

SIMRAD

Sonars



TECHNOLOGY FOR SUSTAINABLE FISHERIES

ST90

#RANGEDEFINITION

SIMRAD is continuously developing the sonar range by utilizing the latest in technology combined with over 70 years of experience. The latest achievement is the new low frequency sonar, ST90. Our current low frequency sonars (SX90 and SU90) have been in the 20-30kHz range. With the ST90 we have lowered this range to 14-22kHz. In order to achieve this, a completely new transducer has been designed. Each element is larger than the previous, but the amount of elements are the same as the SU90, giving the same narrow beam and ultimately a longer range.

The ST90 is made to search at very long range in all conditions. Whether it is heavy weather, hard bottom, open waters, weak targets it all will be handled by the ST90 due to the fully stabilized and very narrow beams combined with state of the art signal processing.

The ST90 will also feature the new and powerful Winson sonar operating SW with all the new benefits like multiple monitor, "all beams in one ping" and so forth. Please see the new sonar SW section where this is described in more detail.



NEW WINSON SONAR OPERATING SOFTWARE

NEW WINSON SONAR OPERATING SOFTWARE

The current operating software in Simrad sonars has been a tremendous success with its intuitive and easy to use interface. Now it is time to take this success to another level by introducing the new operating software already operational in our echosounders, catch monitoring systems and SN90 sonar. This will complete our mission of having one unified interface between the user and the product regardless of what product you are operating.

Great new features are also a part of this upgrade.

OPTIMIZED FOR MULTIPLE DISPLAYS

The new "docking" function enables the user to take any window and place it on a separate screen or display. If you move the vertical view to another display, it will automatically scale the window for best viewing of long range in shallow water for example.

"ALL IN ONE PING"

Modern sonars today use multiple pings to generate the various views. For example, one for the omni 360° view and maybe two different vertical view are three pings, now all three will be transmitted and received in one ping. This dramatically improves the update rate on the screens giving a more real time information.

RECORDING

The new operational software is now enabled to record real time situations. Before, only screen captures were recorded. Now the real echoes are recorded making it possible to replay sequences like in real life. During playback vital information can be viewed for training and/or troubleshooting purposes.

TRACKER FUNCTION

The tracker function has been further developed and can now utilize information from both the horizontal and vertical ping.

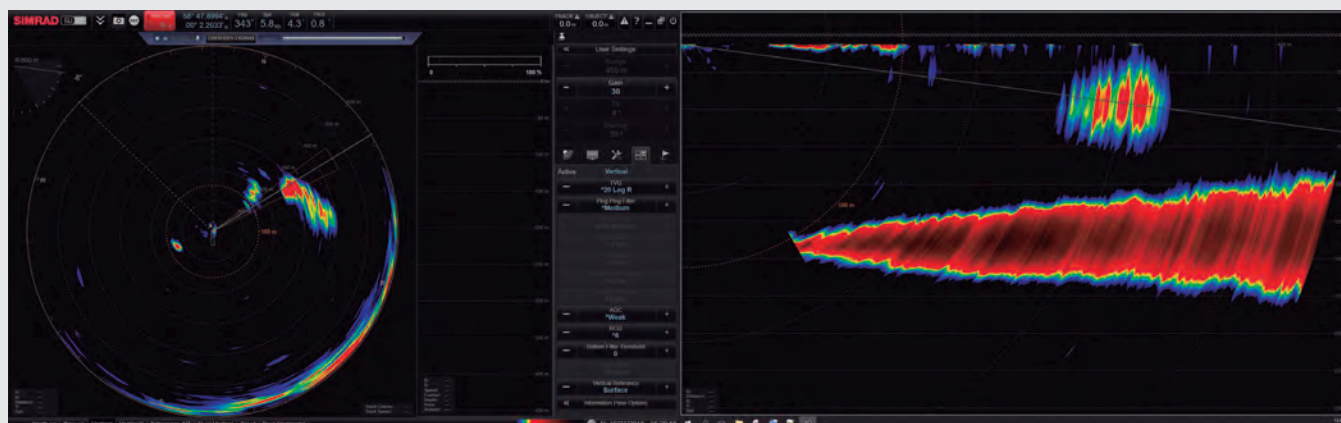


SIMRAD SU90 SONAR

The SU90 Sonar is made with no compromises. The number of channels has been increased by 50% compared to the SX90 Sonar giving the sonar an even better performance in selectivity and range. Its operational frequency is 20 to 30 kHz. The narrow opening angle (4,9° at 30 kHz) and the increased source level (3dB) makes the SU90 a very powerful and high resolution low frequency sonar.

The narrow beam makes the SU90 even more ideal for searching fish close to the bottom or close to the surface at long ranges. Also it will give a far better vertical view with less "bottom climbing" that is seen on sonars with a wider beam. The SU90 is equipped with the celebrated signal processing seen on the SX90 such as Hyperbolic FM transmission giving the user a clutter free picture with very high resolution in range.

The higher source level (3dB higher than SX90) will increase the detection range and enhance the detected echoes in general. How much longer range is almost impossible to calculate as temperature layers, salinity, bottom hardness, target strength and sea conditions will never be the same for a good comparison. However, the sonar will have a longer range than the SX90.



When connecting two displays any sonar presentation can be placed on any of the two. In the above example the vertical view has been placed on the display to the right. Notice that the scaling is different in horizontal and vertical plane. This makes the vertical slice useful when fishing in shallow water at long range.

SX90 THE COST EFFECTIVE WORKHORSE

The SX90 is a low frequency, high-definition, long range sonar that utilizes the latest high-end computer to process data from the transducer. The SX90 is specially designed for vessels where high resolution combined with long range is needed. With the state of the art processor there are several unique possibilities for advanced signal processing. Three different vertical beam widths, single or dual vertical view and 180° tiltable vertical view are available. At 30 kHz operating frequency, the vertical beam width is only 7,1°.

The Simrad SX90 Sonar offers unique features such as full circle beam stabilization for easier fish detection in poor weather and 11 different sonar operating frequencies with 1 kHz separation to avoid interference from other sonars. The long range and higher definition of the SX90 will improve your catching abilities and help you make better use of your time at sea. Great emphasis has been placed on giving the best possible overview in the search and catch situation. In addition, full screen echo presentation, resizable windows, off center, zoom and dual operation are standard functions on all sonar models. You can evaluate one school while tracking two other targets, giving you full control of schools and net from detection to catch.



