NAVIKNOT Multisensor Speed Log Series
The Ultimate in Speed Log Flexibility

Sperry Marine
The NAVIKNOT 600 Series Speed Log utilizes satellite-based technology (GPS) to determine dual-axis speed over ground.

- The vessel’s dual-axis ground speed is shown on a large colour TFT display.
Proven Expertise
The NAVIKNOT Multisensor Speed Log Series is a new generation in a long line of very successful Sperry Marine speed logs. The 350, 450 and 600 series offer unlimited flexibility and have been designed with the most modern computer tools for application on all types and sizes of vessels including cruise ships, container ships, tankers, megayachts and a wide variety of other craft, both new build and retrofit.

The Series
NAVIKNOT 350 E
Electromagnetic Speed Log System, Single-Axis Water Speed

NAVIKNOT 450 D
Doppler Speed Log System, Single-Axis Water Speed

NAVIKNOT 600 S
Satellite Speed Log System, Dual-Axis Ground Speed, Docking Mode

NAVIKNOT 600 SE
Satellite and Electromagnetic Speed Log System, Dual-Axis Ground Speed and Single-Axis Water Speed, Docking Mode

NAVIKNOT 600 SD
Satellite and Doppler Speed Log System, Dual-Axis Ground Speed and Single-Axis Water Speed, Docking Mode

Key Highlights
- Suitable for all types of vessels ranging from small pleasure craft to the largest crude carriers
- Simple and low-cost installation
- Speed accuracy ±1% or 0.1 kn whichever is greater
- Large colour TFT display
- Display colours selectable by the operator
- Varied selection of speed and distance interfaces
- Double-end ferry mode
- Miles counter (one total counter and one daily counter)
- Separate damping for speed display and outputs (0 – 99 sec.)
- Displays longitudinal and transverse speeds (transverse speed 600 S, 600 SE & 600 SD only)
- Support of docking maneuvers by displaying rate of turn, heading, course over ground, longitudinal speed over ground, and bow and stern transverse speed over ground (600 S, 600 SE, 600 SD)
- Remote control and display units are available in different sizes
- Integrated take-over function Remote-to-Master
- Type approved by Germanischer Lloyd to Marine Equipment Directive (MED) 96/98/EC

Control and Display Units

The innovative NAVIKNOT Multisensor Speed Log Series features two different-sized Control and Display Units (CDU) each with a large colour TFT display, and utilizes satellite-based technology (GPS) in addition to the traditional Doppler and electromagnetic sensors to provide the user with high-accuracy displays of dual-axis ground speed and/or single-axis water speed.
## Performance and Operating Principle

### Electromagnetic Sensor - Operating Principle
The electromagnetic sensor houses a coil which, when energized with an AC current, produces a magnetic field around the sensor in the surrounding water. The ship’s motion through the water produces an electrical field (E) perpendicular to the magnetic field (B) and the ship’s motion (V). The resulting signal is picked up by the sensor electrodes and fed to the preamplifier where it is converted into a digital format and transmitted to the NAVIKNOT electronics unit.

### Doppler Transducer - Operating Principle
The Doppler transducer utilizes the Doppler frequency shift effect to determine the speed of a vessel through water. The transducer emits high-frequency sound pulses in the fore and aft directions through two transmitter windows. Two receiver windows in the transducer detect the return echo of the sound pulses. A time delay between pulse transmissions ensures that echoes are received from the undisturbed water outside the vessel’s boundary layer. The signals are processed to determine the ship’s fore/aft speed vector. The preamplifier transmits the speed information in a digital format to the NAVIKNOT electronics unit.

### Satellite Sensor - Operating Principle
The satellite sensor make use of GPS satellite signals to determine the vessel’s longitudinal and transverse ground speeds. Two GPS receivers integrated in an electronics unit with rate gyros, and a dual antenna unit determine the vessel’s heading, velocity, course and attitude. While the heading is referenced to the vessel’s fore-and-aft line, the velocity and course represent the vessel’s motion vector, i.e. the magnitude and direction of its motion over ground. The information received from the satellites is channelled to the processor PCB in the electronics unit which resolves the velocity data into the vessel’s longitudinal and transverse ground speeds. The speed vectors combined with the rate of turn data are used to discern between translational and rotational movement of the vessel. These are used to determine the bow and stern transverse speeds shown in the docking displays.

