

# Echologger MRS900

Mini Scanning Sonar

## User Manual

---



Rev2.0 Jan. 2019

## ■ Specifications

Pulse type	Chirp, CW
Operating Frequency	~900kHz
Beam Pattern	Fanbeam (2.5°H /25°V)
Range	from 30cm, up to 60m
Range Resolution	7.5 mm @ 100kHz Sampling Frequency
Scanning Angle	Selectable up to 360°
Scan Angle Resolution:	0.1125°, 0.225°, 0.45°, 0.9°, 1.8°
Scan Speed:	4 sec / 360° @ range 5 m 6.4 sec / 360° @ range 10m range 40 sec / 360° @ range 60 m
Scanning Resolution	0.9°
Transmit Pulse Length	500 us (chirp), 10 - 100us (CW)
Interface	RS232 / RS485 up to 3 Mbaud
Power Requirements	12 - 60 VDC, 4 W max
Cable max length	300m @ 2 Mbaud, 1 km @ 115,200 baud
Connector	MCIL6M(Subconn) or pigtail
Operating Depth	2000 m / 1000m(MRS900L) / 100m(MRS900S)
Material	Hard Anodize Aluminum(MRS900, MRS900L/ Acetal(MRS900S)
Dimensions(mm)	D66 x H76, D64,H75 (MRS900L), D64 x H80 (MRS900S)
Weight	MRS900 :580 / 350g (in air / in water MRS900L : 410 / 190g MRS900S : 380 / 140g

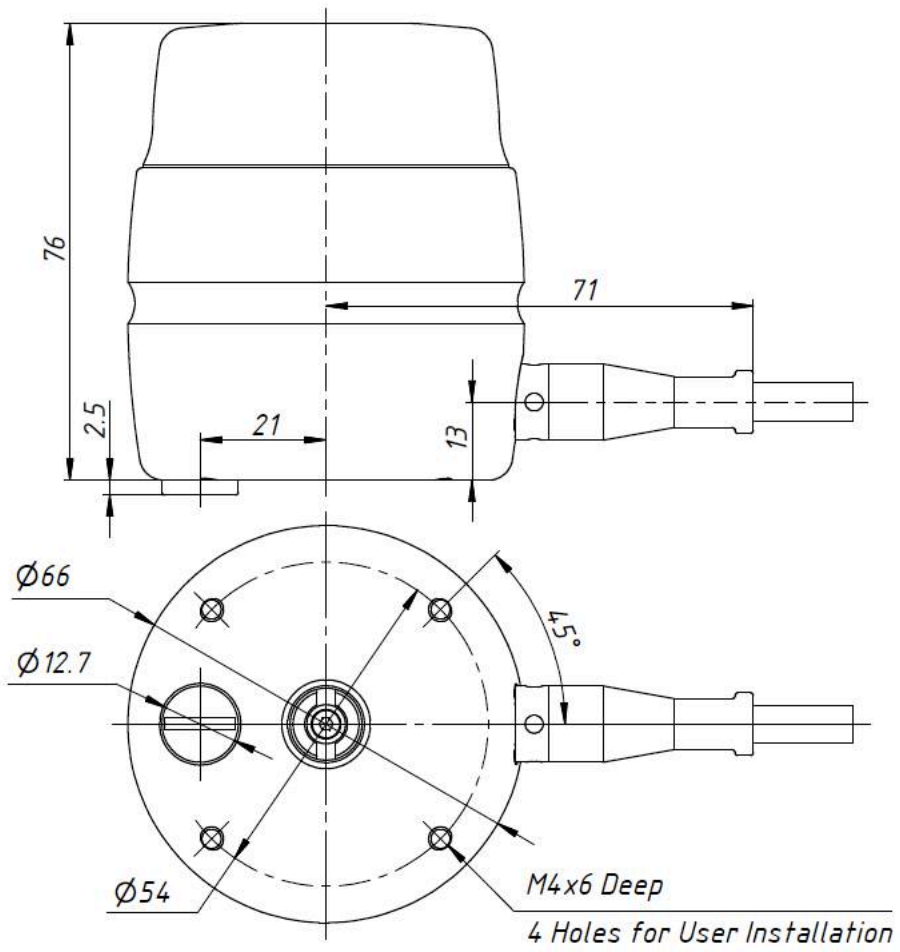


Fig1. MRS900

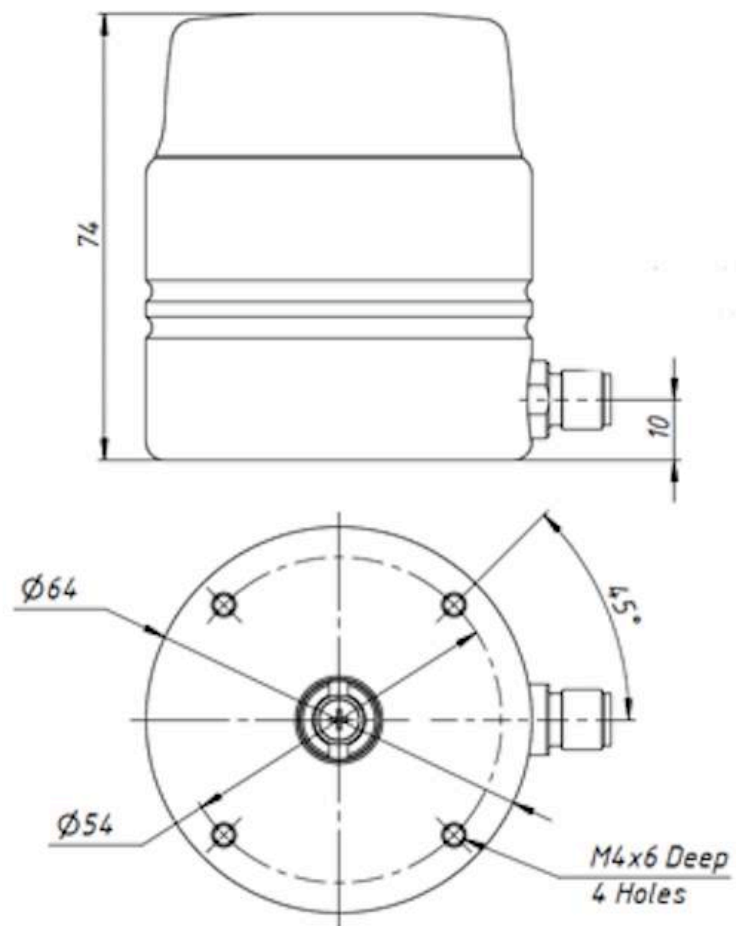


Fig2. MRS900L



## ■ Connection (pinouts)

### 1. Pigtail



Fig4. MRS900 with a pigtail

#### MRS Penetrator Pigtail pinout:

Wire Color	Signal name	Description
RED	+V Power	Input Power = +12V ... +60V DC, 5W max. Reverse Polarity protected
BLACK	GND	Common wire for Power
WHITE	485A / 232RX	RS-485 Input/Output line "A" (485+), or RS-232 Input
GREEN	485B / 232TX	RS-485 Input/Output line "B" (485-), or RS-232 Output
SHIELD	DATA COM	Common wire for Data Lines (It MUST be used for RS-485 and RS-232 connections)

\* Power Lines are galvanically isolated from the Data Lines.

