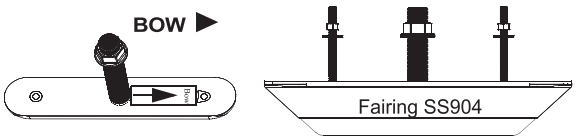
Model: **SS904**

05/24/22
102366-rev.1
D-20553-rev.1

Record the information found on the cable tag for future reference.

Part No:_____Serial No:_____

Date_____Frequency_____kHz



Follow the precautions below for optimal product performance and to reduce the risk of property damage, personal injury, and/or death.

WARNING: Installation of the anti-rotation studs/screws is mandatory! The anti-rotation studs/screws hold the fairing firmly in place. Failure to install the anti-rotation studs/screws may result in the fairing rotating while the boat is underway. The effect may be violent movement and loss of steering.

WARNING: The transducer must be installed parallel to the keel/centerline to ensure proper boat handling and water flow under the transducer.

WARNING: Always wear safety glasses, a dust mask, and ear protection when installing.

WARNING: Immediately check for leaks when the boat is placed in the water. Do not leave the boat in the water unchecked for more than three hours. Even a small leak may allow a considerable amount of water to accumulate.

WARNING: **Fairing**—The fairing must be screwed to a block of wood before cutting. It is too thin to cut safely without additional material. Failure to do so may result in the fairing moving on the band saw.

WARNING: **Fairing**—Do not install a fairing that has been mis-cut. Replace it.

- Cutting the fairing at an angle greater than the maximum allowed will cut into the transducer and/or anti-rotation pockets, thus weakening the fairing.
- Do not allow any gap between the fairing and the hull that is greater than 1.5mm (1/16"). When the boat is underway, water will enter any gaps and push against the fairing with considerable force, possibly rotating it.

WARNING: **Fiberglass hull**—The transducer must be installed in solid fiberglass, not in coring.

CAUTION: Never install a metal transducer on a vessel with a positive ground system.

CAUTION: Never pull, carry, or hold the transducer by the cable as this may sever internal connections.

CAUTION: Never strike the transducer.

CAUTION: **Stainless steel transducer in a metal hull**—Stainless steel must be isolated from a metal hull to prevent electrolytic corrosion. Use the isolation sleeving supplied.

CAUTION: **Transducer Orientation** —Be sure to install the transducer in the correct orientation to the bow. If the transducer is installed in reverse, the display will not work properly.

CAUTION: **Installation without a Fairing** —The transducer must be installed on a nearly flat hull with less than 10°of deadrise. Do not install on a V-hull. If the transducer is installed without a fairing on a hull with a deadrise greater than 10°, the display will not work properly.

CAUTION: **Transducer Pair** —Be sure to install the port transducer and the starboard transducer in the correct orientation to the bow. If the transducers are installed in reverse, the display will not work properly.

CAUTION: Never use solvents. Cleaner, fuel, sealant, paint, and other products may contain solvents that can damage plastic parts, especially the transducer's face.

IMPORTANT*:* Read the instructions completely before proceeding with the installation. These instructions supersede any other instructions in your instrument manual if they differ.

Applications

- Stainless steel is compatible with all hull materials. Recommended for aluminum hulls to prevent electrolytic corrosion, provided the stainless steel transducer is isolated from the metal hull.
- Recommended for boats capable of speeds up to 30kn (35MPH). Optimal speed is 1.5 - 8.5kn (2 - 10MPH).
- A fairing is strongly recommended if the deadrise angle of the hull exceeds 10°. The fairing can accommodate a deadrise angle of up to 22°.
- **Transducer Pair** - On a boat with a steep deadrise angle, a pair of transducers, one on the port side and one on the starboard side, can be installed and connected to the echosounder module.
- For stepped hulls, to be installed just ahead of the first step.

Tools & Materials

Safety glasses
Dust mask
Ear protection
Angle finder (installation with fairing)
Band saw (installation with fairing)
Block of wood (installation with fairing) min. 4" x 4" x 18"
Screws (4) (installation with fairing) No. 8
Screwdrivers
Rasp *or* power tool (installation with fairing)
Electric drill
Drill bits and hole saws:
- Pilot hole 3mm *or* 1/8"
- Transducer stem 25mm *or* 1"
- Anti-rotation studs in solid fiberglass or wood hull 9mm *or* 11/32"
- Anti-rotation studs in metal hull 10mm *or* 3/8"
- Sandpaper

Mild household detergent *or* weak solvent (such as alcohol)
File (installation in metal hull)
Marine sealant (suitable for below waterline)
Slip-joint pliers
Grommet(s) (some installations)
Cable ties
Water-based anti-fouling paint (**mandatory in salt water**)
Installation in a cored fiberglass hull: (see page 8)
- Drill bits and hole saws for hull interior:
- Transducer stem 38mm *or* 1-1/2"
- Anti-rotation studs 19mm *or* 3/4"
- Cylinder, wax, tape, and casting epoxy

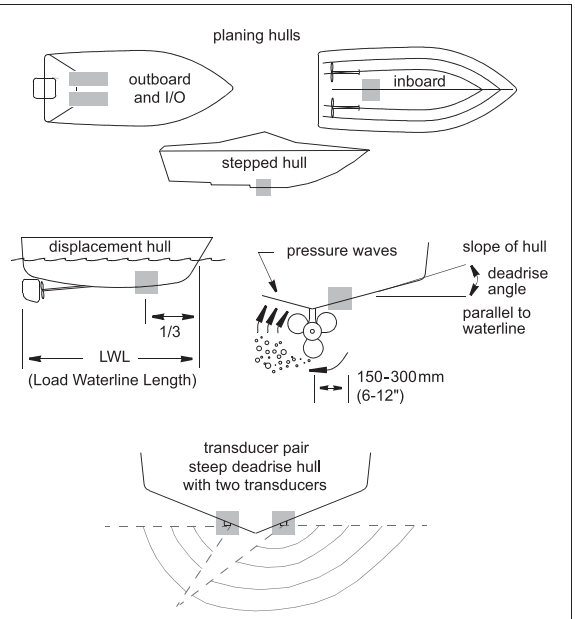


Figure 1. Best location

Mounting Location

Guidelines

CAUTION: Do not mount in line with or near water intake or discharge openings or behind strakes, struts, fittings, or hull irregularities that will disturb the water flow.

CAUTION: Do not mount the sensor where the boat may be supported during trailering, launching, hauling, or storage to avoid damaging the transducer's face.

- The water flowing under the hull must be smooth with a minimum of bubbles and turbulence (especially at high speeds).
- The transducer must be continuously immersed in water.
- The transducer beam must be unobstructed by the keel or propeller shaft(s).
- Choose a location away from interference caused by power and radiation sources such as: the propeller(s) and shaft(s), other machinery, other echosounders, and other cables. The lower the noise level, the higher the echosounder gain setting that can be used.
- Choose an accessible spot inside the vessel with adequate space for the height of the stem and tightening the nuts.
- Choose a location with a minimal deadrise angle. If the hull has a steep deadrise, mount a pair of transducers.

Boat Types (Figure 1)

- **Planing hull powerboat**—Mount well aft near the centerline and *well inboard of the first set of lifting strake*s to insure that it is in contact with the water at high speeds. The starboard side of the hull where the propeller blades are moving downward is preferred.
  Outboard and I/O—Mount just forward and to the side of the engine(s).
  Inboard—Mount well ahead of the propeller(s) and shaft(s).
  Stepped hull—Mount just ahead of the first step.

- **Displacement hull powerboat**—Locate 1/3 of the way along the LWL and 150–300mm (6–12") off the centerline. The starboard side of the hull where the propeller blades are moving downward is preferred.

- **Transducer Pair**—Mount the transducers across from one another on opposite sides of the centerline (keel).

