Installation Manual
DUAL-FREQUENCY SEARCHLIGHT SONAR
CH-300

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SAFETY INSTRUCTIONS

Read these safety instructions before you operate the equipment.

| WARNING | Indicates a condition that can cause death or serious injury if not avoided. |
| CAUTION | Indicates a condition that can cause minor or moderate injury if not avoided. |

### Warning, Caution

#### Prohibitive Action

#### Mandatory Action

---

#### WARNING

**ELECTRICAL SHOCK HAZARD**

Do not open the equipment.

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.

Do not install the equipment where it may get wet from rain or water splash.

Water in the equipment can result in fire, electrical shock or equipment damage.

Be sure no water leaks in at the transducer installation site.

Water leakage can sink the vessel. Also confirm that the transducer will not loosen by ship's vibration. The installer of the equipment is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation.

---

#### WARNING

Install the specified transducer tank in accordance with the installation instructions. If a different tank is to be installed the shipyard is solely responsible for its installation, and it should be installed so the tank doesn't strike an object.

The tank or hull may be damaged if the tank strikes an object.

If a steel tank is installed on a wooden or FRP vessel, take appropriate measures to prevent electrolytic corrosion.

Electrolytic corrosion can damage the hull.

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

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.
CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

Observe the following compass safe distances to prevent deviation of a magnetic compass:

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Standard</th>
<th>Steering</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH-302/ MU-100C</td>
<td>0.80 m</td>
<td>0.55 m</td>
</tr>
<tr>
<td>CH-303</td>
<td>0.55 m</td>
<td>0.30 m</td>
</tr>
<tr>
<td>IF-8000</td>
<td>0.95 m</td>
<td>0.65 m</td>
</tr>
<tr>
<td>CH-302</td>
<td>0.30 m</td>
<td>0.30 m</td>
</tr>
<tr>
<td>CH-256</td>
<td>0.30 m</td>
<td>0.30 m</td>
</tr>
</tbody>
</table>

WORKING WITH THE SONAROIL

**Precautions**
Keep oil away from eyes. Wear protective gloves when working with the oil. The oil can cause inflammation of the eyes.

Do not touch the oil. Wear protective gloves when working with the oil. The oil can cause inflammation of the skin.

Do not ingest the oil. Diarrhea or vomiting can result.

Keep the oil out of reach of children.

**Emergency**
If the oil enters eyes, flush with clean water about 15 min. Consult a physician.

If the oil contacts skin, wash within soap and water.

If the oil is ingested, see a physician immediately.

**Disposal of oil and its container**
Dispose of oil and its container in accordance with local regulations. For further details, contact place of purchase.

**Storage**
Seal container to keep out foreign material. Store in dark place.
Note 1: MU-100C is the standard supply monitor unit. An external monitor may be connected via the interface unit (option). The drawing above shows the system configuration with the MU-100C.

Note 2: For blackbox type, MU-100C is not supplied. Connect external monitor (user supply) and control unit to the interface unit.
### Standard Supply

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code no.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Unit/ Monitor Unit</td>
<td>CH-302/ MU-100C</td>
<td>-</td>
<td>1</td>
<td>Not supplied with blackbox type</td>
</tr>
<tr>
<td>Control Unit</td>
<td>CH-302</td>
<td>-</td>
<td>1</td>
<td>Not supplied with unibody type</td>
</tr>
<tr>
<td>Interface Unit</td>
<td>IF-8000</td>
<td>-</td>
<td>1</td>
<td>For blackbox type (not required for MU-151C)</td>
</tr>
<tr>
<td>Transceiver Unit</td>
<td>CH-303</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Hull Unit</td>
<td>CH-304</td>
<td>-</td>
<td>1</td>
<td>400 stroke See the following table for Hull Unit Standard Supply.</td>
</tr>
<tr>
<td></td>
<td>CH-305</td>
<td>-</td>
<td>1</td>
<td>250 stroke</td>
</tr>
</tbody>
</table>

**Spare Parts**

<table>
<thead>
<tr>
<th>Name</th>
<th>Code no.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP06-01101</td>
<td>006-556-200</td>
<td>1</td>
<td>For unibody type*</td>
</tr>
<tr>
<td>SP06-01102</td>
<td>006-556-210</td>
<td>1</td>
<td>For transceiver unit*</td>
</tr>
<tr>
<td>SP06-01103</td>
<td>006-558-990</td>
<td>1</td>
<td>For hull unit*</td>
</tr>
<tr>
<td>SP06-01111</td>
<td>006-556-220</td>
<td>1</td>
<td>For interface unit*</td>
</tr>
</tbody>
</table>

**Installation Materials**

<table>
<thead>
<tr>
<th>Name</th>
<th>Code no.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>CP06-01200</td>
<td>000-068-496</td>
<td>1 set</td>
<td>06S4078 (5 m), 06S4080 (15 m), CP06-01251*</td>
</tr>
<tr>
<td>CP06-01201</td>
<td>000-068-497</td>
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<td>06S4078 (5 m), 06S4080 (30 m), CP06-01251*</td>
</tr>
<tr>
<td>CP06-01202</td>
<td>000-068-498</td>
<td></td>
<td>06S4078 (5 m), 06S4080 (50 m), CP06-01251*</td>
</tr>
<tr>
<td>CP06-01203</td>
<td>000-068-499</td>
<td></td>
<td>06S4078 (10 m), 06S4080 (15 m), CP06-01251*</td>
</tr>
<tr>
<td>CP06-01204</td>
<td>000-068-500</td>
<td></td>
<td>06S4078 (10 m), 06S4080 (30 m), CP06-01251*</td>
</tr>
<tr>
<td>CP06-01205</td>
<td>000-068-502</td>
<td></td>
<td>06S4078 (10 m), 06S4080 (50 m), CP06-01251*</td>
</tr>
<tr>
<td>CP06-01261</td>
<td>006-562-580</td>
<td>1</td>
<td>For transceiver unit*</td>
</tr>
<tr>
<td>CP06-01501</td>
<td>006-561-620</td>
<td>1 set</td>
<td>For hull unit*</td>
</tr>
<tr>
<td>CP02-06600</td>
<td>000-012-486</td>
<td>1 set</td>
<td>MJ-A10SPF0002-0015 (0.15 m), for unibody type</td>
</tr>
<tr>
<td>CP02-06610</td>
<td>000-012-480</td>
<td></td>
<td>MJ-A10SPF0002-015 (1.5 m), for blackbox type</td>
</tr>
<tr>
<td>CP02-06620</td>
<td>000-012-481</td>
<td></td>
<td>MJ-A10SPF0002-050 (5 m), for blackbox type</td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th>Name</th>
<th>Code no.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>FP02-05100</td>
<td>000-012-474</td>
<td>1 set</td>
<td>For unibody type, FP02-05101*, hood</td>
</tr>
<tr>
<td>FP06-01410</td>
<td>000-068-630</td>
<td>1</td>
<td>For control unit, FP06-01120*, hard cover</td>
</tr>
</tbody>
</table>

*: See the lists at the back of this manual.

### Hull Unit Standard Supply

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code no.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raise/lower Drive Unit</td>
<td>CH-3041</td>
<td>-</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>Soundome</td>
<td>CH-3051</td>
<td>-</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CH-3042</td>
<td>-</td>
<td>1 set</td>
<td></td>
</tr>
<tr>
<td>Flange</td>
<td>CH-2543</td>
<td>006-557-810</td>
<td>1 set</td>
<td>See the lists at the back of this manual.</td>
</tr>
<tr>
<td>Assembly Kit for field</td>
<td>CH-2544</td>
<td>006-557-820</td>
<td>1 set</td>
<td>See the lists at the back of this manual.</td>
</tr>
<tr>
<td>Shaft</td>
<td>SHJ-0006</td>
<td>661-000-062</td>
<td>1</td>
<td>2.2 m, for 3.5/5.2 m cable</td>
</tr>
<tr>
<td></td>
<td>06-007-1572</td>
<td>600-715-721</td>
<td>3.8 m, for 5.2m cable</td>
<td></td>
</tr>
<tr>
<td>Sonar Oil</td>
<td>4 lit.</td>
<td>000-824-033</td>
<td>1</td>
<td></td>
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<tr>
<td>Options</td>
<td>Name</td>
<td>Type</td>
<td>Code no.</td>
<td>Qty</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>Remote Controller</td>
<td>CH-256-E</td>
<td>000-068-492</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>Interface Unit</td>
<td>IF-8000</td>
<td>-</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>Motion Sensor</td>
<td>MS-100</td>
<td>-</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>Monitor Unit</td>
<td>MU-100C</td>
<td>-</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>Control Unit</td>
<td>CH-302-E</td>
<td>-</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>Clinometer</td>
<td>BS-704</td>
<td>-</td>
<td>1 set</td>
</tr>
<tr>
<td></td>
<td>Loudspeaker</td>
<td>SC-05WR</td>
<td>000-136-156</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Signal Cable</td>
<td>S06-9-5</td>
<td>006-556-270</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Rectifier</td>
<td>RU-1746B-2</td>
<td>000-030-439</td>
<td>1</td>
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<tr>
<td></td>
<td>Cable assy.</td>
<td>MJ-A6SPF0012-050</td>
<td>000-134-424</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MJ-A6SPF0012-100</td>
<td>000-133-817</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MJ-A6SPF0011-050</td>
<td>000-132-244</td>
<td>1</td>
</tr>
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<td></td>
<td>MJ-A6SPF0011-100</td>
<td>000-132-336</td>
<td>1</td>
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<tr>
<td></td>
<td>Control Unit Separate Kit</td>
<td>OP06-15-1.5 NEW</td>
<td>006-559-140</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OP06-15-5 NEW</td>
<td>006-559-150</td>
<td>1</td>
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<td></td>
<td></td>
<td>OP02-83-1.5</td>
<td>001-413-600</td>
<td>1</td>
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<td></td>
<td></td>
<td>OP02-83-5</td>
<td>001-413-610</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Flush mount kit</td>
<td>OP06-16</td>
<td>006-556-300</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OP06-17</td>
<td>006-556-310</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Control unit flush mount kit</td>
<td>OP06-18</td>
<td>006-556-320</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Tank</td>
<td>06-007-1570-2</td>
<td>600-715-702</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SHJ-0001-2</td>
<td>661-000-012</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td>06-007-1571-2</td>
<td>600-715-712</td>
<td>1</td>
</tr>
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<td></td>
<td></td>
<td>06-021-4024-0</td>
<td>100-295-470</td>
<td>1</td>
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<tr>
<td></td>
<td></td>
<td>06-007-1573-0</td>
<td>600-715-730</td>
<td>1</td>
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<td></td>
<td></td>
<td>OP10-5</td>
<td>000-069-763</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Fairing</td>
<td>06-021-4502</td>
<td>001-159-790-10</td>
<td>1 set</td>
</tr>
</tbody>
</table>
1. MOUNTING