<table>
<thead>
<tr>
<th>Performance</th>
<th>Water Speed from Electromagnetic Sensors (350 E, 600 SE)</th>
<th>Ground Speed from Satellite (600 S, 600 SE, 600 SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water speed range</strong></td>
<td><strong>sensor NF type 2829</strong> -20 kn to +30 kn</td>
<td><strong>Ground speed range</strong> -99 kn to +99 kn longitudinal</td>
</tr>
<tr>
<td><strong>sensor FNF III type 4874</strong> -20 kn to +35 kn</td>
<td><strong>-99 kn to +99 kn transverse</strong></td>
<td></td>
</tr>
<tr>
<td><strong>sensor FNF II type 4120</strong> -20 kn to +35 kn</td>
<td><strong>Accuracy of ground speed</strong> ±1% or 0.1 kn of true speed, whichever is greater</td>
<td></td>
</tr>
<tr>
<td><strong>sensor FNF I type 4040</strong> -20 kn to +35 kn</td>
<td><strong>Settling time</strong> 4 min. coast time</td>
<td></td>
</tr>
<tr>
<td><strong>sensor FNF I type 4726</strong> -20 kn to +60 kn</td>
<td><strong>Accuracy, relative to water flow at location of sensor</strong> ±1% or 0.1 kn of true speed, whichever is greater</td>
<td></td>
</tr>
</tbody>
</table>

- Water Speed from Doppler Transducers (450 D, 600 SD)
  - Water speed range -50 kn to +50 kn
  - Accuracy ±1% or 0.1 kn of true speed, whichever is greater

  1 sigma error of speed displayed for a period of 5 minutes (under good hydrostatic conditions, pitch angles < 5°)
Electromagnetic Speed Log System – Single-Axis Water Speed

**Master Control and Display Unit**

**Electronics Unit**

**Remote Control and Display Unit**

**Interface PCB**

**Digital and Analogue Speed Repeaters**

**Optional Accessory Equipment**

**Preamplifier**

**Electromagnetic Sensors** (see pages 14-15)

- NF Type 2829
- FNF III Type 4874
- FNF II Type 4120
- FNF I Type 4040
- FNF I Type 4726

**Specifications**

- 18 – 36 VDC
- Double-End Ferry Mode
- Ext. DIM-
- Ext. DIM+
- Mute In
- RS422 Central DIM
- Analogue Voltage
- Analogue Current
- ext. Backlight
- Pulse 1 to 5
- Pulse 6 / Mute Out
- RS422 Out 1 to 6
- Watch Alarm
- Speed Limit
- Power Failure
- Speed Log Failure

- Optional accessory equipment:
  - Interface PCB
  - Remote control and display unit
  - Master control and display unit
  - Preamplifier
  - Electromagnetic sensors

- NAVIDKNOT 350 E Basic System Configuration

- Sperry Marine
NAVIKNOT 450 D  Basic System Configuration

Doppler Speed Log System – Single-Axis Water Speed

Master Control and Display Unit

Remote Control and Display Unit

Preamplifier

Electronics Unit

Interface PCB

Digital and Analogue Speed Repeaters

Optional Accessory Equipment

Doppler Transducers

One transducer input only

Doppler Transducer in Gate Valve

Doppler Transducer in Tank Mount

Analogue Voltage

Analogue Current

Ext. Backlight

18 – 36 VDC

Double-End Ferry Mode

Ext. DIM-

Ext. DIM+

Mute In

18 – 36 VDC

Pulse 1 to 5

Pulse 6 / Mute Out

RS422 Out 1 to 6

Watch Alarm

Speed Limit

Power Failure

Speed Log Failure

RS422 Central DIM

Doppler Transducers (see pages 14-15)
Satellite Speed Log System – Dual-Axis Ground Speed

**Electronics Unit**

**Dual Satellite Antenna**

**Master Control and Display Unit**

**Remote Control and Display Unit**

**Remote Control and Display Unit**

**Digital and Analogue Speed Repeaters**

**Optional Accessory Equipment**

- **18 – 36 VDC**
- **Double-End Ferry Mode**
- **Ext. DIM-**
- **Ext. DIM+**
- **Mute In**
- **RS422 Central DIM**
- **External Heading**
- **External Rate of Turn**
  - for enhanced docking accuracy.

