Operations Manual

xDR-DSP – Digital Diver Intercom radio with DSP

NOVASUB standard digital 2 or 4 Diver Intercom radio built in different Novasub Surface Control configurations

xDR firmware: v0.13B48 and DSP firmware: v0.25
Date: 07-08-2023

Seascape Subsea BV
De Hoogjens 22
4254 XW Sleeuwijk
The Netherlands
T. +31-183-307900
E. info@novasub.com
www.novasub.com
www.seascapesubsea.com

Index

1 New & Fixed

In Build 48:
- Added support for new internal charger (BCPSZ)
- Added support for pressure sensor on diver 2
- Added low pressure alarm for both divers
- Changed Head gain for D1 and D2 in “novasub” comms type (15→40)
- Changed D1 & D2 depth display to intermittent (5 seconds) on screen
- Fixed battery status display

In Build 46:
- Fixed missing wireless headset PCB

In Build 45:
- Fixed corrupted data streams

In Build 44:
- Added AUX unmute setting
- Fixed tender 1 & 2 PTT buttons
- Added support for pressure sensor

In Build 43:
- Fixed diver 3 & 4 audio routing

In Build 42:
- Fixed AUX 2 volume control
- Fixed Gain progress bar in menu transition
- Fixed menu cancel command

In Build 41:
- Added PCB version detection
- Fixed DAC volume

In Build 40:
- Fixed Backlight issues
- Fixed Contrast issues
- Code optimalization

In Build 39:
- Added an On/Off switch for VOX in the menu
- Fixed the Loudness of the External speaker

2 Abbreviations

Ah	Ampere per hour
Vdc	Volt DC
Vac	Volt AC
Vpp	Volt peak to peak
DSP	Digital signal processing
PTT	Push to Talk
2-wire (simplex)	Two wire used for communication. The Microphone and earphones of the diver share the two wires in the umbilical.
4-wire (duplex)	Four wires used for communications. Two wires are used for the microphone and two wires are used for the earphones.
Mic	Microphone (Diver, panel or headphone/set)
Head	Earphone (diver or headphone/set)
HS	Headset
WHS	Wireless Headset
H	Wireless Headset
D	Diver
T	Tender (operator/supervisor)
HD	Half Duplex (Diver is always heard, Tender needs to press PTT to talk to the diver)
FD	Full Duplex (Full open communication between divers and divers-Tenders)
Vol.	Volume (gain)
Int.	Internal
Ext.	External
SPK	Speaker
Aux	Auxiliary audio input or output
Rec	Output to recorder or Audio output
CW	Clock-wise
CCW	Counter clock-wise
FFM	Full Face Mask

3 Introduction

The xDR Diver Intercom is a self-contained , Two / Four diver Intercom for a 2- or 4- wire communication between the operator (Tender) and divers. The xDR can operate in half duplex/full duplex mode Tender to Diver and full duplex between divers (round Robin). The Tender may choose to talk with the divers via the panel microphone, hand held Mic, headset Mic and Table Mic, using the PTT button. When pressing the PTT the Tender will communicate in full duplex mode with the diver (only in 4 wire mode). Each diver has a volume control from Diver to Tender and a volume control from Tender to diver. Apart from the Internal speaker an external speaker can be connected with separate amplifier and volume control.

The xDR Diver Intercom is the latest generation diver intercom radio based on an internal digital process based DSP (Digital signal processing). The DSP makes the xDR a complete adjustable Diver Intercom in which you can select what you want to hear on the outputs and each input and output can be set to the required levels. The advantage of this is that the xDR can be adjusted to the levels of your connected devices, like diver communication helmets and mask microphones and speaker. But also the connected audio recording devices, or the audio input devices, like a MP3 player. The standard xDR is a 2 channel diver radio with a connection of two divers. Each has the Volume control to and from the diver from the Tender. An overall Tender Volume control. A built in Speaker and Microphone for the Tender. Each diver a PTT (Push-to Talk) switch and a PTT All switch.

The xDR has a 2 line, 16 characters transflective display. The display is used to scroll through the menu and adjust the required settings. Without using the Menu settings, by default the xDR will work as a standard 2 Diver intercom as you will be used too. Using the Menu you have access to an extensive settings menu in which you can configure and adjust the audio and other settings to your needs.

3.1 DSP

DSP means in general Digital Signal Processing, the xDR has an audio DSP. With DSP the audio can be duplicated, adjusted, filtered, amplified, suppressed, etc. This makes it possible to easily route and adjust the audio signals from and to the inputs and outputs. Also each input and output can be set to a required gain level. Another advantage is that on each output can selected what you would like to hear.
That means that you can select at each Diver what he/she may here, but also on any output or speaker/headset.
All audio inputs are analog signals which are first digitized before passed on to the DSP. The audio is digital send to an output where it is converted to an analog signal.

3.2 Features

- Fully audio configurable, select on each Diver, Tender and output what it may hear
- Each Diver, input and output has a gain level adjustment
- Separate amplifiers for Divers, Internal speaker and External speakers
- Transformer Isolated on all Divers, inputs and outputs
- 3,5 mm jacks to connect any media / gaming headset with mic

3.3 Options

- Wireless headsets (two or four) with PTT
- Wireless hand held speaker/Mic
- Rugged waterproof Single ear headset with PTT
- Hand held wired Mic with PTT
- Table Mic with PTT button per diver and PTT all button
- Diver light power supply and control (24 vdc max 30 watt)
- Depth sensor which displays diver depth, dive time and max. diving depth per diver
- High Pressure sensor which can display the pressure of a cylinder on the screen with an alarms set on 100 bar.

First please read this manual thoroughly to understand all possibilities

4 Specifications

Electrical	
Input Impedance (Each Input)	250 Ohms
Frequency Response	300 - 10000 Hz
Common Mode Rejection 40 dB Minimum	40 dB Minimum
Output Impedance	4 Ohm
Diver Mic Sensitivity (Input)	15 mVpp
Headset Mic	159 mVpp
Inputs audio (Aux&DVR in)	2,82 Vpp
Outputs Audio (Rec, Out & Aux)	2,82 Vpp
Headset speaker	1 watt audio
Diver Output Power (RMS @ 4 Ohm Load, 12 Vdc)	7 watt audio
Speaker Output Power (4 Ohm)	15 watt audio
Inputs and outputs Isolation	Transformer galvanic Isolated
Internal Power Supply Voltage	12-32vdc 6 watt
Power Drain	0.2 – 0.5 Ah (12v)
External Power supply voltage	100-240 vac
Battery	Lead-acid or Li-Ion
Battery Life	Depending of system, min. 12 hrs
Charging time	Depending of system

Mechanical	
Front Panel Material & finish	Aluminum epoxy print coated
Case / Box / Panel	Depending of system
Configuration	2 or 4 Diver
Protection	IP 54, protected against spraying water

5 Audio schematics

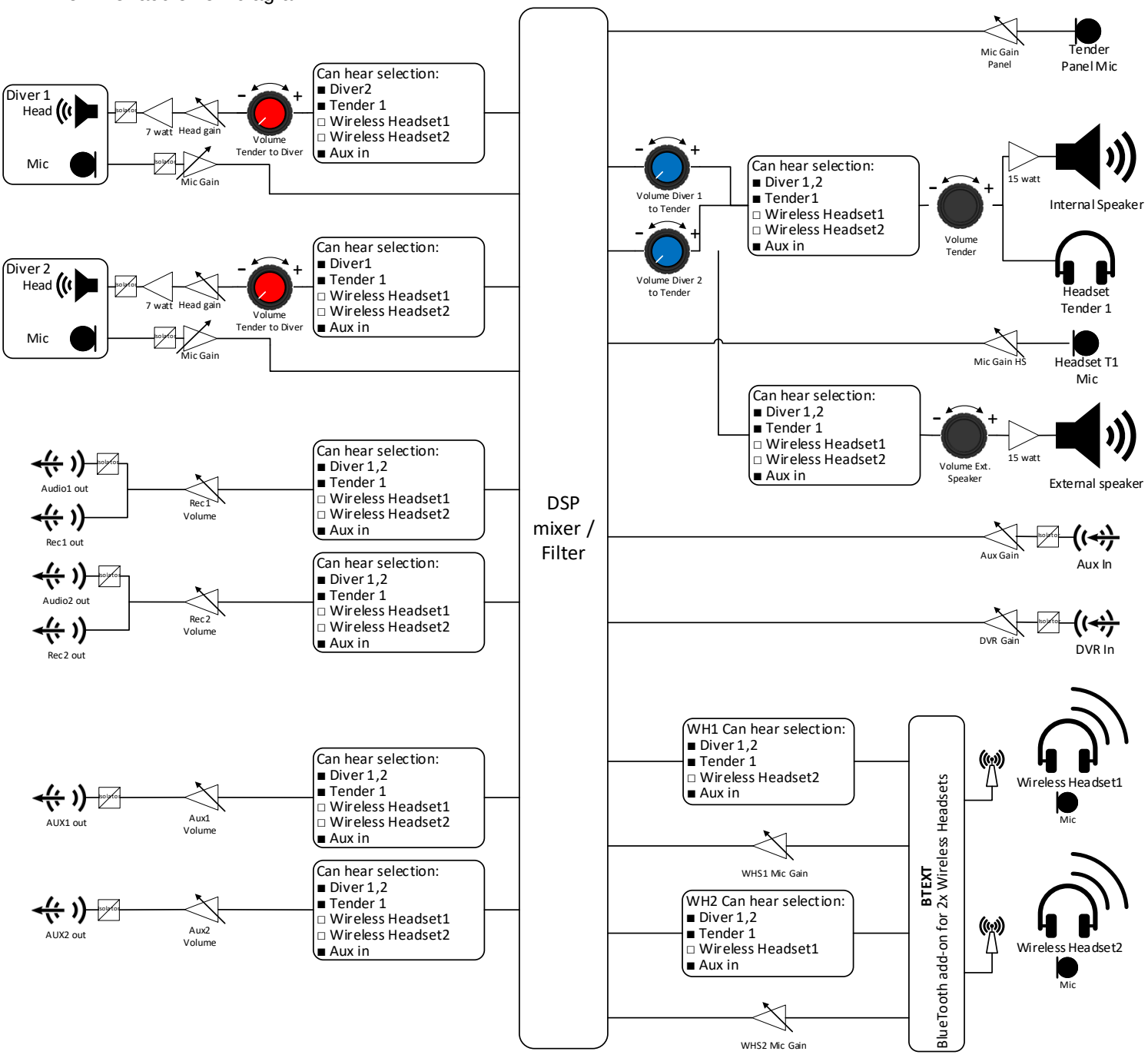
The below schematics shows the route of the audio to and from the connected devices. The Diver and Tender connections are digitized to and from an analog input/output. Each digital audio signal is being filtered, adjusted and amplified before being routed to another input/output.

