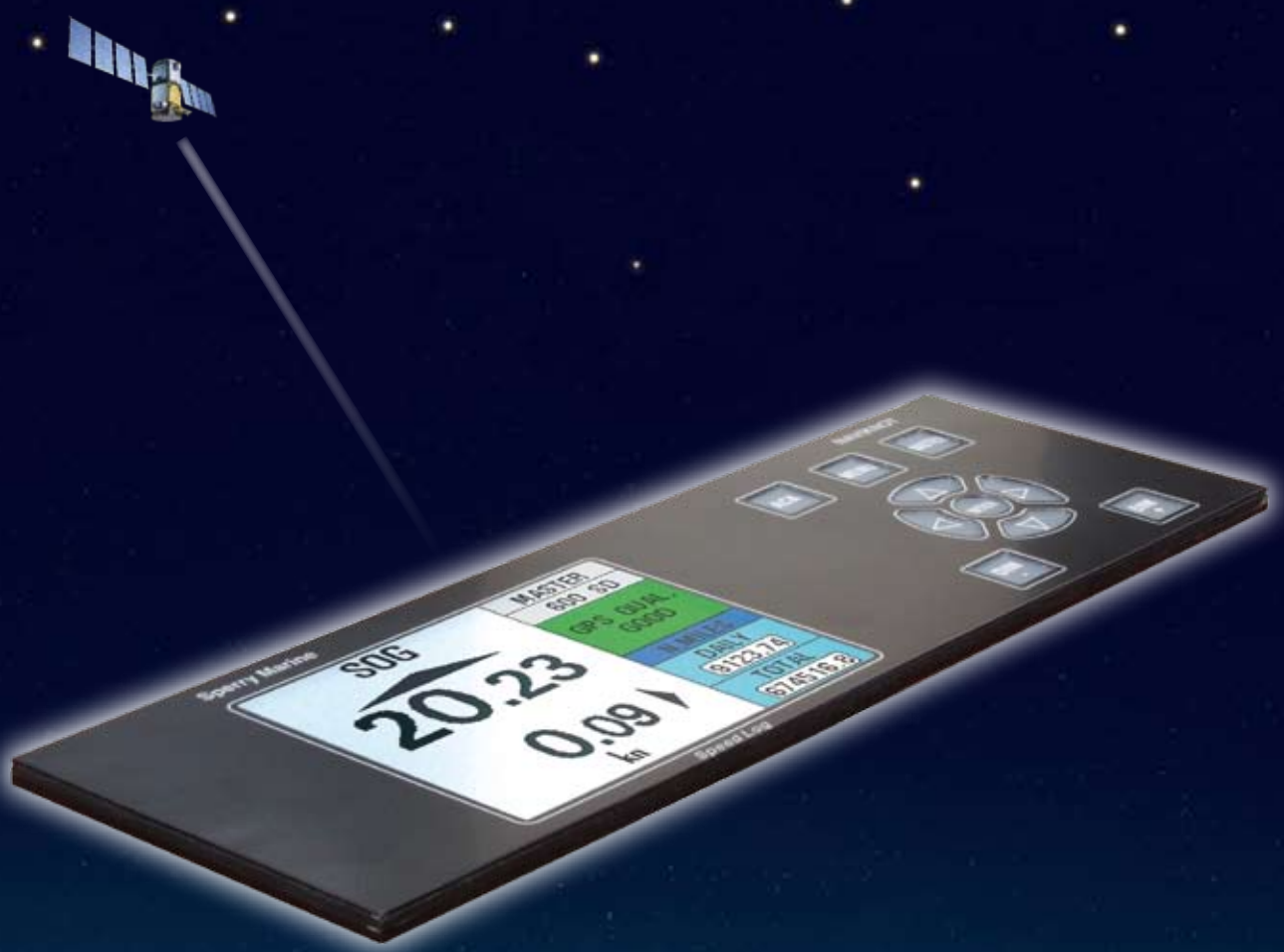
NORTHROP GRUMMAN



NAVIKNOT Multisensor Speed Log Series

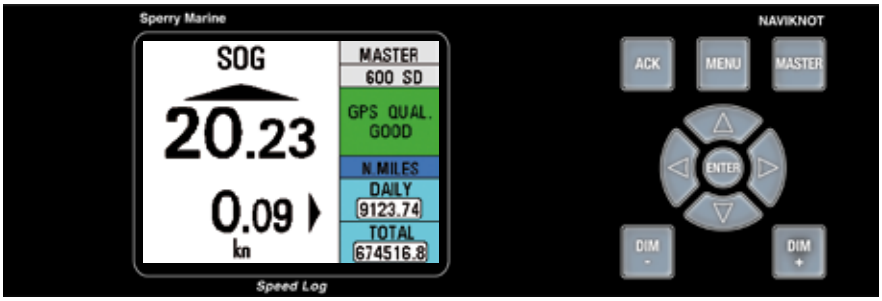
The Ultimate in Speed Log Flexibility

Sperry Marine

Navigating into the 21st Century…

…with the most modern Satellite Technology

- 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.



NAVIKNOT 600 SD Control and Display Unit

Dual-Axis Ground Speed

The *Ville de Bordeaux* is equipped with a complete Sperry Marine Integrated Bridge System including a NAVIKNOT 600 SD Multisensor Speed Log.

NAVIKNOT Multisensor Speed Log Series

Sperry Marine

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 flexibilty 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 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.

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

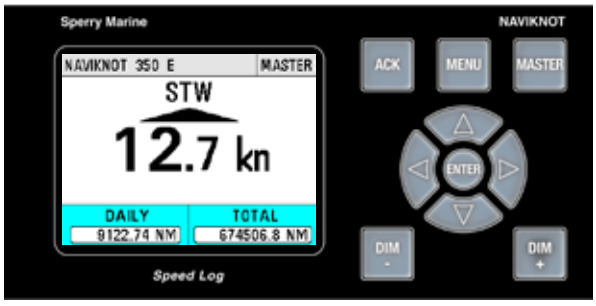
NAVIKNOT 600 SE
Satellite and Electromagnetic Speed Log System, Dual-Axis Ground Speed and Single-Axis Water Speed, Docking Mode

