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Installation Manual

MGC® COMPASS

Gyro compass - R-series

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Gyro Compass - R-series
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MGC-D-114/408705/15/O

Document history

Document number: MGC-D-114/408705 / Revision 15/O		
Rev. 1	November 2015	First issue.
Rev. 2	November 2016	The operating temperature range on sensor unit and repeater junction box is changed. The DNV GL product certificate is added. The heading resolution on the NMEA output formats HDT and THS is changed to 0.01 degrees.
Rev. 3	January 2017	The MGC R2 COMPASS product included in this manual
Rev. 4	November 2018	Description of using neoprene dampers as an option for noise reduction is included. The power and wiring layout drawing have been corrected for incorrect PWR input wiring.
Rev. 5	May 2019	The heading specification is updated. The MGC-E-JB6 connection box description is included. Updated to correspond with MRC+ version 5.07.00.
Rev. 6	September 2019	Corrected color code on pin 11 and 12 on the MGC JB6 connection box cable wiring.
Rev. 7	December 2019	Configuration of analog output from MGC-E-JB6 is described
Rev. 8	January 2021	Updated to correspond with renewed IMO type approval certificate and JB7 junction box.
Rev. 9	April 2021	The text for pin 10 and pin 20 on J6 terminal on MGC JB7 has been exchanged. Updated heading specification for MGC R1.
Rev. 10	May 2021	Added description of the MGC JB7 web configuration program.
Rev. 11	October 2022	Restructuring of document. Description of LEDs in MGC JB7. Gain calculation for analog Rate-of-Turn corrected. Updated relay description. Updated MGC JB7 configuration program description for JB7 software version 1.00.04.
Rev. 12	February 2023	Added how to turn on system, grounding information.
Rev. 13	March 2023	Added Switch Over Unit functionality.
Rev. 14	March 2024	Added NMEA VER, PSXN 20 and PSXN 23 telegrams.
Rev. 15	October 2024	Updated with new roll and pitch specifications. Mounting of the MGC adapter dampening plate is added. Enabling SOU functionality and replica ports.

Document information

- Product: MGC® COMPASS
- Document: Installation Manual
- Document part number: MGC-D-114/408705
- Revision: 15/O

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Warning

The equipment to which this manual applies must only be used for the purpose for which it was designed. Improper use or maintenance may cause damage to the equipment and/or injury to personnel. You must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.

Kongsberg Discovery disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Disclaimer

Kongsberg Discovery AS endeavours to ensure that all information in this document is correct and fairly stated, but does not accept liability for any errors or omissions.

Support information

If you require maintenance or repair, contact Kongsberg Discovery's support organisation. You can contact us using the following address: support.seatex@kd.kongsberg.com. If you need information about our other products, visit http://www.kongsberg.com/discovery.

Table of contents

About this manual

Purpose of manual

The purpose of this manual is to provide the information, procedures and basic drawings required for the physical installation of the R-series MGC® COMPASS.

Target audience

The publication is intended for technical personnel such as skilled shipyard and factory workers, electricians, qualified engineers, and naval architects.

License information

The MGC product requires an export license.

Software version

This manual and the IMO (International Maritime Organisation) type approval apply to MRU software version 5.06.xx and MRC+ version 5.08.xx.

Registered trademarks

MGC® is a registered trademark in Norway and Europe.

Maintenance purposes

This publication is also intended as reference material for the maintenance personnel. Keep this publication for later use.

MGC® COMPASS

Topics

System description

The MGC® COMPASS consists of the MGC Sensor Unit and the MGC JB7 Junction Box.

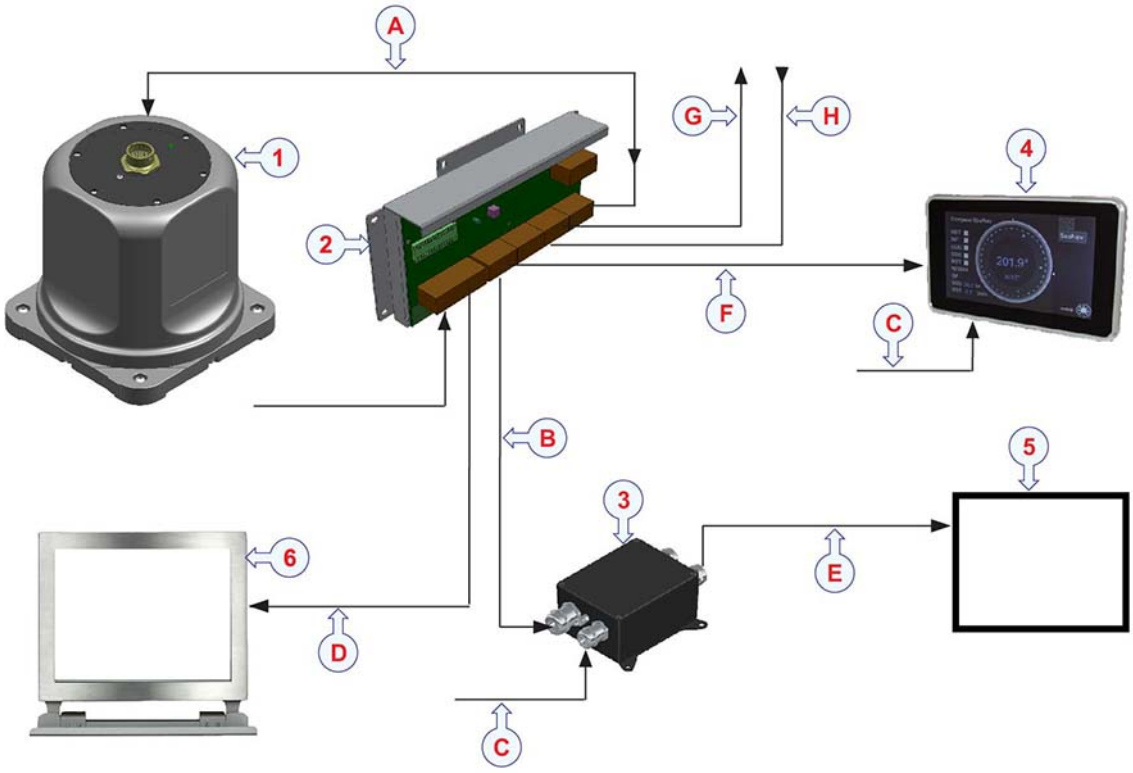
The MGC® COMPASS is type approved by IMO (International Maritime Organisation) as a gyro compass for navigation purposes. It can be used together with a heading and bearing repeater.

The MGC® COMPASS can also be operated as an inertial navigation system. Then it will output position and heading. Linear position and velocity measurements can be output in up to four different points on the vessel.

Special arrangements have been made with regard to mounting of the unit. This makes it easy to align the unit with the vessel axis.

System diagram

The system diagram identifies the main components of a basic MGC® COMPASS system.



Main units

1 *MGC Sensor Unit*

2 *MGC JB7 Junction Box*

3 *MGC JB5 repeater Junction Box*

4 *Alert display*

5 *Data receivers: Heading and bearing repeaters*

6 *Computer with web and MRC+ configuration software*

Cables

A *Sensor Unit cable (MRU-E-CS8)*

B *Repeater data cable*

C *Power cable (24 V DC)*

D *Ethernet cable (shielded)*

E *Data receiver data cable*

F *Ethernet cable*

G *Data output cable for NMEA messages*

H *Data input cable for NMEA messages*

System units

Topics

Sensor Unit description

The Sensor Unit is a north-seeking gyro compass. It is based on three Ring Laser Gyros (RLG) and three linear accelerometers. The unit can also be operated as an inertial navigation system. Then it will output position and heading.

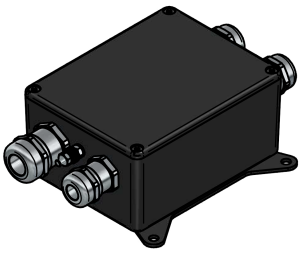
MGC JB7 Junction Box description

The Junction Box provides extended interfaces between the Sensor Unit and external equipment. The Junction Box is delivered with connectors and pigtail cable(s).

The Junction Box is often mounted inside a cabinet with cable ducts and termination terminals.

MGC JB5 Repeater Junction Box description

The Junction Box provides connection terminals for the heading and bearing repeater.



Alert display - description

This 7" Alert display is a web view display used for visualization and configuration of the connected MGC JB7 Junction Box.

The design allows for different mounting solutions. Panel mount, flange mount, DIN rail mount and RAM bracket mount. It is a touch display. It is quick to install and easy to operate. Communication with the display is via LAN (local area network). The required software is pre-installed.

Scope of supply

Basic items

Observe the basic items provided with a standard MGC® COMPASS delivery.

- 1 ea MGC Sensor Unit

  MGC-R1-COMPASS, MGC-R2-COMPASS, MGC-R3-COMPASS, MGC-R4-COMPASS, MGC-R5-COMPASS.
- 1 ea angle bracket

  For alignment of the Sensor Unit, MGC-M-AB1.
- 1 ea MGC Junction Box

  Junction box with serial communication, Ethernet and DC power input, MGC-E-JB7.
- 1 ea MGC repeater junction boxes

  For data receivers, MGC-E-JB5.
- 1 ea MGC Sensor Unit cable

  Heavy-duty screened cable with MGC connector, MGC-E-CS8.
- 1 ea Ethernet cable

  Shielded crossover cable, 1.5 metres, MRU-E-CE2.
- 1 ea Sensor Unit transportation box

  MGC-M-SC51.
- 1 ea MGC configuration software and end user documentation

  Software, calibration file and documentation on USB flash drive, MGC-SW-ED.

Additional required items

Additional items are required for operation. Additional required items can be purchased from Kongsberg Discovery AS or from a third party supplier.

- Computer for configuration purposes

- Data output cable for NMEA messages
- Data input cable for NMEA messages
- Display

Additional optional items

The following additional optional items can be used together with the MGC® COMPASS. Additional optional items can be purchased from Kongsberg Discovery AS.

- Sensor Unit adapter dampening plate, MGC-M-AP4
- Cabinet for mounting of MGC Junction Box
- Alert display

Product restrictions

Topics

Restrictions in export, page 14

Restrictions in guarantee, page 14

Restrictions in export

Export of the MGC component requires an export license.

Important

Notice to customer/importer/end user.

The MGC specified here is shipped from Norway in accordance with the Ministry of Foreign Affairs' Official Notification on Export Control and U.S. Export Administration Regulations (EAR).

The MGC will be subject to restrictions if re-exported from your country, including but not limited to a re-export license from the US Government.

Restrictions in guarantee

Changes or modifications to the product not explicitly approved by Kongsberg Discovery AS will void the guarantee.

The liability of Kongsberg Discovery AS is limited to repair of this product only under the given terms and conditions stated in the sales documents. Consequential damages

such as customer's loss of profit or damage to other systems traceable back to this product's malfunctions, are excluded.

The warranty does not cover malfunctions of the product resulting from the following conditions.

- The Sensor Unit is not shipped in the original transportation box.
- The Sensor Unit has been exposed to extreme shock and vibrations.
- The Sensor Unit housing has been opened by the customer.
- Incorrect power connection.

Network security

If the MGC® COMPASS product is connected to a local area network, data security is important.

Equipment manufactured by Kongsberg Discovery is often connected to a local area network (LAN). When you connect a computer to a local area network you will always expose the data on that computer. All the other computers connected to the same network may be able to access your data. Several threats are imminent:

- Remote computers can read your data.
- Remote computers can change your data.
- Remote computers can change the behavior of your computer, for example by installing unwanted software.

Usually, two parameters are used to define the threat level:

1 The likelihood that any remote computer will do any of the above.

2 The damage inflicted if a remote computer succeeds doing any of the above.

Kongsberg Discovery has no information about your complete system installation. Products provided by Kongsberg Discovery are always regarded as stand-alone offline systems. They are regarded as stand-alone even though they may be connected to a local area network for sensor interfaces or data distribution.

Note

No network safety applications are installed on Kongsberg Discovery computers. The computer is not protected against viruses, malware or unauthorized access by external users.

Securing the MGC® COMPASS system has no meaning unless you have established a policy that secures all the computers on the network. This policy must include physical access by trained and trusted users. The customer or end user of the MGC® COMPASS system is responsible for defining and implementing a security policy and providing the relevant network security applications.

Note

Kongsberg Discovery will not accept any responsibility for errors or damages caused by unauthorized use of or access to the MGC® COMPASS system.

Support information

If you need technical support for your product you must contact a Kongsberg Discovery office. A list of all our offices is available on our website.

- **Company name**: Kongsberg Discovery AS
- **Address**: Havnegata 9, N-7010 Trondheim, Norway
- **Telephone**: +47 33 03 41 00
- **Telephone, global 24h support**:

  Europe, the Middle East and Africa: +47 33 03 24 07

  Asia Pacific: +65 97 11 24 07

  Americas: +15 04 303 5244
- **E-mail address**: support.seatex@kd.kongsberg.com
- **Website**: http://www.kongsberg.com/discovery

KM-Support App

Kongsberg Discovery support is also available in the KM-Support App. Our support application is available for free in the App Store and Google Play.

Preparing the installation

Topics

Mechanical drawings

Outline dimension drawings are included in this manual.

Unless otherwise specified, all measurements are in millimetres. The drawings are not to scale.

Related topics

Drawings, page 85

Necessary tools and equipment

We assume that you are equipped with a standard set of tools. This tool set must comprise the normal tools for electronic and electromechanical tasks. This includes different screwdriver types, pliers, spanners, a cable stripper, a soldering iron, etc.Each tool must be provided in various sizes. We recommend that all tools are demagnetized to protect your equipment.

Unless otherwise stated, all mounting hardware (such as bolts, nuts, washers, screws etc.) referred to in this document is to be supplied by the customer or the shipyard.

Special equipment:

- Torque screwdriver, less than 10 Nm

Sensor Unit transportation box

The unit is shipped in a specially designed transportation box. Keep the unit stored within the box until everything is ready for installation of the unit.

Note

After the unit has been installed, please keep the transportation box. The unit must be shipped in this box for maintenance or repair in order to maintain the warranty.

Location of hardware units

Topics

Sensor Unit location

Correct location of the unit is important for the system performance. Consider these factors when installing the unit.

- The unit is designed for installation in an indoor environment and for operation within the temperature range.
- Mount the unit with the Forward arrow on the Sensor Unit top pointing in the bow direction and parallel to the centre line of the vessel.
- Mount the unit onto a rigid and stable structure. Mount the unit directly onto the hull structure, if possible.
- Mount the unit away from areas with high frequency vibrations. Such as hydraulic pumps and valves.
- Mount the unit away from the heat of machinery, heaters and air conditioning systems.
- Mount the unit in a location where it is not subject to sea water.

Be aware of vibrations

The unit has some sensitivity to vibrations around sequences of 100 Hz (100, 200, 300 Hz and so on). Such vibrations should not exceed 0.5 m/s^2 in any direction.

Be aware of resonance

Take care when mounting the Sensor Unit to the vessel's hull. This to avoid self-resonance, which in turn can amplify the dithering frequencies of the gyroscopes. Around 600 Hz. A correctly mounted Sensor Unit will typically emit 58 - 64 dBA (1 metre). If not mounted correctly, the sound pressure level may increase to 85 dBA.

Be aware of temperature changes

The unit is sensitive to frequent temperature changes. The safest location for the unit is where the temperature is low and the changes in temperature are slow.

Be aware of corrosion

The unit must not be subject to an environment which can cause corrosion. For example exposure to sea water.

Related topics

Sensor Unit dimensions, page 86
Adapter dampening plate dimensions, page 89
Mounting the Sensor Unit, page 22
Mounting the adapter dampening plate and Sensor Unit, page 25

MGC JB7 Junction Box location

Consider these factors when installing the junction box.

- The Sensor Unit cable is 5 metres long. The junction box must be placed within the distance of the 5-metre Sensor Unit cable.
- The junction box can be mounted inside a cabinet or it can be mounted as a stand-alone unit directly on the bulkhead.
- If you mount the junction box within a cabinet, place the cabinet within two meters of the Sensor Unit.
- Make sure that the cabinet door can be fully opened for unrestricted access.

Related topics

MGC JB7 Junction Box dimensions, page 90
Cabinet dimensions, page 94
Installing the MGC JB7 Junction Box as a stand-alone unit, page 29
Installing the MGC JB7 Junction Box inside a cabinet, page 30

Display location

Consider these factors when installing the display.

- The display must be placed at a location which makes it easily visible to the operator.
- The display is designed for indoor installation.

Related topics

Display dimensions, page 93
Mounting the display in a panel, page 33
Mounting the display in the bracket, page 34
Mounting the display on a DIN rail, page 35
Mounting the display with a flange, page 37

MGC JB5 Repeater Junction Box location

Consider these factors when installing the Junction Box.

- Place the Junction Box close to the repeater. The distance is determined by the length of the cable.
- Place the Junction Box on the floor or on a wall.
- Place the Junction Box in a location where it is easily accessible.

Related topics

MGC JB5 Repeater Junction Box dimensions, page 92
Installing the MGC JB5 Repeater Junction Box, page 32

Repeater unit location

Heading repeater

Consider these factors when installing the unit.

- The best location is typically on the bridge.

Bearing repeater

Consider these factors when installing the unit.

- The best location is typically on the bridge wings.

MGC® COMPASS power requirements

The MGC® COMPASS must be powered by a clean 24 V DC source. The MGC® COMPASS power lines are galvanically isolated from the signal circuits inside the unit. The maximum isolation voltage inside the MGC® COMPASS is 200 V DC.

Caution

Permanent damage to the MGC® COMPASS may occur if power is applied to the Ethernet or digital conductors. Therefore, it is very important to measure the power voltage at the connector before the MGC® COMPASS is connected. Any damage resulting from incorrect connection or power, is not covered by the Kongsberg Discovery AS warranty.

Related topics

Mounting the Sensor Unit, page 22
Mounting the adapter dampening plate and Sensor Unit, page 25

System communication ports description

The MGC® COMPASS has 8 communication lines. The digital communication lines COM1, COM2, COM3, COM4, COM5, COM6, COM7 and COM8 have separate ground (GND). They are isolated from the MGC® COMPASS power system.

The Ethernet connection pins RJ_1, 2, 3 and 6 are isolated from the MGC® COMPASS power system.

COM 1, 2, 3 and 4

These ports are RS-422 input and output lines. Transmit is on OUT and receive on IN.

COM 5

This is an RS-422 output line and input line for PPS. The PPS signal is connected to the PPSA- and PPSB+ terminals. The PPS signal shares ground with the COM5 input.

COM 6, 7 and 8

These are RS-422 output lines. These ports are output on selectable replica port (Replica 1–8).

Ethernet LANs

Three separate LAN ports are available. They are configured through the MGC JB7 web interface.

Installation

Topics

Mounting the Sensor Unit

A correct installation of the Sensor Unit is important in order to ensure high quality and accurate measurements.

Prerequisites

Note

This procedure applies to the MGC R4 and R5 COMPASS models.

You have found a rigid and stable mounting surface for the unit. This is important in order to avoid vibration and resonance.

Context

Sensor Unit base plate

If you make your own base plate, you can use the provided bolt pattern to mark the holes.

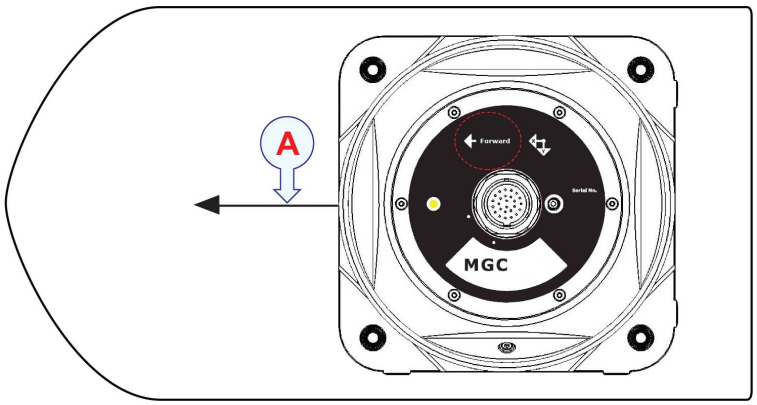
- Place the Sensor Unit and the angle bracket in an orientation where the **Forward** arrow at the top of the unit is pointing in the bow direction.
- Mark seven holes in the mounting surface for the Sensor Unit and the angle bracket screws.
- Remove the Sensor Unit and the angle bracket.
- Drill seven M6 holes in the mounting surface for the Sensor Unit and the angle bracket screws.
- Thread seven M6 screw holes with threaded depth minimum 11 mm.

Sensor Unit angle bracket

It is optional to use the angle bracket. However, it is very useful if you for some reason have to move the Sensor Unit. Then the angle bracket will remain in place and it will be easy to reinstall the Sensor Unit.

Sensor Unit mounting orientation

The default mounting orientation for the unit is with the **Forward** arrow at the top of the unit pointing in the bow direction of the vessel.



A *Bow direction of vessel*

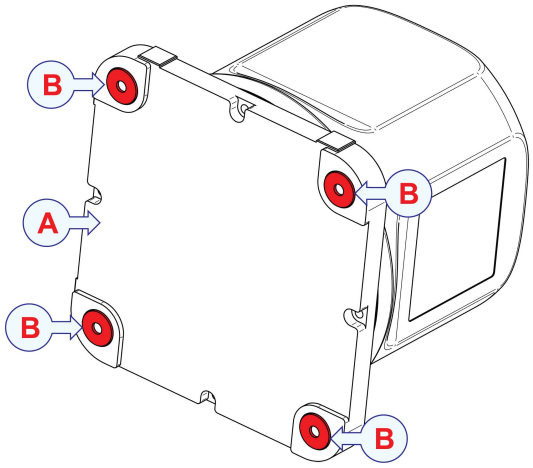
Procedure

1 Identify the best mounting location for the unit.

2 Make sure that the insulation disks surrounding the four screw holes on the Sensor Unit base plate are in place.

Important

This is important for electrical and mechanical insulation of the unit from the mounting surface due to earthing. It is also important in order to prevent corrosion.



A *Sensor Unit base plate*

B *Insulation disks surrounding screw holes*

3 Place the base plate for the Sensor Unit on the mounting surface.

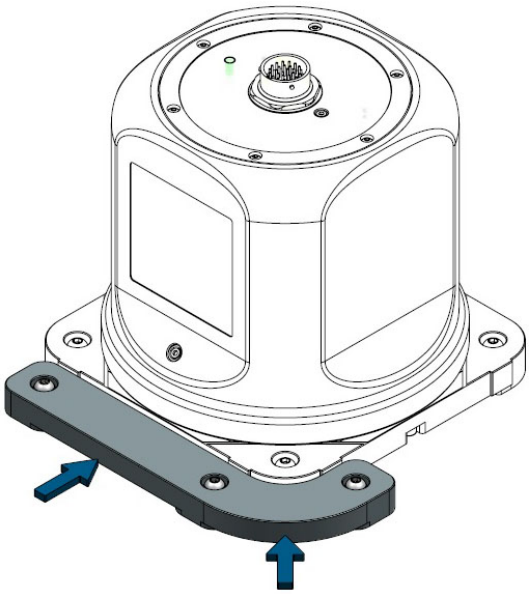
4 Place the Sensor Unit base plate in an orientation where the **Forward** arrow at the top of the unit is pointing in the bow direction.

5 Enter a plastic bushing, a washer and an M6 screw for each Sensor Unit screw hole.

6 Tighten the screws to fasten the Sensor Unit.

Tighten the four M6 screws for the Sensor Unit in steps in a diagonal pattern. Recommended torque steps is 1.5 Nm, 3.5 Nm and 7.9 Nm.

7 Place the angle bracket next to the Sensor Unit.



8 Fasten the angle bracket.

Tighten the three M6 screws in steps while applying pressure to the angle bracket towards the Sensor Unit. Recommended torque steps is 1.5 Nm, 3.5 Nm and 7.9 Nm.

