

Simrad SX90

远距离高清晰度声纳

360° 全方位声纳

90° 垂直扫描模式

20至30 kHz的发射频率

窄波束

可选择的波束宽度

双曲调频

广大动态范围

高清晰度

全方位波束稳定系统

双波束操作

操作简便

存储和调用声纳数据

定义自己的用户设置

Simrad SX90

Long range high definition sonar system



具备远距离量程及更高的分辨率 - 所有范围具备相同高分辨率

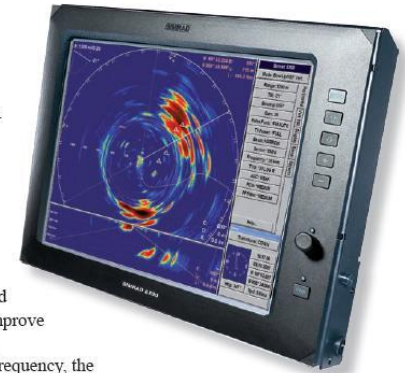
Simrad SX90是一种低频率, 高清晰度, 远距离声纳, 专门设计用于长距离探测的船只。

- 从20KHZ到30KHZ共11个频率可选, 从而避免其它船只的干扰。
- 在检测如鲭鱼, 金枪鱼这类快速移动的对象时, 使用Hyperbolic FM Mode(双曲调频模式)比使用CW发射波(连续波)探测得更远。
- 通过对窄波的发射和接收组合。可成功完成在硬质海底地区进行长距离探测。这种特殊设计的窄波技术, 可辨别出旁瓣底部假回波和主波束回波。从而去除干扰
- 接收器的宽动态范围, 很容易识别不同密度的鱼群。它也可分离硬软底部。
- 可选择纵向波束宽度, 并列于长, 中, 短探测范围设置, 有助于改善近距离探测效果。
- 在30 kHz的工作频率, 波束宽度只有6.7°。
- 一个全新的180°垂直视图可调倾角在这90°特别针对于远洋拖网渔船而设计。
- 全新更快的全方位波束稳定系统, 在恶劣的天气或当有渔船靠近检测表面时, 以确保获得平稳的回波显示。
- 远距离量程和更高的清晰度, 提高您的捕捉能力, 并帮助您有效的利用在海上的时间。

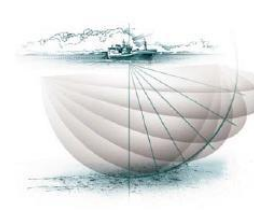
Longer range with better resolution - same high resolution on all operative ranges

The Simrad SX90 is a low frequency, high-definition; long range sonar, designed for vessels where long detection range is important.

- Eleven user selectable frequencies from 20 to 30 kHz prevents interference from other vessels.
- Fast moving objects like mackerel and tuna are detected further away than with CW (continuous wave) using the Hyperbolic FM mode.
- In areas with hard bottom, longer detection range is accomplished by combining a narrow transmitter beam with a special designed narrow receiver beam. This removes most of the disturbing bottom echoes from the side lobes, commonly seen on other sonar models.
- The receiver's wide dynamic range easily identifies schools with different densities. It also separates hard from soft bottom.
- Selectable Narrow, Medium and Wide beamwidths tied in with long, medium and short range settings improve close range detection.
- At 30 kHz operating frequency, the beam width is only 6.7°.
- A new 180° vertical view tiltable down to 90° is specially designed for pelagic trawlers.
- New and faster full circle beam stabilization ensures better fish detection in poor weather and/or when fishing close to the surface.
- The long range and higher definition of the SX90 improves your catching abilities, and helps you to make better use of your time at sea.



Horizontal and vertical beams
The combination of vertical and horizontal presentations show you the schools of fish both from above and from the side at the same time. It is not necessary to go over the target to see the vertical distribution on the echo sounder.



Bow up/180° vertical
The vertical slice is made "tippable", and by selecting a 60° tip angle (or less), a full 180° coverage is obtained. The tip angle can be adjusted from +10 to -90°. This mode is ideal when you are trawling for fish on deep water.



