FURUNO

# OPERATOR'S MANUAL

## INTEGRATED HEADING SENSOR

MODEL PG-1000

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NISHINOMIYA, JAPAN

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(HIMA) PG-1000

*00080805700*

# ⚠ SAFETY INSTRUCTIONS

## Safety Information for the Installer

### ⚠ WARNING

**Turn off the power at the mains switchboard before beginning the installation.**
**Post a sign near the switch to indicate it should not be turned on while the equipment is being installed.**

Fire or electrical shock can result if the power is left on or is applied while the equipment is being installed.

### ⚠ CAUTION

**Confirm that the power supply voltage is compatible with the voltage rating of the equipment.**

Connection to the wrong power supply can cause fire or equipment damage.

**Use the supplied power cable.**

Use of a wrong power cable can cause fire or equipment damage.

**Maintain the compass safe distance.**

| Standard compass | Steering compass |
|---|---|
| 0.5 m | 0.4 m |

## Safety Information for the Operator

### ⚠ WARNING

**Do not disassemble or modify the equipment.**

Fire, electrical shock or serious injury can result.

**Turn off the power immediately if water leaks into the equipment or the equipment is emitting smoke or fire.**

Continued use of the equipment can cause fire or electrical shock.

**Do not place liquid-filled containers on the top of the equipment.**

Fire or electrical shock can result if a liquid spills into the equipment.

### ⚠ CAUTION

**Turns off the autopilot before selecting output data format.**

The autopilot may turn the rudder suddenly.

**Turns off the autopilot before aligning heading.**

The autopilot may turn the rudder suddenly.

# FOREWORD

## A Word to PG-1000 Owners

Congratulations on your choice of the FURUNO PG-1000 Integrated Heading Sensor. We are confident you will see why the FURUNO name has become synonymous with quality and reliability.

For over 50 years Furuno Electric Company has enjoyed an enviable reputation for innovative and dependable marine electronics equipment. This dedication to excellence is furthered by our extensive global network of sales and service.

Your heading sensor is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless operated and maintained properly. Please carefully read and follow the recommended procedures for installation, operation and maintenance.

We would appreciate hearing from you about whether we are achieving our purposes.

Thank you for choosing FURUNO equipment.

## Features

- The PG-1000 uses a flaxgate magnetic sensor in conjunctions with solid-state angular rate sensor to find heading.
- Automatic correction of magnetic variation
- Can convert magnetic heading to true heading (requires Furuno GPS Navigator).

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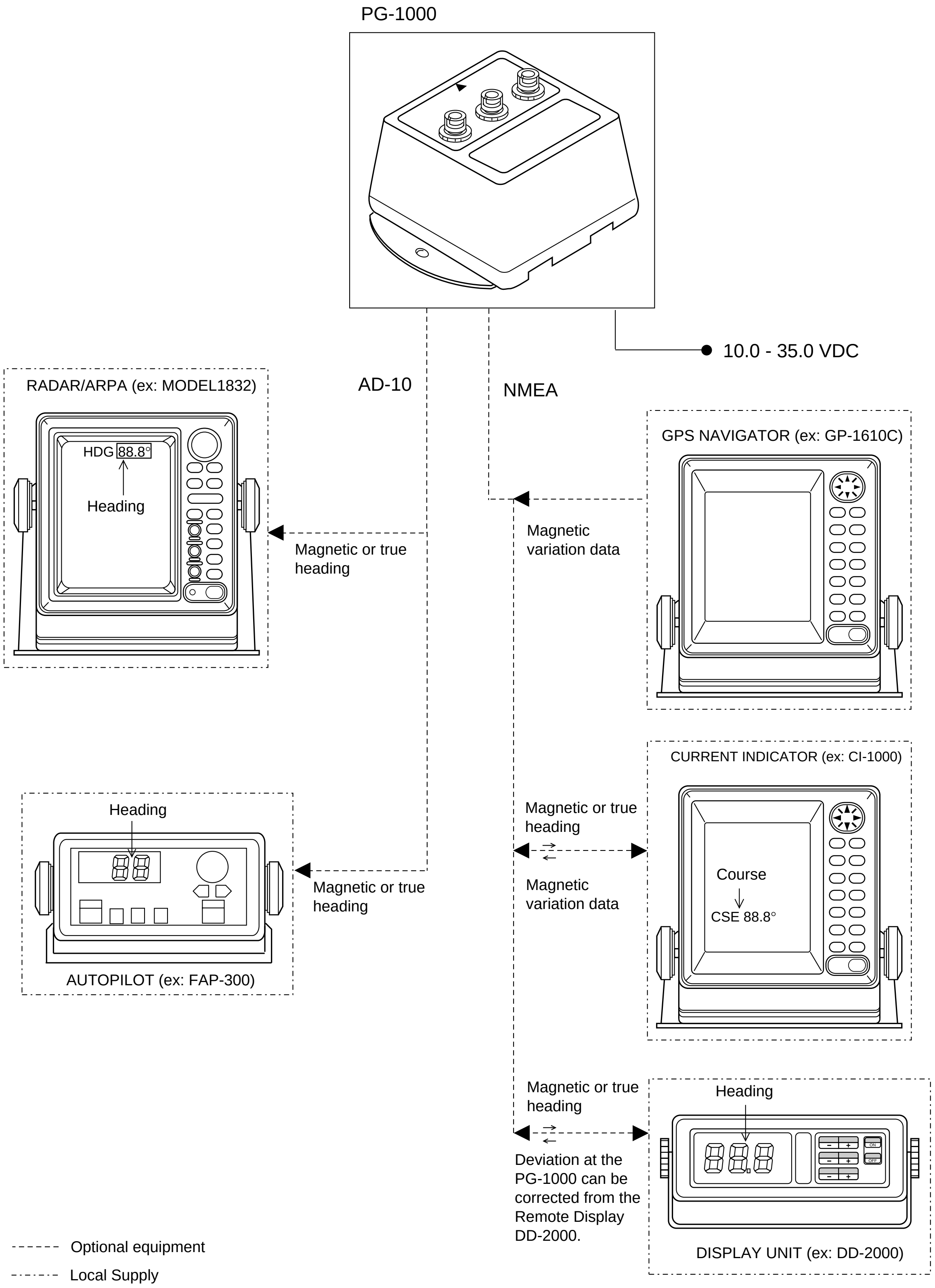
# SYSTEM CONFIGURATION


PG-1000
10.0 - 35.0 VDC
AD-10
NMEA
RADAR/ARPA (ex: MODEL1832)
HDG 88.8°
Heading
Magnetic or true heading
GPS NAVIGATOR (ex: GP-1610C)
Magnetic variation data
Heading
88
Magnetic or true heading
AUTOPILOT (ex: FAP-300)
CURRENT INDICATOR (ex: CI-1000)
Magnetic or true heading
Magnetic variation data
Course
CSE 88.8°
Magnetic or true heading
Heading
888
ON
OFF
Deviation at the PG-1000 can be corrected from the Remote Display DD-2000.
DISPLAY UNIT (ex: DD-2000)
Optional equipment
Local Supply

# SPECIFICATIONS OF INTEGRATED HEADING SENSOR
# PG-1000

The PG-1000 is an electromagnetic compass consisting of a fluxgate and a solid-state rate gyro, supported with advanced software. The heading information is outputted in IEC 61162-1 or NMEA format. For high data speed, AD-10 format (25 ms) is also available. The heading information is used for radar, AIS, ECDIS, automatic steering system and other navaids.

| | |
|---|---|
| Heading Accuracy | Static ±1.0° (within 30° of tilt) after correcting deviation |
| Freedom of tilt | ±35° |
| Follow-up | 25°/s rate-of turn |
| Display resolution | 0.1° |
| Useable area | 70°N to 70°S |
| Correction of anomaly | Deviation: Automatic correction of coefficients A, B, C, D, E by turning the ship (manual by optional DD-2000 display unit) |
| I/O Port | Input: 1 port<br>Output: 2 ports |
| Interfacing | Output<br>FURUNO AD-10 format, IEC 61162-1 (NMEA 0183 Ver.2.0)<br>$HCHDG,XXX.X,,,,<CR><LF><br>$HCHDT,XXX.X,T<CR><LF><br>For old equipment:<br>$HCHDM,XXX.X,M<CR><LF><br>$HCHCC,XXX.X,<CR><LF><br>Input<br>IEC 61162-1 (NMEA 0183 Ver.2.0)<br>$--RMC or $--VTG,<br>either is required for correction of variation |
| Data Update | AD-10 formatted: 25 ms<br>IEC 61162-1 (NMEA 0183): 1 s, 2 s, 100 ms or 200 ms selected |
| Power supply | 12-24 VDC: 0.2-0.08 A |