Related topics

Sensor Unit location, page 18
Sensor Unit dimensions, page 86
Angle bracket dimensions, page 87
Sensor Unit and angle bracket mounting, page 88
Cabling between Sensor Unit and MGC JB7 Junction Box, page 42
MGC® COMPASS power requirements, page 20

Mounting the adapter dampening plate and Sensor Unit

A correct installation of the Sensor Unit is important in order to ensure high quality and accurate measurements.

Prerequisites

Note

This procedure applies to the MGC R1, R2 and R3 COMPASS models.

You have found a rigid and stable mounting surface for the unit. This is important in order to avoid vibration and resonance.

If your Sensor Unit is a replacement unit, use the adapter dampening plate to place the Sensor Unit on.

If your Sensor Unit is a new installation, you do not need to use the adapter dampening plate.

Context

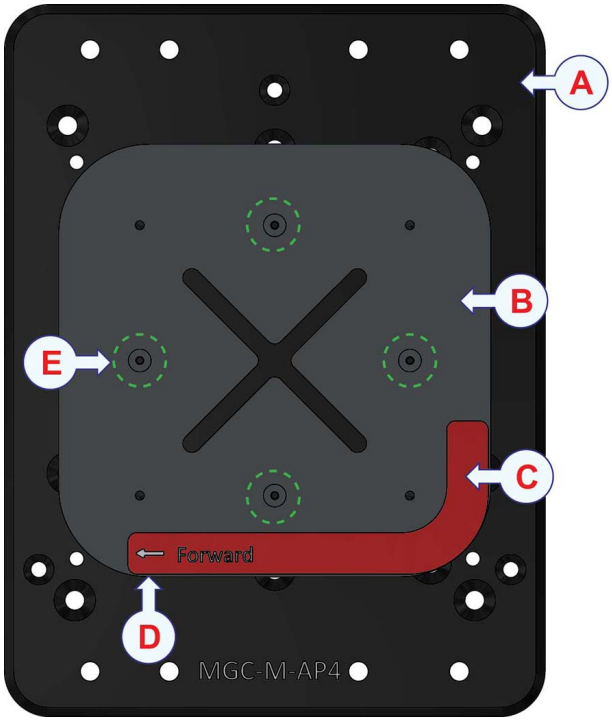
Sensor Unit adapter dampening plate

The ready made adapter dampening plate has holes which fit the Sensor Unit and the base plate for an easier installation. This adapter plate is also designed for replacement of the Sperry Navigat 2100, Navigat X mk1, Navigat 100, Navigat 200 and the Anshutz STD 22 gyro compasses. The mounting holes on the adapter dampening plate will fit the mounting holes on these gyro compasses.

The adapter dampening plate has dampening for noise reduction and can be used to reduce the noise from the Sensor Unit. The adapter plate can be used on the MGC R1 and MGC R2 models without any reduction in accuracy.

If the orientation of the adapter dampening plate can be freely selected, mount the adapter plate with the **Forward** arrow pointing in the bow direction of the vessel.

If you make your own adapter plate, you can use the provided bolt pattern to mark the holes.



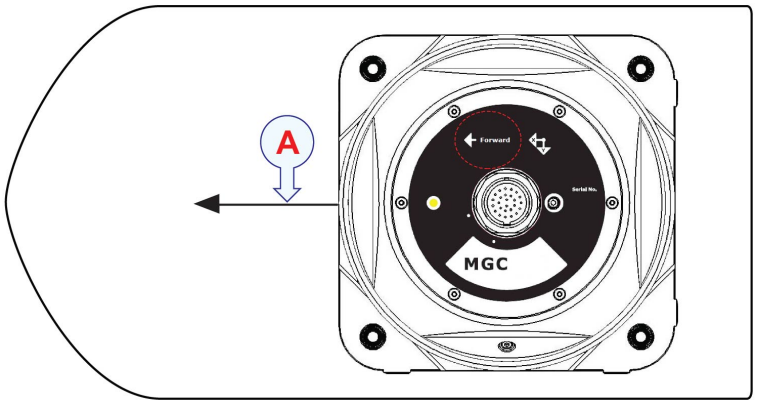
A *Main adapter dampening plate*
B *Middle adapter plate*
C *Angle bracket*
D *Forward arrow*
E *Four damper screws*

Sensor Unit angle bracket

The angle bracket is fixed on the middle adapter plate. The **Forward** arrow label is attached to the angle bracket.

Sensor Unit mounting orientation

The default mounting orientation for the unit is with the **Forward** arrow at the top of the unit pointing in the bow direction of the vessel.



A *Bow direction of vessel*

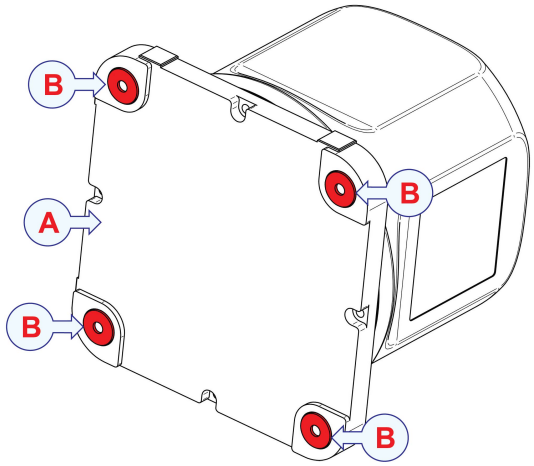
Procedure

1 Identify the best mounting location for the unit.

2 Make sure that the insulation disks surrounding the four screw holes on the Sensor Unit base plate are in place.

Important

This is important for electrical and mechanical insulation of the unit from the mounting surface due to earthing. It is also important in order to prevent corrosion.



A *Sensor Unit base plate*

B *Insulation disks surrounding screw holes*

3 Place the dampening plate for the Sensor Unit on the mounting surface.

4 Identify the best mounting location for the replacement adapter plate either on existing gyro compass holes or by making new holes.

5 When the mounting location has been identified, place the adapter plate on the foundation in the preferred orientation.

6 **Forward arrow is pointing in bow direction of vessel:**

a Fasten the adapter plate to existing holes in the foundation or mark and drill new holes in the foundation according to the adapter plate bolt pattern. Tighten the screws.

7 **Forward arrow is <u>not</u> pointing in bow direction of vessel:**

a Fasten the adapter plate to existing holes in the foundation or mark and drill new holes in the foundation according to the adapter plate bolt pattern. Tighten the screws.

b Disassemble the middle plate by unscrewing the four damper screws.

Use the embrace tool delivered with the adapter plate to unscrew the damper screws.

c Remove the plate.

d Rotate the middle plate so that the Forward arrow label on the angle bracket points in the bow direction of the vessel.

e Place the middle plate on the adapter plate dampers in this orientation.

f Use locking washers on the damper screws and fasten the middle plate to the adapter plate by tightening the screws.

8 Place the Sensor Unit on the adapter plate with the Forward arrow on top of the Sensor Unit pointing in the bow direction of the vessel.

9 Enter the four M6 screw in the Sensor Unit mounting holes and fasten the unit to the adapter plate.

10 Tighten the four M6 screws in steps in a diagonal pattern. Recommended torque steps: 1.5 Nm, 3.5 Nm and finally 7.9 Nm.

Related topics

Sensor Unit location, page 18
Sensor Unit dimensions, page 86
Adapter dampening plate dimensions, page 89
MGC® COMPASS power requirements, page 20
Cabling between Sensor Unit and MGC JB7 Junction Box, page 42

Installing the MGC JB7 Junction Box as a stand-alone unit

The Junction Box provides extended interfaces between the Sensor Unit and external equipment.

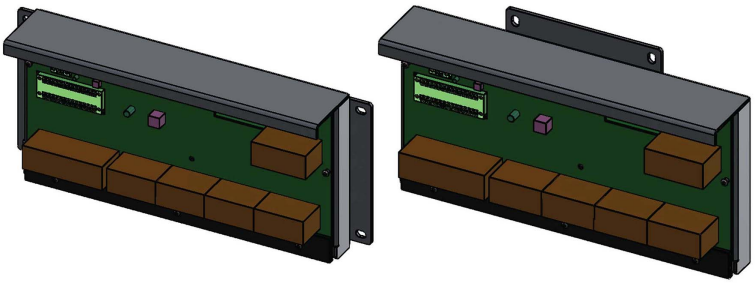
Prerequisites

The junction box can be mounted as a stand-alone unit directly on the bulkhead.

Context

The Sensor Unit cable is 5 metres long. Mount the junction box within the distance of the 5-metre Sensor Unit cable.

Two mounting brackets are included in the delivery. They can be placed vertically or horizontally on the junction box.



Procedure

1 Find a suitable location for the junction box.

2 Attach the mounting brackets to the junction box. Horizontally or vertically.

3 Fasten the junction box with four screws.

4 Secure the screws with washers and nuts.

Related topics

MGC JB7 Junction Box location, page 19
MGC JB7 Junction Box dimensions, page 90
Relays in MGC JB7 Junction Box, page 41
Connecting IEC 61162:1 and IEC 61162:2 devices, page 41
Cabling between Sensor Unit and MGC JB7 Junction Box, page 42
MGC JB7 Junction Box connections, page 45

Installing the MGC JB7 Junction Box inside a cabinet

The Junction Box provides extended interfaces between the Sensor Unit and external equipment.

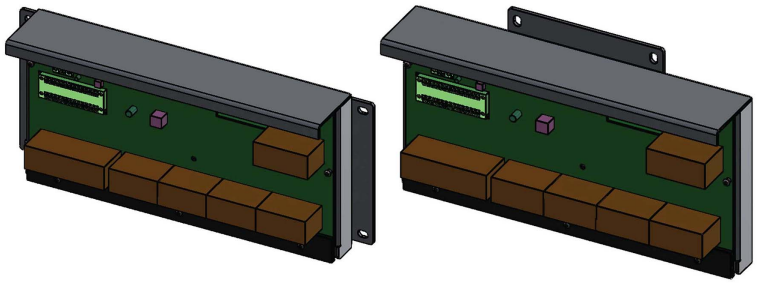
Prerequisites

The junction box can be mounted inside a cabinet. You can use an existing cabinet or you can buy a new one. Make sure that you have a cabinet which is suitable for the junction box installation.

Context

The Sensor Unit cable is 5 metres long. The cabinet must not be mounted more than 4 metres away from the Sensor Unit. Make sure that the cabinet door can be fully opened for unrestricted access.

Two mounting brackets are included in the delivery. They can be placed vertically or horizontally on the junction box.



The illustration shows an example of a junction box mounted inside a cabinet. It shows the junction box, cable ducts, power and communication terminals on a mounting plate. The cabinet used here is a RITTAL AX 1050.000 cabinet.

Procedure

1 Find a suitable location for the cabinet.

2 Attach the mounting brackets to the junction box. Horizontally or vertically.

3 Fasten the junction box with four screws inside the cabinet.

4 Secure the screws with washers and nuts.

Related topics

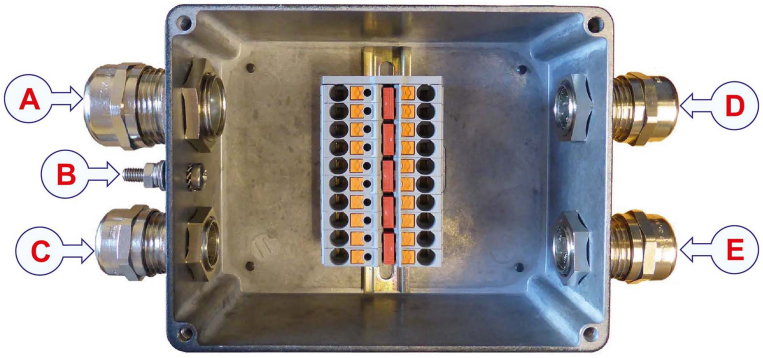
MGC JB7 Junction Box location, page 19
MGC JB7 Junction Box dimensions, page 90
Cabinet dimensions, page 94
MGC JB7 Junction Box wiring inside cabinet, page 95
MGC JB7 power connection inside cabinet, page 96
Relays in MGC JB7 Junction Box, page 41
Connecting IEC 61162:1 and IEC 61162:2 devices, page 41
Cabling between Sensor Unit and MGC JB7 Junction Box, page 42
MGC JB7 Junction Box connections, page 45

Installing the MGC JB5 Repeater Junction Box

The repeater junction box provides connection terminals for data receivers such as heading and bearing repeaters.

Context

The mounting bracket is pre-attached to the box. Mount the box where it is easy to run the cables into the box. The terminals within the box must be easily accessible. The box can be mounted on a wall or a horizontal surface.



A *Signal cable from MGC JB7 Junction Box*

B *Chassis ground*

C *Power cable*

D *Data receiver no. 1 data cable*

E *Data receiver no. 2 data cable*

Procedure

1 Find a suitable location for the junction box close to the repeater.

2 Fasten the box to the surface with four 5 mm screws.

3 Unscrew and remove the lid.

4 Connect the wires for the signal and power cable input. Through glands A and C.

5 Connect the wires for the signal and power cable output. Through glands D and/or E.

6 Replace the lid and tighten the screws.

Related topics

MGC JB5 Repeater Junction Box location, page 20
MGC JB5 Repeater Junction Box dimensions, page 92

Mounting the display in a panel

The display design is prepared for several different mounting methods. One option is to mount it through a panel.

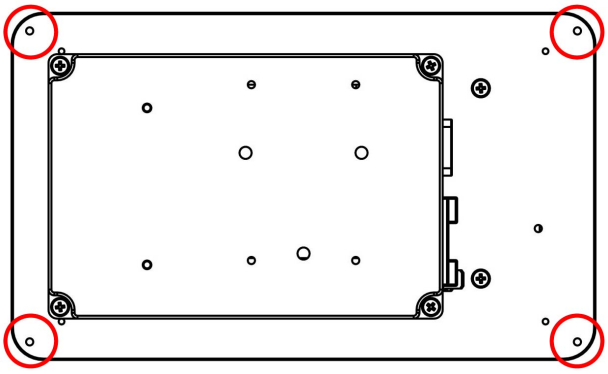
Prerequisites

Note

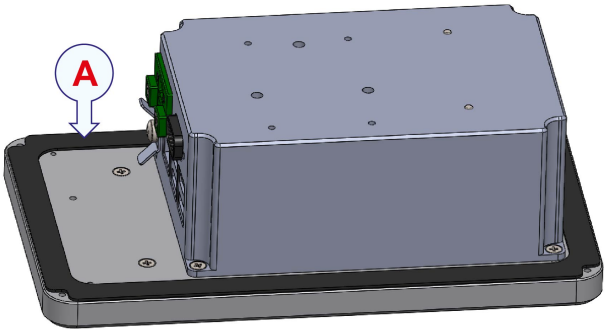
Before you start cutting, make sure there is nothing behind the surface you want to cut through.

Context

Use the illustrated mounting holes when you mount the display in a panel.



A rubber gasket can be used to seal the space between the display and the mounting surface.



A *Rubber gasket (option)*

Procedure

1 Cut a hole in the console, wall or similar surface where the display is to be mounted.

Observe the cutout drawing provided with the display.

2 Mark and drill holes according to the drawing.

3 If you are using a rubber gasket, attach the gasket to the display.

4 Mount the display in the hole and secure with the screws and washers provided.

Result

Once the display has been mounted, you can proceed with the cabling.

Related topics

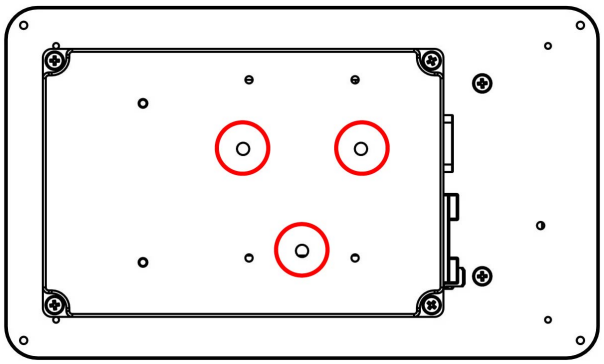
Display location, page 20
Display dimensions, page 93
Cabling for the display, page 50
Cabling with AC power adapter, page 52
Serial connector pin layout, page 52
Display connectors, page 53

Mounting the display in the bracket

The display design is prepared for several different mounting methods. One option is to mount it with a mounting bracket.

Context

Use the illustrated mounting holes when you mount the display in a bracket.



Use the mounting bracket to install the display on a desktop, ceiling or similar surface.The mounting bracket consists of three sections: the two identical base plates and the centre section.

Procedure

1 Place one of the mounting bracket base plates on the ceiling, desktop or similar surface where the mounting bracket is to be mounted.

2 Mark the screw holes.

3 Remove the base plate and drill holes for the screws.

4 Place the base plate over the holes and secure with screws and washers.

5 Attach the other base plate to the rear of the display. Fasten with the provided screws.

6 Assemble the centre section to the base plates.

Result

Once the display has been mounted, you can proceed with the cabling.

Related topics

Display location, page 20
Display dimensions, page 93
Cabling for the display, page 50
Cabling with AC power adapter, page 52
Serial connector pin layout, page 52
Display connectors, page 53

Mounting the display on a DIN rail

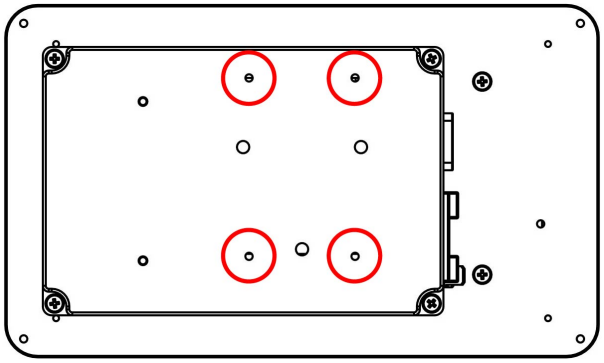
The display design is prepared for several different mounting methods. One option is to mount it on a DIN rail.

Prerequisites

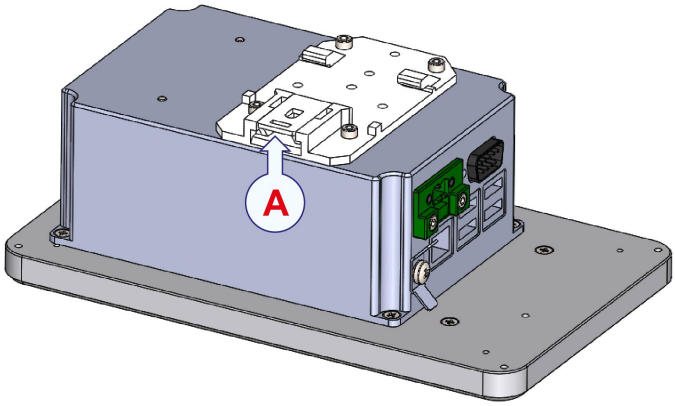
You need a DIN rail to mount the display on.

Context

Use the illustrated mounting holes when you mount the display on a DIN rail. The DIN mounting bracket is delivered with four M3 screws.



The illustration shows the DIN rail bracket mounted to the rear of the display.



A *DIN rail bracket release mechanism*

Procedure

1 Attach the DIN mounting bracket to the rear of the display with the provided screws.

The text on the mounting bracket indicates the correct mounting direction.

2 Clip the display onto the DIN rail.

To remove the display, use a screwdriver to release the display from the DIN rail.

Result

Once the display has been mounted, you can proceed with the cabling.

Related topics

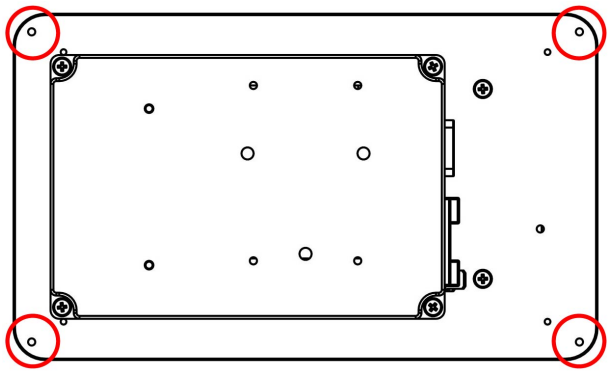
Display location, page 20
Display dimensions, page 93
Cabling for the display, page 50
Cabling with AC power adapter, page 52
Serial connector pin layout, page 52
Display connectors, page 53

Mounting the display with a flange

The display design is prepared for several different mounting methods. One option is to mount it through a panel. If you replace the display with an existing display, you can use a flange to mount the display in the existing hole.

Context

Use the illustrated mounting holes when you mount the display with a flange.



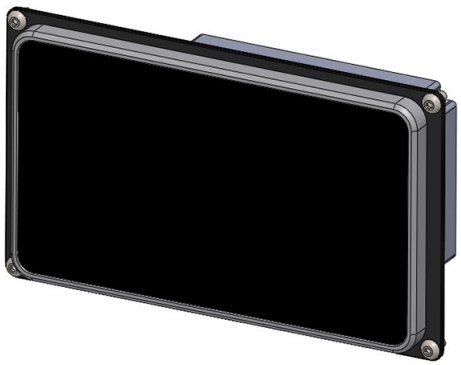
Different flanges can be supplied depending on the display which it shall replace.

We offer flanges for replacement of these products:

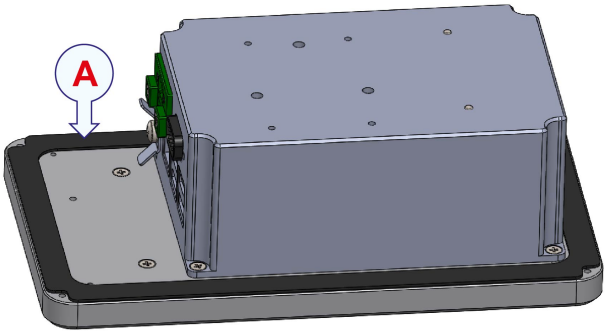
- Kongsberg AIS 100
- Navitwin
- Kongsberg AIS 200/Seapath 20
- Anschutz

The displays for Kongsberg AIS 200/Seapath 20 and Anschutz are smaller than this 7" display. The standard flange can be used for these products.

The illustration shows the display with a standard flange.



A rubber gasket can be used to seal the space between the display and the mounting surface.



A *Rubber gasket (can be ordered as an option)*

Procedure

1 Remove the existing display.

2 Make a cutout for the display if needed.

This depends on the type of flange you want to use.

3 Place the flange over the hole. Mark the holes and remove the flange.

Or you can check if any existing holes can be used.

4 Drill the holes.

5 Place the display in the flange. Fasten the display to the flange with the provided screws with washers.

6 If you are using a rubber gasket, attach the gasket to the display.

7 Place the display with the flange in the hole.

8 Fasten with the provided screws and washers. Or reuse existing screws.

Result

Once the display has been mounted, you can proceed with the cabling.

Related topics

Display location, page 20
Display dimensions, page 93
Cabling for the display, page 50
Cabling with AC power adapter, page 52
Serial connector pin layout, page 52
Display connectors, page 53

Cable layout and interconnections

Topics

MGC JB7 Junction Box grounding system

The Junction Box consist of the following two grounding systems:

Chassis ground (GGND)

The chassis ground is by design equal to power ground. For systems that require a floating chassis ground with reference to power ground, a standard DC/DC converter must be used to supply the Junction Box 24 V input.

Communication ground (CGND)

All the digital communication lines have separate ground (GND) and they are separated from the MGC COMPASS power system. It is important that the ground (GND) for each communication line used is terminated in the junction box. If not, noise on the communication line could occur for baud rates higher than 4800.

Related topics
MGC JB7 Junction Box connections, page 45

Relays in MGC JB7 Junction Box

The junction box has three relays: RL1, RL2 and RL3B. They are 60 Volt, 1 A solid state relays, with form C contacts (NO-C-NC). RL1 and RL2 are for BAM (Bridge Alert Management). The normal state of the relays is inactivated.

- **Relay 1 (RL1)**: Alarm LED. It is activated when heading is invalid.
- **Relay 2 (RL2)**: Alarm Buzzer. It is activated when heading is invalid.
- **Relay 3 (RL3)**: Power Good Indicator. It is activated when only one of the two 24 Volt power inputs are missing.