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

1.1 Monitor Unit/Control Unit

This searchlight sonar has two types of shipments, unibody type which is shipped with monitor unit, and blackbox type which is shipped without a monitor unit, but has an interface unit. For blackbox type, see page 1-5.

The control unit can be installed together with the monitor unit, or independently of the monitor unit. For separate installation, the optional monitor kit is required. These units can be installed on a tabletop or flush mounted in a console or panel.

1.1.1 General mounting considerations

- Keep the monitor unit out of direct sunlight.
- Select a location where the unit(s) can easily be operated while observing the fishing ground or area surrounding the vessel.
- For maintenance and checking purposes, leave sufficient space at the sides and rear of the unit and leave slack in cable. (Refer to the outline drawing at the back of this manual.)

1.1.2 Mounting Unibody type

1. Fasten the mounting base to the mounting location with four self-tapping screws (5X20).

2. Fasten the bracket at the rear of monitor/control unit with four binding screws (M4x10).
3. Coat threads of upset screws (M6x16, 2 pcs.) used to fasten bracket to mounting base.

4. Fasten the bracket to the mounting base with two upset screws. (Use the upper holes to tilt the monitor unit 20°; lower holes to tilt it 9°.)
Flush mounting

Flush mounting for unibody (Type: OP06-16, Code no.: 006-556-300)

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code No.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixing metal</td>
<td>06-021-1311-2</td>
<td>100-279-612-10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Self-tapping screw</td>
<td>5x20</td>
<td>000-162-609-10</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Hex. bolt</td>
<td>M4x12</td>
<td>000-162-939-10</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

1. Cut out a hole (W287 x H297) in the mounting location.
2. Fasten monitor/control unit with the fixing metal (supplied) and four hex. bolts (M4x12, supplied).
3. Fasten the fixing metal assembled at step 2 to hole made at step 1 with six self-tapping screws (5x20, supplied).

1.1.3 Mounting separated monitor unit

1. Fasten the mounting base to the mounting location with four self-tapping screws (5x20).

2. Dismount the coupling plate to separate monitor unit from control unit.
3. Attach the bracket at rear of the monitor unit with four binding screws (M4x10).
1. MOUNTING

Bracket (rear view)

4. Coat threads of upset screws (M6x16, 2 pcs.) used to fasten bracket to mounting base.

5. Fasten the bracket to the mounting base with two upset screws. (Use the upper holes to tilt the monitor unit 20°; lower holes to tilt it 9°.)

Flush mounting for monitor unit (Type: OP06-17, Code no. 006-556-310)

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code No.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixing metal</td>
<td>06-021-1321-2</td>
<td>100-279-622-10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Self-tapping screw</td>
<td>5x20</td>
<td>000-162-609-10</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Hex. bolt</td>
<td>M4x12</td>
<td>000-162-939-10</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

1. Cut out a hole (W287 x H207) in the mounting location.
2. Fasten the fixing metal (supplied) to the monitor unit with four hex. bolts (M4x12, supplied).
3. Fasten the fixing metal assembled at step 2 to hole made at step 1 with four self-tapping screws (5x20, supplied).
1.1.4 Blackbox type

The blackbox type requires a VGA monitor, connected via the interface unit IF-8000. Supply commercial monitor and interconnection cable (Max. length 15 m with Dsub-15P connectors of male, three rows of 15 pins). The monitor used should satisfy the specifications shown below.

- VGA type
- ANALOG RGB 0.7 Vpp, positive polarity
- TTL level H, V, Negative polarity

Note: The LCD monitor MU-151C does not require the interface unit IF-8000. For details, see the operator's manual for MU-151C.

1.2 Control Unit

For blackbox type, fix the control unit to the mounting plate (supplied as accessories).

See the parts list of FP06-01120 and outline drawings at the back of this manual.

1. Fix the mounting plate to the place selected with two self-tapping screws (5X20, supplied).
2. Fix the bracket to the control unit with two hex. screws (M4X12, supplied).
3. Insert the screwdriver from the top of the mounting plate holes and then tighten two hex. screws (M4X12) loosely.
4. Attach the control unit to the mounting plate, and fasten two hex. screws tightly.
5. Attach two cosmetic caps to the holes at the top of the mounting plate.

6. Attach hard cover to protect the control unit.

How to remove the hard cover
Place your thumbs at the locations shown with circles in the illustration at right, and then lift the cover while pressing it with your thumbs.
1. MOUNTING

To mount the control unit separate from the monitor unit, the optional control unit separate kit is required. Mount the control unit same as the above procedure. See the outline drawing at the back of this manual to mount.

**Type: OP06-15-1.5 NEW**
**Code no.: 006-559-140: with 1.5 m cable**

**Type: OP06-15-5 NEW**
**Code no.: 006-559-150: with 5 m cable**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code no.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>MJ-A10SPF0002-015</td>
<td>000-142-878</td>
<td>1</td>
<td>For 1.5 m cable</td>
</tr>
<tr>
<td></td>
<td>MJ-A10SPF0002-050</td>
<td>000-131-411</td>
<td></td>
<td>For 5 m cable</td>
</tr>
<tr>
<td>Bracket</td>
<td>06-021-2112</td>
<td>100-281-880-10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mounting Plate</td>
<td>06-021-2111-1</td>
<td>100-279-741-10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Self-tapping Screw</td>
<td>5x20</td>
<td>000-162-608-10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cosmetic Cap</td>
<td>DP-687</td>
<td>000-165-997-10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Hex. bolt</td>
<td>M4x12</td>
<td>000-162-939-10</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Flush mounting for control unit

**Type: OP02-83-1.5, Code no.: 001-413-600 (1.5 m cable)**

**Type: OP03-83-5, Code no.: 001-413-610 (5 m cable)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code No.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixing metal</td>
<td>06-021-2101-2</td>
<td>100-279-732-10</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Self-tapping screw</td>
<td>5x20</td>
<td>000-162-609-10</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Hex. bolt</td>
<td>M4x12</td>
<td>000-162-939-10</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cable assembly</td>
<td>MJ-A10SPF0002-015</td>
<td>000-142-878</td>
<td>1</td>
<td>1.5 m</td>
</tr>
<tr>
<td></td>
<td>MJ-A10SPF0002-050</td>
<td>000-131-411</td>
<td>1</td>
<td>5 m</td>
</tr>
</tbody>
</table>

1. Cut out a hole (W287 x H87) in the mounting location.
2. Fasten the fixing metal to the control unit with two hex. bolts (M4x12, supplied).
3. Fasten the fixing metal assembled at step 2 to holes made at step 1 with four self-tapping screws (5x20, supplied).
1. MOUNTING

1.3 Transceiver Unit

1.3.1 General mounting considerations

- The mounting location should be well ventilated and dry.
- The unit can be mounted on a bulkhead or the deck.
- The maximum cable length between the transceiver unit and the raise/lower drive unit is 50 m.
- The maximum cable length between the transceiver unit and the monitor (interface) unit is 10 m.
- Keep the transceiver unit out of splash.

1.3.2 Mounting method

Fasten the transceiver unit with four self-tapping screws (5X20, local supplied).

For bulkhead mounting, do as follows:

1. Tighten upper self-tapping screws so there is 5 mm clearance between bottom of screw head and bulkhead.
2. Hook the transceiver unit on the upper screws.
3. Tighten the upper screws followed by the lower screws.
1.4 Hull Unit

1.4.1 General mounting considerations

- Noise and air bubbles will affect performance.
- Do not turn on the equipment with the transducer exposed to air. Exposing the transducer to air may damage it.