The explanation of the used pictograms in the audio flow diagram:

	Internal Gain setting in Menu		Audio isolator		Rotary switch for Menu & General volume		Selected
Volume Diver 1 to Tender	Volume setting with turn knob	7 watt	Amplifier		Microphone		Un selected

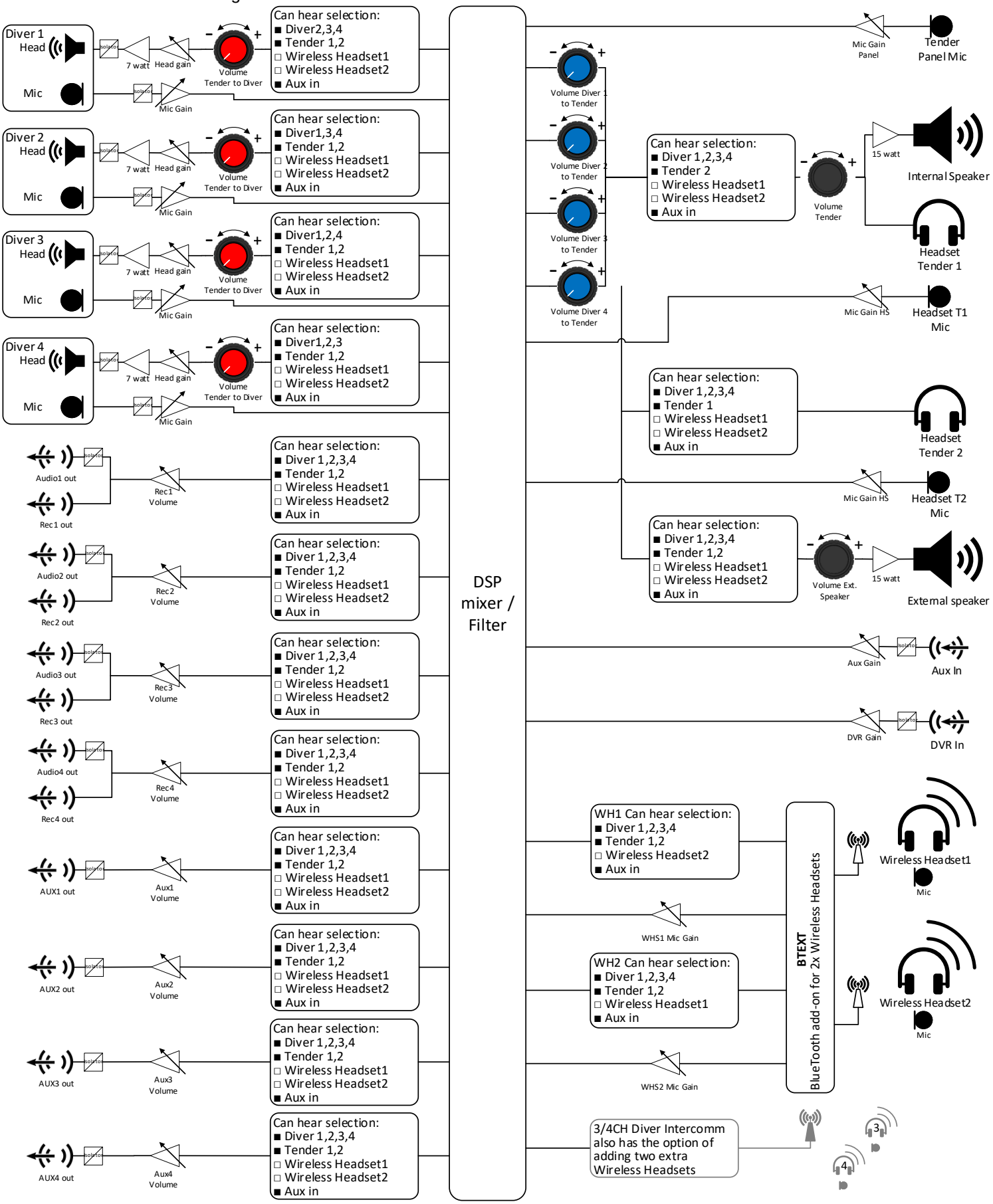
5.1 2DR audio flow

Two Diver audio flow diagram



5.2 4DR audio flow

Four Diver audio flow diagram



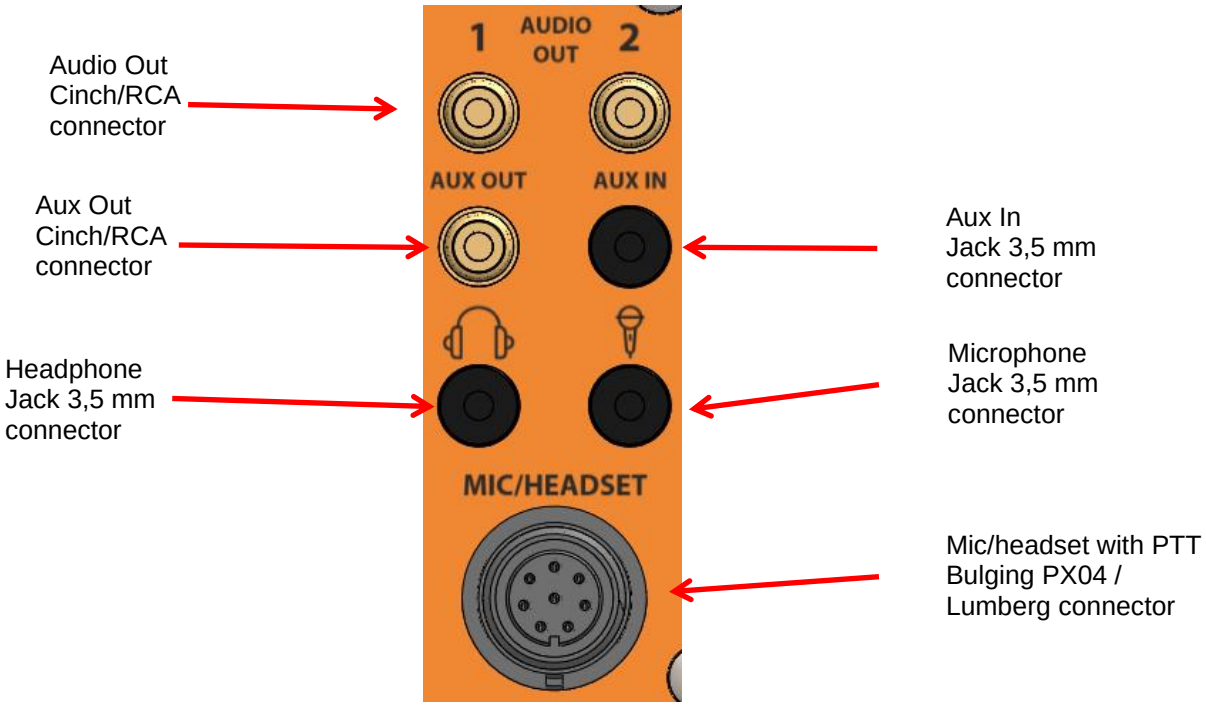
6 Controls

The xDR has standard controls which will be familiar to you using any other Diver Intercom. Each Diver has a Tender and Diver Volume potentiometer knob and a PTT switch. There is also a PTT All push button, to speak to all Divers at once. There is a general rotary switch which has as default selection the function of increasing and decreasing the Tender audio Volume heard at the internal speaker and connected headset. There is an on/off switch for the internal speaker.

Function	Description
Rotary Switch	This switch has a rotation and push function. It is used to enter and scroll through the Menu items. By default the switch is used to increase/decrease the value of the selected startup function. By default the startup function is the Volume Tender.
Menu Display	This a 2 line, 16 character display showing the selected menu functions. The display is a transflective LCD display with a back ground light. It can be used outdoor in full sunlight. The contrast and background display light can be adjusted in the menu.
Diver Volume control	Each diver has 2 rotary potentiometer's for adjusting the Tender to Diver volume and Diver to Tender volume • Volume Tender to Diver: This is the volume of the Diver earphone speakers when the Tender speaks to the Diver. • Volume Diver to Tender: This is Volume of the Diver Microphone speaking to the Tender
Panel Mic	On the panel between the Diver controls, the internal MIC is positioned. It is not needed to place your mouth close to the Mic. Normal arm length distance is sufficient to pick-up the Tender speaking volume.
PTT (Push-to-Talk)	Press the PTT to speak to the diver (only in HD mode), or PTT All to speak to all divers at once.
Speaker	This a switch to switch the internal speaker On or Off the internal speaker. Depending on the system this can be a rocker switch or a push latching switch.

