Saab TransponderTech

R6 SUPREME System
Class A AIS

OPERATION & INSTALLATION MANUAL

SAAB TECHNOLOGIES SAAB

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ii Disclaimer

While reasonable care has been exercised in the preparation of this manual, Saab AB (publ) TransponderTech shall incur no liability whatsoever based on the contents or lack of contents in the manual.

iii Firmware

This manual reflects the capabilities of the R6 SUPREME System with R6 Transponder FW 1.1.0 and R6 CDU (Control & Display Unit) with Firmware version 1.1.0.

System has the ability to be firmware updated after delivery. Therefor the product label can specify a firmware different from the actual firmware in the product. Current firmware versions in the system can always be verified in the F/W info view as described in Section 7.3.

iv Manual Part Number and Revision

Part number 7000 121-304, revision B1.

v Disposal Instructions

Broken or unwanted electrical or electronic equipment parts shall be classified and handled as ‘Electronic Waste’. Improper disposal may be harmful to the environment and human health. Please refer to your local waste authority for information on return and collection systems in your area.

vi Contact Information

For installation, service, ordering info and technical support please contact your local Saab TransponderTech representative. A list with dealers, OEM partners and service stations can be found at our website, listed under the corresponding product page.

www.saab.com/maritime

For the latest manual, firmware and certificates please visit:
https://www.saab.com/transpondertechsupport

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF PICTURES

TABLE OF TABELS

1 SAFETY INSTRUCTIONS

1.1 General

Saab AB (publ), TransponderTech assumes no liability for customer not complying with requirements in this section or warnings and cautions elsewhere in this document.

This safety instruction section refers to all components of the R6 SUPREME System, referred to as “equipment” in this section.

1.2 Installation and Service

Only qualified technicians shall do installation and servicing of equipment. Electrical fuses must be replaced with correct types.

To prevent electrical chock hazard and damage to the equipment, the equipment shall be connected to electrical ground. A power supply corresponding to the voltage rating of the equipment shall be used. Failure to comply with this requirement may damage the equipment.

To ensure proper functioning of the equipment, only signal cables and antennas specified in this document may be used. Failure to comply with this requirement may cause unexpected behavior of the equipment.

The equipment may not in any way be modified; doing so may cause fire, shock hazard or serious injury.

1.3 AIS Operational safety considerations

AIS Systems are very powerful tools, assisting safe navigation, which many vessels are equipped with. AIS enables vessel identification and positioning, enhancing navigational safety.

However, it is important to know that:

- Smaller vessels are more likely to not be equipped with AIS at all.
- There are different classes of AIS equipment. Some non-SOLAS vessels may carry Class B AIS equipment with 30s or more between position reports.
- AIS information is only as good as the input it gets. Should any input to the AIS malfunction and provide incorrect data (such as Heading, ROT, COG, SOG, Position), this data may still be reported to nearby vessels. The mariner should therefore be aware that received AIS data could be incorrect.
- Each Voyage requires updating of Voyage related AIS settings

Considering this, it is important to use multiple sources of information for decision-making.

To ensure proper operation of the AIS system, make sure to view the “Alert List” for any irregularities in system operation and verify any voyage settings are correct.

Further, in many cases there is a carriage requirement that a Class A - AIS system must be installed and fully operating on the vessel. Some administrations may allow the AIS to be switched off when continual operation of AIS compromise the safety or security of the vessel or where a security incident is imminent. Turning off the AIS will result in a “Non-Functioning Time Log” entry.

1.4 Compass Safe Distances

Measured distances according to ISO25862:2019, IEC 60945:2008

Equipment	R6 SUPREME Transponder	R6 CDU
Safe Distance to		
Standard-Magnetic-Compass	0,35 m	0,65 m
Steering-Magnetic-Compass	0,30 m	0,40 m
Reduced Safe Distance to		
Standard-Magnetic-Compass	0,30 m	0,40 m
Steering-Magnetic-Compass	0,30 m	0,30 m

Table 1-1 – Compass safe distances

2 THE AUTOMATIC IDENTIFICATION SYSTEM

The Automatic Identification System (AIS) is a safety information system that was proposed as a worldwide standard in 1997 and adopted by IMO in 1998. The AIS system is standardized by ITU, IEC, IALA and IMO and is subject to approval by a certification body. The first type approved AIS transponder in the world was Saab TransponderTech's R3 Class A Transponder in 2002.

AIS allows transceivers to automatically share static and dynamic data such as ship name, call sign, dimensions, position and sensor information on two dedicated data links in the upper marine VHF band. There are a number of different AIS devices that can send and receive information on the AIS data link:

- **Class A Transponder –** This type of transponder is used on open sea waters and is mandatory for ships of 300 gross tonnage or more on international voyages, all cargo ships of 500 gross tonnage or more and on passenger ships.
- **Class B Transponder –** Used on smaller vessels and pleasure crafts. It transmits with a lower power than the Class A transponder and has lower priority on the data link. Two sub categories exist: Class B CS with 2W output and 30s report interval, and Class B SO with 5W output and up to 5s report interval.
- **Base Station –** Fixed shore station that is typically connected to an AIS network to collect information from all vessels at a certain port or shore line, and may also transmit information such as text messages, weather data and virtual ATON markers.
- **Repeater Stations –** Used to extend coverage range by repeating incoming messages. Can also be implemented as a function in an AIS Base station or an AtoN station.
- **SAR (Search and Rescue) Transponder –** Used on airplanes and helicopters in search and rescue missions.
- **AtoN (Aids to Navigation) –** A transceiver that is fitted on buoys and lighthouses in order to send information about their positions.
- **MAtoN (Mobile Aids to Navigation) –** A non-fixed or un-moored AtoN; but does not include a fixed or moored buoy that is adrift from station, temporary or otherwise
- **Inland AIS –** A European standardized extension to Class A systems for use on inland water ways. An inland transponder has additional messages to communicate with bridges, ports and locks and can also send some additional information that are useful on water ways such as blue sign indication, specific hazardous cargo etc.
- **Locating Devices –** Emergency and distress location transmitters e.g. AIS-SART, EPIRB-AIS and MOB-AIS.

3 SYSTEM OVERVIEW

3.1 Product Description

The basic R6 SUPREME System consists of two central parts

- The R6 SUPREME Transponder
- The R6 CDU (Control and Display Unit)

The R6 SUPREME Transponder is a system that consists of a VHF Data transceiver, a 48 channel GNSS receiver, and a controlling unit. In Class A - AIS operation, the system enables at least two AIS receiver processes and one DSC receiver process. The transmitter alternates its AIS transmissions between the two AIS channels. The controlling unit creates and schedules data packets (containing dynamic, static and voyage related data) for transmission based on the IMO performance standard for AIS, and manages any data processing necessary.

The R6 SUPREME system shall be connected to the ship's sensors as required by the installation guidelines published by IALA and IMO. The R6 SUPREME can interface external navigation and presentation systems that support required sentences using IEC 61162-1/2, as well as IEC 61162-450 interfaces. Refer to Section 11 for more information. The R6 SUPREME is prepared for connection to Long Range systems like Inmarsat C.

To facilitate connection to serial devices, as well as provide power fuses, installation of the R6 Junction Box is recommended.

The R6 CDU is a graphical display with touch and keypad input, type tested to meet AIS MKD (Minimum Keyboard and Display) requirements, and is used to control and monitor the AIS system. The colour LCD together with the touch interface provides a graphical user-friendly interface to the system. The rubber keypads may be used for many basic operations instead of the capacitive touch interface, in cases such as under rough sea or with gloved hands. With the R6 CDU it is possible to plot the location of other ships, aids to navigation and search and rescue vessels. The R6 CDU can also be used to send and receive messages, perform configuration as well as supervise the R6 SUPREME transponder status. The front of the R6 CDU is designed to allow for a water proof panel mount installation, and the rear of the CDU has an SD card slot for service and Firmware updates.

4 INSTALLATION

4.1 Equipment part numbers

The R6 SUPREME System typically consists of the R6 SUPREME transponder, the R6 CDU and a number of optional accessories. The most common parts and accessories are listed below. Delivery note.

NOTE: This is not a list of supplied parts, as contents may vary for each order depending on user needs.

Name	**Part number**
R6 SUPREME Transponder	7000 121-500
R6 Junction box	7000 122-100
R6 CDU	7000 123-500
Power Cable	7000 121-134 alt 7000 118-077
Signal Cable DSUB-DSUB 26p 2m	7000 118-286
Signal Cable DSUB-DSUB 9p 2m	7000 123-126
R6 Supreme Document Set *Including:* *AIS Installation Short Instruction* *AIS Operator Short Instruction* *Module B Certificate and DoC* *R6 Supreme Document CD*	7000 121-310
Ethernet Cable 5m	7000 000-525
Pilot Plug Port with Cable 5m	7000-123-128
GNSS antenna options	
MA-700	7000 000-485
AT575-68	7000 000-135
Combined VHF/GPS Antenna	7000 000-435
GNSS01	7000 000-797
MGA3	7000 000-554
GNSS Antenna mast/rail mount 1" x 14	7000 000-574
VHF Antenna mast/rail mount G1"-11	7000 000-681
AIS Alarm Relay Unit incl. socket	7000 100-132
VHF Antenna BA1012 with mount	7000 000-077
R6 CDU Gimbal Mount kit	7000 123-140

R6 CDU Flush Mount kit	7000 123-142
R6 CDU Frame Mount kit	7000 123-119

Table 4-1 – R6 SUPREME and accessories

4.2 Equipment Installation Environment

The table below lists the IEC 60945 equipment classification for the system.

Name	**Part number**	**IEC 60945 installation category**
R6 SUPREME Transponder	7000 121-500	Protected
R6 CDU	7000 123-500	Protected*
R6 Junction box	7000 122-100	Protected
MA-700	7000 000-485	Exposed
AT575-68	7000 000-135	Exposed
Combined VHF/GPS Antenna	7000 000-435	Exposed
GNSS01	7000 000-797	Exposed
MGA3	7000 000-554	Exposed

Table 4-2 - IEC 60945 equipment classification

**An R6 CDU installed in a water sealed flush mount configuration in a panel will be water proof from the front side. However proper ingress protection to the rear of the R6 CDU inside the panel is needed, as the rear does not have the same water protection level.*

4.3 Installation Cables

The following cables are needed to install the R6 SUPREME System with the R6 Junction Box.

Signal Cable DSUB-DSUB 26p 2m

Marking:	7000 118-286
Type:	Shielded Twisted Pair x 0.33 mm^2
Length:	2 m
Connector:	2 x 26-pole H.D.D-SUB (female to male)
Flame retardant:	IEC60332-1, LSZH
Interconnection:	Straight connection on all pins.

Signal Cable DSUB-DSUB 9p 2m

Marking:	7000 123-126
Type:	Shielded Twisted Pair x 0.25 mm^2
Length:	2 m
Connector:	2 x 9-pole DSUB (female to male)
Flame retardant:	IEC60332-1, LSZH
Interconnection:	Straight connection on all pins.

Power Cable

Marking: 7000 118-077 / 7000 123-130

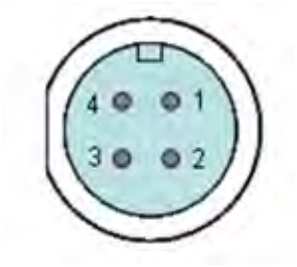
Type: Unshielded 4 wire cable x 1.3 mm2 / Unshielded 2 wire cable x 1.3 mm2

Length: 2 m

Diameter: 6 mm

Connector: ConXall Mini-Con-X 6382-4SG-311 (female)

Interconnection specification:



Function	Pin	Cable Colour	Included in 7000 123-130
12 / 24 VDC	1	Red	X
0 VDC	2	Black	X
NC	3	Brown	-
NC	4	Orange	-

Table 4-3 – Interconnector pins

VHF Antenna Cable

Type and length: See section 4.9.2 VHF Cabling

Connector: BNC (Male)

GPS Antenna Cable

Type and Length: See section 4.10.2 GNSS Cabling

Connector: TNC (Male)

Ethernet Cable 5m

Type: Cat-6, LSZH, IEC 60332-1

Length: 5 m

Connector: RJ-45

Part number: 7000 000-525

4.3.1 Minimum cable bending radius

When installing the cables the recommended minimum bending radiuses are as follows:

Signal and power cables: 10 times cable diameter

Coaxial cables: 5 times cable diameter

4.4 System interconnection overview

4.4.1 Basic system setup

There are numerous ways to install the system using the redundant network interfaces of the R6 SUPREME and R6 CDU. Below is a simple system setup without interface to external networks. External sensors and systems shall in this case be connected to the R6 Junction box serial interfaces. For alternate system setups, please see Section 15 “System Setups”

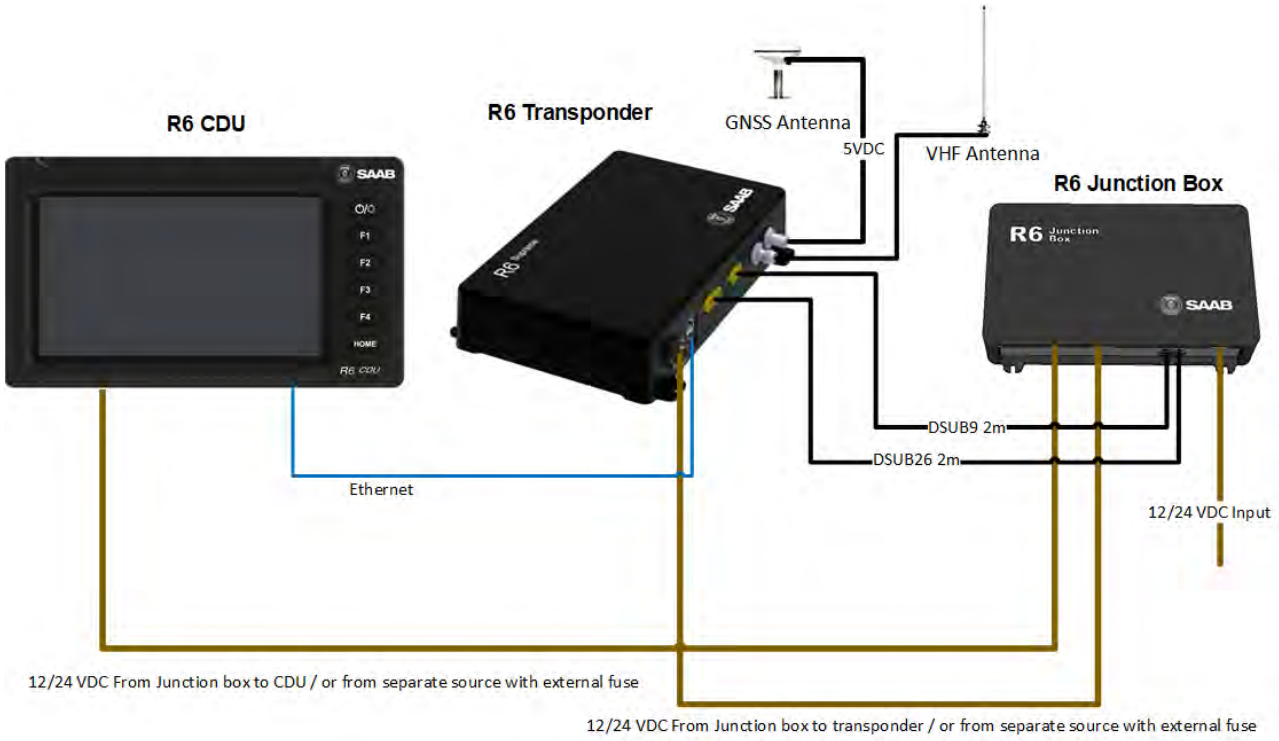


Figure 4-1 – System overview

	R6 Supreme Transponder 7000 121-500	R6 Junction box 7000 122-100

R6 Junction box **7000 122-100**	Signal cable DSUB-DSUB 26p 2m 7000 118-286 Signal Cable DSUB-DSUB 9p 2m 7000 123-126 Power Cable 7000 118-077 alt 7000 123-130	-
R6 CDU **7000 123-500**	Ethernet Cable 5m 7000 000-525	Power Cable 7000 118-077 alt 7000 123-130

Table 4-4 – System interconnect

4.5 Installation Procedure

The installation of Class A - AIS equipment shall be done in line with IMO SN/Circ.227 - GUIDELINES FOR THE INSTALLATION OF A SHIPBORNE AUTOMATIC IDENTIFICATION SYSTEM (AIS)

Further, when installing the R6 SUPREME System it is recommended to follow the steps described in this installation manual. Details of the installation procedure can be found in the coming sections of the manual.

Recommended installation steps:

1. Mount the R6 CDU at conning station
2. Mount the R6 SUPREME transponder
3. If required, mount the R6 Junction box
    - Connect the R6 SUPREME transponder signal cables to R6 Junction box
    - Connect all external systems and sensors to the R6 AIS Junction Box
4. Install the VHF and GNSS antennas and connect cables to the R6 Transponder
5. Connect the R6 SUPREME transponder and R6 CDU Ethernet ports, direct connection or to common IEC 61162-450 network(s)
6. Connect the R6 SUPREME/R6 CDU power cables to R6 Junction box or external power sources with separate fuses
7. Power up the units
8. Run CDU Setup Wizard to set CDU and transponder network settings
9. Configure the rest of the system
10. Perform system functional checks

4.6 Installing the R6 CDU

4.6.1 CDU Location

The R6 CDU should be mounted close to the position from which the ship is normally operated, preferably on the bridge console close to the conning position.

When mounting the R6 CDU, please consider the following:

- The temperature and humidity should be moderate and stable, operating temperature: -15ºC to +55ºC.
- Select a location away from excessive heat sources
- Avoid areas where there is a high flow of humid salt air
- Avoid places with high levels of vibrations and shocks
- Avoid mounting the R6 CDU in direct sunlight. Prolonged exposure to direct sunlight may have adverse effects to the system.
- Ensure that there is enough airflow to avoid high ambient temperatures
- The units can affect magnetic compasses.
    - The minimum compass safe distance from the R6 CDU is 0.65 meters to a standard magnetic compass and 0.40 meters to a steering magnetic compass.

4.6.2 R6 CDU Mounting Options

The R6 CDU can be mounted in three different ways.

- Panel mount – Using the R6 CDU Flush Mount Kit (7000 123-142)
- Gimbal mount – Using the R6 CDU Gimbal Mount Kit(7000 123-140)
- Frame mount – Using the R6 CDU Mounting Frame(7000 123-119)

4.6.2.1 CDU Gimbal Mount

The gimbal mount allows for a quick installation, and is suitable for panel as well as ceiling mounting. It will give the benefit of a tilt-able display for optimal viewing angle.

The gimbal mount is fastened with four screws in the mounting surface. The CDU is attached to the gimbal mount with two wing knobs.

Make sure any connected cables that could transport water are installed in a way that will allow for drip off before reaching the R6 CDU. The connectors are not water protected and shall not be the lowest point for external cables if there is a risk of water transport along the cable.

The CDU Gimbal mount is offered as an accessory to the R6 CDU, and may be optional in some sale packages.

4.6.2.2 Panel Mount

Panel mounting will reduce bridge clutter and reduce the space needed for installation. A cut-out fitting the CDU profile must be made. See Section 17.4 CDU Cut-out Measurements for Panel Mount for dimensions.

Panel mounting with proper sealing between the R6 CDU and the panel, will enable a splash proof installation of the R6 CDU. Note, only the front of the R6 CDU is protected from water

ingress, water leakage to the rear of the R6 CDU may result in water ingress through the external interfaces.

The CDU is fastened in place using the bracket and the threaded bar included in the flush mount kit 7000 123-142.

Figure 4-2 – R6 CDU Flush Mount Kit.

4.6.2.3 Frame Mount (Future Update)

This kit will be available later.

4.7 Installing the R6 SUPREME Transponder

4.7.1 Transponder Location

When mounting the R6 SUPREME Transponder, please consider the following:

- Mount the unit on a wall or on top of a bench
- The temperature and humidity should be moderate and stable, operating temperature: -15ºC to +55ºC.
- Select a location away from excessive heat sources
- Avoid areas where there is a high flow of humid salt air
- Avoid places with high levels of vibrations and shocks
- Ensure that there is enough airflow to avoid high ambient temperatures
- Ensure that the cables can be connected without violating their minimum bending radius
- The unit can affect magnetic compasses. The minimum compass safe distance is 0.35 meters to a standard magnetic compass and 0.30 meters to a steering magnetic compass
- Install the R6 SUPREME transponder as close as possible to the transponder's VHF/GNSS antennas to minimise cable loss

4.7.2 R6 SUPREME Transponder Mounting

The Transponder unit is secured in place using the screw holes in the four feet in the bottom corners. When wall mounting, ensure the interface ports are facing downwards, to prevent intrusion of water that may come from connected cables.

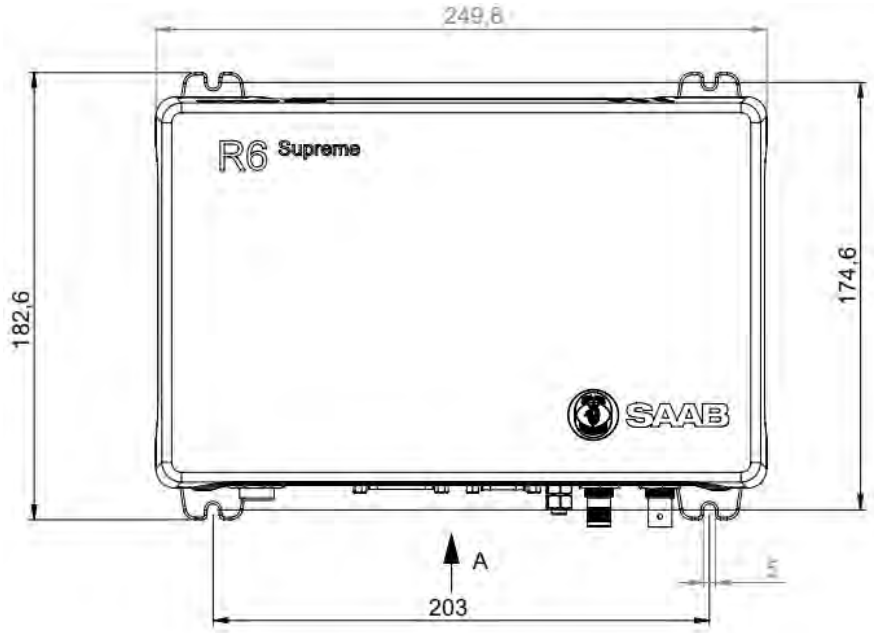


Figure 4-3 – Transponder mounting holes locations.

4.8 Install the R6 Junction Box

4.8.1 Junction Box Location

The Signal Cables connecting the transponder to the Junction box are 2m long and will determine the maximum distance between the Junction Box and the Transponder unit.

Leave a clearance area at the cable side of the R6 Junction Box to observe minimum cable radius recommendation. Also leave enough surrounding space to facilitate service and installation.

See below figure for minimum recommended cable clearance area.

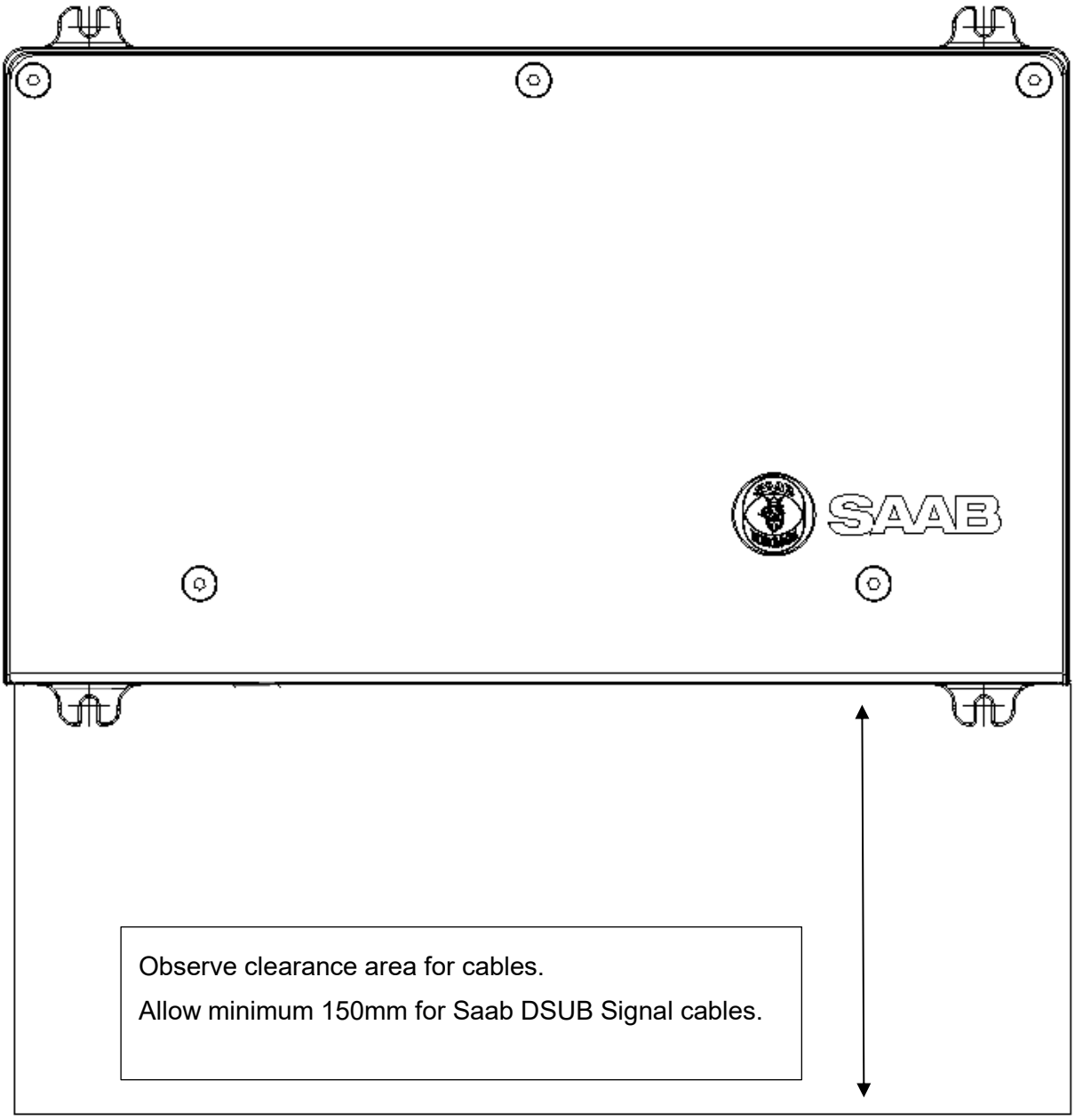


Figure 4-4 – Recommended Clearance Area (mm) for R6 Junction Box

4.8.1 Junction box mounting

The unit may be wall mounter or shelf mounted. When wall mounting, it is recommended to mount the unit with the cable opening downwards. This reduces the risk of water ingress.

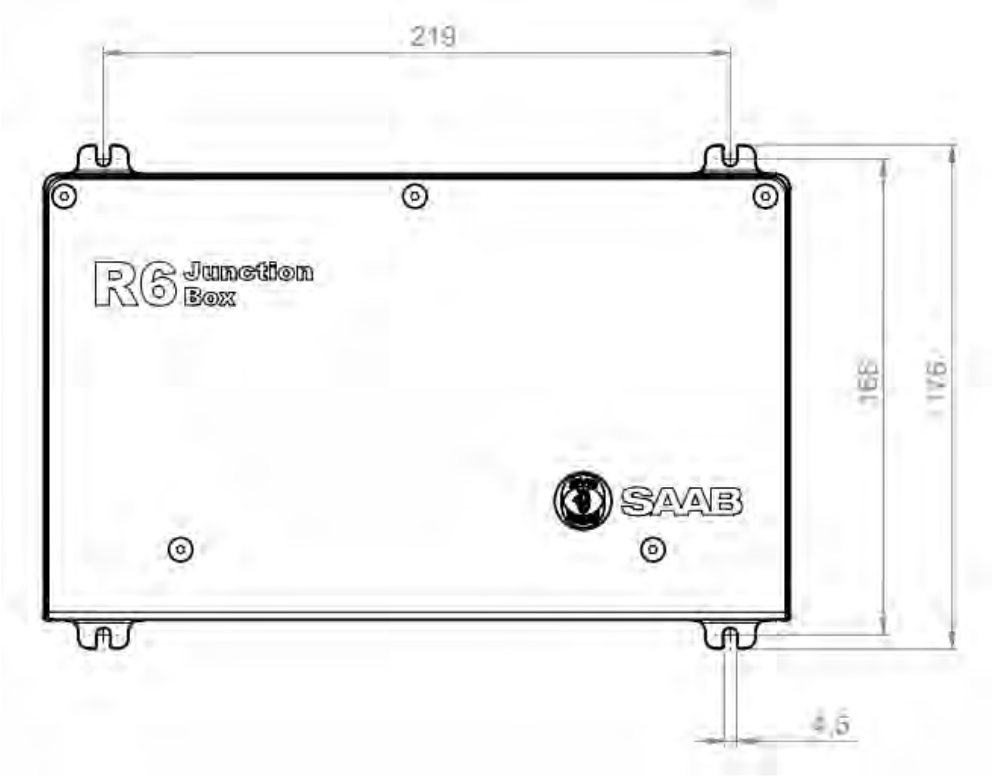


Figure 4-5 – R6 Junction Box mounting dimensions

- Open the lid of the R6 Junction Box.
- Fix the box on an appropriate surface/place with using the screw holes on the four feet of the junction box.
- Shielded cables should be stripped down to the shielding and fastened with cable ties (not included)
- Connect the cables to the terminal blocks.
- Fix the lid to the box casing.

NOTE: Cables meant for connection to the screw terminals inside the R6 Junction box have a maximum diameter of 13mm, due to space limitations entering the box.

4.8.2 Junction Box Interfaces

The Junction box features one 26-pin DSUB connector and one 9-pin DSUB connector. All other connectors are internal of terminal block type.

NOTE: The R6 Junction Box has three internal fuses. F3 "AIS" fuse protects the AIS PWR output (10A), F2 "CDU" is for the CDU PWR output (2A) and F1 "JB" is for the junction box integrated alarm relay (2A).

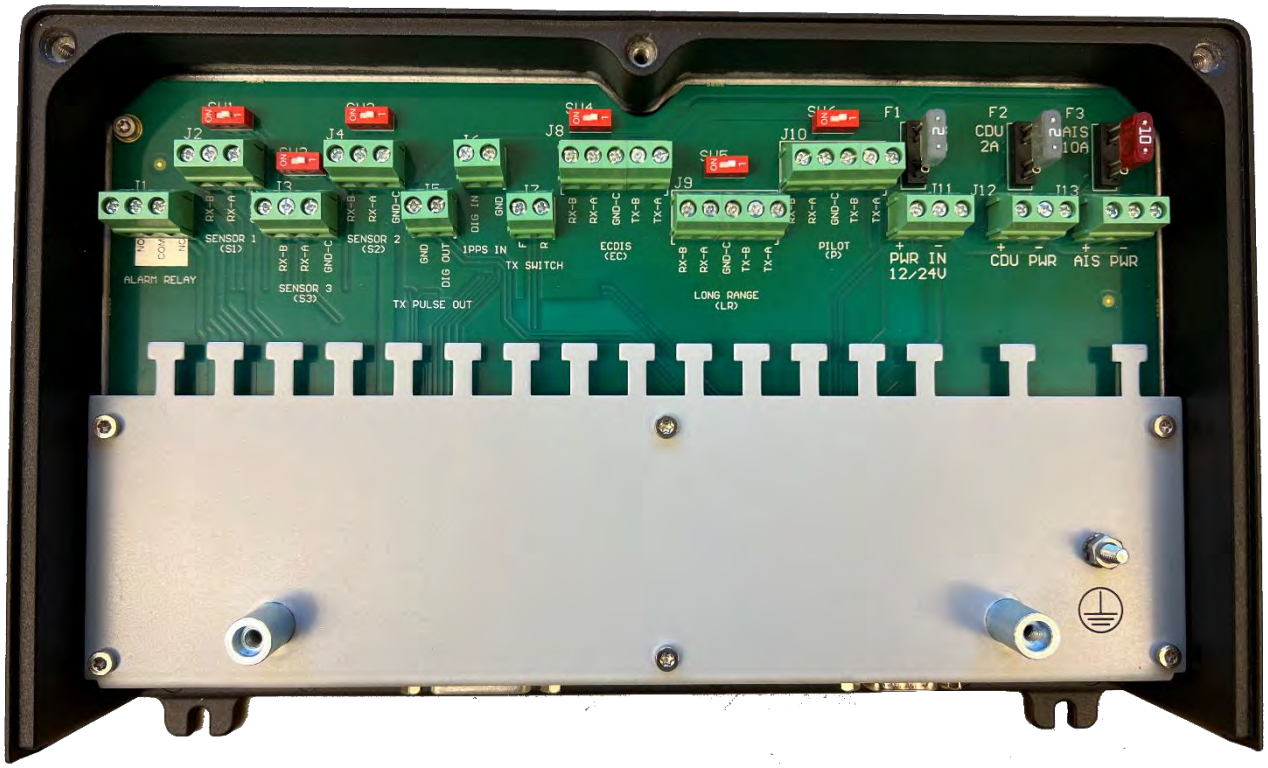


Figure 4-6 –R6 Junction Box interface

Please see Section 16.3 "R6 Junction box Interfaces" for details.