1.4.2 Installation position considerations

Discussion and agreement are required with the dockyard and ship owner in deciding the location for the hull unit. When deciding the location, take into account the following points:

- Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are minimal. Generally, the point at 1/3 to 1/2 of the ship’s length from the bow or near the keel is the best. On-the-keel installation is advantageous for minimizing oil consumption in comparison with off-the-keel. If the hull unit cannot be installed on the keel, the center of the retraction tank should be within 1 meter of the keel to prevent a rolling effect.

![Installation location for hull unit](image)

- Select a place where interference from the transducers of other sounding equipment is minimal. The hull unit should be at least 2.5 meters away from the transducers of other sounding equipment.

- An obstacle in the fore direction not only causes a shadow zone but also aerated water, resulting in poor sonar performance. Be sure to locate the transducer well away from any obstacle in the fore direction.

Mounting method

A typical mounting method is shown in the outline drawing at the back of this manual. Consult ship’s owner, dockyard and user to determine appropriate mounting method. Pay attention to safety (strength, watertightness) first, followed by ease of maintenance and inspection.
1.4.3 Transducer tank

Tank length

Shorten the transducer tank so the transducer is lowered into water as deep as possible. Pay particular attention to the tank length Lt. Determine the length of the main shaft.

- Length of main shaft = Lt + 200 mm (for 400 stroke)
- Length of main shaft = Lt + 50 mm (for 250 stroke)

Note: When the retraction tank is constructed locally, finish it so that welding beads do not protrude on the inner surface of the tank. The tank guide will hit the bead, burning out the raise/lower motor. Also, do not position the welding bead in the ship’s fore-aft line.

For small FRP ship

The retraction tank should be mounted in parallel with the ship’s draft. For a small ship, however, the hull has 2 degrees of tilt rising toward the bow. This creates high water pressure in the tank because of the resistance at the rear of the tank well. To solve this problem, attach a fin to the hull at the location shown in the figure below.

This fin creates a smooth stream in the retraction dome. Fin specifications: Height, 1-1.5 cm, Material, FRP.
1. MOUNTING

Mounting of transducer tank

Install the transducer tank referring to the hull unit outline drawings at the back of this manual.

**Note 1:** When making a retraction tank locally, the inside diameter of the retraction tank should be $\phi 190 \pm 0.5$ as shown in the outline at the back of this manual. If larger, the hull unit may be damaged.

**Note 2:** Locate the retraction tank so that the center of any two bolt holes is facing the ship’s bow.

1.4.4 Assembling and mounting of hull unit

The hull unit is shipped as the parts shown in the hull unit kit in the Equipment Lists (page v). Assemble the hull unit as shown in the procedure below.

**Note:** Confirm the frequency of soundome before mounting by referring to the table below.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>60/153 kHz</td>
<td>There is NO label attached on the dome.</td>
</tr>
<tr>
<td>85/215 kHz</td>
<td>There is the label “85/215 kHz” attached on the dome.</td>
</tr>
</tbody>
</table>

**Necessary tools**

<table>
<thead>
<tr>
<th>Name</th>
<th>Specification</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wrench</td>
<td>For M10 (Hex. size 17 mm)</td>
<td>Recommended: double offset wrench</td>
</tr>
<tr>
<td>Wrench</td>
<td>For M20 (Hex. size 30 mm)</td>
<td></td>
</tr>
<tr>
<td>Pipe Wrench</td>
<td>55 mm</td>
<td>For fixing gland</td>
</tr>
<tr>
<td>Ball Wrench</td>
<td>Hex size 4 mm</td>
<td>For fixing the dome</td>
</tr>
</tbody>
</table>
1. Calculate necessary length of main shaft from the length of retraction tank \( L_t \) and cut off the unnecessary portion.

Supplied length: 2.2 m or 3.8 m

\[ L_t + 200 \text{ mm for } 400 \text{ mm travel} \]
\[ L_t + 50 \text{ mm for } 250 \text{ mm travel} \]

Take care not to damage.

2. Remove hex bolt, nut, spring washers, flat washers and trunnion pins from the main body flange. Then, mount the raise/lower drive unit on the shaft sleeve by using the hardware removed.

**WARNING**

**Hex. bolt (M10X30)**

**Spring washer**

**Flat washer**

**Trunnion pin**

**Raise/lower drive unit**

**Flange assembly**

3. Pass the transducer cable through the main shaft.
1. MOUNTING

4. Fully screw main shaft into the soundome neck, and then unscrew by four turns. Coat threads with CEMEDINE HIGH SUPER.

Grasp the soundome neck with a wrench, and tighten the shaft with a pipe wrench. Coat threads with CEMEDYNE HIGH SUPER.

5. Screw in main shaft completely.
6. As shown in the drawing below, confirm that the narrowest gap between the tank guide, and retraction tank in the range (20 to 170 mm) is within 0.5 mm.

Adjustment range (travel) 250 or 400
20 mm (400 travel) - 170 mm (250 travel)
Tank guide
Retraction tank
less than 0.5mm

Applying CEMEDINE HIGH SUPER to main shaft

Tank and tank guide, sectional view
7. If the gap at a side is more than 0.5 mm, install shim(s) to make the gap within 0.5 mm.
   a) Unscrew four M10x50 bolts.
   b) Unscrew four countersunk screws, then attach shim(s) with the countersunk screws as shown below.

![Installing shims diagram]
The table below shows tank length and necessary shim thickness. In addition, the shim thickness shown is for one side. For example, when cutting the 1800 mm tank to 800 mm, the tank inside diameter is 191.25 mm, and shim thickness is 2.5 mm as shown the table in below.

<table>
<thead>
<tr>
<th>Length A (mm) tank shortened</th>
<th>Shim thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800</td>
<td>0</td>
</tr>
<tr>
<td>1700</td>
<td>0.5</td>
</tr>
<tr>
<td>1600</td>
<td>1</td>
</tr>
<tr>
<td>1500</td>
<td>1.5</td>
</tr>
<tr>
<td>1400</td>
<td>2</td>
</tr>
<tr>
<td>1300</td>
<td>2.5</td>
</tr>
<tr>
<td>1200</td>
<td>3</td>
</tr>
<tr>
<td>1100</td>
<td>4</td>
</tr>
<tr>
<td>1000</td>
<td>5</td>
</tr>
<tr>
<td>900</td>
<td>5.5</td>
</tr>
<tr>
<td>800</td>
<td>6</td>
</tr>
<tr>
<td>700</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The table below shows number of shims required and shim thickness.

<table>
<thead>
<tr>
<th>Shim thickness</th>
<th>0</th>
<th>0.5</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
<th>4.5</th>
<th>5</th>
<th>5.5</th>
<th>6</th>
<th>6.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>11.0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inside dia of tank</th>
<th>188.1</th>
<th>188.7</th>
<th>189.3</th>
<th>189.9</th>
<th>190.5</th>
<th>191.1</th>
<th>191.7</th>
<th>192.3</th>
<th>192.9</th>
<th>193.5</th>
<th>194.1</th>
<th>194.7</th>
<th>195.3</th>
<th>195.9</th>
</tr>
</thead>
</table>

The table below shows number of shims required and shim thickness.
8. Coat the inside of the tank guide with ADHESIVE 1104 200G. Then, fasten tank guide at the neck of the main shaft securely with M10X80 bolts. Face the tank guide toward ship's bow.

9. Pass the main shaft through the flange assembly.

10. Pass the main shaft through the shaft retainer at the raise/lower drive unit.
1. MOUNTING

11. Align the bow mark on the soundome with the bow mark on the flange assembly, and then fix the main shaft with and shaft retainer.
12. Fix the jubilee clip to the main shaft.

Note: Attach the shaft retainer so it is 15 mm from the top of the shaft. The soundome is then placed 10 mm above the bottom of tank when retracted.
13. Insert grease cotton (supplied with flange assembly), and fix them with the cotton retainer as follows.
   a) Wind grease cotton onto main shaft.
   b) Mark on the cotton as below.
   c) Remove the cotton from the shaft, and then cut it at the position of the mark. Discard the ends.
   d) Wind cottons as shown below.
   e) Push cottons into the flange assembly.
14. Tighten the grease cotton retainer.

15. Fasten the pipe cap (supplied) to main shaft.
16. Unscrew eight pcs. of M5x30 socket head cap screws with soundome fixing tool to dismount soundome.

Note: Do not unfasten two nuts painted in red.
17. Remove and discard the protection sponge placed in soundome.

**NOTE**

Do not unfasten two nuts painted in red.
Unfastening the nuts may allow water to leak inside, which can damage the soundome.

- Rotate 4 or 5 turns by hand to make sure that turning mechanisms are functioning properly.
- Do not unfasten these trusshead screws. Oil may leak inside.

**Detaching the soundome**

18. Stand the soundome upright on top of the soundome packing. Fill the soundome with oil (supplied) so the level is 5 cm from the top of the soundome. Keep the soundome packing for future use.

**Filling the soundome with sonar oil**
1. MOUNTING

**CAUTION**

Keep oil away from eyes. Where protective goggles when working with the oil. The oil cause inflammation of the eyes.

Do not touch the oil. The oil can cause inflammation of the skin. Wear protective gloves when working with the oil.

Do not ingest the oil. Diarrhea or vomiting can result.

Keep the oil out of reach of children.

**EMERGENCY**

If the oil enters the eyes, flush with clean water about 15 minutes. Consult a physician. If oil contacts skin, wash with soap and water. If the oil is ingested, see a physician immediately.

