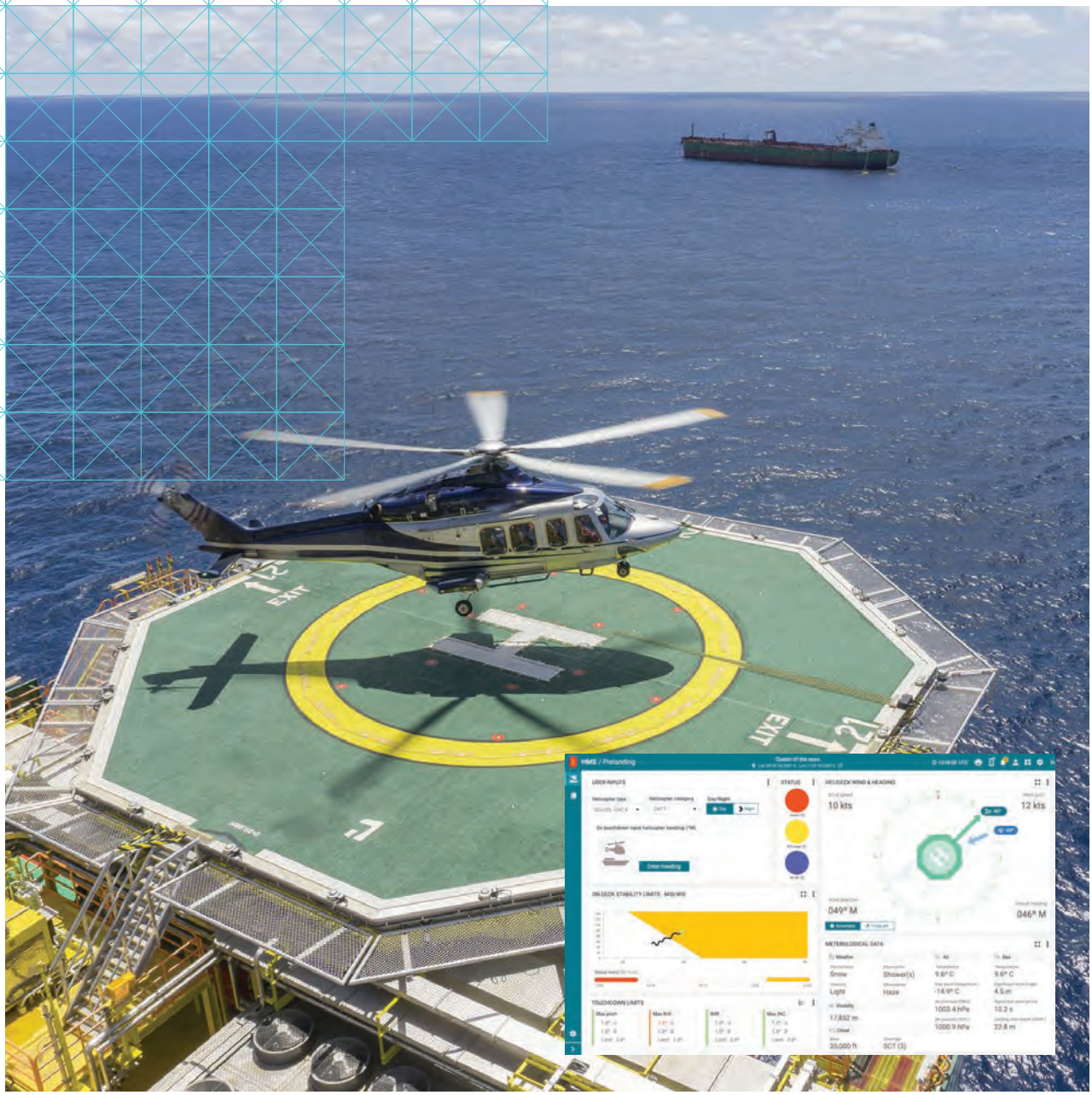
KONGSBERG

INSTALLATION MANUAL

HMS 300

Helideck Monitoring System



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HMS 300
Helideck Monitoring System

Installation Manual

M450-70/7.0

Document history

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Rev. 1.0	October 2021	First version.
Rev. 2.0	December 2021	Updated repeater light control unit enclosure drawing. Updated HMI Unit dimensions and drawing. GSN router dimensions included.
Rev. 3.0	January 2022	Updated GSN router interface schematics.
Rev. 4.0	February 2022	Updated with survey of helideck and wind sensor. HMS 300 wiring diagram updated.
Rev. 5.0	May 2022	Updated procedure and text in chapter 12. Updated check list in Appendix A. CAP 437 requirement on 4 Hz wind data output rate is described in chapter 8.1.
Rev. 6.0	October 2022	Configuration of Helimet output included. Updated with survey of Gill wind sensor. Updated with latest HMI hardware. Appendix with description of how to connect helideck status light included.
Rev. 7.0	July 2023	Corrected description of wave and water lever system with IP range for RangeFinder sensor. The Gill wind sensor is added to the list of meteorology sensor interfaces.

Note

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Kongsberg Maritime 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.

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. The user must be familiar with the contents of the appropriate manuals before attempting to operate or work on the equipment.
Kongsberg Maritime disclaims any responsibility for damage or injury caused by improper installation, use or maintenance of the equipment.

Comments

To assist us in making improvements to the product and to this manual, we welcome comments and constructive criticism.
e-mail: km.seatex@km.kongsberg.com

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BSD license 170
Curl license 171
f2c license 171
GCC license 172
GNU general public license, version 2 173
GNU general public license, version 3 177
GNU lesser general public license, version 2.1 185
GNU lesser general public license, version 3 192
GNU C library license 194
ISC license 196
OpenSSL license 197
OpenSSH license 200
TinyLogin license 203
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Glossary

Abbreviations

CG	Centre of Gravity. The mass centre of a vessel. This is normally the location with least linear acceleration, and hence the best location for measurements of roll and pitch.
CGND	Communication ground.
CL	Centre line. Is the longitudinal axis along the centre of the ship.
GGND	The MRU and MGC ground.
GPS	Global positioning system
GUI	Graphical user interface
HMI	Human machine interface
LED	Light emitting diode
LGND	Logic ground
MP	Monitoring Point
MRC	Special software delivered with all MRU units. Running on a PC under Windows XP, Vista and 7. With this software the user can set up the MRU according to his application by use of the delivered configuration cable. The MRC software is used to change the configuration parameters, to check the internal status, etc.
MRU	Motion Reference Unit. This is the inertial sensor within the HMS measuring dynamic linear motion and attitude.
MSL	Mean Sea Level. In the HMS software this means the design water line of the vessel on which the HMS system is installed.
NMEA	National marine electronics association. NMEA 0183 (reference IEC 61162) is a standard for interchange of information between navigation equipment.
PGND	Power ground
RMS	Root mean square
QFE	Air pressure at helideck level
QNH	Air pressure at mean sea level
SHR	Significant heave rate. The heave rate calculation for the CAP 437.
UTC	Universal Time Coordinated. This is the official time in the world and has replaced GMT (Greenwich Mean Time) as the official time.
WEEE	Waste Electrical and Electronic Equipment

Definitions

Alignment	Is the process of adjusting the current internal navigation frame in the instrument to the true external frame.
Attitude	The orientation relative to the vertical axis of a vehicle. Heading is not included. If heading is included, the word "orientation" is used for the vehicle.
b-frame	Body frame. An orthogonal frame fixed to the MRU housing or to the vehicle where the MRU is fixed.
g-frame	Geographic frame. An orthogonal frame having axes pointing North, East, and Down at the current location of the vehicle.
Heave	The vertical dynamic motion of a vehicle and defined positive down. Heave position and velocity are dynamic motion variables calculated for a selected average heave period.
Pitch	A rotation about the pitch axis is positive when the bow moves up. Normally, pitch means the dynamic pitch angle motions.
Roll	A rotation about the roll axis is positive when starboard side of the vehicle moves down. Normally, roll means the dynamic roll angle motion.
Starboard	When looking in the bow direction of a vehicle, this is the right hand side of the vehicle.
Yaw	A rotation about the vertical axis is positive when turning Eastward (Clockwise) when the vehicle cruises in North direction. Normally, yaw means the dynamic yaw motion.

About this manual

Purpose of manual

This installation manual provides you with the descriptions and procedures required to install the HMS system on a vessel. For more detailed information about the operational use of the product, please refer to the *HMS 300 Operator manual*.

Target audience

This manual is intended for technical personnel such as skilled shipyard workers, electricians, qualified engineers, naval architects or system integrator company for installation and configuration of the HMS system.

License information

An export license is required for the export of the Inertial Measurement Units (MGC and MRU).

Registered trademarks

MGC® is a registered trademark in Norway and Europe.

Windows® and Windows 10® are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Maintenance purposes

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

HMS 300

System description

The HMS 300, Helideck Monitoring System, measures the helideck motion during helicopter pre-landing and on-deck operations. HMS 300 monitors the helidecks acceleration, heave velocity, inclination, roll and pitch in real-time.

The HMS 300 will improve flight and passenger safety in challenging environments by providing real-time monitoring of helideck motion and weather conditions.

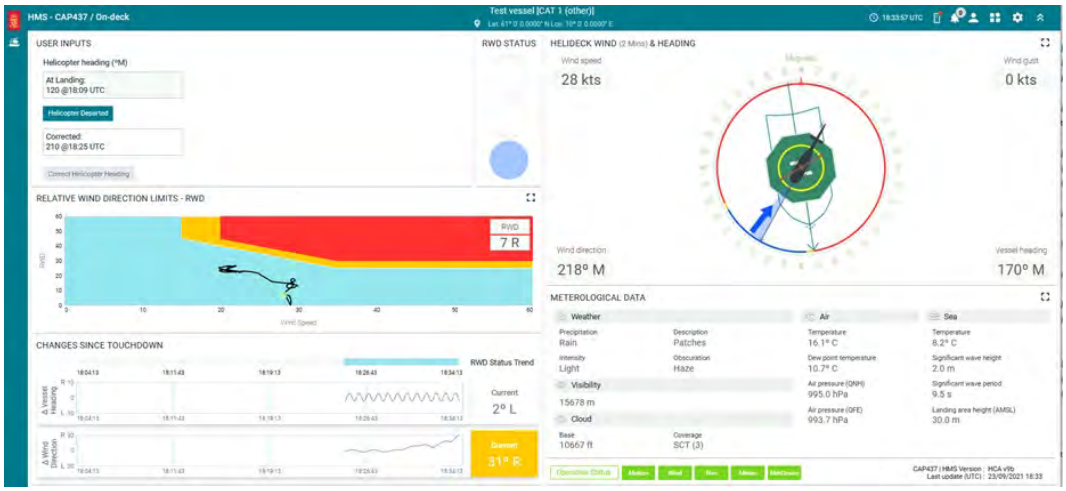
The HMS 300 is fully compliant with the prevailing recommendations and guidelines issued by the Civil Aviation Authorities in the UK, Norway and Brazil. The HMS 300 is compliant with the CAP 437 from September 2018 and accompanying Helideck Certification Agency (HCA) document revision 9b. In addition the HMS 300 is compliant to NOROG ver. 9.2 for the Norwegian sector and NORMAM-27 for the Brazilian sector.

The HMS 300 will monitor and present the Motion Severity Index (MSI) and Wind Severity Index (WSI) data together with significant heave rate (SHR), inclination, roll and pitch of the helideck in real-time. The system uses the Inertial Measurement Units MRU (models E, H, 5 or 5+) or MGC (models R2 or R3) to precisely monitor vessel motion and accelerations in the helideck centre. These data are transferred to the Processing Unit, which processes helideck motion data and MSI and WSI figures to determine whether the helicopter operation is safe or not.

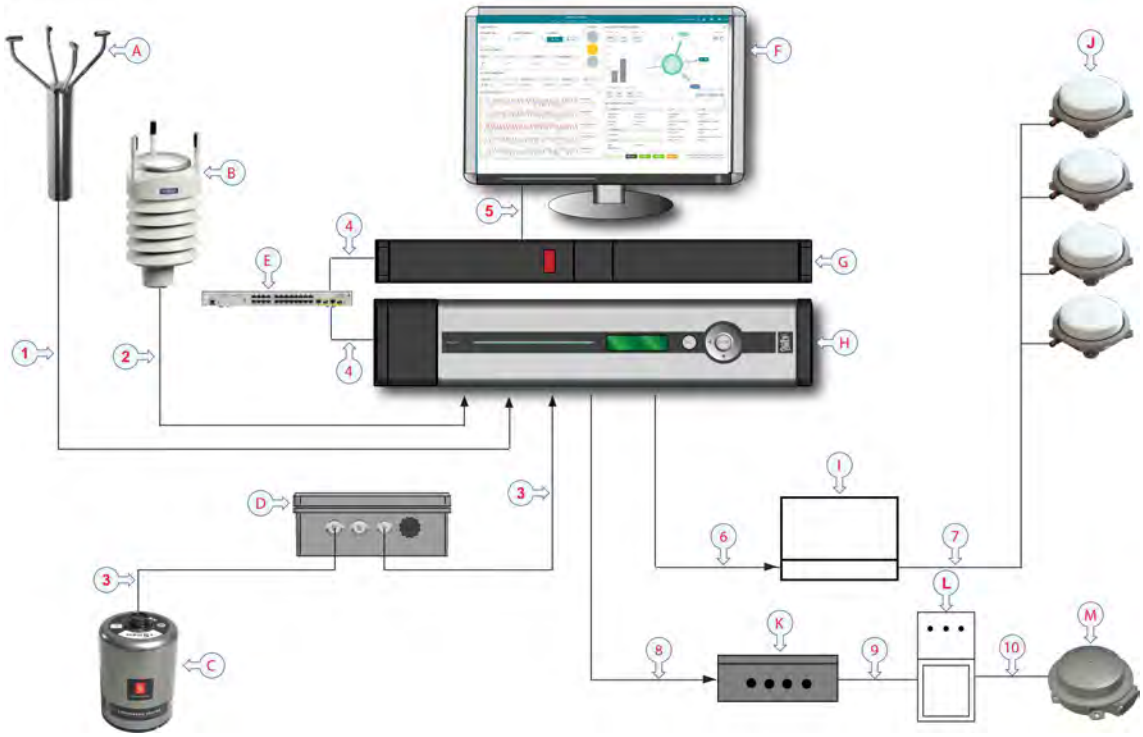
Live vessel data from the system will be available through the Kognifai cloud based digital platform (optional). The Web access will be available to customers through a paid service. This web service will assist helicopter operators in planning the flight prior to take-off from the heliport. Both onboard and onshore personnel can monitor helideck movements and meteorological data in real-time and see the same operational picture in order to increase operational awareness.

The HMS 300 is a two-module solution with a Processing Unit and an EDGE Unit (HMI Unit) connected via Ethernet. The Processing Unit runs critical computations independent of the user interface on the EDGE Unit to ensure continuous and reliable operation. The EDGE Unit presents the helideck motion and the weather conditions in an easy-to-understand format.

The illustration shows a typical view for the operator on the EDGE Unit (HMI Unit).



System diagram



Units

A Wind sensor
B Meteorological sensor
C Inertial Measurement Unit (IMU)
D Junction box
E GSN router
F Monitor
G EDGE Unit (HMI Unit)
H Processing Unit
I Control Unit for repeater lights
J Repeater lights
K External light relay box
L Status light control panel
M Status light (optional)

Cables

1 Wind data
2 Pressure, temperature and humidity data
3 IMU data
4 Ethernet cable
5 Monitor cable
6 Ethernet cable
7 Power and data cable
8 Alarm signal cable
9 Data cable
10 Power and data cable

Note

The EDGE/HMI Unit (item E) may be supplied with two (2) IOT units inside and will then require two (2) Ethernet cables (item 4) to be installed. See Chapter 14 for detailed drawings.

Note

To apply with CAP 437 of September 2018 the wind data have to be output at 4 Hz. This require a separate wind sensor for CAP 437 installation..

Scope of supply

Basic items

These are the basic items provided with an HMS system with minimum meteorological instrumentation which meet the requirements for ships with less or equal to 12 helicopter landings per year.

Units

- Processing Unit (2U)
  Part number M450-10
- EDGE/HMI Unit (1U)

Part number M450-11
- Repeater light
  Part number M450-60
- Repeater light control unit
  Part number M450-61
- Optional: Repeater light control unit mounted within enclosure
  Part number M450-64

Cables

- Power cable to Processing and HMI Unit
  Two metres length, part number G032-10
- Power and communication cable to repeater lights
  Delivery specific length, part number M450-63

Other items

- Software recovery stick
  Part number M450-07
- Product manual
  Part number M450-72

Additional required items

Observe the additional items which are required for installation and/or operation. They can be ordered from Kongsberg Seatex AS or purchased locally.

- Inertial Measurement Unit, MRU or MGC
  MRU models MRU 5+, MRU 5, MRU E, MRU H.
  MGC models R2, R3.
- A 19-inch rack for mounting of the rack components
  (minimum 4U space is required if rack-mountable keyboard/mouse is use)
- Monitor
  (recommended resolution 1280 x 1024, minimum resolution 1024 x 768)
- Keyboard and mouse
- Multi power rail with serial DIN and net switch
  Part number M410-75
- GSN router, Cisco 891-24X with 24 ports
  Part number 417936

Additional items

The product can optionally be delivered with:

Wind sensor

- The wind sensor (Wind Speed/Direction), part number M440–59.

  Including:

  – The wind sensor, part number M410–51.
  – Wind sensor mounting bracket, M410–34.

Multi-weather sensor

- The multi-weather sensor (Wind Speed/Direction, Air Temperature, Barometric Pressure, Humidity) with heating.

  Including:

  – Multi-weather sensor, part number M440-58
  – Power supply, part number G072-78
  – Mounting rod, part number M410-68
  – Connection box, part number M410-69

Dual barometric pressure sensor

- The dual pressure sensor has packet number MET-S-2XPressure.

  Including:

  – Dual pressure sensor, part number M440–50.

Cloud height sensor

- The cloud height sensor with sky condition software and heating has packet number MET-S-Cloud.

  Including:

  – Cloud height sensor, part number M410-44.
  – Shock absorber, part number CT35022
  – Phoenix converter box, RS–232/485, part number 50.081
  – Junction box, part number Termbox-1200

Present weather and visibility sensor

- The present weather and visibility sensor with heating has packet number MET-S-Visibility.

  Including:

  – Present weather and visibility sensor with heating, part number M410-46
  – Power supply, 24 V DC for operation, part number G071-78
  – Power supply, 240 V AC/24 V DC for heater, part number G072–59
  – Phoenix converter box, RS–232/485, part number 50.081
  – Connection box, part number M410-69

Wave and water level system

- Significant wave height and water level system, part number MET-S-WWL.

Including:

– RangeFinder Narrow Motion sensor with range 2 to 95 meters, part number M440-40

Main system units

Processing Unit description

The Processing Units runs the processing software. The software handles all critical computations. It is connected to the HMI Unit via Ethernet and network switch.

The unit receives data from the Inertial Measurement Unit and the meteorological sensors. The unit outputs status light signals to the repeater lights.

The unit is designed to fit standard 19" racks. It is typically installed on the bridge or in the instrument room.

The power on/off switch, local area network (LAN) port and USB connection are located behind the lid to the left on the front panel. Push lid on left side to open. LAN 1 is type RJ-45, 10/100 Mbits/s and reserved for support. The rear panel of the unit contains communication interface ports for interfacing to external equipment. These ports are individually galvanically isolated.

Note

The USB ports are not compatible with USB 3 devices.

EGDE/HMI Unit description

HMI Unit holds the operator software which is used for configuration of the system, performance monitoring and presentation of helideck motion and weather conditions.

The unit is a 1U unit designed to fit standard 19" racks. It is typically installed on the bridge or in the instrument room.

The power on/off switch and two USB connection are located on the front panel. The rear panel of the unit contains power inlet, LAN port, mouse and keyboard ports, a display port and four USB ports.

Note

For some HMS 300 installations the 1U HMI Unit will be delivered with two EDGE Units installed.

MRU description

The MRU (Motion Reference Unit) is designed for motion measurement in marine applications. The unit incorporates 3-axis sensors for linear acceleration and angular rate, along with complete signal processing electronics and power supply. The MRU outputs absolute roll and pitch as well as dynamic acceleration in the north, east and down direction, velocity and relative position.

The interior of the MRU is divided into two sub-assemblies consisting of an electronic part and a sensor part. The sensor unit shall not be repaired or serviced by anyone else than Kongsberg Maritime AS.

MGC description

The MGC (Motion Sensor and Gyro Compass) 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.

Repeater lights description

A sufficient number of repeater lights shall be provided on the helideck to ensure that the flight crew will be able to easily see at least one light regardless of the orientation of the helicopter on the helideck. This is expected to require at least four lights on the helideck. The repeater lights on the helideck must be connected to a control module mounted in an enclosure as close as possible to the HMS Processing Unit.

Each repeater light is connected to the control module with the Orga combined power and communication cable SLxx3 (Strobeline cable). This cable is armoured offshore grade single pair halogen free signal cable.

Repeater lights control unit/module description

The repeater light control module (in an enclosure if required) should be mounted as near to the HMS Processing Unit as possible to ensure a short Ethernet cable run between the two system.

Meteorological sensors

For technical description of the meteorological sensors:

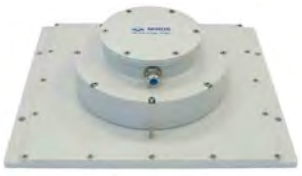
- wind sensor
- multi-weather sensor
- dual-pressure sensor
- cloud height sensor
- visibility sensor

see their individual documentation referred to in *References* on page 157.

Wave and water level system

The wave and water level system is delivered with the Miros SM-140 RangeFinder Narrow Motion sensor and Miros RangeFinder software.

See their individual documentation referred to in *References* on page 157.



Product restrictions

Restrictions in export

Export of the Inertial Measurement Unit (MGC or MRU) requires an export license.

Note

Notice to importer: The MRU product specified in this document 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 MRU may therefore be subject to restrictions from your national export control authorities if exported/re-exported from your country. ***Any valid and approved export license granted to Kongsberg Seatex AS from the Norwegian Ministry of Foreign Affairs is not an authorization for you to export/re-export the MRU.***

Note

Notice to importer: The MGC product specified in this document 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 product will be subject to restrictions if re-exported from your country, including but not limited to a re-export license from the U.S. Government.

Restrictions in guarantee

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

The liability of Kongsberg Maritime AS is limited to repair of this system 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 system's malfunctions, are excluded. The warranty does not cover malfunctions of the system resulting from the following conditions:

- Incorrect power connection.

Restrictions in use

The HMS system is designed for use on board marine surface operated vessels with linear acceleration less than ±30 m/s^2 (±3g) and an angular rate range less than ±75 °/s.

Only relative dynamic heave position is calculated and the measurements are limited by the selection of their motion periods available in the range 1 to 25 seconds.

The HMS system is designed as a landing aid only and is not to be used as a landing guide in helicopter operations.

General safety rules

General safety guidelines to be followed when working in mast and on deck.

Network security

Equipment manufactured by Kongsberg Maritime AS is frequently connected to a local area network (LAN). Connecting any computer to a network will always expose the data on that computer to all other computers connected to the same network. Several threats may immediately occur:

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

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

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

2 The damage done if a remote connection succeeds doing this.

Because Kongsberg Maritime AS has no information regarding the complete system installation, we can not estimate the threat level and the need for network security. For this reason, we can not accept responsibility for network security. Systems provided by Kongsberg Maritime AS are regarded as stand-alone offline systems, even though they may be connected to a network for sensor interfaces and/or data distribution.

Note

No network safety applications are installed on any Kongsberg Maritime computers. The computers are thus not protected against viruses, malware or unintentional access from external users.

Securing the system itself has no meaning unless there is a policy in place that secures all computers in the network. This policy must include physical access by trained and trusted users. The customer/end user of the system will always be in charge of defining and implementing a security policy, and providing the relevant network security applications.

Note

Kongsberg Maritime AS will not accept any responsibility for errors and/or damages caused by unauthorized use or access to the product.

Support information

- **Company name**: Kongsberg Maritime AS, Seatex
- **Address**: Havnegata 9, 7010 Trondheim, Norway
- **Switchboard**: +47 73 54 55 00
- **Duty phone**: +47 33 03 24 07 (24 hours)
- **E-mail address**: km.support.seatex@km.kongsberg.com
- **Website**: http://www.kongsberg.com

KM-Support App

Support is also available from the KM Support App. This app is available for free in App Store and Google Play.

Preparations

Installation drawings

General arrangement drawings of the ship should be acquired to simplify determination of offsets between the Inertial Measurement Units, MRU or MGC, the ship's centre of gravity (CG), the centre of the helideck, the air pressure sensor and water level system.

For some applications, references for calibration of roll and pitch measurements, and the meteorological sensors, are needed.

Outline dimension drawings are included in this manual.

Related topics

- *Drawings* on page 104

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, such as screwdrivers, pliers, spanners, a cable stripper etc. Each tool must be provided in various sizes. We recommend that all tools are demagnetized to protect your equipment.

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

Special equipment

A computer with the MRC+ configuration software installed.

IMU 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 in the mounting bracket.

Note

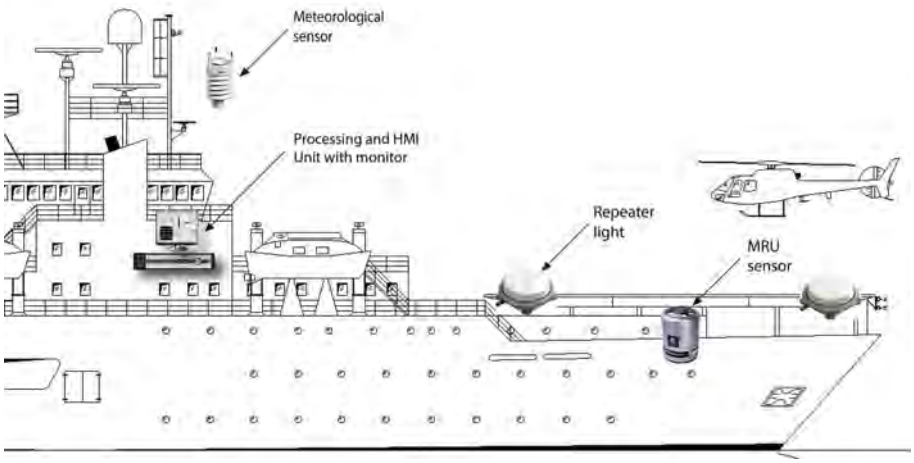
After the unit has been installed, please keep the transportation box. The unit must be shipped in this box for maintenance or repair in order to maintain the warranty.

Worker skills

Trained electrical workers.

Determining the location of system parts

These are recommendations on where to install the various system parts for a best possible system performance.



Processing Unit and HMI Unit location

Consider these factors when installing the unit:

- The unit is designed for indoor installation. The best location is typically in the instrument room or on the bridge
- The unit fits on rails in a 19" rack or console.
- The unit has an internal fan and requires free airflow from the rear and out to the sides. It is recommended that ventilation or air conditioning is provided in order to keep the ambient operating temperature at around 20 °C.

- Avoid placing the unit in locations with heavy vibrations, strong electronic fields (close to transformers), excessive heat.
- Keep the area around the unit free from dust and static electricity.
- All connections to the unit are on the rear side and available space for cable connections and service must be provided.

Related topics

- *Processing Unit dimensions* on page 105
- *HMI Unit dimension* on page 106

IMU 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.

  Note

  The MRU E can be installed in an outdoor environment inside a cabinet or enclosure.

- The unit should be mounted underneath the helideck or as close to it as possible.

  This location will ensure the best possible acceleration measurements and avoid errors in these measurements due to long lever arms and ship-hull torsion.

  Below is a table that shows recommended maximum distance vector (x, y, z) on the lever arms from the MRU and MGC to the helideck centre. Local conditions such as vibration in the hull and helideck structure may reduce the distances indicted to get the acceleration measurements within the requirement.
- Mount the unit along the longitudinal axis of the vessel if possible. Avoid mounting the unit out to the side of the vessel.
- If the helideck is located in an Ex zone, the IMU must be mounted in an Ex enclosure.
- Mount the unit onto a rigid and stable structure. Mount the unit directly onto the hull structure, if possible.

Distance to helideck center	<5 meter	<15 meter	<20 meter
MRU H & E (5th generation)	X		
MRU 5 & 5+ (5th generation)		X	
MGC R2 & R3			X

Be aware of vibrations

The unit is sensitive to vibrations. Avoid mounting the unit on thin walls that may resonate with vibrations driven by machinery, propellers, pumps or motors.

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

- *MRU dimensions* on page 107

IMU Junction Box location

Consider these factors when installing the Junction Box:

- Mount the Junction Box on the floor or on the wall within three metres from the Inertial Measurement Unit.

  The junction box is connected to the IMU with a 3-metre cable.

Related topics

- *MRU junction box dimensions* on page 110

Monitor location

When installing the monitor, consider the following:

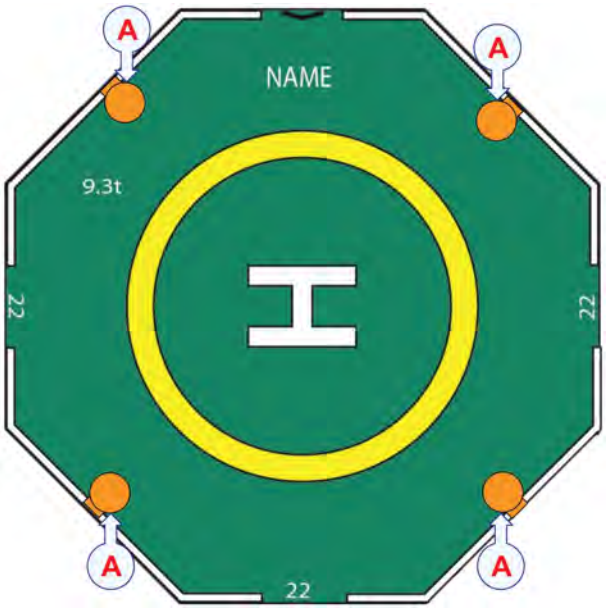
- The unit is designed for installation in an indoor environment and for operation within the temperature range. The best location is typically on a table in the instrument room or on the bridge mounted close to the HMI Unit.
- The HMI Unit and the monitor should be mounted close to each other to reduce the length of the VGA cable.
- It is recommended that the area around the unit is kept free from dust and static electricity.

Repeater lights location

Consider these factors when installing the repeater lights:

- A sufficient number of lights must be provided so that the flight crew can easily see at least one light, or set of lights, regardless of the orientation of the helicopter on the helideck.

  This means that at least four lights, or sets of lights, are required. They should be arranged in a cross, oriented 45 degrees to the bisector of the Obstacle Free Sector (OFS) on the helideck.



A Repeater lights

- The repeater lights shall be connected to a Control Unit. The Control Unit must be located as close as possible to the Processing Unit.
- Install the repeater lights on a rigid, horizontal surface.
- Make sure that the operation of the repeater lights is not obstructed by any shadows and/or objects around it.
- Make sure that the repeater lights are accessible for maintenance.
- Make sure that the location is clean and dry before installation.
- Make sure that the photocell on each repeater light has the clearest possible view on the environment. Make sure that each photocell points away from obstacles such as: light sources, other lights, other equipment and structure.
- If it is not possible to point the photocell on one or more of the repeater lights away from obstacles or light sources, turn off the photocell of that light.

Related topics

- *Repeater light dimensions* on page 124

Repeater lights Control Unit location

Consider these factors when installing the repeater light Control Unit:

- The Control Unit must be located as close as possible to the Processing Unit.

  That is because a short Ethernet cable should connect the two units.
- If required, the unit can be mounted inside an enclosure.

  An enclosure with dimensions 300 x 400 x 120 mm is suitable.
- The unit can be mounted on a DIN rail.

Related topics

- *Repeater light control unit enclosure dimensions* on page 126

Meteorological sensors location

When installing the meteorological sensors, consider the following:

Wind sensor

- **For best wind measurements:** mount the sensor high up in the vessel and in a location with an undisturbed wind flow. Avoid mounting the sensor in a location where it is hidden by obstructions generating turbulent wind flows at the sensor location. A preferable location is high up in the vessel mast away from obstructions and heat sources.

Multi-weather sensor

Multi-weather sensor is a combined wind, temperature, humidity and pressure sensor.

- **For best wind measurements:** mount the sensor high up in the vessel and in a location with an undisturbed wind flow. Avoid mounting the sensor in a location where it is hidden by obstructions generating turbulent wind flows at the sensor location. A preferable location is high up in the vessel mast away from obstructions and heat sources.
- **For best air temperature and humidity measurements:** avoid mounting the sensor close to heat sources. A preferable location is high up in the vessel mast.
- **For best barometric pressure measurements:** mount the sensor in an area with clean, dry and non-conducting air.

Dual barometric pressure sensor

- **For best barometric pressure measurements:** mount the sensor in an area with clean, dry and non-conducting air.

Cloud height sensor

- Mount the sensor straight up (not tilted) on a ship installation.
- It is recommended to mount the sensor on the shock absorber.
- Mount the sensor with free sight to the sky.

Visibility and present weather sensor

- Mount the sensor in a location with undisturbed wind flow and at least two metres above the nearest deck. It is also important that there is no superstructure or flashing light sources nearby.

Related topics

- *Meteorology sensor connection box dimensions* on page 112
- *Multi-weather sensor dimensions* on page 113
- *Cloud height sensor dimensions* on page 114

- *Visibility sensor dimensions* on page 116
- *Shock absorber dimensions* on page 115

Wave and water level system

When installing the this system consider the following:

- Mount the RangeFinder sensor at or near the bow of the vessel.
- A mounting arrangement for the RangeFinder sensor have to be made at the ship yard. Optionally, a mounting arrangement for handrail mounting can be delivered (part number M440-47).
- The RangeFinder sensor has measurement range 2 to 95 meters. Ensure that the sensor is mounted within measurement range to the sea level.
- The location should be accessible for periodical cleaning and service.
- The sensor is not certified for installation in explosive atmospheres.

Related topics

- *RangeFinder sensor dimensions* on page 117
- *RangeFinder hand rail mounting bracket dimensions* on page 118
- *Installing the wave and water level system* on page 73

Cabinet requirements

The HMS system can be delivered with or without a cabinet. If the product is delivered with a cabinet, the cabinet components are pre-installed in the cabinet. If the product is delivered without a cabinet with pre-installed components, the Processing Unit and HMI Unit must be installed in a cabinet which is already in place on site. Consider the following to determine whether your cabinet is suitable for the installation.

- The rack must be securely mounted to the floor.
- The rack must be a standard 19–inch rack.
- The minimum depth of the rack must be 600 mm.
- The rack should have air inlet on top and bottom or ventilation splits on the sides. The Unit has ventilation on the sides. Forced ventilation may be required if the rack contains several electronic modules.
- The rack must be mounted in such a way that the minimum bending radius of the cables (on the rear side) is not exceeded.
- The rack must be connected to a grounded outlet.

Related topics

- *Mounting the Processing and HMI Units in a rack* on page 33

Installing the Processing and HMI Units

System units pre-installed in a rack

The HMS system can be delivered with or without a rack. If the product is delivered with a rack, the rack components are pre-installed in the rack.

The rack components in this system are:

- the Processing Unit
- the HMI Unit

With pre-installed components you have to mount the rack in a suitable location and carry out the cabling for the system.

Installing the delivered rack

Your system can be delivered with a rack with the Processing Unit and HMI Unit pre-installed.

Context

When mounting the rack, consider the following:

- Find a suitable location for the rack in the instrument room or bridge.
- Ensure that all cables are long enough to accommodate service from the front. The cables should be long enough to make it possible to pull each unit to the front of the rack for disconnection of cables.
- The rack must be mounted in such a way that the minimum cable bends (on the rear side) are not exceeded.

Caution

The rack must be connected to a grounded outlet.

Procedure

1 If not already mounted, attach the mounting plates to the rack feet using four bolts, washers and nuts at each foot.

2 Lift the rack into its mounting position.
3 Mark on the floor the position of the four attachment holes in the mounting rails.
4 Lift the rack away from its position.
5 Drill four holes in the marked positions on the floor.
6 Lift the rack into its mounting position again.
7 Use four bolts, washers and nuts and attach the rack to the floor.

Mounting the Processing and HMI Units in a rack

If your system is delivered without a rack, the Processing Unit and the HMI Unit shall be mounted in a 19" rack or cabinet. In addition you must carry out the cabling and interface configuration.

Context

Important

If you have a rack-mountable keyboard in your system, make sure that you have enough space in the rack for the keyboard. A rack-mountable keyboard and mouse will require 1U space in the rack.

The cable strain relief bracket allows for flexibility in the cables without putting stress on the vulnerable points on the cable.

Note

The Processing Unit and HMI Unit have a plastic film on top, and may have one underneath, to protect from transport scratches. This film must be removed before operation as the plastic film will reduce the heat transfer from the unit and thus cause temperature increase inside the unit.

Note

The recommended keyboard cable length is 3.3 m (10 feet) maximum without degradation. If longer keyboard cable is needed, please use keyboard extender.

Procedure

1 Find a suitable location for the units.

   Typically on the bridge or in the instrument room.
2 Remove any plastic film from the units.
3 Place the units on rails or shelves in the 19” rack.

This to ensure that the unit is supported at the rear. Minimum 10 cm free space is needed behind the unit for connection of cables.