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

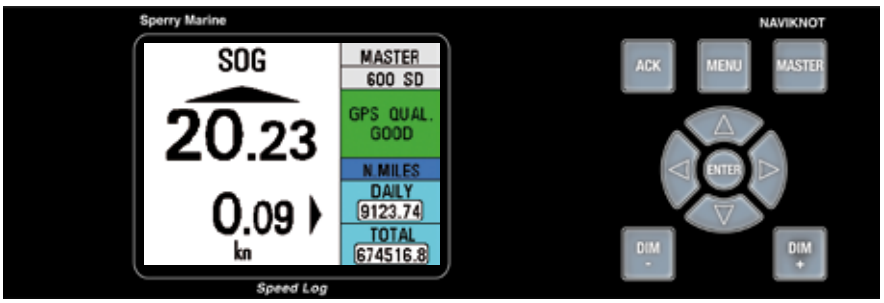
Key Highlights

- 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



NAVIKNOT 350 E and 450 D



NAVIKNOT 600 S, 600 SE and 600 SD

Performance and Operating Principle

Performance

Water Speed from Electromagnetic Sensors (350 E, 600 SE)

Water speed range	
sensor NF type 2829	-20 kn to +30 kn
sensor FNF III type 4874	-20 kn to +35 kn
sensor FNF II type 4120	-20 kn to +35 kn
sensor FNF I type 4040	-20 kn to +35 kn
sensor FNF I type 4726	-20 kn to +60 kn
Accuracy, relative to water flow at location of sensor	±1% or 0.1 kn of true speed, whichever is greater

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

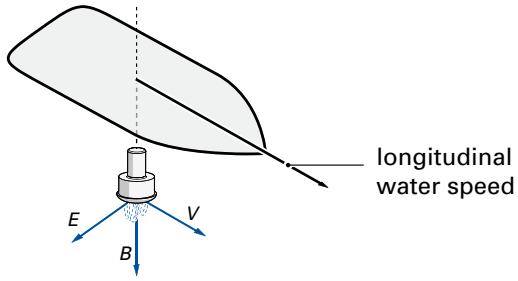
1 sigma error of speed displayed for a period of 5 minutes (under good hydrostatic conditions, pitch angles < 5°)

Ground Speed from Satellite (600 S, 600 SE, 600 SD)