Beam stabilization
When the beam stabilizer is activated, both the horizontal and vertical beams are electronically stabilized for roll and pitch. The full circle beam stays on the target independent of the vessel movement, even in rough seas.

全方位和垂直波束组合显示

结合纵向和横向的探测图像, 表同时获得水平和垂直方向获得鱼群位置, 因而不必到鱼群上方用鱼探仪查看鱼群密度。

船首朝上/180° 垂直

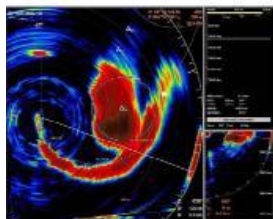
可调整垂直切面, 如选用60°切面角(或更少), 可以得到一个完整的180°覆盖范围。切面角度可以从+10到-90调整°。当您深水拖网时, 这种模式是非常理想的。

波束稳定系统

当波束稳定模式被启动时, 内置电子传感器, 可将声纳波束保持于所需的方位和角度, 补偿船舶的摇晃, 在恶劣下海情况也获得平稳的回波显示

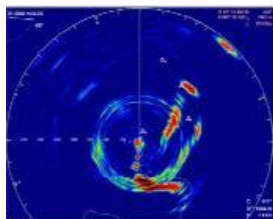
偏离中心图像

可偏移船到屏幕的任何位置，扩大回波分布显示更详细的信息。



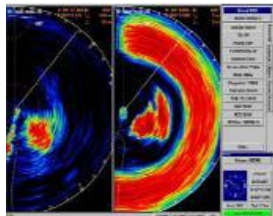
Off center presentation

Offset the vessel to any screen position and enlarge the echoes for more detailed information.



Full screen presentation

In full screen presentation, the echo presentation will be extended to cover the entire display area.



"Two sonars in one"

In the dual mode, each sonar presentation can be set up as if you were using two different sonars simultaneously. Individual frequencies, tilt angles, ranges, gain and filters can be used.

全屏图像

回波图像将扩展至整个显示区域。

双声纳画面

在双模式下，如果你使用两种不同的声纳，可以分别设立每声纳图像。

频率，倾斜角度，范围，增益和滤波器都可以分为调节使用。

SIMRAD SX90



Operating panel

A dedicated operating panel provides fast and easy access to the most frequently used functions.

- A Main switch: Power the sonar on (and off), lower the transducer
- B Symbol: Control the target markers providing exact latitude and longitude positioning.
- C Mode: Select your favourite display mode or user setting with the push on a button.
- D Gain: Separate gain control for

vertical and horizontal sonar presentation.

E Range: Separate range control for vertical and horizontal sonar presentation.

F Cursor: Menu and cursor control.

G Tilt: Easy control of the sonar's tilt angle, or start automatic search program.

H Various: Store interesting screen captures, and zoom in on details.

I Train: Manual control of beam training, start automatic search and tracking programs.

操作面板

一个专用的操作面板提供快速方便地访问最常用的功能。

A.Main Switch(总开关): 声纳系统的(打开和关闭)开关，降低传感器。

B.Symbol(符号): 控制目标。提供精确的经度和纬度定位标记。

C.Mode(模式): 选择你喜欢的显示模式或用户设置。

D.Gain(增益): 独立的增益控制纵向和横向的声纳图像。

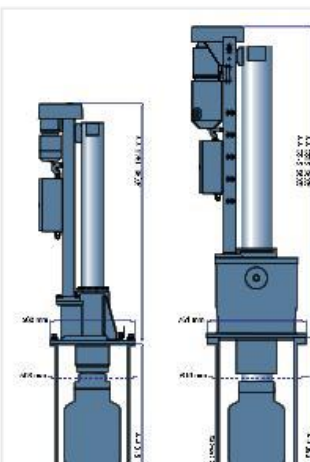
E.Range(范围): 单独的控制水平和垂直方向的声纳图像范围。

F.Cursor(光标): 菜单和光标控制。

G.Tilt(倾斜): 简易控制声纳的倾斜角度，或启动自动搜索程序。

H.Various(各项): 捕捉各种有趣的画面，并放大细节。

I.Train(控制): 手动控制波束，开始自动搜索和目标锁定方案。



Hull units

Three hull units are available:

- SX92 will extend the transducer 1200 mm. Maximum speed with transducer lowered is 24 knots.
- SX93 will extend the transducer 1600 mm. Maximum speed with transducer lowered is 20 knots.
- SX95 will extend the transducer 1000 mm. Maximum speed with transducer lowered is 12 knots.