Related topics
Installing the MGC JB7 Junction Box as a stand-alone unit, page 29
Installing the MGC JB7 Junction Box inside a cabinet, page 30

RS-422 A and B signal definition

Signal state definition according to the IEC 61162-1 standard from the International Electrotechnical Committee.

The idle, marking, logical 1, OFF or stop bit states are defined by a negative voltage on line A with respect to line B. The active, spacing, logical 0, ON or start bit states are defined by a positive voltage on line A with respect to line B. It should be noted that the above A with respect to B levels are inverted from the voltage input/output requirements of standard UARTs and that many line drivers and receivers provide a logic inversion.

Connecting IEC 61162:1 and IEC 61162:2 devices

Devices mentioned in the IEC 61162-1 standard (International Electrotechnical Commission) do not require a signal ground (Common) connection, and could be connected to the TxA-/TxB+ and RxA-/TxB+ pairs only.

According to the IEC 61162-2 standard, a common signal ground is required between devices, hence the Common signal must be terminated in both ends. The MGC JB7 Junction Box connections do not use the cable shield as a conductor, hence the common signal ground should be connected to a separate conductor. The common connector should be connected to the GND connector on the selected port.

The report rate for the THS message IEC 61162-2 devices should be set to 20 ms/50 Hz to comply with the ISO 8728 standard (International Organization for Standardization). A serial device should be connected to the Tx and Rx pair and GND signal (see 61162-1 description above). For listen only devices, connection to the Tx pair and GND is sufficient.

A cable shield should always be connected to equipment chassis in the sender end.

Related topics

Installing the MGC JB7 Junction Box as a stand-alone unit, page 29
Installing the MGC JB7 Junction Box inside a cabinet, page 30

Cabling between Sensor Unit and MGC JB7 Junction Box

The Junction Box provides extended interfaces between the Sensor Unit and external equipment.

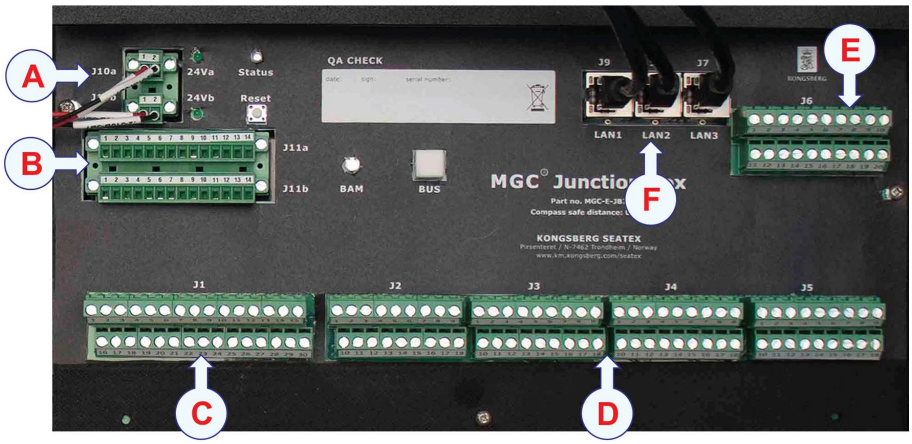
Context

The Junction Box can be mounted inside a cabinet or it can be stand-alone.

Cables with shield has to be used in order to fulfil the MGC® COMPASS power and EMC requirements. The cable shield must be connected to ground in both ends.

The terminal blocks for the J1 to J6 terminals can accommodate wires of until 2.5 mm^2.

The web interface is used for configuration of the output on the replica ports. In the web interface you can select which COM port (COM 1 to COM 8) to be replicated at the preferred replica port. For each replica port, the signal is available on three terminals (RXA, RXB and RXC, where X is the replica port number).



A	*Power connections*	**D**	*Replica ports*
B	*Sensor Unit connection*	**E**	*Relay and analog ports*
C	*COM ports 1 to 5*	**F**	*Network connections*

Procedure

1 Connect the connector on the Sensor Unit cable into the connector at the top of the Sensor Unit.

2 Terminate the wires to the J11a and J11b terminals in the junction box.

3 Terminate the power wires into the J10a and J10b terminals.

4 Terminate the wires for RS-422 signal distribution to output on COM 1, 2, 3, 4 or 5 on the J1 terminal.

5 Terminate wires for any other RS-422 input to COM1, 2, 3 or 4 on the J1 terminal.

6 Terminate the wires for PPS input to the J1 terminal.

7 Terminate the wires for network connection, LAN 1, 2, 3 to the LAN ports.

8 Terminate the wires for analog output signals and status signals from relays to the J6 terminal, upper part.

9 Terminate the wires for relay signals and analog output to the J6 terminal, lower part.

10 Terminate the wires for replica output to the terminals J2 to J5.

11 Make sure that the cable shields are in contact with the cable glands for grounding.

12 Fasten the Sensor Unit cable to the wall, cable ladder or cable tray using cable strips or similar.

13 Apply power to the junction box when all cable wires are connected.

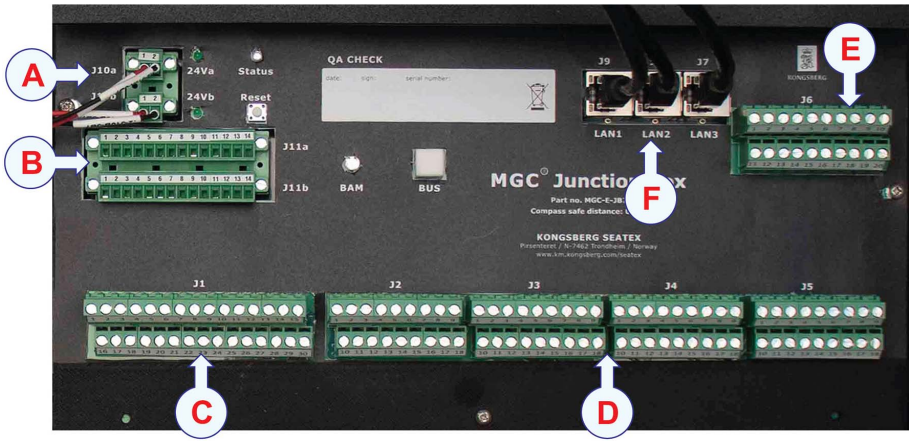
14 Observe the status LED on the Sensor Unit. If the LED is lit, the installation is finished.

Related topics

Mounting the Sensor Unit, page 22
Mounting the adapter dampening plate and Sensor Unit, page 25
Installing the MGC JB7 Junction Box as a stand-alone unit, page 29
Installing the MGC JB7 Junction Box inside a cabinet, page 30

MGC JB7 Junction Box connections

The Junction Box provides extended interfaces between the Sensor Unit and external equipment.



A	*Power connections*	**D**	*Replica ports*
B	*Sensor Unit connection*	**E**	*Relay and analog ports*
C	*COM ports 1 to 5*	**F**	*Network connections*

The system has the following communication signals which are to be distributed on:

- 5 COM ports
- 8 replica ports with three outputs each
- 3 network LANs
- 4 analog signals
- 3 relays

MGC JB7 Junction Box power connections

J10a terminal			J10b terminal		
Pin	**Signal**	**Description**	**Pin**	**Signal**	**Description**
1	PWR1+	Power supply (+24 V)	1	PWR2+	Power supply (+24 V)
2	PWR0-	Power supply (0 V)	2	PWR0-	Power supply (0 V)

Note

In order to obtain a floating chassis ground with reference to the power ground, an external standard DC/DC converter must be used to supply the Junction Box terminals J10a and J10b with 24 V input.

MGC JB7 Junction Box Ethernet connections

Ethernet connections	
Port	**Connection**
LAN 1	PP1 - Data 1
LAN 2	PP1 - Data 2
LAN 3	PP1 - Data 3

MGC JB7 Junction Box - Sensor Unit cable connections

Table 1 Sensor Unit cable connections in the JB7 Junction Box - J11A terminal

J11A terminal				
Pin	**Signal**		**Pair no.**	**Colour**
1	MTX1_A-	RS-422A-, output data from MGC	2b	Orange
2	MTX1_B+	RS-422B+, output data from MGC	2a	White
3	MRX1_A-	RS-422A-, input data to MGC	3b	Green
4	MRX1_B+	RS-422B+, input data to MGC	3a	White
5	MRX2_A-	RS-232, data to MGC	7a	Red
6	MRX2_B+		14a	Black
7	MTX2_A-	RS-232, data from MGC	7b	Orange
8	MTX2_B+		14b	Brown
9	MRX3_A-	RS-422A- or RS-232, input to MGC	8a	Red
10	MRX3_B+	RS-422B+ or RS-232, return to MGC	8b	Green
11	MRX4_A-	RS-422A- or RS-232, input to MGC	9a	Red
12	MRX4_B+	RS-422B+ or RS-232, return to MGC	9b	Brown
13	DISP0	Internal control	12a	Black
14	DISP1	Internal control	12b	Orange

Table 2 Sensor Unit cable connections in the JB7 Junction Box - J11B terminal

J11B terminal				
Pin	**Signal**		**Pair no.**	**Colour**
1	PWR-	Power supply (0 V)	1b	Blue
2	PWR+	Power supply (+24 V)	1a	White
3	RJ-1	TD+, Ethernet	4a	White
4	RJ-2	TD-, Ethernet	4b	Brown
5	RJ-3	RD+, Ethernet	6a	Red
6	RJ-6	RD-, Ethernet	6b	Blue
7	Alert	MGC alert	5a	White
8	GND	MGC ground	5b	Grey
9	XIN	Signal to MGC	10b	Grey
10	CGND	Communication ground	10a	Red
11	EOUT	Signal from MGC, 5 Volt level	11b	Blue
12	XOUT	Signal from MGC, 5 Volt level	11a	Black
13	DISP2	Internal control	13a	Black
14	VDD	5 Volt out, max. 20 mA	13b	Green

MGC JB7 Junction Box signal distribution connections

Table 3 J1 terminal in the JB7 Junction Box

J1 terminal					
Pin	Signal		Pin	Signal	
1	TX1_B+	COM1, RS-422 output	16	TX4_B+	COM4, RS-422 output
2	TX1_A-	COM1, RS-422 output	17	TX4_A-	COM4, RS-422 output
3	GND1	COM1, signal ground	18	GND4	COM4, signal ground
4	RX1_B+	COM1, RS-422 input	19	RX4_B+	COM4, RS-422 input
5	RX1_A-	COM1, RS-422 input	20	RX4, A-	COM4, RS-422 input
6	TX2_B+	COM2, RS-422 output	21	TX5_B+	COM5, RS-422 output
7	TX2_A-	COM2, RS-422 output	22	TX5_A-	COM5, RS-422 output
8	GND2	COM2, signal ground	23	GND5	COM5, signal ground
9	RX2_B+	COM2, RS-422 input	24	RX5_B+	COM5, RS-422 input
10	RX2A-	COM2, RS-422 input	25	RX5_A-	COM5, RS-422 input
11	TX3_B+	COM3, RS-422 output	26	TXP_B+	COMP, RS-422 output
12	TX3_A-	COM3, RS-422 output	27	TXP_A-	COMP, RS-422 output
13	GND3	COM3, signal ground	28	GND5	COM5, signal ground
14	RX3_B+	COM3, RS-422 input	29	PPS_B+	PPS input
15	RX3_A-	COM3, RS–422 input	30	PPS_A-	PPS input

Table 4 J2 terminal in the JB7 Junction Box

J2 terminal					
Pin	Signal		Pin	Signal	
1	R1A_GND	Replica port 1A, RS-422 ground	10	R2A_GND	Replica port 2A, RS-422 ground
2	R1A_TX_A-	Replica port 1A, RS-422 output	11	R2A_TX_A-	Replica port 2A, RS-422 output
3	R1A_TX_B+	Replica port 1A, RS-422 output	12	R2A_TX_B+	Replica port 2A, RS-422 output
4	R1B_GND	Replica port 1B, RS-422 ground	13	R2B_GND	Replica port 2B, RS-422 ground
5	R1B_TX_A-	Replica port 1B, RS-422 output	14	R2B_TX_A-	Replica port 2B, RS-422 output
6	R1B_TX_B+	Replica port 1B, RS-422 output	15	R2B_TX_B+	Replica port 2B, RS-422 output
7	R1C_GND	Replica port 1C, RS-422 ground	16	R2C_GND	Replica port 2C, RS-422 ground
8	R1C_TX_A-	Replica port 1 C, RS-422 output	17	R2C_TX_A-	Replica port 2C, RS-422 output
9	R1C_TX_B+	Replica port 1 C, RS-422 output	18	R2C_TX_B+	Replica port 2C, RS-422 output

Table 5 J3 terminal in the JB7 Junction Box

J3 terminal					
Pin	Signal		Pin	Signal	
1	R3A_GND	Replica port 3A, RS-422 ground	10	R4A_GND	Replica port 4A, RS-422 ground
2	R3A_TX_A-	Replica port 3A, RS-422 output	11	R4A_TX_A-	Replica port 4A, RS-422 output
3	R3A_TX_B+	Replica port 3A, RS-422 output	12	R4A_TX_B+	Replica port 4A, RS-422 output
4	R3B_GND	Replica port 3B, RS-422 ground	13	R4B_GND	Replica port 4B, RS-422 ground
5	R3B_TX_A-	Replica port 3B, RS-422 output	14	R4B_TX_A-	Replica port 4B, RS-422 output
6	R3B_TX_B+	Replica port 3B, RS-422 output	15	R4B_TX_B+	Replica port 4B, RS-422 output
7	R3C_GND	Replica port 3C, RS-422 ground	16	R4C_GND	Replica port 4C, RS-422 ground
8	R3C_TX_A-	Replica port 3C, RS-422 output	17	R4C_TX_A-	Replica port 4C, RS-422 output
9	R3C_TX_B+	Replica port 3C, RS-422 output	18	R4C_TX_B+	Replica port 4C, RS-422 output

Table 6 J4 terminal in the JB7 Junction Box

J4 terminal					
Pin	Signal		Pin	Signal	
1	R5A_GND	Replica port 5A, RS-422 ground	10	R6A_GND	Replica port 6A, RS-422 ground
2	R5A_TX_A-	Replica port 5A, RS-422 output	11	R6A_TX_A-	Replica port 6A, RS-422 output
3	R5A_TX_B+	Replica port 5A, RS-422 output	12	R6A_TX_B+	Replica port 6A, RS-422 output
4	R5B_GND	Replica port 5B, RS-422 ground	13	R6B_GND	Replica port 6B, RS-422 ground
5	R5B_TX_A-	Replica port 5B, RS-422 output	14	R6B_TX_A-	Replica port 6B, RS-422 output
6	R5B_TX_B+	Replica port 5B, RS-422 output	15	R6B_TX_B+	Replica port 6B, RS-422 output
7	R5C_GND	Replica port 5C, RS-422 ground	16	R6C_GND	Replica port 6C, RS-422 ground
8	R5C_TX_A-	Replica port 5C, RS-422 output	17	R6C_TX_A-	Replica port 6C, RS-422 output
9	R5C_TX_B+	Replica port 5C, RS-422 output	18	R6C_TX_B+	Replica port 6C, RS-422 output

Table 7 J5 terminal in the JB7 Junction Box

J5 terminal					
Pin	Signal		Pin	Signal	
1	R7A_GND	Replica port 7A, RS-422 ground	10	R8A_GND	Replica port 8A, RS-422 ground
2	R7A_TX_A-	Replica port 7A, RS-422 output	11	R8A_TX_A-	Replica port 8A, RS-422 output
3	R7A_TX_B+	Replica port 7A, RS-422 output	12	R8A_TX_B+	Replica port 8A, RS-422 output
4	R7B_GND	Replica port 7B, RS-422 ground	13	R8B_GND	Replica port 8B, RS-422 ground
5	R7B_TX_A-	Replica port 7B, RS-422 output	14	R8B_TX_A-	Replica port 8B, RS-422 output
6	R7B_TX_B+	Replica port 7B, RS-422 output	15	R8B_TX_B+	Replica port 8B, RS-422 output
7	R7C_GND	Replica port 7C, RS-422 ground	16	R8C_GND	Replica port 8C, RS-422 ground
8	R7C_TX_A-	Replica port 7C, RS-422 output	17	R8C_TX_A-	Replica port 8C, RS-422 output
9	R7C_TX_B+	Replica port 7C, RS-422 output	18	R8C_TX_B+	Replica port 8C, RS-422 output

Table 8 J6 terminal in the JB7 Junction Box

J6 terminal					
Pin	Signal		Pin	Signal	
1	RL1_NC	Relay 1, normally closed	11	AGND	Analog ground
2	RL1_C	Relay 1, common	12	ANA1	Analog 1, output
3	RL1_NO	Relay 1, normally open	13	AGND	Analog ground
4	RL2_NC	Relay 2, normally closed	14	ANA2	Analog 2, output
5	RL2_C	Relay 2, common	15	AGND	Analog ground
6	RL2_NO	Relay 2, normally open	16	ANA3	Analog 3, output
7	232_TX	RS-232, transmit	17	AGND	Analog ground
8	232_GND	RS-232, ground	18	ANA4	Analog 4, output
9	232_RX	RS-232, receive	19	RL3_C	Relay 3, common
10	RL3_NO	Relay 3, normally open	20	RL3_NC	Relay 3, normally closed

Related topics

Installing the MGC JB7 Junction Box as a stand-alone unit, page 29
Installing the MGC JB7 Junction Box inside a cabinet, page 30
MGC JB7 Junction Box wiring inside cabinet, page 95
MGC JB7 power connection inside cabinet, page 96

Cabling for the display

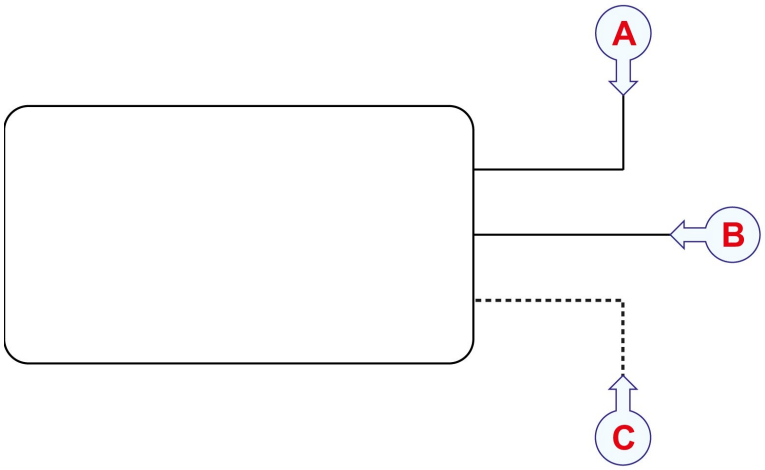
A set of cables is required to connect the MGC® COMPASS to the relevant power source(s) and to external equipment.

Context

The power connector is inserted into the display when delivered. The folio on the display indicates + and —. The display accepts 12 or 24 V DC nominal power input.

The Ethernet cable should be Cat5e/UTP or better.

It is optional to use a serial connection to other equipment.



A *Power cable, 24 VDC*

B *Ethernet cable (Not delivered by Kongsberg Discovery AS.)*

C *Serial cable, Optional (Not delivered by Kongsberg Discovery AS.)*

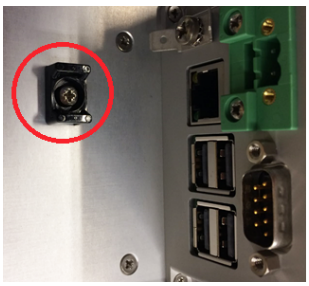
Procedure

1 Attach the power cable to the power plug and the power source.

2 Attach the Ethernet cable. It connects the display to the sensor unit or switch.

3 Optional. Attach the serial cable. It connects the display to other equipment.

4 Fasten the cables to the strain relief with a strip after they have been connected.



Related topics

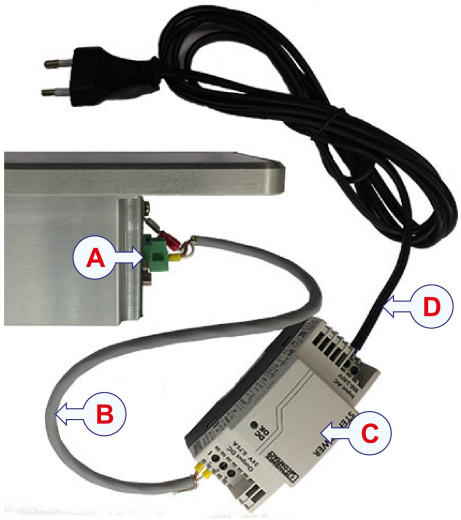
Mounting the display in a panel, page 33
Mounting the display in the bracket, page 34
Mounting the display on a DIN rail, page 35
Mounting the display with a flange, page 37

Cabling with AC power adapter

A set of cables is required to connect the MGC® COMPASS to the relevant power source(s) and to external equipment. One power source option is to use an AC power adapter.

Context

A power adapter for 110/230 VAC to 24 VDC or 12 VDC is available for the display.



A *Multi Function Display power plug*
B *Two-wired DC power cable*
C *AC power adapter*
D *AC power cable*

Procedure

1 Attach the AC power cable to the power adapter.
2 Attach a two-wired power cable (shielded) to the DC side of the power adapter.
3 Attach the other end of the two-wired power cable to the power plug on the display.
Follow the +/- indications on the display.
4 Apply power to the AC side.

Related topics

Mounting the display in a panel, page 33
Mounting the display in the bracket, page 34
Mounting the display on a DIN rail, page 35
Mounting the display with a flange, page 37

Serial connector pin layout

If you have purchased the serial connection version of the display it is possible to use a serial connection to other equipment. The serial connection is RS-422.

The pin layout is illustrated in the table. The pinning is seen from the chassis 9-pin D-Sub.

Pin no.	Signal description
2	TX+
3	RX+
5	GND (Optional)
7	RX-
8	TX-

Related topics

Mounting the display in a panel, page 33
Mounting the display in the bracket, page 34
Mounting the display on a DIN rail, page 35
Mounting the display with a flange, page 37

Display connectors

The table holds a description of the connectors on the display and their use. The serial connector is only available if you have purchased the serial connection version of the display.

Connector	Description
Power	Connected to power source
LAN	Connected to sensor unit or Ethernet switch
Serial	Connected to sensor unit or equipment for serial IO data
USB 1 – 4	May be used for software upgrade or data storage
Grounding connector	Can be used to connect the power cable shield.

Related topics

Mounting the display in a panel, page 33
Mounting the display in the bracket, page 34
Mounting the display on a DIN rail, page 35
Mounting the display with a flange, page 37

Surveying sensors on vessels

Topics

Vessel coordinate system

The vessel coordinate system is established in order to define the relative physical locations and orientations of systems and sensors. It is a Cartesian coordinate system using three axes: X, Y and Z. X is positive forwards, Y is positive toward starboard and Z is positive downwards.

The coordinate system must be well defined. It is usually established by surveying and documenting coordinates of several points on the vessel. The X axis is in the longitudinal direction of the vessel. The Y axis is in the transverse direction of the vessel. The Z axis is perpendicular to the X and Y axes.

The X and Y axes constitute the reference plane on the vessel. This can be a best-fit plane on the main deck or a best-fit plane through the draught marks on the hull.