4.9 Mount the VHF Antenna

The R6 SUPREME Transponder, like any other transceiver operating in the VHF maritime band, may cause interference to a ship's VHF radiotelephone. Because AIS is a communication system with time slotted transmission, this interference may occur as a periodic (e.g. every 10 second) soft clicking sound on a ship's radiotelephone. This effect may become more noticeable when the VHF radiotelephone antenna is located close to the AIS VHF antenna and when the radiotelephone is operating on channels near the AIS operating channels (e.g. channels 27, 28 and 86).

Attention should be paid to the location and installation of different antennas in order to obtain the best possible efficiency. Special attention should be paid to the installation of mandatory antennas like the AIS antennas.

Therefore, installing the AIS VHF antenna is also a crucial part of the system installation. How and where you install your AIS VHF antenna and cable will affect its efficiency.

4.9.1 VHF Antenna Location

Location of the mandatory AIS VHF antenna should be carefully considered. Digital communication is more sensitive than analogue/voice communication to interference created by reflections in obstructions like masts and booms. It may be necessary to relocate the VHF radiotelephone antenna to minimize the interference effects. Installing the VHF antenna for AIS on a vessel is a compromise between the following items:

- Antenna type
- Antenna separation
- Clear view of the horizon
- Antenna height

4.9.1.1 Antenna Type

The AIS VHF antenna should have Omni directional vertical polarization providing unity gain.

4.9.1.2 Antenna Separation

AIS transponders use simplex channels at frequencies on the high side of the marine mobile band (AIS channel A = 2087, 161.975 MHz, and AIS channel B = 2088, 162.025 MHz). These channels are close to the duplex channels used for shore to ship marine communication. The AIS VHF antenna should be separated as much as possible from the voice VHF installations used for main communication to avoid unnecessary interference.

There should not be more than one antenna on the same level. The AIS VHF antenna should be mounted directly above or below the ship's primary VHF radiotelephone antenna, with no horizontal separation and with a minimum of 2 meters vertical separation. If it is located on the same level as other antennas, the distance apart should be at least 10 meters.

The AIS VHF antenna should be installed safely away from interfering high-power radiating sources like radar and other transmitting radio antennas, preferably at least 3 meters away from and out of the transmitting beam.

4.9.1.3 Clear View of the Horizon

The AIS VHF antenna should be placed in an elevated position that is as free as possible with a minimum distance of 2 meters in horizontal direction from constructions made of conductive materials. The antenna should not be installed close to any large vertical obstruction. The objective for the AIS VHF antenna is to see the horizon freely through 360 degrees.

4.9.1.4 VHF Antenna Height

The AIS is using VHF radio frequencies, which propagation characteristics are close to line of sight. The higher the antenna location is, the longer the range will be.

4.9.2 VHF Cabling

The cable should be kept as short as possible to minimize attenuation of the signal. Double shielded coaxial cable equal or better than RG214 is recommended to minimize the effects from electromagnetic interference from high power lines, radar or other radio transmitter cables.

The table below gives recommendation on cables that can be used for the VHF-antenna connections. The cable attenuation shall be kept as low as possible; a 3 dB loss is the same as cutting the signal strength in half.

Type	Attenuation @ 150 MHz (dB/100m)	∅ (mm)	Weight (kg/100m)
RG 214	7	10.8	18.5
RG 217	5	13.8	30.1
RG 225	8	10.9	23.3

Table 4-5 – VHF Antenna Cables

Example: A cable of 40 meter RG 214 has a cable attenuation of 2.8 dB.

4.9.3 VHF Cable Mounting

Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°).

Coaxial cables should not be exposed to sharp bends, which may lead to a change of the characteristic impedance of the cable. The minimum bending radius should be 5 times the cable's diameter.

All outdoor installed connectors should be weather proofed, e.g. with shrink tubing, watertight seal tape or butyl rubber tape and plastic tape sealing, to protect against water penetration into the antenna cable.

Secure the cable properly close to the cable ends.

4.9.4 VHF Cable Grounding

Coaxial down-leads must be grounded. The coaxial shielding screen should be connected to ground.

4.10 Mount the GNSS Antenna

The R6 SUPREME shall be connected to one of the approved GNSS antenna types. 5V DC is supplied through the antenna lead for the antenna preamplifier.

If a combined GNSS/VHF antenna is used, the diplexer unit shall be installed in an indoors environment.

Attention should be paid to the location and installation of the different antennas on the ship in order to obtain the best possible efficiency. Special attention should be paid to the installation of mandatory antennas like the AIS units antennas.

Therefore, installation of the GNSS antenna is a crucial part of the system installation. How and where you install your GNSS antenna and cable will greatly affect its sensing efficiency.

4.10.1 GNSS Antenna Location

The GNSS antenna must be installed where it has a clear view of the sky. The objective is to see the horizon freely through 360 degrees with a vertical observation of 5 to 90 degrees above the horizon. Small diameter obstructions, such as masts and booms do not seriously degrade signal reception, but such objects should not eclipse more than a few degrees of any given

bearing. Do not mount the antenna in the top of a mast or tower, as this may degrade the COG and SOG readings.

Locate the GNSS antenna at least 3 meters away from and out of the transmitting beam of high-power transmitters such as S-Band Radar (typically ±15° vertically from the array's centre point) and/or Inmarsat systems (A, B, C, or M; typically ±10º from the array's centre point in any of the possible transmitting directions).

Locate the GNSS antenna at least 3 meters away from HF or VHF radios or their antennas. This includes the ship's own AIS VHF antenna if it is designed and installed separately.

4.10.2 GNSS Cabling

The gain of the GNSS antenna built-in pre-amplifier shall match the cable attenuation. The resulting installation gain (pre-amplifier gain minus cable attenuation) shall be within 0 to 26 dB. A minimum value of 10 dB is recommended for optimum performance.

Double shielded coaxial cable is recommended. The coaxial cable should be routed directly between the GNSS antenna and the R6 SUPREME Transponder's GNSS connector in order to reduce electromagnetic interference effects. The cable should not be installed close to high-power lines, such as radar or radio-transmitter lines or the AIS VHF antenna cable. A separation of 1 meter or more is recommended to avoid interference due to RF-coupling. Crossing of antenna cables should be done at 90 degrees to minimise magnetic field coupling.

The table below gives recommendation on cables that can be used for the Transponder GNSS-antenna connections. Due to the high frequency it's important that the attenuation in the cable is low for the specific frequency (1.5 GHz).

Type	Attenuation @ 1.5 GHz (dB/m)	∅ (mm)	Weight (kg/100m)
RG 58	0.9	5	3.7
RG 400	0.6	4.95	6.3
RG 223	0.6	5.40	5.5
RG 214	0.35	10.8	18.5
RG 225	0.3	10.9	23.3

Table 4-6 – GNSS Antenna Cables

For optimum performance approximately +10dB gain should be available when the cable attenuation has been subtracted from the GNSS-antenna preamplifier gain. The net gain shall not exceed +26dB.

Example:

Cable type	Preamplifier gain (dB)	Required min. cable length (m)	Recommended max. cable length (m)
RG 58	12	0	2
RG 58	26	0	18
RG 58	30	4.5	22
RG 223	12	0	3.5
RG 223	26	0	26.5
RG 223	30	6.5	33.5
RG 214	12	0	6
RG 214	26	0	46
RG 214	30	11.5	57

Table 4-7 – GNSS Antenna Cable Examples

Min length = (Preamp. Gain – 26 dB)/Cable attenuation per meter.

Max length = (Preamp. Gain – 10 dB)/Cable attenuation per meter.

4.10.3 GNSS Cable Mounting

Coaxial cables should be installed in separate signal cable channels/tubes and at least 10 cm away from power supply cables. Crossing of cables should be done at right angles (90°).

Coaxial cables should not be exposed to sharp bends, which may lead to a change of the characteristic impedance of the cable. The minimum bending radius should be 5 times the cable's diameter.

All outdoor installed connectors should be weather proofed, e.g. with shrink tubing, watertight seal tape or butyl rubber tape and plastic tape sealing, to protect against water penetration into the antenna cable.

Secure the cable properly near the cable ends.

4.10.4 GNSS Cable Grounding

Coaxial down-leads must be used. The coaxial shielding screen should be connected to ground.

4.11 Electrical Installation details

For complete specification of signal interface details see Section 16 “Electrical Interfaces”.

4.11.1 Input ports

The protocol of the serial port interfaces is compliant to IEC 61162-1 Ed.5.

All serial ports in the R6 SUPREME Transponder have the same capabilities with one exception, any Long Range equipment must be connected to the Long Range port. Apart from that, all ports can be connected to any external equipment such as ECDIS and external sensors. The primary external position sensor should be connected to the Sensor 1 port since this port has the highest priority. The serial ports in the R6 SUPREME Transponder can also receive differential corrections in RTCM format for the internal GNSS receiver. The ports in the R6 SUPREME Transponder have different default baud rates but they can all be configured to any baud rate of 4800, 9600, 38400, 57600 or 115200 bps. The priority levels for input of sensor data on the different ports are listed below:

Priority	Identification	Default Baud Rate
1 (Highest priority)	Sensor 1	4800 bps
2	Sensor 2	4800 bps
3	Sensor 3	4800 bps
4	ECDIS	38400 bps
5	Long Range	9600 bps
6 (Lowest priority)	Transponder Pilot	38400 bps
N/A	CDU J1 Serial port	38400 bps (fixed)

Table 4-8 – Port Priorities and Default Baud Rates

If valid position data from external position sources are input on both Sensor 1 and ECDIS port, the position data from Sensor 1 will be used.

If the same data is provided using different NMEA sentences on the same port, the priority depends on the sentence in accordance with Table 4-9.

Priority	Position	COG/SOG	HDG	ROT
1 (Highest)	RMC	RMC	THS	ROT
2	GNS	VTG	HDT	-
3	GGA	VBW	OSD	-
4	GLL	OSD	-	-

Table 4-9 – Sentence priority

4.11.2 Output Drive Capacity for Serial Ports

Each serial port transmitter can have a maximum of 10 listeners assuming 2.0 mA current for each listener.

4.11.3 Input Load

Input impedance for each listener input is 6.4 kΩ.

4.11.4 Schematics of Serial Transceivers

Each of the RS422 serial interfaces fulfils the requirements of IEC 61162-2 and IEC 61993-2. A detailed schematic of one of the serial ports is shown below. R6 SUPREME input only serial ports (Sensor 1-3) do not have the UART-RS422 TX signals connected. The CDU J1 serial interface uses the same design as the R6 SUPREME bi-directional ports.

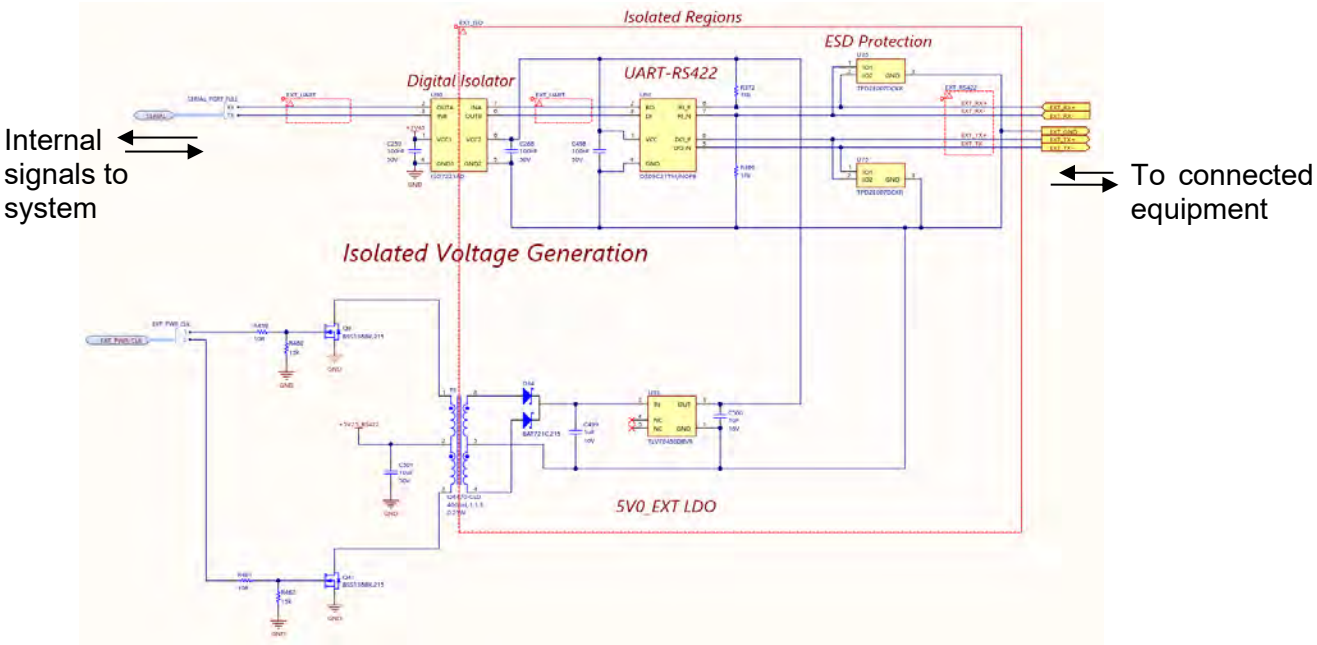


Figure 4-7 – Serial Port Schematics

4.11.5 Transponder Connections

- Connect Transponder Ground to ship ground
- Install network cable according to system set up. See Section 15 System Setups
- Connect Signal Cables to Junction box.
- Connect GNSS antenna to GNSS port and
- VHF antenna to VHF port
- Connect Power Cable to Junction box.

4.11.6 CDU Electrical Connections

- Connect Ethernet cable to network or directly to R6 Supreme Transponder Ethernet port.
- Connect Power Cable to Junction box or other external power with 2A Fuse.
- Connect Ground terminal to ship ground.

4.11.7 R6 Junction box connections

Figure 4-1 show a general overview on how the R6 Supreme Transponder can be connected to the R6 Junction Box. For a more detailed description of the cable connections, see Section 4.3 Installation Cables.

4.11.7.1 R6 Supreme System connections

- Connect External power to the POWER IN.
- Connect the Saab Power cable from R6 Supreme Transponder to AIS PWR terminal
- Connect the Saab Power cable from R6 CDU to CDU PWR terminal (optional)

NOTE: R6 CDU can be mounted in a remote location and use another power source, but in this case needs an external fuse (2A).

- Connect Signal Cables from R6 Transponder **J1** and **J2** ports to R6 Junction box DSUB connectors.

4.11.7.2 External Serial Sensor connections

- Connect external sensor providing GNSS Position (mandatory)
- Connect external sensor providing True Heading, and Rate of Turn if available.
- Connect: DGPS Beacon receiver providing RTCM-104 format data to any of the RS-422 input screw terminals, if available.
- Connect Pilot Plug port cable to PILOT
- Connect ECDIS/RADAR to ECDIS port

NOTE: Above data may also be provided using the Ethernet interfaces, provided the external equipment conforms to IEC 61162-450

4.11.8 External Switch

It is possible to connect an external switch to the R6 SUPREME Transponder.

The switch may be used to quickly turn off transmissions (TX OFF), or it may also be used to force the radio transmit power to 1W only.

NOTE: Manually set 1W mode operation, or Silent Mode, is outside of type approved operational mode.

The status of the switch can be controlled by connecting to the R6 Junction Box (R) and (F) signals in the “TX Switch” terminal block.

Connect the external switch as in the figure below. When the switch is open, all VHF transmissions will be disabled or only transmit in low power mode depending on configuration. When the switch is closed, the R6 SUPREME Transponder will transmit normally or transmit at normal power level.

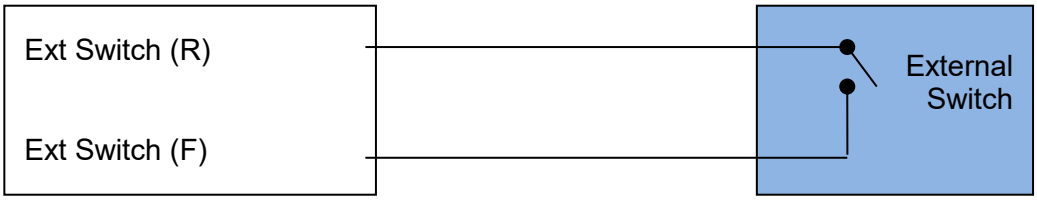


Figure 4-8 – External Switch

4.11.9 Alarm Relay

It is required that the AIS alert output (relay) is connected to an audible alert device or the ship’s alert system, if available. The R6 AIS Junction Box has a built in alert relay that can be connected to the ship’s alert system. If the installation is done without the junction box, an external alarm relay should be connected.

Alternatively, the ship’s alert system may use the alert messages output on the AIS Presentation Interface (PI) provided the alert system is AIS compatible. The AIS Alarm Relay is either mounted on a DIN mounting rail or direct on the wall.

The alarm relay wires have the following colour codes in the 26-pole signal cable:

RELAY VCC	Brown / Red
RELAY GND	White / Pink
RELAY OUT	Pink / Brown

Table 4-10 – Alarm Relay Wires

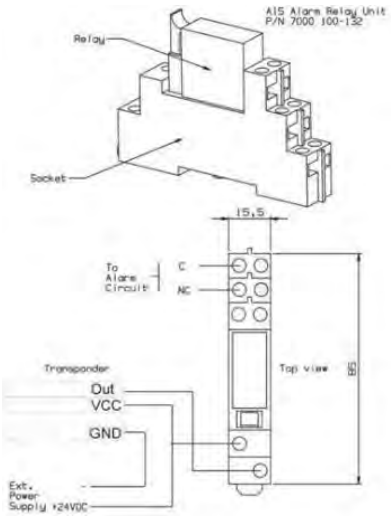


Figure 4-9 – Alarm Relay

4.12 Hot Standby Installation

R6 SUPREME Transponder system supports installation in a “Hot Standby” configuration using the serial interfaces, where two complete R6 SUPREME systems monitor each other and are used to get full redundancy. Each transponder system has its own R6 CDU, R6 SUPREME Transponder, GNSS antenna and VHF antenna.

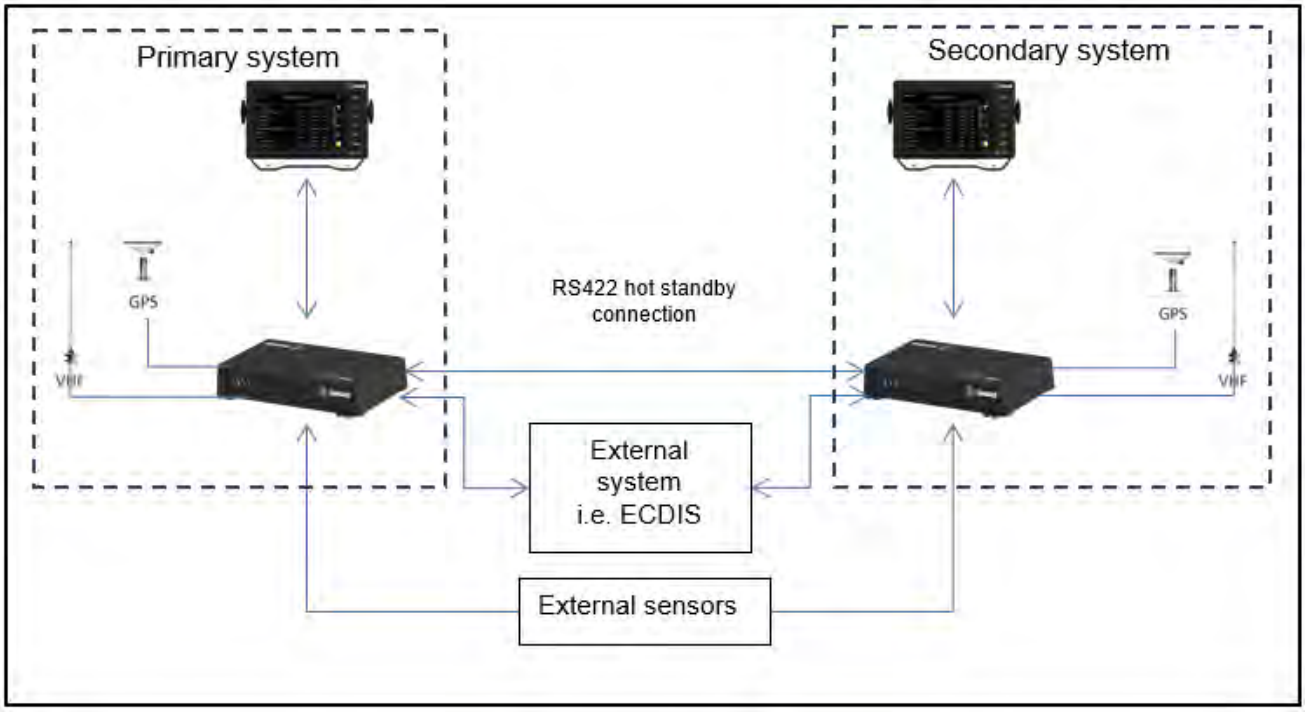


Figure 4-10 – Hot Stand-by configuration

One transponder will be in standby mode and be silent while the other transponder is active and operates as a normal transponder. If the active transponder stops working the standby transponder will wake up and take over the transmissions.

Since the systems shall be able to function as normal stand-alone systems, all external sensors need to be connected to both systems independently. With RS422 this is easily done since sensor data is one-way and both transponders can be connected to each sensor in a multiple listener fashion.

For external systems requiring redundant AIS operation each such system must be connected to both the primary and secondary systems.

While working in hot standby the standby unit will output NMEA of the transmissions from the active system, so both systems will appear as normal functioning AIS systems to other connected systems, regardless if active or standby.

The systems will monitor each other and the system with the best current status will be used as the active system while the other is in standby mode. If both transponder systems have exactly the same status, the system configured as “Primary” will be chosen as the active system. Important criteria will be considered first to select the transponder with the best status. These criteria are listed below in decreasing severity:

1. *”General Fault” alert*
2. *“Transceiver fail” alert*
3. *“Impaired Radio” alert*
4. *“Sync In Fallback” alert*
5. *”Lost Position” alert*
6. *”Missing SOG” alert*
7. *”Missing COG” alert*
8. *”Missing Heading” alert*
9. *“Missing ROT” alert*
10. Position Quality
11. Heading Quality
12. Rate of Turn Quality
13. *“Doubtful Heading” alert*
14. *“Lost MKD” alert*
15. Primary/Secondary Configuration

4.12.1 Configure use of Hot Standby functionality

Both units in the hot-standby pair need to be configured for hot-standby operation. There are only two configurations needed for this:

- **Hot Standby Function**: *Disabled, Primary, Secondary*
- **Hot Standby Port**: *ECIDS, Long Range, Pilot (transponder)*

In the Hot Standby pair one unit must be configured as “*Primary”* and the other as “*Secondary”*, also the baud rate of the used Hot Standby ports on the two units must match.

Hot Standby Function and Hot Standby Port parameters can be configured from the Miscellaneous Interfaces view described in section 5.3.8. The baud rate of the selected Hot Standby port can be configured in the Serial Ports view described in section 5.3.13.

4.12.2 Hot Standby Synchronizing

The transponders in the Hot Standby pair will continuously synchronize static and voyage data so that the same information is sent out on the VHF link regardless of which transponder is active. The transponder configured as “Secondary” will during the pairing procedure adapt its synchronized parameters according to the transponder set as “Primary”. The following parameters are synchronized in Hot Standby mode:

- MMSI (Maritime Mobile Service Identity)
- IMO number (International Maritime Organization)
- Call Sign
- Ship Name
- Ship Type
- Height over Keel
- Persons on Board
- Draught
- Destination
- ETA (Estimated Time of Arrival)
- Navigation Status
- Operational Mode

5 CONFIGURATION

When the physical and electrical installation of the system is complete, the R6 SUPREME System needs to be configured. This section describes what the installer is required to do before the R6 SUPREME System is fully operational.

The R6 CDU menu system is divided into three categories: Operative, Status and Configuration. Views belonging to the Configuration Menus will be described in the following section.

5.1 Configuration Wizard

The first time the R6 CDU is started, a configuration wizard will be shown. This wizard is a helpful guide to configure the basic functionality of the R6 SUPREME System. The following sections describe the different steps in the configuration wizard.

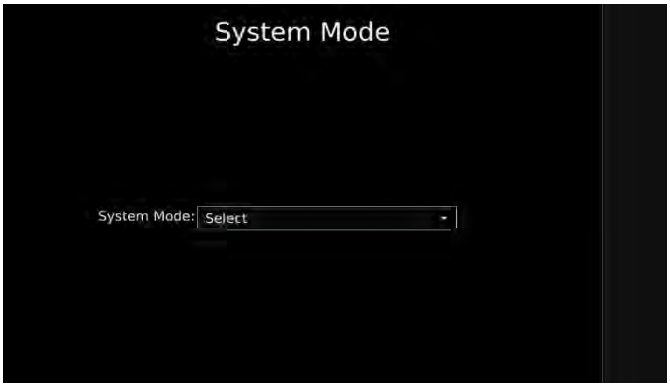
If desired or needed it is possible to skip a part in the wizard by using the **[Skip]** 

button. This will jump to the next part in the configuration wizard.

NOTE: CDU password will be required, default is "cdupwd".

5.1.1 Select System mode

Select R6 SUPREME AIS as System mode to configure an CLASS A AIS system.



Picture 5-1 – Select System Mode

5.1.2 CDU network Configuration

Picture 5-2 – CDU Network

The R6 CDU uses UDP Multicast as defined by IEC 61162-450, to communicate with the R6 SUPREME Transponder. It is therefore necessary to configure an IP number and a System

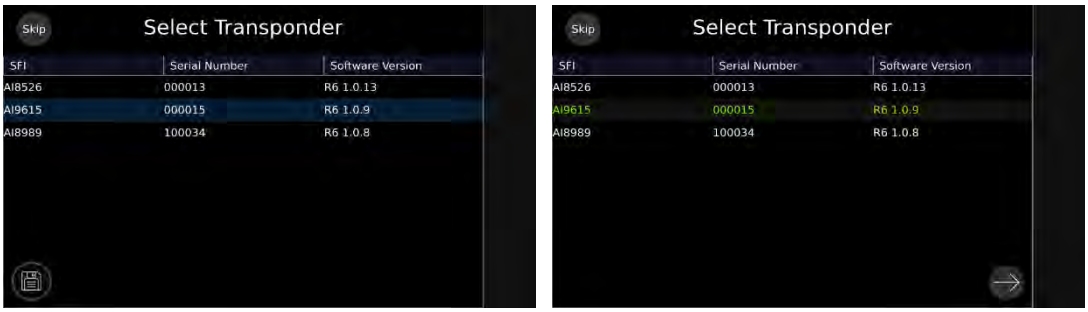
Function ID (SFI) for the R6 CDU. The SFI consists of two letters (always “SN” for the R6 CDU) and four digits. Enter SFI, press **[Save]** and thereafter **[Next]** .

To learn more about this view, please consult section 5.4.2.

The IP and SFI must be unique for all equipment connected to the same IEC 61162-450 network. The system will require that the default SFI “SN9999” is reconfigured, because this SFI is not valid during normal operation in accordance with IEC 61162-450.

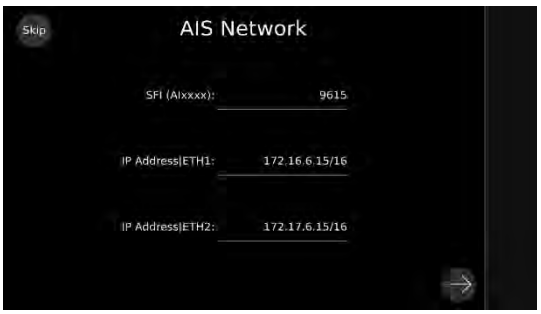
5.1.3 Select Transponder

When the R6 CDU is configured to be used in an AIS system, an R6 Transponder must be located and selected on the network. Make sure that the R6 Transponder has power and is connected to the same network as the R6 CDU. In the “Select Transponder” view the R6 CDU will automatically search for R6 Transponders on the network. Select the R6 Transponder that the R6 CDU should communicate with and press **[Save]**, and thereafter **[Next]**, , to go to the “Transponder Network Configuration” view.



Picture 5-3 – Select Transponder

5.1.4 Transponder Network Configuration



Picture 5-4 – AIS Network

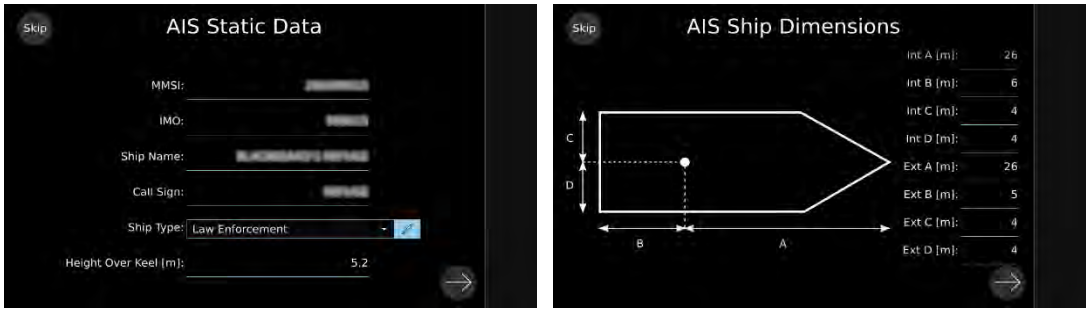
When a transponder has been selected by the R6 CDU it is possible to configure the transponder IP address and SFI. The R6 SUPREME Transponder must have a unique SFI that consists of two letters (always “AI” for an R6 Transponder) and four digits. Press “Save” to save changes and thereafter “Next” to finish the configuration wizard.

The R6 Transponder IP address and SFI configuration is password protected. The default AIS user password is “user” and the password is case sensitive.

The IP and SFI must be unique for all equipment connected to the same IEC 61162-450 network. The system will require that the default SFI "SN9999" is reconfigured, because this SFI is not valid during normal operation in accordance with IEC 61162-450.

Picture 5-5 – SUPREME User Password

5.1.5 AIS Static data



Picture 5-6 – AIS Static data

Fill in the Vessel/ship AIS Static information and press **[Next]**  .

Continue with the AIS Ship dimensions and press **[Next]**  .