ENVIRONMENTAL CONDITION

| | |
|---|---|
| Temperature | -15°C to +55°C (15°C to 35°C for accuracy ±1.5°) |
| Waterproofing | IP5 (IEC 60529), CFR-46 (USCG standard) |
| EMC and others | Complies with IEC 60945 |
| Coating | Housing: Munsell scale N3.0 (Dark gray) |
| Dimensions and mass | refer to the Outline Drawings |

# 1 INSTALLATION

## 1.1 Equipment List

### Standard set

| No. | Name | Type | Code No. | Qty | Remarks |
|---|---|---|---|---|---|
| 1 | Sensor | PG-1000-E | ---- | 1 | |
| 2 | Installation Materials | CP64-02000 | 000-040-433 | 1 | Refer to table below. |

### Installation materials (CP64-02000)

| No. | Name | Type | Code No. | Qty | Remarks |
|---|---|---|---|---|---|
| 1 | Tapping screw | 4x16 SUS304 | 000-802-080 | 2 | |
| 2 | Flat washer | M4 SUS304 | 000-864-126 | 2 | |
| 3 | Power cable | 22S0019 | 000-109-000 | 1 | |
| 4 | Cable assy. | MJ-A6SPF0007-100 | 000-125-237 | 1 | |

### Optional units

| No. | Name | Type | Code No. | Qty | Remarks |
|---|---|---|---|---|---|
| 1 | Signal cable | MJ-A6SPF0003-050 | 000-117-603 | 1 | w/connector, 5m (for AD-10) |
| 2 | Cable assy. | MJ-A6SPF0007-100 | 000-125-237 | 1 | 6p-6p, 10m (for AD-10) |
| | | MJ-A6SPF0012-100 | 000-133-817 | 1 | 6p-6p, 10m (for NMEA) |

## 1.2 Selecting Mounting Location

The PG-1000 must be indoor on the horizontal plane.

When selecting a mounting location, keep in mind the following points:

- The ambient temperature must be between -15°C and 55°C.
- Vibration at the mounting location should be minimal.
- Install the sensor as far as possible from power cable, ferrous materials.
- Install the sensor ship's center of gravity.
- Align the bow mark with the ship's bow on the fore-and-aft-line.

1. Tentatively select the mounting location. Do not fix it yet.

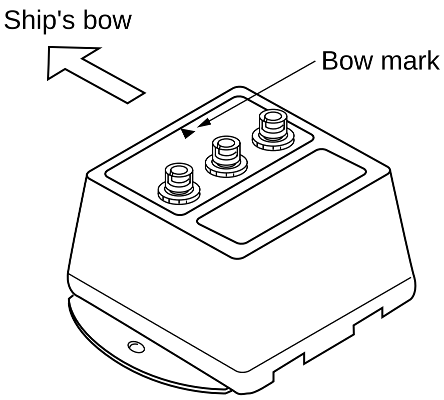

Ship's bow
Bow mark

*Figure 1 PG-1000*

2. Connect the PG-1000 to the battery as shown in right.

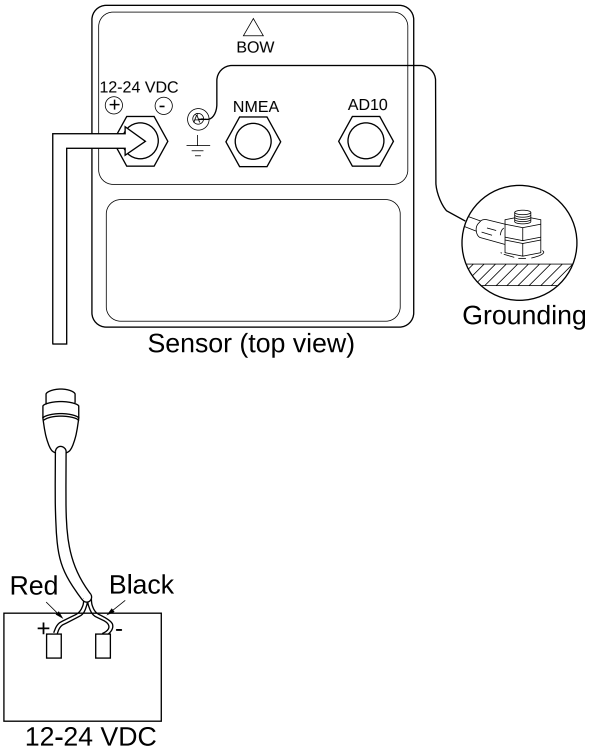

BOW
12-24 VDC
+
-
NMEA
AD10
Sensor (top view)
Grounding
Red
Black
+
-
12-24 VDC

*Figure 2 Battery connections to PG-1000*

3. Turn the ship's mains switch on. This sensor doesn't have power switch.

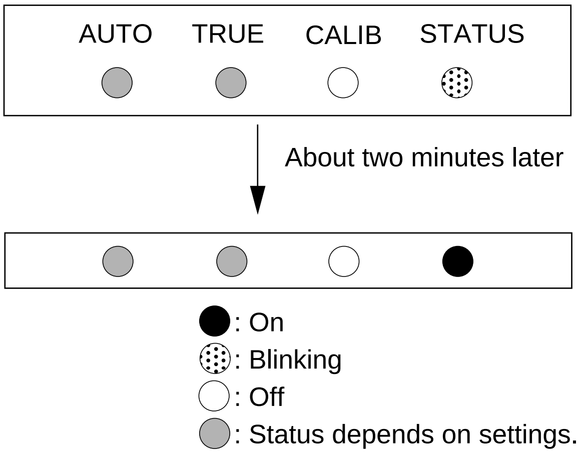

AUTO
TRUE
CALIB
STATUS
About two minutes later
● : On
⁙ : Blinking
○ : Off
● : Status depends on settings.

*Figure 3 LEDs at power on*

4. Confirm that the STATUS LED blinks. Two minutes later it will light. If STATUS LED doesn't blink and then light, suspect sensor error. Reset power.

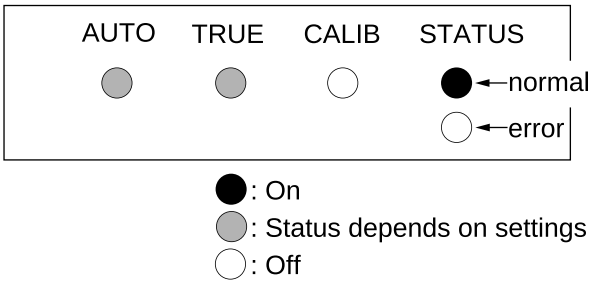

AUTO
TRUE
CALIB
STATUS
normal
error
● : On
● : Status depends on settings
○ : Off

*Figure 4*

5. Press the [AUTO] and [+] keys together more than two seconds.

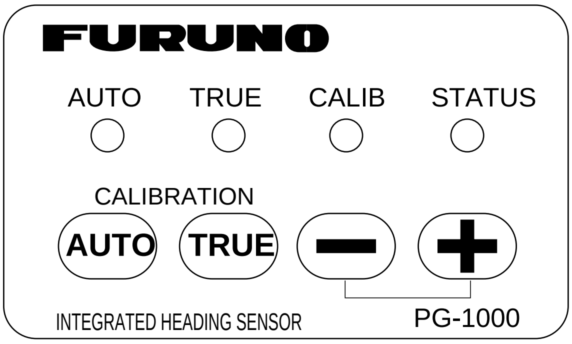

FURUNO
AUTO
TRUE
CALIB
STATUS
CALIBRATION
AUTO
TRUE
INTEGRATED HEADING SENSOR
PG-1000

*Figure 5 Key and LEDs*

After the TRUE, CALIB and STATUS LEDs light and AUTO LED blinks, rotate the equipment 360º slowly, keeping it uplight. If three LEDs are lighting, the mounting location is suitable.

