FURUNO

INSTALLATION AND OPERATION MANUAL

GNSS RECEIVER

Model FFGR-10

FURUNO FINLAND

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DOCUMENT HISTORY

Version	Date	Changes	Writer
1.00	07.07.2026	First release	Janne Grön
1.10	12.08.2026	Added NMEA version information, corrected NMEA data polarity(Figure 2.5), improved specification data and made small correction into General Information text.	Janne Grön

1. GENERAL OVERVIEW

FFGR-10 is a multi-band (L1 + L2 + L5) high precision multi-constellation GNSS receiver. The unit has been tested according to IEC 60945 standard.

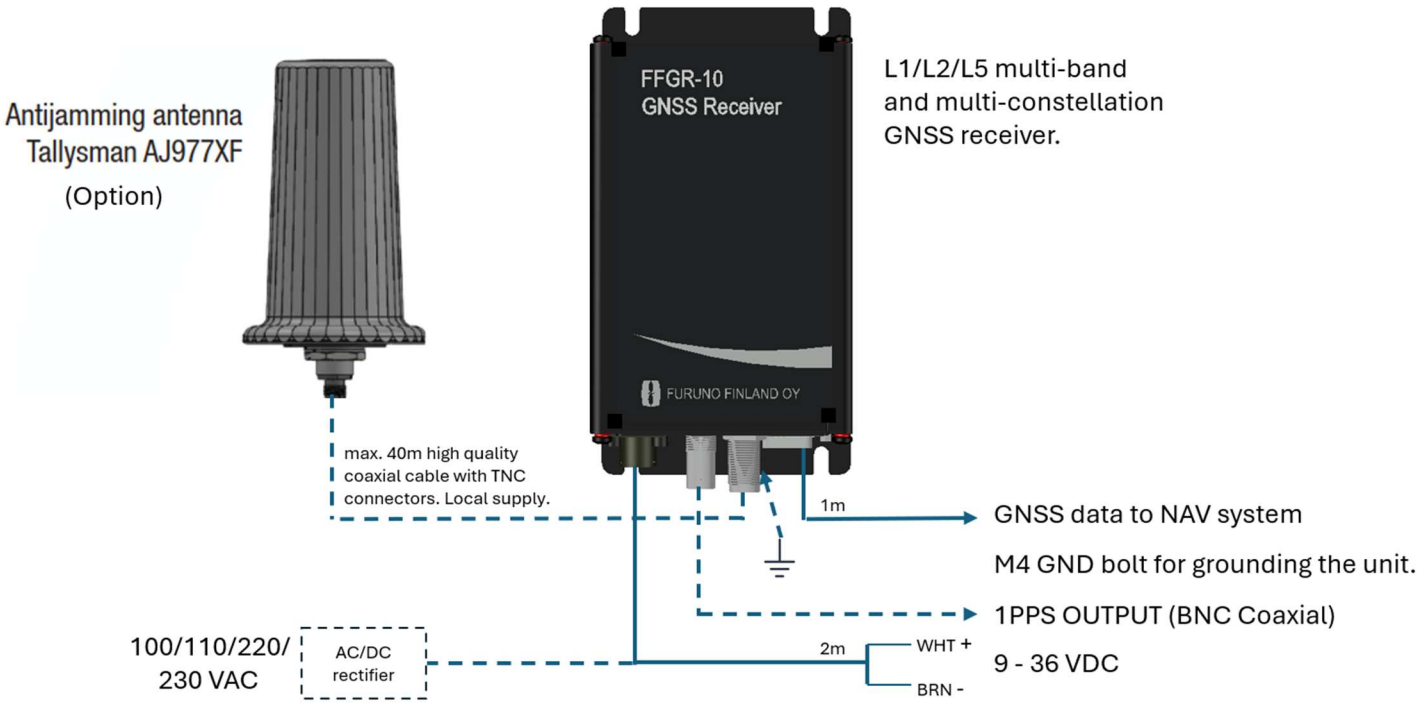
The receiver has two 4800 bps RS-422 output ports and two 38400 bps RS-422 output ports. Default NMEA0183 output messages include GGA, RMC, VTG, ZDA and DTM. All NMEA messages have GP talker identifier as a standard. NMEA sentences and talker cannot be modified in the field. The unit also has a 1PPS synchronization signal output available.