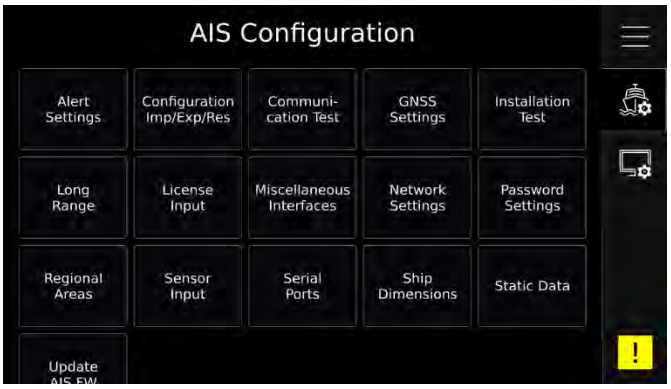
5.2 System Functional Check

When the R6 SUPREME has been installed according to the procedures described in previous sections, it is recommended to make a first functional check of the system. Check the following things to ensure that the R6 SUPREME System is fully functional:

- If this is the first time, please configure transponder first, see section 5.3.15.
- Check the "Own Ship Data" view to make sure that the configured data is sent on the VHF link, refer to Section 7.1.5 for more information.
- Make sure that there are no unexpected active alerts in the alert list, see Section 6.12 "Alert List".
- Perform a communication test to ensure that the R6 SUPREME transponder can send and receive messages from other AIS transponders. Refer to Section 5.3.3 for information on how to perform a communication test.

5.3 AIS Configuration Menu

This section describes the different configuration parameters that can be set in the R6 SUPREME System under the AIS Tab. For navigation in the CDU see section 6.



Picture 5-7 – AIS Configuration

NOTE: Menus may differ dependent on installed licenses and FW versions.

5.3.1 Alert Settings

In this view all alerts can be configured to either be “Enabled” or “Disabled” by checking or unchecking corresponding check boxes. When the alert is enabled, an active alert will affect the external alarm relay as well as the buzzer in the R6 CDU.

For more information about the alert view, refer to Section 6.12 “Alert List”. For a list of all the alerts that can occur, refer to Section 10.3 “Troubleshooting with Alert Messages.”

Picture 5-8 – AIS Alerts

5.3.2 Configuration Import/Export/Reset

See Section 5.4.7 for detailed description.

5.3.3 Communication Test

When installing the R6 SUPREME System, or when performing annual testing, a communication test shall be done to ensure that other transponder systems can receive the R6 SUPREME Transponder’s transmissions.

When entering the *Communication Test* view a suggested target with a suitable range (between 15 NM and 25 NM) will be selected in the MMSI parameter field if such a target has been

received by the R6 SUPREME System. It is however possible to select a different target for the communication test. To start the test, click on the “Play symbol” button in lower right corner.

The Status field will be updated with the current result. The test be determined as failed if no reply has been received within 15 seconds.

Results will be cleared within 30 seconds of a successful or failed test.

Picture 5-9 – Communication Test

5.3.4 GNSS Settings

Picture 5-10 – AIS GNSS

Parameter Name	Description
Enable GPS	This parameter specifies if the American Satellite System “GPS” should be included in the GNSS/Navigation solution of the R6 SUPREME internal GNSS receiver.
Enable Galileo	This parameter specifies if the European Satellite System “Galileo” should be included in the GNSS/Navigation solution of the R6 SUPREME internal GNSS receiver.

Table 5-1 – GNSS Settings

5.3.5 Installation Test

Picture 5-11 – Installation Test

Parameter Name	Description
Locating Device Test Mode *Note: This is equivalent to the SART Test Mode.*	Determines if Locating Device Test targets should be displayed in Target List and Plot views of the R6 CDU. It also controls if connected systems, for example ECDIS, will receive Locating Device Test targets. This parameter automatically reverts to disabled on reboot of the R6 SUPREME Transponder.
Sensor Data Source	Specifies which port the R6 SUPREME Transponder is using as external sensor source (position, COG/SOG, heading, ROT). The default value of this parameter is “Automatic” which means that the R6 SUPREME Transponder will accept sensor information on any port and use the information on the port with highest priority. If it is set to anything other than “Automatic”, the R6 SUPREME Transponder will only accept sensor information if it comes from the port specified by this parameter. This parameter can be used to test incoming data on a specific sensor port. The parameter will automatically revert to “Automatic” on reboot of the R6 SUPREME Transponder.

Table 5-2 – Installation Test Settings

5.3.6 Long Range

Picture 5-12 – Long range

Parameter Name	Description
Reply Mode	When set to “Automatic” the R6 SUPREME Transponder will automatically respond to any Long Range interrogation messages. When set to “Manual” the operator is responsible for sending a response or refusal to any Long Range interrogation message. The information that is sent in a response is automatically filled in by the R6 CDU depending on the Long Range filter settings (the parameters below).
Ship ID (A)	Filter setting that defines if a Long Range response message should include ship name, call sign and IMO number.
Message Date/Time (B)	Filter setting that defines if a Long Range response message should include information about date and time of message composition.
Latitude / Longitude (C)	Filter setting that defines if a Long Range response message should include position.
Course Over Ground (E)	Filter setting that defines if a Long Range response message should include COG.
Speed Over Ground (F)	Filter setting that defines if a Long Range response message should include SOG.
Destination And ETA (I)	Filter setting that defines if a Long Range response message should include destination and ETA.
Draught (O)	Filter setting that defines if a Long Range response message should include draught.

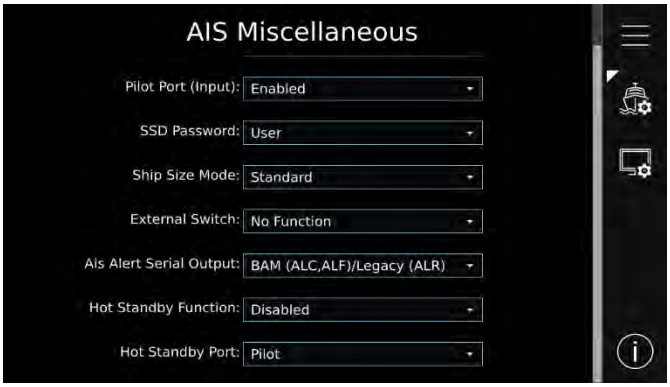
Ship Type And Cargo (P)	Filter setting that defines if a Long Range response message should include ship type and cargo information.
Ship Size And Type (U)	Filter setting that defines if a Long Range response message should include ship's length, beam and type.
Persons On Board (W)	Filter setting that defines if a Long Range response message should include number of persons on board.

Table 5-3 – Long Range Settings

5.3.7 License input

See Section 5.6 for detailed description.

5.3.8 Miscellaneous Interfaces



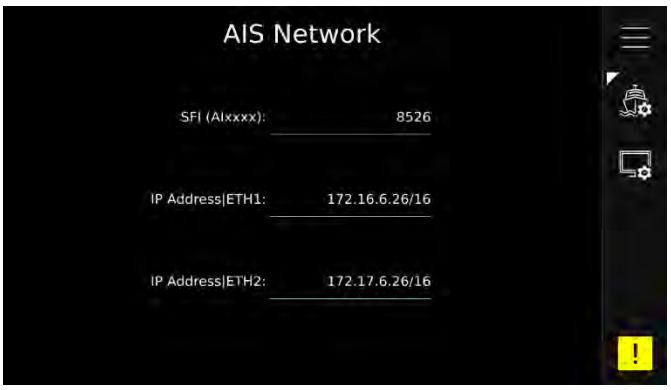
Picture 5-13 – AIS Miscellaneous

Parameter Name	Description
AIS GNSS Output Port	Defines on which serial port the R6 SUPREME should output data from the internal GNSS. When set to "None" no internal GNSS data will be output.
Pilot Port (input)	Pilot port access level. When set to "Disabled", the possibility to input data to the system through the pilot port is restricted.
SSD Password	Changes the value of the SSD password level. When set to "None", no password is required when configuring the transponder with an SSD sentence from e.g. an ECDIS via the serial port interface. When set to "User", an SPW or SSA sentence with the correct user level password must be sent before the SSD on the serial port interface.

Ship Size Mode	This affects how the user should input the ship size, convoy size and antenna positions. See Section 5.3.14 for more details.
External Switch	This parameter specifies if there is an external switch connected to the system and the desired system use of the switch. If no switch is used, set the parameter to “No Function”. See section 4.11.8 “External Switch” for more information.
AIS Alert Serial Output	Defines if the R6 Transponder’s serial ports shall output both/either or none of Legacy alarms (ALR) and Bridge Alert Management alerts (ALF/ALC).
Hot Standby Function	Enables/Disables the Hot Standby functionality described in section 4.12. It is important that one transponder is configured as “Primary” and the other transponder in hot standby pair is configured as “Secondary” for the hot standby function to work properly.
Hot Standby Port	The port designated for hot standby functionality described in section 4.12. If hot standby functionality is enabled, this port cannot be used for anything else than synchronization with the other transponder in the hot standby pair.

Table 5-4 – Miscellaneous Interface Settings

5.3.9 Network Settings (AIS)



Picture 5-14 – AIS Network

Parameter Name	Description
SFI	The unique ID that is used on the network. For example if this parameter is set to “3142” the R6 Transponder will transmit messages on the network with the SFI “AI3142”. This ID must be unique for all equipment connected to the same network. **The IP and SFI must be unique for all equipment connected to the same IEC 61162-450 network. The system will require that the default SFI “SN9999” is reconfigured, because this SFI is not valid during normal operation in accordance with IEC 61162-450.**
IP Address ETH1	The IP Address and network mask used for the R6 SUPREME Transponder port ETH1. Example: 172.16.0.2/16
IP Address ETH2	The IP Address and network mask used for the R6 SUPREME Transponder port ETH2. Example: 172.17.0.2/16

Table 5-5 – Network Settings AIS

5.3.10 Password Settings (AIS)

Picture 5-15 – AIS Password

Parameter Name	Description
Change User Password	Changes the user level password for the R6 SUPREME Transponder. **The default user level password is "user"**
Change Admin Password	Changes the admin level password for the R6 SUPREME System. **The default admin level password is "admin"**
Restore Passwords	It is possible to restore both user password and admin password to the default values above with a secret restore key. To obtain the restore key, contact TransponderTech Support and be prepared to provide the **serial number** of the **R6 SUPREME** transponder unit.

Table 5-6 – Password Settings

5.3.11 Regional Areas

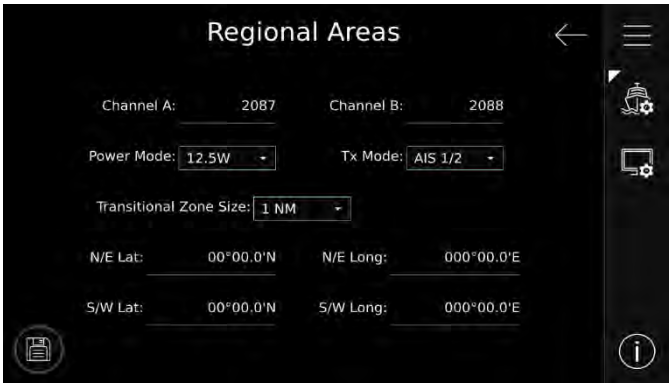
Regional Area messages are transmitted from shore based AIS Base Stations by local authorities to control AIS VHF settings of AIS transponders within a defined area. The transponder will store up to eight different areas. An area will timeout and be deleted if more than 24 hours passes since last reception, or if the distance to the area becomes greater than 500 NM.

All regional areas that are stored in the R6 SUPREME Transponder can be viewed in the *Regional Areas* view. The list shows the north east and south west corners of the areas. To view the settings of an area or to edit an existing area, mark the area in the list and click on the **Notepad Symbol** in the upper right corner.

It is possible to manually create and edit regional areas in the system by pressing the **Pen Symbol** in the upper right corner. It is not recommended to modify anything in this view unless instructed to do so by the authorities or for testing in a controlled environment.

Picture 5-16 – Regional Areas

The view shows the regional areas set in the transponder. These are normally transmitted by an AIS base station to change AIS VHF nominal power level and/or frequencies in a specific area. Press the clipboard in the top right corner to create a new regional area. Or, select a regional area then press the clipboard to edit an already existing one.



Picture 5-17 – Modify Regional Areas

When editing an area or creating a new area the following parameters can be configured:

Parameter Name	Description

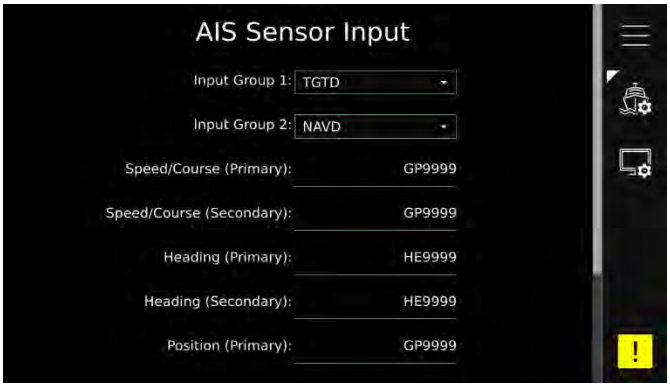
Channel A	The channel number for AIS channel A (2087 = default) that should be used in the regional area
Channel B	The channel number for AIS channel B (2088 = default) that should be used in the regional area
Power Mode	Output power for the transponder in the regional area. High = 12.5 W, Low = 1 W.
TX Mode	Decides on which channels the transponder will transmit in the regional area. When set to “Silent”, the transponder will stop automatic transmissions on AIS channels A and B.
Transitional Zone Size	The transitional zone size of the regional area in nautical miles (NM)
N/E LAT	The latitude for the North East corner of the regional area
N/E LON	The longitude for the North East corner of the regional area
S/W LAT	The latitude for the South West corner of the regional area
S/W LON	The longitude for the South West corner of the regional area

Table 5-7 – Regional Area Settings

5.3.12 AIS Sensor Input

Configuration in this view allows for connection of GNSS, heading and ROT equipment to the R6 SUPREME transponder using the network interface.

For each data type, enter the SFI for each external system that the Transponder shall receive data from. For example if Primary position source is set to “GP3210” the R6 SUPREME Transponder will accept position data on the network from systems with the SFI “GP3210”, if broadcast on any of the two Input Groups defined.



Picture 5-18 – AIS Sensor Inputs

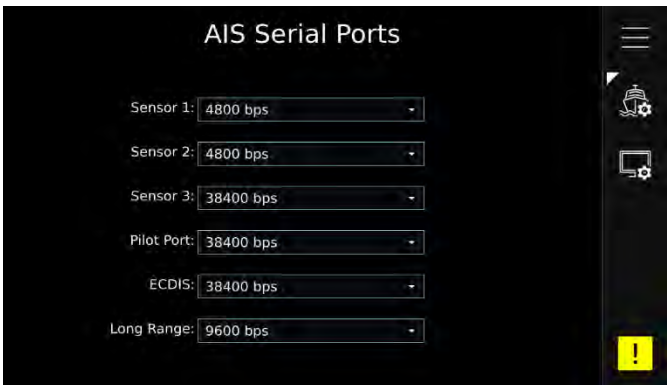
Parameter Name	Description
Input Group 1	Multicast group as defined by IEC 61162-450
Input Group 2	Multicast group as defined by IEC 61162-450
Speed/Course Primary Source	Set to SFI of primary Speed/Course source
Speed/Course Secondary Source	Set to SFI of secondary Speed/Course source
Heading Primary Source	Set to SFI of primary Heading source
Heading Secondary Source	Set to SFI of secondary Heading source
Position Primary Source	Set to SFI of primary Position source
Position Secondary Source	Set to SFI of secondary Position source
Rotation Primary Source	Set to SFI of primary Rate of Turn source
Rotation Secondary Source	Set to SFI of secondary Rate of Turn source

Table 5-8 – Network Sensor Input

5.3.13 Serial Ports

In the AIS Serial Ports view it is possible to configure the baud rate for all the serial ports of the R6 SUPREME Transponder. . For electrical details and default baud rates see section 4.11.1

NOTE: The R6 CDU J1(Pilot Port) is fixed to 38400.



Picture 5-19 – Serial Ports

Parameter Name	Description

Baud Rate	Changes the baud rate (bits per second) for the corresponding serial port.

Table 5-9 – Baud rate Settings

NOTE: If a baud rate is set to be lower than 38400 bps on an output port, no VDM/VDO sentences will be output.

5.3.14 Ship Dimensions

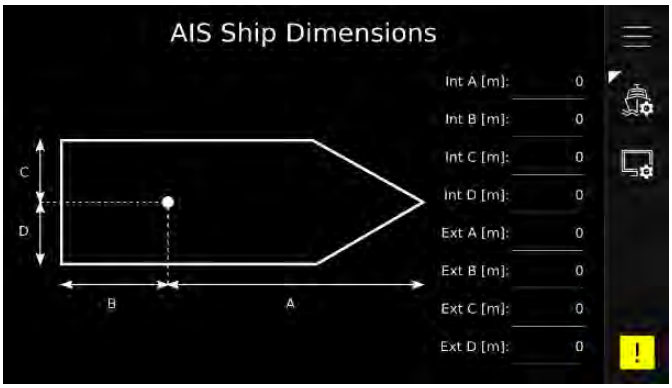
NOTE: A notification will be created and shown in the alert list if ship dimensions not have been defined.

The parameters in the “Ship Dimensions” view depends on the configuration parameter “Ship Size Mode” in the “Misc. Interfaces” view. The “Ship Size Mode” parameter can be set to either Standard or Simplified (default). The “Ship Size Mode” affects how the user should input ship size and antenna position information and how it is interpreted. Note that there’s a third Size Mode called “Towing” in which ship dimensions can be temporarily extended during towing operations as described in section 6.10.

In standard mode the ship’s size is calculated based on the external antenna and internal (R6 SUPREME) antenna positions relative to the ship. To attain accurate ship dimensions and position it is important that these parameters are input correctly.

In simplified mode the ship’s size is directly input, and the external and internal antenna positions are given relative to the ship. Observe that all dimensions are input with one decimal precision.

- **Standard Mode**



Picture 5-20 – Ship Dimensions, Standard mode

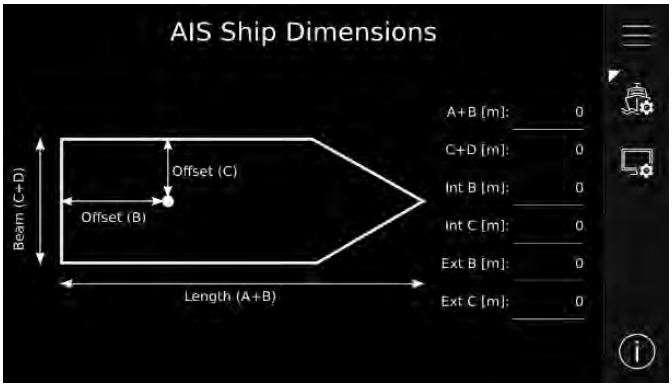
In this mode the user must input:

Parameter Name	Description
Int A, B, C, D	Internal antenna position relative to ship's bow, stern, and sides [m]
Ext A, B, C, D	External antenna position relative to ship's bow, stern, and sides [m]

Table 5-10 – Ship dimensions, standard mode

- **Simplified Mode (default)**

In simplified mode the transponder will automatically calculate and correctly round the A, B, C and D values reported on the VHF link.



Picture 5-21 – Ship Dimensions Simplified mode

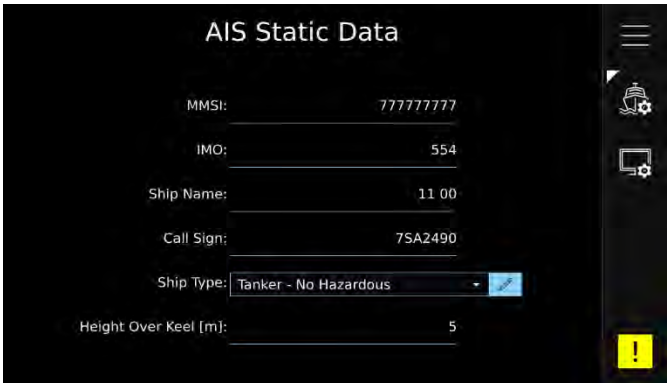
In this mode the user must input:

Parameter Name	Description
Length (A+B)	Ship's length [m] (with one decimal allowed)

Beam (C+D)	Ship's beam [m] (with one decimal allowed)
Int B, C	Internal antenna position relative to ship's stern and port side [m] (with one decimal allowed)
Ext B, C	External antenna position relative to ship's stern and port side [m] (with one decimal allowed)

Table 5-11 – Ship dimensions, simplified mode

5.3.15 Static Data



Picture 5-22 – Static data

Parameter Name	Description
MMSI	Maritime Mobile Service Identity reported by own ship
IMO	International Maritime Organization number reported by own ship
Ship Name	Ship name reported by own ship
Call Sign	Call sign reported by own ship
Ship Type (IMO)	Type of Ship according to ITU 1371-5. Both numerical input and selection from list is possible.
Height over Keel [m]	Height over keel in meters (one decimal precision). Height over Keel information is sent as a response to an "Extended Ship Static and Voyage Related Data" request message.

Table 5-12 – Static data

5.3.16 Target Classification

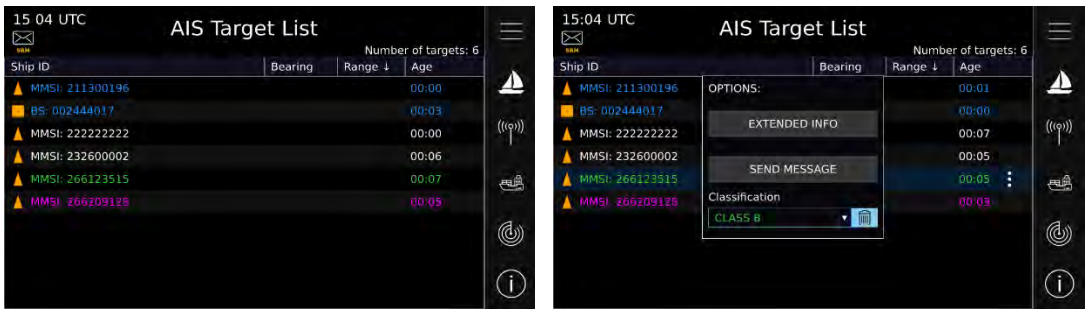
View to configure target classes and target belongings. A class can have a colour that is shown in the AIS target list and plot. A target can be added from the target list to a class, see section 6.7. The target classification do not affect the AIS Transmissions, only the visual presentation in AIS Target List

Picture 5-23 – Target Classification

To create a Class or target:

- Press **[Add]** to add Class or Target.
- To Edit a class or target, select item in the list and press **[Edit]**
- To Delete a class or target, select item in the list and press **[Delete]**

AIS Target List will now show the selected colour, and the plot. For more information on the target list/plot see Sections 6.7 and 6.8.



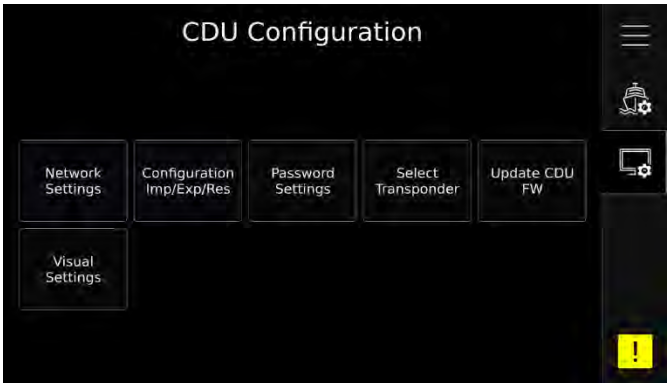
Picture 5-24 – Target Classification AIS Target list

5.3.17 Update SUPREME Firmware

For more information about the update procedure, refer to Section 8, Firmware Update.

5.4 CDU Configuration Menu

This section describes the different configuration parameters that can be set in the R6 SUPREME System under the CDU Tab.



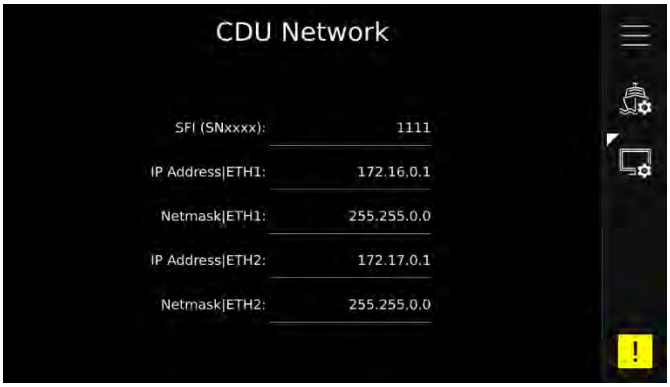
Picture 5-25 – CDU Configuration

NOTE: Menus may differ dependent on installed licenses and FW versions.

5.4.1 Configuration Import/Export/Reset

See Section 5.4.7 for detailed description.

5.4.2 Network Settings (CDU)



Picture 5-26 – CDU Network

Parameter Name	Description
SFI	The unique ID that is used on the network. For example if this parameter is set to “3141” the R6 CDU will transmit messages on the network with the SFI “SN3141”. This ID must be unique for all equipment connected to the same network. **The system will not allow the SFI SN9999, because this SFI is not valid during normal operation in accordance with IEC 61162-450.**
IP Address ETH 1	The IP address used for port ETH1 of the R6 CDU.

Netmask ETH1	IP-address Subnet mask used for port ETH1 of the R6 CDU.
IP Address ETH2	The IP address used for port ETH2 of the R6 CDU.
Netmask ETH2	IP-address Subnet mask used for port ETH2 of the R6 CDU.

Table 5-13 – Network settings

5.4.3 Password Settings (CDU)

Picture 5-27 – CDU Password

Parameter Name	Description
Change Password	Changes the CDU password for the R6 CDU. **The default password is "cdupwd"**
Restore Password	It is possible to restore the CDU password to the default with a unit unique restore key. To obtain the restore key, contact TransponderTech Support and be prepared to provide the **serial number** of the **R6 CDU** unit.

Table 5-14 – Password

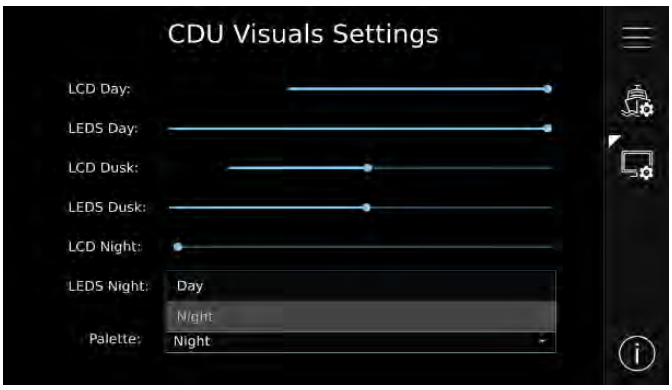
5.4.4 Select Transponder

See Section 5.1.3.

5.4.5 Update CDU Firmware

For more information about the update procedure, refer to Section 8, "Firmware Update".

5.4.6 Visual Settings



Picture 5-28 – Backlight settings

The settings to be applied in day/dusk/night brightness modes are configured in the CDU "*Visuals Settings"* view. While touching any of the settings sliders, instantaneous feedback is given. Some settings have a range limitation to ensure reliable performance.

Parameter Name	Description
LCD Day	Controls LCD backlight intensity to use in Day brightness mode.
LEDS Day	Controls Keypad LEDS backlight intensity to use in Day brightness mode.
LCD Dusk	Controls LCD backlight intensity to use in Dusk brightness mode.
LEDS Dusk	Controls Keypad LEDS backlight intensity to use in Dusk brightness mode.
LCD Night	Controls LCD backlight intensity to use in Night brightness mode.
LEDS Night	Controls Keypad LEDS backlight intensity to use in Night brightness mode.
Palette	There are two colours schemes available, Day and Night. The Day palette uses primarily black text on white background, where the Night palette does the opposite.

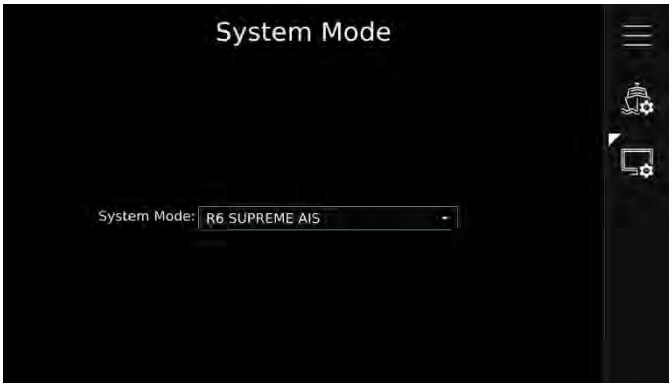
Table 5-15 – Dimmings mode settings

To quickly change backlight mode on the R6 CDU, press the **PWR/Dimming** button on the front panel of the CDU to cycle between Day/Dusk/Night/Off brightness modes.

*NOTE: The brightness setting may be operated from a central dimming source if connected to the system. Pressing the **PWR/Dimming** button will override central dimming, until a new instruction is received from the central dimming source.*

5.4.7 System Mode

Select the System mode.



Picture 5-29 – System Mode

Options to select from:

- **R6 Supreme AIS –** Type approved Class A AIS System, Described in this manual
- **R6 Navigation System –** Type approved Navigation System, **Not** Described in this manual
- **R6 Combined (AIS/NAV) –** When using one R6 CDU for both AIS and Navigation

5.5 Configuration Import/Export/Reset

Enter the "*Configuration Imp/Exp/Res"* views found under the AIS and CDU Configuration Menus, to save Transponder or CDU configuration to a file on an SD card, or to read the configuration back. From the same view it is possible to do a factory reset. The AIS Admin password or the CDU password respectively will be needed to import or reset a configuration.

Picture 5-30 – Configuration Imp/Exp/Res views

5.6 Input of Licenses

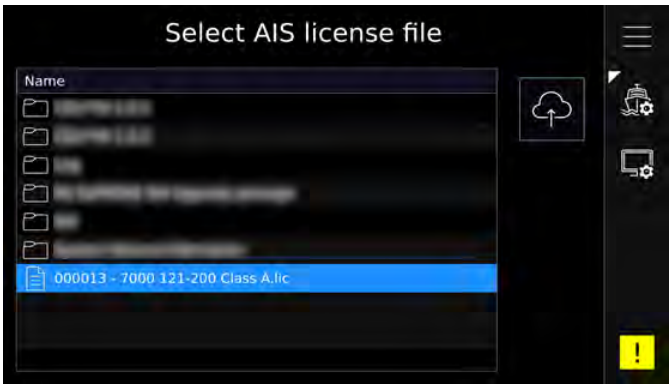
Some features in the R6 SUPREME System are license controlled and needs to be unlocked by a special license file. A license file is unique for each single R6 SUPREME Transponder. The license file name has the following structure:

200001 - 7000 121-200 Class A.lic

In this example:

200001 – The serial number of the R6 SUPREME Transponder unit this key works with.

7000 121-200 – The part number of this license key.



Picture 5-31 – Lisence Input view

To update the license in the R6 SUPREME System, perform the following:

- Place the license file on a SD-Card.
- Make sure that the R6 CDU and R6 Transponder communicates with each other via Ethernet.
- Insert the SD-Card in the rear of the CDU.
- Select License file and press the **[Upload]** button  .
- Confirm the upload of the license.
- Press [**Close]** in the successful upload dialog.

6 OPERATION

These sections describes all the features related to everyday operation and various views found in the “Main Menu”.

6.1 General usage

The system is typically operated using the R6 CDU. Modern ECDIS systems will allow for presentation of AIS data, and some may even operate as a full replacement of the R6 CDU. Consult your ECDIS documentation to determine its AIS capability and approvals.

Apart from observing received AIS targets, normal interfacing with the system involves:

- Updating voyage related parameters
- Updating navigational status
- Observing AIS system alerts
- Sending/receiving text messages.

6.2 Description of LED indicators on R6 SUPREME Transponder

Picture 6-1 – Transponder Status LED

1 - STATUS LED (multi-colour)

- Solid green when the transponder is operating and no alerts are active.
- Solid red if there is an active alert.
- Flashing red if there is an unacknowledged alert.
- Off if there is a power failure.

