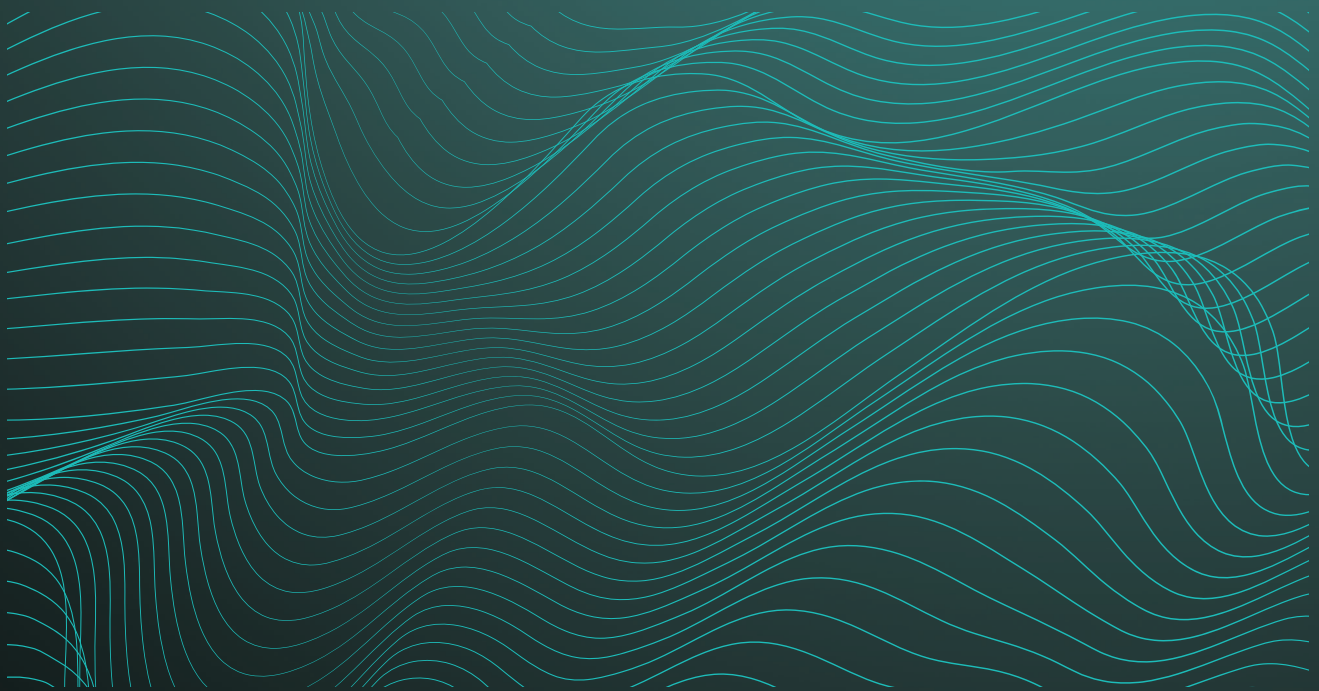


WASSP WSP-038 IMU INSTALLATION MANUAL



SEE IT ALL

WASSP WSP-038 IMU INSTALLATION MANUAL

The WASSP WSP-038 IMU is a motion sensor that can be used with G3 WASSP Multibeam systems.

It is designed for ease of installation and simplified system configuration through direct connection to the WASSP DRX (WASSP Smart transceiver used with G3 WASSP Multibeam) .

The WSP-038 supplies roll, pitch and heave attitude data required by the DRX, and should be used alongside an appropriate Satellite Compass to supply position, heading and speed to the DRX.

Refer to the DRX Installation Manual for full details on system configuration.



NOTE: WSP-038 IMU is compatible with:
- F3 and S3 #389+
- F3X #1+



NOTE: Supply 12V or more to F3/S3 when using WSP-038. Use a 24V supply to power the DRX when using WSP-038 with a 20m extension cable.

DOCUMENT REVISION HISTORY

REVISION DATE	REASON FOR CHANGE	VERSION
September 2018	Compilation	1.0
January 2019	Update to Interconnections	1.1
April 2019	Update for Ethernet Configuration	1.2
June 2019	Update to V123 Configuration and Appendix A.4	1.3
December 2019	Update to cable and interconnections	1.4

RELATED DOCUMENTS

- » DRX Installation Manual; Shipped with DRX
- » Satellite Compass Installation Manuals as required
- » Furuno IF-NMEASC Operators Manual as required

RELATED TOOLS

- » WSP-038 Configuration App
- » Satellite Compass Configuration SW

Further documentation can be found at wassp.com

General Notices

WASSP Ltd. reserves the right to change the contents of this manual and any system specifications without notice.

Contact WASSP Ltd. regarding copying or reproducing this manual.

Support information

If you require maintenance or repair, contact your local dealer. You can also contact WASSP Ltd. using the following address: wassp.com/support/.

If you need information about WASSP products, visit wassp.com.

On the website you will also find a list of WASSP dealers and distributors.

Warnings, Cautions, and Notes

Warnings, cautions, and notes are indicated by the following icons throughout this manual:



CAUTION indicates that if the instruction is not heeded, the action may result in equipment damage or software corruption.



NOTE indicates a TIP or additional information that could be helpful while performing a procedure.

Safety Instructions for the Installer



CAUTION: Turn off power at the switchboard before beginning installation. Fire or electrical shock can result if power is left on.



CAUTION: Be sure that the power supply is compatible with the voltage rating of the equipment. Connecting to incompatible power supply can cause fire or damage to the equipment.



CAUTION: Do not open the equipment. Only qualified personnel should work inside the equipment.