#### Interface type is selected by jumper JP1 on the Serial Interface PCB.

Interface	JP1
RS-485	Open (Jumper not installed)
RS-232	Short (Jumper installed)

Fig5. Pinouts of MRS900 with pigtail

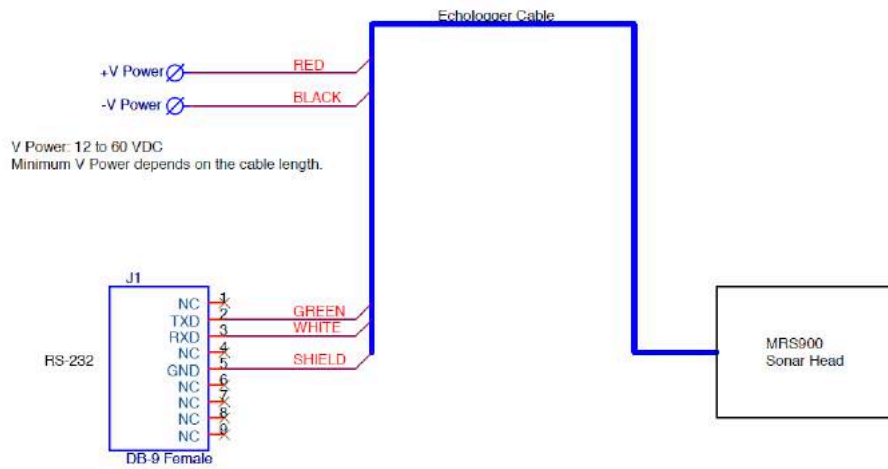
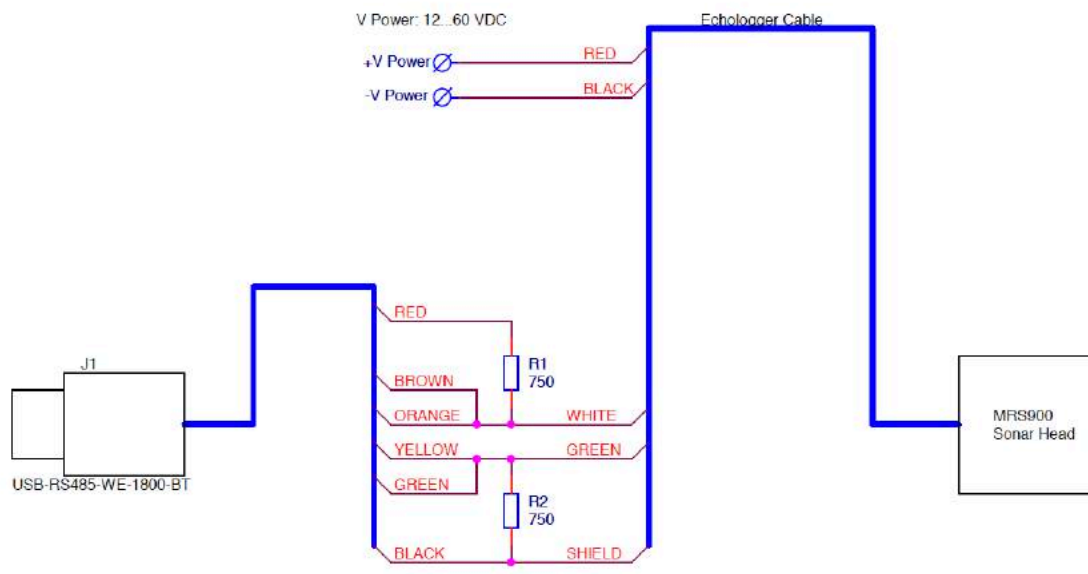


Fig6. RS232 interface with DB9 connector



USB-RS485-WE-1800-BT --- FTDI, USB to RS485 Serial Converter Cable  
 R1, R2 --- Resistors 750 Ohm, 5%, 0.125W

Fig7. RS485 interface with FTDI USB converter

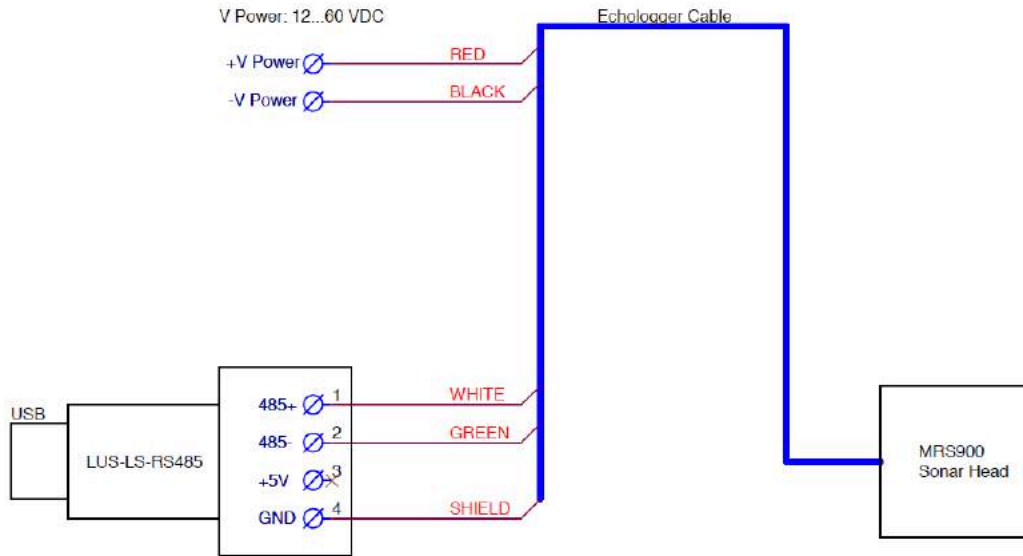
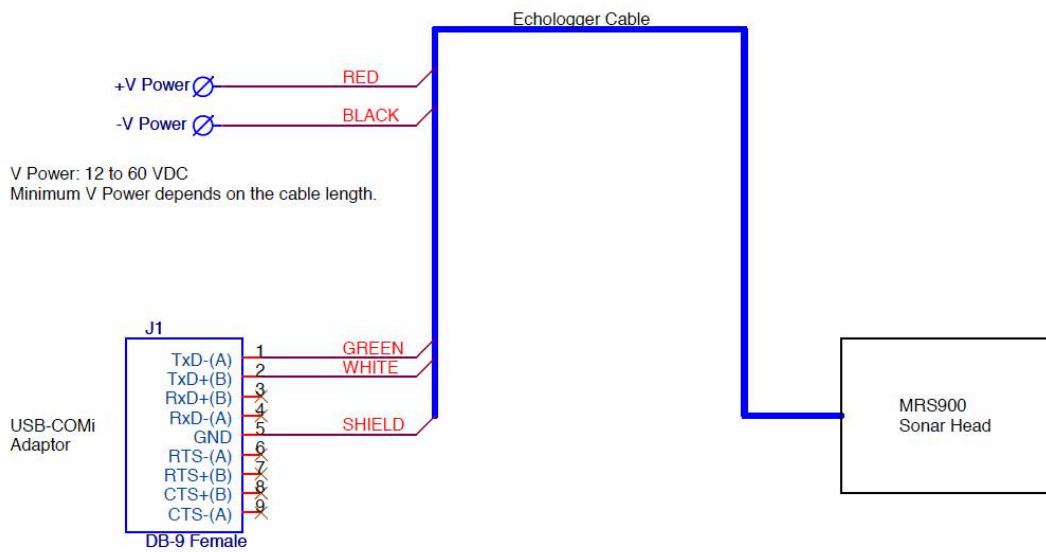


Fig8. RS485 interface with LUS-LS USB converter



Names of the signals correspond to the manufacturer names.

USB-COMi Settings:

Switch Block Configuration (RS-485 Mode):

S1 ----> OFF

S2 ----> OFF

S3 ----> OFF

Jumper Block Settings (RS-485 Mode):

1-2-3 ----> 1-2 short (install jumper)

4-5-6 ----> 4-5 short

7-8-9 ----> 7-8 short

10-11-12 ----> 11-12 short

13-14-15 ----> 14-15 short

16-17-18 ----> 17-18 short

19-20-21 ----> 20-21 short

Fig9. RS485 interface with USB-COMi Adaptor



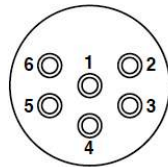
## 2. MCIL6M(Subconn)



Fig10. MRS900 with MCIL6M connector (Subconn)

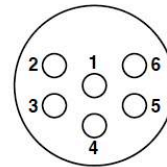
### MRS900 Umbilical Connector

In-Line Connector Male 6 pins  
SUBCONN MCIL6M



### Cable Connector

In-Line Connector Female 6 pins  
SUBCONN MCIL6F



### MRS900 Connector pinout:

Pin number	Wire Color	Signal name	Description
1*	Black	+V Power	Input Power = +12V ... +60V DC, 5W max. Reverse Polarity protected
2*	White	GND	Common wire for Power
3	Red	485A / 232RX	RS-485 Input/Output line "A", or RS-232 Input
4	Green	485B / 232TX	RS-485 Input/Output line "B", or RS-232 Output
5	Orange	DATA COM	Common wire for Data Lines
6	Blue	SELECT	Interface Select Pin: Not Connect for RS-485 , Short to DATA COM for RS-232.

