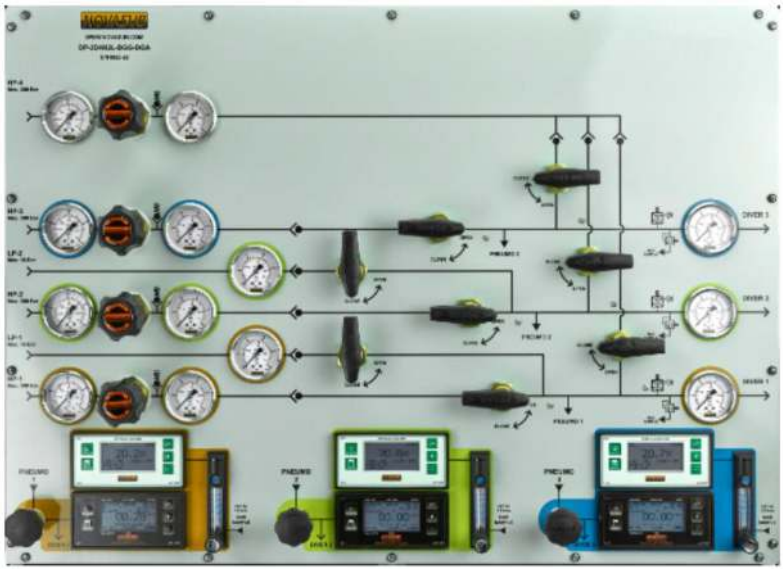


Operations Manual

Dive Panel

NOVASUB surface control panel for dive air

Version: 1.1 - Date: 02-09-2022

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 ABBREVIATIONS / TERMINOLOGY 3
2 INTRODUCTION 4
3 SPECIFICATIONS 5
4 SAFETY 6
5 MAINTENANCE 7
5.1 Maintenance Scheme 7
6 CONTROL 8
6.1 Panel 8
6.1.1 Symbols 8
6.1.2 Route 9
6.2 Air control 10
6.2.1 High Pressure Supply 10
6.2.2 Low pressure Supply 11
6.2.3 Diver Supply 11
6.3 Pressure alarm 12
6.3.1 Internal Alarm 12
6.3.2 DDG Alarm 12
6.4 Depth Monitoring 12
6.4.1 DDG 12
6.4.2 Pneumo Gauges 12
6.5 Gas Analyzing 12
6.5.1 Gas sample point 12
6.5.2 Digital Gas Analyzer 12
7 PROCEDURES 13
7.1 Pre-Dive 13
7.1.1 Set up 13
7.1.2 Checks 13
7.1.3 Pneumo test 13
7.1.4 Pressure Alarm Test 13
7.2 Operation 14
7.2.1 Pressure regulation 14
7.2.2 Switching to backup supply 14
7.2.3 Monitoring depth 14
8 DDG – DIVER DEPTH GAUGE 15
9 DGA – DIVER GAS ANALYZER 16
10 CONNECTORS 17
11 HELP & SUPPORT 18
12 WARRANTY 19
12.1 Warranty Period 19
12.2 Exclusions and Limitations 19
12.3 This Limited Warranty is not enforceable if item: 19
12.4 Limitation of Liability 19

1 Abbreviations / Terminology

Ah	Ampere hour
DDG	Diver Depth Gauge
DGA	Diver Gas Analyzer
FSW	Feet Sea Water
HP	High Pressure
LP	Low Pressure
MSW	Meter Sea Water
Vac	Volt AC

2 Introduction

The air diver control panels are solid and ruggedized, they are simple and easy to understand. There are standard types for 1, 2 and 3 diver control and the panels can also be custom made. The air panels are fitted with diver depth gauges, low and high pressure inputs, accuracy precision gauges and durable needle and ball valves. All piping and fittings are stainless steel and the needle and ball valves are made from brass. The diver depth gauges are both with MSW and FSW scale with mirror for precision depth readings. The panel are made of stainless steel or with clear text and line engravings. The diver depth gauges (pneumo) are protected with a 6 bar inline safety valve, this ensures that the depth gauges are protected for any overpressure. The opening of the needle valve too the diver pneumo hose provides a full air flow and pressure. All panels are fitted with an audible low pressure air alarm. The Novasub air diving panels can be built accordingly IMCA regulations.