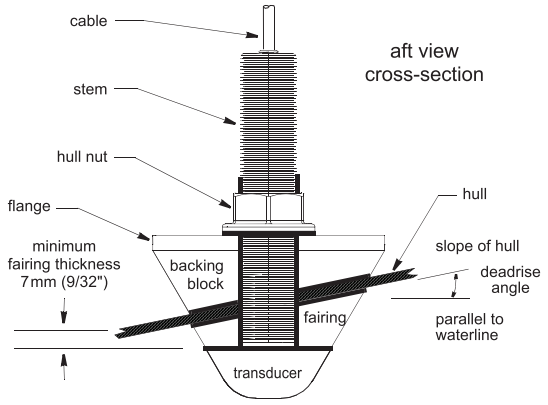


Figure 2.
Deadrise angle and fairing thickness

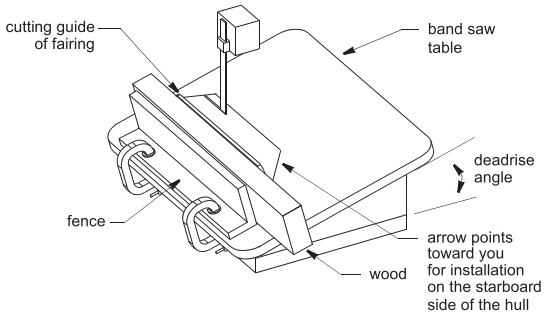


Figure 3. Cutting the fairing

Installation:

***NOTE**: If you are installing the transducer with NO fairing, disregard all references to a fairing and backing block. Skip to "Hole Drilling" on page 3.*

Cutting the Fairing

CAUTION: The arrow on the fairing points forward toward the bow when installed. Be sure to orient the fairing on the band saw, so the angle cut matches the intended side of the hull and not the mirror image.

CAUTION: Shape the fairing to the hull as precisely as possible. If there are gaps between the fairing and the hull near the ends, cut a new fairing. Over tightening the rods to minimize gaps may crack the transducer and/or crush the fairing.

1. **Metal hull**—The holes for the anti-rotation studs must be enlarged to accommodate the isolation sleeving. Using a 10mm (3/8") drill bit, enlarge the two holes in the fairing.
2. Measure the deadrise angle of the hull at the selected mounting location using an angle finder or a digital level (Figure 3).
3. Tilt the band saw table to the measured angle and secure the cutting fence (Figure 4).
4. Fasten the fairing to the center of the block of wood using the four corner holes and No. 8 screws.
5. Place the fairing on the table so the cutting guide rests against the fence. The arrow will be pointing *toward* you for installation on the starboard side of the boat or *away* from you for installation on the port side (Figure 5).
6. Adjust the cutting fence, so the fairing will be cut in about two equal parts (Figure 3). *The section that will become the fairing must be a minimum of 7mm (9/32") at its thinnest dimension.* This number corresponds to the flange on the fairing.
7. Recheck steps 1 through 5. Then cut the fairing.
8. **Check the fit of the fairing by placing it against the hull, being sure it is parallel to the centerline of the boat (keel).** Hold the fairing on the ends and try to rock it back and forth. Shape the fairing to the hull as precisely as possible with a rasp or power tool until it no longer rocks.
9. Remove the fairing from the block of wood.
10. Use the remaining section of the fairing with the cutting guide as the backing block.

Hole Drilling

***Cored fiberglass hull**—Follow separate instructions on page 6.*

1. Locate and drill the holes for the transducer stem and anti-rotation studs, using the fairing or the provided template on page 8 as a guide (Figure 4, 5, 6, or 7). Align the fairing or template parallel to the centerline of the boat (keel).
   - Drill 3mm (1/8") pilot holes for the transducer stem and the two anti-rotation studs.
   - Using the appropriate drill bits/hole saw, drill the holes for the transducer stem and the two anti-rotation studs.
     Fairing—Drill through the holes in the fairing to be sure the holes are drilled *perpendicular to the waterline* and not at the angle of the hull.
     NO Fairing—Be sure to drill the holes perpendicular to the hull.
2. Sand and clean the area around the holes, inside and outside, to ensure the marine sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either a mild household detergent or a weak solvent (alcohol) before sanding.
   Metal hull—Remove all burrs with a file and sandpaper.

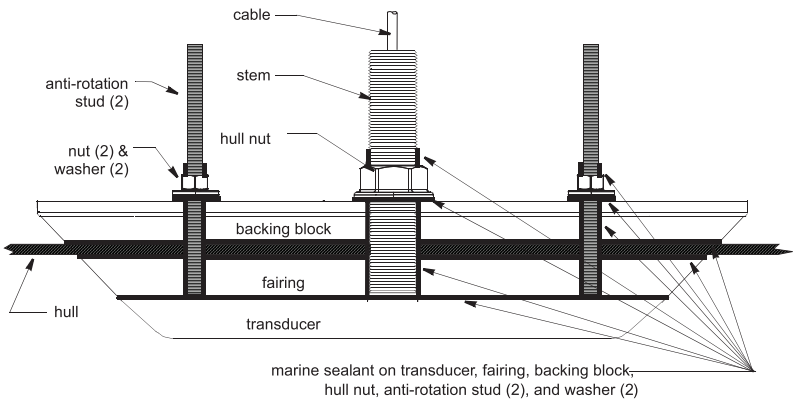


Figure 4. Bedding and installing with a fairing in a fiberglass or wood hull

Bedding

CAUTION: Be sure all surfaces to be bedded are clean and dry**.**

CAUTION: When installing the anti-rotation studs, use slip-joint pliers placed near the bottom of the stud. Do not use pliers farther up, as this will damage the threads.

1. Remove the hull nut (Figure 4,5, 6, or 7).
2. Apply a 2mm (1/16") thick layer of marine sealant to the surface of the transducer that will contact the hull/fairing and up the stem. *The sealant must extend 6mm (1/4") higher than the combined thickness of the hull, fairing and backing block (if used), and the hull nut.* This will ensure there is marine sealant in the threads to seal the hull and hold the hull nut securely in place.
3. Apply a 2mm (1/16") thick layer of marine sealant around the anti-rotation studs *including the bottom***.** This will ensure there is marine sealant in the threads to secure the studs in the transducer, seal the hull, and hold the nut securely in place**.**
4. Screw the anti-rotation studs into the holes in the transducer. Using slip-joint pliers placed *near the bottom of the stud*, tighten each one in turn. Do not use pliers farther up, as this will damage the threads.
5. **Metal hull**—Use the isolation sleeving to cover the transducer stem and the two anti-rotation studs. Cut the length of each sleeve greater than the thickness of the hull. *Note that the sleeves must not interfere with tightening the nuts.* Slide the larger diameter isolation sleeve over the bedded transducer stem. Slide the two remaining isolation sleeves over the bedded anti-rotation studs. Slide the sleeves as far down as possible. Apply a 2mm (1/16") thick layer of the marine sealant to the outside of the three isolation sleeves.
6. **Fairing**—Thread the transducer cable through the fairing. Seat the transducer firmly within the recess in the fairing. Apply a 2mm (1/16") thick layer of marine sealant to the following surfaces:
   - Fairing that will contact the hull
   - Backing block that will contact the hull
   - Hull nut that will contact the backing block
   - Washers for the anti-rotation studs that will contact the backing block