\* Power Lines (1, 2) are galvanically isolated from the Data Lines (3, 4, 5, 6).

Fig11. Pinouts of MRS900 with MCIL6M connector



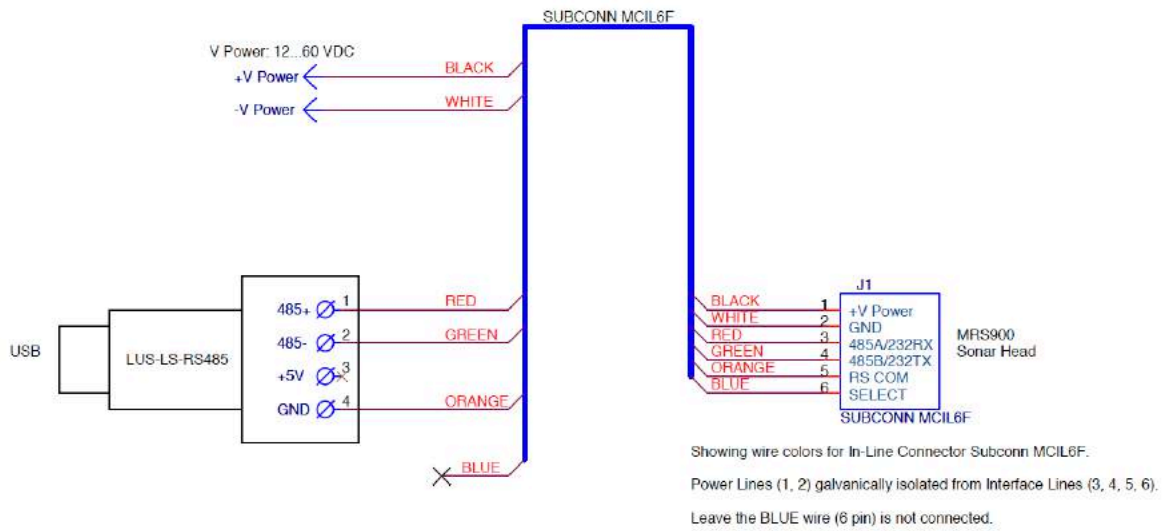


Fig14. RS485 interface with LUS-LS USB converter

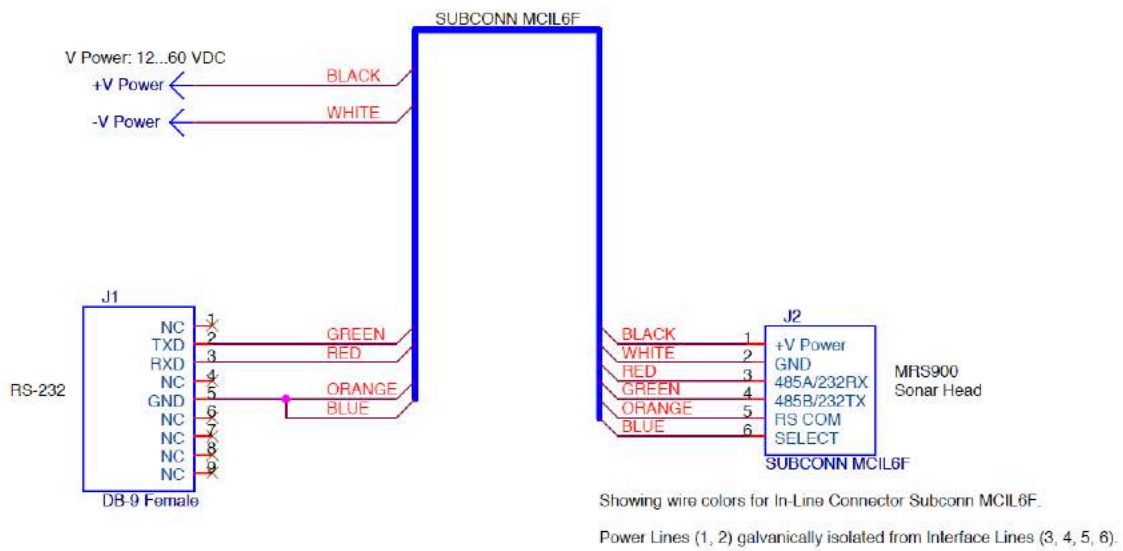


Fig15. RS232 interface with DB9 connector

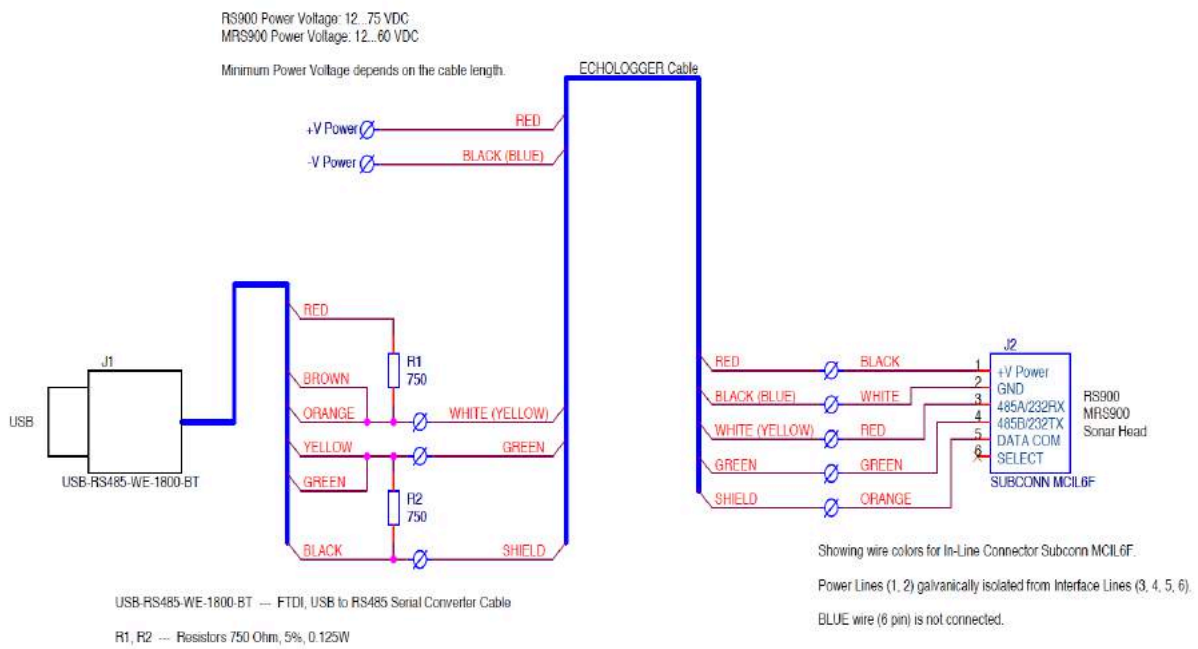


Fig16. RS485 interface with FTDI USB converter  
(Cable extension : Echologger Cable, same scheme applied to other converters)

## ■ GUI Software (RS900ControlProgram.exe)

### 1. Connection

- Check if the GUI software is the latest version from the manufacturer. Version number can be found on 'Help' of the menu