升降单元

三种款式可供选择:

- SX92升降单元行程为1200毫米。降低探头的最大速度为24节。
- SX93升降单元行程为1600毫米。降低探头的最大速度为20节。
- SX95升降单元行程为1000毫米。降低探头的最大速度为12节。

The Simrad SX90 sonar uses the ultimate of modern technology to detect targets under difficult conditions.

360° Omnidirectional sonar

The SX90 transmits a narrow vertical beam 360° around the vessel. The horizontal resolution is as narrow as 8.5° making sharp edges around the school during evaluation of different targets.

90° Vertical Tip

This a new feature on our sonars. We transmit a narrow forward-looking fan-shaped 180° wide beam. The fan beam can be tilted from +10° and down to -90°. This feature is specially designed for pelagic trawlers.

20 to 30 kHz

The SX90 sonar can operate on 11 different frequencies from 20 to 30 kHz. Lower frequency give less absorption and wider beam for long range in deep water, where range is limited by salinity. The higher frequencies provide narrower beams for use in shallow waters where range is limited by reverberation. You will also avoid interference from other sonars in the area

Narrow sound beams

Unlike other sonars, the SX90 both transmits and receives with narrow beams. Narrow beams are important in order to avoid false unwanted echoes from bottom and surface, this limits the detection range. At 30 kHz the transmit beam is only 6.7° wide. The receiver beam is only 7.4°.

Simrad SX90声纳采用现代化的技术使其在困难的条件下也能检测到目标和鱼群

360° 全方位声纳

Sx90向船的四周发射360方位的窄波束。其波束的水平夹角为8.5°，便于对一大块鱼群的周边做更好的评估。

90° 垂直切面角度

这是一个新的声纳功能。传输一个狭窄扇形一样的180°窄波束。扇形波束倾斜角可达+10°和-90°。此功能专为远洋拖网渔船设定。

20 to 30 kHz

SX90声纳，可以从20至30千赫之间操作11种不同的频率。较低频率给予较少的吸收，更宽的波束用于深水远距离量程，以及因盐度而造成的量程限制。

较高的频率提供的窄波束可用在浅水海域，以及因反射而造成的量程限制。您也将避免从在该地区的其他声纳的干扰。

窄声束

不同于其他的声纳，SX90同时发送和接收窄波束。窄波束很重要，以避免不必要的从底部和表面反射回来的虚假回波，这将会限制检测范围。在30千赫的发射波束宽仅为6.7°。接收器的波束只有7.4°。

Selectable beam width

With a narrow beam you continuously need to operate the tilt to keep the beam on the school. During the busy catching time, two wider vertical beams can automatically be selected. Target tracking is then made less dependent on the tilt angle.

Hyperbolic FM

This is another unique Simrad feature. The SX90 sonar transmits a long pulse with a continuously variable frequency. The receiver listens for an echo with the same frequency variations. Echoes with different frequency signatures are vastly reduced. The actual fish echoes are enhanced, and fish detection is made easier under difficult conditions. Hyperbolic FM gives you 30 times better range resolution than common CW transmissions.

Large dynamic range

Picking the right school is important. Dynamic range means that you can tell the difference between a scattered school providing a weaker echo, and a dense school giving a stronger echo. Looking at the bottom echo, you can easily tell smooth from rough bottom. This is important when purse seining in shallow water, and during pelagic trawling where the footrope can touch the bottom.

Stabilized beams

The SX90 sonar is vertically stabilized evenly 360° around the ship, both for the horizontal as well as the vertical beams. The stabilized sonar beams enhance fish detection in poor weather making searching still possible in situations you earlier gave up.