Ground speed range	-99 kn to +99 kn longitudinal -99 kn to +99 kn transverse
Accuracy of ground speed	±1% or 0.1 kn of true speed, whichever is greater
Settling time	4 min. coast time

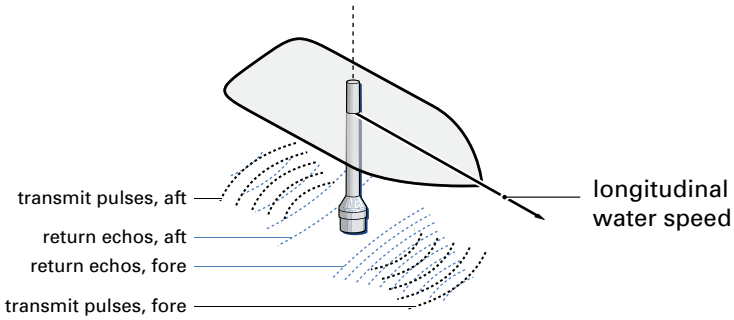
Electromagnetic Sensor - Operating Principle

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.



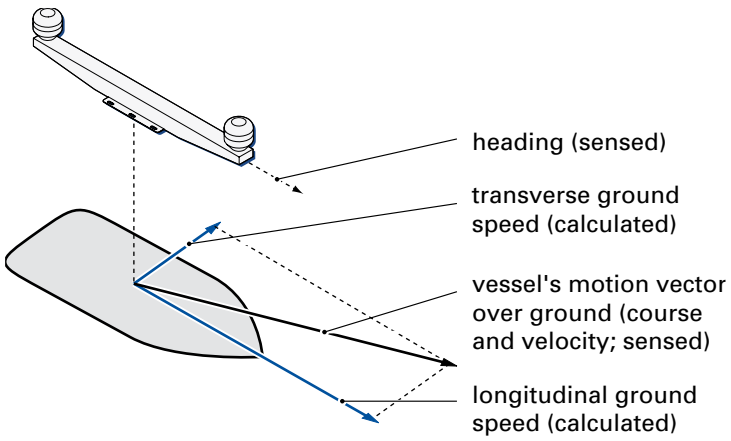
Doppler Transducer - Operating Principle

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.



NAVIKNOT 350 E Basic System Configuration

Sperry Marine

Electromagnetic Speed Log System – Single-Axis Water Speed

Master Control and Display Unit

Electronics Unit

Remote Control and Display Unit

Digital and Analogue Speed Repeaters

Optional Accessory Equipment

Preamplifier

One sensor Input only

18 – 36 VDC

Double-End Ferry Mode

Ext. DIM-

Ext. DIM+

Mute In

RS422 Central DIM

Interface PCB

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

Electromagnetic Sensors (see pages 14-15)

NF
Type 2829

or

FNF III
Type 4874

or

FNF II
Type 4120

or

FNF I
Type 4040

or

FNF I
Type 4726

NAVIKNOT 450 D Basic System Configuration

Doppler Speed Log System – Single-Axis Water Speed

Master Control and Display Unit

Electronics Unit

Remote Control and Display Unit

Digital and Analogue Speed Repeaters

Optional Accessory Equipment

Preamplifier

One transducer input only

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

18 – 36 VDC

Double-End Ferry Mode

Ext. DIM-
Ext. DIM+

Mute In

RS422 Central DIM

Interface PCB

Doppler Transducers (see pages 14-15)

Doppler Transducer in Gate Valve

or

Doppler Transducer in Tank Mount

NAVIKNOT 600 S Basic System Configuration

Sperry Marine

Satellite Speed Log System – Dual-Axis Ground Speed

Dual Satellite Antenna

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

SAT CPU

Interface PCB

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

NAVIKNOT 600 SE Basic System Configuration

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

Dual Satellite Antenna

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

SAT CPU

Interface PCB

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

Preamplifier

One sensor Input only

Electromagnetic Sensors (see pages 14-15)