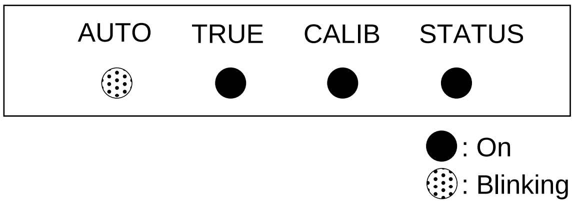

AUTO
TRUE
CALIB
STATUS
: On
: Blinking

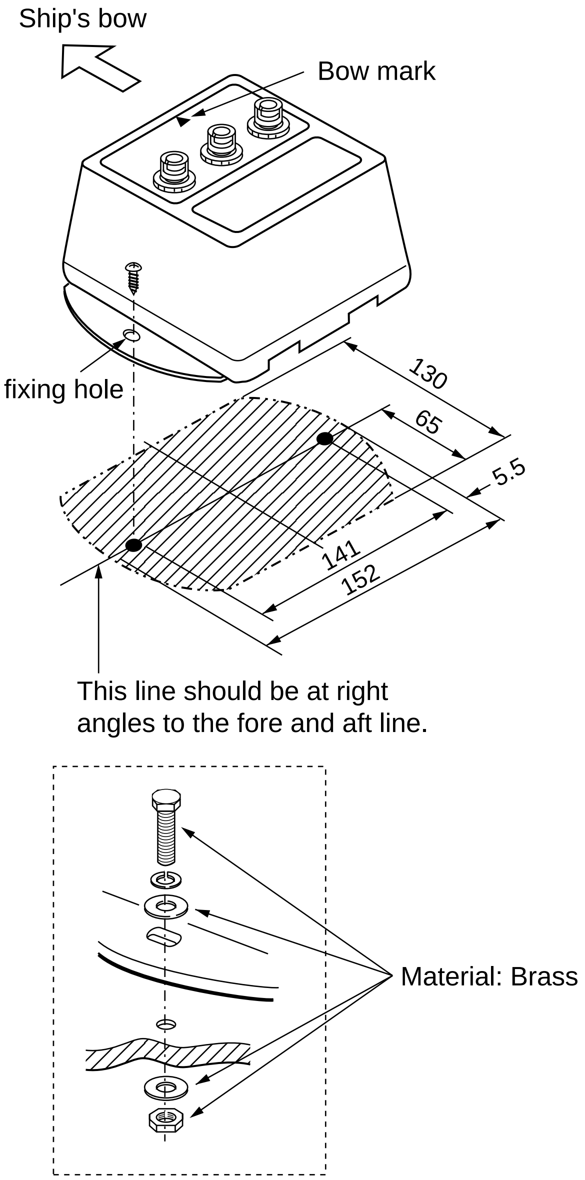
*Figure 6*

If one or more LED is off, the mounting location is not suitable. Try to change the location, and do step 5 again.

6. Press the [AUTO] and [TRUE] keys together to return to the normal mode. The STATUS LED blinks while the sensor is being calibrated and lights steady when the calibration is completed. Do not operate the sensor while the LED is blinking; calibration will be incomplete.

## 1.3 Mounting

1. Fix the sensor by using screws and washers (supplied). The size of the fixing hole is ø 4.5 mm.


Ship's bow
Bow mark
fixing hole
130
65
5.5
141
152
This line should be at right angles to the fore and aft line.
Material: Brass

o All dimensions in mm.
o For added support, use nuts, bolts and washers.
o Secure sufficient clearance around the sensor for maintenance and checking.

*Figure 7 Mounting the PG-1000*

**Note:** Do not overtighten the screws or bolts; the sensor may crack.

### Checking for inclination

Make sure that the PG-1000 is mounted horizontally by the following checks.

1. Press the [TRUE] and [+] keys more than two seconds.

When the inclination is within ±5°, STATUS LED lights and TRUE LED blinks.

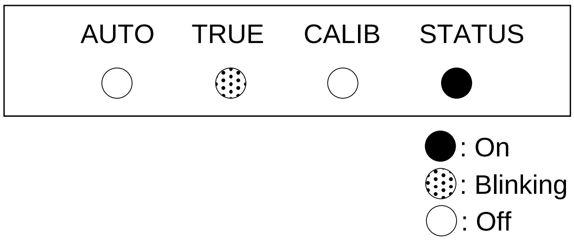


*Figure 8 LED status when inclination is within ±5°*

If STATUS LED is off, the inclination is over ±5°. In this case, relocate the sensor to where inclination becomes within ±5° or use a levelling brock.

2. Press the [AUTO] and [TRUE] keys more than two seconds to return to the normal mode. The STATUS LED blinks while the sensor is being calibrated and lights when the calibration is completed (return to normal mode). Do not operate the equipment while the LED is blinking; calibration will be incomplete.

## 1.4 Connections

Connect cables as shown in the Figure 8.

Leave sufficient slack in cables for maintenance and checking ease. If cables run outside the bridge run them through conduit to protect them from corrosion.

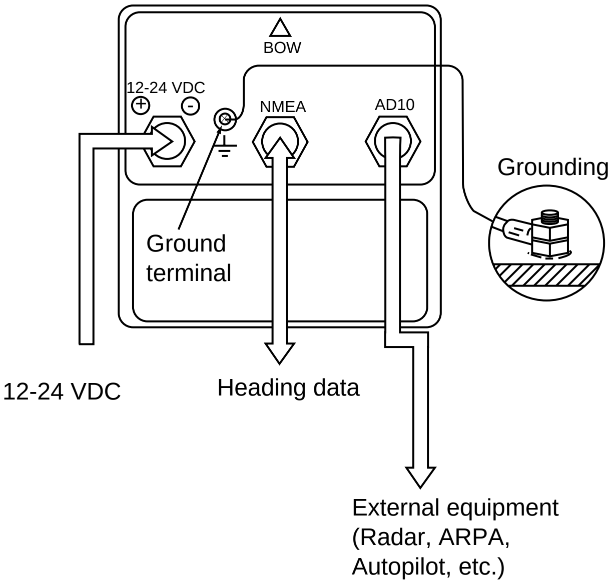


*Figure 9 Connections of sensor, top view*

### Grounding

Ground the PG-1000 as follows to prevent interference:

- The ground wire should be as short as possible.
- The ground wire should be about 1.25 sq and not contain steel.
- Use only a closed end lug.

**⚠ CAUTION**

**Ground the equipment to prevent loss of sensitivity.**

### Connection of external equipment

**IEC-61162-1:** Digital interface IEC-61162-1 format input/output terminal. Output**:** HDG, HDT, Input**:** RMC or VTG.

**NMEA0183 (Ver.1.5):** Outputs HDM (Magnetic Heading), HCC (Compass Heading).

**AD-10:** Outputs heading information in AD-10 format.

**Note:** Cover unused connector(s) with the rubber cap (supplied) to prevent ingress of water.

## 1.5 Correcting Magnetic Field Distortion (Deviation)

The magnetic field at the sensor around ship is subjects to change with the ship structure, engins, electronic equipment or any ferrous materials in the vicinity.

The PG-1000 contains an automatic correction facility against magnetic field distortion aboard the ship.

1. Do this procedure in a calm water.
2. Steer the boat clockwise or counterclockwise in a circular course. Take more than two minutes to complete the circle (at about 3 kt). While turning the boat, go to step 3.