4 Fasten the units with four screws in the front.

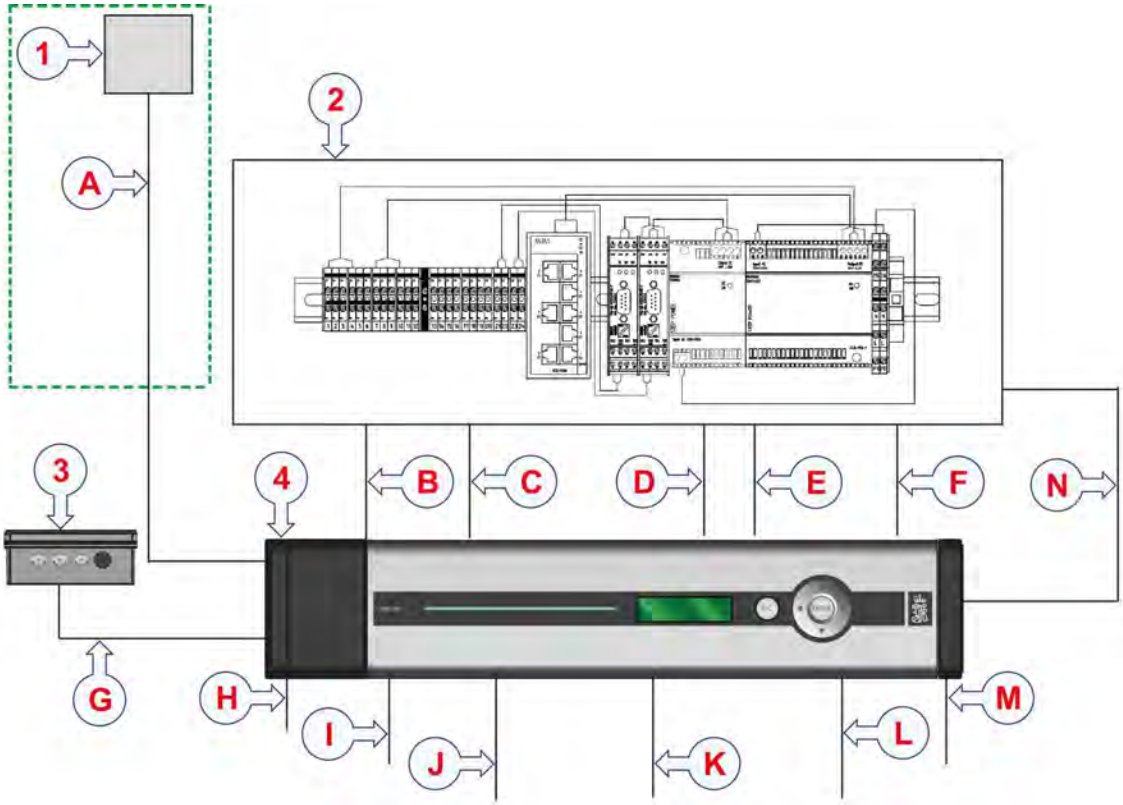
5 Install the AC power cable in the power supply and to a suitable grounded power outlet.

6 The power supply chassis must be grounded to vessel ground.

Related topics

- *Processing Unit and HMI Unit location* on page 26
- *Cabinet requirements* on page 31
- *Processing Unit dimensions* on page 105
- *HMI Unit dimension* on page 106
- *Installing the delivered rack* on page 32
- *Multi power serial DIN rail dimensions* on page 119

Cables HMS Processing Unit



Units

1 WindObserver II (Gill) sensor connection box (not standard solution) *)

2 MET-sensor power rail with Phoenix converter and net switch

3 MRU or MGC junction box

4 HMS Processing Unit

Note

**) If an external wind sensor is to be used in combination with the Range Finder sensor system, a specific solution with extended ports is required.*

Cables

A Signal/power cable from HMS Processing Unit COM 13 to WindObserver II (Gill) sensor connection box (not standard solution) *)

B Serial cable from HMS Processing Unit COM 9 to multi power serial DIN terminal block

C Serial cable from HMS Processing Unit COM 12 to multi power serial DIN terminal block

D Serial cable from HMS Processing Unit COM 2 to multi power serial DIN Phoenix converter #1

E Serial cable from HMS Processing Unit COM 1 to multi power serial DIN Phoenix converter #2

F Ethernet cable from HMS Processing Unit LAN 2 to MET-sensor power rail net switch

G Signal and power cable from HMS Processing Unit COM 8 (MRU port) to MRU or MGC junction box

H Serial cable from HMS Processing Unit to Wind sensor interface

I Serial cable from HMS Processing Unit COM 11 to Gyro interface

J Serial cable from HMS Processing Unit COM 10 to GNSS/Seapath

K Ethernet cable from HMS Processing Unit LAN 4 to ship network infrastructure through GSN router port 20

L Ground cable

M Power cable to uninterrupted power supply

N Ethernet cable from HMS Processing Unit LAN 3 to repeater light

Processing Unit cable installation procedure

Note

Do not place the cable in between the tongues at the rear of the unit but fasten the cable with cable tie as illustrated.

1 Connect the 100 - 240 V AC ship's power supply to the power connector at the rear of the Processing Unit.

2 Connect an Ethernet cable from a LAN port on the rear of the Processing Unit to the network on board the vessel through the GSN router.

3 Connect the signal cables from the GNSS sensor and the Compass/Gyro to free terminals at the rear of the Processing Unit

4 Connect the cable between the MRU port at the rear of the Processing Unit and the MRU or MGC junction box. See separate chapter on how to terminate the MRU or MGC sensor.

5 Connect the number of cables required from the meteorological sensors to free terminals at the rear of the Processing Unit. See *Wiring of meteorology sensors* on page 65 on how to terminate the meteorology sensors.

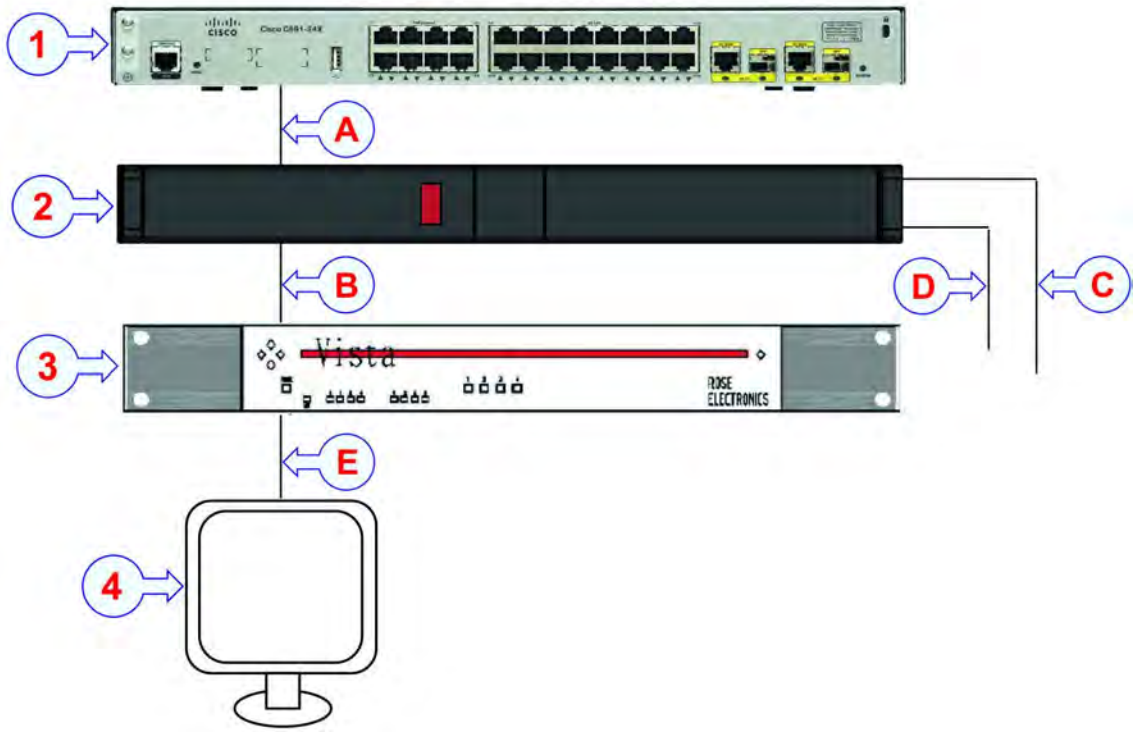
Note

For maximum protection against lightning and for safety the wind sensor must be earthed via its mountings. This unit is NOT an intrinsically safe (IS) device. The unit MUST be earthed or grounded to an appropriate grounding point with a minimum of 6 mm² copper wire, via the M5 base screws. The cable screen must be joined with any cable screen continuing from the unit cable via a junction box. Do NOT connect the unit 0v, heading -ve, analog output 0v or digital 0v to the screen earth.

6 If a cloud and visibility sensor is part of the delivery, a converter of the RS-485 signals from these sensors to an RS-232 signal on the Processing Unit has to be used. See *Wiring of meteorology sensors* on page 65 on how to install the RS-485/232 converter and how to terminate the signals from the cloud and visibility sensor.

7 When all cables are connected, power on the Processing and HMI Units. The four LED indicators located on the front panel of the Processing Unit should then start to shine red. The LED indicator located next to the connector on the MRU or MGC sensor unit should start flashing indicating that the IMU receives power. If the software starts on both the Processing and the HMI Units, the installation is now completed and the setup of the configuration parameters can continue.

Cables EDGE/HMI Unit



Units

1 GSN router

2 HMI Unit

3 KVM switch

4 Monitor

Cables

A Ethernet cable from HMI Unit to GSN router or switch

B Monitor cable from HMI Unit to KVM switch

C Power cable to uninterrupted power supply

D Ground cable

E Monitor cable from KMV switch to monitor

HMI Unit cable installation procedure

1 Connect the 100 - 240 V AC ship's power supply to the power connector at the rear of the HMI Unit.

2 Connect the Displayport (DP) cable from the EDGE/HMI Unit IOT-2 display port to the KVM switch.

3 Connect a Monitor cable from the KVM switch to the monitor.

4 Connect an USB cable from the EDGE/HMI Unit IOT-2 USB 3 to the KVM switch.

5 Connect an Ethernet cable from the EDGE/HMI Unit IOT-2 LAN to the GSN routher port 15.

6 Connect an Ethernet cable from the EDGE/HMI Unit IOT-1 LAN to the GSN routher port 9.

7 When all cables are connected, power on the Processing and HMI Units. The four LED indicators located on the front panel of the Processing Unit should then start to shine red. The LED indicator located next to the connector on the MRU or MGC sensor unit should start flashing indicating that the IMU receives power. If the software starts on both the Processing and the HMI Units, the installation is now completed and the setup of the configuration parameters can continue.

Installing the MRU and Junction Box

Installing the MRU with wall mounting bracket

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

Context

The MRU can be mounted on board by use of the **wall mounting bracket** (MRU-M-MB4).

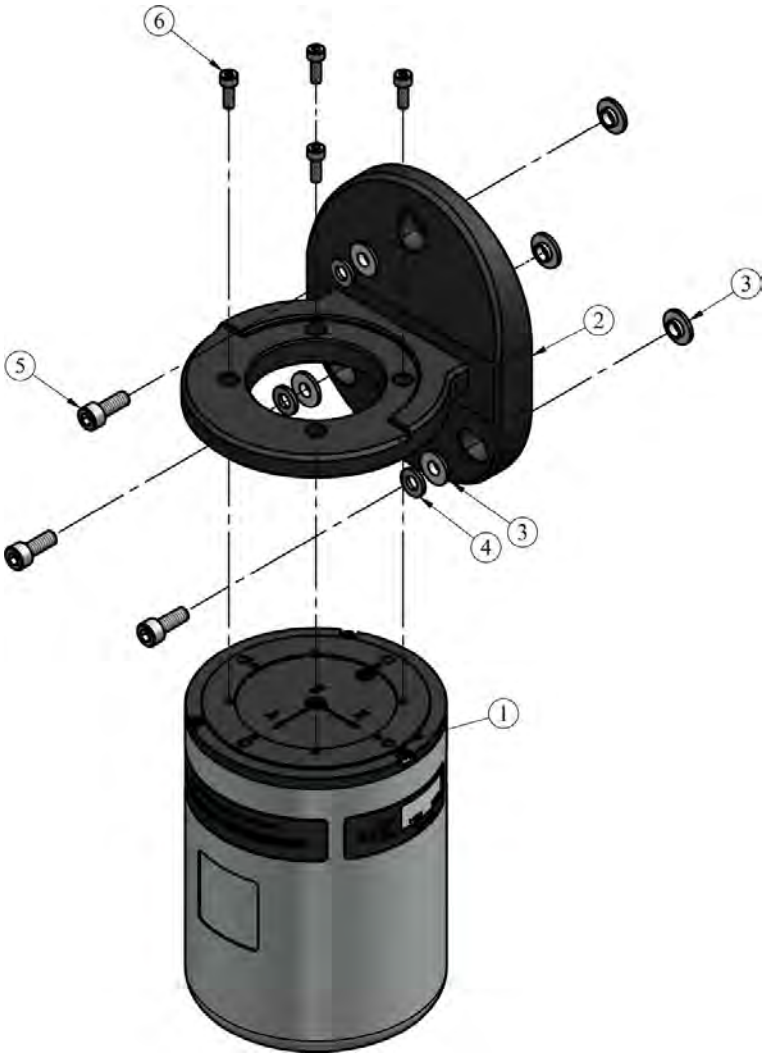
Note

After the installation of the MRU, please save the transportation container. The MRU must be shipped in this container for service or repair to maintain the warranty.

How to install the MRU with wall mounting bracket

1. Identify the best mounting location for the MRU. Preferably mount the Bracket on longitudinal or transversal bulkheads of the hull structure, this to assist alignment and to prevent vibration.
2. Preferably mount the MRU with the opening pointing downwards, as illustrated.
3. Reserve sufficient space below the Bracket for the MRU and the cable.
4. Mount the Bracket to the wall with the screws, pos. 5, before the MRU is mounted to the Bracket.
5. Clean the surface between the MRU and the Bracket carefully prior to assembly. Connecting surfaces between MRU and Bracket must in no way be damaged before mounting.
6. Mount the MRU to the Bracket with the screws, pos. 6.

Figure 1 MRU with wall mounting bracket



7 When disassembling the MRU from the Bracket for service purposes, only remove the screws, pos. 6. Do not remove the Bracket from its position.

Related topics

- *MRU dimensions* on page 107
- *MRU wall mounting bracket dimensions* on page 108

Installing the MRU with protected mounting bracket

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

Context

The MRU can be mounted on board by use of the **protected mounting bracket** (MRU-M-MB6).

Note

After the installation of the MRU, please save the transportation container. The MRU must be shipped in this container for service or repair to maintain the warranty.

How to install the MRU with protected mounting bracket

1 Identify the best mounting location for the MRU on the wall. Preferably mount the Bracket on longitudinal or transversal bulkheads of the hull structure, this to assist alignment and to prevent vibration.

2 Mount the Bracket with the opening pointing downwards, as illustrated. Reserve sufficient space below the Bracket for the MRU and the cable.

Figure 2 Wall mounting with the Bracket opening pointing down

3 Mark and drill an M8 hole for the top screw, pos. 1, and enter the screw without tightening it completely. Align the bracket vertically using its own weight or by aligning it in relation to the wall. Drill two holes for the lower screws, pos. 2, and insert and securely tighten all three screws, using lock washers and nuts.

Figure 3 Wall mounting with the Bracket opening pointing down

4 Unscrew the cover on the bottom of the Bracket, as illustrated.

Figure 4 Bracket with cover

Figure 5 Bracket without cover

5 Fasten the MRU cable (MRU-M-CS8) to the MRU connector and insert the MRU into the bracket.

Figure 6 Bracket with the MRU and cable inserted

Note

The MRU mounting angles have to be modified by use of the MRU configuration to correspond with the actual mounting orientation of the MRU in the Bracket. Precise MRU orientation is important to ensure that high quality and accurate measurements are available to the host system.

6 Fasten the MRU to the Bracket with the four M4 screws, pos. 1, with lock washers and push down the cover caps , pos. 2, at the top of the screw holes, as illustrated, to ensure that water is not entering the holes.

Figure 7 The four mounting screws for the MRU

Figure 8 The cover caps entered above the screws

7 Mount the cover on the bottom of the Bracket with the three M4 screws, as illustrated.

Figure 9 MRU with wall mounting bracket

8 When disassembling the MRU from the Bracket for service purposes, do not remove the Bracket from its position only the MRU inside.

Related topics

- *MRU dimensions* on page 107

- *MRU protected mounting bracket dimensions* on page 109

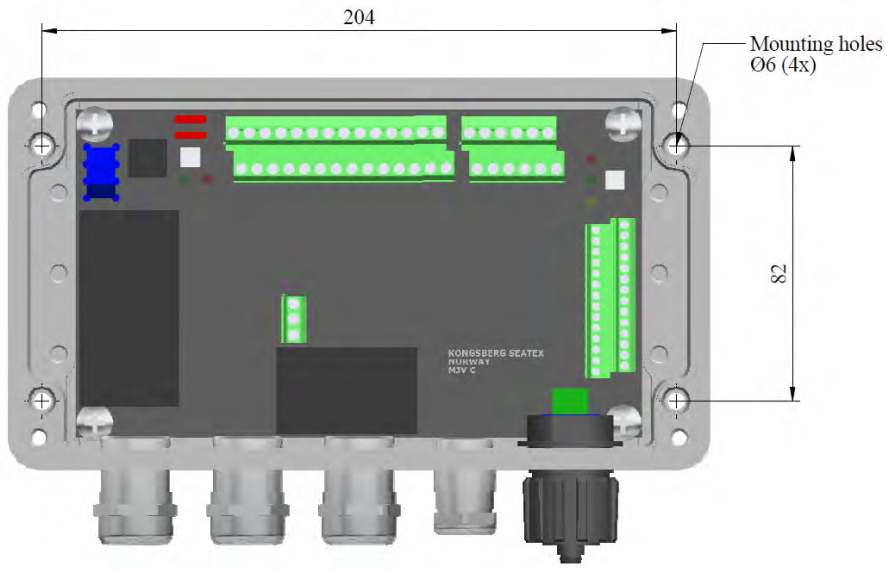
Installing the MRU junction box

When mounting the MRU junction box, consider the following:

- The junction box can be placed on the floor or on a wall.
- Make sure that the location is within the length of the 3–metre cable.
- Provide for a minimum space of 100 mm below the connectors when using the cable MRU-E-CS8.

Procedure

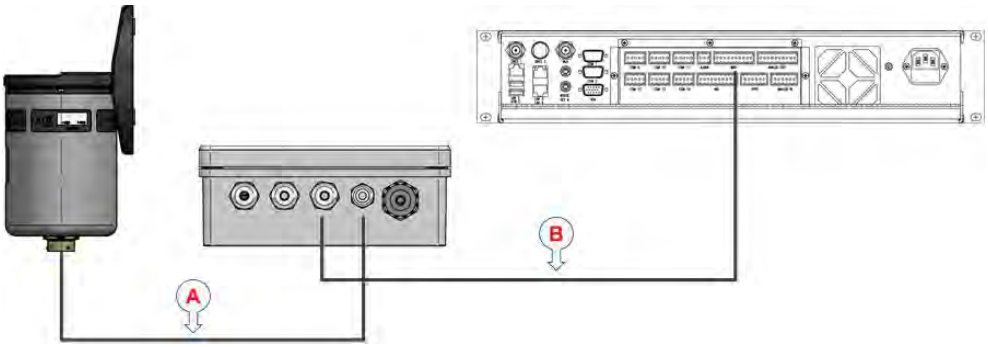
1. Remove the junction box cover by unscrewing the four cover screws.
2. Place the junction box onto its mounting position.
3. Mark four M6 holes on the mounting surface for the junction box.
4. Remove the junction box.
5. Drill four M6 holes in the marked positions.
6. Check that no metal shavings have entered into the junction box while drilling. If so, remove the metal shavings.
7. Replace the junction box onto its mounting position.
8. Use screws with washers and self-locking nuts to attach the junction box to the mounting surface.
9. Replace the junction box cover and fasten it with the four cover screws.



Related topics

- *MRU junction box dimensions* on page 110

Cables



A MRU cable, MRU-E-CS8

B Junction box to Processing Unit cable, MRU terminal, ship cable

Cable from Processing Unit to junction box

Cable specification

Type	3 x 2 x 0.5 mm² individually shield twisted pairs
Maximum length	100 m
Diameter	10 mm
Flame retardation	IEC 332-3/A

MRU to Processing Unit cable wiring

The MRU is connected to the Processing Unit with a cable which is terminated in the MRU junction box in one end and with a 10–pin terminal for the Processing Unit in the other end. The MRU is then powered from the Processing Unit.

Table 1 MRU to Processing Unit cable wiring

Processing Unit/MRU Pin no.	Signal	Pair no. Colour	MRU junction box Pin no.	MRU connector Pin no.
3	NC	Screen	Chassis (P3 side)	
10	24V_MRU	1 white	1 (P2 side)	R
1	GND	1 blue	2(P2 side)	B
9	RX_B	2 white	3(P2 side)	C
8	RX_A	2 blue	4(P2 side)	T

Table 1 MRU to Processing Unit cable wiring (cont'd.)

Processing Unit/MRU Pin no.	Signal	Pair no. Colour	MRU junction box Pin no.	MRU connector Pin no.
5	XIN/MRU_1PPS_P	3 white	23(P2 side)	U
2	LGND	3 blue	24(P2 side)	a

The MRU is supplied with 24 V DC power from the MRU port on the Processing Unit.

Note

The shield around each pair in the cable has to be individually isolated in the 10–pin terminal. The outer shield is connected to pin 3 (screen) in this terminal, which is an open end (not connected to earth). In the MRU junction box both the shield around each pair and the outer shield are terminated in pin 40 (chassis) on the P3 side.

Junction box to Processing Unit cable installation procedure

1 Enter the cable from the MRU port at the rear of the Processing Unit through one of the free nipples on the junction box. Ensure that the cable shield is in contact with the nipple for grounding before the cable is fastened to the box. Use the required number of clips to fasten the cable to the wall.

Note

Fill the nipples not used with self-bounding tape. Press the self-bounding tape together as ball and fill it into the nipple. Screw in the nipples properly afterwards to ensure it is watertight. This to fulfil the enclosure protection specification.

2 Insert each of the MRU to Processing Unit cable wires into the correct terminal on the user side (P2) and all cable shields to pin 40 (chassis) on the user side (P3) within the box. Ensure that the shield around each pair in the cable is individually isolated on the 10-pin terminal on the Processing Unit. The outer shield is connected to pin 3 (screen) on this terminal, which is an open end (not connected to earth).

Note

The junction box housing is grounded to earth through the screws for mounting the box to the wall or floor. Please note that if the foundation on which the junction box is mounted, is NOT connected to earth, one of the junction box mounting screws has to be connected to earth by connecting a wire from the screw to an object that is connected to earth.

|———————————————User side P2———————————————|

Pin	Signal description		Pin	Signal description
1	PWR+ (power +)		23	XIN (to MRU)
2	PWR- (power GND)		24	CGND
3	Com1_Out_B			
4	Com1_Out_A			

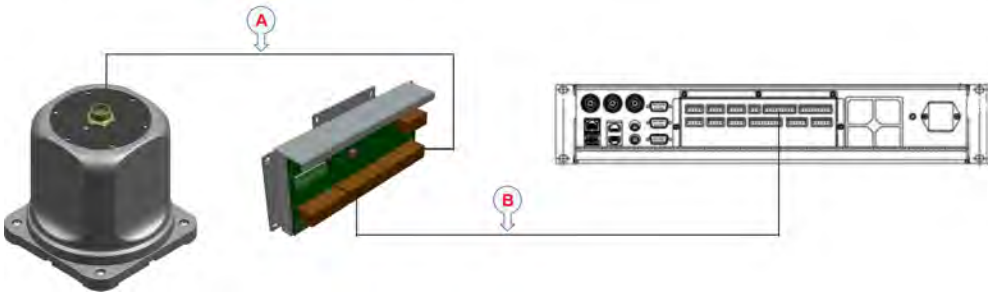
Installing the MGC and Junction Box

Installing the MGC and Junction Box

This chapter describes a shared MGC installation where the HMS 300 is one of many systems connected to the MGC. If the MGC installation is dedicated to the HMS 300 system only, then 24 VDC power to the MGC JB7 box can be supplied from the HMS 300 Processing Unit as described for the MRU installation.

For the physical installation of the MGC and the MGC JB7 junction box, refer to *MGC COMPASS R-series Installation Manual*.

Cables



A MGC cable, MGC-E-CJB7

B MGC JB7 junction box to Processing Unit cable, MRU port terminal, ship cable

Cable from Processing Unit to MGC JB7 junction box

Cable specification

Type	2 x 2 x 0.5 mm^2 individually shield twisted pairs
Maximum length	100 m
Diameter	10 mm
Flame retardation	IEC 332-3/A

MGC to Processing Unit cable wiring

The MGC is connected to the Processing Unit with a cable which is terminated in the MGC JB7 junction box in one end and with a 10–pin terminal for the Processing Unit in the other end (MRU port). The MGC is powered with 24 V DC from an external source.

Table 2 MGC to Processing Unit cable wiring

Processing Unit/MRU Pin no.	Signal	Pair no. Colour	MGC JB7 junction box Pin no.	MGC connector Pin no.
3	NC	Screen		
9	RX_B	1 white	4 (J1)	C
8	RX_A	1 blue	5 (J1)	T
2	LGND	2 white	3 (J1)	a
2	LGND	2 blue	3 (J1)	a

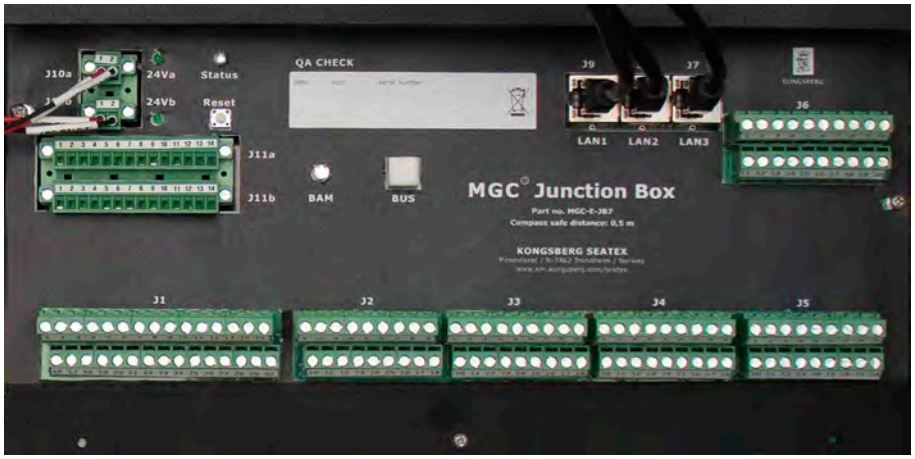
It is recommended to terminate the two wires for the second pair (LGND/GND1) on the same terminal on both ends.

Note

The shield around each pair in the cable has to be individually isolated in the 10–pin terminal on the HMS PU. The outer shield is connected to pin 3 (screen) in this terminal, which is an open end (not connected to earth). Both the shield around each pair and the outer shield are terminated in cable gland on the cabinet which the MGC JB7 junction box is mounted within.

Junction box to Processing Unit cable installation procedure

1 Enter the cable from the MRU port at the rear of the Processing Unit to one of the free serial ports on the MGC JB7 junction box. We recommend to use COM1, but any free port (COM1 to 8) can be used.



2 Terminate the signal wires in the cable from the HMS 300 PU to COM1 (pin1 to 3) to the J1 terminals (marked red on the figure below).

J1														
COM1 COM2 COM3														
Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10	Pin 11	Pin 12	Pin 13	Pin 14	Pin 15
TX1B+	TX1A-	GND1	RX1B+	RX1A-	TX2B+	TX2A-	GND2	RX2B+	RX2A-	TX3B+	TX3A-	GND3	RX3B+	RX3A-
COM4 COM5														
Pin 16	Pin 17	Pin 18	Pin 19	Pin 20	Pin 21	Pin 22	Pin 23	Pin 24	Pin 25	Pin 26	Pin 27	Pin 28	Pin 29	Pin 30
TX4B+	TX4A-	GND4	RX4B+	RX4A-	TX5B+	TX5A-	GND5	RX5B+	RX5A-	TXPB+	TXPA-	GND5	PPSB+	PPSA-

3 It is recommended to terminate the two wires for the second pair (LGND/GND1) on the same terminal on both ends.

Installing the Repeater Lights and Control Unit

Installing the repeater lights

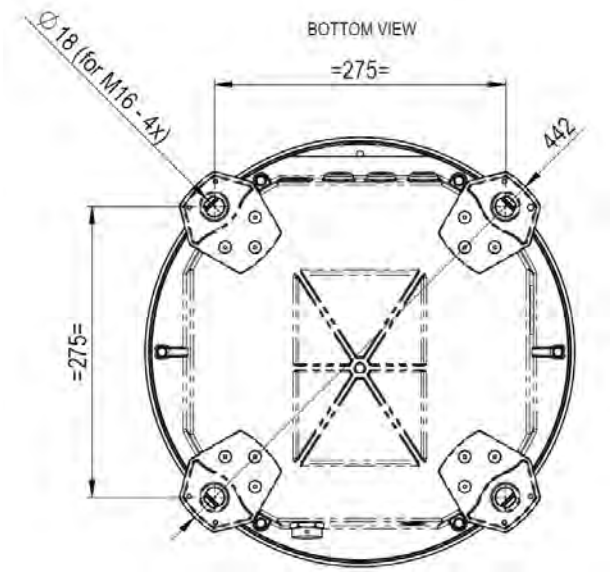
Prerequisites

- At least four repeater lights for mounting on each corner of the helideck.
- The repeater light control module is mounted in an enclosure.
- Each repeater light is connected to the control module with the Orga combined power and communication cable SLxx3 (Strobeline cable). This cable is armoured offshore grade single pair halogen free signal cable.
- For more details of the installation, see the *HMS Repeater Lights System, Installation, operation and maintenance manual* from Orga.

Procedure

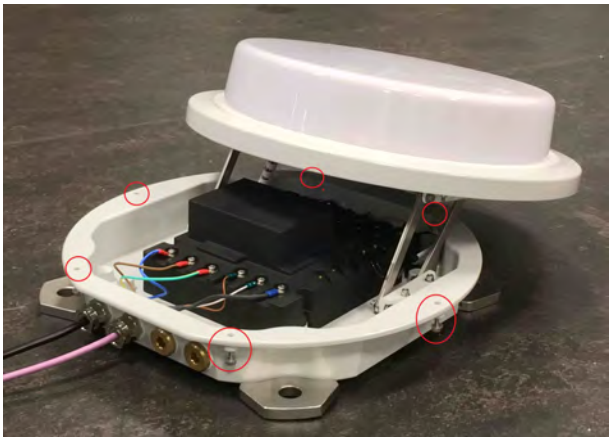
1 Identify the best mounting location for the repeater lights.

2 Mark and drill four M16 holes in the foundation according to the bolt pattern for the light screws.

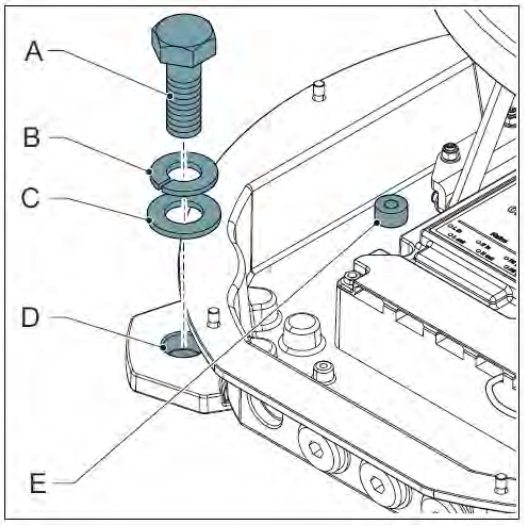


3 Thread four M16 mounting holes with threaded depth minimum 25 mm.

4 Open the repeater light cover by unscrew the six screws marked with red cycles in the figure below.

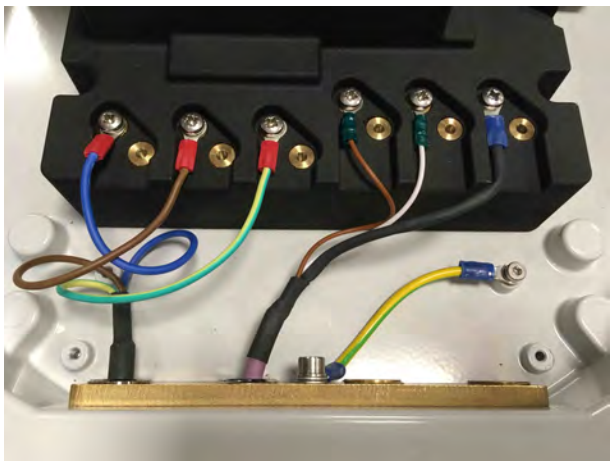


5 Put the mounting feet (D) in the correct. Use the level (E) to make sure that the light is horizontal.



6 Install the rings (B and C) and the fasteners (A).

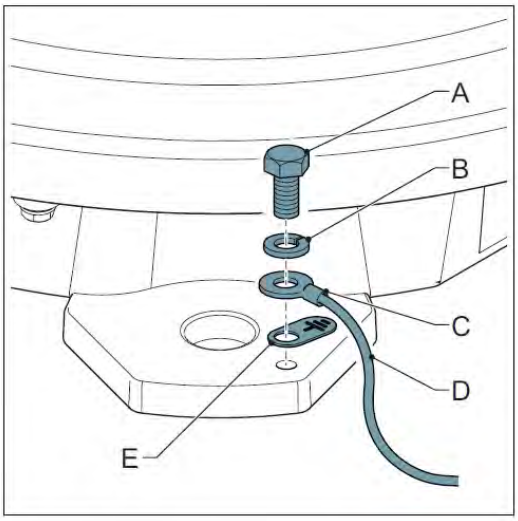
7 Enter the cable wires into the terminals.



8 Close the repeater light cover and fasten the six screws for the cover.

9 Connect the metric earth connection on the foot of the base with a bolt to a grounded structure on the platform.

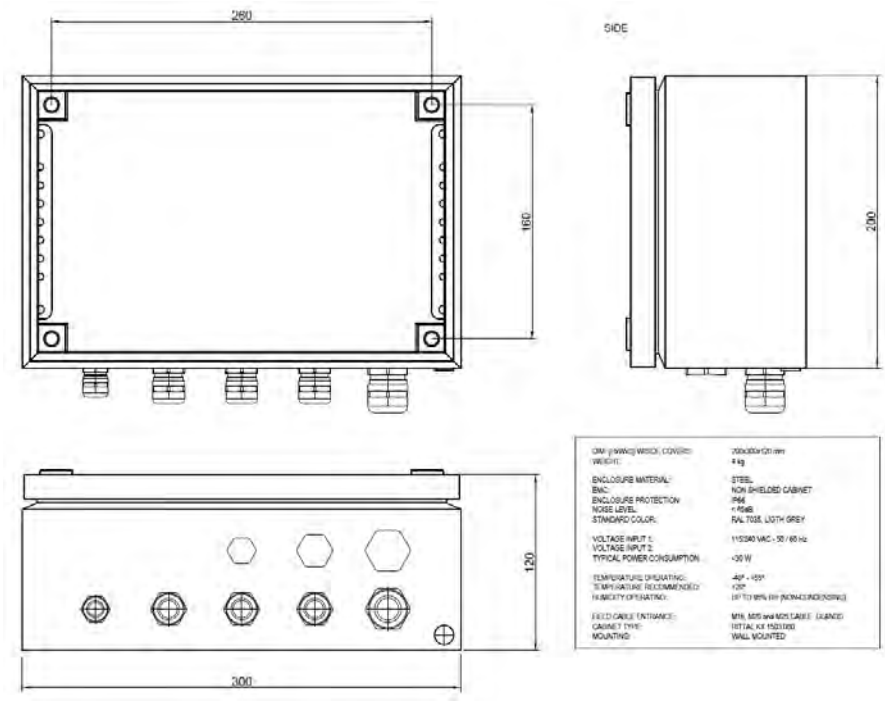
- Use a PE wire (D) with a crosssectional area of at least 4 mm2 with a suitable cable lug (C).
- Use an earth cable mounting bolt (A) in combination with the provided spring lock washer (B).
- Keep the earthing tag (E).


A
B
C
D
E

Installing the repeater light control unit

Procedure

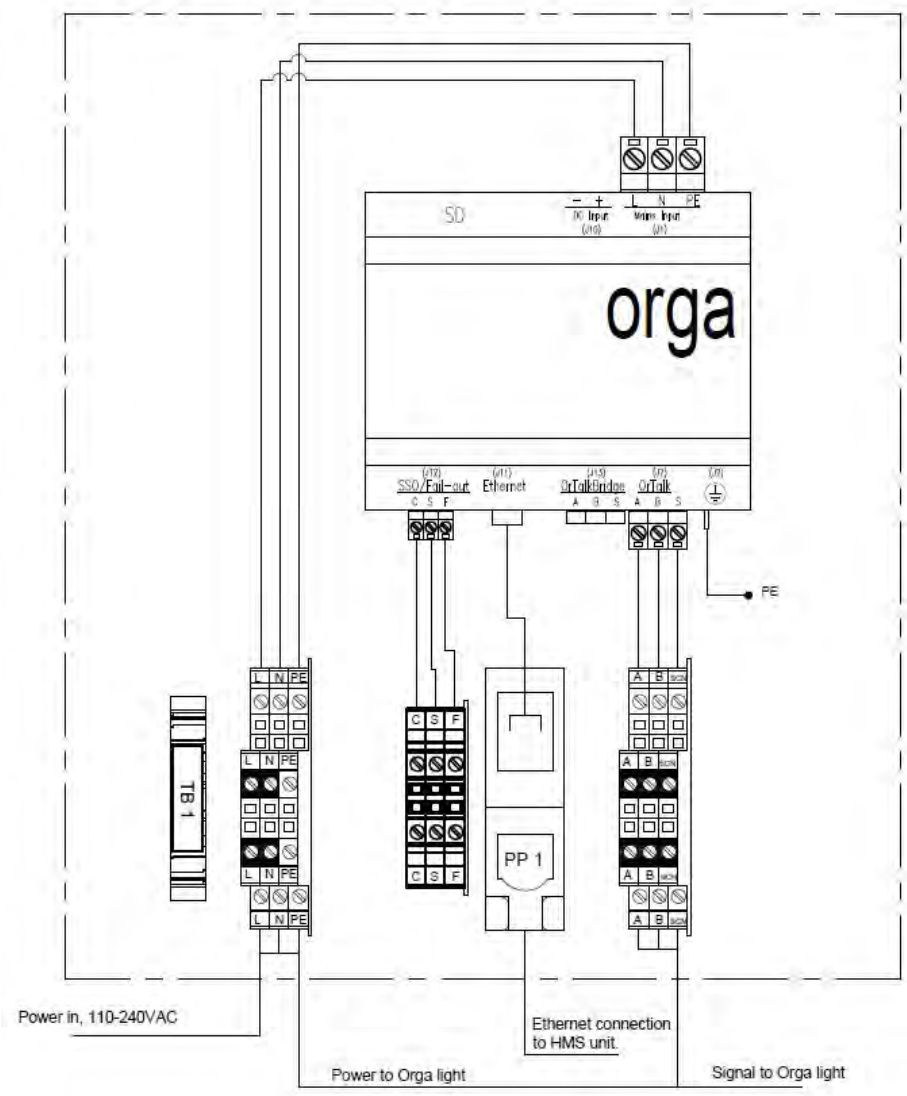
1 Identify the best mounting location for the repeater light control unit enclosure.