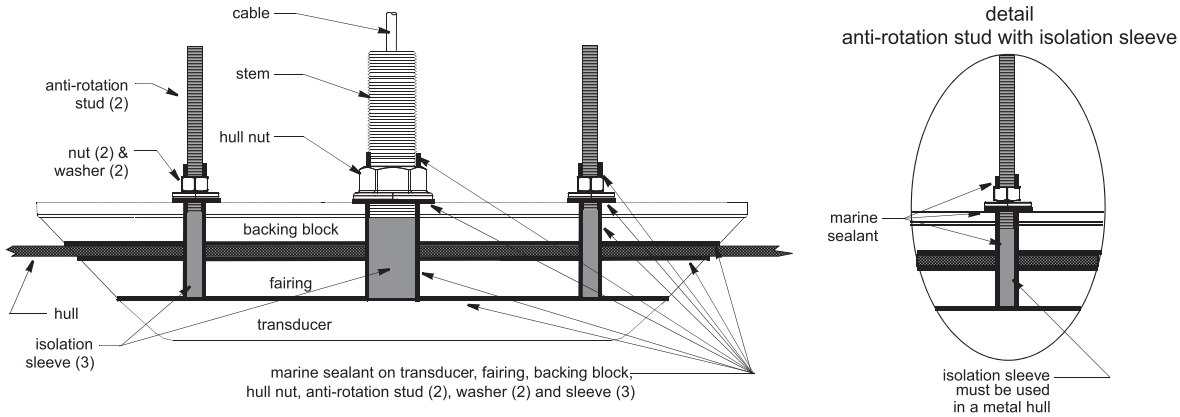


Figure 5. Bedding and installing with a fairing in a metal hull

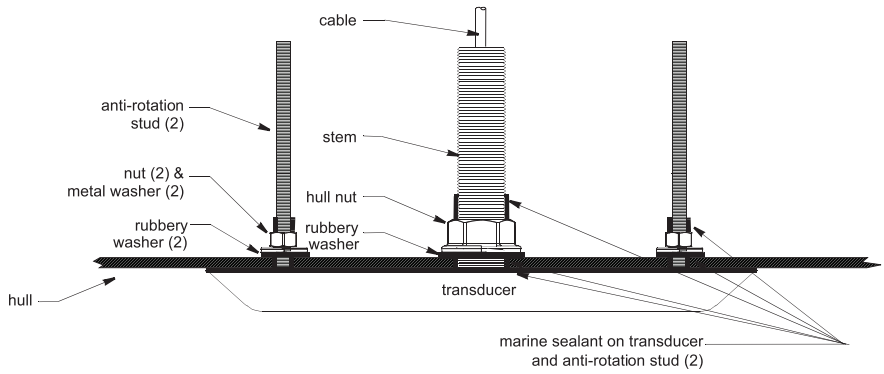


Figure 6. Bedding and installing WITHOUT a fairing in a fiberglass or wood hull

Installing

CAUTION: Do not over-tighten the nuts possibly damaging the transducer or fairing.

1. From outside the hull, thread the cable through the mounting hole (Figure 4, 5, 6, or 7).
2. Push the stem of the transducer and the anti-rotation studs through the hull.
3. From inside the hull:
   - **Fairing**—Slide the backing block and the hull nut onto the cable. Seat the backing block firmly against the hull. Screw the hull nut in place and tighten it with slip-joint pliers. *Do not over-tighten*. With the bedded side down, slide one washer and nut onto each anti-rotation stud. Tighten the nuts *one full turn only* with slip-joint pliers. *Do not over-tighten*.
     Cored fiberglass hull—*Do not* over-tighten crushing the hull.
     Wood hull—Allow for the wood to swell before tightening.
     Metal hull—Be sure the isolation sleeves are between the transducer stem/studs and the hull. *The isolation sleeves must be below the nuts to prevent the sleeves from interfering with tightening the nuts.* Trim the sleeves if necessary.
   - **NO fairing**—Slide the rubbery washer and hull nut onto the cable. Seat the rubbery washer firmly against the hull. Screw the hull nut in place and tighten it with slip-joint pliers. *Do not over-tighten*. Slide the rubbery washer, metal washer, and nut onto each anti-rotation stud. Seat the rubbery washer firmly against the hull. Tighten the nuts *one full turn only* with slip-joint pliers. *Do not over-tighten*.
     Cored fiberglass hull—*Do not* over-tighten crushing the hull.
     Wood hull—Allow for the wood to swell before tightening.
     Metal hull—Be sure the isolation sleeves are between the transducer stem/studs and the hull. *The isolation sleeves must be below the nuts to prevent the sleeves from interfering with tightening the nuts.* Trim the sleeves if necessary.
4. **Fairing**—When the boat is underway, especially at high speeds, water will enter any gaps and push against the fairing with considerable force, possibly rotating it. Fill any gaps between the fairing and the hull with marine sealant. **If there is any gap greater than 1.5 mm (1/16"), replace the fairing.**
5. Remove any excess marine sealant on the outside of the hull, transducer, and fairing if used to ensure smooth water flow under the transducer.

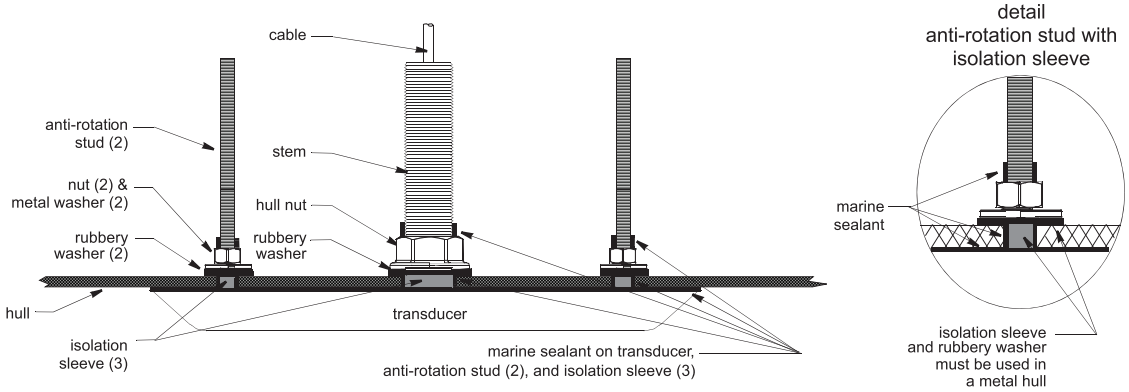


Figure 7. Bedding and installing WITHOUT a fairing in a metal hull

Installation in a Cored Fiberglass Hull

The core (wood or foam) must be cut and sealed carefully. The core must be protected from water seepage, and the hull must be reinforced to prevent it from crushing under the hull nut allowing the transducer(s) to become loose.

CAUTION: Completely seal the hull to prevent water seepage into the core.

1. Drill a 3mm or 1/8" pilot hole perpendicular to the waterline from inside the hull (Figure 8). If there is a rib, strut, or other hull irregularity near the selected mounting location, drill from the outside. If the hole is drilled in the wrong location, drill a second hole in a better location. Apply masking tape to the outside of the hull over the incorrect hole and fill it with epoxy.
2. Using the appropriate size drill bit/hole saw, cut a hole from outside the hull through the outer skin only. Be sure to hold the drill plumb, so the hole will be perpendicular to the water surface.
3. The optimal interior hole diameter is affected by the hull's thickness and deadrise angle. It must be large enough in diameter to allow the core to be completely sealed.
4. Using the drill bit/hole saw for the hull interior, cut through the *inner* skin and most of the core from inside the hull keeping the drill perpendicular to the hull. The core material can be very soft. Apply only light pressure to the drill bit after cutting through the *inner* skin to avoid accidentally cutting the *outer* skin.
5. Remove the plug of core material so the *inside* of the outer skin and the inner core of the hull is fully exposed. Sand and clean the inner skin, core, and the outer skin around the hole.
6. Coat a hollow or solid cylinder of the correct diameter with wax and tape it in place. Fill the gap between the cylinder and hull with casting epoxy. After the epoxy has set, remove the cylinder.
7. Sand and clean the area around the hole, inside and outside, to ensure that the sealant will adhere properly to the hull. If there is any petroleum residue inside the hull, remove it with either mild household detergent or a weak solvent (alcohol) before sanding.
8. Follow the same procedure to prepare the hull for each anti-rotation stud/screw (steps 1 through 6).
9. Proceed with "Bedding" on page 4.

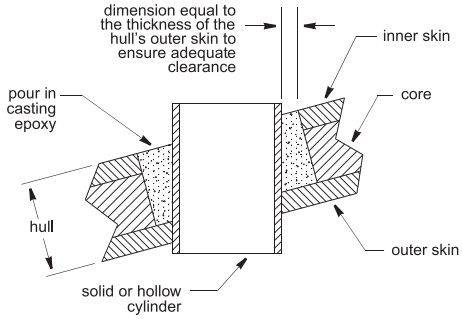


Figure 8. Preparing a cored fiberglass hull

Cable Routing & Connecting

CAUTION: Do not remove the connector(s) to ease cable routing. If a cable must be cut and spliced, use Airmar's splash-proof Junction Box No. 33-035 and follow the instructions provided. Removing the waterproof connector or cutting the cable, except when using a water-tight junction box, will void the sensor warranty.

1. Refer to the instructions that came with the echo sounder module to connect it to the display and the power supply.
2. **Transducer Pair**—Connect the starboard transducer to the short cable on the port transducer. Rout the longer cable on the port transducer to the echo sounder module (Figure 9).