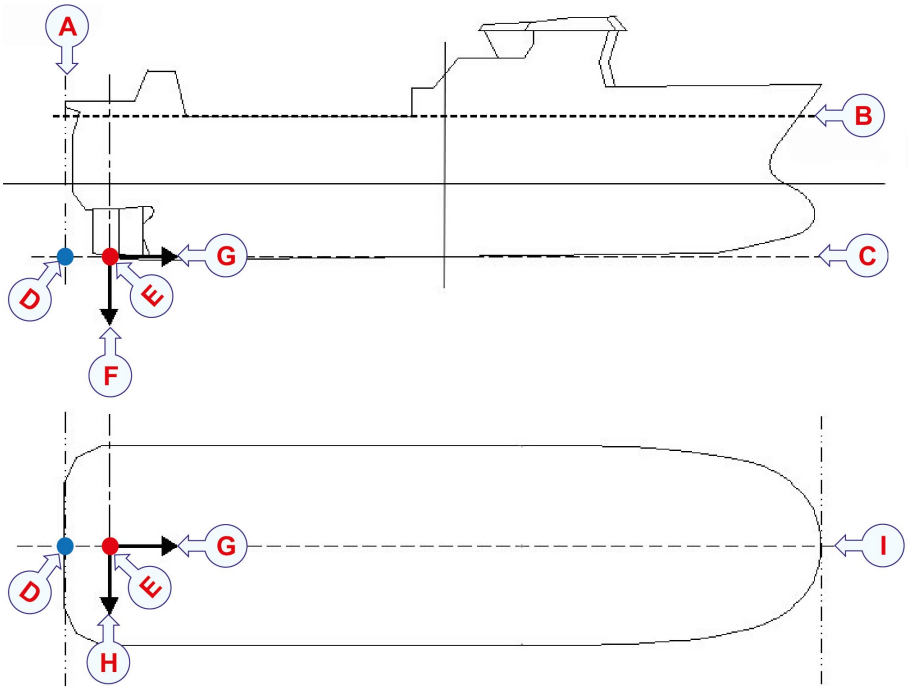
When establishing the vessel coordinate system, the origin can be freely chosen. Typical choices for origin are frame 0 at keel level, the vessel's centre of gravity (CG) or the location of the Inertial Measurement Unit. But any convenient point can be used.

In addition to the coordinate system it is useful to have an approximate X, Y and Z offset from the common reference point (CRP) to origin. The common reference point (CRP) is defined to be the intersection between stern, centre line and keel.

The chosen conventions must be made clear to all parties involved. Both to the survey personnel performing the survey and to the users of the survey results. Any deviation

from the defined coordinate system should be well described in both text and drawings to avoid common misunderstandings.

The illustration shows the definition of origin on the vessel and positive X, Y and Z axes directions.



A	*Stern*	**F**	*+Z axis*
B	*Main deck*	**G**	*+X axis*
C	*Keel*	**H**	*+Y axis*
D	*CRP (common reference point)*	**I**	*CL (centre line)*
E	*Origin*		

Surveying the MGC Sensor Unit

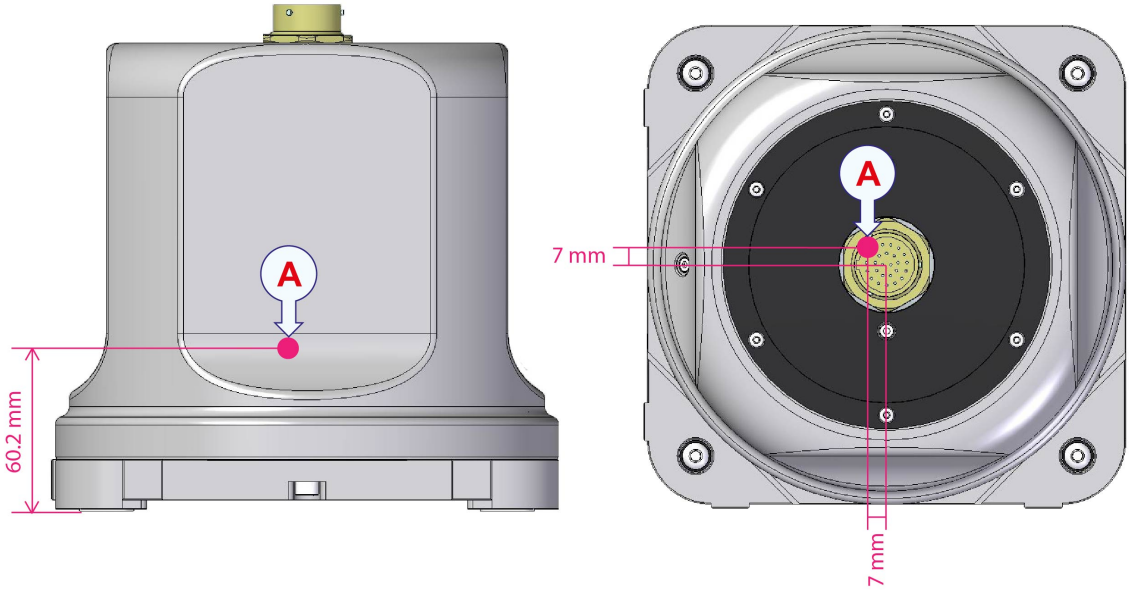
For the MGC (Motion Sensor and Gyro Compass) the following should be surveyed.

- The mounting angles in roll, pitch and yaw (heading).
- The offset between the gyro compass heading and the vessel centre line (CL).

A static gyro compass calibration/verification (heading log) should be done after the gyro compass system is installed and fully operational. This can be performed in dock or alongside a quay.

A dynamic gyro compass calibration/verification and attitude verification (heading, roll and pitch verification) must be performed at sea.

Sensor point for the MGC

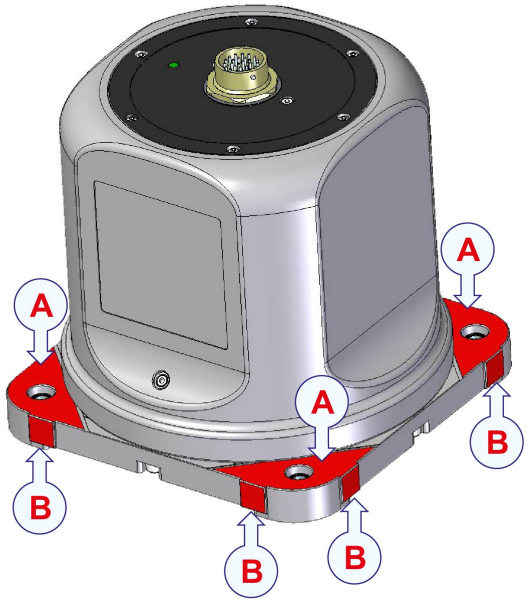


A *Sensor point on MGC*

MGC alignment surfaces

The MGC bottom plate designed with alignment surfaces where you can place prisms for surveying the offset angles in roll, pitch and heading by use of a theodolite.

The illustration shows the alignment surfaces for roll and pitch alignment and heading alignment.

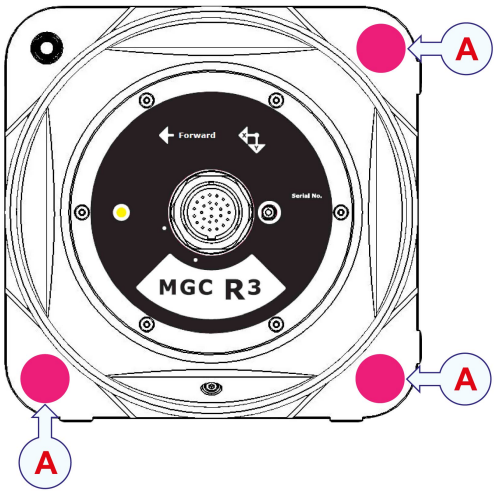


A *Alignment surface for roll and pitch*

B *Alignment surface for heading*

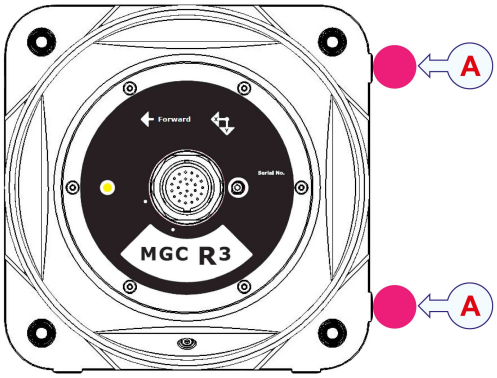
For the roll and pitch alignments, space for prisms is made in three corners of the MGC bottom plate. The surface on these locations is prepared specially to make it flat and aligned (parallel) with the sensors inside the unit.

A *Space for prism*



For the heading alignment two sides of the bottom plate has two protruding squared surfaces. Place the prisms against these surfaces when measuring the heading of the MGC towards the vessel axis.

A *Space for prism*



Related topics
Survey accuracy values, page 58

Survey accuracy values

The system must be surveyed according to the given accuracy level. If not, the performance of the system will be degraded.

- The MGC heading offset angle with the vessel axis: < 0.01°

Related topics
Surveying the MGC Sensor Unit, page 56
Setting MGC Sensor Unit location and mounting angles, page 71

Setting to work

Topics

Setting to work summary

When all hardware units have been installed, all the cables have been connected the MGC® COMPASS system can be turned on and set to work.

Prerequisites

- All system units have been installed.
- All system cables are connected.
- All cable connections are made.
- Correct operating power is available.

Procedure

1 Verify that all hardware and cable installation have been made correctly.

2 Apply power to the Sensor Unit by connecting the Sensor Unit cable (MRU-E-CS8) to the unit.

3 Apply power to the MGC JB7 Junction Box.
The Sensor Unit is powered through the Junction Box.

4 Install the MRC+ application on a computer.

5 Configure the MGC® COMPASS system for operational use.

6 Verify that the MGC® COMPASS system is operational.

Related topics

Mounting the Sensor Unit, page 22
Installing the MGC JB7 Junction Box as a stand-alone unit, page 29
Installing the MGC JB7 Junction Box inside a cabinet, page 30
Installing the MGC JB5 Repeater Junction Box, page 32
Mounting the display in a panel, page 33
Mounting the display in the bracket, page 34
Mounting the display on a DIN rail, page 35
Mounting the display with a flange, page 37
Turning on the MGC® COMPASS system, page 60
MGC® COMPASS power requirements, page 20
Installing the MRC+ application, page 65
About configuration methods, page 61
Configuring the MGC® COMPASS for normal operation, page 70

Turning on the MGC® COMPASS system

When you have verified that all hardware units and cables have been properly installed, and that the supply power is correct, you can turn on the MGC® COMPASS system for the first time.

Context

The system is turned on when the MGC JB7 Junction Box is connected to a power source. The system will start automatically after power has been applied.

After the initialization phase the heading accuracy is normally approximately 0.5 degrees. Assuming correct latitude and velocity input. The MGC then enters the alignment phase. After approximately 8 to 30 minutes full accuracy is achieved, depending on MGC Sensor Unit model.

Note

Settling to optimal heading accuracy can take longer than the specified time if the unit is exposed to high accelerations at start-up. For a fast settling of heading, start-up in harbour is recommended. However, under most conditions the heading accuracy will be within 1 degree during five to ten minutes from power-on.

Procedure

1 Make sure that the Sensor Unit cable is connected between the MGC JB7 Junction Box and the Sensor Unit.

2 Apply power to the MGC JB7 Junction Box.

The Sensor Unit receives power through the MGC JB7 Junction Box. The unit starts automatically when it receives power and it will remain in operation as long as it is powered.

3 Observe that the LED on top of the Sensor Unit flashes green and that the unit generates a humming sound.

4 From start-up and until the Sensor Unit reaches full accuracy, the unit goes through three phases:

- **Initialization**: This phase lasts for four to ten minutes. Normally four to five minutes.
- **Alignment**: This phase lasts for approximately 8 to 30 minutes from power-on, depending on the MGC model.
- **Fully operational**: This is the normal state.

5 Leave the unit with power on.

Result

The system is now ready for configuration.

Related topics

About configuration methods, page 61
Connecting to the web interface, page 64
Configuring the MGC® COMPASS for normal operation, page 70

About configuration methods

There are two ways in which you can do the setup of the MGC® COMPASS. You can either set up the unit directly from the web interface configuration menu of the MGC JB7 Junction Box or by using the MRC+ application via the LAN connection on the MGC JB7 Junction Box.

An external computer is required to run the web configuration through a browser and to run the MRC+ application.

Configuration directly through web interface

The web interface consists of a menu with configuration options and a corresponding page for parameter settings. When you click an option, a box with the settings appears. This is where you change the settings.

If you place the mouse cursor over the question mark icon, an explanatory text for that parameter, will appear.

When you have made the changes, they need to be confirmed before the changes take effect. This confirmation is carried out under **Review changes**. Here are all the changes listed. You can edit or revert your changes before you confirm.

When you select **Apply changes**, the changes are written to the MGC JB7 Junction Box setup file. The junction box is then reloaded with the new parameter settings.

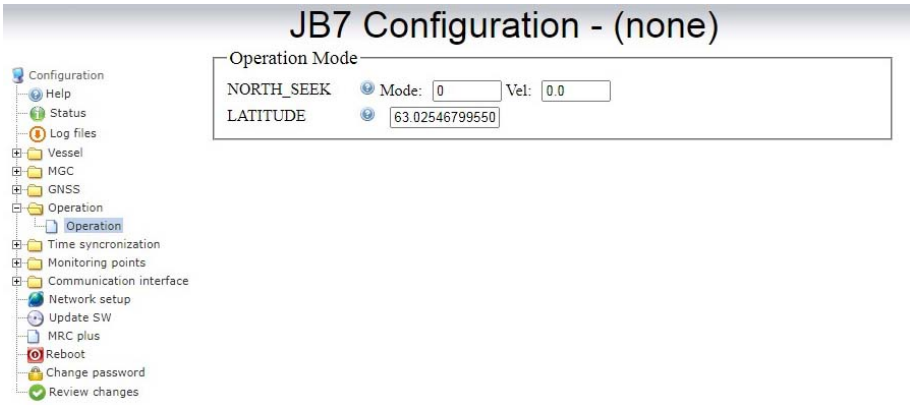
No validation is performed on the values you enter. If you apply incorrect values, the application may malfunction.

The **Network** and **Input/Output** parameters under **Communication interface** can only be set up directly from the web configuration.

You can update the Sensor Unit software directly from the web configuration.

Note

Setting up the Sensor Unit directly from the web configuration is only recommended for advanced users and service personnel.



Configuration with MRC+ application

You can set up the Sensor Unit by use of the MRC+ application. First you have to install the MRC+ application on an external computer. Then you must connect to the MGC JB7 Junction Box web interface and open the MRC+ application from the web interface configuration menu.

The communication between the MGC JB7 Junction Box and the Sensor Unit must be opened by starting a proxy server on the junction box. When you have connected to the Sensor Unit, you can set up the parameters from the **Configuration** tab.

When you have set up the wanted parameters, you download the settings to the Sensor Unit.

The **Network** and **Input/Output** parameters under **Communication interface** cannot be set up via the MRC+ application. They can only be set up directly from the web configuration.

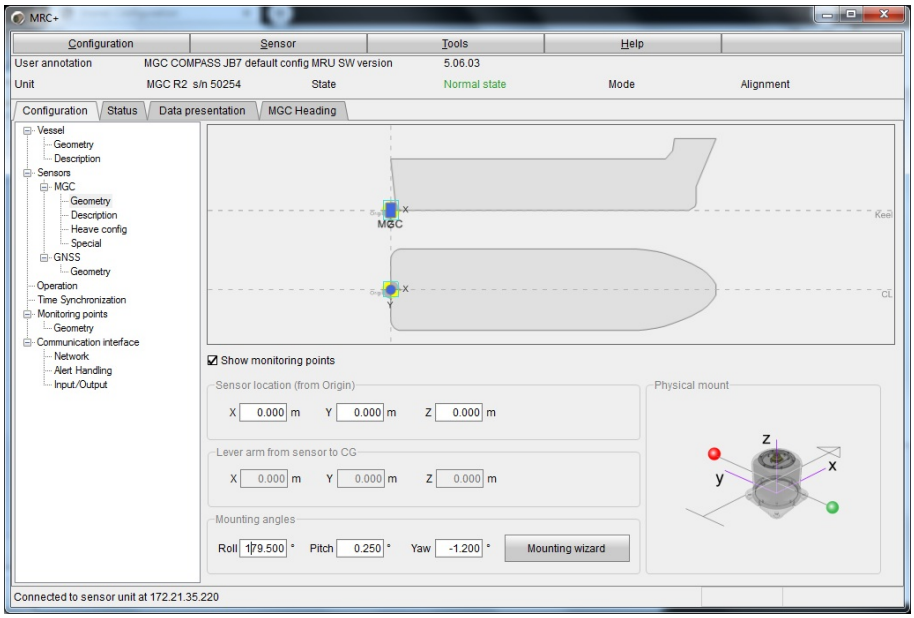
Note

Setting up the Sensor Unit via the MRC+ application is the recommended way to set up the Sensor Unit, as this method will give you more detailed information about the parameters.

These configuration parameters are recommended set up via the MRC+ application.

- Vessel geometry and description
- Sensor MGC geometry
- Sensor GNSS geometry
- Operation
- Time synchronization
- Monitoring points geometry

All other changes must be done through the web configuration.



Related topics

Connecting to the web interface, page 64
Installing the MRC+ application, page 65

Connecting to the web interface

You must set up certain parameters in order to get a working MGC® COMPASS system. The configuration of the Sensor Unit is done through the MGC JB7 Junction Box web interface on an external computer.

Prerequisites

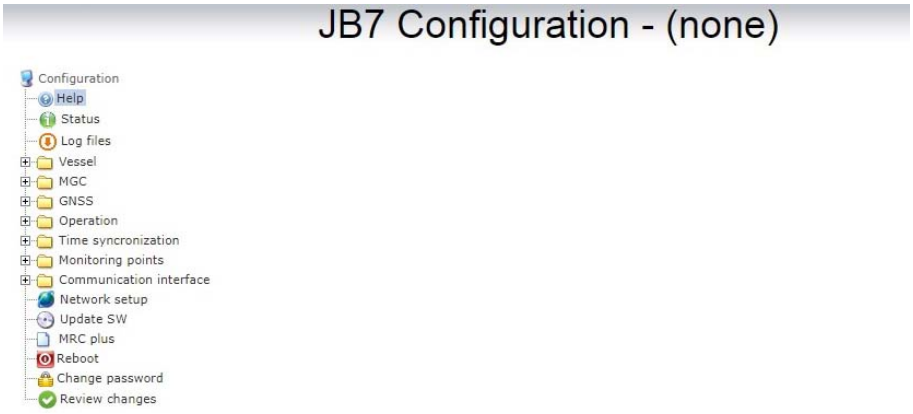
An external computer. Make sure that the external computer is in the same network range as the junction box.

Set up the external computer to use local area connection.

Context

The default IP address for the MGC JB7 Junction Box is: 172.21.35.220. The external computer must be set up with an IP address in the range 172.21.35.xxx, where xxx may be 100. The network mask is 255.255.255.0.

The network settings in this procedure is for a Windows 10 operating system.



Procedure

1 Connect an Ethernet cable between the external computer and LAN 1 on the junction box.

2 On the external computer, select **Control Panel → Network & Internet → Network Sharing Centre**

3 Under active networks, select the active network under **Connections** and select **Properties** in the network Status dialog box.

4 Select **Internet Protocol Version 4 (TCP/IPv4) → Properties**.

5 Select **Use the following IP address** and type an IP address in the same range as the junction box, for example 172.21.35.100.

6 Type the subnet mask: 255.255.255.0

7 Select **OK** and exit network settings.

8 Open a browser and type the default IP address of the junction box in the address bar.

9 Type the default login credentials for **User**: `jb7`.

10 Type the default login credentials for **Password**: `1234`.

11 Select **OK**.

The web interface with the configuration menu appears in the display.

Related topics

About configuration methods, page 61
Setting up Sensor Unit directly from web interface on MGC JB7 Junction Box, page 66
Setting up Sensor Unit using MRC+, page 68

Installing the MRC+ application

The MRC+ application is used to set the configuration parameters for the Sensor Unit.

Prerequisites

You have received a USB flash drive with the MRC+ application software together with the Sensor Unit. The flash drive is included in the Sensor Unit transportation box. If the flash drive is not included in the delivery you must upload it from a customer support server.

Context

You must install the MRC+ application on a local computer (standard Windows procedure).

After installation the MRC+ icon will appear on your desktop.

Procedure

1 Insert the USB flash drive with the software into a local computer.

2 Open the Windows File Explorer.

3 Locate the Removable disk drive to which the flash drive is connected.

4 Open the `MRC+ setup.exe` file located in the **SW/MRC** folder.

5 Follow the instructions on the screen in order to complete the installation of the MRC+ application.

6 Select **Run MRC+ now**.

7 Select **Finish**.

8 Close the Windows File Explorer and remove the USB flash drive.

Related topics

About configuration methods, page 61
Setting up Sensor Unit using MRC+, page 68

Setting up Sensor Unit directly from web interface on MGC JB7 Junction Box

The communication interfaces have to be configured for the MGC® COMPASS to be able to communicate with external equipment. The configuration is done through the web interface on the MGC JB7 Junction Box.

Prerequisites

An external computer. Make sure that the external computer is in the same network range as the junction box.

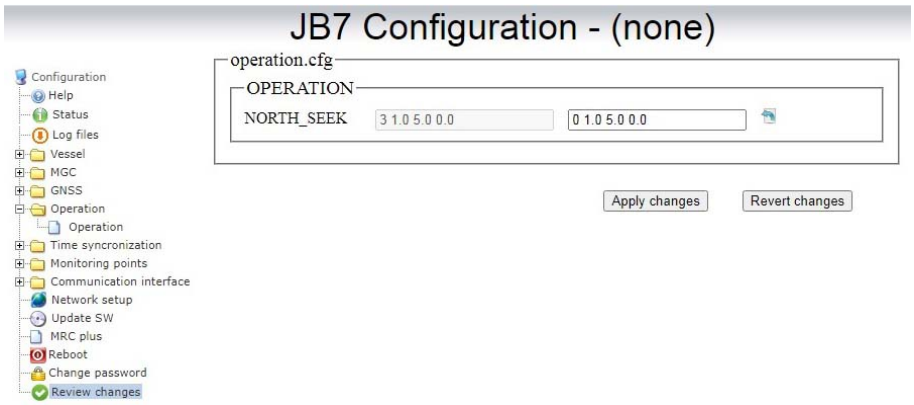
Set up the external computer to use local area connection.

Context

The default IP address for the MGC JB7 Junction Box is: 172.21.35.220. The external computer must be set up with an IP address in the range 172.21.35.xxx, where xxx may be 100. The network mask is 255.255.255.0.

Note

No validation is performed on the values you enter. If you apply incorrect values, the application may malfunction.



Procedure

1 Connect an Ethernet cable between the external computer and LAN 1 on the junction box.

2 Make sure that the external computer is in the same network range as the junction box.

3 Open a browser and type the default IP address of the junction box in the address bar.

4 Type the default login credentials for **User**: `jb7`.

5 Type the default login credentials for **Password**: `1234`.

6 Select **OK**.

The web interface with the configuration menu appears in the display.

7 Select the wanted configuration option and set the wanted parameters.

You can set or edit all parameters before you confirm your choice.

8 Select **Review changes** to see all the changes you have made.

9 Select **Apply changes**.

The settings are written to the MGC JB7 Junction Box setup files and the junction box is reloaded with the new parameter settings.

Related topics

Connecting to the web interface, page 64

Setting up Sensor Unit using MRC+

The MRC+ application is used to set up all configuration parameters, except for the communication interface parameters.

Prerequisites

An external computer. Make sure that the external computer is in the same network range as the junction box.

Set up the external computer to use local area connection.

The MRC+ application must be installed on the external computer.

