SIMRAD

70 YEARS
1947-2017

Catch Monitoring Systems

TECHNOLOGY FOR SUSTAINABLE FISHERIES
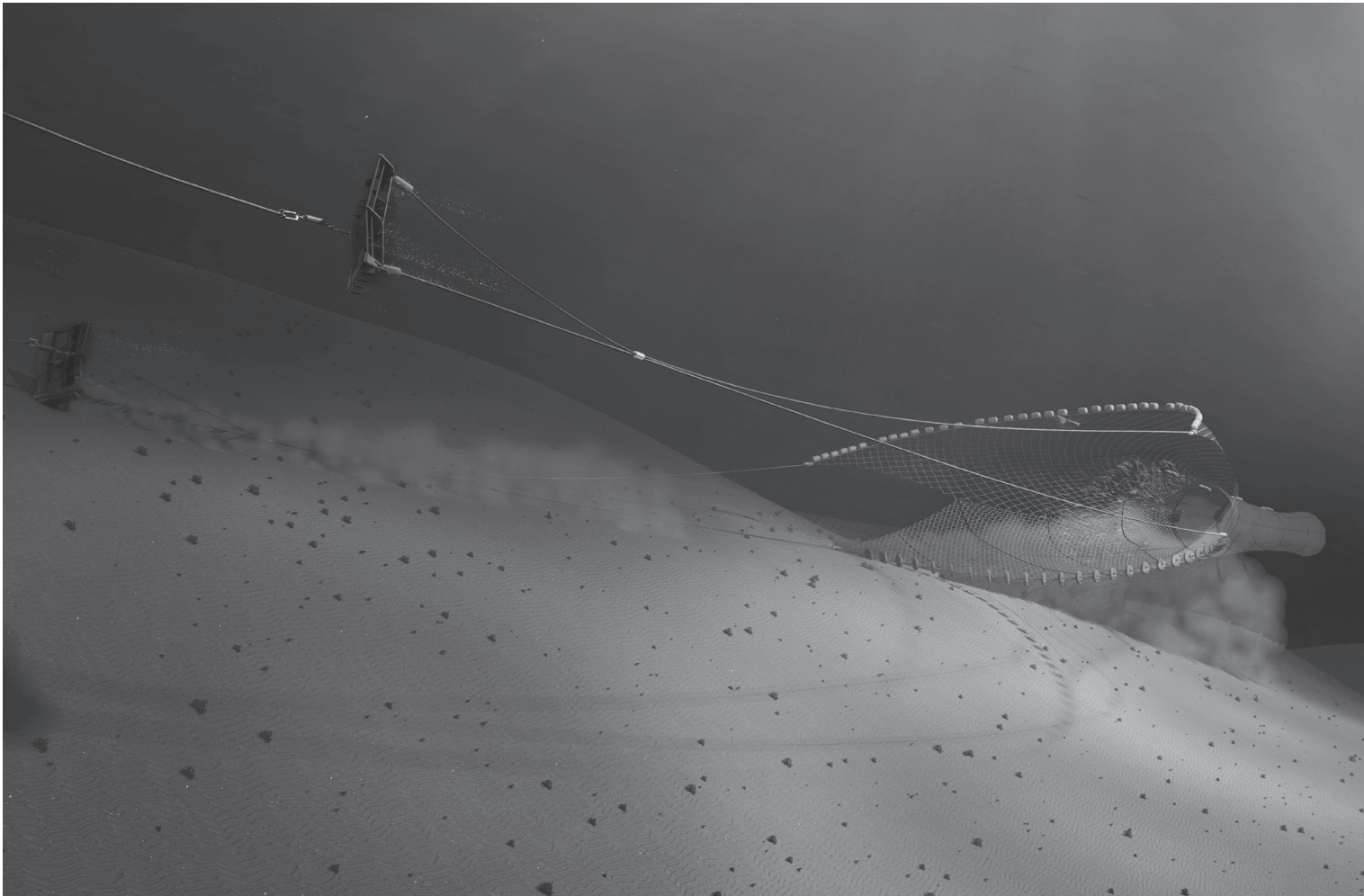
SIMRAD CATCH MONITORING SYSTEMS

SIMRAD developed and introduced the first wireless catch sensor more than 40 years ago. Not very late, it also introduced the 3rd wire systems. Since then, SIMRAD manufactures, and keeps developing, a wide range of catch monitoring systems so that the skipper can have full control of the catch process, while enhancing efficiency and respecting the environment.

Wireless sensors are developed for fitting in all different fishing scenarios. For example, in bottom trawling, whether it is single, twin, triple or more, wireless sensors are placed on the gear and doors and communicate acoustically with the vessel. Depending on where they are placed, they can send to the skipper some vital measurements like spread between doors, the fish entering the trawl opening, the filling of the net or the distance from the

doors to the bottom - that will prevent them from damaging the fauna -, amongst many others.

