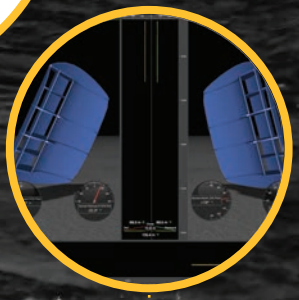
Door Sensors User Manual



MARPORT

Contents

Legal

History

V1	10/30/17	First release
V2	03/09/18	• New topic: About Time Variable Gain on page 39 • Installation Principles on page 68: added indications on roll angles according to tilt of doors.
V3	07/06/18	• New troubleshooting topic: Sensor cannot connect in wireless connection on page 87 • Interference Check on page 78: more detailed information about **Spectrum** page.
V4	11/30/18	• Frequency Plan on page 93: drawings have been changed, frequencies are now allocated between 34 kHz and 36 kHz and frequency ranges of narrowband and wideband hydrophones are indicated.
V5	07/16/20	Now documents Mosa2 version 02.03, Scala version 01.06.34 and Scala2 version 02.02.
V6	03/08/21	• Now documents Mosa2 version 02.05. • Connecting the Sensor to Mosa2 on page 25: added guidance on how to connect sensor to Mosa2 using the Configuration Cable product. • Added troubleshooting topic: Sensor does not connect correctly with Mosa2 when using the Configuration Cable on page 88 • Added details on the **Down 1 + Down 2** sounding mode in Configuring the Uplink and Down Settings on page 37. • Added contact details for the sales offices in South Africa and Norway in Support Contact on page 92.
V7	07/05/21	• Now documents Scala2 version 02.04 and Mosa2 version 02.07. • Replaced term Configuration Plug by Configuration Cable. • Connecting the Sensor to Mosa2 on page 25: Updated distance between other electrical devices and the computer: 1 m instead of 50 cm. •

V8	08/04/22	• Now documents Scala2 version 02.10.x and Mosa2 version 02.11.x. • Added guidance about connecting the sensor to Mosa2 using the Configuration Cable and Dock in Connecting the Sensor to Mosa2 on page 25. • Added guidance about charging the sensor with the Dock in Charging the Sensor on page 83. • Replaced DealerWeb website by Marport Authorized Service Provider (MASP). • Added contact details of the sales office in United Kingdom, and updated contact details of Iceland sales office.

Copyright

Disclaimer

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

The present user guide is applicable for the following versions:

- Scala: 01.06.06-01.06.34 / Scala2: 02.10.x
- Mosa2: 02.11.x

Patents apply to products. U.S. Patents 9,772,416; 9,772,417

Introduction and Presentation

Read this section to get a basic knowledge of your door sensor.

Tip: Click Marport logo at the bottom of pages to come back to the table of contents.

Introduction

Door sensor family includes two types of sensors: Spread Sensor and Door Sounder.

Spread Sensors are placed on starboard and port doors and clump in order to monitor the spread of your trawl doors. They communicate with each other via an acoustic link. The Master sensor on the port door communicates with the Starboard and Clump sensors, then sends distance data to the vessel. Sensors also monitor pitch and roll, water temperature and depth. This gives you a full picture of each door's performance. For example, you can know if one of the doors falls flat during a tow or if doors are crossing over each other. Spread sensors can be installed on all types of trawling that use doors.

Spread sensors also exist in smaller size to meet the needs of smaller trawlers: a mini Spread (stubby bottle) with a standard or slim housing.

Door Sounder sensor displays an echogram presentation and communicates with the vessel through our narrow band protocol. Door Sounder sensors can be installed on both doors. They are here to check that there is a steady distance between the door shoes and seabed. The latest generation is Door Sounder with target strength calibration: sensors are calibrated to all display the same colors for a given target.

Note:

Scala

Scala2

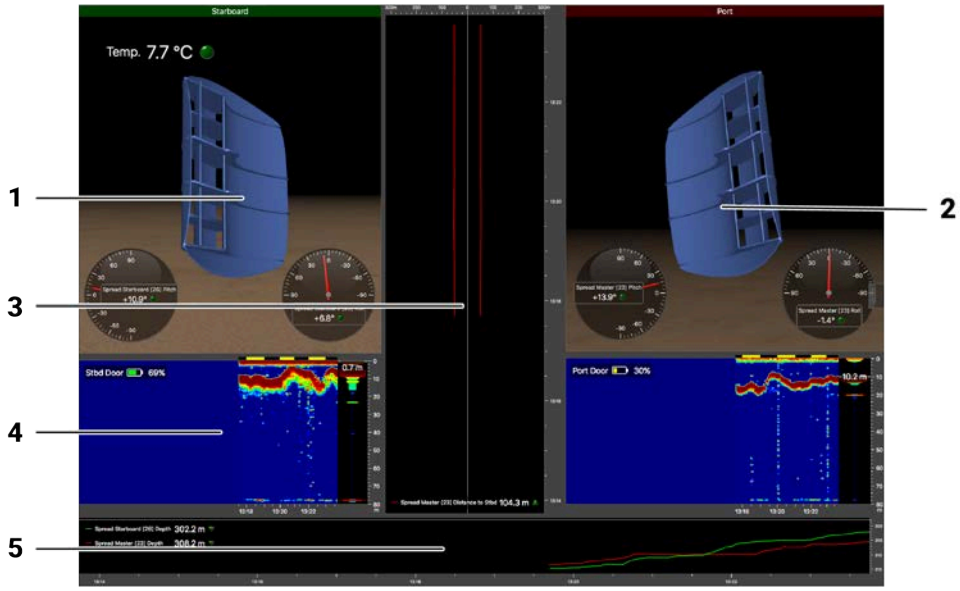
These labels tag topics or actions that are specific to Scala and/or Scala2. Depending on the version you have, you may follow either one of these labels.

Applications

Here are some examples of data received from Spread Sensors and Door Sounder sensors displayed in Scala/Scala2.

Single Trawl

- Master and Starboard Spread Sensors
- Door Sounder sensors on both doors



1. Starboard door

2. Port door

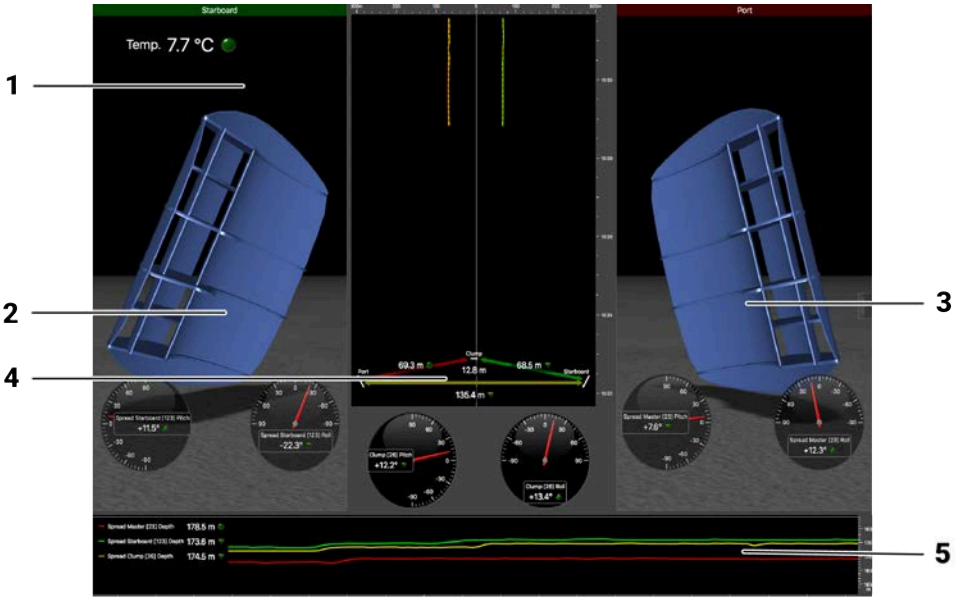
3. Distance between doors displayed as text or line graphs

4. Echogram of the sea bottom from Door Sounder sensors on each door

5. Depth of doors

Twin Trawls with Triple Distance

Master, Clump and Starboard Spread Sensors with triple distance option. Distances from Port door to Starboard door, Port door to Clump and Clump to Starboard door are displayed.



1. Distance between doors, displayed as text or history plots.

2. Spread diagram displays distance between Port/Clump/ Starboard

3. Starboard door

4. Port door

5. Depth of doors

Safety Guidelines

Important: To ensure proper and safe use of this equipment, carefully read and follow the instructions in this manual.

Basic good practices

When using the product, be careful: strong impacts can cause damage to the electronic components inside.

Never place the product in a hazardous and/or flammable atmosphere.

Product installation and use

Install and use this product in accordance with this user manual. Incorrect use of the product may cause damage to the components or void the warranty.

Only qualified Marport dealers can do maintenance and repairs on internal components of the sensors.

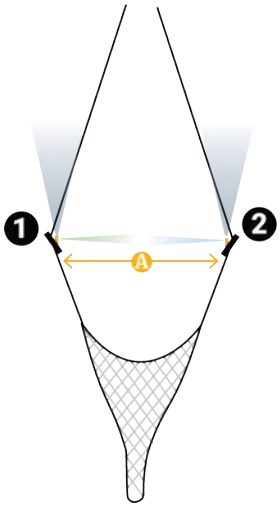
Precautions

Warning: In case of water ingress in the product, do not charge it: battery may vent or rupture, causing product or physical damage.

About Spread Sensors

You can use Spread sensors in three different modes: single trawl, twin trawls with double distance and twin trawls with triple distance. The following schemas illustrate the three modes and how Spread sensors communicate with each others.

Single Trawl



Port **Stbd**

Asks for answer

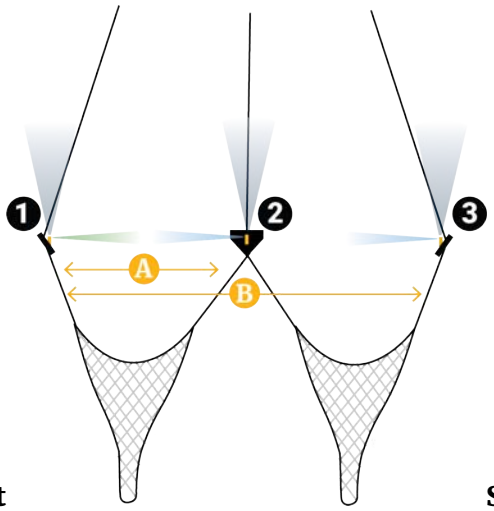
Answers

Sends data to the receiver (door spread distance, bearing, pitch and roll, depth...)

- The port sensor (**1**) interrogates the starboard sensor (**2**) to know the distance between them (**A**). Then, it sends the distance to the receiver.
- The sensors send data such as bearing, temperature, depth, pitch and roll to the receiver.

Twin Trawls

Twin trawls with double distance



Port **Stbd**

Asks for answer

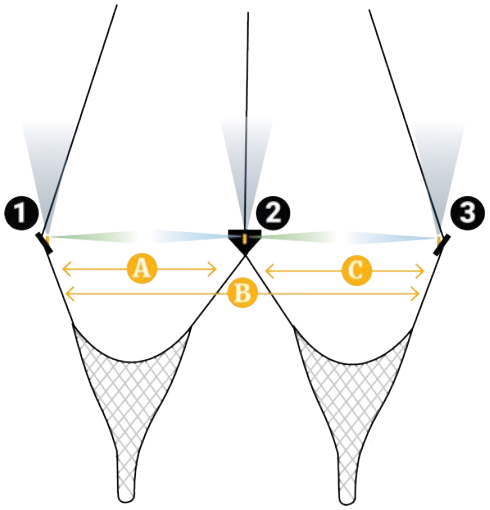
Answers

Sends data to the receiver (door spread distance, bearing, pitch and roll, depth...)

- The port sensor (**1**) interrogates the clump (**2**) and starboard sensors (**3**) to know the distance with each one. Then, it sends the two distances (**A**, **B**) to the receiver.

- All sensors send data such as bearing, temperature, depth, pitch and roll to the receiver.

Twin trawls with triple distance



Port Stbd

Asks for answer

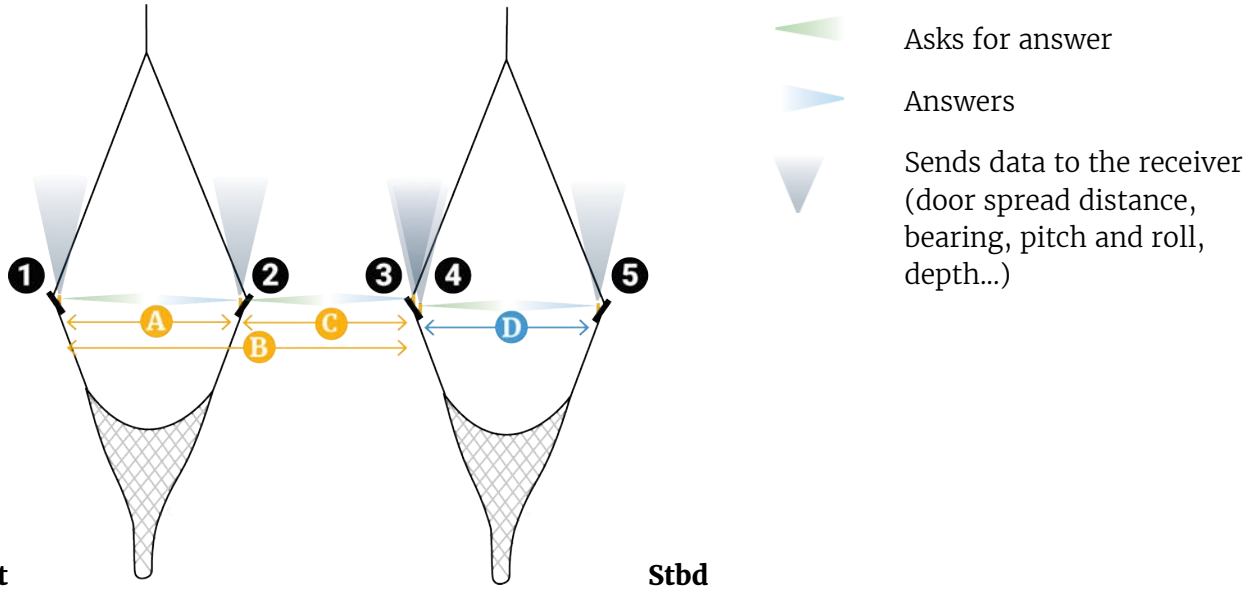
Answers

Sends data to the receiver (door spread distance, bearing, pitch and roll, depth...)

- The port sensor (**1**) interrogates the clump (**2**) and starboard sensors (**3**) to know the distance with each one. Then, it sends the two distances (**A**, **B**) to the receiver.
- The clump sensor (**2**) interrogates the starboard sensor (**3**) to know the distance between them. Then, it sends the distance (**C**) to the receiver.
- All sensors send data such as bearing, temperature, depth, pitch and roll to the receiver.

Dual Trawls

If you use two separate trawls, you need to install two sets of spread sensors. You can install them in two different ways: in the same way as for a single trawl on each trawl, or if you want to have the spread distance between the two inner doors, you can set up the following installation:



Sensors with triple distance are installed on the port trawl and sensors with single distance are installed on the starboard trawl.

- The port sensor (master) (**1**) interrogates the starboard sensor (clump) on the port trawl (**2**) and the starboard sensor (slave) on the starboard trawl (**3**) to know the distance with each one. Then, it sends the distances (**A** and **B**) to the receiver.
- The starboard sensor (clump) on the port trawl (**2**) interrogates the port sensor (slave) on the starboard trawl (**3**) to know the distance between them. Then, the distance (**C**) to the receiver.
- The port sensor (master) on the starboard trawl (**4**) interrogates the starboard sensor (slave) on the starboard trawl (**5**) to know the distance between them. Then, it sends the distance (**D**) to the receiver.
- All sensors send data such as bearing, temperature, depth, pitch and roll to the receiver.

Note: Make sure to put different ranging frequencies between the two sets of Spread sensors.

Description

Firmware

Spread Sensors

Firmware for Spread Sensors depends on your type of trawl and on the distances they measure.

About Spread Sensor Firmware

There are two generations of Spread Sensor firmware. The first generation (V1) measures one or two distances and the second generation (V2) measures one, two or three distances, with an improved communication link.

Important: Do not mix V1 and V2 Spread Sensor firmware on a same installation or the sensors will not be able to send the spread distance.

Important: V2 can only be installed on A1 PCBA with rev7 or higher.

If using a single trawl you need:

- V1 or V2 firmware with single distance measurement.
- A Master firmware for the Master Spread Sensor.
- A Slave firmware for the Starboard Spread Sensor.

If using twin trawls you need:

- V1 firmware with dual distance measurement or V2 firmware with dual or triple distance measurement.
- A Master firmware for the Master Spread Sensor.
- A Slave firmware for the Starboard Spread Sensor.
- A second Slave firmware for the Clump Spread Sensor.

If using dual trawls you need two sets of sensors: one set of sensors for a single trawl installation and one set of sensors for twin trawls with triple distance (see About Spread Sensors on page 12 for illustration).

Single Trawl

Master Spread Sensor

Firmware Name	Firmware Number	
	V1	V2
Spread Master (single distance/single trawl)	FIRM062	FIRM220
Spread Master with depth (single distance/single trawl)	FIRM065	FIRM226
Spread Master with depth and temp (single distance/single trawl)	FIRM064	FIRM224
Spread Master with pitch and roll (single distance/single trawl)	FIRM066	FIRM228
Spread Master with pitch, roll and depth (single distance/single trawl)	FIRM067	FIRM230
Spread Master with pitch, roll and temp (single distance/single trawl)	FIRM162	FIRM234
Spread Master with pitch, roll, depth and temp (single distance/ single trawl)	FIRM068	FIRM232
Spread Master with temp (single distance/single trawl)	FIRM063	FIRM222
Spread Master PI (Single distance)*	FIRM069	x
Spread Master PI (Single distance) with depth PI*	FIRM082	x

Starboard Spread Sensor

Firmware Name	Firmware Number	
	V1	V2
Spread Slave (single trawl)	FIRM041	FIRM221
Spread Slave with depth (single trawl)	FIRM047	FIRM227
Spread Slave with depth and temp (single trawl)	FIRM045	FIRM225
Spread Slave with pitch and roll (single trawl)	FIRM049	FIRM229
Spread Slave with pitch, roll and depth (single trawl)	FIRM153	FIRM231
Spread Slave with pitch, roll and temp (single trawl)	FIRM159	FIRM235
Spread Slave with pitch, roll, depth and temp (single trawl)	FIRM141	FIRM233
Spread Slave with temp (single trawl)	FIRM043	FIRM223
Spread Slave PI*	FIRM085	x
Spread Slave PI with depth PI*	FIRM086	x

*Compatible with Simrad PI receivers.

Twin Trawls

Master Spread Sensor

Measured Distance	Firmware Name	Firmware Number	
		V1	V2
Dual distance only	Spread Master (dual distance)	FIRM040	x
	Spread Master with temp (dual distance)	FIRM042	x
	Spread Master with depth and temp (dual distance)	FIRM044	x
	Spread Master with depth (dual distance)	FIRM046	x
	Spread Master with pitch and roll (dual distance)	FIRM048	x
	Spread Master with pitch, roll and depth (dual distance)	FIRM140	x
	Spread Master with pitch, roll and temp (dual distance)	FIRM154	x
	Spread Master PI (Dual distance)*	FIRM083	x
	Spread Master PI (Dual distance) with depth PI*	FIRM084	x
Dual or triple distance	Spread Master with pitch, roll and depth (Triple distance Dual direction)	x	FIRM170
	Spread Master with pitch, roll, depth and temp (Triple distance Dual direction)	x	FIRM172
	Spread Master with pitch, roll, depth, position and temp (Triple distance Dual direction)	x	FIRM174
	Spread Master V2 (Twin Trawl)	x	FIRM240
	Spread Master V2 with Temp (Twin Trawl)	x	FIRM242
	Spread Master V2 with Depth and Temp (Twin Trawl)	x	FIRM244
	Spread Master V2 with Depth (Twin Trawl)	x	FIRM246
	Spread Master V2 with Pitch and Roll (Twin Trawl)	x	FIRM248
	Spread Master V2 with Pitch, Roll and Depth (Twin Trawl)	x	FIRM250
	Spread Master V2 with Pitch, Roll and Temp (Twin Trawl)	x	FIRM254

Starboard / Clump Spread Sensor

Measured Distance	Firmware Name	Firmware Number	
		V1	V2
Dual distance only	Spread Slave	FIRM041	x
	Spread Slave with depth	FIRM047	x
	Spread Slave with depth and temp	FIRM045	x
	Spread Slave with pitch and roll	FIRM049	x
	Spread Slave with pitch, roll and depth	FIRM153	x
	Spread Slave with pitch, roll and temp	FIRM159	x
	Spread Slave with pitch, roll, depth and temp	FIRM141	x
	Spread Slave with temp	FIRM043	x
	Spread Slave PI*	FIRM085	x
	Spread Slave PI with depth PI*	FIRM086	x
Dual or triple distance	Spread Slave with pitch, roll, depth and temp (Dual direction)	x	FIRM171
	Spread Slave with pitch, roll, depth, position and temp (Dual direction)	x	FIRM173
	Spread Slave V2 (Twin Trawl)	x	FIRM241
	Spread Slave V2 with Temp (Twin Trawl)	x	FIRM243
	Spread Slave V2 with Depth and Temp (Twin Trawl)	x	FIRM245
	Spread Slave V2 with Depth (Twin Trawl)	x	FIRM247
	Spread Slave V2 with Pitch and Roll (Twin Trawl)	x	FIRM249
	Spread Slave V2 with Pitch, Roll and Depth (Twin Trawl)	x	FIRM251
	Spread Slave V2 with Pitch, Roll and Temp (Twin Trawl)	x	FIRM255

*Compatible with Simrad PI receivers.

Door Sounder Sensors

The first generation of Door Sounder sensors uses the firmware called Door Sounder, FIRM124. It is compatible with all A1 PCBA.

The second and latest generation is Door Sounder with target strength calibration. It uses the firmware called Bottom Explorer V3, FIRM129. It is compatible with A1 PCBA with rev8 and higher.

Firmware is loaded into both port and starboard door sensors.

Technical Specifications

Spread Sensor

Uplink frequency	30 to 60 kHz
Range to vessel	up to 2500 m*
Data update rate (telegrams)	Spread: 3-15 sec. - Depth: 3-8 sec. - Temp: 3-16 sec. - Pitch & roll: 3-15 sec.
Depth range	up to 1800 m
Depth resolution	0.1 m with 0.1% accuracy
Pitch angle	±90°
Roll angle	±90°
Pitch & roll accuracy	±0.1°
Temp measurement range	-5° C to +25° C
Temp accuracy	±0.1° C
Typical battery life	Up to approx. 16 days (approx. 8 days for mini Spread Sensor) †
Charging time	Standard: 8-12 hours ‡
	Fast Charge: 4 hours
Battery type	Lithium-Ion
Weight in air (with housing)	7.3 kg
Weight in water (with housing)	2.4 kg
Mini Spread Sensor weight in air	4 kg, slim 3.3 kg
Mini Spread Sensor weight in water	1 kg, slim 0.9 kg
Warranty	2 years (Sensor & Battery) **

Door Sounder

Uplink frequency	30 to 60 kHz
Range to vessel	up to 2500 m*
Sounder broadband frequency	Configurable between 120-210 kHz
Sounder range	5 to 640 m
Data update rate	Echog. of Door Sounder V1: up to 1 image per second Echog. of Door Sounder with target strength calibration: up to 3 images per second Battery: max. every second
Typical battery life	Up to approx. 75 hours †
Charging time	Standard: 8-12 hours ‡
	Fast Charge: 4 hours
Battery type	Lithium-Ion
Weight in air (with housing)	7.3 kg
Weight in water (with housing)	2.4 kg
Warranty	2 years (Sensor & Battery) **

*Reference only. Depends on functions enabled. / † Depends on sensor uplink power and options. / ‡ Based on average charging time. / **Marport Standard Marine Limited Warranty

Door Sounder Beamwidths

Beamwidths for Uplink pings:

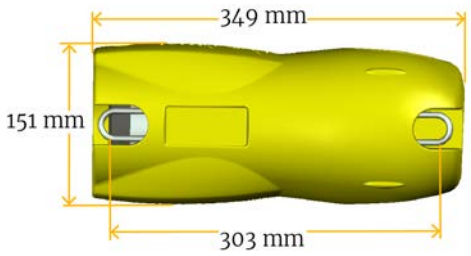
Beamwidth	**@ 35 kHz**	**@ 50 kHz**	**@ 60 kHz**
-3dB	46°	40°	30°

Beamwidths for down pings:

Beamwidth	**@ 125 kHz**	**@ 160 kHz**	**@ 200 kHz**
-3dB	26°	24°	22°

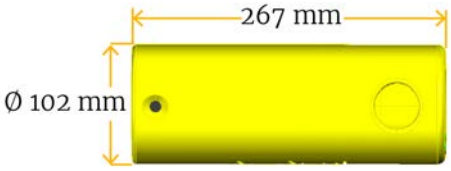
Dimensions

Spread Sensor (standard) & Door Sounder (XL bottle)



Mini Spread Sensor (stubby bottle)

Mini Spread Sensor with slim housing (stubby bottle)



Main Parts

External View

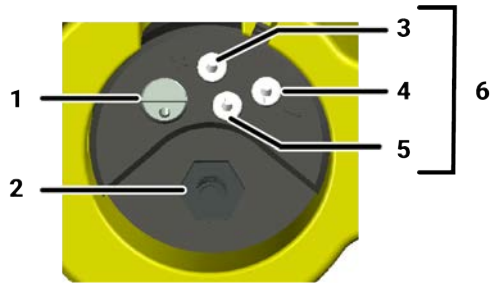
Tip: Door sensors have colored markers on the housing to indicate their location on trawl doors:

- Starboard sensor (green)
- Port sensor (red)
- Clump sensor (black)

Figure 1: Standard Spread Sensor & Door Sounder (XL bottle)

Figure 2: Mini Spread Sensor (stubby bottle)

Figure 3: Mini Spread Sensor with slim housing (stubby bottle)



1. Pressure sensor
2. Temperature sensor
3. Positive charge
4. Negative charge
5. Water switch
6. Shoulder bolts

CAUTION:

- Do not put foreign objects into pressure sensor opening or try to open it.
- Do not remove the shoulder bolts from the outside of the sensor.

It may damage the components.

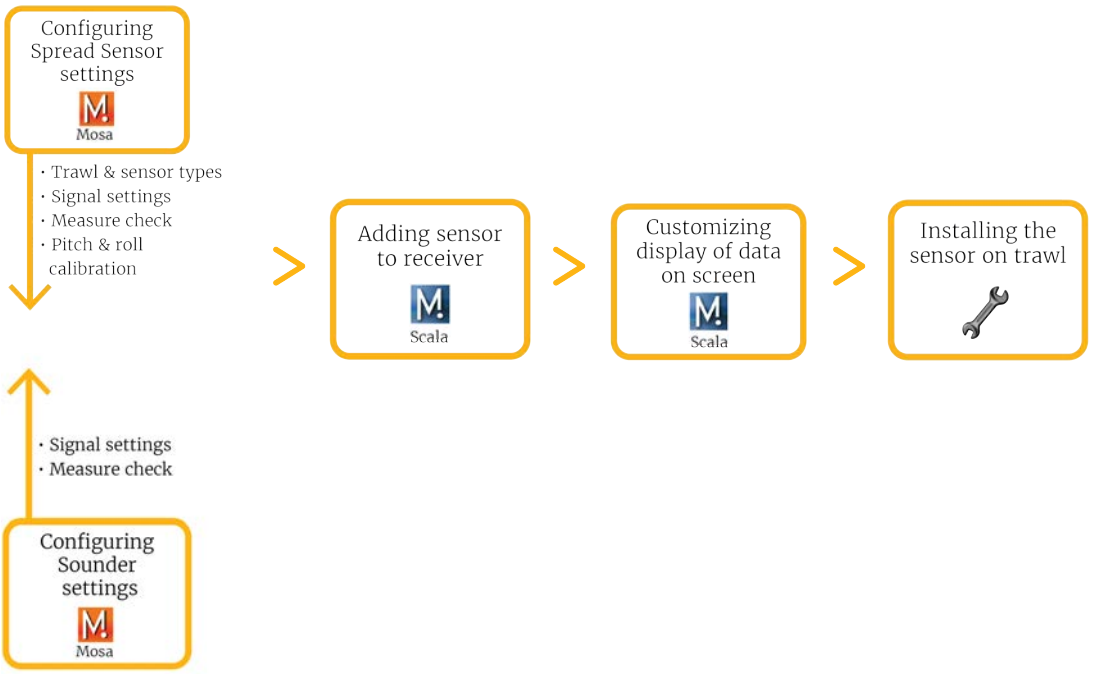
Operational Mode Indicator

Indicators from the transducer

State	Situation	Operation	LED
Charging	Charger plug is connected.	Batteries are charging.	No light.
Running	Sensor is in water or activated with jumper.	After an initialization phase, echo sounder is operating.	 Flashing red
Configuring	Sensor is out of water.	Configuration via wireless communication. Turns off after 10 minutes without user action.	 Flashing green

Installation Steps

Click an installation step to jump directly to the corresponding section.



Note: You can customize the display of data on Scala/Scala2 at any time.

Sensor Configuration

Learn how to configure the sensor settings.

Note: This guide refers to the following versions of **Mosa2:** 02.11.x. If you use another version, the visual interface and options may vary.

Connecting the Sensor to Mosa2

To configure the sensor, you need to connect it to Mosa2 using a wireless communication or using the Configuration Cable.

Using a Wireless Connection

About this task

Important: Mosa 2.11 running on macOS Monterey: A1 sensors cannot connect by short range wireless signal. You must use a Configuration Cable.

Procedure

1. Open Mosa2.

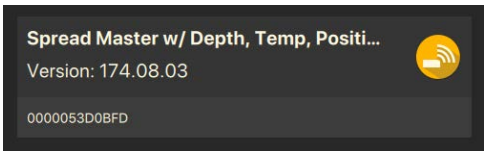
2. Connect the water-switch.

The light on the transducer flashes red.