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

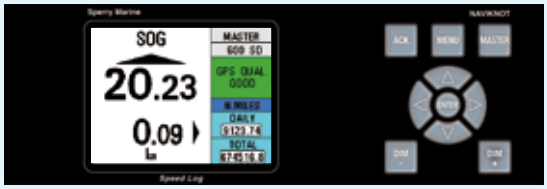
Sperry Marine

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

Dual Satellite Antenna

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

SAT CPU

Interface PCB

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

Preamplifier

One transducer input only

Doppler Transducers (see pages 14-15)

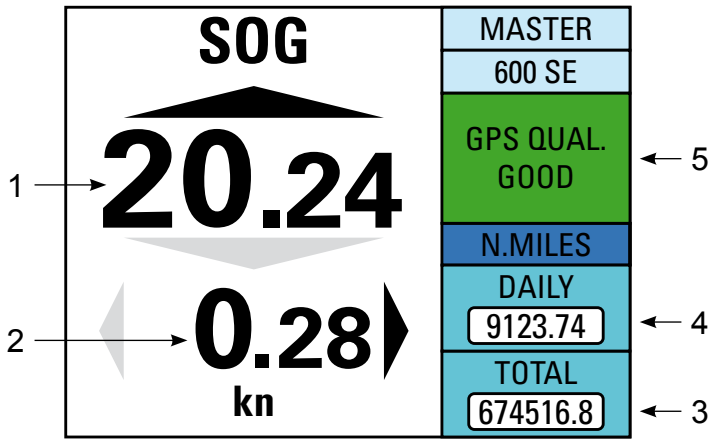
Doppler Transducer in Gate Valve

or

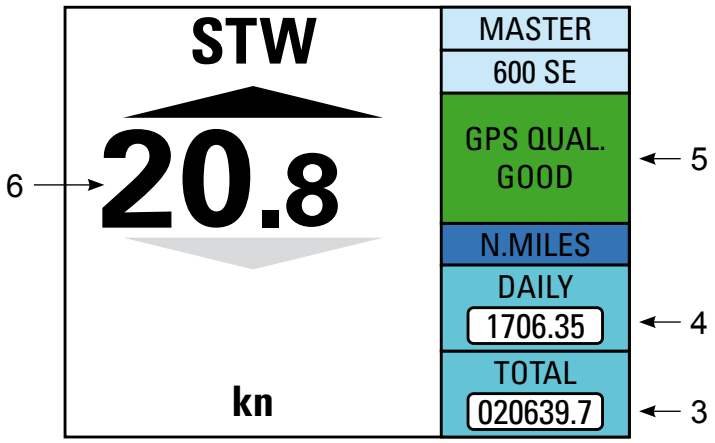
Doppler Transducer in Tank Mount

Major Displays

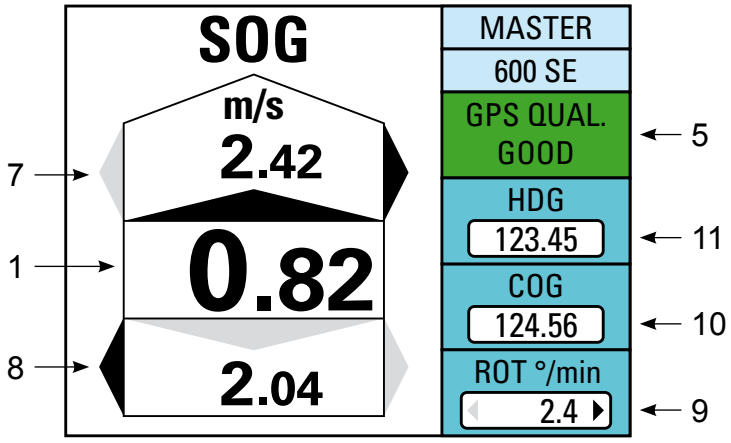
Speed Over Ground



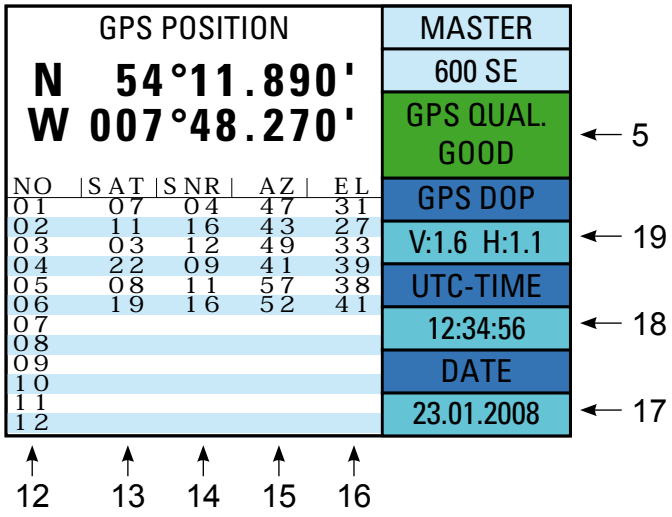
Speed Through Water



Docking



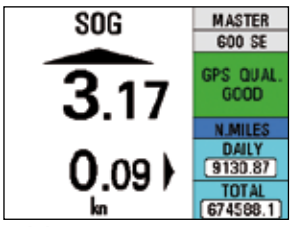
GPS Position and Satellite Table



1 Longitudinal speed over ground
2 Transverse speed over ground
3 Total miles counter
4 Daily miles counter
5 GPS signal quality
6 Speed through water
7 Transverse speed over ground at bow
8 Transverse speed over ground at stern
9 Rate of turn
10 Course over ground
11 Heading
12 Sequential number
13 Satellite identification number
14 Signal to noise ratio
15 Satellite azimuth
16 Satellite elevation
17 Date
18 Universal time coordinated
19 GPS vertical and horizontal dilution of precision

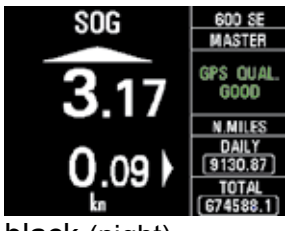
Selectable Display Colours

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



white

blue

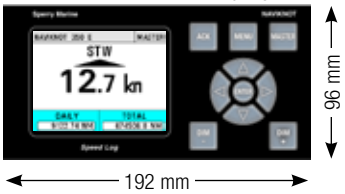