Context

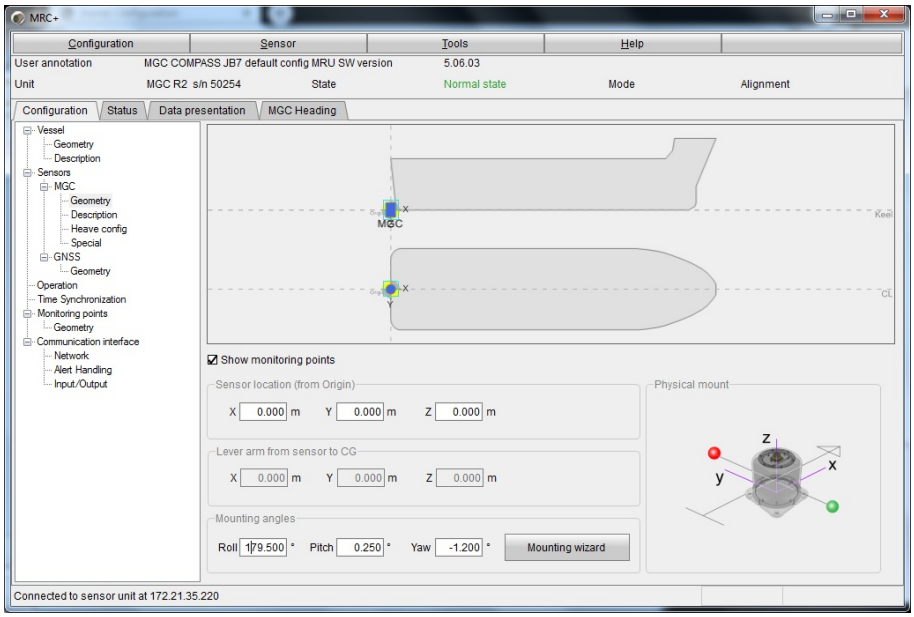
The default IP address for the MGC JB7 Junction Box is: 172.21.35.220. The external computer must be set up with an IP address in the range 172.21.35.xxx, where xxx may be 100. The network mask is 255.255.255.0.

The **Network** and **Input/Output** parameters under **Communication interface** cannot be set up via the MRC+ application. They can only be set up directly from the web interface.

If the MRC+ application should lose contact with the Sensor Unit after download of setup parameters, restart the process from where you start the MRC+ proxy.

These configuration parameters are recommended set up via the MRC+ application.

- Vessel geometry and description
- Sensor MGC geometry
- Sensor GNSS geometry
- Operation
- Time synchronization
- Monitoring points geometry



Procedure

1 Connect an Ethernet cable between the external computer and LAN 1 on the junction box.

2 Make sure that the external computer is in the same network range as the junction box.

3 Open a browser and type the default IP address of the junction box in the address bar.

4 Type the default login credentials for **User**: `jb7`.

5 Type the default login credentials for **Password**: `1234`.

6 Select **OK**.

The web interface with the configuration menu appears in the display.

7 Select **MRC plus** → **Start MRC+ proxy**.

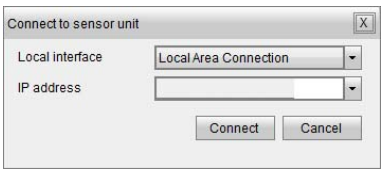
The proxy server will be running unit you stop it by selecting **Stop MRC+ proxy** or the junction box is rebooted.

8 Select **OK** to start the proxy server.

9 Select the MRC+ icon on your desktop to start the MRC+ application.

10 Select the **Sensor** menu → **Connect**.

11 Type the IP address of the junction box interface to which you are connected and select **Connect**.



When the connection is up and running, the configuration parameters appear in the **Configuration** tab.

12 Select the wanted configuration option and set the wanted parameters.

13 Select the **Configuration** menu → **Send to sensor unit** to download the changes to the Sensor Unit.

14 Close the MRC+ application when you have completed the setup.

15 Select **MRC plus** → **Stop MRC+ proxy** → **OK** in the web interface.

Related topics

Connecting to the web interface, page 64
Installing the MRC+ application, page 65

Configuring the MGC® COMPASS for normal operation

Topics

Setting MGC Sensor Unit location and mounting angles

The physical location of the Sensor Unit relative to the origin and its mounting angles is required for the Sensor Unit to be able to calculate position, roll, pitch and heading correctly.

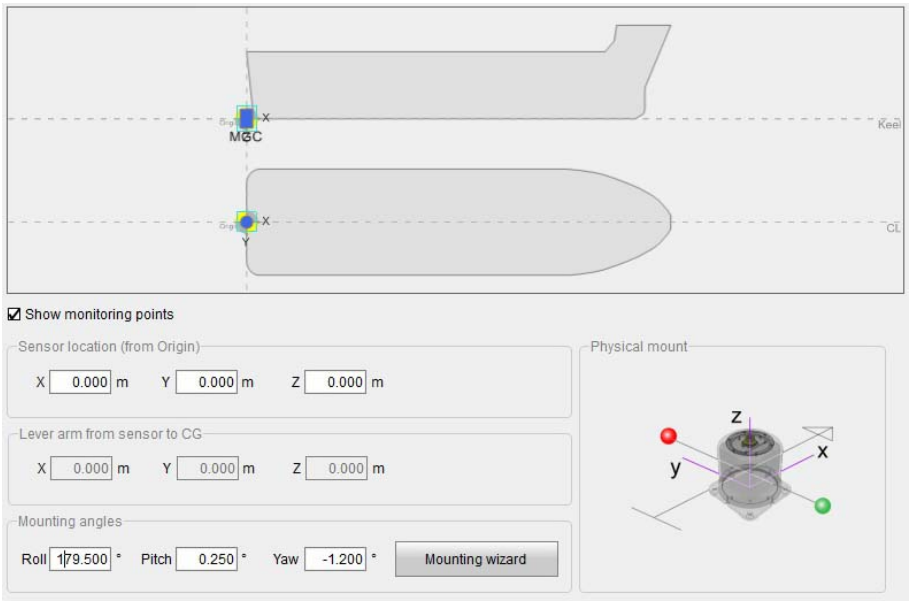
Prerequisites

For accurate location of the MGC (Motion Sensor and Gyro Compass) a survey has to be carried out.

This procedure is done using the MRC+ application.

Context

The correct sensor unit position is with the connector up and the x-axis pointing towards the bow of the vessel. Use the **Mounting Wizard** to determine the mounting angles.



Procedure

1 In the MRC+ application, select the **Configuration** tab.

2 Select **Sensors** → **MGC** → **Geometry**.

3 Type the X, Y and Z coordinates in metres from Origin to the sensor unit location.

4 Type the mounting angle values directly:

   a Type the values for **Roll**, **Pitch** and **Yaw**.

   b Select the **Configuration** menu → **Send to sensor unit** to apply your settings.

5 Use the **Mounting wizard** to determine the mounting angles:

   a Select the **Mounting wizard** button.

   b If the sensor unit main orientation is correct, select **Next**.

c Type the offset angles.

d Select **Finish** to close the wizard.

e Select the **Configuration** menu → **Send to sensor unit** to apply your settings.

Related topics

Survey accuracy values, page 58

Setting the latitude

You must set the latitude of the location where the Sensor Unit is to be turned on for operational use.

Prerequisites

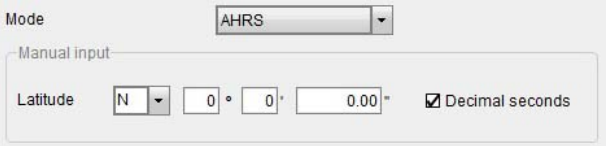
Make sure that you know the latitude of the vessel's position at the time you start to operate the system.

The Sensor Unit may also receive latitude through the NMEA GGA input message.

This procedure is done using the MRC+ application.

Context

The latitude is used as a backup latitude if the GPS latitude is unavailable at system start-up.



Procedure

1 In the MRC+ application, select the **Configuration** tab.

2 Select **Operation**.

3 Type the latitude in degrees.

4 Select the **Configuration** menu → **Send to sensor unit** to apply your settings.

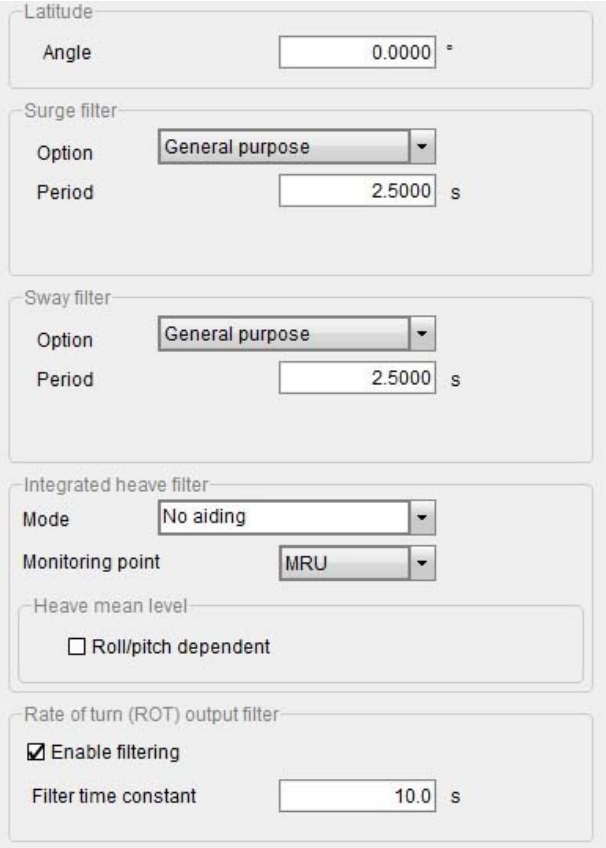
Setting the ROT filtering constant

The analog ROT output signal can be filtered with a selectable filter constant.

Prerequisites

This procedure is done using the MRC+ application.

Context



Procedure

1 In the MRC+ application, select the **Configuration** tab.

2 Select **Sensors** → **MGC** → **Special**.

3 In the **Rate of turn (ROT) output filter** box, select **Enable filtering**.

4 For the **Filter time constant**, type the value in seconds. Typically 10 seconds.

5 Select the **Configuration** menu → **Send to sensor unit** to apply your settings.

Setting the time synchronization

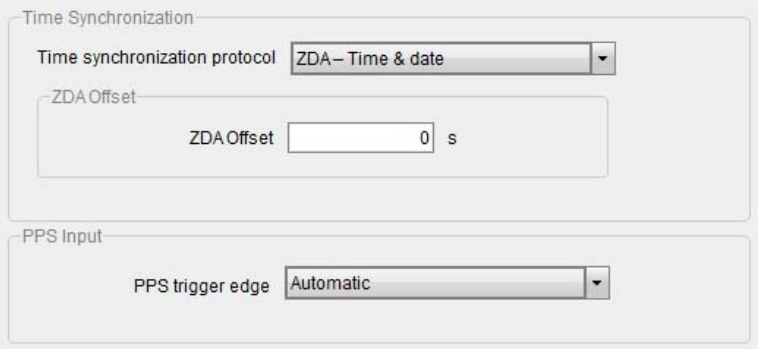
In order to time stamp events and alerts correctly, the Sensor Unit should be time synchronized to an external clock.

Prerequisites

This procedure is done using the MRC+ application.

Context

The recommended method is to use ZDA input when the Sensor Unit is used as a compass. This is also the default method.



Procedure

1 In the MRC+ application, select the **Configuration** tab.

2 Select **Time Synchronization**.

3 Select the preferred time synchronization method.

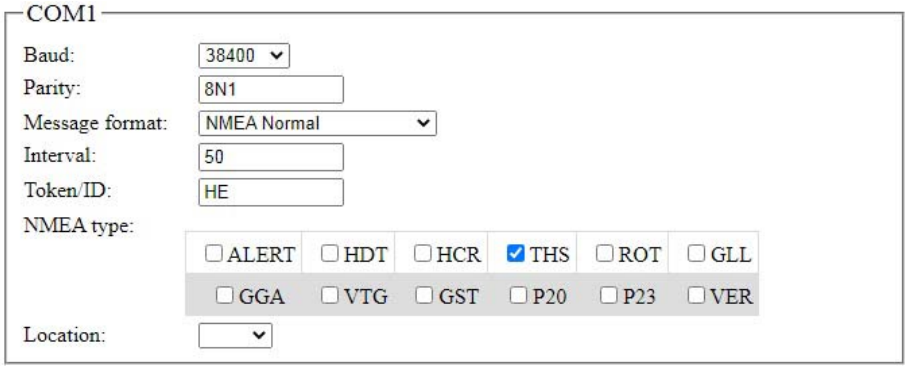
4 Select the **Configuration** menu → **Send to sensor unit** to apply your settings.

Setting output data to heading repeater junction box

You must set the serial communication parameters for the heading data in order for the heading repeaters to receive heading input from the MGC® COMPASS.

Context

This procedure is done in the MGC JB7 Junction Box web interface.



Procedure

1 Enter the **Configuration** menu → **Communication interface** → **Serial ports** → **COM1** (for example).

2 Select the preferred baud rate. Typical 38400.

3 Select **Message format NMEA Normal**.

4 Type the data output **Interval** in milliseconds. Typical value is 50.

5 Type HE as **Token/ID**.

6 Select THS as **NMEA type**.

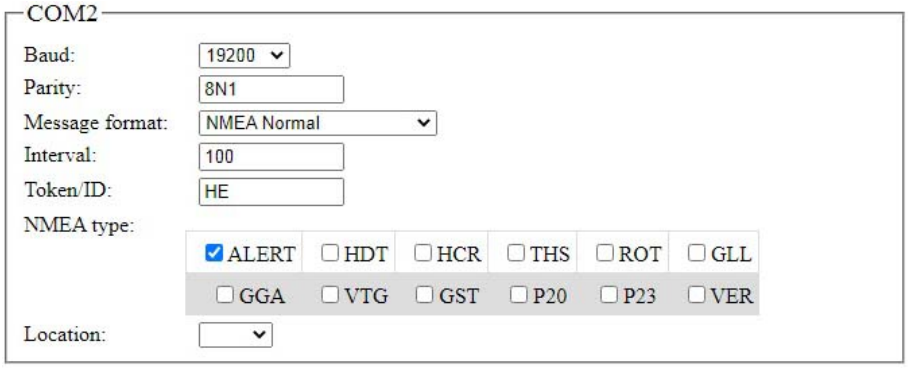
7 Select **Apply Changes** to save your settings.

Setting communication channel for alert handling

You must set the serial communication parameters for the alert interface in order to receive and transmit alert messages.

Context

This procedure is done in the MGC JB7 Junction Box web interface.



Procedure

1 Enter the **Configuration** menu → **Communication interface** → **Serial ports** → **COM2** (for example).

2 Select the preferred baud rate. Typical 19200.

3 Select **Message format NMEA Normal**.

4 Type the data output **Interval** in milliseconds. Typical value is 100.

5 Type HE as **Token/ID**.

6 Select ALERT as **NMEA type**.

7 Select **Apply Changes** to save your settings.

Related topics

Alert messages, page 114

Setting the alert handling mode

Alerts are used to announce abnormal situations and conditions which require attention, decisions and/or action.

Context

Alert handling is done by exchanging messages between the Integrated Navigation System (INS) and the MGC.

The MGC can operate in two different alert handling modes.

- The legacy *ALR* mode, using ALR and ACK sentences.
- The newer, and preferred, *ALF* mode, using ALF, ALC, ACN, and HBT sentences.

The *ALF* mode is the default and recommended mode.

This procedure is done in the MGC JB7 Junction Box web interface.

Procedure

1 Enter the **Configuration** menu → **Communication interface** → **Alert**.

2 Select **ALERT_MODE**. The default selection is **ALF**.

3 Select **BAMINTERFACE**. The default selection is **LAN1**.

4 Select **Apply Changes** to save your settings.

Related topics

Alert messages, page 114

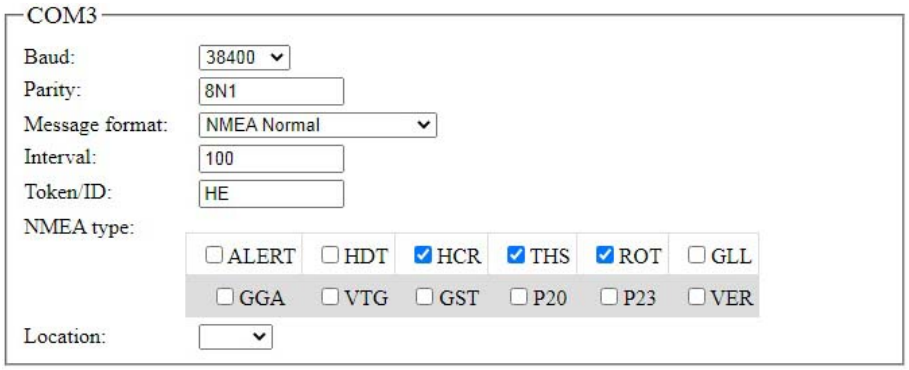
Setting in and out communication with the INS

You must set up the MGC® COMPASS to output data to the Integrated Navigation System (INS) and to receive data from the INS.

Context

The MGC® COMPASS outputs heading, rate of turn and heading correction state data to the Integrated Navigation System (INS). For the MGC® COMPASS to work as intended, it requires input of velocity, latitude and time from the INS.

This procedure is done in the MGC JB7 Junction Box web interface.



Procedure

1 Enter the **Configuration** menu → **Communication interface** → **Serial ports** → **COM3** (for example).

2 Select the preferred baud rate. Typical 38400.

3 Select **Message format NMEA Normal**.

4 Type the data output **Interval** in milliseconds. Typical value is 100.

5 Type HE as **Token/ID**.

6 Select HCR, THS and ROT as **NMEA type**.

7 Select **Apply Changes** to save your settings.

Related topics

Output formats, page 104
Input formats, page 109

Setting analog roll and pitch output data

You must define gain and offset to get the correct output voltage for the analog roll and pitch data output.

Context

Four analog output channels are available from the MGC® COMPASS. The same output variable list is valid for the analog channels as for the digital communication. For each of the analog channels, you must specify the gain and offset. The limit on the output signal is fixed to ±10 Volt.

Gain is set according to this formula:

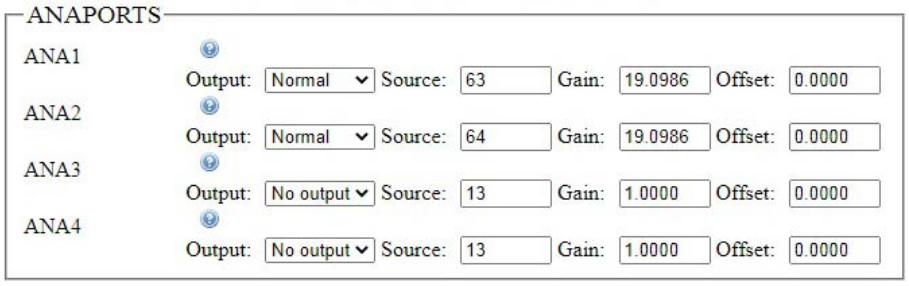
- [Voltage out in Volts] = Gain * [Selected Variable + Offset]

The gain therefore has scaling volts per physical unit (for example volts/degrees). Note that the variables in the Sensor Unit are given in standard SI units.

Example: Gain calculation for roll/pitch output

Requirement: ±10 V shall give ±0.5236 radians (±30 degrees). The gain factor must then be; Gain = volts/radians = 10/0.5236 = 19.0986 v/rad.

This procedure is done in the MGC JB7 Junction Box web interface.



Procedure

1 Enter the **Configuration** menu → **Communication interface** → **Analog ports**.

2 Select the preferred analog channel. For example ANA1.

3 Select **Output**. Values are **No output**, **Normal** and **Fade in**.

4 Type **Source** number. Typically 63 for roll and 64 for pitch.

5 Type the **Gain** value.

6 Type the **Offset** value.

7 Select **Apply Changes** to save your settings.

Setting analog NMEA ROT output data

You must define gain and offset to get the correct output voltage for the analog rate-of-turn (ROT) data output.

Context

Four analog output channels are available from the MGC® COMPASS. The same output variable list is valid for the analog channels as for the digital communication. For each of the analog channels, you must specify the gain and offset. The limit on the output signal is fixed to ±10 Volt.

Gain is set according to this formula:

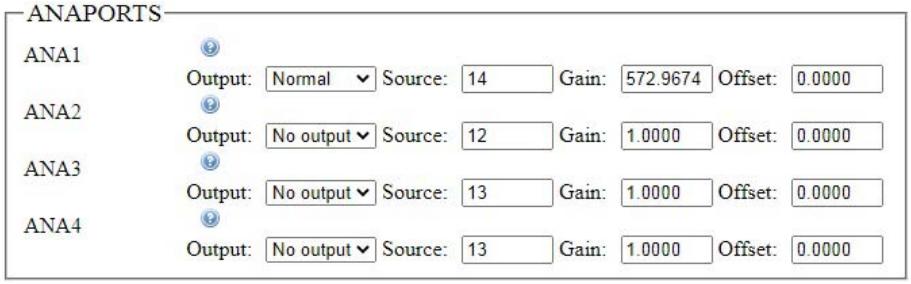
- [Voltage out in Volts] = Gain * [Selected Variable + Offset]

The gain therefore has scaling volts per physical unit (for example volts/degrees). Note that the variables in the Sensor Unit are given in standard SI units.

Example: Gain calculation for analog rate-of-turn (ROT) indicator

Requirement: ±10 V shall give ±0.017453 radians/s (±60 degrees per min = 60 deg/60 s = 1 deg/s). The gain factor must then be; Gain = volts/radians/s = 10/0.017453 = 572.9624.

This procedure is done in the MGC JB7 Junction Box web interface.



Procedure

1 Enter the **Configuration** menu → **Communication interface** → **Analog ports**.

2 Select the preferred analog channel. For example ANA1.

3 Select **Output**. Values are **No output**, **Normal** and **Fade in**.

4 Type **Source** number 14.

5 Type the **Gain** value.

6 Type the **Offset** value.

7 Select **Apply Changes** to save your settings.

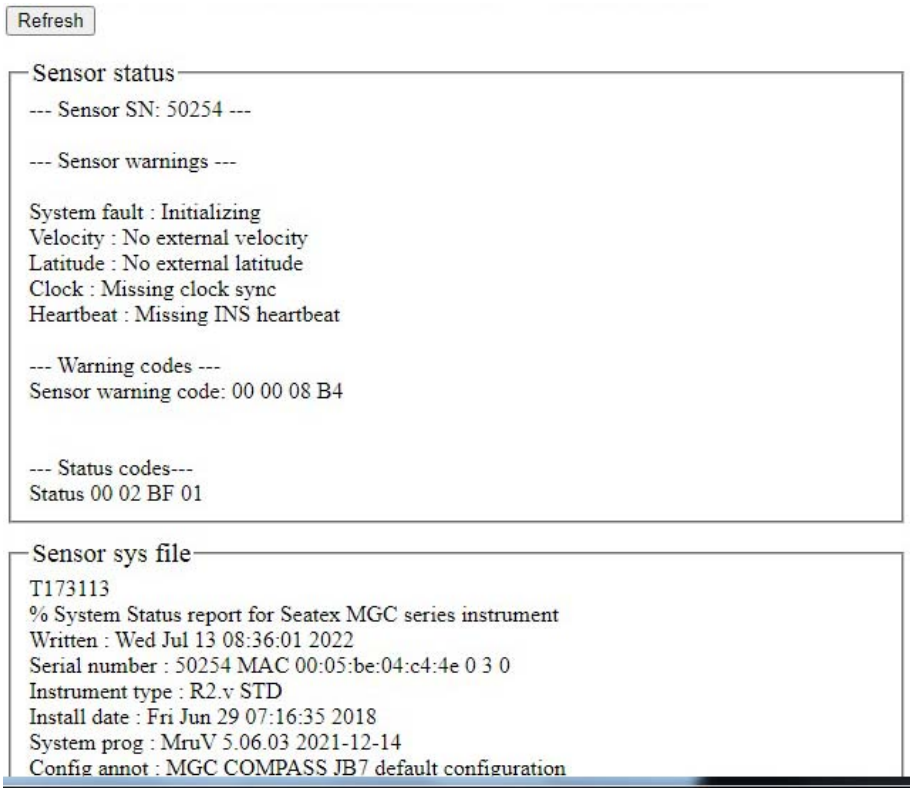
Verifying that the MGC® COMPASS system is ready for operational use

When the MGC system configuration is completed, you must verify that the system is operational.

Context

When the MGC® COMPASS and the external equipment are set up according to the described procedures and turned on, it is recommended to make sure that the system status is OK. This can be done in the MGC JB7 Junction Box web configuration **Status** page.

Make sure that the Sensor Unit receives external latitude, external velocity and external time form the Integrated Navigation System (INS) by observing the **Status** page. This can be used to verify that the configuration and the electrical connection to he INS are correct.



Procedure

1 Enter the **Configuration** menu → **Status**.

2 Observe the **Velocity**, **Latitude** and **Clock** status to verify that the Sensor Unit receives these external inputs.