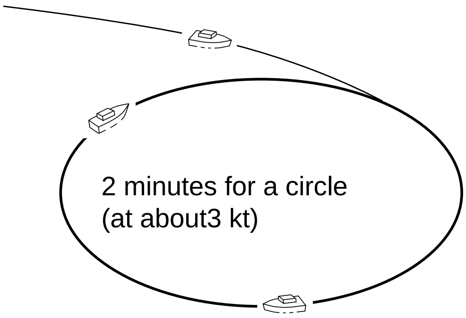


*Figure 10*

**Note 1:** Take at least 2 minutes to navigate the circle, otherwise large error may result.

**Note 2:** For hover craft or simular vessel, turn the vessel in a circle maintaining fixed position.

3. Press [AUTO] and [TRUE] keys together more than two seconds. The CALIB LED blinks.

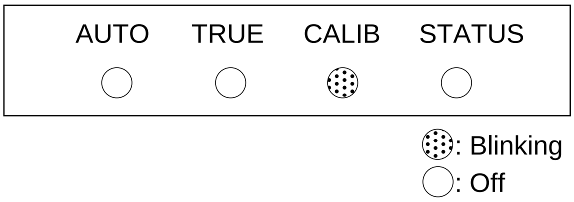


*Figure 11 Compensatin falt LED status during compensation*

**Note:** You can return to normal operation at any time by pressing the [TRUE] key.

4. Continue turning the boat in a circle (three to five times) until a result appears.

The correction result is shown with the LEDs. When correction is successful, all LEDs light. Wait 30 seconds for the sensor to return to normal operation, or press the [TRUE] key for quick return.

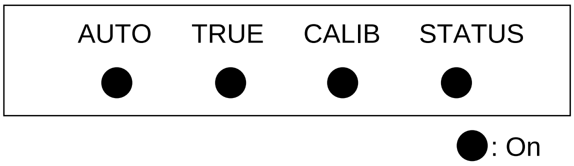


*Figure 12 LED status at successful correction*

**Note 1:** Do not turn off the power supply during the correction. Data may be corrupted.

**Note 2:** You may restart correction at anytime during correction or while the correction results are displayed, by pessing [AUTO] key. After pressing the key the AUTO LED lights for two seconds.

**Note 3:** Continue turning the boat even if the CALIB LED status changes from blinking to lighting. Keys are inoperative when the CALIB LED is lighting.

**Note 4:** The sensor does not output heading data during the correction (Program Ver. 3 and after).

5. Anchor the boat at the pier to check sensor heading to a known point (for example, lighthouse).

If there is a compass error, see "1.6 Heading Alignment".

If some LED does not light, change sensor location and repeat step 2 through 4.

If automatic correction failed at step 4, the correction result is shown in LEDs. This continues until you press any key to clear the display.(Turning off the power at switch board will not clear the LED display.)

**Note:** Bearing output is done with the status before the automatic correction.

Failure of automatic correction may be caused by the factors mentioned in the table below. Try the correction again referring to the table.

| Causes | Results of correction | | | | Remedy |
|---|---|---|---|---|---|
| | AUTO | TRUE | CALIB | STATUS | |
| Above range of magnetic sensor | ● | ● | ● | ◌ | Follow the procedure in above from step 2 after the replacement of unit. |
| Magnetic field distortion | ● | ● | ◌ | ◌ | Follow the procedure in above from step 2 after the replacement of unit. |
| Turning error | ● | ◌ | ◌ | ◌ | Follow the procedure in above from step 2. |

●: On
◌: Blinking

*Figure 13*

**Note:** Correction can also be done at Remote Display DD-2000. See the Operator's Manual for the DC-2000.

## 1.6 Heading Alignment

Heading alignment is required when sensor heading is different from actual heading.

This alignment must be done using magnetic heading (default setting).

**⚠ CAUTION**

**Turn off the autopilot before aligning heading.**

The autopilot may turn the rudder suddenly.

**Procedure**

1. Press the [-] and [+] keys together more than two seconds. All LEDs go off.

| AUTO | TRUE | CALIB | STATUS |
|---|---|---|---|
| ○ | ○ | ○ | ○ |

○: Off

*Figure 14*

**Note:** Complete the next step within 10 seconds, otherwise normal operation is restored.

2. Set difference between sensor heading (output) and actual heading with the [+] or [-] key. For example, the hading output by the sensor is 70° and the actual heading is 75°. Therefore, the difference is +5°. Press the [+] key five times to set +5°. Each time the [+] key is pressed the LEDs light as shown in Figure 14.

| | AUTO | TRUE | CALIB | STATUS |
|---|---|---|---|---|
| +1° | ● | ○ | ○ | ○ |
| +2° | ● | ● | ○ | ○ |
| +3° | ● | ● | ● | ○ |
| +4° | ● | ● | ● | ● |
| +5° | ○ | ○ | ○ | ○ |
| +6° | ● | ○ | ○ | ○ |
| +7° | ● | ● | ○ | ○ |
| ⋮ | Repeat | | | |

●: On
○: Off

*Figure 15 LED state and pressing of [+] key*

## 1.7 Setting Output Data

### Setting output interval

The deffault setting is 100 ms.

1. Disconnect the power connector from the sensor.
2. Reattach the connector to the sensor while pressing the [+] key. The PG-1000 is powered on, and the current output interval is shown by the LEDs.

| | AUTO | TRUE | CALIB | STATUS |
|---|---|---|---|---|
| 100ms | ● | ○ | ○ | ○ |
| 200ms | ● | ● | ○ | ○ |
| 1s | ● | ● | ● | ○ |
| 2s | ● | ● | ● | ● |

●: On
○: Off

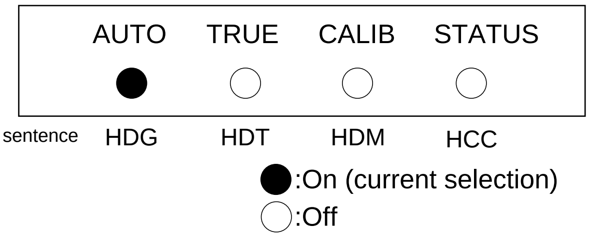
*Figure 16 LED state and output interval*

3. Press the [+] or [-] key to change interval.
4. Press the [AUTO] and [TRUE] keys together more than two seconds to return to the normal mode. The STATUS LED blinks while the equipment is being calibrated and lights when the calibration is completed (return to normal mode). Do not operate the equipment while the LED is blinking; calibration will be incomplete.

## Setting the output sentence(s)

Select which type(s) of heading data to output. The default setting is HDG.

1. Disconnect the power connector from the sensor.
2. Reattach the connector to the sensor while pressing the [-] key. The PG-1000 is powered on, and LED(s) light to show which output sentence(s) is being output.



HDG : Magnetic heading, Magnetic variation value
HDT : True heading
HDM : Magnetic heading
HCC : Compass heading

*Figure 17 LED and output sentence*

3. Press key(s) corresponding to sentence(s) to output. For example, press the [TRUE] key to output HDT.

**Note 1:** Several sentences may be output simultaneously. However, delay may result when the output interval is 100 ms or 200 ms.

**Note 2:** "HDT" outputs true heading data. However, if variation data is not input from the GPS navigator, magnetic bearing will be output.

4. Press the [AUTO] and [TRUE] keys together more than two seconds to return to the normal mode. The STATUS LED blinks while the equipment is being calibrated and lights when the calibration is completed (return to normal mode). Do not operate the equipment while the LED is blinking; calibration will be incomplete.