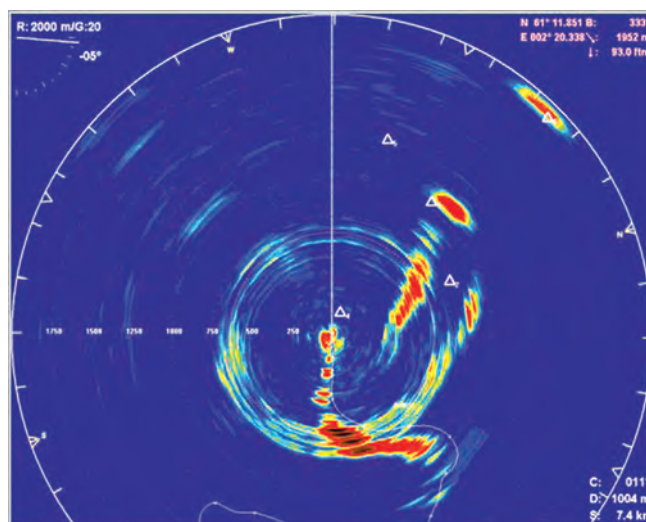
Multi frequency 20 to 30 kHz!

Fishing in the same area as others can be a challenge as other vessels might have sonars transmitting on the same, or close to the frequency you are using. With multi frequency from SIMRAD you are able to tune your sonar for maximum performance and avoid interference from other vessels. With 11 different frequencies with 1 kHz separation, interference is no longer a problem.

Only a wideband transducer can be used to be able to transmit and receive at such a wide spread band of frequencies. SIMRAD designs and produces our own transducers for this purpose.

Mackerel

School of mackerel detected at 40° starboard and marked as "6". Sonar is operated in "Bow Up" mode with "Full Screen". Range is 2000 meter and tilt is set at 5°. Range to school is 1952 meter and depth is indicated to be 93 fathoms saying that the mackerel school is on the bottom. Echoes between the mackerel and the vessel is wake from pair trawlers coming towards the vessel.

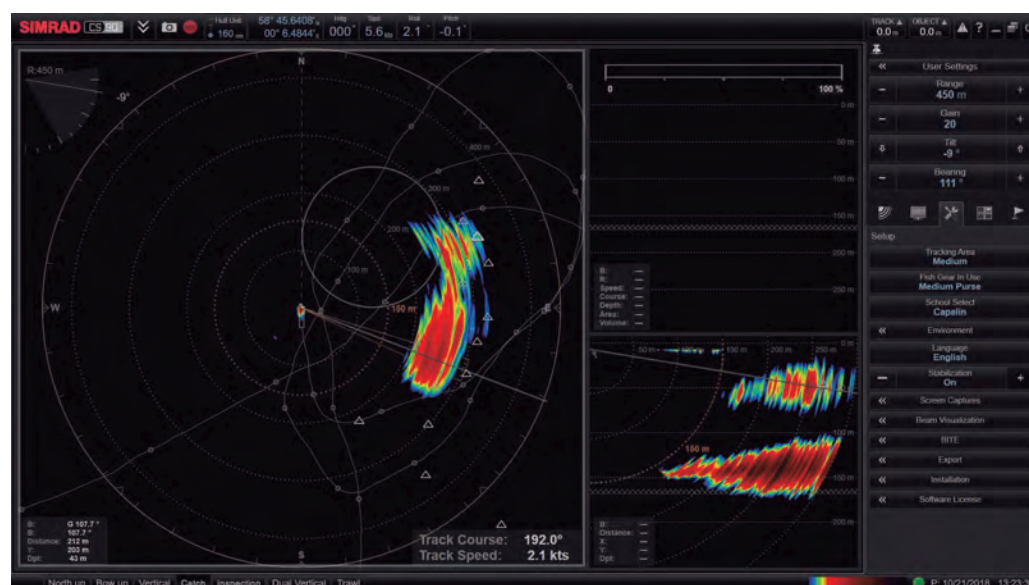


CS90

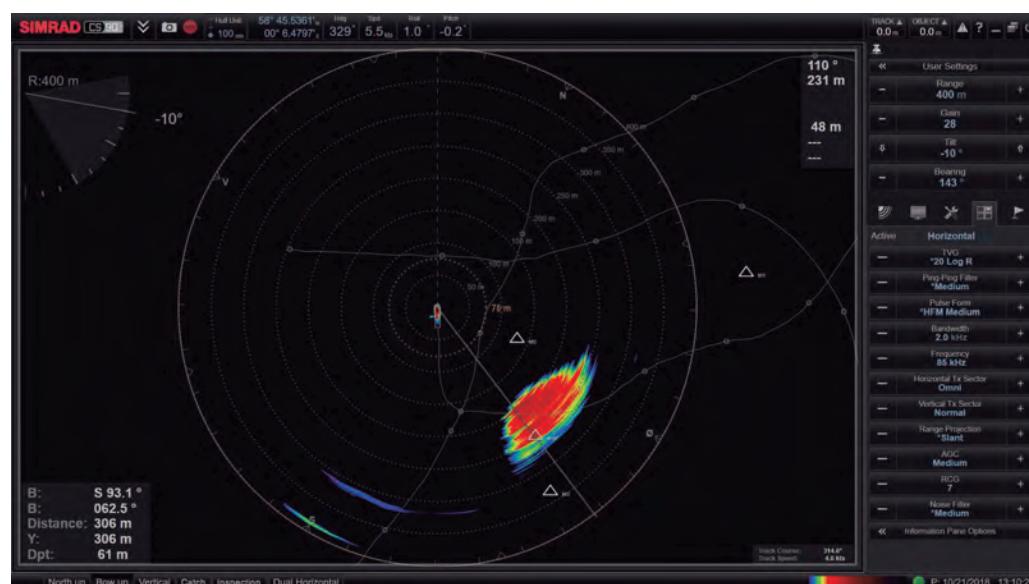
TRUE BROADBAND HAS ARRIVED!

The CS90 is the first Omni broadband sonar on the market. The world first composite transducer makes it possible to transmit and receive in a wide range of frequencies, in fact 70-90kHz! This makes it possible to achieve high resolution on longer ranges as well as tuning the frequency for better detection or avoiding a noisy source such as another echosounder or any other acoustic source.

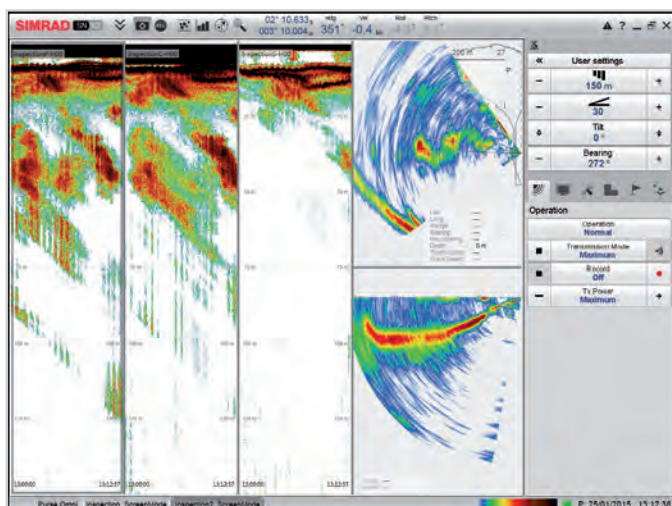
The CS90 also has the latest Winson SW enabling the user to view the various windows on separate displays using the new docking feature. Another great feature with the new SW is that it will ping all beams at the same time reducing the ping rate and increasing the update rate on the screen dramatically.