- **Velocity**: External velocity (code 22)
- **Latitude**: External latitude (code 21)
- **Clock**: Clock sync (code 5)

3 Make sure that **System prog** is the correct software version. The software version must be 5.06.10 or later for the system to work properly.

Switch Over Unit functionality

Topics

Connecting the 7" Alert display

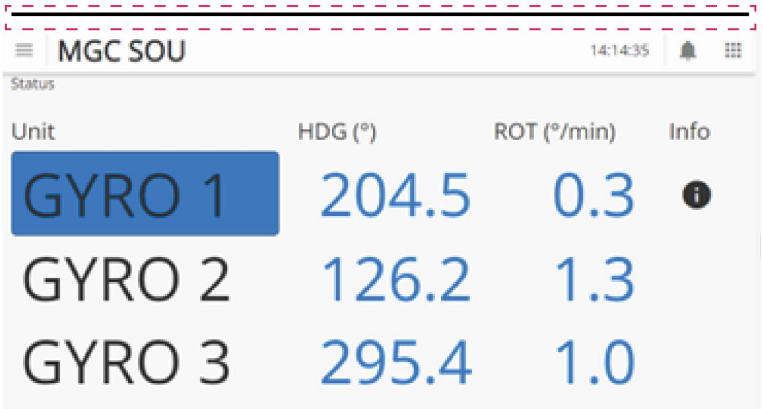
When you have installed the display and connected power and network, you must connect the display to the gyro system.

Prerequisites

The physical installation of the 7" Alert display is described in a separate manual, *MFD 7" Installation Manual*.

Context

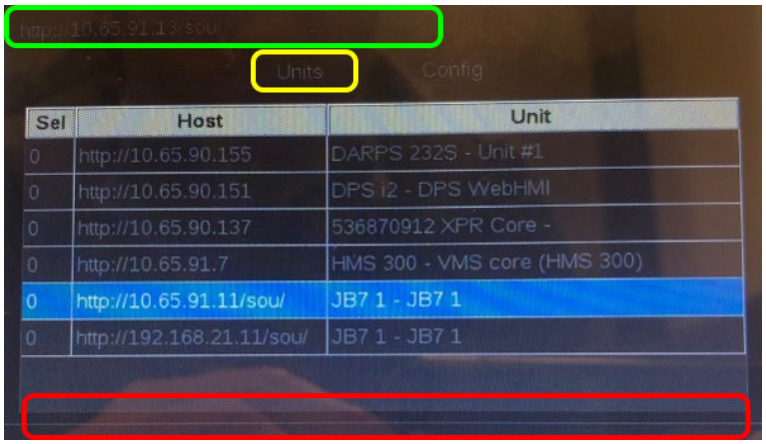
The Kongsberg Network Protocol (KNP) is used to identify units.



Procedure

1 Press the horizontal soft button at the top of the display (dotted red rectangle).

A window opens which shows available units in the network.



2 Select **Units** (yellow rectangle) to open a list of available units.

3 Select the gyro system you want to connect to.

The selected gyro will be marked (√) in the **Sel** column to the left.

The display will automatically connect to the **Master** gyro. The address to which gyro the display is connected, is shown in the address bar (green rectangle) at the top of the window.

4 Close the window by pressing the bottom of the window (red rectangle).

Enabling Switch Over Unit functionality

To be able to use the Switch Over Unit functionality, you must enable the functionality in the Alert display.

Prerequisites

This procedure is done on the Alert display.

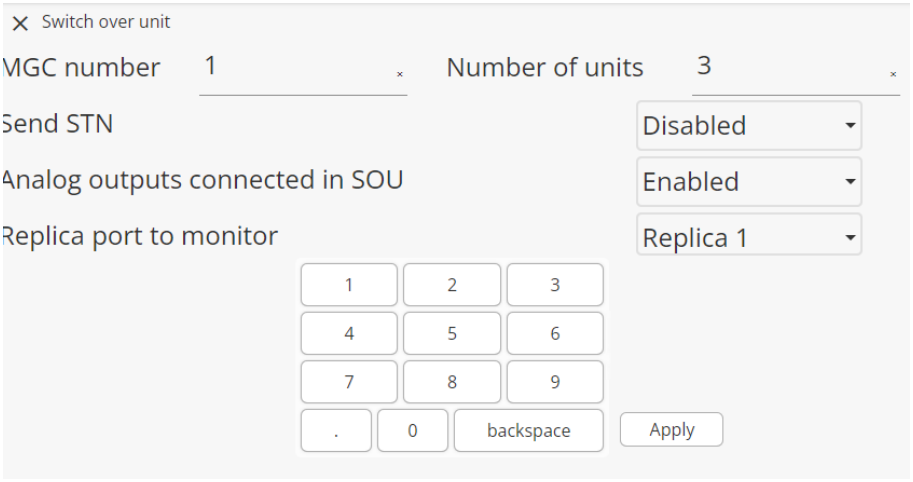
Context

Each of the junction boxes in the Switch Over Unit (SOU) functionality must be set up with the identification of the MGC, 1 through 3. If you have three gyros in your setup, you must type 1 for GYRO 1 and 2 for GYRO 2 etc. You will also need to set up the number of MGC units daisy chained together. This must be done equally on all units.

The **Send STN** parameter is by default set to **Disabled**. This parameter enables transmission of the NMEA sentence with the redundancy identification number for the junction box.

If the analog outputs are daisy chained together as part of the SOU system, the **Analog outputs connected in SOU** parameter needs to be set to **Enabled**. This will set the output voltage to zero while a unit is in Slave mode.

You must select which replica port the Slave units shall listen to in order to confirm that the Master works as normal. We recommend to use the lowest replica out port that is in use, and only select **Ethernet** if the replica ports are not used at all.



Procedure

1 Select the display menu -

2 Select Configuration change icon -

3 Select **Gyro**.

4 Select **Installation Configuration**.

5 Select **SOU**.

6 Set **Send STN** to **Enabled**.

7 Set **Analog outputs connected in SOU** to **Enabled**.

8 Select which replica port to monitor.

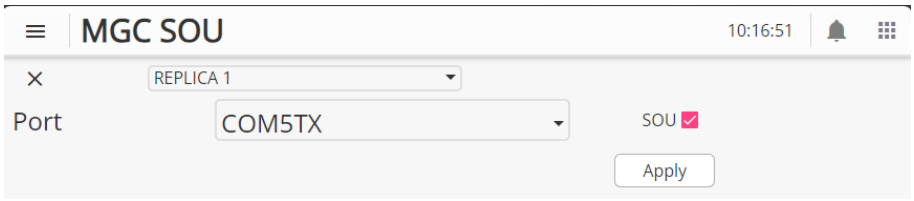
9 Select **Apply**.

Connecting the replica ports

The replica ports which shall be used in the Switch Over Unit (SOU) functionality context must be daisy chained (wired) together.

Context

These replica ports are configured by selecting the SOU check box under replica configuration in the Alert display.



The same replica ports must be used on all JB7 Junction Boxes.

The table shows the SOU connection for three JB7 Junction Boxes where REPLICA (R) port number 2 and 3 are used as an example.

In this case, data on REPLICA2 and REPLICA3 will be included in the SOU setup and forwarded to clients.

JB7 #1 signal	**JB7 #2 signal**	**JB7 #3 signal**
R*2*A_GND	R*2*A_GND	R*2*A_GND
R*2*A_TX_A-	R*2*A_TX_A-	R*2*A_TX_A-
R*2*A_TX_B+	R*2*A_TX_B+	R*2*A_TX_B+
R*3*A_GND	R*3*A_GND	R*3*A_GND
R*3*A_TX_A-	R*3*A_TX_A-	R*3*A_TX_A-
R*3*A_TX_B+	R*3*A_TX_B+	R*3*A_TX_B+

Procedure

1 Select the display menu -

2 Select Configuration change icon -

3 Select **Gyro**.

4 Select **Installation Configuration**.

5 Select **Replica**.

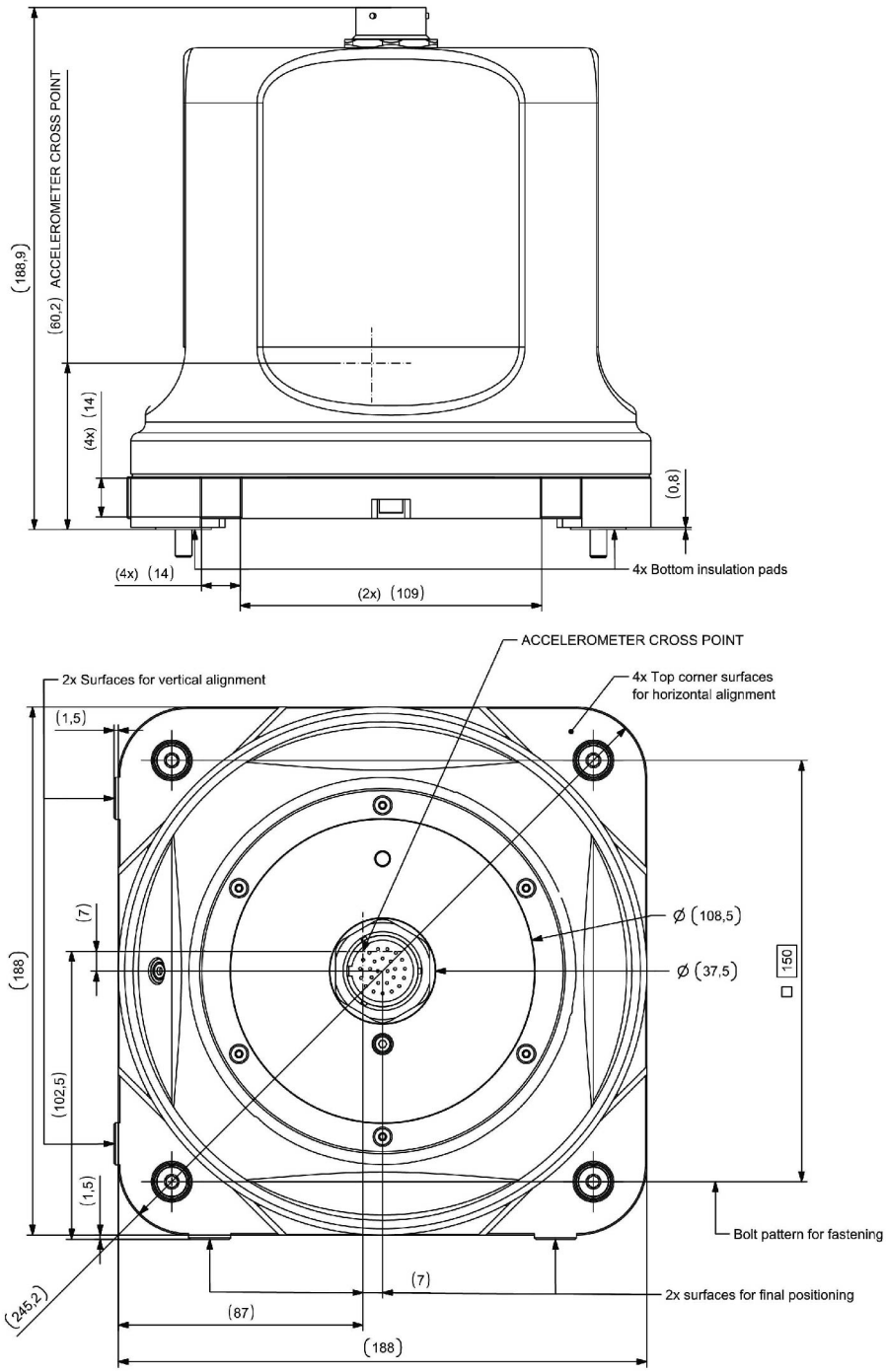
6 Select the **SOU** check box.

7 Select **Apply**.

Drawings

Topics

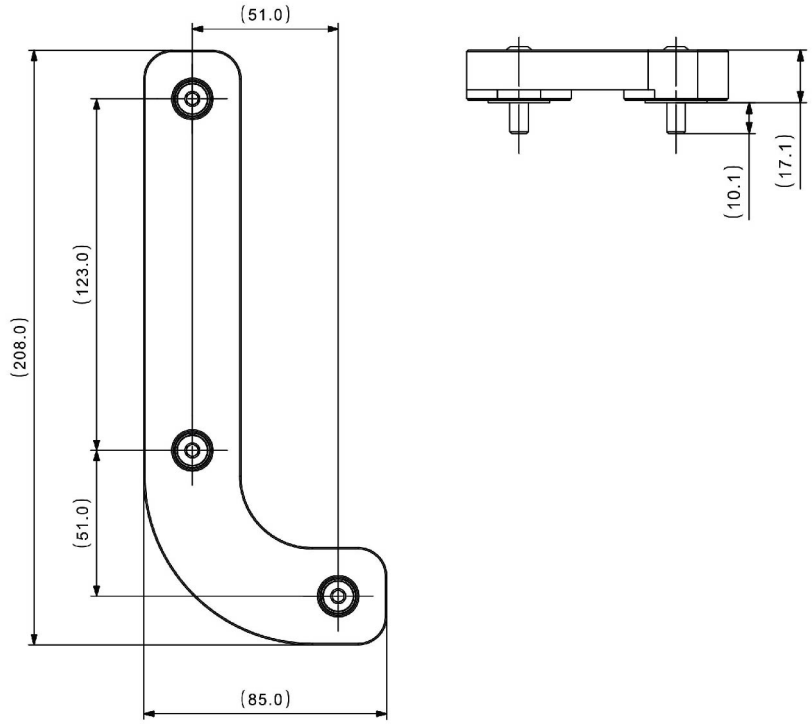
Sensor Unit dimensions

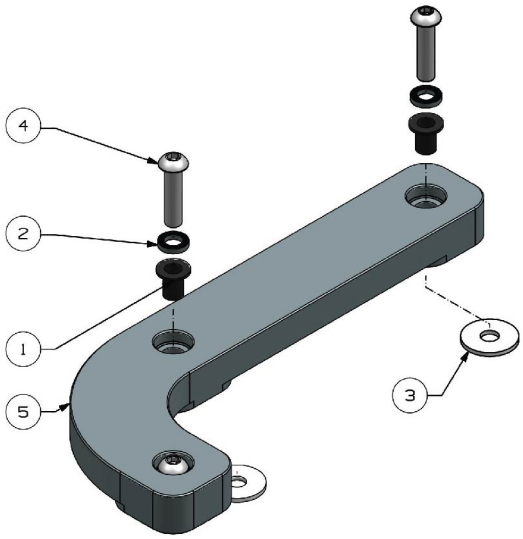


All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

3800-MA-411 Rev.07

Angle bracket dimensions





1) Insulation sleeve 6.2 x 7.2 x 10, Nylon-6 + 25% glass fibre, ELRA AS 3120827 599 35

2) Nordlock washer NL6ss, NordLock AS, art. nr. 1080

3) Ceramic washer 20.1 x 6.6 x 1.6 (M6), Al2O3, QuickOhm 5032-00061

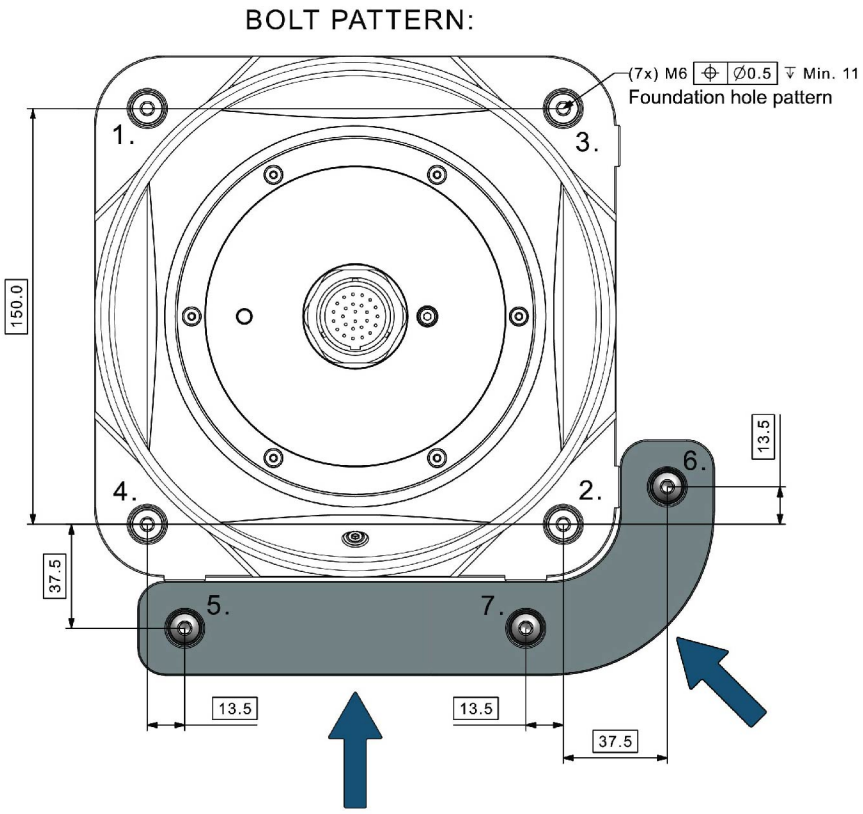
4) Hex button head screw M6 x 25 A4 Grade 70 ISO 7380