# 2 CORRECTING MAGNETIC ANOMALIES

## 2.1 Controls and Indications

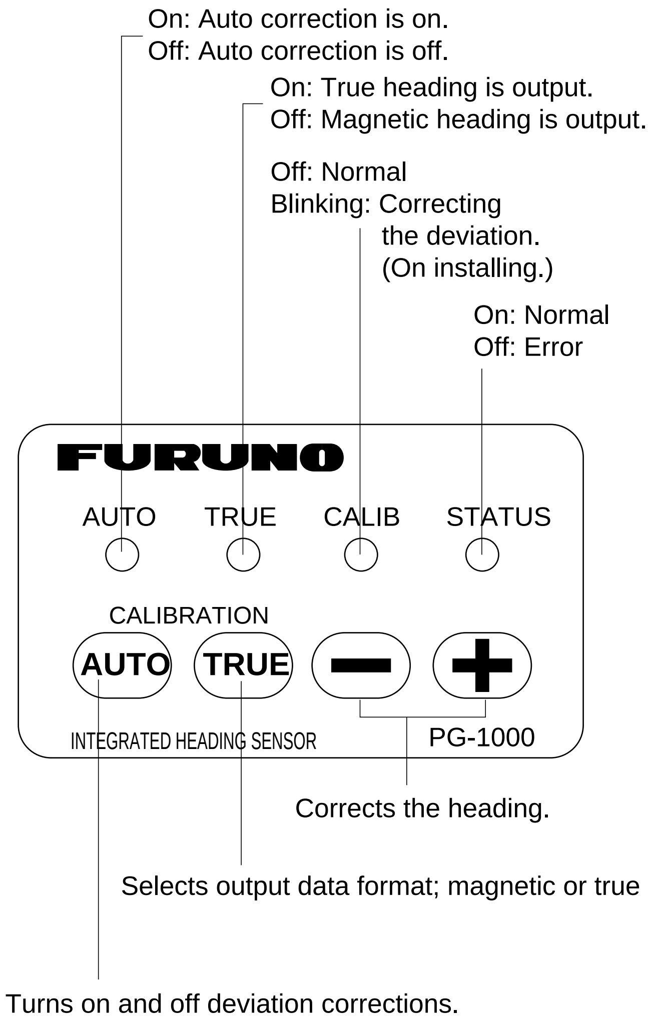

On: Auto correction is on.
Off: Auto correction is off.
On: True heading is output.
Off: Magnetic heading is output.
Off: Normal
Blinking: Correcting the deviation. (On installing.)
On: Normal
Off: Error
FURUNO
AUTO
TRUE
CALIB
STATUS
CALIBRATION
AUTO
TRUE
INTEGRATED HEADING SENSOR
PG-1000
Corrects the heading.
Selects output data format; magnetic or true
Turns on and off deviation corrections.

*Figure 18 Front panel of PG-1000*

## 2.2 Turning the Power On/Off

**Note:** You may leave port after the STATUS LED begins lighting (not blinking).

Power to the sensor unit may be turned on or off at the mains switchboard.

1. Turn the mains switch on.

   STATUS LED blinks. About two minutes later it lights. Bearing is now reliable.

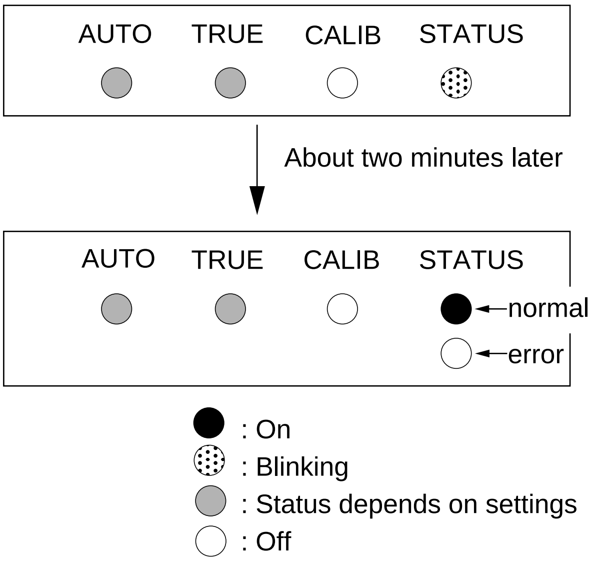

AUTO
TRUE
CALIB
STATUS
About two minutes later
AUTO
TRUE
CALIB
STATUS
normal
error
: On
: Blinking
: Status depends on settings
: Off

*Figure 19 LED state at power on*

## 2.3 Automatic Distortion Compensation

Magnetic field distortion can be automatically corrected as follows:

Note: This function is only effective after correcting for magnetic field distortion (refer to page 5).

1. Press the [AUTO] key more than two seconds to light the AUTO LED.

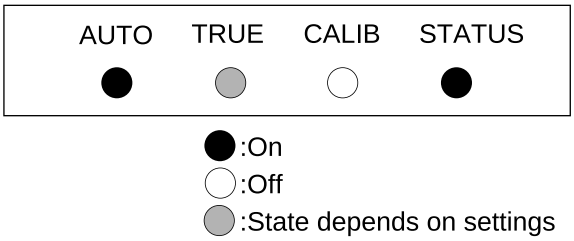


*Figure 20*

2. To cancel automatic compensation, press the [AUTO] key more than two second to turn off the AUTO LED.

**Note 1:** Turn off this function when your boat is near a steel ship or iron bridge, since they affect sensor performance.

**Note 2:** Correct distortion whenever you feel error is excessive.

## 2.4 Selecting Output Data Format

The PG-1000 can output heading true or magnetic. The default setting is magnetic heading in AD-10 format.

**⚠ CAUTION**

**Turn off the autopilot before selecting output data format.**

The autopilot may turn the rudder suddenly.

1. Connect Furuno GPS Navigator to PG-1000.

   RMC or VTG data is required which contains GPS position in RMC, SOG (speed over ground) and COG (course over ground) in VTG.

2. Set up magnetic variation (manual or automatic) at the GPS navigator.
3. Press the [TRUE] key more than two seconds.

   The TRUE LED blinks. It lights when receiving data from the navaid.

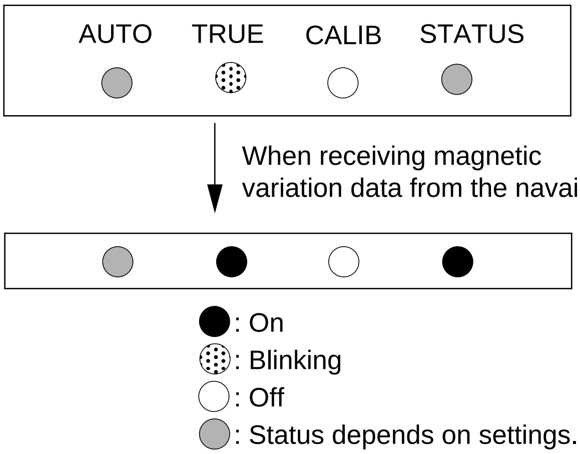

AUTO
TRUE
CALIB
STATUS
When receiving magnetic variation data from the navaid.
● : On
: Blinking
○ : Off
: Status depends on settings.

*Figure 21*

**Note:** If the TRUE LED dose not light within 90 seconds after pressing the [TRUE] key, check that the GPS navigator is connected and properly working.

4. To return to magnetic heading output, press the [TRUE] key more than two seconds to turn off the TRUE LED.

**Note 1:** If the PG-1000 stops receiving magnetic variation data while outputting true heading, the TRUE LED stops lighting and blinks. The last used variation data is used.

**Note 2:** Magnetic variation cannot be corrected manually at the PG-1000. Therefore, if you desire true heading output but do not have a navigation aid, you may enter appropriate variation as shown in 1.6 Heading Alignment on page 6.

**Note 3:** HDM and HCC sentence are magnetic heading output sentences. HDG sentence must be changed to true heading at the equipment connected, by using the magnetic heading and magnetic variation data in the sentence.

# 3 MAINTENANCE & TROUBLESHOOTING

## 3.1 Maintenance

Regular maintenance is important to maintain intended performance over a long period. Regularly check the following:

- Clean the component with a soft cloth. Do not use chemical cleaners; they can remove paint and markings.
- Make sure all connections are tight.
- Check the ground terminal for corrosion. Clean if necessary.

## 3.2 Troubleshooting

The table below provides simple troubleshooting procedures which the user can follow to restore normal operation. If normal operation cannot be restored do not check inside the equipment; there are no user-serviceable parts inside. Any repair work should be referred to a qualified technician.

| Symptom | Remedy |
|---|---|
| Unit cannot be powered. | • Check power connector.<br>• Check the ship's mains. |
| LEDs do not light. | • Check power connector.<br>• Do the diagnostic test.<br>(Refer to the next page.) |
| Heading data error. | • Do the self-test.<br>(Refer to the next page.) |
| The heading data is not output to external equipment. | • Check connections.<br>• Do the diagnostic test.<br>(Refer to the next page.) |

## 3.3 Diagnostic test

The PG-1000 has a self-test which checks the circuit board and keys for proper operation.

### LED/KEY/ROM/RAM test

1. Disconnect the power cable from the equipment.
2. While pressing the [AUTO] key, reattach the power cable.

   The test sequence is as below.