The CS90 is a broadband sonar capable of transmitting between 70 and 90kHz. It features the new operating SW and is optimized for the new joystick operating panel. This makes the CS90 very efficient to use during purse seine operation when a lot of equipment must be operated at the same time.



Notice the bandwidth here is 2kHz with a center frequency of 85kHz. This can be adjusted between 70-90kHz. The CS90 is an Omni broadband sonar with composite transducer. Here is an example from Mackerel fishery in the North sea. The CS90 has the new Winson 2019 operating SW with several benefits (please see page 22-23).



Up to five inspection beams (three shown here) can be trained and tilted individually while maintaining the overview with the horizontal fan and vertical slice.

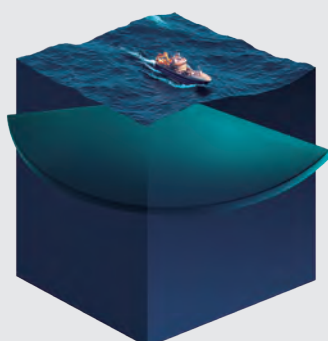


Installed looking to the port side of the vessel together with horizontal looking ES70 echosounders previously installed.

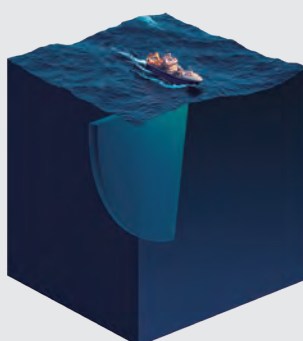
SIMRAD SN90 SEINE SONAR. FULL CONTROL BEFORE AND DURING THE SETTING OF THE NET

The game-changing SN90 Sonar is the latest development from SIMRAD. With the SN90 the user will get full control over the setting of the seine without having to care about retracting the hull unit. The SN90 transducer can be installed without a retractable hull unit to the side of the keel facing the purse seine. The 256 individual beams have a horizontal coverage area of 160° and the vertical beam width is typically 6° (varies with the frequency from 5° to 8°). The beams are tiltable from 0° down to 90°.

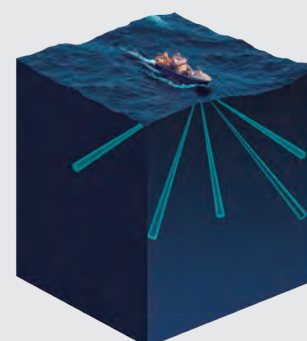
In addition to this, five steerable inspection beams of 5°x5° can be used for more detailed inspection of a school like observing fish behaviour, target strength and biomass. This will enable the fisherman to run alongside a school of fish and observe, like a horizontal echosounder, and analyse the school without passing over it. Fish avoidance is then minimized and more information about the fish in the school will reduce the bycatch, unwanted species in addition to catch the correct school size and conduct volume estimation of the school before setting the net.



The SN90 has a 160° fan that is tiltable from 0° down to 90°. This will enable to see the purse seine during the whole setting of the net.



The SN90 has one vertical slice that can be trained in any direction within the fan. This will give full control of the edges of the school during setting of the net.

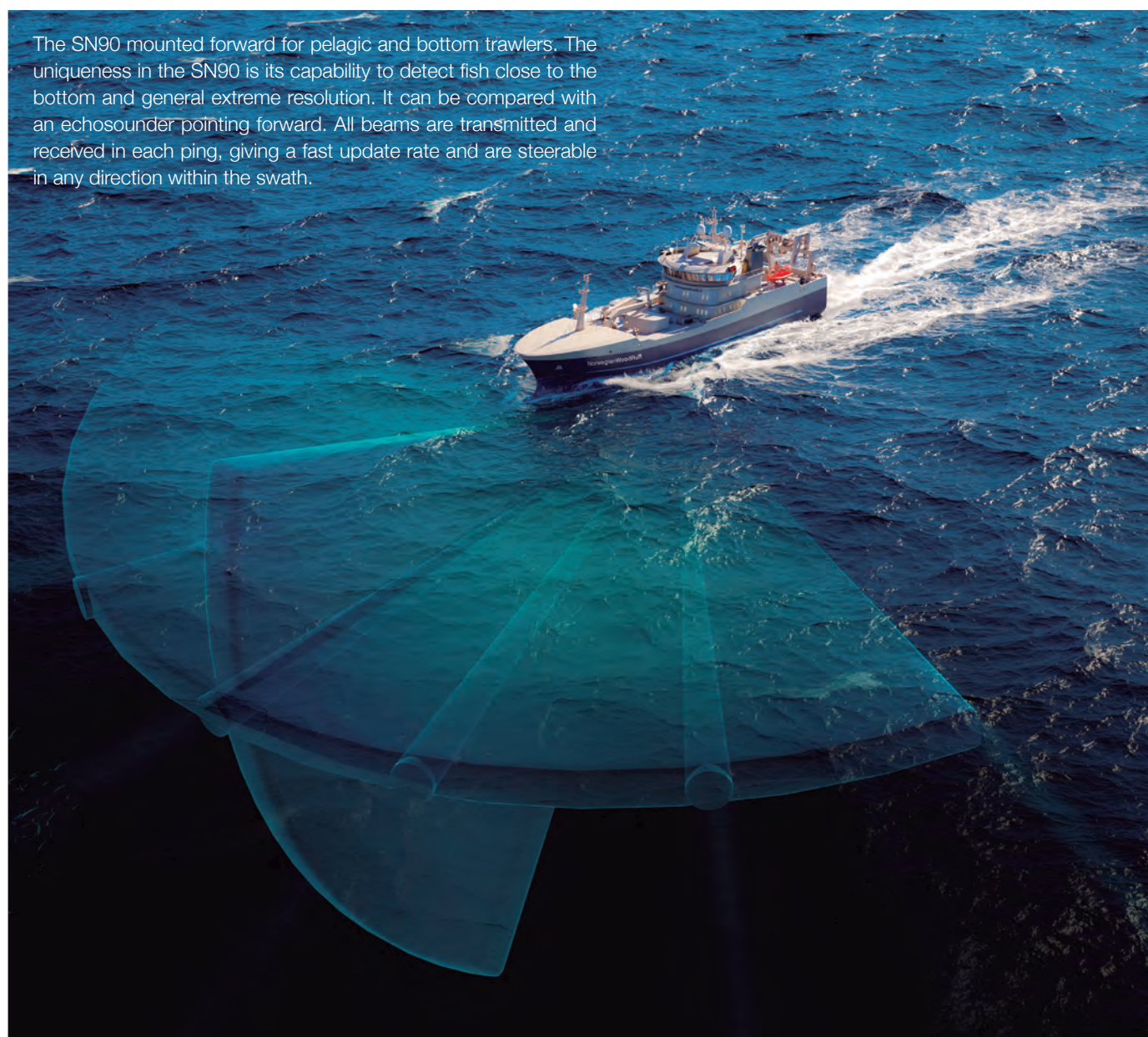


The SN90 has five individually steerable inspection beams that can be trained and tilted with any frequency between 70 and 120 kHz. The inspection beam will give a detailed high resolution echogram.