3. Disconnect the water-switch.

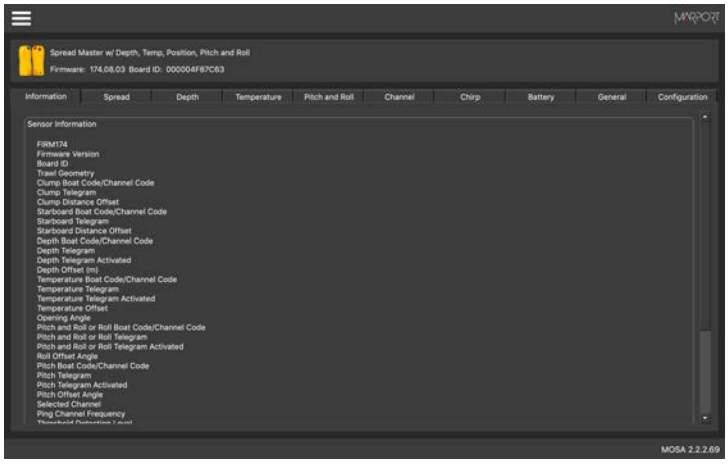
After a few seconds, the light flashes green.

4. Wait a few seconds for the sensor to be recognized. When it appears in the discovery page, click  .



Results

The sensor configuration pages are displayed.



Using the Configuration Cable

Simply connect the Configuration Cable from the computer to the sensor to display the sensor configuration page on Mosa2.

About this task

Note: Compatible with Mosa2 02.05.x and above.

Tip: Refer to the Configuration Cable Quick Reference Guide for more details about the use of this product.

Procedure

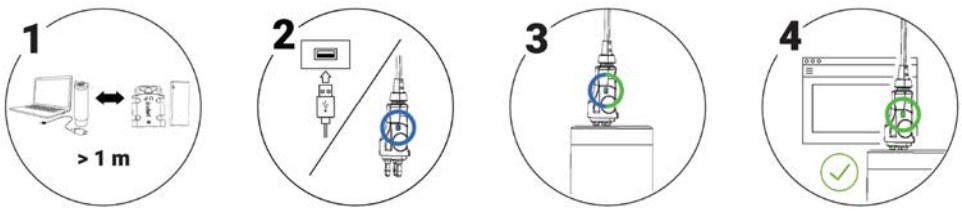
1. Move other electrical devices minimum 1 m away from the computer.
2. Connect the USB connector directly to the computer.

   Mosa2 opens automatically and the startup wizard is displayed. The LED on the plug is solid blue.
3. Connect the three-pin plug to the sensor.

   The LED on the plug blinks alternatively blue and green.
4. Wait a few seconds. The configuration page of the sensor is displayed on Mosa2.

   The LED on the plug is solid green.

Example



What to do next

You can now configure the sensor.

Note: You can keep the Configuration Cable continuously connected by USB, and virtually eject or connect it. When no sensor is connected to the Configuration Cable, click **Menu** > **Eject Config Plug** or **Connect Config Plug**. When ejected, you come back to the discovery page. It stays disconnected until you virtually connect to it or manually disconnect then connect it.

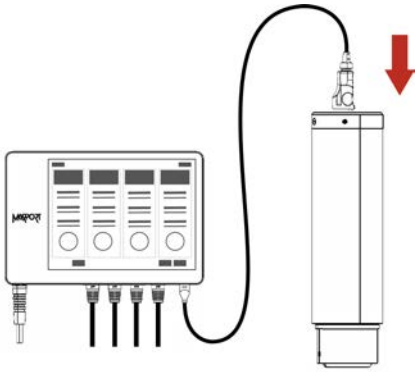
Using the Dock and a Configuration Cable

About this task

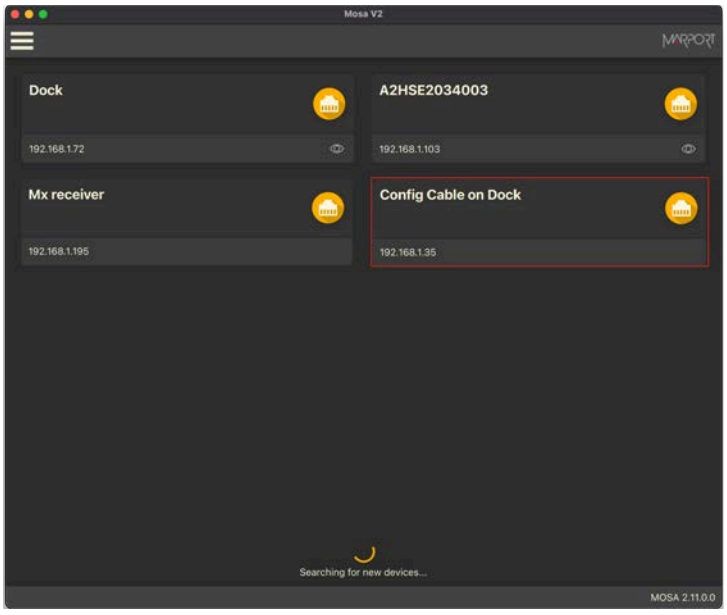
Note: Compatible with Mosa2 02.11.x and above.

Procedure

1. Connect the USB connector of the Configuration Cable to the Dock and the plug to the sensor's endcap.



2. Open Mosa2. The Configuration Cable is displayed on the discovery page.



Click to open the sensor configuration page.

3. To leave Mosa2 configuration page and come back to the discovery page, click ≡ > **Disconnect**.

Spread Sensor Specific Settings

Defining the Trawl Geometry

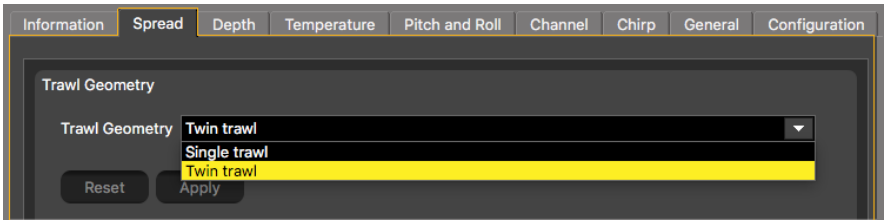
If you have firmware for twin trawls, you need to define for the Master Spread Sensor the type of trawl that you are using.

About this task

Configure the trawl geometry only if you have firmware for twin trawls. Firmware for twin trawls can be used for single trawl and twin trawls.

Procedure

1. Connect the Master sensor to Mosa2.
2. Click the tab **Spread**.
3. From **Trawl Geometry**, select your type of trawl, depending if you are fishing with twin trawls or a single trawl.



4. Click **Apply** and make sure there is a green check mark ✓.

Defining the Starboard and Clump Sensor Type

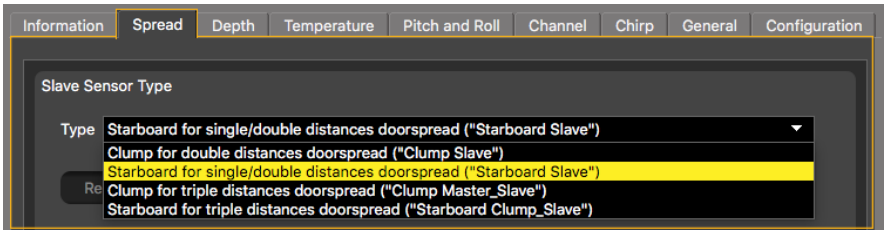
You need to define the type of Starboard and Clump (if applicable) sensors that are installed.

About this task

If you have a Starboard and a Clump sensor, you need to do this task for both of them.

Procedure

1. Connect the Starboard or Clump sensor to Mosa2.
2. Click the tab **Spread**.
3. From **Slave Sensor Type**, choose according to your type of installation:



- Single Trawl:

Sensor	Slave Sensor Type
Starboard	Starboard for single/double distances doorspread

- Twin trawls with double distance:

Sensor	Slave Sensor Type
Starboard	Starboard for single/double distances doorspread
Clump	Clump for double distances doorspread

- Twin trawls with triple distance:

Sensor	Slave Sensor Type
Starboard	Starboard for triple distances doorspread
Clump	Clump for triple distances doorspread

4. Click **Apply** and make sure there is a green check mark ✓.

Configuring Spread Sensor Telegrams

You need to configure telegrams sent by the Master, Starboard and Clump (if applicable) sensors.

Before you begin

The sensor is connected to Mosa2.

About this task

You need to configure telegrams for each door sensor that you have.

Telegrams are used to define the acoustic communication between the sensor and the receiver. Data (e.g. temperature, depth) are recognized by the receiver according to the type of telegram defined (e.g. TL, CL). The telegram defines intervals between pulses emitted by the sensor, and one interval represents one value. For example, if the interval between 2 pulses of an AL spread telegram is 15 s, the spread is 250 meters.

The temperature, depth, pitch and roll options that are displayed on Mosa2 depend on the firmware installed.

Important: Make sure there is a minimum distance of 100 Hz between PRP telegrams and of 400 Hz with the uplink frequency of NBTE sensors. See Frequency Plan on page 93 for a full list of boat/channel codes.

Remember: Always click **Apply** after you change a setting and make sure there is a green check mark ✓.

Note: To use Spread sensors with a Scanmar system, use AL and AL6 spread telegrams. Temperature, depth, pitch and roll telegrams are all compatible.

Spread

You need to configure spread telegrams sent by the Master sensor to the vessel and, if applicable, by the Clump sensor. You do not need to configure spread telegrams for a Starboard sensor.

About this task

Choose spread telegrams according to the distance between trawl doors, or between the Clump and doors:

- AL: less than 250 m. Sends data every 11 to 15 sec. (compatible with Scanmar system)
- AN: less than 250 m. Sends data every 3 to 8 sec.
- AL6: less than 610 m. Sends data every 11 to 14 sec. (compatible with Scanmar system)
- A6: less than 610 m. Sends data every 3 to 8 sec. (starboard telegram only)

Procedure

1. If you have a single trawl, you need to configure the telegram giving the spread distance from Master to Starboard:

   a) Connect the Master sensor to Mosa2.
   b) Click the tab **Spread**.

   c) From **Starboard Telegram** (Master to Starboard distance), choose AL, AN, A6 or AL6.

   Note: If using the sensors with Scanmar system, choose between AL and AL6.

   a) From **Starboard Boat Code/Channel Code** choose a frequency for the telegram.

2. If you have twin trawls:

   a) Connect the Master or Clump sensor to Mosa2.
   b) Click the tab **Spread**.

   c) The table below shows which telegram you need to configure, depending on the measured spread distances. You also need to set a frequency for each one.

Measured Distance	Sensor	Telegrams
Dual distance	Master	• Clump telegram (Master to Clump distance) • Starboard telegram (Master to Starboard distance)
	Clump	n/a
Triple distance	Master	• Clump telegram (Master to Clump distance) • Starboard telegram (Master to Starboard distance)
	Clump	Starboard telegram (Clump to Starboard distance)

3. If needed, you can change the frequency used for the sensors to communicate with each other.

   a) From Mosa2, click **Menu** ☰ > **Expert** and enter the password `copernic`.
   b) From **Spread** > **Ping Frequency**, enter the same frequency for all door sensors (default is 144 kHz, range is 120 to 220 kHz).

   Important: If using dual trawls with two sets of Spread sensors (see About Spread Sensors on page 12), you must apply different frequencies between the two sets (e.g. 110 kHz for port trawl sensors and 144 kHz for starboard trawl sensors).

   Note: V2 firmware: When operating, a difference of frequency is automatically applied.

- Master emitting frequency (Tx): configured ping frequency
- Clump Tx: configured ping frequency - 10 kHz
- Starboard Tx: configured frequency + 10 kHz

For example, if spread frequency is set at 144 kHz for all door sensors, it means that Master emits at 144. Clump listens 144 then emits at 134. Starboard listens at 144 then emit at 154.

Note: A Marport spread sensor working with a SS4 Scanmar spread sensor need to have a ping frequency of 144,5 kHz and a V1 firmware version. Read Configuring the Spread Sounding Channel on page 33 to know how to configure the spread sounding channel of the sensors working with V1 firmware.

Depth

Procedure

1. Click the tab **Depth**.

2. From **Depth Boat Code/Channel Code**, choose a frequency.
3. From **Depth Telegram**, choose among the telegrams according to the depth at which you are fishing. They all send data every 3 to 8 sec, but at different depth ranges.

   Note: The lower the depth range is, the more precise the measures are.

   - D3 = 300 m
   - D6 = 600 m
   - D12 = 1200 m
   - D18 = 1800 m

4. You can deactivate depth data to save battery life:

   a) From Mosa2, click **Menu** ☰ > **Expert** and enter the password `copernic`.
   b) From **Depth Activation**, select **No**.

Temperature

Procedure

1. Click the tab **Temperature**.

2. From **Temperature Boat Code/Channel Code**, choose a frequency.
3. From **Temperature Telegram**, choose between:
   - TL: sends data between every 11 to 16 sec.
   - TN: sends data between every 3 to 11 sec.

   Note: TN sends data more often, but it reduces the battery life.

4. You can deactivate temperature data to save battery life:

   a) From Mosa2, click **Menu** ☰ > **Expert** and enter the password `copernic`.
   b) From **Temperature Activation**, select **No**.

Pitch & Roll

Procedure

1. Click the tab **Pitch and Roll**.

2. If you send pitch and roll data on the same channel:

   a) From **Pitch and Roll or Roll Boat Code/Channel Code**, select a frequency.
   b) From **Pitch and Roll or Roll Telegram**, choose between:

   - **Telegram CL**: sends data every 11 to 14 sec.
   - **Telegram VQ**: sends data every 5 to 9 sec.

   Note: VQ sends data more often, but it reduces the battery life.

3. If you send pitch and roll data on two different channels:

   a) From **Pitch and Roll or Roll Boat Code/Channel Code**, select a channel for roll data.
   b) From **Pitch and Roll or Roll Telegram**, choose roll telegram between:

   - **Telegram D3**: sends data every 3 to 8 sec.
   - **Telegram AL**: sends data every 11 to 15 sec.

   Note: D3 sends data more often, but it reduces the battery life.

   c) From **Pitch Boat Code/Channel Code**, select a channel for pitch data.
   d) From **Pitch Telegram**, choose between:

   - **Telegram D6**: sends data every 3 to 4 sec.
   - **Telegram AN**: sends data every 3 to 6 sec.

4. You can deactivate pitch and roll data to save battery life:

   a) From Mosa2, click **Menu** ☰ > **Expert** and enter the password `copernic`.
   b) To deactivate the roll: from **Pitch and Roll or Roll Activation**, select **No**.
   c) To deactivate the pitch: from **Pitch Activation**, select **No**.

Configuring PI Compatible Spread Sensors

You can configure Marport PI compatible spread sensors to communicate with Simrad PI receiver.

Procedure

1. Connect the Master sensor to Mosa2.
2. Click the tab **Spread**.

3. If you have a Clump sensor, from **PI Clump Channel**, choose a channel for clump distance data.
4. If you have a Clump sensor, from **PI Clump Telegram**, choose the update rate of clump distance data. The update of data is quicker when **Fast** is set, but this reduces the battery life.
   - **Telegram Fast**: sends data every 4 to 7 sec.
   - **Telegram Normal**: sends data every 13 to 16 sec.
   - **Telegram Slow**: sends data every 33 to 36 sec.
5. From **PI Starboard Channel**, choose a channel for starboard distance data.
6. From **PI Starboard Telegram**, choose the update rate of starboard distance data. The update of data is quicker when **Fast** is set (see above), but this reduces the battery life.
7. If you have depth option, click the tab **Depth**.

8. From **Depth PI Frequency**, choose a frequency for depth data.
9. From **Depth PI Telegram**, choose the data update rate and range of depth.
10. Connect to Mosa2 the Starboard sensor.
11. Click the tab **Spread**.

12. From **Slave Type** select **Starboard Slave compatible to Marport Master**.
13. If you have depth option:
    a) From **Depth** > **Depth PI Frequency**, choose a frequency for depth data.
    b) From **Depth PI Telegram**, choose the data update rate and range of depth.
14. If you have a Clump sensor, connect it to Mosa2.
15. From **Spread** > **Slave Type** select **Clump Slave compatible to Marport Master**.
16. If applicable, configure depth options as explained above.

Configuring the Spread Sounding Channel

For XL bottles produced before S/N 3636606 (see sticker on the end cap), you need to configure correctly the up and down channels.

Before you begin

The sensor is connected to Mosa2.

About this task

Important: Only do this task if:

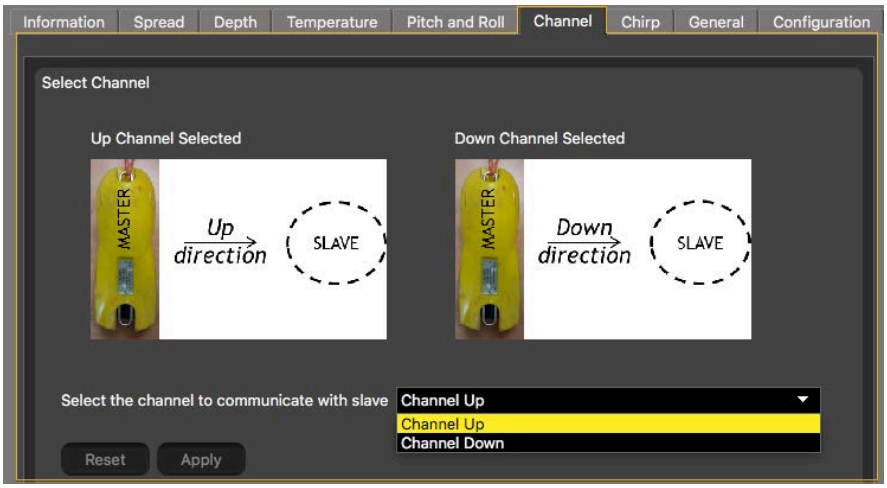
- You have XL bottles produced before S/N 3636606 with V2 firmware
- You have XL bottles produced after S/N 3636606 with V1 firmware

For other bottles, leave default settings.

Sensors communicate with each other with the down sounder on the transducer. On XL bottles produced before S/N 3636606, the down sounder is connected to the up A1 connector. To correctly receive spread data, you need to configure the channels on Mosa2 when these bottles have V2 firmware. If you have a V1 firmware on a bottle produced **after** S/N 3636606, the connector on the A1 board must be manually changed.

Procedure

1. V2 firmware: Click the tab **Channel**.
2. For a Master, Starboard and Clump sensor, select **Channel Up**.



3. If you have a V1 firmware on a bottle produced **after** S/N 3636606, qualified Marport technicians need to open the bottle and connect the down cable to the up connector on the A1 board and up cable to the down connector.
4. Click **Apply** and make sure there is a green check mark ✓.

Calibrating the Pitch and Roll

You need to calibrate the pitch and roll of the sensors when they are placed in the sensor pockets.

Before you begin

Some trawl door manufacturers measure the pitch and roll offsets themselves and write it on the doors. Check on trawl doors.

About this task

The sensor pocket is usually welded to the door at a 15 to 20 degree vertical angle. This means that when trawl doors are vertical, the sensors will already have a pitch angle and maybe a roll angle. You need to calculate these angles and offset them in order to have 0° of pitch and roll when doors are vertical.

If you do not know the pitch and roll offsets, doors need to be taken out and placed on the ground in order to calibrate the pitch and roll.

Procedure

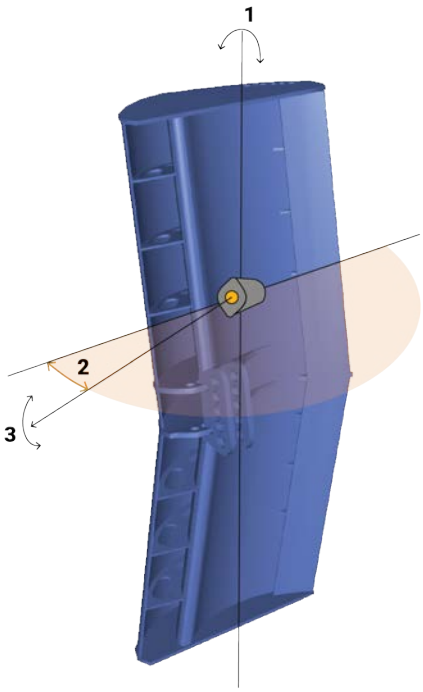
1. If you already know the pitch and roll offsets, go straight to step 4.
2. Prepare the doors:
   a) Remove all rigging, shackles and attachment points from the doors.
   b) Remove the net gear attached to the door.
   c) Using a crane or forklift, place the door on a flat surface, such as a dock or similar location.
   d) Using the necessary rigging, hang doors with angles as close to 0 degree as possible on the vertical and horizontal plane. Use a carpenter level to help you.

3. Insert the sensor in the pockets on the doors.
4. Open Mosa2 application.
5. Activate and deactivate the water-switch to connect the sensor to Mosa2 via a wireless signal.
6. Click the tab **Pitch and Roll**.

7. Click **Pitch and Roll Calibration**, then:
   a) If you already know the pitch and roll offsets, select **Manual**, then manually enter the offsets.

   b) If you do not know the pitch and roll offsets, click **Auto Calibrate**. Offset values change according to the position of the sensor on the door.

8. Click **Save**.
9. From **Opening Angle**, enter the angle between the door and the sensor (horizontal plane) in degrees. If you do not know the angle, ask the manufacturer for the angle of attack. If you cannot know the angle, you can put 35° but be aware that a wrong angle impacts pitch and roll measurements.



1. Roll
2. Opening angle: 25-40°
3. Pitch

10. Click **Apply** and make sure there is a green check mark ✓.

Door Sounder Specific Settings

You need to set these settings for a Door Sounder sensor.

Configuring the Uplink and Down Settings

You can configure different settings for uplink and down soundings.

Before you begin

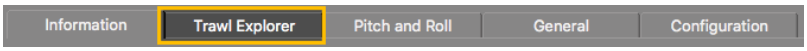
The sensor is connected to Mosa2.

About this task

Remember: Always click **Apply** after you change a setting and make sure there is a green check mark ✓.

Procedure

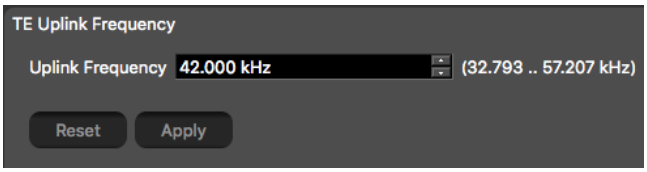
Click the tab **Trawl Explorer**.



Uplink

Procedure

From **TE Uplink Frequency**, enter a frequency for the signal toward the vessel.

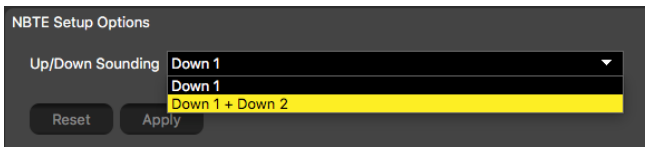


Important: This parameter must be the same in the sensor settings in Scala/Scala2.

Down Sounding

Procedure

1. For Door Sounder with target strength only: in **NBTE Setup Options** you can select **Down 1 + Down 2** if you want to compare two different settings on the down sounding (for example, two ping lengths or 2 frequencies). The sensor will send two consecutive pings toward down direction.



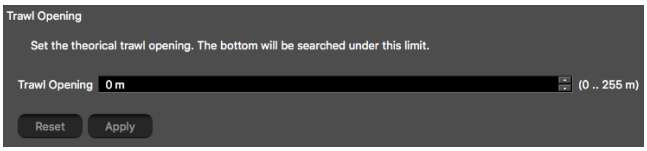
2. From **Down Sounding Range**, select the range according to how many meters you want to see under the sensor.

Note: The range influences the display of echogram images. The smaller the range, the shorter the listening time, which gives better quality images. But the bigger the range is, the lesser the image quality is, because data arrives slower.

Note: Door Sounder with target strength calibration: The range of the down sounding can automatically change to 20 meters if the distance to the bottom becomes lower than 20 meters and if you entered a trawl opening lower than 20 m. See next step to activate or not this feature.

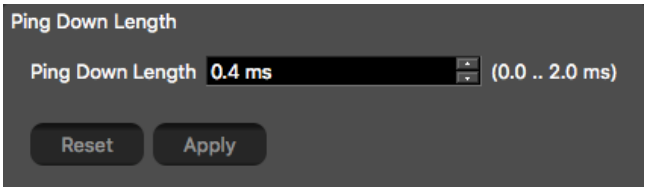
Important: This parameter must be the same in the sensor settings in Scala/Scala2.

3. Door Sounder with target strength calibration: From **Trawl Opening**, enter 0. The opening needs to be lower than 20 m to have the autorange feature. Otherwise this setting is not useful for a door sensor.



Important: If you use **Down 1 + Down 2** sounding mode, enter 20 m or more to deactivate the autorange feature because it creates wrong data on the echogram.

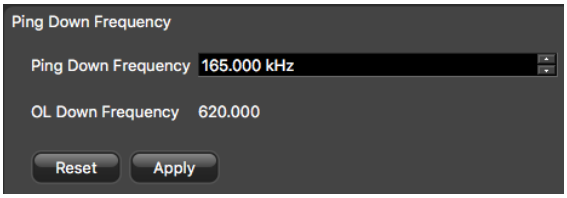
4. From **Ping Down Length**, enter a pulse length. Choose a pulse length according to the distance at which you need to detect the bottom. (the longer the pulse, the further you can see, but with a lower resolution):



- Detection between 20 cm and 2 m: enter 0.1 ms
- Detection between 50 cm and 160 m (V2: up to 80 m): enter 0.4 ms .

Note: The maximum detection depth depends on ping frequency and type of bottom. The lower the ping frequency is, the longer the detection depth is.

5. From **Ping Down Frequency**, enter a frequency for the down sounding. Make sure to put a minimum distance of 20 kHz between starboard and clump frequencies.



Important: Frequency needs to be between 120-210 kHz for a Door Sounder.

Important: Do not change ping frequency on a V3 sensor or it will have to be returned to a Marport sales' office for target strength calibration.

Target Strength

Procedure

From **Down TVG Mode**, select the appropriate TVG (Time Variable Gain) mode. See About Time Variable Gain on page 39 for more information.

TVG parameters for Door Sounder with target strength calibration:

Select 20 log to see the bottom in the same color, whatever its distance from the sensor.

TVG parameters for Door Sounder V1:

- From **TVG Coefficient**, enter 0.500 to see the bottom in the same color, whatever its distance from the sensor.
- From **Attenuator Coefficient**, enter 25.
- Leave **VCO Coefficient** default settings at 3.

About Time Variable Gain

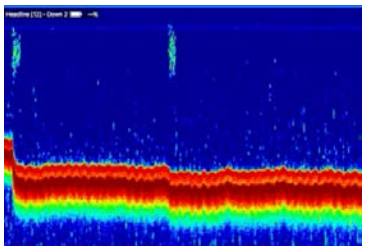
TVG (Time Variable Gain) is a method that compensate signal loss in the water. Basically, the aim is to have targets or sea bottom displayed in the same color on the echogram, whatever the distance from the sensor.

When the sounder sends pings, the deeper the target is, the more attenuated signals will be received and sent back. As a result, if the signal is too much attenuated, echoes (target strength) received from a target might not be as strong as they should be. TVG is here to compensate this effect. It uses a lower gain level when signals travel toward a target at a small distance and higher gain level when signals travel toward deeper targets. The end result is to compensate sounding attenuation and therefore to show a same target strength for a same target at different depths.

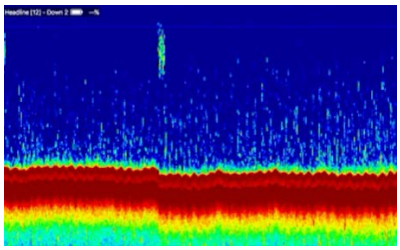
You can choose between three different TVG modes:

- 20 log: use to focus on the bottom, footrope or a school of fish (recommended for Door Sounder).
- 40 log: use to focus on individual targets.
- 30 log: compromise between the two others.

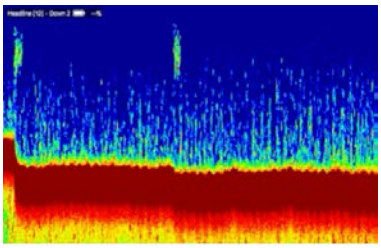
20 log



30 log



40 log



Configuring the Uplink Power

You can increase the uplink power of the sensor to increase the power of the signal transmitted. It is useful if you have interferences or if the sensor is far from the vessel.

Before you begin

The sensor is connected to Mosa2.

Procedure

1. From Mosa2, click the tab **General**.

2. From **Uplink Power Adjustment Level**, choose the uplink power (values in percentage are for Mosa version 01.02.00 and later):

Sensor	Recommended Uplink Powers	Conditions	Estimated Battery Life
Spread Sensor	1800 / 43%	Works for most conditions.	approx. 11 to 16 days (8 days for a Mini Spread Sensor)*
	4095 / 100%	• Sensor is far from vessel (e.g. more than 800 m depending on conditions, high depth) • High level of interferences • Issues receiving data • Low SNR	approx. 4 days (2 days for a Mini Spread Sensor)
Door Sounder	1000 / 32%	Works for most conditions.	60-75 hours
	1800 / 58%	• Sensor is far from vessel (e.g. more than 800 m depending on conditions, high depth) • High level of interferences • Issues receiving data • Low SNR	30-40 hours

*Starboard sensor usually has a longer battery life than a Master sensor (1-2 additional days).

Note: The average battery life also depends on the uplink frequency, sounding range and options activated.

Testing Measures

You can test the measures taken by the sensor (e.g. battery level, temperature, depth) to check that there are no faults.

Before you begin

The sensor is connected to Mosa2.

Procedure

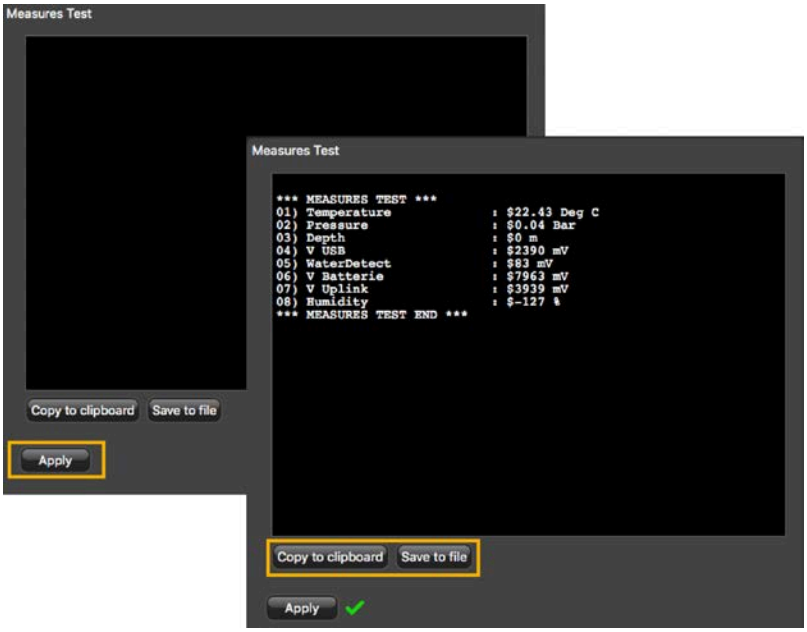
1. From Mosa2, click **Menu** ☰ > **Expert** and enter the password `copernic`.
2. Click the tab **General**.