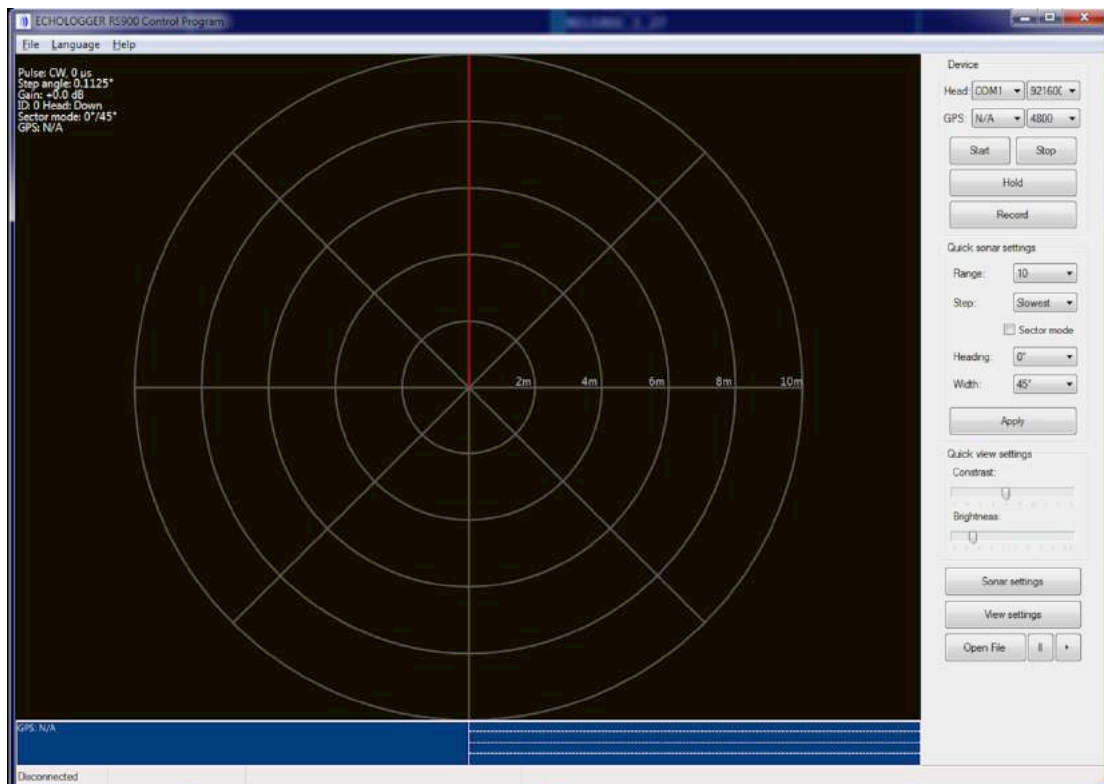


Fig17. Control GUI software

- Check the serial port number on PC after the device is connected to the PC through the RS485-USB converter
- Check the port of GPS, if available
- The serial (COM) ports connected can be found on Control Panel(Windows7) > Hardware and Sound > Devices and Printers (Fig13)

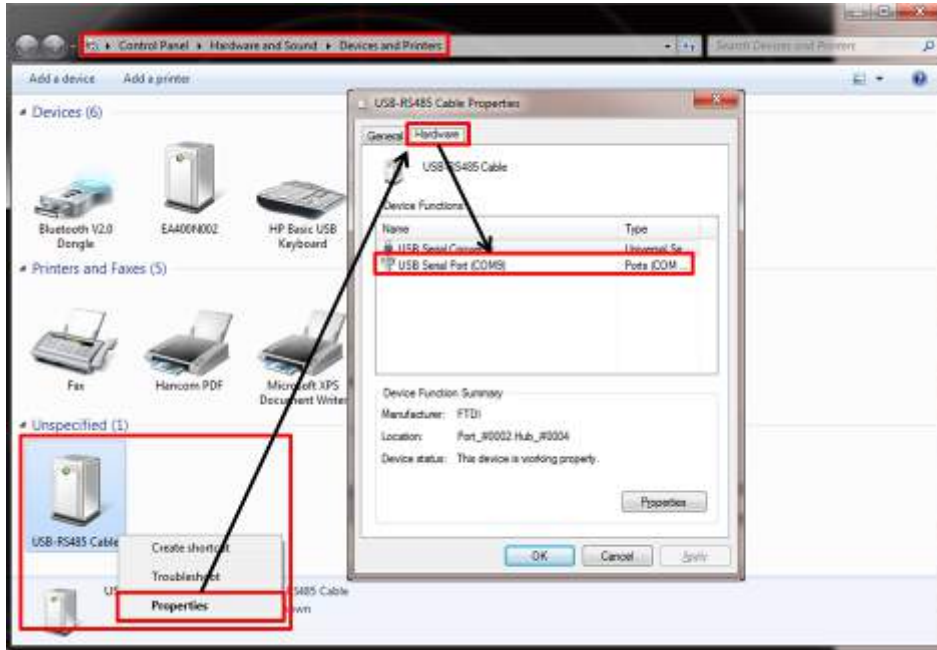


Fig18. Find COM port using Device Manager (Windows7)

- Select the Sonar and GPS port (COM ports) and their baud rates.
  - o Default baud rate of Sonar head : 921600 (Check with user's PC)
  - o Default baud rate of GPS : 4800 (If GPS is not available, COM port is N/A)

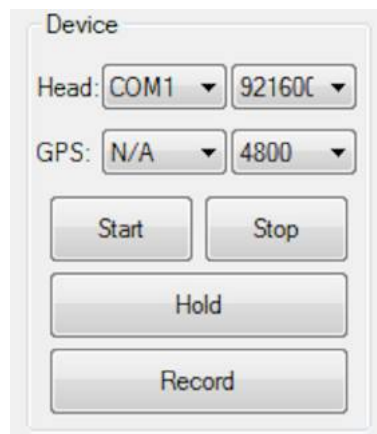


Fig19. Device Menu

## 2. Start scanning

- Press Start to connect and scan
- When connection is successful, Pop-windows with 'Zero positioning' & 'Connected' will appear, then scanning will start (Fig15)
- Stop button will quit scanning and disconnect
- Hold button will quit scanning but the connection is still on
- While scanning, user can record scanned data in a pre-set folder of the hard disc, by pressing Record button