7 Audio Connections

The xDR has audio in- and output connections, these can vary with each system. The most common connections are shown below:



Below is a list of al the connections that are possible on a system:

Audio connections	**Description**	**Connector**
Audio Out 1 Rec Out 1	Audio out 1 and Rec out 1 have both the same selection of you want to hear on these outputs and the same internal gain setting. Audio Out is standard isolated. REC out is both isolated to the recorder as well if it is an output. By default Diver 1 & Tender are selected to output	RCA (Cinch) (Phono)
Audio Out 2 Rec Out 2	Audio out 2 and Rec out 2 have both the same selection of you want to hear on these outputs and the same internal gain setting. Audio Out is standard isolated. REC out is both isolated to the recorder as well if it is an output. By default Diver 2 & Tender are selected to output	
Aux Out 1 Aux Out 2	Aux Out 1 & 2 have each their own selection of to hear and both have their own internal gain setting. Both outputs are isolated. By default Diver 1&2, Tender and Aux are selected to output.	
Aux In	Aux in can be used to input an audio source from any device, like a MP3 player or Smartphone. This audio source can be selected in the Menu to hear at any output. This means for example, that you can selected at the Diver can hear, and the diver can hear music. If the Tender talks to the diver, the aux (music in this example) will be muted. This can be turned off in the menu.	Jack 3,5 mm (mono/stereo)
DVR In	DRV In is an audio input which can be used to connect to a DVR or other output. The sound of this output will be heard on the Internal speaker of the xDR radio. This input will be internally used in all Novasub systems with a built in DVR recorder. This input is isolated and has an internal gain setting.	RCA (Cinch) (Phono)
Headphone	Headphone connection of a standard headphone used with PC's or other devices. The volume control of the headphone is in parallel with the Internal speaker volume. This is the Vol. Tender on the menu display, using the rotary switch	Jack 3,5 mm (mono/stereo)
Microphone	Microphone input of a headset or other Mic input which is an Electret Microphone. This input has an internal gain setting. When a microphone is plugged it, it is detected and this switches automatically from the internal panel Mic.	Jack 3,5 mm (mono)
Mic/Headset	This is a Novasub configured multipin connection used for a Table Microphone with PTT buttons, hand held Mic with PTT button or rugged Mic/Headsets with PTT button.	Bulgin PX0412/08S or Lumberg 0271-07
Note that when there is a microphone connected to either the multipin or the jack then the panel microphone is disabled.		

8 Wireless Headsets

All systems that have the xDR-DSP installed have the possibility to integrate wireless headsets. Therefore the xDR-DSP is sold in 3 different configurations:

With Wireless	The system incorporates buttons and antennas on the panel and the Bluetooth print is installed. Headsets are sold alongside the system.
Without Wireless	There is nothing installed for wireless headsets. This cannot be incorporated later.
Prepared for Wireless	The system is prepared for the addition of wireless headsets. buttons and antennas are installed but the Bluetooth print is not yet. This can be incorporated later.

Note that when the wireless antennas and buttons are installed it does not mean that the system supports wireless headsets. It is possible it is only prepared for it.

If this is the case then Seascape Subsea can accommodate in adding the wireless headset functions.

The Bluetooth is controlled with the buttons on the panel, these can be seen below. If they blink green, then there is nothing connected, if they blink blue then they are connected.

Blinking

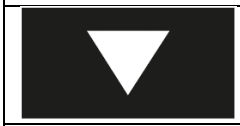
Not connected, Headset can either be OFF or not paired

Blinking

Connected

8.1 Control

The wireless headset has a few button on it, these are explained below:

Right earcup:	
	Volume UP
	ON: Press and Hold (2 sec.) You will hear “Power On” and the battery status “Battery High (medium,Low)” and when already paired with the SCC you will hear “Your device is connected” OFF: Press and Hold (2 sec.) You will hear “Power Off”
	Volume DOWN
Left Earcup:	
	Volume Reduce. By Pressing you toggle between normal Volume and reduced Volume. The last settings are stored in the memory at switch OFF
	PTT button, press and Hold to speak. Only needed in All HD comms mode settings

8.2 Pairing

When connection between the headset and the system is lost, the headset needs to be paired with the system:

1. Switch the headset OFF
2. Press and hold the power button on the Headset until you hear “Two”, then release the button.
3. Press the wireless button on the panel for 4 seconds
4. The button will start blinking blue fast
5. If the button starts blinking blue slower, then the headset is connected. the headset will also say: “Your device is connected”

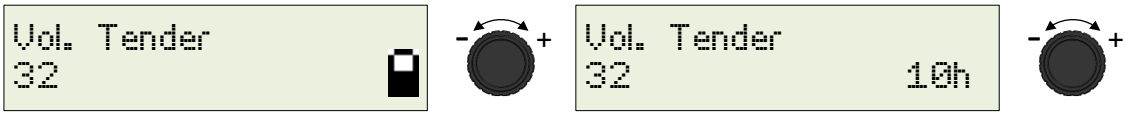
9 Menu

The xDR has a menu which can be accessed using the 2-line LCD display and the rotary encoder switch. By default, the xDR display shows the Vol. Tender, which is the audio volume of the Tender internal speaker and headset. By rotating the encoder switch the Volume can be increased and decreased.

The xDR is based on internal firmware for control and the DSP. Both can be updated. Please check the www.novasub.com website regularly for any updates.

9.1 Startup display

When you switch on the xDR radio the display will show by startup display. By default, this is the Volume Tender control. That means when you use the rotary switch you will increase or decrease the Tender Volume. In the system configuration with only a xDR Diver intercom, it will also show the internal battery status and lifetime.

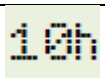


In the menu you can select 3 of the below options you want to control in the Startup display

1. **Vol. Tender**: The Volume of the Tender, which is the volume of the internal speaker and headset when connected. The scale is from 0 -100% of full power.
2. **Vol. Ext. Speaker**: The volume of the separate amplified external speaker. The scale is from 0 -100% of full power.
3. **Comms Mode**: The type of comms modus settings

9.1.1 Battery status

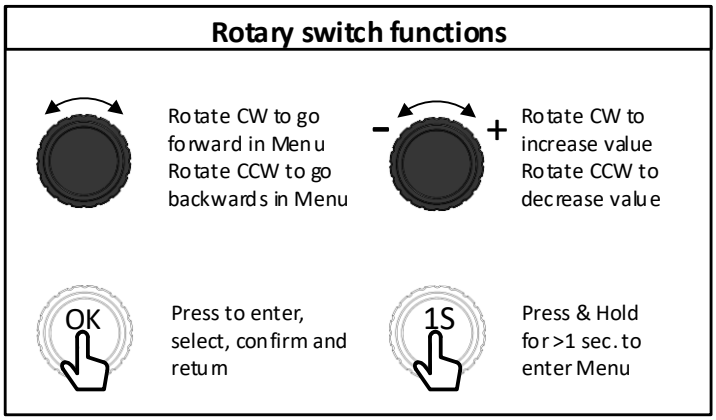
When you have the external power connected the battery charging status is indicated with a small battery icon which is filled to solid when the battery is full. When you disconnect the external power the battery's remaining time is indicated in the hours left. 10h means that the radio will operate for the next 10 hours.

	Charging		**On battery**	
Screen		Battery charging with 6 levels of charge capacity. When solid filled, the battery is fully charged		Battery discharging with indicating the remaining time in hours, if less the 1 hour it will show remaining minutes.
LED*		The LED on the system is on and not blinking when the system is connected to external power. The color corresponds with the battery capacity: Green: 80-100% Yellow: 20-80% Red:0-20% Please note that the LED can be on the panel or on the side of the system.		The LED on the system is on and blinking when the system is not connected to external power. The color corresponds with the battery capacity: Green: 80-100% Yellow: 20-80% Red:0-20% Please note that the LED can be on the panel or on the side of the system.
*Please note that the LED is only incorporated on the newer versions of radio systems.				

9.2 Menu access and control

The menu is accessed using the rotary switch on the right side of the LCD display. To access the Menu, you need to press & hold the rotary switch longer than 1 second. If you press & hold too short, it will indicate this on the display. You just press & hold again longer than 1 sec. to access the menu.

The Menu has two levels, the Main menu for some general controls and the Main settings.
Both can be set with password protection. This can be used in case you have set all internal settings correct and want to avoid that the users altering these settings. This can be set up in Password Prompt.

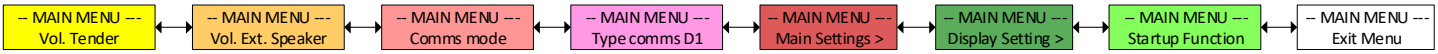


9.2.1 Menu control

The menu is fully controlled with the rotary switch. The switch has a rotating function, left and right. Which are clicks, each click is one step. The switch also has a push function which you use to enter the menu, select, confirm, and return in the menu.

