

FURUNO®

Revolutionary heading sensor, Radome type

SATELLITE COMPASS

Model SC-60



The future today with FURUNO's electronics technology.

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Catalogue No. N-846a

TRADE MARK REGISTERED
MARCA REGISTRADA

Continuous, steady and highly information from advanced GF

- Heading information for radar, Scanning Sonar, VideoPlotter
- Tri-antenna system reduces effect of pitching, rolling and yawing
- Accuracy $\pm 0.8^\circ$
- Heading output in NMEA 0183, IEC 61162-1 and AD-10 (25 ms update)
- Short settling time of 4 minutes
- Excellent follow-up rate of $25^\circ/\text{s}$
- Clear 4.5" backlit monochrome LCD
- Four display modes: Compass Rose, Steering, Nav Data and Heading
- Free from routine maintenance
- Works as a normal GPS navigator



Compass Rose Mode

The SC-60 is a new satellite compass that uses Furuno's advanced GPS Kinematic technology. This compass offers a wide range of applications for any type of vessel. Radar/ARPA, AIS, ECDIS, Scanning Sonar, and VideoPlotter can utilize the functions of this compass.

The SC-60 consists of Radome Antenna, Display Unit and Processor Unit. The low-profile radome accommodates three GPS antenna/receiver units. The tri-antenna system helps reduce the influence of ship's motion.

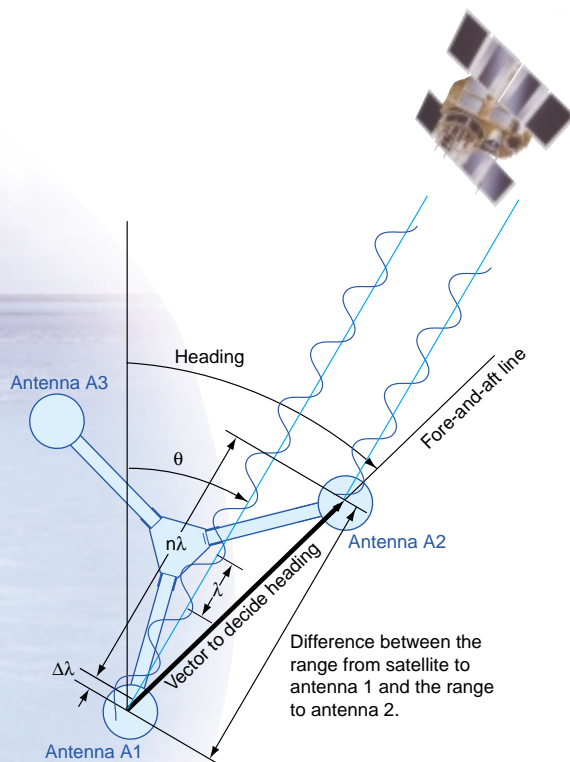
The compass performance is not affected by ship's speed, latitude, geomagnetism, etc. There are no mechanical parts such as gimbals or rotating meter, thus the compass is free from routine maintenance. Settling time is remarkably short compared to any gyrocompass, it takes only four minutes for initialization. The follow-up

performance satisfies $20^\circ/\text{s}$ as required by high speed craft.

This unit is also a fully functional GPS navigator. The hybrid configuration of GPS satellites and 3-axis solid-state gyroscopes provide a steady and accurate heading, even when the satellite signals are blocked under a bridge or tall building or when the ship is subject to pitching, rolling or yawing.

There are four display modes: Compass Rose, Steering, Nav Data and Heading mode. The unit delivers true heading and course/speed over ground, as well as GPS fix, through four ports. The heading information can also be exported in AD-10 format at a high update of 25 ms to satisfy high speed data requirements in special applications.

Highly-accurate heading and GPS Kinematic technology



Principle

Own ship's heading can be determined by decoding the phase data in the GPS carrier frequency. In principle, a pair of antennas A1(ref) and A2(fore), each connected with an associated GPS engine and processor, are installed along the ship's fore-aft line. The GPS systems at A1 and A2 calculate the range and azimuth to the satellite.

The difference in range between A1 and A2 is $\Delta\lambda + n\lambda$ where λ is about 19 cm and n is automatically found during the initialization stage. A fraction of a carrier wavelength, $\Delta\lambda$, is processed by Furuno's advanced kinematic technology in geographical survey, thus determining a vector (range and orientation) A1 to A2, i.e., heading of own ship relative to north.

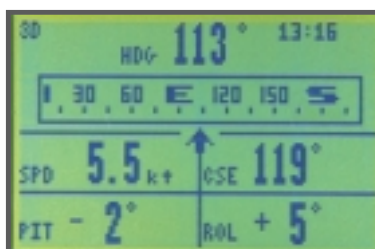
In reality, a third antenna is added to reduce the influence of pitch, roll and yaw, and five satellites are used to process 3D data (3rd sat), to reduce clock derived error (4th sat), and to calculate n in initial stage (5th sat).

If the GPS signal is blocked by a tall building or under a bridge, the 3-axis solid-state angular rate gyros, in the processor unit, takes the place of the satellite until all five satellites are in view. The angular rate gyros also contribute to regulating the heading data against pitch, roll and yaw.