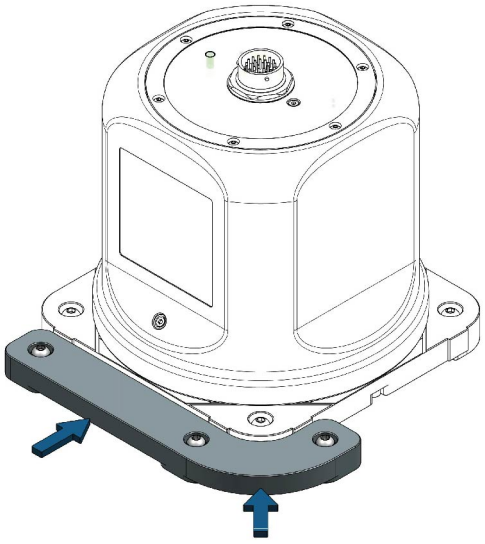
5) Angle bracket

All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

3800-MA-427 Rev.0

Sensor Unit and angle bracket mounting

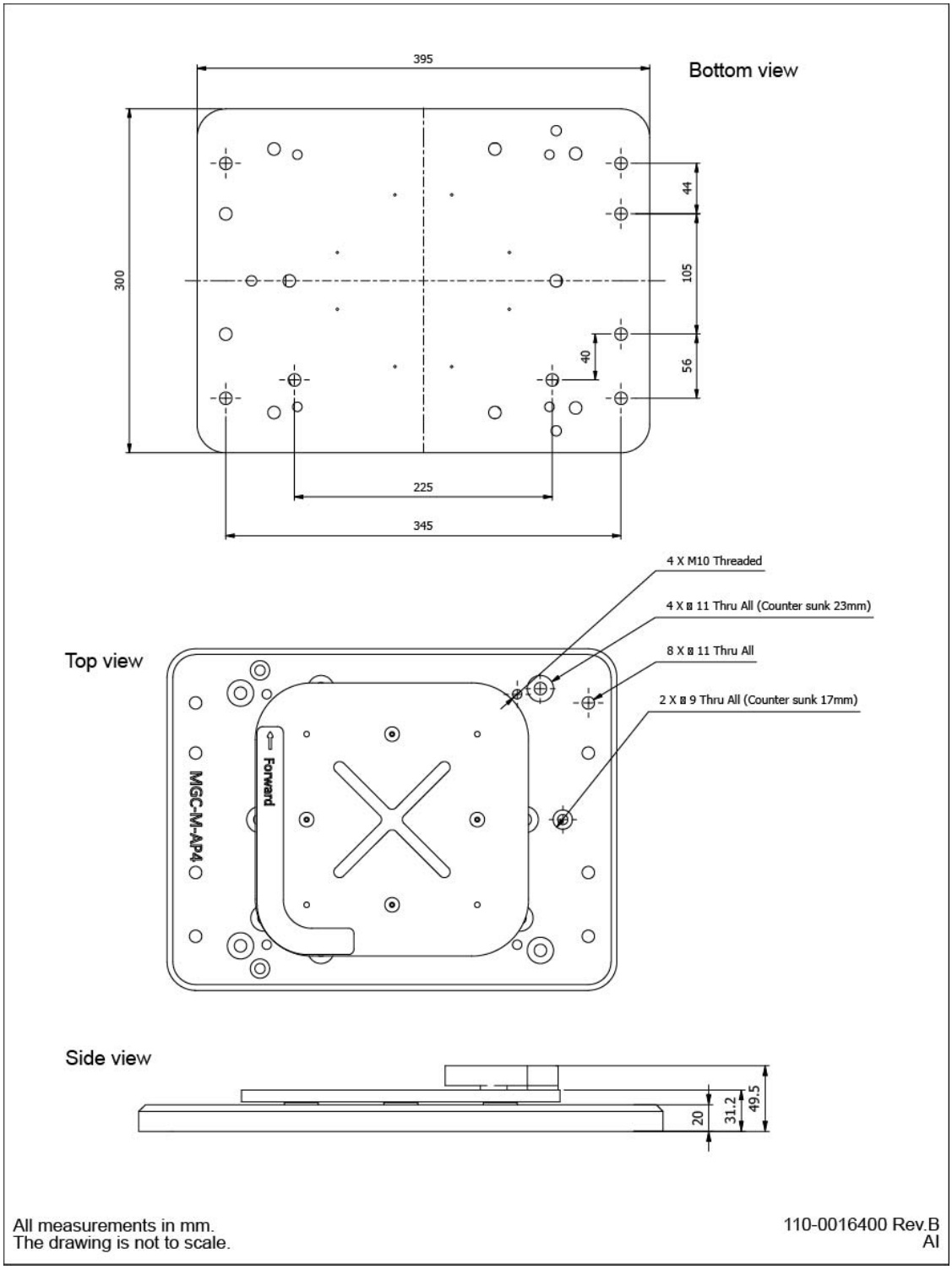




All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

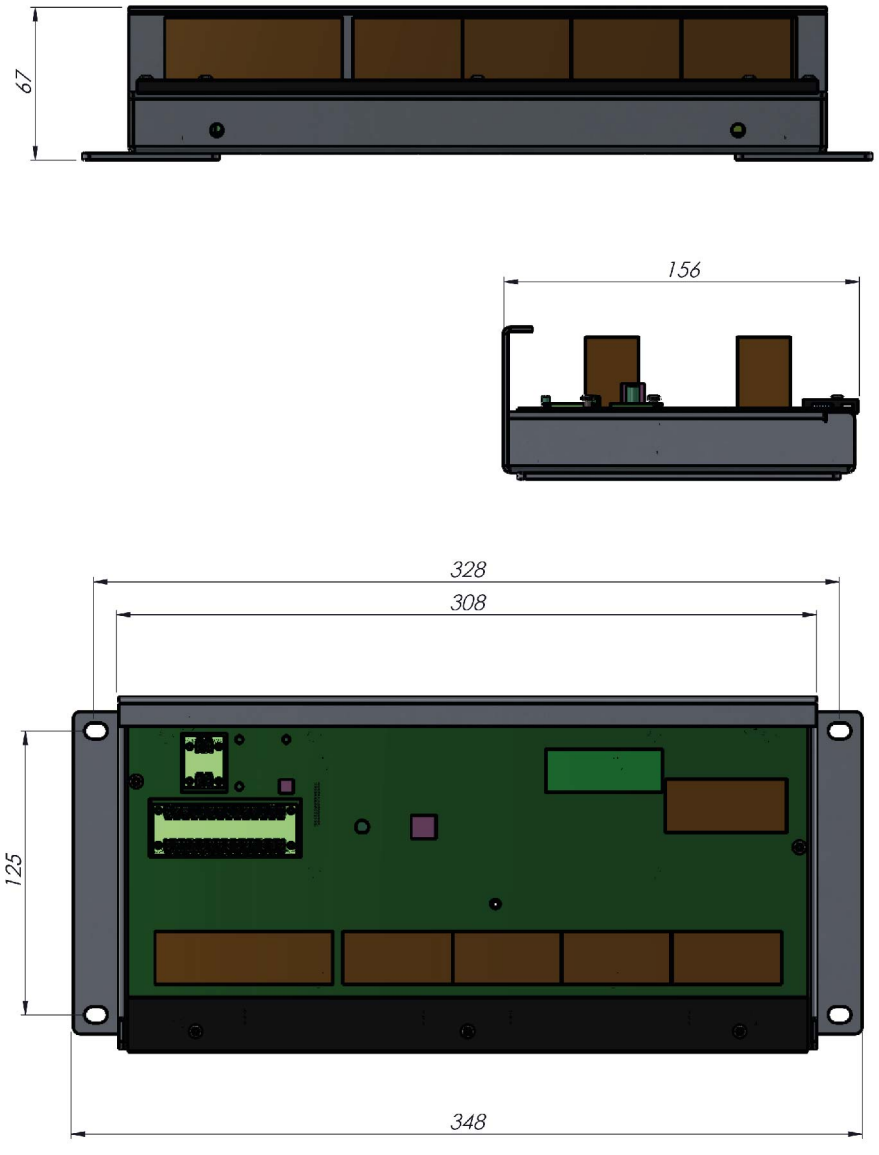
3800-MA-427 Rev.0

Adapter dampening plate dimensions



MGC JB7 Junction Box dimensions

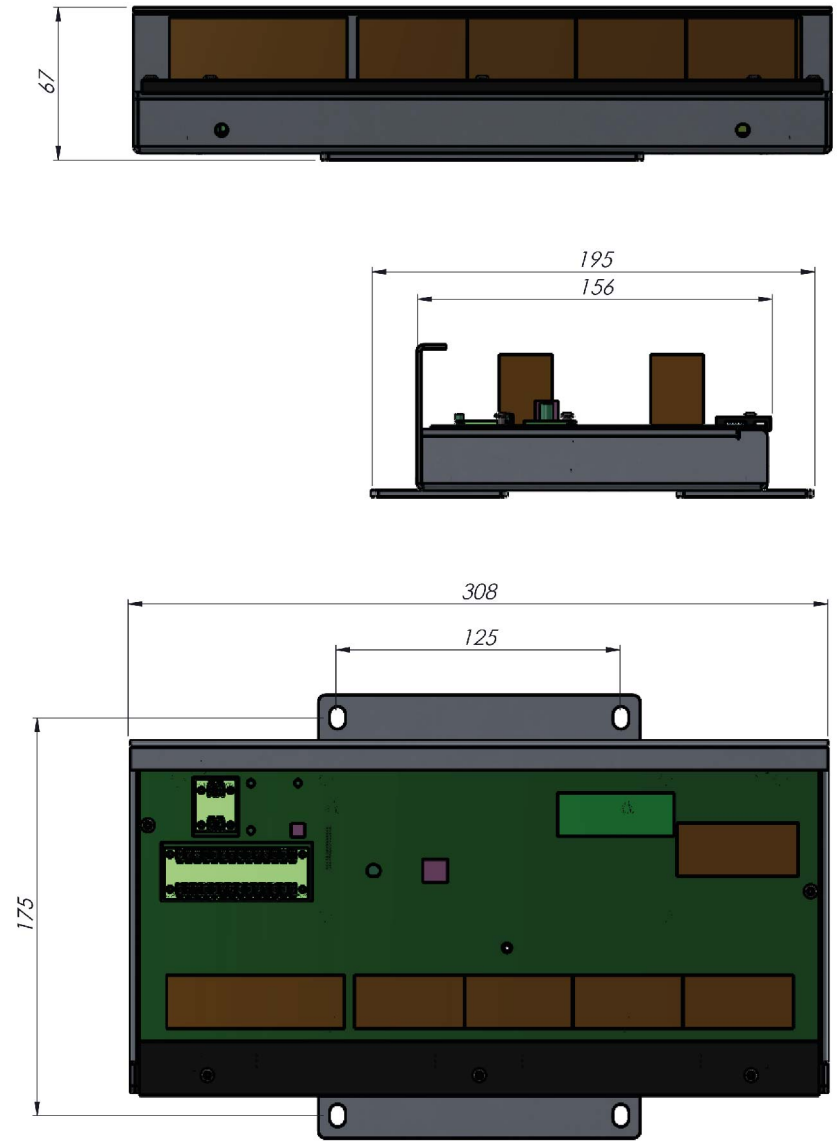
Horizontal mounting bracket



All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

[117004-A10] Rev.2
AI

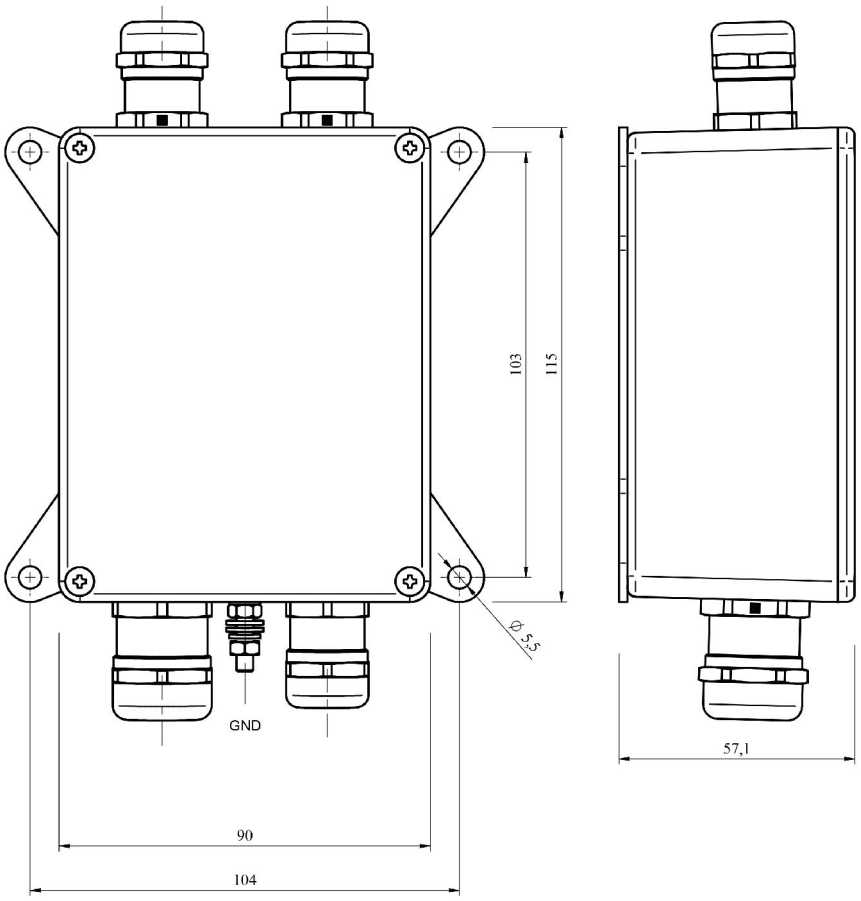
Vertical mounting bracket



All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

[117004_A10] Rev.2
AI

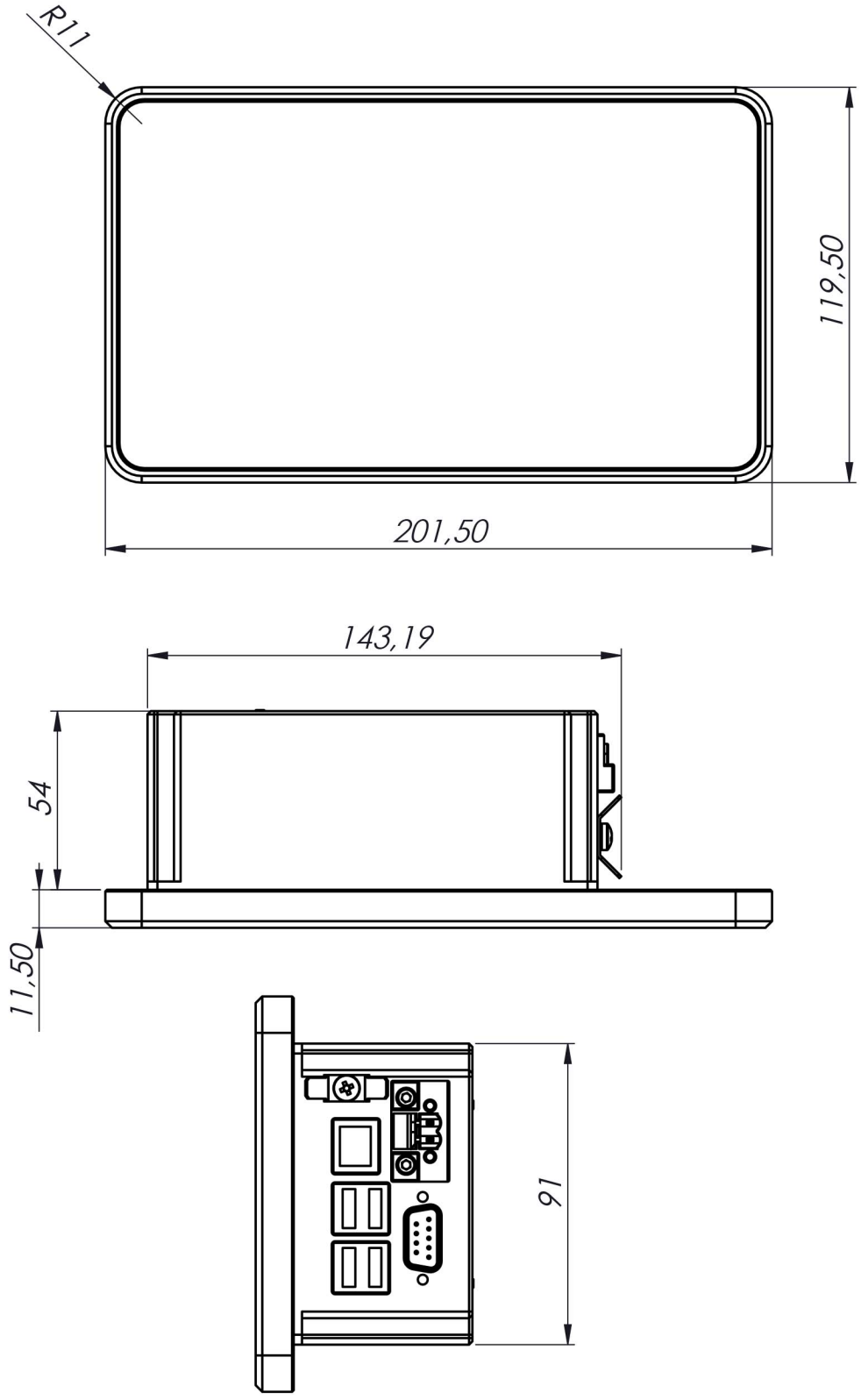
MGC JB5 Repeater Junction Box dimensions



All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

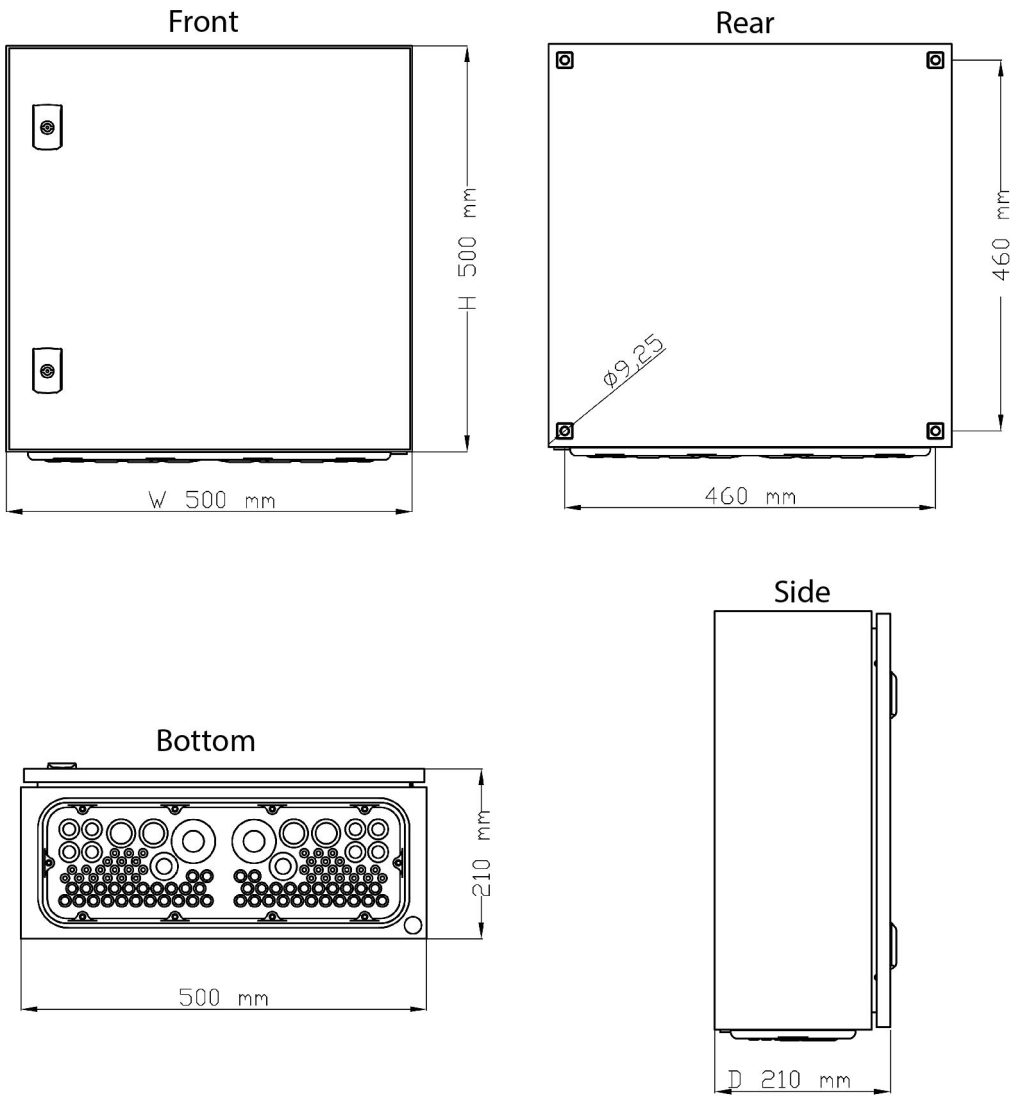
[3800-MA-464] Rev.0
MGC JB5

Display dimensions



Cabinet dimensions

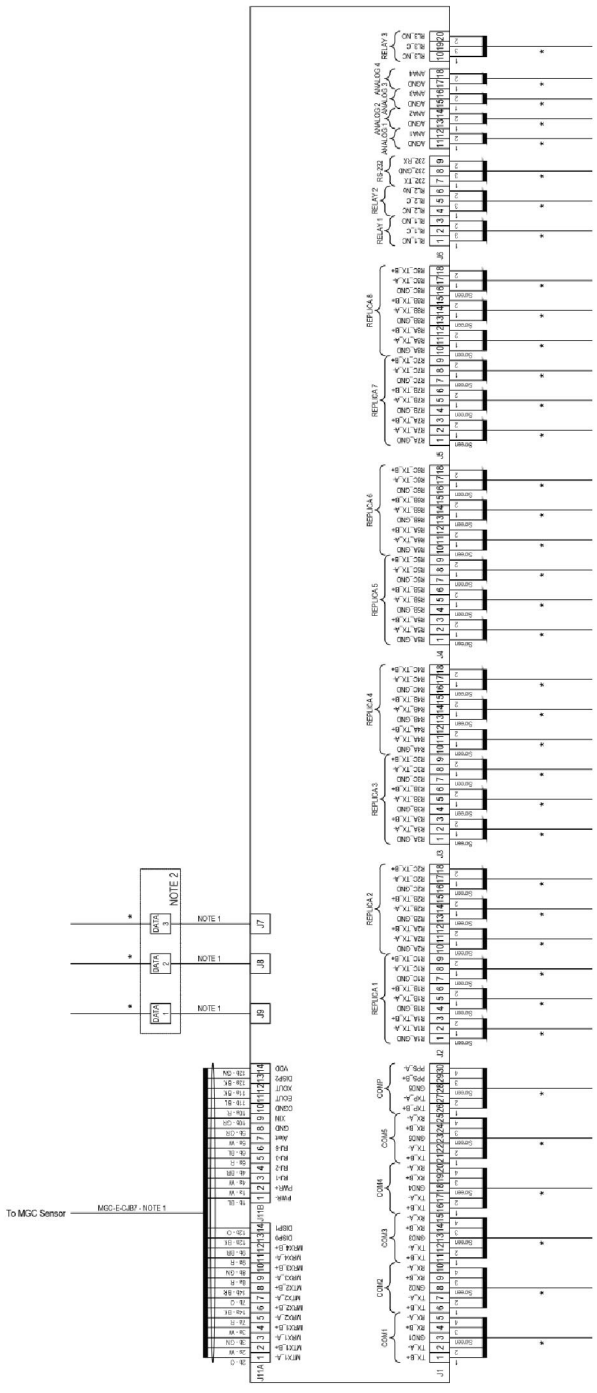
Rittal AX 1050.000



All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

[N/A] Rev.0

MGC JB7 Junction Box wiring inside cabinet



Note 1: Cable delivered by vendor

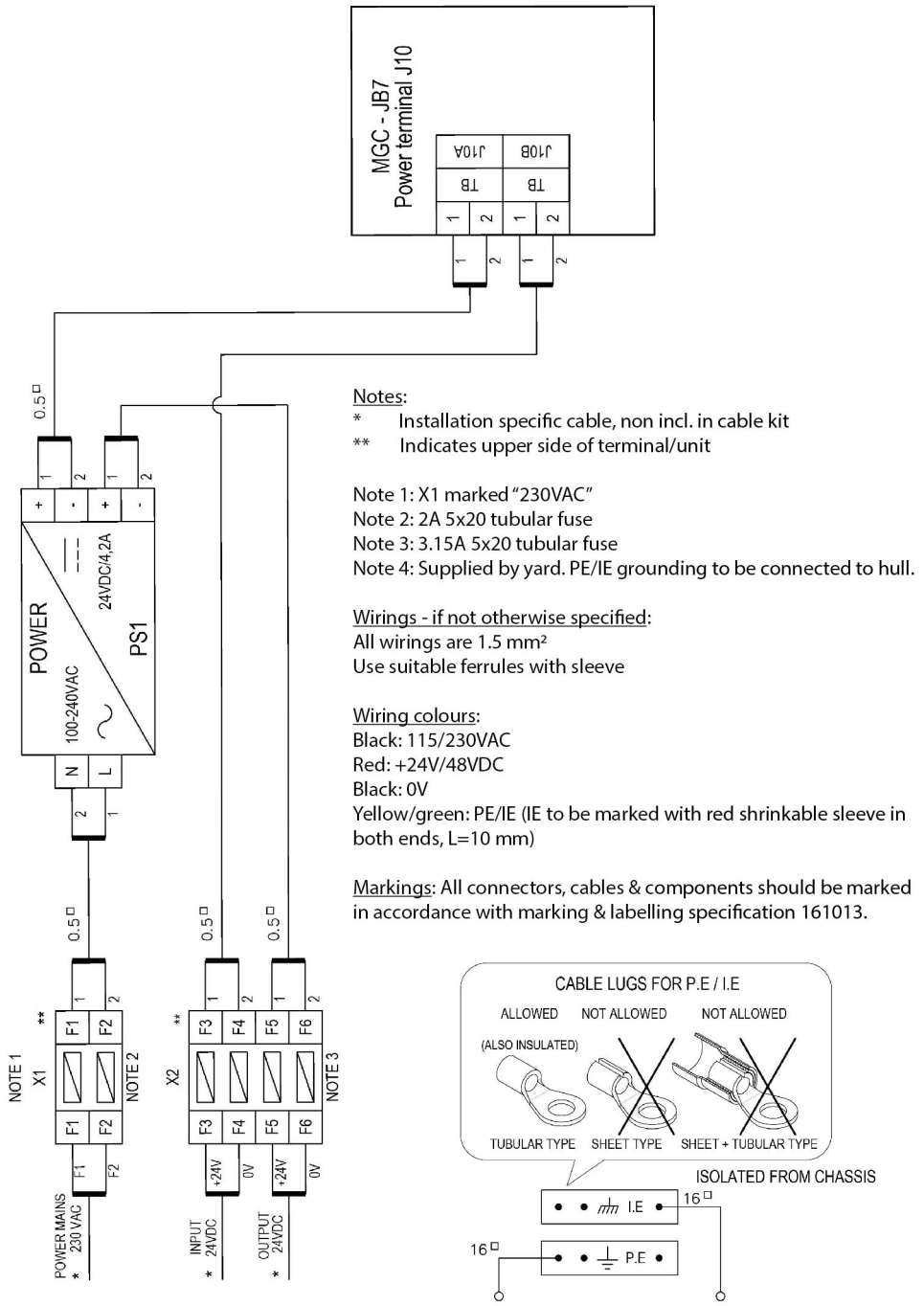
Note 2: External connections in Interface Cabinet

*) Installation specific cable, not included in cable kit

All measurements in mm.
The drawing is not to scale.
Information may be omitted. Observe the source drawing for additional details.

[MGC-IF-55-JB7/468350] Rev.B
AI

MGC JB7 power connection inside cabinet



Technical specifications

Topics

Performance specifications

Heading output

- **Output range**: 0 - 360°
- **Resolution**: 0.01°

MGC R1

- **Heading accuracy (speed aided)**: 0.25° secant latitude RMS
- **Heading accuracy (GNSS aided)**: 0.2° secant latitude RMS
- **Heading settling time to data available**: <5 minutes from start-up (typical)
- **Heading settling time to full accuracy**: 30 minutes from start-up (typical)

MGC R2 & R3

- **Heading accuracy (speed aided), MGC R2**: 0.15° secant latitude RMS

- **Heading accuracy (speed aided), MGC R3**: 0.08° secant latitude RMS
- **Heading accuracy (GNSS aided), MGC R2**: 0.1° secant latitude RMS
- **Heading accuracy (GNSS aided), MGC R3**: 0.04° secant latitude RMS
- **Heading settling time to data available, MGC R2 & R3**: <5 minutes from start-up (typical)
- **Heading settling time to full accuracy, MGC R2 & R3**: 17 minutes from start-up (typical)

MGC R4 & R5

- **Heading accuracy (speed aided), MGC R4**: 0.04° secant latitude RMS
- **Heading accuracy (speed aided), MGC R5**: 0.02° secant latitude RMS
- **Heading accuracy (GNSS aided), MGC R4**: 0.02° secant latitude RMS
- **Heading accuracy (GNSS aided), MGC R5**: 0.008° secant latitude RMS
- **Heading settling time to data available, MGC R4 & R5**: <5 minutes from start-up (typical)
- **Heading settling time to full accuracy, MGC R4 & R5**: 8 minutes from start-up (typical)

Roll and pitch output

- **Output range**: ±90°
- **Resolution**: 0.001°
- **Roll/pitch static accuracy (unaided), MGC R1**: 0.05° RMS
- **Roll/pitch dynamic accuracy (unaided), MGC R1**: 0.008° 1-sigma
- **Roll/pitch static accuracy (unaided), MGC R2**: 0.02° RMS
- **Roll/pitch dynamic accuracy (unaided), MGC R2**: 0.005° 1-sigma
- **Roll/pitch static accuracy (unaided), MGC R3**: 0.01° RMS
- **Roll/pitch dynamic accuracy (unaided), MGC R3**: 0.004° 1-sigma
- **Roll/pitch static accuracy (unaided), MGC R4 & R5**: 0.008° RMS
- **Roll/pitch dynamic accuracy (unaided), MGC R4 & R5**: 0.002° 1-sigma

Heave motion output

- **Output range**: ±50 m

MGC R1

- **Heave accuracy for 0 to 18 s motion periods (real-time)**: 10 cm or 10% whichever is highest (RMS)

MGC R2, R3, R4 & R5

- **Heave accuracy for 0 to 25 s motion periods (real-time)**: 5 cm or 5% whichever is highest (RMS)
- **Heave accuracy for 10 s motion periods (real-time)**: 1 cm or 1% whichever is highest (RMS)
- **Heave accuracy for 0 to 50 s motion periods (delayed)**: 1 cm or 1% whichever is highest (RMS)

Position output

MGC R2 & R3

- **Free inertial (GNSS aided), MGC R2**: 5 nm/h
- **Free inertial (GNSS aided), MGC R3**: 2 nm/h

MGC R4 & R5

- **Free inertial (GNSS aided), MGC R4**: 0.4 nm/h
- **Free inertial (GNSS aided), MGC R5**: 0.25 nm/h DRMS
- **Free inertial (GNSS aided), MGC R5**: <20 m/15 minutes DRMS

Internal processing

- **Main processing cycle frequency**: 200 Hz

Weights and outline dimensions

Sensor Unit

- **Outline dimensions**:
  - **Length**: 189.5 mm
  - **Width**: 189.5 mm
  - **Height**: 188.9 mm
- **Weight**:8 kg
- **Connector type**: Souriau 851–36RG 16–26S50 (MIL spec.)