2 Fasten the enclosure to the structure.

3 Mount the CIP400–H-BN control unit in the enclosure, if not already done.

4 Terminate the cables to the HMS 300 Processing Unit and the repeater lights on the termination list within the enclosure. The control unit is connected to the Processing Unit with Ethernet cable connected to sensor net/LAN3. The control unit IP address to be in range 192.168.2.75.



5 When all cables are connected, close the enclosure cover.

Installing the meteorological sensors

The meteorological sensors are not necessarily a part of the Kongsberg Maritime AS delivery. If they are, please refer to the documentation for the respective sensors for detailed installation instructions. The documentation can be found in the box when unpacking the sensor.

For some of the sensors a Kongsberg Maritime AS connection box, part no. M410–69, is delivered with the sensor.

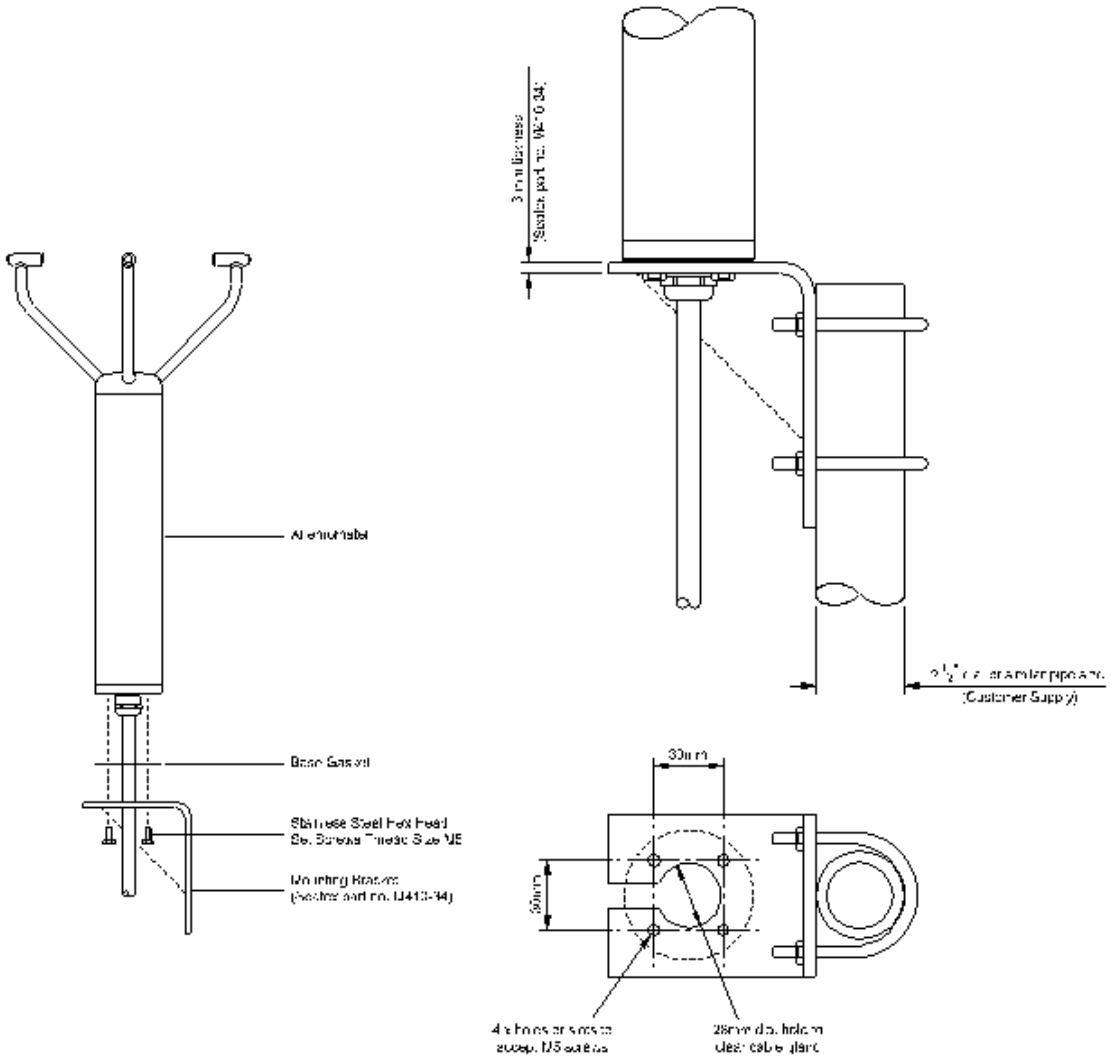
A short description on what to consider when installing the various sensors, is provided.

Wind sensor

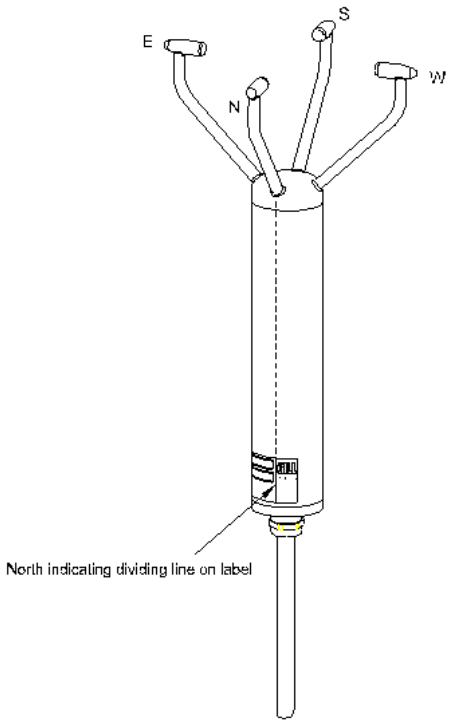
What to consider when installing the wind sensor:

- Find a suitable location for the sensor on the vessel.
- The sensor is preferably mounted in an upright position. Use the Kongsberg Maritime AS mounting bracket M410–34 for this purpose.
- Set the wind sensor to point in the bow direction, or to some known reference direction, using the North alignment indicator at the base of the instrument.
- To apply with the requirements in CAP 437 of September 2018 the wind sensor has to be setup with output data rate of 4 Hz. See the *WindObserver II Ultrasonic Anemometer, User Manual* for how to configure the sensor for 4 outputs per second.

Suggested mounting arrangement for the wind sensor is illustrated.



Shows North pointing spar (bow direction) of unit aligned with dividing line between silver and blue portions of Gill Instrument Model and Serial No. label.



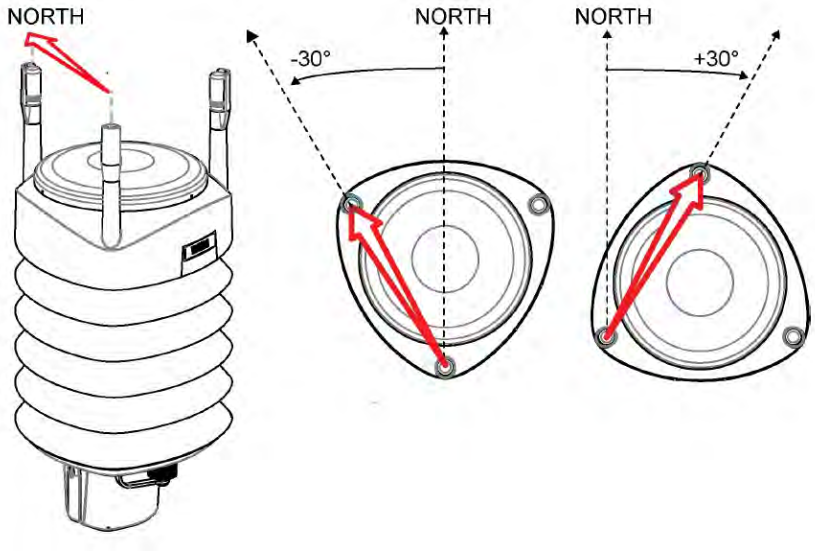
Refer to the *WindObserver II Ultrasonic Anemometer, User Manual* in *References* on page 157 for a detailed installation description.

Multi-weather sensor

What to consider when installing the multi-weather sensor:

- Find a suitable location for the sensor on the vessel.
- Mount the sensor in an upright position.
- Set the sensor to point in a known reference direction, such as the ship longitudinal axis, here referred to as North.

Orientation direction to North on the multi-weather sensor is illustrated.



Refer to the *Vaisala Weather Transmitter WXT530, User's Guide* in *References* on page 157 for a detailed installation description.

Related topics

- *Multi-weather sensor dimensions* on page 113

Dual-pressure sensor

What to consider when installing the dual-pressure sensor:

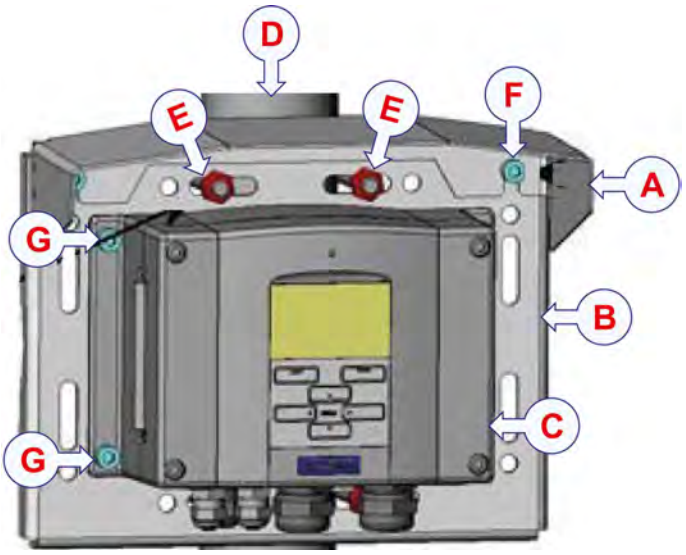
- Find a suitable outdoor location for the sensor on the vessel.

The pressure sensor can be mounted on a wall or to a rail or mast by the use of U-bolts. The screws and U-bolts are provided in the mounting kit.

This procedure describes how to install the dual-pressure sensor on a mast or pole.

Procedure

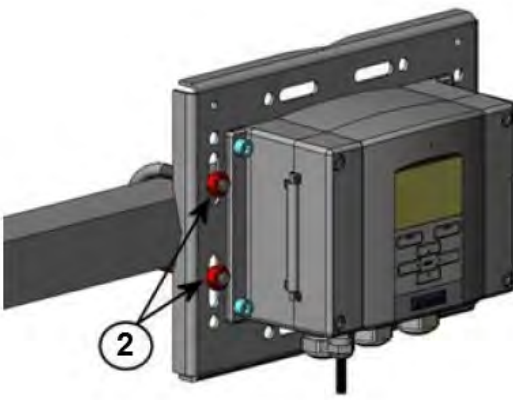
1 Fasten the rain shield (A) to the metal mounting plate (B) with 2 M6 screws (F).

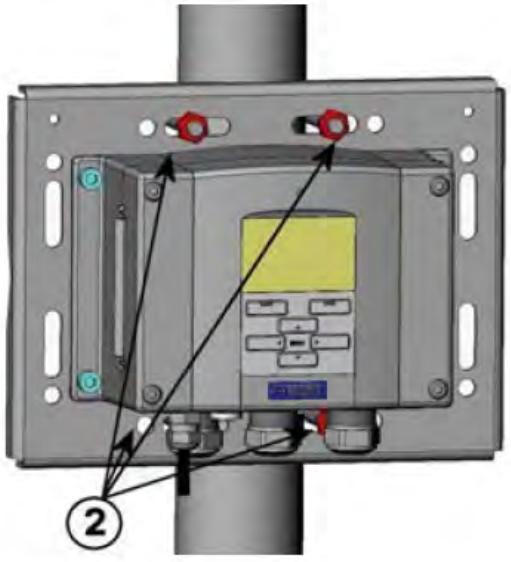


A Rain shield
B Metal mounting plate
C Pressure sensor
D Pipe or mast
E Screws for U-bolts
F Screws for rain shield
G Screws for mounting plate

2 Fasten the mounting plate with rain shield to the mast or pole (horizontal or vertical) by using the U-bolts (2 pcs) M8 (E) for 30 to 102 mm poles.

Figure 10 Horizontal pole mounting *Figure 11 Vertical pole mounting*





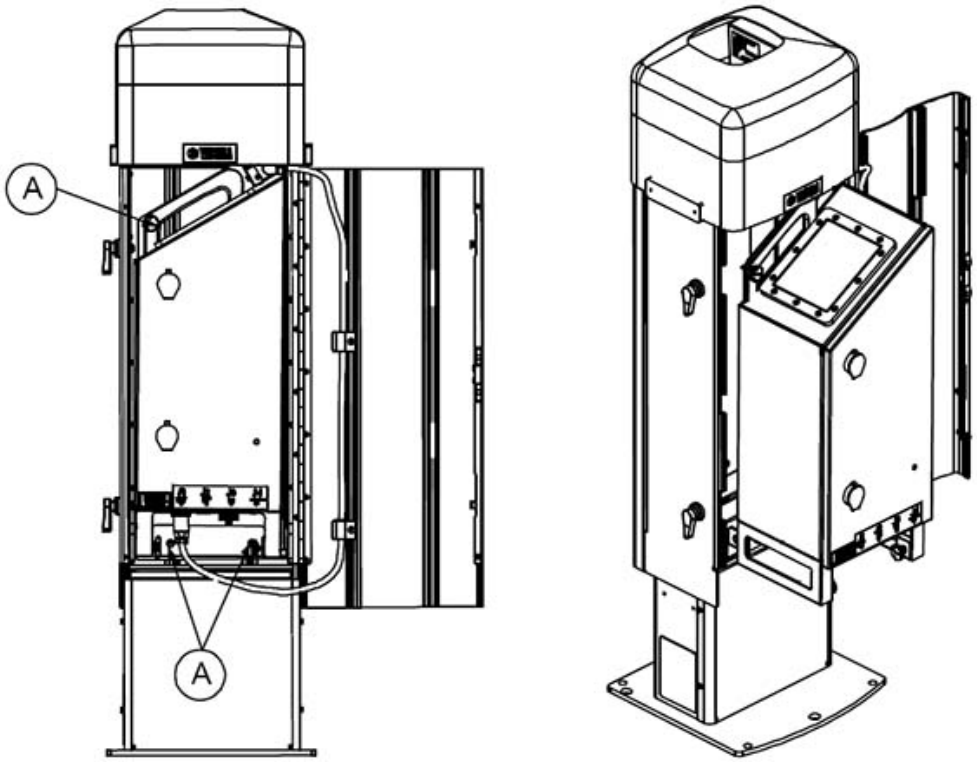
3 Fasten the dual-pressure sensor (C) to the mounting plate with 4 fixing screws M6 (G). The mounting orientation of the dual-pressure sensor must be as shown on the figure with the cable connections pointing down.

Refer to the *Vaisala BAROCAP Digital Barometer PTB330, User's Guide* in *References* on page 157 for a detailed installation description.

Cloud height sensor

What to consider when installing the cloud height sensor:

- Find a suitable location for the sensor on the vessel.
- Mount the sensor in an upright position, not tilted.
- In a ship installation it is recommended to mount the ceilometer on the shock absorber.



A Shows CL31 measurement unit within the pedestal

See *Shock absorber dimensions* on page 115 for dimensions on the shock absorber for the CL31.

Refer to the *Vaisala Ceilometer CL31, User's Guide* in *References* on page 157 for a detailed installation description.

Related topics

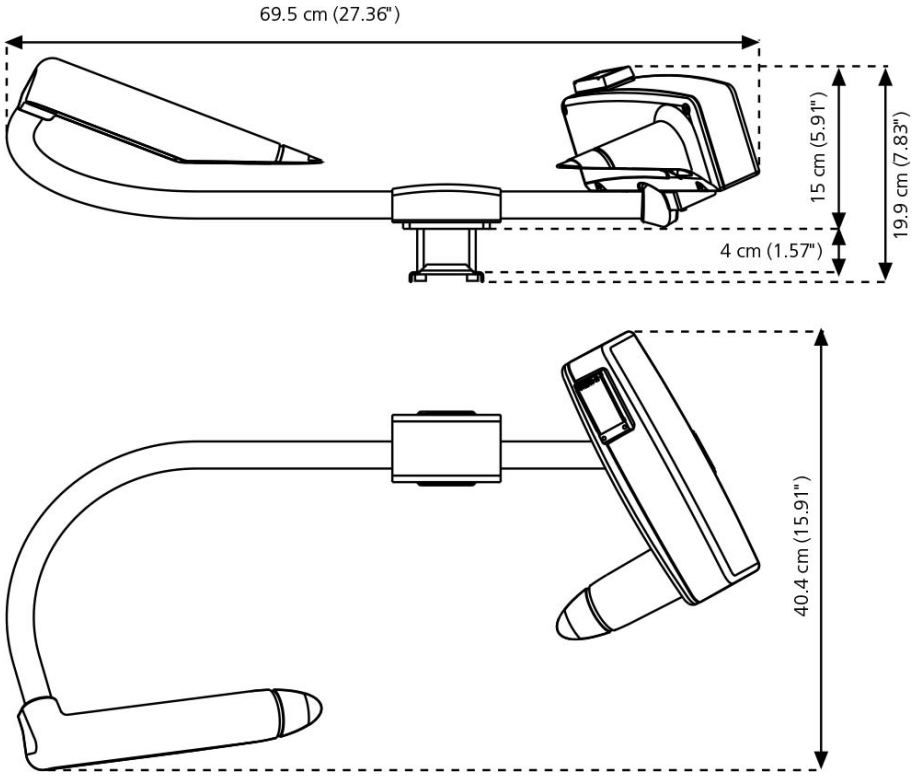
- *Cloud height sensor dimensions* on page 114
- *Shock absorber dimensions* on page 115

Visibility sensor

What to consider when installing the visibility sensor:

- Find a suitable location for the sensor on the vessel.
- Mount the sensor in an upright position.

The visibility sensor dimensions are illustrated.



Refer to the *Present Weather Detector PWD22, User's Guide* in *References* on page 157 for a detailed installation description.

Related topics

- *Visibility sensor dimensions* on page 116
- *Phoenix contact DIP switch settings* on page 120

Connection box for meteorology sensors

When installing the connection box consider the following:

- Mount the box in a location where it is easy to enter the cables and with easy access to the terminals within the box.

How to install the connection box

1 Remove the lid to gain access to the mounting holes.

2 Remove the two nipples located inside the box.

3 Make holes in the box for the two nipples by using a screw driver or similar. Preferably make the holes at the side which will point down when the box is mounted so as to prevent water intrusion from above.

4 Mount the box to a suitable surface with two screws.

5 Place the rubber gaskets on top of the two mounting screws to make the screw hole water tight.

6 Mount the two nipples.

7 Run the cables through the nipples and tighten.

8 Replace the lid and fasten.

Related topics

- *Meteorology sensor connection box dimensions* on page 112

Wiring of meteorology sensors

Wind sensor

Termination of the cabling between the Processing Unit and the for the wind sensor, type WindObserverII, part no. M410–51.

		Cable from Processing Unit COM 13		Cable to connection box for wind sensor	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	RX_A	5–pin screw terminal	1	Terminal block	4
2	RX_B	5–pin screw terminal	2	Terminal block	1
3	GND	5–pin screw terminal	3	Terminal block	
4	TX_A	5–pin screw terminal	4	Terminal block	2
5	TX_B	5–pin screw terminal	5	Terminal block	3
Cable no. W-2229, cable type 2 x 2 x 0.25 mm^2.					

		Cable from wind sensor power supply		Cable to connection box for wind sensor	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	24 V DC			Terminal block	6
2	0 V DC			Terminal block	7

		Cable from wind sensor power supply		Cable to connection box for wind sensor	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
3	24 V DC heating			Terminal block	8
4	0 V DC heating			Terminal block	9
Cable no. W-2230, cable type 2 x 1.5 mm² + GND.					

		Cable from wind sensor connection box		Cable to wind sensor	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	RX_A	Terminal block	4	Pigtail cable	Pair 1: black
2	RX_B	Terminal block	1	Pigtail cable	Pair 1: green
3	TX_A	Terminal block	2	Pigtail cable	Pair 2: black
4	TX_B	Terminal block	3	Pigtail cable	Pair 2: white
5	24 V DC operating	Terminal block	6	Pigtail cable	Pair 3: red
6	0 V DC operating	Terminal block	7	Pigtail cable	Pair 3: black
7	24 V DC heating	Terminal block	8	Pigtail cable	Pair 5: yellow
8	0 V DC heating	Terminal block	9	Pigtail cable	Pair 5: black
Cable no. W-2231, cable type 10 x 2 x 0.25 mm².					

		Cable from wind sensor		Cable to EMC ground/P.E.	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Earth	P.E.		P.E.	
Cable no. W-2232, cable type 1 x 1 x 4.0 mm².					

Multi-weather sensor

Termination of the cabling for the multi-weather sensor, type WXT536, part no. M440–58. You can have two multi-weather sensors.

The multi-weather sensor is configured to output the NMEA messages MWV and XDR (Press, temp, hum) at 9600 baud (9600 n 8 1).

Wiring for multi-weather sensor

		Cable from multi power serial DIN rail		Cable to connection box for multi-weather sensor	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	TX_A (White)	Terminal block	13	Terminal block	1
2	TX_B (Green)	Terminal block	14	Terminal block	2
3	RX_A (Blue)	Terminal block	15	Terminal block	3
4	RX_B (Grey)	Terminal block	16	Terminal block	4
5	Vin+ (Brown)	Terminal block	7	Terminal block	5
6	GND Vin+ (Red)	Terminal block	10	Terminal block	6
7	Vh+ (Yellow)	Terminal block	1	Terminal block	7
8	GND Vh+ (Pink)	Terminal block	4	Terminal block	8
Cable no. W-2213, cable type 4 x 2 x 0.5 mm^2. Power consumption at 24 V DC, 0.6 A					

		Cable from connection box for multi-weather		Cable to multi-weather sensor WXT536	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	TX_A (White)	Terminal block	1	M12 connector	1
2	TX_B (Green)	Terminal block	2	M12 connector	3
3	RX_A (Blue)	Terminal block	3	M12 connector	7
4	RX_B (Grey)	Terminal block	4	M12 connector	5
5	Vin+ (Brown)	Terminal block	5	M12 connector	2
6	GND Vin+ (Red)	Terminal block	6	M12 connector	8
7	Vh+ (Yellow)	Terminal block	7	M12 connector	4
8	GND Vh+ (Pink)	Terminal block	8	M12 connector	6
Cable no. W-2214, cable type 4 x 2 x 0.5 mm^2. Cable delivered with sensor (10 m, ø 6 mm). Power consumption at 24 V DC, 0.6 A.					

		Cable from multi-weather sensor WXT536		Cable to EMC cround/P.E.	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Earth	P.E.		P.E.	
Cable no. W-2215, cable type 1 x 1 x 4.0 mm^2.					

Dual-pressure sensor

Termination of the cabling for the dual-pressure sensor, type PTB330, part no. M440–50.

The dual-pressure sensor is configured to output the NMEA messages XDR (Press, temp, hum) at 9600 baud (9600 n 8 1).

Wiring for dual-pressure sensor

		Cable from multi power serial DIN rail		Cable to Processing Unit, Com 12	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	RX_A	Terminal block	17	5–pin screw terminal	4
2	RX_B	Terminal block	18	5–pin screw terminal	5
	GND	Terminal block			
3	TX_A	Terminal block	19	5–pin screw terminal	1
	TX_B	Terminal block	20	5–pin screw terminal	2
Cable no. W-2252, cable type 2 x 2 x 0.25 mm^2.					

		Cable from multi power serial DIN rail		Cable to dual-pressure sensor PTB330	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	24 V DC	Terminal block	8	Terminal block	+
2	0 V DC	Terminal block	11	Terminal block	–
3	TX+	Terminal block	19	Terminal block	TX0–
4	TX–	Terminal block	20	Terminal block	TX0+
Cable no. W-2253, cable type 2 x 2 x 0.5 mm^2.					

Cloud height sensor

Termination of the cabling for the cloud height sensor, CL31, part no. M410–44. The sensor RS-485 output signal is converted to RS-232 in the Phonix Contact (PSM-ME-RS232/RS485-P) mounted on the Multi power serial DIN rail.

The ceilometer is configured to output data at 19200 baud (19200 n 8 1).

		Cable from Processing Unit COM 1		Cable to Phoenix converter #2 on multi power serial DIN rail	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	RX	9–pin D-sub F	3	9–pin D-sub F	2
2	TX	9–pin D-sub F	2	9–pin D-sub F	3
3	GND	9–pin D-sub F	5	9–pin D-sub F	5
Cable no. W-2223, cable type 3 x 1 x 0.5 mm². The cable is delivered with the multi power serial DIN rail (3 m).					

		Cable from multi power serial DIN rail		Cable to Termbox–1200 for cloud height sensor CL31	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	D(A)	Terminal block	23	Terminal block	1
2	D(B)	Terminal block	24	Terminal block	2
Cable no. W-2224, cable type 2 x 2 x 0.5 mm².					

		Cable from Termbox–1200 for cloud height sensor CL31		Cable to Uninterrupted Power Supply	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Neutral (L2) IN	Terminal block	N		
2	Positive Earth	Terminal block	PE		
3	Line 230 V AC IN	Terminal block	L		
Cable no. W-2225, cable type 2 x 2.5 mm + GND. The cable is delivered with the sensor (2 m, ø 8.5 mm). Power consumption 310 W.					

		Cable from Termbox–1200 for cloud height sensor CL31		Cable to EMC ground/P.E.	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Earth	P.E.		P.E.	
Cable no. W-2226, cable type 1 x 1 x 4.0 mm²					

		Cable from Termbox–1200 for cloud height sensor CL31		Cable to cloud height sensor CL31	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	D(A)	Terminal block	1	Sensor connector J3	1
2	D(B)	Terminal block	2	Sensor connector J3	2
Cable no. W-2235, cable type 2 x 2 x 0.5 mm^2. The cable is delivered with the sensor (ø 6 mm)					

		Cable from Termbox–1200 for cloud height sensor CL31		Cable to cloud height sensor CL31	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Neutral (L2) IN	Terminal block	N	Sensor connector J2	3
2	Positive Earth	Terminal block	PE	Sensor connector J2	4
3	Line 230 V AC IN	Terminal block	L	Sensor connector J2	1
Cable no. W-2236, cable type 2 x 2.5 mm^2 + GND. The cable is delivered with the sensor (ø 8.5 mm). Power consumption 310 W.					

Visibility sensor

Termination of the cabling for the visibility sensor, PWD22, part no. M410–46. The sensor RS-485 output signal is converted to RS-232 in the Phoenix Contact (PSM-ME-RS232/RS485-P) mounted on the Multi power serial DIN rail.

The visibility sensor is configured to output data at 9600 baud (9600 n 8 1 or 9600 e 7 1).

		Cable from Processing Unit COM 2		Cable to Phoenix converter #1 on multi power serial DIN rail	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	RX	9–pin D-sub F	3	9–pin D-sub F	2
2	TX	9–pin D-sub F	2	9–pin D-sub F	3
3	GND	9–pin D-sub F	5	9–pin D-sub F	5
Cable no. W-2220, cable type 3 x 1 x 0.5 mm^2. The cable is delivered with the multi power serial DIN rail (3 m).					

		Cable from multi power serial DIN rail		Cable to connection box for visibility sensor PWD22	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Operating 24 V DC	Terminal block	9	Terminal block	1
2	Operating 0 V DC	Terminal block	12	Terminal block	2
3	D(A)	Terminal block	21	Terminal block	3
4	D(B)	Terminal block	22	Terminal block	4
5	Heating + 24 V DC	Terminal block	3	Terminal block	5
6	Heating – 0 V DC	Terminal block	6	Terminal block	6
7	Ground	Terminal block		Terminal block	
Cable no. W-2221, cable type 4 x 2 x 0.5 mm^2. Power consumption with heating 72 W.					

		Cable from connection box for visibility sensor PWD22		Cable to visibility sensor PWD22	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	Heating + 24 V DC (White, green)	Terminal block	5	Sensor connector	X3 – 5
2	Heating – 0 V DC (Brown, green)	Terminal block	6	Sensor connector	X3 – 6
3	Ground	Terminal block		Sensor connector	Shield
4	Operating 24 V DC (Red)	Terminal block	1	Sensor connector	X1 – 4
5	Operating 0 V DC (Black)	Terminal block	2	Sensor connector	X1 – 5
6	D(A) (White)	Terminal block	3	Sensor connector	X1 – 2
7	D(B) (Brown)	Terminal block	4	Sensor connector	X1 – 3
Cable no. W-2222, cable type 16 x 2 x 0.25 mm^2. The cable is delivered with the sensor (35 m, ø 8 mm). Power consumption with heating 72 W.					

Sea water temperature sensor

Termination of the cabling for the sea water temperature sensor interface. Contact Kongsberg Maritime AS for details.

		Cable from sea water temp. interface		Cable to multi power serial DIN rail	
Core no.	**Signal**	**Terminal**	**Pin no.**	**Terminal**	**Pin no.**
1	RJ-45			Port 4, Ethernet switch	
Cable no. W-2237, cable type CAT5e					

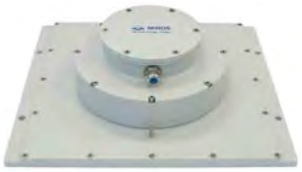
Installing the wave and water level system

This chapter describes the installation of the RangeFinder Motion sensor (M440–40) and the MET sensor power rail (M410–75). The RangeFinder sensor is used for measuring waves and the distance from the water lever to the helideck.

Although the sensor is constructed for measurements in harsh environments it is an instrument which must be handled with care during installation.

About the RangeFinder sensor

The Miros SM-140 RangeFinder is a microwave radar based sensor operating at 9.6 GHz. It measures the vertical distance from the sensor antenna to the water surface. Typical applications are water measurements from vessel and floating offshore installations for water level measurements and determination of significant wave height.



Sensor location and orientation

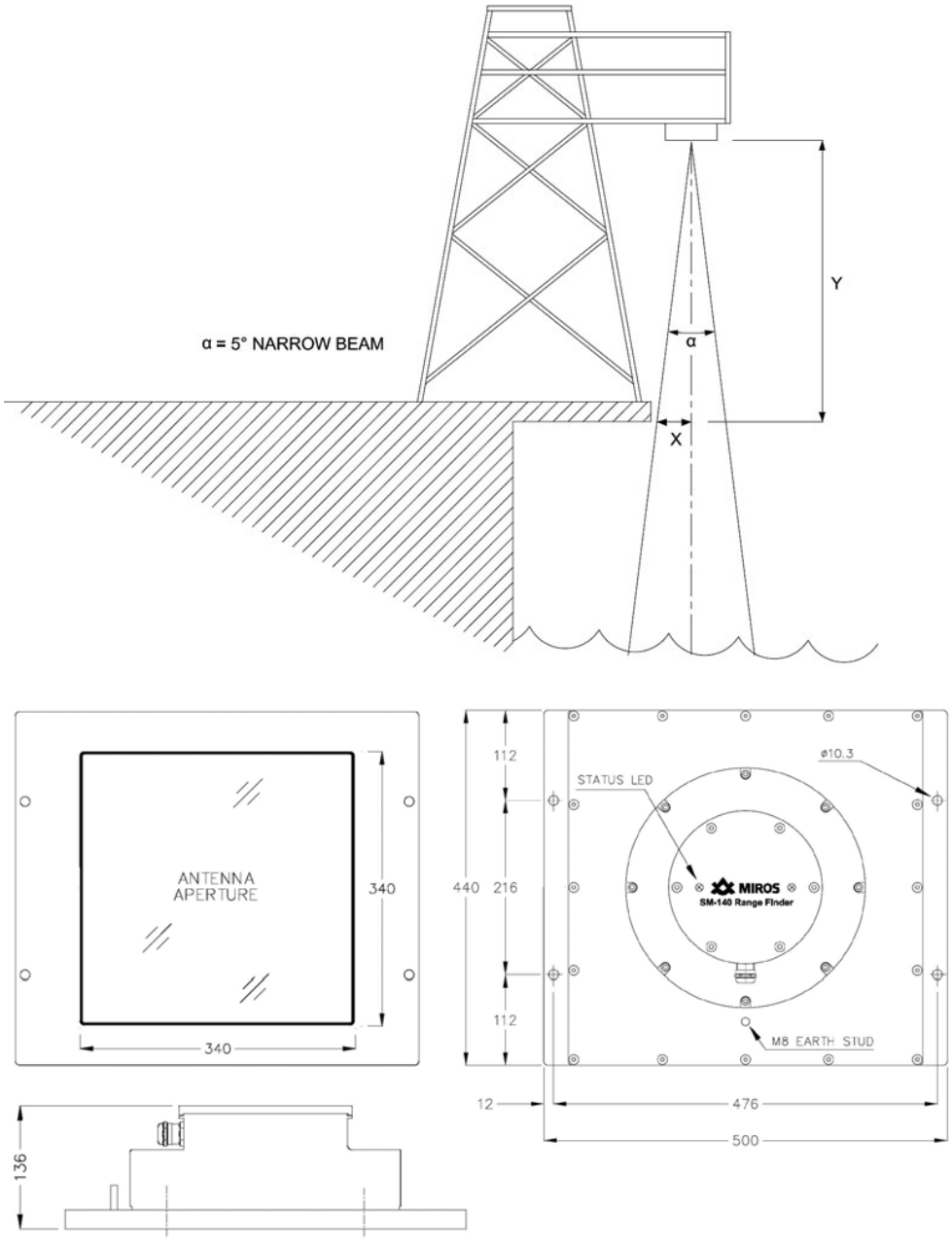
When installing the RangeFinder sensor consider the following:

- Mount the sensor on a suitable support structure with an open vertical view of the water surface, e.g. at the bow of the vessel or on the outside of a bridge or platform handrail.
- Mount the sensor away from reflecting objects to avoid problems caused by multi-path signal propagation for the range finder antenna.
- The instrument's measuring range is a determining factor for finding the optimum installation height. The RangeFinder sensor has measurement range 2 to 95 meters. Ensure that the sensor is mounted within measurement range to the sea level.
- Mount the RangeFinder sensor at or near the bow of the vessel.

- A mounting arrangement for the RangeFinder sensor have to be made at the ship yard. Optionally, a mounting arrangement for handrail mounting can be delivered (part number M440-47).
- The location should be accessible for periodical cleaning and service.
- The sensor is not certified for installation in explosive atmospheres.

The drawing illustrates the need for an open view from the range finder to the water.

- $X_{min} = Y * \tan(\alpha/2)$



Refer to the *SM-140 RangeFinder, User Manual* in *References* on page 157 for a detailed installation description.

Related topics

- *RangeFinder sensor dimensions* on page 117
- *RangeFinder hand rail mounting bracket dimensions* on page 118

MET sensor power rail

This rail contains power supply and Ethernet for the RangeFinder sensor, means for connecting up network for the RangeFinder sensor and interfacing of the sea water temperature information to the HMS Processing Unit. The RangeFinder sensor is connected to the Processing Unit with Ethernet cable connected to sensor net/LAN3. The RangeFinder sensor IP address to be in range 192.168.2.80.

Survey of sensors on vessels

In order to achieve the specified accuracy of the IMU (MRU or MGC) the installation has to be surveyed.

The reference systems in use for this system are:

- The vessel reference system
- The Inertial Measurement Unit (GC or MRU) sensor point and axes system
- The helideck
- The wind sensor

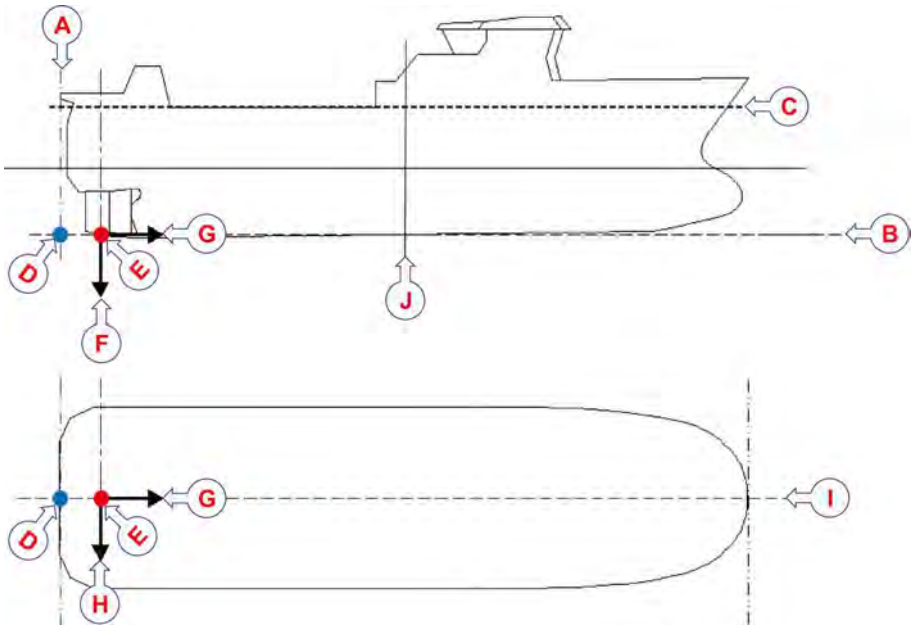
A survey has to be performed to determine the offsets in angle and position from the vessel reference system to the IMU, the helideck and the wind sensor.

Vessel reference system definition

The following definitions are used:

- All vessels have a defined Cartesian coordinate system that all sensors can be referenced to. In this right hand system, the X-axis is positive forwards, which is parallel to the centre line of the vessel, the Y-axis, positive towards starboard, and the Z-axis, which is positive downward.
- The origin in the vessel reference system is typically frame 0 at keel level or the surveyed origin in a survey report, i.e. where X, Y and Z are all 0.
- The common reference point (CRP) is defined to be in the intersection between stern, centre line and keel. In case the keel is not parallel with the base line, the reference for CRP is where the keel crosses the vertical section amidships. The location of CRP vs the origin is configurable, and is typically set based on the survey report.
- The reference plane in this system must be well defined and described. This can be a Best Fit Plane on main deck, or a Best Fit Plane through the draught marks on the hull. This is particularly important on a floating vessel, as it is not possible to project the horizontal plane from land.
- The chosen convention must be made clear to all parties involved, both survey personnel performing the survey and the users of the survey results. Any deviation from the defined coordinate system, shown in the figure *Definition of Origin on vessel and positive X, Y and Z axes directions* on page 77, should be well described in both text and drawings to avoid common misunderstandings.

Figure 12 Definition of Origin on vessel and positive X, Y and Z axes directions



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

Surveying the MRU

For the sensor unit the following should be surveyed:

- Position (X,Y,Z) of sensor point. The axis cross centre on the MRU sensor unit is illustrated
- Mounting angles in Roll, Pitch and Yaw (heading).