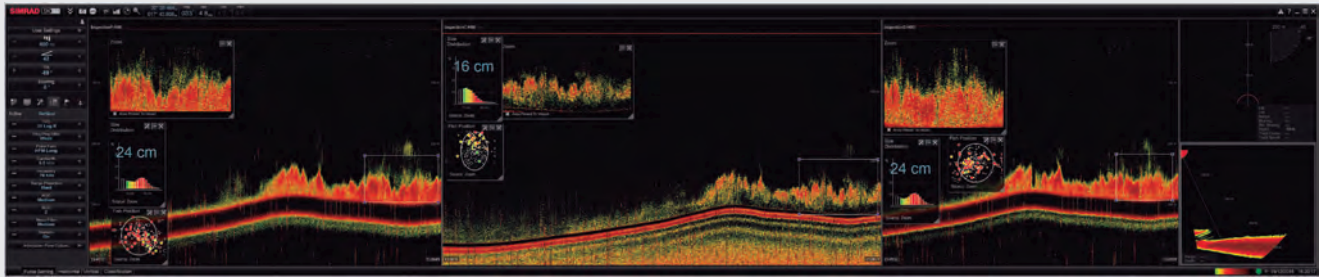
SIMRAD SN90 TRAWLING SONAR. THE ULTIMATE TOOL FOR ANY TRAWLER!

Simrad SN90 can be configured as a forward looking multibeam sonar for trawlers. The unique flexibility of the SN90 enables it to be used at almost any fishery depending on how the transducer is installed. Mounted forward looking the SN90 can be used as a trawling sonar. The display software is then oriented forward during installation. The SN90 transducer can be fixed to the hull or bulb like a regular echosounder's transducer or mounted on a hull unit when fishing in ice or other hazards. The sonar beams are pointing forward only in a 120 degree swath, taking the propeller noise out of the equation.

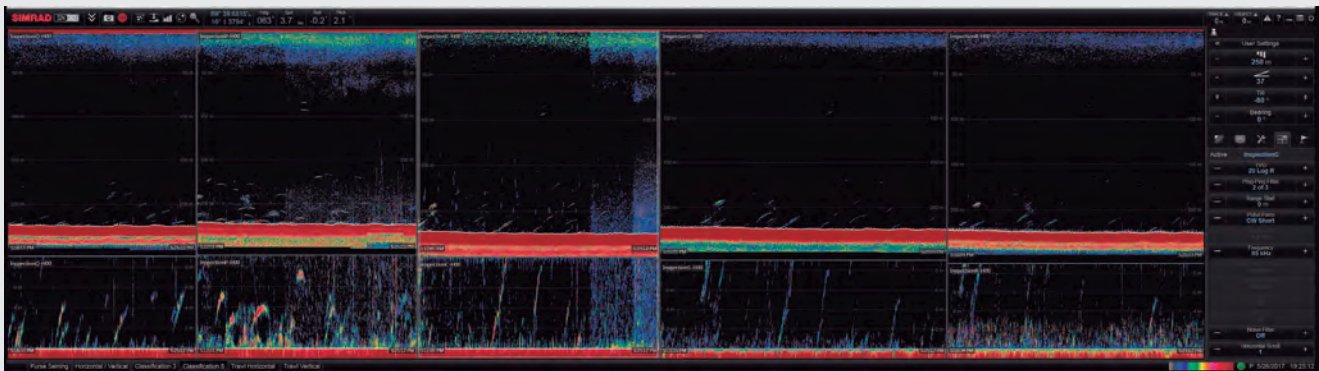
A full vertical slice as well as five inspection split beams can be individually trained and tilted to the user's needs. Stack the five beams on top of each other or spread them out to inspect to any side. A bottom detector and bottom expansion has been included in the presentation of the 5 inspection beams. This will enable the user to detect fish close to the bottom forward of the vessel and have more time to decide before the fish reaches the trawl. The SN90 is a chirp wideband sonar/echosounder transmitting and receiving between 70-120 kHz.



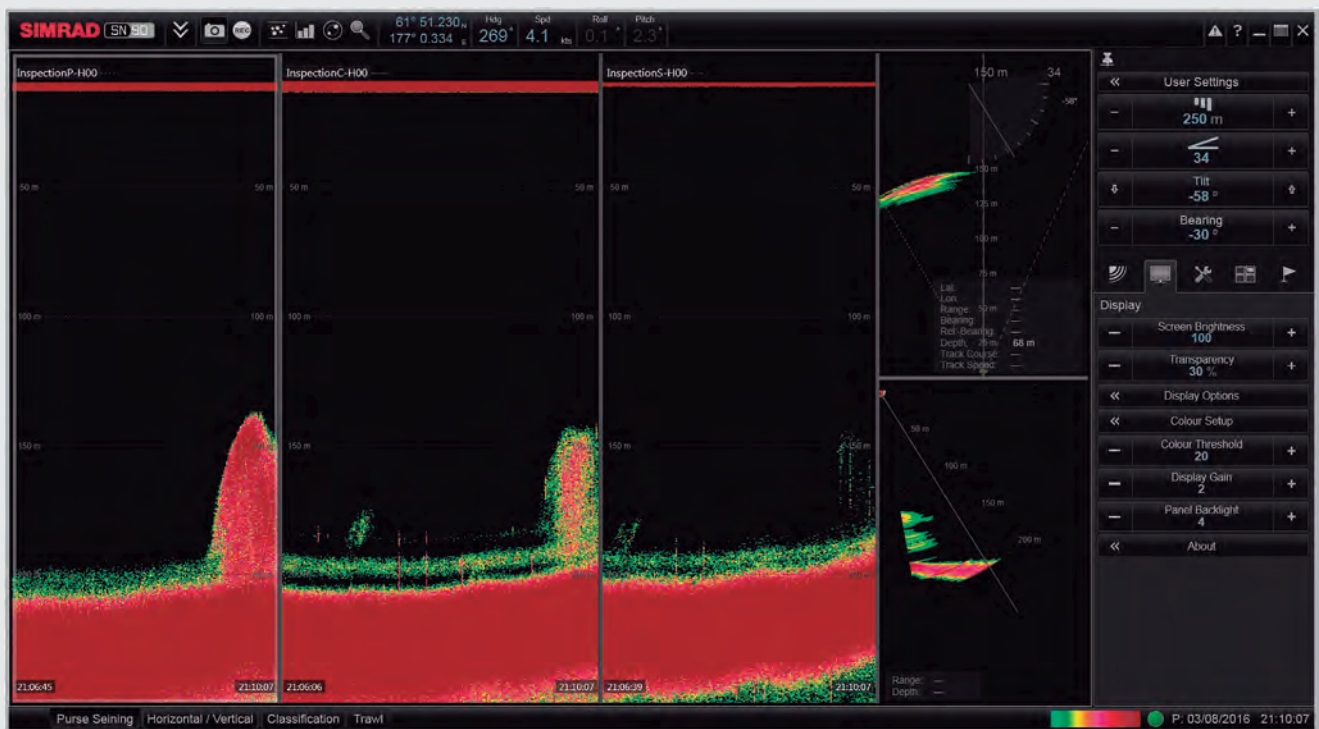
The SN90 mounted forward for pelagic and bottom trawlers. The uniqueness in the SN90 is its capability to detect fish close to the bottom and general extreme resolution. It can be compared with an echosounder pointing forward. All beams are transmitted and received in each ping, giving a fast update rate and are steerable in any direction within the swath.