可选择的波束宽度

使用窄波束，你需要不断调整倾斜，以保证能找到鱼群。但在繁忙的追赶鱼群时，可以选择更宽的波束角，这样可减少扫描角度的调整。

双曲调频

这是Simrad的另一个独特功能。SX90声纳传输带有连续可变的长脉冲频率。接收器侦听具有相同频率变化的回波。不同频率的回波将大大减少。而实际的鱼回波却增强，鱼的检测将在困难的条件下变得更容易。双曲调频的距离分辨率，比常见的连续传输要大30倍，。

大动态范围

选择合适的鱼群非常重要。动态范围提供回波之间的差异。分散鱼群的回波较弱，密集鱼群的回波较强。而底部的回波，也可以轻易地让我们知道海底的光滑或粗糙度。尤其是你使用浅水围网或远洋拖网捕捞时。

稳定波束

无论是横向或纵向波束，SX90声纳的垂直稳定均匀地绕船360°。稳定的声纳波束在恶劣的天气中可提高鱼群检测，让你仍然可以继续搜索。

Dual mode

Conditions may sometimes change very quickly even within a few hours. With the dual mode feature you can set up two different sonar pictures on the monitor. One picture shows your normal settings, while the other is used to test new settings, filters, modes, pulse lengths, frequencies, tilt and other parameters in order to achieve better performance. If you find better setting, you save the new one settings as a new personal setting.

Store and Recall

The SX90 sonar can store display presentations manually or automatically, and you can recall these later for further studies. All the pictures in this document are screen captures from actual situations on the fishing grounds from vessels already using the SX90 sonar.

User settings

The sonar can store an unlimited number of user settings for different fishing conditions and different operators. Sonar settings are often personal, and most captains have favorite settings for different types of fishing, species, time of day etc. On the SX90 you can have your favorite settings stored and named just as you like.

Noise filter

The noise filter will suppress propeller noise, interference from other acoustic systems on your own vessel or on other vessels near by.

双模式

很多时候海上情况变化非常迅速，双模式功能可以让您在显示器上设置两个不同的声纳图像。一张图像显示正常设置，而另一张用来测试新的设置，过滤，模式，脉冲长度，频率，倾斜度和其他参数，以达到更好的效果。如果找到更好的设置，您可保存为新的个人设置。

存储和调用

SX90声纳可以手动或自动存储显示图像。存储图像可作为以后的参考与研究。本文档中的所有图像来源于使用SX90声纳的船只在渔场捕鱼的实际情况屏幕截图。

用户设置

声纳可以根据不同的捕捞条件和操作人员而作无限量的用户设置存储。声纳设置往往是个人喜好，大多数船长会根据不同类型的捕捞，物种，时间等作出喜爱的个人设置。SX90能让您随意地存储与命名最喜爱的设置。

噪音过滤

噪音过滤将抑制船只的螺旋桨噪声和来自附近船只的声波系统干扰。

鲭鱼探测

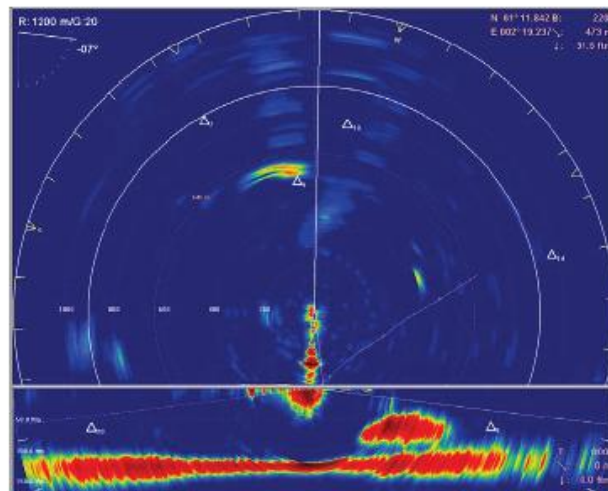
鲭鱼鱼群位于船的正前方，但是只有垂直视图可以看到鱼群，它们没出现于横向视图中。垂直视图的倾斜指示器显示，更多的倾斜角度可让我们在横向视图中看到鱼群。在垂直视图中，离船只约200米鱼群可清楚地被看见。垂直视图也是主要用来测量鱼群的深度。这可避免船只航行至鱼群上方，惊动鱼群将鱼群分散。垂直视图将帮助你更容易捕获鱼类。操作频率为30kHz，采用双曲调频传输。