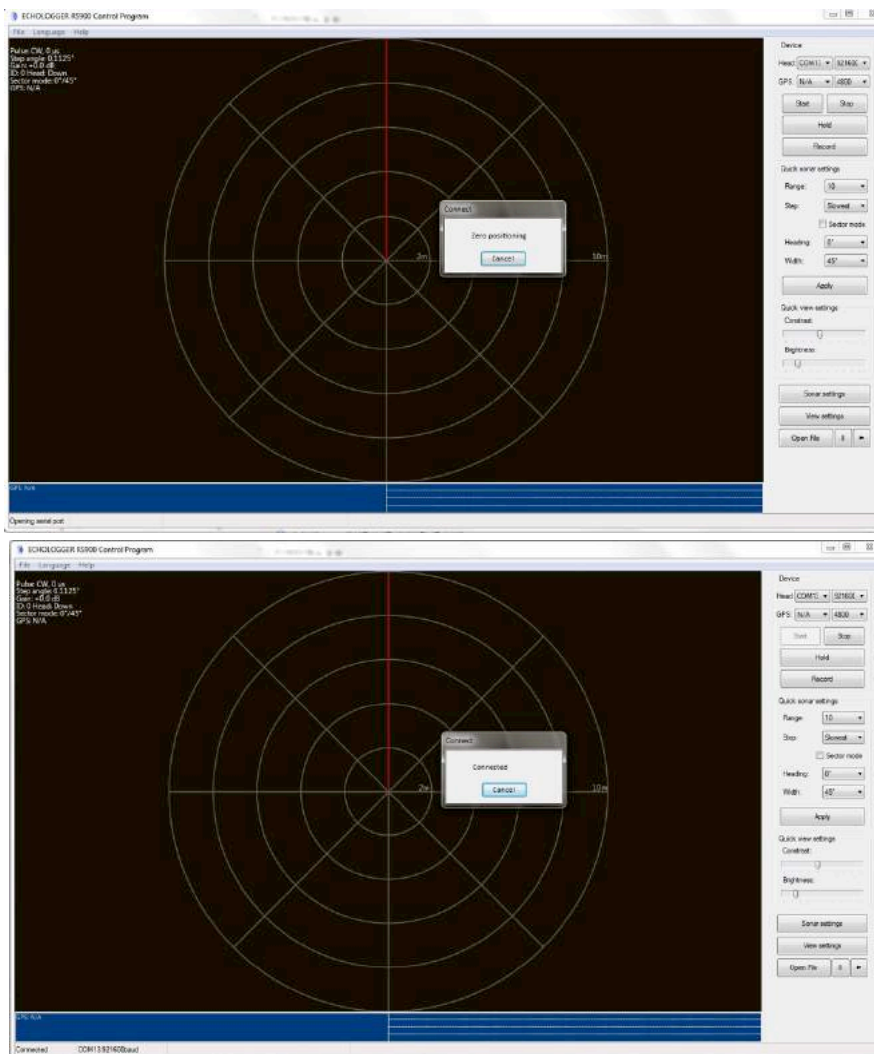


Fig20. Connection to the device

### 3. Quick Sonar Settings



Fig21. Quick Sonar Settings

- Range : Maximum detecting range
- Step : Scanning speed (The slower the finer imaging)
- Sector scan : Scanning only designated angle (not full 360deg scan)
- Heading: Central angle of the sector scan
- Width: Sector angle
- Apply : Any change of parameter will be effective only after Apply button is pressed. Apply button will also change file names of recorded data. i.e., New files will be generated when each new parameter set is applied

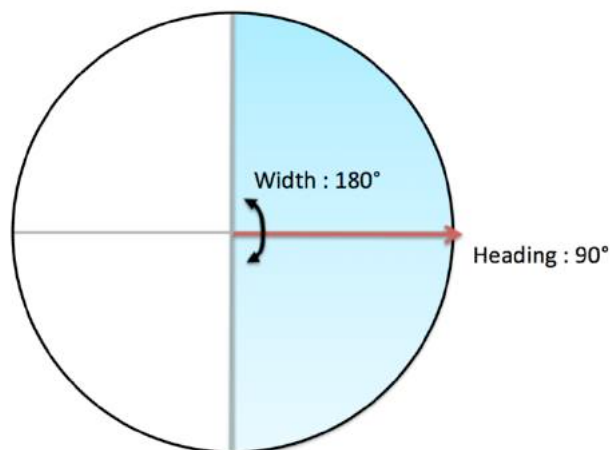


Fig22 Sector Scan (Heading & Width)



#### 4. Sonar Settings (Detailed Parameters)

- When 'Sonar settings' is selected, a pop-up window appears

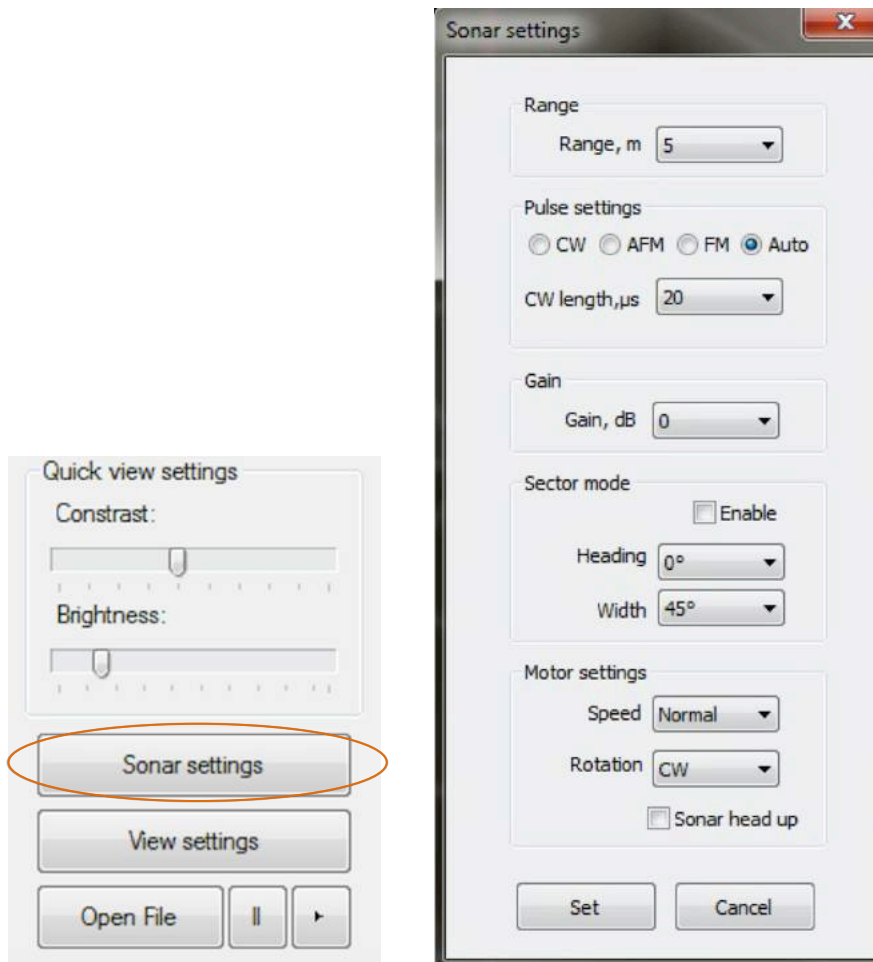


Fig23. Sonar Settings

- Range : Set maximum scanning range
- Pulse settings
  - o default parameter is AFM
  - o CW : Continuous wave (**recommended when within 10m range**)
  - o CW length( $\mu$ s) : Pulse length (**only in CW**)
  - o AFM : Amplitude/Frequency modulation (**pulse length : fixed at 512 $\mu$ s**), **default**
  - o FM : Frequency modulation (**pulse length : fixed at 512 $\mu$ s**)
  - o Auto : set pulse mode automatically, CW(up to 5m range), AFM (5~45m range), FM(45~60m range)

\* CW is useful for inspecting short ranges up to 5~10m. With this mode, unwanted noise is likely to be in far fields. Pulse length of 20 micro second(us) is recommended for CW mode. In turbid environments, it is recommended to increase up to 100 us for stronger echo signals

\* FM is recommended for long range inspection. This will increase signal level of echo. AFM is slightly superior in image resolution

- Gain : Adjust gain of the receiving amplifier
- Sector mode
  - o Enable : Sector scan enabled
  - o Heading : Central angle of the sector scan
  - o Width : Sector angle
- Motor settings
  - o Step angle : Scanning speed (The slower, the more resolution)
  - o Rotation : Rotating direction, CW(Clockwise) / CCW(Counter clockwise)
  - o Sonar head up : Select this when the sonar head is installed upward