Figure 13 Sensor point and position (0, 0, 0) for all MRU units

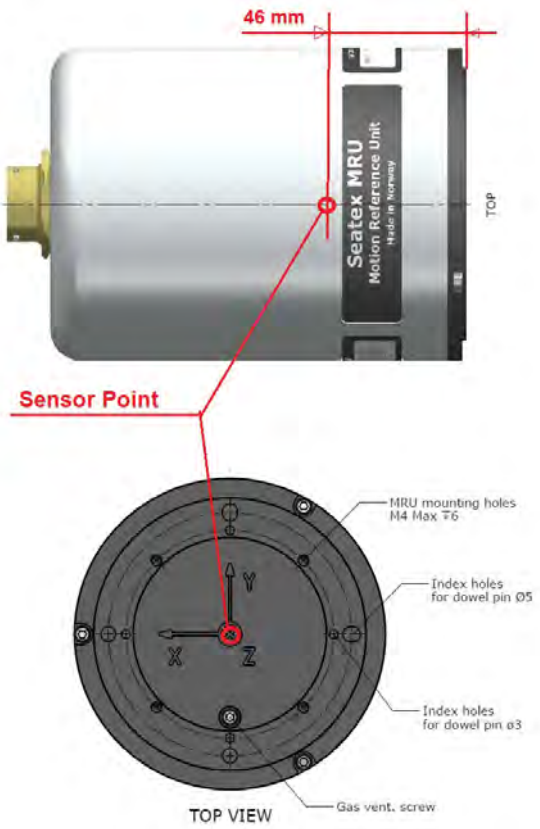


Figure 14 Sensor plane on the wall mounting bracket

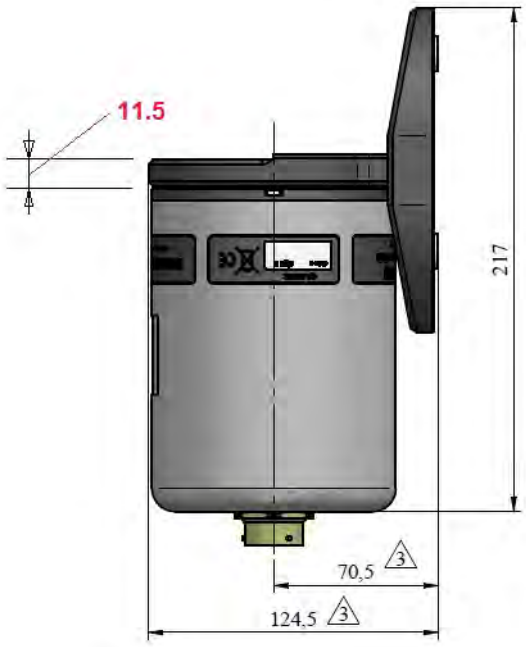
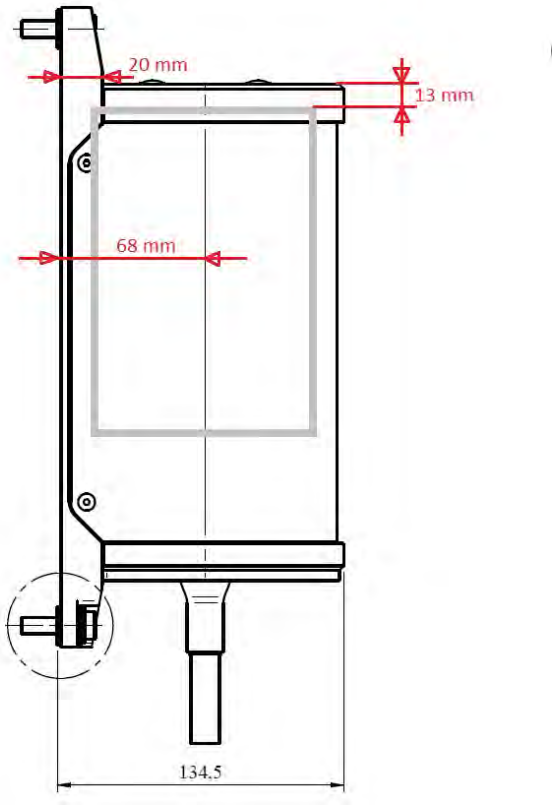


Figure 15 Sensor plane on the protected mounting bracket



Note

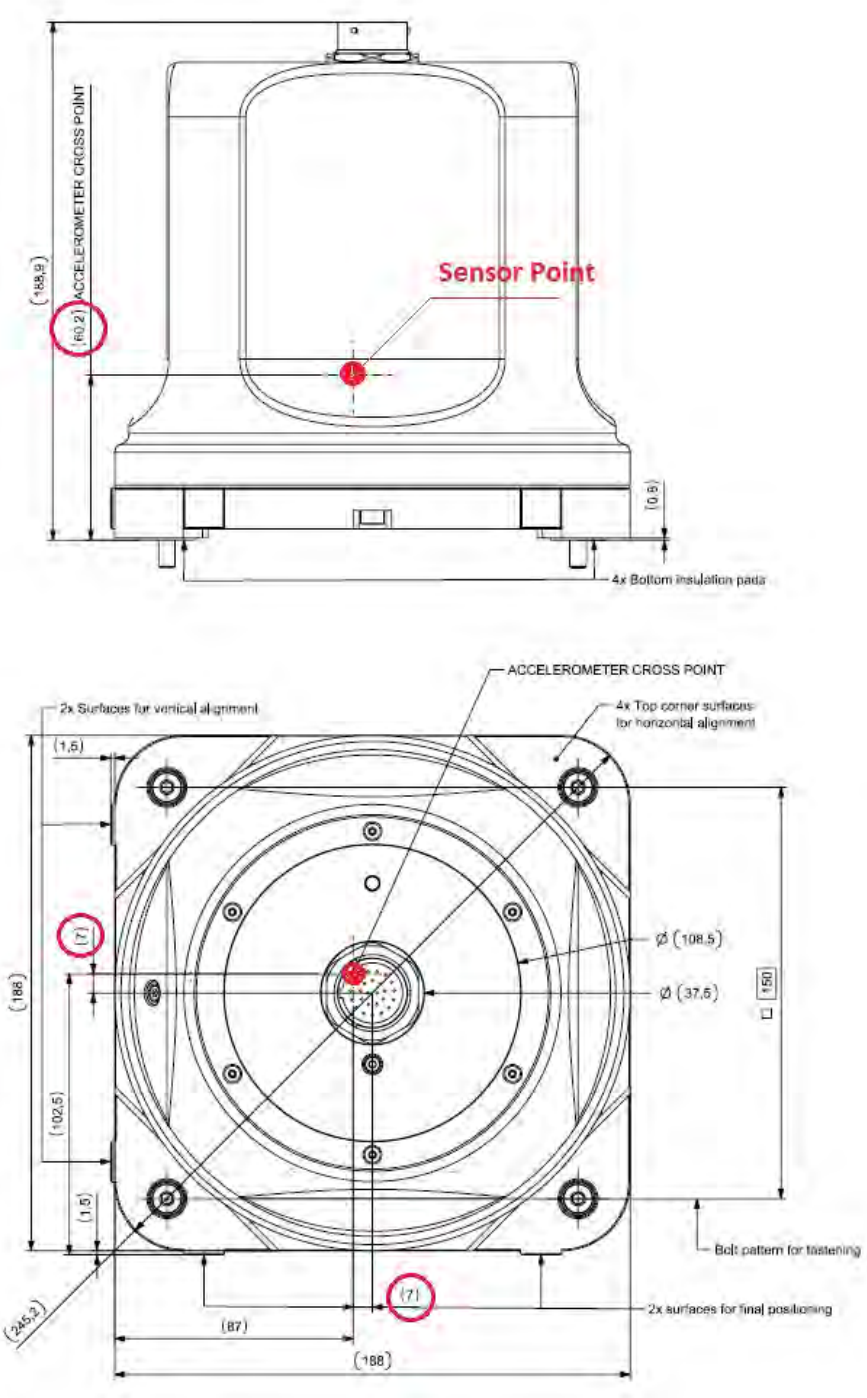
The MRU mounting bracket allows easy exchange with another MRU without affecting the orientation calibration. This is due to the precision of the dowel pins within the bracket. Therefore, when an MRU is replaced in a system with another unit it is no need for re-sureying position or angles again if the mounting bracket is in the same location.

Surveying the MGC

For the sensor unit the following should be surveyed:

- Position (X,Y,Z) of sensor point. The axis cross centre on the MGC sensor unit is illustrated.
- Mounting angles in Roll, Pitch and Yaw (heading).

Figure 16 MGC sensor point location



Alignment surfaces

The sensor unit mounting bracket is manufactured with accurately machine alignment surfaces to place prisms for surveying the offset angles in roll, pitch and heading by a theodolite. For roll and pitch alignment, space for prisms are made in each corner of the sensor unit plate. The surface on these locations are prepared specially to make it flat and aligned (parallel) with the sensors inside the unit.

Figure 17 Alignment surfaces

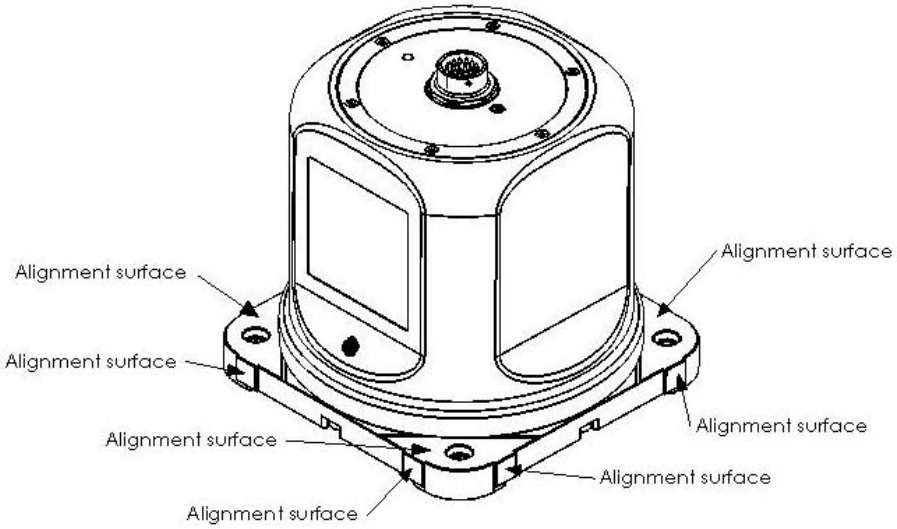
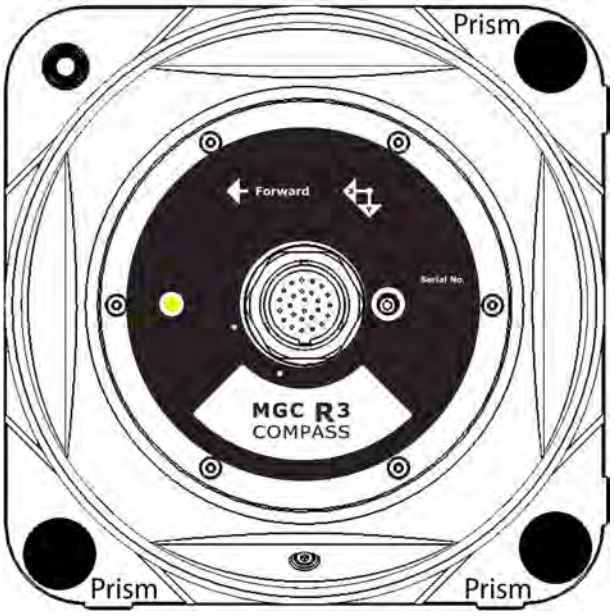
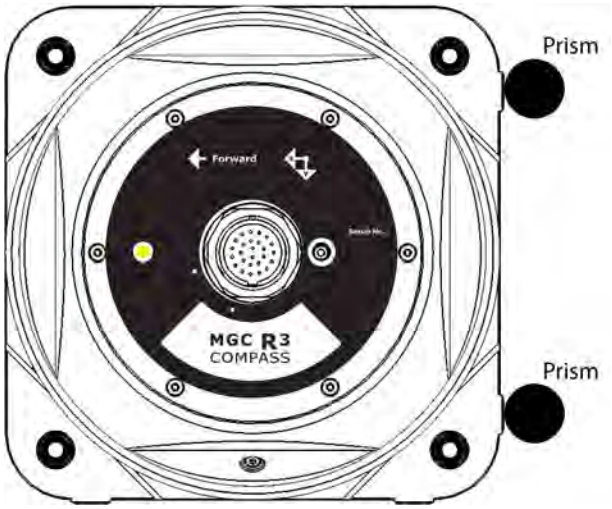


Figure 18 Prisms located in three corners of the sensor unit plate



At two sides of the sensor unit plate there are two squared surfaces which stick out. These surfaces are meant for measuring the heading of the unit towards the vessel axes by placing prisms into each of these surfaces.

Figure 19 Two prisms place into the spaced out surfaces for heading alignment



For the gyro compass the following should be surveyed:

- The offset between the gyro compass heading and the vessel centre line (CL).

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.

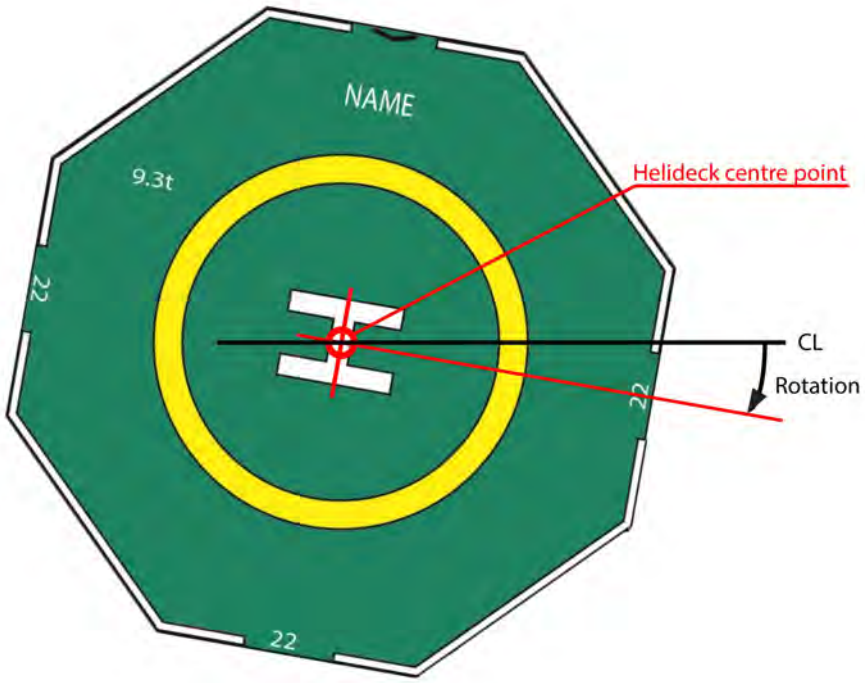
Dynamic gyro compass calibration/verification and attitude verification (heading, roll and pitch verification) must be performed at sea.

Surveying the helideck

For the helideck the following should be surveyed:

- Position (X,Y,Z) of the centre point of yellow TD/PM circle on helideck
- Orientation of the H on the helideck in degrees related to the vessel centre line (CL)
- Mounting angles in Roll and Pitch

Figure 20 Helideck centre point location and positive rotation direction



Surveying the wind sensor

For the wind sensor the following should be surveyed:

- Height of point A above the helideck centre
- Orientation of point A towards point B (sensor NORTH) related to the vessel centre line (CL)

Figure 21 Gill WindObserverII sensor location and rotation direction. The red dot under the product label is the North side alignment point.

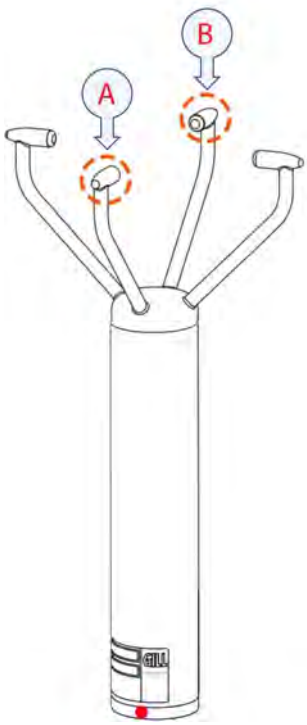
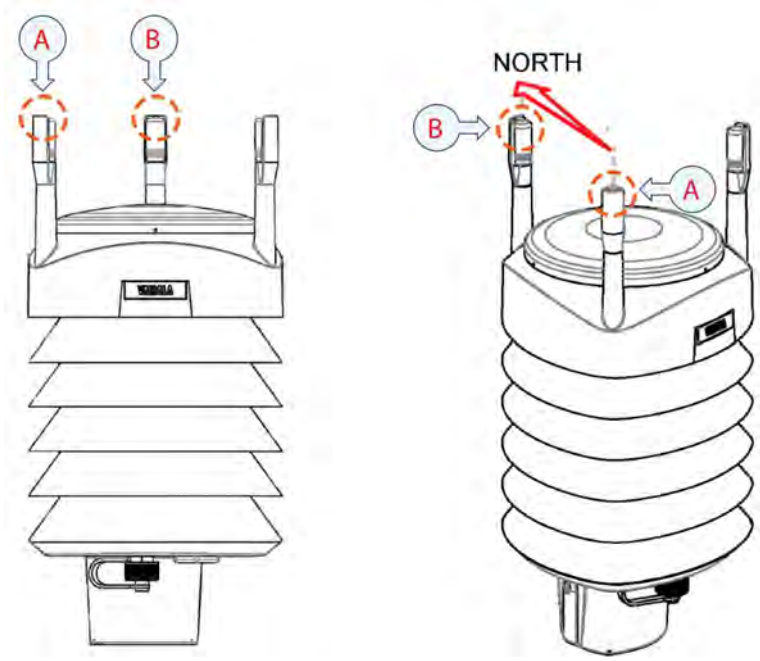


Figure 22 WXT520/530 wind sensor location and rotation direction



Survey accuracy

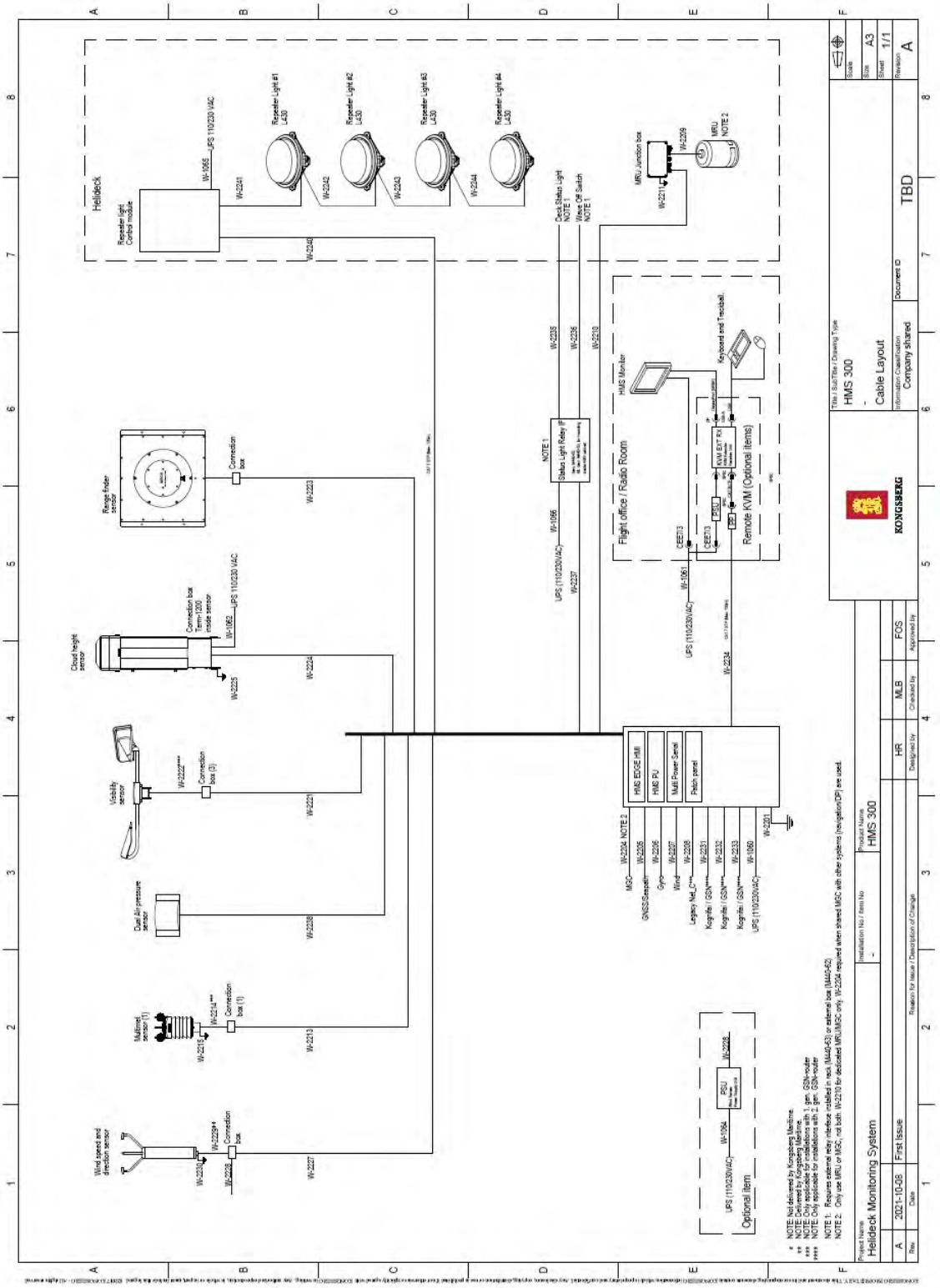
The IMU (MRU and MGC) sensor and the helideck must be surveyed to the following accuracy level. If not, the performance of the HMS 300 product will be degraded.

- Distance vector from the Origin to the IMU sensor point (X, Y, Z): <0.1 metre
- Distance vector from the Origin to the centre point of yellow TD/PM circle on helideck (X, Y, Z): <0.5 metre
- Height from the Origin to the wind sensor point A: <0.1 metre
- Distance vector from the Origin to the Centre of Gravity (CG) location (X, Y, Z): <1 metre
- The IMU yaw misalignment angles with the vessel axes: <0.5°
- The IMU misalignment angles (Roll, Pitch) with the vessel axes: <0.1°
- The helideck rotation (heading) angle with the vessel axes: <1°
- The helideck roll and pitch misalignment angles with the vessel axes: <0.1°
- The wind sensor rotation angle with the vessel axes: <1°

Cable layout and interconnections

Cable plan

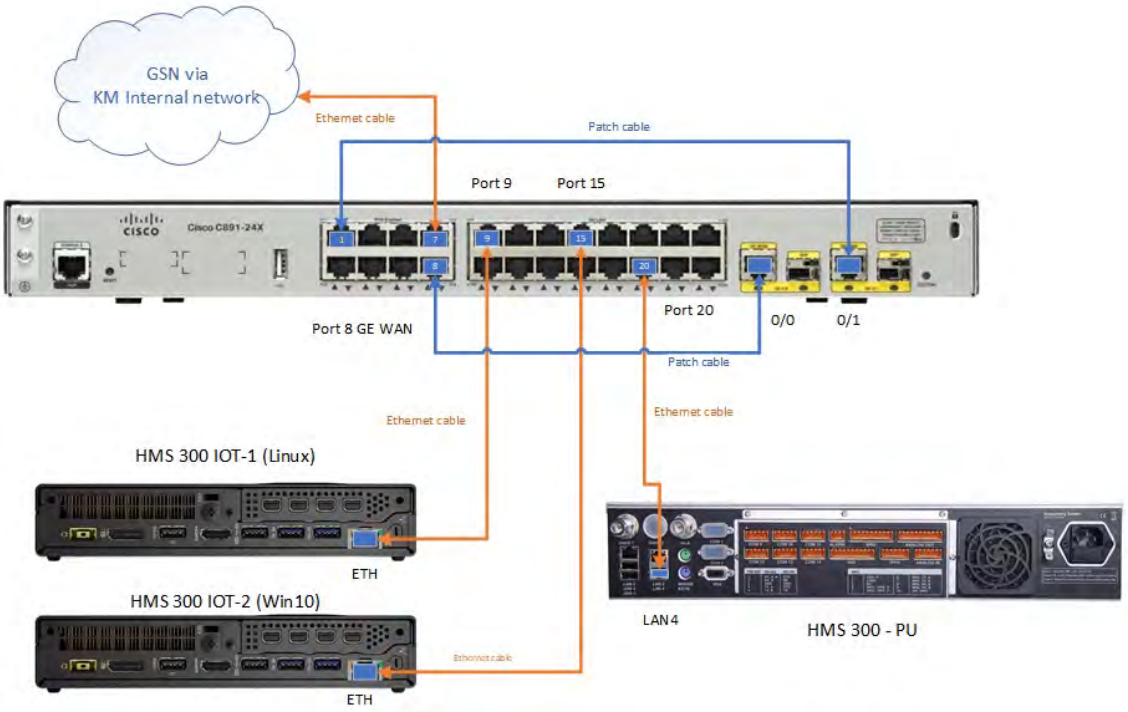
Cable plan for the HMS system.


Helideck
Repeater light Combi module
Repeater Light #1 L430
Repeater Light #2 L430
Repeater Light #3 L430
Repeater Light #4 L430
MRU Junction box
MRU NOTE 2
Deck Status Light NOTE 1
Wave Off Switch NOTE 1
Flight office / Radio Room
HMS Monitor
Keyboard and Trackball
Remote KVM (Optional items)
Range Finder sensor
Connection box
Cloud height sensor
Visibility sensor
Dual Air pressure sensor
Millimet. sensor (1)
Wind speed and direction sensor
HMS EDGE HMI
HMS PU
Multi Power Panel
Patch panel
Optional item
Project Name
Helideck Monitoring System
Product Name
HMS 300
Title / Sub Title / Drawing Type
HMS 300
-
Cable Layout
Information Classification
Company shared
Document ID
TBD
Revision
A
Scale
Size
A3
Sheet
1/1
KONGSBERG
Rev
Date
Reason for Issue / Description of Change
Designed by
Checked by
Approved by
A
2021-10-08
First Issue
HR
MLB
FCS
NOTE 1: Requires external relay interface installed in rack (M440-43) or external box (M440-42)
NOTE 2: Only use MRU or MSC, not both. W-2210 for dedicated MRU/MSC only. W-2204 required when shared MSC with other systems (navigation/DP) are used.

Interconnections

The different HMS 300 system parts are connected as follows:

Unit	Connector	Connected to
EDGE/HMI IOT-1	LAN	Port 9 on GSN router
EDGE/HMI IOT-2	LAN	Port 15 on GSN router
EDGE/HMI IOT-2	Display	KVM Extender/DP-VGA
EDGE/HMI IOT-2	USB 3	KVM Extender
HMS PU	LAN 3	Repeater Light
HMS PU	LAN 4	Port 20 on GSN router
GSN via KM network (ShipsNet)		Port 7 on GSN router



Setting to work

Setting to work summary

Once all the hardware units have been installed, and all the cables have been connected, the Seapath can be powered up for the first time, and set to work.

Prerequisites

- All hardware units have been installed according to the relevant instructions.
- All system cables have been installed.
- All connections have been made.
- All operating power is available.
- All external devices which shall communicate with the Seapath are available and operational.
- All relevant personnel and tools are available.

Procedure

1 Verify that the HMS 300 is ready for operational use.

  a Verify that all hardware units have been installed correctly.

  b Verify that all cables have been connected correctly.

2 Power up the HMS 300 PU and EDGE/HMI Units for the first time.

3 Configure the HMS for operational use.

  a Configure the vessel geometry.

  b Configure the helideck category and location.

  c Configuration of communication interfaces.

4 Set up interfaces to external devices.

  To provide correct information the system needs to communicate with external devices. All these interfaces must be set up in the system software.

Verifying that the HMS is ready for operational use

The HMS system is ready for operational use when:

- All cables are properly connected.
- The power is correct. The system operates on 100 to 240 V AC power from the vessel's mains supply.

LED indicators Processing Unit

At the front of the Processing Unit there are four LED indicators, but only one of them are in use. The LED to the left indicates power and software status, while the other three LEDs have for the moment no function and will always be turned off.

LED indications

- The first LED to the left indicates power and software status.
  - The LED is red if the system is not running.
  - The LED is green when the system is running.
  - During normal operation, one LED should be green and the rest should be off.

LED indicator on EDGE/HMI Units

At the front of the EDGE/HMI Unit a LED indicator is located in the center of the power button. The LED indicate power status. When powered the LED is red and if not the unit is unpowered (turned off).

Configuration management description

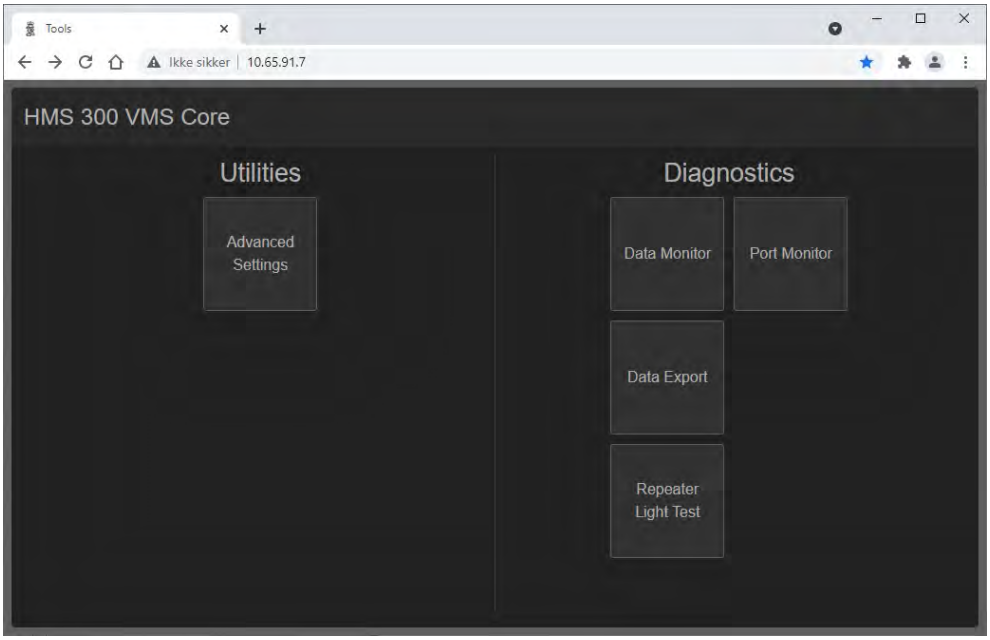
Entering HMS 300 VMS Core configuration

The HMS 300 Processing Unit includes a web configuration and diagnostics program. Follow the procedure below to configure the HMS 300 by this program.

Procedure

1 Connect a PC to the LAN of the Processing Unit.

2 Enter the IP address like 10.65.91.7 in a browser on the PC. The configuration and diagnostics program as shown below with appear in the browser.



3 Enter the wanted dialog box for Utilities and Diagnostics.

Note

Advanced Settings configuration is for service personnel only.

Required system configuration

Vessel configuration

The vessel configuration includes:

- Vessel, including:
  - Geometry
  - Description

- Helideck Category
- Helideck Report
- Locations
- Operation
- OVs
- Equipment
- Sensors

Vessel geometry

In the **Vessel Geometry** configuration, information needed to specify correct location of various sensors and equipment on a vessel is entered. The unit of the entered coordinates is in [m].

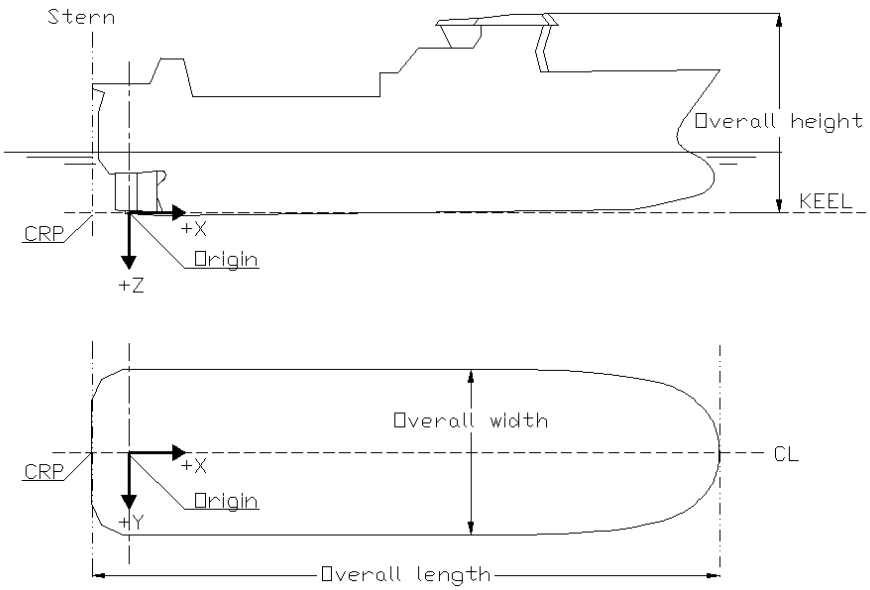
LOA

The overall length of the vessel, i.e. from stern to bow.

SurveyOrigin

All point locations in the configuration refer to the origin. The location of the origin is defined using distance from stern, center line and keel (often referred to as the CRP (common reference point) in survey reports). In HMS 300 the coordinates have to be 0, 0, 0.

Figure 23 Different dimensions and location of Origin



ModelDirectory

The default directory is /data/user/system/cfg/misc.

ModelChecksum

The default Model Checksum is 0 (zero).

Beam (overall width)

The overall width of the vessel.

Height

The distance from the highest point of the vessel to the keel.

Shape

The default Shape is **Ship**.

ShapeFormat

The default Shape Format is **Basic**.

MeanSeaLevel

The distance from the helideck center to waterline defines the Mean Sea Level used for calculation of QNH. MeanSeaLevel is a positive value and the same as the operational draught.

Vessel description

In the **Vessel Description** configuration contains information about the vessel needed for identification purposes.

Name

The name of the vessel. An empty name field is not allowed. The default value is **VESSEL**.

Description

The type of vessel is typically used as description (optional).

MMSI

The MMSI assigned to the vessel. Default value is 0.

IMO

The IMO ID assigned to the vessel. Default value is 0.

Country

The name of the vessel's country of origin (optional).

Owner

The name of the vessel owner (optional).

Telephone

Not applicable (NA).

Fax

Not applicable (NA).

Mobile

Not applicable (NA).

Helideck Category

In the **Helideck Category** configuration of which category the vessel/rig applies to.

HelideckCategory

The category number the vessel/rig applies to.

SemiSubEnable

The night operation limits for semi-submeribles apply (1) or not (0).

Helideck Report

In the **Helideck Report** configuration information for tailoring the helideck report and contact information.

DynamicPosition

The vessel are on dynamic positioning (1) or not (0).

AccMonEquipment

The vessel has active roll compensated helideck (1) or not (0).

CompHelideck

The vessel has accurate measurement equipment (1) or not (0).

RadioNDB

Not applicable (NA).

RadioVHF

Not applicable (NA).

EmailSubject

The default value is **Helideck Report**.

EmailTo

The email address the helideck report should be sent too. Note: Use only small letters.

EmailCC

The email address to the person in copy for the helideck report. Note: Use only small letters.

Helideck location

In the **Location Helideck** configuration information the helideck is input.

Enable

Not applicable (NA).

Arm

Enter the Arm/position of the helideck selected in X, Y, Z coordinated from Origin. The helideck location has to be measured or calculated based upon drawings or previously measured points.

Name

Enter the preferred name on the helideck.

Rotation

Enter the roll and pitch mounting angles of the helideck in degrees and the rotation of the helideck in yaw (degrees) towards the vessel axes. Note: The yaw angle must be input correctly to get the H in the HMI on the screen correctly. In the example below yaw rotation is 0 degrees.

EquipmentIndex

Not applicable (NA).

Equipment

In the **Equipment** configuration information the helideck is input.

Name

Enter the preferred name on the helideck.

Type

The equipment type. Default 4.

Size

Enter the helideck size in **Length**, **Width** and **Height**.

Location

Enter the location/position of the helideck selected in X, Y, Z coordinated from Origin. The helideck location has to be measured or calculated based upon drawings or previously measured points.

Orientation

Enter the orientation of the helideck in degrees.

Configuring the MRU

The MRU unit has to be configured separately by connecting an external PC to the unit through the Ethernet port on the MRU junction box (MRU-E-JB3). A description on how to operate the configuration software MRC+ is described in on page .

The MRU configuration includes numerous parameters but for this system only the parameters described here are to be modified.

The parameters are set in the **Configuration** tab in the **MRC+ configuration software** window. The following configuration parameters must be set for the MRU.

Vessel geometry

The vessel geometry has to be input as correctly as possible to ensure that the performance of the MRU will be optimal. The following has to be input:

- **Shape dimension.** Enter the overall vessel dimension to which the HMS system is to be installed.
- **Origin location.** Enter a Origin location. The location can be selected freely and often frame 0 is used.
- **Centre of gravity.** Enter a location of the CG as correct as possible.

MRU geometry

The MRU geometry has to be configured as follows:

- **MRU position in reference to Origin.** Enter X, Y and Z values in metres.
- **Mounting angles.** Default orientation is with the cable down, the +x arrow pointing forward and the +y arrow pointing to starboard. Then the mounting angles are 0, 0, 0. If the MRU is mounted in a different orientation, the correct angles have to be implemented.

Heave configuration

Select **Automatic** in the heave filter **Option** drop-down list to use the Automatic heave filter mode.

Serial #1

For the **Communication interface →Input/Output**, select interface **Serial #1**. The COM 1 port is the standard port.

- **Baud rate.** Select baud rate **19200** from the drop-down list.
- **Protocol.** Select **MRU normal** from the drop-down list.
- **Interval.** Select **100** ms (10 Hz).
- **Token.** Set token to **55**.
- **Source.** The number of output variables are 16 and the Source IDs are:
  - Roll (63).
  - Pitch (64).
  - Yaw (65).
  - AngRate_R (1).
  - AngRate_P (2).
  - AngRate_Y (3).
  - VelMru_F (212).
  - VelMru_S (213).
  - VelMru_D (214).
  - AccMru_Ff (203).
  - AccMru_Sf (204).

- AccMru_Df (205).
- AccM_Rf (11).
- AccM_Pf (12).
- AccM_Yf (13).
- SampleTime.n (169).