围网

选有“Off Centre”模式，在横向和纵向视图里鱼群的方向将可获得更好的分辨率。SX90拥有优秀的短距离检测。此屏幕，声纳操作于300米范围设置，鱼群不超出船只50米的范围，可在横向和纵向视图里被清楚看见。右上角的所有PI深度传感器全面下调至80英尺。

Mackerel detection

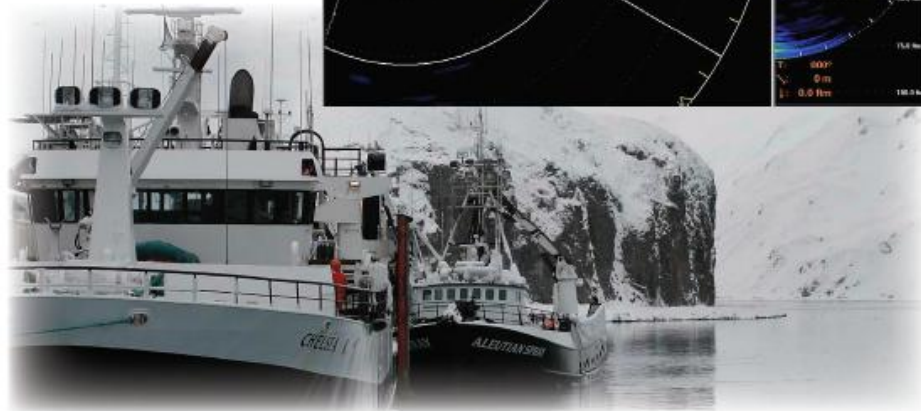
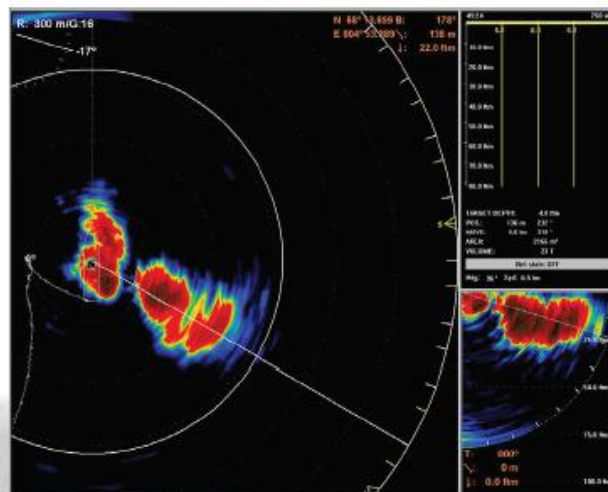
The school of mackerel is dead ahead of the vessel. It can not be seen in the horizontal view, only in the vertical view. The tilt indicator shown in the vertical picture tells you that you need more tilt in order to see the school in the horizontal view. The school is clearly shown in the vertical view at about 200 meter away from the vessel. The vertical view is primary used to measure the depth of the school. This view is provided so you do not need to sail directly over the school. This would scatter the fish, and break up the school in several smaller parts. The vertical view thus makes it easier to catch the fish. Operational frequency is 30 kHz using Hyperbolic FM transmission.