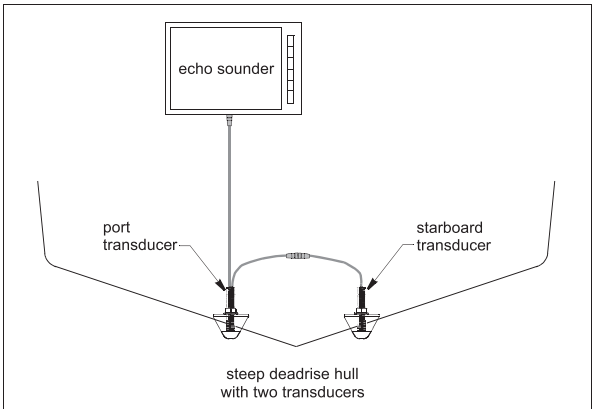


Figure 9. Cable routing transducer pair

Maintenance, Parts & Replacement

Anti-fouling Coating

Surfaces exposed to salt water must be covered with an anti-fouling coating. Use a *water-based* anti-fouling coating made for transducers only. Never use ketone based paint, since ketones can attack many plastics possibly damaging the transducer. Brush on anti-fouling coating every 6 months or at the beginning of each boating season.

Checking for Leaks

When the boat is placed in the water, **immediately** check around the transducer(s) for leaks. Note that very small leaks may not be readily observed. Do not leave the boat in the water for more than 3 hours before checking it again. If there is a small leak, there may be considerable bilge water accumulation after 24 hours. If a leak is observed, repeat "Bedding" and "Installing" **immediately.**

Cleaning

Aquatic growth can accumulate rapidly on the transducer's surface reducing its performance within weeks. Clean the surface with a Scotch-Brite® scour pad and mild household detergent taking care to avoid making scratches. If the fouling is severe, lightly wet sand with fine grade wet/dry paper.

Transducer Replacement & Parts

The information needed to order a replacement transducer is printed on the cable tag. Do not remove this tag. When ordering, specify the part number, serial number, date, and frequency in kHz. For convenient reference, record this information on the top of page 1.

Lost, broken, and worn parts should be replaced immediately.

Obtain parts from your instrument manufacturer or marine dealer.

Model	Fairing	Hull Nut
SS904	ACC-FAIR-SS904-01	02-149-01

Gemeco
USA
Tel: 803-693-0777
Email: sales@gemeco.com

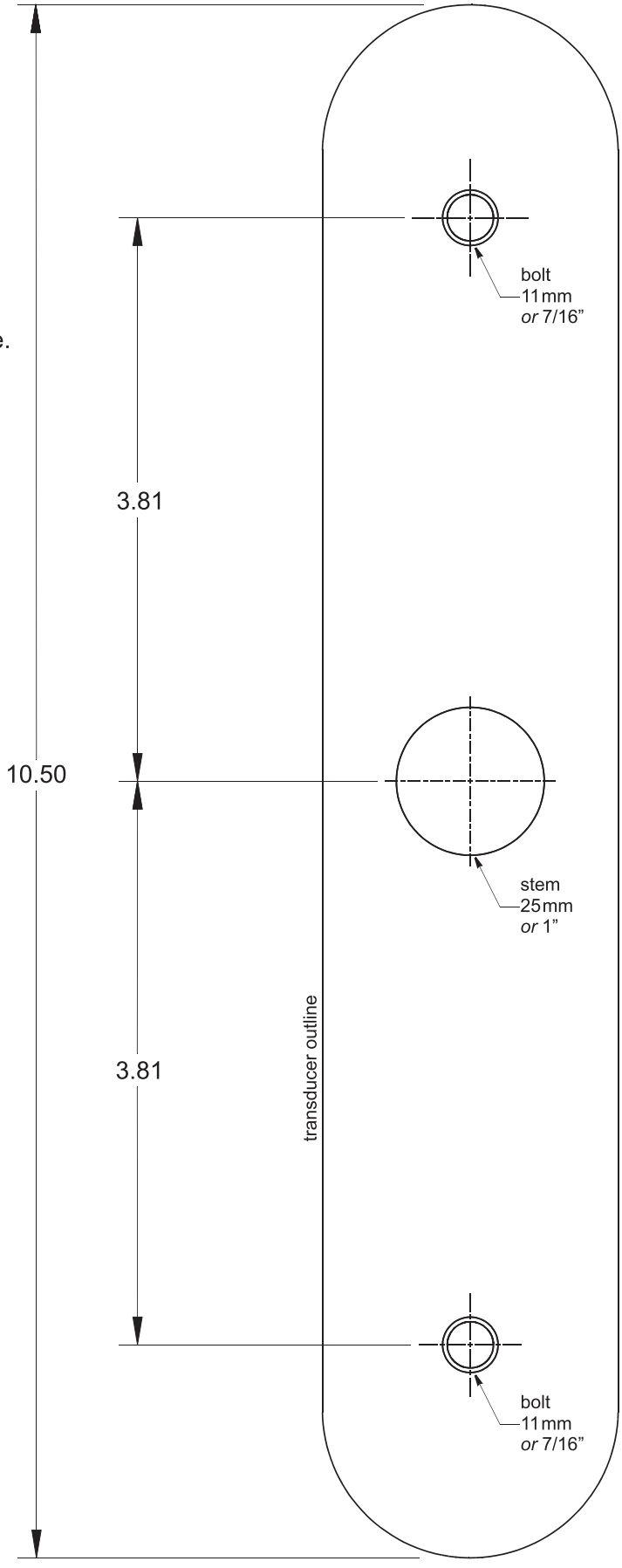
Airmar EMEA
Europe, Middle East, Africa
Tel: +33.(0)2.23.52.06.48
Email: sales@airmar-emea.com

Template

SS904

IMPORTANT: Some printers and printer settings can alter the size of the template.

Verify the template's size before cutting. Place the transducer on the template to be sure it is the *exact* size. If necessary, redraw the template.



APPX. 2 TRANSDUCER LIST

The table below available transducers and whether they are compatible with the functions listed.

Optional transducers

Standard transducers (CW narrow band)

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
520-5PSD	Yes	Yes	Yes	600 W
520-5MSD	Yes	Yes	Yes	
525-5PWD	Yes	Yes	Yes	
525STID-MSD	Yes	Yes	Yes	
525STID-PWD	Yes	Yes	Yes	
520-PLD	Yes	Yes	Yes	
525T-BSD	Yes	Yes	Yes	
525T-PWD	Yes	Yes	Yes	
525T-LTD/12	Yes	Yes	Yes	
525T-LTD/20	Yes	Yes	Yes	
SS60-SLTD/12	Yes	Yes	Yes	
SS60-SLTD/20	Yes	Yes	Yes	
526TID-HDD	Yes	Yes	Yes	1 kW
50/200-1T	Yes	Yes	Yes	
50B-6	No	No	No	
50B-6B	No	No	No	
200B-5S	No	No	No	
28BL-6HR	No	No	No	2 kW (Requires DFF3-UHD/DI-FFAMP)
38BL-9HR	No	No	No	
50BL-12HR	No	No	No	
82B-35R	No	No	No	
88B-10	No	No	No	
200B-8	No	No	No	
200B-8B	No	No	No	
28BL-12HR	No	No	No	3 kW (Requires DFF3-UHD/DI-FFAMP)
38BL-15HR	No	No	No	
50BL-24HR	No	No	No	
68F-30H	No	No	No	
100B-10R	No	No	No	
150B-12H	No	No	No	
88F-126H	No	No	No	5 kW* (Requires DFF3-UHD/DI-FFAMP)
200B-12H	No	No	No	

*: 3 kW with DFF3-UHD/DI-FFAMP

CHIRP transducers

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
TM150M	No	No	No	300W
B-75L	No	No	No	
B-75H	No	No	No	600W
B-175H	No	No	No	1kW
B-175L	No	No	No	
B265LH-FJ12	Yes	No	No	
CM265LH-FJ12	Yes	No	No	
TM265LH-FJ12	Yes	No	No	
PM111LHG	No	No	No	2 kW (Requires DFF3-UHD/DI-FFAMP)
CM599LHG	No	No	No	2 to 3 kW (Requires DFF3-UHD/DI-FFAMP)
CM599LM	No	No	No	

CHIRP Side Scan transducers

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
225T-TM904	No	No	No	150 W
225T-SS904	No	No	No	
225T-PR904	No	No	No	

Note: Only 230 kHz CHIRP side scan transducers are supported (455 kHz CHIRP side scan transducers are not supported).