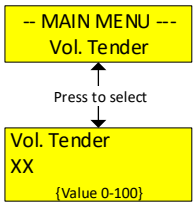
9.3 Main Menu

The Main Menu has 8 different pages where you scroll through using the rotary switch.



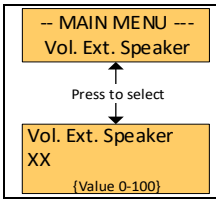
Press at a Main Menu display page and press once on rotary switch to enter this menu item
Rotate the rotary switch back and forwards to scroll through the menu and press it once at a display to select it. The last page is to Exit this menu.

9.3.1 Vol. Tender



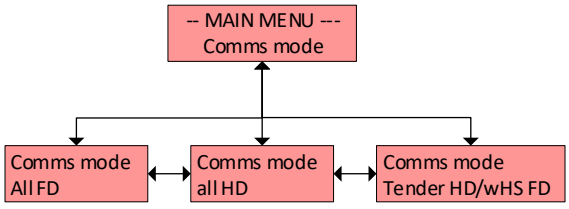
The Vol. Tender is the internal speaker and connected headset volume level. The level is adjusted from 1-100% of the full output power. This Volume control is on top of the Diver to Tender Volume control of each diver.

9.3.2 Vol. Ext. Speaker



The Vol. Ext. Speaker is the external speaker volume level. The level is adjusted from 1-100% of the full output power. This Volume control is on top of the Diver, Tender and other audio gains selected. The external speaker has an independent amplifier of 15 watts.

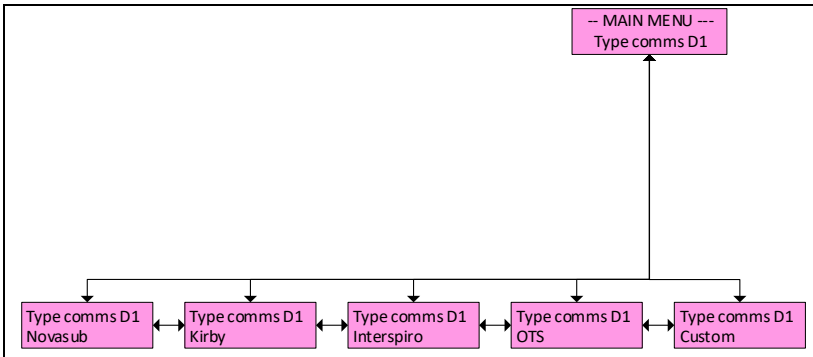
9.3.3 Comms Mode



The Comms Mode is used to select when you want to operate half duplex or full duplex and in hybrid mode with wireless headsets.

- All FD: All Full Duplex
  In this mode you speak with the divers in a full duplex mode, there is no need of using the PTT buttons. You can hear the divers and the divers can hear you.
- All HD: All half duplex
  You will always hear the divers, even when you speak to him (only with 4 wire comms) but every Tender needs to press a PTT button to speak to the divers.
- Tender HD/wHS FD: Tender (panel/wired headset) half duplex & Wireless headset full duplex
  The Tender needs to press the PTT to talk with the divers and the wireless headset speaks to the divers without the use of PTT button on the headset.

9.3.3.1 Type of comms D1



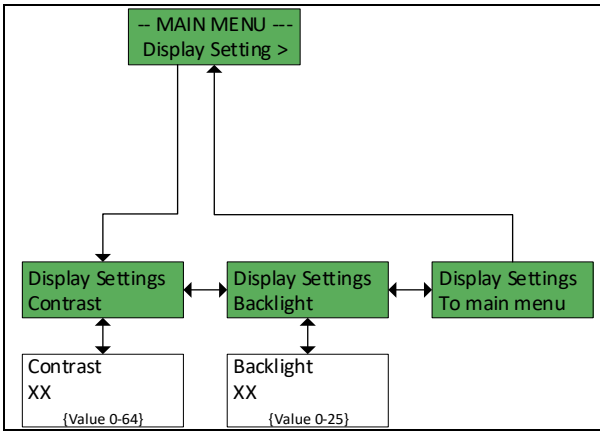
A quick access to select which type of communication is used on the helmet or FFM. Each system has different gain settings for optimum use. We made a pre-selected gain matching each brand of communication unit.
Each predefined gain setting can be adjusted in the menu at the diver settings and will be stored in the memory. When you use the reset settings it will jump back to the factory settings.
Predefined settings are based on 4 wire comms.

Novasub	Novasub brand comms set for Kirby helmets
Kirby	Kirby Morgan standard comms set for Kirby helmets
Interspiro	Interspiro comms set for Divator FFM
OTS	OTS comms set for FFM
Custom	Custom or other brand of comms set used in helmet or FFM

9.3.4 Main settings

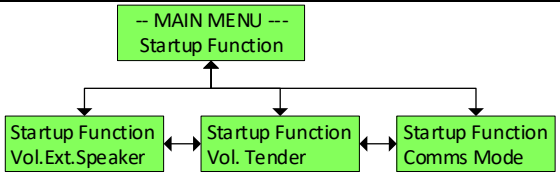
-- MAIN MENU --- Main Settings >	This enters the Main setting menu, which will be further explained in chapter 9.4 It the password protection is activated you will need to enter the password by using the rotary encoder, see chapter 9.4.109.4

9.3.5 Display settings



In this page you can adjust the contrast and backlight of the display. The display is a daylight display, that means the more daylight you have, the better you will see the text. You only need backlight in darker surroundings. By default, the backlight display is set low.

9.3.6 Startup Function



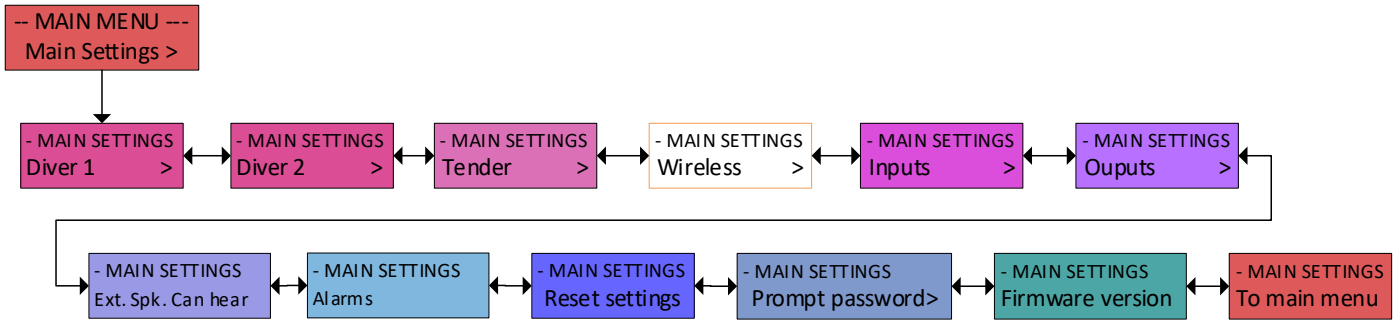
Here you select what you want to control with the rotary switch in the standard display when you are not in the Main Menu.

- Vol. Ext. Speaker
  This shows in the main display the volume of the external speaker, increase, and decrease the volume with the rotary switch
- Vol. Tender
  This shows in the main display the volume of the Tender, which is the internal speaker & headset. Increase and decrease the volume with the rotary switch
- Comms Mode
  This shows in the main display the comms mode you selected of Diver1. You can switch quickly to another type of comms. This can be handy when you use different type of comms systems on the helmet/FFM in your team. Note that this feature only changes the gains to accommodate for a different comms system and does not change the wire layout/wiring diagram.

9.4 Main settings

In the main settings you can configure the diver, tender, in and output settings, as well system related settings.
The main settings can also be password protected if this is selected in the prompt password menu. The Main settings are either for 2 or 4 divers, depending of the system hardware configuration. We will explain the 2-diver menu, as each diver settings are the same.

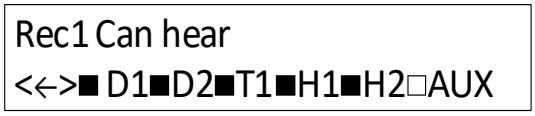
The Main setting has 11 different pages where you scroll through using the rotary switch:



Press at a Main settings display page and press once on rotary switch to enter this menu item.
Rotate the rotary switch back and forwards to scroll through the menu and press it once at a display to select it.
In a 4CH xDR version you will also see Diver3, Diver 4 and Tender 2 appear in the Main settings Menu.

9.4.1 Can hear selection

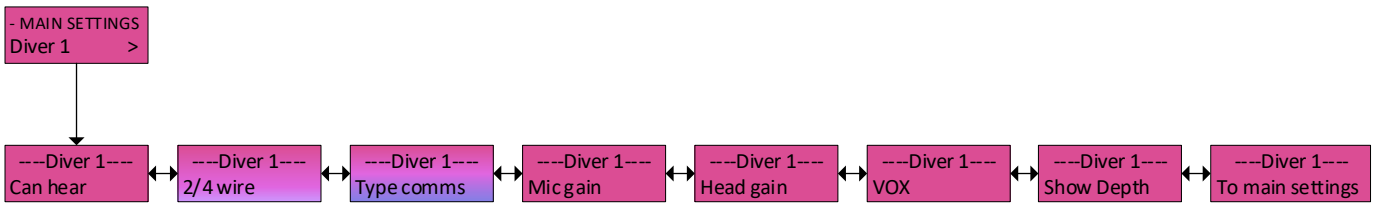
At different settings pages you will see the Can hear page. This page is a selection of audio sources which can be selected for that specific output (listener), which can be a Diver, Tender, Wireless headset, or output.
Once you see the window below you can scroll with the rotary switch to the source you want to select. The selected source will be between these marks < > when you press the rotary switch once you either select ■ or deselect □ that source.
When you press at < ←>, you leave this window and go back to previous page.