MGC JB7 Junction Box

- **Outline dimensions**:
  - **Type**: MGC-E-JB7

  - **Length**: 308 mm
  - **Width**: 155 mm
  - **Height**: 67 mm
- **Weight**: 1.5 kg

MGC repeater junction box

- **Outline dimensions**:
  - **Type**: MGC-E-JB5
  - **Length**: 115 mm
  - **Width**: 104 mm
  - **Height**: 57.1 mm
- **Weight**: 0.5 kg
- **Cable glands (clamping range)**: 4.5 mm - 9 mm, 7 mm - 12.5 mm

Alert display

- **Type**: MFD 7"
- **Physical dimensions**:
  - **Height**: 119.5 mm
  - **Width**: 201.5 mm
  - **Depth**: 65.5 mm
- **Weight**: 0.86 kg

MGC adapter dampening plate

- **Outline dimensions**:
  - **Length**: 395 mm
  - **Width**: 300 mm
  - **Height**: 44.7 mm
- **Weight**: 7.7 kg
- **Material**: Aluminium

Power specifications

MGC® COMPASS (JB7 Junction Box)

- **Input voltage 1**: 24 V DC nominal (18 - 32 V DC)
- **Power consumption**: Max. 20 W

- **Power rise speed**: Not critical
- **Uninterruptible power supply (UPS)**: Not integrated. Connection to UPS recommended. UPS required for high-speed craft.

Alert display

- **Type**: MFD 7"
- **Voltage**: 10.8 – 32 VDC
- **Power consumption**: 10 W (Maximum)

Environmental specifications

Sensor Unit

- **Operating temperature**: -15 °C – 55 °C
- **Storage temperature**: -35 °C – 70 °C
- **Storage humidity**: Sealed
- **Ingress protection (IP) code**: IP66
- **Enclosure material**: Anodised aluminium
- **Max shock non-operational**: 1000 m/s^2 (10 ms peak)
- **MTBF (hours)**: 50000 h (computed)
- **MTBF (hours)**: 100000 h (service history based)

MGC JB7 Junction Box

- **Type**: MGC-E-JB7
- **Operating temperature**: -15 °C - 55 °C
- **Storage temperature**: -35 °C - 70 °C
- **Ingress protection (IP) code**: IP52
- **Enclosure material**: Aluminium

MGC repeater junction box

- **Type**: MGC-E-JB5
- **Operating temperature**: -15 °C - 55 °C
- **Storage temperature**: -35 °C - 70 °C
- **Ingress protection (IP) code**: IP54
- **Enclosure material**: Aluminium

Alert display

- **Type**: MFD 7"
- **Enclosure material**: Aluminium, Surtec surface treatment
- **Operating temperature**: -20 – 55 °C

Related topics

Storage, page 119

Cable specifications

Sensor Unit cable

- **Type**: MGC-E-CJB7, Heady duty screened, 14 x 2 x 0.25 mm^2
- **Length**: 5 m
- **Diameter**: 13.5 mm
- **Weight**: 0.27 kg/m
- **Flame retardation**: IEC 60332-1
- **Insulation**: PP (conductors), PUR (outer cover)
- **Screen**: Cu-braid

Data cable

Specification for cables connected to the communication interface ports.

- **Clamping range, max.**: 0.08 mm^2 - 1.50 mm^2
- **Cable types**: 0.50 mm^2 - 1.50 mm^2Solid H05(07) V-U, Stranded H07 V-R, Flexible H05(07) V-K, Flexible with ferrule, Ferrule with plastic collar
- **Stripping length**: 6.0 mm

Interface specifications

- **COM 1 - COM 4**: Serial port, bidirectional RS-422 (IEC 61162)
- **COM 5**: Serial port output RS-422 and PPS port input RS-422
- **Baud rate**: 115200 baud, max.
- **COM 6 - COM 8**: Serial port output RS-422 with fixed baud rate, 4800 baud
- **Ethernet**: 3 x 10/100 Mbps
- **UDP/IP ports**: 5 outputs (user configurable), 1 input (static)
- **Data output variables (for each output)**: 24, max. (serial line or Ethernet port)

- **Data output rate**: 200 Hz, max.
- **Analog output**: 3 user configurable channels, ±10 Volts
- **Timing accuracy**: 1 ms
- **Data delay**: Typical 3.5 ms plus transmission delay
- **Data output**: Cyclic output of data or by request from host computer
- **Fanout**: Typical 10
- **Input impedance**: Open-ended/120 Ohm (optional)

Data input specifications

- **Input formats**: NMEA sentences. Available formats GGA, GLL, VTG, VBW, ZDA.

Telegram specifications

Topics

Output formats

Topics

NMEA HCR

The NMEA HCR sentence is used to inform about the state and value of the heading correction included in the heading which is reported by the THS sentence when the heading source can apply correction.

Fixed output rate for the HCR sentence is 1 Hz.

Note

The HCR sentence will send correction status N when the compass has no velocity input, or if the heading status is invalid, or when the compass in the realignment phase after a long velocity outage.

Format

```
$HEHCR,x.x,a,a,x.x*hh
```

Description

1 **x.x**: Heading, degrees true.

Value of heading for which HCR is referenced. This value does not replace heading value from the THS sentence. This value is used for synchronization between the high data rate of the THS sentence and the low data rate of the HCR sentence.

2 **a**: Mode indicator.

A = Autonomous

E = Estimated (dead reckoning)

M = Manual input

S = Simulator mode

V = Data not valid (including standby)

3 **a**: Correction state. This field should not be null.

A = Both speed/latitude and dynamic correction included in heading.

D = Dynamic correction included in heading.

S = Speed/latitude correction included in heading.

N = No correction included in heading.

V = Not available, reporting device does not know about correction state.

4 **x.x**: Correction value.

Value of correction included in heading. Degrees +/- 180,0° with one decimal. Null field indicates correction state N (no correction included) or V (not available).

5 ***hh**: Checksum

NMEA HDT

The NMEA HDT sentence contains the actual vessel heading in degrees true produced by any device or system producing true heading.

Note

This is a deprecated sentence which has been replaced by THS.

Format

```
$--HDT,x.x,T*hh<CR><LF>
```

Description

1 **x.x**: Heading, degrees true.

2 **T**: Heading, degrees true.

3 ***hh**: Checksum

NMEA ROT

The NMEA ROT sentence contains rate of turn and direction of turn information.

Format

```
$--ROT,x.x,A*hh<CR><LF>
```

Description

1 **x.x**: Rate of turn, °/min, "-" = bow turns to port.

2 **A**: Status.

A = Data valid.

V = Data invalid.

3 ***hh**: Checksum

NMEA THS

The NMEA THS sentence contains the actual vessel heading in degrees true produced by any device or system producing true heading.

This sentence includes a "mode indicator" field providing critical safety related information about the heading data.

Note

This sentence replaces the HDT sentence.

Format

```
$--THS,x.x,a*hh<CR><LF>
```

Description

1 **x.x**: Heading, degrees true.

2 **T**: Mode indicator. This field should not be null.

A = Autonomous

E = Estimated (dead reckoning)

M = Manual input

S = Simulator mode

V = Data not valid (including standby)

3 ***hh**: Checksum

NMEA VER

The NMEA VER sentence provides identification and version information about a device. This sentence is produced as a reply to a query sentence.

The sentence is as specified in NMEA standard 0183, version 4.0.

Format

```
$--VER,x,x,aa,c--c,c--c,c--c,c--c,c--c,c--c,x*hh
```

Description

1 **x**: Total number of sentences needed, 1 - 9

2 **x**: Sentence number, 1 - 9

3 **aa**: Device type

4 **c--c**: Vendor identification

5 **c--c**: Unique identifier. Max 15 characters.

6 **c--c**: Manufacturer serial number. Max. 32 characters.

7 **c--c**: Model code (product code). Max. 32 characters.

8 **c--c**: Software revision. Max. 32 characters.

9 **c--c**: Hardware revision. Max. 32 characters.

10 **x**: Sequential message identifier. Message identification number from 0 - 9.

11 ***hh**: Checksum

PSXN20

The proprietary PSXN20 NMEA sentence contains quality indicators for roll, pitch, heading and position.

The sentence destination is positioning reference systems.

The sentence is based on NMEA sentence format.

Format

```
$PSXN,20,x,x,x,x*hh<CR><LF>
```

Description

1 **$**: Start character.

2 **PSXN**: Seatex ID.

3 **Message number**: 20.

4 **x**: horiz-qual - Horizontal position and velocity quality.

0 = Normal

1 = Reduced performance

2 = Invalid data

5 **x**: hgt-qual - Height and vertical velocity quality.

0 = Normal

1 = Reduced performance

2 = Invalid data

6 **x**: head-qual - Heading quality.

0 = Normal

1 = Reduced performance

2 = Invalid data

7 **x**: rp-qual - Roll and pitch quality.

0 = Normal

1 = Reduced performance

2 = Invalid data

8 ***hh**: Checksum.

9 **<CR><LF>**: End of sentence.

PSXN23

The proprietary PSXN23 NMEA sentence contains attitude and heave data calculated in the MGC system.

The sentence destination is PRS monitoring systems.

The sentence is based on NMEA sentence format.

Format

```
$PSXN,23,x.x,x.x,x.x,x.x*hh<CR><LF>
```

Description

1 **$**: Start character.

2 **PSXN**: Seatex ID.

3 **Message number**: 23

4 **x.x**: Roll in degrees. Positive with port side up.

5 **x.x**: Pitch in degrees. Positive with bow up.

6 **x.x**: Heading, degrees true.

7 **x.x**: Heave [m]. Positive down.

8 ***hh**: Checksum (delimiter and field).

9 **<CR><LF>**: End of sentence.

Input formats

Topics

About input formats

The MGC® COMPASS will accept several NMEA 0183 sentences, and extract valuable information. With reference to *Maritime navigation and radiocommunication equipment and systems – Digital interfaces Part 1: Single talker and multiple listeners*, IEC 61162-1 2010-11, edition 4.

All fields must be non-empty, unless stated otherwise.

NMEA GGA

The NMEA GGA sentence transfers the time, position and fix related data from a global positioning system (GPS).

The sentence is as specified in NMEA standard 0183, version 3.0.

Format

```
$--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh
```

Description

1 **hhmmss.ss**: UTC of position (Hours, minutes and seconds)

2 **llll.ll**: Latitude (Degrees, minutes and fractions of minutes)

3 **a** : Latitude sector, North/South

4 **yyyyy.yy**: Longitude (Degrees, minutes and fractions of minutes)

5 **a** : Longitude sector,

6 **x**: GPS quality indicator. This shall not be a null field.

0 = Fix not available or invalid

1 = GPS/GLONASS, Fix valid

2 = DGPS/DGLONASS, Fix valid

5 = Float RTK fix

7 **xx**: Number of satellites in use, 00 - 12

8 **x.x**: Horizontal dilution of precision (HDOP)

9 **x.x**: Altitude, ref: mean-sea level (geoid)

10 **M**: Altitude unit, M = Metres

11 **x.x**: Geoidal separation

The difference between the WGS-84 earth ellipsoid surface and mean-sea-level (geoid) surface.

12 **M**: Geoidal separation unit, M = Metres

13 **x.x**: Age of differential GPS data

Time i seconds. Null field if DGPS is not used.

14 **xxxx**: Differential reference station ID

15 ***hh**: Checksum

Requirements for MGC® COMPASS

- **Item 6 - GPS quality**: Must be > 0.
- **Items 7, 8, 11, 12, 13, 14**: Not used.

NMEA GLL

The NMEA GLL sentence transfers the latitude and longitude of vessel position, the time of the position fix and the current status from a global positioning system (GPS).

The sentence is as specified in NMEA standard 0183, version 3.0.

Format

```
$--GLL,llll.ll,a,yyyyy.yy,a,hhmmss.ss,A,a*hh
```

Description

1 **llll.ll**: Latitude (Degrees, minutes and fractions of minutes)

2 **a** : Latitude sector,

3 **yyyyy.yy**: Longitude (Degrees, minutes and fractions of minutes)

4 **a** : Longitude sector,

5 **hhmmss.ss**: UTC of position (Hours, minutes and seconds)

6 **A**: Status

A = The data are valid.

V = The data are not valid.

7 **a**: Mode indicator

A = Autonomous

D = Differential

N = The data are not valid.

8 ***hh**: Checksum

Requirements for MGC® COMPASS

- **Item 6 - Status**: Must be A.
- **Item 7 - Mode indicator**: Not used

NMEA VTG

The NMEA VTG sentence transfers the actual course and speed relative to the ground. The sentence is as specified in NMEA standard 0183, version 3.0.

Format

```
$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh
```

Description

1 **x.x**: Course over ground, Degrees (True)

2 **T**: Course over ground, marker

3 **x.x**: Course over ground, Degrees (Magnetic)

4 **M**: Course over ground, marker

5 **x.x**: Speed over ground, knots

6 **N**: Speed over ground, knots

7 **x.x**: Speed over ground, km/h

8 **K**: Speed over ground, km/h

9 **a**: Mode indicator. This shall not be a null field.

A = Autonomous

D = Differential

N = The data are not valid.

10 ***hh**: Checksum

Requirements for MGC® COMPASS

- **Items 1 and 2 - True course over ground**: Used if present.
- **Items 3 and 4 - Magnetic course over ground**: Not used
- **Items 5 and 6 - Speed in knots**: Used if present.
- **Items 7 and 8 - Speed in km/h**: Used if present. Preferred over knots.
- **Item 9 - Mode indicator**: Must be A or D.

NMEA VBW

The NMEA VBW datagram contains water- and ground-referenced vessel speed data.

Format

```
$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A*hh<CR><LF>
```

Description

1 **x.x**: Speed relative to water, Longitudinal (knots)

2 **x.x**: Speed relative to water, Transverse (knots)

3 **A**: Status, Speed relative to water,

A = The data are valid.

4 **x.x**: Speed relative to ground, Longitudinal (knots)

5 **x.x**: Speed relative to ground, Transverse (knots)

6 **A**:Status, Speed relative to ground

A = The data are valid.

7 **x.x**: Speed relative to water, Stern, Transverse (knots)

8 **A**: Speed relative to water Status, Stern,

A = The data are valid.

9 **x.x**: Speed relative to ground, Stern, Transverse (knots)

10 **A**: Status, Speed relative to ground, Stern,

A = The data are valid.

V = The data are not valid.

11 ***hh**: Checksum

Note

Transverse speed: " – " = port. Longitudinal speed: " – " = astern.

Requirements for MGC® COMPASS

- **Items 1, 2 and 3 - Water speed in knots**: May be empty.
- **Items 4, 5 and 6 - Ground speed in knots**: May be empty. Preferred over water speed.
- **Items 3 and 6 - Status**: Must be A if used.
- **Items 7 - 11**: Not used

NMEA ZDA

The NMEA ZDA sentence contains the universal time code (UTC), day, month, year and local time zone.

The sentence is as specified in NMEA standard 0183, version 3.0.

Format

```
$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx*hh
```

Description

1 **hhmmss.ss**: UTC of position (Hours, minutes and seconds)

2 **xx**: Day UTC, 01 - 31

3 **xx**: Month UTC, 01 - 12

4 **xxxx**: YearUTC

5 **xx**: Local time zone, hours, 00 - ±13 hrs

6 **xx**: Local time zone, minutes, 00 – +59

7 ***hh**: Checksum

Requirements for MGC® COMPASS

- **Items 5 and 6:**Not used.

Alert messages

Topics

About alert handling messages

All alert handling in the Junction Box JB7/MGC Sensor Unit is based on reference IEC 62923-1 , edition 1.0, 2018-08.

The Junction Box JB7/MGC Sensor Unit will issue warnings using ALF and ACN messages. The mode is selected in the user configuration setup.

Alerts are used to announce abnormal situations and conditions requiring attention, decision and/or action. Two priorities are used: warnings and cautions. For a description of alert types, see the *MGC COMPASS R-series Operator manual*. Alert handling is carried out by exchanging messages between the CAM and the MGC. A message consists of 1 or more sentences.

For the received sentences ACN and HBT, see *Maritime navigation and radiocommunication equipment and systems - Integrated navigation systems - Part 2:*

Modular structure for INS - Operational and performance requirements, methods of testing and required test results, IEC 62923-1, edition 1.0, 2018-08.

NMEA ACN

The NMEA ACN sentence is used for alert handling. The sentence is used for acknowledge, silence, responsibility transfer and to request repeat of alert details.

The ACN message is sent by the CAM to issue commands to the Junction Box JB7/MGC Sensor Unit.

Format

```
$HEACN,hhmmss.ss,aaa,x.x,x.x,c,a*hh<CR><LF>
```

Description

1 **hhmmss.ss**: Time.

2 **aaa**: Manufacturer mnemonic code. Always null.

3 **x.x**: Alert identifier. 3062 for system fault.

4 **x.x**: Alert instance, 1 to 999999. Unique within the life cycle of distributed alert.

5 **c**: Alert command, A, Q, O or S.

6 **a**: Sentence status flag.

7 ***hh**: Checksum

NMEA ALC

The NMEA ALC sentence is used for alert handling. The purpose of the sentence is to satisfy the needs for a safe and consistent data distribution with a minimum of data traffic.

The ALC sentence is transmitted by the Junction Box JB7 once each 30 seconds as a minimum.

Format

```
$HEALC,xx,xx,xx,x.x,aaa,x.x,x.x,x.x,......,aaa,x.x,x.x,x.x*hh<CR><LF>
```

Description

1 **xx**: Total number of sentences for this message, 01 to 99.

2 **xx**: Sentence number, 01 to 99.

3 **xx**: Sequential message identifier, 00 to 99. Identifies sentence belonging to group of sentences.

4 **x.x**: Number of alert entries. 0-n if all alerts in normal state.

5 **aaa**: Manufacturer mnemonic code. Null if alert identifier = 3062 (system fault).

6 **x.x**: Alert entry 1 - Alert identifier. 3062 for system fault.

7 **x.x**: Alert entry 1 - Alert instance, 1 to 999999. Unique within life cycle of distributed alert.

8 **x.x**: Alert entry 1 - Revision counter, 1 to 99. Unique for each instance of alert.

9 **…...**: Additional alert entries

10 **aaa**: Manufacturer mnemonic code - See ALF manufacturer identifier

11 **x.x**: Alert entry n - Alert identifier - See ALF Alert identifier

12 **x.x**: Alert entry n - Alert instance - See ALF Alert instance

13 **x.x**: Alert entry n - Revision counter - See ALF Revision counter

14 ***hh**: Checksum

NMEA ALF

The NMEA ALF sentence is used for alert handling. It is used to report an alert condition and the alert state of the device.

An ALF message shall be published for an alert each time the alert information in this sentence changes and on alert request.

Format

```
$HEALF,x,x,x,hhmmss.ss,a,a,a,aaa,x.x,x.x,x.x,x,c--c*hh<CR><LF>
```

Description

1 **x**: Total number of ALF sentences for this message, 1 to 2. This message = 2.

2 **x**: Sentence number, 1 to 2.

3 **x**: Sequential message identifier, 0 to 9.

4 **hhmmss.ss**: Time of last change. Last time the data within the alert message has changed, UTC.

5 **a**: Alert category, A, B or C. Category = B.

6 **a**: Alert priority, E, A, W or C. Priority = W for id 3062 system fault.

7 **a**: Alert state, A, S, N, O, U or V.

8 **aaa**: Manufacturer mnemonic code. Null if alert identifier = 3062 (system fault).

9 **x.x**: Alert identifier.3062 for system fault.

10 **x.x**: Alert instance, 1 to 999999.

11 **x.x**: Revision counter, 1 to 99.

12 **x**: Escalation counter, 0 to 9.

13 **c--c**: Alert text.

14 ***hh**: Checksum

NMEA ARC

The NMEA ARC sentence is used for alert handling.

The ARC sentence is transmitted by the Junction Box JB7/MGC Sensor Unit to notify the CAM about refused commands.

Format

```
$HEARC,hhmmss.ss,aaa,x.x,x.x,c*hh<CR><LF>
```

Description

1 **hhmmss.ss**: Time.

2 **aaa**: Manufacturer mnemonic code. Always null.

3 **x.x**: Alert identifier. 3062 for system fault.

4 **x.x**: Alert instance, 1 to 999999. Unique within the life cycle of distributed alert.

5 **c**: Refused alert command, A, Q, O or S.

6 ***hh**: Checksum

NMEA HBT

The NMEA HBT sentence is intended to be used to indicate that equipment is operating normally, or for supervision of a connection between two units.

In responsibility transfer mode the Junction Box JB7 could receive a heartbeat sentence, HBT, at 60-second intervals as a minimum. If heartbeat is missing for 120 seconds, normal alert handling is resumed.

Format

```
$HEHBT,x.x,A,x*hh<CR><LF>
```

Description

1 **x.x**: Configured repeat interval.

2 **A**: Equipment status. Equipment in normal operation = A (yes) or V (no).

3 **x**: Sequential sentence identifier. 0 to 9.

4 ***hh**: Checksum

Equipment handling

Topics

Taking delivery

When the equipment arrives at its destination:

- Perform an inspection immediately to register any damage that may have occurred in transit.
- If you find any damage, both the insurance company and the shipping agent must be informed immediately.

Unpacking and handling

Care should be taken when unpacking and handling the equipment. A visual inspection should be made to check that the equipment has not been damaged during shipment and that all components and parts are present according to the packing list.

The equipment contains delicate electronic components – handle with care and avoid shocks.

The equipment can be lifted by hand.

Storage

After the equipment in the boxes has been inspected and it has been verified that no damage has occurred, the equipment must be stored in its original packaging until the time of installation. The storage premises must be dry and well protected.

Sensor Unit transportation box

The unit is shipped in a specially designed transportation box. Keep the unit stored within the box until everything is ready for installation of the unit.

Note

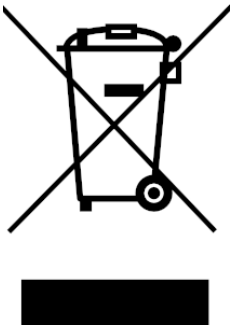
After the unit has been installed, please keep the transportation box. The unit must be shipped in this box for maintenance or repair in order to maintain the warranty.

Related topics

Environmental specifications, page 101

Disposal

At the end of the product lifetime, all parts and products must be disposed of in an environmentally-friendly way.



All electrical and electronic parts and components must be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or local authorities. The correct disposal and separate collection of your old appliance will help prevent potential negative consequences for the environment and human health. This is a precondition for reuse and recycling of used electrical and electronic equipment. For more detailed information about disposal of your old appliance, please contact your local authorities or waste disposal service.

All disposal of mechanical, electromechanical, electronic and chemical waste - including all types of batteries - must take place according to national and international rules and regulations. Observe the relevant Waste Electrical and Electronic Equipment (WEEE) regulations.

The equipment can be returned to Kongsberg Discovery AS if there is no local WEEE collection. The equipment is marked with this waste pictogram.

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