FFGR-10 will always output $GPGGA although GPS constellation signal would be totally jammed and other constellations used. Device will not change GP data talker in any case.

On board SOLAS vessels FFGR-10 is a backup GNSS receiver. Please note that FFGR-10 is a multi-constellation GNSS device even though it is using only the GP talker identifier. Ships have lots of old equipment which understand only the GPS and the GP talker identifier. Using the GP talker is an arrangement to avoid practical broblems in the integration of the FFGR-10 receiver on board legacy equipped vessels.

Important: Furuno FFGR-10 is designed to enhance resilience against jamming and spoofing threats. While it provides significantly improved protection compared to standard wheelmarked GNSS equipment, it is important to note that no system can guarantee absolute immunity. Under conditions of sufficiently strong jamming or sophisticated spoofing signals, FFGR-10 may also experience degradation in positioning accuracy or be affected by spoofing. Users should remain aware of operational limitations and maintain situational awareness when relying on GNSS data. Furuno does not warrant that FFGR-10 will prevent all instances of jamming or spoofing.

1.1 System configuration



2. INSTALLATION

2.1 Equipment list

Standard supply

Name	Type	Code	Qty	Remarks
GNSS receiver	FFGR-10	FFGR-10	1	
Power cable	FFGR/FFSP series, 2m	PT0-PC	1	2m cable
Data cable	DB9M-open wires SERIAL 1m	AK-CO-03_MOD1	1	1m cable

Optional supply

Name	Type	Code	Qty	Remarks
Antenna	AJ977XF	AJ977XF	1	
Angle mast mount	N171F	N171F	1	
Display unit	RD-33	IMD02361001	1	Remote Display for FFGR-10
DC/DC converter	Orion-Tr 24/24-5A	ORI242410110	1	Isolating DC/DC converter for RD-33(Mandatory) and FFGR-10

2.2 GNSS antenna installation (Option)

Tallysman AJ977XF antenna is installed mechanically using N171F angle mast mount or equal which can be optionally or locally supplied.

RF cable is connected to the TNC female connector of the antenna. See below Figure 2.1. Maximum cable length is 40 meters with good quality 50 ohms coaxial cable (RG-214 or better).

Antenna is installed in such a position where there is good visibility in all directions, and no disturbing electrical equipment is close to the antenna like satellite communication equipment and MF/HF transmitter antennas.
In case the FFGR-10 is used as a backup device (switch over between vessel's MAIN GNSS device) on board SOLAS vessels, the antenna of FFGR-10 must be located nearby (1 – 2 m) the MAIN GNSS receiver antenna to avoid any issue in sensor location settings in the NAV-system on board (please, refer to Figure 2.4 on page 9).