black (night)

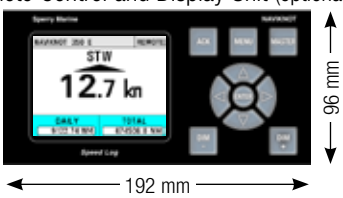
Control and Display Units (CDU)

NAVIKNOT 350 E and 450 D

Master Control and Display Unit

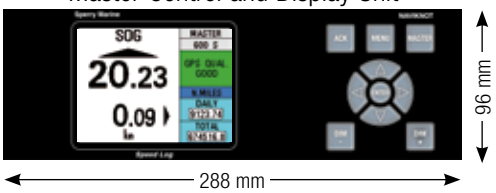


Remote Control and Display Unit (optional)

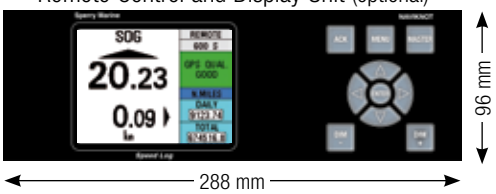


NAVIKNOT 600 S, 600 SE and 600 SD

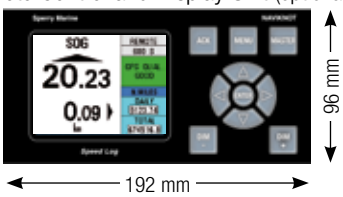
Master Control and Display Unit



Remote Control and Display Unit (optional)



Remote Control and Display Unit (optional)



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.

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.

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 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

Magentic 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

Magentic 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

Magentic 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

Magentic Clearance
to standard magnetic compass: 0.3 m
to steering magnetic compass: 0.3 m

Digital and Analogue Speed Repeaters

Sperry Marine

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)

Console Version
144 x 144 mm

Speed Ranges
-5 kn to +25 kn
-5 kn to +40 kn
IP 56 (front only)

In a Watertight Housing with a Mounting Bracket
144 x 144 mm

Speed Range
-5 kn to +25 kn

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

Hull Fittings, Sensors and Transducers

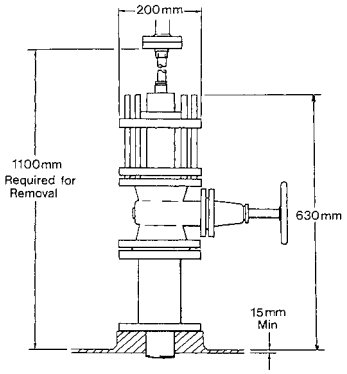
NF Flush-Fitted Sensor with Sea Valve, Type 2829