The 3rd wire is a communication and power cable connected to a scanning trawl sonar placed on the net's headrope. This type of system can be used in pelagic fishery in combination with wireless sensors. These sensors can then communicate with the trawl sonar and the data will go through the 3rd wire up to the vessel. The advantage of combining both wireless and 3rd wire systems is that down by the trawl the environment for wireless communication is perfect, since there is no propeller noise or long distances. For this specific situation, a 3rd wire winch will be needed.
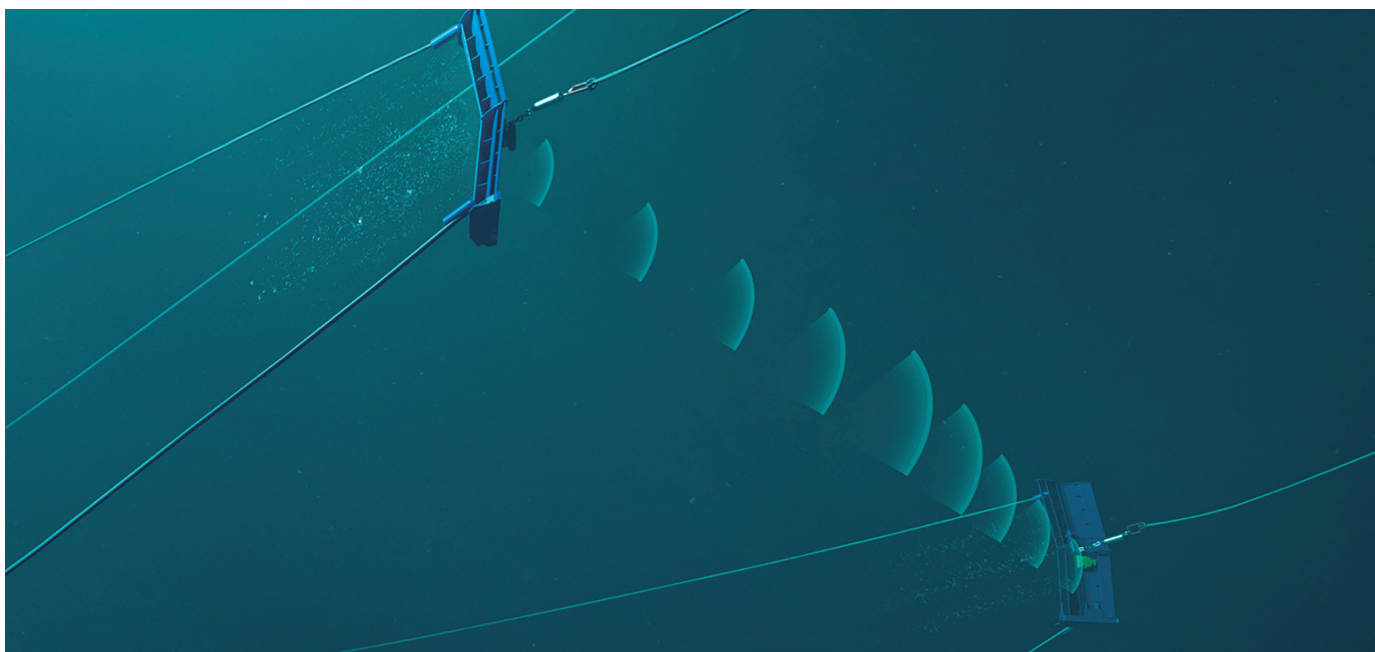
ACTIVE HYDROPHONE WITH EXCELLENT SENSITIVITY

Active hydrophones have pre-amplifiers built-in. SIMRAD offers three different active hydrophones:

PURSE SEINE HYDROPHONE
The hull mounted hydrophone for purse seining operations has a 90° horizontal beam and a 30° vertical beam to provide the PI50 with optimal reception from the sensors on a purse seine.

This specific beam pattern is especially suited for purse seining and the wide coverage area reduces the need for careful alignment.

TRAWL HYDROPHONE
The hull mounted hydrophone for trawling operations has a 50° horizontal beam and a 30° vertical beam to provide the PI50 with optimal reception from the sensors on a bottom or pelagic trawl.

This specific beam pattern is especially suited for trawling and the wide coverage area reduces the need for careful alignment.

NEW GENERATION SENSOR RECEIVERS

In the latest years, the fast evolution of wideband electronics has been met by Simrad's engineers as an opportunity to develop two new sensor receivers that can cover almost all fishing operating scenarios because they can receive multiple signals from many sensors. The new Sensor Receivers can receive data from all the PX family catch sensors including the TrawlEye.

SR70 RECEIVER UNIT

This is a versatile and powerful sensor receiver that can have up to four separate hydrophones connected simultaneously. Four connected hydrophones ensure a stable communication in all kinds of situations, even during steep turning of the vessel, where the SR70 will automatically switch and select the hydrophone with the strongest signal. Besides, in combined vessels, hydrophones can be mounted in different directions to suit both purse seine and trawling operations, all of them connected to a single unit.

SR15 RECEIVER UNIT

The SR15 Receiver is a compact and cost-effective receiver unit that has one single hydrophone connected.

To process the data and run the visualization software (TV80) a powerful small marine computer is available from SIMRAD. You can also use your own computer. We recommend you to ask your Simrad dealer first since TV80 software runs on powerful computers.

PORTABLE HYDROPHONE

A portable hydrophone is also available. It is designed as a temporary measure until a fixed hydrophone can be installed at the vessel's next planned dry docking. It has an omnidirectional beam and a 50 meter integrated cable.

The cable is sheathed in polyurethane providing robust external protection to compliment its 150 kg tensile strength.

The cable is supplied on a reel for convenient retrieval and storage, and is equipped with a plug for easy attachment to the Receiver Unit.

SIMRAD PX SENSOR

THE PX FAMILY, SENSORS MADE TO WORK!

The PX sensor family comes in two different bodies and 8 different HW configurations. At the same time, each sensor can read up to 5 different measurements. A standard sensor will have 2 data readings and the user can purchase a license for up to 3 additional functions. All available functions can be user programmable according to the matrix below using the TV80 software.

The complete PX sensor family is depth rated to 1000m including the depth sensors and seine sounders.
Previous PX Multisensor can be easily upgraded to the new PX Multisensor MK2. The difference between MKI and MK2 is the number of functions: MKI has a maximum of 2 and MK2 has a maximum of 5 function readings.

The PX Universal comes either as a Standard sensor or as a Multicatch sensor. The Standard sensor can measure height of the door, distance to bottom on trawl or purse seine. The Multicatch can be configured as a catch sensor or a depth/temperature sensor.

SENSORS		FUNCTIONS						
Name	Part no.	Battery Status	Catch	Depth	Echogram	Geometry	Geometry Diff	Height
MK2	421180	■				■	■	■
MK2 Trd Lid	421294	■						■
MK2 D1000/T	421293	■		■		■	■	■
PX TrawlEye	399967	■			■			■
PX TrawlEye D/T	406399	■		■	■			■
PX Universal	400943	■		■				■
PX MultiCatch D/T*	418419	■		■				
PX MultiCatch C/T*	418520	■	■					

MK1 sensors can be upgraded to MK2 sensors

FUNCTIONS								SENSORS	
Pitch	Roll	Spread	Temperature	Twin Spread	Remote Geometry	Remote Spread		Part no.	Name
■	■	■		■	■	■		421180	**MK2**
■	■	■		■	■	■		421294	**MK2 Trd Lid**
■	■	■	■	■	■	■		421293	**MK2 D1000/T**
■	■							399967	**PX TrawlEye**
■	■		■					406399	**PX TrawlEye D/T**
■	■		■					400943	**PX Universal**
■	■		■					418419	**PX MultiCatch D/T***
■	■		■					418520	**PX MultiCatch C/T***

SIMRAD
PX
TRAWLEYE

WIRELESS ECHOSOUNDER FOR PELAGIC AND BOTTOM TRAWLS

The Simrad PX TrawlEye provides a real time echogram from the trawl via a wireless link. In addition to the high resolution echogram the PX TrawlEye sends up the battery status so you can plan when to charge the sensor.