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1 INTERCONNECTION DIAGRAMS

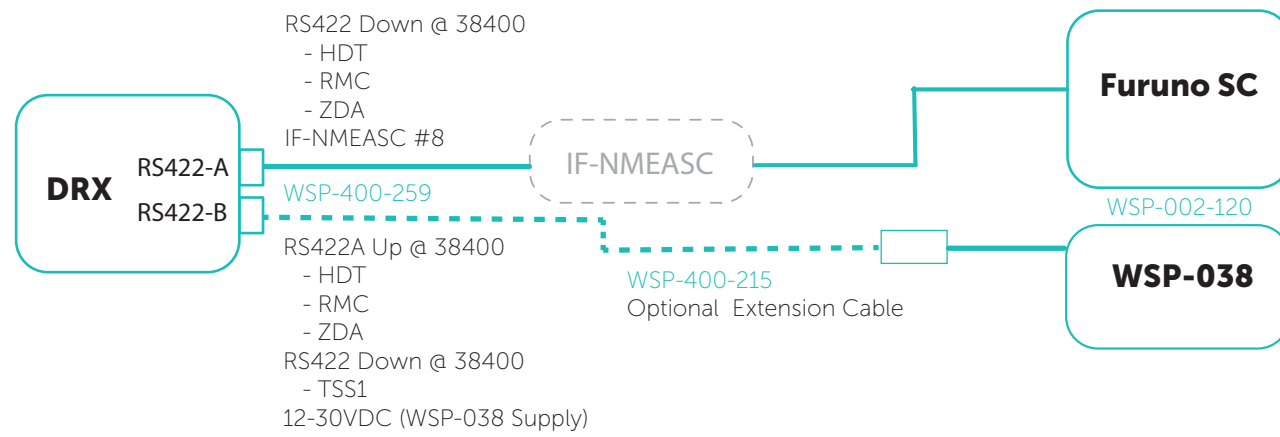


Figure 1. Interconnection Diagram, Furuno SC Option

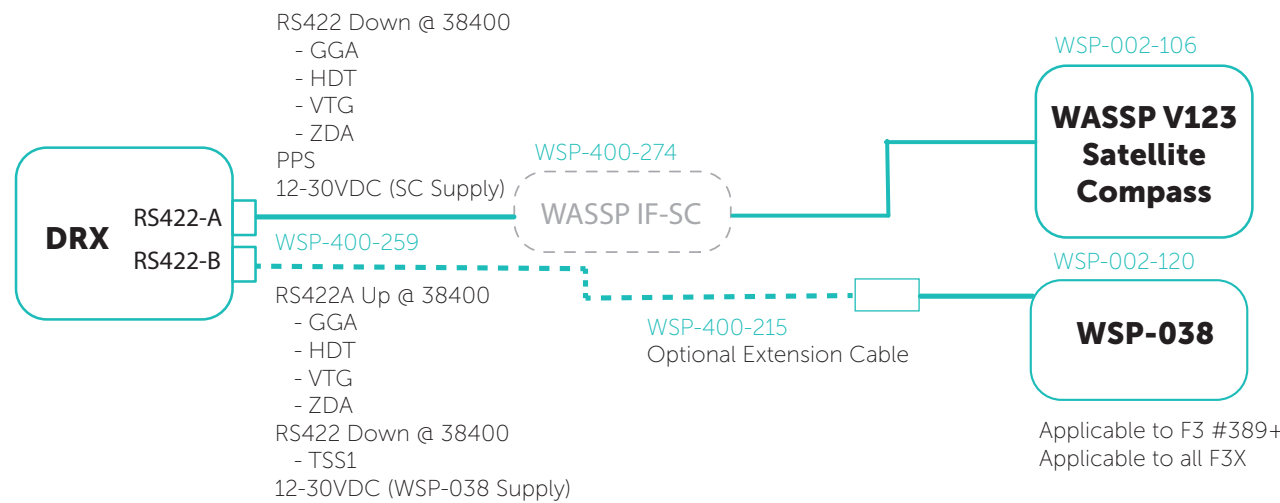


Figure 2. Interconnection Diagram, WASSP V123 Option



NOTE: Satellite Compass should be connected to DRX RS422-A not NMEA0183 or RS232.

2 COMPONENTS

2.1. WSP-038 IMU

P/N WSP-002-120

Preconfigured WASSP IMU with direct connection to DRX.



Figure 3. WSP-038 IMU

2.2. WSP-038 EXTENSION CABLE - OPTIONAL

P/N WSP-400-215

Optional 20m Extension Cable from WSP-038 to DRX.

3 WSP-038 MOUNTING

The WSP-038 should be installed taking the following into consideration:

- » Accurate measurements need to be taken from the WSP-038, reference point, transducer and the Satellite compass. Typically cm accuracy is recommended to achieve acceptable multibeam performance. Refer to the DRX Installation Manual for details on system commissioning and the ship's measurements.
- » The WSP-038 should be as close to the vessel's centre of motion as possible (usually very close to the vessel centre of gravity). If mounting close to the vessel's centre of motion is not practical then use the Ethernet port to configure Lever Arm corrections for the sensor. See ["Appendix A.4 Lever Arm configuration" on page 18](#) (and ["Appendix A.3 WSP-038 Configuration" on page 17](#) to establish connection). This will give optimum motion sensor performance which is required to achieve acceptable multibeam performance.
- » Cabling from the DRX and Satellite compass needs to be accessible.
- » A flat, rigid mounting location is required for optimum motion sensor performance.
- » The WSP-038 should be located where it will not move and is not exposed to vibration or other influences that could impact IMU performance.
- » WSP-038 needs to be mounted accurately in fore/aft vessel orientation as per the arrow on the WSP-038. The unit should be mounted closely aligned to the vessel orientation.
 - Heading accuracy +/-1 degrees
 - Pitch accuracy +/-2 degrees. Any offset should be adjusted for during commissioning
 - Roll accuracy +/-2 degrees. Any offset should be adjusted for during commissioning



NOTE: The WSP-038 needs to be mounted aligned fore/aft as per the arrow on the box.



NOTE: Full commissioning should be carried out as per the DRX Installation Manual to account for angular offsets.

4 WASSP CONNECTION AND CONFIGURATION

Refer to ["1 Interconnection diagrams" on page 6](#) for system configuration.

4.1. SATELLITE COMPASS CONNECTION AND CONFIGURATION

4.1.1. Satellite Compass Connection

The Satellite Compass should be connected to the DRX connector RS422-A on the DRX Back Plate.

Connect the RS422-A Satellite Compass Cable, P/N WSP-400-259, to the DRX RS422-A connector and to the Satellite Compass interface box. The Satellite Compass Interface Box will depend on Satellite Compass type and configuration.

See ["Appendix A.1 DRX RS422-A To Satellite Compass" on page 15](#) for required interconnect.