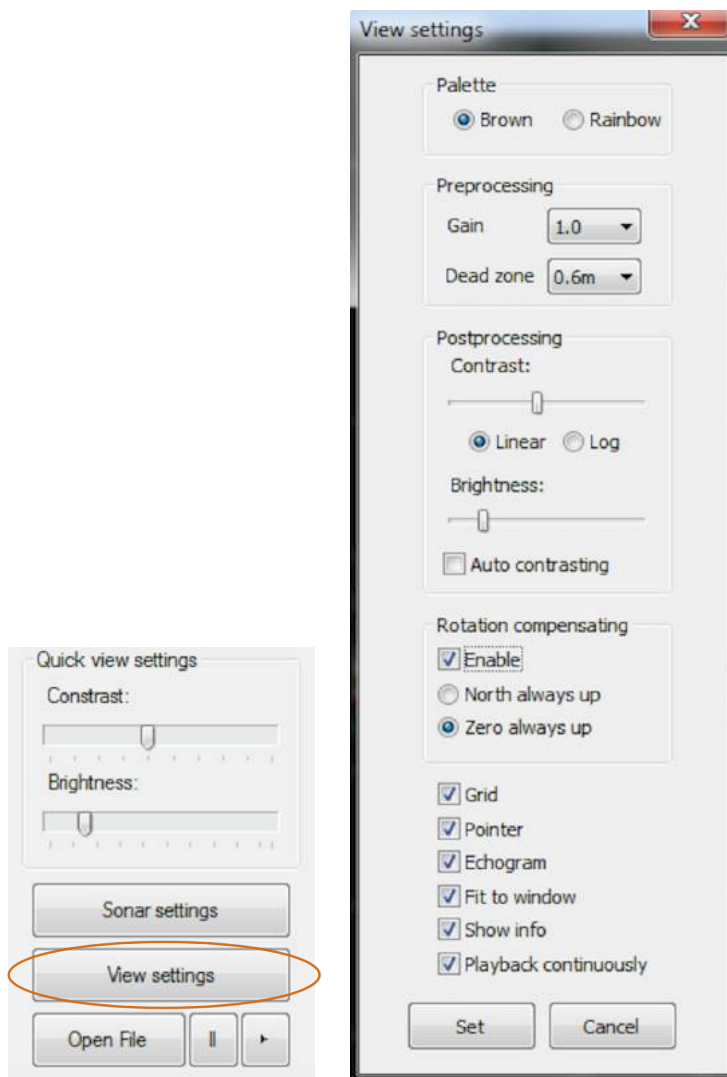


Fig24. View Settings

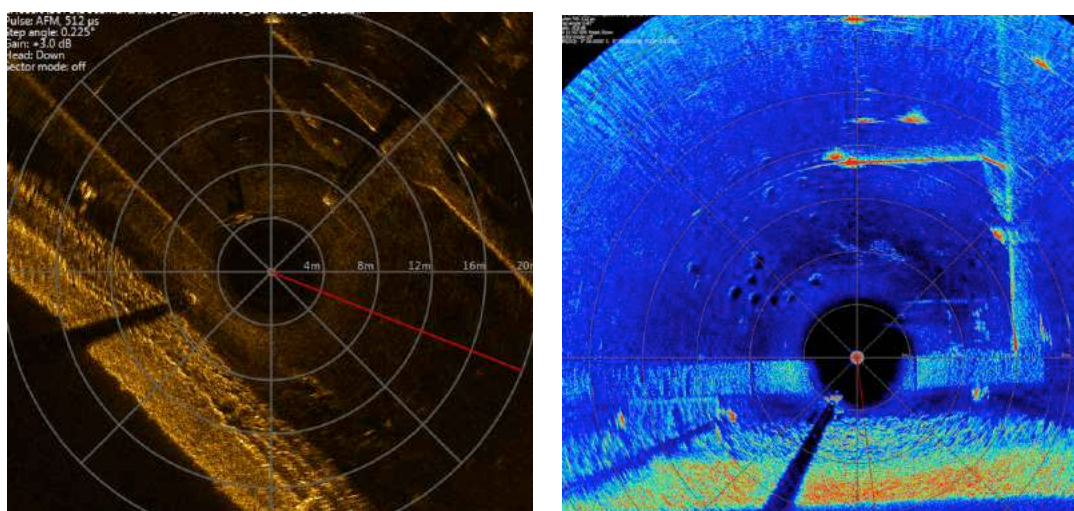


Fig25. Brown palette vs. Rainbow palette

## 5. View Settings

- When 'Sonar Adjust Contrast & Brightness with slide bars of 'Quick view settings' to change viewing parameters. Press 'View settings' for more detailed settings
- Palette : Choose 'Brown' or 'Rainbow' scale
- Preprocessing
  - o Gain : Digital gain of the data
  - o Dead zone : Near field distance where imaging is not carried out to remove reverberated echoes
- Postprocessing
  - o Contrast: Adjust contrast of image
  - o Linear or Log: Linear or Log scale in contrasting
  - o Brightness: Adjust brightness of image
  - o Auto contrasting: Contrast automatically adjusted depending on amplitudes of sonar data
- Rotation compensation (NA for MRS900, only for RS900)
  - o Show compass at the right top corner of the screen and around the circle of main scanned image
  - o 'North always up' mode: Scanned image will rotate with magnetic North pole on top of the screen. Compass will be static.
  - o 'Zero always up': Scanned image is static with Zero direction of the sonar head always to the top of the screen. Compass will rotate with regards to the direction of the sonar head
- Fit to window
  - o Show the full range (full circle) on the screen

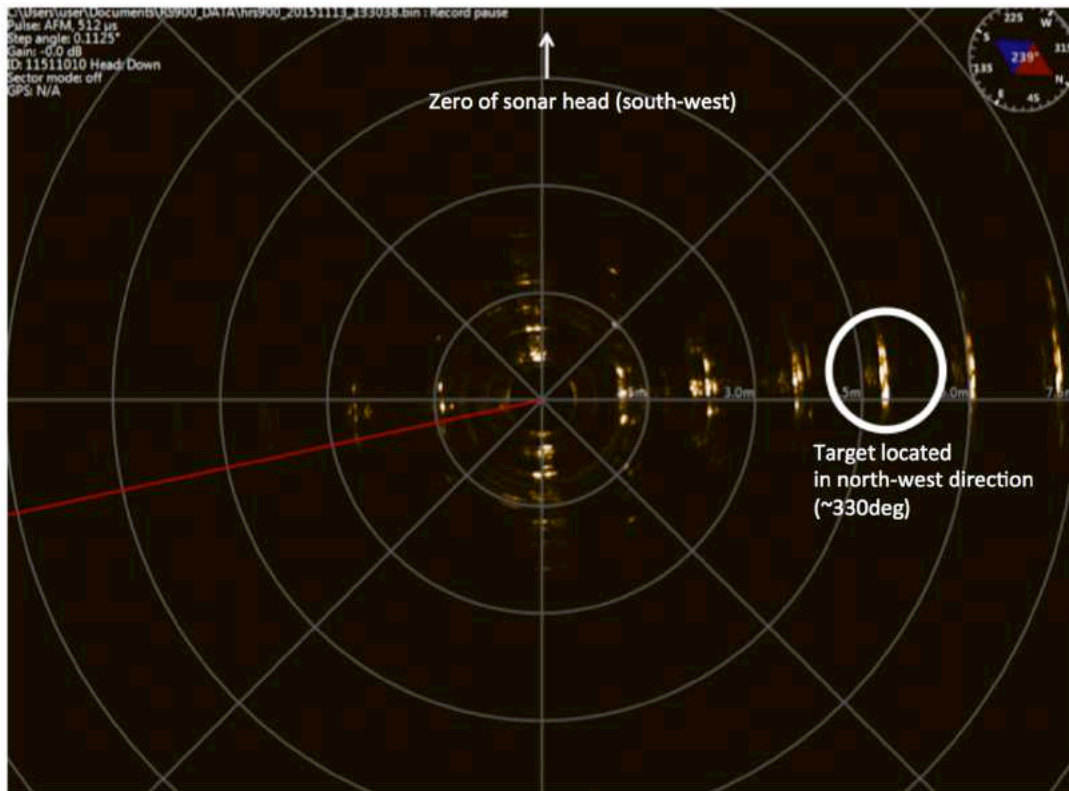


Fig26. Rotation Compensation (Zero Always Up)