3. From **Measures Test**, click **Apply**.

   The measures taken by the sensor are displayed.
4. Check the following measures:
   - The temperature is consistent with the sensor environment.
   - The depth is between 0 and 2m.
   - The battery is between 6.9V and 8.1V.

   Troubleshooting: If depth is incorrect, you can put an offset in **Depth** > **Depth Offset**.

   The other measures are only useful for the support service.
5. To save the test results on your computer:



   - Click **Save to file** to download the file.
   - Or, click **Copy to clipboard** then press **Cmd + V** on a word processor like Pages to paste the contents.

Exporting Sensor Configuration Settings for Record Keeping

You can export in a *.txt file all the settings configured for the sensor (such as ping length, frequency, range, TVG...).

Before you begin

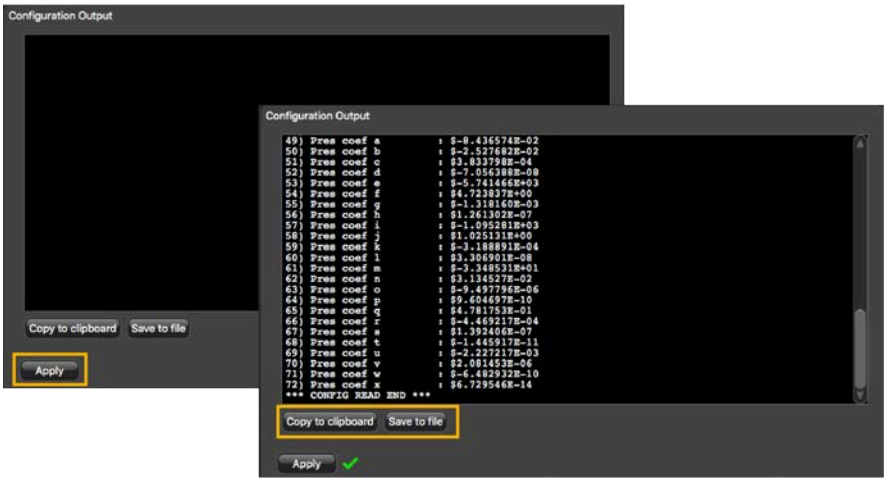
- You have finished configuring the sensor.
- The sensor is connected to Mosa2.

Procedure

1. Click the tab **Configuration**.

2. Click **Configuration Output**.
3. Click **Apply** under the black area.

   The settings are displayed.
4. To save the settings:



   - Click **Save to file** to download the file on the computer.
   - Or, click **Copy to clipboard**, then press **Cmd + V** on a word processor like Pages to paste the contents.

Exporting Sensor Configuration Settings for the Receiver

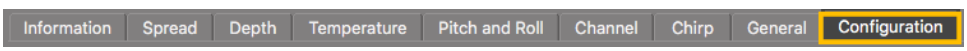
You can export on an XML file the sensor settings that you configured on Mosa2. You can afterward use this file when adding the sensor to a receiver.

Before you begin

- You have finished configuring the sensor.
- The sensor is connected to Mosa2.

Procedure

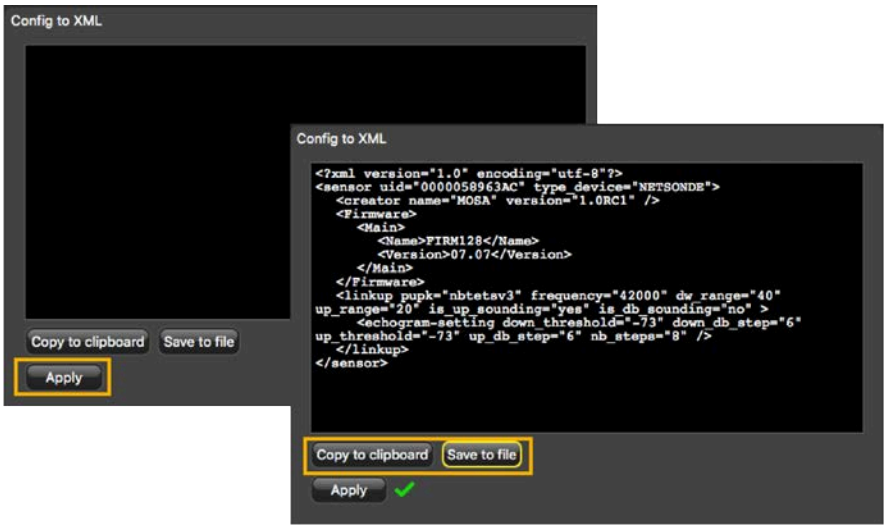
1. Click the tab **Configuration**.



2. Click **Config to XML**.
3. Click **Apply**.

The settings are displayed.

4. To save the settings:



- Click **Save to file** to download the XML file on the computer.
- Or, click **Copy to clipboard**, then press **Cmd + V** on a word processor like Pages to paste the contents.

5. Change the name of the XML file saved on your computer.

Note: When you export the sensor settings, the XML file always has the same name. Changing its name will prevent you from overwriting it the next time you download sensor settings.

What to do next

See Adding the Sensor with a Configuration File on page 45 to know how to add the sensor to a receiver with this file.

System Configuration and Display

Learn how to configure the receiver to be able to receive and display door sensor data.

Note: This guide refers to the following versions: Scala 01.06.06-01.06.34, Scala2 02.10.x. If you use another version, the visual interface and options may vary.

Adding Sensors to the Receiver

You need to add the sensors to the receiver in order to display their data on Scala/Scala2.

Firmware	Mx receiver version	Scala/Scala2 version
Spread Master/Slave V2	all	all
Spread Master/Slave V1	all	all
Door Sounder (FIRM124)	all	all
Door Sounder with target strength calibration (FIRM129)	04.02.28 or later	01.02.05 or later

Adding the Sensor with a Configuration File

You can add the sensor to the receiver with a configuration file that contains the sensor settings you configured on Mosa2.

Before you begin

- You have exported an XML file containing the sensor settings (See Exporting Sensor Configuration Settings for the Receiver on page 43).

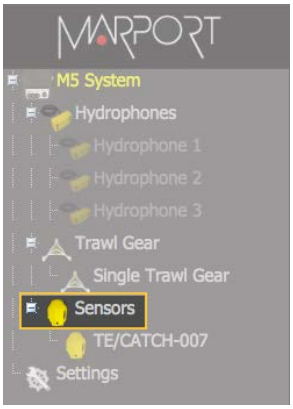
Important: You need to have **Firefox version 22 to 51**.

Procedure

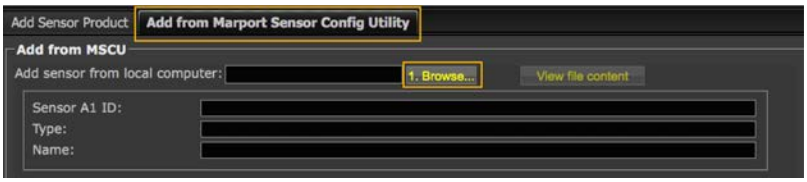
1. Enter your receiver IP address in Firefox web browser to access the system web page. The system web page gives access to the configuration of the receiver.

   Note: Default IP addresses are: 192.168.10.177 for M3 and M6 receivers, 192.168.1.170 for M4 receiver. Add the address as a bookmark in Firefox to easily access it.

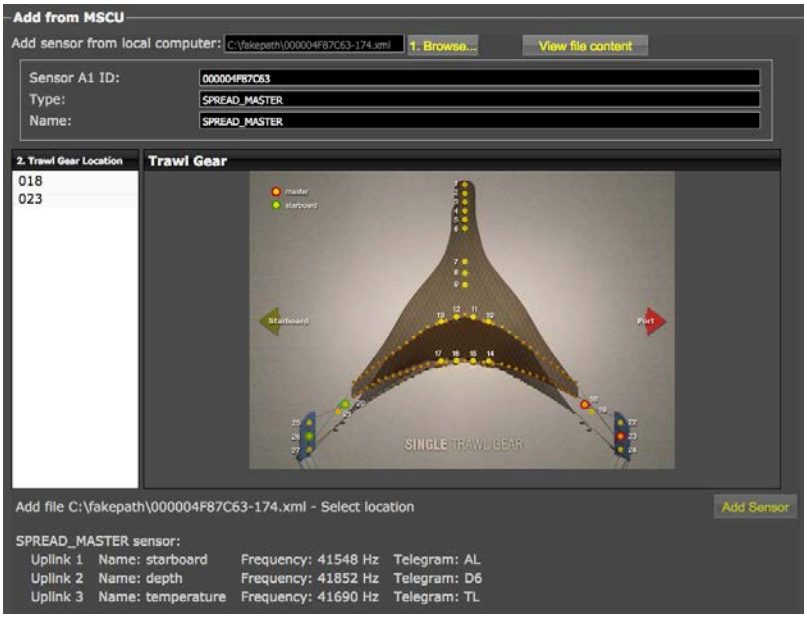
2. From the left side of the page, click **Sensors**.



3. Click the tab **Add from Marport Sensor Config Utility**.
4. Click **Browse** and select the XML file.



Information about the sensor is displayed.



5. Select a node from the list on the left. Nodes in green are already used.

Note: For Spread sensors, choose:

- Master: 23
- Starboard: 26 (single trawl), 123 (twin trawls)
- Clump: 26

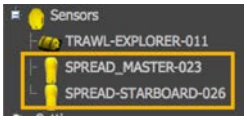
For Door Sounder sensors, choose:

- Master: 24

- Starboard: 27, 124

6. Click **Add Sensor**.

   The sensor is added to the system, with all its settings.



Results

You can see incoming data in the control panels, in Scala **Sensors Data**/ Scala2 **Mx**.

What to do next

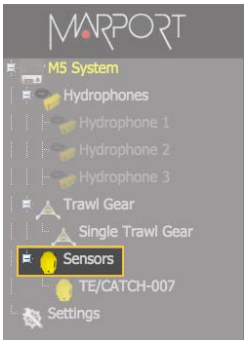
- If you want to apply filters on data received by the sensor, see Configuring Sensor Settings on page 49.
- You can now configure the display of incoming data in Scala/Scala2.

Adding the Sensor Manually

You can add the sensor to the receiver from Scala/Scala2, by entering the same settings as the ones in Mosa2.

Adding Sensors to the Receiver

1. From Scala/Scala2, click **Menu** ☰ > **Expert Mode** and enter the password `copernic`.
2. Scala Click menu again, then **Receivers**.
3. Scala2 Right-click the IP address of the receiver at the bottom of the page, then click **Configure Receiver**.
4. From the left side of the receiver page, click **Sensors**.



5. From the page **Add Sensor Product** select the options according to your type of sensor:

Type of sensor	Product Category	Product Name	Trawl Gear Location
Spread Sensor	Spread Master	Spread Master + options*	23
	Spread Starboard	Spread Starboard + options*	• Single trawl: 26 • Twin trawls: 123

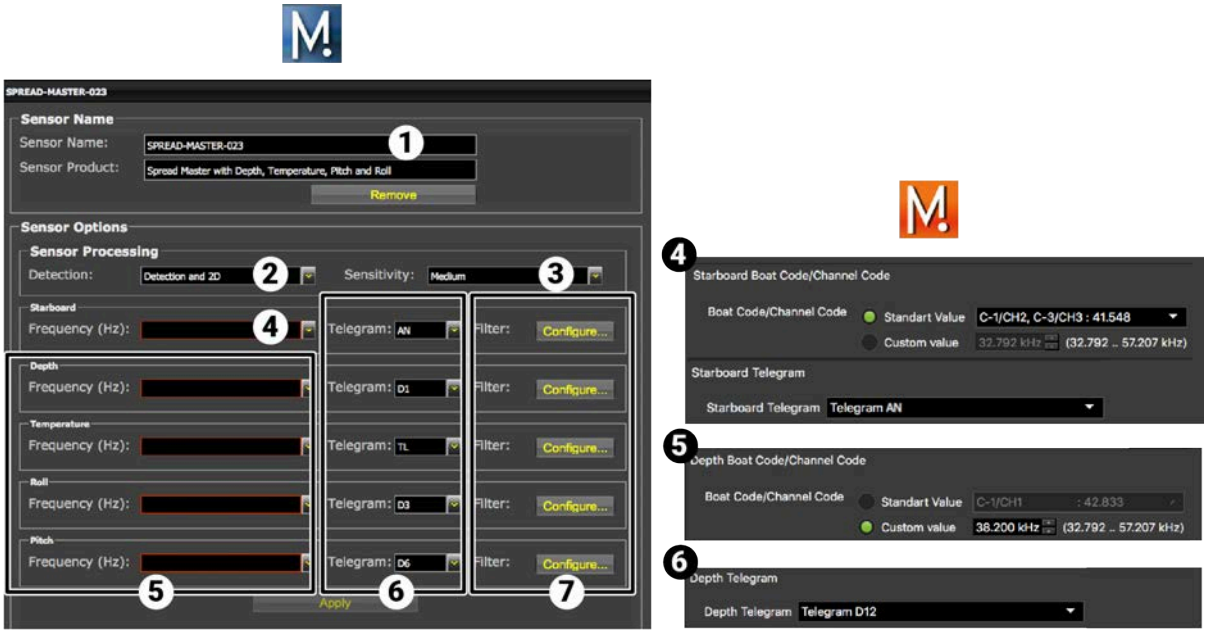
Type of sensor	Product Category	Product Name	Trawl Gear Location
	Spread Clump	Spread Clump + options*	26
Door Sounder (FIRM124)	Door Sounder	Narrow Band Door Sounder	• Single trawl: 24, 27 • Twin trawls: 24, 27, 124
Door Sounder with target strength calibration (FIRM129)	Bottom Explorer	Bottom Explorer (V3)	• Single trawl: 24, 27 • Twin trawls: 24, 27, 124
Marport PI compatible Spread sensor †	PI Sensor	PI Spread	23

*The options depend on the firmware installed. / † Only add the Master sensor.

Configuring Sensor Settings

Important: Make sure the settings you enter here are the same as in Mosa2.

Spread Sensors



1	Sensor name displayed in Scala/Scala2 and its features.
2	This setting helps detecting the signal of the sensor among other sensor or echosounder signals. Change only if you have issues receiving data. • **Detection and 2D**: default value. This setting helps distinguishing the sensor signals when there are a lot of interferences (e.g. echosounders). It selects the correct signals according to very selective criteria. • **Detection**: If you do not receive data, it may be because the **Detection and 2D** setting is too selective with the signal. **Detection** is less selective and allows more signals to be received. • **Detection for Seiner**: no need for this sensor
3	• **Low**: if the signal of the sensor is high = the trawl is close to the vessel (SNR min. 18 dB). • **Medium**: Default setting. Compromise between the two other settings (SNR min. 12 dB). • **High**: if the signal of the sensor is low = the trawl is far from the vessel (SNR min. 6 dB).
4	Master and clump sensors only: enter the same frequencies as those entered in Mosa2 in Clump and Starboard **Boat Code/Channel Codes**.
5	For each option, enter the same frequencies as those entered in Mosa2 in **Boat Code/Channel Codes**.
6	For each option, enter the same telegrams as those entered in Mosa2.
7	Click **Configure** to change filters applied on incoming data.

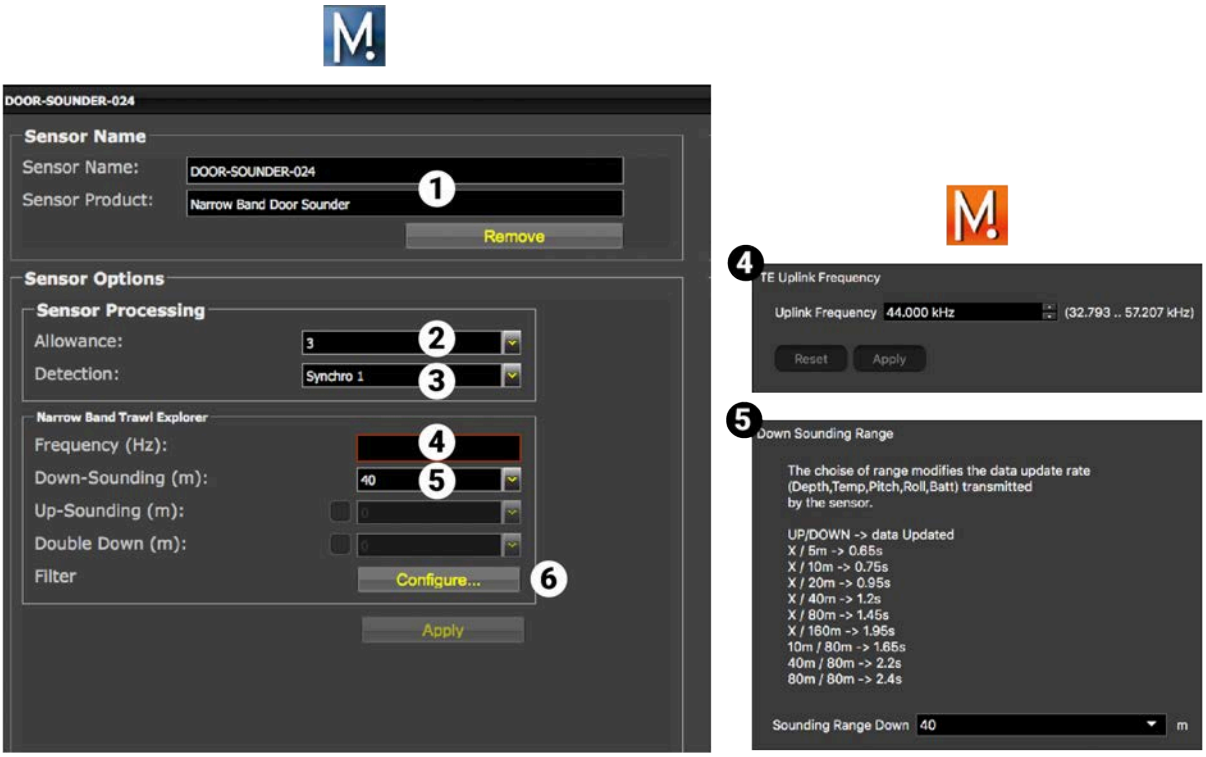
Click **Apply** when you have finished.

Marport PI compatible Spread Sensors

1	Sensor name displayed in Scala/Scala2 and its features.
2	This setting helps detecting the signal of the sensor among other sensor or echosounder signals. Change only if you have issues receiving data. • **Detection and 2D**: default value. This setting helps distinguishing the sensor signals when there are a lot of interferences (e.g. echosounders). It selects the correct signals according to very selective criteria. • **Detection**: If you do not receive data, it may be because the **Detection and 2D** setting is too selective with the signal. **Detection** is less selective and allows more signals to be received. • **Detection for Seiner**: no need for this sensor
3	• **Low**: if the signal of the sensor is high = the trawl is close to the vessel (SNR min. 18 dB). • **Medium**: Default setting. Compromise between the two other settings (SNR min. 12 dB). • **High**: if the signal of the sensor is low = the trawl is far from the vessel (SNR min. 6 dB).
4	Enter the same frequency as the one entered in Mosa2 in **PI Starboard Channel** or **PI Clump Channel**, if applicable (exact frequency is visible from the **Information** page).
5	Enter the interval at which signals are sent. They must be the same as in Mosa2.
6	Click **Configure** to change filters applied on incoming data.

Click **Apply** when you have finished.

Door Sounder Sensor

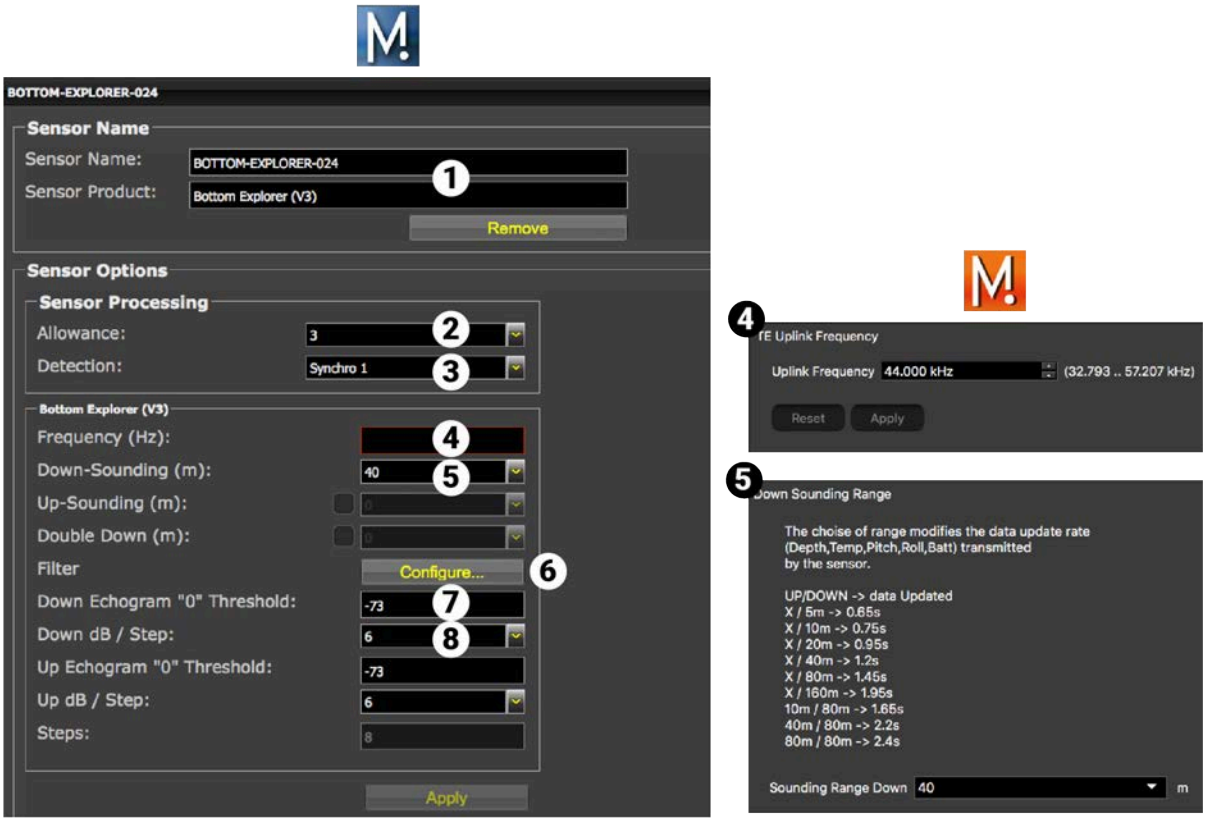


1	Sensor name displayed in Scala/Scala2 and its features.
2	This setting helps detecting the signal of the sensor among other sensor or echosounder signals. Change default setting only if you have issues receiving data. · Choose between **0-2** only if no interferences on the vessel (not recommended). · **3** is default setting. · Choose between **4-6** if you have issues receiving data. It allows you to receive more data, but be aware they might be wrong data.
3	This setting also helps detecting the sensor signal. Leave default setting at Synchro 1.
4	Enter the same frequency as the one entered for the uplink frequency in Mosa2.
5	Range of the down sounding (do not select the other soundings). Corresponds to **Sounding Range** in Mosa2.
6	Click **Configure** to change filters applied on incoming data. Filters are particularly useful to reduce interferences on the echogram data. **Tip:** Please refer to Scala/Scala2 user guide for more information about the filters.

Click **Apply** when you have finished.

Door Sounder with target strength calibration

Note: Door Sounder with target strength calibration is named Bottom Explorer in Scala/Scala2.



1	Sensor name displayed in Scala/Scala2 and its features.
2	This setting helps detecting the signal of the sensor among other sensor or echosounder signals. Change default setting only if you have issues receiving data. • Choose between **0-2** only if no interferences on the vessel (not recommended). • **3** is default setting. • Choose between **4-6** if you have issues receiving data. It allows you to receive more data, but be aware they might be wrong data.
3	This setting also helps detecting the sensor signal. Leave default setting at Synchro 1.
4	Enter the same frequency as the one entered for the uplink frequency in Mosa2.
5	Range of the down sounding. Select and complete **Double Down** if using **Down 1 + Down 2** sounding mode.
6	Click **Configure** to change filters applied on incoming data. **Tip:** Please refer to Scala/Scala2 user guide for more information about the filters.
7	Do not change this setting.
8	Do not change this setting.

Click **Apply** when you have finished.

Results

The sensor is added to the system. You should see incoming data from the control panels, in **Sensors Data**. You can now configure the display of incoming data in Scala/Scala2.

Configuring Data Display

You can display measurements taken by the sensors (e.g. distances between doors, depth, pitch and roll...) on pages in Scala/Scala2.

About this task

Sensor measurements are displayed in the control panels, under Scala **Sensors Data** / Scala2 **Mx**. Data title should be:

- **Spread Master** / **Spread Slave** / **Spread Clump** for Spread sensors.
- **Door Sounder**

The title is followed by the node where the sensor was placed when added to the system. Data displayed (e.g. spread distances, pitch & roll) depends on the firmware installed.

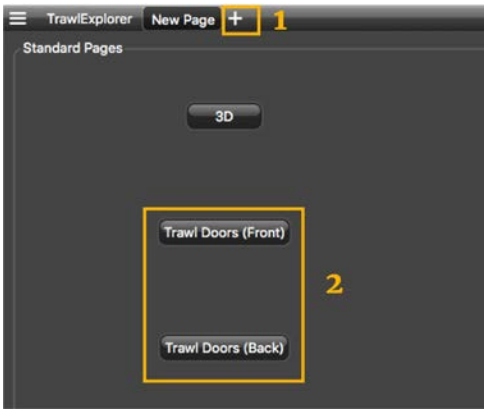
Displaying Doors 3D View

Before you begin

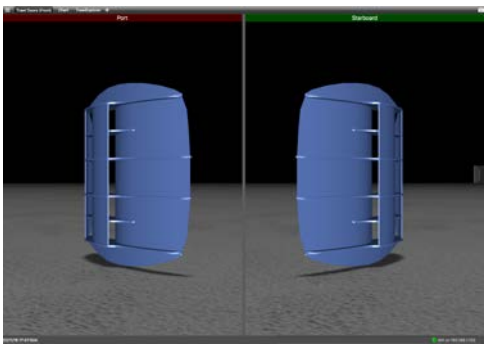
You need to have Spread sensors with pitch and roll option activated.

Procedure

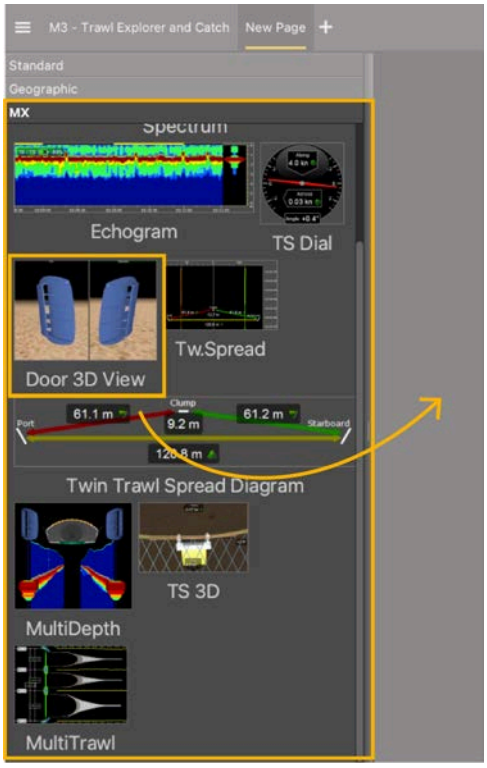
1. From the top left corner of the page click **Menu** ☰ > **Customize** and enter the password `eureka`.
2. From the top toolbar, click the add icon +.
3. Scala From Standard Pages, click **Trawl Doors (Front)** to see doors from vessel or **Trawl Doors (Back)** to see doors from trawl.



Port and starboard trawl doors are displayed.



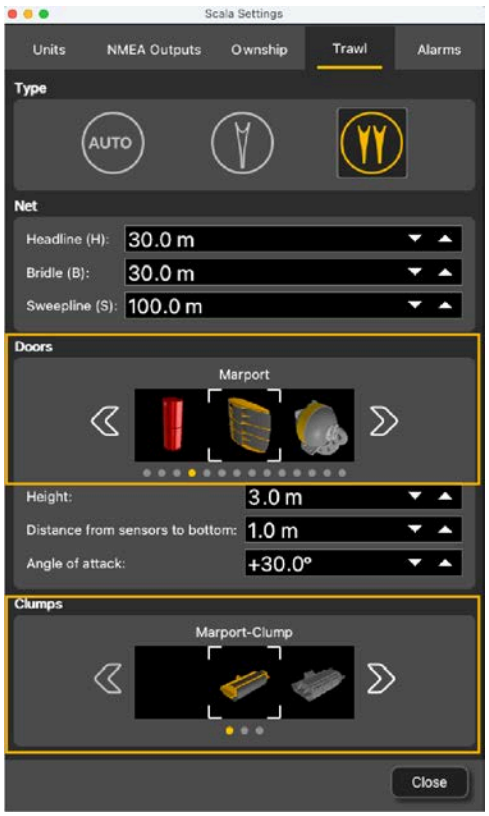
4. Scala2 Open the customize panel, then go to **Mx** and drag **Door 3D View** to the page.



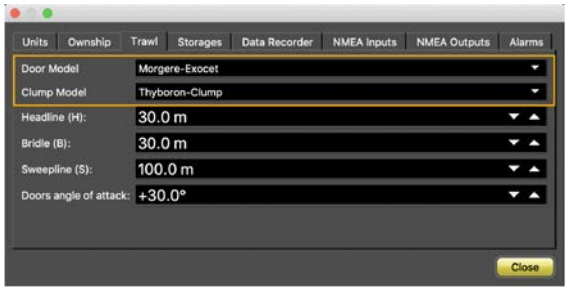
5. To change the door or clump model:

   a) From the top left corner, click **Menu** ☰ > **Settings**.