Note

The sequence of the MRU output variables is essential and has to be as described.

Note

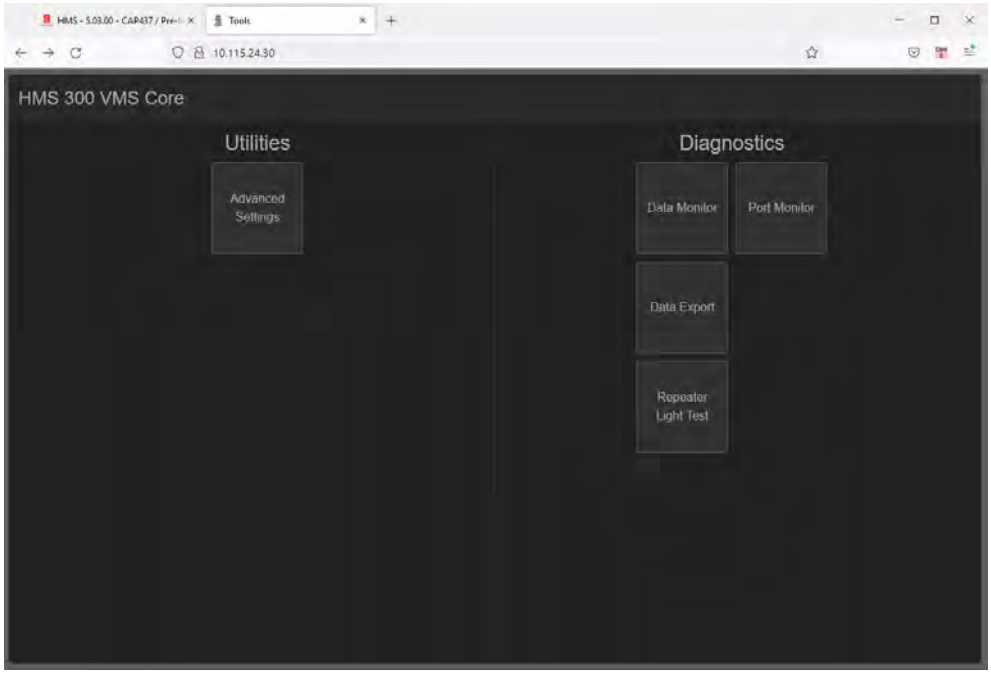
For earlier generation MRU models (generation 1 to 4) the output variable sources and sequence are: Roll (63), Pitch (64), Yaw (65), VelAngR (1), VelAngP (2), VelAngY (3), VelMonF (113), VelMonS (114), VelMonD (115), AccMonF (86), AccMonS (87), AccMonD (88), AccMruGR (11), AccMruGP (12), AccMruGY (13), SampleTime.n (169).

Helimet output configuration

Follow the below procedure to configure the HMS for output of the Helimet data

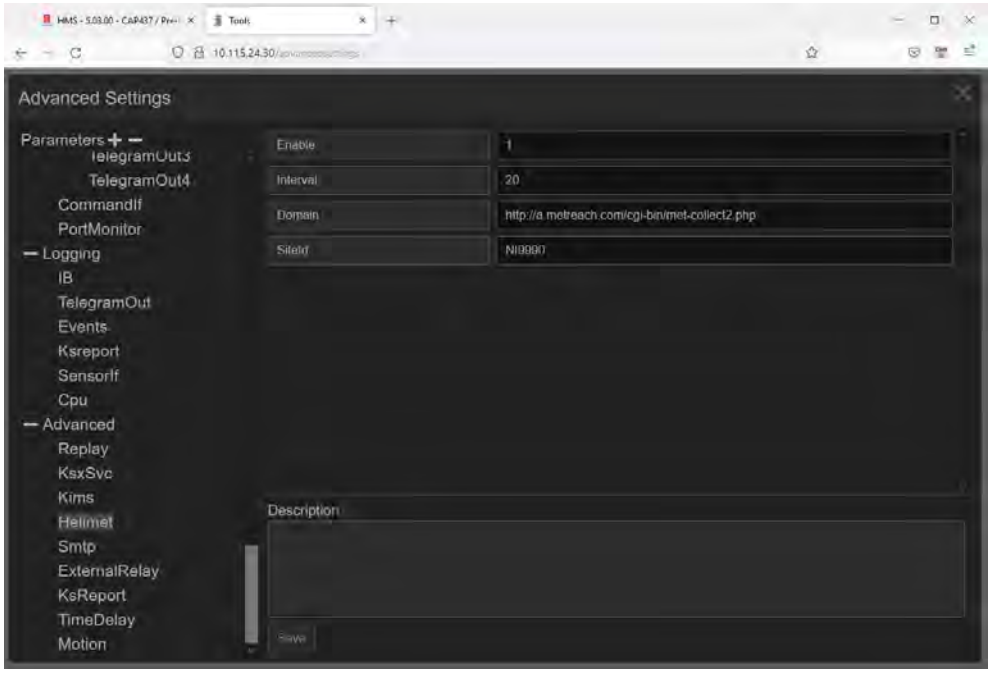
Procedure

1 Enter the VMS Core configuration tool as shown below.



2 Enter **Advanced Settings** under **Utilities**. Input the password **stx**.

3 Scroll down to bottom of the menu and enter **Advanced**. Select **Helimet** as shown below.



a The **Enable** value should be 1.

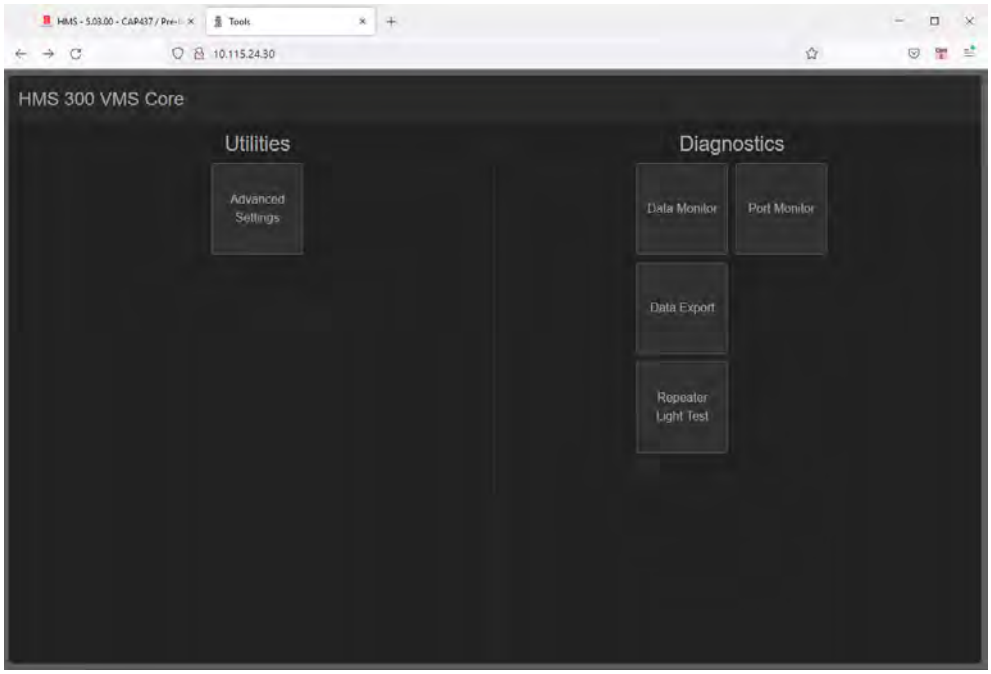
b The **Interval** has default value 20.

c Enter the address from the HMS API in **Domain**.

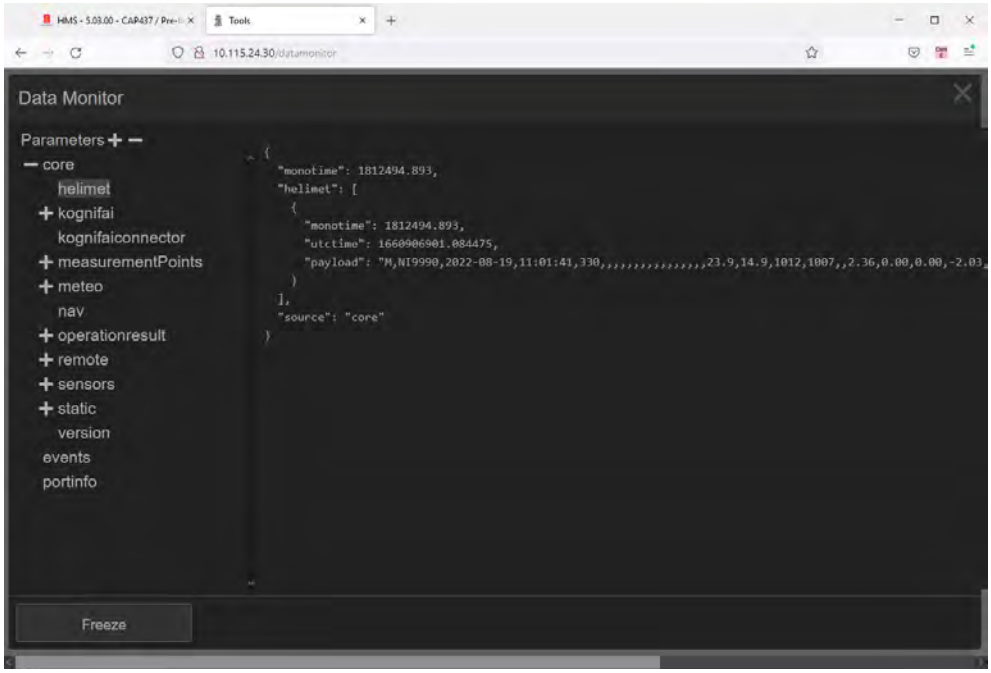
d The **Siteid** is taken from the vessel ID which is set by Helimet.

4 Press **Save** and leave the **Advanced Settings** menu.

5 Enter the **Data Monitor** under **Diagnostics** to check that Helimet data is output.



6 Enter **core** and **helimet** to check the Helimet data sent output.



7 If data on **payload** is continuously changing, then the Helimet data output works.

Commissioning

The equipment will be commissioned after installation. A trained operator will fill out the Functional Test Form (part of the Site Acceptance Test) with the necessary parameters.

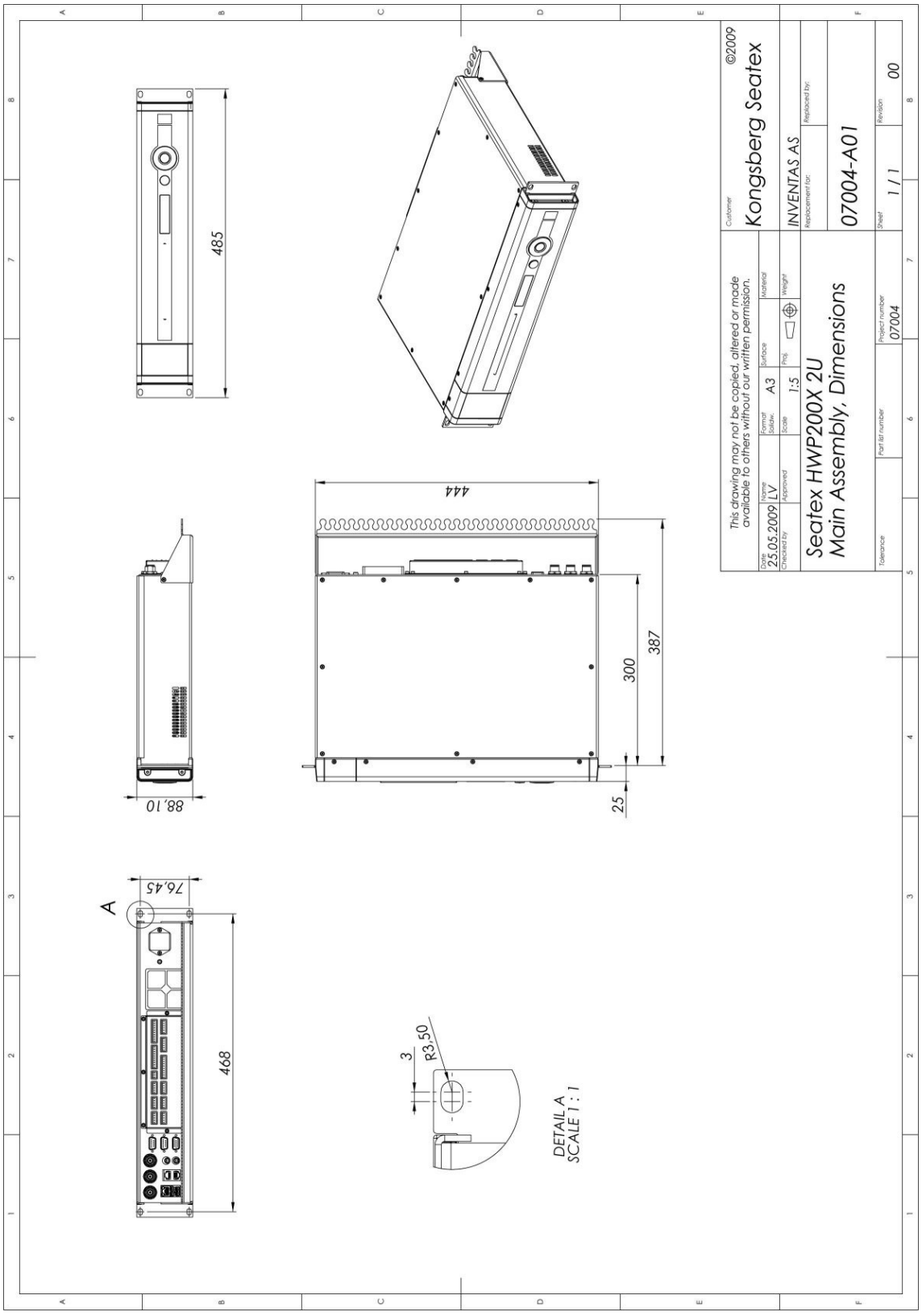
Drawings

Unless otherwise specified, all measurements are in millimetres.

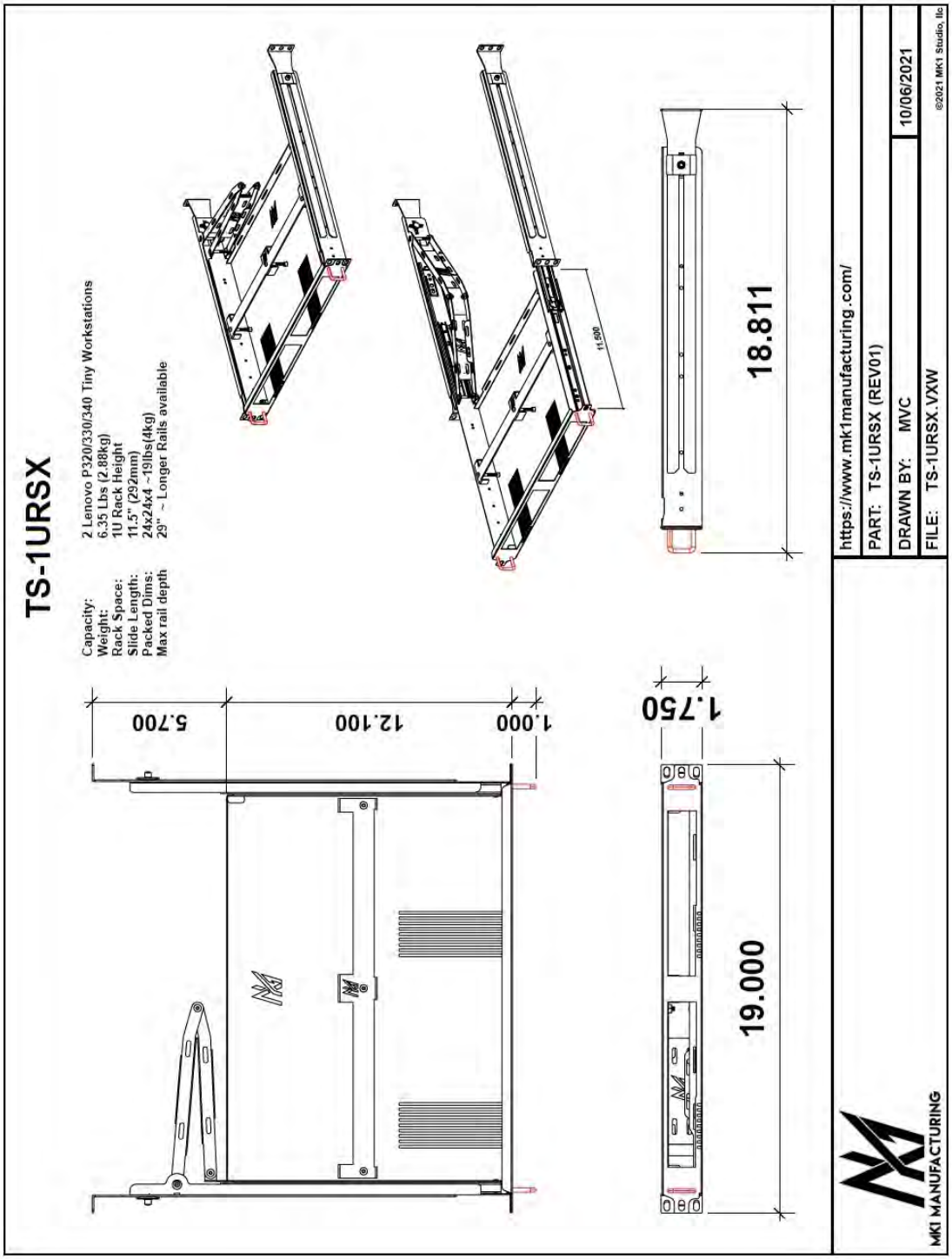
Note

The drawings are not to scale. To-scale drawings are available on request.

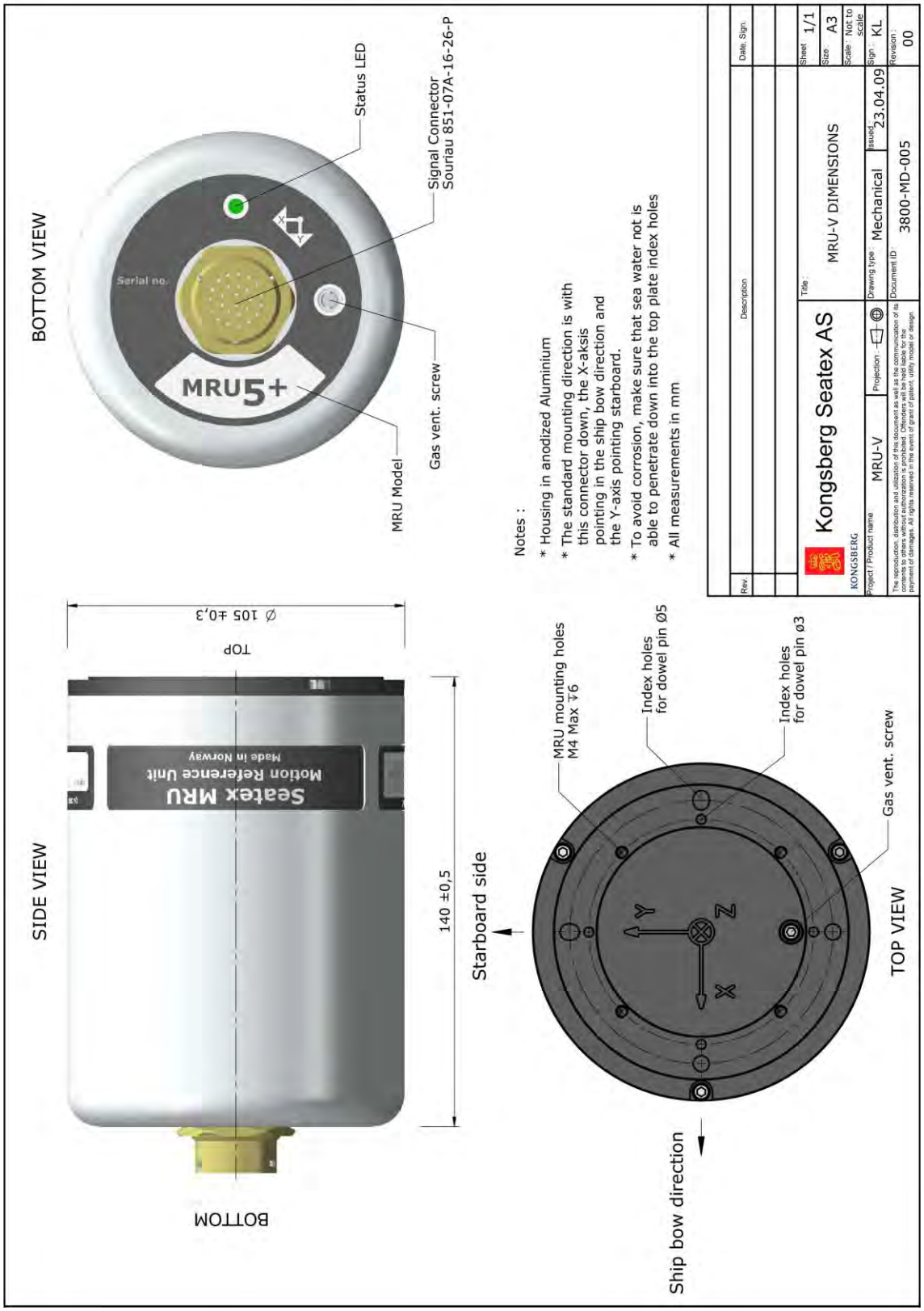
Processing Unit dimensions



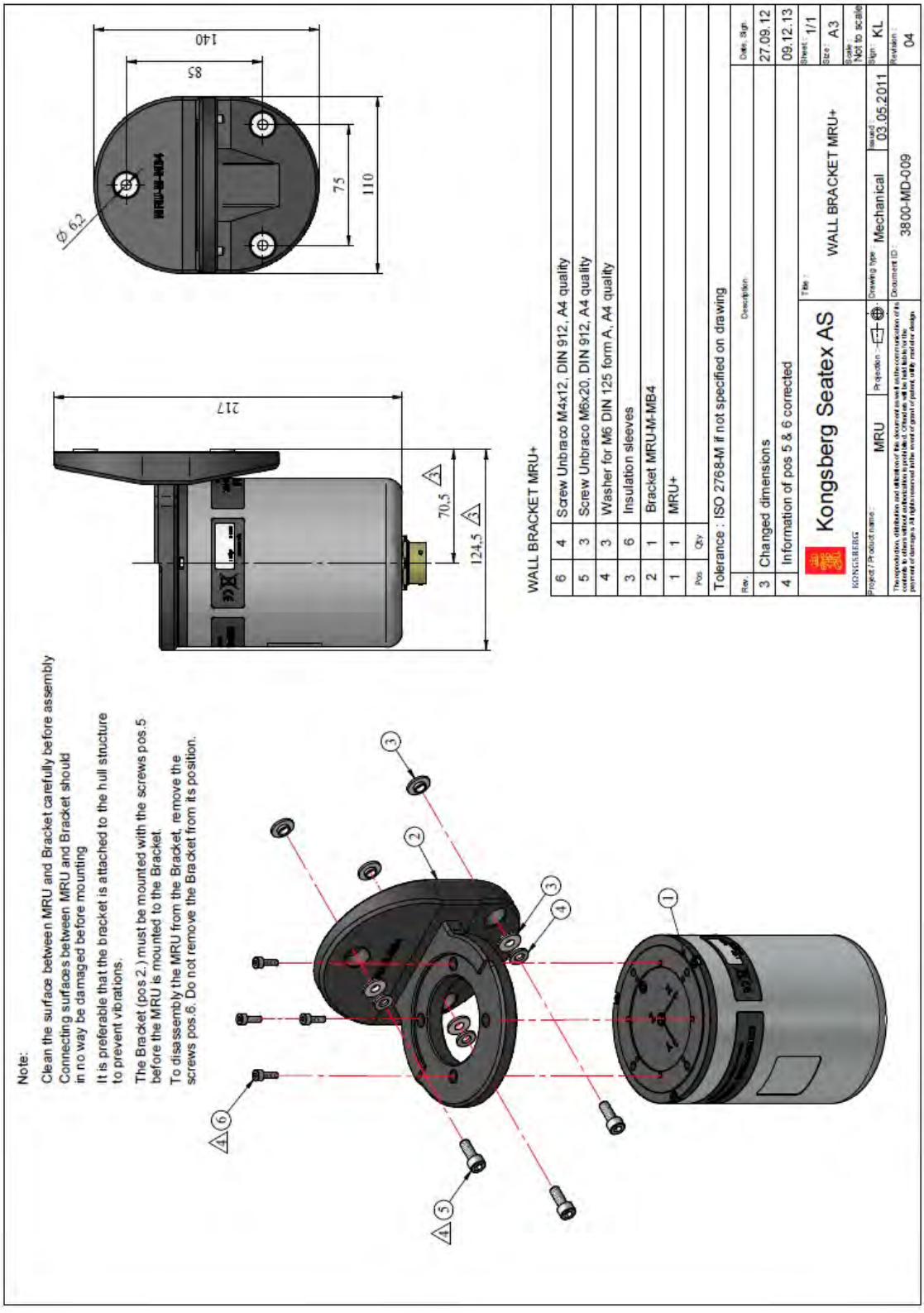
HMI Unit dimension



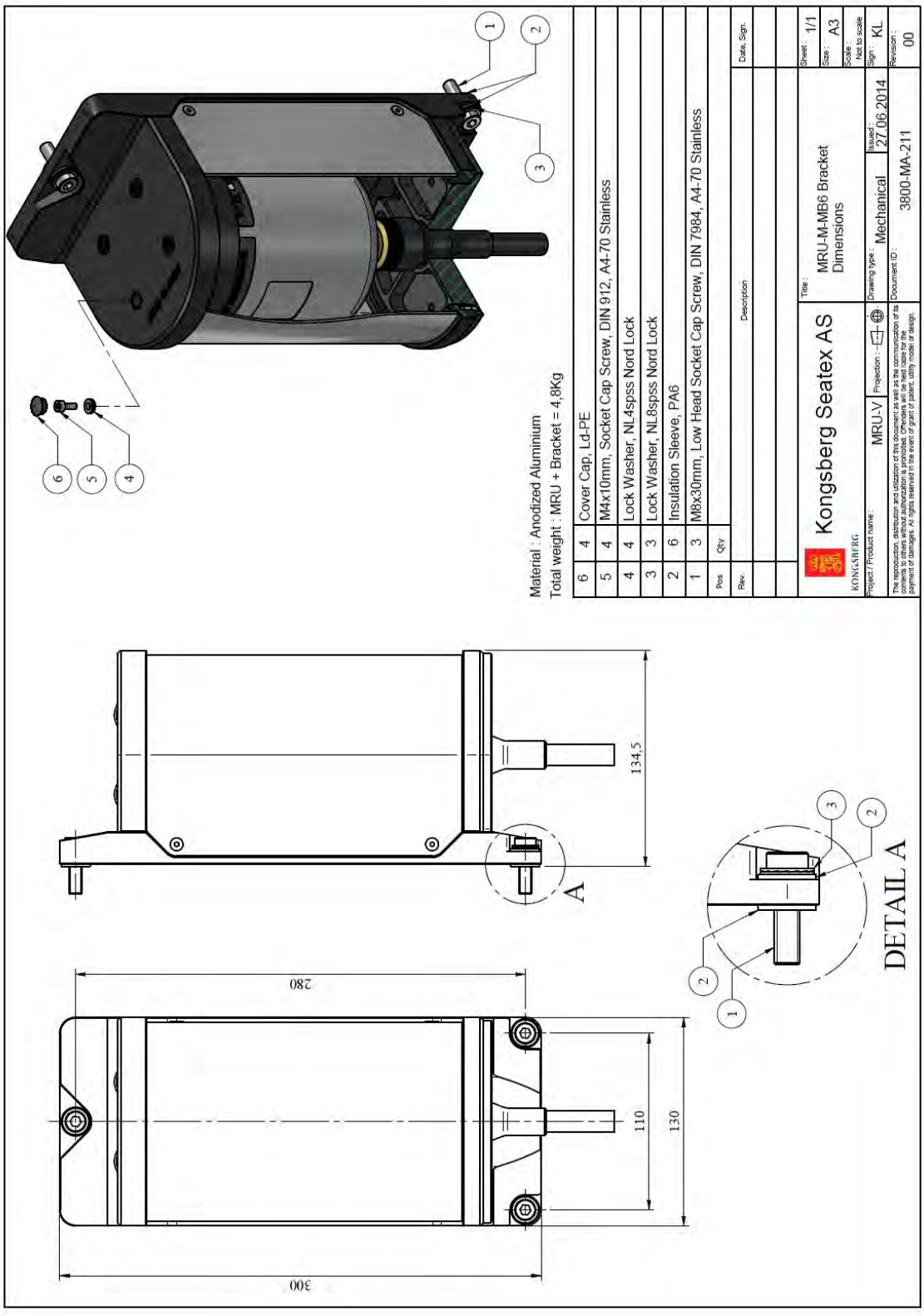
MRU dimensions



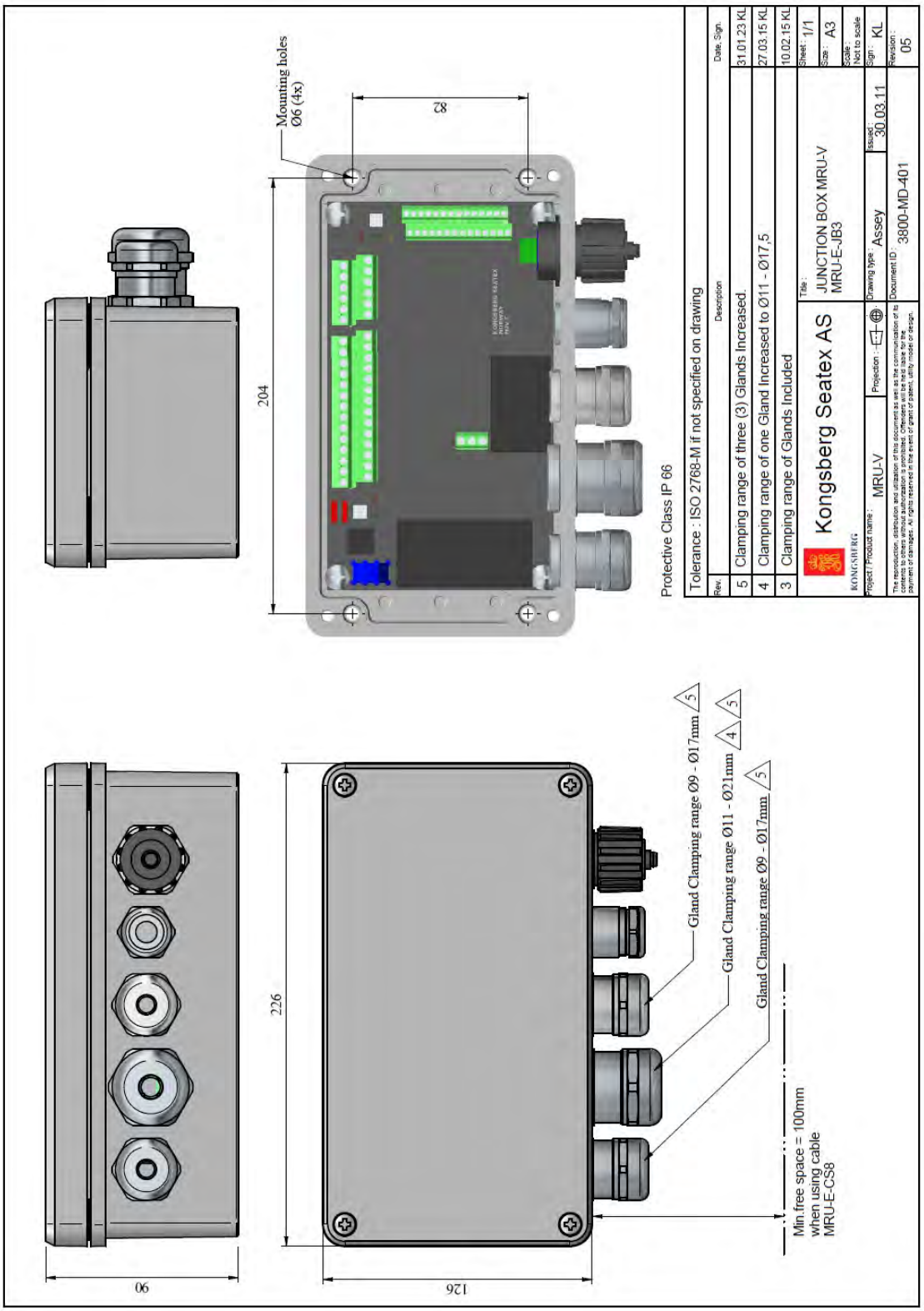
MRU wall mounting bracket dimensions



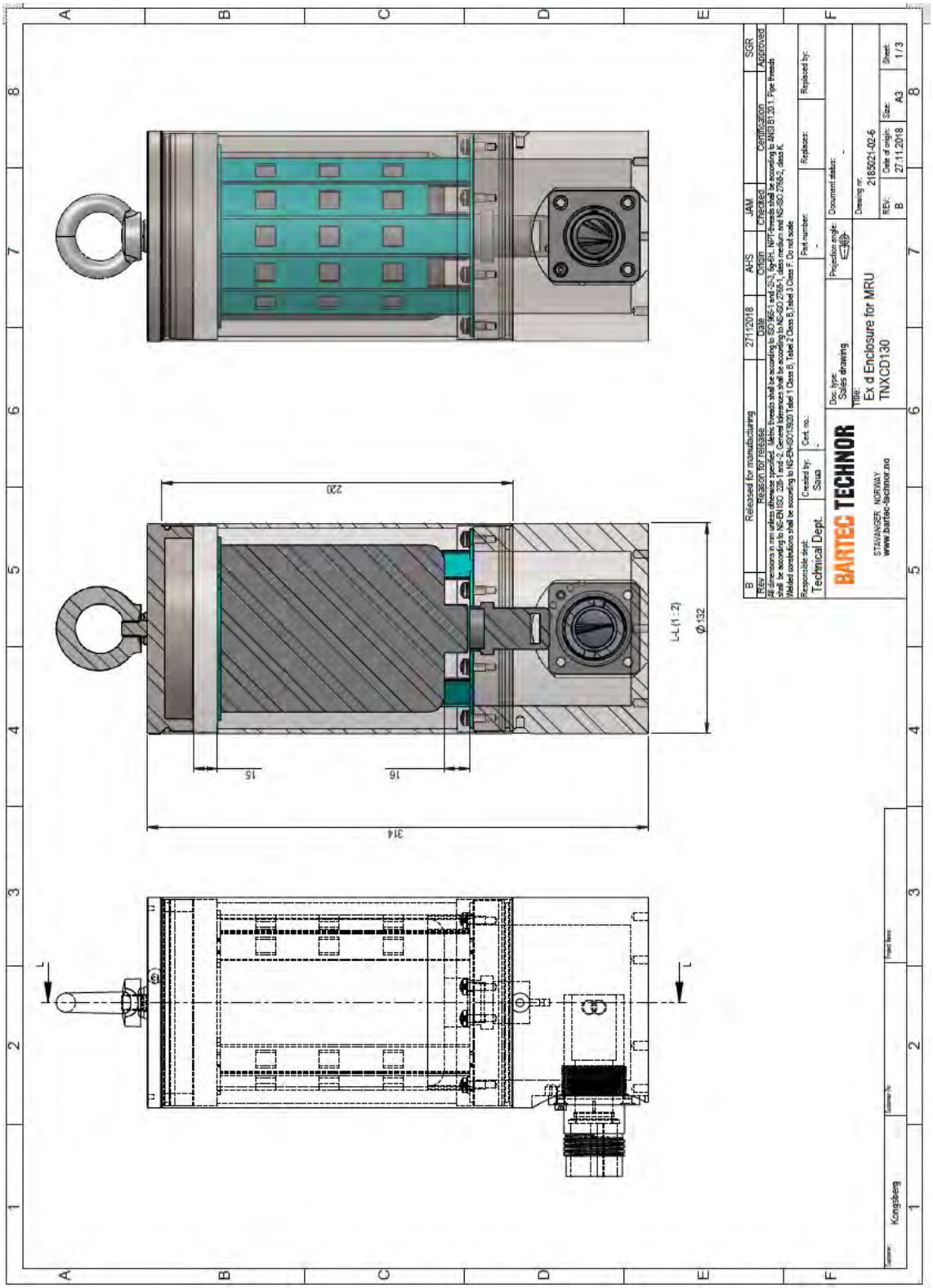
MRU protected mounting bracket dimensions