4.1.2. Satellite Compass Configuration Requirements

Satellite Compass should be configured:

- » Baud; 38400
- » Position:
 - Rate; Minimum 1Hz, Recommended 20Hz
 - Sentences; GGA, GLL, RMC
- » Heading:
 - Rate; Minimum 20 Hz
 - Sentences; HDT
- » Speed:
 - Rate; Minimum 1 Hz, Recommended 2 Hz
 - Sentences; RMC, VTG
- » Time:
 - ZDA at 1 Hz
 - PPS recommended

4.1.3. Furuno SC Configuration

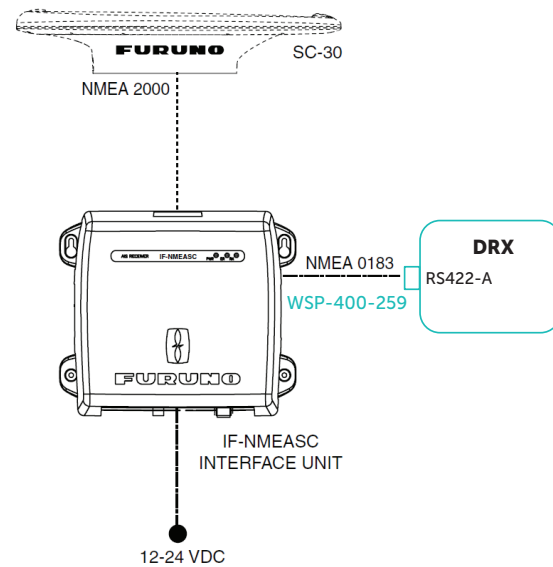
The Furuno SC should be set up to output NMEA0183. Refer to the appropriate Furuno SC manuals for mounting and configuration details.

Configuration setup will depend on the specific Furuno SC but will need to meet the minimum criteria specified in ["4.1.2. Satellite Compass Configuration Requirements" on page 9](#) for the port connected to DRX RS422-A.

See ["Appendix A.1 DRX RS422-A To Satellite Compass" on page 15](#) for Satellite Compass Interconnect.

If using the Furuno Interface unit, IF-NMEASC, refer to the IF-NMEASC Operator's Manual.

1. Connect the RS422-A Satellite Compass Cable, P/N WSP-400-259, from J5 (NMEA0183) on the IF-NMEASC unit to RS422-A on the DRX.
2. Select Sentence number 8 from J5 at 38400 bps.
 - a. HDT Output Interval 25 ms.
 - b. RMC Output Interval 1000 ms (or higher if available).
 - c. ZDA Output Interval 1000 ms.



NOTE: J4 (NMEA0183) on IF-NMEASC can be used instead of J5 (NMEA0183).



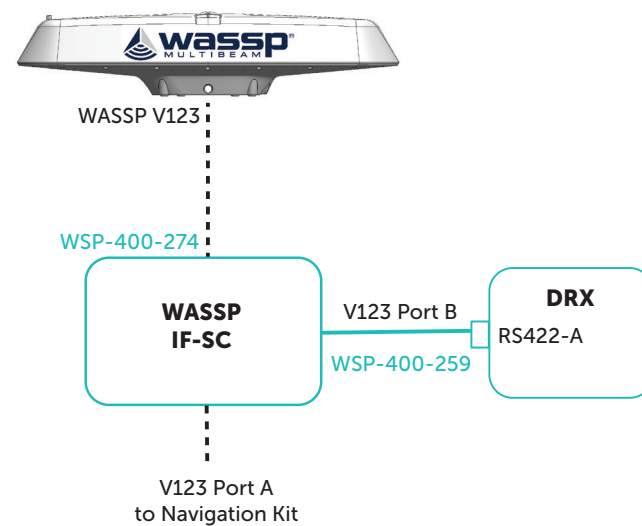
CAUTION: Prepare, terminate and connect WSP-400-259, RS422-A to Satellite Compass cable, to the Furuno SC before connecting to DRX RS422-A.

4.1.4. WASSP V123 Configuration

WASSP V123 will be supplied preconfigured from WASSP and should be mounted Fore/Aft for true heading. See "Appendix A.1 DRX RS422-A To Satellite Compass" on page 15 for Satellite Compass Interconnect.

Typical configuration will be:

- » Port B (RS422): 38400 Baud
 - GGA 25Hz
 - VTG 5Hz
 - ZDA 1Hz
 - HDT 25Hz
- » PPS Out
- » Port A (RS422); 38400 Baud
 - GGA 25Hz
 - VTG 5Hz
 - ZDA 1Hz
 - HDT 25Hz



Port B should be used as dedicated connection to the DRX RS422-A Port. Port A can be used with other devices on the vessel for navigation.

4.1.5. Hemisphere V103

Reference the Hemisphere V103 Installation Manual for mounting and configuration details.

Hemisphere V103 will be supplied preconfigured from WASSP and should be mounted Fore/Aft for true heading.

Configuration setup will be:

- » Port B (RS422): 38400 Baud
 - GGA 20Hz
 - VTG 2Hz
 - ZDA 1Hz
 - HDT 20Hz
- » PPS Out

Port B should be used as dedicated connection to the DRX RS422-A Port.

4.2. WSP-038 CONNECTION

The WSP-038, P/N WSP-002-120, connects directly to the DRX connector RS422-B.

If required the cable for DRX to WSP-038 can be extended using the optional WSP-038 Extension Cable, P/N WSP-400-215.

See "Appendix A.2 DRX RS422-B To WSP-038" on page 16 for the WSP-038 interconnect.

WSP-038 comes preconfigured and does not require any install specific configuration.

WSP-038 connectivity:

- » Baud; 38400
- » Output Rate: 100Hz
- » Sentence; TSS1

For diagnostics purposes the WSP-038 can be reconfigured.

See "Appendix A.3 WSP-038 Configuration" on page 17 for configuration setup.

The WSP-038 has both RS232 & RS422 outputs, and can be wired to other interfaces. To do so, just cut off the moulded cable plug and re-wire to other interface ports.

See "Appendix A.2 DRX RS422-B To WSP-038" for WSP-038 wiring functions.

4.3. DRX CONFIGURATION

Connect the WSP-038 and Satellite Compass to the DRX as per "1 Interconnection diagrams" on page 6.