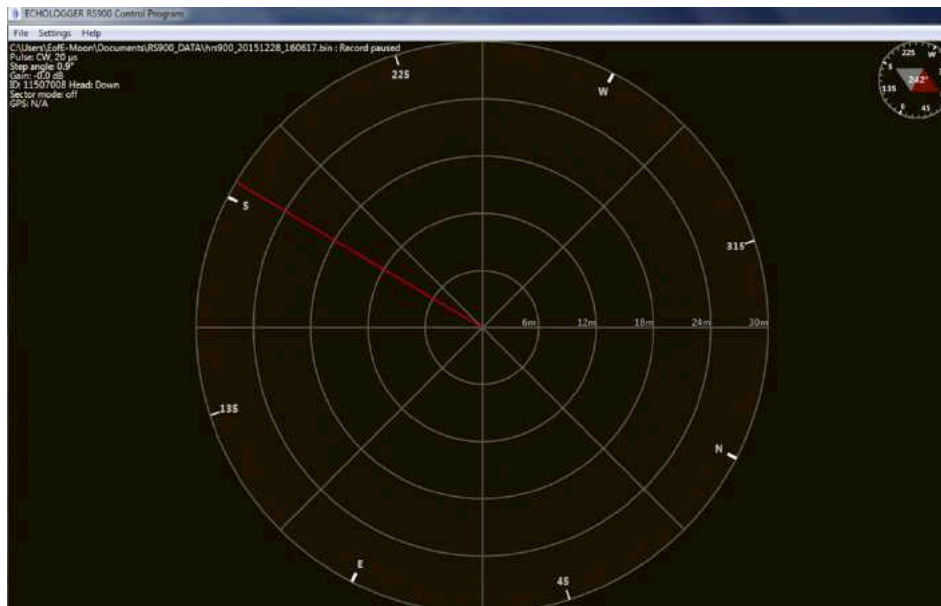


Fig27. Compass shown both at the right top corner and around the circle

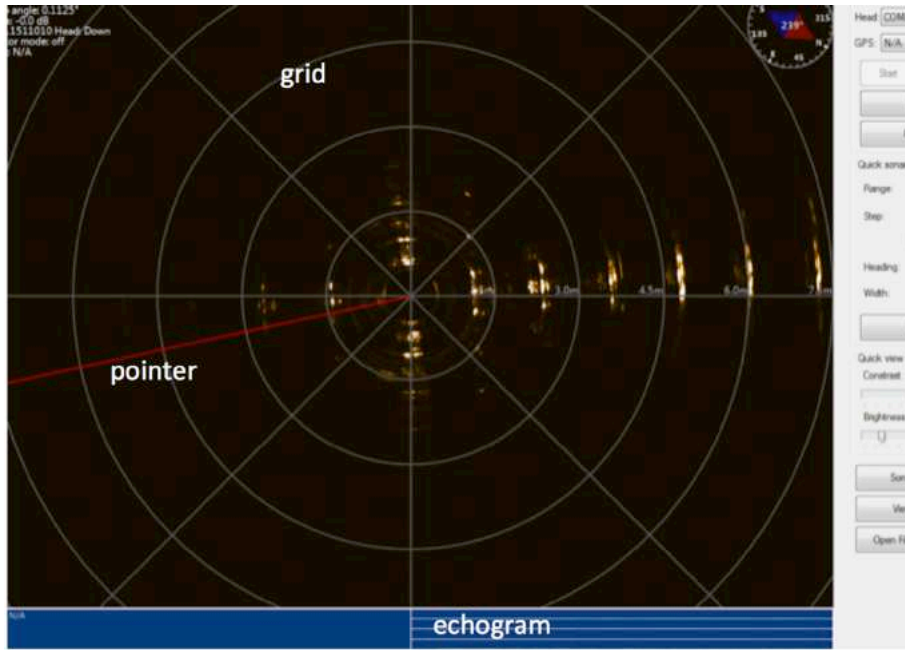


Fig28. Grid & Pointer & Echogram

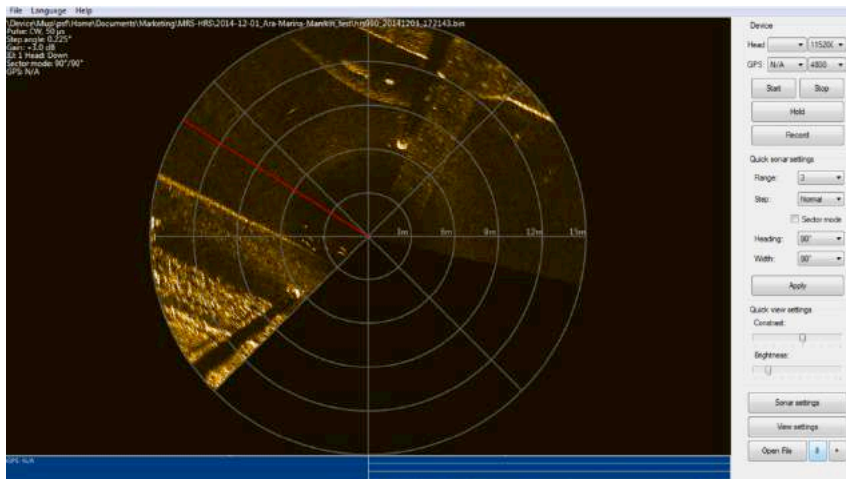
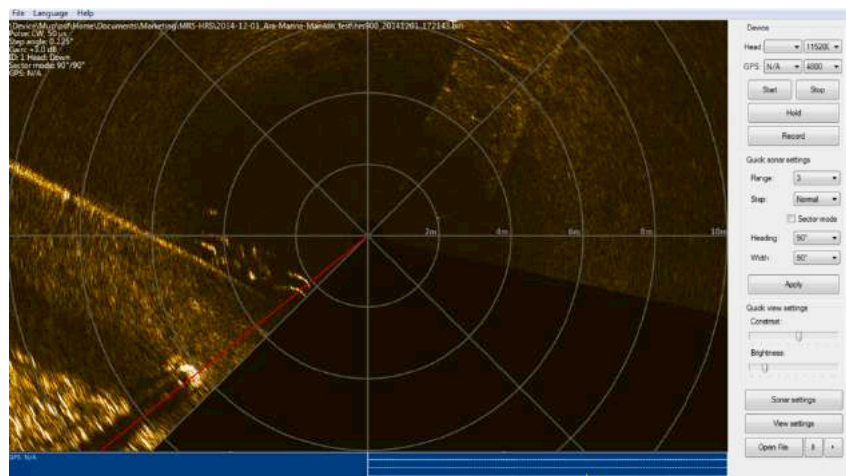


Fig29. Fit to window



## 6. Data recording & playback

- Data is saved on a pre-set folder (In the main menu, /Settings/Working folder..)
- File is binary format and is name based on date and time like  
hrs900\_20140710\_144306.bin
- To retrieve saved data, press 'Open File' and choose a binary file to playback
- Playback fast up to x16
- Use scrollbar for search during playback