To ensure long range communication and optimum alignment between sensor and vessel the PX TrawlEye also sends up roll and pitch information, enabling you to detect if you have a bad alignment and/or if the TrawlEye was tangled in a mesh or similar while shooting your trawl.

The TrawlEye can be received through Simrad hydrophones or even non-Simrad types, provided that the frequency is similar. Both the SR15 and the SR70 sensor receivers can be used with the PX TrawlEye.

The PX TrawlEye is equipped with a composite echosounder transducer enabling advanced LFM pulses, Linear Frequency Modulation, also called chirp.

The PX TrawlEye can be configured to suit various fisheries using the TV80 software to program update rate (0.5s – 8s), pulse length, pulse type, sounder gain, echo range, communication power, etc.

WIRELESS

The PX Deployment Pack is designed to provide easy access and replacement of the PX TrawlEye, whilst still ensuring a safe and sturdy installation.

The picture to the right is Kobe Fishery in the Pacific. Note the fish going under the footrope, any information is important to act!
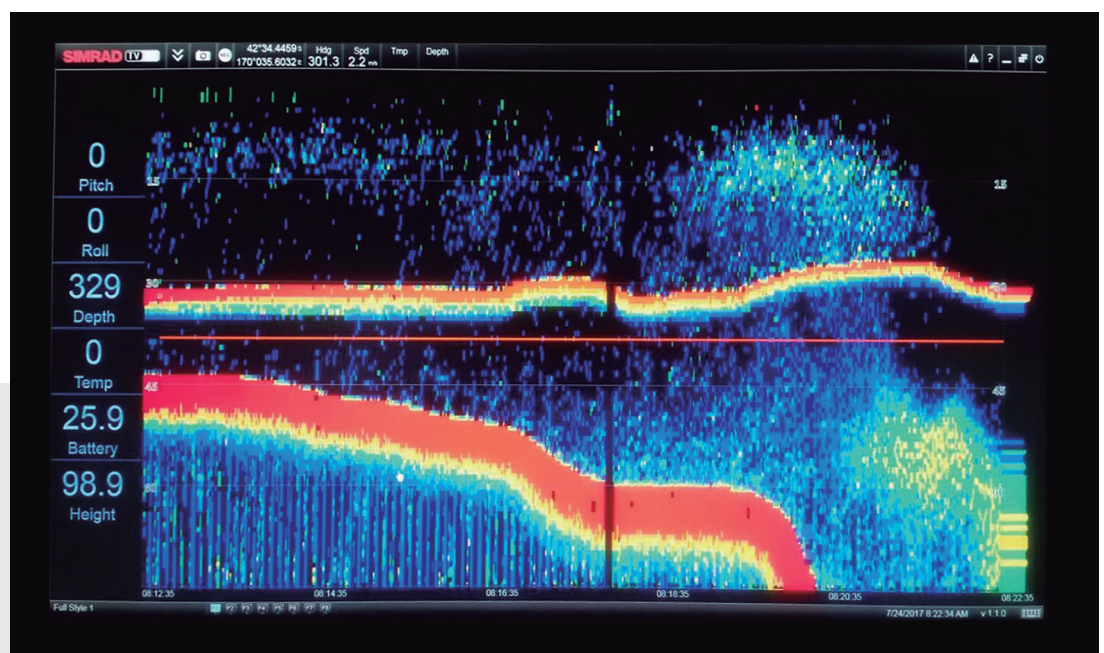
TV80, MAKING SENSOR DATA UNDERSTANDABLE

With the introduction of multifunction catch monitoring sensors, the challenge is how to show the information in a friendly way for the skipper, who wants to receive the relevant information in a quick look on the screen. The TV80 is designed to fulfill this concept.

The TV80 can work with a single or dual monitor configuration and can display information simultaneously from all existing Simrad Catch Monitoring Systems, ITI, PI, FS and SR. This feature provides an easy update path for Simrad customers, in spite of the system they are using or want to use. In addition to the data supplied by Simrad Catch Monitoring Systems, the TV80 accepts data from other sources like GPS receivers, echosounders, heading sensors, winch sensors, etc.

The user can create his own layout of up to four independent views to fit his operating scenario. He can also decide what information is going to be presented on every view. Each view is assigned to a function key, allowing a fast and efficient swap between predefined views with a single keystroke.

The TV80 has a built-in recording function for all the received data. The user can either use the recorded data to replay or export it to a compatible CSV file format for later analysis or study.
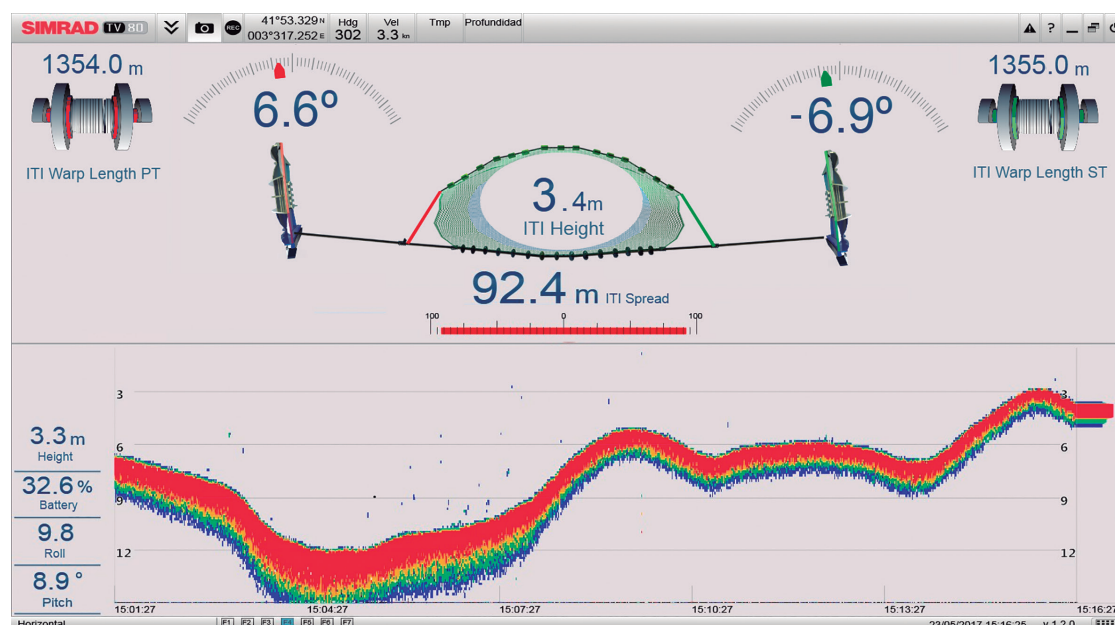