The picture shows Mackerel outside Mauretania. The vessel is trawling for the Mackerel close to the bottom. Notice the oval shaped split beam circle in the middle. This means that the middle inspection beam has a different tilt and consequently a different opening angle of the beam.



The picture above is from F/V "Ramoen" using five inspection beams forward with bottom lock and bottom expansion. This makes it easier to turn onto the fish even if they are close to the bottom.



Pollock behaves differently during day time and night time. In this example, the Pollock is mixed with Herring in the Bering sea Russian side. Heavy tilt is used pointing the inspection beams slightly forward and to both sides. We can see that port side has more mixed Herring than on starboard side giving the skipper the information needed to take important decisions.

SONAR OPERATING PANEL (SOP)

The new Sonar Operating Panel (SOP) includes a handy multifunction joystick. It allows the operator to control the tilt, vertical and inspection beams easily just by pushing it and/or turning its top knob. With one single Operating Panel you can control up to four sonars with the new Winson 2019 SW. Or right the opposite: you can connect up to three different Operating Panels on different locations onboard to operate one sonar just by means of an Ethernet connection. One on the bridge, one on the wing and

one in the tower for example. Also, the front panel USB port makes it possible to upgrade sonar SW as well as saving/importing user settings. Dedicated buttons as well as programmable buttons/knobs are also available. The new SOP fits in the previous Simrad SOP spot using a bracket making the installation easy as well.

- 1 USB port
- 2 Multifunction Joystick
- 3 Trackball
- 4 User defined function buttons
- 5 User defined potmeters (Gain, range, etc.)
- 6 Sonar selector



SONAR UPGRADES

High frequency sonars

FROM	UPGRADE TO	REQUIREMENTS
		<ul style="list-style-type: none">• Transceiver and processor• Return old transceiver and power supply• SOP optional
		<ul style="list-style-type: none">• No Upgrade

Note! The new SOP will not work with old SW!
(But old SOP will work with new SW, expect delivery time)
SOP = Sonar Operating Panel

Low frequency sonars

FROM	UPGRADE TO	REQUIREMENTS
		<ul style="list-style-type: none">• Return a full operating SX90• Remember adapter on trunk
		<ul style="list-style-type: none">• Return a full operating SX90• Remember adapter on trunk
	Winson 2019	<ul style="list-style-type: none">• Including the latest Processor Unit• SOP optional
		<ul style="list-style-type: none">• Transducer and processor• Return SU transducer• Remember adapter on trunk• SOP optional
	Winson 2019	<ul style="list-style-type: none">• Including the latest Processor Unit• SOP optional

SONARS SPECIFICATIONS

	SC90	CS90	SN90	SX90	SU90	ST90
PROCESSING UNIT						
Voltage	110/220 VAC					
Consumption	5 A					
Processor type	ENIX					
Operating system	Windows™ 10					
Display output	Triple					
Serial interface I/O	Four serial ports (expandable)					
Ethernet interface	Three + one fiber optic					
Display resolution	1920 x 1080 or 1920 x 1200					
Operating ranges	50 to 2000 m	50 to 2000 m	50 to 2000 m	50 to 5000 m*	50 to 5000 m*	50 to 5000 m**

TRANSCEIVER UNIT						
Voltage	110/220 VAC					
Consumption	750 VA	750 VA	400 VA	750 VA	750 VA	750 VA
Operating Frequency	85 kHz	70 to 90 kHz	70 to 120 kHz	20 to 30 kHz (1 kHz step)	20 to 30 kHz (1 kHz step)	14 to 22 kHz (1 kHz step)
Modulation	CW and Hyperbolic FM					

BEAM						
Horizontal coverage	Omni	Omni	160°	Omni	Omni	Omni
Vertical Tilt	+10° to -90°	+10° to -90°	+10° to -60°	+10° to -90°	+10° to -90°	+10° to -90°
Vertical beam width	8,0°	8,0°	6,0°	See table below	See table below	6,0°
Transceiver channels	480	480	256	256	384	384
Pitch & Roll Stabilisation	Included					
External Pitch & Roll interface	MRU Kongsberg Seatex format (Optional)					
Scientific Data Output	Optional					

HULL UNIT						
Voltage	230/380/440 VAC 3 Phase	230/380/440 VAC 3 Phase	230/380/440 VAC 3 Phase	230/380/440 VAC 3 Phase	230/380/440 VAC 3 Phase	230/380/440 VAC 3 Phase
Consumption	1100VA	1100VA	3000VA - 1100 VA	3000VA - 1100 VA	3000VA - 1100 VA	3000VA - 1100 VA
Selectable Transducer Position	Yes	Yes	Yes	Yes	Yes	Yes
20 knots hull unit	Yes	Yes	No	Yes	SU92	No
2.1m Transducer lowering	N/A	CS94	N/A	N/A	SU94 Hull Unit	ST94 Hull Unit
1.6m Transducer lowering	N/A	N/A	N/A	SX93 Hull Unit	SU93 Hull Unit	ST93 Hull Unit
1.2m Transducer lowering	N/A	N/A	SN92H	SX92 Hull Unit	SU92 Hull Unit	ST92 Hull Unit
1m Transducer lowering	SC90	CS90	N/A	SX95 Hull Unit	N/A	N/A

*Optional extended range 6000 to 10000 m, requires export license in selected countries.