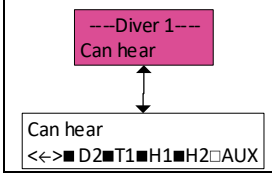
Symbol	Full Name	Notes
D1	Diver 1	
D2	Diver 2	
D3	Diver 3	Only with 4Ch
D4	Diver 4	Only with 4Ch
T1	Tender 1	Panel mic or Headset mic
T2	Tender 2	Panel mic or Headset mic. Only with 4CH
H1	Wireless Headset 1	Only with Wireless Headset board
H2	Wireless Headset 2	Only with Wireless Headset board
H3	Wireless Headset 3	Only with 4Ch and with Wireless Headset board
H4	Wireless Headset 4	Only with 4Ch and with Wireless Headset board
AUX	Aux In	

9.4.2 Diver 1

These settings pages are the same for Diver 2, 3 and 4. But each Diver has its own settings which can be set.
The diver settings menu has 7 different pages where you scroll through using the rotary switch. The last page returns to Main settings.

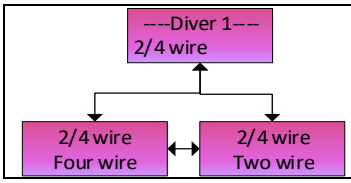


9.4.2.1 Can Hear



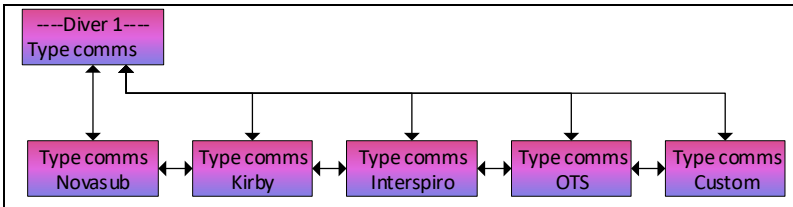
At each diver you can select which audio source the diver will hear on his earphone.
See Chapter *9.4.1 Can hear selection* for a full explanation of the can hear function.

9.4.2.2 2/4 wire



Select here the type of wired comms you use. When you use a 2-wire comms system, you need to select the Two wire mode, else the diver will not hear the Tender.
When you have a 4-wire comms system, you need to select Four wire mode, else the diver will also not hear the Tender.

9.4.2.3 Type of comms

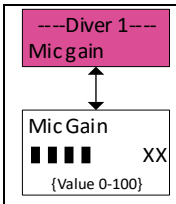


Here you can select which type of communication is used on the helmet or FFM. Each system has different gain settings for optimum use. We made a pre-selected gain matching each brand of communication unit. Each predefined gain setting can be adjusted in the menu at the diver settings and will be stored in the memory. When you use the reset settings it will jump back to the factory settings. Predefined settings are based on 4 wire comms.

This setting does not change the wire layout/wiring diagram!

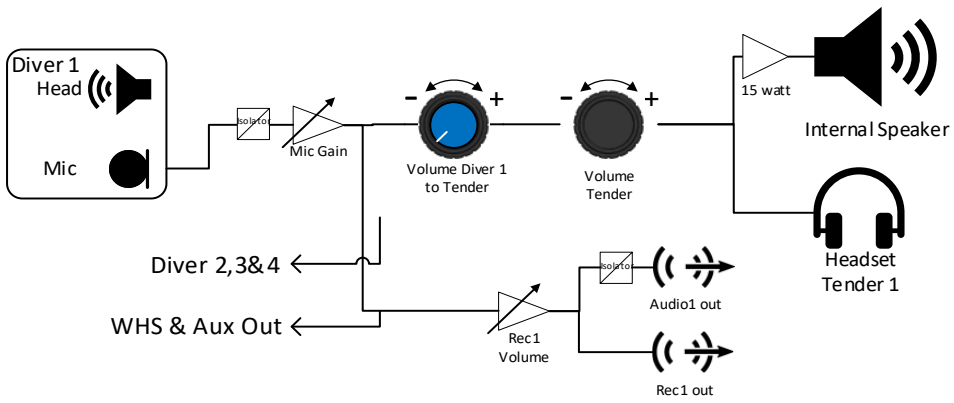
Novasub	Novasub brand comms set for Kirby helmets
Kirby	Kirby Morgan standard comms set for Kirby helmets
Interspiro	Interspiro comms set for Divator FFM
OTS	OTS comms set for FFM
Custom	Custom or other brand of comms set used in helmet or FFM

9.4.2.4 Mic Gain



This setting is the gain (power) value for the diver microphone in the helmet or FFM. You can increase or decrease the value to the optimum value. In this way you can level the gain (volume) with the Tender gain (volume) to have both on the same loudness to the audio outputs. This gain setting is before the volume control of the Diver to Tender Volume control & Vol. Tender control on the panel.
This means that you have 3 steps of Volume settings.

The display shows the level (Black bars) of sound coming from the diver Mic and the set value XX.
When the diver speaks into the MIC you will see the bars increasing from left to right. Adjust the gain so that the level bars move past the middle of the screen.

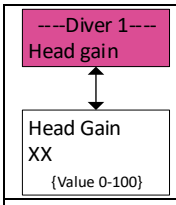


This diagram shows the audio routing from the diver Mic to the Tender and audio outputs for recording.

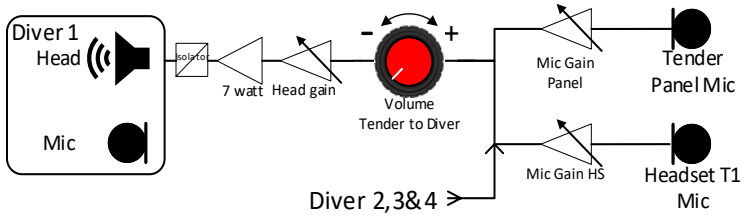
Mic Gain is the first volume control, this influences the audio level going to the Tender (internal speaker and Headset), audio recording, audio outs and other divers.

The Volume to Tender and Volume Tender only influence the level of audio to the internal speaker and headset.

9.4.2.5 Head Gain

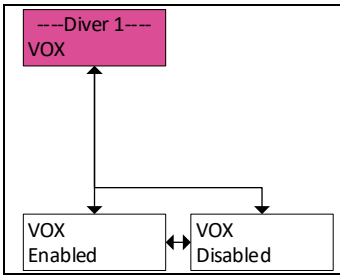


This setting is the Gain (power) value to the diver earphones in the helmet or FFM. You can increase or decrease the value to the optimum value. This gain setting is after the volume control of the Tender to Diver control on the panel. Set the value correct so that the diver can hear the Tender loud and clear. Set the Head Gain level with the Tender To Diver volume in mid position. And make sure that the Tender Panel Mic and headset Gain are also set correctly for other outputs.



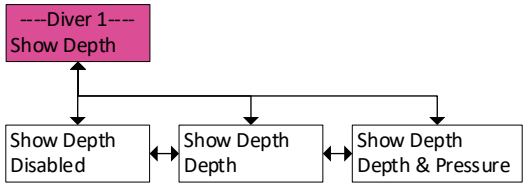
This diagram shows the audio routing to the diver headphones (earphones) from the Tender and other divers. Head gain is the actual audio power to the earphones of the diver. The audio level at the diver is influenced by the Tender Mic Gain panel and Mic Gain HS and the Volume Tender to diver control. And last by the set Head gain. Adjusting the levels of Mic gain panel and Mic gain HS also influence the audio levels to audio outs and other divers.

9.4.2.6 VOX



This setting can enable or disable the VOX for each diver. VOX is a set microphone sensitivity for which the microphone connection opens. This means that if this function is enabled you will only hear the microphone of the diver when the diver is actually talking. This eliminates noises when there is no communication.

9.4.2.7 Show Depth



If the system supports a depth sensor then you can select which sensor you are using in this setting. This makes it so that the depth, dive time, max depth and possibly pressure are visible on the main screen.

The depth function works best with the UDS-3 sensor. The depth and pressure sensor works better with the UDPS sensor.

As soon as you rotate the rotary switch the display will jump to the set startup function selected display, which by default is the Volume Tender.

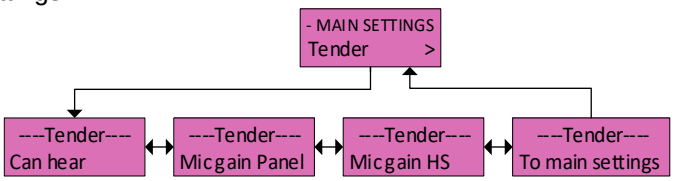
The dive time starts automatically when the diver goes below 1 meter of depth and will stop when the diver goes above 1 meter. If the diver goes below 1 meter within 15 minutes, then the dive time will continue, otherwise it will start at zero.

If more than 1 diver has a depth sensor enabled then the main screen will switch automatically every 5 seconds between both divers. Which diver is showing can be recognized by the first 2 characters on line 1: D1 = Diver 1, D2 = Diver 2, etc.