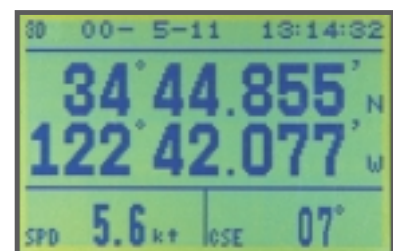
*Ambiguity "n" is resolved by LAMBDA algorithm developed by Prof. Teussen, Delft University of Technology, The Netherlands.



Heading Mode



Steering Mode



NAV Data Mode

SPECIFICATIONS OF SC-60

1. **Accuracy** $\pm 0.8^\circ$
2. **Follow-up** 25°/s rate-of-turn
3. **Settling time** 4 min
4. **Interface** IEC 61162-1
 Input: 1 port in RS 422 or FURUNO AD-10
 HDT (Heading true), HDG, HDM
 Output: 4 ports for HDT in RS 422 or RS 232C
 2 ports for others
 HDT (Heading true), VTG (COG or SOG), ZDA (Time/Date), GGA (GPS fix), PFECATT (Yaw/Pitch/Roll)
 AD-10 format: 25 ms update

3. NMEA cable 10 m (MJ-A6SPF0012-100)
4. Antenna cable 30 m (CP20-01700),
50 m (CP20-01710)
5. Flush mount kit for display S type (OP20-17)
F type (OP20-18/29)
6. Repeater Interface (under development)

ENVIRONMENTAL

IEC 60945 for EMC, Vibration, Temperature

GPS RECEIVER CHARACTERISTICS

1. **Receiver Type** Twelve discrete channels.
C/A code, all-in-view
2. **Receive Freq** L1 (1575.42 MHz)
3. **Position Accuracy** GPS: 10 m approx. (95 %)
DGPS: 5 m or better (95 %)

DISPLAY

1. **Display Unit** 4.5-inch LCD (4 gray tones),
120 (V) x 64 (H) pixels
2. **Display Mode** Steering, Nav Data,
Compass Rose and
Heading modes

POWER SUPPLY 12-24 VDC, 15 W

EQUIPMENT LIST

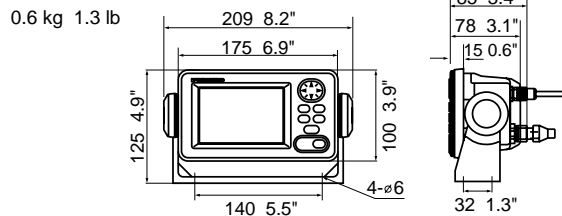
Standard

- | | | |
|---|--------|--------|
| 1. Display Unit | SC-602 | 1 unit |
| 2. Antenna Unit | SC-303 | 1 unit |
| 3. Processor Unit | SC-601 | 1 unit |
| 4. Standard spare parts, Installation Materials | | 1 set |

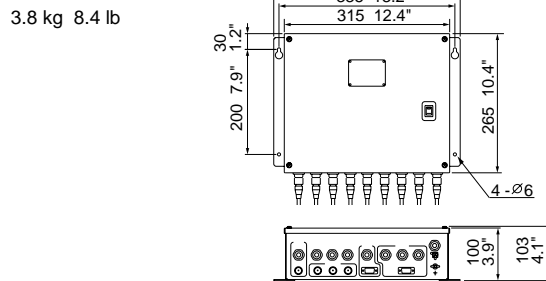
Optional

- | | |
|-------------------------|---|
| 1. Beacon receiver kit | GR-7001 |
| 2. Data cable for AD-10 | 5 m (MJ-A6SPF0003-050)
10 m (MJ-A6SPF0007-100) |

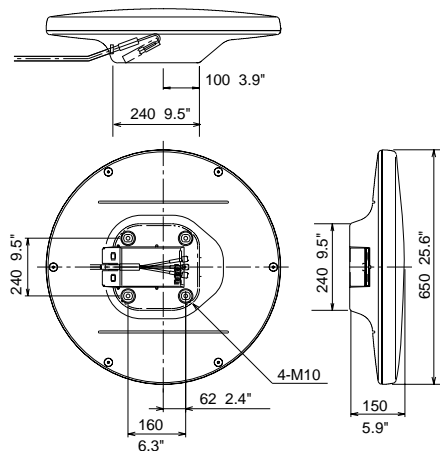
Display Unit



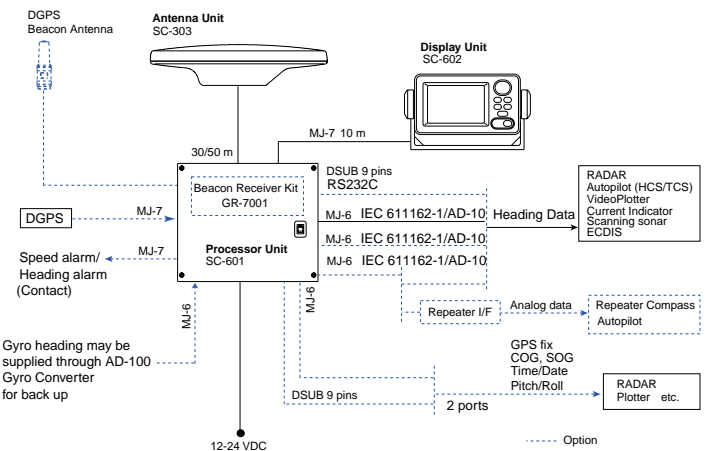
Processor Unit



Antenna Unit 3.5 kg 7.7 lb



Interconnection Diagram



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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