2 - RX LED (yellow)

- Flashes yellow when the transponder receives a message on the VHF link.

3 - TX LED (red)

- Flashes red when the transponder transmits a message on the VHF link.

6.3 R6 CDU HMI

This section describes the controls and status indications of the R6 CDU.

Key elements that are used to control and observe the system are identified below. Note that the physical function keys F1 - F4 have different function in CDU **Operative views, Status views/menus** and **Configuration views/menus** as indicated by the corresponding symbols in the HMI area no.7 described below. The physical function key descriptions below, are applicable to the **Operative Mode** view.

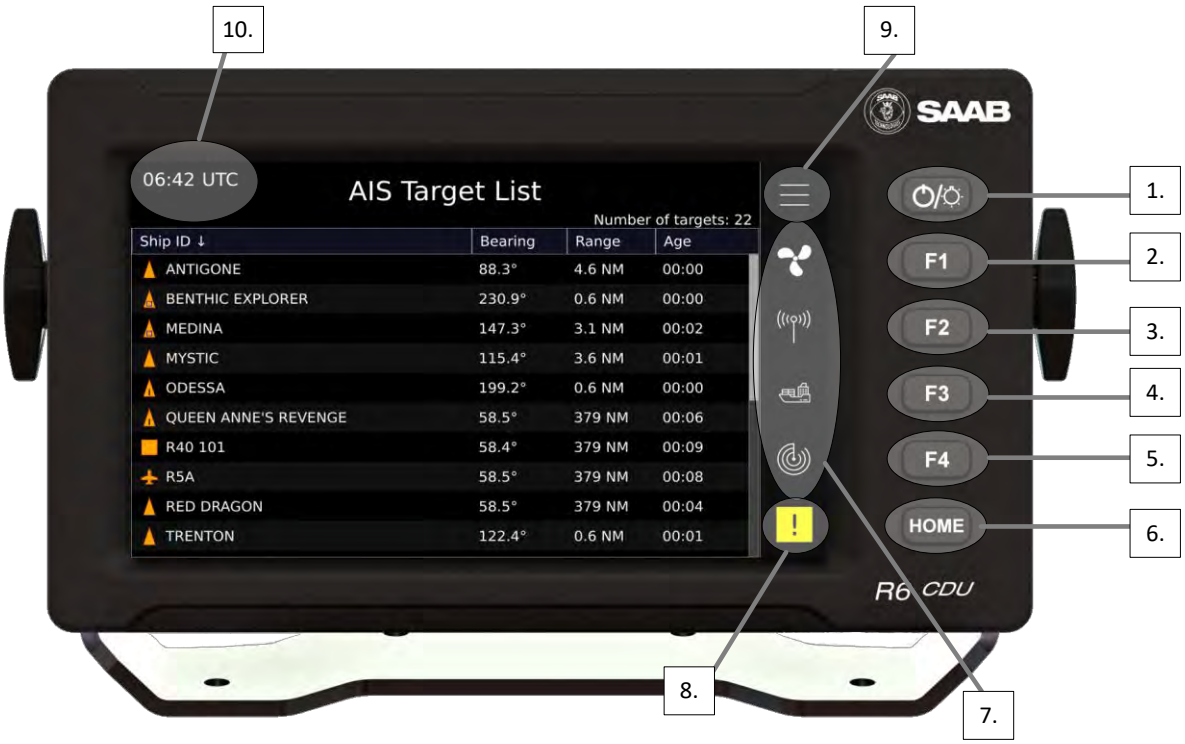


Figure 6-1 – Key HMI elements of the R6 CDU

1 - Power / Dimmer button (multi-colour)

Changes colour depending on Alert status:

- Constant green when the transponder is operating and no alerts are active
- Constant yellow or orange if there is an active alert (depending on alert priority)
- Flashing orange if there is an unacknowledged alert

Quick press will toggle dimming levels:

Day → Dusk → Night → Off → Day

*NOTE: The brightness setting may be operated from a central dimming source if connected to the system. Pressing the **PWR/Dimming** button will override central dimming, until a new instruction is received from the central dimming source.*

*NOTE: In Off mode, **PWR/Dimming** button are still active.*

Shut down or power up the system

- Long press (10 seconds) will power off the R6 CDU completely (soft shutdown)
- After a soft shut down, press the power button again to power up
- After a hard shut down (using power supply), the system will automatically power up

2 - F1 - Function Key

Provides quick selection of navigational status (default).

Will be user configurable in future FW updates.

3 - F2 - Function Key

Provides quick toggle of VHF transmission mode (default).

Will be user configurable in future FW updates.

4 - F3 - Function Key

Provides quick access to AIS Voyage setting (default).

Will be user configurable in future FW updates.

5 - F4 - Function Key

Provides quick access to GNSS status view (default).

Will be user configurable in future FW updates.

6 - HOME Key

Provides quick return to AIS Target View from any other view, including Configuration/Status views and menus.

7 - F-key function indicators

Indicates the current function of the corresponding physical Function Key located to the right.

Also works as touch buttons.

8 - Alert status field

Will indicate if any alerts are present in the system. Touch for quick access to alert list.

9 - Main Menu button

Provides access to lists of all available screens of the system, as well as access to the Configuration/Status views and menus. For more information on how to navigate the menu system, see Section 6.4.1.

10 - Time and status indications field

Colon in time stamp will blink as long as the R6 CDU is responsive. Provides indications of new received AIS text messages. Touch letter symbol for quick access to Messages view. Indication shown if 1W transmission mode is activated.

6.3.1 Change Settings of a Parameter

Many views contain parameters that can be edited (colour marked). To edit a parameter, simply press it on the screen. Once the desired changes have been made press the **[Save]**  button which will appear on the view if a change has been done.

Data can be entered in the following ways:

- **Text/Numbers** through a virtual keyboard. Press characters on screen directly and press **[Enter]** to confirm. Press [**ESC]** to undo changes.
- **Selection List:** Parameters with fixed values are displayed in a drop-down list shown when parameter is selected.
- **Selection List and Numeric Input:** in views like **AIS Message** it is possible to select a target MMSI from a selection list. It is also possible to enter any MMSI number by pressing the pen symbol.
- **Checkbox:** Some parameters with only on/off or enable/disable options are displayed as a checkbox. Just Click to select/unselect.

NOTE: REMEMBER THAT MOST CONFIGURATIONS REQUIERS TO BE SAVED WITH THE "DISKETTE BUTTON" AND THAT SYSTEM POWER IS NOT TURN OFF WITHIN 2 SECONDS AFTER THE PARAMETERS ARE SAVED.

6.4 View Structure – Tree view

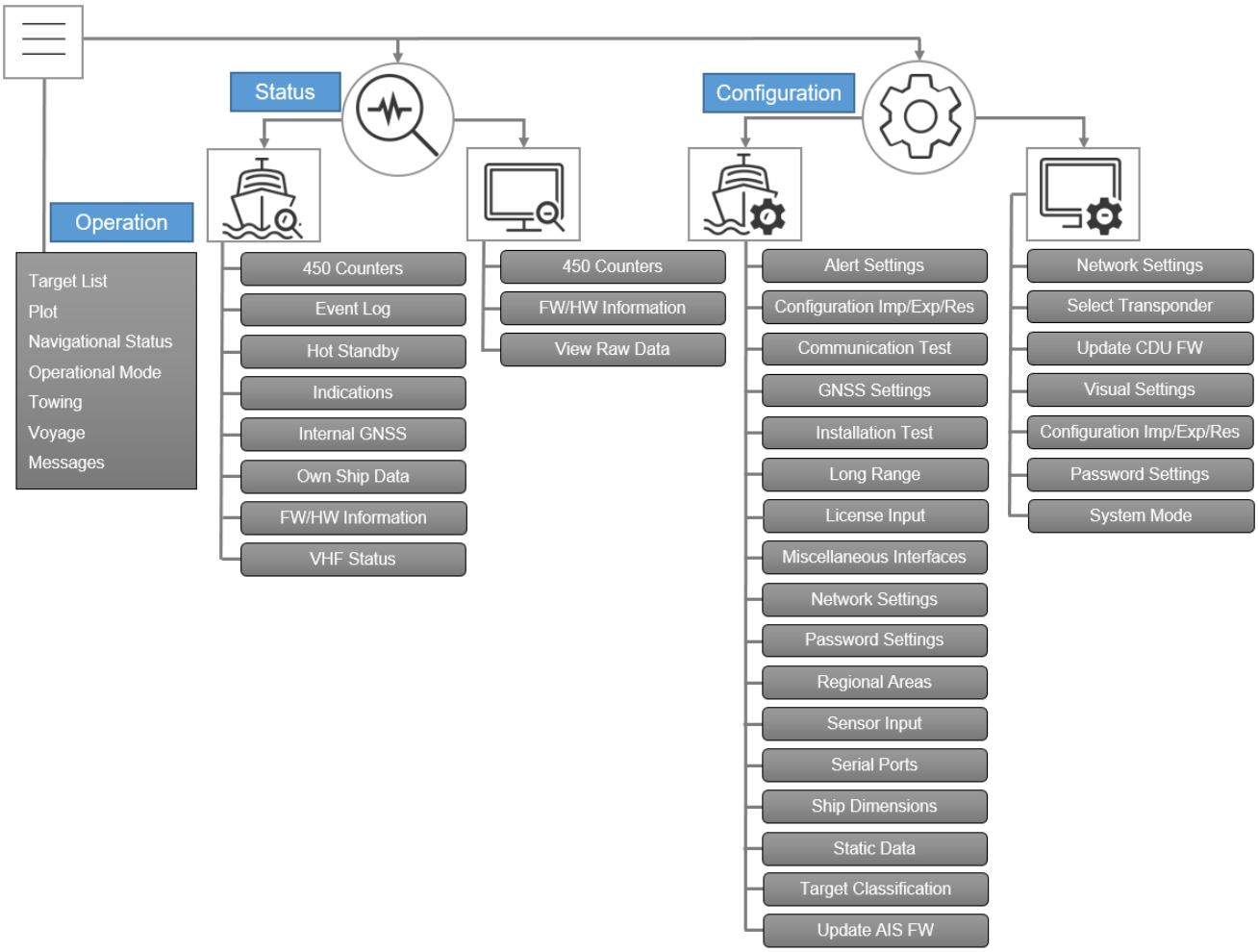


Figure 6-2 – Tree View

6.4.1 Navigating to specific views

To fully navigate the R6 CDU, use of the touch display interface is necessary. Below is a quick guide on how to navigate to the various menus. Consult figure “Figure 6-2 – Tree View” for guidance. Press the physical **[HOME]** key to exit any view and bring up the AIS Target List view.

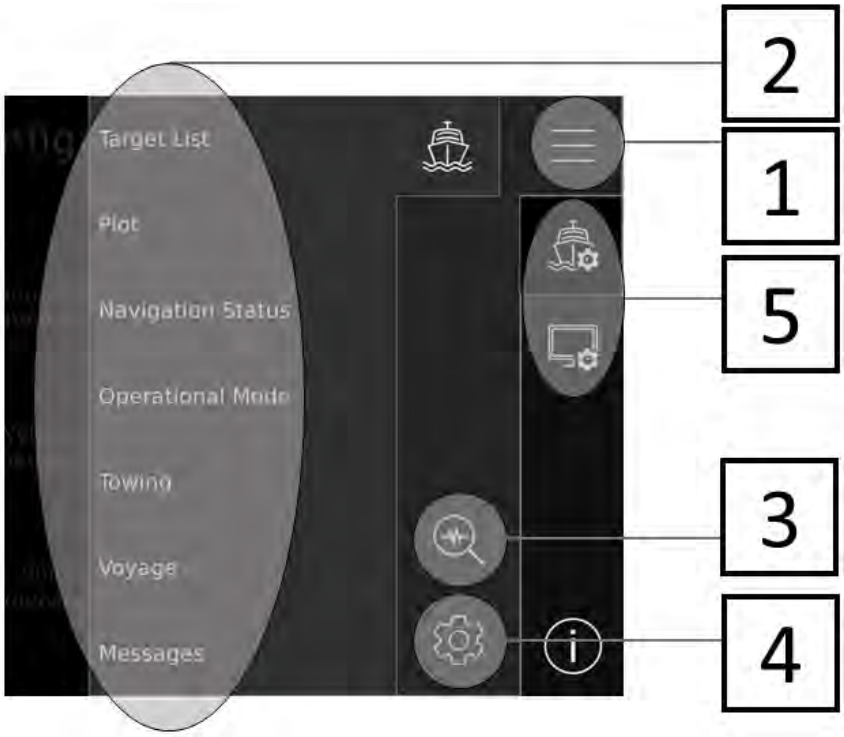


Figure 6-3 – Main Menu

1 - Main Menu

Press the [**Main Menu]** button ☰ in the top right corner to bring up a list of options.

2 - Operative Menu

All these options belong to the Operative view group. Select any of these options to enter.

3 - Status Menus

Press the analyse magnifying glass to enter the Status Menus.

4 - Configuration Menus

Press the cogwheel to enter the Configuration Menus.

5 - AIS/CDU view

For the Status menus/views and Configuration menus/views it is possible to toggle between the AIS and CDU menus by selecting the ship or display symbols respectively. Either by the touchscreen or their related hardware buttons.

6.4.1 Precautions for LCD panel operation

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may

also appear shortly. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

Response time is greatly delayed at temperatures below the operating temperature range, however this does not mean the LCD is out of order. It will recover when it returns to the specified temperature range.

If the display area is pushed hard during operation, the display may become abnormal, however it will return to normal if it is turned off and then turned back on.

6.5 Alerts

If the R6 SUPREME system detects a malfunction or operational issue, an alert will be raised, indicated by an alert icon in the Alert status field (see Section 6.6.1) and possibly audible signals.

The significance of an alert is presented with their different priority levels, some requiring immediate attention and an acknowledgement.

To see alerts requiring acknowledgement or to see an overall view of all raised alerts, navigate to the "*Alert List*" by clicking on the **alert indication symbol** in the lower right corner. Perform necessary actions by following the instructions in section 6.12.

NOTE: Not all alerts require acknowledgement.

NOTE: For more detailed information about alert types and their effect on the system, see section 6.13.

6.6 Status Icons

6.6.1 Alert status icons


Active unacknowledged warning (flashing)


Active silenced warning (flashing)


Active acknowledged warning

Active caution


Active unacknowledged notification


Active acknowledged notification

NOTE: The list shows all alert icons in falling priority order. No alert classified as alarm will occur in a pure AIS system. For quick access to the Alert List, press the icon.

6.6.2 Navigational status icons


Status not defined


Under way using engine


Under way sailing


At anchor


Moored


Engaged in fishing


Not under command


Restricted manoeuvrability


Constrained by draught


Aground


Power-driven Vessel Towing Astern


Power-driven Vessel Pushing/Side Towing

Press the Navigational Status icon in the right side vertical panel for quick access to the Navigation Status selection view. The Navigational Status icon changes based on the current Navigational Status.

NOTE: The transponder will automatically engage 1W mode when the following conditions are met: Ship type = Tanker, Nav Status = Moored and SOG ≤ 3 knots, otherwise 1W mode will be automatically disengaged. The Tanker 1W mode is fully automatic and cannot be disengaged by other external control.

Other status icons that can be displayed are:


Unread message.


1W mode (Indicates 1 Watt TX mode for Tankers is enabled). See NOTE above for details.

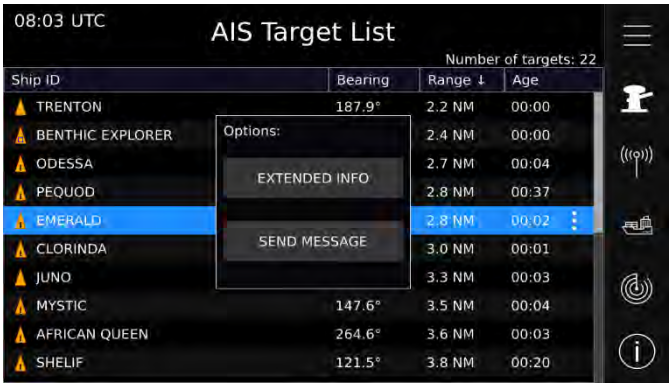
Silent Mode activated, by either TX Mode parameter or silent switch.


Transmitting Mode active.

6.7 Target List

The R6 SUPREME System will power up in "*Target List"* view. This view is accessed from "*Main Menu"*, and also the physical **HOME** button.

The "*Target List"* view displays a list of all AIS targets received on the VHF data link. The list includes MMSI or ship's name (Ship ID), bearing, range and time since last report was received (Age) for each AIS target received by the system.



Picture 6-2 – Target List

For extended information about a target in the list, select the desired target and press the three dots in the rightmost column.

The *Extended Information* view includes static, dynamic and voyage related data for the selected target. Press the right arrow symbol to switch between the pages of extended information.

Picture 6-3 – Extended Info

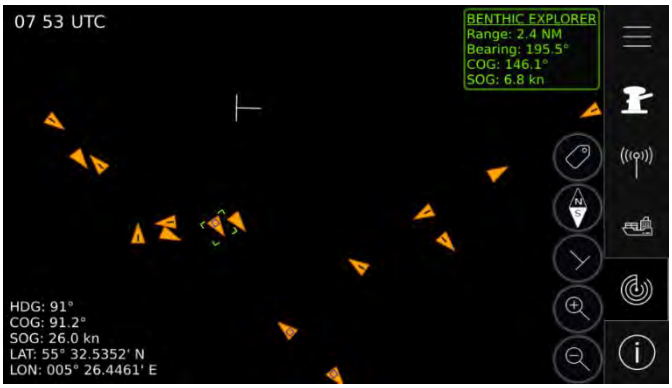
Press the  button to return to *Target List* view.

Press the  for more information.

If target classification is used it is possible to add a target to a class. See Section 5.3.16.

6.8 Plot

The location of targets relative to your own ship is visualized in the *Plot* view.



Picture 6-4 – Target Plot

The own ship target is displayed as a 'T' shaped symbol. Class B targets are indicated by a 'B' appended to the target icon and inland targets are indicated by either an 'I' or a blue sign symbol appended to the target.

6.8.1 Navigating the Plot View

Use the touch panel interface to pan the plotted area with a drag gesture. Use pinch gesture to zoom in and out, alternatively use the plot buttons for zooming.

For range and bearing to a target, select it in the plot using the touch panel. Use the Target List View to view complete target information.

6.8.2 Plot Buttons

Show/Hide Target Names

North Up / Heading up toggle

Centre on own position (reset panning)

Zoom In

Zoom Out

6.9 Voyage

AIS Voyage related information is displayed in the "*AIS Voyage"* view. Voyage related data includes destination, estimated time of arrival (ETA) and number of persons on-board.

Picture 6-5 – AIS Voyage

Parameter Name	Description
Destination	The destination for the current voyage
Estimated Time of Arrival (ETA)	The estimated time of arrival to destination of current voyage
Persons on-Board	Total number of persons on board
Draught [m]	The vertical distance measured from the lowest point of a ship's hull to the water surface, in meters (one decimal precision)
Hazardous Cargo (X,Y,Z,OS) **(not available for all ship types)**	Classification of current cargo according to X,Y,Z,OS

Table 6-1 – Voyage information

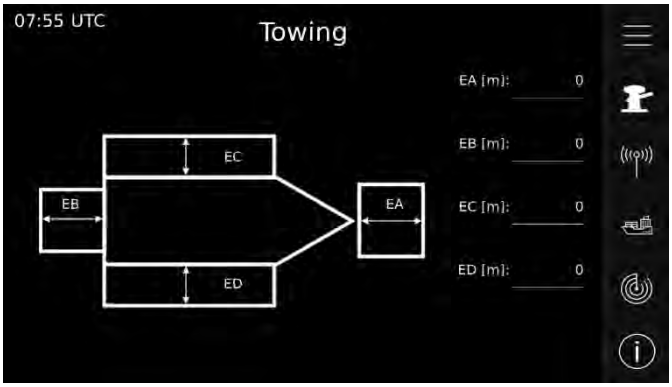
6.10 Towing

Extensions to the normal ship dimensions (configured according to section 5.3.14) can be entered in the *Towing* view.

These dimensions are added to the normal ship dimensions sent over AIS when navigational status is "Power driven vessel pushing/side towing" (navstatus 12).

A popup notification is provided after selection of navstatus 12. The user is reminded to check proper setting of extended dimensions and adjust them if necessary.

A popup notification is also provided if extended dimensions are set to zero during navstatus 12.



Picture 6-6 – Towing - Extended Ship Dimensions

6.11 **Messages**

AIS Safety related messages (SRMs) and text messages can be sent to specific targets (addressed messages) or broadcast to all targets.

The "*Inbox"*, "*Outbox"* and "*Long Range"* tabs for messaging are available in the Messages view.

To draft a new message:

1. Start in the Inbox or Outbox tab.
2. Press the letter symbol,  shown in Picture 6-7.
    a. Alternatively, press  to reply to an old message in the Inbox or to reply a message in the Outbox tab. Use  to delete a message.

Picture 6-7 – Message – Inbox tab

3. Draft the text; click in the text edit area to the left (see Picture 6-9). This will show the virtual keyboard used to input text (see Picture 6-8). Click on the **[Enter]** button of the virtual keyboard when done.

Picture 6-8 – Virtual Keyboard

4. Select message type.

NOTE: SRM type messages are only for Safety Related purposes, and not intended for general use.

5. Choose transmission channel (may be omitted).
6. Select MMSI number from drop down, or free input (only for addressed message types).
7. Press the  to send.

NOTE: A message with the text "Target may not display message" will be shown if the addressed target's AIS information indicates that display functionality not is available (DTE flag).

Picture 6-9 – Send new Message

6.11.1 Inbox Tab

Received messages can be accessed in the "*Inbox" tab*. Unread SRMs and text messages are indicated with an envelope icon in the status field. In the "*Inbox"* tab unread messages are marked with a closed envelope while read messages are marked with an open envelope.

To delete a message press symbol nr2 shown in Picture 6-7.

6.11.2 Outbox Tab

Sent or pending messages can be viewed in the *Outbox* tab, see Picture 6-10

Picture 6-10 – AIS Message Outbox

6.11.1 Long Range Tab

The "*Long Range*" tab is used to view long range interrogation messages received over the AIS Long Range PI port.

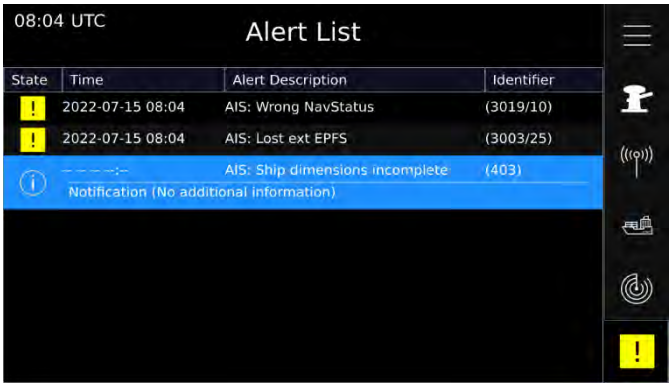
If the reply mode has been configured to Manual, this tab can be used to manually reply to Long Range Interrogations.

6.12 Alert List

All currently active and enabled alerts are shown in the "*Alert List"* view that can be accessed from or by clicking on the **alert indication symbol** in the lower right corner. For a list of all alerts, see section 6.13.5. For troubleshooting alerts see section 10.3.

If an unacknowledged/silenced alert is selected in the list a checkmark icon will become visible in the upper right corner. Press the checkbox to acknowledge the alert, the checkbox will turn grey.

NOTE: Not all alerts require acknowledgement.



Picture 6-11 – Alert List

6.13 Alert Status

The R6 SUPREME system is a "Bridge Alert Management" and "Legacy Alert" compliant system of "Type P" according to IEC 62923-1 ed.1. Capable of handling and generating necessary information for communication with old as well as new systems.

All active alert in the R6 CDU are both presented visually and by audio signals according to BAM (IEC 62923-1 ed. 1). The visual icons used for representing the alert states in both the "Alert List"–view and the Alert Notification Area, can be seen in section 6.6.1.

6.13.1 Priority

Each alert is prioritized to one of following priorities:

- **Emergency Alarm** – Highest priority alert. Not used by any R6 SUPREME system.
- **Alarm** – Next highest alert level there is, not occurring in a pure R6 SUPREME system, requiring immediate attention and action. Unacknowledged alarm causes a three beeps audio signal every 7.5s.
- **Warning** – Condition requiring immediate attention, but no immediate action. Unacknowledged and escalated warning results in a two beeps audio signal. (Warnings escalates every two minutes as long as they are “Active Unacknowledged”).
- **Caution** – Lowest alert level, requiring awareness out of the ordinary, consideration of the situation, or of given information and does not cause any audio signal.
- **Notification** – Non-alert level not causing any audio signal.

6.13.2 Category

Each alert is categorized to one of following classes:

- **A** – Alert for which graphical information at the task station directly assigned to the function generating the alert is necessary, as decision support for the evaluation of the alert related condition.
- **B** – Alert where no additional information for decision support is necessary besides the information which can be presented at the central alert management interface.
- **C** – Alert that cannot be acknowledged on the bridge but for which information is required about the status and treatment of the alert.

NOTE: The R6 SUPREME System only generates alerts of category B.

6.13.3 Grouping and Aggregation

The R6 SUPREME system does not apply these features.

6.13.4 Alert Commands

This section describes the effect of commands as applicable on alerts in the R6 SUPREME system.

6.13.4.1 Acknowledgement

If an active or silenced alert is acknowledged, the alert will still be present but not able to escalate or cause more audible alert signals. If the alert is in any other state the command will have no effect on the alert.

6.13.4.2 Silence

If an active alert is silenced it will be prevented from causing audible signals for 30 seconds. However, it will still be present and regarded as unacknowledged. If the alert is in another state the command will not affect the alert.

NOTE: The CDU does not provide the functionality of this operation; it requires an external action/input by for example a CAM system.

6.13.4.3 Query

Equipment integrated with R6 units may require more information, more frequently, of the system's alerts and their status, this is done via queries. Any received queries will not affect the status of alerts, but will generate an extra data output.

6.13.4.4 Responsibility transfer

The R6 SUPREME System does not use this command.

6.13.5 Alert Identification List

In “Table 6-2 – Alert Identification List” all alerts that the R6 SUPREME System can generate are listed with Alert identifiers, Instance identity, Priority and texts for both “Legacy Alert” and “Bridge Alert Management”.

Observe that all alerts generated by the R6 SUPREME System are of *“Category B”* and does not support responsibility transfer functionality.

Alert ID	Instance ID	Priority	Alert Text (BAM)	Description Text (BAM)	Alert Description (Legacy Alert)
3003	165	Caution	Lost AIS	Check connection to AIS transponder	CDU Lost Connection To Transponder
3003	25	Caution	Lost ext EPFS	Check external position sensor	External EPFS lost
3003	65	Caution	Hot standby lost	Check AIS Hot standby connection	Hot standby connection failure
3008	1	Warning	Transceiver fail	Not transmitting check AIS	Tx malfunction
3008	34	Warning	Transceiver fail	Not receiving check AIS	(No Legacy)
3009	8	Caution	MKD Lost	Cannot Display safety related messages	MKD connection lost
3013	9	Caution	Doubtful GNSS	Int/Ext GNSS position mismatch	Int/Ext GNSS position mismatch
3013	11	Caution	Doubtful Heading	Difference with COG exceeds limit	Heading sensor offset
3015	26	Warning	Lost positon	Own ship position not transmitted	No sensor position in use
3019	10	Caution	Wrong NavStatus	Check NavStatus setting	NavStatus incorrect
3062	6	Warning	General fault	Check AIS equipment	General failure
3108	14	Warning	Locating device	Check AIS targets	Active AIS SART
3113	7	Caution	Sync in fallback	Check AIS for UTC time synchronization	UTC sync invalid
3116	2	Caution	Impaired radio	Reduced coverage (antenna VSWR)	Antenna VSWR exceeds limit
3116	3	Caution	Impaired radio	Ch1 inoperative check AIS	Rx channel 1 malfunction
3116	4	Caution	Impaired radio	Ch2 inoperative check AIS	Rx channel 2 malfunction
3116	5	Caution	Impaired radio	DSC inoperative	Rx channel 3 malfunction
3119	29	Caution	Missing SOG	Not transmitting SOG	No valid SOG information
3119	30	Caution	Missing COG	Not transmitting COG	No valid COG information

Alert ID	Instance ID	Priority	Alert Text (BAM)	Description Text (BAM)	Alert Description (Legacy Alert)
3119	32	Caution	Missing Heading	Not transmitting Heading	Heading lost/invalid
3119	35	Caution	Missing ROT	Not transmitting Rate of Turn	No valid ROT information
10072	72	Caution	Tx disabled	AIS transmitting externally disabled	TX disabled externally

Table 6-2 – Alert Identification List

Maximum number of alerts possible to occur: 21

NOTE: Active alert of priority "Warning" escalates to "Warning" every other minute if not acknowledged, while "Caution" cannot escalate.

NOTE: Information on when and why the alerts appear can be found in section 10.3

NOTE: When working with "Legacy alert" (ALR sentence) compatibility the Instance identifier is the same as the "Unique Alarm Identifier"

7 STATUS

The R6 CDU menu system is divided into three categories: Operative, Status and Configuration. Views belonging to the Status Menus are described in the following sections.

7.1 AIS Status Menu

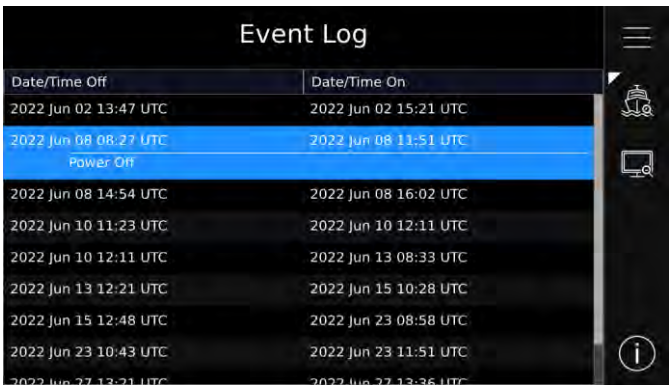
This section describes the views that can be found in the R6 SUPREME System under the AIS Tab.

7.1.1 AIS - 450 Counters

See Section 10.4.6 for more detailed information.

7.1.2 Event Log

Displays information about times when the R6 SUPREME Transponder has been turned off or, for some reason, has not been transmitting for more than 15 minutes.



Picture 7-1 – Event log view entries

7.1.1 Indication List

Current status indications are listed in the "*Indication"* view. The different status indications that can occur are listed in section 10.8.

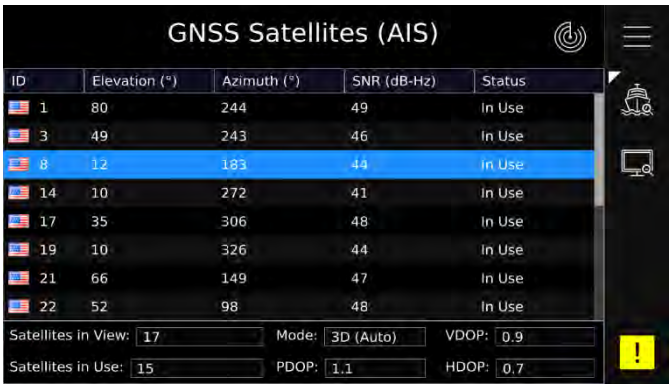
Picture 7-2 - Indication List

7.1.1 Internal GNSS Satellites – List view

Displays the satellites received by the R6 SUPREME Transponder internal GNSS receiver. The list is sorted by the satellites ID (PRN number) and shows elevation, azimuth and signal to noise ratio (SNR) for each satellite.

The view also displays the total number of satellites in view, total number of satellites used in the position calculation, current operating mode and dilution of precision (DOP) values.

To view the currently used GNSS constellation, press the **Radar Symbol** in the upper right corner.