**Optional extended range 12000 m

OPENING ANGLES ON SX AND SU SONARS						
SX90			SU90			
	WIDE	NORMAL	NARROW	WIDE	NORMAL	NARROW
20 kHz	14,8°	11,0°	10,7°	10,7°	7,8°	7,2°
21 kHz	14,1°	10,5°	10,2°	10,2°	7,4°	6,9°
22 kHz	13,5°	10,0°	9,7°	9,7°	7,1°	6,5°
23 kHz	12,9°	9,6°	9,3°	9,3°	6,8°	6,3°
24 kHz	12,3°	9,2°	8,9°	8,9°	6,5°	6,0°
25 kHz	11,8°	8,8°	8,6°	8,6°	6,2°	5,8°
26 kHz	11,4°	8,5°	8,2°	8,2°	6,0°	5,5°
27 kHz	11,0°	8,1°	7,9°	7,9°	5,8°	5,3°
28 kHz	10,6°	7,9°	7,6°	7,6°	5,6°	5,1°
29 kHz	10,2°	7,6°	7,4°	7,4°	5,4°	5,0°
30 kHz	9,9°	7,3°	7,1°	7,1°	5,2°	4,8°

BASIC SONAR THEORY

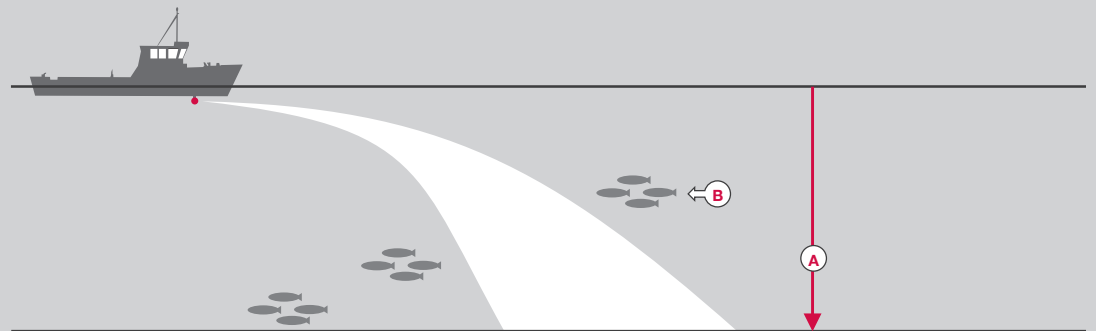
A sonar can sometimes be a challenging tool to operate. There are never two days at sea that are the same, weather, water temperature, bottom conditions, fish behavior, temperature layers, plankton layers, ships noise, sonar settings etc all influence the performance of a sonar.

The horizontal transmission of sound is defined by SIMRAD as a sonar. If transmitted vertically, then it is defined as an echosounder. Sending sound vertically is not as challenging as sending it horizontally and therefore an echosounder performance can be compared from day to day or between vessels. On a sonar this is not true. Even between vessels fishing

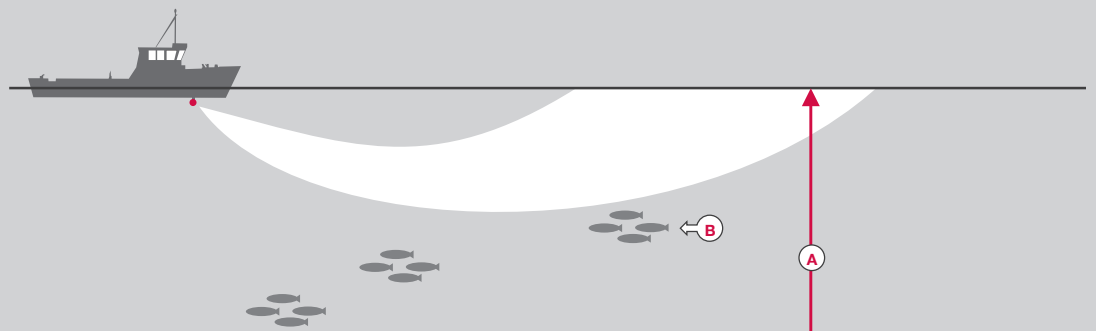
on the same fishing grounds, sonar can perform differently. Ship's noise, electrical and/or acoustic, is different from vessel to vessel, transducer installation is different from vessel to vessel, filter settings and general sonar operation is different from vessel to vessel and will affect the sonar performance.

On this page we have made some illustrations to consider when operating a sonar. There are many more but these are the most common ones that will change from day to day and between vessels.

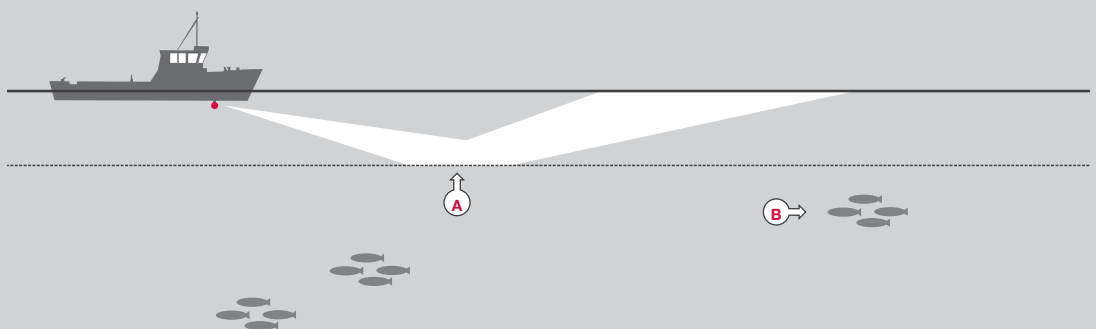
With decreasing temperature (A) the beam will bend towards the bottom shortening the range (B).

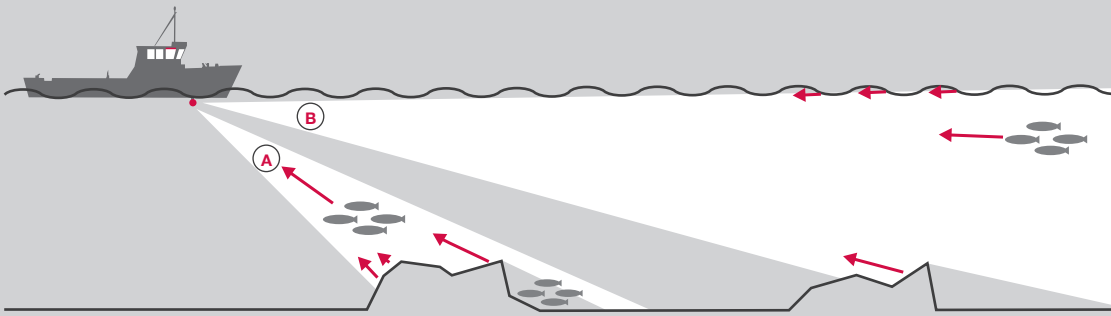


With increasing temperature (A) the beam will bend towards the surface shortening the range (B).