- **Analogue Voltage**
- **Analogue Current**
- **ext. Backlight**
- **Pulse 1 to 5**
- **Pulse 6 / Mute Out**
- **RS422 Out 1 to 6**
- **Watch Alarm**
- **Speed Limit**
- **Power Failure**
- **Speed Log Failure**

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**NAVIKNOT 600 S Basic System Configuration**

**Sperry Marine**
NAVIKNOT 600 SE  Basic System Configuration

Satellite & Electromagnetic Speed Log System – Dual-Axis Ground Speed & Single-Axis Water Speed

Electronics Unit

Dual Satellite Antenna

Master Control and Display Unit

Remote Control and Display Unit

Remote Control and Display Unit

Digital and Analogue Speed Repeaters

Optional Accessory Equipment

Preamplifier

Electromagnetic Sensors (see pages 14-15)

One sensor Input only

NF Type 2829

or

FNF III Type 4874

or

FNF II Type 4120

or

FNF I Type 4040

or

FNF I Type 4726
NAVIKNOT 600 SD Basic System Configuration

Satellite & Doppler Speed Log System – Dual-Axis Ground Speed & Single-Axis Water Speed

Electronics Unit

Master Control and Display Unit

Remote Control and Display Unit

Remote Control and Display Unit

Digital and Analogue Speed Repeaters

Optional Accessory Equipment

Preamplifier

Doppler Transducers (see pages 14-15)

Doppler Transducer in Gate Valve

or

Doppler Transducer in Tank Mount

18 – 36 VDC

Double-End Ferry Mode

Ext. DIM-

Ext. DIM+

Mute In

RS422 Central DIM

Analogue Voltage

Analogue Current

ext. Backlight

Pulse 1 to 5

Pulse 6 / Mute Out

RS422 Out 1 to 6

Watch Alarm

Speed Limit

Power Failure

Speed Log Failure

One transducer input only

for enhanced docking accuracy.

Satellite & Doppler Speed Log System – Dual-Axis Ground Speed & Single-Axis Water Speed

Sperry Marine
**Major Displays**

### Speed Over Ground

**SOG**

<table>
<thead>
<tr>
<th>1</th>
<th>Longitudinal speed over ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Transverse speed over ground</td>
</tr>
<tr>
<td>3</td>
<td>Total miles counter</td>
</tr>
<tr>
<td>4</td>
<td>Daily miles counter</td>
</tr>
<tr>
<td>5</td>
<td>GPS signal quality</td>
</tr>
<tr>
<td>6</td>
<td>Speed through water</td>
</tr>
<tr>
<td>7</td>
<td>Transverse speed over ground at bow</td>
</tr>
<tr>
<td>8</td>
<td>Transverse speed over ground at stern</td>
</tr>
<tr>
<td>9</td>
<td>Rate of turn</td>
</tr>
<tr>
<td>10</td>
<td>Course over ground</td>
</tr>
</tbody>
</table>

**N.MILES**

1. **TOTAL**
2. **DAILY**

### Speed Through Water

**STW**

<table>
<thead>
<tr>
<th>1</th>
<th>Longitudinal speed over ground</th>
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<tr>
<td>2</td>
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<td>Course over ground</td>
</tr>
</tbody>
</table>

### Docking

**SOG**

<table>
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</thead>
<tbody>
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<td>Rate of turn</td>
</tr>
<tr>
<td>10</td>
<td>Course over ground</td>
</tr>
</tbody>
</table>

### GPS Position and Satellite Table

**GPS POSITION**

1. **NO**
2. **SAT**
3. **ISNR**
4. **AZ**
5. **EL**
6. **GPS DOP**
7. **UTC-TIME**
8. **DATE**

### Selectable Display Colours

- **White**
- **Blue**
- **Black (night)**

The display colours of all NAVIKNOT Control and Display Units are selectable by the operator.
### Control and Display Units (CDU)

**NAVIKNOT 350 E and 450 D**
- Master Control and Display Unit
  - Width 223, height 127, depth 44 mm.
  - Installation depth 100 mm. Weight 1.1 kg. With 2.8 m cable. IP 23.
- Remote Control and Display Unit (optional)
  - Width 192, height 96, depth 44 mm.
  - Installation depth 100 mm. Weight 1.1 kg. With 2.8 m cable. IP 23.

**NAVIKNOT 600 S, 600 SE and 600 SD**
- Master Control and Display Unit
  - Width 256, max. height 155, max. depth 116 mm. Weight 1.6 kg. With 2.8 m cable. IP 56.
- Remote Control and Display Unit (optional)
  - Width 192, height 96, depth 43 mm.
  - Installation depth 120 mm. Weight 1.1 kg. With 3.5 m cable. IP 23.
- Remote Control and Display Unit (optional)
  - Width 319, height 127, depth 44 mm.
  - Installation depth 100 mm. Weight 1.8 kg. With 3.5 m cable. IP 23.

