FURUNO Doppler sonar DS-60 provides accurate, real-time information of ship's motion and water speed for safe berthing and docking operations

The DS-60 is a precision, 3-axis Doppler Sonar designed to output the required information for berthing and docking operation of vessels. It complies with IMO MSC.36(63), MSC.96(72), MSC.302(87), A.694(17) and A.824(19), designed for the vessels of 50,000 GT and greater, such as container vessels, VLCC and other tankers.

The DS-60 provides accurate information of ship's speed over a wide range. Speeds are detected relative to the ground or water for both fore-aft and port-starboard directions. The measurement capability at dead slow speed is vital for precise docking of huge tankers to oil loading/unloading facilities, as well as safe navigation in narrow channels or straits. Operation at high speed assists economical cruising in open seas.

While retaining the measurement accuracy of the DS-30, the DS-60 provides a greatly downsized transducer unit. This means that the time for installation and space required for installation will be reduced. The compact, high-frequency transducer measures ship's longitudinal (fore-aft) and transverse (port-starboard) speed, as well as water speed and direction under the hull.

The 8.4-inch color LCD display shows information in both alphanumerics and graphics. It offers three display modes: 3-axis speed, berthing and NAV data. The modes can be switched with the optional remote controller. For wing installation, IP56 waterproof box for the display is available (optional supply).

Comparison between DS-30 and DS-60

Thanks to the development of the new compact transducer, the size of the gate valve has been greatly downsized. This facilitates space-saving installation, and reduces the time for installation.

<table>
<thead>
<tr>
<th>Transducer size</th>
<th>DS-30 Ø 260 mm</th>
<th>DS-60 Ø 112 mm</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Size of the gate valve</th>
<th>DS-30</th>
<th>Weight: approx. 600 kg</th>
<th>DS-60</th>
<th>Weight: approx. 120 kg</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Ground tracking inaccuracy</th>
<th>Ship's speed (less than 1 kn): ±0.01 m/s, whichever is greater</th>
<th>Ship's speed (more than 1 kn): ±1.0 % or ±0.1 kn, whichever is greater</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Water tracking inaccuracy</th>
<th>±1.0 % or ±0.1 kn, whichever is greater</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Depth range</th>
<th>1-200 m</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Transducer diameter</th>
<th>DS-60 Ø 112</th>
<th>DS-30 Ø 260</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gate Valve diameter</th>
<th>DS-60 Ø 125</th>
<th>DS-30 Ø 326</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gate Valve weight</th>
<th>DS-60 120 kg</th>
<th>DS-30 600 kg</th>
</tr>
</thead>
</table>
Comparison between DS-30 and DS-60:

- High speed assists economical cruising in open seas.
- Navigation in narrow channels or straits.
- Operation at tankers to oil loading/unloading facilities, as well as safe at dead slow speed is vital for precise docking of huge.
- The measurement capability to the ground or water for both fore-aft and speed over a wide range. Speeds are detected relative.
- The DS-60 provides accurate information of ship’s tankers.
- A.824(19), designed for the vessels of 50,000 GT and greater, such as container vessels, VLCC and other.
- MSC.36(63), MSC.96(72), MSC.302(87), A.694(17) and docking operation of vessels. It complies with IMO.
- Designed to output the required information for berthing A.824(19), required for the vessels of 50,000 GT and greater.
- Deliver high precision measurement required for berthing and docking maneuvers.
- 3-beam transmission reduces the effects of vessel’s pitch and roll in order to output precision measurements.
- Ground-tracking speed measurement range of up to 200 m.
- Workload for installation has been greatly reduced thanks to its compact transducer unit.
- 8.4-inch color LCD display gives high-legibility, real-time information in both graphics and alphanumerics.
- Remote controller and dimmer controller available (optional supply).
- Waterproof box for the display for wing installation (optional supply).
- Additional remote display can be selected from color LCD (DS-600/RD-50) and red LED display (RD-20).
- Water-tight connector available for the transducer (selectable upon purchase order).

Berthing:

- Full compliance with IMO MSC.36(63), MSC.96(72), MSC.302(87), A.694(17) and A.824(19), required for the vessels of 50,000 GT and greater.
- Workload for installation has been greatly reduced thanks to its compact transducer unit.
- 8.4-inch color LCD display gives high-legibility, real-time information in both graphics and alphanumerics.
- Remote controller and dimmer controller available (optional supply).
- Waterproof box for the display for wing installation (optional supply).
- Additional remote display can be selected from color LCD (DS-600/RD-50) and red LED display (RD-20).
- Water-tight connector available for the transducer (selectable upon purchase order).
Comparison between DS-30 and DS-60

High speed assists economical cruising in open seas. Navigation in narrow channels or straits. Operation at tankers to oil loading/unloading facilities, as well as safe at dead slow speed is vital for precise docking of huge port-starboard directions. The measurement capability to the ground or water for both fore-aft and speed over a wide range. Speeds are detected relative to the display is available (optional supply).