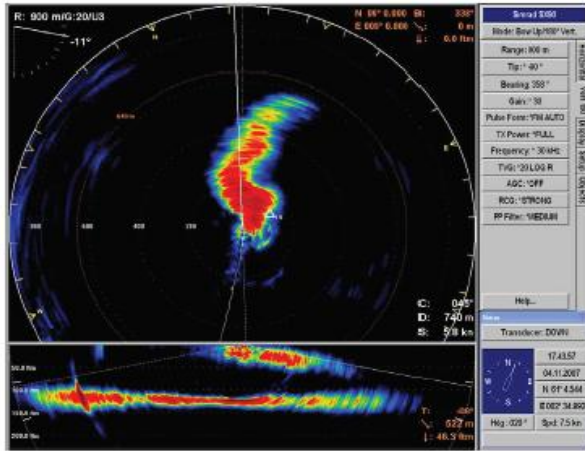
Looking into the seine

“Off centre” mode is selected to obtain better resolution in the direction of the school in horizontal and vertical views.

The SX90 has a superb short range detection. In this screen capture the sonar is operated with a 300 meters range setting, and the fish is no more than 50 meters from the vessel, as clearly seen in both the horizontal and the vertical presentation. In the top right hand corner all PI depth sensors are fully marked down to 80 fathoms.



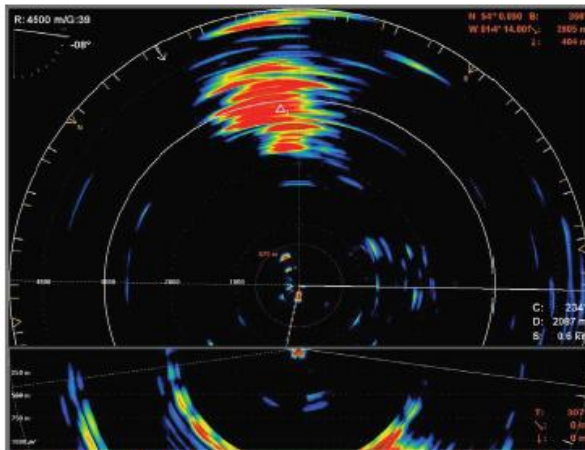
SIMRAD SX90



Scattered mackerel detection

The SX90 sonar is operated at 30 kHz. This upper frequency is selected because it will provide the narrowest beam. At 30 kHz, no other sonars can interfere with the performance of this sonar, even with multiple similar sonars were operating in the area.

The mackerel can be seen as a long “stripe of fish” ahead of the vessel in both horizontal and vertical views. The water depth is 100 meter, and the echo from a pipe line can be seen in the vertical presentation behind the vessel.



Blue Whiting

This screen captures shows how the SX90 has detected a school of Blue Whiting. The range is set 4500 meters, and the sonar detects the Blue Whiting all the way out to the end of the range.



分散鯖鱼检测

SX90声纳操作于30kHz。这个较高频率的选择可提供最狭窄的波束。在30kHz，就算有多种类似的声纳在该范围内操作，也无法干扰该声纳。

鯖鱼，可以被看作是一个长“条纹鱼”船只在横向和纵向的视图。水深为100米，在垂直两面上可以清楚看到船只的尾迹。

蓝鳕鱼

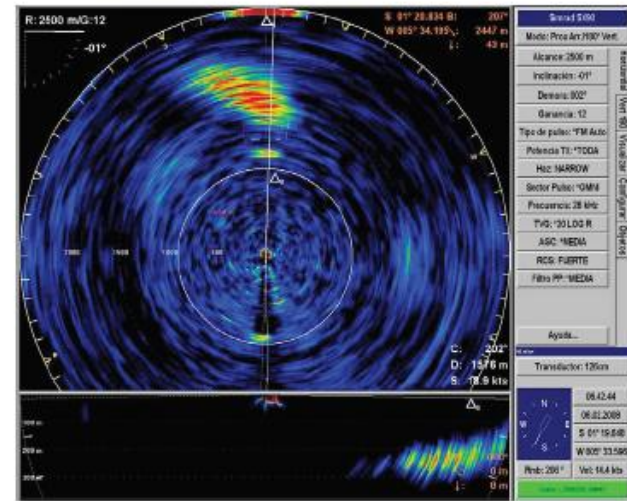
此屏幕显示SX90如何探测蓝鳕鱼鱼群。探测范围设置在4500米，声纳可探测蓝鳕鱼的范围可达到声纳的最大量程。