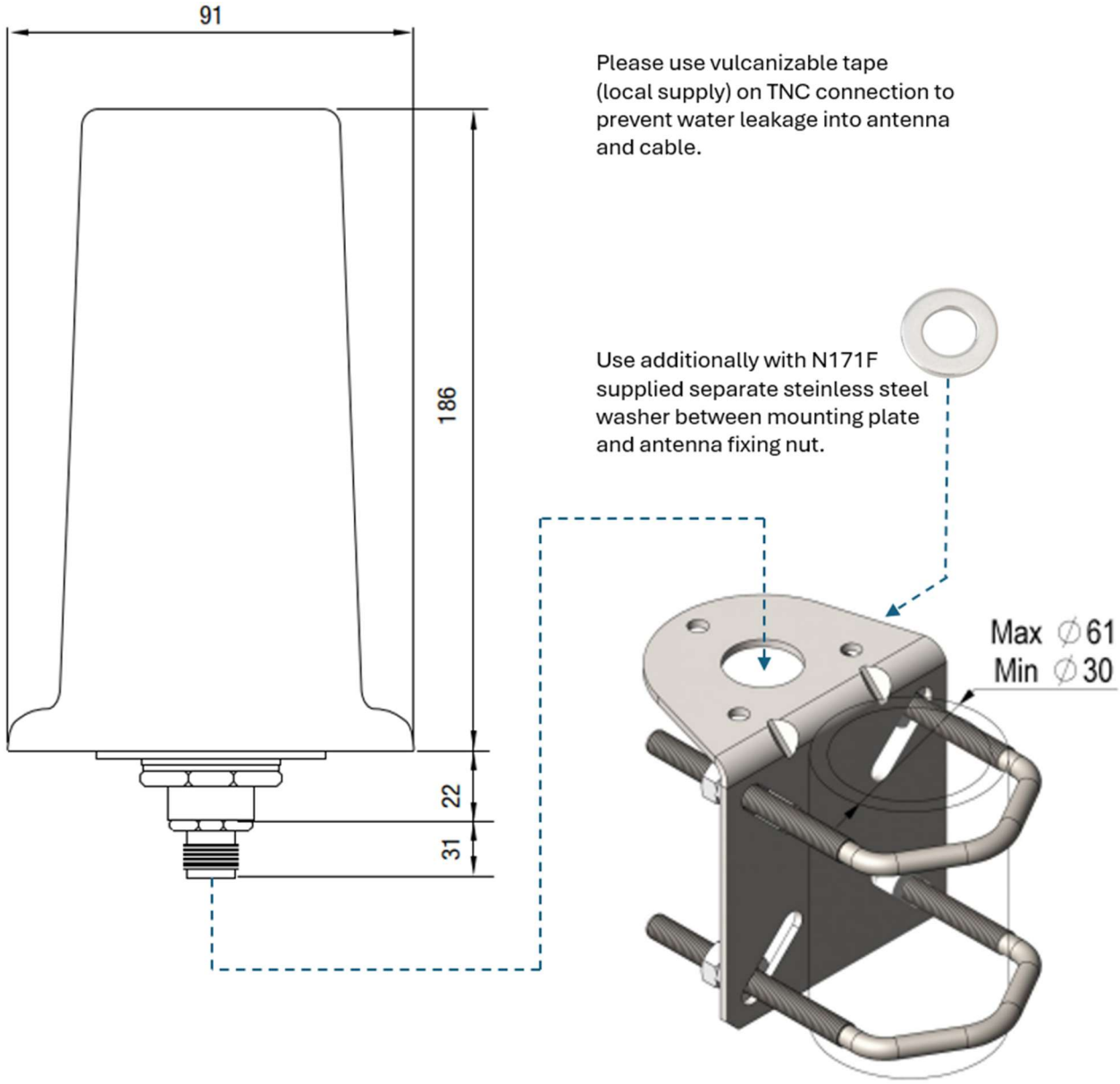


Figure 2.1 Tallysman AJ977XF GNSS antenna.

2.3 Receiver unit installation

Install FFGR-10 receiver unit in accordance with environmental specifications and ensure easy access to the LED indicators of the unit.

2m power cable is included in scope of supply. It is to be connected to the PWR connector. Power supply voltage is 9 – 36 VDC and power is less than 1W. 1m data cable is included in scope of supply. It is to be connected to the 9 pin DSUB DATA connector. Connect high quality antenna cable (RG-214 or better, local supply) to TNC antenna connector. Connect grounding wire (local supply) to M4 GND bolt. Use 1PPS BNC connector to output 1PPS signal to external device if necessary.