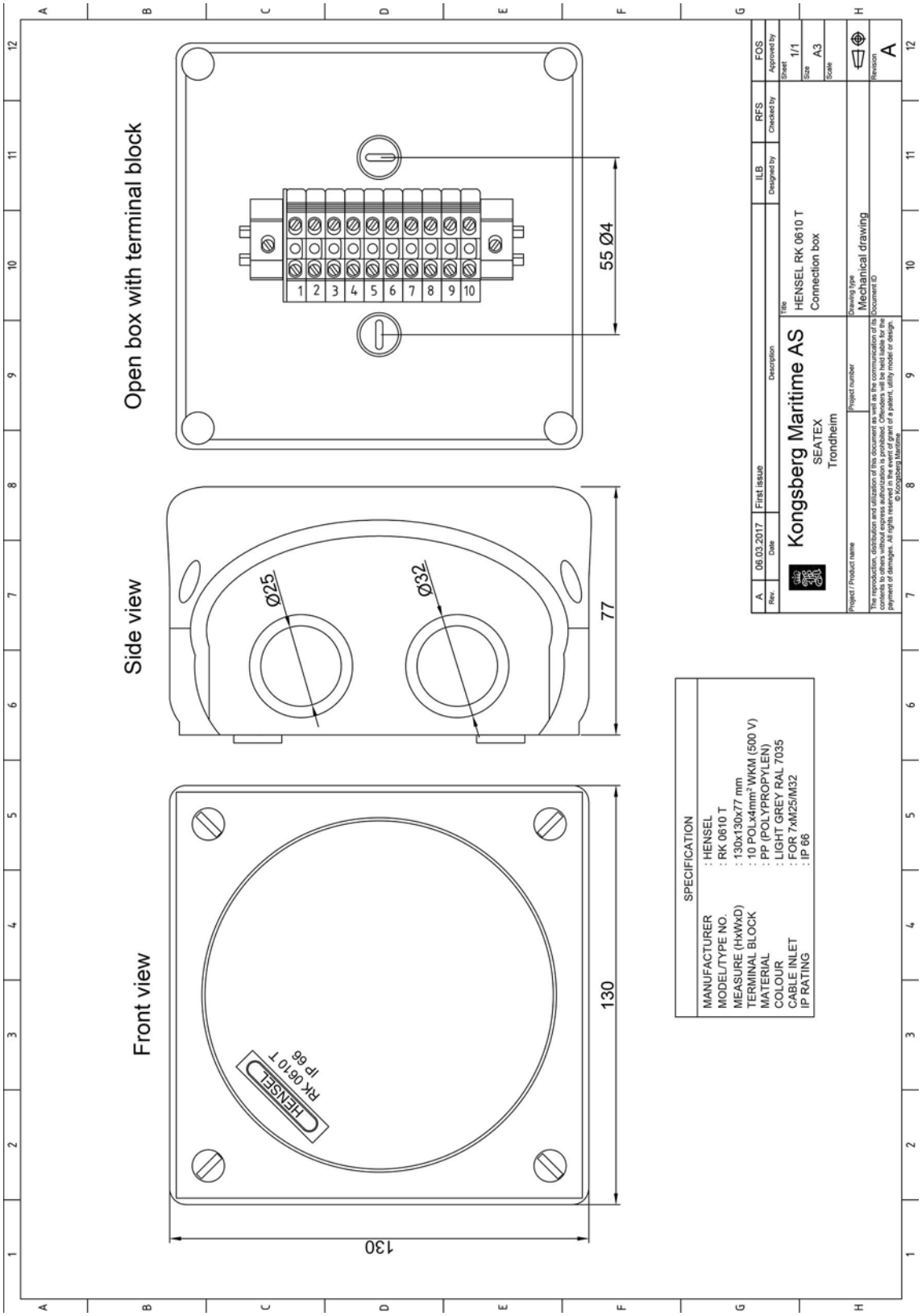
MRU junction box dimensions



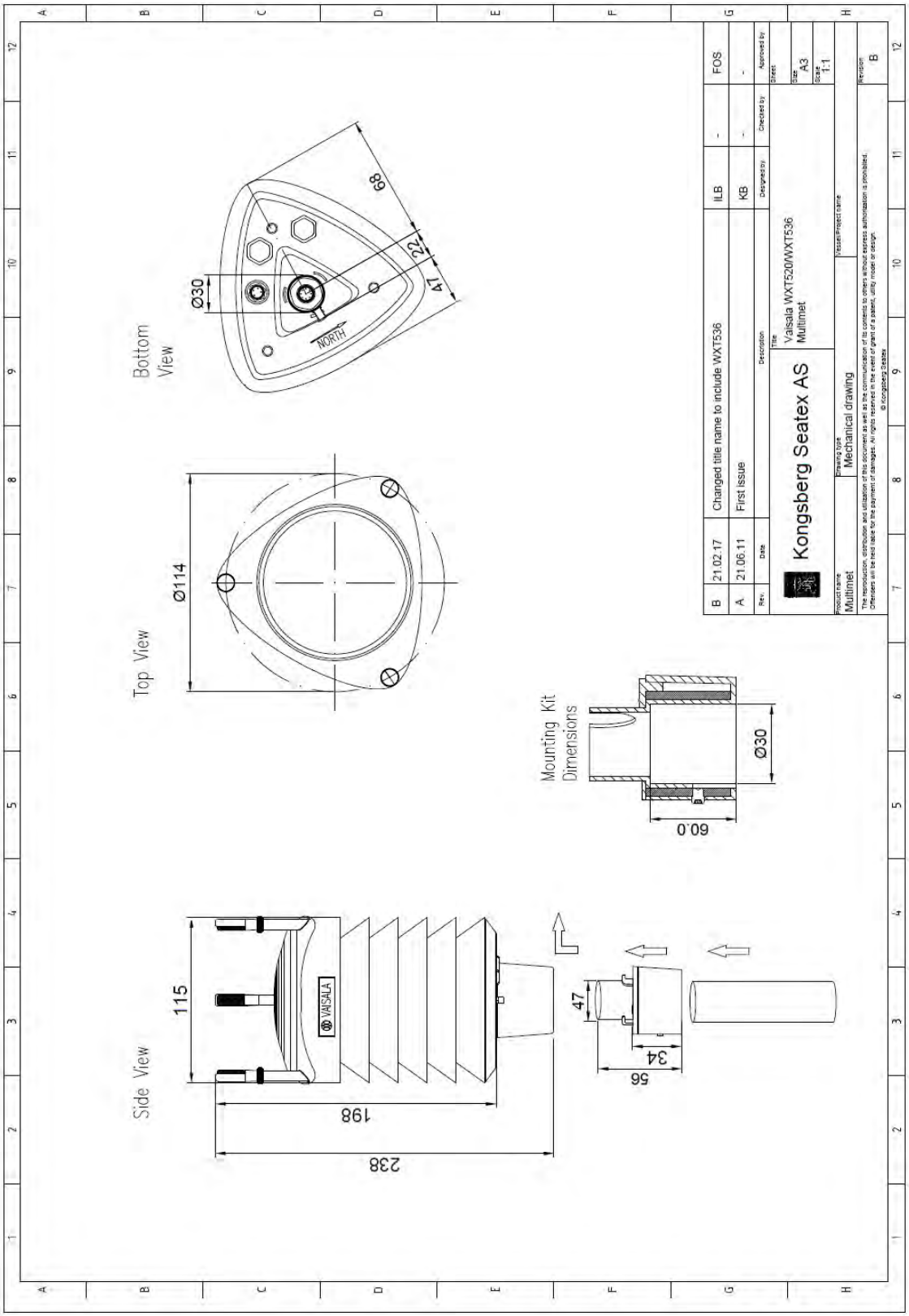
MRU Ex enclosure dimensions



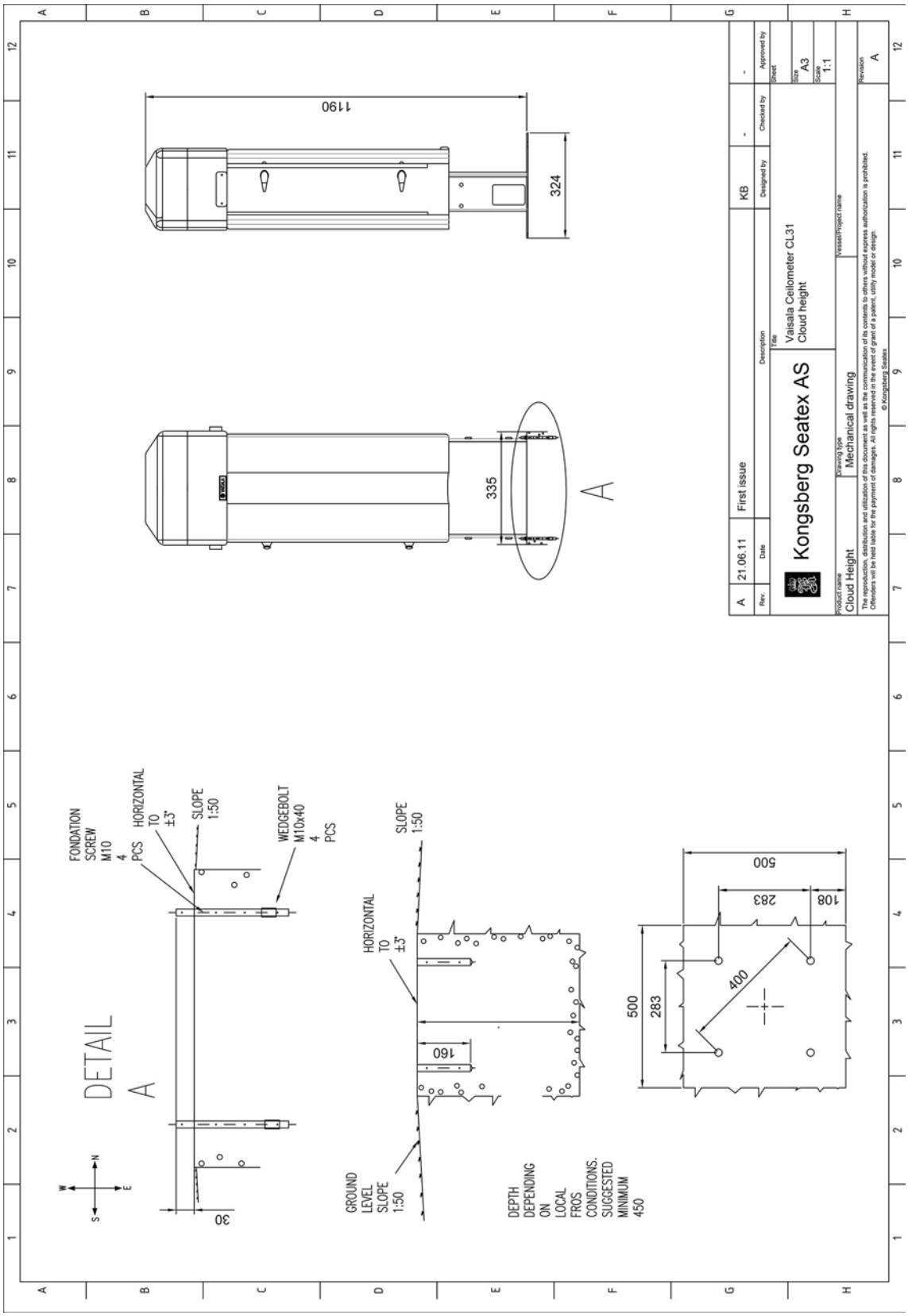
Meteorology sensor connection box dimensions



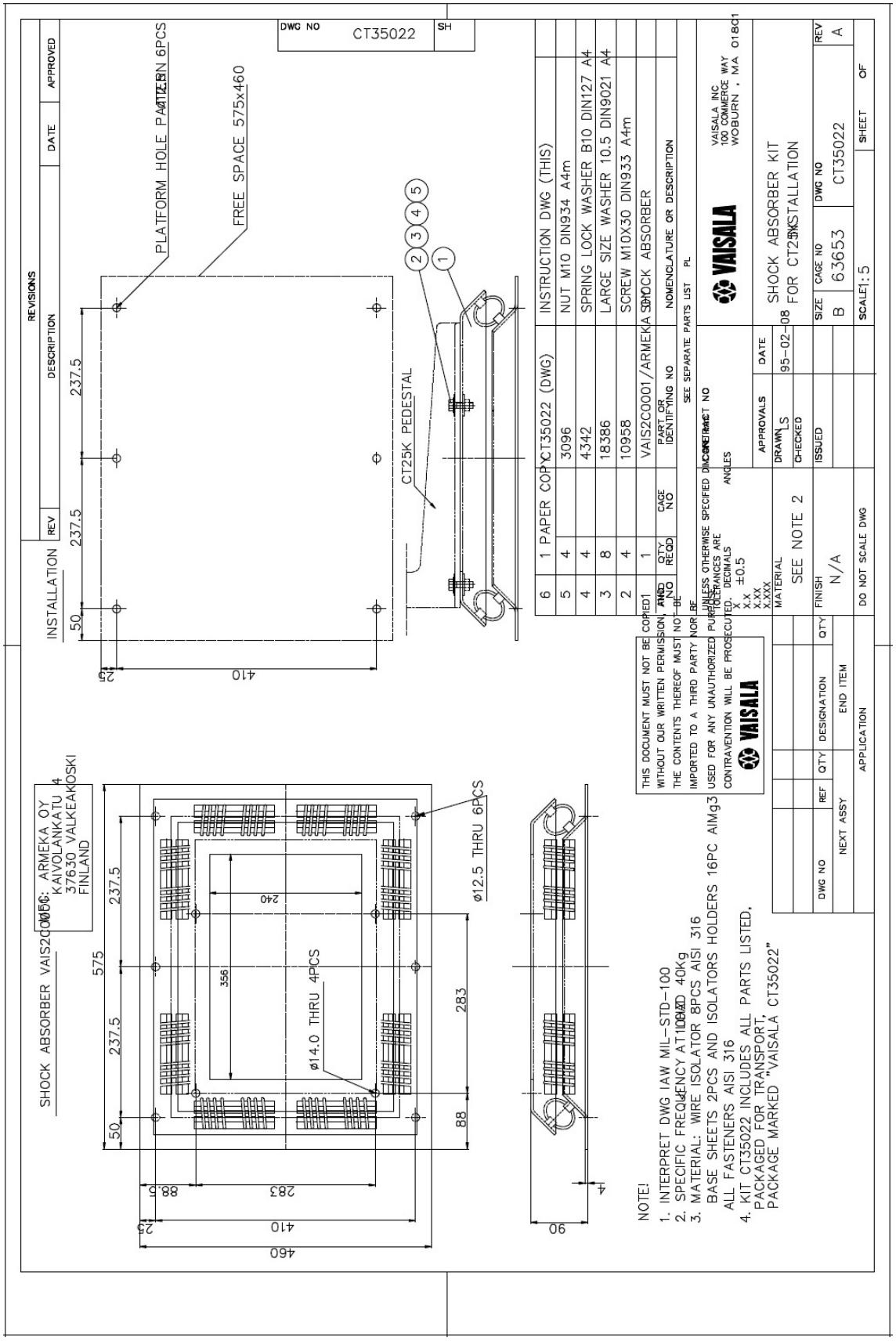
Multi-weather sensor dimensions



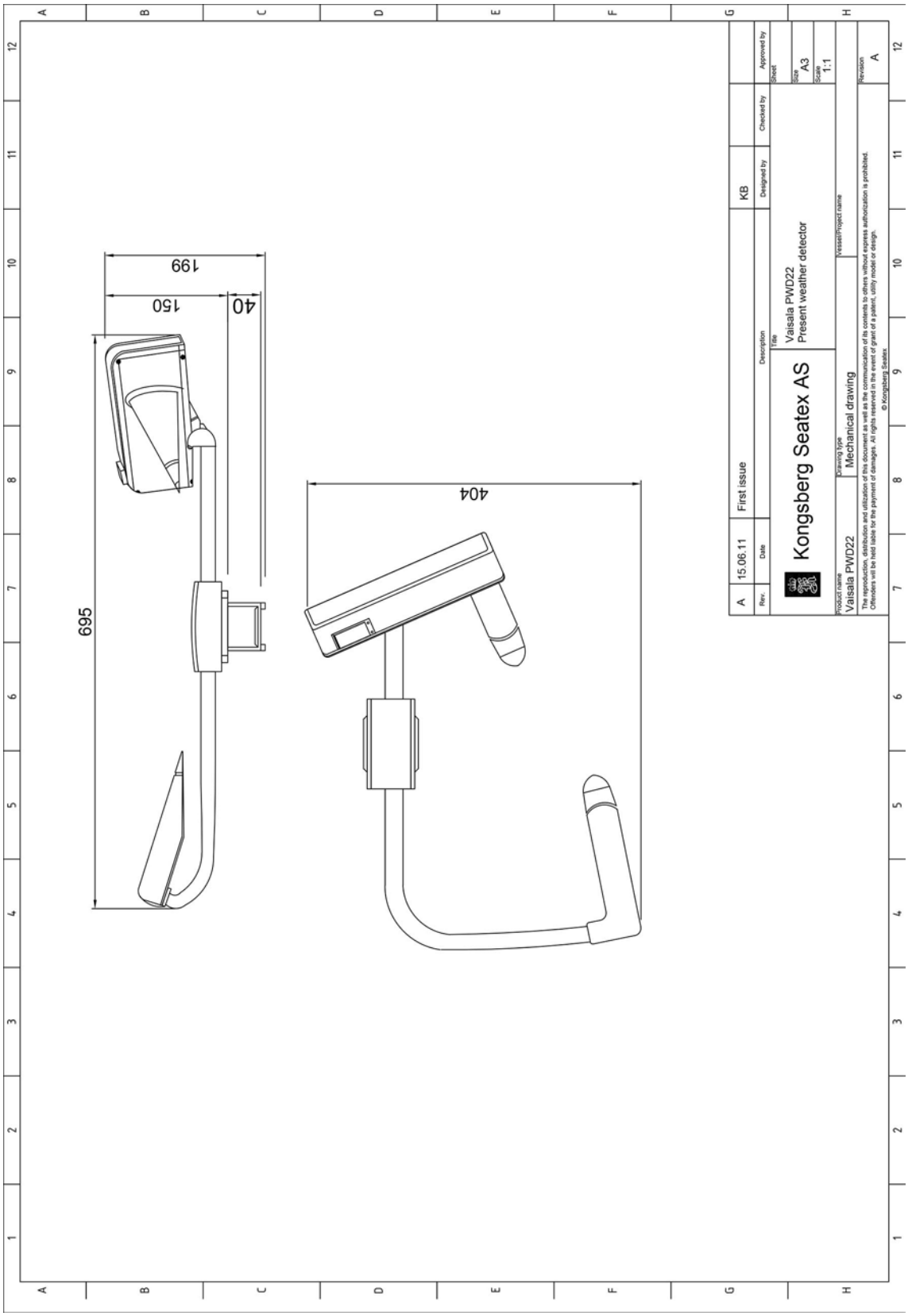
Cloud height sensor dimensions



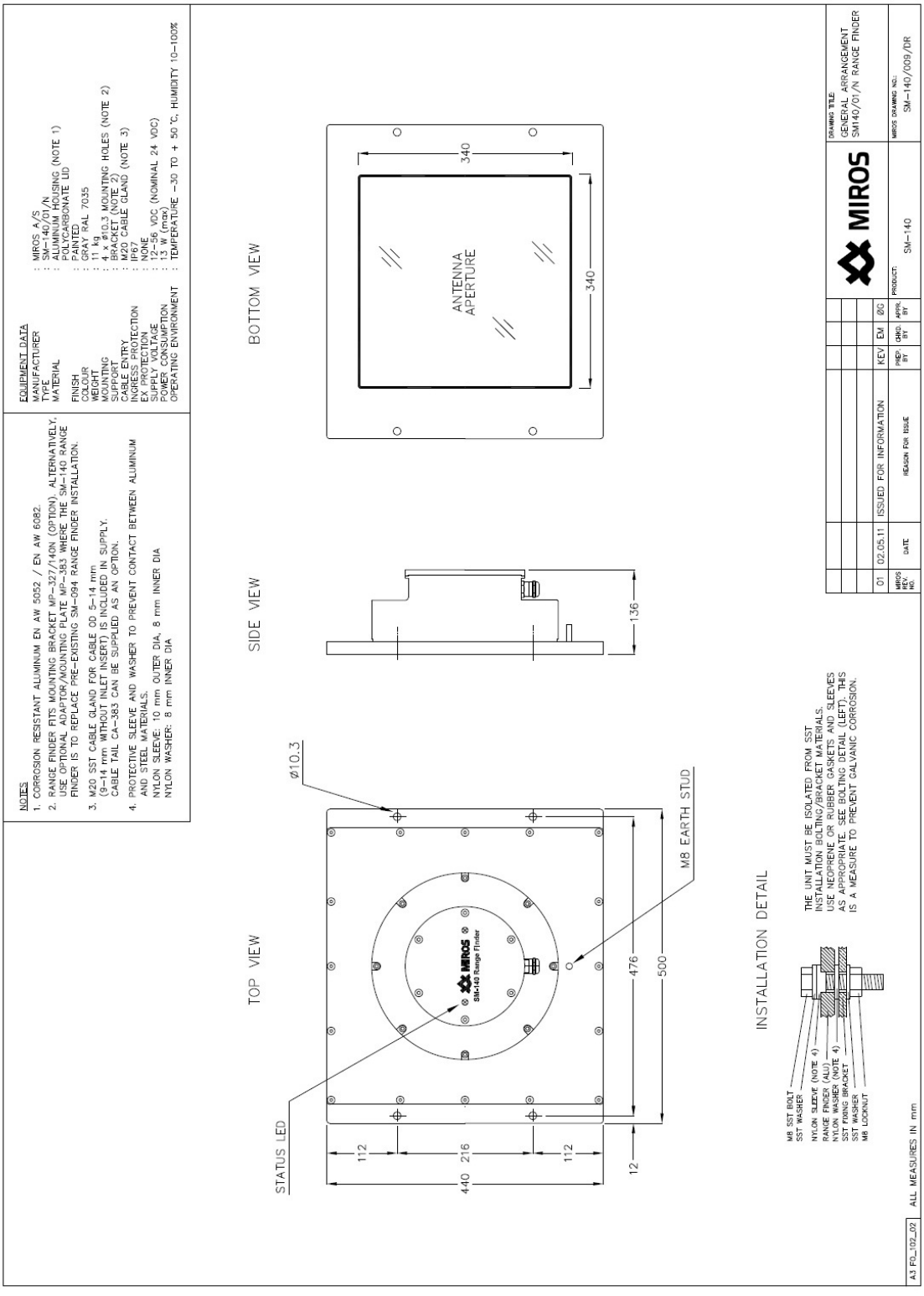
Shock absorber dimensions



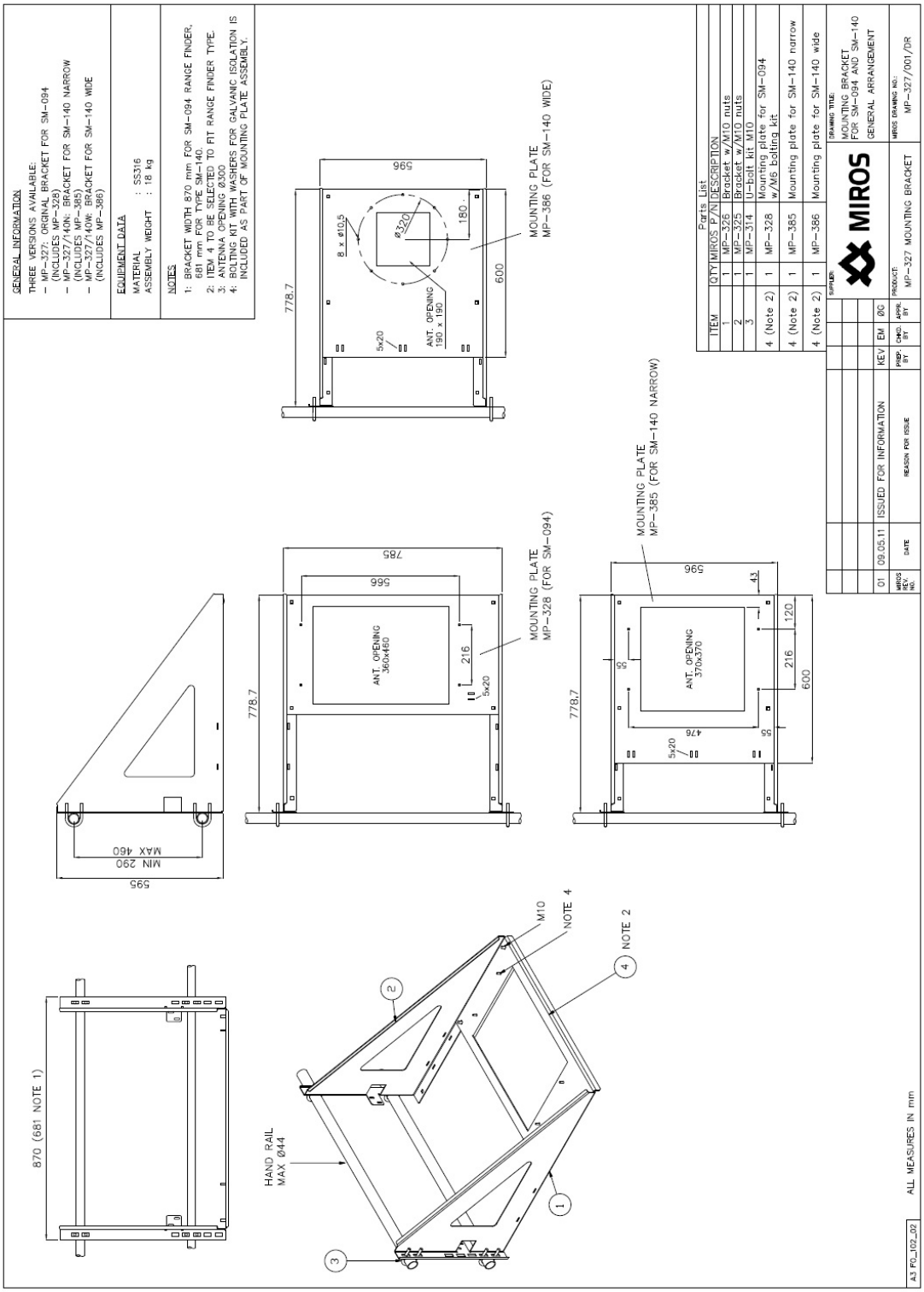
Visibility sensor dimensions



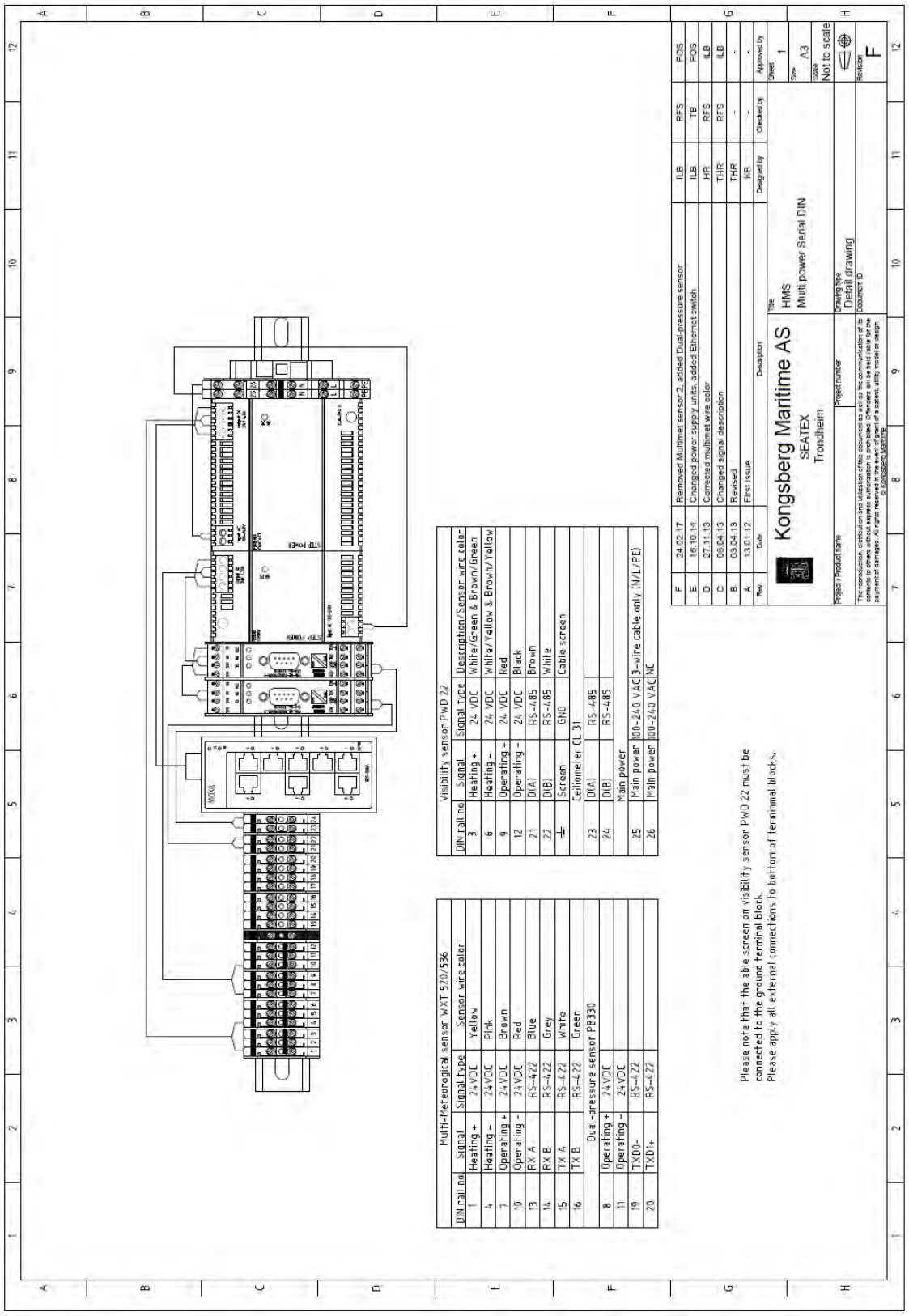
RangeFinder sensor dimensions



RangeFinder hand rail mounting bracket dimensions



Multi power serial DIN rail dimensions



Phoenix contact DIP switch settings

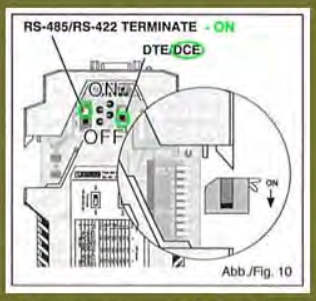
DIP-switch settings for use with Vaisala PWD-22

Speed [kBit/s]	DIP-Switch 1	2	3	4
115,2	OFF	ON	OFF	ON
93,75	OFF	ON	ON	OFF
75	OFF	ON	ON	ON
57,6	ON	OFF	OFF	OFF
38,4	ON	OFF	OFF	ON
19,2	ON	OFF	ON	OFF
9,6	ON	OFF	ON	ON
4,8	ON	ON	OFF	OFF

	DIP-Switch 5	6	7	8
RTS/CTS-CONTROLLED	ON			
SELF-CONTROLLED	OFF			
RTS/CTS-INVERS		ON		
RTS/CTS-STANDARD		OFF		
RS-485 4-WIRE			ON	
RS-485 2-WIRE			OFF	
RS-422				ON
RS-485				OFF

Abb./Fig. 8

8-pole DIP-switch for communication parameters should be configured according to above table.
Note ! ON direction is DOWN



Termination switch in ON position
Equipment type switch in DCE position

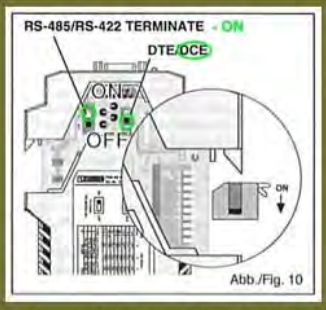
DIP-switch settings for use with Vaisala CL-31

Speed [kBit/s]	DIP-Switch 1	2	3	4
115,2	OFF	ON	OFF	ON
93,75	OFF	ON	ON	OFF
75	OFF	ON	ON	ON
57,6	ON	OFF	OFF	OFF
38,4	ON	OFF	OFF	ON
19,2	ON	OFF	ON	OFF
9,6	ON	OFF	ON	ON
4,8	ON	ON	OFF	OFF

	DIP-Switch 5	6	7	8
RTS/CTS-CONTROLLED	ON			
SELF-CONTROLLED	OFF			
RTS/CTS-INVERS		ON		
RTS/CTS-STANDARD		OFF		
RS-485 4-WIRE			ON	
RS-485 2-WIRE			OFF	
RS-422				ON
RS-485				OFF

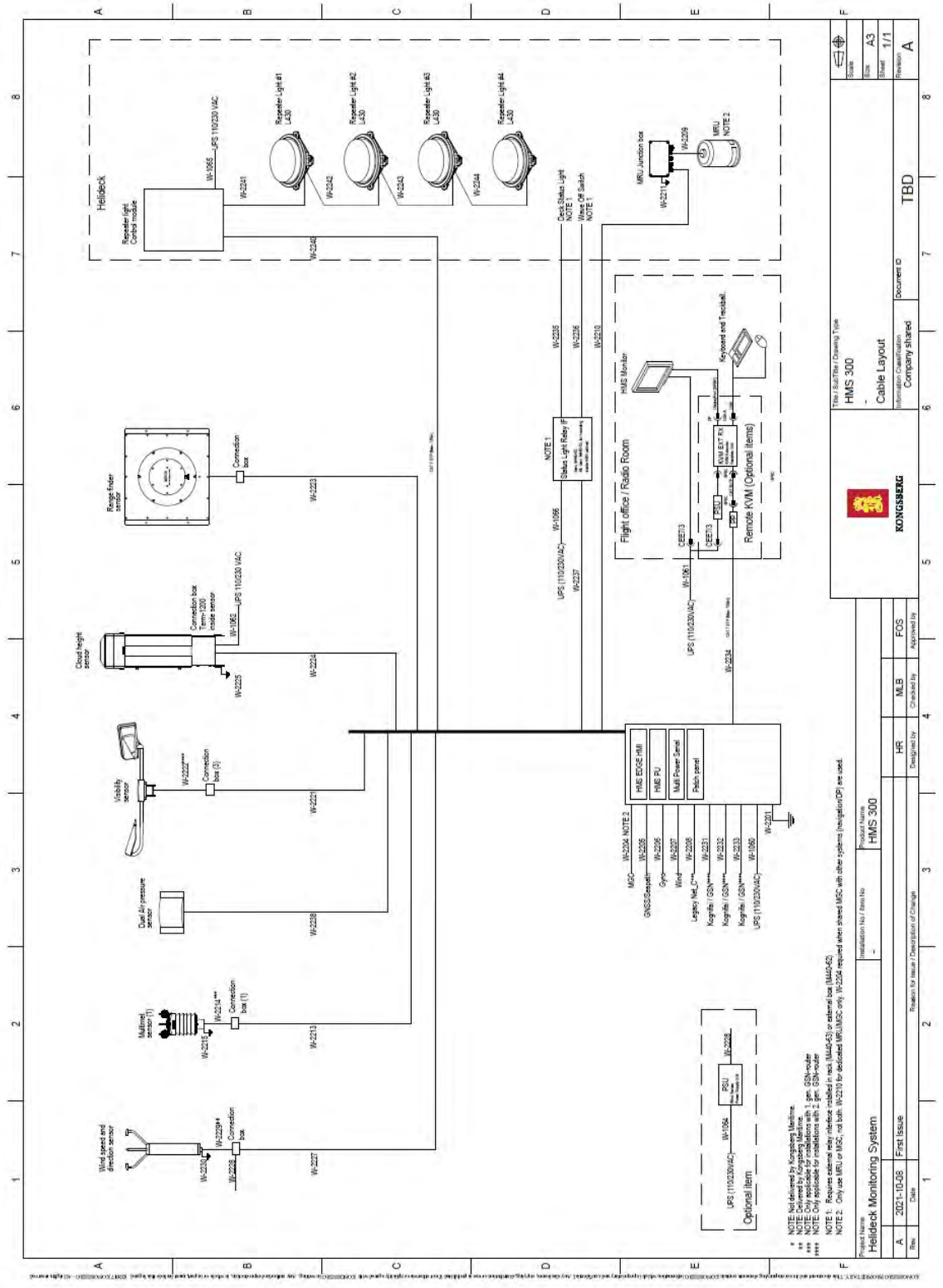
Abb./Fig. 8

8-pole DIP-switch for communication parameters should be configured according to above table.
Note ! ON direction is DOWN