Other compatible transducers

Standard transducers (CW narrow band)

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
28F-38M	No	No	No	5 kW* (Requires DFF3-UHD/DI-FFAMP and BT-5-1/2)
50F-38	No	No	No	
28F-72	No	No	No	10 kW* (Requires DFF3-UHD/DI-FFAMP and BT-5-1/2)
50F-70	No	No	No	

*: 3 kW with DFF3-UHD/DI-FFAMP

CHIRP transducers (single frequency)

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
B75HW	No	No	No	300 W
B150M	No	No	No	
P95M	No	No	No	
SS75L	No	No	No	
B75M	No	No	No	600 W
B785M	No	No	No	
P75M	No	No	No	
SS75H	No	No	No	
SS75M	No	No	No	
TM165HW	No	No	No	

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
B175HW	No	No	No	1 kW
B175M	No	No	No	
B175MW	No	No	No	
B285HW	No	No	No	
B285M	No	No	No	
SS175MW	No	No	No	
TM185HW	No	No	No	
TM185M	No	No	No	
TM185MW	No	No	No	

CHIRP transducers (dual frequency)

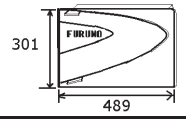
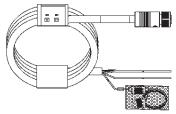
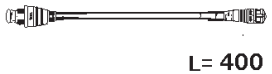
Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
B275LHW-FJ12	No	No	No	1 kW
B265LM-FJ12	No	No	No	
CM265LM-FJ12	No	No	No	
CM275LHW-FJ12	No	No	No	
TM265LM-FJ12	No	No	No	
TM275LHW-FJ12	No	No	No	

CHIRP transducers (dual frequency, requires the DFF3-UHD/DI-FFAMP)

Model	ACCU-FISH™	Bottom Disc.	RezBoost™	Remarks
PM111LH	No	No	No	2 kW
PM111LHW	No	No	No	
PM111LM	No	No	No	
PM411 LMW	No	No	No	
165T-PM542LHW*	No	No	No	
165T-PM542LM	No	No	No	
R109LH	No	No	No	
R109LHW	No	No	No	
R109LM	No	No	No	
R111LH	No	No	No	
R111LM	No	No	No	
CM599LH	No	No	No	2 to 3 kW
CM599LHW	No	No	No	
R409LWM	No	No	No	
R509LH	No	No	No	
R509LHW	No	No	No	
R509LM	No	No	No	
R599LH	No	No	No	
R599LM	No	No	No	

*: Not available with the DI-FFAMP.

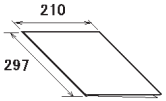
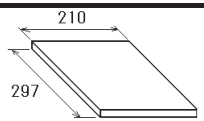
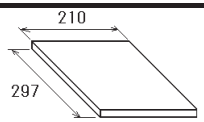
PACKING LIST TZT19F-E/-J

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット UNIT			
ﾏﾙﾁﾃﾞｨｽﾌﾟﾚｲ MULTI FUNCTION DISPLAY		TZT19F-* 000-037-166-00 **	1
付属品 ACCESSORIES			
付属品 ACCESSORIES		FP19-02301 001-563-920-00	1 (*1)
付属品 ACCESSORIES		FP26-00401 001-175-940-00	1 (*2)
工事材料 INSTALLATION MATERIALS		**CP19-02600**	
ｹｰﾌﾞﾙ(組品) CABLE ASSEMBLY		FRU-3P-FF-A002M-001 000-197-092-10	1
ｹｰﾌﾞﾙ(組品) CABLE ASSEMBLY		FRU-CCB12-MJ-01 000-197-069-10	1
工事材料 INSTALLATION MATERIALS		CP19-02501 001-563-860-00	1
工事材料 INSTALLATION MATERIALS		CP19-02603 001-566-970-00	1

ｺｰﾄﾞ番号末尾の[**]は、選択品の代表ｺｰﾄﾞを表します。
CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

(*1)の付属品は和文仕様専用です。
(*1) MARKED ACCESSORIES ARE FOR JAPANESE SET ONLY.

(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
図書 DOCUMENT			
ﾌﾗｯｼｭﾏｳﾝﾄ型紙 FLUSH MOUNTING TEMPLATE		C42-01904-* 000-197-112-1*	1
操作要領書 OPERATOR'S GUIDE		OS*-45120-* 000-197-102-1* **	1
装備要領書 INSTALLATION MANUAL		IM*-45100-* 000-197-106-1* **	1

(*2)の付属品は英文仕様専用です。
(*2) MARKED ACCESSORIES ARE FOR ENGLISH SET ONLY.

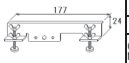
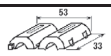
A-1

FURUNO

CODE NO.	001-563-860-00	19BK-X-9402 -1
TYPE	CP19-02501	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Fマウント金具 FLUSH MOUNT FIXTURE		CP19-01813 CODE NO. 001-476-050-00	2	
2	六角スリワリ ボルト HEX.BOLT(SLOTTED HEAD)		M6X12 SUS304 CODE NO. 000-162-897-10	2	
3	EMIコア EMI CORE		GRFC-10 CODE NO. 000-177-010-10	1	
4	コネクタキャップ CONNECTOR CAP		CAP-18-011C CODE NO. 000-197-178-10	1	

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO ., LTD.

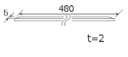
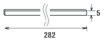
C4511-M01-B

FURUNO

CODE NO.	001-566-970-00	19BK-X-9405 -1
TYPE	CP19-02603	1/1

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Fスポンジ 19H F SPONGE 19H		19-034-1675-0 CODE NO. 100-431-320-10	2	
2	フードFパッキンヨコ15 F-MOUNT HOOD PACKING SIDE15		26-005-2307-0 CODE NO. 100-351-730-10	2	

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO ., LTD.

C4512-M01-B

FURUNO

CODE NO.	001-175-940-00	26AD-X-9501 -9
TYPE	FP26-00401	1/1

付属品表

ACCESSORIES

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	フィルタークリーナー LCD CLEANING CLOTH		19-028-3125-7 CODE NO. 100-360-677-10	1	

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO ELECTRIC CO . LTD.

C4456-F01-K

FURUNO

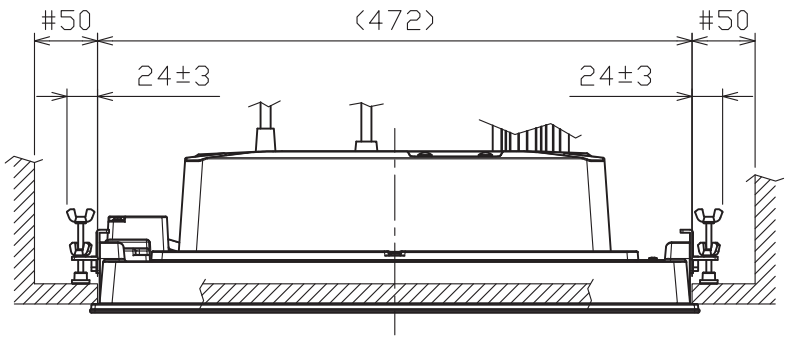
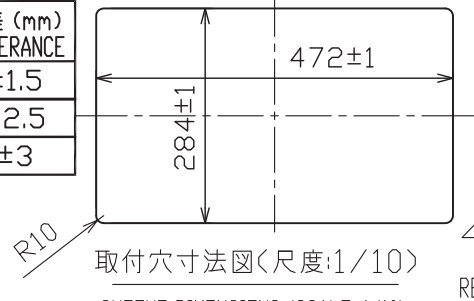