**CDU Installation Variations**
- For installation in a console. Width 192, height 96, depth 44 mm. Installation depth 100 mm. Weight 0.6 kg. With 2.8 m cable. IP 56.
- Installed in a console frame. Width 223, height 127, depth 44 mm. Installation depth 100 mm. Weight 1.1 kg. With 2.8 m cable. IP 23.
- For installation in a console. Width 192, height 96, depth 43 mm. Installation depth 120 mm. Weight 1.1 kg. With 3.5 m cable. IP 23.
- Installed in a console frame. Width 319, height 127, depth 44 mm. Installation depth 100 mm. Weight 1.8 kg. With 3.5 m cable. IP 23.
- In a housing with bracket attachment. Width 256, max. height 155, max. depth 116 mm. Weight 1.6 kg. With 2.8 m cable. IP 56.
- Installed in a console frame. Width 350, max. height 150, max. depth 130 mm. Weight 1.9 kg. With 3.5 m cable. IP 23.
Dual Satellite Antenna, Electronics Units

**Dual Satellite Antenna**

Overall Dimensions
- Height: 144 mm
- Length: 776 mm
- Width: 98 mm

Weight with 15 m cable: antenna 1.9 kg; cable 1.0 kg
Weight with 50 m cable: antenna 1.9 kg; cable 3.2 kg

**Electronics Unit for NAVIKNOT 350 E & 450 D**

Overall Dimensions
- height: 100 mm
- width: 340 mm
- depth: 250 mm
- weight: 4.0 kg

Ambient Temperature Range
- operation: -15°C to +55°C
- storage: -25°C to +70°C

Protection Grade: IP 23 to DIN EN 60529

Environmental Conditions / EMC: in accordance with IEC 60945

Magnetic Clearance
- to standard magnetic compass: 0.5 m
- to steering magnetic compass: 0.4 m
- reduced, to standard magnetic compass: 0.3 m

**Electronics Unit for NAVIKNOT 600 S, 600 SE & 600 SD**

Overall Dimensions
- height: 120 mm
- width: 300 mm
- depth: 500 mm
- weight: 8.0 kg

Ambient Temperature Range
- operation: -15°C to +55°C
- storage: -25°C to +70°C

Protection Grade: IP 23 to DIN EN 60529

Environmental Conditions / EMC: in accordance with IEC 60945

Magnetic Clearance
- to standard magnetic compass: 0.5 m
- to steering magnetic compass: 0.4 m
- reduced, to standard magnetic compass: 0.3 m

**Preamplifier for NAVIKNOT 350 E & 600 SE**

Overall Dimensions
- height: 290 mm
- width: 239 mm
- depth: 83 mm
- weight: 3.0 kg

Ambient Temperature Range
- operation: -15°C to +55°C
- storage: -25°C to +70°C

Protection Grade: IP 65 to DIN EN 60529

Environmental Conditions / EMC: in accordance with IEC 60945

Magnetic Clearance
- to standard magnetic compass: 0.3 m
- to steering magnetic compass: 0.3 m

**Preamplifier for NAVIKNOT 450 D & 600 SD**

Overall Dimensions
- height: 290 mm
- width: 239 mm
- depth: 83 mm
- weight: 3.0 kg

Ambient Temperature Range
- operation: -15°C to +55°C
- storage: -25°C to +70°C

Protection Grade: IP 65 to DIN EN 60529

Environmental Conditions / EMC: in accordance with IEC 60945

Magnetic Clearance
- to standard magnetic compass: 0.3 m
- to steering magnetic compass: 0.3 m
**Digital and Analogue Speed Repeaters**

### Universal Digital Speed Repeater

**Console Version**

Overall Dimensions
- front plate: 96 x 96 mm
- depth: 140 mm
- weight: 1.0 kg with cable

- **In a Watertight Housing with a Mounting Bracket**

**Overall Dimensions**
- width: 158 mm
- height: 155 mm
- depth: 154 mm
- weight: 2.2 kg with cable

Both versions:
- **Ambient Temperature Range**
  - operation: -25°C to +70°C
  - storage: -25°C to +70°C
- **Protection Grade**: IP 56 to DIN EN 60529
- **Environmental Conditions / EMC**: in accordance with IEC 60945

### Analogue Speed Repeaters

**Console Version**

- **96 x 96 mm**
  - **Speed Ranges**
    - -5 kn to +25 kn
    - -5 kn to +40 kn
    - -5 kn to +60 kn
  - IP 56 (front only)

**In a Watertight Housing with a Mounting Bracket**

- **144 x 144 mm**
  - **Speed Range**
    - -5 kn to +25 kn
  - IP 66

**Console Version**

- **192 x 192 mm**
  - **Speed Range**
    - -5 kn to +25 kn
  - IP 56 (front only)