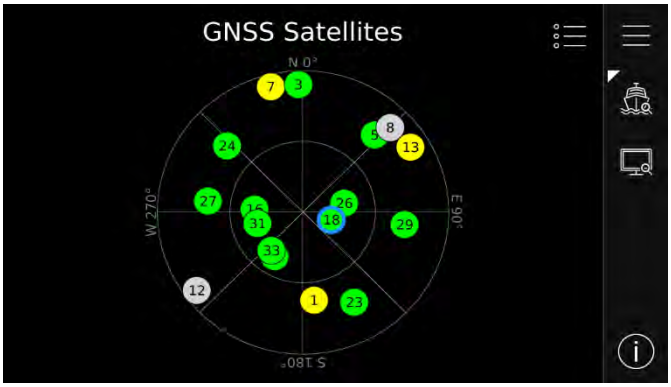
Picture 7-3 – AIS Internal GPS Status

7.1.2 Internal GNSS Satellites – Sky Plot view

From the GNSS Satellites List view the "*Sky Plot"* view is accessible. This view shows the current GNSS constellation in a plot. Each received satellite is colour coded based on status and SNR.

Depending on SNR and status, received satellites are displayed in colours according to:

- Status *In Use* and SNR over 40 dB-Hz
- Status *In Use* and SNR below 40 dB-Hz
- Status *Tracking* (not used in position solution)



Picture 7-4 – GNSS Satellites Sky Plot view

7.1.3 Own Ship Data

The information transmitted by the R6 SUPREME Transponder on the VHF link is viewed in the *Own Ship Data* view. This view includes the static, dynamic and voyage related data actually sent by the R6 SUPREME Transponder. The view reflects the contents of the last transmitted AIS

messages, thus there may be some delay from the time the parameters are changed until they are displayed in the *Own Ship Data* view.

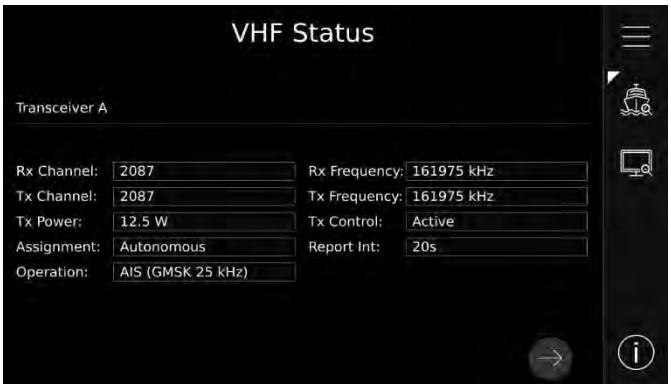
Picture 7-5 – Transmitted Own Ship Data

7.1.4 AIS - FW/HW Information

See Section 7.3 for more detailed information.

7.1.5 VHF Status

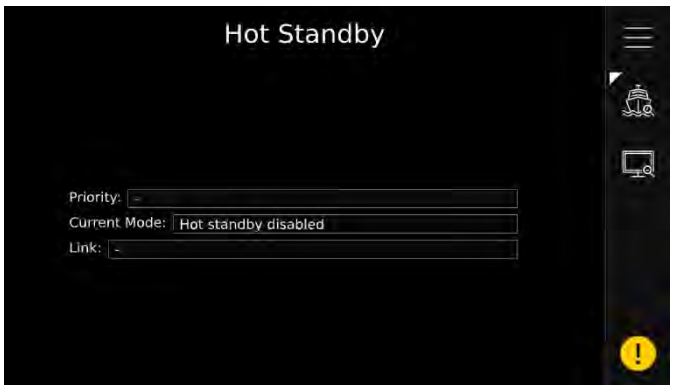
The *VHF Status* view shows the currently active VHF settings. Channel number, frequency, power and operational mode are displayed for each VHF transceiver function in the R6 SUPREME Transponder. This information is useful when troubleshooting to make sure that the R6 SUPREME Transponder is using the expected VHF radio settings. If e.g. a regional area is set and in use, this will affect the information shown in the VHF Status view.



Picture 7-6 – VHF Status

The VHF Status view have three slides, one for each transceiver A, B, and C. Use the **[Arrow]** to navigate to the next, use **[Arrow]** to go to the previus.

7.1.6 Hot Standby Status



Picture 7-7 – Hot Standby Status

The view shows if the transponder is configured as Primary or Secondary unit in the hot standby pair, current mode (“Active” or “Standby”) and also status of the hot standby operation.

The Priority can be:

- **Hot standby disabled** – Hot standby is disabled
- **Primary Unit** – Primary unit on the Hot standby pair
- **Secondary Unit** – Secondary unit on the Hot standby pair

Current Mode:

- **“-“** – Hot standby is disabled
- **Active** – Unit is active
- **Standby (Silent)** – Unit is in standby mode and silent

The link status can be one of the following:

- **OK** – Hot Standby is working properly.
- **No Contact** – Serial connection between the two transponders is not working.
- **One way communication** – Status from this unit does not reach the other unit.
- **Configuration mismatch** – Primary/Secondary configuration wrong. One unit must be set to “Primary” and the other to “Secondary” for the Hot Standby pair to work.
- **Hot standby version mismatch** – The transponders in the Hot Standby pair have different firmware versions.
- **License mismatch** – The transponders in the Hot Standby pair have different product licenses.

If the hot standby connection status is anything else the “OK” an alert will also be generated. The hot standby alert is configurable as described in section 5.3.1.

7.2 CDU Status Menu

This section describes the views that can be found in the R6 SUPREME System under the CDU Tab.

7.2.1 CDU - 450 Counters

See Section 10.4.6 for more detailed information.

7.2.2 View Raw Data

Displays incoming data on the selected serial port. It is also possible to pause the data on the screen by pressing the **Pause** button. The "*View Raw Data"* view can be a helpful tool when trouble shooting the system to see what sensor input is actually received on each port.

Characters are displayed according to ISO 8859-1 (Latin-1). Non-printable characters are displayed with symbol names as "<SYMBOL>", e.g. carriage return and line feed are displayed as "<CR><LF>".

Use **Clear** button to clear current log data.

Picture 7-8 – View Raw Data

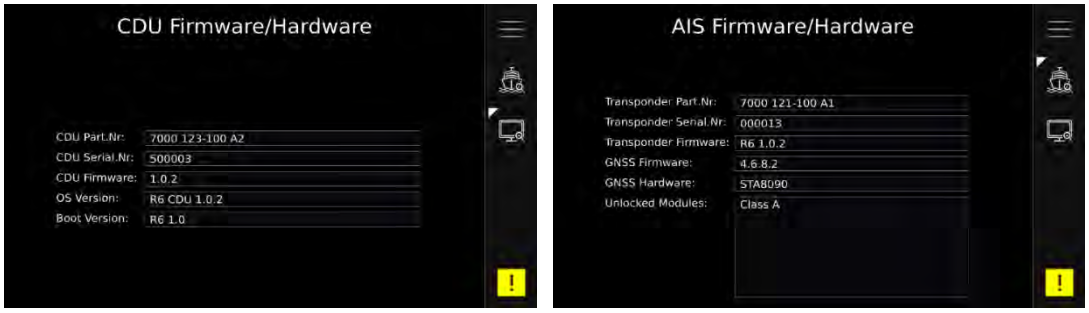
7.2.1 CDU - FW/HW Information

See Section 7.3 for more detailed information.

7.3 FW/HW Information view

This view displays the Firmware and Hardware revisions for a system component. Separate views are available for display (CDU) and transponder (AIS) Firmware/Hardware information.

This information should always be provided when contacting Saab TransponderTech support.



Picture 7-9 – FW/HW Information Views

8 FIRMWARE UPDATE

After replacing a CDU or Transponder unit with a different unit, it may be necessary to make a Firmware update to make sure the CDU and Transponder FW versions are fully aligned.

The Transponder can be updated over Ethernet via the R6 CDU using a SD card or from the R6 SUPREME web interface.

Make sure to carefully read the release notes for the Firmware update package first.

For the latest manual, firmware and certificates please visit:
https://www.saab.com/transpondertechsupport

8.1 Update Firmware in R6 SUPREME Transponder via CDU

The R6 SUPREME is upgradable through the R6 CDU SD card host interface located on the back of the R6 CDU, using the Ethernet interface. To update the Firmware in the R6 Transponder, perform the following steps:

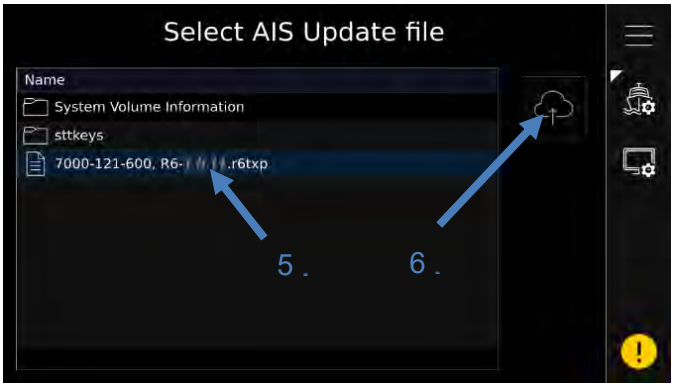
- Ensure the R6 SUPREME and R6 CDU is connected to a common network or directly using any of the ETH interfaces, as long as the subnet is the same.
- Unzip the R6 SUPREME update package directly on an SD card (must be FAT32 formatted). There should now be a file called **7000-121-600, R6-*.*.*.r6txp**.

Note: the '' fields will indicate the FW version number of the package selected.*

- Insert the SD-Card in the SD-Card interface located on the back of the R6 CDU.
- Navigate(1,2) to the "*Update AIS FW*" (4) view that can be accessed from the "*AIS Configuration Menu*"(3) *see. 6.4*

Picture 8-1 – Navigate to Transponder FW Update

- In the browser select the update file(5) on the SD card and press the update symbol  (6).



Picture 8-2 – Update Transponder FW Update

- Confirm start of update in the pop-up dialog.
- If update succeeds, the unit will restart.

NOTE: Should there be an issue during the firmware load, the transponder will fall-back to back-up firmware and the Status led will be lit red and Rx/Tx leds will be flashing.

NOTE: Back-up firmware will require a firmware load by either CDU or Web-interface before the transponder will be operational again. The Back-up firmware will change the IP settings, therefor it is important to verify connection and IP Adress in the CDU before preforming an update of the firmware from the Back-up firmware.

- In the Firmware Complete Dialog, Press **Close**

In case of repeated failures to update the FW. Verify content on the SD card and possibly try with another brand of SD card if the problem persists.

8.2 Update Firmware in R6 SUPREME Transponder via Web

To update the R6 firmware and Firmware, simply use the file upload tool on the Web servers "*Maintenance"* category page.

To perform a Firmware update, perform following steps:

- Click the **Select Firmware file** button.
- Browse the file structure to find and select the .r6txp–file for upload. Click on the **Open** button (or similar in your language). The update process will start.
- The file is uploaded to the R6. A progress bar displays the data transfer.
- Once the file is uploaded it will be written to the device. A progress bar is shown.
- When written the device will reboot, and the Web page will reload. The update process is thereafter finished.

NOTE: This is the procedure to follow regardless of type of update. The contents of the .R6Pkg-file controls what is updated.

8.3 Update Firmware in R6 CDU

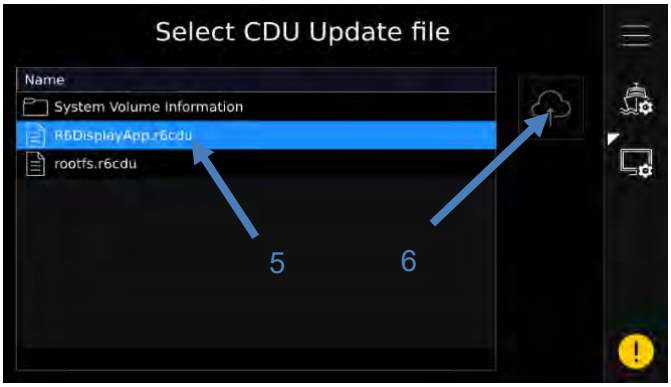
The R6 CDU is upgradable through the SD card host interface located on the back of the R6 CDU. To update the Firmware in the R6 CDU, perform the following steps:

- Unzip the R6 CDU update package directly on an SD card (must be FAT32 formatted). There should now be a file called **7000-123-600, R6-*.*.*.r6cdu**.

  Note: the '' fields will indicate the FW version number of the package selected.*
- Insert the SD card in the SD card interface located on the back of the R6 CDU.
- Navigate to the *Update CDU FW(3-4)* view that can be accessed from the "*CDU Configuration Menu"(1-2) see section 6.4.*

Picture 8-3 – Navigate to CDU FW Update

- In the browser select the update file(5) on the SD card and press the update symbol  (6).



Picture 8-4 –CDU FW Update

  - Confirm the start of update in the pop-up dialog.
  - Loading progress will be shown in GUI.
  - If preparation succeeds, the unit will restart and start loading. This is indicated by the **POWER BUTTON LED**
    - Initial **RED** Led indication will switch to **BLUE** within 5s
    - **BLUE** state will remain while loading. Estimated 1-2 minutes.
    - When loading is done, indication will turn **YELLOW** and the system will reboot.
    - If the update process fails, The LED will lit **YELLOW** and stay in this state for more than 15 s without the other buttons being lit.
    - Should this happen, perform a Hard Factory Reset (see Section 8.4).

In case of repeated failures to update the FW. Verify content on the SD card and possibly try with another brand of SD card if the problem persists.

If there is a power failure during FW loading the CDU will not be able to resume update automatically, and a Hard Factory Reset will be needed (see Section 8.4).

	POWER LED colour
Initial state	RED
Update in progress	BLUE
Update done, booting	YELLOW

Table 8-1 – CDU LED Indicators during Firmware Update

8.4 Hard Factory reset of CDU FW

If the FW has been corrupted, the CDU will not complete the boot process and the **POWER BUTTON LED** will turn **RED** and then stay **YELLOW** indefinitely after power is applied. In this case the CDU FW must be factory reset. This FW may be older than the FW that was operating before the corruption. Update the FW to desired version per normal procedures after a factory reset.

To factory reset the FW:

- Disconnect power to the CDU.
- Make sure no SD card is in the SD card reader.
- Reconnect power while holding **F3** and **F4** for factory reset to commence.
- The **POWER BUTTON LED** will during the reset procedure change colours in the following sequence: **RED→BLUE→YELLOW**.
- **F3** and **F4** can be released when the **POWER BUTTON LED** turns **BLUE.** Estimated time for completion is one minute.
- The unit will automatic reboot after completion, and normal FW update procedures can be performed.

9 TECHNICAL SPECIFICATIONS

9.1 R6 SUPREME Transponder

9.1.1 Physical

Dimensions:	Height: 52 mm Width: 250 mm Depth: 183 mm
Weight:	2.0 kg

Table 9-1 – R6 Supreme physical dimensions

9.1.2 Electrical

Input Voltage:	12-24 VDC
Power Consumption:	15 W (60 W peak)

Table 9-2 – R6 Supreme electrical

9.1.3 Environmental

Temperature:	-15˚C to +55˚C (Operational) -30˚C to +80˚C (Storage)
Vibrations:	IEC 60945 ed. 4
EMC:	IEC 60945 ed. 4
Radio Type Approval:	IEC 61993-2 ed. 3
Compass Safe Distance:	35 cm (for standard magnetic compass) 30 cm (for steering magnetic compass)

Table 9-3 – R6 Supreme enviromental

9.1.4 VHF Transceiver

Receivers:	156.025 – 162.025 MHz (TDMA) 156.525 MHz fixed (DSC, Channel 70)	
Transmitter:	156.025 – 162.025 MHz	
Channel bandwidth:	25 kHz	
Output Power:	High: Low:	12.5 W 1W

	"Tanker 1W Mode": 1W
VHF antenna connector:	BNC-Female
Antenna Input Impedance:	50 ohm

Table 9-4 – R6 Supreme radio

9.1.5 Internal GNSS Receiver

Type:	GNSS – Separate or concurrent (default) GPS L1 and GALILEO E1
Update rate:	1 Hz
Accuracy:	< 2.0 m (GPS, CEP, 50%, 24 hours static)
Antenna feeding:	5 VDC
GNSS Antenna connector:	TNC-Female
Antenna Input Impedance:	50 ohm

Table 9-5 – R6 Supreme GNSS

9.2 R6 CDU

9.2.1 Physical

Dimensions (excluding gimbal mount):	Height: 129 mm Width: 224 mm Depth: 50 mm
Weight:	0.65 kg
Dimensions (incl. gimbal mount):	Height: 160 mm Width: 243 mm Depth: 86 mm
Weight (incl. gimbal mount):	0.85 kg

Table 9-6 – R6 CDU physical

9.2.2 Electrical

Input Voltage:	12-24 VDC
Power Consumption:	5 W

Table 9-7 – R6 CDU electrical

9.2.3 Environmental

Temperature:	-15˚C to +55˚C (Operational) -30˚C to +80˚C (Storage)
Vibrations and EMC:	IEC 60945 ed. 4
Compass Safe Distance:	65 cm (for standard magnetic compass) 40 cm (for steering magnetic compass)

Table 9-8 – R6 CDU environmental

9.1 R6 Junction Box

9.1.1 Physical

Dimensions:	Height: 53 mm Width: 261 mm Depth: 176 mm
Weight:	0.9 kg

Table 9-9 – R6 Junction box physical

9.1.2 R6 Junction Box Alarm Relay

Max switching current:	2 A
Max switching voltage:	30 VDC
Max switching power:	60W

Table 9-10 – R6 Junction box alarm relay

10 TROUBLESHOOTING

One of the basic ideas with troubleshooting is to solve a supposed problem on site instead of immediately sending the suspected part for a costly repair. Solving a supposed problem would in this aspect mean both to rectify the real problem, but it could also mean that the suspected part is confirmed to be working or not-working.

Historically, many of the parts sent to Saab TransponderTech for repair have in fact been confirmed working instead. Another common scenario is that the equipment has faulty I/O settings or other erroneous configurations, easy to fix on site. A proper troubleshooting would ideally prevent those unnecessary returns of fully functional equipment.

There are numerous ways to troubleshoot a transponder installation, much dependant on the skill and experience level of the trouble-shooter. The preferred approach may probably also differ between different individuals, and there is no such thing as right or wrong.

This section is not intended to be a step by step troubleshooting instruction, but instead offer a toolbox with some different techniques on how to troubleshoot the R6 SUPREME System.

10.1 Troubleshooting Prerequisites

A transponders operating environment may naturally differ widely, ranging from small high-speed RIB's to very large SOLAS tankers, military aircraft carriers and even submarines. The diversity of installation environments will of course have impact on the complexity of the troubleshooting, but it is always advisable to start with minimizing all possible interference sources in order to simplify the troubleshooting.

- Disconnect other NMEA equipment from the R6 (ECDIS, RADAR, NAV, etc.)
- Switch off other emission sources (RADAR, SATCOM, VHF, etc.)

We strongly encourage to always use the latest Firmware available for the R6 SUPREME System. It may contain bug-fixes and other improvements solving already known issues. Always check existing release notes to see if your problem is to be found.

10.2 Troubleshooting with the Front Panel LED's of the Transponder

It is very fast and effective to use the LED's to verify the status of the R6 SUPREME Transponder.

10.2.1 STATUS LED (multi-coloured)

- The STATUS LED is constantly lit green when the transponder is operating and no alerts are active.
- The STATUS LED is constantly lit red if there are one or more active alerts in the transponder, but no unacknowledged alerts. Refer to Section 10.3 for interpretation of the alerts.
- The STATUS LED is flashing red if there are one or more unacknowledged alerts in the transponder. Refer to Section 10.3 for interpretation of the alerts.

If neither colour are lit, nor flashing, then check the power supply and make sure that:

- The voltage is correct and stable
- The polarity is correct and not switched
- The available current is sufficient for start-up and transmission
- The external fuse is functional
- The power cable is undamaged

- The power connector is properly connected and secured

10.2.2 RX LED (yellow)

The RX LED is flashing yellow when the transponder is receiving a message from the VDL. This can be intermittently.

If there is verified traffic on the VDL and the RX LED still is dark, then check the alert list for any active alerts. Refer to Section 10.3 for interpretation of the alerts.

Lack of reception may be an indication of a VHF antenna problem or connectivity issues. Check the installation for problems.

10.2.3 TX LED (red)

The TX LED is flashing red when the transponder is transmitting a message to the VDL. The transmission interval is between 2 – 360 seconds. Refer to Section 10.5.

If the TX LED is completely dark, then check so that the transmission is not switched off either through an active regional area or by the TX-Mode parameter. It is possible to check the status on each transceiver in the VHF Status view described in Section 7.1.5.

If the transmission is activated and there still is no red flashing, then check the alert list for any active alerts. Refer to Section 10.3 for interpretation of the alerts.

10.3 Troubleshooting with Alert Messages

The R6 SUPREME System constantly monitors itself for failures, abnormal conditions and other important parameters. Some of the monitoring trigger alerts and those alerts are excellent aids in the troubleshooting process.

An active alert can have three states, silenced, unacknowledged and acknowledged. The state of an alert will affect the STATUS LED on both the R6 SUPREME Transponder and the R6 CDU. Refer to Section 10.2.1.

All active alerts are output on all the serial interface ports of the R6 SUPREME Transponder every 30 seconds. The alert status can for example be used in interfacing ECDIS systems or centralized alert systems. The alerts can also be monitored or recorded for troubleshooting purposes by for example a terminal application.

The alerts that can occur in the R6 SUPREME System are listed below:

10.3.1 Transceiver fail (Alert Identifier: 3008 Instance: 001)

See section 10.3.2

10.3.2 Transceiver fail (Alert Identifier: 3008 Instance: 034)

These alerts are generated if there is a malfunction in the radio transmitter hardware or if the antenna VSWR exceeds an allowed ratio. If the radio transmitter returns to normal operation or if VSWR returns to a value below the allowed threshold, the alert is cleared. The Transceiver fail alert is also generated when the MMSI is configured to “0”, in which case the R6 SUPREME Transponder will not transmit.

The transponder will automatically shut down any transmission with a duration that exceeds two seconds. This will also result in a Transceiver fail alert. The shutdown procedure is independent of Firmware control and will remain activated until a power cycle of the transponder.

10.3.3 Impaired radio (Alert Identifier: 3116 Instance: 002)

The VSWR (Voltage Standing Wave Ratio) of the antenna is checked for every transmission and if it exceeds a given ratio, this alert is generated. If the VSWR goes below the allowed threshold, the alert is cleared. The VSWR threshold for this alert is lower than for the Transceiver fail alert.

10.3.4 Impaired radio (Alert Identifier: 3116 Instance: 003-005)

The radio receivers are continuously monitored and if any part of the receivers' hardware should malfunction, an Rx Malfunction alert is generated for that receiver. If the radio receiver returns to normal operation, the alert is cleared.

10.3.5 General Fault (Alert Identifier: 3062 Instance: 006)

This alert is generated if the R6 SUPREME Transponder fails to initiate the radio or if a severe hardware failure has occurred. If this alert occurs, contact your retailer.

10.3.6 Sync In Fallback (Alert Identifier: 3113 Instance: 007)

This alert is generated when the R6 SUPREME Transponder loses UTC direct synchronization (cannot synchronize from internal GNSS receiver).

10.3.7 Lost MKD (Alert Identifier: 3009 Instance: 008)

This alert is active if the R6 SUPREME Transponder has lost connection with the R6 CDU. If this alert occurs, check the Ethernet connection and the network settings.

10.3.8 Doubtful GNSS (Alert Identifier: 3013 Instance: 009)

This alert is generated if the difference between the internal and external GNSS position is more than 100 m for more than 15 minutes.

10.3.9 Wrong NavStatus (Alert Identifier: 3019 Instance: 010)

This alert is generated if the navigational status is incorrect. If e.g. the navigational status is set to "At Anchor" but the ship is moving faster than 3 knots, the NavStatus incorrect alert will become active.

A popup will appear when the "Incorrect NavStatus" alert is activated to prompt user to change the NavStatus.

10.3.10 Doubtful Heading (Alert Identifier: 3013 Instance: 011)

This alert is active when SOG (Speed Over Ground) is greater than 5 kn and the difference between COG (Course Over Ground) and HDT (True Heading) is greater than 45˚ for 5 min.

10.3.11 Locating Device (Alert Identifier: 3108 Instance: 014)

This alert is generated when the R6 SUPREME Transponder has received an active Locating Device position report.

Note: This is not an error/fault of the system, just information, that this message has been received.

10.3.12 Lost ext EPFS (Alert Identifier: 3003 Instance: 025)

This alert is generated if the position from the external Electronic Position Fixing System is invalid (i.e. no external GNSS). Due to the fallback arrangement for the positioning sensor this alert can be active up to 30 seconds (during which the internal GNSS is used) before the alert is deactivated.

10.3.13 Lost Position (Alert Identifier: 3015 Instance: 026)

This alert is active if the R6 SUPREME Transponder does not have a valid position (latitude/longitude) from any sensor.

10.3.14 Missing SOG (Alert Identifier: 3119 Instance: 029)

See section 10.3.15.

10.3.15 Missing COG (Alert Identifier: 3119 Instance: 030)

These alerts are active if the R6 SUPREME Transponder does not have a valid SOG (Speed Over Ground) or a valid COG (Course Over Ground) from any sensor. The SOG and COG is based on the speed log (if external GNSS is used and a valid heading is available) or the GNSS currently in use.

10.3.16 Missing Heading (Alert Identifier: 3119 Instance: 032)

This alert is generated if either the heading information is lost/invalid (from external sensors) or if the heading data value is “undefined”.

10.3.17 Missing ROT (Alert Identifier: 3119 Instance: 035)

This alert is active if ROT (Rate Of Turn) is undefined or if no valid ROT information is available from external sensor or internal calculations (based on heading external heading information).

10.3.18 Hot Standby Lost (Alert Identifier: 3119 Instance: 065)

This alert is active if hot standby functionality is enabled and there is a problem with the connection to the other transponder unit in the hot standby pair. More details about the connection problem can be found in the *Hot Standby Status* view. See section 4.12 and 7.1.6 for more information about the hot standby functionality in the R6 SUPREME transponder system.

10.3.19 Lost AIS (Alert Identifier: 3002 Instance: 165)

This alert is active if the R6 CDU has lost connection with the R6 SUPREME Transponder. If this alert occurs, check the Ethernet connection and the network settings.

10.3.20 TX Disabled (Alert Identifier: 10072 Instance: 072)

This alert is active when an external silent switch is used and the switch has disabled transmissions.

10.4 Troubleshooting via the CDU

There is a lot of information and data accessible via the CDU that can be useful for troubleshooting, and that can help finding a presumed problem. The following items are just a few examples of what to look at.

10.4.1 Own Ship Data View

When the transponder transmits data on the VDL, it also simultaneously outputs this data on all the serial ports. This information is displayed in the *Own Ship Data* view.

Picture 10-1 –Own Ship Data view

10.4.2 AIS Target List view

The target list is primarily useful when analysing the receiving functionality. The propagation characteristics of VHF radio frequencies are close to line of sight. A harsh radio environment, reflections in cables, connectors or the antenna will shorten the effective range.

Picture 10-2 – AIS Target List

10.4.3 Time in Status Bar

The time (UTC) in the upper left corner of the display is provided by the transponder. If the time is not correct, the transponder's internal GNSS does not have a position fix. This will also be indicated by the alert "UTC sync invalid". This problem is normally caused by a GNSS-antenna failure or damaged antenna cables. This problem may also be caused by interference from radio equipment on-board.

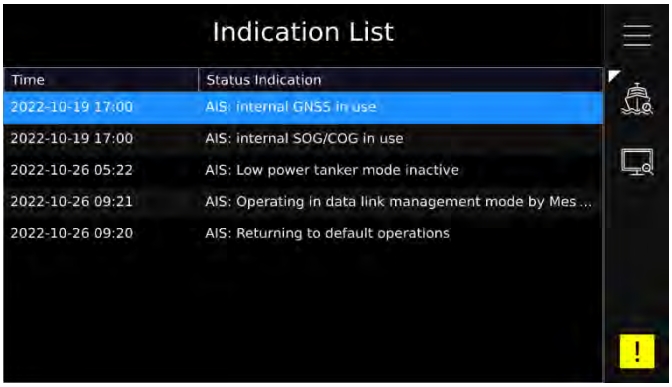
10.4.4 View Raw Data

The "*View Raw Data"* view can be used to see received data on the ports of the R6 SUPREME System. It is useful for troubleshooting to make sure that connected sensors provide correct data to the system. The **Port** parameter determines from which port the data displayed in the view are taken. It is possible to pause the view by pressing the "Pause" button. All data that is received while the view is paused will not be displayed in the view.

Picture 10-3 – View Raw Data

10.4.5 Status List

The *"Status List"* view is used to display status indications that are stored in the transponder. The indications are created when an important event has occurred in the transponder. Time of occurrence and status indication text are shown in the view. A list of all possible indications can be found in section 10.8 "Indication Messages".



Picture 10-4 – Status List

10.4.6 LWE Counters - IEC 61162-450 Counters

The *IEC 61162-450 Counters* view displays the rate of received and used datagrams per second and counters for the amount of different issues detected on received datagrams since start up.

Separate Views are available for the R6 CDU and the R6 SUPREME Transponder (AIS).

Data available are:

- Invalid header according to the IEC 61162-450 standard
- Framing issues (missing TAG start/end etc.)
- TAG-blocks longer than 80 characters (Length)
- TAG-blocks with unexpected/invalid characters (Syntax)
- TAG-blocks with missing sources, out of range values or sequence error (Format)
- TAG-blocks with mismatching checksum
- Sentences longer than 80 characters (Length)
- Sentences with unexpected/invalid characters (Syntax)
- Sentences with mismatching checksum

Counter	NAVD (4)	NETA (56)	TGTD (2)	NAVD (4)
RX Datagrams	145.9 /s	0.0 /s	0.0 /s	0.0 /s
Used Datagrams	110.8 /s	0.0 /s	0.0 /s	0.0 /s
Invalid Header	0	0	0	0
Framing Error	31050	0	0	0
TAG Block Length	0	0	0	0
TAG Block Syntax	14	0	0	0
TAG Block Format	23	2	0	0
TAG Block Checksum	0	0	0	0
Sentence Length	3	0	0	0
Sentence Syntax	83476	0	0	0
Sentence Checksum	0	0	0	0

Picture 10-5 – IEC 61162-450 Counters

10.5 Reporting Intervals for Class A - Transponders

The different information types sent by the R6 SUPREME System are valid for different time periods and therefore they need different update intervals. These update intervals are defined in the AIS standard (ITU-R M 1371-5) and should be applied by all transponders. There are however some exceptions from this, which can be found in the standard. Class B transponders have for example different intervals than Class A transponders.

All this needs to be taken in consideration while troubleshooting since it affects the anticipated behaviour of transponders.

Information type / Condition	Nominal reporting interval
Static Information	6 min, on amendment, on request
Voyage related information	6 min, on amendment, on request
Dynamic information (See conditions below)	
- Ship at anchor or moored and not moving faster than 3 knots	3 minutes
- Ship at anchor or moored and moving faster than 3 knots	10 seconds
- Ship 0-14 knots	10 seconds
- Ship 0-14 knots and changing course	3 1/3 seconds
- Ship 14-23 knots	6 seconds
- Ship 14-23 knots and changing course	2 seconds
- Ship > 23 knots	2 seconds
- Ship > 23 knots and changing course	2 seconds

Table 10-1 – Reporting Intervals

10.6 F.A.Q

10.6.1 I cannot see the vessel on the Internet AIS service

Websites providing AIS services like e.g. www.marinetraffic.com does not cover all the seas of the world, but only specific coastal areas where AIS receivers have been installed and that upload the data to the websites. The vessel must be in reception range of these AIS receivers to show up on the Internet AIS service.