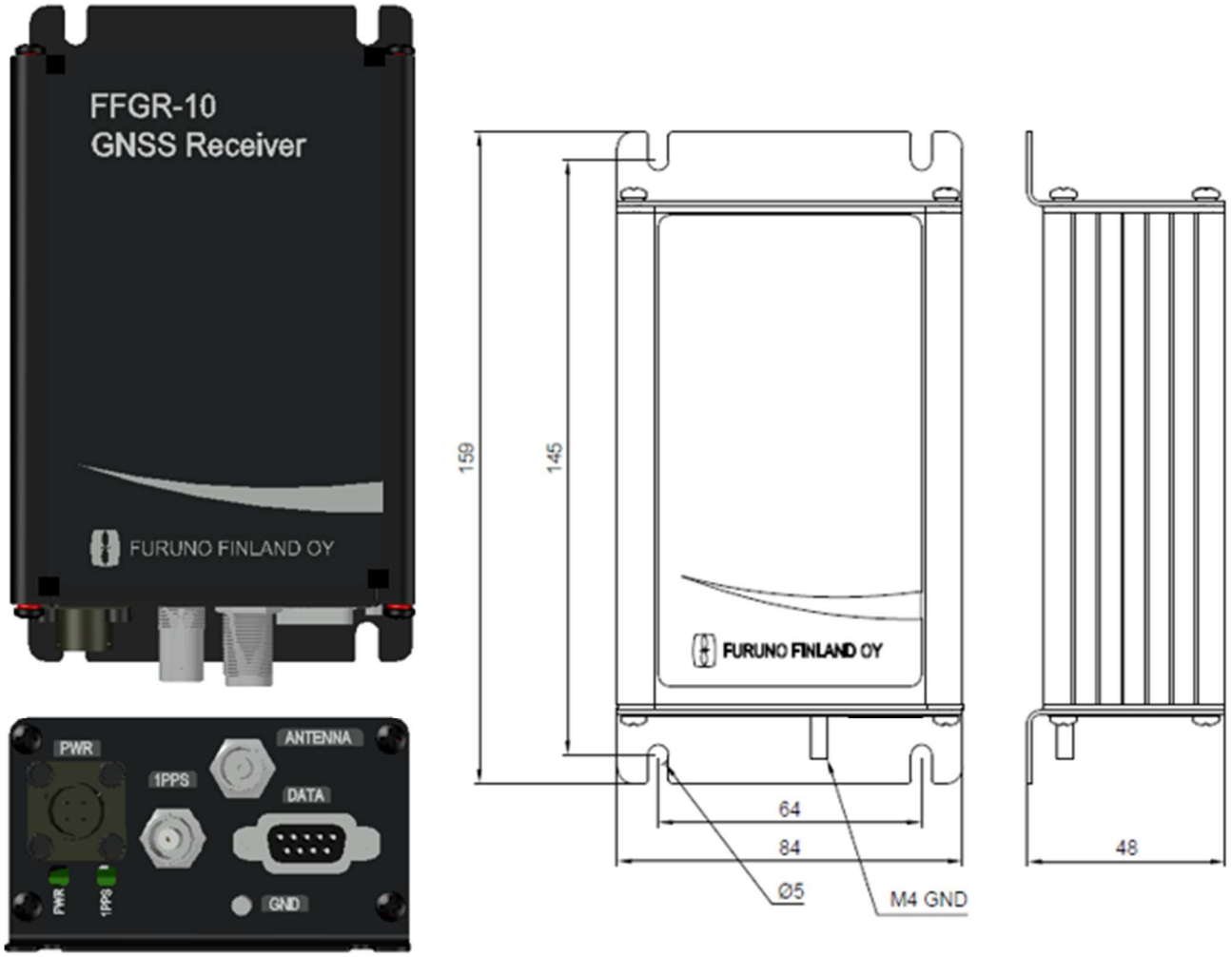