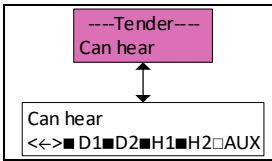
Depth	D1:0.00m 0:00:00 MD00m 13h	The following data is visible on the main screen when "Depth" is selected: **Top left:** The diver **Top Middle:** Depth (updated every sec.) **Top Right:** Dive Time **Bottom Left:** Maximum Depth **Bottom Right:** Battery (see "battery")
Depth & Pressure	D1:0.00m 0:00:00 MD00m AP041B 13h	The following data is visible on the main screen when "Depth & Pressure" is selected: **Top left:** The diver **Top Middle:** Depth (updated every sec.) **Top Right:** Dive Time **Bottom Left:** Maximum Depth **Bottom Middle-left:** Alarm indicator (A) (see "alarms") **Bottom Middle-Right:** Pressure (updated every 10 sec.) **Bottom Right:** Battery (see "battery")

9.4.3 Tender

These pages are for the Tender settings, in case of a 4-channel radio there will be also a Tender 2 settings page. The last page returns to Main settings.

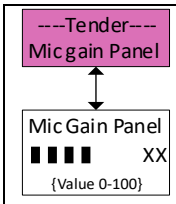


9.4.3.1 Can hear

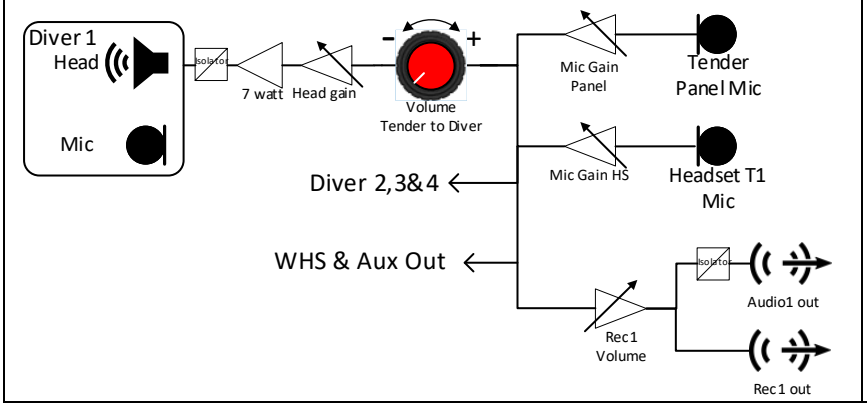


At the Tender you can select which audio source the Tender will hear at the panel speaker and on his earphone of the connected headset. See Chapter *9.4.1 Can hear selection* for a full explanation of the can hear function.

9.4.3.2 Mic Gain Panel

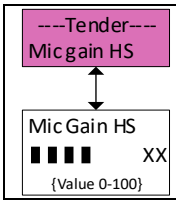


This setting is the gain (power) value for the panel microphone built in the front panel. You can increase or decrease the value to the optimum value. In this way you can level the gain with the Diver Mic gain to have both on the same loudness to the audio outputs. This gain setting is before the volume control of the Tender to Diver Volume control on the panel and final Head Gain to the Diver.
This means that you have actually 3 steps of Volume settings to the diver earphones.
The display shows the level (Black bars) of sound coming from the Panel Mic and the set value XX.
When the Tender speaks into the MIC you will see the bars increasing from left to right. Adjust the gain so that the level bars move past the middle of the screen. Just speak at a normal arm length distance from the panel. The Microphone is very sensitive and will pick-up all noise.



This diagram shows the audio routing from the Tender to the Divers and audio outputs. Mic gain panel is the actual audio level of the panel mic to all listeners. The audio level at the diver is influenced by the Tender Mic Gain panel and Mic Gain HS and the Volume Tender to diver control. And last by the set Head gain. Adjusting the levels of Mic gain panel and Mic gain HS also influence the audio levels to audio outs and other divers.

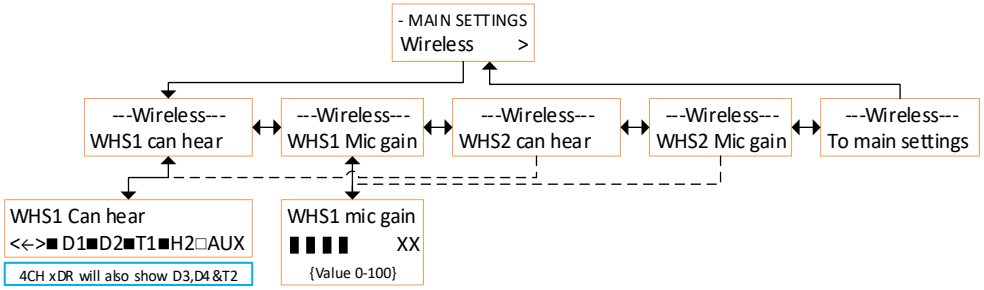
9.4.3.3 Mic Gain Headset



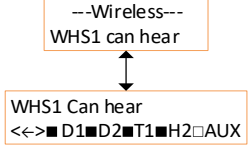
This setting is the gain (power) value for the connected headset microphone. The gain settings can be set optimum for the type of headset or table mic connected to the MIC/Headset or MIC connectors.
The settings explanation is identical to 9.4.3.2 Mic Gain Panel (see above)

9.4.4 Wireless

These settings will only work when the BTEXT print is installed internally on the xDR print. Most xDR Diver intercom units are prepared with the wiring of antennas and control buttons for the use of Bluetooth headsets. That means that an BTEXT print can easily be installed post build along with the purchase of Bluetooth headsets WLHEADSET3.

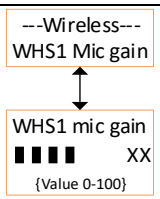


9.4.4.1 Can Hear



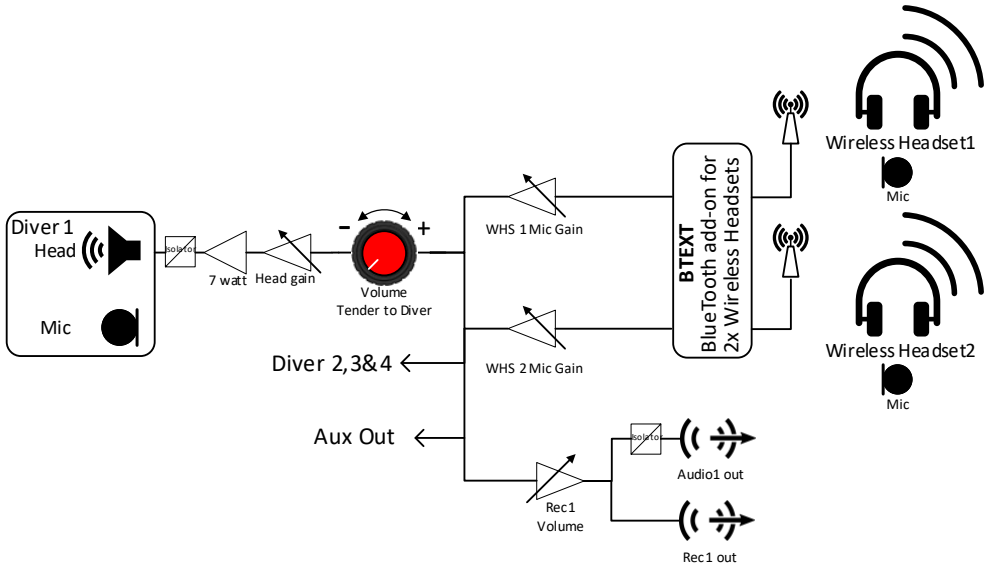
At the WHS1 you can select which audio source the wireless headset will hear.
See Chapter *9.4.1 Can hear selection* for a full explanation of the can hear function.

9.4.4.2 Mic Gain



This setting is the gain (power) value for the wireless headset. You can increase or decrease the value to the optimum value. In this way you can level the gain (volume) with the Diver Mic gain (volume) to have both on the same loudness to the audio outputs. This gain setting is before the volume control of the Tender to Diver Volume control on the panel and final Head Gain to the Diver. This means that you have 3 steps of Volume settings to the diver earphones. The display shows the level (Black bars) of sound coming from the headset and the set value XX.

When someone speaks into the headset you will see the bars increasing from left to right. Adjust the gain so that the level bars move past the middle of the screen.

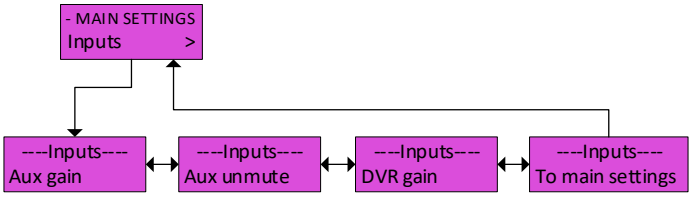


This diagram shows the audio routing from the Wireless headsets to the Divers and audio outputs. The audio level at the diver is influenced by the WHS x Mic Gain, the Volume Tender to diver control, and last by the set Head gain.

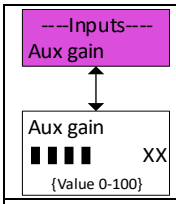
Adjusting the levels of WHS x Mic Gain also influence the audio levels to audio outs and other divers.