10.6.2 I can "see" the other vessel, but they do not "see" my vessel

There are several reasons why this might happen. The first thing to check is if the R6 SUPREME Transponder is transmitting at all or if is transmitting in low power mode. In "*VHF Status"* view described in Section 7.1.5 it is possible to check the status on all R6 SUPREME Transponder's VHF transceivers. Make sure that correct channels and power mode are used. There might be a regional area set in the transponder that changes the operating mode of the R6 SUPREME Transponder. Regional areas are listed in the "*Regional Area"* view (see Section 5.3.11).

The MMSI must also be configured in order for the R6 SUPREME Transponder to transmit. If the MMSI is zero, the R6 SUPREME Transponder will be silent.

Another possibility is that the other vessels' transponder requires a stronger signal (shorter range) in order to receive the R6 SUPREME Transponder's transmissions. In the *Target List* view and the *Plot* view it is possible to see the range and bearing to other vessels.

10.6.3 The VHF range seems to be short

As a rule of thumb, the VHF range is equal to line of sight from the antenna position, which means that the higher the antenna is installed, the longer the range will be. It is also important to follow the guidelines for an antenna installation as thoroughly as possible. Section 4.9 "Mount the VHF Antenna" describes how to best install the VHF antenna.

10.6.4 I can only receive a few GNSS satellites

The position of the GNSS antenna is of high importance to optimize the GNSS reception. Follow the guidelines of GNSS antenna installation described in Section 4.10 "Mount the GNSS Antenna" as thoroughly as possible.

If the ship is close to a harbour or shore with high structures or travelling in an area with high terrain, the GNSS reception might be worse. The GNSS antenna must be installed where it has a clear view of the sky. The objective is to see the horizon freely through 360 degrees with a vertical observation of 5 to 90 degrees above the horizon.

The GNSS antenna cable should also be as short as possible and with 50 Ω impedance. A very long antenna cable or faulty impedance can heavily reduce the GNSS reception.

10.7 Contacting Support

The primary source for support and RMA issues for end customers should be the local dealer where the equipment was purchased in the first place. Another option is to contact one of our OEM partners or affiliate service stations and request help. An updated list with our dealers, OEM partners and service stations can be found at our website, **Error! Hyperlink reference not valid.**www.saab.com/maritime , listed under the corresponding product.

It is also possible to contact Saab TransponderTech's technical support if this is preferred.

We recommend contacting us via email at support.transpondertech@saabgroup.com for most accurate and detailed help. If the situation is very urgent then it is of course also possible to call us at normal Swedish workdays and working hours. Telephone **+46-13-189420**.

Before contacting support, always check the following information and include it in the first email, or have it ready at the phone call:

- All the information provided by the "*FW/HW Information*" views (CDU and Transponder).
- Detailed fault description.

For the latest manual, firmware and certificates please visit
https://www.saab.com/transpondertechsupport

10.8 Indication Messages

The indication messages, with identity and type information, are listed below:

ID	Type	Message text
021	Status	External DGNSS in use
022	Status	External GNSS in use
023	Status	Internal DGNSS in use (beacon)
024	Status	Internal DGNSS in use (msg 17)
025	Status	Internal GNSS in use
027	Status	External SOG/COG in use
028	Status	Internal SOG/COG in use
031	Status	Heading valid
033	Status	Rate of Turn Indicator in use
034	Status	Other ROT source in use
036	Event	Channel management parameters changed
037	Status	Low power tanker mode active
038	Status	Low power tanker mode inactive
040	Event	Operating in assigned mode by message 16 from base station MMMMMMMMM
041	Event	Operating in data link management mode by message 20 from base station(s) MMMMMMMMM
042	Event	Operating in channel management mode by Message 22 from base station MMMMMMMMM on channel XXXX and XXXX
043	Event	Operating in group assignment mode by message 23 from base station MMMMMMMMM
044	Event	Returning to default operation
056	Event	Channel management zone memory changed
061	Status	Enter semaphore mode
062	Event	Leave semaphore mode
064	Event	RATDMA overflow
067	Status	Beacon correction received

068	Status	VDL correction received
069	Status	No correction received

10.9 Long Range Definitions

A = Ship's name, call sign, and IMO number

B = Date and time of message composition

C = Position

E = Course over ground (COG)

F = Speed over ground (SOG)

I = Destination and Estimated Time of Arrival (ETA)

O = Draught

P = Ship/Cargo

U = Ship's length, breadth, type

W= Persons on board

11 COMMUNICATION INTERFACES

This section describes the characteristics of the communication interfaces in the R6 SUPREME system.

The system is equipped with RS-422 serial ports as well as two Ethernet network interfaces.

- Unless otherwise stated, an output sentence is transmitted on the networks as well as on all serial ports
- Unless otherwise stated, an input sentence can be received from the networks as well as from any serial port

11.1 Serial Ports

The R6 SUPREME Transponder has three bi-directional serial ports:

- ECDIS port
- Long-range port
- Pilot port

It also has three input only serial ports:

- Sensor port 1,2,3

The R6 Control and Display Unit is equipped with one bi-directional serial port that can be connected to an external Pilot Plug port.

The possibility to input data through a pilot port can be restricted by means of the Pilot Port (Input) setting in the "*Misc Interface"* configuration view (Section 5.3.8). From this view it is also configurable whether to output data from the AIS transponder internal GNSS receiver on a serial port.

Port Baud rates can be individually configured for each port from the "*Serial Ports"* configuration view (Section 5.3.13).

11.2 Ethernet Ports

There are two Ethernet ports on the R6 SUPREME transponder and two on the R6 CDU. These ports handles datagrams according to the IEC 61162-450 standard.

Transmission group TGTD is used for outgoing messages. The equipment may receive data from transmission group TGTD, NAVD or SATD.

The R6 SUPREME transponder system supports IGMP versions 1, 2 and 3.

To be able to identify source/destination of a datagram on the Ethernet, each datagram is tagged with System Function Identity (SFI). The SFIs for the R6 SUPREME transponder and the R6 CDU are configurable according to the table below.

Unit	Function	System Function Identity
R6 CDU	Main function	**SN***YYYY*
R6 SUPREME transponder	Main function	**AI***XXXX*

Table 11-1 – R6 System SFIs

11.3 Load Capacity

The R6 CDU is compliant to IEEE 802.3ab (10BASE-T/100BASE-TX/1000BASE-T) and can handle following rates of received datagrams:

- 300 datagram/s intended for processing by the unit
- 6000 datagram/s not intended for processing by the unit
- 150 datagram/s intended for processing (50% of the unit max load) and 3000 datagram/s not intended for processing

The R6 SUPREME transponder is compliant to IEEE 802.3ab (10BASE-T/100BASE-TX/1000BASE-T) and can handle following rates of received datagrams:

- 2000 datagram/s intended for processing by the unit
- 8000 datagram/s not intended for processing by the unit
- 1000 datagram/s intended for processing (50% of the unit max load) and 5000 datagram/s not intended for processing

12 INTERPRETATIONS OF ALERT SENTENCES

The protocol of the serial input/output sentences are compliant to IEC 61162-, IEC 61162-2 or IEC 61162-450.

12.1 Input Sentences, Alerts

12.1.1 ACN – Alert command

$--ACN,hhmmss.ss,ccc,x.x,x.x,c,c

Field	Format	Name	Note
1	--ACN	Sentence Id	Used
2	hhmmss.ss	UTC time	
3	ccc	Manufacturer mnemonic code: STT = Proprietary Alert Null = Standard Alert	Used
4	x.x	Alert identifier	Used
5	x.x	Alert instance	Used
6	c	Alert command: A = Acknowledge Q = Request S = Silence	Used
7	c	Sentence status flag (C Always)	Used

12.1.2 ACK – Acknowledge alert (legacy)

$--ACK,xxx

Field	Format	Name	Note
1	--ACK	Sentence Id	Used
2	xxx	Alert identifier number	Corresponds to ALR message for alert to acknowledge

12.2 Output Sentences, Alerts

12.2.1 ALC – Cyclic alert list

Output rate: Output every 30s listing active alerts.

$--ALC,xx,xx,xx,x.x,ccc,x.x,x.x,x.x,…

Field	Format	Name	Note
1	--ALC	Sentence Id	
2	xx	Number of sentences	
3	xx	Sentence number	
4	xx	Sequential identifier	
5	x.x	Number of alert entries	
Fields for one alert entry, repeats "Number of alert entries" times			
6,10,14,..	ccc	Manufacturer mnemonic code: STT = Proprietary Alert Null = Standard Alert	
7,11,15,..	x.x	Alert identifier	
8,12,16,..	x.x	Alert instance	
9,13,17,..	x.x	Revision counter	

12.2.2 ALF – Alert sentence

Output rate: On event, and on request.

$--ALF,x,x,x,hhmmss.ss,c,c,c,ccc,x.x,x.x,x.x,x,c-c

Field	Format	Name	Note
1	--ALF	Sentence Id	
2	x	Number of sentences	
2	x	Sentence number	
3	x	Sequential identifier	
4	hhmmss.ss	UTC time of change	
5	c	Alert category	
6	c	Alert priority: W = Warning C = Caution	
7	c	Alert state: N = Normal V = Active, Unacknowledged A = Active, Acknowledged S = Active, Silenced	
8	ccc	Manufacturer mnemonic code	
9	x.x	Alert identifier	
10	x.x	Alert instance	
11	x.x	Escalation counter	
12	x	Revision counter	
13	c-c	Alert/Description text	

12.2.3 ALR – Alert state

Output rate: On event, on request, and automatically. Output every 30s for active alerts and every 60s when there are no active alerts.

$--ALR,hhmmss.ss,xxx,c,c,c-c

Field	Format	Name	Note
1	--ALR	Sentence Id	
2	hhmmss.ss	UTC time of alert condition change	
3	xxx	Unique alert identifier	
4	c	Alert condition: A = Active V = Inactive	
5	c	Acknowledgment state: A = acknowledged V = unacknowledged	
8	c-c	Alert description text	

12.2.4 ARC – Alert command rejection

$--ARC,hhmmss.ss,ccc,x.x,x.x,c

Field	Format	Name	Note
1	--ARC	Sentence Id	
2	hhmmss.ss	UTC time of alert condition change	
3	ccc	Manufacturer mnemonic code: STT = Proprietary Alert Null = Standard Alert	
4	x.x	Alert identifier	
5	x.x	Alert instance	
6	c	Alert command: A = Acknowledge Q = Request S = Silence	

13 INTERPRETATION OF INPUT SENTENCES

All interface ports accepts the full set of input listed below sentences, except the sentences listed in Section 13.4.1 that are unique to the Long Range interface port.

The protocol of the serial input sentences are compliant to IEC 61162-1, IEC 61162-2 for maximum interoperability.

13.1 GNSS and Sensor Input Sentences

13.1.1 DTM – Datum Reference

If local code is other than WGS84, then the positions report from that port is discarded.

$--DTM,ccc,a,x.x,a,x.x,a,x.x,ccc

Field	Format	Name	Note
1	--DTM	Sentence Id	Used
2	ccc	Local Datum Code	Interpret if it's WGS84 or not
3	A	Local Datum Subdivision Code	Ignored
4	x.x	Lat Offset (2 fields)	Ignored
5	a		Ignored
6	x.x	Long Offset (2 fields)	Ignored
7	a		Ignored
8	x.x	Altitude Offset	Ignored
9	ccc	Reference Datum Code	Ignored

13.1.2 GBS – GNSS Satellite Fault Detection

If this sentence is received once a second from the position source in use, the RAIM flag will be set to TRUE.

$--GBS,hhmmss.ss,x.x,x.x,x.x,xx,x.x,x.x,x.x

Field	Format	Name	Note
1	--GBS	Sentence Id	Used
2	hhmmss.ss	UTC Time of GGA or GNS	Ignored
3	x.x	Expected error in latitude	Used
4	x.x	Expected error in longitude	Used
5	x.x	Expected error in altitude	Ignored
6	xx	ID number of most likely failed satellite	Ignored
7	x.x	Probability of missed detection	Ignored
8	x.x	Estimate of bias in meters	Ignored
9	x.x	Standard Deviation of bias estimate	Ignored

13.1.3 GGA – Global Positioning System Fix Data

$--GGA,hhmmss.ss,llll.ll,a,yyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx

Field	Format	Name	Note
1	--GGA	Sentence Id	Used
2	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
3	llll.ll	Latitude	Used
4	a		
5	yyyy.yy	Longitude	Used
6	a		
7	x	GPS quality indicator	Used, 1 -> Position with Low Accuracy 2 -> Position with High Accuracy 3 -> Position with Low Accuracy

Field	Format	Name	Note
			6 -> Dead Reckoning with Low Accuracy 7 -> Manual mode with low accuracy OTHER -> No Position Used when the GPS is the internal GPS (Used in proprietary sentences)
8	xx	Satellites in use	Ignored
9	x.x	Horizontal dilution of precision	Ignored
10	x.x	Antenna altitude	Ignored
11	M	Units of antenna altitude, meter	Ignored
12	x.x	Geodial separation	Ignored
13	M	Units of geodial sep.	Ignored
14	x.x	Age of differential GPS data	Ignored
15	xxxx	Differential reference station ID	Ignored

13.1.4 GLL – Geographic position, latitude/longitude

$--GLL,llll.ll,a,yyyy.yy,a,hhmmss.ss,A,a

Field	Format	Name	Note
1	--GLL	Sentence Id	Used
2	llll.ll	Latitude	Used
3	a		
4	yyyy.yy	Longitude	Used
5	a		
6	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
7	A	Status	Used
8	a	Mode indicator	NULL -> Message is ignored A -> Position with Low Accuracy D -> Position with High Accuracy E -> Dead Reckoning Mode with Low Accuracy M-> Manual Mode with Low Accuracy OTHER -> No Position

13.1.5 GNS – GNSS fix data

If the Mode Indicator is a NULL field, the sentence is ignored.

$--GNS,hhmmss.ss,llll.ll,a,yyyy.yy,a,c--c,xx,x.x,x.x,x.x,x.x,x.x

Field	Format	Name	Note
1	--GLL	Sentence Id	Used
2	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
3	llll.ll	Latitude	Used
4	a		
5	yyyy.yy	Longitude	Used
6	a		
7	c--c	Mode indicator	A, P -> Position with low accuracy D, R, F -> Position with high Accuracy E -> Dead Reckoning Mode with Low accuracy M -> Manual Mode with low accuracy OTHER -> No Position
8	xx	Total number of satellites	Used when the GPS source is the internal GPS (used in proprietary sentences)
9	x.x	HDOP	Ignored

Field	Format	Name	Note
10	x.x	Antenna altitude, meter	Ignored
11	x.x	Geodial separation	Ignored
12	x.x	Age of differential corrections	Ignored
13	x.x	Differential reference station ID	Ignored

13.1.6 HDT – Heading, True

The use of this sentence is talker identifier dependent.

$--HDT,x.x,T

Field	Format	Name	Note
1	--HDT	Sentence Id	Used
2	x.x	Heading, degrees true	Used
3	T		

NOTE: HDT input must be received at least every 3 seconds for the R6 SUPREME to calculate ROT from the HDT input.

13.1.7 OSD – Own ship data

$--OSD,x.x,A,x.x,a,x.x,a,x.x,x.x,a

Field	Format	Name	Note
1	--OSD	Sentence Id	Used
2	x.x	Heading, degrees true	Used if heading status is 'A'
3	A	Heading status	Used
4	x.x	Vessel course, degrees true	Used as COG
5	a	Course reference	Used[1]
6	x.x	Vessel speed	Used as SOG
7	a	Speed reference	Used[1]
8	x.x	Vessel set	Ignored
9	x.x	Vessel drift	Ignored
10	a	Speed units	Used to convert SOG to knots

13.1.8 RMC – Recommended minimum specific GNSS data

$--RMC,hhmmss.ss,A,llll.ll,a,yyyy.yy,a,x.x,x.x,xxxxxx,x.x,a,a

Field	Format	Name	Note
1	--RMC	Sentence Id	Used
2	hhmmss.ss	UTC of position	UTC Second is used to indicate Time Stamp
3	A	Status	Used
4	llll.ll	Latitude	Used
5	a		
6	yyyy.yy	Longitude	Used
7	a		
8	x.x	Speed over ground, knots	Used
9	x.x	Course over ground, degrees true	Used
10	xxxxxx	Date	Ignored
11	x.x	Magnetic variation	Ignored
12	a		
13	a	Mode indicator	NULL -> Message is ignored A -> Position with low accuracy D -> Position with high accuracy E -> Dead Reckoning Mode with Low accuracy M -> Manual Mode with low accuracy OTHER -> No Position

[1] SOG and COG are used if both COG reference and SOG reference are set to either: B, P, R

13.1.9 ROT – Rate of turn

The rate of turn value is only used if the talker identifier is TI. Otherwise the value will only be used to determine the direction, i.e. “Turning Right” or “Turning Left”.

$--ROT,x.x,A

Field	Format	Name	Note
1	--ROT	Sentence Id	Used
2	x.x	Rate of turn	Used if Status is set to ‘A’
3	A	Status	Used

13.1.10 THS – True Heading and Status

$--THS,x.x,a

Field	Format	Name	Note
1	--THS	Sentence Id	Used
2	x.x	Heading, degrees true	Used if Status is set to ‘A’
3	a	Status	Used

NOTE: THS input must be received at least every 3 seconds for the R6 SUPREME to calculate ROT from the THS input.

13.1.11 VBW – Dual Ground / Water Speed

The current position source must be external GNSS, and heading must be available for the transponder to accept this sentence.

$--VBW,x.x,x.x,A,x.x,x.x,A,x.x,A,x.x,A

Field	Format	Name	Note
1	--ROT	Sentence Id	Used
2	x.x	Longitudinal water speed	Ignored
3	x.x	Transverse water speed	Ignored
4	A	Status: water speed	Ignored
5	x.x	Longitudinal ground speed	Used if Status is set to A
6	x.x	Transverse ground speed	Used if Status is set to A
7	A	Status: ground speed	Used
8	x.x	Stern transverse water speed	Ignored
9	A	Status stern water speed	Ignored
10	x.x	Stern transverse ground speed	Ignored
11	A	Status stern ground speed	Ignored

13.1.12 VTG – Course over ground and ground speed

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a

Field	Format	Name	Note
1	--VTG	Sentence Id	Used
2	x.x	Course over ground, degrees true	Used
3	T		
4	x.x	Course over ground, degrees magnetic	Ignored
5	M		
6	x.x	Speed over ground, knots	Used
7	N		
8	x.x	Speed over ground, km/h	Ignored
9	K		
10	a	Mode indicator	Used

13.1.13 ZDA – Time and date

This message is received but not used by the standard R6 SUPREME transponder system.

$--ZDA,hhmmss.ss,xx,xx,xxxx,xx,xx

Field	Format	Name	Note
1	--ZDA	Sentence Id	Used
2	hhmmss.ss	UTC	Used
3	xx	Day (UTC)	Used
4	xx	Month (UTC)	Used
5	xxxx	Year (UTC)	Used
6	xx	Local zone hours	Ignored
7	xx	Local zone minutes	Ignored

13.2 General Input Sentences

13.2.1 EPV – Command or report equipment property value

$--EPV,a,c--c,c--c,x.x,c--c

Field	Format	Name	Note
1	--EPV	Sentence Id	Used
2	a	Sentence status flag	Used
3	c--c	Destination equipment type	Used, AI or STT
4	c--c	Unique Identifier	Used, may be null
5	x.x	Property identifier	Used
6	c--c	Value of property to be set	Used

13.2.2 SPW – Security Password Sentence

$--SPW,ccc,c--c,x,c--c

Field	Format	Name	Note
1	--SPW	Sentence Id	Used
2	ccc	Password protected sentece	Used
3	c--c	Unique Identifier	Used, may be NULL
4	x	Password level	Used
5	c--c	Password	Used

13.2.3 SSA – Sender Signature Authentication

$--SSA,ccc,c,h--h

Field	Format	Name	Note
1	--SSA	Sentence Id	Used
2	ccc	Signature protected sentence	Used
3	c	Signature calculation method	Used
4	h--h	Signature authentication	Used

13.2.4 HBT – Heartbeat Supervision Sentence

$--HBT,x.x,A,x

Field	Format	Name	Note
1	--HBT	Sentence Id	Used
2	x.x	Configured repeat interval	Used (Limited to 60 sec)
3	A	Equipment status	Used
4	x	Sequential sentence identifier	Ignored

13.3 AIS Specific Input Sentences

13.3.1 ABM – Addressed Binary and Safety-Related Message

!--ABM,x,x,x,xxxxxxxxx,x,x.x,s--s,x

Field	Format	Name	Note
1	--ABM	Sentence Id	Used
2	x	Total nr of sentences	Used if in interval 1..9, otherwise the sentence is ignored
3	x	Sentence number	Used if in interval 1..total sentences, otherwise the sentence is ignored
4	x	Sequential message identifier	Used if in interval 0..3, otherwise the sentence is ignored
5	xxxxxxxxx	MMSI of Destination	Used
6	X	AIS Channel	Used
7	x.x	Message Id	Used if 6 or 12, otherwise the sentence is ignored
8	s--s	Encapsulated Data	Used
9	x	Number of filled bits	Used

13.3.2 ACA – AIS Regional Channel Assignment Message

The zone created of this sentence must be accepted by the channel management rules (size of zone, distance to own position, valid channel number etc). If the zone isn't accepted, the zone will be ignored.

$--ACA,x,llll.ll,a,yyyy.yy,a,llll.ll,a,yyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x, hhmmss.ss

Field	Format	Name	Note
1	--ACA	Sentence Id	Used
2	x	Sequence number	Ignored
3	llll.ll	NE latitude (2 fields)	Used
4	a		
5	yyyy.yy	NE longitude (2 fields)	Used
6	a		
7	llll.ll	SW latitude (2 fields)	Used
8	a		
9	yyyy.yy	SW longitude (2 fields)	Used
10	a		
11	x	Transitional zone size	Used
12	xxxx	Channel A	Used
13	x	Channel A bandwidth	Used
14	xxxx	Channel B	Used
15	x	Channel B bandwidth	Used
16	x	Tx/Rx mode	Used
17	x	Power level	Used
18	a	Information source	Ignored
19	x	In use flag	Ignored
20	hhmmss.ss	Time of In use change	Ignored

13.3.3 AIQ – Query Sentence

$--AIQ,ccc

Field	Format	Name	Note
1	--	Talker ID of requester	Used

Field	Format	Name	Note
2	AIQ	Talker ID for device	Used
3	ccc	Approved sentence formatter of data being requested	It's possible to query the following sentences: ACA, ALR, EPV, LRI, SSD, TRL, TXT and VSD

13.3.4 AIR – AIS Interrogation Request

This sentence is used to interrogate AIS messages. It can also be used to do a "UTC Request".

$--AIR,xxxxxxxxx,x.x,x,x.x,x,xxxxxxxxx,x.x,x

Field	Format	Name	Note
1	--AIR	Sentence Id	Used
2	xxxxxxxxx	MMSI 1	Used
3	x.x	Message ID 1.1	Used
4	x	Message sub section	Ignored
5	x.x	Message ID 1.2	Used, may be NULL
6	x	Message sub section	Ignored
7	xxxxxxxxx	MMSI 2	Used, may be NULL
8	x.x	Message ID 2.1	Used, may be NULL
9	x	Message sub section	Ignored
10	x	Channel	Used, may be NULL

13.3.5 BBM – Broadcast Binary Message

$--BBM,x,x,x,x,x.x,s--s,x

Field	Format	Name	Note
1	--BBM	Sentence Id	Used
2	X	Total number of sentences	Used if in interval 1..9, otherwise rejected
3	X	Sentence number	Used if in interval 1..total number of sentences, otherwise rejected.
4	X	Sequential message identifier	Used if in interval 0..9, otherwise rejected
5	X	AIS channel	Used
6	x.x	Message Id	Used if 8 or 14
7	s—s	Encapsulated data	Used
8	X	Number of filled bits	Used

13.3.6 SSD – Ship Static Data

$--SSD,c--c,c--c,xxx,xxx,xx,xx,c,aa

Field	Format	Name	Note
1	--SSD	Sentence Id	Used
2	c--c	Call sign	Used, may be NULL
3	c--c	Name	Used, may be NULL
4	xxx	Pos ref A	Used to change position reference for the position source in use. May be NULL.
5	xxx	Pos ref B	Used to change position reference for the position source in use. May be NULL.
6	xx	Pos ref C	Used to change position reference for the position source in use. May be NULL.
7	xx	Pos ref D	Used to change position reference for the position source in use. May be NULL.

Field	Format	Name	Note
8	c	DTE	Ignored
9	aa	Source identifier	Used

13.3.7 VSD – Voyage Static Data

$--VSD,x.x,x.x,x.x,c--c,hhmmss.ss,xx,xx,x.x,x.x

Field	Format	Name	Note
1	--VSD	Sentence Id	Used
2	x.x	Type of ship and cargo	Used
3	x.x	Maximum present draught	Used
4	x.x	Persons on-board	Used
5	c--c	Destination	Used
6	hhmmss.ss	Est. UTC of arrival	Used
7	Xx	Est. day of arrival	Used
8	Xx	Est. month of arrival	Used
9	x.x	Navigational status	Used
10	x.x	Regional application flags	Used

13.4 Long Range Input Sentences

13.4.1 On Long Range Port

The LR sentences can only be used with the Long Range interface port.

13.4.1.1 LRF – AIS long-range function

$--LRF,x,xxxxxxxxx,c—c,c—c,c—c

Field	Format	Name	Note
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

13.4.1.2 LRI – AIS long-range interrogation

$--LRI,x,a,xxxxxxxxx,xxxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a

Field	Format	Name	Note
1	--LRI	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of requestor	Used
4	xxxxxxxx	MMSI of destination	Used
5	llll.ll	Latitude	Used
6	a	N / S	Used
7	yyyyy.yy	Longitude	Used
8	a	E / W	Used

13.4.2 On Other Input Ports

13.4.2.1 LRF – AIS long-range function

$--LRF,x,xxxxxxxxx,c—c,c—c,c—c

Field	Format	Name	Note
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used

Field	Format	Name	Note
3	xxxxxxxxx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

13.5 Proprietary Input Sentences

All Saab TransponderTech Proprietary Sentences will have talker ID PSTT.

13.5.1 Proprietary Query message PSTT,101

$PSTT,101,c--c

Field	Format	Name	Note
1	PSTT	Proprietary SAAB TranspondeTech Sentence	Used
2	101	Sentence Query	Used
3	c--c	Proprietary sentence to query	Used

14 INTERPRETATION OF OUTPUT SENTENCES

14.1 General Output Sentences

14.1.1 HBT – Heartbeat Supervision Sentence

This sentence is only transmitted on the network interface and is output each 10s.

$--HBT,x.x,A,x

Field	Format	Name	Note
1	--HBT	Sentence Id	HBT always
2	x.x	Configured repeat interval	10 seconds
3	A	Equipment status	A=Normal
4	x	Sequential sentence identifier	Cyclic 0 to 9

14.2 Proprietary Output Sentences (PSTT)

In addition to the standardized IEC sentences, the R6 SUPREME System is able to output the proprietary sentences listed below. All Saab TransponderTech Proprietary Sentences have talker ID “PSTT”.

14.2.1 $PSTT,10A – UTC Date and Time

This sentence provides UTC Date and Time, i.e. R6 SUPREME system time (based on internal GNSS time). It is output approximately once every 10 seconds (± 1 s).

$PSTT,10A,YYYYMMDD,HHMMSS

Field	Format	Name	Note
1	10A	Sentence Id	10A always
2	YYYYMMDD	Date	Year, month and day in decimal notation. (00000000 = Not available)
3	HHMMSS	Time	Hour, minute and second in decimal notation. (999999 = Not available)

Example: $PSTT,10A,20121028,135230*<FCS><CR><LF>

= Date October 28, 2012

= Time 13:52:30 UTC

14.2.2 $PSTT,10C – Data Link Status

This sentence provides information about the traffic on the VHF data link. It is output approximately once every 60 seconds. Traffic load is calculated over the last frame (i.e. 60 seconds). Number of units is derived from the internal user list and is generally the number of received units within the last few minutes.

$PSTT,10C,C,LLL,NNNN

Field	Format	Name	Note
1	10C	Sentence Id	10C always
2	C	Channel	A = VDL Channel A B = VDL Channel B
3	LLL	Traffic Load	Data link traffic load in percent, 0-100.
4	NNNN	Number of Units	Number of units occupying the data link

14.2.3 $PSTT,106 – Notification

This sentence is output when a notification's state is changed and, if active, it is output cyclic once every minute.

$PSTT,106,AI,x.x,c,hhmmss.ss,c-c

Field	Format	Name	Note
1	106	Sentence Id	106 always
2	AI	Talker Id	AI always
3	x.x	Identifier	See notification list
4	c	Notification State	N = Normal V = Active, Unacknowledged A = Active, Acknowledged P = Popup Only W = Active, Unacknowledged with popup
5	hhmmss.ss	UTC Time	
6	c-c	Description	Notification text

Notification list

Identifier	Description Text	Active when
401	NavStatus 12 activated. Extended dimensions properly set?	NavStatus 12 is selected
402	No extended dimension set with NavStatus 12 active	Extended dimensions set to zero when NavStatus 12 is active
403	Ship dimensions incomplete	Ship dimensions are zero

14.2.4 $PSTT,146 – System Operational Mode Status

This sentence reports the system operational mode. This sentence is output on change, periodically every minute and on request using PSTT,101.

$PSTT,146,x,x,x

Field	Format	Name	Note
1	146	Sentence Id	146 always
2	x	1 W Mode	0 = Default 1 = 1 Watt
3	x	System Mode	0 = Class A 1 = Inland
4	x	Transmit mode	0 = Normal 1 = Silent

14.2.5 $PSTT,1F3 – Transponder Restart

This sentence will be output when the transponder has restarted.

$PSTT,1F3,R

Field	Format	Name	Note
1	1F3	Sentence Id	1F3 always
2	R	Restart Reason	0 = Unknown 1 = Cold Start 2 = General Protection Fault 3 = Power Fail 4 = Warm Start

14.3 Long Range Output Sentences

14.3.1 On Long Range Port

14.3.1.1 LR1 – AIS long-range reply sentence 1

Output rate: On event

$--LR1,x,xxxxxxxxx,xxxxxxxxx,c—c,c—c,xxxxxxxxx

Field	Format	Name	Note
1	--LR1	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of responder	Used
4	xxxxxxxxx	MMSI of requestor (reply destination	Used
5	c--c	Ship’s name	Used
6	c--c	Call sign	Used
7	xxxxxxxxx	IMO Number	Used

14.3.1.2 LR2 – AIS long-range reply sentence 2

Output rate: On event

$--LR2,x,xxxxxxxxx,xxxxxxxx,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x.x,T,x.x,N

Field	Format	Name	Note
1	--LR2	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of responder	Used
4	xxxxxxxx	Date	Used
5	hhmmss.ss	UTC time of position	Used
6	llll.ll	Latitude	Used
7	a	N / S	Used
8	yyyyy.yy	Longitude	Used
9	a	E / W	Used
10	x.x	Course over ground	Used
11	T	Validity of COG	Used
12	x.x	Speed over ground	Used
13	N	Validity of SOG	Used

14.3.1.3 LR3 – AIS long-range reply sentence 3

Output rate: On event

$--LR3,x,xxxxxxxxx,c—c,xxxxxx,hhmmss.ss,x.x,x.x,x.x,x.x,x.x,x.x

Field	Format	Name	Note
1	--LR3	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of responder	Used
4	c--c	Voyage destination	Used
5	xxxxxxxx	ETA Date	Used
6	hhmmss.ss	ETA time	Used
7	x.x	Draught	Used
8	x.x	Ship / Cargo	Used
9	x.x	Ship length	Used
10	x.x	Ship width	Used

Field	Format	Name	Note
11	x.x	Ship type	Used
12	x.x	Persons	Used

14.3.1.4 LRF – AIS long-range function

Output rate: On event

$--LRF,x,xxxxxxxxx,c—c,c—c,c—c

Field	Format	Name	Note
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

14.3.2 On All Other Output Ports

14.3.2.1 LRF – AIS long-range function

Output rate: On event

$--LRF,x,xxxxxxxxx,c—c,c—c,c—c

Field	Format	Name	Note
1	--LRF	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of requestor	Used
4	c--c	Name of requestor	Used
5	c--c	Function request	Used
6	c--c	Function reply status	Used

14.3.2.2 LRI – AIS long-range interrogation

Output rate: On event

$--LRI,x,a,xxxxxxxxx,xxxxxxxxx,llll.ll,a,yyyyy.yy,a,llll.ll,a,yyyyy.yy,a

Field	Format	Name	Note
1	--LRI	Sentence Id	Used
2	x	Sequence number	Used
3	xxxxxxxxx	MMSI of requestor	Used
4	xxxxxxxx	MMSI of destination	Used
5	llll.ll	Latitude	Used
6	a	N / S	Used
7	yyyyy.yy	Longitude	Used
8	a	E / W	Used

14.4 AIS Output Sentences

14.4.1 ABK – AIS Addressed and binary broadcast acknowledgement

Output rate: On event

$--ABK,xxxxxxxxx,x,x.x,x,x

Field	Format	Name	Note
1	--ABK	Sentence Id	Used
2	xxxxxxxxx	MMSI of the addressed AIS unit	Used
3	x	AIS channel of reception	Used
4	x.x	ITU - R M.1371 Message ID	Used
5	x	Message sequence number	Used
6	x	Type of acknowledgement	Used

14.4.2 ACA – AIS Regional Channel Assignment Message

Output rate: On event. On request.