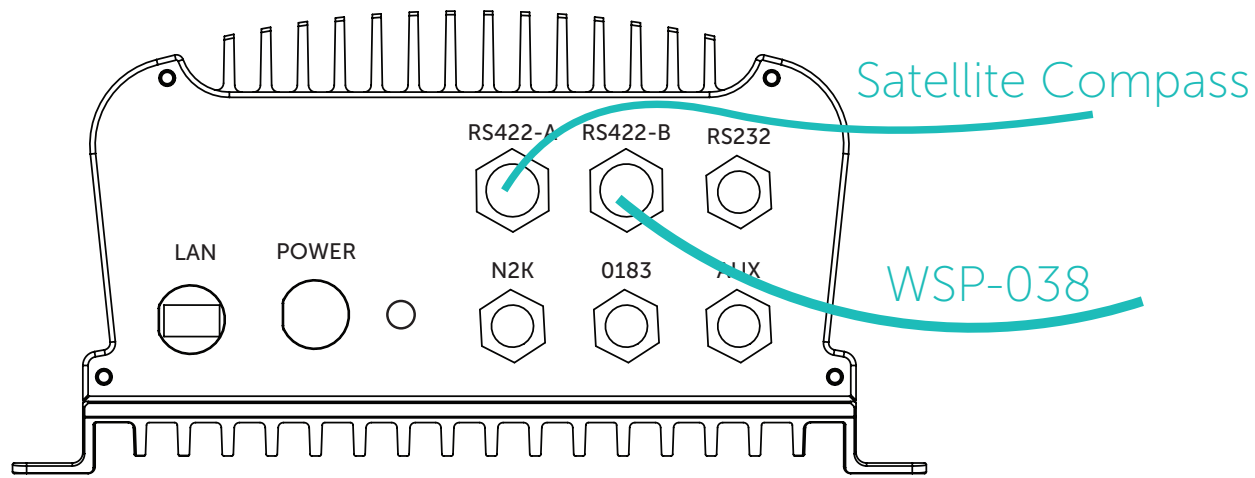


Figure 4. S3/F3/F3X WSP-038 Connections

For sensor configuration on the DRX refer to the DRX Installation Manual.

Configure the DRX using the [DRX SETUP WEBPAGES](#).

Using the WSP-038 [PRESET](#) the sensor setup can be automated for [PORT SETUP, DATA SETUP, CORRECTIONS AND PPS](#).

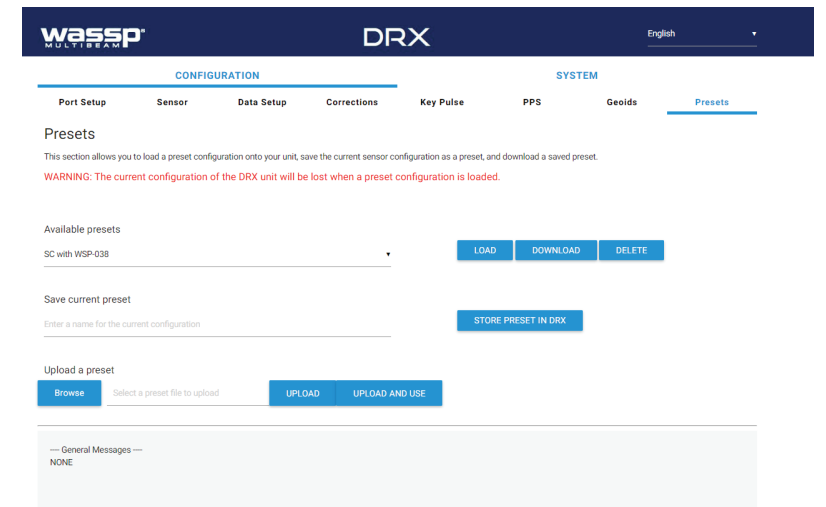
Sensor offsets will need to be input manually using the [SENSOR](#) configuration page.

Sensor biases (angular offsets) will need to be input manually using the [DATA SETUP CONFIGURATION](#) page or using appropriate automated path tests.

Refer to the DRX Installation Manual for full details.

4.3.1. Configuring for WSP-038 with Furuno SC

1. With the system fully connected with all sensors powered on open the [DRX SETUP WEBPAGES](#).
2. Select [CONFIGURATION](#) and open the [PRESETS](#) tab.
3. Under [AVAILABLE PRESETS](#) select [SC WITH WSP-038](#) and select [LOAD](#).



4. Setup the sensor offsets under the [SENSOR](#) tab, following the instructions in the DRX Installation Manual.

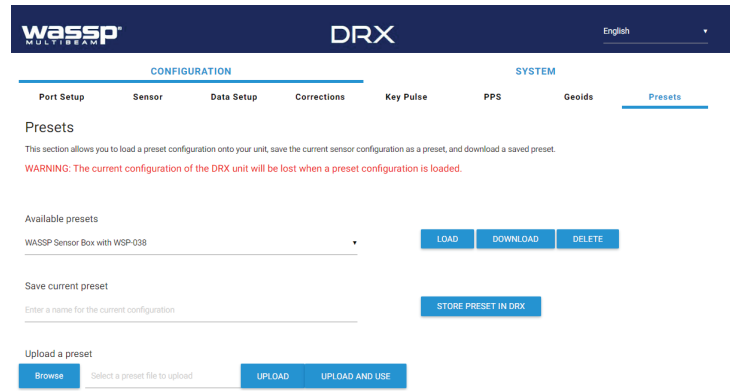
Sensor	X Offset [m]	Y Offset [m]	Z Offset [m]	Port	
Transducer	160kHz	0.00	1.25	3.25	Standard 160kHz Manual
Sensor 1	Furuno SC	4.2	0.00	-3.15	RS422-A
Sensor 2	WSP-038	2.10	0.00	0.00	RS422-B
Sensor 3	N/A				N/A
Sensor 4	N/A				N/A
Sensor 5	N/A				N/A