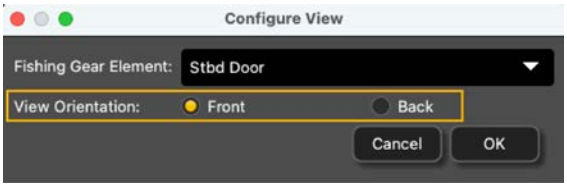
   b) Scala2 Click the **Trawl** tab and select the models of doors and clump from the lists, using left and right arrows.



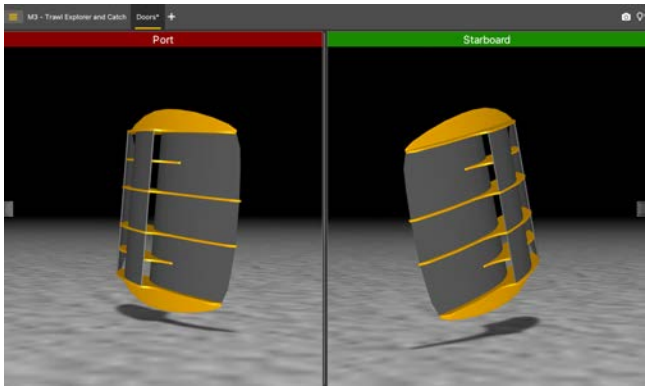
c) Scala Click the **Trawl** tab and select the models from the drop-down lists.



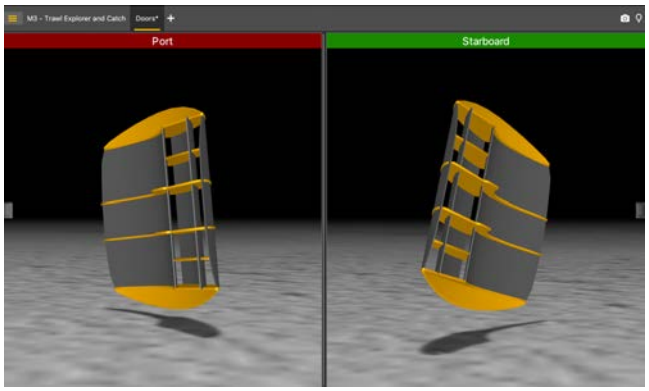
6. You can also change the viewing angle: looking from the trawl toward the vessel (front), or from the vessel toward the trawl (back).



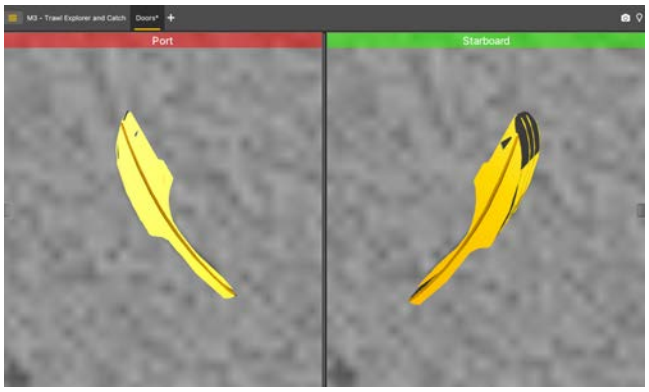
7. To change the view angle of the door, right-click the 3D view and choose:
   - **Horizontal Camera** to see the doors from the front:



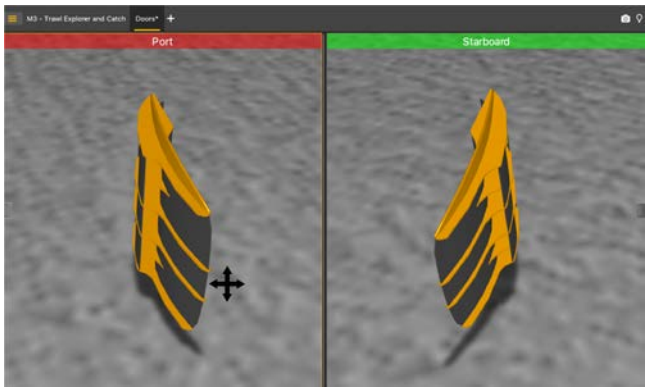
Or back:



- **Vertical Camera** to see the doors from above.

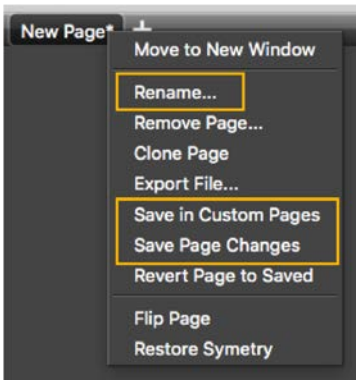


- **Free Camera** to adjust the viewing angle yourself, by clicking and dragging the 3D doors.

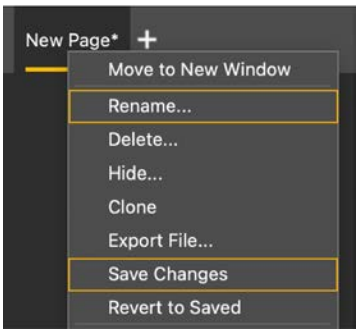


8. To display or hide the ground, right-click the 3D view and select or not **Display Ground**. You should leave the ground displayed, in order to see if the doors are touching it.
9. To save the changes you made:
    1. To rename the page, right-click the name of the page and click **Rename**.
    2. To save the page, right-click the name of the page and click **Save Changes**.
    3. Scala To have a backup of the page, right-click the name of the page and click **Save page template as**.
    Your page is saved in Scala's page backups.

Scala



Scala2



10. Deactivate the Customize mode when you have finished customizing pages: click **Menu** ☰ > **Customize** again.

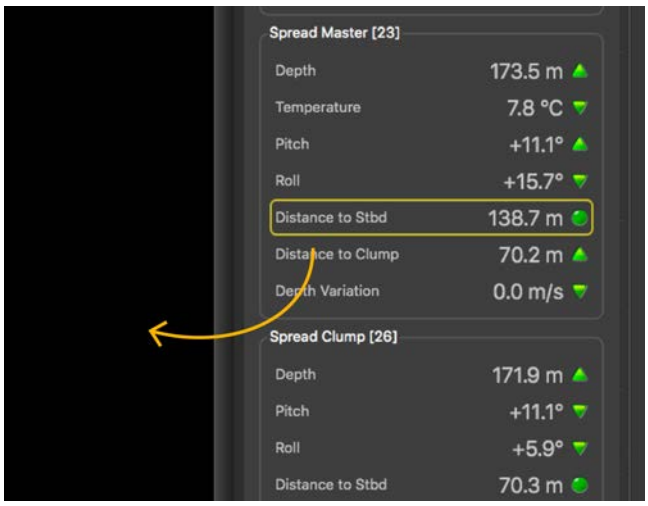
Displaying Single Trawl Spread

Before you begin

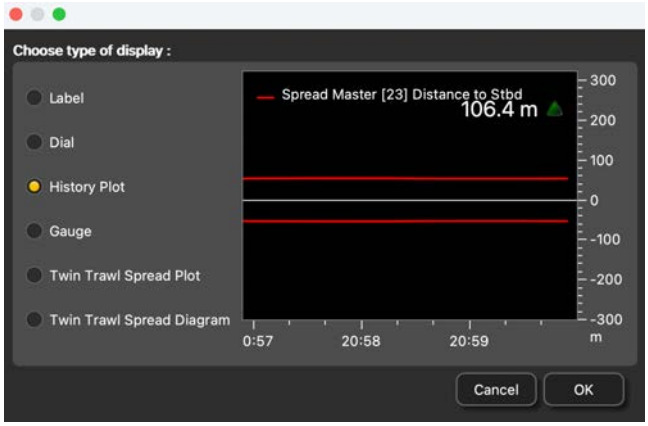
You need to have Spread sensors that send distance between port and starboard doors.

Procedure

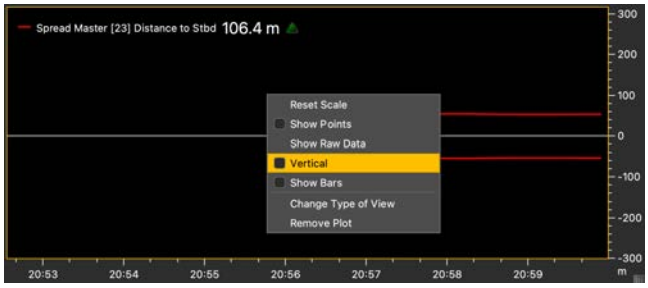
1. From the top left corner of the screen, click **Menu** ☰ > **Customize** and enter the password `eureka`.
2. Open the control panels and from the Scala **Sensors Data** / Scala2 **Mx** tab, click + hold distance data from spread sensors such as **Distance to Stbd** from a **Spread Master** and drag it to the page display.



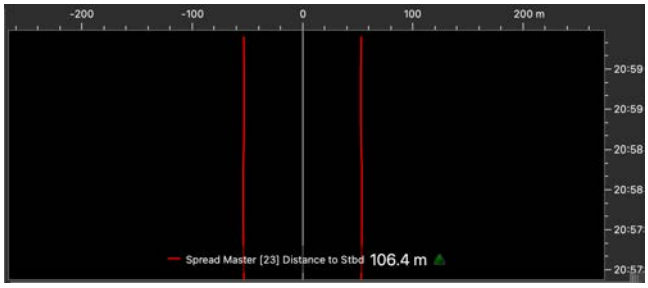
3. In **Choose new Gauge Type**, select **History Plot**.



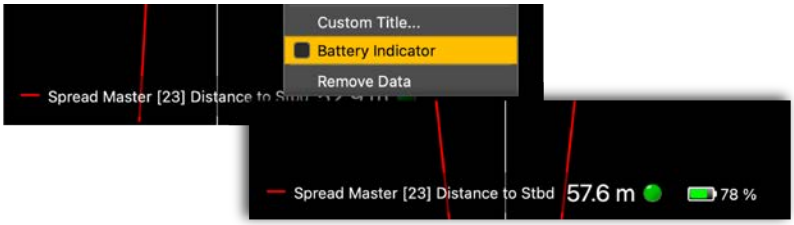
4. Right-click the history plot and select **Vertical**.



The history plot becomes vertical. You can see the distance between the port and starboard door.



5. If you have a firmware version 08.03 and above, you can display the battery level on the plot. Right-click the title of the plot and click **Battery Indicator**.



6. Deactivate the Customize mode when you have finished customizing pages: click **Menu** ☰ > **Customize** again.

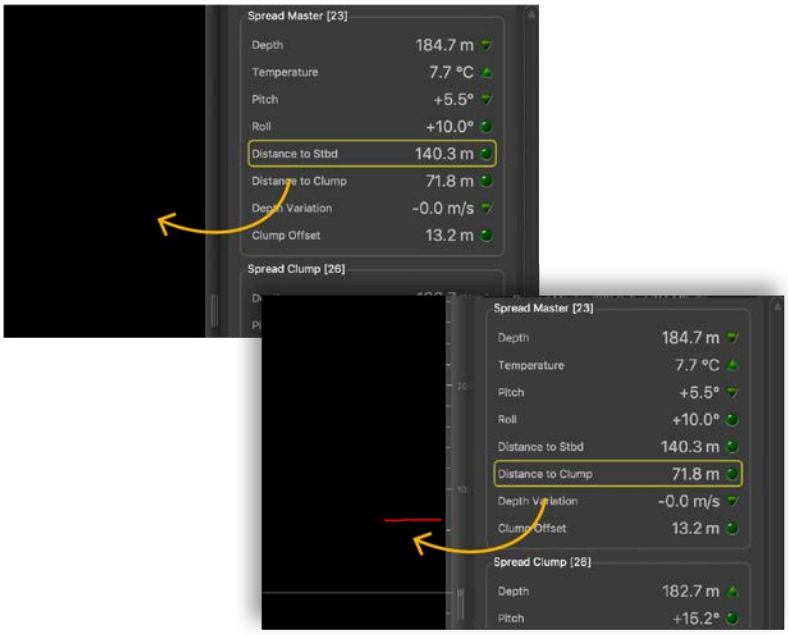
Displaying Twin Trawl Spread

Before you begin

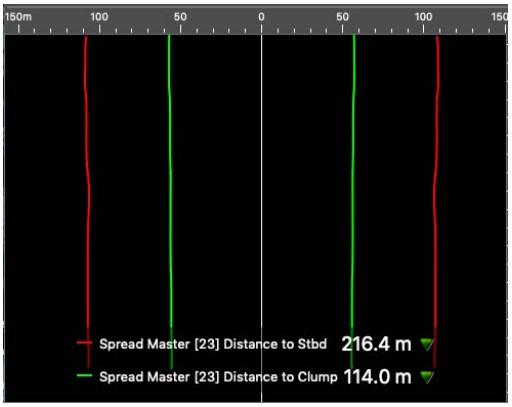
You need to have twin trawls and Spread sensors with dual or triple distance option.

Procedure

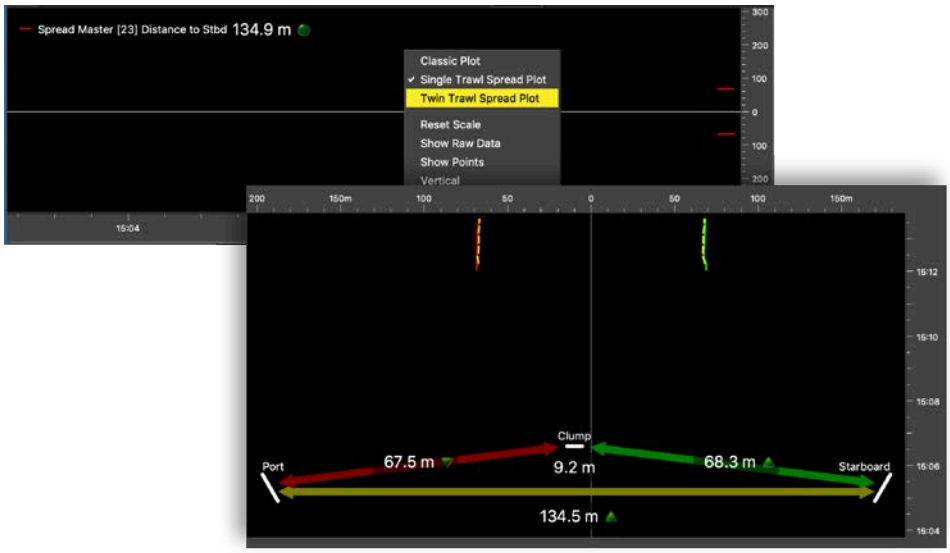
1. From the top left corner of the screen, click **Menu** ☰ > **Customize** and enter the password `eureka`.
2. If you have twin trawls with **2 measured distances**, drag to the page the Spread Master **Distance to Stbd**, then drag **Distance to Clump** above the plot of the distance to starboard. Right-click the plot and click **Vertical**.



Distances between the port door and starboard door and between the port door and clump are displayed.



3. Right-click the title of the plot and click **Battery Indicator** to display the battery level of the sensor.
4. Scala If you have twin trawls with **3 measured distances**:
   - Drag to the page one spread distance such as a Spread Master **Distance to Stbd**, then right-click the plot and click **Twin Trawl Spread Plot**. You can know if the clump is centered when the yellow dashed line is above the red and green lines.



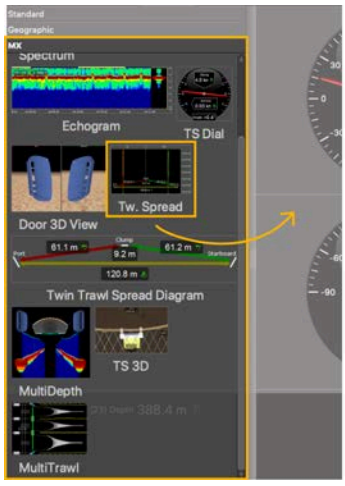
   - Or, click **Customize**, then drag the **Twin trawl Spread Diagram** to only display the diagram.

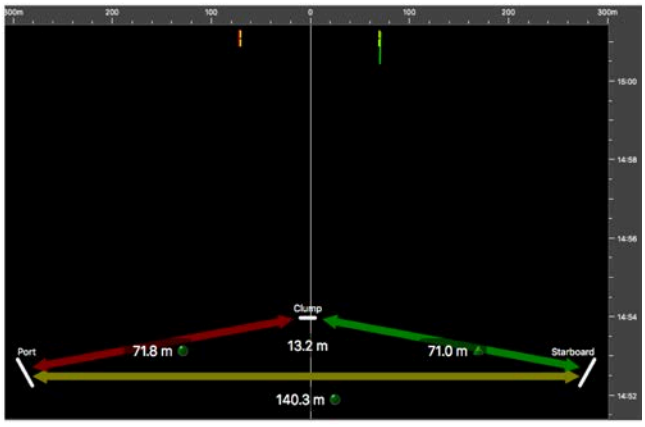
Now you can see the distances between:

- port door and starboard door,
- port door and clump,
- clump and starboard door.

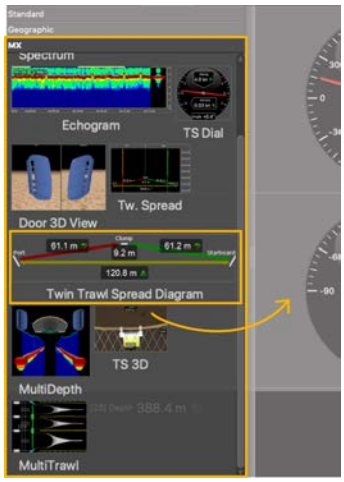
Note: Right-click the plot and click **Single Trawl Spread Plot** if you need to switch to single trawl.

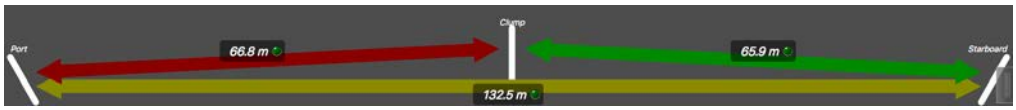
5. Scala2 If you have twin trawls with **3 measured distances**, open the **Customize** panel and go to the **Mx** tab.
   - Click + drag a **Twin Trawl Spread Plot** to the page. You can know if the clump is centered when the yellow dashed line is above the red and green lines.





- Or click + drag a **Twin trawl Spread Diagram** to only display the diagram.





Now you can see the distances between:

- port door and starboard door,
- port door and clump,
- clump and starboard door.

Note: Right-click the plot and click **Single Trawl Spread Plot** if you need to switch to single trawl.

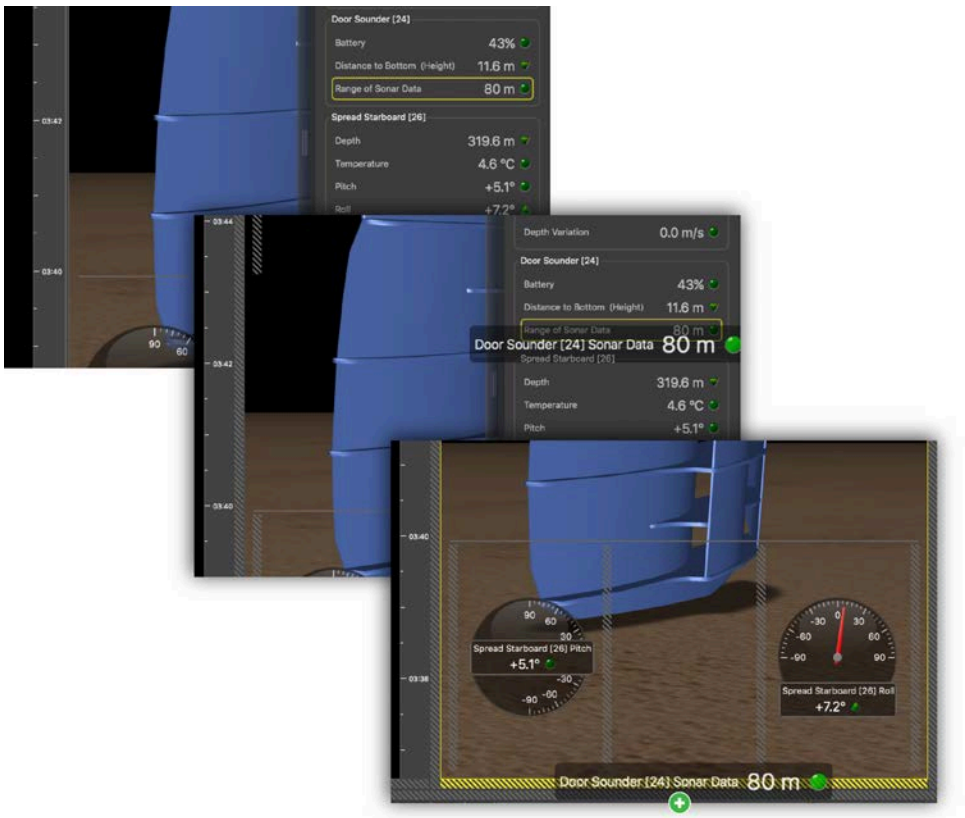
6. Deactivate the Customize mode when you have finished customizing pages: click **Menu** ☰ > **Customize** again.

Displaying Door Sounder Echograms

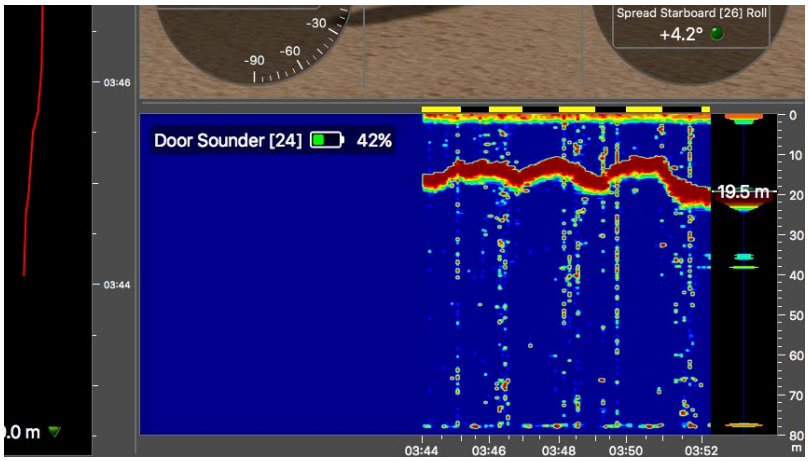
You can display echograms from Door Sounder sensors in order to see how doors are placed above the sea bottom.

Procedure

1. From the top left corner of the screen, click **Menu** ☰ > **Customize** and enter the password `eureka`.
2. Open the control panels and from the Scala **Sensors Data** / Scala2 **Mx** tab, click + hold **Sonar Data** from a Door Sounder or Bottom Explorer (Door Sounder with target strength calibration) and drag it to the page display.



The echogram is displayed.



3. Deactivate the Customize mode when you have finished customizing pages: click **Menu** ☰ > **Customize** again.

Scala2 Changing the Distance from the Door Sounder to the Bottom

You can change the distance at which the Door Sounder echogram begins.

About this task

By default, the echogram is displayed beginning from the sensor position. You can increase the distance at which the echogram begins to:

- Have distance to bottom values beginning from the shoes, instead of from the sensor position.

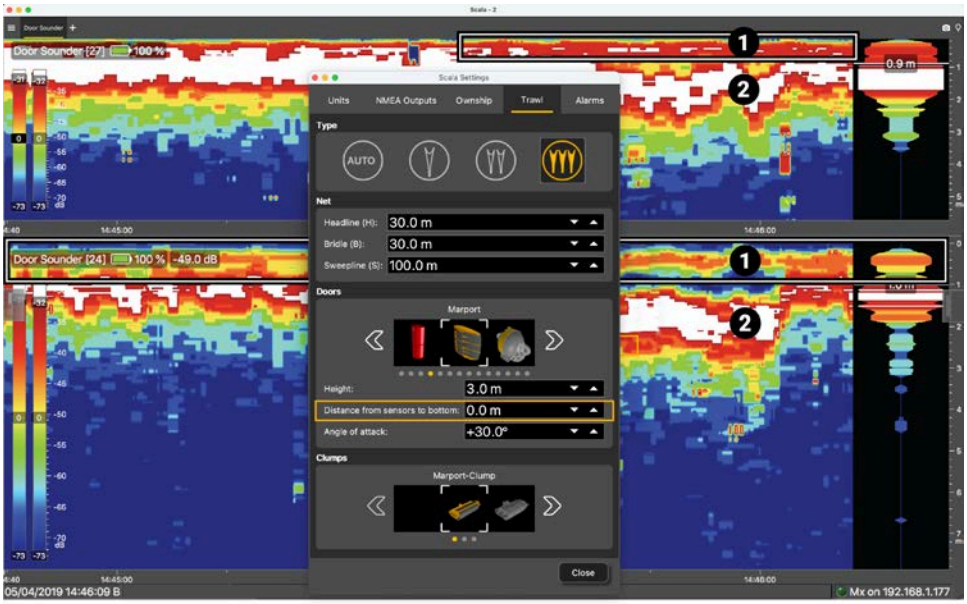
- Remove the echo of the shoes from the echogram

Procedure

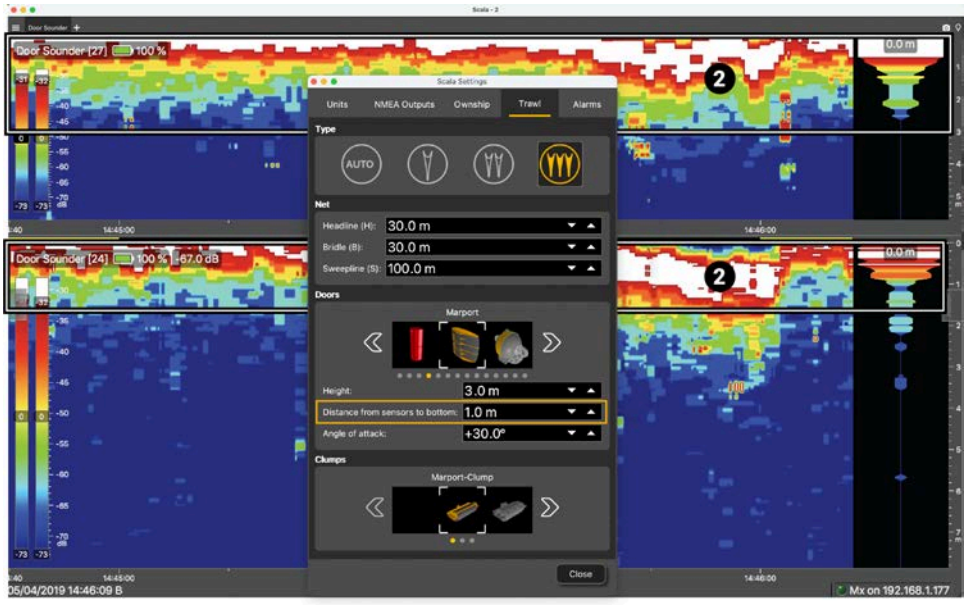
1. Click **Menu** ☰ > **Settings**, then go to the **Trawl** tab.
2. In **Doors** > **Distance from sensors to bottom**, enter the distance of the Door Sounder sensors from the door shoes.

   The echoes of the shoes do not appear anymore on the echogram.

   The image below shows the default echogram from Door Sounder sensors. You can see that the echoes of the shoes (**1**) appear above the echo of the ground (**2**).



   The image below shows the echogram received from Door Sounder sensors when a distance is added. Now, you can only see the echo of the ground (**2**).



Receiving Warp Lengths from Scantrol

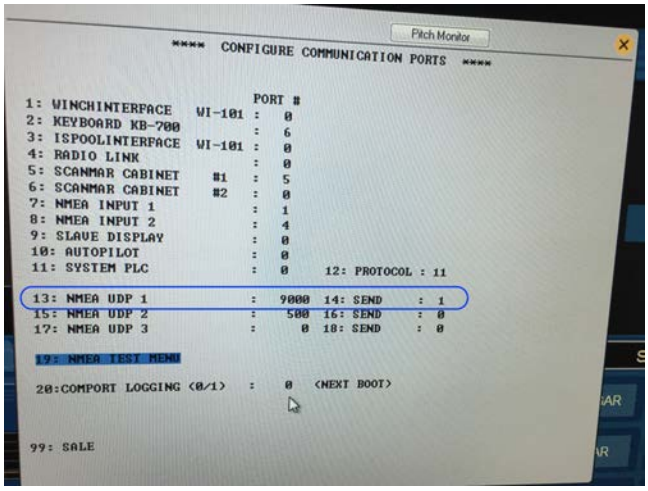
You can output warp length data from Scantrol iSYM Trawl Control application to Scala/Scala2 software.

About this task

Note: In this procedure, data are transmitted via a UDP port but a connection via a serial port can be possible.

Procedure

1. Scantrol and Marport computers must be connected together via an Ethernet wired network. Both computers must be on the same sub-network to communicate with each other: 192.168.0.XX.
   For example, the network IP address can be set at **192.168.0.10** on Scantrol computer and at **192.168.0.12** on Marport computer. The subnet mask address is 255.255.255.0 for both.
2. Go to iSYM's **Configure Communication Ports** menu, then in **13: NMEA UDP 1** or **15: NMEA UDP 2** enter a port number, such as `9000`, and set **SEND** to 1.



Note: The port number must be different from the one on which Scala/Scala2 sends data (if applicable).

3. In Scala/Scala2, open the control panels then click **NMEA Inputs** > **Add input**.
4. Set a UDP connection and enter the corresponding port.

5. Scala2 Clear the **Validate Checksum** checkbox.

Important: If you do not clear this checkbox, you will not receive the data from Scantrol.

Results

Scantrol data are displayed in Scala/Scala2.

Installation

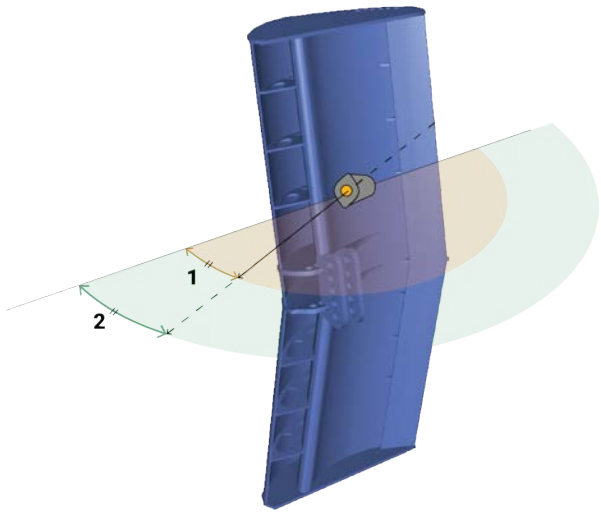
Learn how to install door sensors on the trawl gear.