$--ACA,x,llll.ll,a,yyyy.yy,a,llll.ll,a,yyyy.yy,a,x,xxxx,x,xxxx,x,x,x,a,x, hhmmss.ss

Field	Format	Name	Note
1	--ACA	Sentence Id	Used
2	x	Sequence number	Ignored
3	llll.ll	NE latitude (2 fields)	Used
4	a		
5	yyyy.yy	NE longitude (2 fields)	Used
6	a		
7	llll.ll	SW latitude (2 fields)	Used
8	a		
9	yyyy.yy	SW longitude (2 fields)	Used
10	a		
11	x	Transitional zone size	Used
12	xxxx	Channel A	Used
13	x	Channel A bandwidth	Used
14	xxxx	Channel B	Used
15	x	Channel B bandwidth	Used
16	x	Tx/Rx mode	Used
17	x	Power level	Used
18	a	Information source	Ignored
19	x	In use flag	Ignored
20	hhmmss.ss	Time of In use change	Ignored

14.4.3 EPV – Command or report equipment property value

Output rate: On request.

$--EPV,a,c--c,c--c,x.x,c—c

Field	Format	Name	Note
1	--EPV	Sentence Id	Used
2	a	Sentence status flag	Used
3	c--c	Destination equipment type	Used
4	c--c	Unique Identifier	Used
5	x.x	Property identifier	Used
6	c--c	Value of property	Used

14.4.4 NAK – Negative acknowledgement

Output rate: On event

$--NAK,cc,ccc,c--c,x.x,c—c

Field	Format	Name	Note
1	--NAK	Sentence Id	Used
2	cc	Talker identifier	Used
3	ccc	Affected sentence formatter	Used
4	c--c	Unique Identifier	Used
5	x.x	Reason code for negative acknowledgement	Used
6	c--c	Negative acknowledgement's descriptive text	Used

14.4.5 SSD – Ship Static Data

Output rate: On request.

$--SSD,c--c,c--c,xxx,xxx,xx,xx,c,aa

Field	Format	Name	Note
1	--SSD	Sentence Id	Used
2	c--c	Call sign	Used, may be NULL
3	c--c	Name	Used, may be NULL
4	xxx	Pos ref A	Used to change position reference for the position source in use. May be NULL.
5	xxx	Pos ref B	Used to change position reference for the position source in use. May be NULL.
6	xx	Pos ref C	Used to change position reference for the position source in use. May be NULL.
7	xx	Pos ref D	Used to change position reference for the position source in use. May be NULL.
8	c	DTE	Ignored
9	aa	Source identifier	Ignored

14.4.6 TRL – AIS transmitter non functioning log

Output rate: On request. Up to 10 sentences in a burst.

$--TRL,x.x,x.x,x,xxxxxxxx,hhmmss.ss,xxxxxxxx,hhmmss.ss,x

Field	Format	Name	Note
1	--TRL	Sentence Id	Used
2	x.x	Total number of log entries	Used
3	x.x	Log entry number	Used
4	x	Sequential message identifier	Used
5	xxxxxxxx	Switch off date	Used
6	hhmmss.ss	Switch off UTC time	Used
7	xxxxxxxx	Switch on date	Used
8	hhmmss.ss	Switch on UTC time	Used
9	x	Reason code	Used

14.4.7 TXT – Text transmission

Output rate: On request, on event.

$--TXT,xx,xx,xx,c--c

Field	Format	Name	Note
1	--TXT	Sentence Id	Used
2	xx	Total number of sentences	Used
3	xx	Sentence number	Used
4	xx	Text identifier	Used
5	c--c	Text message	Used

14.4.8 VDM – AIS VHF data-link message

Only output on serial port when baud rate is 38400 bps or higher.

Output rate: On VHF message receive event.

!--VDM,x,x,x,a,s—s,x

Field	Format	Name	Note
1	--VDM	Sentence Id	Used
2	x	Total number of sentences needed to transfer the message	Used
3	x	Sentence number	Used
4	x	Sequential message identifier	Used
5	a	AIS channel	Used
6	s—s	Encapsulated ITU-R M.1371 radio message	Used
7	x	Number of fill bits	Used

14.4.9 VDO – AIS VHF data-link own-vessel report

Only output on serial port when baud rate is 38400 bps or higher.

Output rate: On VHF transmission event. Status message once per second.

!--VDO,x,x,x,a,s—s,x

Field	Format	Name	Note
1	--VDO	Sentence Id	Used
2	x	Total number of sentences needed to transfer the message	Used
3	x	Sentence number	Used
4	x	Sequential message identifier	Used

Field	Format	Name	Note
5	a	AIS channel	Used for transmission event. Not used for "dummy" position messages.
6	s—s	Encapsulated ITU-R M.1371 radio message	Used
7	x	Number of fill bits	Used

14.4.10 VER – Version

Output rate: On request.

$--VER,x,x,aa,c--c,c--c,c--c,c--c,c--c,c--c,x

Field	Format	Name	Note
1	--VER	Sentence Id	Used
2	x	Total number of sentences	Always 1
3	x	Sentence number	Always 1
4	aa	Device Type	Used
5	c--c	Vendor ID	Used
6	c--c	Unique Identifier	Used
7	c--c	Manufacturer serial number	Used
8	c--c	Model code	Used
9	c--c	Firmware revision	Used
10	c--c	Hardware revision	Used
11	x	Sequential message identifier	Always NULL

14.4.11 VSD – Voyage Static Data

Output rate: On request.

$--VSD,x.x,x.x,x.x,c--c,hhmmss.ss,xx,xx,x.x,x.x

Field	Format	Name	Note
1	--VSD	Sentence Id	Used
2	x.x	Type of ship and cargo	Used
3	x.x	Maximum present draught	Used
4	x.x	Persons on-board	Used
5	c--c	Destination	Used
6	hhmmss.ss	Est. UTC of arrival	Used
7	Xx	Est. day of arrival	Used
8	Xx	Est. month of arrival	Used
9	x.x	Navigational status	Used
10	x.x	Regional application flags	Used

15 SYSTEM SETUPS

15.1 Installation without bridge network connection

The system can be installed without any external network equipment by direct connection between any of the Ethernet ports of the R6 SUPREME transponder and the R6 CDU per below drawing.

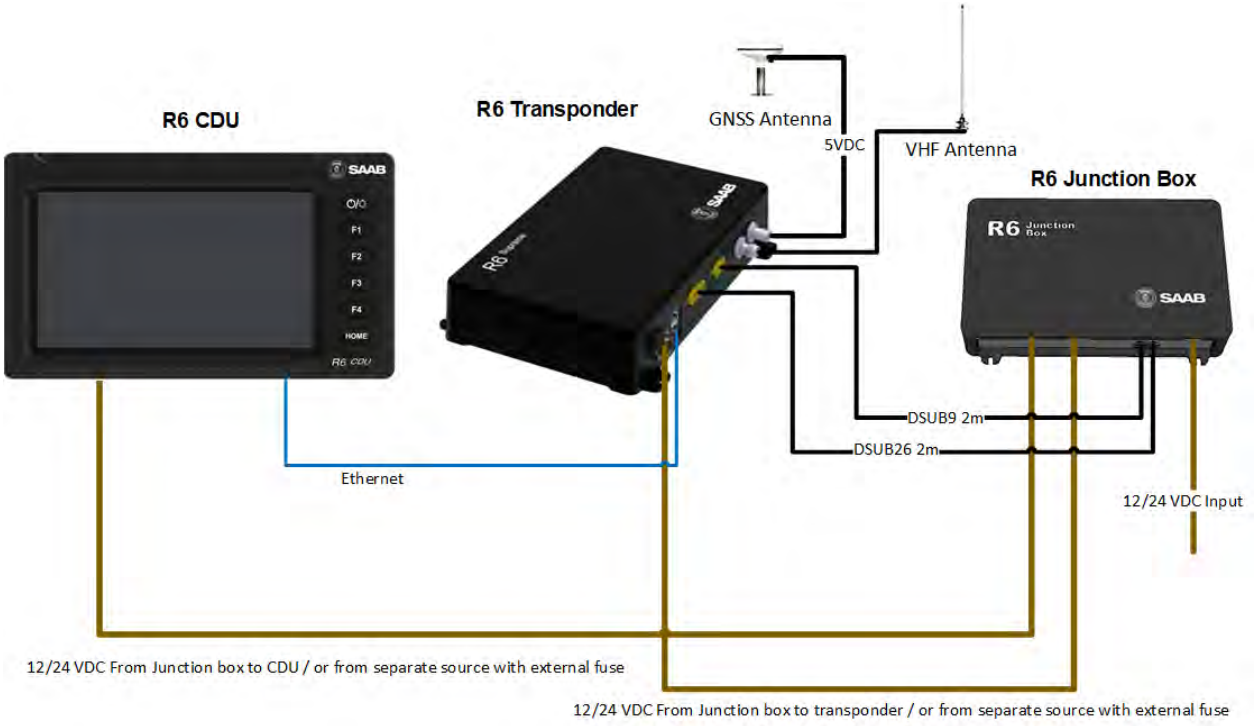


Figure 15-1 – Stand-Alone installation – no external network

15.2 In redundant external network

If there is a need to use the IEC 61162-450 ports to connect to external equipment, it may be necessary to install a network switch. When doing so, using dual networks provides redundancy in case of problems with external network equipment. It is possible to use only one network.

NOTE: ETH1 and ETH2 of the R6 Transponder and the R6 CDU provide identical data and have the same functionality.

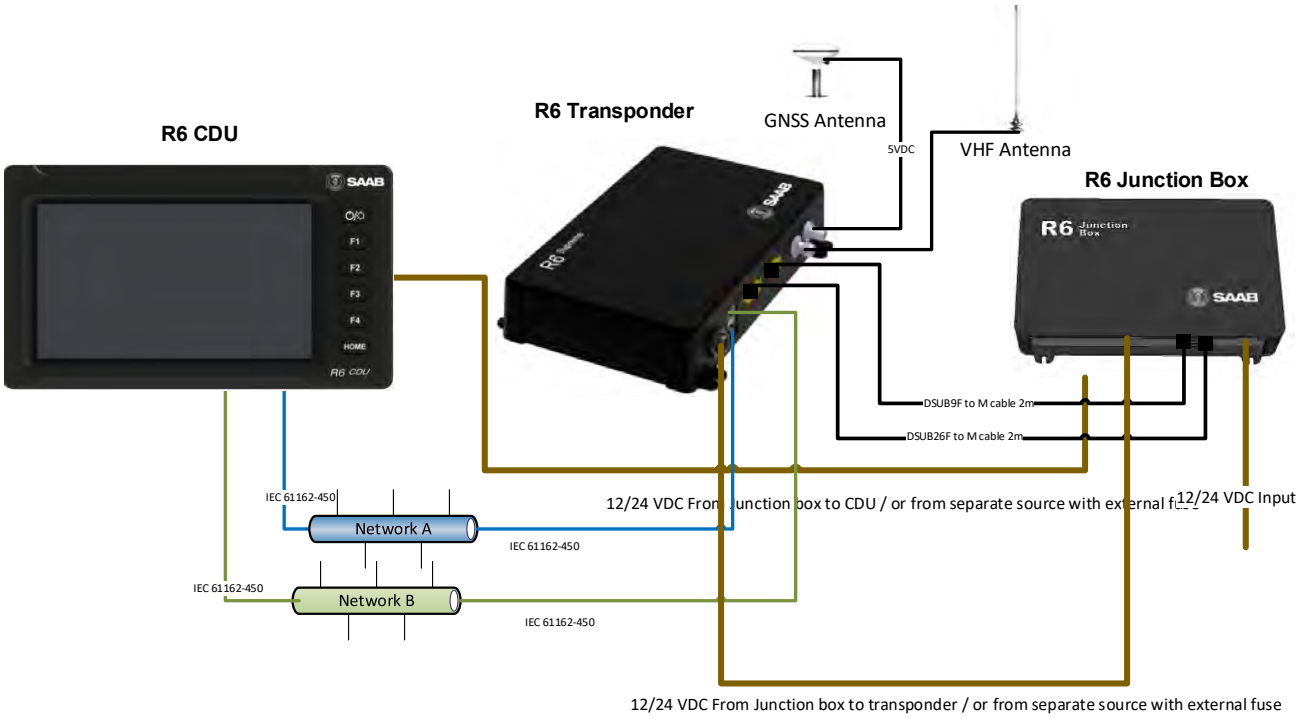


Figure 15-2 – Redundant network installation

15.3 Combined AIS and Navigation system setup

The R6 CDU will also support full navigation system approval with the R5 Navigation sensor series of products, through a FW update once type approval for MED GNSS concludes. Once released it will be possible to install the R6 SUPREME transponder in combination with the R5 Navigation sensor using a common CDU as per below methods.

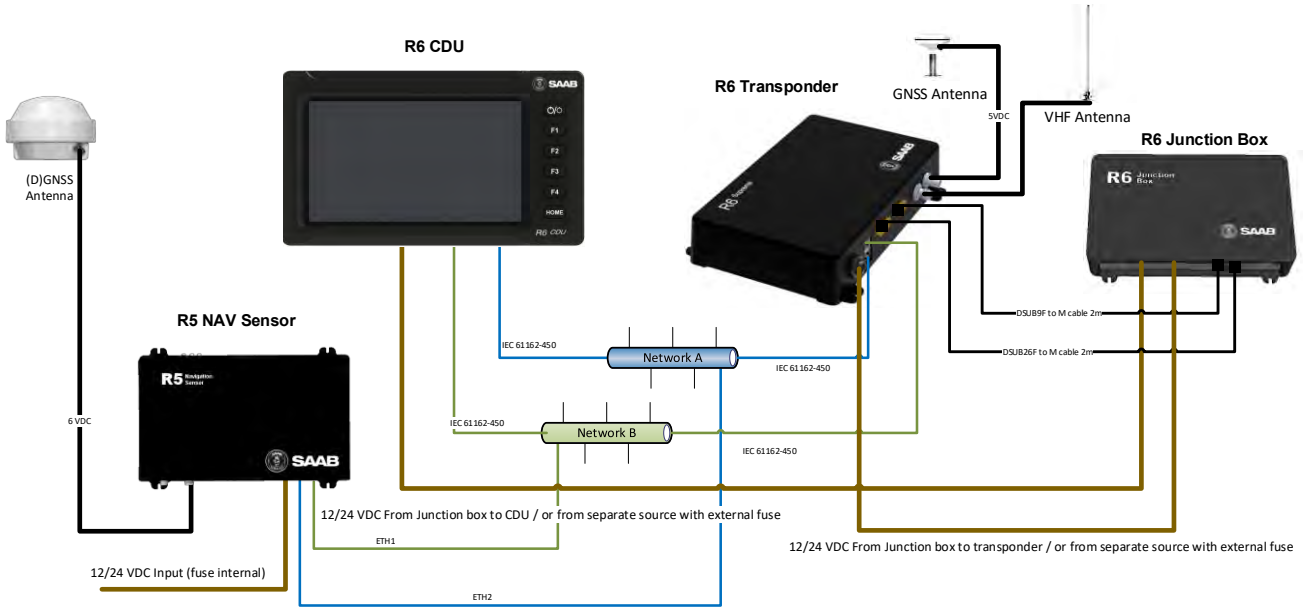


Figure 15-3 – Combined installation in redundant networks

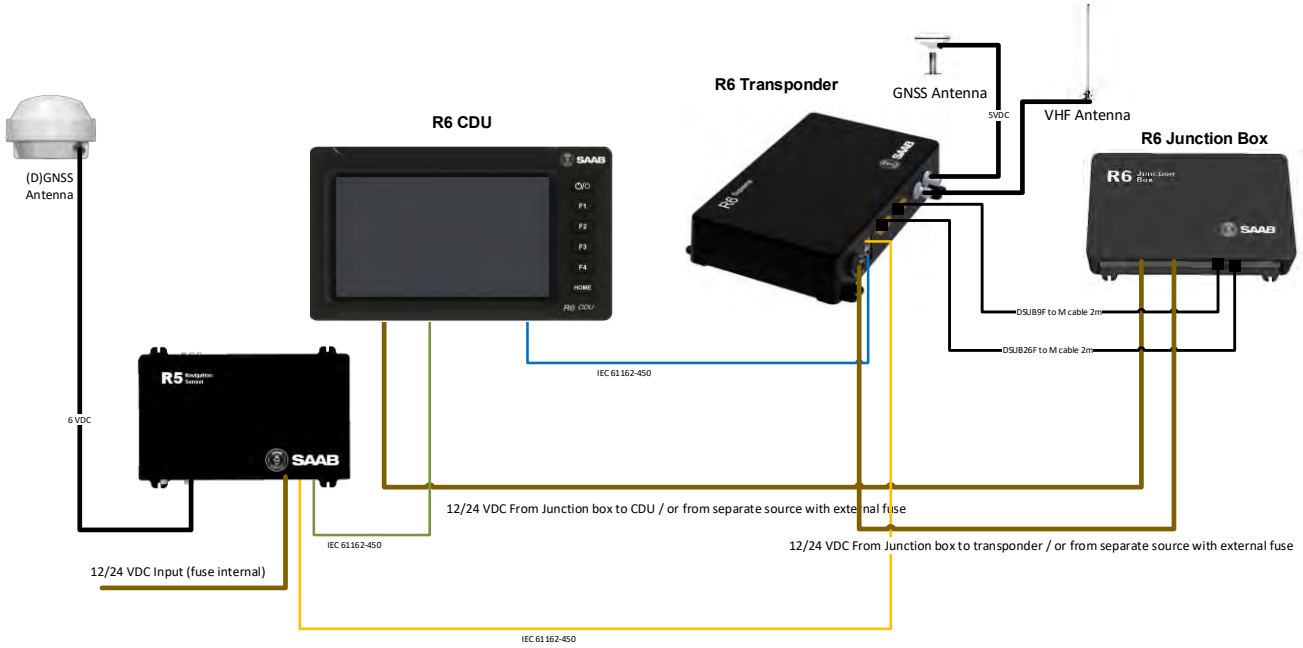


Figure 15-4 – Combined installation without network

16 ELECTRICAL INTERFACES

16.1 **Wiring diagram for installation with Junction box**

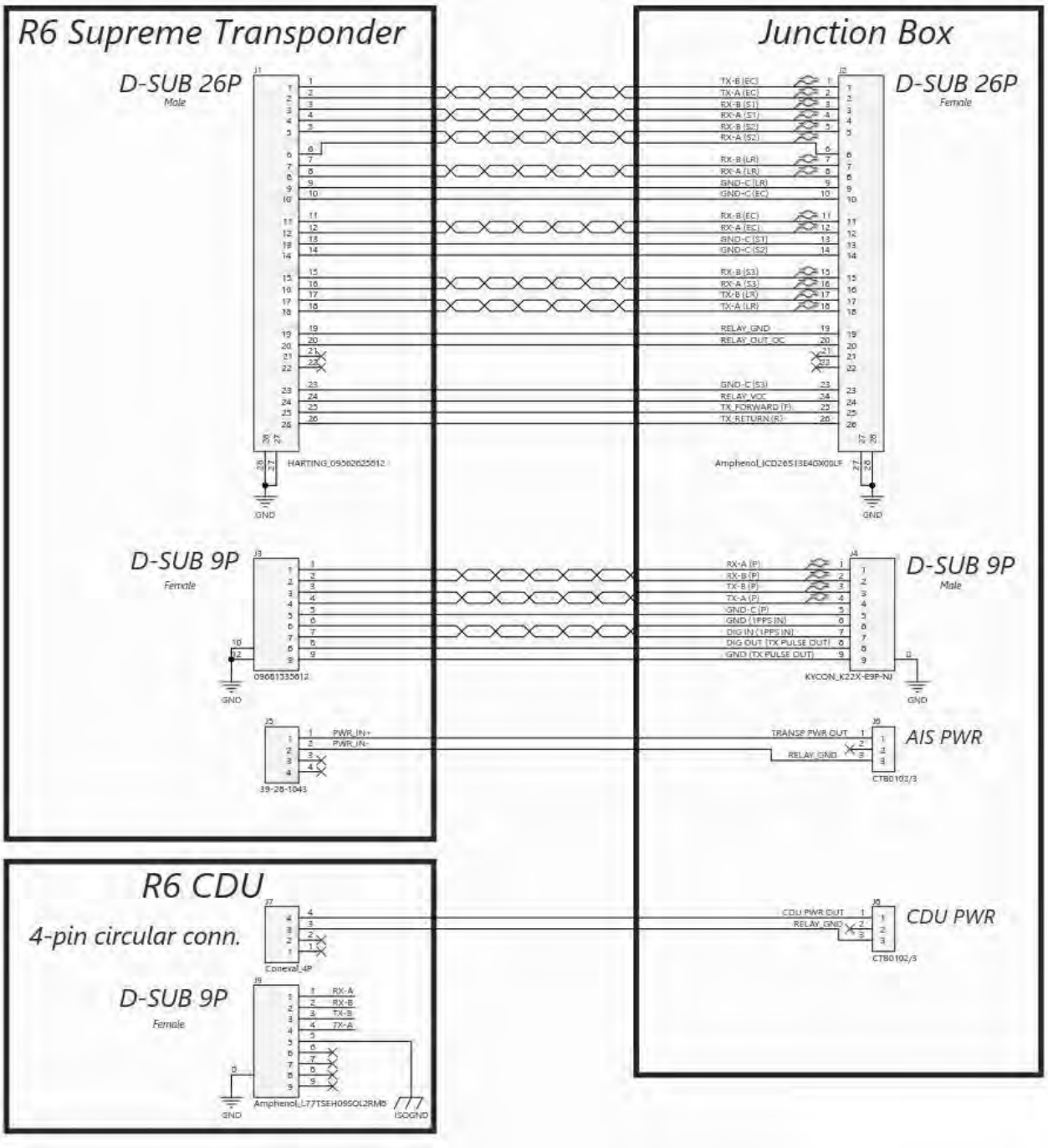


Figure 16-1 – Interconnection diagram for Junction box

For details in RS-422 Baud rates and Sensor input priority please see section 4.11.1 “Input port”.

16.2 Transponder interface details

Figure 16-2 – R6 Supreme Interface

16.2.1 J1 Interface

Type: DB26M

Function: Serial and electrical interface as per Table 16-1 – R6 SUPREME J1 Signal Connector

Pin	In/Out	Signal Name	Signal Type
1	Out	ECDIS - TxB (+)	RS422
2	Out	ECDIS - TxA (-)	RS422
3	In	Sensor1 - RxB (+)	RS422
4	In	Sensor1 - RxA (-)	RS422
5	In	Sensor2 - RxB (+)	RS422
6	In	Sensor2 - RxA (-)	RS422
7	In	Long Range - RxB (+)	RS422
8	In	Long Range - RxA (-)	RS422
9	-	Long Range - GND	RS422
10	-	ECDIS - GND	RS422
11	In	ECDIS – RxB (+)	RS422
12	In	ECDIS – RxA (-)	RS422
13	-	Sensor1 – GND	RS422
14	-	Sensor2 – GND	RS422
15	In	Sensor3 – RxB (+)	RS422
16	In	Sensor3 – RxA (-)	RS422
17	Out	Long Range – TxB (+)	RS422
18	Out	Long Range – TxA (-)	RS422
19	-	Alarm Relay – GND	-
20	Out	Alarm Relay – Out	-
21	-	GND	-
22	-	-	-
23	-	Sensor3 – GND	RS422
24	-	Alarm Relay - VCC	-
25	In	External Switch (R)	-

26	Out	External Switch (F)	-

Table 16-1 – R6 SUPREME J1 Signal Connector

16.2.2 J2 Interface

Type: DB9F

Function: Serial and electrical interface as per Table 16-2 – R6 SUPREME J2 Signal Connector

Pin	In/Out	Signal Name	Signal Type
1	In	PILOT - RxA (-)	RS422
2	In	PILOT - RxB (+)	RS422
3	Out	PILOT – TxA (-)	RS422
4	Out	PILOT – TxB (+)	RS422
5	-	PILOT – GND	RS422
6	-	1PPS – GND	-
7	In	1PPS – Signal	3.3V/5V TTL
8	-	TX Pulse – GND	-
9	Out	TX Pulse – Signal	5V TTL

Table 16-2 – R6 SUPREME J2 Signal Connector

16.2.3 12/24 VDC interface

Type: Conxall Mini-Con-X 4-pin

Function: Power input

Pin	In/Out	Signal Name	Signal Type
1	In	PWR +	12/24 VDC
2	In	PWG GND	0 VDC
3	In	-	-
4	In	-	-

Table 16-3 – Power Cable signals

16.2.4 ETH1 and ETH2 interfaces

Compliant to IEEE 802.3ab (10BASE-T/100BASE-TX/1000BASE-T)

Supports IEC 61162-450

16.2.5 GNSS interface

Type: TNC (Female)

Function: GNSS antenna RF input - 5 VDC output

16.2.6 VHF interface

Type: BNC Female

Function: VHF antenna connection

16.2.7 GND symbol interface

Type: M6 hex nuts and threaded rod

Function: Connection to ground

16.3 **R6 Junction box Interfaces**

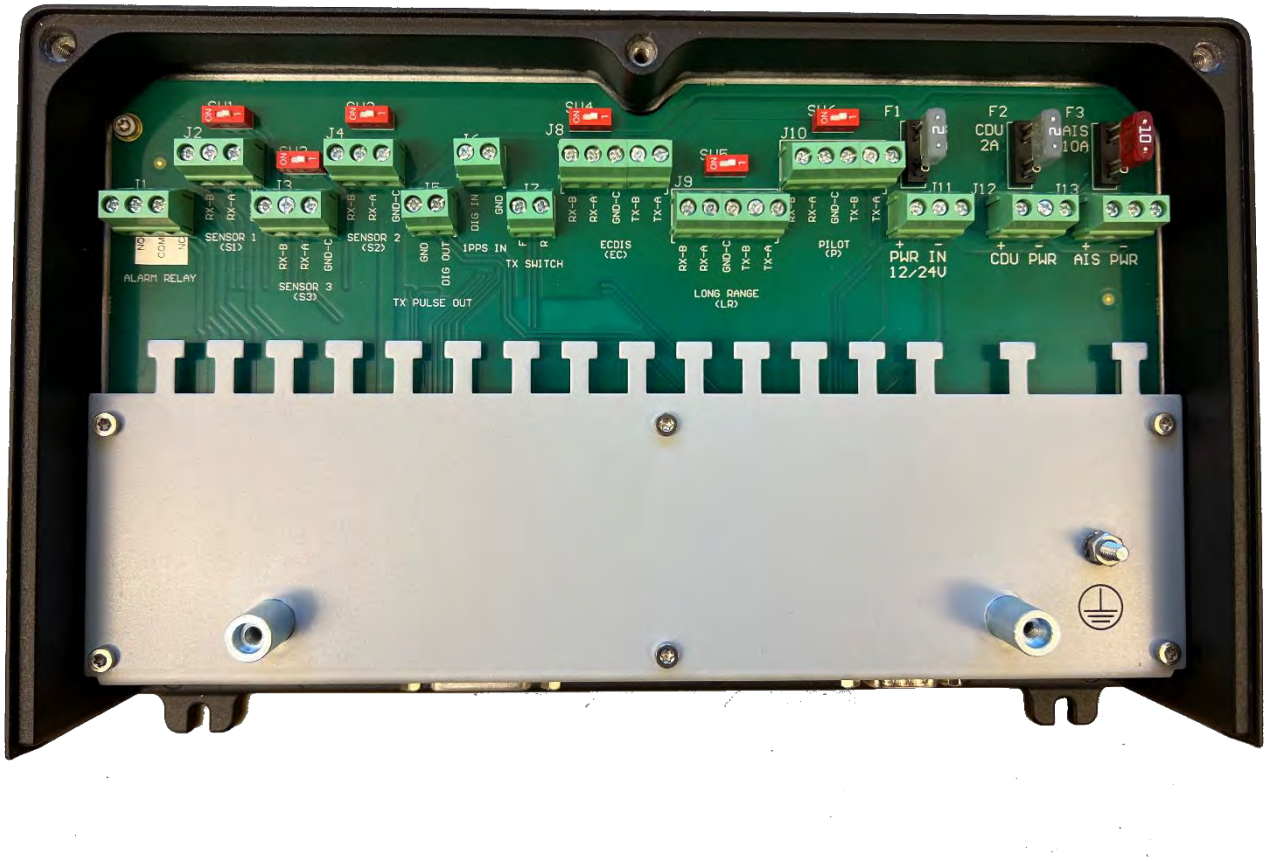


Figure 16-3 – R6 Junction box

16.3.1 D-SUB J1 Interface

Type: DB26F

Function: Serial and electrical interface. Connects to R6 SUPREME “J1” using 7000 118-286, Signal cable DSUB-DSUB 26p 2m

16.3.2 D-SUB J2 Interface

Type: DB9M

Function: Serial and electrical interface. Connects reversed Signal Cable DSUB-DSUB to 7000 123-126, Signal Cable DSUB-DSUB 9p 2m

16.3.3 Internal Screw terminals and components

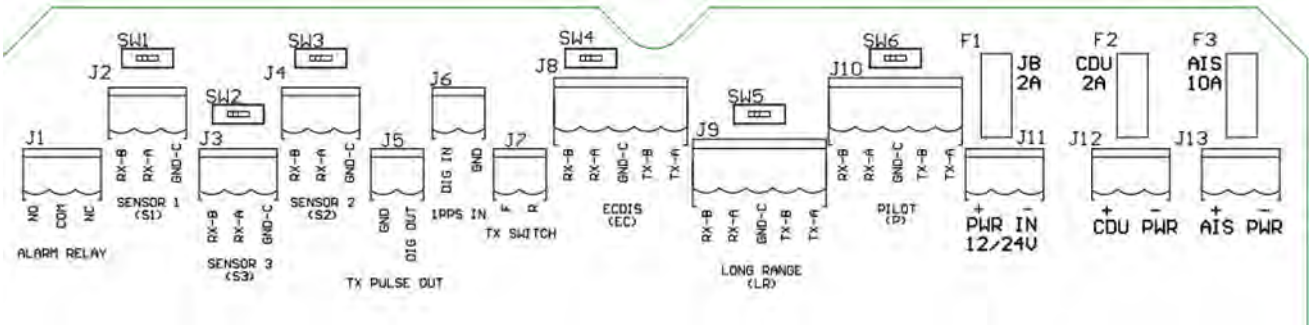


Figure 16-4 – Circuit Board Layout and markings

The table below details all the screw terminal connections when D-SUB J1 and D-SUB J2 are connected to an R6 SUPREME Transponder

Item	Terminal Marking	Pin Marking	Signal	Connects to
J11	PWR IN 12/24V	+	Ext Power In (+)	External power
		-	Ext Power In (-)	External power
J12	AIS PWR	+	Power Out Transponder (+)	Transponder Power Cable (+)
		-	Power Out Transponder (-)	Transponder Power Cable (-)
J13	CDU PWR	+	Power Out CDU (+)	CDU Power Cable (+)
		-	Power Out CDU (-)	CDU Power Cable (-)
J1	ALARM RELAY	NC	Alarm Relay NC	Internal Relay
		COM	Alarm Relay COM	Internal Relay
		NO	Alarm Relay NO	Internal Relay
J2	SENSOR 1	GND	RS422 GND	D-SUB J1 Pin 13
		RX-A	RS422 RX-A (-)	D-SUB J1 Pin 4
		RX-B	RS422 RX-B (+)	D-SUB J1 Pin 3
J3	SENSOR 2	GND	RS422 GND	D-SUB J1 Pin 14
		RX-A	RS422 RX-A (-)	D-SUB J1 Pin 6
		RX-B	RS422 RX-B (+)	D-SUB J1 Pin 5
J4	SENSOR 3	GND	RS422 GND	D-SUB J1 Pin 23
		RX-A	RS422 RX-A (-)	D-SUB J1 Pin 16
		RX-B	RS422 RX-B (+)	D-SUB J1 Pin 15
J8	ECDIS	TX-A	RS422 TX-A (-)	D-SUB J1 Pin 2

		TX-B	RS422 TX-B (+)	D-SUB J1 Pin 1
		GND	RS422 GND	D-SUB J1 Pin 10
		RX-A	RS422 RX-A (-)	D-SUB J1 Pin 12
		RX-B	RS422 RX-B (+)	D-SUB J1 Pin 11
J9	LONG RANGE	TX-A	RS422 TX-A (-)	D-SUB J1 Pin 18
		TX-B	RS422 TX-B (+)	D-SUB J1 Pin 17
		GND	Ground	D-SUB J1 Pin 9
		RX-A	RS422 RX-A (-)	D-SUB J1 Pin 8
		RX-B	RS422 RX-B (+)	D-SUB J1 Pin 7
J10	PILOT	TX-A	RS422 TX-A (-)	D-SUB J2 Pin 3
		TX-B	RS422 TX-B (+)	D-SUB J2 Pin 4
		GND	RS422 GND	D-SUB J2 Pin 5
		RX-A	RS422 RX-A (-)	D-SUB J2 Pin 1
		RX-B	RS422 RX-B (+)	D-SUB J2 Pin 2
J5	TX PULSE OUT	DIG OUT	5V TLL	D-SUB J2 Pin 9
		GND	Ground	D-SUB J2 Pin 8
J6	1PPS IN	DIG IN	3.3V/5 TTL	D-SUB J2 Pin 7
		GND	Ground	D-SUB J2 Pin 6
J7	TX SWITCH	F	Ext Switch F	D-SUB J1 Pin 26
		R	Ext Switch R	D-SUB J1 Pin 25

Table 16-4 – Screw terminals

Below table details additional components in the Junctionbox

Item	Description
SW1	Termination Switches for Sensor 1
SW2	Termination Switches for Sensor 2
SW3	Termination Switches for Sensor 3
SW4	Termination Switches for ECDIS
SW5	Termination Switches for Long Range
SW6	Termination Switches for Pilot
F1	2A fuse for PWR IN(Junction box)
F2	2A fuse for CDU PWR
F3	10A fuse for AIS PWR

Table 16-5 – Additional Junction box components

16.4 CDU Interfaces

All electrical interfaces of the R6 CDU are located on the rear side of the unit.