FREQUENCY SPECTRUM

The acoustic communication link between the receiver and the sensors could be challenging in a fishing vessel, due to propeller, pumps, compressors and other electric systems onboard generating noise. When the noise is in the same frequency range than the sensor, the result is unstable or even worse, no data readings. The TV80 has a built-in spectrum analyzer that shows the signals coming through each hydrophone. With this advanced tool, the user will be able to identify the noise and find the cleanest frequencies. Programming the communication channel of the sensors in the "quiet" frequencies to assure a stable data reading from the sensor.
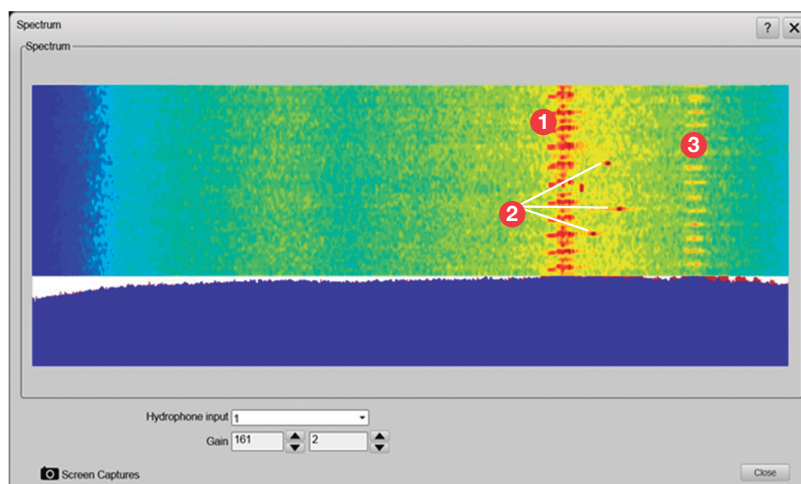
Spectrum example with PX sensors configured away from the echosounder interference

1 PX TrawlEye signal **2** PX sensors (three different channels) **3** Echosounder interference

SIMRAD ITI POSITIONING SYSTEM

Knowing the geographical position of your trawl, doors or any underwater object is of general interest for any fisherman. With the Simrad ITI system, this is fully possible with high accuracy. The system will enable you to position several points by adding position sensors, for example on the headrope, each door or codend. The system uses split beam technology known by Simrad users since the mid 80's and has been available as a compact sensor since the 90's.

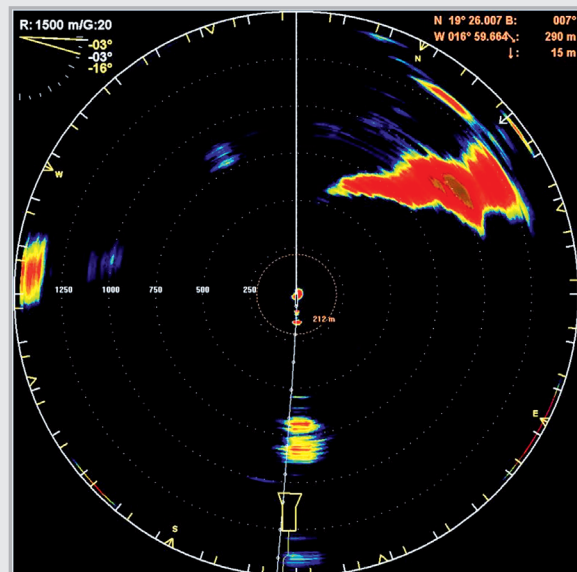By adding the ITI system to your existing Simrad Trawl Monitoring system, you will have all the information needed to fish close to obstacles, steer your trawl to the target or simply map your hauls on a chart plotter for later reference.

When connecting the ITI positioning system to a sonar, aimed trawling is possible. Aimed trawling increases efficiency and time at sea. The above picture shows a school of sardines aligned to the trawl opening on a pelagic vessel fishing in Mauritania. The positioning system is here connected to a Simrad SX93 sonar.

YOUR WARPS WILL NOT NECESSARY TELL YOU WHAT SIDE YOUR TRAWL IS!

Every skipper is convinced of what side of the vessel the trawl is. Just a quick view to the warps and that's it.

Not always what you see in the warps is giving you the right information. Even using the ITI positioning system alone might not be enough. It is easy to make a very costly decision when trawling in an area with obstacles like wrecks or rocks.
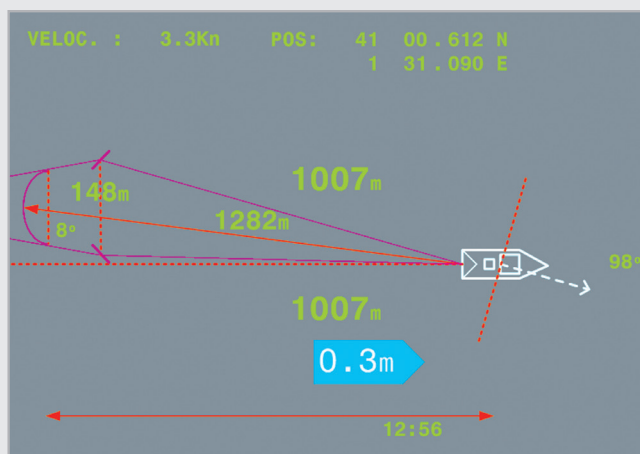
In a bird's-eye view it looks like the trawl is on the port side and the warps are giving the same information when the skipper looks at them. In order to make a solid decision of where the trawl is, the skipper has to look at the COG and the heading of the vessel.
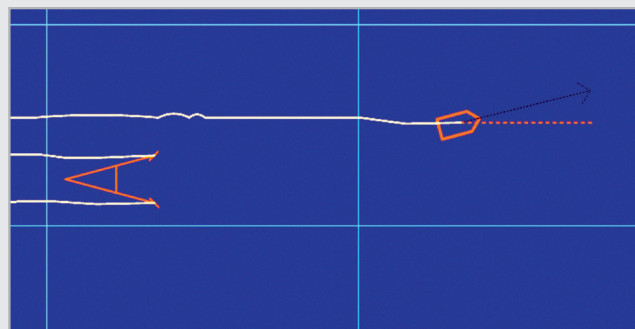
Placing the information on a chart plotter, the situation can be the opposite of what was initially thought. Here it is clear that the trawl is on the starboard side as a plotter records history and only plots COG.