5. Setup the Sensor Biases under the [DATA SETUP](#) tab, following the instructions in the DRX Installation Manual.

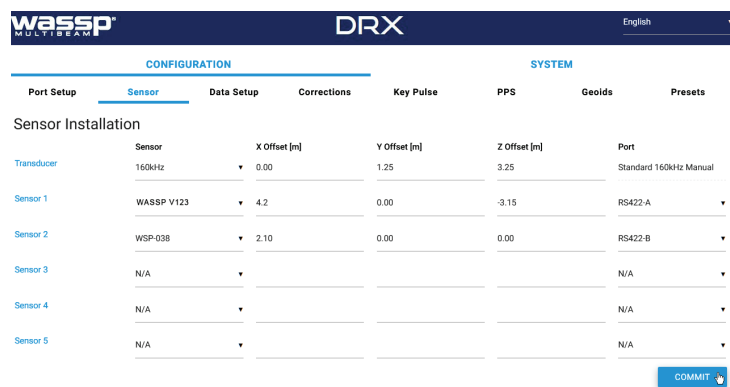
Sensor	Sentence	Lag [s]	Bias/Offset	
POSITION	Furuno SC	RMC	0.800	
HEADING	Furuno SC	HDT	0.060	0.00
COG/SOG	Furuno SC	RMC	0.800	
ROLL	WSP-038	TSS1	0.010	1.50
PITCH	WSP-038	TSS1	0.010	-2.40
HEAVE	WSP-038	TSS1	0.010	
TIME	Furuno SC	ZDA	0.000	

4.3.2. Configuring for WSP-038 with WASSP V123

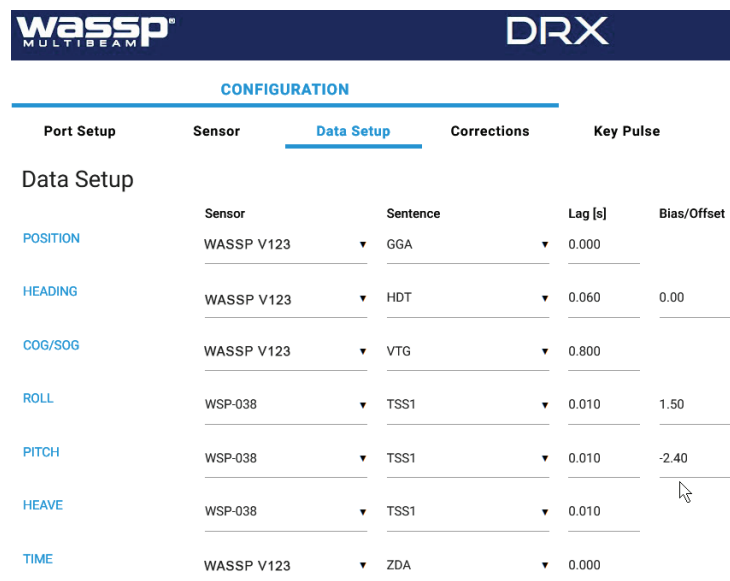
1. With the system full connected with all sensors powered on open the [DRX SETUP WEBPAGES](#).
2. Select [CONFIGURATION](#) and open the [PRESETS](#) tab.
3. Under [AVAILABLE PRESETS](#) select [WASSP V123 WITH WSP-038](#) and select [LOAD](#).



4. Setup the sensor offsets under the [SENSOR](#) tab, following the instructions in the DRX Installation Manual.



5. Setup the Sensor Biases under the [DATA SETUP](#) tab, following the instructions in the DRX Installation Manual.



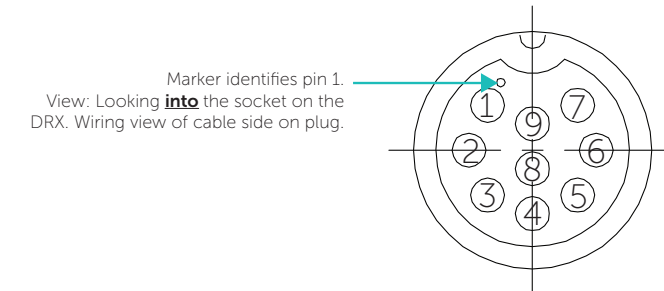
5 APPENDIX

APPENDIX A - INTERCONNECTIONS

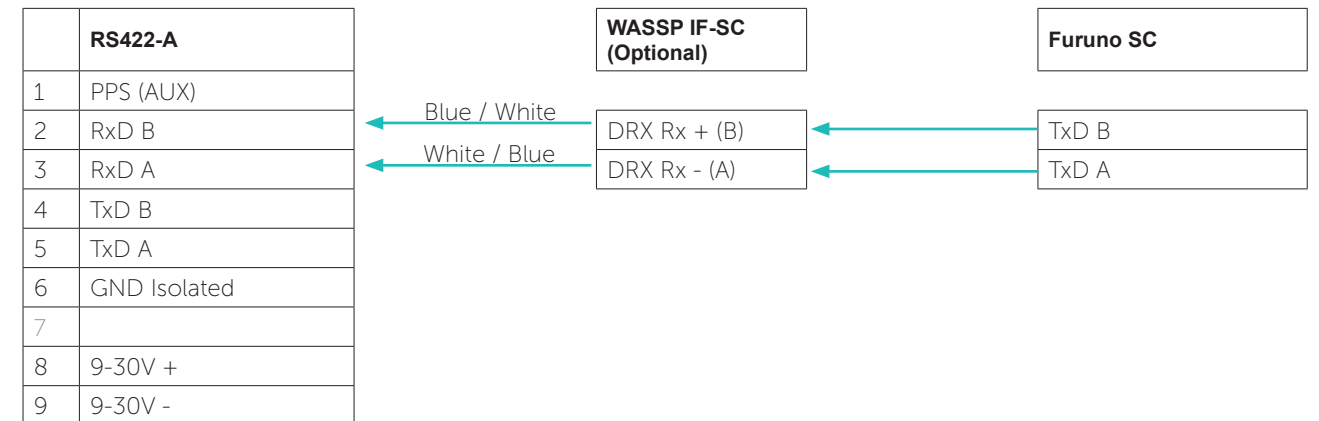
APPENDIX A.1 DRX RS422-A TO SATELLITE COMPASS