With a temperature layer (A) the beam can create a "sound channel" and increase the range (B) on certain tilt angles.



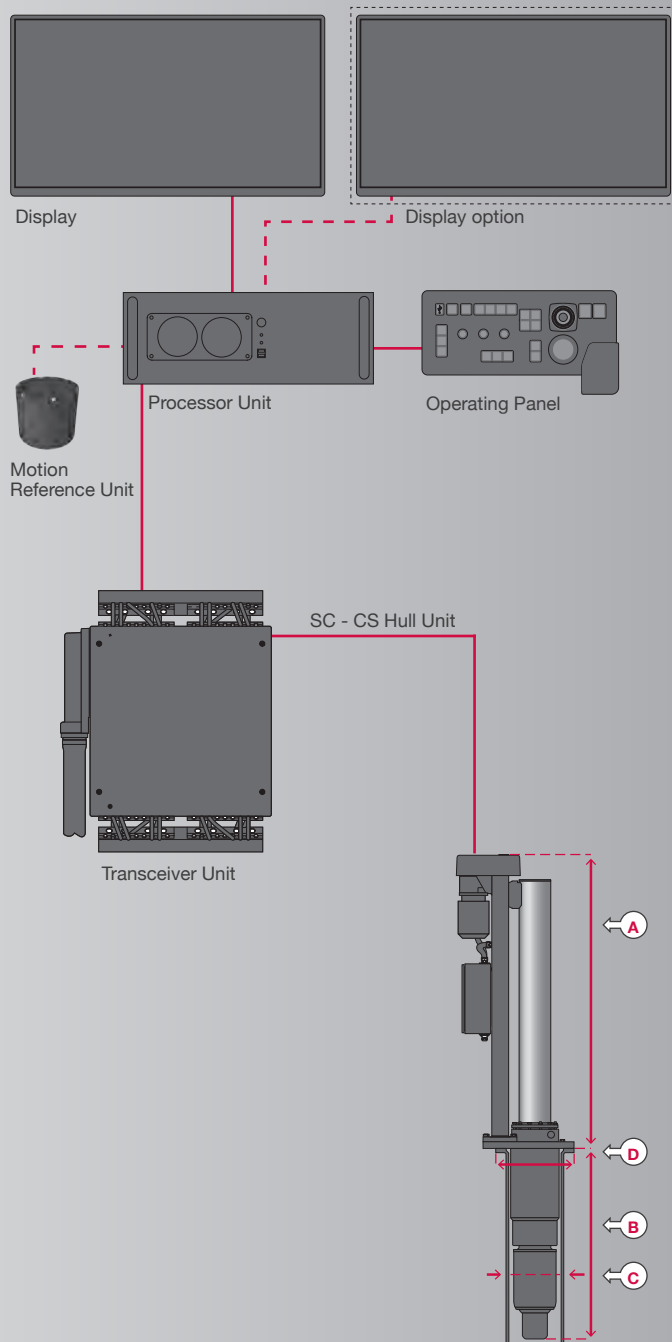


Depending on the tilt, echoes from other than fish will be detected. Bottom and surface is among those which generate the most echoes. Sometimes if weather is rough it is difficult to separate fish from surface echo and sometimes if fish is close to bottom or the bottom is rocky it is difficult to separate fish from bottom. A Simrad Sonar has the best filter available (RCG) to assist in separating fish from unwanted echo.

Propeller noise is caused by cavitation as illustrated in below picture. A clean propeller will still cavitate but much less than a propeller with marks and damages. Also, a large propeller will cavitate much less than a small due to the lower RPM.