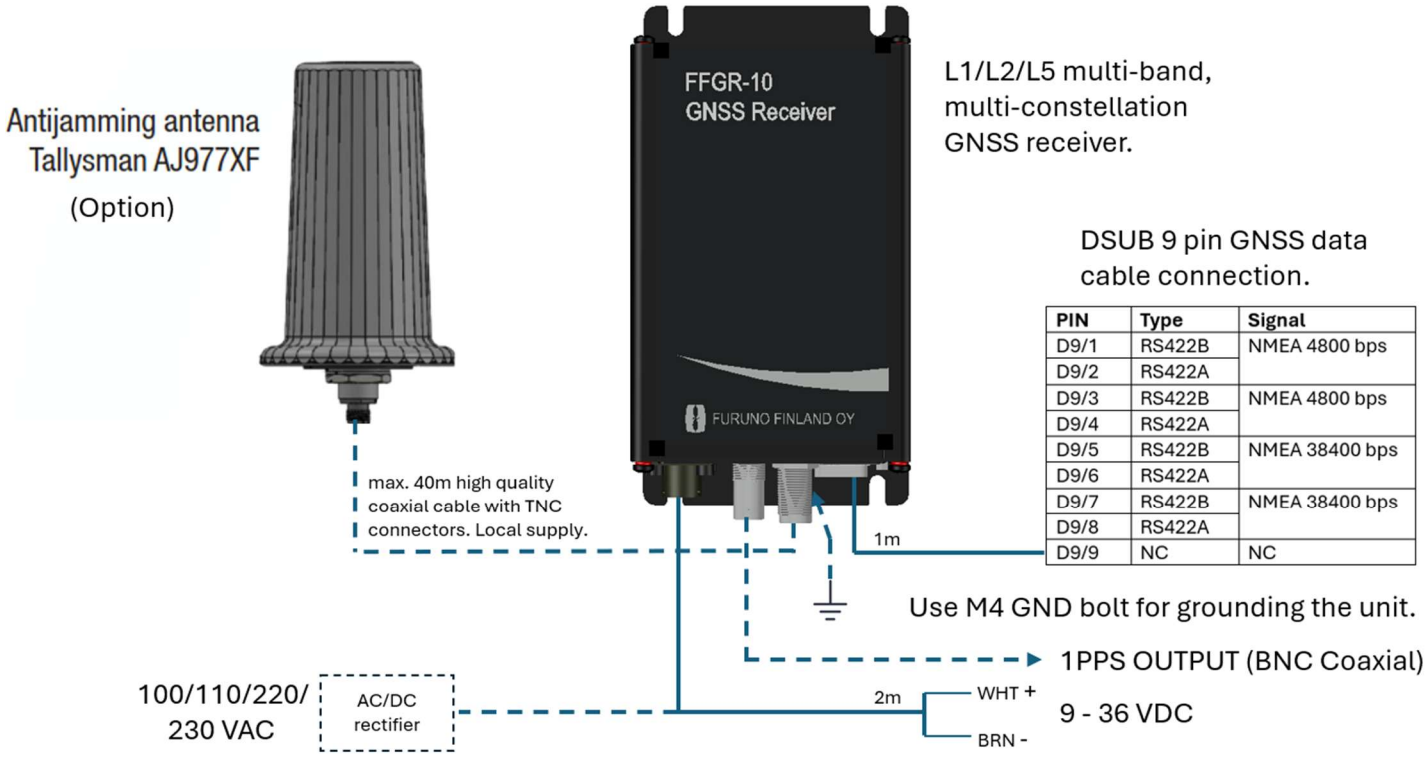