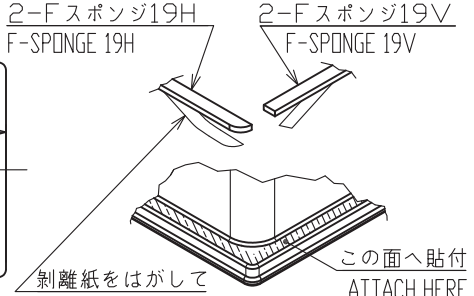
表1 TABLE 1

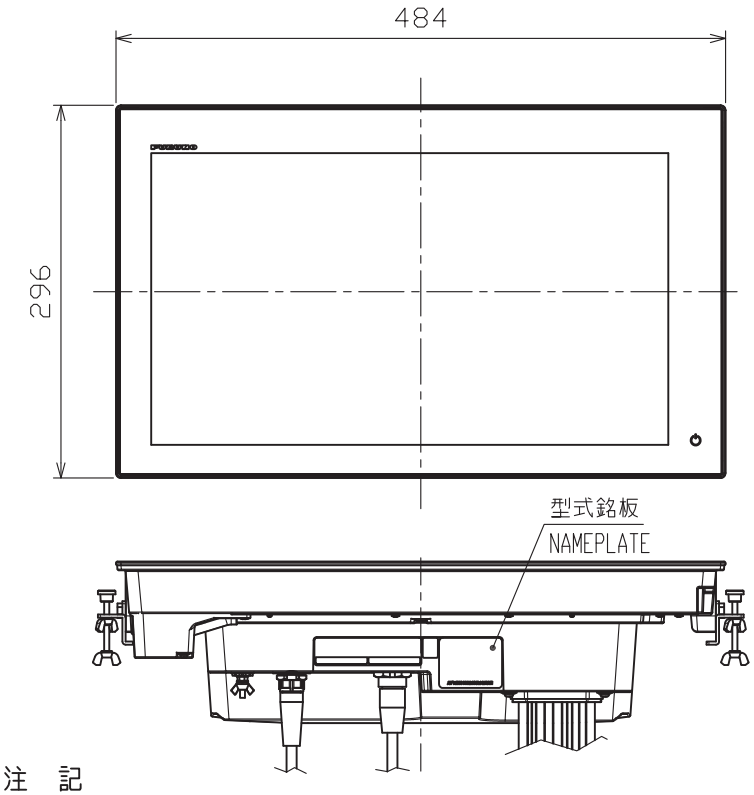
寸法区分（mm） DIMENSION	公差（mm） TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

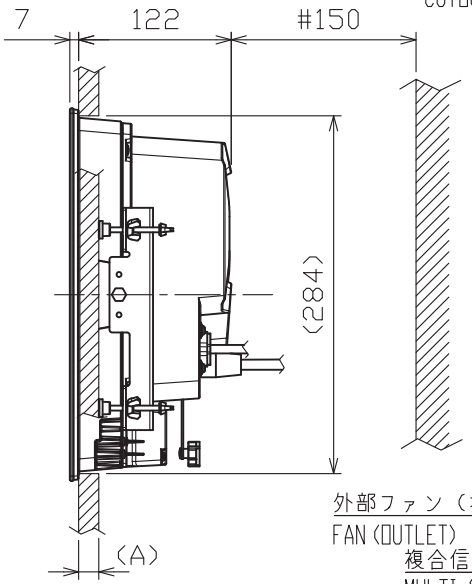


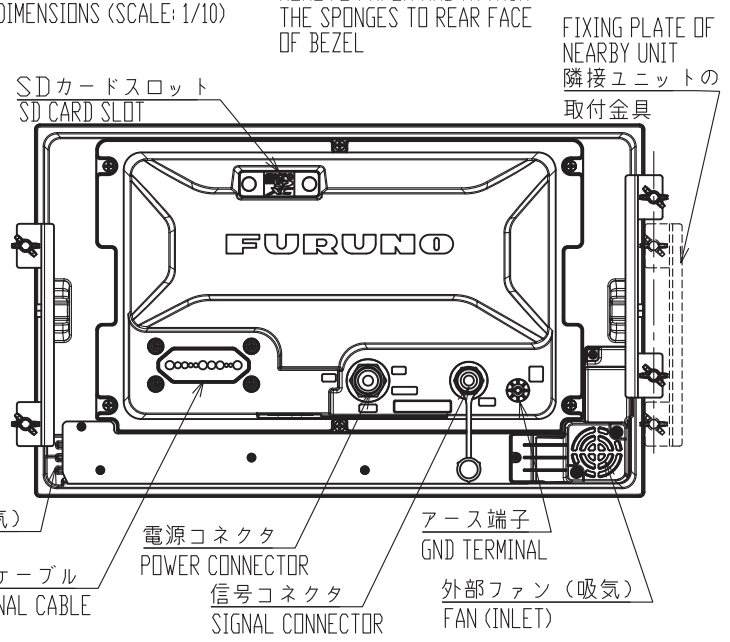
取付穴寸法図（尺度:1/10）

CUTOUT DIMENSIONS (SCALE: 1/10)









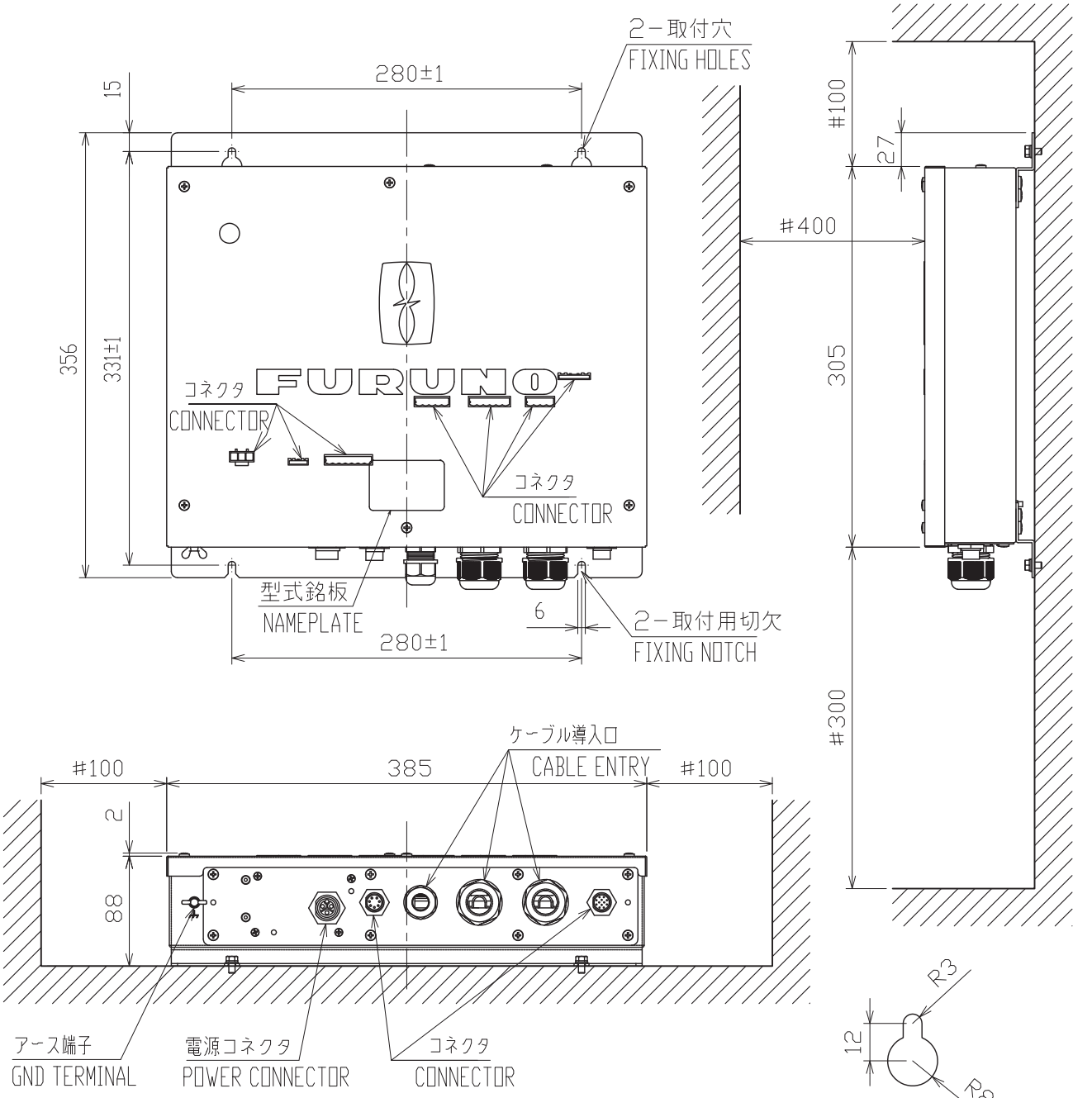
NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. BULKHEAD THICKNESS (A): 5≦A≦20.