SC - CS SYSTEM DIAGRAM



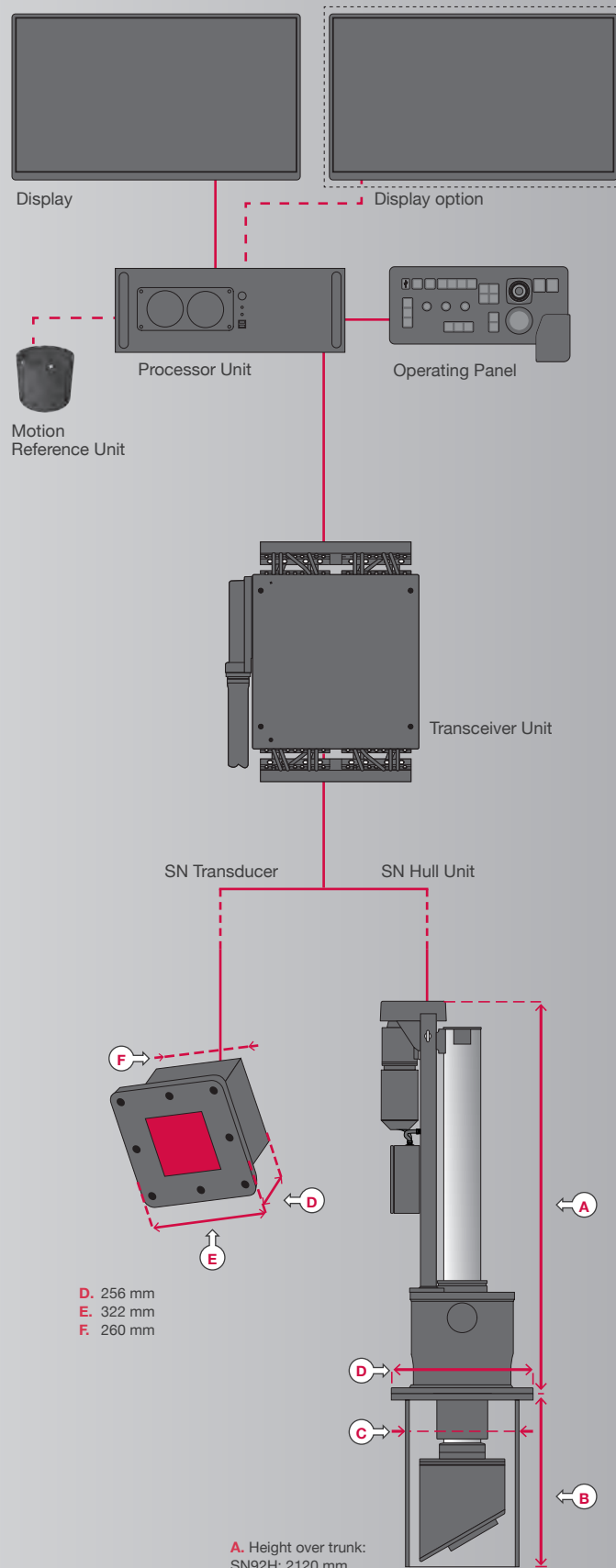
A. Height over trunk:
SC90 - 1390 mm

B. Height of trunk:
SC90 - 970 mm

C. Trunk diameter:
SC90 - 273 mm

D. Flange diameter:
SC90 - 370 mm

SN SYSTEM DIAGRAM



A. Height over trunk:
SN92H: 2120 mm

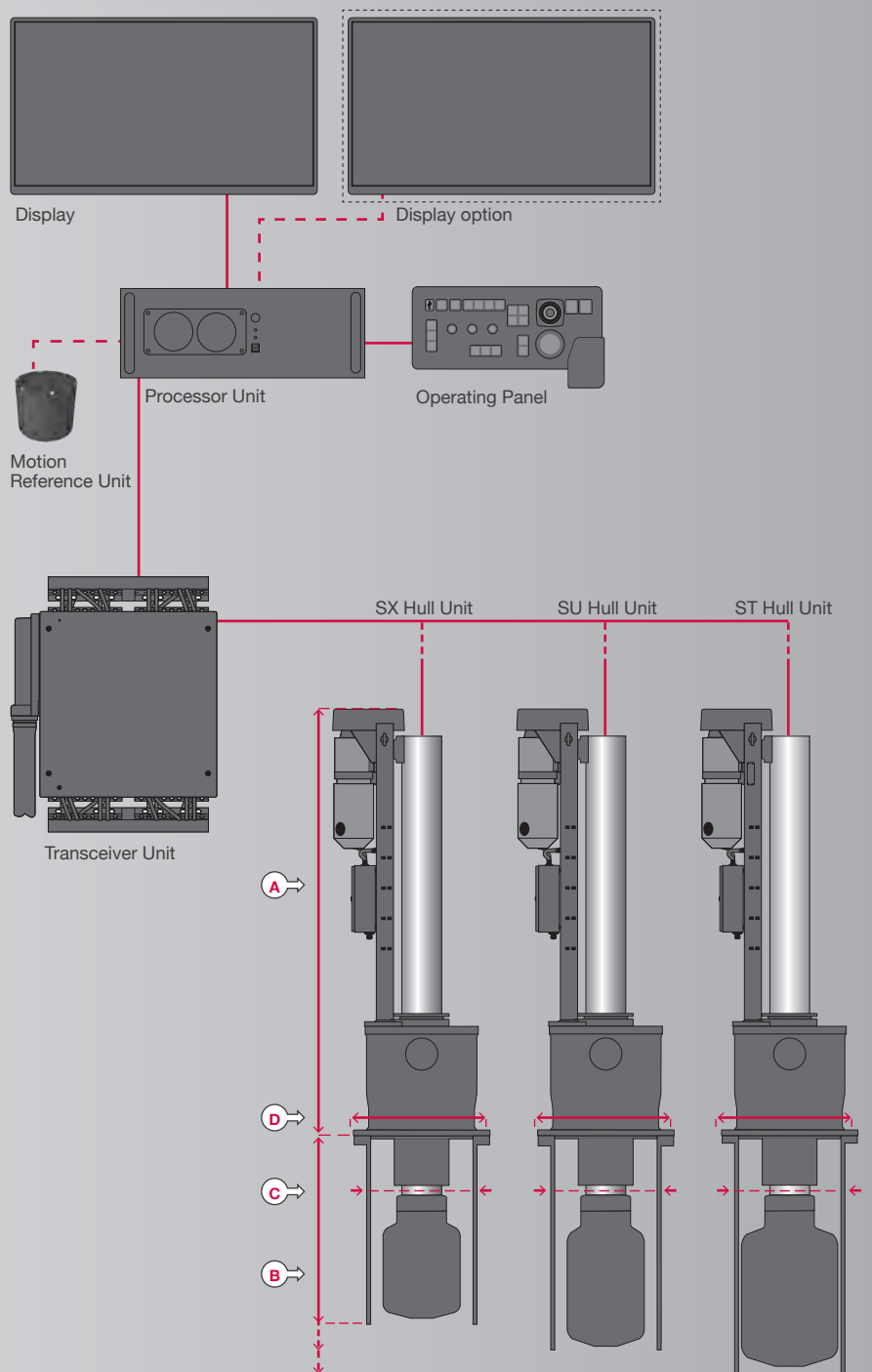
B. Height of trunk:
SN92H: 930 mm

C. Trunk diameter:
SN92H: 610 mm

D. Flange diameter:
SN92H: 761 mm

D. 256 mm
E. 322 mm
F. 260 mm

SX - SU - ST SYSTEM DIAGRAM



(SX92/SX93/SX95)

A. Height over trunk:
SX92 - 2118 mm
SX93 - 2518 mm
SX95 - 1645 mm

B. Height of trunk:
SX92 - 930 mm
SX93 - 930 mm
SX95 - 910 mm

C. Trunk diameter:
SX92 - 610 mm
SX93 - 610 mm
SX95 - 508 mm

D. Flange diameter:
SX92 - 760 mm
SX93 - 760 mm
SX95 - 580 mm

(SU92/SU93/SU94)

A. Height over trunk:
SU92 - 2118 mm
SU93 - 2518 mm
SU94 - 3018 mm

B. Height of trunk:
SU92 - 1110 mm
SU93 - 1110 mm
SU94 - 1110 mm

C. Trunk diameter:
SU92 - 610 mm
SU93 - 610 mm
SU94 - 610 mm

D. Flange diameter:
SU92 - 760 mm
SU93 - 760 mm
SU94 - 760 mm

(ST92/ST93/ST94)

A. Height over trunk:
ST92 - 2118 mm
ST93 - 2518 mm
ST94 - 3018 mm

B. Height of trunk:
ST92 - 1280 mm
ST93 - 1280 mm
ST94 - 1280 mm

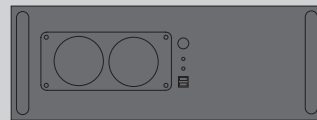
C. Trunk diameter:
ST92 - 610 mm
ST93 - 610 mm
ST94 - 610 mm

D. Flange diameter:
ST92 - 760 mm
ST93 - 760 mm
ST94 - 760 mm

PROCESSOR UNIT

Width: 600 mm
Height (with shock absorbers): 410 mm
Depth: 640 mm
Weight: 24 kg

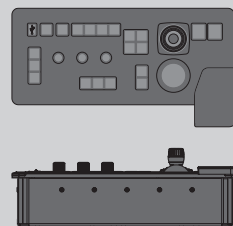
(Shipping dimensions)



OPERATING PANEL

Width: 346 mm
Height: 150 mm
Depth: 77 mm
Weight: 5 kg

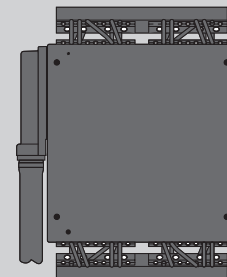
(Shipping dimensions)



TRANSCIVER UNIT

Width: 670 mm
Height: 760 mm
Depth: 580 mm (Excluding climate door)
Weight: 108 kg

(Shipping dimensions)



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