Installation Principles

Door sensors need to be installed in pockets welded on trawl doors. Carefully read these installation principles before installing sensor pockets.

Angle of Attack

The angle of attack is the angle of the door in relation to the towing direction. This angle is important for the efficiency of the doors. It varies between trawl door models, so refer to manufacturer to know the exact angle. The angle is usually from 25° to 40°.



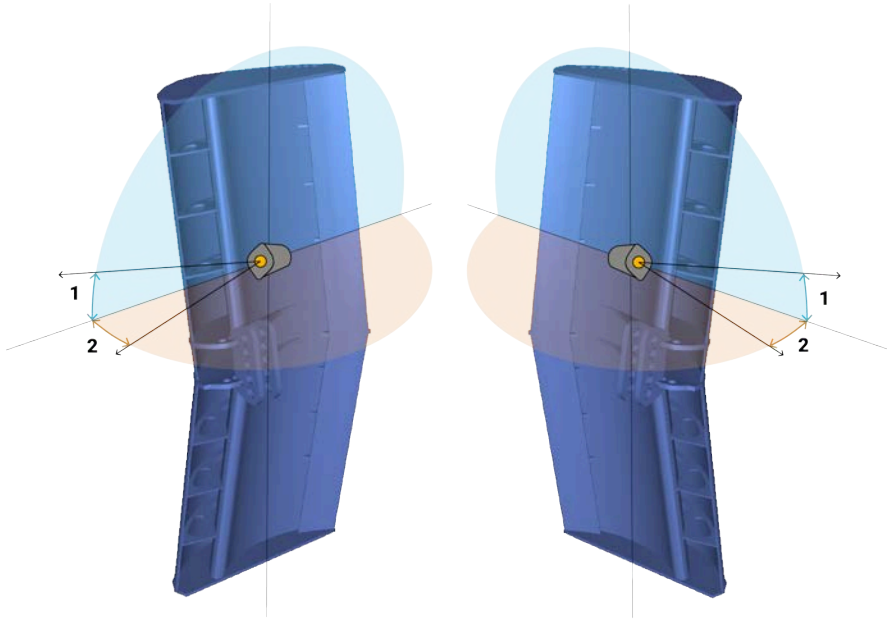
1. Angle of attack: 25-40°
2. Opening angle 25-40°

Opening and Elevation Angles for Spread Sensors

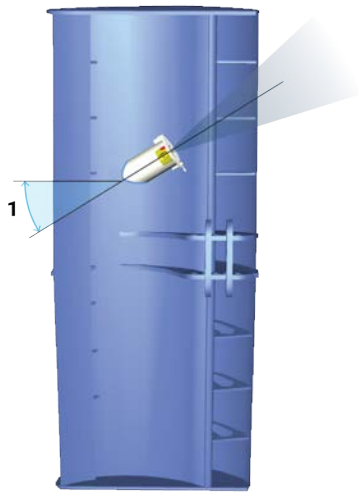
The opening and elevation angles depend on the pocket installation on the door.

The opening angle is the horizontal angle of the pocket in relation to the door. It should be between 25° and 40°. Opening angles should be in line with the angle of attack. You need to indicate the opening angle on Mosa2.

The elevation angle, or tilt angle, is the vertical angle of the pocket in relation to the door. It should be between 15° and 20°. The sensor must point toward the vessel: adjust the elevation angle based on the operational depth of the door during fishing operations.



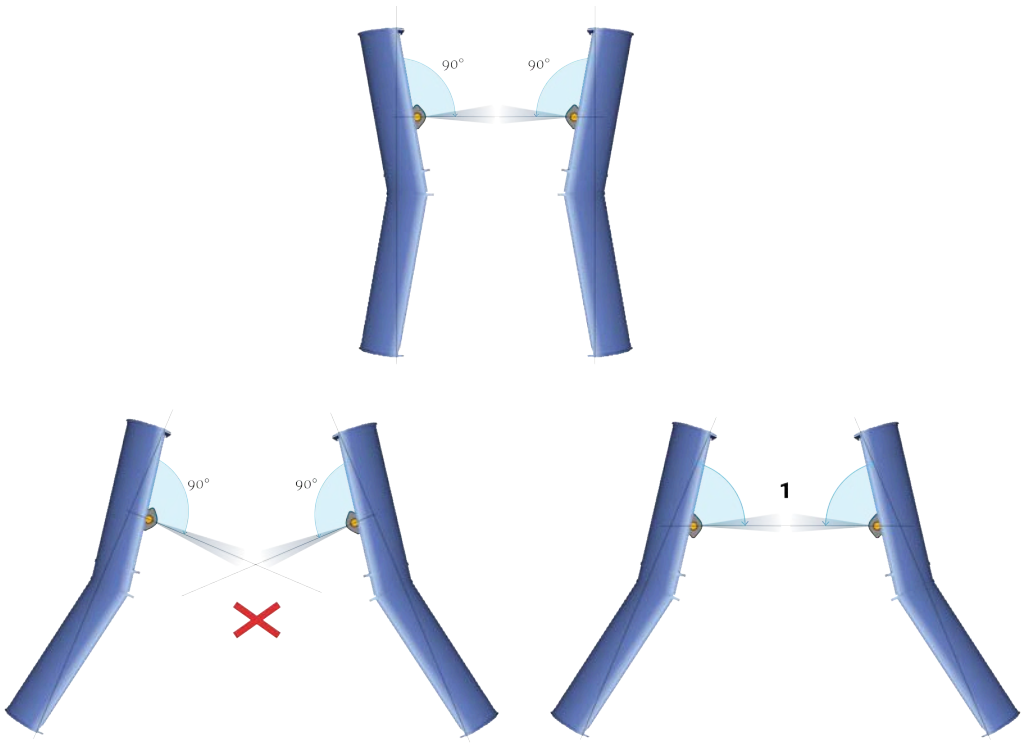
1. Elevation angle: 15-20°
2. Opening angle: 25-40°



1. Elevation angle: 15-20°

Roll Angles for Spread Sensors

Roll angle of the sensors depends on the tilt of the doors when fishing. If doors are straight during fishing, you can apply a roll angle of 90°. If doors are tilted inward during fishing, slightly roll the pocket so that lines of communication between the sensors stay aligned. If not, you will have sporadic spread readings.

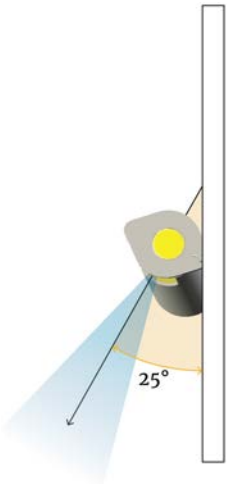


1. Adapt roll angles of pockets according to the tilt of the doors.

Angles for Door Sounder Sensors

For Door Sounder sensors, the down sounder must have a roll angle of 25° in relation to the door. If not, the door will disturb the signal.

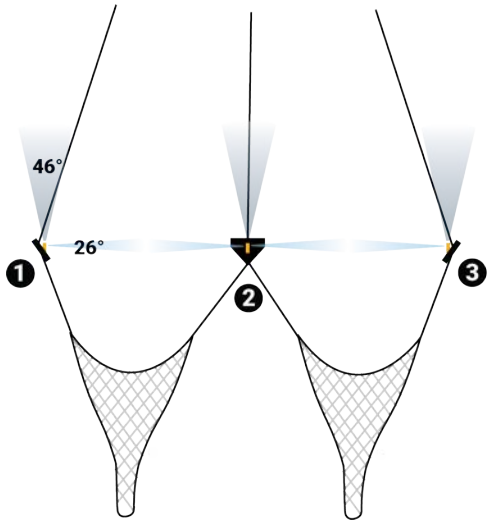
Attack angle should be between 25 and 40°. Adjust the elevation angle so that the sensor points toward the vessel during operation, recommended angle is 15 to 20°. For bottom trawling, install sensors on the lower part of doors.



Communication

Spread sensors communicate with each other and with the receiver. Lines of communication between them and toward the receiver must be unobstructed.

The beamwidth toward the receiver (uplink ping) is 46° and beamwidth toward the other sensors (down ping) is 26°. This beamwidth is thinner: this is why it is important to keep sensors aligned.



Communication toward receiver (46°)

Communication between sensors (26°)

Communication toward receiver (46°)

Communication between sensors (26°)

1. Master sensor

2. Clump sensor

3. Starboard sensor

Door Sounder sensors do not communicate with each other, so only lines of communication toward the receiver and bottom must be unobstructed.

Installing Sensor Pockets

You need to install pockets on each trawl door to hold the door sensors.

Before you begin

- Read Installation Principles on page 68 to become familiar with installation requirements.
- You need different pockets depending on your type of door sensor:
  - Spread Sensor / Door Sounder XL bottle
  - Mini Spread Sensor (stubby bottle)
  - Mini Spread Sensor (stubby bottle) with slim housing

See Appendix C: Pocket Drawings on page 98 to know which installation you need.

About this task

Important: Make sure you install the sensor pockets in accordance with the installation principles: pockets are important for the correct functioning of the sensors. If they are misaligned or if the pocket hides the sensor signal, you will have issues receiving data.

Important: We strongly recommend to have alignment bars inside the pockets to hold the sensor in the correct position.

Important: Take care to gather as much information as possible from the trawl doors manufacturer before installation. Such as the angle of attack and towing angle.

Note: If your door model have the doors rigged “nose up” or “nose down”, you need to change the angle of the door pockets so that the sensor always point toward the bottom of the ship when being towed.

Figure 4: Nose down (left) and nose up (right)

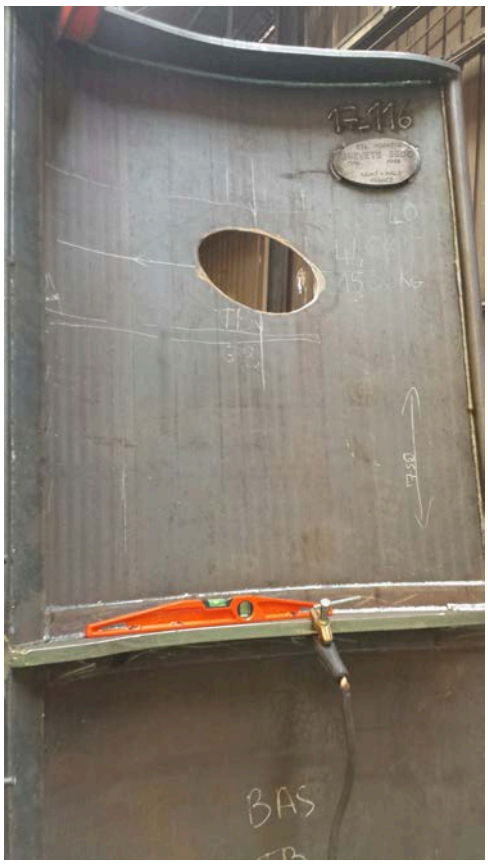
Note: If you use the sensors for bottom trawling, install pockets on the upper part of trawl doors. Make sure the pocket's position does not influence too much the center of gravity of the door. Refer to door manufacturer for details.

Procedure

1. Use drawings of door pockets to mark the shape to be cut off: Appendix C: Pocket Drawings on page 98.

   Note: Ask your local Marport sales office for scaled templates of door pockets.

2. Cut round openings in the doors.



3. When setting up the alignment bar in the sensor pocket:

   Note: Master and Starboard sensors need to be oriented in a way they can communicate with each other. The alignment bar in the pocket ensures correct positioning. The housing of the sensors have a slot so they can be inserted in the alignment bar.

   - The alignment bar must be downwards on the port door (Master sensor).
   - It must be upwards on the starboard door, or clump (Slave or Clump sensor).

4. Place the sensor pocket with the bottom portion sticking out of back side of the door. Adjust accordingly to the elevation angle and angle of attack you need (see Pocket Angle of Attack on page 98). Picture below shows angles of attack seen from above the door.

5. You can trace a line with a marker around the pocket at the point it enters the door to remember the correct position.
6. Check if angles are correct:

   a) Weld only a few points on two sides of the pocket to hold it on the door.
   b) Open Mosa2 software.
   c) Activate and deactivate the water-switch to connect the sensor to Mosa2 via a wireless signal.

d) From Mosa2, click the tab **Pitch and Roll**.

e) Click **Pitch and Roll Calibration** then click **Auto Calibrate**. Pitch and roll offset values change according to the position of the sensor on the door. Pitch should be between 15 and 20°, roll should be ±5°. Roll may need to be higher depending on the door model and operation: adjust accordingly.

f) If you do not have Mosa2 software, manually check the angles.

7. If values are not correct, move the pocket, then check again.
8. If values are correct, permanently weld the pocket to the door.
9. We recommend to use a protective cage made of metal bars around pockets to protect sensors, like the examples below.

Note: Make sure there is sufficient space between the protective cage and the sensor pocket, so that if the cage becomes bent, you can still remove the sensor.

Installing Spread Sensors

You need to install Spread sensors in pockets welded to the trawl doors.

Before you begin

To install Spread sensors on the doors, you need to have specifically designed sensor pockets welded to the trawl doors. See Installing Sensor Pockets on page 72.

Single Trawl

Before you begin

For a single trawl you need:

- A Master Spread sensor
- A Starboard Spread sensor

Procedure

1. Remove the screw holding the pocket cover.
2. Install the Master sensor (red marker) on the port door and the Starboard sensor (green marker) on the starboard door.
3. The top of the transducer (side with marker on housing) must be oriented toward the vessel and the side of the transducer with the circle/A must be oriented toward the opposite door.

   Note: Pockets can have an alignment bar that ensure correct positioning of the sensors. Simply slide the sensor into the alignment bar.
4. Attach the safety line from the sensor to the pocket and fasten the pocket's screw.
5. Make sure that both sensor transducers are aligned with each other during towing. This way, they can communicate with each other.
6. Make sure there is nothing in front of the sensors that would block their signal toward the vessel.

Port

Starboard

Twin Trawls

Before you begin

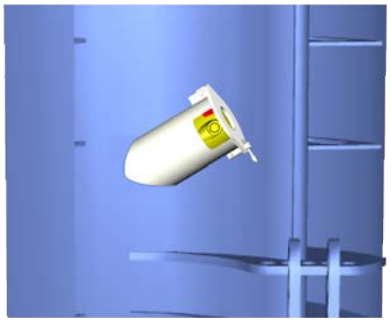
For twin trawls you need:

- A Master Spread sensor
- A Starboard Spread sensor

- A Clump sensor

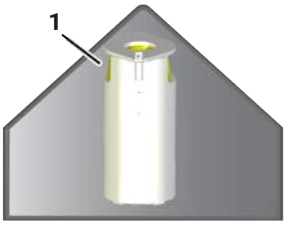
Procedure

1. Remove the screw holding the pocket cover.
2. Install the Master sensor (red marker) on the port door and the Starboard sensor (green marker) on the starboard door.
3. Install the Clump sensor (black marker) on the clump.
4. The top of the transducer (side with marker on housing) must be oriented toward the vessel. For Master and Starboard sensors, the side of the transducer with the circle/A must be oriented toward the opposite door. For a Clump sensor, it must be oriented toward the Master sensor on the port door.
5. Attach the safety line from the sensor to the pocket and fasten the pocket's screw.
6. Make sure that all three sensors are correctly aligned, to be able to communicate with each other.
7. Make sure there is nothing in front of the sensors that would block their signal toward the vessel.



Port

Starboard



Clump

1. Down sounder (marked with a circle)

Installing Door Sounder Sensors

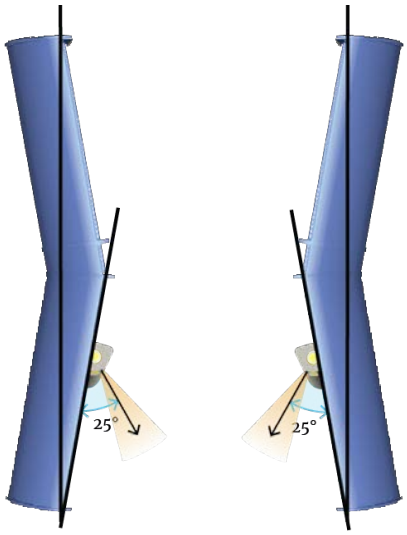
You need to install Door Sounder sensors in pockets welded to the trawl doors.

Before you begin

To install Door Sounder sensors on the doors, you need to have specifically designed sensor pockets welded to the trawl doors. See Installing Sensor Pockets on page 72.

About this task

- The sensor down sounder must have a roll angle of 25° in relation to the door.
- Attack angle: 25-40°
- Elevation angle: 15-20°



Procedure

1. Remove the screw holding the pocket cover.
2. Install Door Sounder sensors inside each door pocket: the top of the transducer (side with marker on housing) must be oriented toward the vessel and the side with the circle/A must points downwards with an angle of 25° in relation to the door.
3. Attach the safety line from the sensor to the pocket and fasten the pocket's screw.
4. Make sure there is nothing in front of the sensors that would hide their signal toward the vessel, and nothing in front of the down sounder.

Maintenance and Troubleshooting

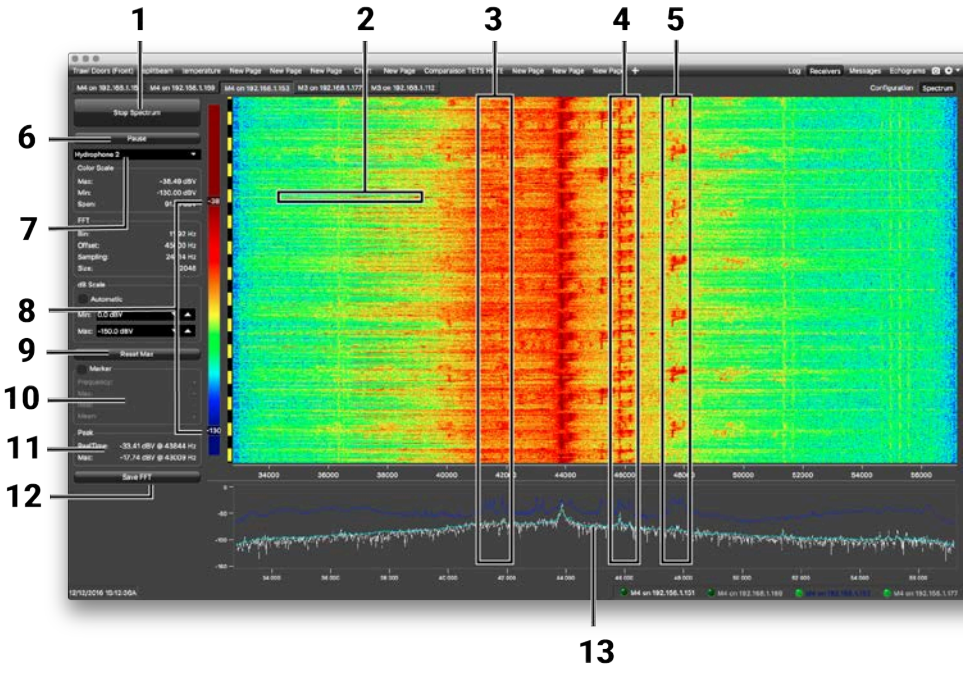
Read this section for troubleshooting and maintenance information.

Interference Check

You can check if there is noise interfering with the reception of signals.

Scala Spectrum Analyzer Display

The following picture explains the main parts of the spectrum analyzer page on Scala/Scala2.



1. Start/Stop spectrum analyzer
2. Noise interference
3. Pulses of the sensors (PRP)
4. Narrow band/HDTE signals
5. Door sounder signals
6. Pause spectrum analyzer
7. Select hydrophone
8. Drag to adjust color scale
9. Reset the Max line.
10. **Marker**: display frequency and levels of noise (dB) at the mouse pointer location on the graph.
11. **Peak**:
    - **RealTime**: latest highest level of noise recorded.
    - **Max**: highest level of noise recorded since the beginning of the spectrum.
12. Export recorded max, mean and real time noise levels in a txt file.
13.
    - Dark blue line: maximum signal level
    - Cyan line: average signal level
    - White line: last received signal level

Scala Checking Noise Interference

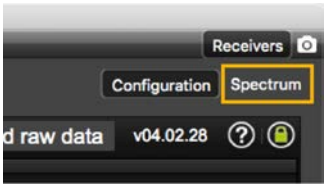
You can use the spectrum analyzer to check the noise level of the hydrophones and check for interference.

About this task

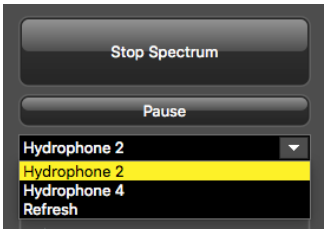
See Spectrum Analyzer Display on page 78 for details about the spectrum analyzer display.

Procedure

1. Click **Menu** ☰ > **Expert Mode** and enter the password `copernic`.
2. Again in the menu, click **Receivers**.
3. From the top right corner of the screen, click **Spectrum**.



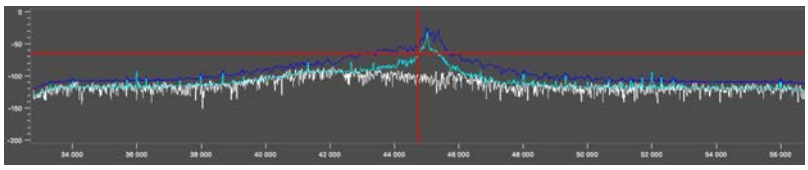
4. Select the hydrophone you want to test. Only the hydrophones that are switched on are displayed. Select refresh to update the list.



5. From the top left corner of the screen, click **Start Spectrum**.

   The graph at the bottom of the page shows three levels of noise in dBV:

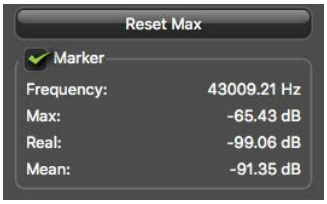
   1. **RealTime** (white): level of noise recorded in real time.
   2. **Mean** (cyan): mean recorded level of noise. It is useful to assess the noise floor.
   3. **Max** (dark blue): shows the latest highest level of noise recorded. It is useful to see on which frequencies are the sensors.



   The acceptable average level of noise depends on the conditions (distance from the sensor to the hydrophone, fishing method, type of hydrophone). You can have better performance with the following levels:

   - Active wideband hydrophone with high/low gain: below -100 dBV
   - Active narrowband: NC-1-04 below -80 dBV / NC-1-07 below -100 dBv
   - Passive hydrophone: below -110 dBV

6. To see the maximum, mean and real time measures of noise level at a specific frequency, select **Marker** on the left side of the screen and move the mouse over the graph.



   Frequency and levels of noise (dB) at the mouse pointer location are displayed under **Marker**.

7. Under **Peak**, you can check:
   - **RealTime**: the latest highest level of noise recorded.
   - **Max.**: the highest level of noise recorded since the beginning of the spectrum.
8. Check that there is more than 12dBV between the maximum noise level (dark blue line) and the average noise level (light blue line) on the peak of sensor frequencies.
9. If you changed the configuration of the hydrophone or sensors, click **Reset Max** to reset the dark blue line showing the maximum level of noise.
10. To save data recorded by the spectrum in a *.txt file, click **Save FFT**.

    The FFT file lists for the entire bandwidth used by the hydrophone (frequencies are in Hz) the maximum and mean levels of noise since the FFT export has started and the last real time level of noise before the export (dBV).

FFT level for Hydrophone 1 of Receiver 192.168.1.153			
Freq	Max	RealTime	Mean
32793	-129.07	-136.64	-138.50
32804	-129.31	-138.41	-139.65
32816	-128.72	-142.89	-139.02
32828	-128.09	-147.78	-139.86
32840	-127.95	-143.07	-140.06

11. When you have enough data, click **Stop Spectrum**.

Scala2 Checking Noise Interference

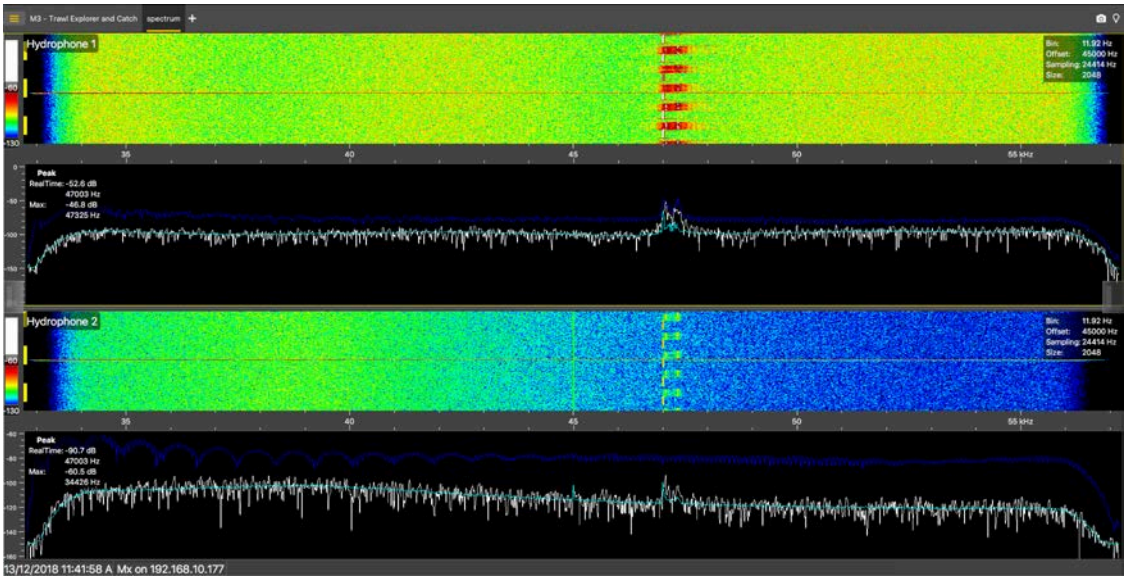
Use the spectrum analyzer to check the noise level of the hydrophones and check for interference.

Procedure

1. Click Add + to create a new page on which you will add the spectrum analyzer(s).
2. Right-click the IP address of the receiver in the status bar and click **Start Spectrum**.

3. Open the control panels and go to the **Mx** panel.
4. Go to **Hydrophone** data, then drag and drop **Spectrum** data to a page. These data appear only when the spectrum has been started.

5. The spectrum analyzer is displayed. You can display up to 6 spectrum analyzers at the same time. Below is an example of a page with two spectrum analyzers.



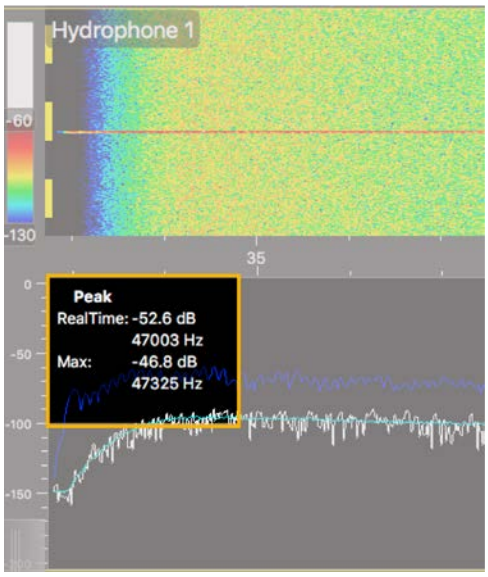
The FFT plot shows three levels of noise in dBV:

1. **RealTime** (white): level of noise recorded in real time.
2. **Mean** (cyan): mean recorded level of noise. It is useful to assess the noise floor.
3. **Max** (dark blue): shows the latest highest level of noise recorded. It is useful to see on which frequencies are the sensors.

The acceptable average level of noise depends on the conditions (distance from the sensor to the hydrophone, fishing method, type of hydrophone). You can have better performance with the following levels:

- Active wideband hydrophone with high/low gain: below -100 dBV
- Active narrowband: NC-1-04 below -80 dBV / NC-1-07 below -100 dBv
- Passive hydrophone: below -110 dBV

6. Scroll on the frequency or dBV scales to zoom in and out.
7. Under **Peak**, you can check:

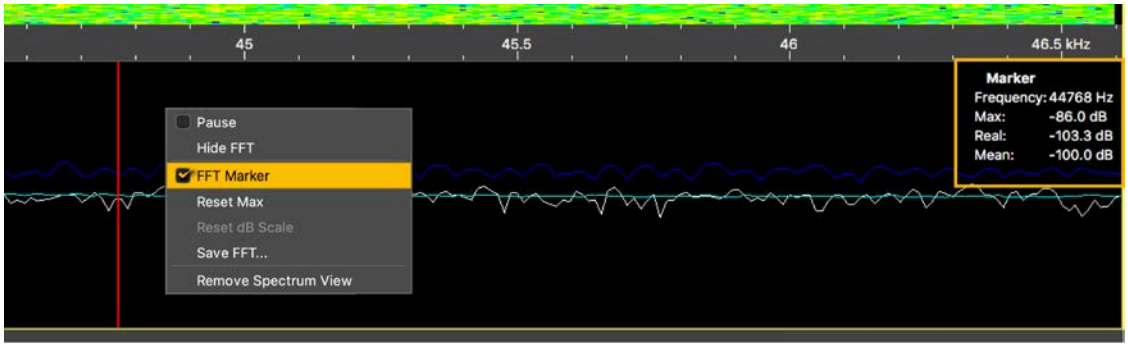


- **RealTime**: the latest highest level of noise (dBV) recorded and its frequency.
- **Max**: the highest level of noise recorded since the beginning of the spectrum and its frequency.

8. Check that there is more than 12 dBV between the maximum noise level (dark blue line) and the average noise level (cyan line) on the peak of sensor frequencies.
9. If you changed the configuration of the hydrophone or sensors, right-click the graph and click **Reset Max** to reset the dark blue line showing the maximum level of noise.
10. To check the maximum, mean and real time measures of noise level at specific frequencies:

    a) Right-click the FFT plot and click **FFT Marker**.
    b) Click and drag the marker at a specific point.

    Frequency and levels of noise at the marker position are displayed on the right side of the graph.



11. Right-click the spectrum and click **Pause** if needed.
12. To save data recorded by the spectrum in a *.txt file, right-click the FFT plot and click **Save FFT**.