**All Analogue Speed Repeaters:**
- **Ambient Temperature Range**
  - operation: -25°C to +70°C
  - storage: -25°C to +70°C
- **Environmental Conditions / EMC**: in accordance with IEC 60945
NF Flush-Fitted Sensor with Sea Valve, Type 2829

Speed range -20 kn to +30 kn
Weight of hull fittings approx. 50 kg
Weight of sensor approx. 20 kg
Space required above floor for replacement of sensor 1.1 m
Length of cable between sensor and preamplifier 30 m

Sensor:
- resistance to pressure IP 68 DIN EN 60529, submersible to 20 m
- excitation voltage 24 V
- excitation current 1 A
- signal voltage 0.18 mV/knot

Sensor can be replaced without drydocking

FNF III, Type 4874, for External Installation in Steel and Aluminium Hulls

Speed range -20 kn to +35 kn
Weight of hull fittings and sensor 22 kg
Space required above floor for replacement of sensor none
Length of cable between sensor and preamplifier 30 m

Sensor:
- resistance to pressure IP 68 DIN EN 60529, submersible to 20 m
- excitation voltage 24 V
- excitation current 1 A
- signal voltage 0.18 mV/knot

Sensor can be replaced without drydocking

FNF I Yacht, Type 4040, 35 Knots for Steel and Aluminium Hulls

Speed range -20 kn to +35 kn
Weight of hull fittings and sensor approx. 17 kg
Space required above floor for replacement of sensor min. 0.5 m
Length of cable between sensor and preamplifier 20 m

Sensor:
- resistance to pressure IP 68 DIN EN 60529, submersible to 20 m
- excitation voltage 24 V
- excitation current 1 A
- signal voltage 0.18 mV/knot

FNF II Yacht, Type 4120, 35 Knots for Wooden and Fiberglass Hulls

Speed range -20 kn to +35 kn
Weight of hull fittings and sensor approx. 15 kg
Space required above floor for replacement of sensor min. 0.5 m
Length of cable between sensor and preamplifier 20 m

Sensor:
- resistance to pressure IP 68 DIN EN 60529, submersible to 20 m
- excitation voltage 24 V
- excitation current 1 A
- signal voltage 0.18 mV/knot
**Hull Fittings, Sensors and Transducers**

**FNF I Yacht, Type 4726, 60 Knots for Steel and Aluminium Hulls**

- Speed range: -20 kn to +60 kn
- Weight of hull fittings and sensor: approx. 17 kg
- Weight of sensor: approx. 20 kg
- Space required above floor for replacement of sensor: min. 0.5 m
- Length of cable between sensor and preamplifier: 20 m

Sensor:
- resistance to pressure: IP 68 DIN EN 60529, submersible to 20 m
- excitation voltage: 24 V
- excitation current: 1 A
- signal voltage: 0.18 mV/knot

**Doppler Transducer in Gate Valve, Type 4983, for Steel and Aluminium Hulls, Single Bottom**

- Speed range: -50 kn to +50 kn
- Weight of gate valve with transducer: 50 kg
- Space required above floor for removable of transducer: 770 mm
- Length of cable to preamplifier: 18 m or 40 m
- Radiated power (electrical): 10 W max.
- Ambient temperature, operation: -2°C to +40°C
- Protection grade: IP 68 DIN EN 60529, submersible to 35 m
- Signal mode: pulse
- Frequency: 2 MHz
- Number of beams: 2
- Beam width: 1.5°
- Beam angle: 1.5° from Vertical
- Min. bottom clearance: 1.8 m
- Sensor can be replaced without drydocking

**Doppler Transducer in Tank Mount, Type 4978, for Steel Hulls, Single or Double Bottom**

- Speed range: -50 kn to +50 kn
- Length of cable to preamplifier: 18 m or 40 m
- Radiated power (electrical): 10 W max.
- Ambient temperature, operation: -2°C to +40°C
- Protection grade: IP 68 DIN EN 60529, submersible to 35 m
- Signal mode: pulse
- Frequency: 2 MHz
- Number of beams: 2
- Beam width: 1.5°
- Beam angle: 1.5° from Vertical
- Min. bottom clearance: 1.8 m
- Sensor can be replaced without drydocking
Sperry Marine

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Sperry Marine Online - www.sperrymarine.northropgrumman.com

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  - Press Releases
  - Suppliers
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- Customer Support
  - Service Online
  - Customer Feedback
- Events & Trade Shows
- Employment Opportunities
- Links to the Northrop Grumman Website
- Home Page Site Search Capabilities

Sperry Marine, with worldwide headquarters in Charlottesville, VA, and major engineering and support offices in Melville, NY, New Malden, England, and Hamburg, Germany, is part of the Northrop Grumman Electronic Systems sector.

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