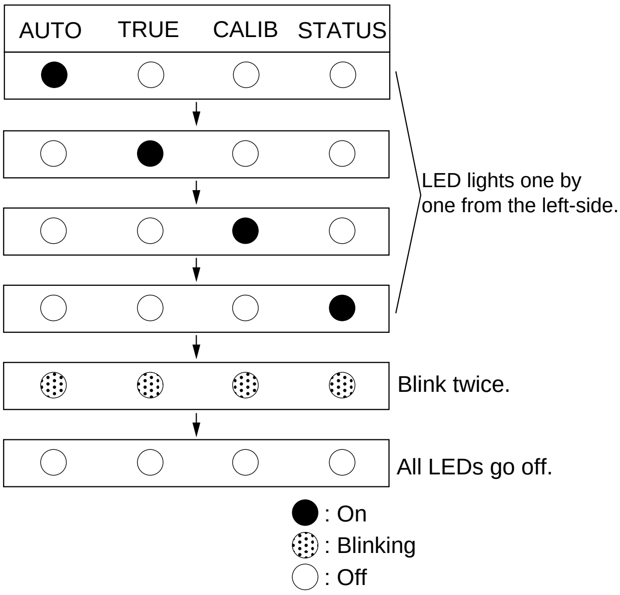

AUTO
TRUE
CALIB
STATUS
LED lights one by one from the left-side.
Blink twice.
All LEDs go off.
● : On
: Blinking
○ : Off

*Figure 22 Sequence of LED test*

3. Press each key one by one.

   LED corresponding to the key lights if the key is normal.

   [AUTO] key: AUTO LED
   [TRUE] key: TRUE LED
   [-] key: CALIB LED
   [+] key: STATUS LED

4. Press the [AUTO] and [TRUE] keys together more than two seconds after checking all keys. Then, the ROM and RAM are checked.

   AUTO LED lights: RAM is normal.

   TRUE LED lights: ROM is normal.

5. Press the [AUTO] and [TRUE] keys together more than two seconds to escape from the test. The STATUS LED blinks while the equipment is being calibrated and lights when the calibration is completed (return to normal mode). Do not operate the sensor while the LED is blinking; calibration will be incomplete.

### EEPROM/Sensor test

This test checks the EEPROM and sensor. All default settings (navigation setting, output sentence, output interval, etc.) are restored at the completion of the test. Do this test after dismounting the equipment.

1. Disconnect the power cable off from the equipment.
2. While pressing the [TRUE] key, reattach the cable. All LEDs go off.
3. After AUTO LED lights, turn the equipment through a circle slowly instead of ship's movement until TRUE LED lights. The test proceeds in the sequence shown below.

When the equipment finds error, LEDs do not light.

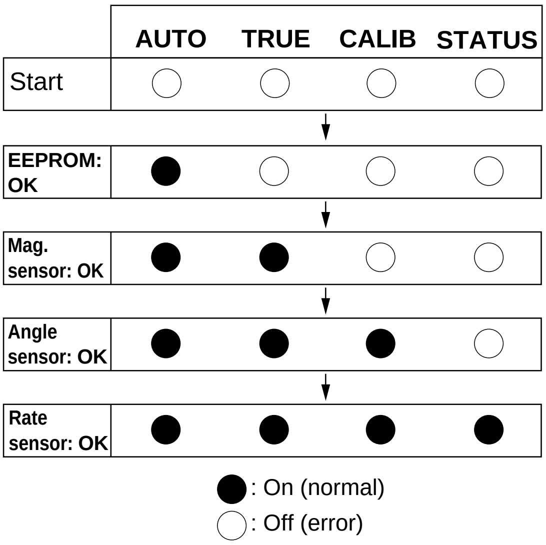

AUTO
TRUE
CALIB
STATUS
Start
EEPROM: OK
Mag. sensor: OK
Angle sensor: OK
Rate sensor: OK
● : On (normal)
○ : Off (error)

*Figure 23 EEPROM/Sensortest sequence*

4. Disconnect the power cable off from the equipment, and then reattach it.
5. Mount the equipment at the previous position, referring to page 3.

## 3.4 Displaying Program Version No.

When the equipment is powered on, the program no., denoted by LEDs in binary notation, is shown about 1 second.

For example, LED state shown below means the program no. is 5.

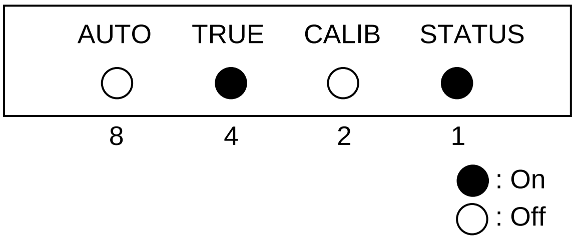
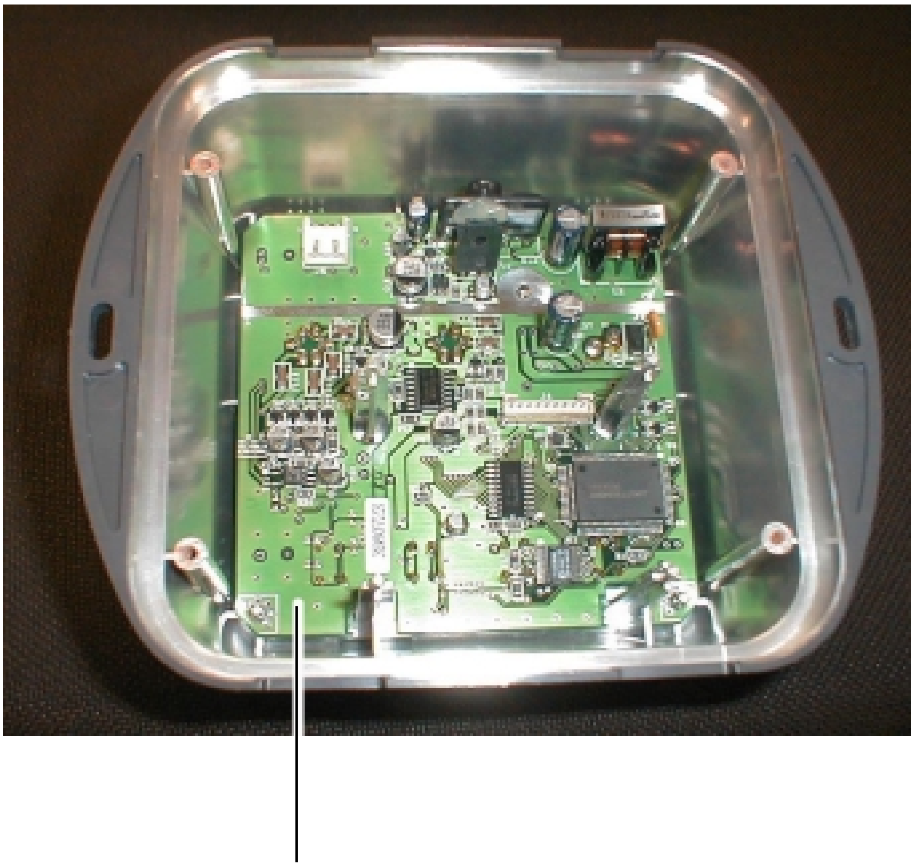