3RD
WIRE

THE NEW TRAWL SONAR PLATFORM COMBINES THE BEST OF TWO WORLDS

The new Simrad FS Trawl System provides the full picture of the trawl by utilizing the ultimate FS third wire system with integrated PI Sensors. This sophisticated solution enables the fisherman to have full control of any type of trawl fishery.

The system provides real-time images from the trawl sonar head and the data from the PI Sensors to the bridge, thus maximizing the quality of the catch and increasing efficiency at sea.

A major benefit of the 3rd wire integration with PI Sensors is to prevent loss of communication with the trawl as the vessel is changing course or in heavy sea conditions.

FS70 TRAWL UNIT

The FS70 trawl housing unit is designed for the harshest environments and for withstanding the extreme forces encountered when shooting a trawl. However, it is easy to handle and the Hyper yellow colour makes it easy to see even in the dark.

EXTRA FLEXIBLE TRAWL SONAR SYSTEM

The Simrad FS70 full screen presentation in a polar sounder mode indicates the position of the trawl close to the bottom and shows the opening of the net by displaying the Cursors 1 and 2.

In addition, the sounder display provides an accurate depth of the bottom and to the foot rope. The operator can monitor up to 6 catch indicators, (if programmed at 40 kHz) indicating the amount of fish being caught by the trawl and the time when the sensors were activated.

The Simrad FS70 200 kHz sounder provides a real time picture of the trawl opening and position relative to the bottom. In addition to the high resolution sounder, the operator can control the descent of the trawl during the set by monitoring the position of the foot rope and the bottom.
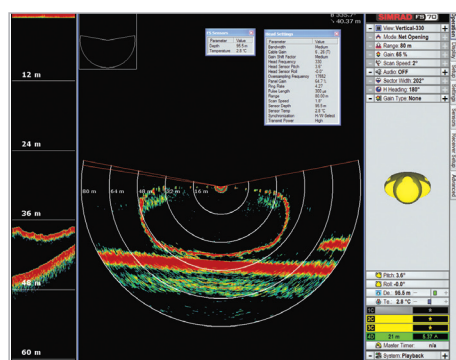
Simrad FS70 full screen display mode.
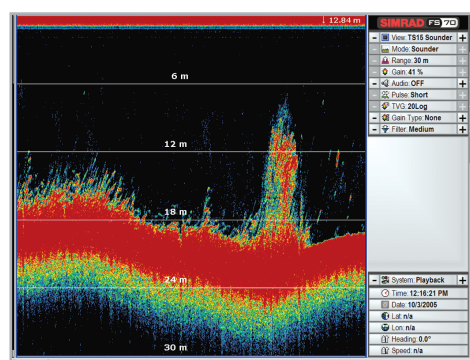
Simrad FS70 Sounder display mode.

SIMRAD
FM
SONAR

FM90
MULTIBEAM TRAWL SONAR

SIMRAD invented the "3rd wire" trawl sonar back in the early 80's. Back then nobody could foresee the impact this has had to the pelagic and semi pelagic fishing industry. Imagine back then, nobody had a "3rd wire" winch and nobody had handled this type of equipment before, making the learning curve steep. But as with everything, if you see the benefit with something, you go the extra mile to be able to benefit from it. For the pelagic and semi pelagic industry the trawl sonar is so important that you will not go out fishing without it.

Traditionally the trawl sonar has been a scanning search light sonar installed in the vertical plane. The advantage with a search light sonar is the resolution, the disadvantage is its real time capabilities. It takes time to scan a trawl opening and time is valuable. The FM90 will instantly give you a picture of the net opening and fish enter. The challenge up until now has been the ability to detect fish and the net geometry when the net is getting closer to the bottom. The FM90 has solved this using all the multibeam technology and knowledge within the SIMRAD organization.
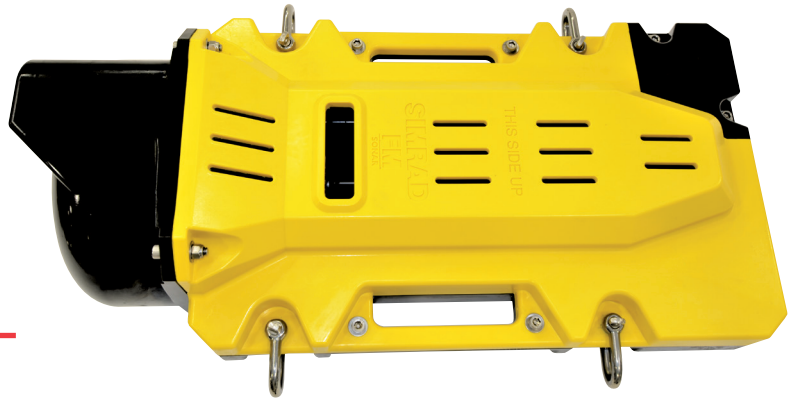
FM90 TRAWL UNIT
The FM90 Deployment Pack has a yellow top and black bottom to confirm correct orientation prior to launching and to assist in visual sighting during recovery. It also has improved hand holds to assist handling even with gloves on. The strain relief can be accessed using standard tools without opening the entire Deployment Pack and the unit is quick filling and draining.