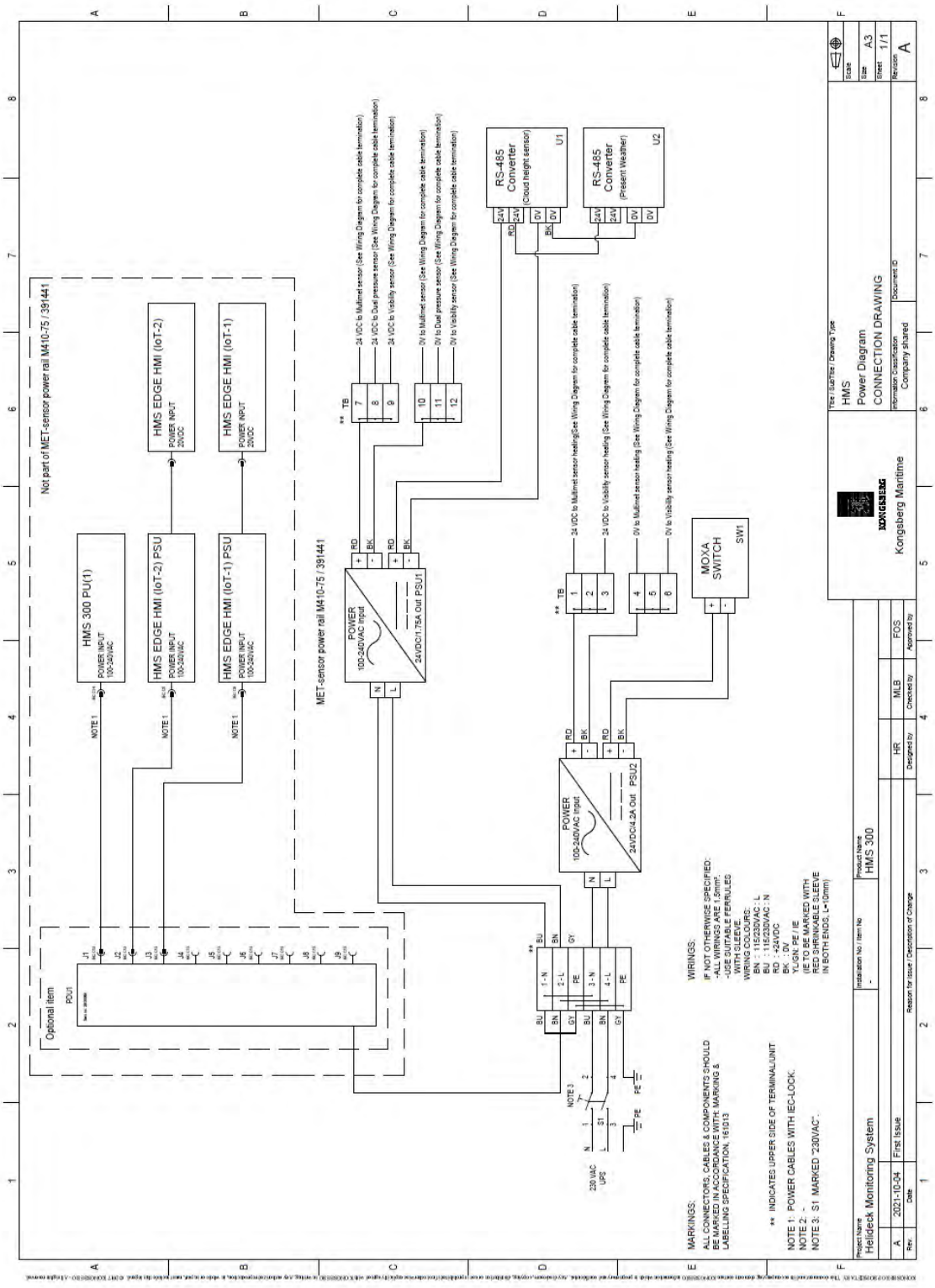


Termination switch in ON position
Equipment type switch in DCE position

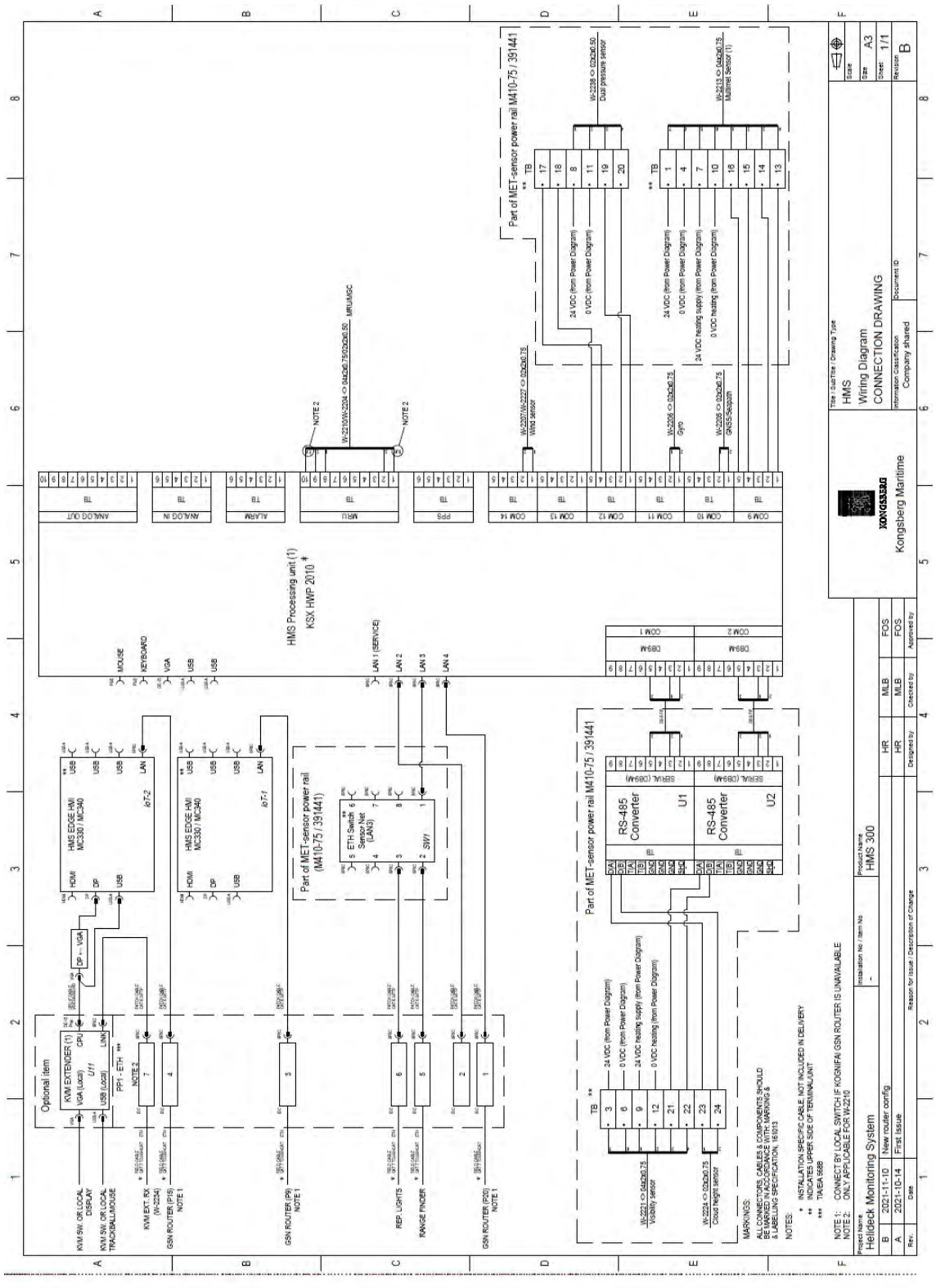
System components and schematics



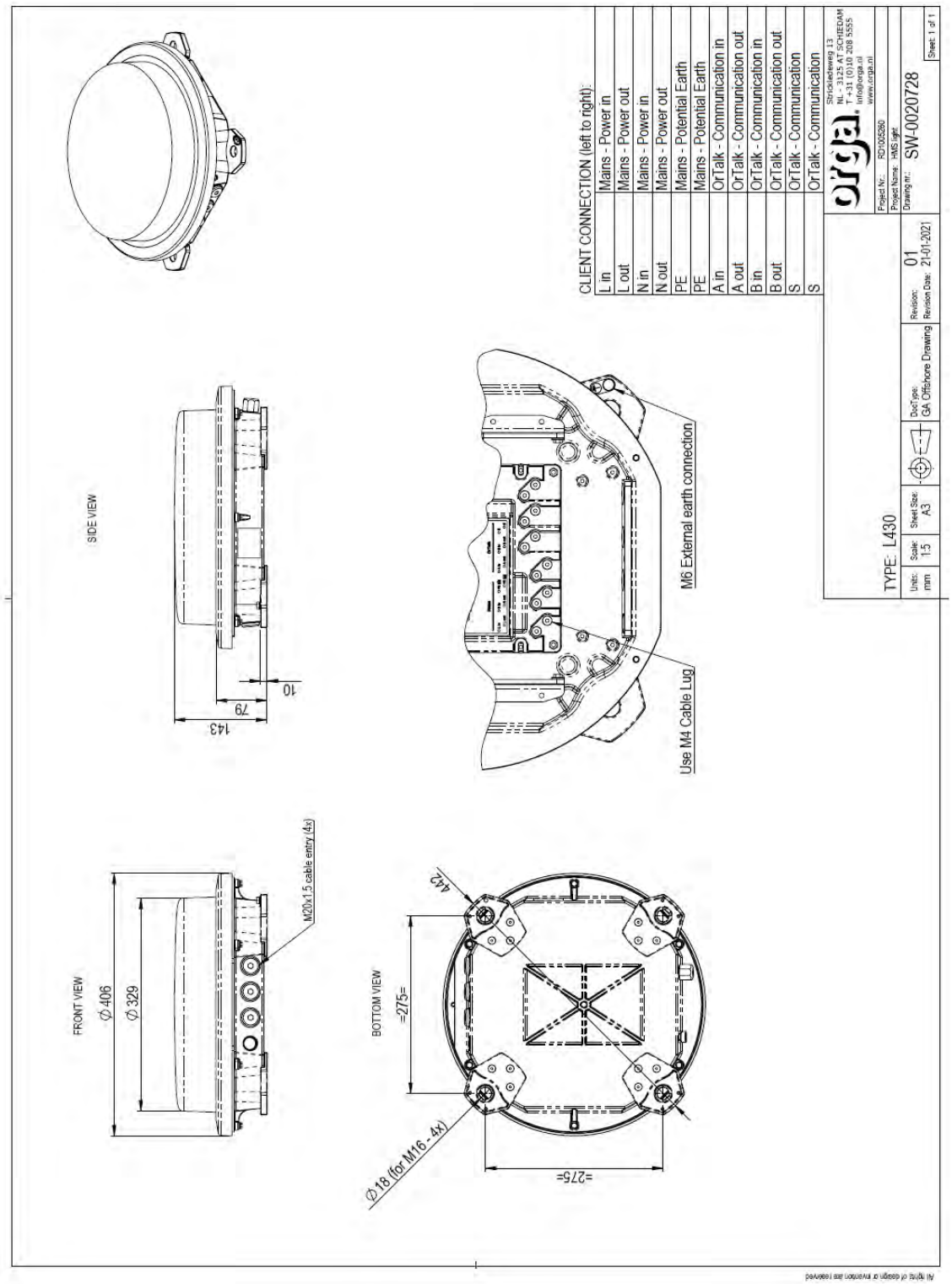
Power diagram



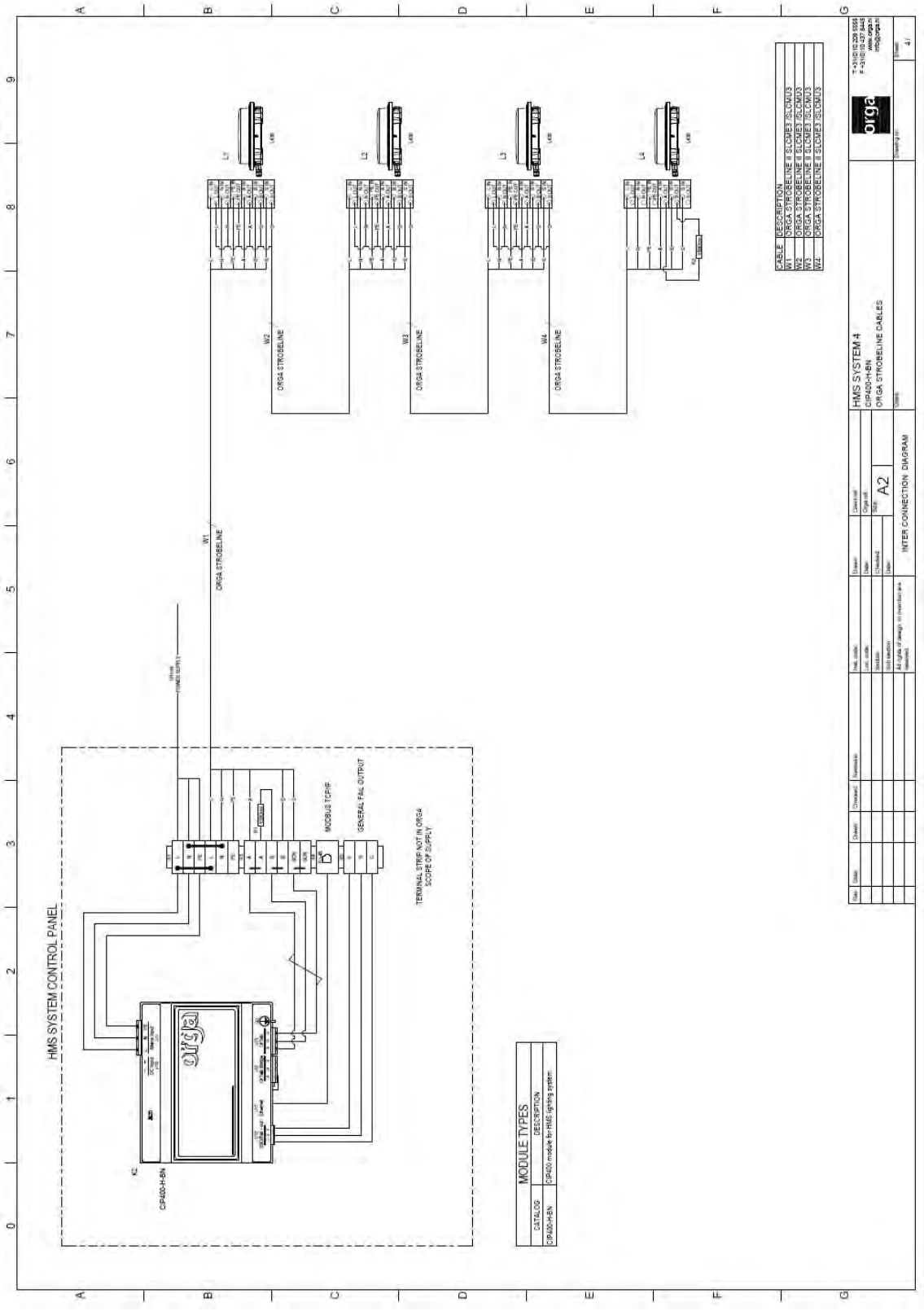
Wiring diagram



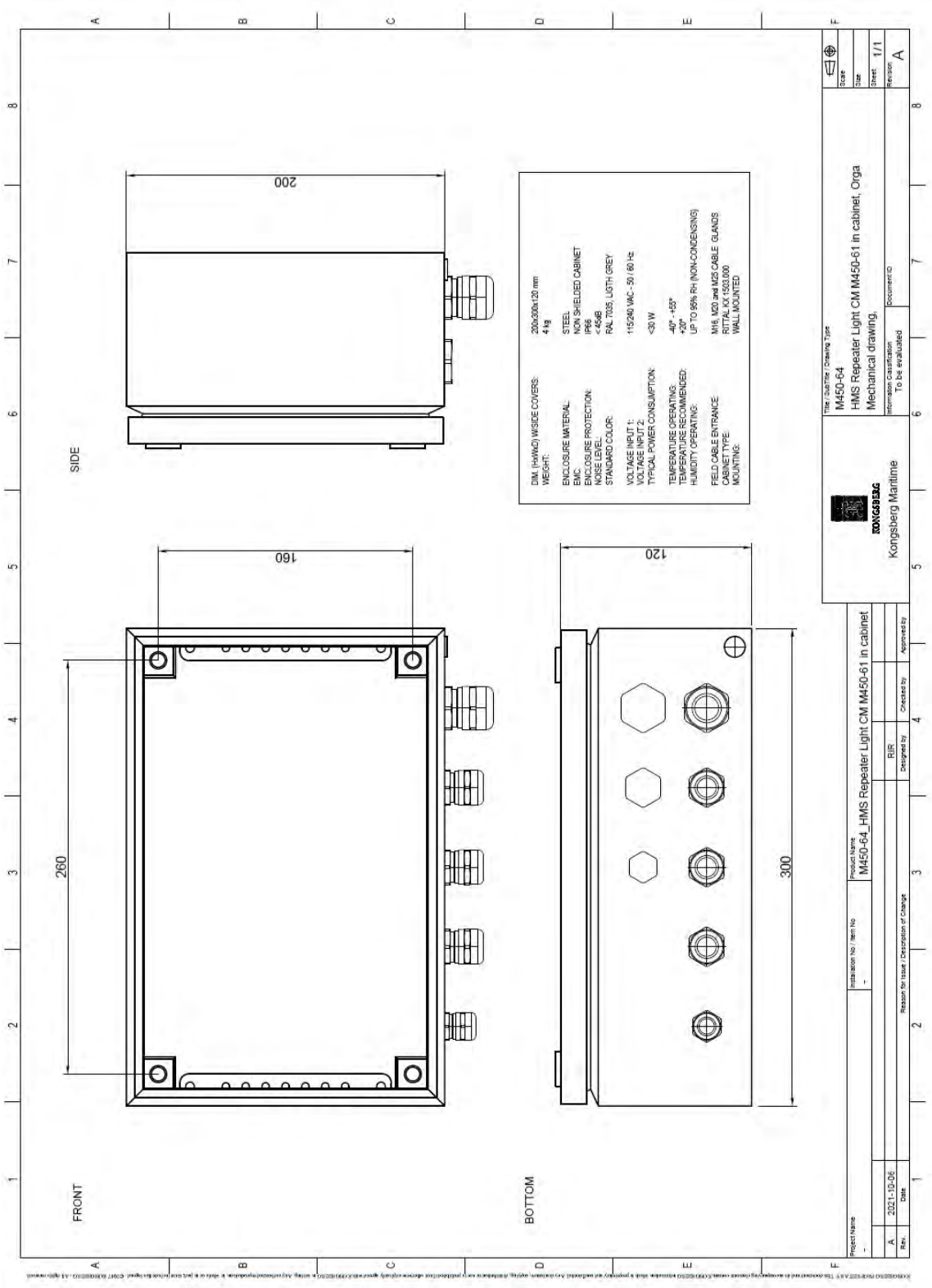
Repeater light dimensions



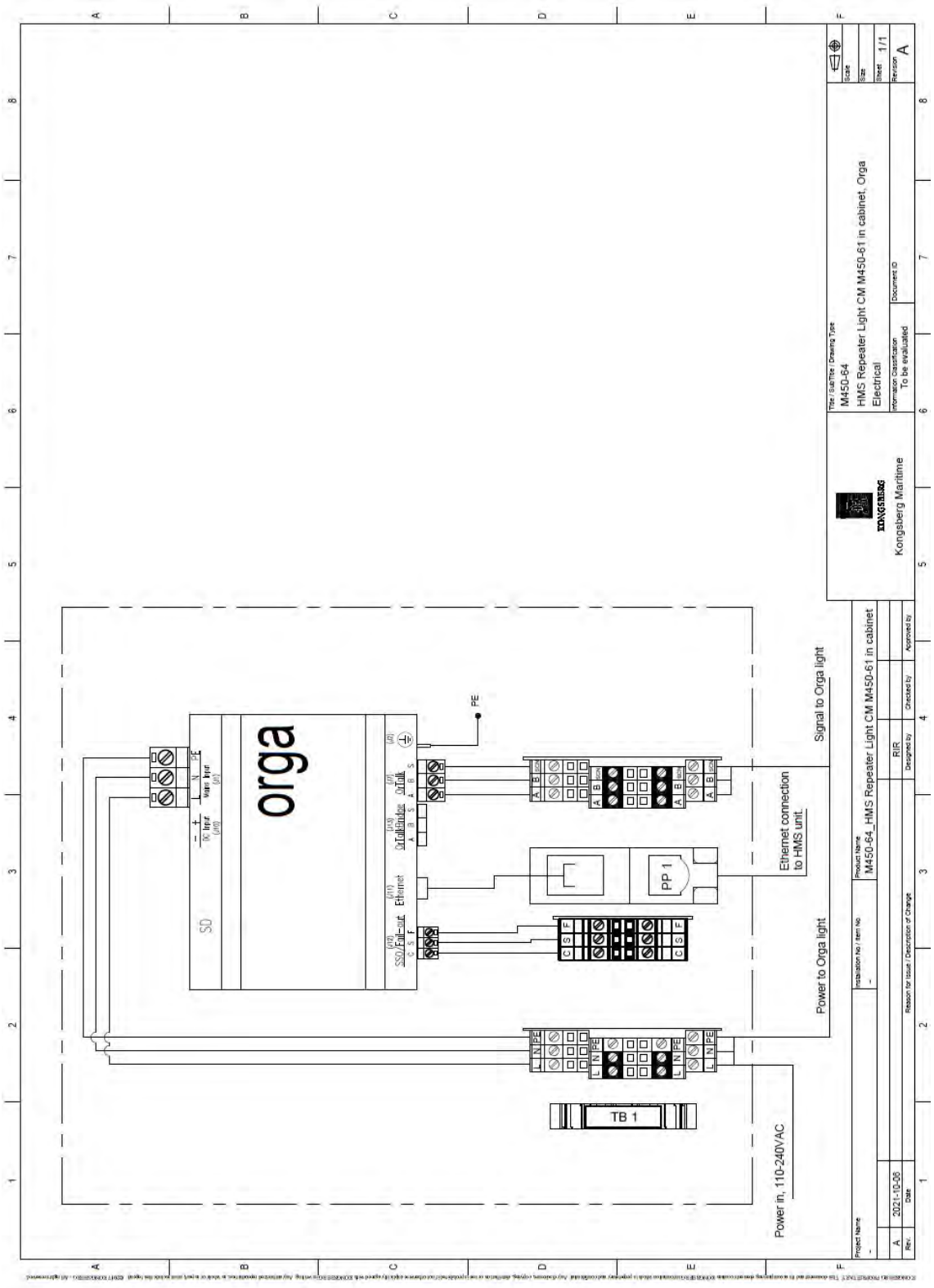
Repeater light schematics



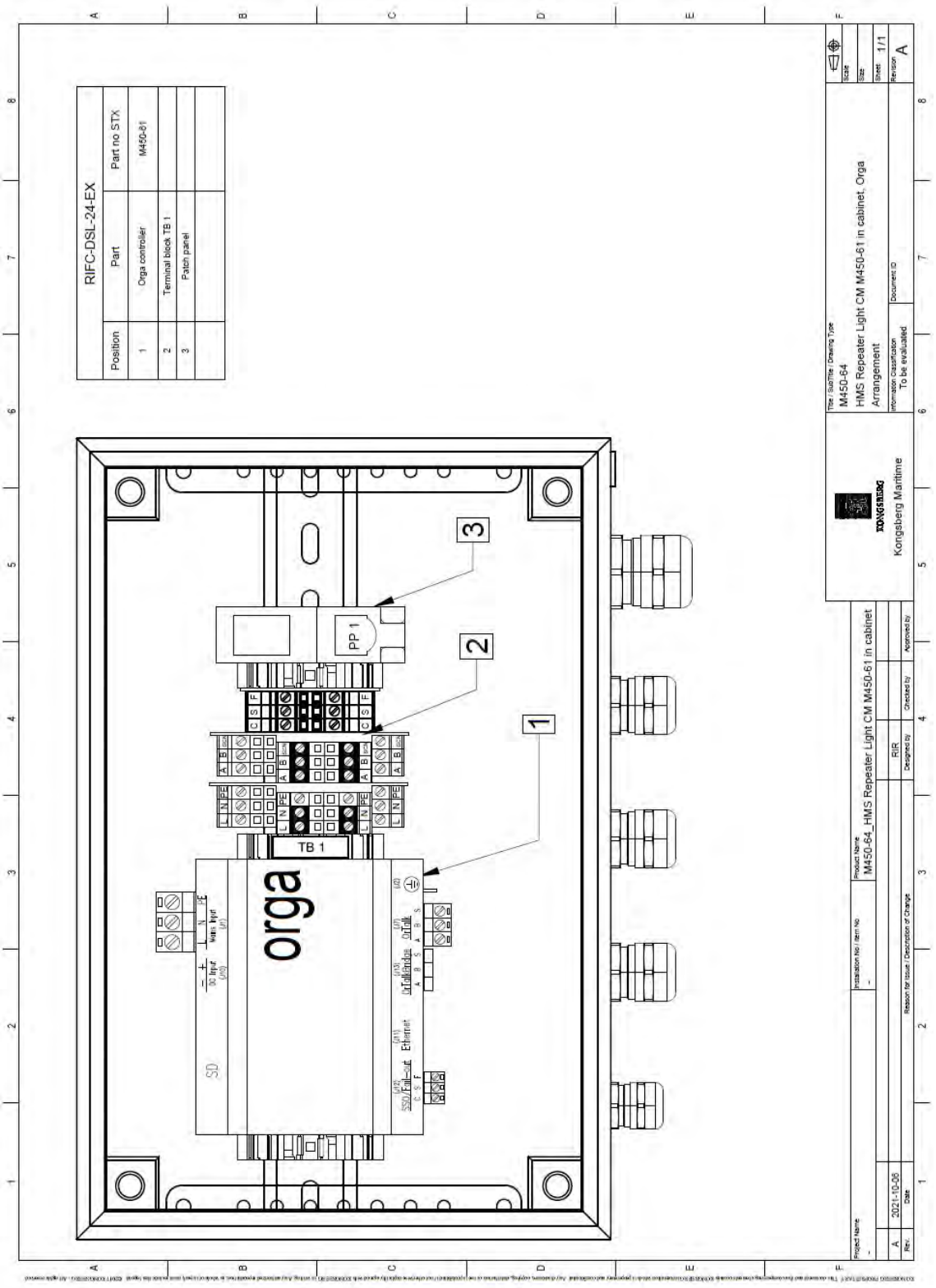
Repeater light control unit enclosure dimensions



Repeater light control unit enclosure wiring diagram



Repeater light control unit enclosure arrangement



Technical specifications

Performance specifications

MRU

Type of MRU	MRU E (used as an example of performance for the MRU models)
Resolution in all axes	0.001°
Static accuracy roll, pitch[1]	0.05° RMS
Dynamic accuracy roll, pitch (for a ±5° amplitude)[2]	0.05° RMS
Scale factor error	0.2 % RMS
Heave output range	±50 m, adjustable
Heave motion periods	1 to 25 s
Dynamic heave accuracy	5 cm or 5 %, whichever is highest

Wind sensor, optional

Type	WindObserver II, part no. M410–51
Wind speed measurement range	0 to 65 m/s
Wind speed accuracy	±2 %
Wind speed resolution	0.01 m/s
Wind speed offset	±0.01 m/s
Direction measurement range	0 to 359°
Direction accuracy	±2°
Direction resolution	1°

1. When the MRU is stationary over a 30-minute period.
2. When the MRU is exposed to a combined two-axis sinusoidal angular motion with five minutes duration.

Multi-weather sensor, optional

Type	WXT536, part no. M440–58
Wind speed measurement range	0 to 60 m/s
Wind speed accuracy	±3 %
Wind speed resolution	0.1 m/s
Wind direction measurement range	0 to 359°
Wind direction accuracy	±3°
Wind direction resolution	1°
Temperature measurement range	-52 to +60 °C
Temperature accuracy at +20 °C	±0.3 °C
Humidity measurement range	0 to 100% RH
Humidity accuracy	±5 % RH
Pressure range	600 to 1100 hPa
Pressure accuracy	0.5 hPa
Pressure resolution	0.1 hPa

Dual-pressure sensor, optional

Type	PTB330, part no. M440–50
Pressure range	500 to 1100 hPa
Pressure accuracy	0.15 hPa
Pressure resolution	0.01 hPa

Cloud height sensor, optional

Type	CL31, part no. M410–44
Measurement range	0 to 25000 feet
Distance measurement range	±1 % or ±17 feet, whichever is highest
Resolution	10 feet

Visibility sensor, optional

Type	PWD22, part no. M410–46
Measurement range	10 to 20000 m
Accuracy	±10 %, range 10 to 10000 m

RangeFinder Motion sensor, optional

Type	SM-140/02, part no. M440–40
Beam width	5° (–3 dB one way)
Measurement range	2 to 95 m
Measurement error	1 cm

Weights and outline dimensions

Processing Unit

Height	88.1 mm (2U)
Width	485 mm (19")
Depth	Min 357 mm (including connectors on rear panel) and max 412 mm (including cable relief bracket)
Weight	5.4 kg

HMI Unit (dual)

Height	44.55 mm (1U)
Width	482.6 mm (19”) including mounting bracket
Depth	Min 452.1 mm
Depth	477.8 mm (including hank on front panel)
Slide length	292 mm
Weight	7.5 kg

MRU Unit

Type	5th generation MRU
Height	140 mm (5.525”)
Diameter	105 mm (4.134”)
Weight	2.2 kg

Colour	Titanium
Connector	Souriau 851-36RG 16-26S50 (MIL. spec.)

MRU wall mounting bracket

Type	MRU-M-MB4
Length	123.5 mm
Width	110 mm
Height	140 mm
Weight	0.8 kg
Colour	Black
Material	Aluminium

MRU protected mounting bracket

Type	MRU-M-MB6
Length	134.5 mm
Width	130 mm
Height	300 mm
Weight	2.4 kg
Colour	Black
Material	Aluminium

MRU junction box

Type	MRU-E-JB3
Length	226 mm
Width	126 mm
Height	90 mm
Weight	2.0 kg
Glands (clamping range)	9 to 21 mm
Colour	Black
Material	Aluminium
Enclosure protection	IP-65

Wind sensor, optional

Type	WindObserver II, part no. M410–51
Height	381 mm
Diameter	213 mm
Weight	2.0 kg

Multi-weather sensor, optional

Type	WXT536, part no. M440–58
Height	238 mm
Diameter	115 mm
Weight	0.65 kg

Dual-pressure sensor, optional

Type	PTB330, part no. M440–50
Length with mounting plate	237 mm
Width with mounting plate	107 mm
Height with mounting plate	179 mm

Cloud height sensor without damper, optional

Type	CL31, part no. M410–44
Width	335 mm
Height	1190 mm
Depth	325 mm
Weight	31 kg

Visibility sensor, optional

Type	PWD22, part no. M410–46
Width	404 mm
Height	199 mm
Length	695 mm
Weight	3 kg

RangeFinder Motion sensor, optional

Type	SM-140/02, part no. M440–40
Height	136 mm
Width	500 mm
Depth	440 mm
Weight	11 kg

RangeFinder sensor hand rail mounting bracket, optional

Type	MP-327/140N, part no. M440–47
Height	595 mm
Width	596 mm
Depth	779 mm
Weight	18 kg

Repeater light

Type	ORGA L430, part no. M450–60
Height	143 mm
Diameter	406 mm
Weight	18 kg

Repeater light control unit enclosure

Type	M450–64
Height	200 mm
Width	300 mm
Depth	120 mm
Weight	5.5 kg

GSN router

Type	Part no. 417936, Cisco 891-24X
Height	44.5 mm (without rubber feet)
Width	438.1 mm
Depth	304.8 mm
Weight	2.5 kg

Connection box for meteorology sensors

Type	Hensel , part no. M410–69
Length	77 mm
Width	130 mm
Height	130 mm
Weight	0.31 kg

Power specifications

Processing Unit

Voltage	100 to 240 V AC, 50/60 Hz
Power consumption	Max. 75 W [3]
Batteries	None, connection to UPS recommended

HMI Unit (dual)

Voltage	100 to 240 V AC, 50/60 Hz
Power consumption, max.	270 W
Power consumption, typical	120 W

MRU Unit

Voltage	24 V DC, from Processing Unit

Wind sensor, optional

Type	WindObserver II, part no. M410–51
Voltage (anemometer only)	9 to 30 V DC
Power consumption (anemometer only)	60 mA max.
Voltage for separate heating module	22 to 30 V DC
Power consumption for separate heating module	3 A

3. With Inertial Measurement Unit connected.

Multi-weather sensor, optional

Type	WXT536, part no. M440–58
Voltage	5 to 32 V DC
Power consumption with heating (at 24 V DC)	0.4 A, typical

Dual-pressure sensor, optional

Type	PTB330, part no. M440–50
Voltage	10 to 35 V DC
Power consumption (at 24 V DC)	0.2 A, typical

Cloud height sensor, optional

Type	CL31, part no. M410–44
Voltage	230 V AC
Power consumption with heating	310 W

Visibility sensor, optional

Type	PWD22, part no. M410–46
Voltage	24 V DC
Power consumption with heating	72 W

RangeFinder Motion sensor, optional

Type	SM-140/02, part no. M440–40
Voltage	12 to 36 V DC (nominal 24 V DC)
Power consumption	< 7 W

Repeater light

Type	ORGA L430, part no. M450–60
Voltage	110 to 254 V AC
Power consumption	45 W per light (190 W total for 4 lights)

Repeater control unit

Type	ORGA CIP400-H-BN, part no. M450–61
Voltage	110 to 254 V AC
Power consumption	1.3 W

GSN router

Type	Part no. 417936, Cisco 891-24X
Voltage	110 to 240 V AC
Power consumption, max.	60 W

Environmental specifications

Processing Unit

Enclosure material	Aluminium
Operating temperature range	-15 °C to +55 °C [4]
Recommended operating temperature	Room temperature (+20 °C)
Storage temperature range	-20 °C to +70 °C [5]
Operating humidity	Max. 95 % non-condensing
Storage humidity	Less than 55 %
Ingress protection front	IP 42
Ingress protection rear	IP 21
Electromagnetic compatibility (immunity/emission)	IEC 60945/EN 60945
Vibration	IEC 60945/EN 60945

HMI Unit

Enclosure material	Aluminium
Operating temperature range	-15 °C to +55 °C
Recommended operating temperature	Room temperature (+20 °C)
Storage temperature	-10 °C to +70 °C

4. Operating temperature up to +55 ºC for 10 hours.
5. Recommended long term storage temperature range between +5 to +35 ºC.

Operating humidity	Max. 95%, non-condensing
Storage humidity	< 55 %
Type approved by	ABS, BV, CCS, DNV, KR, LR, RS, NKK, PRS and RINA. IACS E10 and IEC 60945

MRU Unit

Enclosure material	Anodised aluminium
Enclosure protection	IP-66
Operating humidity (max)	Sealed, no limit
Storage temperature range	-25 °C to +70 °C
Storage humidity	Sealed, no limit
Electromagnetic compatibility (immunity/emission)	IEC 60945/EN 60945
Vibration	IEC 60945/EN 60945
Max shock non-operational (10 ms peak)	1000 m/s^2
MTBF (computed)	50000 h
MTBF (service history based))	100000 h

MRU junction box

Type	MRU-E-JB3
Enclosure material	Aluminium
Operating temperature range	-25 °C to +70 °C
Storage temperature	-25 °C to +70 °C
Ingress protection	IP 66

Wind sensor, optional

Type	WindObserver II, part no. M410–51
Enclosure material	Stainless steel
Enclosure protection, mounted upright	IP 66
Operating temperature range, heated version	–55 to +70 °C
Storage temperature range	–55 to +75 °C
Storage humidity	5 % to 100 % RH

Multi-weather sensor, optional

Type	WXT536, part no. M440–58
Enclosure material	Polycarbonate/glass fibre
Operating temperature range	–52 to +60 ºC
Storage temperature range	–60 to +70 ºC
Ingress protection with mounting kit	IP 66

Dual-pressure sensor, optional

Type	PTB330, part no. M440–50
Operating temperature range	–40 to +60 ºC
Storage temperature range	–55 to +80 ºC
Ingress protection	IP 65

Cloud height sensor, optional

Type	CL31, part no. M410–44
Enclosure material	Anodised aluminium
Temperature range	–40 to +60 °C
Ingress protection	IP 65

Visibility sensor, optional

Type	PWD22, part no. M410–46
Operating temperature range	–40 to +60 °C
Ingress protection	IP 66

RangeFinder Motion sensor, optional

Type	SM-140/02, part no. M440–40
Enclosure material	Aluminium/polyethylen
Temperature range	–30 to +50 °C
Ingress protection	IP 67
Humidity	0 to 100 % RH

Repeater light

Type	ORGA L430, part no. M450–60
Enclosure material	TBD
Temperature range	–25 to +55 °C
Ingress protection	IP 66
Humidity	TBD

Repeater light control unit enclosure

Type	ORGA CIP400–H-R00, part no. M450–64
Enclosure material	Steel
Temperature range	–40 to +55 °C
Ingress protection	IP 66
Humidity	TBD

Connection box for meteorology sensors

Type	Hensel RK 0610 T, part no. M410–69
Enclosure material	Polypropylene (PP)
Temperature range	–25 to +40 °C
Relative humidity	50 % at 40 °C and 100 % at 25 °C
Ingress protection	IP 66

External interface specifications

Processing Unit

Serial ports	6 non-dedicated isolated ports, RS-232 or RS-422 [6] Isolated COM1 and COM2, 9-pin DSub, RS-232
Baud rate	Up to 115 200 bytes/sec
LAN	4 Ethernet ports
USB	3 ports, 1 in front and 2 in rear
Analog inputs	Two user configurable channels, 4 to 20 mA

6. Number of serial ports may be expanded by using a serial port extender.

HMI Unit

LAN	5 Ethernet ports in rear
USB	6 ports, 2 in front and 4 in rear

MRU Unit

Serial ports	1 RS-232 and 1 RS-422
Ethernet UDP/IP	10/100 Mbps
Digital output variables	Max. 24, serial or Ethernet
Data output rates	Max. 200 Hz
Timing	< 1 ms

Product safety specifications

Processing Unit

Electrical safety (LVD)[7]	IEC 61010-1/EN 61010-1

Data output specifications

Processing Unit

Message type	NMEA XDR, MWV and MWD

Data input specifications

Processing Unit

Formats:	
External gyro compass	NMEA 0183 HDT and HDG
External wind sensor	NMEA 0183 MWV and MWD
External temperature sensor	NMEA 0183 XDR(,,,C)
External humidity sensor	NMEA 0183 XDR(,,,H)

7. This equipment is intended for professional use only.

External pressure sensor	NMEA 0183 XDR(,,,P)
External position signal	NMEA 0183 GGA, GLL and RMC
External speed signal	NMEA 0183 VTG
Optional speed time and date signal	NMEA 0183 ZDA

Cable specifications

See the various wiring tables in this document for cable specifications.

MRU cable

Type	MRU-E-CS8, Heavy duty screened, 14 x 2 x 0.25 mm^2
Length	3 m
Diameter	13.5 mm
Weight	0.27 kg/m
Flame retardation	IEC 60332–1
Insulation	PP (conductors) and PUR (outer cover)
Screen	Cu-braid
Bend radius	100 mm

Cable from Processing Unit to MRU/MGC junction box

Type	4 x 2 x 0.5 mm^2 individually shield twisted pairs
Maximum length	100 m
Diameter	10 mm
Flame retardation	IEC 332-3/A

Data cable

Specification for cables connected to the communication interface ports.

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

Repeater light cable

Orga Strobeline cable for Orga obstruction light systems.

Standards/certification	Halogen free AWM Style 20233 E63216 I/II A/B 80 °C 300V FT1/FT2
Electrical characteristics	
System voltage	110 - 230 VAC
Impedance fieldbus wires	120 Ω
Physical characteristics	
Colour	Grey/black, Ral 7021 + Orange stripe Ral 2004
Weight	261 g/m
Operating temperature range	-40 °C – 50 °C
Installation temperature range	-10 °C – 70 °C
Power conductor	2 cores + PE; 1.50 mm^2
Fieldbus conductor	0.50 mm^2/; separately shielded
Alarm wires	0.50 mm^2
Cable bending radius	static 7x cable diameter
Outer cable diameter	Ø 12.5 ± 0.5 mm
Outer shield braided.	
Halogen free materials.	

Repeater light control unit cable

Type	CAT 7
Length	100 m max TBD

Interface descriptions

Processing Unit interfaces

The Processing Unit is a platform which is used for many different Kongsberg Maritime products. The interfaces which are applicable to the HMS system, are described here.

Front interfaces Processing Unit

The power switch, LAN 1 and USB 1 are located behind the lid to the left on the front panel. Push lid on left side to open.

Note

The USB port is not compatible with USB 3 devices.

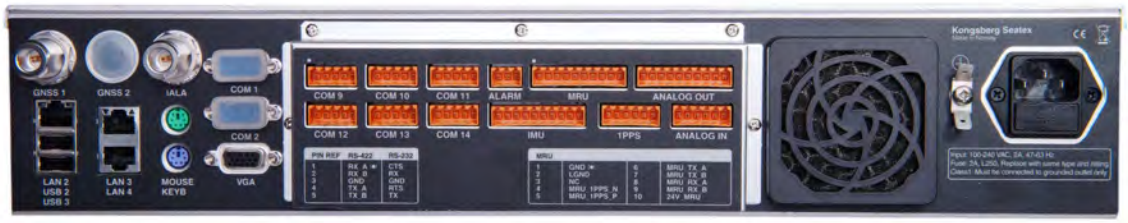
Connector	Type	Connected to
LAN 1	RJ-45 – 10/100 Mbit/s	Reserved for support
USB	USB	For software upgrade and data logging

Rear interfaces Processing Unit

The rear panel of the unit contains communication interface ports for interfacing to external equipment.

Note

The USB ports are not compatible with USB 3 devices.