注　記

1）　指定外の寸法公差は表１による。
2）　＃印寸法は最小サービス空間寸法とする。
3）　壁の厚さ（Ａ）は最小５ｍｍ、最大２０ｍｍとする

DRAWN 17/Dec/2019 T.YAMASAKI		TITLE	TZT19F
CHECKED 17/Dec/2019 H.MAKI		名称	マルチファンクションディスプレイ（埋込装備）
APPROVED 18/Dec/2019 H.MAKI			外寸図
SCALE 1/6 MASS 7.8 ±10% kg	質量は複合信号ケーブルを含む。 MASS INCLUDES MULTI-SIGNAL CABLE.	NAME	MULTI FUNCTION DISPLAY (FLUSH MOUNT)
DWG.No. C4512-G01- C	REF.No. 19-034-160G-4		OUTLINE DRAWING



取付部詳細（尺度：1/2）
DETAIL FOR FIXING (SCALE: 1/2)

注 記
1） 指定外の寸法公差は表１による。
2） ＃印寸法は最小サービス空間寸法とする。
3） 取付ネジはトラスタッピンネジ呼び径Ø５×２０を使用のこと。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. #: MINIMUM SERVICE CLEARANCE.
3. USE TAPPING SCREWS Ø5x20 FOR FIXING THE UNIT.

表１ TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3

DRAWN 8/Nov/2019 T.YAMASAKI		TITLE	DI-FF AMP
CHECKED 8/Nov/2019 H.MAKI		名称	魚探パワーアンプ（壁掛・卓上装備）
APPROVED 11/Nov/2019 H.MAKI	TZT12F/16F/19F		外寸図
SCALE 1/5	MASS 6.3 ±10% kg	NAME	FISH FINDER POWER AMPLIFIER (BULKHEAD/TABLETOP MOUNT)
DWG. No. C4512-G03- B	REF. No. 02-178-500G- 1		OUTLINE DRAWING

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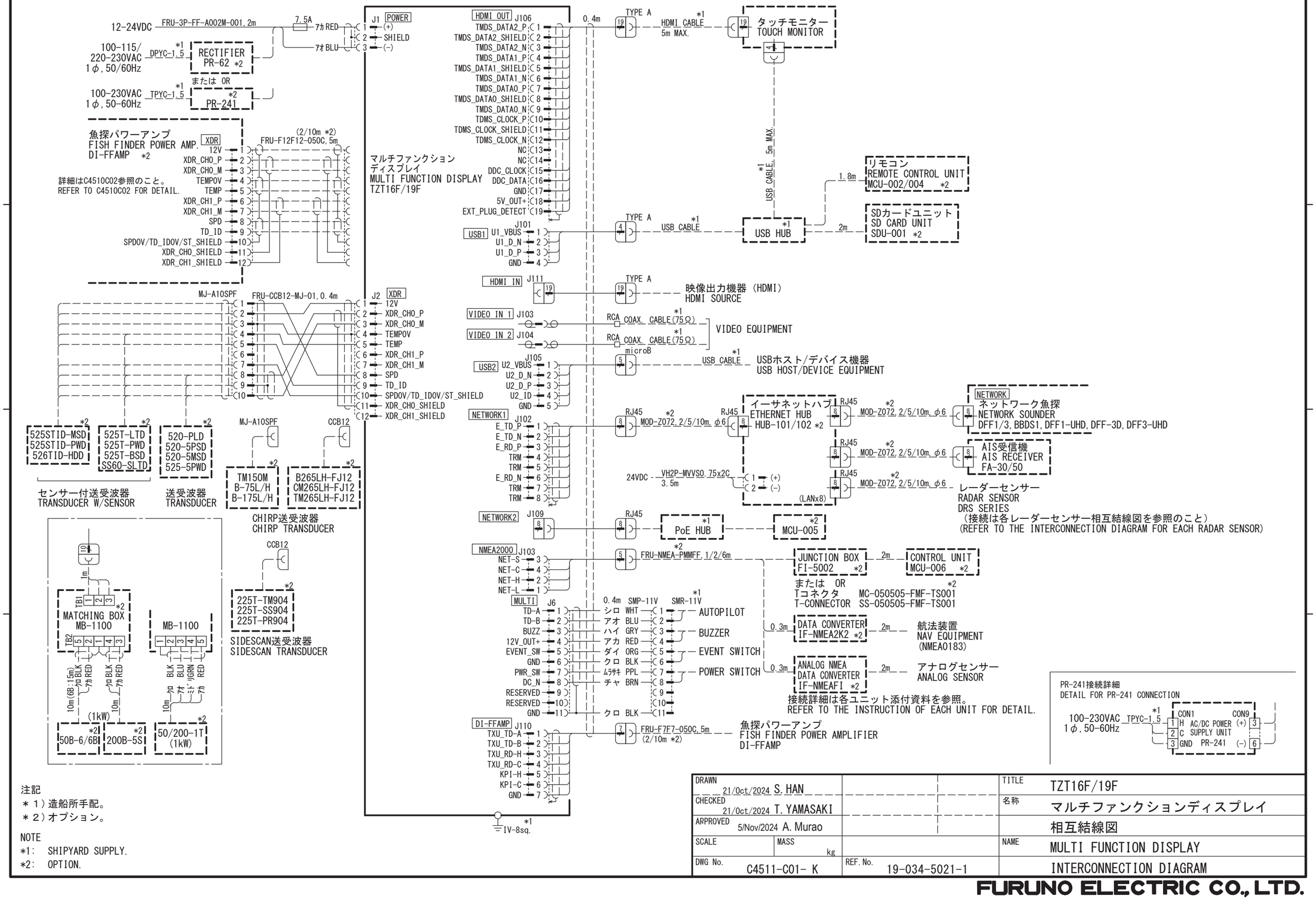
S-1



注記
＊1）造船所手配。
＊2）オプション。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.

DRAWN 21/Oct/2024 S. HAN		TITLE	TZT16F/19F
CHECKED 21/Oct/2024 T. YAMASAKI		名称	マルチファンクションディスプレイ
APPROVED 5/Nov/2024 A. Murao			相互結線図
SCALE	MASS kg	NAME	MULTI FUNCTION DISPLAY
DWG No. C4511-C01- K	REF. No. 19-034-5021-1		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

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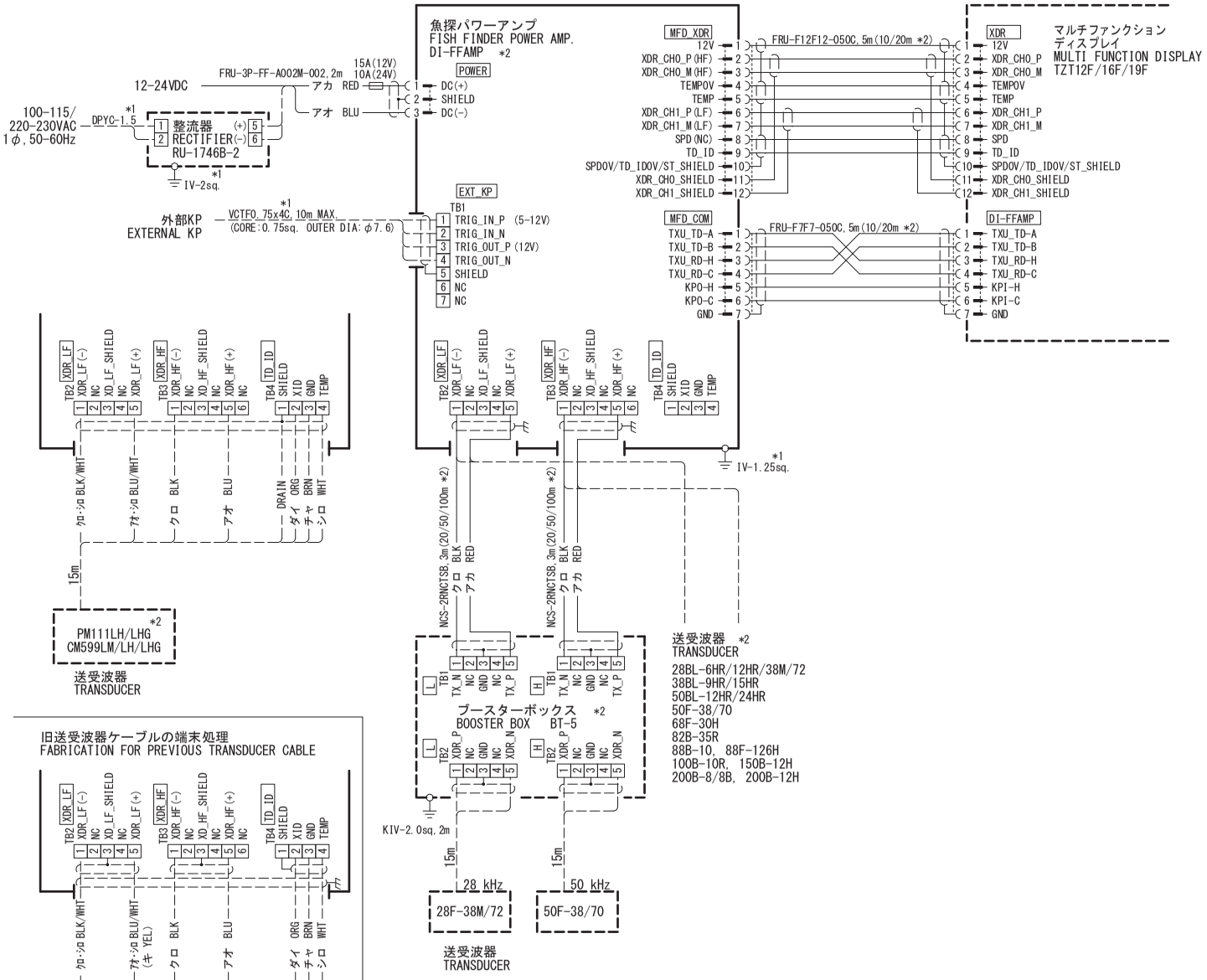