The transducer of the FM90 has no moving parts thus being less vulnerable to damage and less maintenance is needed.
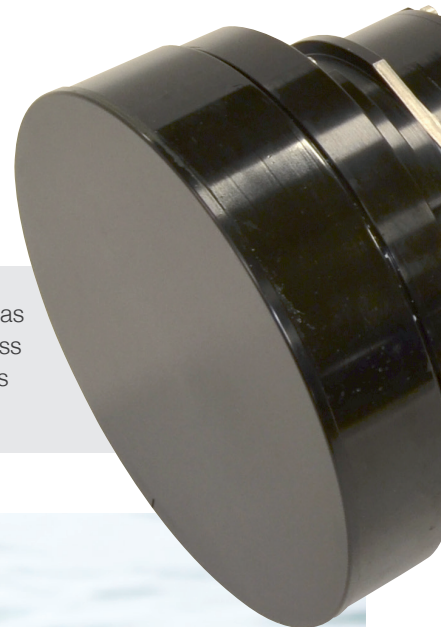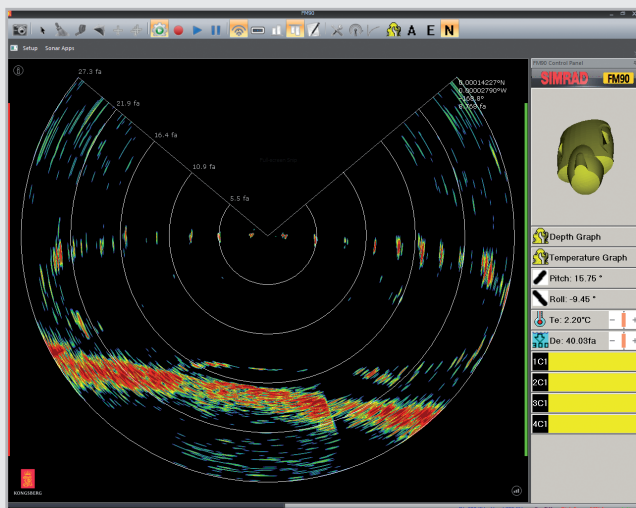
This picture shows Pollock in Alaska. Notice the trawl is actually touching bottom on starboard but on the echosounder it looks like the trawl is off the bottom. This is only truly possible with a multibeam trawl sonar. A traditional search light trawl sonar could lose this information as it takes too long time to draw the picture.
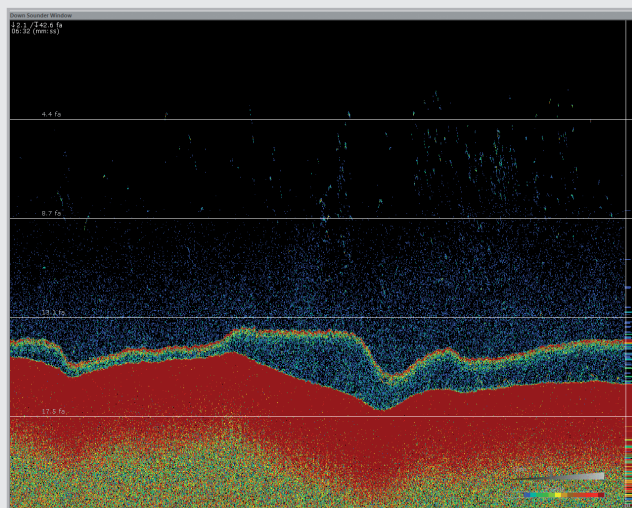
This part is the 200 kHz down looking echosounder. The line above the bottom is the footrope of the trawl. It is easy to see fish escaping below the footrope.
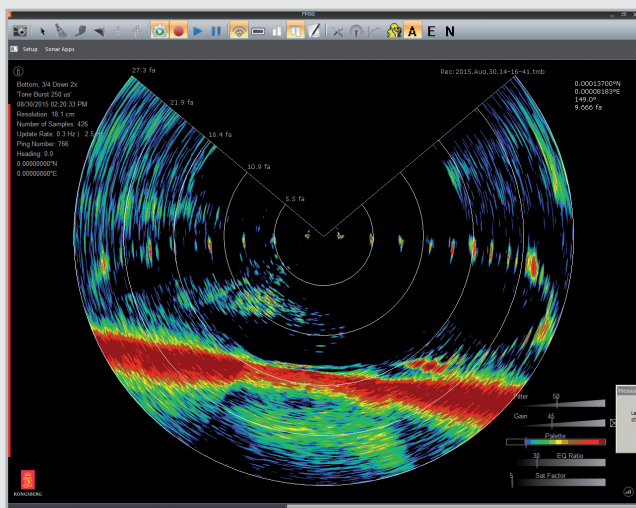
This picture shows Pollock in Alaska. Here the net is almost on the bottom and still the contour of the net is easily seen along with fish entering the trawl opening. Again, the trawl is touching bottom on the starboard side while port side is clear of the bottom.
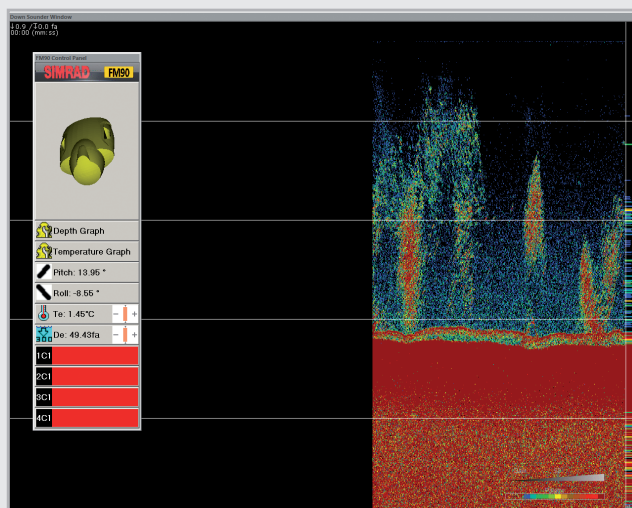
On the down looking echosounder fish entering the trawl opening is easily seen with great details. Also, notice the footrope almost touching bottom. Here four catch sensors have been triggered and it's time to haul!
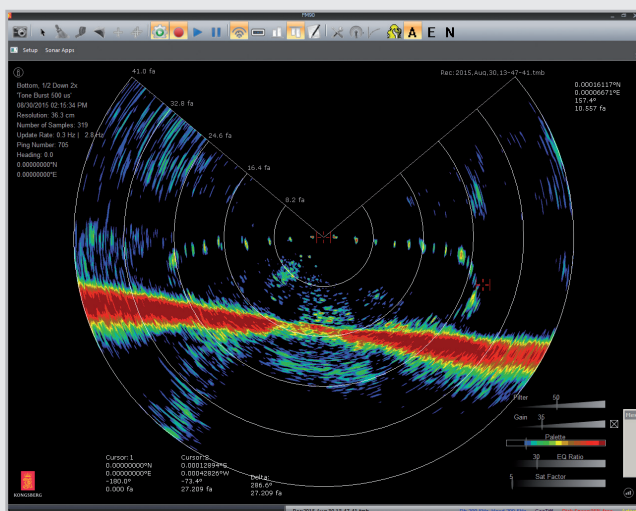
In the above picture the net is solid on the bottom and still the net geometry and fish entrance is easily seen.
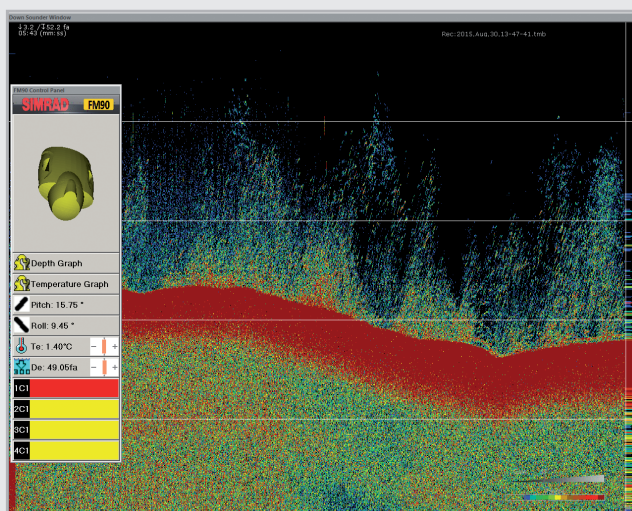
SENSOR LOCATION AND AVAILABLE FUNCTIONS