9.4.5 Inputs

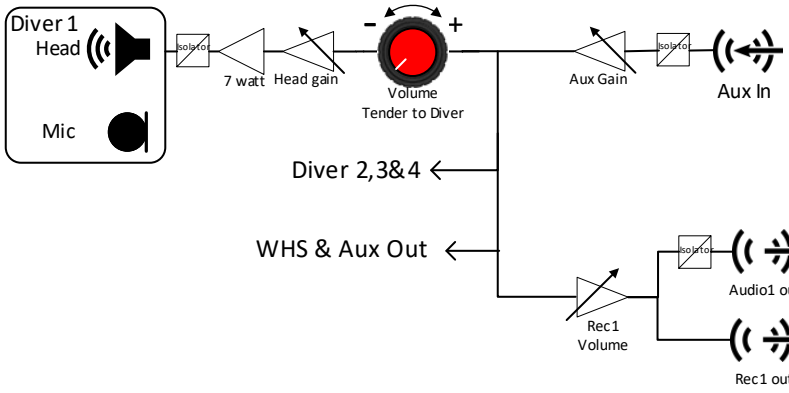
These pages are for the Input settings. The last page returns to Main settings



9.4.5.1 Aux Gain

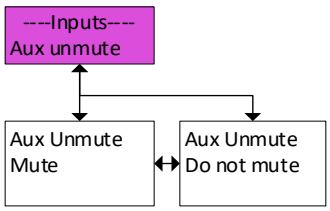


This setting is the gain (power) value for the AUX input. The gain settings can be set optimum. The display shows the level (Black bars) of sound coming from the aux input and the set value XX. When there is audio on the aux input you will see the bars increasing from left to right. Adjust the gain so that the level bars move past the middle of the screen.



This diagram shows the audio routing for the aux in.

9.4.5.2 Aux Unmute

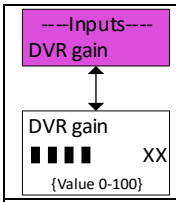


This setting controls whether the aux input should mute when a tender is talking or whether it should not mute.

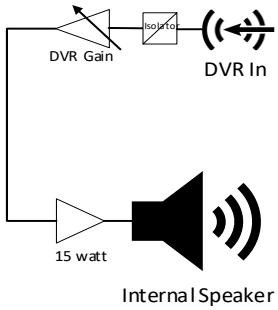
Mute
If the setting is set on “mute” then the aux input will be turned off when a PTT button is pressed (If the radio is set on “all HD”). When the radio is set on “all FD” or “Tender HD/wHS FD” then the aux input is always turned off.

Do not mute
If the setting is set on “do not mute” then the aux input will never be turned off.

9.4.5.3 DVR Gain



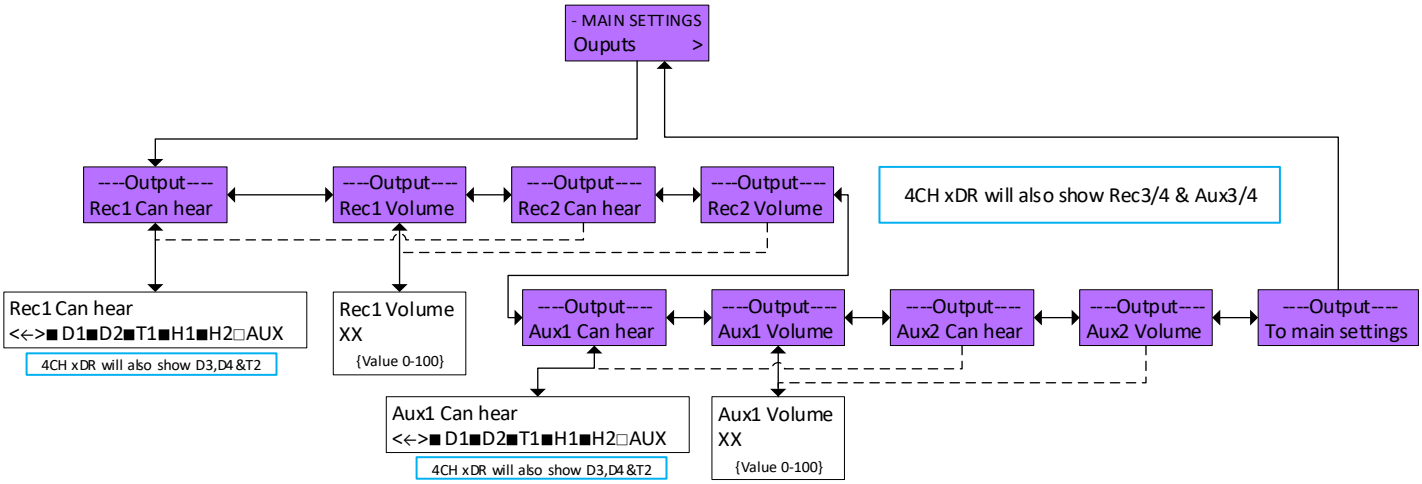
This setting is the gain (power) value for the DVR input. The gain settings can be set optimum. The display shows the level (Black bars) of sound coming from the aux input and the set value XX. When there is audio on the aux input you will see the bars increasing from left to right. Adjust the gain so that the level bars move past the middle of the screen.



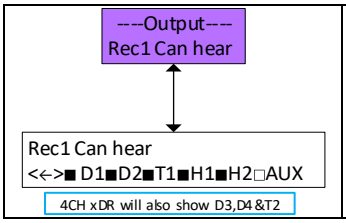
This diagram shows the audio routing for the DVR in.

9.4.6 Outputs

These pages are for the Input settings. The last page returns to Main settings

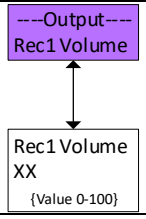


9.4.6.1 Can Hear



For each output you can select which audio source the output will hear:
See Chapter *9.4.1 Can hear selection* for a full explanation of the can hear function.

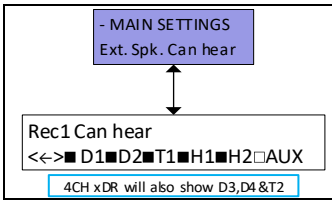
9.4.6.2 Volume



For each output you can select the volume that it will output. This ranges from 0-100 with 100 being the loudest.

9.4.7 Ext. Spk. Can Hear

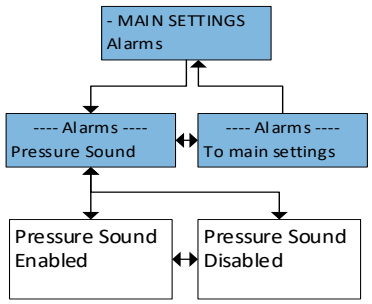
This page is only for selecting the audio sources that this output will hear



For the external speaker you can select which audio source the output will hear:
See Chapter *9.4.1 Can hear selection* for a full explanation of the can hear function.

9.4.8 Alarms

The alarms settings control what alarms are enabled and disabled. Currently only one alarm is available on the radio:



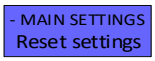
Pressure Sound alarm
The pressure sound alarm is an alarm that works in combination with a pressure sensor (see “depth”).

If the pressure sound is enabled and the pressure of the connected sensor drops below **100 bar**, then an intermittent beep can be heard on the communication for both the diver and the tender, and a blinking “A” is visible on the main screen of the radio. The beep can be muted for 5 minutes by pressing the rotary menu button, the “A” will still be visible on the screen.

If you don’t want to hear the sound on the communication, then you can disable this in the menu on the left. The blinking “A” is always enabled.

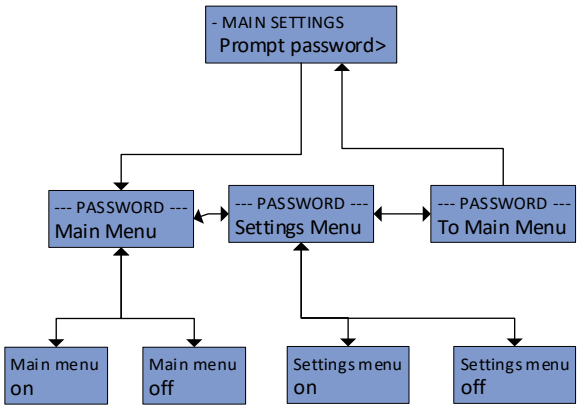
9.4.9 Reset Settings

This page allows for a reset of all the settings. This will set all settings to their factory default. To reset the setting you press OK and you will be prompted to fill in your password. Once you have done that the system will reset and restart.

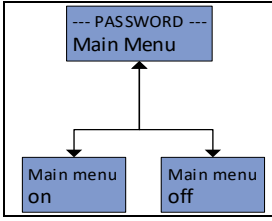


9.4.10 Prompt password

These pages are for enabling and disabling the password for the menus. The last page returns to Main settings.

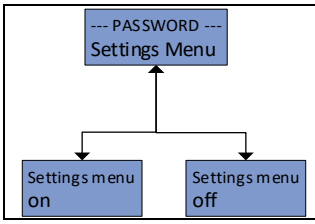


9.4.10.1 Main Menu



This page is for enabling and disabling the password for the main menu. Select ON or OFF and press OK to confirm the choice.

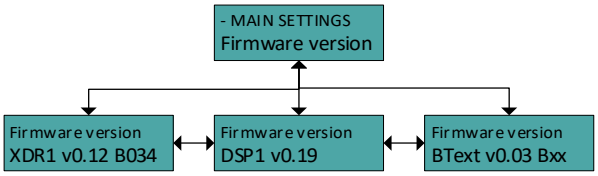
9.4.10.2 Settings Menu



This page is for enabling and disabling the password for the settings menu. Select ON or OFF and press OK to confirm the choice.