    The FFT file lists for the entire bandwidth used by the hydrophone (frequencies are in Hz) the maximum and mean levels of noise since the FFT export has started and the last real time level of noise before the export (dBV).

FFT level for Hydrophone 1 of Receiver 192.168.1.153			
Freq	Max	RealTime	Mean
32793	-129.07	-136.64	-138.50
32804	-129.31	-138.41	-139.65
32816	-128.72	-142.89	-139.02
32828	-128.09	-147.78	-139.86
32840	-127.95	-143.07	-140.06

13. Right-click the spectrum analyzer and click **Hide FFT** to hide the FFT plot.
14. Right-click the IP address of the receiver in the status bar and click **Stop Spectrum**.

Charging the Sensor

Charge the sensor at any battery level with either Marport Dock charger, Basic Sensor Charger or Medusa II Multi-charger.

About this task

The sensor uses lithium-ion batteries. Charge them only with Marport's chargers.

Warning: In case of water ingress in the product, do not charge it: battery may vent or rupture, causing product or physical damage.

Important: For Basic/Medusa chargers and Dock products with serial number before DOC2107XXX: Do not leave the sensors connected on a charger that is switched off. If the charger is not connected to the mains voltage, the sensor switches on and this will drain the battery.

Note: Avoid full discharges and charge the battery whenever possible, at any battery level. Lithium-ion batteries do not have a charge memory, so they do not need full discharge cycles.

Procedure

1. Before charging the sensor: wash with fresh water and dry the sensor. This prevent corrosion of the charging pins.

   Note: Check that the charging pins are not damaged. If they are, contact you local Marport dealer for replacement. Below is an example of shoulder bolts damaged because of insufficient maintenance.

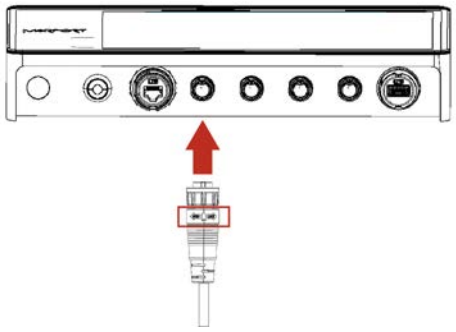
2. Place the sensor and charger in a dry room like the deck or bridge. The optimal temperature while charging is between 10 and 25 °C.
3. Place the sensor away from any installing material (e.g. wet ropes) and fix the sensor with brackets to keep it stable while charging.
4. Allow good air circulation around the charger for cooling.
5. Connect the 3-pin charging connector to the sensor shoulder bolts.

6. You can apply a small film of electrical contact grease lubricant on pins.

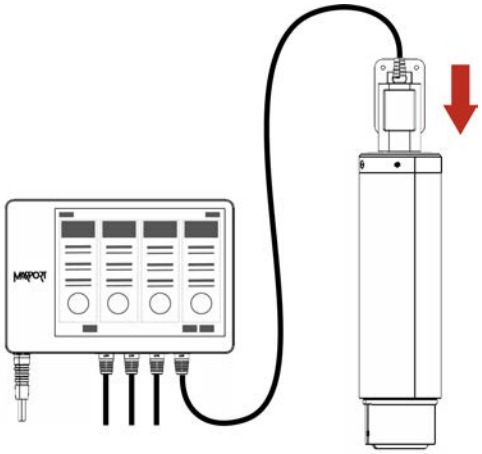
   Tip: To maintain the electrical pins, polish them with fine sandpaper.

7. Plug in the charger to a 115-230 Vac 50-60 Hz socket.
8. To charge with a Dock:

   a) Make sure the Dock is connected to a power supply and turned on.
   b) Connect the charger plug to one of the 4 charging ports.



   c) Connect the 3-pin charging connector to the sensor charging pins.



   The Dock screen and Virtual Charger Room display the state of charge of the sensor.

9. To charge with a Basic/Medusa Charger:

   a) If you have the Medusa multi-charger, turn the power switch to the **ON** position. The power switch lights on. If not, check the AC power cord connection.
   b) Connect the 3-pin charging connector to the sensor shoulder bolts.
   c) Look at the LED(s) on the charger box to know the charge status. For the multi-charger, there is a LED for each sensor charging cable. The charge status are:

- Green LED: > 90 %
- Orange LED: from 70 % to 90 %
- Red LED: < 70 %

Note: If the sensor is in configuration mode, it will begin to charge after 10 minutes. As long as it is in configuration mode, the charger's LED remains red, whatever the charge level.

10. Wait for the battery to charge: standard charging cycle takes 8 to 12 hours. A fast charge configuration allows a 70 % charge in 1 hour and full charge in 4 hours.

Results

Once charged, the operational life time can be up to approximately 16 days for a Spread Sensor (8 days for a mini Spread Sensor) and 75 hours for Door Sounder sensors.

The operational life time depends especially on the uplink power of the sensor, but also on the sounding range, uplink frequency and options activated.

Cleaning the Sensor

You need to regularly clean the sensor for proper performance.
Wash the sensor with fresh water and dry it before you charge or store it.

Regularly check that the sensor is clean. If not:

- Remove any marine life with a piece of wood or screwdriver.
- Wash away mud or debris with warm water.

CAUTION: Do not use highly abrasive materials or jet wash.

CAUTION: Special care should be taken with sensors and components sensitive to mechanical shock or contamination.

Maintenance Checklist

We recommend you to follow this maintenance schedule for better performance and to avoid any trouble with the equipment.

Before use	• Check that all attachment equipment are not worn or torn. Replace when appropriate. • Check that the sensor is clean. See Cleaning the Sensor on page 85 for cleaning procedures. • Check the battery level 24 hours before use and recharge if necessary.
After use	Wash the sensor with fresh water.
Between uses	When the sensor is not in use, store in a dry area, without humidity, at a temperature between -10° and 70 °C (14 to 158 °F).
Not used for more than 3 months	• Do not leave the batteries at full charge or discharged for a long period of time or they will wear out. • Every 6 months, put the sensor in charge for less than an hour.
Every 2 years	The sensor must be returned to an approved Marport dealer for inspection and maintenance.

If the sensor has not been not used for more than 3 months, we highly recommend to check the following points before using it:

- Make sure the sensors on the end cap are in good condition and clean.
- Connect the sensor to a charger and check the charging status.
- Switch on the sensor by shorting the center lug to the negative lug, then listen for a ping noise and check if you see the LED switched on.
- Test the sensor measures with Mosa2: depth, temperature, pitch, roll, and if applicable: spread distance, echogram, catch status, speed measures (using the EM log tester).
- If you have a test hydrophone, check the reception in the wheelhouse with Scala.

Troubleshooting

Learn how to solve common problems.

Mosa2 does not open due to error message

Mosa2 displays an error message saying it cannot be opened.

➜ Your Mac security preferences do not allow you to open applications not downloaded from the App Store.

1. From the upper left corner of the screen, click **Apple menu** > **System Preferences** > **Security & Privacy** .
2. Click the lock icon and enter the password, if applicable.
3. At **Allow apps downloaded from**, select **Anywhere**, then close the dialog box.
4. **macOS Sierra or later: Anywhere** option is not displayed by default. To display **Anywhere**:
   1. Click the magnifying glass from the top right corner of your screen and type `Terminal`.
   2. Click **Terminal** from the results.
   3. Enter in the terminal: `sudo spctl --master-disable`.
   4. Press Enter.
      Anywhere option is now displayed in **Security & Privacy** preferences.

Sensor cannot connect in wireless connection

When trying to connect to the sensor by wireless connection, the sensor appears on Mosa2 discovery area but you cannot click it OR the sensor does not appear on the discovery area.

Remember: First, always connect the sensor to a charger, then disconnect it. The sensor will reboot and this may resolve the issue.

➜ The sensor is out of the range of the wireless signal.

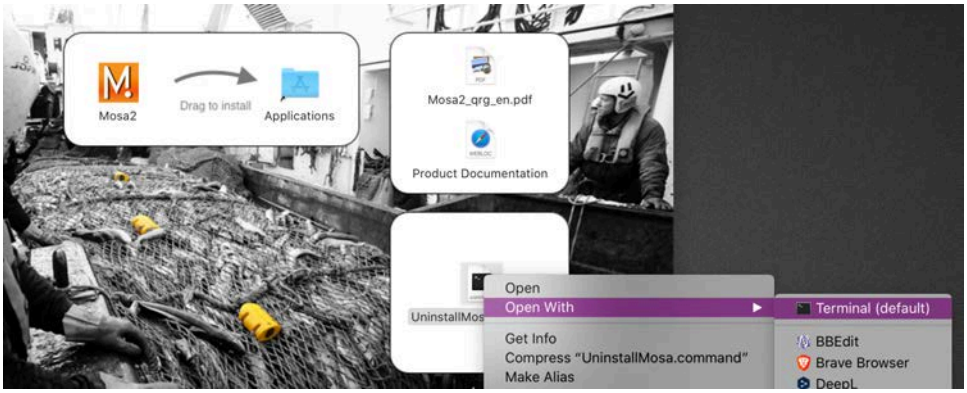
- Bring the sensor closer to the computer.
- For door sensors that need to be in door pockets for calibration: remove the sensor from the door, establish the connection, then put the sensor back in the door.

➜ If the sensor is not detected by Mosa2, the issue might come from the short-range wireless connection of the computer.

1. Close Mosa2.
2. Click the short-range wireless symbol in the top-right corner of the menu bar while holding the Shift (#) + ALT (#) keys on your Mac's keyboard.
3. Click **Debug** > **Remove all devices**.
4. Open Mosa2.

➜ In some cases, the computer keeps an history of some wireless devices and this interfere with the correct detection of sensors. You need to launch a script to uninstall Mosa2 and erase all wireless preferences.

1. Double-click the DMG file of a Mosa2 version **02.03.00 and after**.
2. Right-click **UninstallMosa.command** and select **Open With** > **Terminal**.



3. From the terminal window, enter your computer password and press **Enter**.

   Note: For security reasons, the terminal window will not display anything when you type the password.

   The terminal window displays **Process completed** when the script is completed. Mosa2 is uninstalled from your computer and all wireless settings on the computer are erased.
4. Open the DMG file to install Mosa2 again.

Sensor does not connect correctly with Mosa2 when using the Configuration Cable

Remember: If the sensor does not connect correctly with Mosa2, always:

- Disconnect both USB connector and three-pin plug.
- Connect again the Configuration Cable.
- Make sure the three pins are fully inserted inside the sensor.

➜ Mosa2 does not automatically open when connecting the Configuration Cable.

- Check that you see Marport Captain icon in the desktop taskbar. If you do not see it: close, then open Mosa2. The icon should appear in the taskbar.

Note: Marport Captain is a program running in the background. It allows Mosa2 automatic opening and displays shortcuts to Mosa2 and Scala applications installed on the computer. It should not be closed.

- If the problem persists, install Mosa2 again.

➜ At the end of step 2 of the configuration wizard, the sensor does not respond.

- Connect the sensor to a charger and wait until it is fully charged.

➜ The sensor has been disconnected from Mosa2.

- Check that the Configuration Cable is not connected to a USB hub. The Configuration Cable must be connected directly to the computer.
- If the computer goes to sleep mode, the sensor may be disconnected. Change the settings on your computer to increase the time before sleep mode.
- If the problem persists, connect the sensor to a charger and wait until it is fully charged. Then try again to connect.

➜ Mosa2 displays a critical error message.

- Disconnect both USB connector and three-pin plug. Then, connect again the Configuration Cable. If the message is still displayed, it means there is an issue with the sensor's components. Contact Marport support.

Data in Scala/Scala2 is wrong

Data displayed in Scala/Scala2 is wrong. For sensors with echograms, the echogram is noisy.

➜ There are signal interferences.

1. First, check that the sensor frequencies and telegrams are the same in the sensor configuration (via Mosa2) and the receiver configuration (via Scala/Scala2 or the system web page).
2. Check the frequencies of your other sensors and make sure there is enough distance between them.
3. Check the noise on the spectrum (see Checking Noise Interference on page 79). If the frequency where the sensor is placed is too noisy, change for a less noisy frequency:
   1. Spread Sensor: see Configuring Spread Sensor Telegrams on page 29
   2. Door Sounder: see Configuring the Uplink and Down Settings on page 37

   Important: Do not forget to also change the frequency on the system web page (accessible through Scala/Scala2 receiver page).
4. You can increase the uplink power of the sensor to increase the power of the signal transmitted to the receiver: see Configuring the Uplink Power on page 41.
5. For sensors with echograms you can change the Echogram filter on the system web page (Scala/Scala2 receiver page):
   1. From Scala/Scala2, click **Menu** ☰ > **Expert Mode** and enter the password `copernic`.
   2. Scala Click menu again, then **Receivers**.
   3. Scala2 Right-click the IP address of the receiver at the bottom of the page, then click **Configure Receiver**.
   4. From the left side of the page, click the name of the sensor.
   5. From the sensor configuration page, click **Configure** next to **Filter**.
   6. From NBTE Echograms Filter select **Echosounder and Interference Reduction Medium** or **High**.

Echogram is fixed and blue

The echogram displayed in Scala/Scala2 is completely blue. There is no yellow line moving on top of the echogram, which means that no sonar data is received.

➜ Sounder frequency may be outside the correct frequency range.

1. From Mosa2, click **Trawl Explorer** > **Ping Down Frequency** and check that the frequency is between 120-210 kHz for a Door Sounder.
2. If not, change the frequency.

➜ You may have dragged and dropped wrong sonar data to the display.

1. Check that the name of the sensor on the top left corner of the echogram is Door Sounder or Bottom Explorer (Door Sounder with target strength calibration).
2. If not, from **Door Sounder** or **Bottom Explorer** sensor data, click + hold **Range of Sonar Data** and drag it to the page.

➜ The sounder in the transducer is damaged.

- Contact the support service for repair.

In Scala/Scala2, Lost is displayed instead of spread distance

It is written **Lost** instead of spread distance data.

➜ Trawl doors may not be aligned or may lay on their side.

1. Check the pitch and roll.
2. If needed, pull the warps to align the doors or set them back upright.

➜ Master and Starboard sensors have been inverted on the doors. In that case, you will also have wrong pitch and roll values.

- Open the pocket and check the top of the housing of the sensor: the one with a green marker must be on the starboard side and the one with a red marker on the port side. If there is no marker on the top, remove the sensor and check on the side if there is a marker. The side of the transducer with a circle must be oriented towards the outside.

➜ If you used to have correct data and suddenly lost them, the up or down component in the transducer may be broken.

1. Remove sensors from the doors and check from the office if **Lost** is still displayed.
2. If yes, see with support service for repair.

➜ Distance between trawl doors is more than 255 m (signal is lost at 256 m, ±1 m) and the sensor telegram does not cover such a distance.

- Change the sensor telegrams to AL6 or A6: see Configuring Spread Sensor Telegrams on page 29.

Distances are incorrect or irregular

Spread distances displayed in Scala/Scala2 do not correspond to the reality or distance values are very irregular.

➜ The threshold of the sensor detection level is too low.

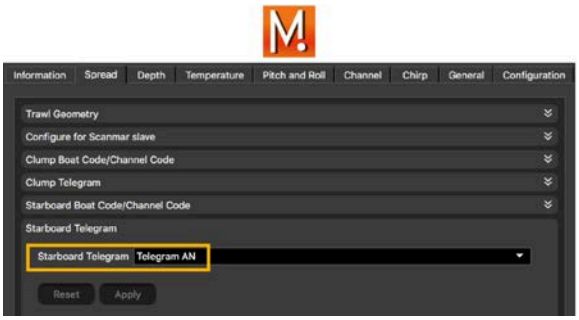
1. Connect the sensor to Mosa2.
2. From Mosa2, click **Menu** ☰ > **Expert** and enter the password `copernic`.
3. Click the tab **Spread** and from **Threshold Detection Level**, add 10 to the current level.
4. Test the sensor when installed on the doors during trawling, and if needed, add 12 again (this corresponds to 6 dB).

➜ There is a conflict between frequencies.

- Make sure there is a minimum distance of 100 Hz between all the telegram frequencies.

➜ The spread telegrams you entered in Mosa2 and those you entered in the receiver settings (Scala/Scala2 receiver page or system web page) are not the same.

- Compare the telegrams you configured on Mosa2 and those you entered in the receiver settings. Change if necessary.



➜ If the spread distances are very small such as 1 meter or less, the Master and Starboard sensors have been inverted on the doors. In that case, you will also have wrong pitch and roll values.

- Open the pockets and check the top of the housing of the sensor: the one with a green marker must be on the starboard side and the one with a red marker on the port side. If there is no marker on the top, remove the sensor and check on the side if there is a marker. The side of the sensor with a circle (**1**) must be oriented towards the outside.

Support Contact

You can contact your local dealer if you need maintenance on your Marport products. You can also ask us at the following contact details:

FRANCE

Marport France SAS

8, rue Maurice Le Léon

56100 Lorient, France

supportfrance@marport.com

NORWAY

Marport Norge A/S

Breivika Industrivei 69

6018 Ålesund, Norway

supportnorge@marport.com

SPAIN

Marport Spain SRL

Camino Chouzo 1

36208 Vigo (Pontevedra), Spain

supportspain@marport.com

USA

Marport Americas Inc.

12123 Harbour Reach Drive, Suite 100

Mukilteo, WA 98275, USA

supportusa@marport.com

ICELAND

Marport EHF

Tónahvarf 7

203 Kopavogur, Iceland

supporticeland@marport.com

SOUTH AFRICA

Marport South Africa

Cape Town, Western Cape

11 Paarden Eiland Road

Paarden Eiland, 7405

csanter@marport.com

UNITED KINGDOM

Marport UK ltd

32 Wilson Street

Peterhead, AB42 1UD, United Kingdom

gyoungson@marport.com

Appendix

Frequency Plan

It is important to carefully plan the setup of your sensors before adding them to the system. You can create a table with a list of frequencies and complete it when you add sensors.

Boat & Channel Codes

This list shows the standard frequencies for PRP telegrams. When you configure boat codes, make sure to respect the correct interval between frequencies (see table above).

Codes		
BC/CH	Frequency	FID (Scanmar)
C-1/CH1	42833	45
C-1/CH2	41548	32
C-1/CH3	41852	35
C-1/CH4	40810	25
C-1/CH5	42500	42
C-1/CH6	43200	49
C-2/CH1	42631	43
C-2/CH2	41417	31
C-2/CH3	41690	33
C-2/CH4	40886	26
C-2/CH5	42300	40
C-2/CH6	43100	48
C-3/CH1	42429	41
C-3/CH2	41285	30
C-3/CH3	41548	32
C-3/CH4	40970	27
C-3/CH5	42100	38
C-3/CH6	43000	47
C-4/CH1	42226	39
C-4/CH2	41852	35
C-4/CH3	41417	31
C-4/CH4	41160	29

C-4/CH5	42700	44
C-4/CH6	43300	50
C-5/CH1	42024	37
C-5/CH2	41690	33
C-5/CH3	41285	30
C-5/CH4	41060	28
C-5/CH5	42900	46
C-5/CH6	43400	51
C-6/CH1	39062	3
C-6/CH2	39375	7
C-6/CH3	39688	11
C-6/CH4	40000	15
C-6/CH5	40312	19
C-6/CH6	40625	23
C-7/CH1	38906	1
C-7/CH2	39219	5
C-7/CH3	39531	9
C-7/CH4	39844	13
C-7/CH5	40156	17
C-7/CH6	40469	21

Frequencies and intervals

The diagrams below show the bandwidth of the different types of Marport sensors and intervals you must respect when adding other sensors.

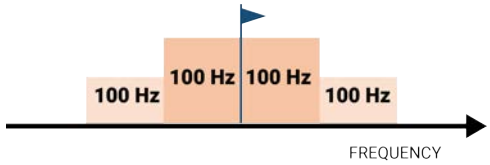


Figure 5: PRP sensors (e.g. Catch sensor, Trawl Speed, Spread sensor...)

Example: If the frequency of the sensor is 40kHz, there should be no sensors between 39.9-40kHz and 40-40.1kHz.

Figure 6: Marport Pro sensors (e.g. Trident, Door Explorer)

Example: If the frequency of the sensor is 40kHz, there should be no sensors between 39.8-40kHz and 40-50.2kHz.

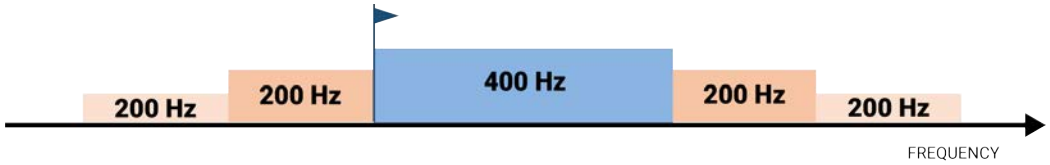


Figure 7: NBTE sensors (e.g. Speed Explorer, Trawl Explorer, Catch Explorer, Door Sounder)

Example: If the frequency of the sensor is 40kHz, there should be no sensors between 39.8-40kHz and 40-40.6kHz.

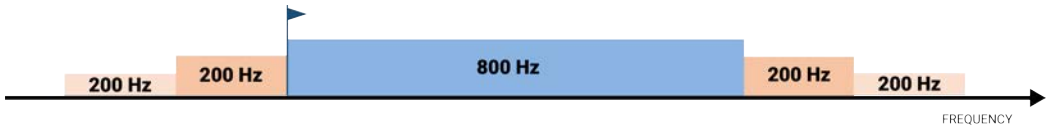


Figure 8: HDTE narrow band mode

Example: If the frequency of the sensor is 40kHz, there should be no sensors between 39.8-40kHz and 40-41kHz.

Figure 9: HDTE wide band mode

Example: If the frequency of the sensor is 40kHz, there should be no sensors between 39.8-40kHz and 40-42.6kHz.

Frequency of the sensor

Bandwidth

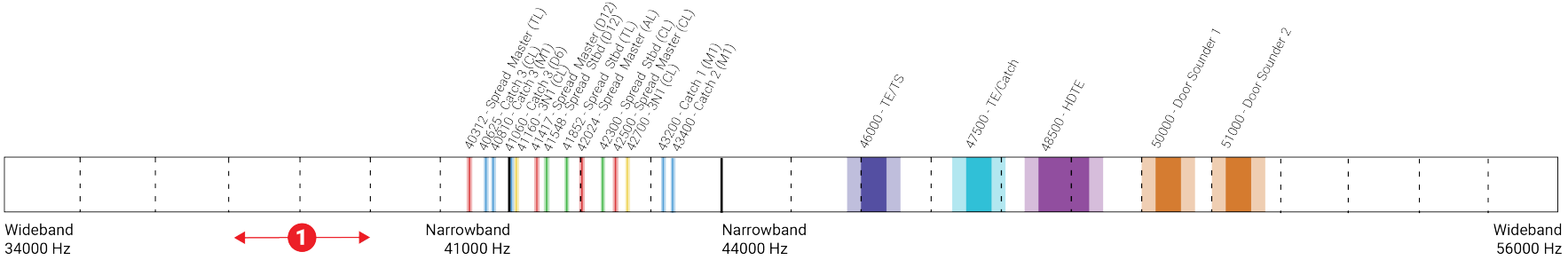
Mandatory distance with other sensors

Recommended distance with other sensors

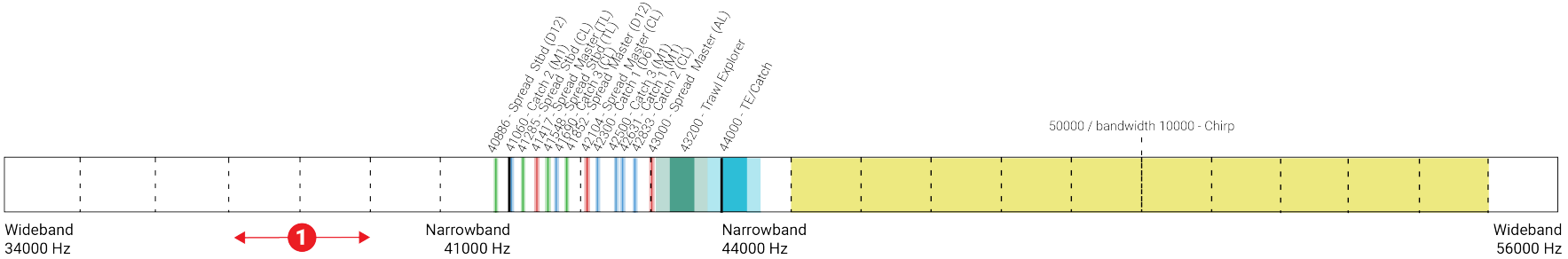
Examples of frequency allocations

- We recommend to allocate frequencies between 34 and 56 kHz for wideband hydrophones and between 41 kHz and 44 kHz for narrowband hydrophones.
- Echosounders are usually placed around 38 kHz, make sure to allow enough distance with them.

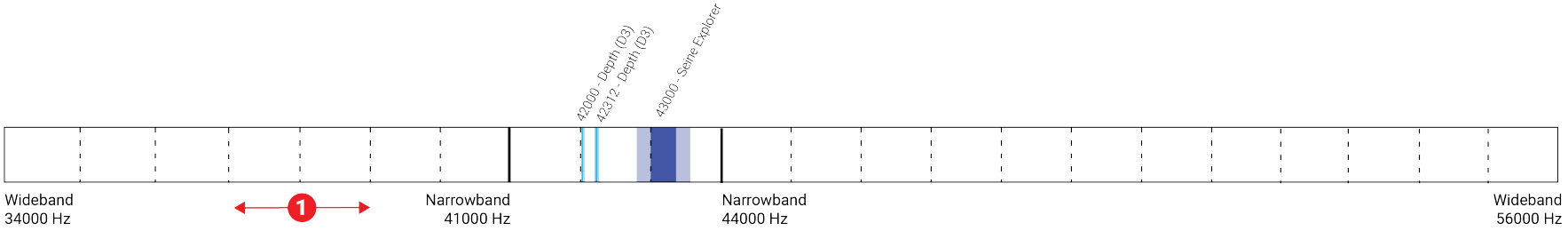
Example of a system with Spread, Catch, Trawl Speed sensors and Speed Explorer, Catch Explorer, HDTE and Door Sounder.



Example of a system with Spread sensors with positioning, Catch sensors, Trawl Explorer and Catch Explorer.



Example of a system for purse seining, with a Seine Explorer and depth Seine sensors.