1   PORT DOOR

Function	Lid type	Remote code
Spread	Any	1 or 2
Spread XT	Any	1 or 2
Height	Any	
Roll	Any	
Pitch	Any	
Temperature	D1000/Temp	
Depth	D1000/Temp	
Battery status	Any	
Twin Spread (Twin trawl)	Any	1 or 2
Twin Spread XT (Twin trawl)	Any	1 or 2
Remote Geometry	Tdr LID	1P or 2P

2   STARBOARD DOOR

Function	Lid type	Remote code
Height	Any	
Roll	Any	
Pitch	Any	
Temperature	D1000/Temp	
Depth	D1000/Temp	
Battery status	Any	
Remote Spread	Any	1A or 2A
Remote Geometry	Tdr LID	1A or 2A

4   HEADLINE / TRAWLEYE

Function	Lid type	Remote code
Geometry DF	Any	1 or 2
Geometry	Any	1 or 2
Geometry XT	Any	1 or 2
Height	Standard	
Roll	Standard	
Pitch	Standard	
Temperature	D1000/Temp	
Depth	D1000/Temp	
Battery status	Any	

5   INTERMEDIATE

Function	Lid type	Remote code
Geometry DF	Any	1 or 2
Geometry	Any	1 or 2
Geometry XT	Any	1 or 2
Height	Any	
Roll	Any	
Pitch	Any	
Temperature	D1000/Temp	
Depth	D1000/Temp	
Battery status	Any	

6   FOOTROPE

Function	Lid type	Remote code
Height	Any	
Roll	Any	
Pitch	Any	
Temperature	D1000/Temp	
Depth	D1000/Temp	
Battery status	Any	
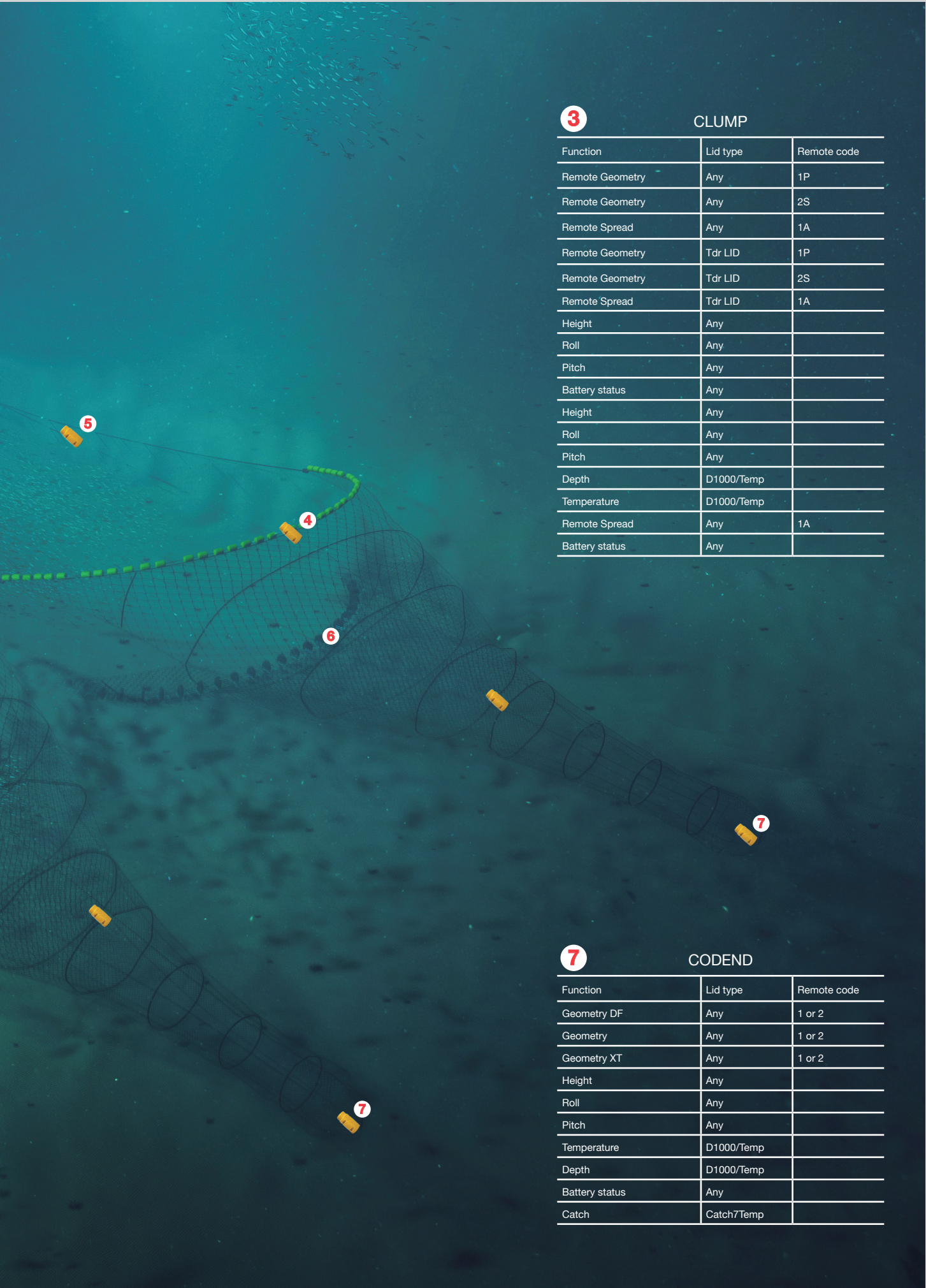
3   CLUMP

Function	Lid type	Remote code
Remote Geometry	Any	1P
Remote Geometry	Any	2S
Remote Spread	Any	1A
Remote Geometry	Tdr LID	1P
Remote Geometry	Tdr LID	2S
Remote Spread	Tdr LID	1A
Height	Any	
Roll	Any	
Pitch	Any	
Battery status	Any	
Height	Any	
Roll	Any	
Pitch	Any	
Depth	D1000/Temp	
Temperature	D1000/Temp	
Remote Spread	Any	1A
Battery status	Any	