Connector [RS422-A](#) on DRX

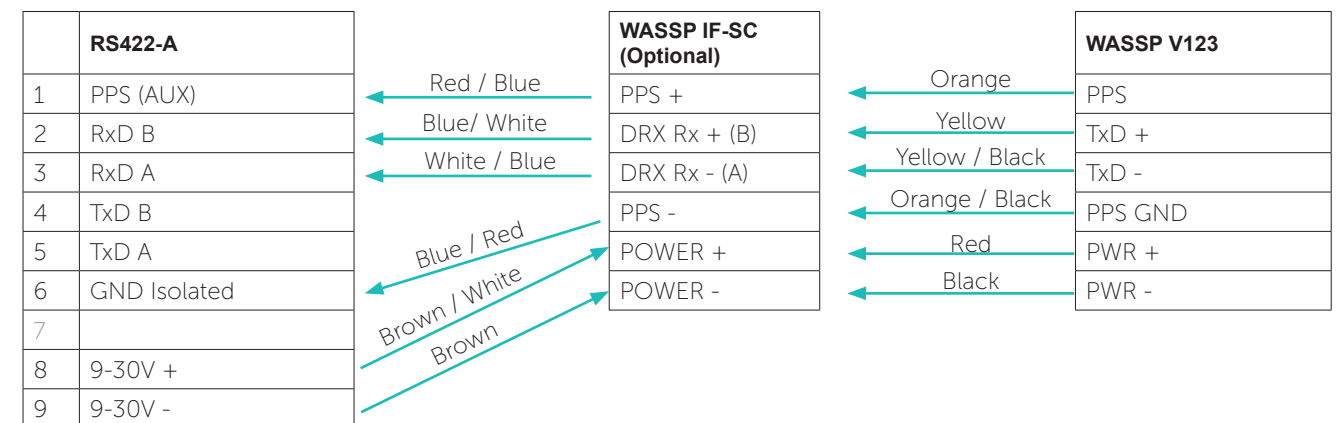
PIN	Function
1	PPS (AUX)
2	RxD B
3	RxD A
4	TxD B
5	TxD A
6	GND Isolated
7	
8	9-30V+
9	9-30V-



Satellite Compass Connection for Furuno SC:



Satellite Compass Connection for WASSP V123:

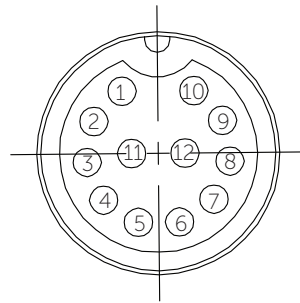


APPENDIX A.2 DRX RS422-B TO WSP-038

Connector **RS422-B** on DRX

PIN	Function
1	PPS (AUX)
2	RxD B
3	RxD A
4	TxD B
5	TxD A
6	GND
7	RESERVED
8	RESERVED
9	RESERVED
10	RESERVED
11	9-30V -
12	9-30V +

View: Looking **into** the socket on the DRX. Wiring view of cable side on plug.



WSP-038 Connection:

RS422-B	WSP-038
1 PPS (AUX)	
2 RxD B	TxD +
3 RxD A	TxD -
4 TxD B	RxD +
5 TxD A	RxD -
6 GND	RxD +
7 RESERVED	RxD -
8 RESERVED	PWR -
9 RESERVED	PWR+
10 RESERVED	
11 9-30V -	
12 9-30V +	

Wiring connections shown with arrows and color codes:

- Green / White (to Pin 2)
- White / Green (to Pin 3)
- Orange / White (to Pin 4)
- White / Orange (to Pin 5)
- Blue / White (to Pin 6)
- White / Blue (to Pin 7)
- Brown (to Pin 8)
- Brown / White (to Pin 9)



NOTE: - - - - -> used for configuration. See "Appendix A.3 WSP-038 Configuration" on page 17.

WSP-038 Wiring function:

WSP-038 Function	Colour	RS422 Rx+ Auxiliary	Colour
Power +	Brown/White	RS422 Rx- Auxiliary	White/Blue
Power -	Brown	RS232 Rx	White/Grey
RS422 Rx+	Orange/White	RS232 Tx	Red/Blue
RS422 Rx-	White/Orange	RS232 Rx Auxiliary	Grey/White
RS422 Tx+	Green/White	SIG_GND	Blue/Red
RS422 Tx-	White/Green		

When referring to colour code of wires, the first colour is the primary colour of the cable and the second is the stripe. Eg. Grey/White is a Grey wire with a white stripe and White/Grey is a white wire with a Grey stripe.

APPENDIX A.3 WSP-038 CONFIGURATION

The WSP-038 can be configured using network.

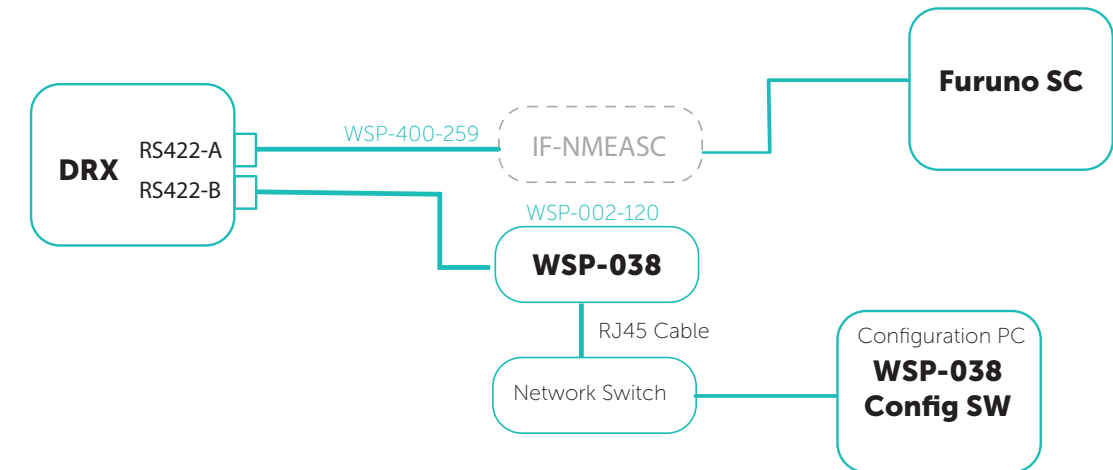
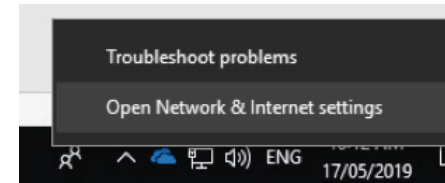