金枪鱼

这声纳画面显示在2500米的距离，金枪鱼鱼群可被探测。在垂直视图中还可以看到在150米左右深度的浮游生物层。在某些情况下，这浮游生物层可以扰乱该范围的检测能力，在指定的范围内，波束打在浮游生物层内引起回波干扰。SX90可通过其高效的过滤能力，克服这个问题并屏蔽掉不必要的浮游生物层表面回波。

Tuna

This sonar presentation shows a school of tuna. It has been detected all the way out to 2500 meters. In the vertical view you can also see a plankton layer at about 150 meters depth. Such layers can in some cases disturb the range detection capabilities, and create unwanted echoes as the horizontal beam hits the layer at one point in range. The SX90 overcomes this problem by means of its efficient filtering capabilities, and masks out the plankton layer in the same manner as unwanted surface echoes.

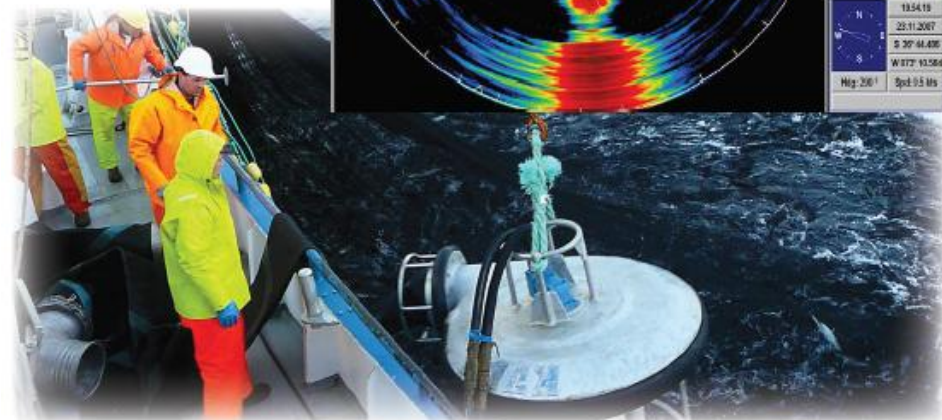
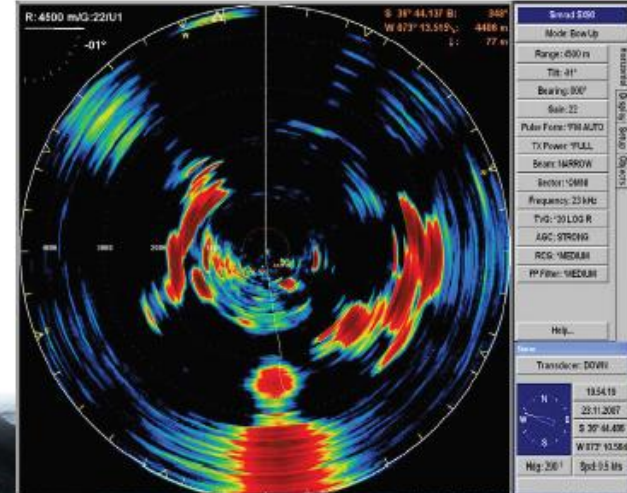


沉船检测

此屏幕显示了远距离探测的35吨沉没货船。你可以看到它在10°左舷，已标上三角形跟踪记号。沉船位于约100米的深度，其他的回波，是在该地区浅岸。声纳系统操作于23kHz，使用“自动调频”和“窄光束”。船只的位置，时间和日期，显示在右下角的对话框。

Wreck detection

This screen capture shows a long range detection of a sunken 35,000 ton cargo vessel. You can see it at 10° port side, it is marked with target tracking triangle. The wreck lays at about 100 meters depth. The other echoes are shallow banks in the area. The sonar is operated at 23 kHz using "FM Auto" and "Narrow Beam". The position of the vessel, as well as time and date, is indicated in the lower right hand corner of the presentation.