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



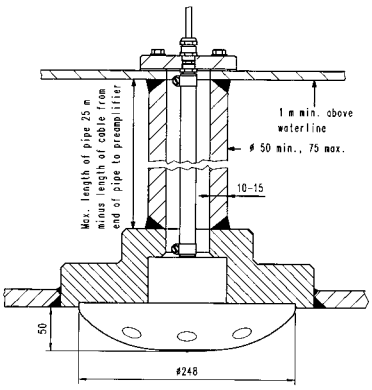
FNF III, Type 4874, for External Installation in Steel and Aluminium Hulls

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

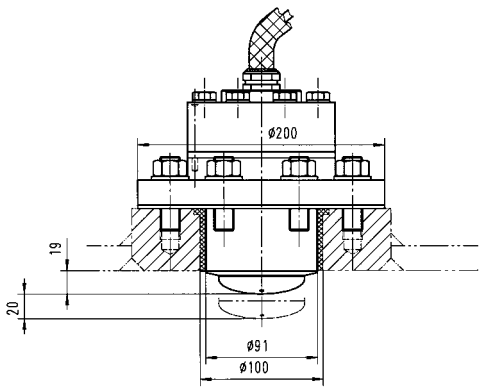


FNF I Yacht, Type 4040, 35 Knots for Steel and Aluminium Hulls

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

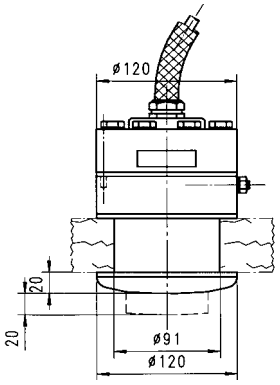


FNF II Yacht, Type 4120, 35 Knots for Wooden and Fiberglass Hulls

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



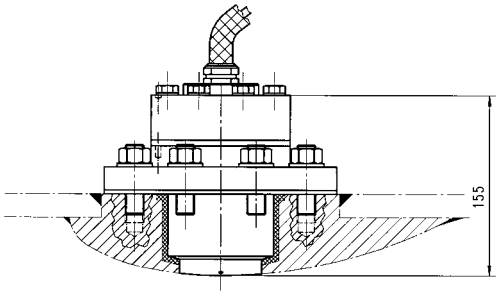
Hull Fittings, Sensors and Transducers

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:

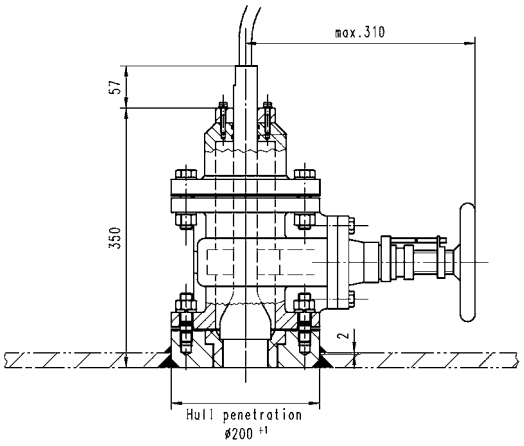
resistance to pressure	IP 68 DIN EN 60529, submersible to 20 m
excitation voltage	24 V
excitation current	1 A
signal voltage	0.18 mV/knot



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

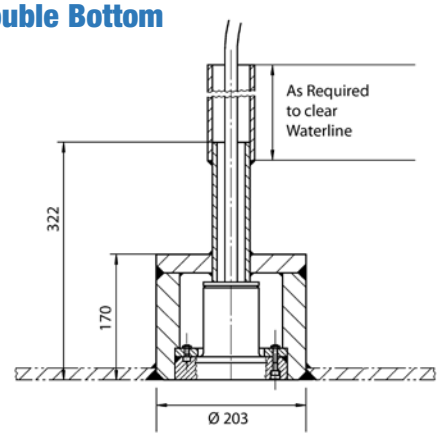
Sensor can be replaced without drydocking



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



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