**DISPOSAL OF OIL AND ITS CONTAINER**
Dispose of oil and its container in accordance with local regulations. For further information, contact place of purchase.

**STORAGE**
Seal container to keep out foreign material. Store in dark place.

19. Rotate the transducer manually to position it at the angle shown below, and then refit the soundome.

![Diagram showing transducer and soundome](image)

**Note 1:** Do not lay the oil-filled soundome down for five minutes. Oil may leak.
Note 2: When the soundome is painted (to keep marine life off the transducer), observe the following precautions:

- Use only anti-fouling paint type MARINE STAR 20 (Manufacture: Chugoku Marine Paint Co., Ltd., Japan).
- Paint only the plastic portion of the dome. Painting the metal parts causes electric corrosion.

20. Clean surface of gasket, tank flange and shaft sleeve, and then coat flange gasket with ADHESIVE 1104 200G.
21. Lightly coat bolts, nuts and washers with KINORUSTER.
22. Set the hull unit into the retraction tank, taking care not to damage the soundome.
23. Fix the shaft sleeve and retraction tank with hex bolts, flat washers and spring washers.
Checking manual raise/lower of soundome with hand crank

Perform this check after all wiring has been completed.

⚠️ CAUTION

Turn the main power off before this check, otherwise the raise/lower motor action may cause injury.

1. Turn off the breaker on the hull unit.
2. Detach the gear cover.
3. Set wrench (opposite side 19 mm) to the screw shaft gear.
4. The transducer should rise/lower smoothly with even force in upper to lower limits. If not, the centers of the shaft sleeve and the retraction tank are not aligned. Adjust the hull mounting position if necessary. Check the following points.
   • Painting inside tank not smooth.
   • Inner diameter of tank not uniform.
   • Welding bead is obstructing raising and lowering.
1. MOUNTING

1.5 Interface Unit

The interface unit is shipped with the blackbox type to enable connection of a monitor. Note that this unit is not necessary when using monitor MU-151C.

1.5.1 General mounting considerations

- The mounting location should be well ventilated and dry. Avoid locations subject to water splash or rain.
- The unit can be mounted on a bulkhead or the deck.
- The maximum cable length between the interface unit and the transceiver unit is 10 m. Keep the length in mind when choosing a mounting location.

1.5.2 Mounting method

Fasten the interface unit with four self-tapping screws (5X20, local supplied). For bulkhead mounting, do as follows:

1. Tighten upper self-tapping screws so there is 5 mm clearance between bottom of screw head and bulkhead.
2. Hook the transceiver unit on the upper screws.
3. Tighten the upper screws followed by the lower screws.
1.6 Motion Sensor MS-100 (option)

The MS-100 measures ship’s pitching and rolling angles with a sensor, using the principles of the gyroscope. The MS-100 is free from error caused by ship’s vertical and horizontal motion. Therefore, it can be installed at any convenient location. However, ship’s semi-permanent inclination due to loading imbalance cannot be detected. Compensate for this as described in Chapter 3.

1.6.1 Mounting considerations

- Vibration in the mounting area should be minimal.
- Locate the unit away from areas subject to water splash.
- The ambient temperature should not exceed 50°C.

1.6.2 Mounting procedure

Orient the FORE mark on the unit toward the ship’s bow and mount the unit level to within 5° in all directions. For the offset, see Chapter 3.
1.7 Clinometer BS-704 (option)

The clinometer detects ship’s inclination caused by ship’s rolling, pitching and its output is used to stabilize the sonar beam against rolling and pitching.

The clinometer is, in principle, a pendulum. It measures the inclination of the ship by sensing the direction of gravity acted on it and therefore when installed on a ship, it should be placed on or near the rotation axes of the ship’s rolling and pitching. If it is placed away upward from the axes, the measured value becomes larger than the actual value. On the other hand, if it is placed below the axes, the measured value is smaller than actual value. The same can be said when it is placed far to the left or right from the axes.

The rotation axes of pitching and rolling are theoretically considered to be located on the level of the ship’s draft and in the center of the ship. In other words, as follows:

1. Vertical position of the pitching and rolling axes is on the draft level of the ship.
2. Horizontal position of the rolling axis is in the center of the ship’s port-starboard line.
3. Horizontal position of the pitching axis is in the center of the ship’s fore-aft line.

From 1, 2 and 3 above, the crossing point of the two axes is indicated by the black dots in the illustration below. The clinometer should be mounted as close as possible to this point.

Note 1: The area near the hull unit is too low to install the Clinometer and should be avoided, since the polarity of the measured value is reversed.

Note 2: When it is impossible to install the clinometer on the intersecting point of both rolling and pitching rotational axes, a special effort should be made to install it at a place where the vertical distance to the intersecting point is shortest.

Note 3: Install the clinometer with the bow mark pointing toward ship’s bow.

Note 4: Be sure to adjust the clinometer following the procedure in section 3.6.
2. WIRING

2.1 Wiring Among Units

- The figure on the next page shows wiring among units.
- The signal cables are fitted with connectors. Connect the cables to the monitor, transceiver and hull units referring to the interconnection diagram on page S-1.
- The power cable should be arranged locally. Use power cable type DPYCYS-2.5 (Japan Industrial Standard cable) or equivalent cables. Attach crimp on lugs (FV2-4) as shown below.

- The raise/lower drive motor and breaker are different depending on ship’s mains.
- Install the mains switch for the sonar where it can be easily accessed. Turn off this switch when the sonar is not being used, to reduce power consumption and to prevent the transducer from slipping by vibration.
- If the D-sub connector is too large to pass through the hole in a bulkhead, etc. remove it, pass the cable through the hole and then reattach the connector.
2. WIRING

Note 1: Optional cable between the monitor unit and control unit for separate installation
- MJ-A10SPF0002-0015 (1.5m)
- MJ-A10SPF0002-0050 (5m)

Note 2: \(a+b \leq 15\) m

Note 3: MU-151C can be connected for MU-100C.
In this case, the monitor and control units should be mounted separately.
Also, the MU-151C requires the independent power.

Note 4: Satellite compass SC-50/110 can be connected.
See the schematic diagram.

Wiring, with monitor
Wiring, without monitor
2.2 Transceiver Unit

Connect the cables as shown in the figure below.

* Note: Fix the braided shield with the clamp.

Transceiver unit, internal view
Synchronizing Transmission with Echo Sounder or Other Sonar

To synchronize transmission of the CH-300 with an echo sounder or other type of sonar, connect it as shown below.

Connection of transceiver unit to other sonar/echo sounder

Note: Outputting KP of CH-300 to other sonar, echo sounder

Outputting KP of CH-300 to other sonar, echo sounder
2.3 Hull Unit

Pass the cables to the 06P0257 Board, through the cable protectors.

- Fasten glands securely by hand.
- Cable from transducer 06S4081
- Attach the EMI core RFC-4 (supplied) to this cable, and then fix the core to the cable for J1 with the cable tie CV-100N (supplied).
- Cable from transceiver unit 06S4080
- Power cable 250V-DPYCYS-2.5
- Power switch
  Should always be in up position (ON).
- Earth
  Connect to ship’s earth.

*Note: Fix the braided shield with cable clamp.

Hull unit, inside view

Attaching EMI core RFC-4
2.4 Interface Unit

The blackbox type requires connection of a VGA monitor, via the interface unit IF-8000. Supply monitor and interconnection cable (Max. length 15 m with Dsub-15P connectors of male, three rows of 15 pins). The monitor used should satisfy the specifications shown below.

- VGA type
- ANALOG RGB 0.7 Vpp, positive polarity
- TTL level H, V, Negative polarity

**Note 1:** Two interface units can be connected to the transceiver unit in parallel.
**Note 2:** When using DATA/VIDEO OUT port, cut and remove the rubber covers as below to attach connectors to the interface unit.

**Note 3:** Connect control unit or navigator equipment to either interface unit or monitor unit (supplied by FURUNO).
**Note 4:** When connecting the monitor unit MU-100C to the interface unit, or two interface units in parallel to the transceiver unit, the length of cables should be as shown in the figure on next page. Note that two cables 06S4078 (10 m length) cannot be used.
2.5 I/O Sentences

Talkers may be chosen from among GP, LC, LA, DR, DE and other (II). Refer to “NAV DATA” in System Setting 1 menu.