Bandwidth

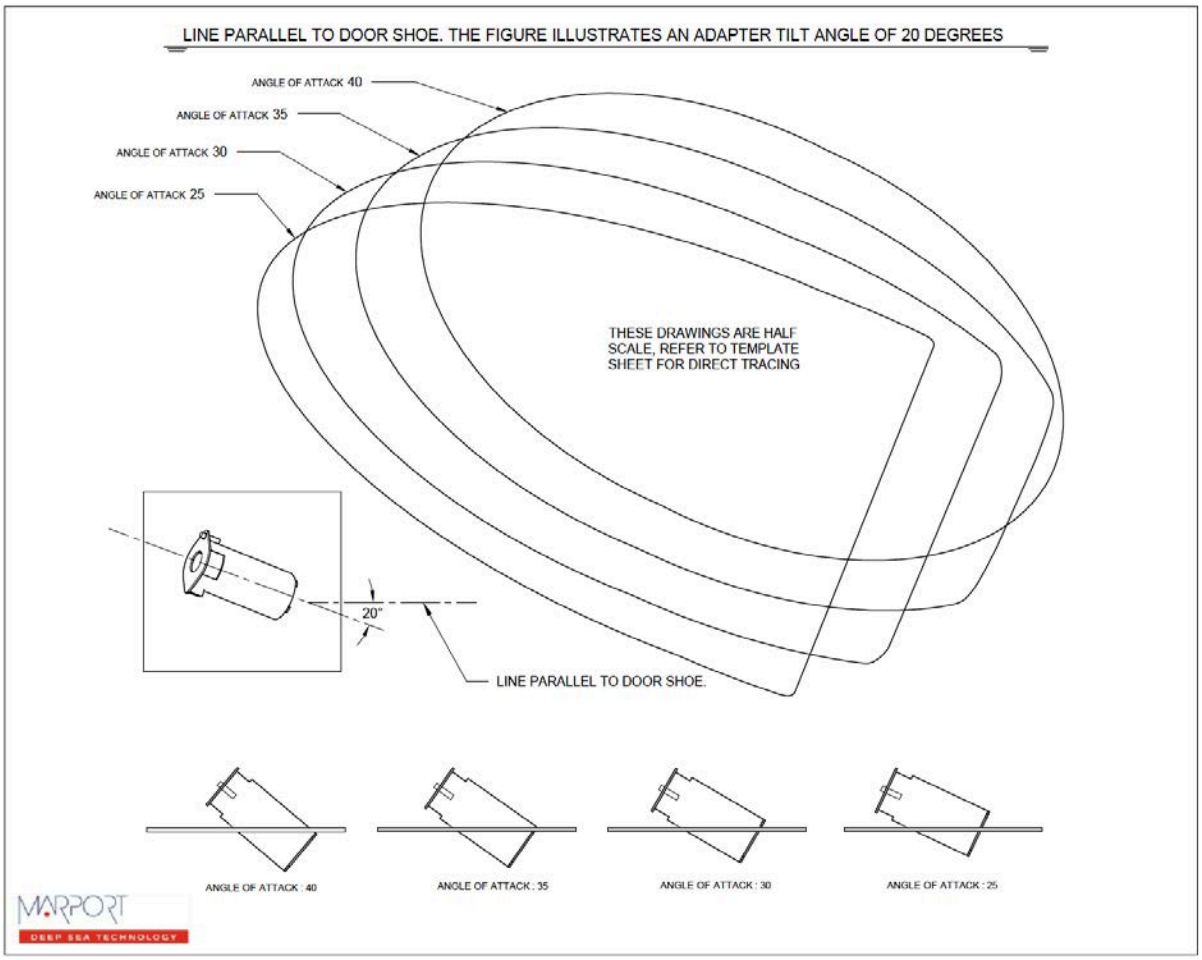
Mandatory distance with other sensors

1 Avoid allocating frequencies between 37 and 39 kHz because this range is generally used by echosounders.

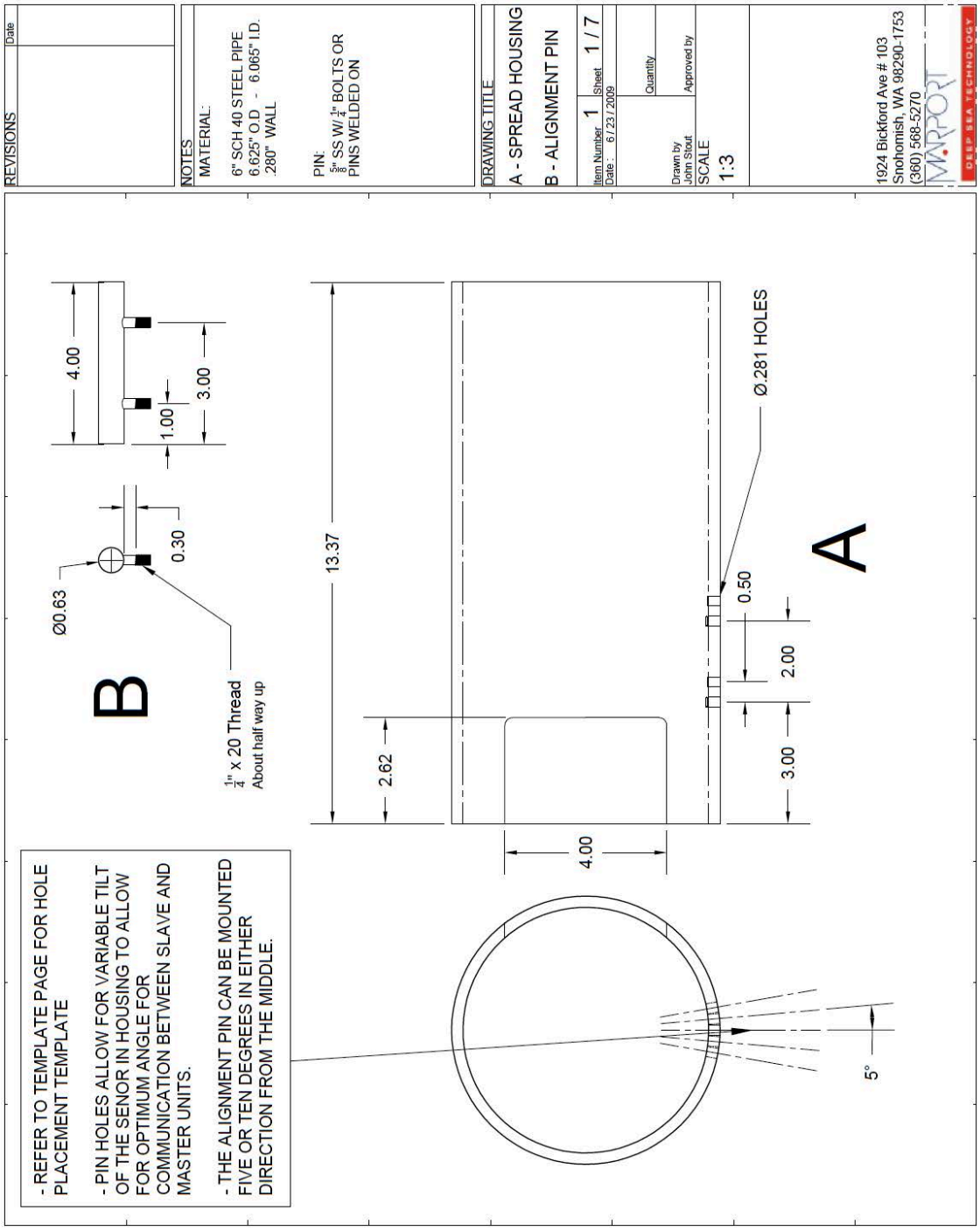
Appendix C: Pocket Drawings

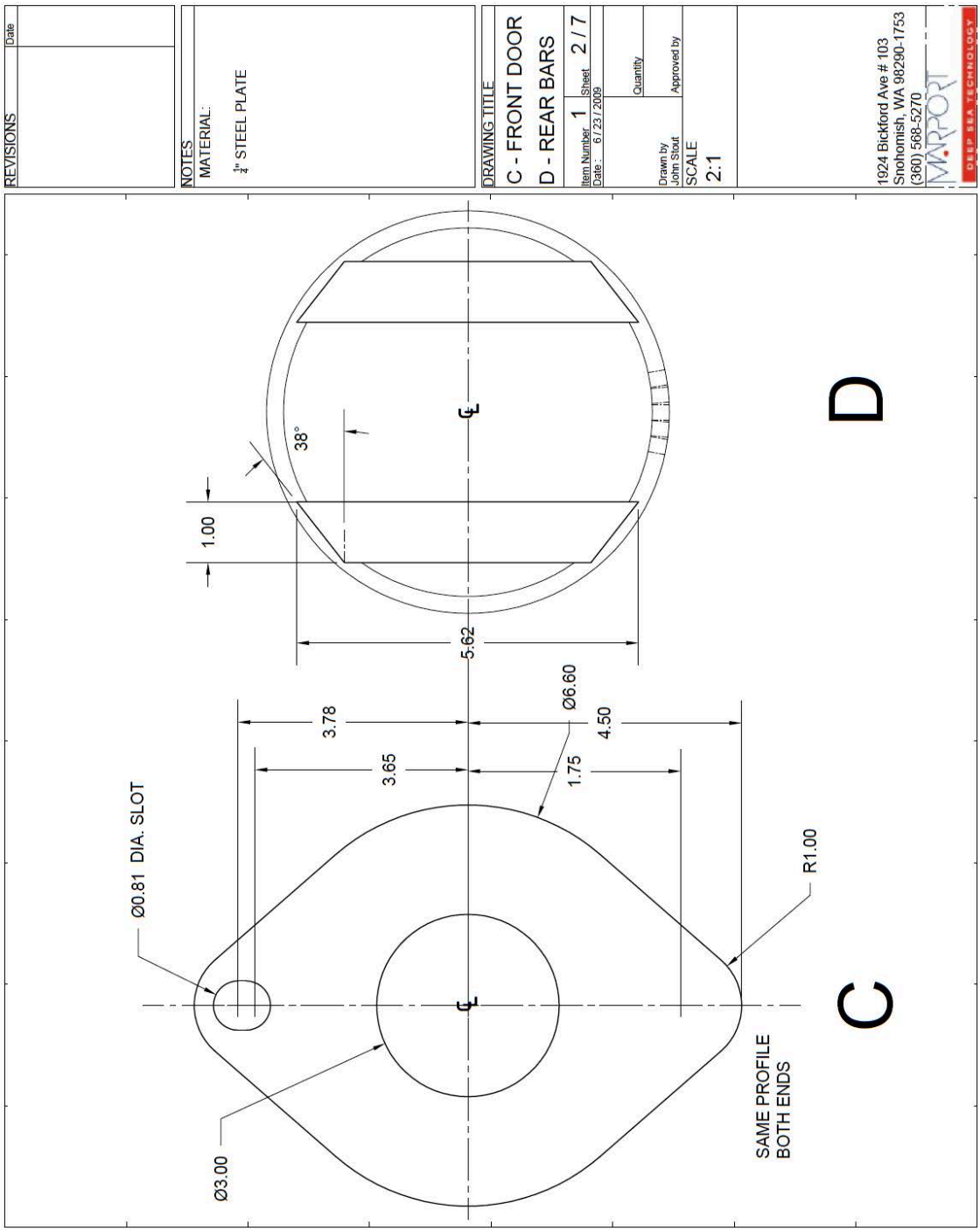
Drawings to manufacture Spread Sensor pockets to be placed on trawl doors. Ask your local Marport Office for scaled templates.

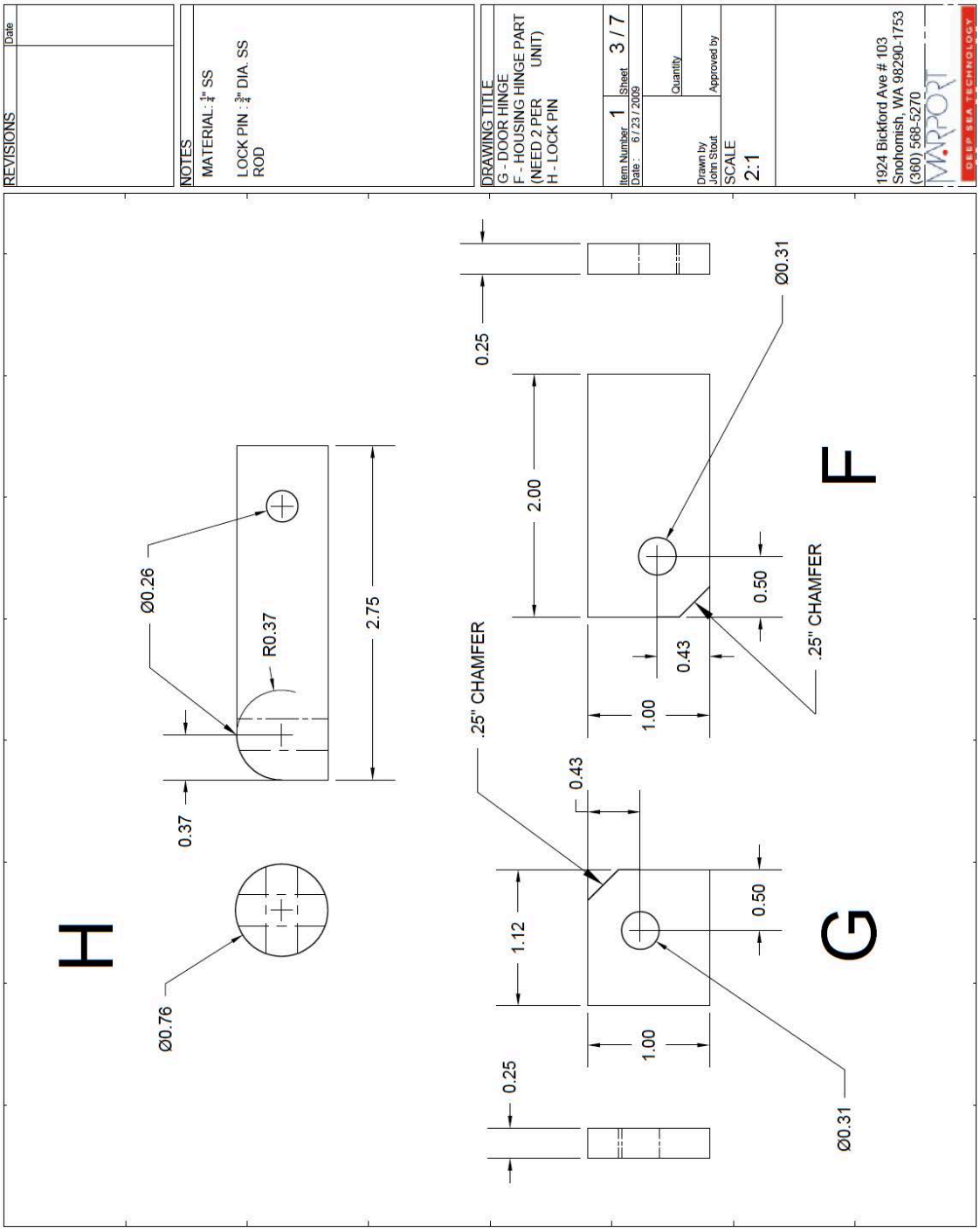
Pocket Angle of Attack

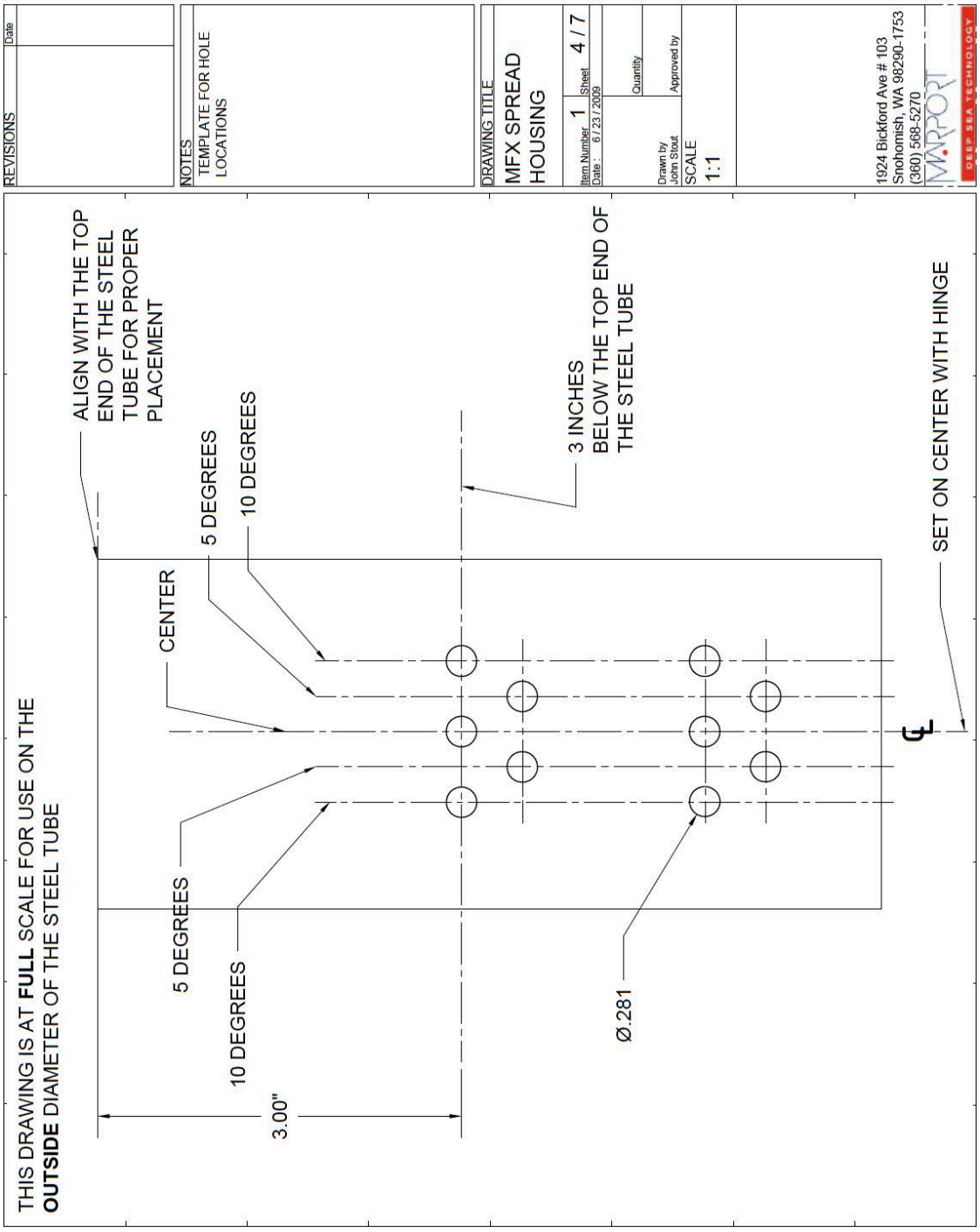


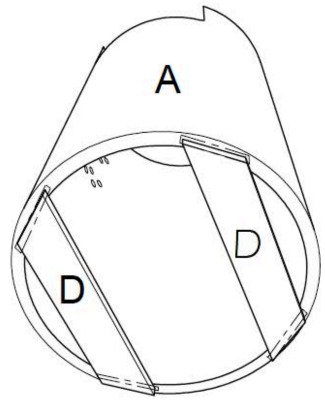
Pocket for XL Bottles (Standard Spread Sensor & Door Sounder)



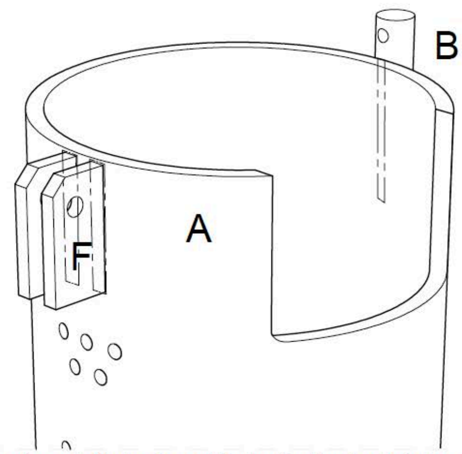

REVISIONS
Date
NOTES
MATERIAL:
¼" STEEL PLATE
DRAWING TITLE
C - FRONT DOOR
D - REAR BARS
Item Number 1
Sheet 2 / 7
Date: 6 / 23 / 2009
Quantity
Drawn by John Stout
Approved by
SCALE 2:1
1924 Bickford Ave # 103
Snohomish, WA 98290-1753
(360) 568-5270
MARPORT
DEEP SEA TECHNOLOGY
D
38°
1.00
5.62
Ø6.60
4.50
1.75
3.78
3.65
Ø0.81 DIA. SLOT
R1.00
Ø3.00
SAME PROFILE
BOTH ENDS
C


REVISIONS
Date
NOTES
MATERIAL: 1/4" SS
LOCK PIN : 3/4" DIA. SS ROD
DRAWING TITLE
G - DOOR HINGE
F - HOUSING HINGE PART (NEED 2 PER UNIT)
H - LOCK PIN
Item Number 1
Sheet 3 / 7
Date : 6 / 23 / 2009
Quantity
Drawn by John Stout
Approved by
SCALE 2:1
1924 Bickford Ave # 103
Snohomish, WA 98290-1753
(360) 568-5270
MARPORT
DEEP SEA TECHNOLOGY
H
Ø0.26
R0.37
2.75
0.37
Ø0.76
G
.25" CHAMFER
0.43
1.12
0.50
1.00
0.25
Ø0.31
F
0.25
2.00
Ø0.31
0.50
.25" CHAMFER
0.43
1.00

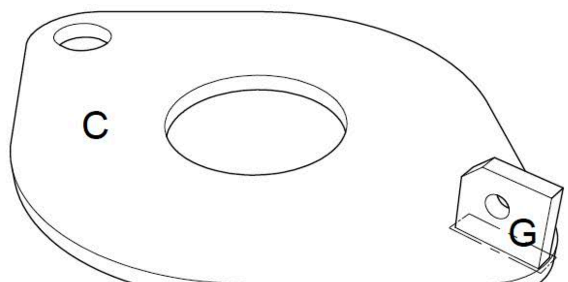

REVISIONS
Date
NOTES
TEMPLATE FOR HOLE LOCATIONS
DRAWING TITLE
MFX SPREAD HOUSING
Item Number 1
Sheet 4 / 7
Date : 6 / 23 / 2009
Quantity
Drawn by John Stout
Approved by
SCALE 1:1
1924 Bickford Ave # 103
Snohomish, WA 98290-1753
(360) 568-5270
MARPORT
DEEP SEA TECHNOLOGY
THIS DRAWING IS AT **FULL** SCALE FOR USE ON THE **OUTSIDE** DIAMETER OF THE STEEL TUBE
ALIGN WITH THE TOP END OF THE STEEL TUBE FOR PROPER PLACEMENT
CENTER
5 DEGREES
10 DEGREES
5 DEGREES
10 DEGREES
3.00"
3 INCHES BELOW THE TOP END OF THE STEEL TUBE
Ø.281
SET ON CENTER WITH HINGE



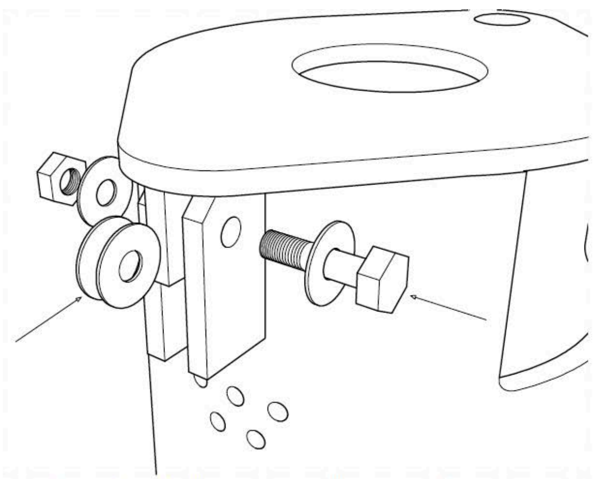
1. Weld both rear bars to main housing tube, ensuring they are parallel to front sensor opening.



2. On the other end of the housing, weld the housing hinge bars to the top end, making sure both bars or the weld does not extend above the top of the tube.



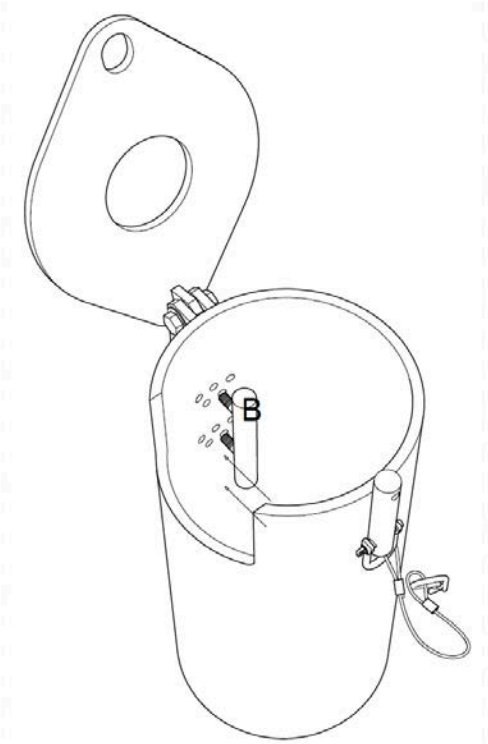
3. Next weld the door hinge onto the top end of the door piece, its distance from the edge is to be determined by the alignment of the opposite hole with the edge of the tube.



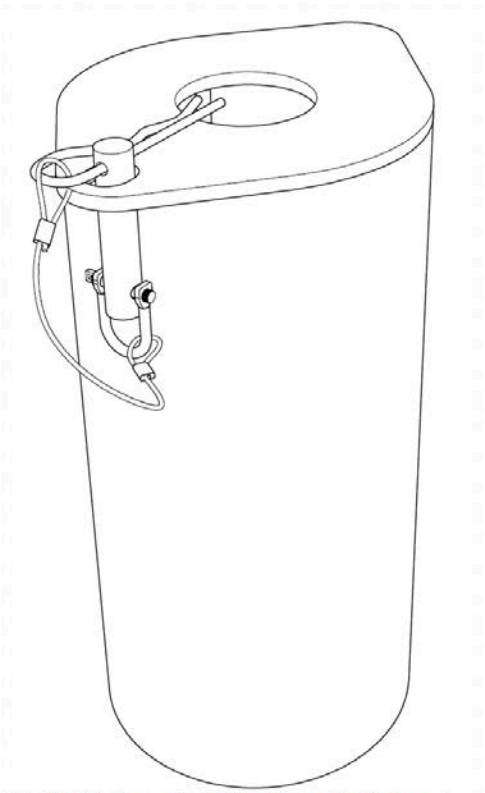
4. Place the $\frac{5}{16}$ x 1.5" bolt through the hinge with washers and $\frac{5}{16}$ nylock nut as shown

MFX SPREAD SENSOR HOUSING

Fabrication Instructions

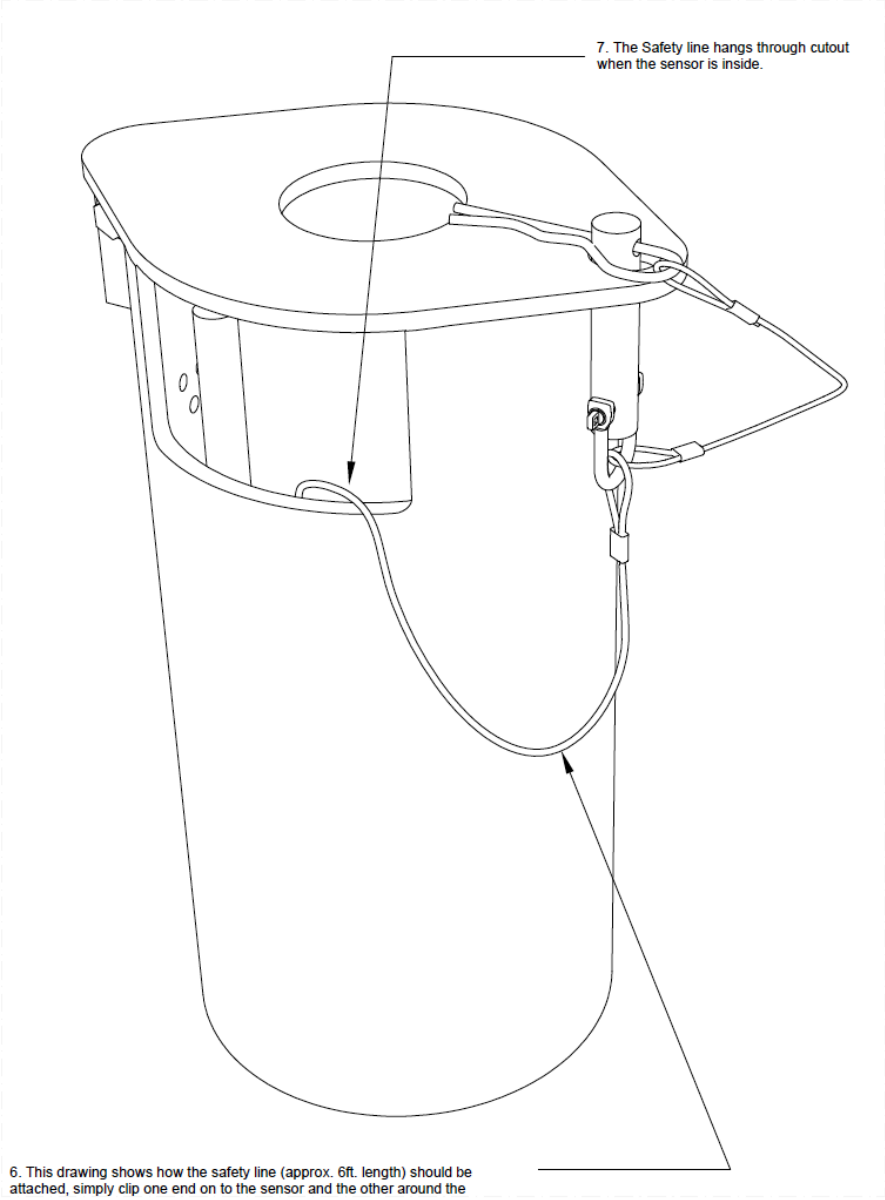


5. Now place the alignment bar at its center location. This can be adjusted for optimum performance of the sensor and once that position is found can be permanently welded into place.



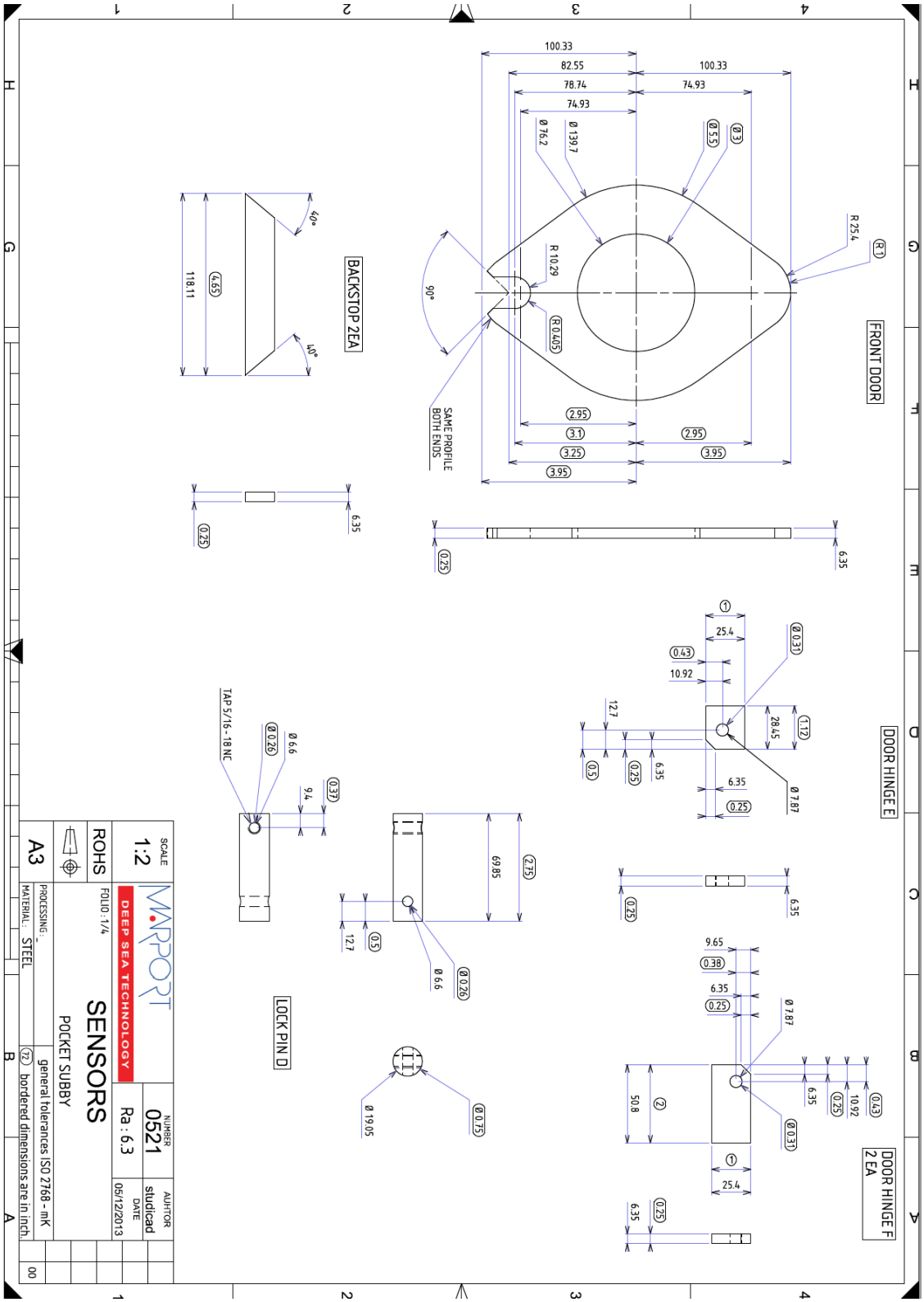
6. Now the final hardware, can be installed, including a safety cable shown on the next page.