范
20至30kHz
50-4500m
: +10° to -60° in 1° , 1步1度
式: CW和FM
式:
全方位
垂直
度: 12/20/24海里,
升降单元

SIMRAD SX90

Technical specifications

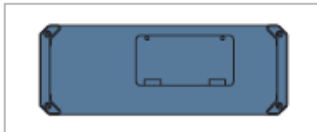
- Frequency: 20 to 30 kHz
- Range scale: 50 - 4500 m
- Tilt: +10° to -60° in 1° steps
- Pulse modes: CW and FM
- Transmission modes:
 - 360° omnidirectional
 - 180° vertical
- Maximum speed: 12/20/24 knots with transducer deployed, depending on hull unit

For additional and more detailed specifications, see the *Simrad SX90 Product description*. The document can be downloaded from www.simrad.com.

欲知更详细的规格, 请参阅
SIMRAD SX90产品说明。
文件可从www.simrad.com下载

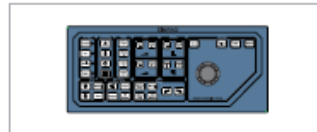
处理器单元
宽度: 445mm
高度 (包括
深度: 365mm

Processor Unit



Width: 445 mm
Height (with shock absorbers): 185 mm
Depth: 365 mm

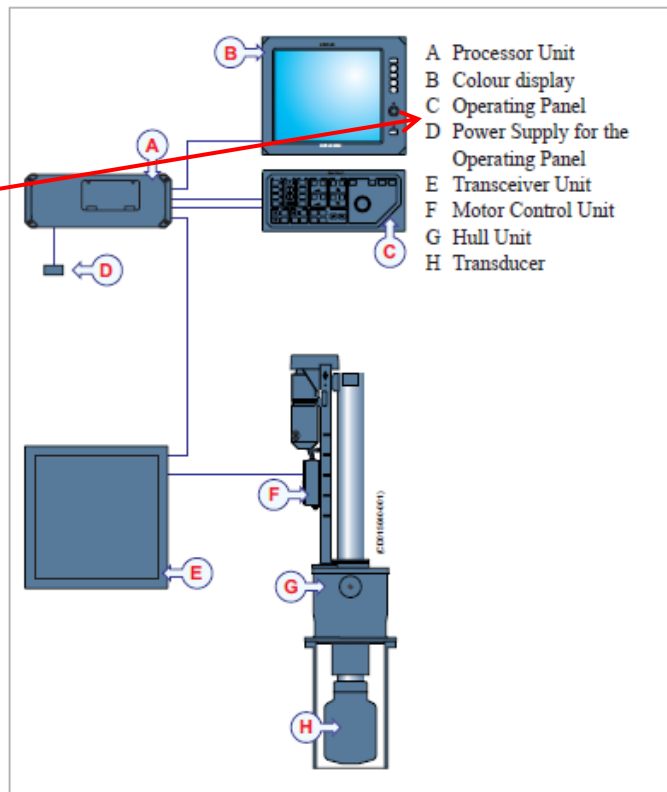
Operating Panel



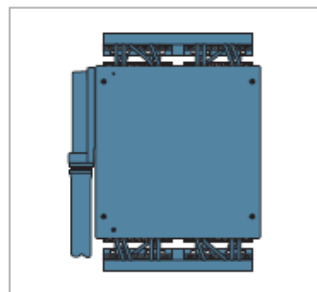
Width: 385 mm
Height: 165 mm
Depth: 51 mm

操作面板
宽度: 385mm
高度: 165mm
深度: 51mm

System diagram



Transceiver Unit



Width: 520 mm
Height (with shock absorbers): 750 mm
Depth (with heat exchanger): 580 mm

收发单元
宽度: 520mm
高度 (包括减震器): 750mm
深度 (包括热交换器): 580mm

Hull Units

See drawing on page 3.

升降单元
见第3页绘图

系统接线图

- A 处理器单元
- B 彩色显示器
- C 操作面板
- D 操作面板的电源
- E 收发单元
- F 电机控制单元
- G 升降单元
- H 探头