Figure 2.2 FFGR-10 Receiver unit.

2.4 Interconnection diagram

FFGR-10 interconnection diagram is presented below in Figure 2.3.



PIN	Type	Signal
D9/1	RS422B	NMEA 4800 bps
D9/2	RS422A	
D9/3	RS422B	NMEA 4800 bps
D9/4	RS422A	
D9/5	RS422B	NMEA 38400 bps
D9/6	RS422A	
D9/7	RS422B	NMEA 38400 bps
D9/8	RS422A	
D9/9	NC	NC

Figure 2.3 FFGR-10 interconnection

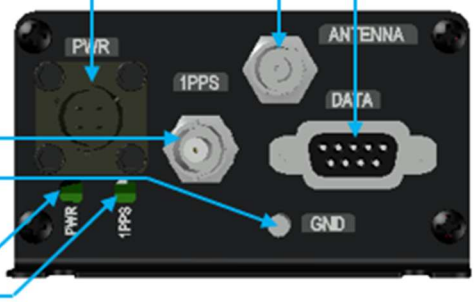
Example of NMEA data messages:

$GPGGA,112707.00,6009.99804,N,02442.33497,E,1,12,0.61,29.8,M,17.7,M,,*7F
$GPVTG,146.14,T,,M,0.007,N,0.013,K,A*20
$GPZDA,112707.00,21,03,2025,00,00*7F
$GPDTM,W84,,0.0,N,0.0,E,0.0,W84*71
$GPRMC,112708.00,A,6009.99800,N,02442.33502,E,0.029,146.14,210325,,,A*77

2.5 Installation instruction

Note. Please do NOT make any connections or remove connections while the unit is powered up.

- Connect GNSS antenna cable to TNC ANTENNA connector.
- Connect Power cable to PWR connector.
- Connect Data cable to DATA connector and make necessary wiring to Navigation system (refer to Figure 2.3).
    - Pins 1,2 & 3,4: 4800 pbs NMEA data
    - Pins 5,6 & 7,8: 38400 pbs NMEA data
- If necessary, use 1PPS output (BNC connector).
- Connect grounding to M4 GND bolt.
- Turn power ON (connect external fuse or equal).
- Check that PWR LED has green light on.
- Wait until 1PPS LED starts to blink at 1 Hz frequency.
- Check that data is valid in systems where data is connected to.



2.6 Installation on SOLAS vessels

FFGR-10 GNSS receiver is categorized as an AtoN (Aids to Navigation) and can be installed on SOLAS vessels as a backup unit (subject to class/flag approvals).
See below Figure 2.4 and Figure 2.5 for connection drawing.

Note. It is **MANDATORY** to use isolated power supply to avoid any grounding loops in case RD-33 remote display or equal device with non-isolated internal power supply is used in the system.
See drawing example on page 9.