Available I/O sentences

<table>
<thead>
<tr>
<th>Sentences</th>
<th>I/O</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>GLL</td>
<td>I</td>
<td>Geographic position, latitude/longitude</td>
</tr>
<tr>
<td>GGA</td>
<td>I</td>
<td>Global positioning system fix data</td>
</tr>
<tr>
<td>RMA</td>
<td>I</td>
<td>Recommended minimum specific LORAN-C data</td>
</tr>
<tr>
<td>RMC</td>
<td>I</td>
<td>Recommended minimum specific GPS/TRANSIT data</td>
</tr>
<tr>
<td>VTG</td>
<td>I</td>
<td>Course over ground and ground speed</td>
</tr>
<tr>
<td>VHW</td>
<td>I</td>
<td>Water speed and heading, any talker</td>
</tr>
<tr>
<td>HDG</td>
<td>I</td>
<td>Heading, magnetic, any talker</td>
</tr>
<tr>
<td>HDM</td>
<td>I</td>
<td>Heading, magnetic</td>
</tr>
<tr>
<td>HDT</td>
<td>I</td>
<td>Heading, true, any talker</td>
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<td>I</td>
<td>Depth below transducer, any talker, NMEA Version 1.5</td>
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<tr>
<td>DPT</td>
<td>I</td>
<td>Depth, any talker, NMEA Version 2.0</td>
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<td>I</td>
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<td>MDA</td>
<td>I</td>
<td>Water temperature, any talker</td>
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<tr>
<td>att</td>
<td>I</td>
<td>True heading, pitching, rolling, P sentence</td>
</tr>
<tr>
<td>TLL</td>
<td>O</td>
<td>Target latitude and longitude</td>
</tr>
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</table>
## 3. ADJUSTMENTS

### 3.1 General Checks

#### General checks

<table>
<thead>
<tr>
<th>Check Item</th>
<th>Check point, Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retraction tank level</td>
<td>On-keel Installation</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="On-keel Installation" /></td>
</tr>
<tr>
<td></td>
<td>Off-keel Installation</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Off-keel Installation" /></td>
</tr>
<tr>
<td>Clearance between transducer and bottom of retraction tank when transducer is completely retracted by hand crank</td>
<td><img src="image" alt="Clearance" /></td>
</tr>
<tr>
<td>Transducer travel (lowered by hand crank)</td>
<td><img src="image" alt="Transducer travel" /></td>
</tr>
<tr>
<td><strong>Note:</strong> For checking purposes, a clearance of approximately 1 meter is required beneath the bottom of the transducer.</td>
<td></td>
</tr>
<tr>
<td>Transducer heading</td>
<td>Bow mark on the shaft sleeve should face to ship’s bow.</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Transducer heading" /></td>
</tr>
</tbody>
</table>
3. ADJUSTMENT

General checks (con’t)

<table>
<thead>
<tr>
<th>Check Item</th>
<th>Check point, Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiring check</td>
<td>All cables are correctly connected.</td>
</tr>
<tr>
<td></td>
<td>All lead wires are tightly fixed with contact pins or crimp-on lugs.</td>
</tr>
<tr>
<td></td>
<td>All screws are firmly fastened.</td>
</tr>
<tr>
<td></td>
<td>Cables are firmly secured.</td>
</tr>
<tr>
<td></td>
<td>Cable shields are properly grounded.</td>
</tr>
<tr>
<td>Rejecting source of noise</td>
<td>Noise generating machinery (motor, radiotelephone, TV set, etc.) are not placed</td>
</tr>
<tr>
<td>and interference</td>
<td>nearby.</td>
</tr>
<tr>
<td></td>
<td>Magnetic devices are not placed in the vicinity of display unit.</td>
</tr>
<tr>
<td>Earth</td>
<td>Each unit is grounded with a copper strap.</td>
</tr>
<tr>
<td>Ship’s mains voltage</td>
<td>Ship’s mains voltage is stable 12 or 24 VDC.</td>
</tr>
<tr>
<td>Watertightness</td>
<td>Water should not leak from the main body flange or along the main shaft.</td>
</tr>
</tbody>
</table>

3.2 Checking TX Frequency

Check the TX frequency after installing the equipment.

1. Press the **MENU** key to open the menu.
2. Press the cursor pad to select SYS at the top of the menu display.
3. Press ▼ to select GO TO SYS MENU.

<table>
<thead>
<tr>
<th>MENU</th>
<th>COM1</th>
<th>COM2</th>
<th>HORZ</th>
<th>VERT</th>
<th>ES</th>
<th>SHORT-CUT</th>
<th>SYS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GO TO SYS MENU</td>
<td>YES</td>
<td>NO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

   ▲▼: SELECT  ◀▶: CHANGE  MENU: END

User menu (SYS)

4. Press ◀ to select YES to display the system menu.
** SYSTEM MENU **

SYSTEM SETTING
- RANGE-SONAR MODE
- RANGE-VERTICAL MODE
- RANGE-E/S MODE
- RANGE-TRACK MODE
- COLOR PALETTE
- LANGUAGE
- SYSTEM BACKUP
- LOAD BACKUP DATA
- HEADING OFFSET, DRAFT OFFSET
- ADJ MOTION SENSOR
- TX FREQ ADJUST
- TEST
- TEST PATTERN
- DEMO MODE
- DEFAULT

▲▼ : SELECT ◄► : MENU DISPLAY MENU: END

System menu

5. Press ▼ to select TEST.
6. Press ► to show the test display.

| MAIN PROGRAM NO. 0650111-**.** |
| PANEL PROGRAM NO. 0650112-**.** |
| ROM : OK |
| RAM : OK |
| VRAM : OK |
| NMEA 1 : OK |
| NMEA 2 : OK |

| TX FREQUENCY : 85/215 kHz (or 60/153 kHz) |
| ROLL MS: 10 SC: _ _ _ |
| PITCH MS: 10 SC: _ _ _ |

| PULSES | NG |
| TRAIN | 359 | 0 |
| TEST COUNT= | 0 | |
| REMOTE CONTROL |

** Program Version No.

Test display

7. Check the frequency at the TX FREQUENCY line on the test display.
8. Press the MENU key several times to close the menu.
3. ADJUSTMENT

3.3 Heading Alignment Setting

The heading line can be compensated from the system menu (−180° to +180°).

1. Locate a target (buoy, etc.) in the bow direction and display it on the screen at close range, read deviation. The heading alignment is correct when the target is displayed at 12 o’clock on the screen.

   ![Diagram of heading alignment](image)

2. Press the **MENU** key to display the menu.
3. Press ◄ ► to select SYS at the top of menu display.
4. Press ▼ to select GO TO SYS.
5. Press ◄ to select YES to display the system menu.
6. Press ▼ to select HEADING OFFSET, DRAFT OFFSET, and then press ► to display the heading offset display.

```
** HEADING OFFSET/DRAFT OFFSET **

HEADING : 0 °  (-180° - +180°)  
DRAFT : 0.0 (0.0 - 60.0m)
```

7. Press ◄ or ► to align heading (1° step) so that the target selected at step 1 appears at the twelve o’clock position.
8. Press ▼ to choose DRAFT.
9. Press ◄ or ► to set ship’s draft.
10. Press the MENU key twice to close the menu.
11. Confirm that the target on heading direction appears at the twelve o’clock position.
3.4 Setting for Synchronizing Transmission with other Equipment

To synchronize transmission with other echo sounder (see paragraph 2.2), do as follows:

1. Press the **MENU** key to display the menu.
2. Press ◄ to select COM1 at the top of menu display.

```
<table>
<thead>
<tr>
<th>MENU</th>
<th>COM1</th>
<th>COM2</th>
<th>HORZ</th>
<th>VERT</th>
<th>ES</th>
<th>PRESET</th>
<th>SYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX POWER</td>
<td>MAX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PULSELENGTH</td>
<td>LONG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TX RATE</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INT REJECT</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AGC</td>
<td>OFF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUDIO LEVEL</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

- ▲▼: SELECT  ◄►: CHANGE  MENU: END

*Menu (COM1)*

3. Press ▼ to select TX RATE.
4. Press ► to display the setting window.

```
<table>
<thead>
<tr>
<th>TX RATE</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXT. MIN</td>
<td>MAX</td>
</tr>
</tbody>
</table>

(EXT., 1-10)
```

*TX RATE window*

5. Press ◄ several times to select EXT.
6. Press the **MENU** key to close the menu.
3. ADJUSTMENT

3.5 Setting for Satellite Compass

FURUNO Satellite Compass SC-50/110 can be connected to feed rolling/pitching data to this equipment. Connect the SC-50/110 sensor to the NMEA/SATELLITE COMPASS port, and set up this port as below.

1. Press the MENU key to show the menu.
2. Press ▶ to select SYS at the top of menu display.
3. Press ▼ to select GO TO SYS MENU.
4. Press ▶ to select YES to display the system menu.
5. Press ▼ to select SYSTEM SETTING.

<table>
<thead>
<tr>
<th><strong>SYSTEM SETTING 1</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MENU</strong></td>
</tr>
<tr>
<td>POSITION :</td>
</tr>
<tr>
<td>TRACK :</td>
</tr>
<tr>
<td>CURRENT DATA :</td>
</tr>
<tr>
<td>HEADING INDICATION :</td>
</tr>
<tr>
<td>NORTH MARK :</td>
</tr>
<tr>
<td>CSE DATA :</td>
</tr>
<tr>
<td>NAV DATA :</td>
</tr>
<tr>
<td>NAV2 BAUDRATE :</td>
</tr>
<tr>
<td>TVG CORRECTION :</td>
</tr>
<tr>
<td>UNIT :</td>
</tr>
<tr>
<td>TEMP :</td>
</tr>
<tr>
<td>TARGET L/L :</td>
</tr>
<tr>
<td>CUSTOM KEY :</td>
</tr>
<tr>
<td>ETA MARK :</td>
</tr>
</tbody>
</table>

▲▼: SELECT  ◀▶: CHANGE  MENU: END

System setting 1 menu

6. Press ▼ to select NAV 2 BAUDRATE, and then press ▶ to select 38400.
7. Press ▲ to select MENU at the top of the menu, and then press ▶ to select 2.
MAXIMUM ALLOWABLE SPEED IS 15 KNOTS WHILE SOUNDOME IS BEING RETRACTED. IF VESSEL HAS REPAID ACCELERATION CAPABILITIES, AUTO RETRACTION SETTINGS OF 10-12 KNOTS ARE MANDATORY TO AVOID CATASTROPHIC DAMAGE TO SOUNDOME ASSY. ANY PHYSICAL DAMAGE TO THE SOUNDOME ASSY. IS CONSIDERED ABUSE AND IS NOT A WARRANTY ISSUE.

** System setting 2 menu **

8. Press ▼ to select STABILIZER.
9. Press ► to select SAT. COMPASS.
10. Press the MENU key twice to close the menu.

** Note:** To output data from SC-50/110 in NMEA format, set the SC-50/110 as follows.
- Output format: IEC ed1
- Sentence: ATT (For others, set all OFF.)
- Baud rate: 38400 bps
- Cycle: 25 ms
  (Talker : any)

** Note:** When connecting the analog signal of Satellite Compass SC-50/110 to the MOTION SENSOR port on the transceiver unit, choose MOTION SENSOR at step 9 in the above procedure. For wiring details, see the interconnection diagram at the back of this manual.
3.6 Setting of Motion Sensor/Satellite Compass

When connecting the motion sensor, clinometer or satellite compass, enter ship’s roll and pitch angles as shown below. Note that the adjustment can be done only when connected to the MOTION SENSOR port. For the satellite compass, however, do not duplicate this adjustment; enter values at one location only.

1. Press the **MENU** key to display the user menu.
2. Press to ► select SYS at the top of the menu display.
3. Press ▼ to select GO TO SYS.
4. Press ◄ to select YES.
5. Press ▼ to select ADJ MOTION SENSOR, and then press ► to display the ADJ MOTION SENSOR menu.