This facilitates space-saving installation, and reduces the time for installation. Thanks to the development of the new compact transducer, the size of the gate valve has been greatly downsized. While retaining the measurement accuracy of the DS-30, the DS-60 provides a greatly downsized transducer unit. This means that the time for installation and space workloads for installation has been greatly reduced thanks to its compact transducer unit.

The DS-60 provides accurate, high precision measurement required for berthing and docking maneuvers. It complies with IMO MSC.36(63), MSC.96(72), MSC.302(87), A.694(17) and A.824(19), required for the vessels of 50,000 GT and greater, such as container vessels, VLCC and other.

The DS-60 is a precision, 3-axis Doppler Sonar designed for the vessels of 50,000 GT and greater, such as container vessels, VLCC and other. It is designed to output the required information for berthing and docking operation of vessels. It complies with IMO MSC.36(63), MSC.96(72), MSC.302(87), A.694(17) and A.824(19), designed for the vessels of 50,000 GT and greater.
**SPECIFICATIONS**

**PRODUCT NAME**
DOPPLER SONAR

**MEASUREMENT RANGE OF SHIP’S SPEED**
- Fore-Alt: -10.0 to 40.0 kn
- Port-Starboard: -9.9 to 9.9 kn

**MEASUREMENT DEPTH**
- Speed over ground: 1 to 200 m below hull bottom
- Speed through water: 0.5 to 25 m below hull bottom

**ACCURACY**
- Ground-tracking (Ship's speed: less than 1 kn): ±0.01 m/s, whichever is greater
- Ground-tracking (Ship's speed: more than 1 kn): ±1.0 % or ±0.1 kn, whichever is greater
- Water-tracking: ±0.1 m/s
- Port-Starboard: ±0.1 % or ±0.04 kn, whichever is greater

**INPUT/OUTPUT SIGNALS**

**INPUT**
- IEC 61162: 3
- Alarm ACK: 1

**INPUT SENTENCES (IEC 61162)**
- ZDA, GLL, GGA, RMC, VDG, HDT, HDG, ROT, DBT, DPT, MWV, THS, GNS, HBT, ACK, ACM, ACN

**OUTPUT**
- Output Ports (IEC 61162): 5
- LOG Pulse: 4
- Analog: 5
- Alarm output: 4

**MAIN DISPLAY**
- Screen Size: 640 x 480 (VGA)

**TRANSODUCER**
- Ultrasonic Frequency: 320 kHz
- Number of Beams: 3

**EQUIPMENT LIST**

**Standard**
1. Display Unit: DS-600 (1 unit)
2. Distribution Box: DS-610 (1 unit)
3. Transceiver Unit: DS-620 (1 unit)
4. Transducer Unit (Choose from 3 choices below) (1 unit)
   - Transducer (DS-630) and Gate Valve (DS-661)
   - Transducer (DS-630) and Transducer Tank (DS-660)
   - Transducer with Water-tight Connector (DS-631) and Transducer Tank (DS-660)
5. Installation Material and Spare Parts (1 set)

**Option**
- Display Unit (as a sub display): DS-600
- Junction Box: DS-640
- Waterproof Box (for Display Unit DS-600): DS-605
- Rate-of-turn Gyro: DS-340
- Remote Controller: RD-501
- Dimmer Controller: RD-502
- Bracket (for Display Unit DS-600): DS-600
- Flange (for Transducer Tank DS-660): DS-660

**INTERCONNECTION DIAGRAM**

**POWER SUPPLY**
100-240 VAC

**ENVIRONMENT**
- Temperature Main Display: -25°C to +55°C
- Other Units: -15°C to +55°C
- Waterproofing
- Main Display: Front: IP66 Back: IP22
- Distribution Box: IP22
- Transceiver Unit/Junction Box: IP68
- Transducer/Transducer Tank/Gate Valve: IP44

**ACCURACY**
- Speed through water: 0.5 to 25 m below hull bottom
- Speed over ground: 1 to 200 m below hull bottom
- Port-Starboard: -9.9 to 9.9 kn
- Measurement range of ship's speed

**INSTALLATION**

- Option or Local Supply
- *Cable length between Transceiver Unit and Transducer is selectable from 30, 40, 50 and 60 m.*