Connector	Type	Connected to
GNSS 1	N connector 50 Ohm female	Not used in this system
GNSS 2	N connector 50 Ohm female	Not used in this system
IALA	N connector 50 Ohm female	Not used in this system
LAN 2	RJ-45 – 10/100/1000 Mbit/s	HMI Unit
USB 2	USB	User configurable
USB 3	USB	User configurable
LAN 3	RJ-45 – 10/100/1000 Mbit/s	MET-sensor power rail
LAN 4	RJ-45	GSN Router/switch
Mouse	PS/2	Not in use
Keyboard	PS/2	Not in use
COM 1	9–pin DSub male, RS-232	User configurable
COM 2	9–pin DSub male, RS-232	User configurable
VGA[8]	HD15 female	Not in use
COM 9 to COM 14	5–pin terminal, RS-422	User configurable
ALARM	3–pin terminal, relay	External alarm system
MRU/COM 8	10–pin terminal, RS-422	MRU 5+, MRU 5, MRU E, MRU H and MGC R2/R3
IMU	10–pin terminal	Not used in this system
1PPS	6–pin terminal	Not used in this system
ANALOG OUT	10–pin terminal	Not used in this system
ANALOG IN	6–pin terminal	Not used in this system
Power	100 to 240 V AC	Input of 100 to 240 V AC

Note

All terminal pin numbering goes from left (no. 1) to right.

RS-422 A and B signal definition

According to the following standard the signal state definitions are:

8. Note that VGA output connector on Processing Unit provides + 5 V on pin 9 of VGA connector. When KVM switches are used this could cause a problem, if so, use a VGA cable without pin 9 connected.

- IEC 61162-1. 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.

With reference to the table showing the pin layout for the serial ports on the rear panel screw terminals, note that the separate GND (ground) pin for each port is isolated from the chassis and shall act as a common signal intended to be connected between the talker (-TX) and the listener side (RX) of other equipment, for example the corresponding isolated GND (ground) pin or common pin. The purpose of the common signal is to increase the reliability of the hardware transmission. It must not be connected to the chassis or the cable screen. This applies to both sides of a connection. The cable screen shall be connected to the equipment chassis on one side only, preferably talker side, -TX.

COM 1 and COM 2

COM 1 and COM 2 at the rear of the Processing Unit are 9-pin DSub male and have the following pin layout.

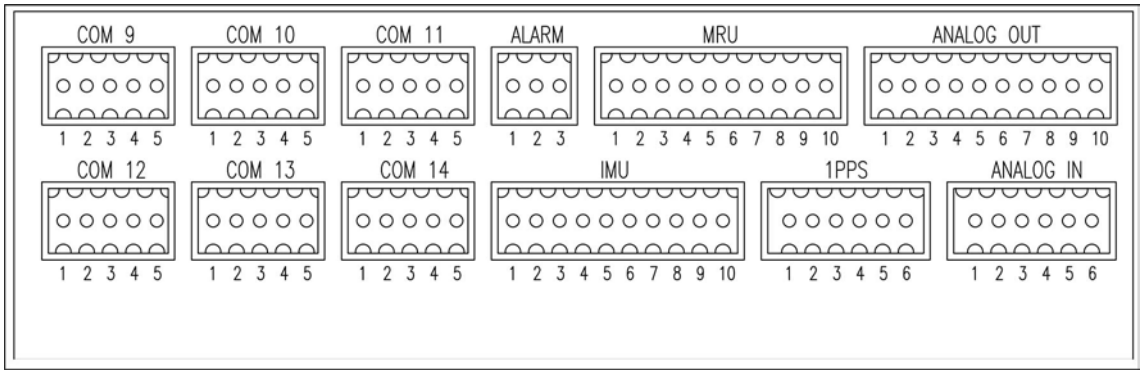
Pin no.	**RS-232**	**Pin no.**	**RS-232**
1	DCD1	6	DSR1
2	RXD1	7	RTS1
3	TXD1	8	CTS1
4	DTR1	9	RI1
5	GND		

Note

COM 1 and 2 are not as accurate with regard to timing as COM 9 to 14 and are not recommended used for timing critical outputs.

Connector board

The illustration shows the screw terminal pin layout on the connector board at the rear of the Processing Unit.



Serial lines

This system communicates with external equipment through the RS-232 or RS-422 configurable serial input and output lines.

Table 3 Pin layout of serial input/output lines

Pin no.	Signal	
	RS-422	**RS-232**
1	RX_A	CTS
2	RX_B	RX
3	GND isolated	GND isolated
4	TX_A	RTS
5	TX_B	TX

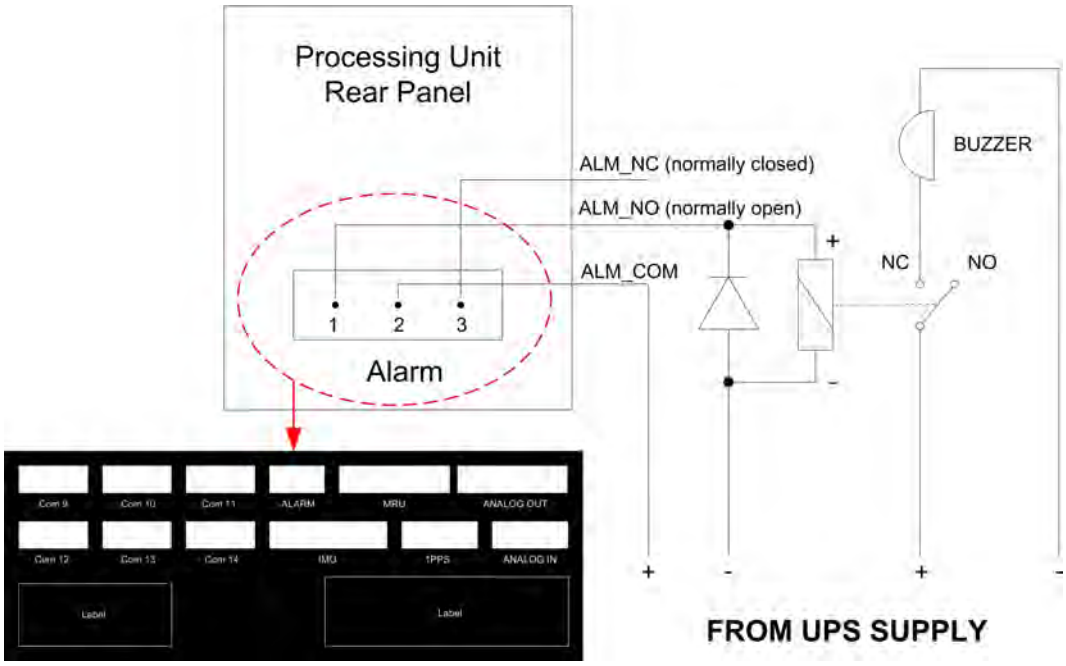
Alarm signal

The Processing Unit has a built-in alarm functionality and can be connected to an external alarm. An alarm will open the alarm relay, which can be used to trigger an external alarm. The external alarm can be connected to the Alarm 3 pin terminal.

Table 4 Pin layout of Alarm port

Pin no.	Signal
1	Alarm_NO
2	Alarm_Com
3	Alarm_NC

The diagram shows how an external alarm can be connected to the Processing Unit ALARM terminal.



MRU

The MRU connector is used for power and interface to an MRU. Usually when an MRU is connected to a Processing Unit, a junction box is used to make the wiring easier.

Table 5 Pin layout of MRU

Pin no.	Signal
1	GND
2	LGND
3	NC
4	MRU_1PPS_N
5	XIN/MRU_1PPS_P
6	TX_A
7	TX_B
8	RX_A
9	RX_B
10	24V_MRU

Analog output

The analog output terminal is not used in this product.

IMU

The IMU terminal is not used in this product.

PPS signal

The PPS terminal is not used in this product.

Analog in

The Analog in terminal is not used in this product.

Ethernet connection

The Processing Unit has the possibility to input and output data on individually configurable network ports. The format and update rate are configured for each port in the **VMS Core Configuration** view.

- **LAN 1 in the front**. This is a service port and has less capacity (10/100 Mbps) than the other LANs. For direct connection to a PC you might need a crossover cable instead of a straight-through cable. The pin wiring for the different cable configurations is according to the table.

Straight-through			Crossover			
Signal	**Pin no.**		**Signal**	**Pin no.**	**Pin no.**	**Signal**
TX+	1		TX+	1	3	RX+
TX-	2		TX-	2	6	RX-
RX+	3		RX+	3	1	TX+
RX-	6		RX-	6	2	TX-

Note

The pins 4, 5, 7 and 8 are not used.

- **LAN 2, 3 and 4 at the rear.** These local area networks (LAN) are of high capacity (10/100/1000 Mbps) and are of type auto crossover and auto-negotiation. Below is the pin wiring for these LANs connected to different network capacities:

10/1000 or 100/1000 Mbps Ethernet				1000/1000 Mbps Ethernet		
Pin no.	**Signal**	**Description**		**Pin no.**	**Signal**	**Description**
1	TX_DA+	Transceive data +		1	BI_DA+	Bi-directional pair +A
2	TX_DA-	Transceive data -		2	BI_DA-	Bi-directional pair -A
3	RX_DB+	Receive data +		3	BI_DB+	Bi-directional pair +B
4				4	BI_DC+	Bi-directional pair +C
5				5	BI_DC-	Bi-directional pair -C
6	RX_DB-	Receive data -		6	BI_DB-	Bi-directional pair -B
7				7	BI_DD+	Bi-directional pair +D
8				8	BI_DD-	Bi-directional pair -D

To connect the unit network, use twisted pair (TP) cable with RJ-45 connectors. To comply with the IEC 60945 standard, shielded (screened) cable has to be used. Recommended cable type is CAT-5e. Category 5e cable is an enhanced version of Category 5 that adheres to more stringent standards. It is capable of transmitting data at speeds of up to 1000 Mbps (1 Gigabit per second). The maximum length of the cable which can be used is 100 metres (328 ft).

HMI Unit interfaces

The HMI Unit is a platform which is used for many different Kongsberg Maritime products. The interfaces which are applicable to the HMS system, are described here.

Front interface HMI Unit

Audio output port together with two USB ports are situated at the front together with the power switch.

Connector	Type	Connected to
Audio	Audio Out	User configurable
USB 1	USB 3.2 Gen. 1 (type-C)	User configurable
USB 2	USB 3.2 Gen. 2 (type-A)	User configurable

Rear interface HMI Unit

The rear panel of the HMI Unit contains communication interface ports for interfacing to the Processing Unit through a network switch.

Connector	Type	Connected to
LAN (marked RED rectangle)	RJ-45	Connected to the Processing Unit through GSN router
USB 3	USB 3.2 Gen. 1 (type-C)	User configurable
USB 4	USB 3.2 Gen. 1 (type-C)	User configurable
USB 5	USB 3.2 Gen. 2 (type-A)	User configurable
USB 6	USB 3.2 Gen. 2(type-A)	User configurable
Display	Displayport	Display
HDMI	HDMI port	HDMI
100 to 240 V AC	Power	Input of 100 to 240 V AC

Ethernet connection

The HMI Unit has one LAN port at the rear. This port is mainly used to connect the HMI Unit to the Processing Unit (normally LAN 2). This LAN has 10/100 Mbps capacity.

To connect this LAN to a network, a straight-through twisted pair (TP) cable with RJ-45 connectors must be used. A straight-through cable is one where the pins of one connector are connected to the same pins of the other connector. The pin wiring for the twisted pair (TP) cable is according to the table.

Straight-through	
Signal	**Pin no.**
TX+	1
TX-	2
RX+	3
RX-	6

Note

The pins 4, 5, 7 and 8 are not used.

To connect the HMI Unit network, use twisted pair (TP) cable with RJ-45 connectors. To comply with the IEC 60945 standard, shielded (screened) cable has to be used. Recommended cable type is CAT-5e. Category 5e cable is an enhanced version of Category 5 that adheres to more stringent standards. It is capable of transmitting data at speeds of up to 1000 Mbps (1 Gigabit per second). The maximum length of the cable that can be used is 100 metres (328 ft).

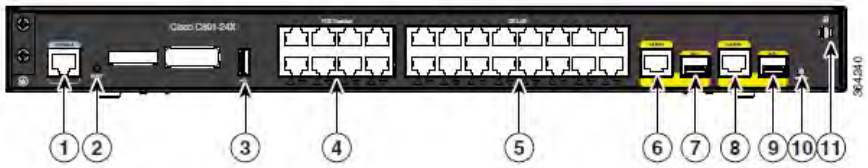
Meteorology sensor interface

This is the use of the different COM ports for the input sensors.

Connector	**Type**	**Connected to**
COM 1	RS-232 and 19200 baud	Cloud height sensor CL31, Ceilometer
COM 2	RS-232 and 9600 baud	Visibility sensor PWD22
COM 9	RS-422, 19200 baud and NMEA XDR and MVW format. On **XDRFilter** select **PRESS**, **TEMP** and **HUM**.	Multi-wether sensor WXT536
COM 10	RS-422, 4800 baud, 1 Hz update rate and NMEA format GGA and VTG	GPS
COM 11	RS-422, 4800 baud, 1 Hz update rate and NMEA HDT format	Gyro compass
COM 12	RS-422, 19200 baud and NMEA XDR. On **XDRFilter** select **PRESS**.	Dual–pressure sensor
COM 13	RS-422, 9600 baud and NMEA MWV with 4 Hz sample rate.	Gill wind sensor WindObserver II
COM 14	5–pin terminal, RS-232, 9600 baud	Not in use
MRU/COM 8	RS-422, 9600 baud and MRU Normal format	MRU 5+, MRU 5, MRU E, MRU H, MGC R2, MGC R3
LAN 2	LAN, NMEA MTW or NMEA XDR format. The XDR format must include TS as transducer ID to be accepted as sea water temperature	Net switch on MET-sensor power rail, sea water temperature from automation system
LAN 3	LAN, repeater lights and Rang Finder wave sensor	Net switch on MET-sensor power rail
LAN 4	LAN, GSN router	GSN router

GSN router interfaces

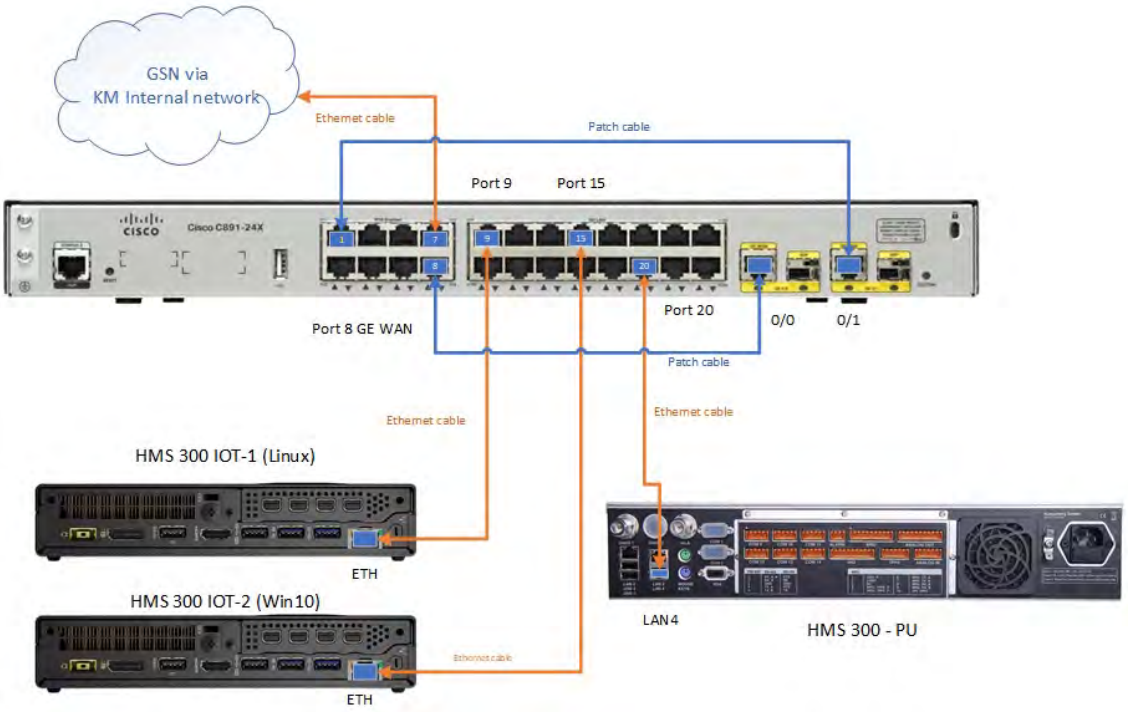
The rear panel of the GSN router C891–24x contains communication ports for interfacing to Processing Unit, HMS Unit (IOT-1), HMS UNIT (IOT-2) and the ship network infrastructure.



1	Console or auxiliary port	7	SFP port
2	Reset Button	8	GE WAN port
3	USB port	9	SFP port
4	PoE enabled GE LAN ports	10	System LED
5	GE LAN ports	11	Kensington security slot
6	GE WAN port		

The C891-24x port mapping for HMS 300 is shown below.

Connector	**Connected to**
Port 1	GE WAN 0/1 patch cable
Port 7	GSN network via internet (ShipsNet)
Port 8	GE WAN 0/0 patch cable
Port 9	HMS EDGE Unit IOT-1
Port 15	HMS EDGE Unit IOT-2
Port 20	HMS 300 PU


GSN via
KM Internal network
Ethernet cable
Patch cable
Port 9
Port 15
Cisco C891-24X
Port 8 GE WAN
Port 20
0/0
0/1
Patch cable
Ethernet cable
Ethernet cable
HMS 300 IOT-1 (Linux)
ETH
HMS 300 IOT-2 (Win10)
ETH
LAN4
HMS 300 - PU

Equipment handling

Taking delivery

When the equipment arrives at its destination:

- Perform an inspection immediately to register any damage which 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 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

All the delivered system components must be stored within their original packing until they have been installed. See the environment specifications for the storage conditions.

If the system components have been installed but are not powered, the temperature at the installation location has to be within the specified operation temperature range and humidity for each component. See the environment specifications for operation conditions.

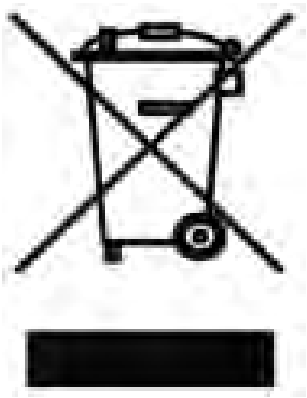
Related topics

- *Environmental specifications* on page 137

Health and safety

Operation or troubleshooting of this equipment will not imply any risk for high voltages, explosions or exposure to gas. The equipment complies with IEC 61010-1/EN 61010-1 standards regarding product safety and IEC 60945/EN 60945 standards on electromagnetic compatibility (immunity/radiation) and vibration.

Disposal



All electrical and electronic components have to 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. It 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.

The equipment may be returned to Kongsberg Maritime AS if there is no local WEEE (Waste Electrical and Electronic Equipment) collection. The equipment is marked with this pictogram.

Virus protection

The system is delivered from Kongsberg Maritime AS without any virus protection software installed. If the system is connected to the network on board the vessel, the network administration on board has to ensure that the HMS system is protected against viruses.

References

Reference documents

1 *HMS 300 Operator manual*, Kongsberg Maritime AS

2 *MGC COMPASS R-series Installation Manual*, Kongsberg Maritime AS

3 HMS Repeater Lights System, Installation, operation and maintenance manual, Orga BV

4 WindObserver II Ultrasonic Anemometer, User Manual

5 Vaisala Weather Transmitter WXT530, User's Guide

6 Vaisala BAROCAP Digital Barometer PTB330, User's Guide

7 Vaisala Ceilometer CL31, User's Guide

8 Present Weather Detector PWD22, User's Guide

9 SM-140 Range Finder, User Manual

10 General Conditions for the Supply of Products, Orgalime S 2000 with one exception sheet

11 Standard Measuring Equipment for Helideck Monitoring System (HMS) and Weather Data

12 CAP 437, Offshore Helicopter Landing Area - Guidance on Standards, CAA, London

13 Check and verification procedure, HMS 300 installations in UK, Norwegian and Brazilian waters

14 WMO-No.306, Manual on codes, Volume I.1, Part A – Alphanumeric codes, Section A – Code Forms. FM 15–XIV METAR Aerodrome routine meteorological report (with or without trend forecast)

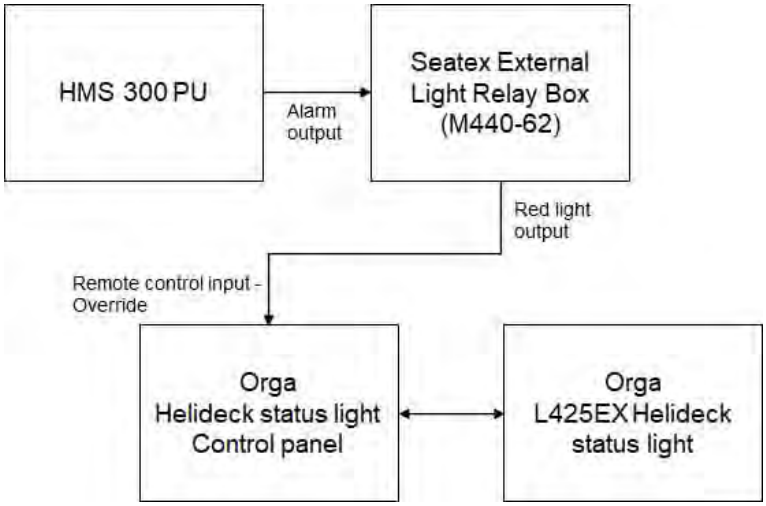
Appendix A Check list

This check list is used to ensure that every item during an installation of a HMS system is completed before leaving the vessel.

Item no	Description	Done
1)	A dimension survey report is completed	□
2)	The Function Test Form from SAT is completed	□
3)	Drawings and cable list updated	□
4)	HMS system software upgraded to latest version	□
5)	Correct operation limits (vessel category) selected	□

Appendix B Status light

The HMS 300 can be connected to the Orga status light and the light controlled through the alarm connector on the rear of the Processing Unit. The figure below shows an overview of the connections and the parts required.



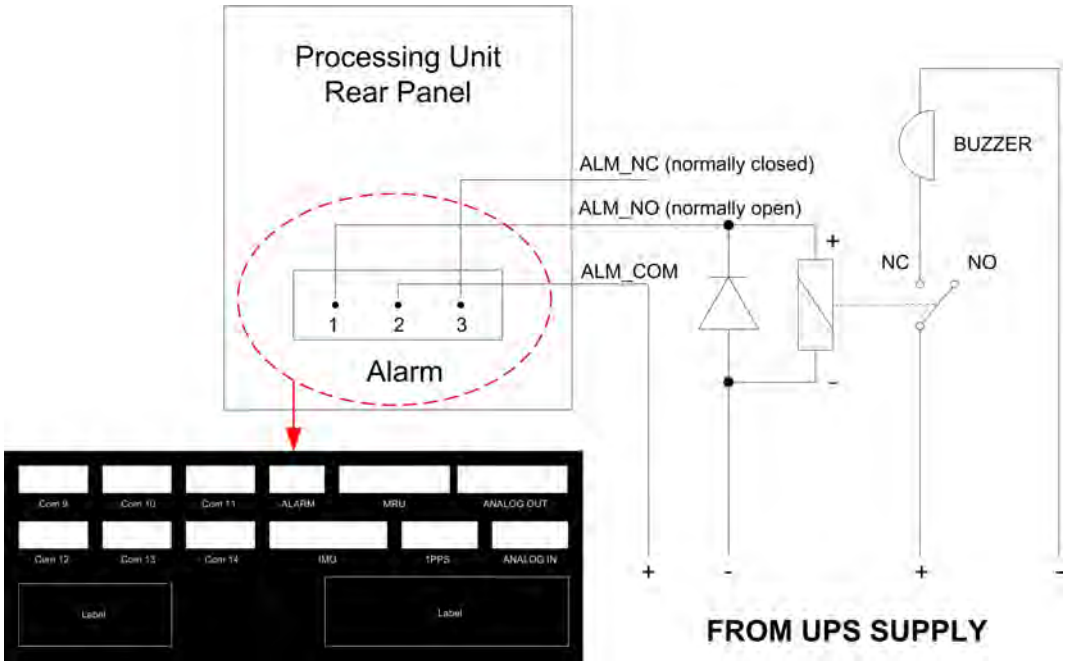
Alarm signal

The Processing Unit has a built-in alarm functionality and can be connected to an external alarm. An alarm will open the alarm relay, which can be used to trigger an external alarm. The external alarm can be connected to the Alarm 3 pin terminal on the rear of the Processing Unit.

Table 6 Pin layout of Alarm port

Pin no.	Signal
1	Alarm_NO
2	Alarm_Com
3	Alarm_NC

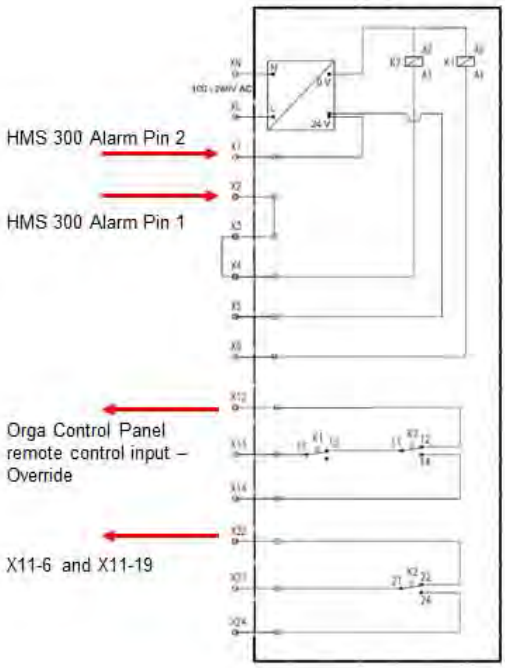
The diagram shows how an external alarm can be connected to the Processing Unit ALARM terminal.

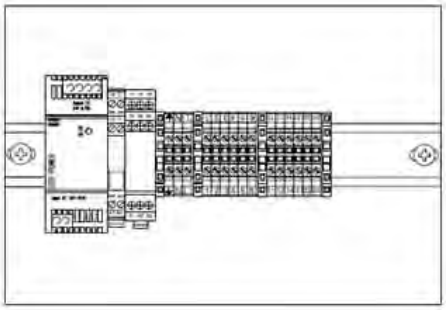


The alarm output signal on pin 1 and 2 are used to control the status light.

External light relay box

The external light relay box with part no. M440–62 is used to connect the HMS 300 alarm signal to the status light control panel. The connections in the external light relay box is shown in the below figure.

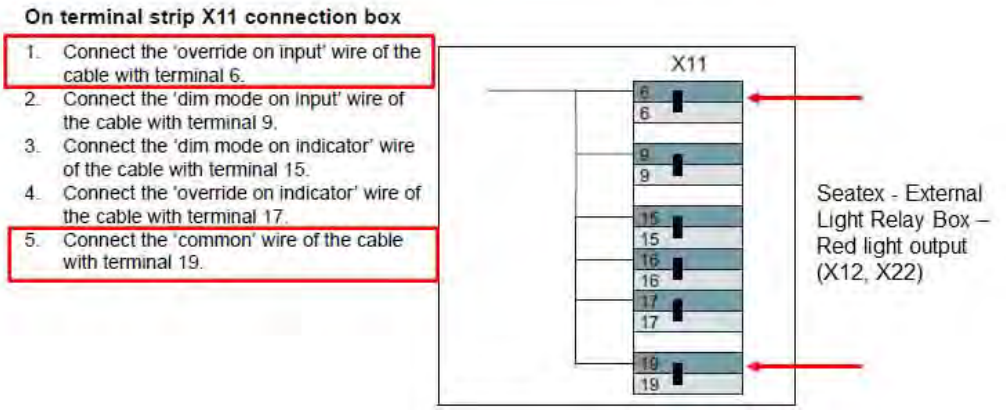




Connections	
N	Ships power
L	Ships power
1	HMS 100/200 Alarm 2 (HWP2000 AUX 4)
2	HMS 100/200 Alarm 1 or 3 (HWP2000 AUX 7)
3	Wave off switch
4	Wave off switch
5	Connet 5 and 6 to turn off signal on 12 and 14.
6	Connet 5 and 6 to turn off signal on 12 and 14.
11	
12	Connection to 11 on Red light
14	Connection to 11 on Green light.
21	
22	Connection to 21 on Red light
24	Connection to 21 on Green light.

Status light control panel

The output from the external light relay box is connected to the Orga Helideck Status Light Control Panel as shown in the figure below.



Installation

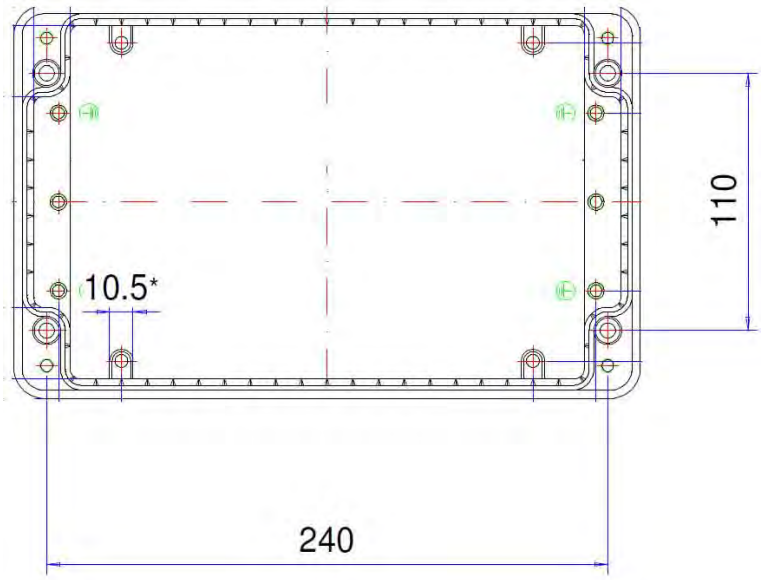
Prerequisites

- The status light is mounted on the helideck. See the *L425EX Helideck status light, Installation and maintenance manual* from Orga for how this is done.
- The status light control panel is mounted and connected to the status light. See the *Helideck status light Control panel, Installation and maintenance manual* from Orga for how this done.
- The HMS 300 system is installed and in operation.

Procedure

1 Identify the best mounting location for the external light relay box (M440–62).

2 Mark and drill four M6 holes in the foundation according to the bolt pattern shown in the figure below.



3 Supply the external light relay box with 100 to 240 V AC power on connector N and L.

4 Connect a cable between the ALARM terminal on the Processing Unit to the external light relay box. Connect one of the wires between pin 1 on the ALARM terminal to connector 2 on the external light relay box and a wire between pin 2 on the ALARM terminal to connector 1 on the external light relay box.

5 Connect a cable between the external light relay box and the status light control paanel. Connect one of the wires between pin 12 on the external light relay box to terminal X11–6 on the control panel and a wire between pin 22 on the external light relay box to terminal X11–19 on the control panel.

6 Connect a cabel from the status light control panel to the status light. See the *L425EX Helideck status light, Installation and maintenance manual* from Orga for how this done.

Appendix C
NMEA protocols

The interfacing protocol NMEA 0183 which is used is defined in *References* on page 157. The system accepts these NMEA protocols for input and output of data.

Wind speed and direction data

MWD message

The MWD message contains the direction which the wind blows across the earth's surface, with respect to north, and the speed of the wind.

Format

```
$--MWD,x.x,T,x.x,M,x.x,N,x.x,M*hh<CR><LF>
```

Format description

1 **x.x,T** = Wind direction, 0 to 359 degreest True

2 **x.x,M** = Wind direction, 0 to 359 degrees Magnetic

3 **x.x,N** = Wind speed, knots

4 **x.x,M** = Wind speed, metres/second

MWV message

The MWV message contains the transferring wind speed and true or relataive wind direction.

For further details, refer to the NMEA standard.

Format

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

Format description

1 **x.x** = Wind angle, 0 to 350 degrees

2 **a** = Reference: R = relaitve, T = Theoretical

3 **x.x** = Wind speed

4 **a** = Wind speed units, K/M/N/S

5 **A** = Status: A = Data valid, V = Data invalid.

Pressure, temperature and humidity data

XDR message

The XDR message contains the transducer measurements for pressure, temperature and humidity. This message can also be used for sea water temperature.

For further details, refer to the NMEA standard.

Format

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

Format description

1 **a** = Transducer type: P = pressure, C = temperature, H = humidity

2 **x.x** = Measurement data

3 **a** = Units of measure

4 **c-c** = Transducer ID

This system supports transmission of up to four measurements in each XDR message. All sensor types can occur anywhere in the message, like: .

```
$..XDR,<type>,<data>,<unit>,<ident>,<type>,...<ident>*<chk>
```

The following adjustments to the XDR message is implemented:

- In the example below the check sum is omitted. The check sum is checked if it is included in the message.
- The Talker (WI in the example) can include any character.
- There are no limitations in the number of decimals for a value.
- The unit field has to be included for the pressure measurement. This field is also checked for the other sensor types, if it is included.
- The transducer ID field is used to identify whether the information is air or sea water temperature. If the ID is TA then its identified as air temperature, if ID is TS its identified as sea water temperature and if the ID is omitted then its identified as air temperature.
- Both type and the unit field is case sensitive.

Example 1 Omission of checksum in XDR message

- Transmission of a pressure value: 954.2 hPa = 0.954 Bar

```
$WIXDR,P,0.954392,B,
```

- Transmission of a humidity value: 90.5 %

Example 1 Omission of checksum in XDR message (cont'd.)

```
$WIXDR,H,90.5,,
```

- Transmission of a temperature value: 6.6 deg C

```
$WIXDR,C,6.6,,
```

Sea water temperature

The MTW message contains the water temperature in degrees C.

Format

```
$--MTW,x.x,C*hh<CR><LF>
```

Format description

1 **x.x** = Temperature,

2 **C** = Degrees C

Heading data

HDT message

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

Format

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

Format description

1 **x.x** = Heading.

2 **T** = Degrees True.

HDG message

The HDG message contains heading (magnetic sensor reading), which if corrected for deviation, will produce Magnetic heading, which if offset by variation, will provide True heading.

For further details, refer to the NMEA standard.

Format

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

Format description

1 **x.x** = Magnetic sensor heading, degrees

2 **x.x,a** = Magnetic deviation, degrees E/W

3 **x.x,a** = Magnetic variation, degrees E/W

Position and speed data

GGA messages

The GGA message contains time, position and GPS/GLONASS data. The message is as specified in NMEA 0183 version 3.0. The message structure is as follows:

Format

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

Format description

1 **hhmmss.ss** = UTC of position (hours, minutes, seconds)

2 **llll.ll** = Latitude (degrees, minutes and fractions of minutes)

3 **a** = Latitude sector, N - North or S - South

4 **yyyyy.yy** = Longitude (degrees, minutes and fractions of minutes)

5 **a** = Longitude sector, E - East or W - West

6 **x** = GPS Quality indicator: 0 = Fix not valid, 1 = GPS/GLONASS fix, 2 = DGPS/DGLONASS fix, 5 = Float RTK fix (XP/G2 corrections used), 6 = Estimated (dead reckoning). This field shall not be a null field.

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

8 **x.x** = HDOP - horizontal dilution of precision 00.0 to 99.9

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

10 **M** = Altitude unit, M = metres.

11 **x.x** = Geoidal separation: the difference between the WGS-84 ellipsoid and mean-sea-level (geoid)

12 **M** = Geoidal separation unit, M = metres

13 **x.x** = Age of differential corrections, in seconds. 0 when DGPS not used

14 **xxxx** = Differential reference station ID, 0000-1023

15 ***hh** = Checksum.

GLL messages

The GLL message presents latitude and longitude of vessel position, time at position fix and status. The message is as specified in NMEA 0183 version 3.0. The message structure is as follows:

Format

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

Format description

1 **llll.ll** = Latitude component of position, in degrees, minutes and fraction of minutes

2 **a** = Latitude sector, N - North or S - South

3 **yyyyy.yy** = Longitude component of position, in degrees, minutes and fraction of minutes

4 **a** = Longitude sector, E - East or W - West

5 **hhmmss.ss** = UTC of position (hours, minutes, seconds)

6 **A** = Status, A = valid, V = invalid

7 **a** = Mode indicator, A = autonomous mode, D = differential mode, N = data not valid

8 ***hh** = Checksum.

VTG messages

The VTG message contains actual course and speed relative to the ground. The message is as specified in NMEA 0183 version 3.0. The message structure is as follows:

Format

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

Format description

1 **x.x** = True course over ground in degrees

2 **T** = True course over ground marker

3 **x.x** = Magnetic course over ground in degrees

4 **M** = Magnetic course over ground marker

5 **x.x** = Speed over ground in knots

6 **N** = "N" shows that speed over ground is in knots

7 **x.x** = Speed over ground in kilometres/hour

8 **K** = "K" shows that speed over ground is in kilometres/hour

9 **a** = Mode indicator. A=automatic mode, D=differential mode, N=data not valid. Shall not be a null field

10 ***hh** = Checksum

RMC messages

The RMC message contains time, date, position, course and speed data. The message is as specified in NMEA 0183 version 3.0. The message structure is as follows:

Format

```
$--RMC,
hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,xxxxxx,x.x,a,a*hh
```

Format description

1 **hhmmss.ss** = UTC of position fix

2 **A** = Status: A = Data valid, V = Navigation receiver warning

3 **llll.ll** = Latitude

4 **a** = Latitude sector, N = North, S = South

5 **yyyyy.yy** = Longitude

6 **A** = Longitude sector, E = East, W = West

7 **x.x** = Speed over ground, knots

8 **x.x** = Course over ground, degrees True

9 **xxxxxx** = Date: day, month, year.

10 **x.x** = Magnetic variation in degrees

11 **a** = Magnetic variation direction, E = Easterly variation, subtracts from True course, W = Westerly variation, adds to True course

12 **a** = Mode indicator, A = Autonomous mode, D = differential mode, E = Estimated (dead reckoning) mode, N = Data not valid

13 ***hh** = Checksum.

Time sync data

ZDA message

The ZDA message contains UTC time, day, month, year and local time. The message is as specified in NMEA 0183 version 3.0. The message structure is as follows:

For further details, refer to the NMEA standard.

Format

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

Format description

1 **hhmmss.sss** = UTC time, hours, minutes and seconds

2 **xx** = Current day in UTC, day 01 - 31

3 **xx** = Current month in UTC, month 01 - 12

4 **xxxx** = Current year in UTC

5 **xx** = Local zone-hours offset from UTC, 00 to ±13 hrs

6 **xx** = Local zone minutes offset from UTC, 00 to ±59

7 ***hh** = Checksum

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Attn.: Customer support

Pirsenteret

N-7462 Trondheim

Norway

E-mail km.support.seatex@kongsberg.com

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