7   CODEND

Function	Lid type	Remote code
Geometry DF	Any	1 or 2
Geometry	Any	1 or 2
Geometry XT	Any	1 or 2
Height	Any	
Roll	Any	
Pitch	Any	
Temperature	D1000/Temp	
Depth	D1000/Temp	
Battery status	Any	
Catch	Catch7Temp	

TRAWL SENSORS SPECIFICATIONS

	PX UNIVERSAL			PX MULTISENSOR		ITI		
	DEPTH	CATCH	STANDARD	MULTISENSOR MK2	TRAWLEYE	SPREAD	COMBI	TRAWL EYE
Communication Frequency	43,5-49,5 kHz	40-70 kHz	43,5-49,5 kHz	43,5-49,5 kHz	25-49 kHz	27-33 kHz	27-33 kHz	27-33 kHz
Echosounder / Transverse working frequency	N/A		70 kHz	70 kHz	200 kHz	104 kHz	104 kHz	120 kHz
Maximum Communication Distance	2500 m			2500 m	2000 m[3]	2500 m		
Depth Rating	1400 m[1]			1400 m[4]	1400 m[4]	1800 m		
Maximum number of measurements	5			5		1		

UPDATE RATES

Slow	5,5 s. approx.				2/4/8 s.			
Normal	14 s. approx.			15 s.	1,1 s.	From 8 to 120 s.[2]		
Fast	34 s. approx.				0,5 s.			

MAXIMUM BATTERY LIFE

With one measurement (hours)	100	150	100	150	20-100 [5]		40	
With two measurements (hours)	N/A	N/A	80	110	20-100 [5]			

CHARGING TIME

Up to 70% of total capacity (hours)	1			3	2	1,5		
Up to 100% of total capacity (hours)	4				3	3		

WEIGHT

In Air	4,3 kg	4,3 Kg	7 Kg	7,5 kg	7,5 kg	9 kg	9 kg	10 kg
In Water	1,5 kg	1,5 kg	2,7Kg	4,5 Kg	4,5 Kg	4,5 kg	3 kg	3,7 kg

Door Spread Maximum Range				600 m	N/A	N/A	300 m	
Geometry Maximum Range				N/A	600 m	N/A		
Acoustic Depth / Height Maximum Range			100 m	100 m				100 m

(1) Except PI D300 which is 1000 m.
(2) Depending on the number of sensors activated, their distance to the vessel and the interrogation rate selected by the user.
(3) Depending on sea conditions, noise level, sensor alignment, output power.
(4) Note: depth lid only goes to 1000 meters
(5) Depending on output power and update rate.

TRAWL UNITS SPECIFICATIONS

	SR15	SR70	FS70	ITI
PROCESSING UNIT				***
Voltage	110/220 VAC		110/220 VAC	110/220 VAC
Consumption	5 A.		5 A.	90 W
Processor type	Standard PC computer		Standard PC computer	Built in
Operating system	Windows™ XP, Vista, 7		Windows™ XP, Vista, 7	
Display output	Single		Dual	Single
Serial interface I/O	One RS232		One RS232	Four NMEA ports
Ethernet interface	One		One	Optional
Display resolution	Standard XGA		Standard XGA	VGA 680x512 (Hs 29,45kHz - Vs 57Hz)

	SR15	SR70	FS70	ITI
TTM / BRIDGE UNIT				
Voltage			110/220 VAC	
Consumption			5 A.	
Communication link			With third wire	

	SR15	SR70	FS70	ITI
WIRELESS SENSORS TX/RX UNIT			(Built in the Deployment package)	*
Voltage	24 VDC **			
Consumption	250 mA.			
Hydrophone connection	1		Up to 2 (Fore and Aft)	Up to 3 - Automatic selection
Hydrophone type	Single Beam with preamplifier		No	2 Way Split Beam
Frequency range	43,5-49,5 kHz		40 kHz or 70 kHz	27-33 kHz
Serial interface I/O	1 RS232			4 NMEA ports
Ethernet interface	1			Optional
Bearing to sensor measurement	No		No	Yes
Distance to sensor measurement	No		No	Yes
Maximum range to sensors ***	2500 m.		2500 m.	4000 m.
Sensor compatibility	PS, PI, PX, FA701		PS, PI, PX, FA701	ITI
RX Channels	6		6	10
Sensor types	Depth, Temperature, Spread, Catch, Rip, Height, Pitch angle, Roll angle, Geometry, Bottom contact, Seine sounder		Depth, Spread, Catch, Rip, Height, Pitch angle, Roll angle, Bottom contact, Seine sounder	Depth, Temperature, Spread, Catch, Height, Grid angle, TrawlEye

UNDERWATER UNIT	FM90	FS70	PX TRAWLEYE
DEPLOYMENT PACK			
Material	Polyurethane with S.S. Fasteners	Polyurethane with S.S. Fasteners	Polyurethane with S.S. Fasteners
Dimension L x W x H in cm.	84 x 41 x 30	79 x 43 x 27	49,5 x 35,5 x 17
Weight (complete system in air)	35,5 Kg	28 Kg	12,5 Kg

	FM90	FS70	PX TRAWLEYE
SENSOR HEAD			
Head type	Multibeam with down/up sounder	Analog Vertical with Echosounder	Wireless
Vertical transducer frequency	200 kHz	120 kHz or 330 kHz	200 kHz
200 kHz/120 kHz Head Beam width ****	3° x 20°	5° to 40°	N/A
Up Sounder/330 kHz Head Beam width *****	25° x 20°	1,9° to 20°	N/A
Echosounder frequency	200 kHz	200 kHz	200 kHz
Echosounder transducer beam width	10° x 20 °	10° x 20°	33°
Depth rating	2000 m.	2000 m.	1000 m.
Sensors built-in	Depth, Temperature, Pitch and Roll	Depth, Temperature, Pitch and Roll	Roll/Pitch/Battery Status

* Built in the processing unit.
** 115/230 VAC to 24 VDC Adaptor included with the delivery.
*** Detection range depends on transducer installation, ambient noise level, temperature gradient and sensor alignment.
**** 200 kHz Head Beam width for FM90. 120 kHz Head Beam width for FS70 and PX TrawlEye.
***** Up Sounder Beam width for FM90. 330 kHz Head Beam width for FS70 and PX TrawlEye.

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