```
** ADJ MOTION SENSOR **

ROLL ANGLE: 0˚ ADJ: +5* ˚ (-10˚ - +10˚)
PITCH ANGLE: 0˚ ADJ: +5* ˚ (-10˚ - +10˚)
```

*: For Clinometer BS-704, tilt angle is displayed. For Motion Sensor MS-100, the readout is "0" (zero) when the ship is stopped, regardless of actual roll or pitch.

**Adj motion sensor menu**

6. Press ▲ or ▼ to select ROLL ANGLE or PITCH ANGLE.
7. Press ◄ or ► to adjust (-10° to +10°).
8. For MS-100, use a clinometer or other similar measuring device to measure ship’s semi-permanent inclination angle. Take the polarity of the angle. For example, if the stern is 3° down, set -3°.

<table>
<thead>
<tr>
<th>Roll Angle</th>
<th>Starboard up</th>
<th>Starboard down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch Angle</td>
<td>Stern up</td>
<td>Stern down</td>
</tr>
</tbody>
</table>

For clinometer BS-704, adjust so that the indication shows “0” (zero).

9. Press the **MENU** key several times to close the menu.
3.7 System Back Up

After setting up the equipment, follow the procedure below to back up system settings. Backup data can be loaded in the event of equipment trouble, to restore previous system settings.

1. Press the **MENU** key to display the user menu.
2. Press ► to select SYS at the top of the menu.
3. Press ▼ to select GO TO SYS MENU.
4. Press ◄ to select YES.
   The system menu appears.
5. Press ▼ to select SYSTEM BACKUP.
6. Press ► to display the system backup menu.

   **SYSTEM BACK UP**

   **ARE YOU SURE?**

   NO       YES

   **NOTE:** OVERWITRES PREVIOUS BACKUP DATA

   ◄ ►: CHANGE    MENU:END

   **System backup menu**

7. Press ► to select YES.
8. Press the **MENU** key to backup data.
   The backup data is saved, and then return to the System menu.
9. Press the **MENU** key to return to the normal display.
3. ADJUSTMENT

3.8 Setting of Interface Unit

Set DIP switch S1 in the interface unit as follows.

- A unit is connected to the DATA/VIDEO OUT port of the interface unit: all OFF.
- Nothing is connected to the DATA/VIDEO OUT port of the interface unit: all ON.

*: J6 and J7 set to "THROUGH" side.
<table>
<thead>
<tr>
<th>番号</th>
<th>名称</th>
<th>型番</th>
<th>数量</th>
<th>备注</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ケーブルアセンブリ</td>
<td>060-4205 &lt;05M&gt;</td>
<td>1</td>
<td>選択 TO BE SELECTED</td>
</tr>
<tr>
<td>2</td>
<td>ケーブルアセンブリ</td>
<td>060-4205 &lt;30M&gt;</td>
<td>1</td>
<td>選択 TO BE SELECTED</td>
</tr>
<tr>
<td>3</td>
<td>ケーブルアセンブリ</td>
<td>060-4205 &lt;50M&gt;</td>
<td>1</td>
<td>選択 TO BE SELECTED</td>
</tr>
<tr>
<td>4</td>
<td>ケーブルアセンブリ</td>
<td>060-4205 &lt;75M&gt;</td>
<td>1</td>
<td>選択 TO BE SELECTED</td>
</tr>
<tr>
<td>5</td>
<td>ケーブルアセンブリ</td>
<td>060-4205 &lt;100M&gt;</td>
<td>1</td>
<td>選択 TO BE SELECTED</td>
</tr>
</tbody>
</table>

FURUNO ELECTRIC CO., LTD.

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

C1316-M02-C
工事材料表

<table>
<thead>
<tr>
<th>番号</th>
<th>名称</th>
<th>OUTLINE</th>
<th>乾電機規格</th>
<th>番号</th>
<th>名称</th>
<th>OUTLINE</th>
<th>乾電機規格</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GRUMP-ON LUG</td>
<td>21 / 9 / 31</td>
<td>F2-4</td>
<td>CODE NO.</td>
<td>056-107-24G-10&quot;</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>UNF-ON LUG</td>
<td>21 / 9 / 31</td>
<td>F2-4</td>
<td>CODE NO.</td>
<td>056-107-30G-10&quot;</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>UNI CORE</td>
<td>33 / 29</td>
<td>004-4</td>
<td>CODE NO.</td>
<td>056-107-44G-10&quot;</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

注: コード番号が2種の場合、下記より選択に当たる通常商品であり、どちらかが入っています。なお、品質は変わりません。

Two types and codes may be listed for an item. The lower product may be shipped in place of the upper product. Quality is the same.

*常の寸法は、参考値です。Dimensions in drawing for reference only.*

FURUNO ELECTRIC CO., LTD.
### 付属品表

| 項目 | 名称 | 部品コード | 部品名 | 数量 | 用途
|------|------|-----------|-------|------|------
| 1    | マウントベース | 001-413-590-00 | MOUNTING BASE | 1 | 
| 2    | ベンチ | 001-413-380-00 | BRACKET | 1 | 
| 3    | サイドピン | 001-413-380-00 | SELF-TAPPING SCREW | 4 | 
| 4    | マッシャーコネクタ | 001-413-380-00 | WASHER BINDING HEAD SCREW | 4 | 
| 5    | ヘックスボルト | 001-413-380-00 | HEX BOLT | 2 | 

### 付属品表

| 項目 | 名称 | 部品コード | 部品名 | 数量 | 用途
|------|------|-----------|-------|------|------
| 1    | コントロールユニットマウントベース | 006-556-266-00 | CONTROL UNIT MOUNTING BASE | 1 | 
| 2    | コントロールユニットベンチ | 006-556-266-00 | CONTROL UNIT BRACKET | 1 | 
| 3    | コンタクトプライ | 006-556-266-00 | SELF-TAPPING SCREW | 2 | 
| 4    | コンタクトプライ | 006-556-266-00 | COSMETIC PLUG | 2 | 
| 5    | ヘックスボルト | 006-556-266-00 | HEX BOLT | 4 | 

注: 型式番号が2段の場合、下段より上段に代わる選択肢であり、どちらかが入っています。なお、品質は変わりません。

Two types and codes may be listed for an item. The lower product may be shipped in place of the upper product. Quality is the same.

（略図の寸法は、参考値です。Dimensions in drawing for reference only.）
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>NAME OF PART</th>
<th>OUTLINE</th>
<th>DRG. NO. OR TYPE NO.</th>
<th>QUANTITY</th>
<th>REMARKS/CODE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuse</td>
<td>20</td>
<td>FMB1 125V 3A RPT</td>
<td>1</td>
<td>090-152-431</td>
</tr>
</tbody>
</table>

MFR'S NAME: FURUNO ELECTRIC CO., LTD. 
DINNG NO.: C1316-P01-D 1/1

(經濟裏长法、参考值です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>NAME OF PART</th>
<th>OUTLINE</th>
<th>DRG. NO. OR TYPE NO.</th>
<th>QUANTITY</th>
<th>REMARKS/CODE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuse</td>
<td>20</td>
<td>FMB1 125V 1A RPT</td>
<td>3</td>
<td>090-152-430</td>
</tr>
</tbody>
</table>

MFR'S NAME: FURUNO ELECTRIC CO., LTD. 
DINNG NO.: C1316-P02-C 1/1

(經濟裏長法、参考值です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)
<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>NAME OF PART</th>
<th>OUTLINE</th>
<th>MN. NO. OR TYPE NO.</th>
<th>QUANTITY</th>
<th>REMARKS/COE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuse</td>
<td>20</td>
<td>FML 125V 7A PIF</td>
<td>1</td>
<td>000-157-493-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FML 7A 125V</td>
<td>1</td>
<td>000-105-868-00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>NAME OF PART</th>
<th>OUTLINE</th>
<th>MN. NO. OR TYPE NO.</th>
<th>QUANTITY</th>
<th>REMARKS/COE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fuse</td>
<td>20</td>
<td>FML 125V 0.2A PIF</td>
<td>3</td>
<td>000-157-457-10</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FML 0.2A 125V</td>
<td>3</td>
<td>000-121-723-00</td>
</tr>
<tr>
<td>No.</td>
<td>NAME</td>
<td>OUTLINE</td>
<td>DESCRIPTIONS</td>
<td>QTY</td>
<td>REMARKS</td>
</tr>
<tr>
<td>-----</td>
<td>--------------</td>
<td>---------</td>