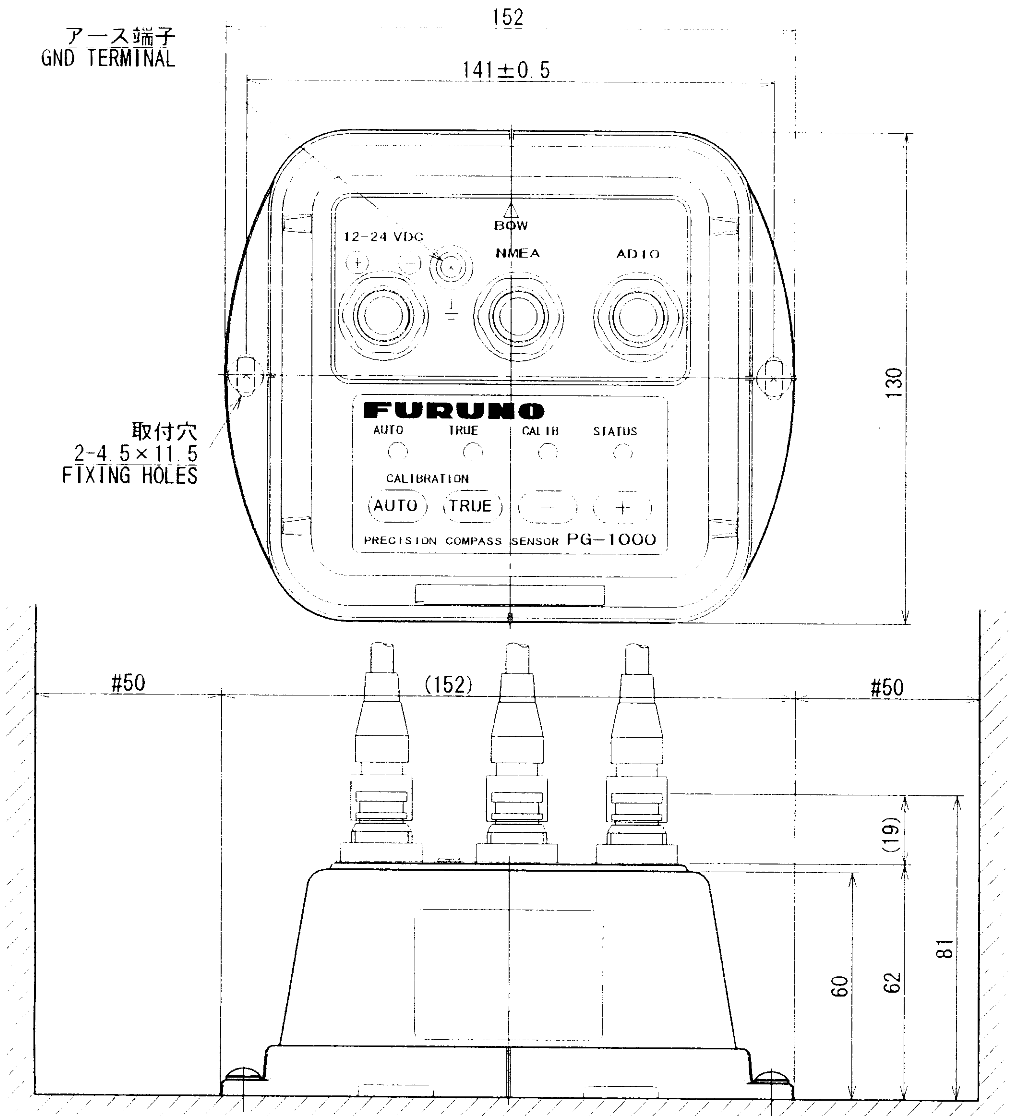
*Figure 24 LED state and program version no.*

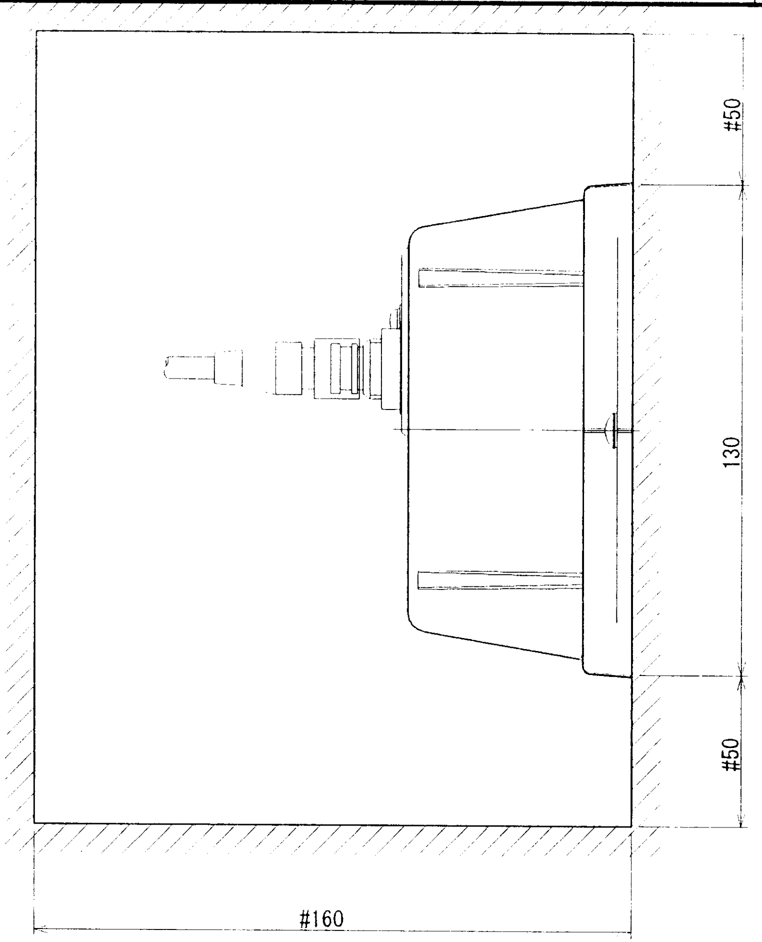
# PARTS LOCATION AND LIST



*PG-1000, cover opened*

| Name | Type | Code No. | Remarks |
|---|---|---|---|
| CPU Board | 64P1135 | 004-415-110 | |


アース端子
GND TERMINAL
152
141±0.5
130
取付穴
2-4.5×11.5
FIXING HOLES
BOW
12-24 VDC
NMEA
ADIO
FURUNO
AUTO
TRUE
CALIB
STATUS
CALIBRATION
AUTO
TRUE
PRECISION COMPASS SENSOR PG-1000
#50
(152)
#50
(19)
60
62
81


#50
130
#50
#160

注記

1）指定なき寸法公差は表1による。

2）#：推奨する最小サービス空間寸法。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

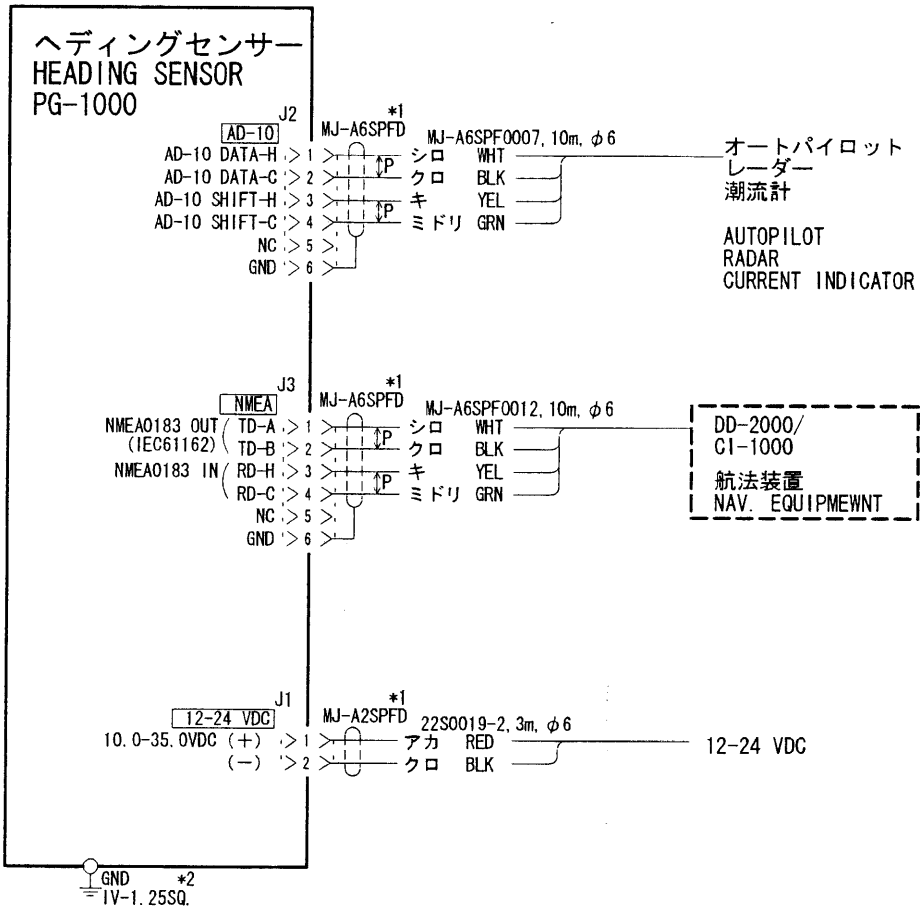
2. #: RECOMMENDED SERVICE CLEARANCE.