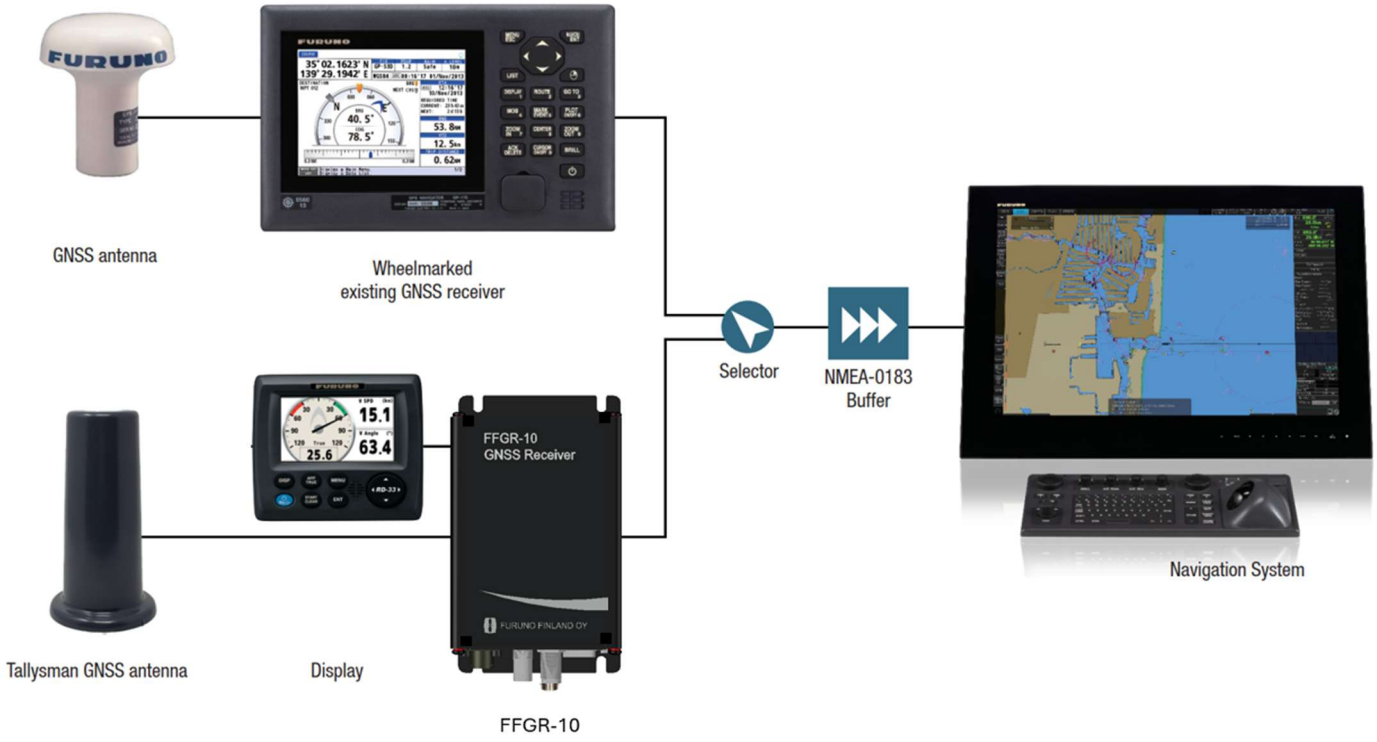


Figure 2.4 FFGR-10 installation recommendation on board SOLAS vessels.