<td>--------------</td>
<td>-----</td>
<td>---------</td>
</tr>
<tr>
<td>1</td>
<td>O-RING</td>
<td>⌀84</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>O-RING(2)</td>
<td>⌀48</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TRUNION PIN</td>
<td>104</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>COTTON RETAINER</td>
<td>0.63</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>FLANGE BUSH</td>
<td>⌀18</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>GREASE COTTON</td>
<td>10</td>
<td>L=0.0M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>GASKET</td>
<td>⌀297</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>LABEL FOR GREASE COTTON</td>
<td>150</td>
<td>PRE-ATTACHED TO FLANGE ASSY.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**FLANGE ASSEMBLY**

- Code No.: 066-537-810-00
- Code No.: 066-537-810-00

---

**LOCAL ASSEMBLY PARTS**

1. **PIPE CAP**
   - φ8
   - Code No.: 060-601-111-01

2. **FASTENING BAND**
   - 1/6 36-41 SV340-4
   - Code No.: 060-601-427-00

3. **HEX BOLT**
   - φ8 033-304
   - Code No.: 060-162-708-10

4. **U-NUT**
   - M10 033
   - Code No.: 060-162-734-10

5. **FLAT WASHER**
   - φ2.1
   - Code No.: 033-304
   - Code No.: 060-131-134-10

6. **TANGSIDE ASSEMBLY**
   - φ154
   - Code No.: 066-546-730-00

7. **HEX BOLT**
   - φ6 033-304
   - Code No.: 060-162-866-10

8. **U-NUT**
   - M10 033-304
   - Code No.: 060-162-866-10

9. **FLAT WASHER**
   - φ4 033-304
   - Code No.: 060-162-866-10

10. **SPRING WASHER**
    - φ34
    - Code No.: 033-304
    - Code No.: 060-131-134-10
<table>
<thead>
<tr>
<th>番号</th>
<th>名称</th>
<th>品番</th>
<th>备考/備考</th>
<th>品番</th>
<th>品番</th>
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<tr>
<td>11</td>
<td>ANTI CORROSION SEALANT</td>
<td>88G-506/C+</td>
<td></td>
<td>599-186-220-0T</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>LIQUID GASKETS</td>
<td>TR184-200G</td>
<td></td>
<td>599-186-443-10T</td>
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<td>13</td>
<td>ADHESIVE</td>
<td>1-50°Ct = -6</td>
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<td>599-187-583-10T</td>
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<td>14</td>
<td>BALL WRENCH</td>
<td>TB3-40</td>
<td></td>
<td>599-186-561-10T</td>
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<tr>
<td>15</td>
<td>HOSE</td>
<td>06-021-4036-0 ROHS</td>
<td>4</td>
<td>100-296-430-10T</td>
<td></td>
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<tr>
<td>16</td>
<td>HOSE</td>
<td>06-021-4036-0 ROHS</td>
<td>2</td>
<td>100-296-430-10T</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>HOSE</td>
<td>06-021-4037-0 ROHS</td>
<td>4</td>
<td>100-295-440-10T</td>
<td></td>
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<tr>
<td>18</td>
<td>APPLYING ADHESIVE</td>
<td>J-985800-00</td>
<td>1</td>
<td>599-399-541-10T</td>
<td></td>
</tr>
</tbody>
</table>

(詳細部品の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)
各絞りフタ番号が2枚の場合、下縁より上部に代わる絞り部品でどちらかが入っています。なお、品番は変わりません。
TOP TYPES AND SIZES MAY BE LISTED. THE BOTTOM PRODUCT MAY BE SHIPPED IN PLACE OF THE TOP PRODUCT.
QUALITY THE SAME.

FURUNO ELECTRIC CO., LTD.
注記 1）#印寸法は最小サービス空間寸法とする。
2）規定外の寸法は表1による。
3）取付用ネジはナラスタビプリネジ呼び径5x20を使用のこと。
4）装置ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

NOTE 1. # MINIMUM SERVICE CLEARANCE
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLING.
注記 1) シリーズは最小サービス空間寸法とする。
2) 指定外の寸法公差は表1による。
3) 取付用ネジはトラススタッドと呼び径5x20を使用のこと。
4) 装着ケーブルはサービス時、本体を前方に十分引出せるよう余裕を持たせること。

NOTE 1. MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4. LEAVE ENOUGH SLACK IN CABLEING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLES.
1. 指定外の寸法公差は表1による。
2. 取付用ネジはプラスチック製呼び径5×20を使用のこと。
3. 装備ケーブルはサービス時、本体を前に十分引き出せるよう余裕を持たせること。
注記
1) #印寸法は最小サービス空間寸法とする。
2) 指定外の寸法公差は表1による。
3) 取付穴ネジは+トウスキャップネジ呼び径5x20を使用のこと
4) 設備ケーブルはサービス時、本体を前方に十分引き出せるよう余裕を持たせること。

NOTE
1) #: MINIMUM SERVICE CLEARANCE.
2) TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3) USE SELF-TAPPING SCREWS 5x20 FOR FIXING THE UNIT.
4) LEAVE ENOUGH SLACK IN CABLEING SO UNIT CAN BE DRAWN FORWARD WITHOUT DISCONNECTING CABLEING.
注記 1） #印寸法は最小サービス空間寸法とする。
2） 指定外の寸法公差は表1による。
3） 取付用ネジは＋トラススタッドピンネジ呼び径4x16を使用のこと。

NOTE
1. # MINIMUM SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
3. USE SELF-TAPPING SCREWS 4x16 FOR FIXING THE UNIT.
表1 (Table 1)

<table>
<thead>
<tr>
<th>尺寸范围 (mm)</th>
<th>百分比 (mm)</th>
<th>允许差 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&lt;500</td>
<td>±1.5</td>
<td>±1.5</td>
</tr>
<tr>
<td>500≤L&lt;1000</td>
<td>±2.5</td>
<td>±2.5</td>
</tr>
<tr>
<td>1000≤L&lt;5000</td>
<td>±3</td>
<td>±3</td>
</tr>
<tr>
<td>L≥5000</td>
<td>±4</td>
<td>±4</td>
</tr>
</tbody>
</table>

注記（Note）
1) 指定外の寸法公差は表1による。
2) 装備装置等は船体から1/3（小型船では1/2）程度で曲げから1m以内とする。
3) 上下シャフトの長さは150mm、軸が長さ150mm、50mmを加えた値で正確にすること。
4) 上下部及び経路が考慮されている船体方向は左図のとおり。
5) ドーム内側保険点検のため、上下装置上部には図示のスペースを設ける必要がある。天井等に300×300mm程度の穴を開ける。

NOTE
1) TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2) THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND WITHIN 1000mm FROM KEEL LINE.
3) THE MAIN SHAFT SHOULD BE CUT TO A LENGTH(L1) GIVEN BY THE FOLLOWING FORMULA
   \[ L_1 = L + 50 \text{mm} \]
   THE TANK LENGTH
4) FORWARD DIRECTION ARROW SHOWS FORE OR AFT FOR HULL UNIT AND TANK.
5) IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING CANNOT BE OBTAINED, MAKE A HOLE OF 300×300mm ON THE OVERHEAD FOR SERVICING.

<table>
<thead>
<tr>
<th>NO.</th>
<th>材質 (Material)</th>
<th>品名 (Name)</th>
<th>数量 (Quantity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SUS304</td>
<td>メカニカルタンク (Mechanical Tank)</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>FC200</td>
<td>コンベヤーキャップ (Conveyor Cap)</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>CR</td>
<td>フラスコ (Cylinder)</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>CR</td>
<td>ガスケット (Gasket)</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>BC6</td>
<td>サイドリテーナー (Side Retainer)</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>BC2</td>
<td>メッキリングカップ (Polished Cup)</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>CR</td>
<td>メッキリング (Polished)</td>
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<td>8</td>
<td>GA3</td>
<td>ガスケット (Gasket)</td>
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</tr>
<tr>
<td>9</td>
<td>CR</td>
<td>サイドリテーナー (Side Retainer)</td>
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<tr>
<td>10</td>
<td>SUS304</td>
<td>メカニカルタンク (Mechanical Tank)</td>
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<tr>
<td>11</td>
<td>FRP</td>
<td>ジュビリーキャップ (Jubilee Cap)</td>
<td>1</td>