表 1　TABLE 1

| 寸法範囲(mm) DIMENSION | 公差(mm) TOLERANCE |
|---|---|
| 0＜L≦50 | ±1.5 |
| 50＜L≦100 | ±2.5 |
| 100＜L≦500 | ±3 |

| | | | |
|---|---|---|---|
| DRAWN Aug 8 '00 T.YAMASAKI | | TITLE | PG-1000 |
| CHECKED Aug 8 '00 Y.K | | 名称 | ハイブリッドヘディングセンサー |
| APPROVED Aug 8 '00 Y.K | | | 外寸図 |
| SCALE | MASS 0.33 kg ±10% | NAME | INTEGRATED HEADING SENSOR |
| DWG. No. C7246-G01- B | 64-022-1100-G1 | | OUTLINE DRAWING |

FURUNO ELECTRIC CO., LTD.


ヘディングセンサー
HEADING SENSOR
PG-1000
J2
AD-10
*1
MJ-A6SPFD
MJ-A6SPF0007, 10m, φ6
AD-10 DATA-H 1
AD-10 DATA-C 2
AD-10 SHIFT-H 3
AD-10 SHIFT-C 4
NC 5
GND 6
P
P
シロ WHT
クロ BLK
キ YEL
ミドリ GRN
オートパイロット
レーダー
潮流計
AUTOPILOT
RADAR
CURRENT INDICATOR
J3
NMEA
*1
MJ-A6SPFD
MJ-A6SPF0012, 10m, φ6
NMEA0183 OUT (IEC61162) TD-A 1
TD-B 2
NMEA0183 IN RD-H 3
RD-C 4
NC 5
GND 6
P
P
シロ WHT
クロ BLK
キ YEL
ミドリ GRN
DD-2000/
CI-1000
航法装置
NAV. EQUIPMEWNT
J1
12-24 VDC
*1
MJ-A2SPFD
22S0019-2, 3m, φ6
10.0-35.0VDC (+) 1
(−) 2
アカ RED
クロ BLK
12-24 VDC
GND *2
IV-1.25SQ.

注記

＊１）工場にて取付済み。
＊２）現地手配。
＊３）オプション。

NOTE

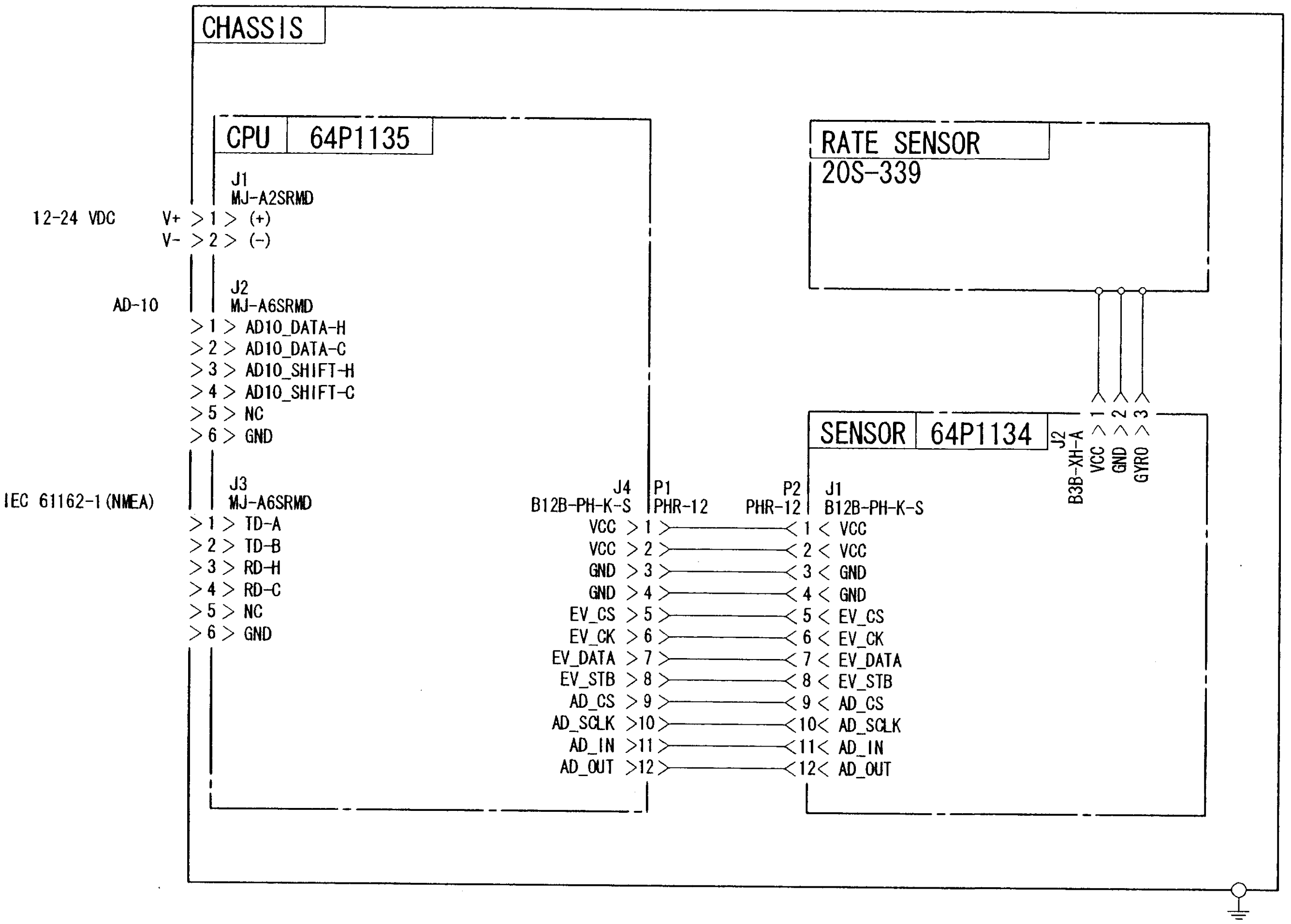
*1. FITTED AT FACTORY.
*2. LOCAL SUPPLY.
*3. OPTION.

DRAWN Oct 5 '00 T. YAMASAKI
CHECKED Oct 6 '00
APPROVED Oct 6 '00
SCALE
MASS kg
DWG. No. C7246-C01- E

TITLE PG-1000
名称 ハイブリッドヘディングセンサー
相互結線図
NAME INTEGRATED HEADING SENSOR
INTERCONNECTION DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO


CHASSIS
CPU 64P1135
J1
MJ-A2SRMD
12-24 VDC
V+ >1> (+)
V- >2> (-)
J2
MJ-A6SRMD
AD-10
>1> AD10_DATA-H
>2> AD10_DATA-C
>3> AD10_SHIFT-H
>4> AD10_SHIFT-C
>5> NC
>6> GND
J3
MJ-A6SRMD
IEC 61162-1(NMEA)
>1> TD-A
>2> TD-B
>3> RD-H
>4> RD-C
>5> NC
>6> GND
J4
B12B-PH-K-S
VCC >1
VCC >2
GND >3
GND >4
EV_CS >5
EV_CK >6
EV_DATA >7
EV_STB >8
AD_CS >9
AD_SCLK >10
AD_IN >11
AD_OUT >12
P1
PHR-12
P2
PHR-12
J1
B12B-PH-K-S
1< VCC
2< VCC
3< GND
4< GND
5< EV_CS
6< EV_CK
7< EV_DATA
8< EV_STB
9< AD_CS
10< AD_SCLK
11< AD_IN
12< AD_OUT
RATE SENSOR
20S-339
SENSOR 64P1134
J2
B3B-XH-A
VCC >1
GND >2
GYRO >3

| | | | | |
|---|---|---|---|---|
| DRAWN Oct 5 '00 T.YAMASAKI | | | TITLE | PG-1000 |
| CHECKED Oct 6 '00 | | | 名称 | ハイブリッドヘディングセンサー |
| APPROVED Oct 6 '00 | | | | 回路図 |
| SCALE | MASS kg | | NAME | INTEGRATED HEADING SENSOR |
| DWG. No. | C7246-K01- E | 64-022-5010- 0 | | SCHEMATIC DIAGRAM |

**FURUNO ELECTRIC CO., LTD.**