注記
＊1） 造船所手配。
＊2） オプション。

NOTE
*1: SHIPYARD SUPPLY.
*2: OPTION.

VCTF: Vinyl Cabtyre cord

DRAWN 27/Sep/2023 T. YAMASAKI		TITLE	DI-FFAMP
CHECKED 27/Sep/2023 H. MAKI		名称	魚探パワーアンプ
APPROVED 27/Sep/2023 H.MAKI			相互結線図
SCALE	MASS kg	NAME	FISH FINDER POWER AMPLIFIER
DWG No. C4510-C02- D	REF. No. 02-178-2001-0		INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO Warranty for North America

FURUNO U.S.A., Limited Warranty provides a twenty-four (24) months LABOR and twenty-four (24) months PARTS warranty on products from the date of installation or purchase by the original owner. Products or components that are represented as being waterproof are guaranteed to be waterproof only for, and within the limits, of the warranty period stated above. The warranty start date may not exceed eighteen (18) months from the original date of purchase by dealer from Furuno USA and applies to new equipment installed and operated in accordance with Furuno USA's published instructions.

Magnetrons and Microwave devices will be warranted for a period of 12 months from date of original equipment installation.

Furuno U.S.A., Inc. warrants each new product to be of sound material and workmanship and through its authorized dealer will exchange any parts proven to be defective in material or workmanship under normal use at no charge for a period of 24 months from the date of installation or purchase.

Furuno U.S.A., Inc., through an authorized Furuno dealer will provide labor at no cost to replace defective parts, exclusive of routine maintenance or normal adjustments, for a period of 24 months from installation date provided the work is done by Furuno U.S.A., Inc. or an AUTHORIZED Furuno dealer during normal shop hours and within a radius of 50 miles of the shop location.

A suitable proof of purchase showing date of purchase, or installation certification must be available to Furuno U.S.A., Inc., or its authorized dealer at the time of request for warranty service.

This warranty is valid for installation of products manufactured by Furuno Electric Co. (hereafter FURUNO). Any purchases from brick and mortar or web-based resellers that are imported into other countries by anyone other than a FURUNO certified dealer, agent or subsidiary may not comply with local standards. FURUNO strongly recommends against importing these products from international websites or other resellers, as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries, as described previously, shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

WARRANTY REGISTRATION AND INFORMATION

To register your product for warranty, as well as see the complete warranty guidelines and limitations, please visit www.furunousa.com and click on "Support". In order to expedite repairs, warranty service on Furuno equipment is provided through its authorized dealer network. If this is not possible or practical, please contact Furuno U.S.A., Inc. to arrange warranty service.

FURUNO U.S.A., INC.
Attention: Service Coordinator
4400 N.W. Pacific Rim Boulevard
Camas, WA 98607-9408
Telephone: (360) 834-9300
FAX: (360) 834-9400

Furuno U.S.A., Inc. is proud to supply you with the highest quality in Marine Electronics. We know you had several choices when making your selection of equipment, and from everyone at Furuno we thank you. Furuno takes great pride in customer service.

FURUNO Worldwide Warranty for Pleasure Boats (Except North America)

This warranty is valid for products manufactured by Furuno Electric Co. (hereafter FURUNO) and installed on a pleasure boat. Any web based purchases that are imported into other countries by anyone other than a FURUNO certified dealer may not comply with local standards. FURUNO strongly recommends against importing these products from international websites as the imported product may not work correctly and may interfere with other electronic devices. The imported product may also be in breach of the local laws and mandated technical requirements. Products imported into other countries as described previously shall not be eligible for local warranty service.

For products purchased outside of your country please contact the national distributor of Furuno products in the country where purchased.

This warranty is in addition to the customer´s statutory legal rights.

1. Terms and Conditions of Warranty

FURUNO guarantees that each new FURUNO product is the result of quality materials and workmanship. The warranty is valid for a period of 2 years (24 months) from the date of the invoice, or the date of commissioning of the product by the installing certified dealer.

2. FURUNO Standard Warranty

The FURUNO standard warranty covers spare parts and labour costs associated with a warranty claim, provided that the product is returned to a FURUNO national distributor by prepaid carrier.

The FURUNO standard warranty includes:

- Repair at a FURUNO national distributor
- All spare parts for the repair
- Cost for economical shipment to customer

3. FURUNO Onboard Warranty

If the product was installed/commissioned and registered by a certified FURUNO dealer, the customer has the right to the onboard warranty.

The FURUNO onboard warranty includes

- Free shipping of the necessary parts
- Labour: Normal working hours only
- Travel time: Up to a maximum of two (2) hours
- Travel distance: Up to a maximum of one hundred and sixty (160) KM by car for the complete journey

4. Warranty Registration

For the Standard Warranty - presentation of product with serial number (8 digits serial number, 1234-5678) is sufficient. Otherwise, the invoice with serial number, name and stamp of the dealer and date of purchase is shown.

For the Onboard Warranty your FURUNO certified dealer will take care of all registrations.

5. Warranty Claims

For the Standard Warranty - simply send the defective product together with the invoice to a FURUNO national distributor.
For the Onboard Warranty – contact a FURUNO national distributor or a certified dealer. Give the product´s serial number and describe the problem as accurately as possible.

Warranty repairs carried out by companies/persons other than a FURUNO national distributor or a certified dealer is not covered by this warranty.

6. Warranty Limitations

When a claim is made, FURUNO has a right to choose whether to repair the product or replace it.

The FURUNO warranty is only valid if the product was correctly installed and used. Therefore, it is necessary for the customer to comply with the instructions in the handbook. Problems which result from not complying with the instruction manual are not covered by the warranty.

FURUNO is not liable for any damage caused to the vessel by using a FURUNO product.

The following are excluded from this warranty:

a. Second-hand product

b. Underwater unit such as transducer and hull unit

c. Routine maintenance, alignment and calibration services.

d. Replacement of consumable parts such as fuses, lamps, recording papers, drive belts, cables, protective covers and batteries.

e. Magnetron and MIC with more than 1000 transmitting hours or older than 12 months, whichever comes first.

f. Costs associated with the replacement of a transducer (e.g. Crane, docking or diver etc.).

g. Sea trial, test and evaluation or other demonstrations.

h. Products repaired or altered by anyone other than the FURUNO national distributor or an authorized dealer.

i. Products on which the serial number is altered, defaced or removed.

j. Problems resulting from an accident, negligence, misuse, improper installation, vandalism or water penetration.

k. Damage resulting from a force majeure or other natural catastrophe or calamity.

l. Damage from shipping or transit.

m. Software updates, except when deemed necessary and warrantable by FURUNO.

n. Overtime, extra labour outside of normal hours such as weekend/holiday, and travel costs above the 160 KM allowance

o. Operator familiarization and orientation.

FURUNO Electric Company, March 1, 2011