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<td>12</td>
<td>POM</td>
<td>タンクガイルド1 (Tank Guide1)</td>
<td>2</td>
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<tr>
<td>13</td>
<td>TANK, GUIDE2</td>
<td>タンクガイルド2 (Tank Guide2)</td>
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<tr>
<td>14</td>
<td>GEAR COVER</td>
<td>ギヤーカバー (Gear Cover)</td>
<td>1</td>
</tr>
</tbody>
</table>

FURUNO ELECTRIC CO., LTD.
注記 1）指定なき寸法公差は表1による。

NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

<table>
<thead>
<tr>
<th>倍数区分 (mm)</th>
<th>図面 (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  ≤ L  ≤ 50</td>
<td>±1.5</td>
</tr>
<tr>
<td>50  ≤ L  ≤ 100</td>
<td>±2.5</td>
</tr>
<tr>
<td>100 ≤ L  ≤ 500</td>
<td>±3</td>
</tr>
</tbody>
</table>

FURUNO ELECTRIC CO., LTD.
注記
1) 指定寸法に公差は表1による。
2) #: 推奨する最小サービス空間寸法。
3) 船首マーク(Fore)を船首方向に向けて、
  きょう体を水平に取り付けること。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.
3. ORIENT THE "FORE" MARK ON THE UNIT TOWARD SHIP'S BOW
   AND MOUNT THE UNIT LEVEL IN PARALLEL WITH SURFACE.
NOTE 1. 保守点検及び放熱用として×印のスペースをとる事。
DIMENSIONS MARKED "**" SHOW RECOMMENDED MAINTENANCE AND
VENTILATION SPACE
2. 船体の回転の中心に水平に取付ける事。
INSTALL THE UNIT HORIZONTALLY ON THE ROTATION AXES OF
SHIP'S ROLLING AND PITCHING.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NAME</th>
<th>MATERIAL</th>
<th>Q'TY</th>
<th>DWG.NO.</th>
<th>REMARKS</th>
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<td>THIRD ANGLE PROJECTION</td>
<td>SCALE</td>
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FURUNO ELECTRIC CO., LTD.
NOTE 1. RECOMMENDED SERVICE CLEARANCE.

NOTE  FOR 220V AC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.
1) 指定外の寸法公差は表1による。

NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Nov. 04 05 E. MIYOSHI TAKAHASHI TAKAHASHI

APPROVED 2000

SCALE 1/4 See Table 2

NOTE RETRUCK TANK (FOR FRP HULL)

FURUNO ELECTRIC CO., LTD.
製作時の注意
NOTE FOR FABRICATION

1. 材料はSTPG38-E-C(圧力配管用炭素鋼管 材質仕様によく絶縁塗装钢管数を増減20%)スケジュール80)を使用すること。
2. 材料はSS41Pを使用すること。
3. タンク側面は大日本ペイント進転鉛丹ペイントを2回塗布のこと。
4. タンク内面はビニールAF（中国塗料）を2回塗布のこと。
5. タンク上面は塗装しないこと。

1. USE STPG-38-E-C (8"SCHEDULE 80, JIS G3454, CARBON STEEL PIPE FOR PRESSURE SERVICE).
2. USE SS41P (JIS G3101, ROLLED STEEL FOR GENERAL STRUCTURE).
3. GIVE TWO COATS OF FAST-DRYING RED LEAD PAINT ON OUTSIDE OF TANK,
4. GIVE TWO COATS OF VINYL PAINT AF OR ANTI-FOULING PAINT ON INSIDE OF TANK.
5. DO NOT PAINT ON SURFACE OF FLANGE.
NOTE: DO NOT CONNECT GROUNDING WIRE OF OTHER EQUIPMENT TO REFRACTION TANK.
1. 銘板タンクの設備は次の条件を満たすこと。
   1. 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2. ケールおよそ1m以内。
   3. フランジが固定されるためフレーム下部（重量船底等）との間に100mm以上のスペースがあること。
   4. フランジの取付はケールの上が約20mmまでである。
   5. フランジの取付は標準船底時には水面があること。

2. 銘板タンクの設備は次の要領を参考にして行うこと。
   1. フレームの取付はフレームが水平にするもの。
   2. フレームあるいはフレーム上部の下に、寒さ対策にフランジ③を設けること。
   3. フランジ②が固定されると取付位置を固定し、必要があればフランジ③を製作し、ケールとフレームを連接する。
   4. PIB 排除枠およびPIBがコンクリートに含まれるものを取付する。
   5. フランジ④を固定する。
   6. フレーム下部の重量船底等にFRP-板を陳列し、固定した後フレーム取り付け。
   7. 鼻簡易を除きフレームで飛行部を流し、特にフレーム上部は重量船底等に成型し、必要に応じてダクトフランジ下部100mmの位置より流し戻すに読むべきとする。
   8. ダクトフランジ下部を流し戻すのには、ケールの前にガスボンベをフレーム④にかけて、補充を施すとこれ。

注：重量船底等に船舶に緩み、施工者の関係者諸氏を協力し、取付位置、方法、材料等を注意すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE,
   1) ABOUT 1/4 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BELOW TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERENCING TO THE PROCEDURE BELOW,
   1) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL PLATE.
   2) PASS THE HULL OR A CORE HAVING THE SAME DIAMETER AS THE TANK THROUGH THE HULL PLATE. MAKE A MOUNTING BED WITH WOODEN BLOCK AND FRP AROUND THE TANK OR THE CORE. THIS BED IS USED TO MOUNT THE FLANGE (2).
   3) WHEN FIXATING THE MOUNTING BED, STAND THE BOLTS ON THE BED FOR FIXING THE FLANGE (2). IF NECESSARY, MAKE THE FLANGE (2) TO ENSURE FIXING OF THE FLANGE (2).
   4) AFTER FRP IS STIFFENED, DRAW OUT THE TANK OR THE CORE FROM THE MOUNTING BED.
   5) WELD THE FLANGE (2) TO THE TANK.
   6) APPLY A STEEL-ADHESIVE TO THE TANK AND THE FLANGE (2), AND INSTALL THE TANK WITH FLANGE (2) IN PLACE. BOLT THE FLANGE (2) WITH BOLTS AND NUTS.
   7) APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FRAME BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION.
   8) IF REQUIRED, INSTALL A REINFORCEMENT PLATE WHEN THE FLANGE (2) IS WELDED TO THE TANK. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>NAME</th>
<th>MATERIAL</th>
<th>QUANTITY</th>
<th>DWG.NO.</th>
<th>REMARKS</th>
</tr>
</thead>
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<tr>
<td>CSH5</td>
<td>CSH5 MARK.2</td>
<td>CH-12/14/16/24/26</td>
<td>100</td>
<td>D-20</td>
<td>FURUNO ELECTRIC CO., LTD.</td>
</tr>
</tbody>
</table>
1. 該MTNの装置は次の条件を満たすこと。
   1) 取付位置は船長から1/2の型船の場合は1/3程度。
   2) キールより1m以内。
   3) フランジのポルトの間隔はソルジャー下端と管端面（三重船尾等）との間
      100mm以上のスパンを設けたこと。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準状態時に水平であること。

2. 充分に冷却した後にFRPで吸収材を用意する。特にタンク周辺は長時間に成型し
   て異なる状態を発生させるためにできるだけ水平に設けること。

3. 必要に応じてタンクのフランジ面下部100mmの位置より隔壁等に向けて数基止めを設けて

注: 耐荷重等の不具合について, 船主, 乗船所担当者, 施工者の間で充分協議し, 取付位置, 方法,
材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1. ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2. WITHIN 1000mm FROM KEEL LINE.
   3. ALLOW CLEARANCE OF MORE THAN 100mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4. KEEP LOWEST END OF TANK 50mm ABOVE BOTTOM OR KEEL.
   5. TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT
   REINFORCEMENT, MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK
   TO MINIMIZE THE EFFECT OF AERATION.
3. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT
   BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPTIRY FOR SUFFICIENT
REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.
A. タンク長を満載時の増水線の上まで取れる場合。
When the longer tank is used so that its flange positions above water line.

B. 1. オフシーデンスに上下装置を取りはずしておく場合。
When the longer tank is used so that its flange positions above water line.
2. タンク長を増水線の上まで取れない場合。
When the longer tank is used due to limited clearance.

C. タンク長を増水線まで取れない場合で、仕切弁を運搬しないとき。
When the longer tank of a gate valve cannot be used.

注記
NOTE
1. 本装置は未使用の場合に、安全性（強度、耐水性等）を考慮し、保守・点検の容易さも配慮すること。
DECIDE AN INSTALLATION METHOD CONSIDERING SUITABLE REINFORCEMENT AND
PATERTIGHTNESS OF THE SHIP'S HULL. ALSO PROVIDE ENOUGH MAINTENANCE CLEARANCE.

2. 増水線の上を運搬する場合、増水線の上まで取れる場合。
WHEN OVERHEAD CLEARANCE IS NOT ALLOWED, MAKE A HOLE
OF 300 x 300 mm ON CEILING FOR FACILITATING INSTALLATION
AND FUTURE CONSULT WITH SERVICE.

FURUNO ELECTRIC CO., LTD.
注記
* 1）造船所手配。
* 2）オプション。
* 3）コネクタは工場で取付済み。
* 4）表示部は 槽の代わりに 槽を使用することも可能。
ただし、 槽には電源接続が必要。

名称：周波サーチライトソナー

Y. Hatai

相互結線図