Figure 16-5 – R6 CDU rear interfaces

16.4.1 12/24 VDC interface

Type: Conxall Mini-Con-X 4-pin

Function: Power input

Pin	In/Out	Signal Name	Signal Type
1	In	PWR +	12/24 VDC
2	In	PWG GND	0 VDC
3	-	-	-
4	-	-	-

Table 16-6 – CDU 12/24 V DC

16.4.2 ETH1 and ETH2 interfaces

Compliant to IEEE 802.3ab (10BASE-T/100BASE-TX/1000BASE-T)

Supports IEC 61162-450 communication

16.4.3 R6 CDU J1 interface

Type: DB9F

Function: AIS PI port. Suitable interface to install an AIS Pilot Port Plug (7000-123-128)

Pin	In/Out	Signal Name	Signal Type
1	In	PILOT - RxA (-)	RS422
2	In	PILOT - RxB (+)	RS422
3	Out	PILOT – TxB (+)	RS422

4	Out	PILOT – TxA (-)	RS422
5	-	PILOT – GND	RS422
6	-	-	-
7	-	-	-
8	-	-	-
9	-	-	-

Table 16-7 – CDU J1 Signals

16.4.4 SD interface

Full size SD Card reader slot (push-push type)

Capacity type: SD, SDHC

Speed class: Supports up to UHS-1 speeds

File system supported: FAT32, exFAT

Used for FW updates and Service Engineering.

17 MECHANICAL DRAWINGS

17.1 Transponder Physical Size and Mechanical Drawing

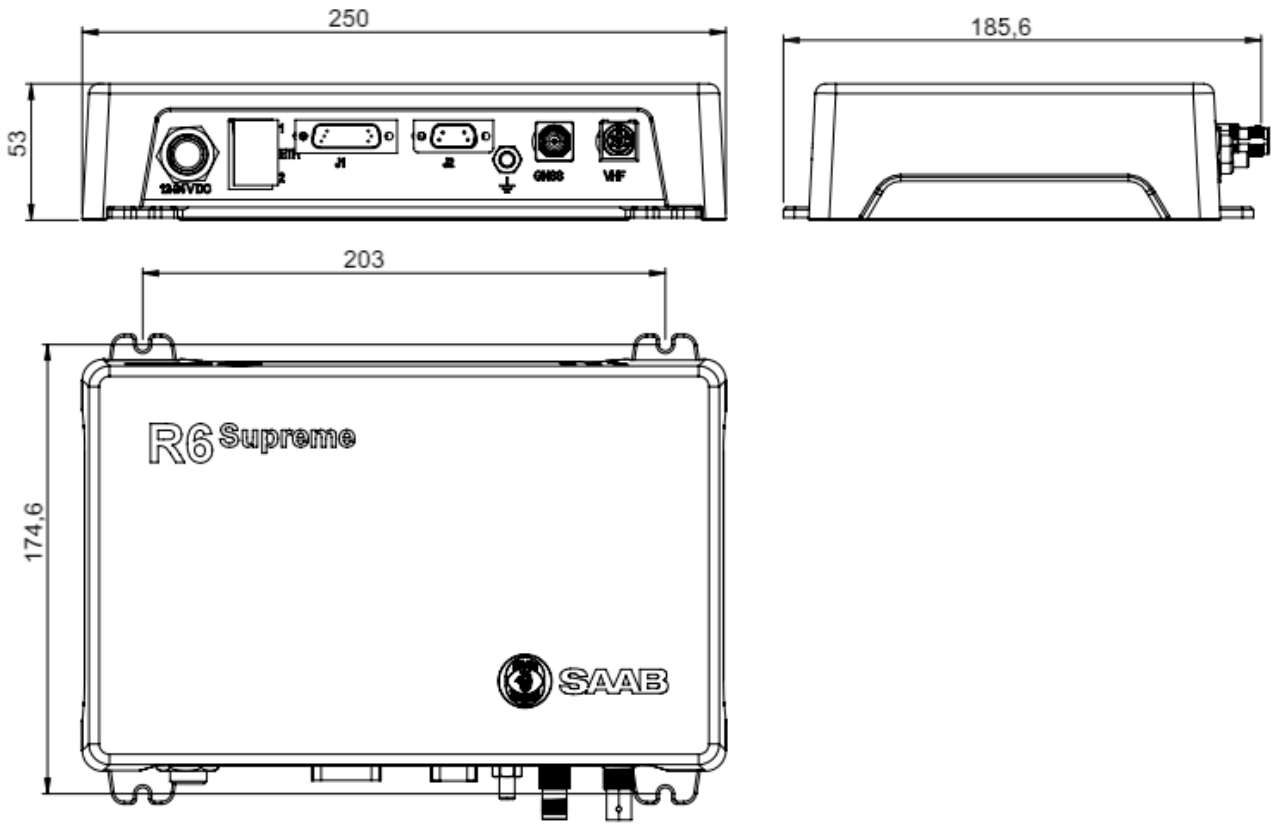


Figure 17-1 – R6 SUPREME Transponder, Dimensions [mm]

17.2 CDU Physical Size and Mechanical Drawing

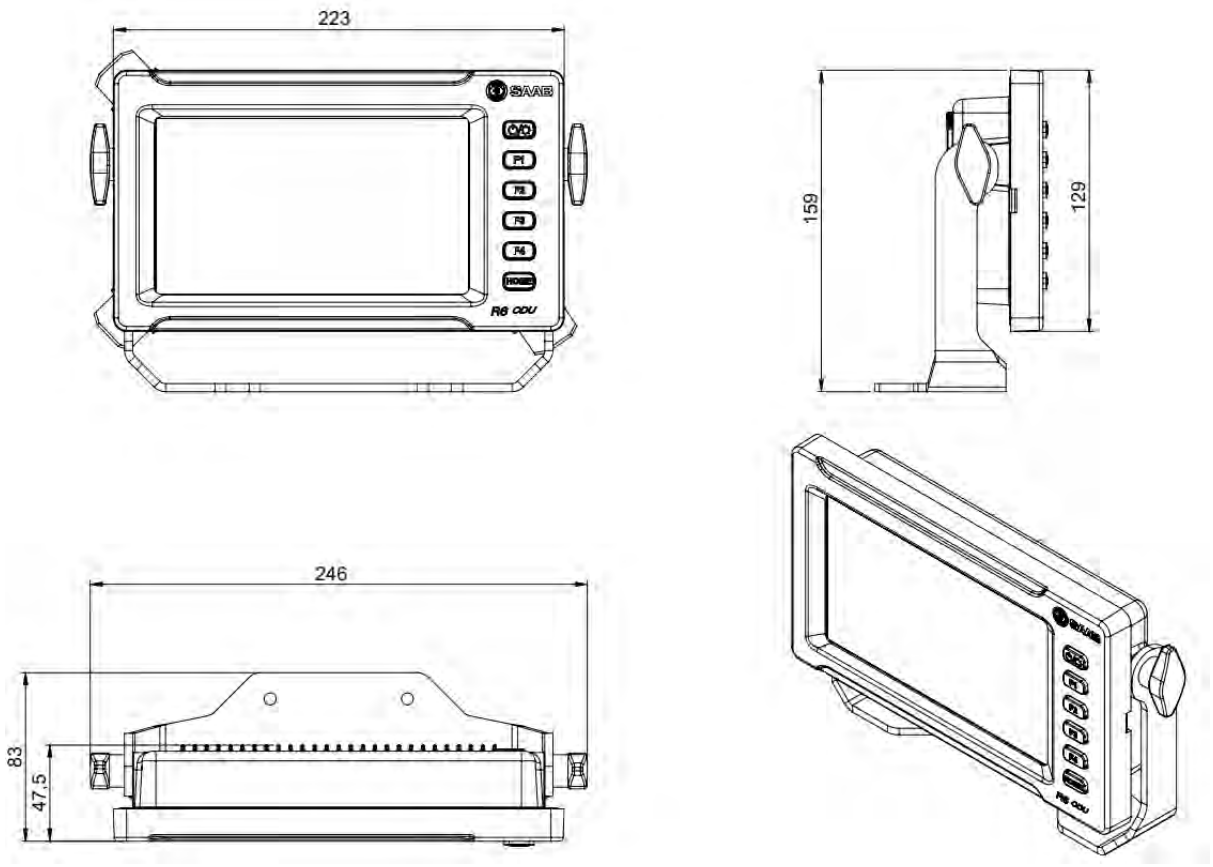


Figure 17-2 – R6 CDU Mechanical Drawing [mm]

17.3 CDU Gimbal Mount Physical Size and Mechanical Drawing

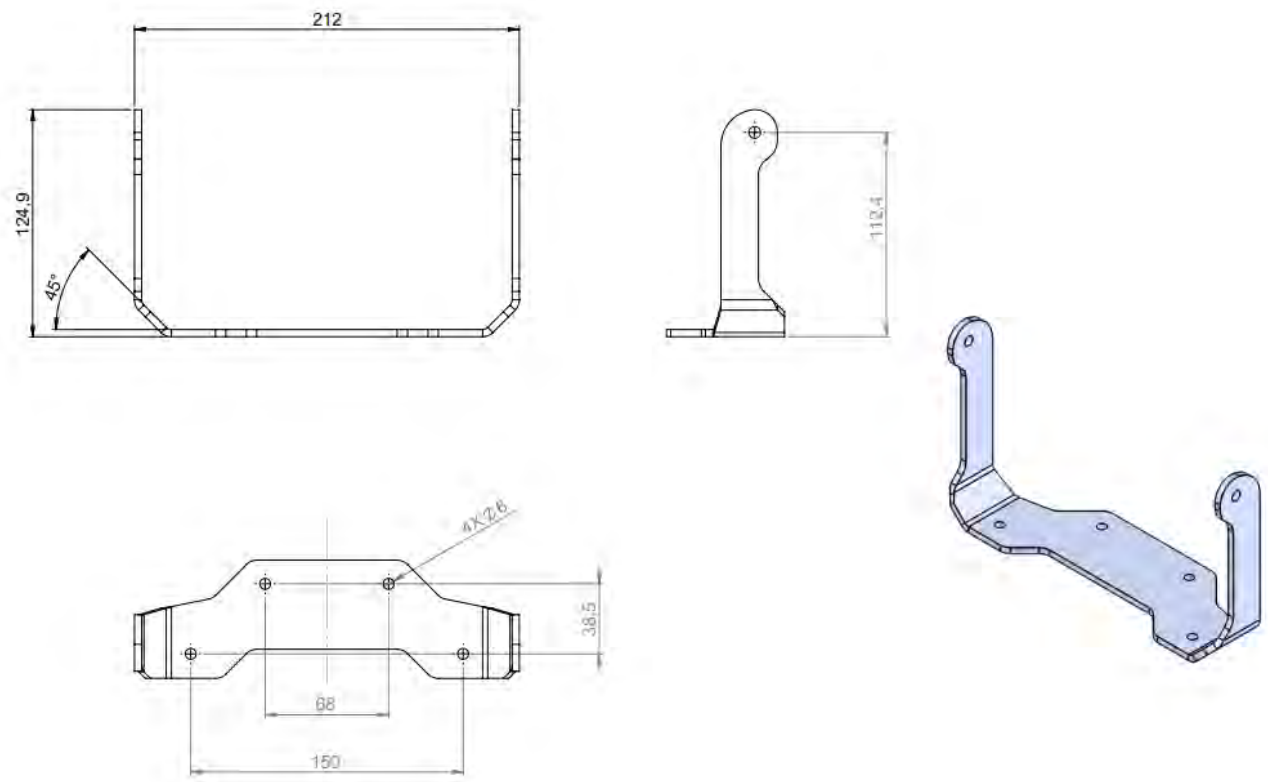


Figure 17-3 – R6 CDU, Gimbal Mount [mm]

17.4 CDU Cut-out Measurements for Panel Mount

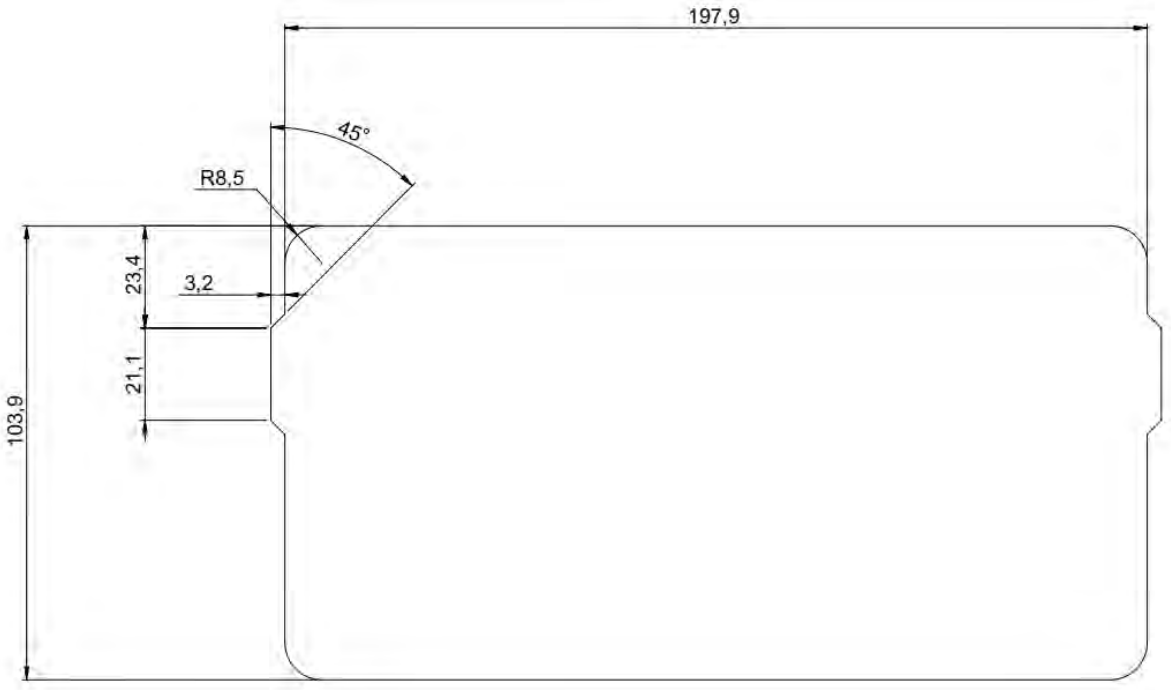


Figure 17-4 – R6 CDU, Cut-out Measurements for Panel Mount [mm]

17.5 CDU Mounting Frame Dimensions

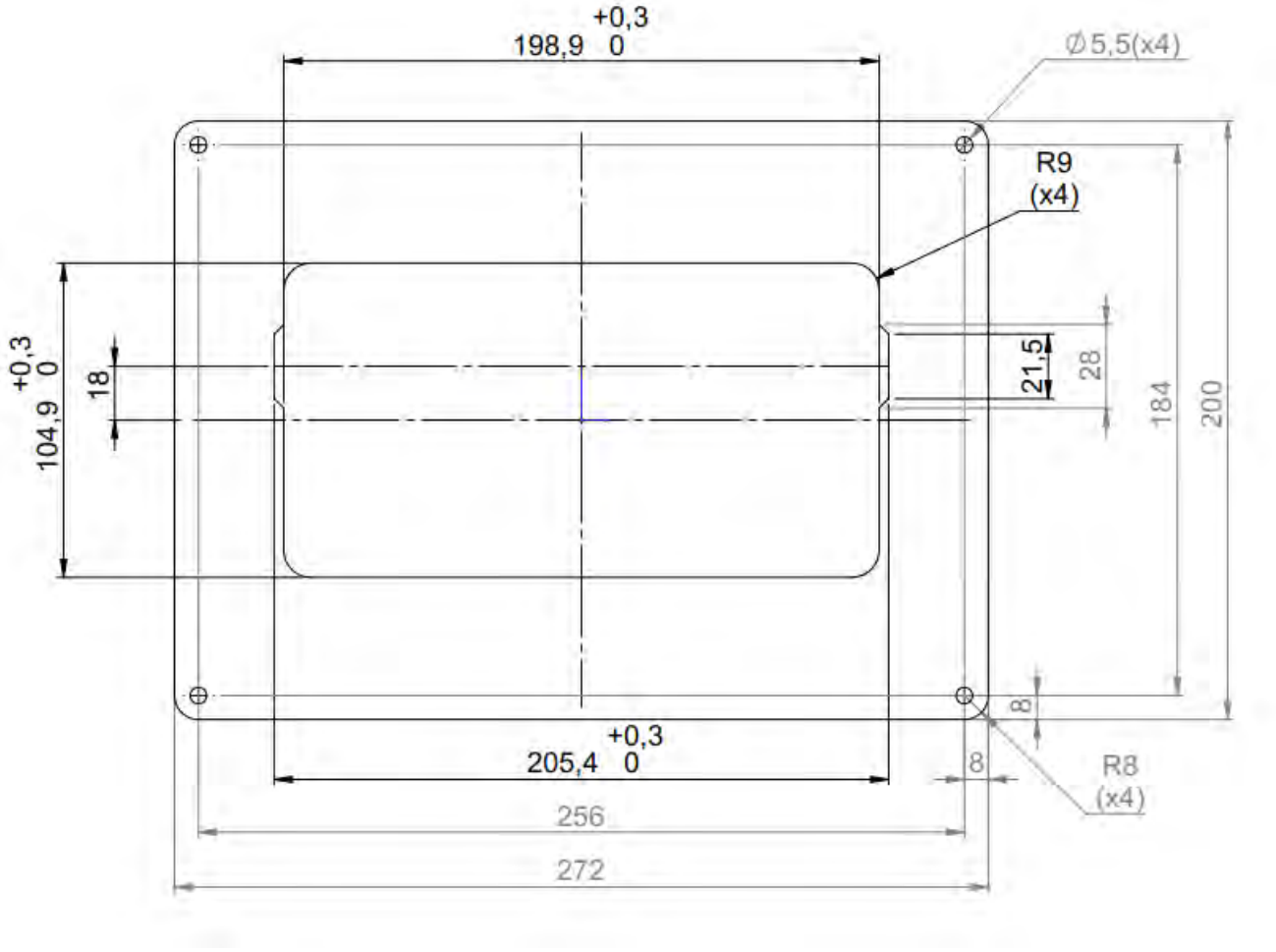


Figure 17-5 – R6 CDU, Mounting frame dimensions [mm]

17.6 R6 Junction Box Physical Size and Mechanical Drawing

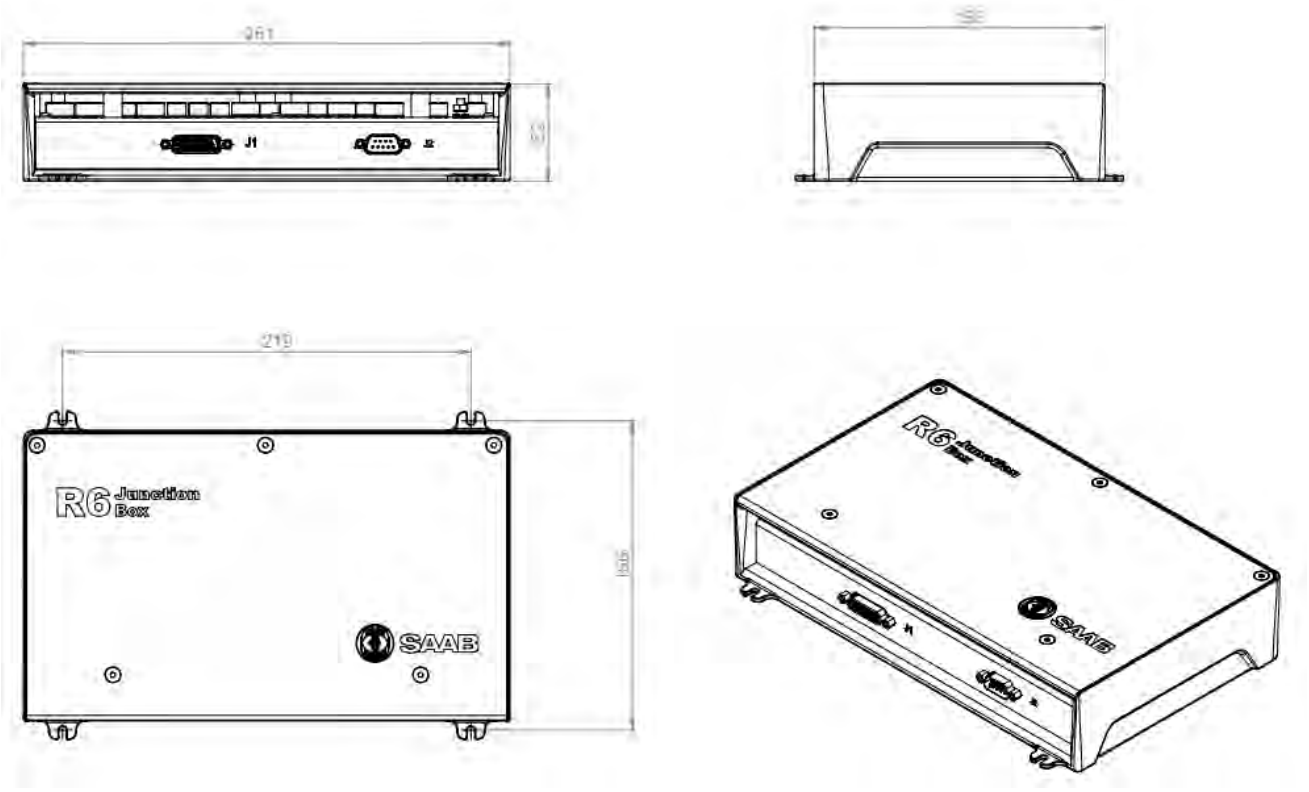


Figure 17-6 – R6 AIS Junction Box, Dimensions [mm]

17.7 GNSS Antennas – Physical Size and Mechanical Drawing

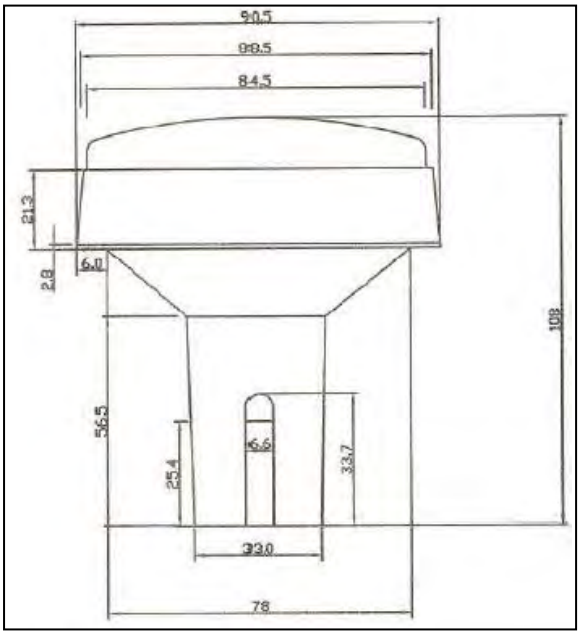


Figure 17-7 – GPS Antenna – MA700

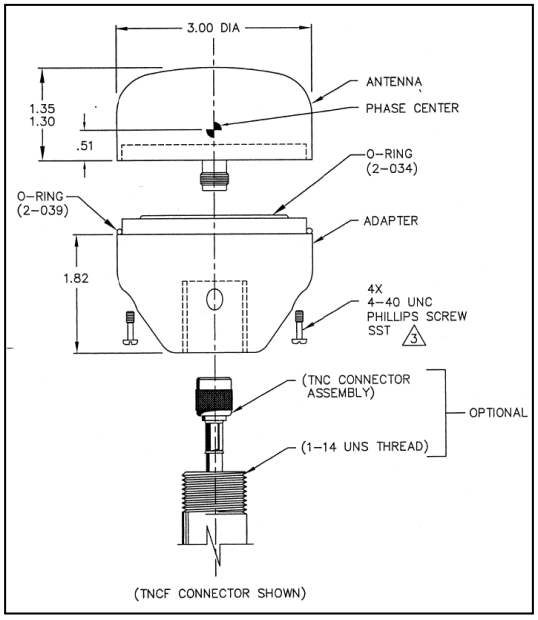


Figure 17-8 – GPS Antenna – AT575-68

Figure 17-9 – Combined VHF / GNSS Antenna

Figure 17-10 – GNSS01 Antenna

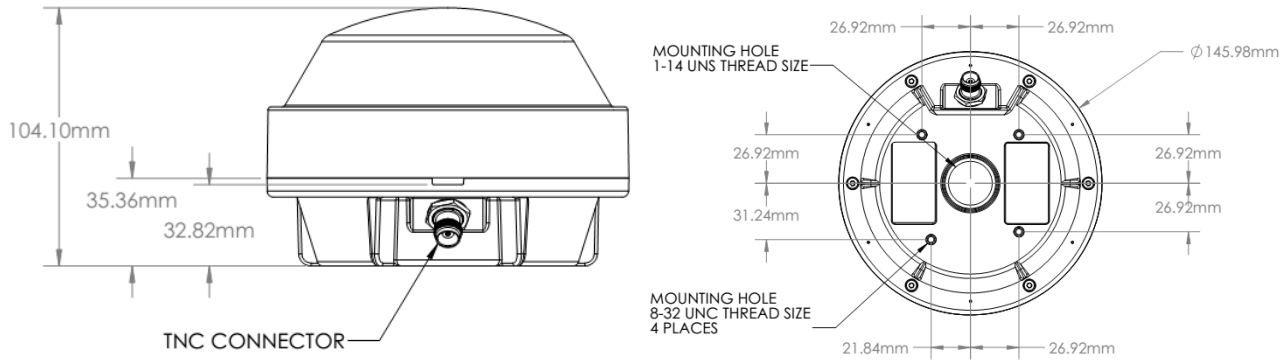


Figure 17-11 – MGL-3 GNSS Antenna

18 GLOSSARY

Term	Description
ACK	Acknowledgement
AIS	Automatic Identification System
Ant	Antenna
ARPA	Automatic Radar Plotting Aid
BRG	Bearing
BS	Base Station
CDU	Control and Display Unit
Ch	Channel
COG	Course Over Ground
Comm	Communication
DGNSS	Differential Global Navigational Satellite System
Disp	Display
DTE	Data Terminal Equipment
DSC	Digital Selective Calling
ECDIS	Electronic Chart Display and Information System
EGNOS	European Geostationary Navigation Overlay Service
EPFS	Electronic Position Fixing System
ETA	Estimated Time of Arrival
Ext	External
FW	Firmware
GALILEO	European GNSS
GLONASS	Russian GNSS
GMSK	Gaussian Minimum Shift Keying
GNSS	Global Navigational Satellite System
GPS	Global Positioning System
HDG	Heading
HDOP	Horizontal Dilution Of Precision
H/W	Hardware
IALA	International Association of Lighthouse Authorities
ID	Identifier
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
Int	Internal
IP	Internet Protocol (address)
ITU	International Telecommunications Union
LAT	Latitude

LED	Light Emitting Diode
LOC	Local
LON	Longitude
LR	Long Range
LWE	Light Weight Ethernet
Msg	Message
MKD	Minimum Keyboard and Display
MSAS	MTSAT Satellite Augmentation System (Japan)
NMEA	National Marine Electronics Association
MMSI	Maritime Mobile Service Identity
N/A	Not available
NE	North East
No	Number
NVM	Non-Volatile Memory
PoB	Persons on board
Pos	Position
RAIM	Receiver Autonomous Integrity Monitoring
RNG	Range
RATDMA	Random Access Time Division Multiple Access
ROT	Rate Of Turn
RTA	Recommended Time of Arrival
Rx	Receive
SAR	Search And Rescue
SART	Search And Rescue Transmitter
SBAS	Satellite Based Augmentation System
SNR	Signal to Noise Ratio
SOG	Speed Over Ground
SRM	Safety Related Message
Sync	Synchronization
SW	South West
S/W	Firmware
TDMA	Time Division Multiple Access
Transp	Transponder
Tx	Transmit
UN	United Nations
UTC	Universal Time Coordinated
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio. (A low value indicates a problem with the antenna or connections/cables to the antenna.)

WAAS	Wide Area Augmentation System (United States)

Table 18-1 – Abbreviation Lista

18.1 Units

bps	Bits per second
W	Watt
m	Meter
kHz	Kilo Hertz
dB-Hz	Decibel-Hertz
NM	Nautical Mile
km	Kilometer
Sm	Statute Mile
kn	Knots
km/h	Kilometer per Hour
mph	Miles per Hour
mm-dd hh:mm	month-day hour:minute

Table 18-2 – Unit List