9.4.11 Firmware version

These pages are to see the version numbers of the system. To go back press OK.



10 Optional & Accessories

Please see below optional add-ons and accessories which can be used with this product

10.1 Wireless headsets

The system can be fitted with the a wireless headset module and wireless headsets. To make use of the wireless headsets the BTEXT module needs to be installed in the system. If your system does not have this it is something that can be done afterwards. When it is installed you can get different types of Wireless headsets:

WLHEADSET 1

The WLHEADSET1 is a wireless headset that connects to the Novasub radios. It is an extremely ruggedized and fully seawater-proof headset.

The headset uses 2.4 GHz Bluetooth 3.0 as a connection, and you can also connect your mobile phone to the headset to listen to music or answer calls.

The headset has Fast charging capabilities. When the battery is empty, you can charge it to 1-hour operation within 5 minutes. The headset is fully charged within 2 hours.

The headset can only be connected to a Novasub product that has "Wireless Ready"

See the 'Wireless Headset' brochure for more info.

WLHEADSET 1	
Range	80 m line of sight
Operation Time	15 hours
IP-Rating	IPX7

WLHEADSET 2

The WLHEADSET2 is a wireless headset that connects to the Novasub radios.The WLHEADSET2 is a wireless headset that is optimized for hardhats. It is an extremely ruggedized and fully seawater-proof headset.

The headset uses 2.4 GHz Bluetooth 3.0 as a connection, and you can also connect your mobile phone to the headset to listen to music or answer calls.

The headset has Fast charging capabilities. When the battery is empty, you can charge it to 1-hour operation within 5 minutes. The headset is fully charged within 2 hours.

The headset can only be connected to a Novasub product that has "Wireless Ready"

See the 'Wireless Headset' brochure for more info.

WLHEADSET 1	
Range	80 m line of sight
Operation Time	15 hours
IP-Rating	IPX7

WLHEADSET 3

The WLHEADSET3 is a wireless headset that has extra features for optimized use. It is an extremely ruggedized and fully seawater-proof headset. The headset uses 2.4 GHz Bluetooth 3.0 as a connection, and you can also connect your mobile phone to the headset to listen to music or answer calls. The headset has a led integrated, which can be used as a reading light, for example.

The headset also has a hearthrough-mode. This mode can be activated with a button and enables you to talk normally with someone without taking off your headset.

The headset has Fast charging capabilities. When the battery is empty, you can charge it to 1-hour operation within 5 minutes. The headset is fully charged within 2 hours.

The headset can only be connected to a Novasub product that has "Wireless Ready"

See the 'Wireless Headset' brochure for more info.

WLHEADSET 1	
Range	80 m line of sight
Operation Time	15 hours
IP-Rating	IPX7

10.2 **Microphone**

The system can also be used with a table microphone or a handheld microphone:

TMIC3-2

The TMIC3-2 is a two-channel table microphone with push-to-talk buttons for the different channels and a push-to-talk all button. It has a Gooseneck for the high-quality microphone. It uses the standard multipin connector for a NOVASUB radio.

Microphone	
Impedance	600Ω
Sensitivity	-50±3 dB
Frequency	1-12 KHz

TMIC3-4

The TMIC3-4 is a four-channel table microphone with push-to-talk buttons for the different channels and a push-to-talk all button. It has a Gooseneck for the high-quality microphone.

It uses the standard multipin connector for a NOVASUB radio.

Microphone	
Impedance	600Ω
Sensitivity	-50±3 dB
Frequency	1-12 KHz

HHMIC3-4L

The HHMIC3-4L is a handheld microphone that can be used with Novasub radios. It has a push-to-talk button to talk to all divers at once. The connector uses a standard multipin for the Novasub radios.

WLHEADSET 1	
Range	80 m line of sight
Operation Time	15 hours
IP-Rating	IPX7

NSEXTSPK33

The TMIC3-4 is a four-channel table microphone with push-to-talk buttons for the different channels and a push-to-talk all button. It has a Gooseneck for the high-quality microphone.

It uses the standard multipin connector for a NOVASUB radio.

NSEXTSPK33	
Power	23 watt
IP-Rating	IP66
Speaker	
Impedance	8Ω
Sensitivity	106dB ±3 dB

10.3 **Headset**

There are also non-wireless headsets that can be used with the system:

NSHEADSET 5

The NSHEADSET 5 is a single ear headset that uses a dual jack 3.5mm as a connector. It is a medium-duty over-the-head headset with a flexible boom microphone.

Standard included with a NOVASUB Diver Radio system

Speaker	
Impedance	32Ω + 15% at 1KHz
Sensitivity	114dB + 10%
Microphone	
Impedance	600Ω ± 30% at 1 KHz
Sensitivity	-69 dB ± 3dB
Frequency	50-80 KHz

NSHEADSET 1

The NSHEADSET 1 is a dual-ear noise-canceling headset, consisting of a heavy-duty headset with a noise-isolating boom microphone.

The headset has a PTT button on the right earpiece and is designed for use with a safety hard hat. The headset uses the standard multipin connector with a carabiner for strain relief.

Speaker	
Impedance	8Ω/ 16Ω
Sensitivity	114dB ± 3dB
Microphone	
Impedance	2.2KΩ
Sensitivity	-38±3dB
Frequency	10-50 KHz

NSHEADSET 4

The NSHEADSET 4 is a single-ear headset, consisting of a heavy-duty headset with a noise-isolating microphone.

The headset has a PTT button on the earpiece. The headset uses the standard multipin connector. The microphone can turn 360° so that the headset can be used for the left or right ear.

NSHEADSET 6

The NSHEADSET 6 is a double-ear headset, consisting of a heavy-duty headset with a noise-isolating microphone.

The headset has a PTT button on one earpiece and a volume button on the other. The headset uses the standard multipin connector.

10.4 Depth display hardware

The Diver depth can be displayed using the Novasub depth sensors with topside hardware. You will need the following integrated or separate equipment.

10.4.1 DDG

The DDG is the Novasub Digital Depth Gauge which is used with the pneumo hose or external pressure sensor UDS-3 to measure the diver depth. The DDG requires to be connected with the 2 wire NovaBus connection the xDR radio.
Devices needed:

- NSDDG2V1.2

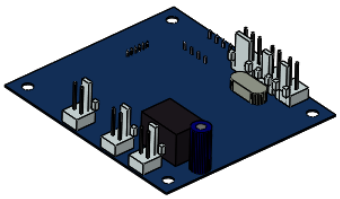
- UDS-3-xMSW

- NovaBus connection

10.4.2 PCBDDSI

The PCBDDSI is a depth sensor data serial interface which is built in a xDR case or other Novasub surface control system. The depth sensor UDS-3 is directly wired to this PCB.
Device integrated in xDR or surface control system:

- PCBDDSI



- UDS-3-x or UDPS-x

11 Help & Support

Further details about a Warranty Statement can be found at the chapter 12 Warranty

For technical support contact your local a Novasub Authorized Service Center or Seascape Subsea BV.
Seascape Subsea BV is the manufacturer of all Novasub branded products.

Seascape Subsea BV
De Hoogjens 22
NL-4254 XW Sleeuwijk
The Netherlands
T. +31-183-307900
E. info@Seascapesubsea.com
www.seascapesubsea.com

support email: support@novasub.com

Copyright © Seascape Subsea BV
All Rights reserved.

If you have cause to use our technical support service, please make ensure that you have the following details at hand prior to calling:

- system serial number
- firmware version and build number
- fault description
- any remedial action implemented

12 Warranty

Novasub warrants that during the Warranty Period Novasub or a Novasub Authorized Service Center (hereinafter Service Center) will, at its sole discretion, remedy defects in materials or workmanship free of charge either by a) repairing, or b) replacing, or c) refunding, subject to the terms and conditions of this Limited Warranty. This Limited Warranty is only valid and enforceable in the country of purchase.

12.1 Warranty Period

The Limited Warranty Period starts at the date of original retail purchase. The Warranty Period is two (2) years for the product. Warranty applies only on manufacturing defaults. The Warranty Period is one (1) year for accessories, including mounting hardware and connector cables.

12.2 Exclusions and Limitations

This Limited Warranty does not cover:

1. a) normal wear and tear;
   b) defects caused by rough handling or;
   c) defects or damage caused by misuse contrary to intended or recommended use;
2. user manuals or any third-party items;
3. defects or alleged defects caused by the use with any product, accessory, software and/or service not manufactured or supplied by Novasub;
4. battery.

This Limited Warranty is not enforceable if item:

1. has been opened beyond intended use;
2. has been repaired using unauthorized spare parts; modified or repaired by unauthorized Service Center;
3. serial number has been removed, altered or made illegible in any way, as determined at the sole discretion of Novasub;
4. has been exposed to chemicals. Novasub does not warrant that the operation of the product will be uninterrupted or error free, or that the product will work with any hardware or software provided by a third party.

12.3 Limitation of Liability

To the maximum extent permitted by applicable mandatory laws, this Limited Warranty is your sole and exclusive remedy and is in lieu of all other warranties, expressed or implied. Novasub shall not be liable for special, incidental, punitive or consequential damages, including but not limited to loss of anticipated benefits, loss of data, loss of use, cost of capital, cost of any substitute equipment or facilities, claims of third parties, damage to property resulting from the purchase or use of the item or arising from breach of the warranty, breach of contract, negligence, strict tort, or any legal or equitable theory, even if Novasub knew of the likelihood of such damages. Novasub shall not be liable for delay in rendering warranty service.