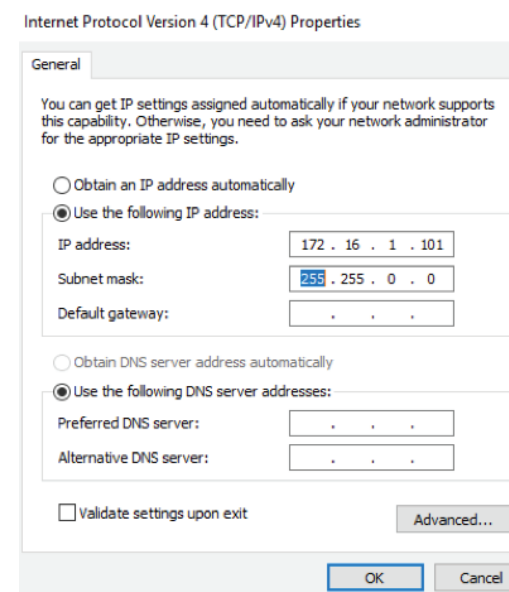
Figure 5. WSP-038 Configuration Setup

To configure or diagnose issues:

1. Setup the system as per "Figure 5. WSP-038 Configuration Setup" on page 17.
2. Power on the DRX. The DRX supplies power to the WSP-038.
3. Power on the Satellite Compass. Satellite Compass input is required for WSP-038 operation.
4. Use a network cable to connect WSP-038 to the switch.
5. Set up PC static IP.
 - »» Open PC network & internet settings.



»» Set TCP/IPv4 properties as shown here, then click "OK".



6. Run the [WSP-038 CONFIG SW](#).
If the WSP-038 Config SW does not automatically connect, follow steps below:
 - » Select the [SET PC COMMUNICATION](#) Tab.
 - » Click [USE ETHERNET FOR COMMUNICATION](#)
 - » Click [NETWORK SCAN](#) and you will see the WSP-038 IP 172.16.1.100, click to connect.
 - » Select [USE SELECTED](#) then [SAVE CHANGES](#).
7. In the WSP-038 Config SW, [SETUP](#), [SERIAL PROTOCOL](#) and [SERIAL INPUT](#) should be checked to confirm data.
Contact WASSP Support or your local dealer for support or WSP-038 diagnosing issues.

APPENDIX A.4 LEVER ARM CONFIGURATION

ENTERING OFFSET MEASUREMENT IN THE WASSP SYSTEM DRX AND WSP-038

Measurements In WASSP DRX to be entered via Commissioning

Application:

- » If the sensor is located aft of the reference point the X measurement is **negative**.
- » If the sensor is located to port of the reference point the Y measurement is **negative**.
- » If the sensor is located above the reference point the Z measurement is **negative**.

CONFIGURATION		SYSTEM					
Port Setup	Sensor	Data Setup	Corrections	Key Pulse	PPS	Geoids	Presets
Sensor Installation							
	Sensor		X (forward) [m]	Y (starboard) [m]	Z (down) [m]		Port
Transducer	160kHz	▼	0.00	0.00	0.00		Standard 160kHz Manual
Sensor 1	GPS	▼	0.00	0.00	0.00		RS422-A ▼
Sensor 2	WSP-038	▼	0.00	0.00	0.00		N/A ▼

Measurements in WSP-038 Motion sensor to be entered via Sensor direct Ethernet Connection:

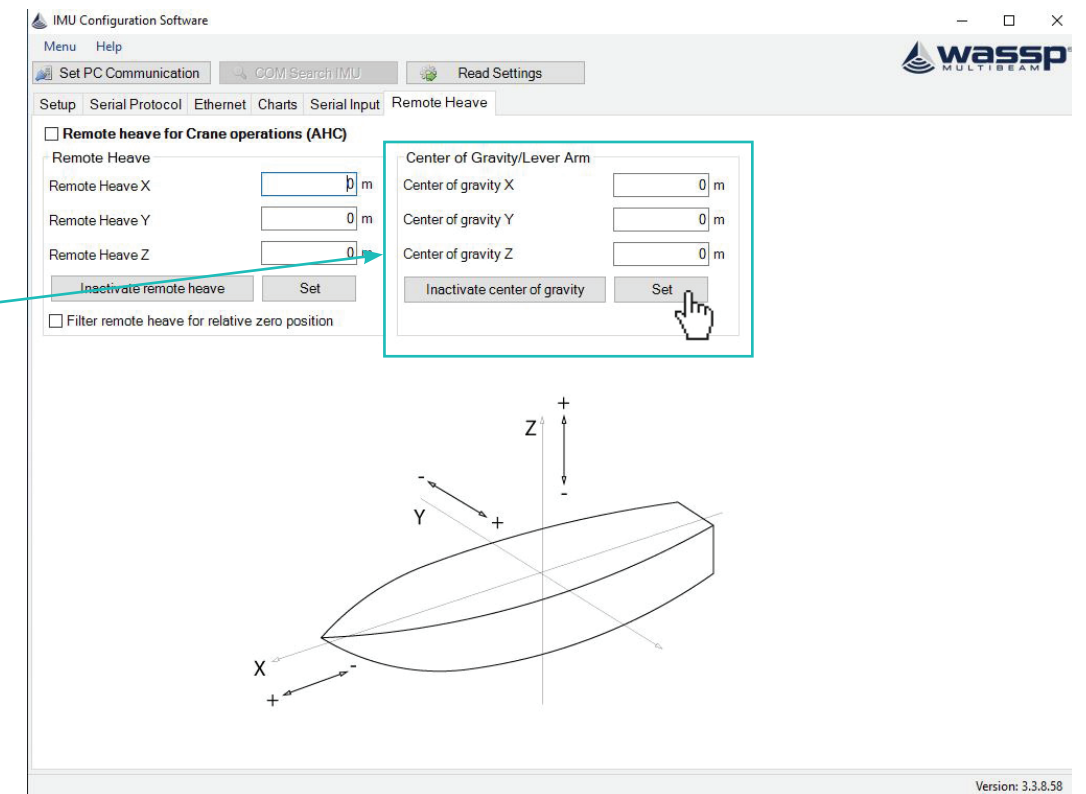
If the motion sensor is located a significant distance from the Centre of Gravity, for example mounted on the bridge of a large vessel, it is possible to enter an offset to reduce acceleration errors. If the motion sensor is located high on a large vessel the most significant factor will be the Z measurement.