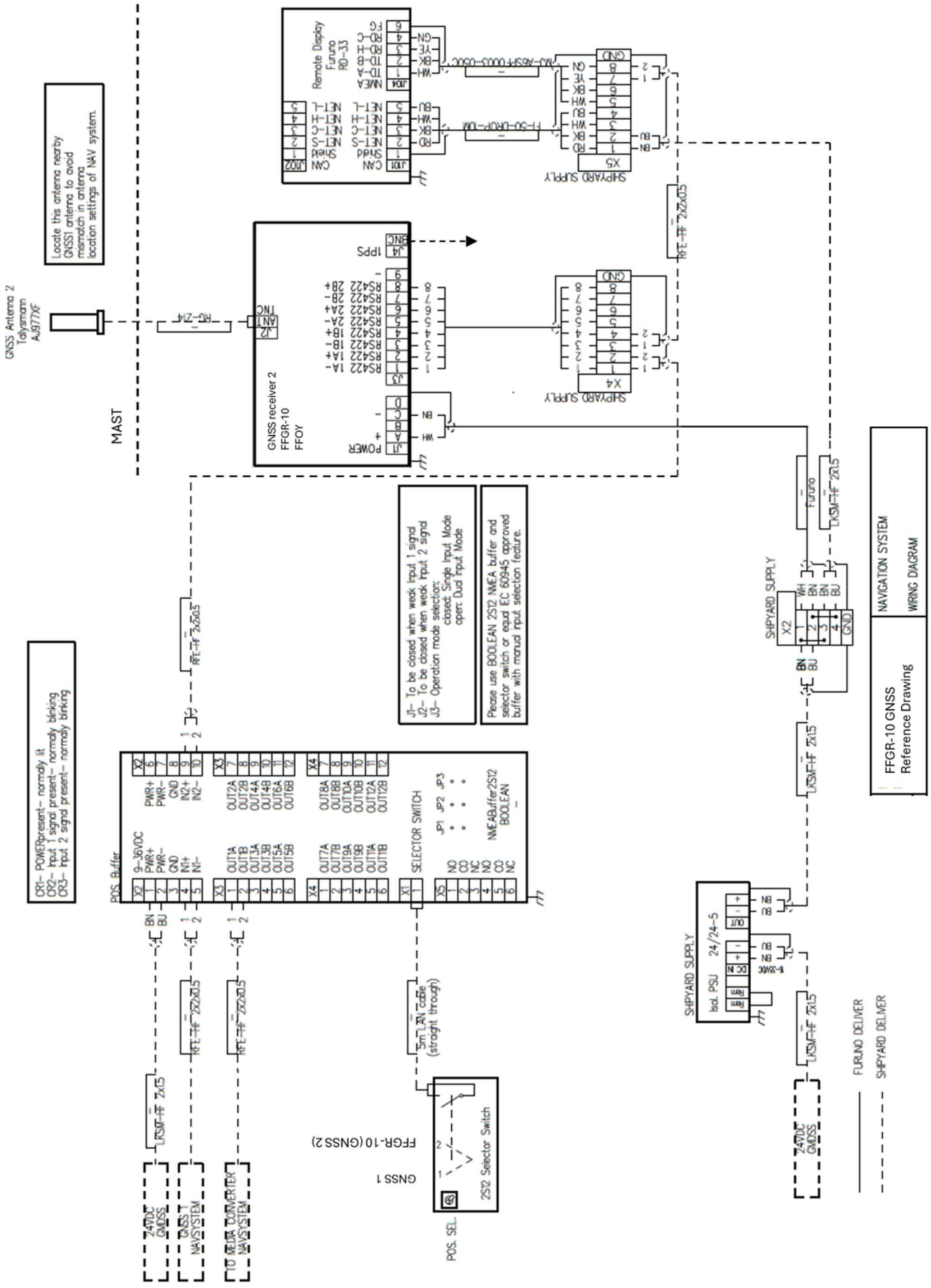


Figure 2.5 Connection drawing example for FFGR-10 setup on board SOLAS vessels.

3. SPECIFICATIONS

GENERAL

Product name	FFGR-10 GNSS Receiver	
Compliance	IEC 60945 Marine Compliant	
Size	Receiver Unit	159 x 84 x 48 mm
	Antenna Unit	Ø 91mm, hight 186 mm
Weight	Receiver Unit	410g
	Antenna Unit	245g

Supported GNSS	GPS, Galileo, BeiDou, GLONASS, QZSS, SBAS
Input Frequency	L1, L2 & L5
Horizontal pos. accuracy	1,5 m
Serial interface (DATA connector)	D9F connector, 4 x RS422 of which 2 ports 4800 bps (1Hz) NMEA0183 (v.4.11) 2 ports 38400 bps (1Hz / 10Hz; GGA+RMC) NMEA0183 (v.4.11) GP-talker, sentences: GGA, RMC, DTM, VTG, ZDA
ANTENNA connector	TNC 50 ohm, Bias voltage 3.3 VDC
1PPS connector	BNC, TTL signal level
Sensitivity	Tracking -167 dBm, Nav -160 dBm
Cold start	25 sec. (GNSS acquisition)
Hot start	2 sec. (GNSS acquisition)

POWER SUPPLY

Power Supply	9-36 VDC / 1W

ENVIRONMENT

Ambient Temperature	Receiver Unit	-20˚C to +70˚C
	Antenna Unit (option)	-40˚C to +85˚C
Degree of Protection	Receiver Unit	IP22
	Antenna Unit (option)	IP66
Relative humidity	93% or less at 40°C	