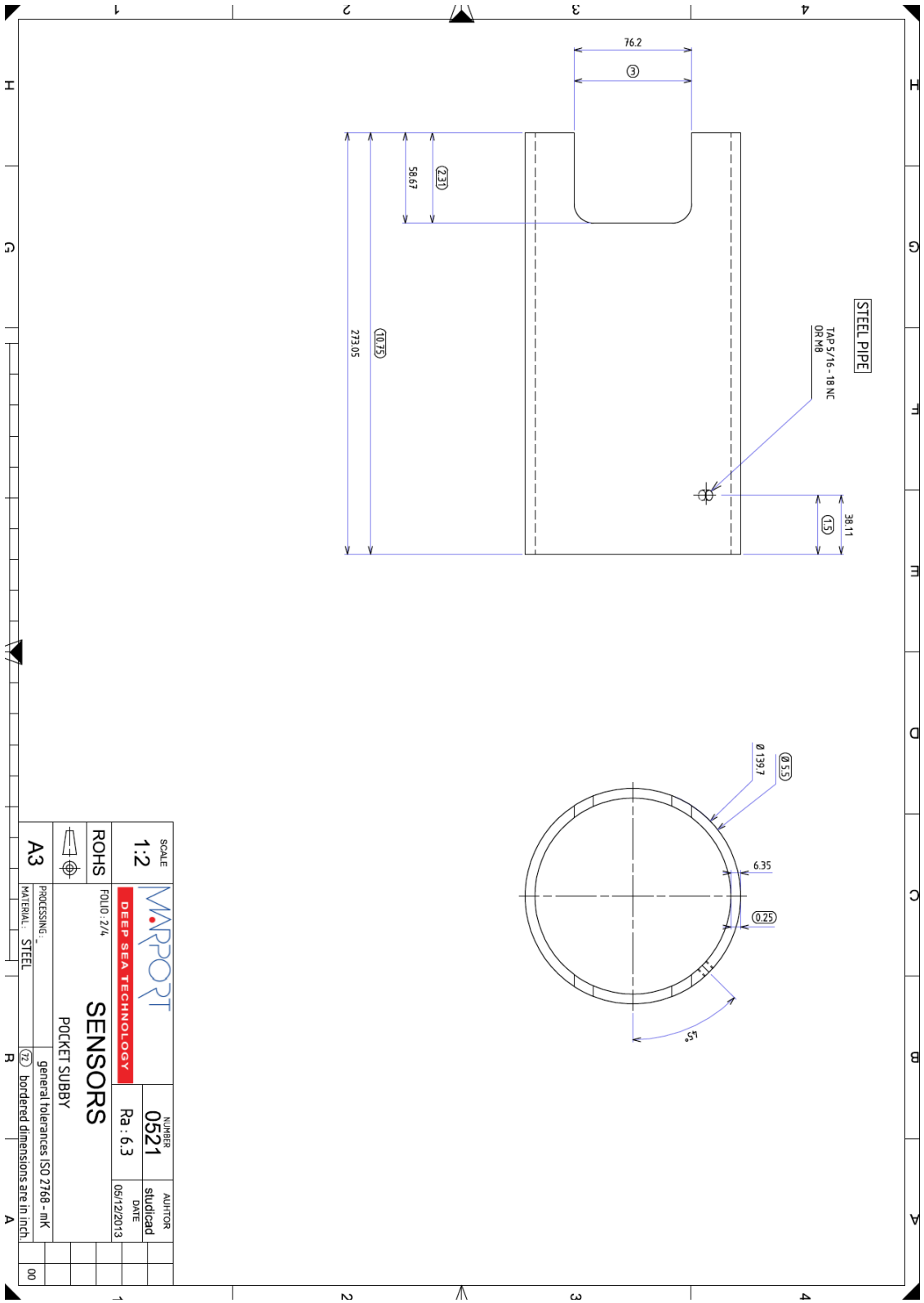
MFX SPREAD SENSOR HOUSING
Fabrication Instructions

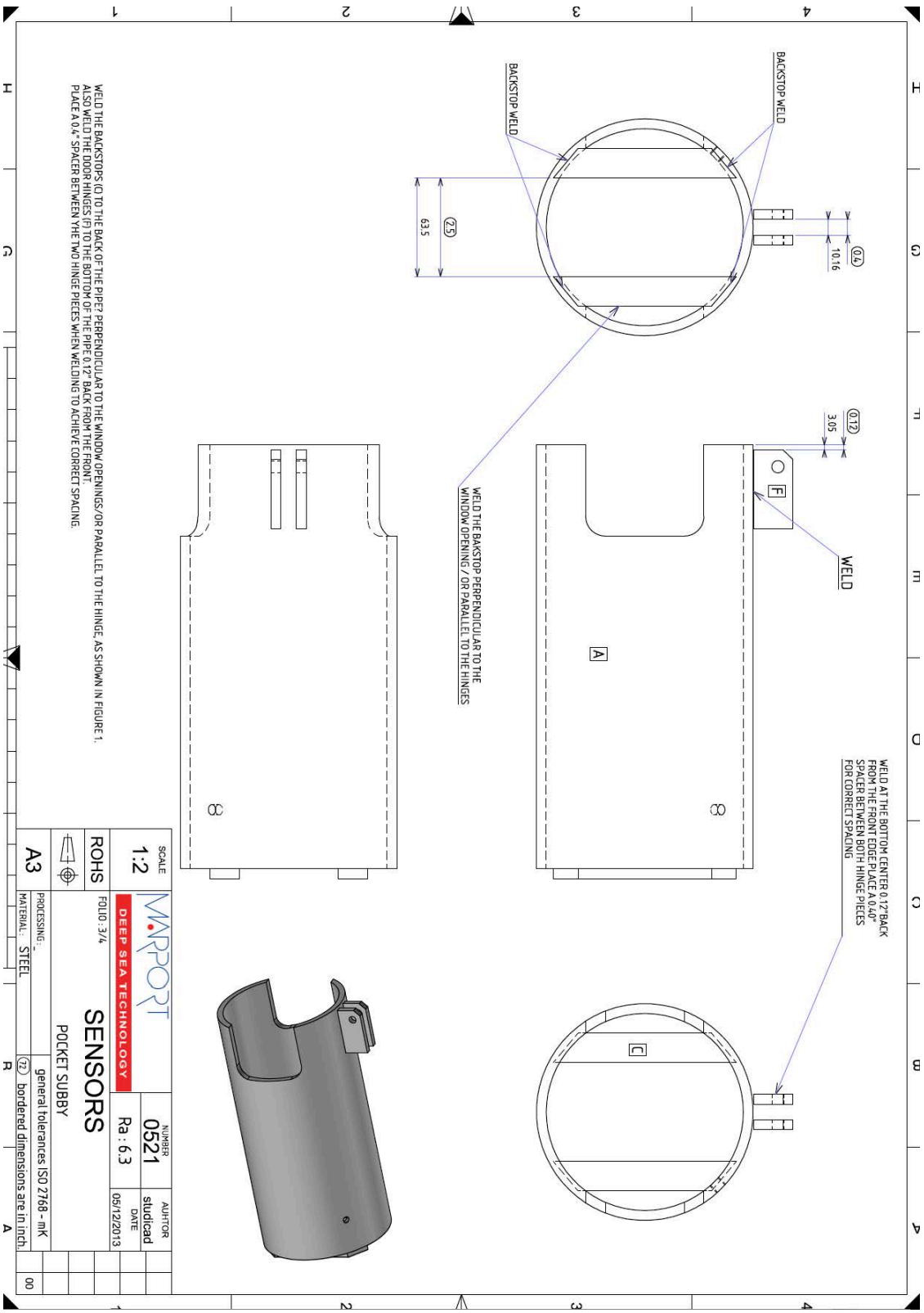


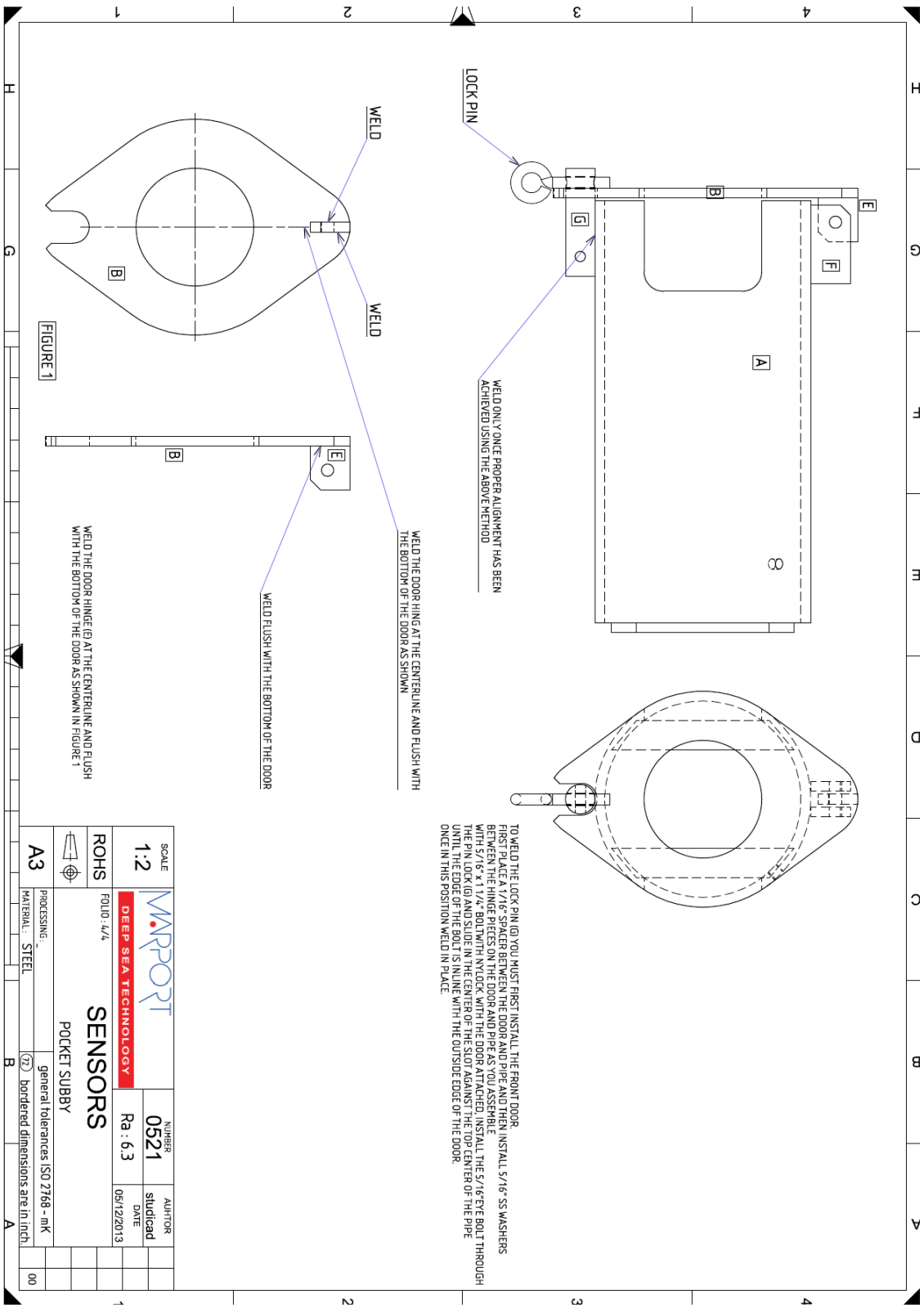
MFX SPREAD SENSOR HOUSING
Fabrication Instructions

Pocket for Stubby Bottles

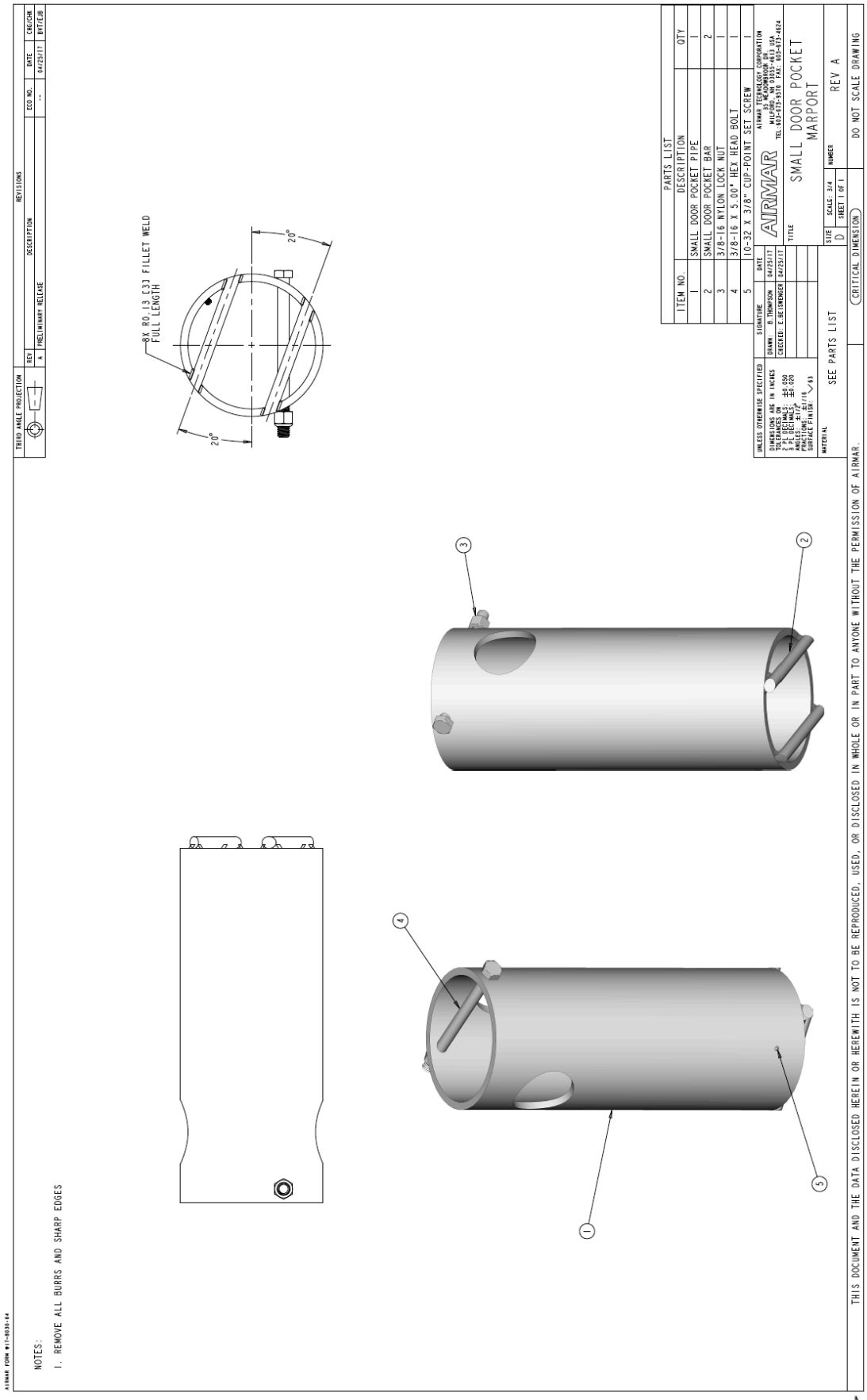



76.2
(3)
58.67
(2.31)
273.05
(10.75)
STEEL PIPE
TAP 5/16 - 18 NC
OR M8
38.11
(1.5)
Ø 139.7
Ø 5.5
6.35
0.25
45°
SCALE
1:2
MARPORT
DEEP SEA TECHNOLOGY
NUMBER
0521
AUHTOR
studicad
ROHS
FOLIO : 2/4
SENSORS
POCKET SUBBY
Ra : 6.3
DATE
05/12/2013
A3
PROCESSING :
MATERIAL : STEEL
general tolerances ISO 2768 - mK
(72) bordered dimensions are in inch.
00

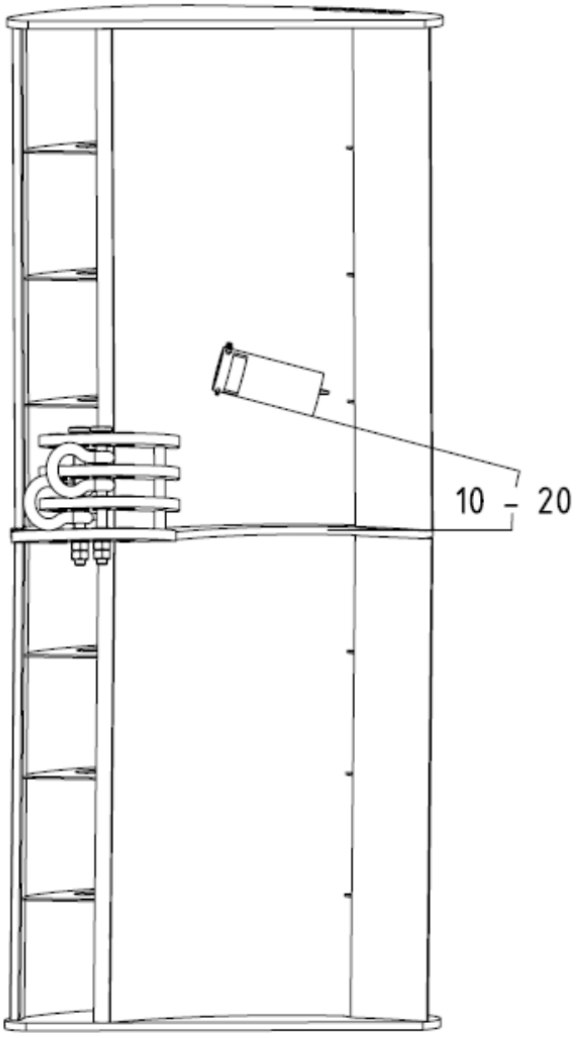

BACKSTOP WELD
BACKSTOP WELD
63.5
2.5
10.16
0.4
3.05
0.12
F
WELD
WELD THE BAKSTOP PERPENDICULAR TO THE WINDOW OPENING / OR PARALLEL TO THE HINGES
WELD AT THE BOTTOM CENTER 0.12"BACK FROM THE FRONT EDGE PLACE A 0.40" SPACER BETWEEN BOTH HINGE PIECES FOR CORRECT SPACING
A
C
WELD THE BACKSTOPS (C) TO THE BACK OF THE PIPE7 PERPENDICULAR TO THE WINDOW OPENINGS/OR PARALLEL TO THE HINGE, AS SHOWN IN FIGURE 1.
ALSO WELD THE DOOR HINGES (F) TO THE BOTTOM OF THE PIPE 0.12" BACK FROM THE FRONT.
PLACE A 0.4" SPACER BETWEEN THE TWO HINGE PIECES WHEN WELDING TO ACHIEVE CORRECT SPACING.
SCALE
1:2
ROHS
A3
MARPORT
DEEP SEA TECHNOLOGY
FOLIO :3/4
SENSORS
POCKET SUBBY
NUMBER
0521
Ra : 6.3
AUHTOR
studicad
DATE
05/12/2013
PROCESSING :
MATERIAL : STEEL
general tolerances ISO 2768 - mK
(72) bordered dimensions are in inch.
00

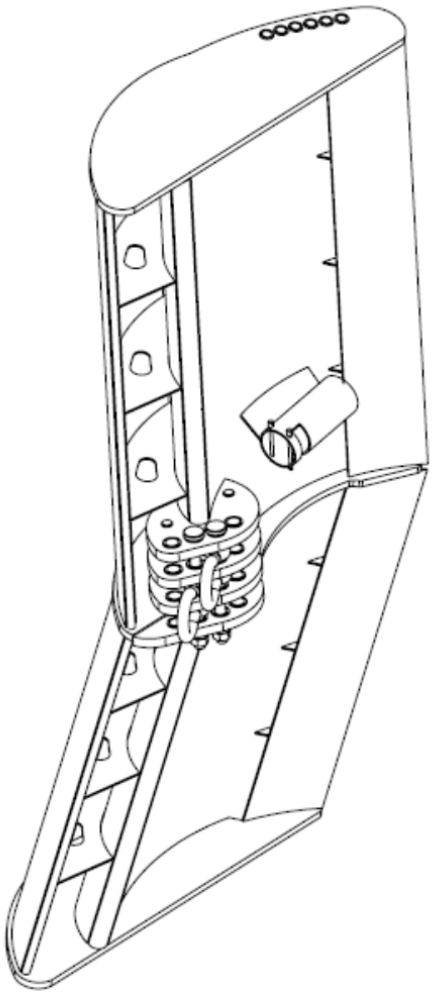

LOCK PIN
WELD ONLY ONCE PROPER ALIGNMENT HAS BEEN ACHIEVED USING THE ABOVE METHOD
WELD
WELD
WELD THE DOOR HING AT THE CENTERLINE AND FLUSH WITH THE BOTTOM OF THE DOOR AS SHOWN
WELD FLUSH WITH THE BOTTOM OF THE DOOR
WELD THE DOOR HINGE (E) AT THE CENTERLINE AND FLUSH WITH THE BOTTOM OF THE DOOR AS SHOWN IN FIGURE 1
FIGURE 1
TO WELD THE LOCK PIN (G) YOU MUST FIRST INSTALL THE FRONT DOOR. FIRST PLACE A 1/16" SPACER BETWEEN THE DOOR AND PIPE AND THEN INSTALL 5/16" SS WASHERS BETWEEN THE HINGE PIECES ON THE DOOR AND PIPE AS YOU ASSEMBLE WITH 5/16" x 1 1/4" BOLT WITH NYLOCK WITH THE DOOR ATTACHED. INSTALL THE 5/16"EYE BOLT THROUGH THE PIN LOCK (G) AND SLIDE IN THE CENTER OF THE SLOT AGAINST THE TOP CENTER OF THE PIPE UNTIL THE EDGE OF THE BOLT IS INLINE WITH THE OUTSIDE EDGE OF THE DOOR. ONCE IN THIS POSITION WELD IN PLACE.
SCALE 1:2
MARPORT
DEEP SEA TECHNOLOGY
NUMBER 0521
AUHTOR studicad
DATE 05/12/2013
ROHS
FOLIO: 4/4
SENSORS
POCKET SUBBY
Ra : 6.3
A3
PROCESSING:
MATERIAL: STEEL
general tolerances ISO 2768 - mK
(72) bordered dimensions are in inch
00

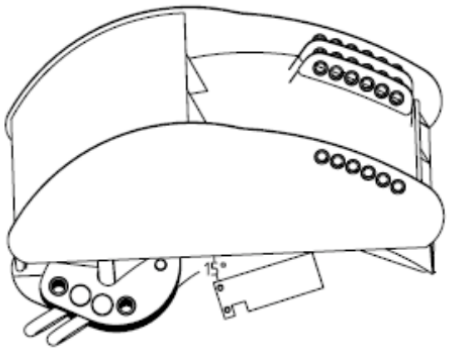
Pocket for Stubby Bottles with Slim Housing



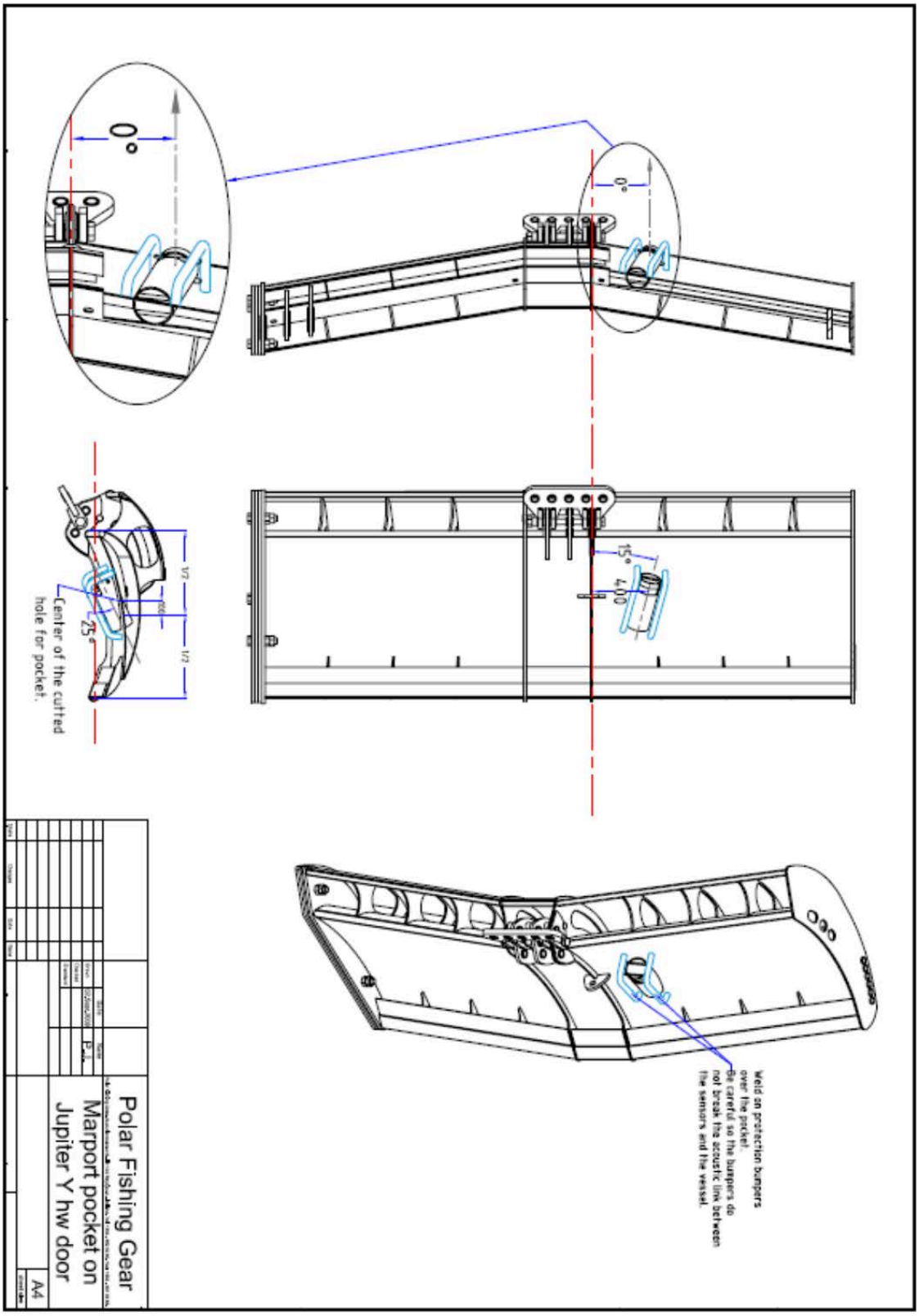
Appendix D: Example of Installation on Poly Jupiter Doors



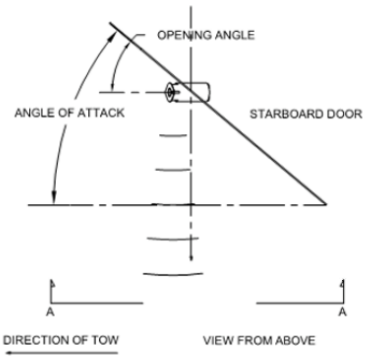


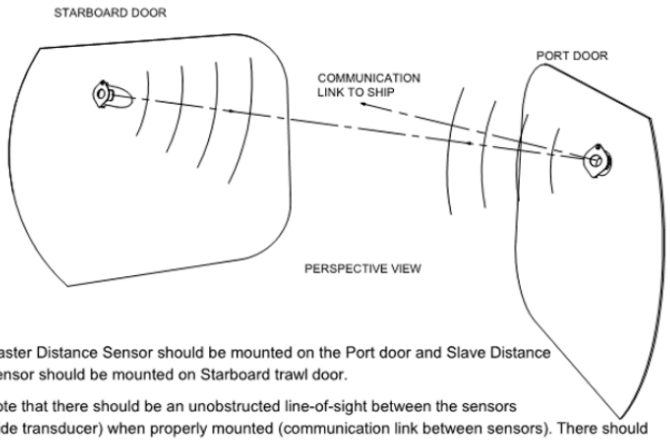


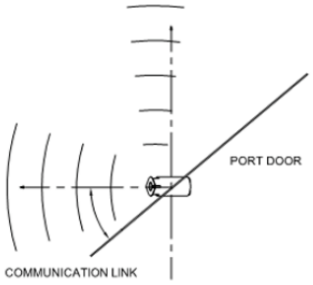
Marport sensor holders on Jupiter hw. doors


0°
0°
15°
4.00
Center of the cutted hole for pocket.
23°
Weld on protection bumpers over the pocket.
Be careful so the bumpers do not break the acoustic link between the sensors and the vessel.
Polar Fishing Gear
Marport pocket on Jupiter Y hw door
A4

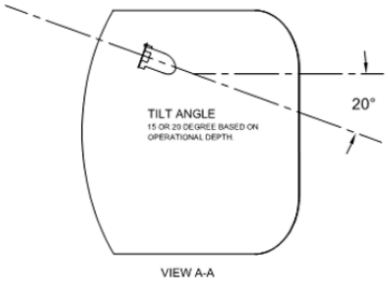
Appendix E: General Installation Instructions and Drawings

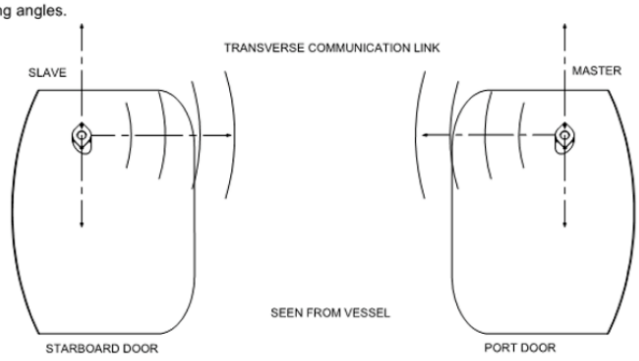






- Master Distance Sensor should be mounted on the Port door and Slave Distance Sensor should be mounted on Starboard trawl door.
- Note that there should be an unobstructed line-of-sight between the sensors (side transducer) when properly mounted (communication link between sensors). There should also be an unobstructed line of sight for communications between the Master Distance Sensor and the vessel's receiving hydrophone.
- For bottom trawling applications, the sensor adapter pocket should be mounted in the upper part of the trawl door but in a place with the least influence in the center of gravity of the door. Consult door manufacturer for details.
- Tilt (elevation angle) should be adjusted in accordance to best performance based on operational depth and length of the trawl gear.
- The door pocket adaptor is designed to compensate for the angle of attack of the trawl door, under normal operational conditions and based on a standard recommendation of 35°.
- Refer to cut-out templates for higher or lower angles. Consult door manufacturer for optional mounting angles.





Index

N

O

P

R

S

T

U

W