Important note for lever arm settings in the WSP-038:

- » If the motion sensor is located aft of the COG the X measurement is **positive**.
- » If the motion sensor is located to port of the COG the Y measurement is **negative**.
- » If the motion sensor is located above the COG the Z measurement is **negative**.

Set the Lever Arm settings to match the measurement of the sensor to the centre of gravity. Especially useful is the Z coordinate.

Press the **SET** button to send the configuration settings to the unit.

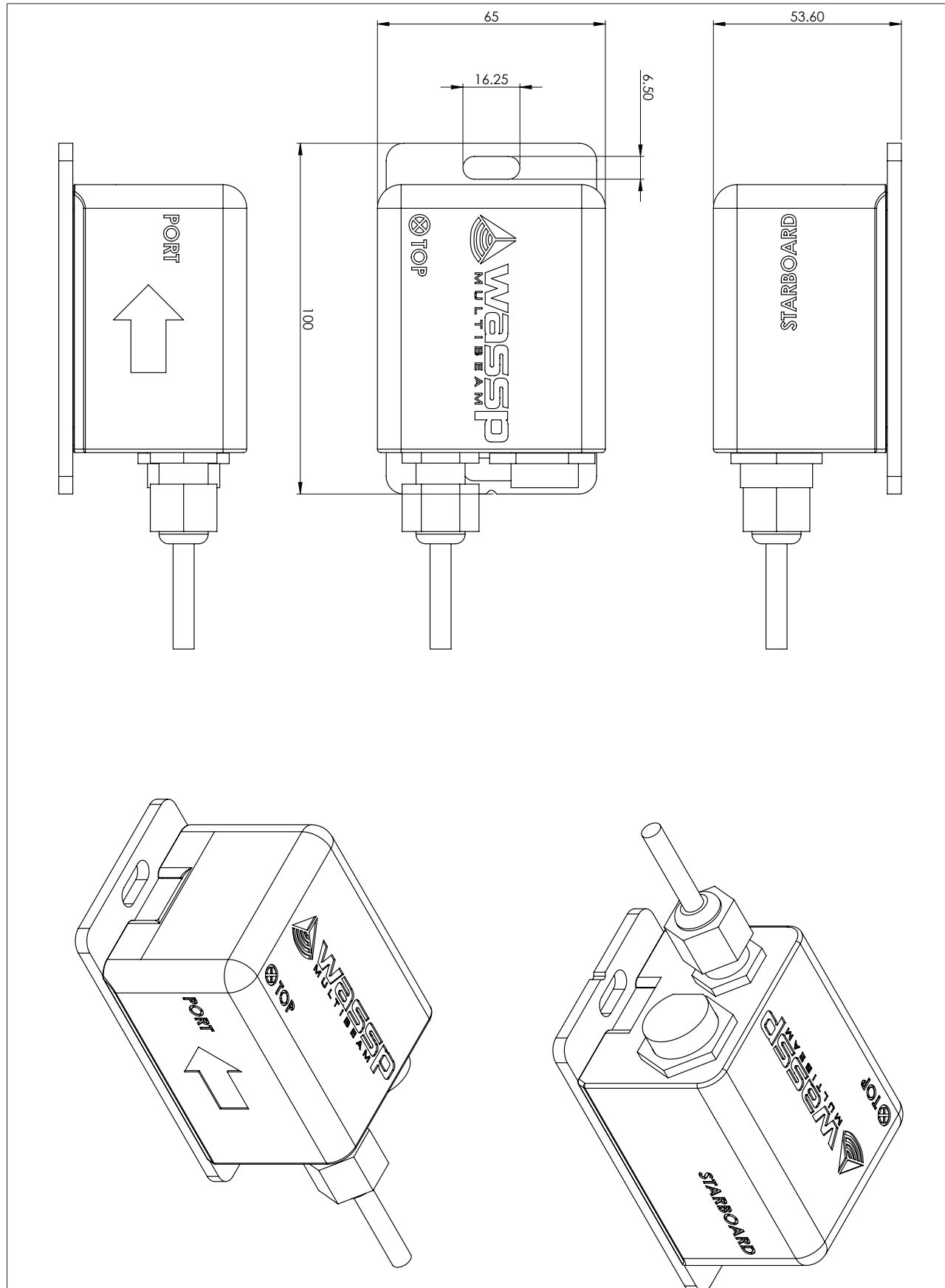


The lever arm is used to compensate for rotational accelerations. For example, if you have a vessel where the motion sensor is located on the bridge with a Z distance from the rotational point of the vessel that has large roll motion. The lever arm would then calculate the lateral accelerations generated from the rotation acceleration and remove this factor from its calculations which improves the angle output during these conditions. The longer the distance is from the center of rotation the bigger the effect is mainly on fast motions so the roll is normally the main parameter.



NOTE: DO NOT USE REMOTE HEAVE settings as this could lead to double accounting of ship offsets.

APPENDIX B - WSP-038 IMU DIMENSIONS



APPENDIX C - SPECIFICATIONS

WSP-038 IMU	
Model	WSP-038
Connectivity	DRX
Performance	
Roll/Pitch Accuracy - Static	0.2°
Roll/Pitch Accuracy - Dynamic	0.25°
Heave Range	+/- 10m
Heave Accuracy	5cm or 5%
Communications	
Input	RS422*
Output	RS422
Physical	
Dimensions (W x D x H)	62.5 x 100 x 43.1 mm
Weight	~0.45 kg
Environmental	
Temperature - Operating	0° to 55°C
Temperature - Storage	-10° to 65°C
DC Input	DRX Supply/12- 30V
Power Consumption (max)	2W
EMC	IEC60945
Interconnect	
Cabling - Standard**	5m

*External Inputs

- Velocity; RMC, RMA, VTG, VBV, VHW
- Heading; HDT, HDG

**Optional 20m Extension cables available

NOTES

NOTES