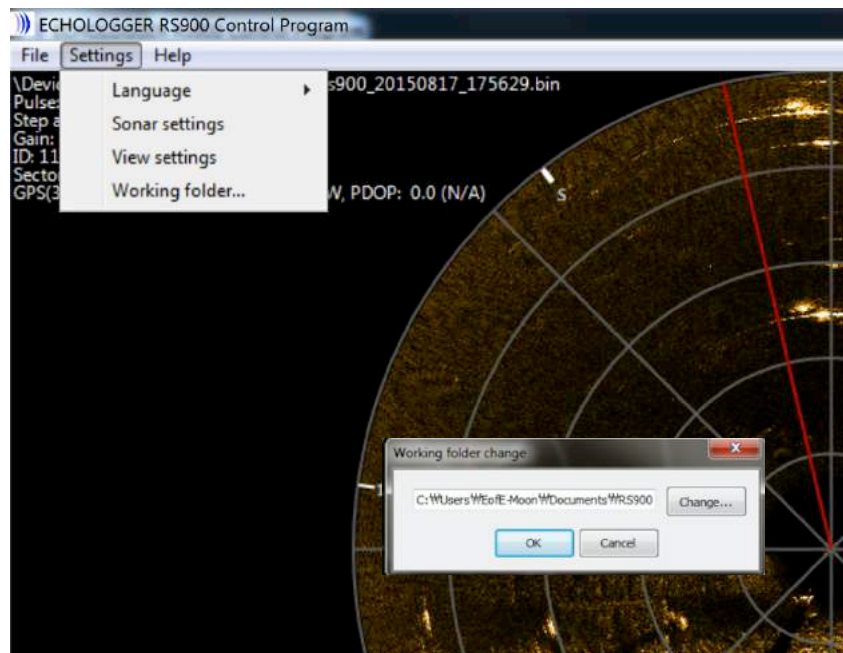


Fig30. Setting working folder for data recording

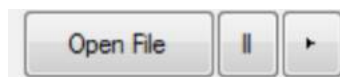


Fig31. Playback recorded data

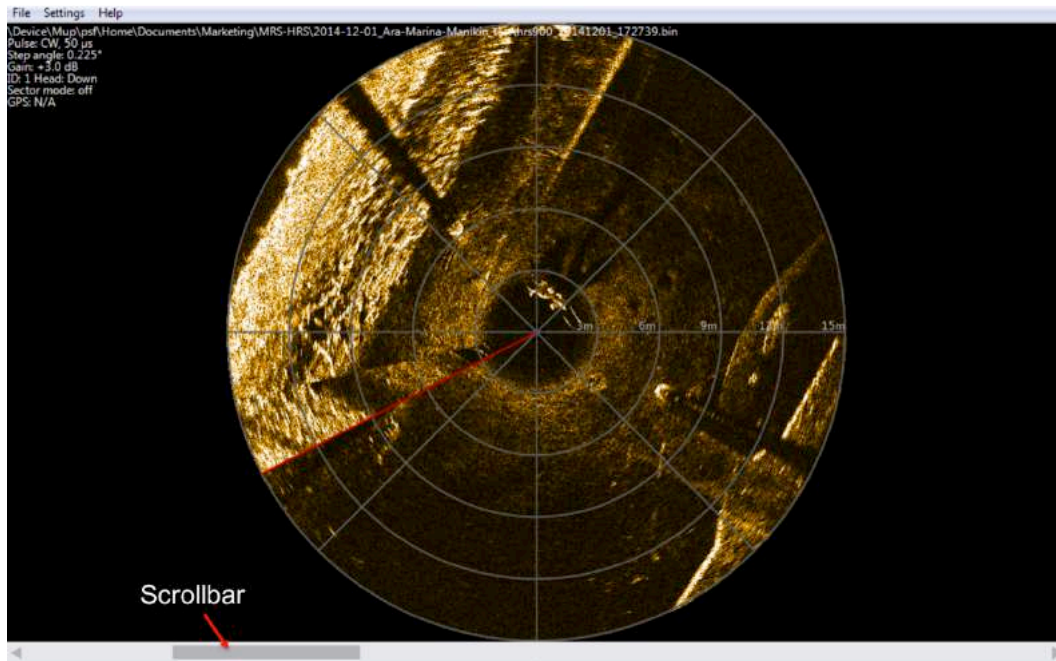


Fig32. Use of scrollbar during playback

## 7. Manipulating screen using a mouse

- Left button : Drag image (panning)
- Wheel button scrolled down/up: Zoom in/out
- Shift + Left button : Go back to default view
- Right button gives two options (Screenshot & Ruler), Fig28
  - o Screenshot : Capture the screen with information and save it to the same directory in bmp format (screenshot\_hrs900\_20151112\_174649.bmp)
  - o Ruler : Tick this option to enable it. Clicking two points will calculate distance of between the points to measure size or location of targets. Continuous measurements until un-ticked.



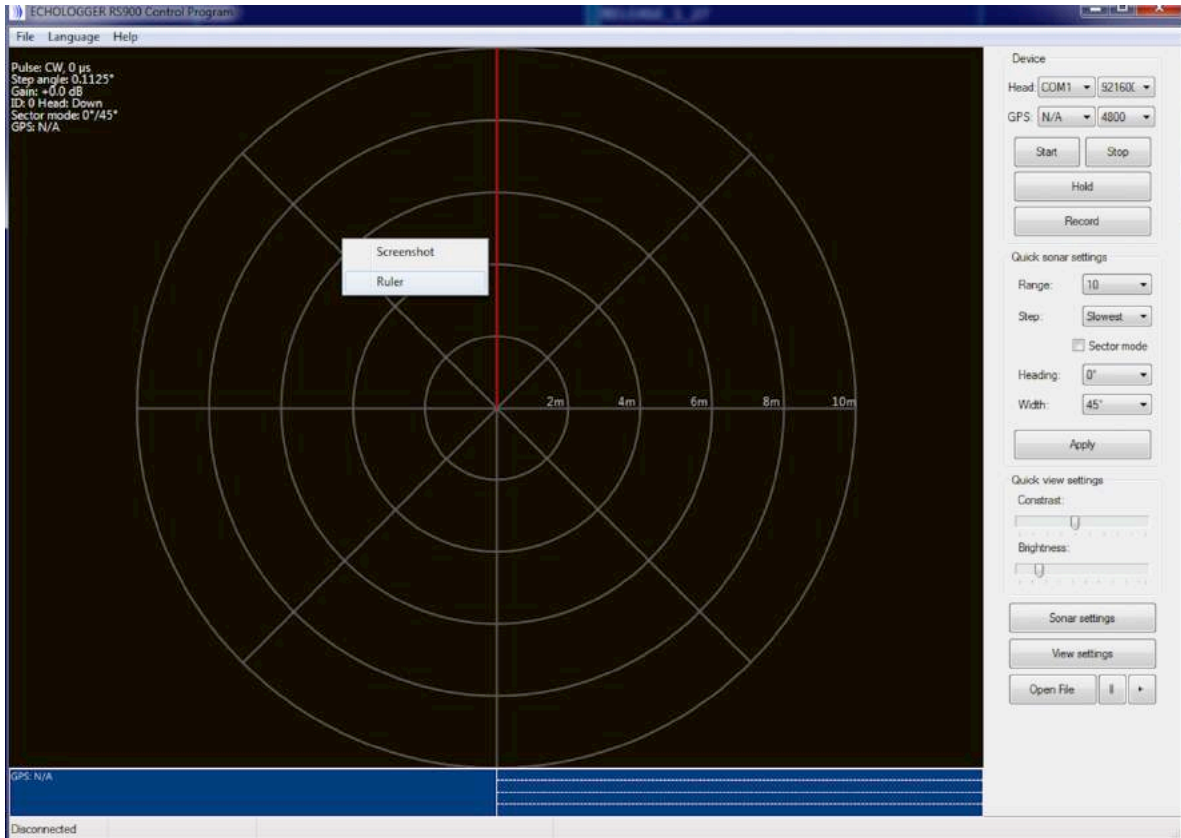


Fig33. Screenshot & Ruler with right mouse button

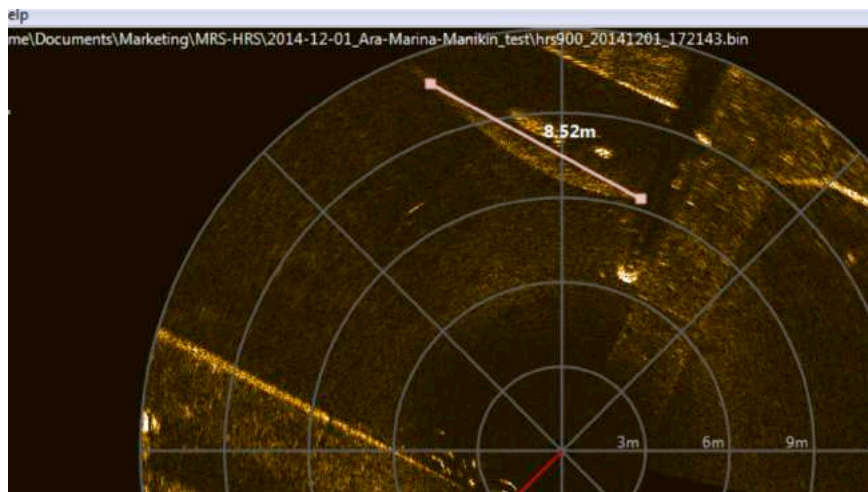


Fig34 Activate Ruler to measure the size of objects  
(Size of the boat estimated to be 8.52m)