3 Specifications

System		
Divers	1-3	
Control		
Selection	Main Selection	2-way ball valve
Open/close	HP Inlet	Needle valve
	Pneumo	Needle valve
Monitoring		
Diver	LP pressure	2 ½" gauge 0-25 bar cl 1.6
	Depth	6" gauge 0-60 MSW & 0-200 FSW cl 0.25
		4" gauge 0-70 MSW & 0-230 FSW cl 0.25
		DDG
Inlet	HP pressure	2 ½ " gauge 0-400 bar cl 1.6
	LP pressure	2 ½" gauge 0-25 bar cl 1.6
Alarm	Low pressure	Audiovisual
Inlet		
Breathing air	HP, max 350 bar	¼ " NPT Female
	LP, max 16 bar,	½ " NPT Female
Outlet		
Umbilical	1x	¼ " NPT Female
Pneumo	1x	¼ " NPT Female
Gas Sample	1x set to 1 bar @ 1.5L/min	Aignep 110 series Mignon DN5
Material		
Case	HDPE	
Reducer	Brass	
Gauges	Stainless Steel	
Valves	Brass / Stainless steel	
Plate	Sublimated Aluminum	
Fittings	Brass / Stainless Steel	
Piping	Stainless Steel	

4 Safety

WARNING	Is used in connection with a procedure or situation that may result in serious injury or death.
CAUTION	Is used in connection with a procedure or situation that will result in damage to the product.
NOTE	Is used to emphasize important information.

WARNING

YOU MUST READ this manual before using the Dive Panel. Failure to do so may lead to improper use, serious injury or death. Care should be taken to follow the instructions correctly and also conduct a separate risk assessment prior to commencing work

WARNING

Do Not Use the Dive Panel for:

- Mixed gas diving operations with an oxygen level greater than 40%

Do not attempt to use the Dive Panel without reading this instruction manual in its entirety, including all the warnings. Make sure that you fully understand the use, displays and limitations of the instrument. If you have any questions about the manual or the system, contact your Novasub Authorized Service Center before diving.

Always remember that **YOU ARE RESPONSIBLE FOR YOUR OWN SAFETY!**

When used properly, the system is an outstanding tool for assisting properly trained, certified divers in planning and executing commercial dives. Check your local laws for safe diving operations.

5 Maintenance

The dive panel is an important diver air live support device. Although it is designed to withstand rough diving circumstances, you must treat it with the same proper care and caution as any other important diving device.

Have your dive panel serviced every 2 years by a Novasub Authorized Service Center. This service will include a general operational check, safety valve check and pressure leak tests. The service requires special tools and training.

Each 6 months the pneumo internal depth gauge and the last diver air supply gauge needs to be calibrated. This can be done by the customer or a Novasub Authorized Service Center.

5.1 Maintenance Scheme

By Customer	
Cleaning	When needed

By Customer Or Novasub Authorized Service Center	
Calibrating internal Depth and supply Gauges	6 months

By Novasub Authorized Service Center	
Servicing	2 years

WARNING

- It is not allowed to disassemble the Dive Panel or to repair the product by unqualified personal.
- DO NOT use the system if you detect any leak or mal functional valve or gauge.

CAUTION

- Protect the unit from shock, extreme heat, direct sunlight, and chemical attack.
- The Dive Panel cannot withstand the impact of heavy objects like air cylinders, nor chemicals like gasoline, cleaning solvents, aerosol sprays, adhesive agents, paint, acetone, alcohol, etc. Chemical reactions with such agents will damage the seals, case and finish.
- Do not use compressed air to blow water off the unit.
- Use clean air as specified in NEN-EN 12021

Disposal of the device

Please dispose of the device in an appropriate way, treating it as electronic waste. Do not throw it in the garbage. If you wish, you may return the device to your nearest Novasub dealer

6 Control

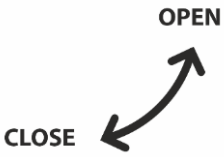
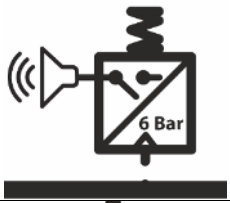
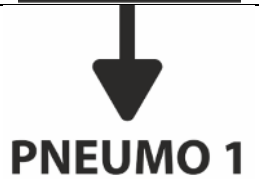
The system has a number of interactive and non-interactive components that used to control the system. This chapter explains these components. Knowing the route of the gas and the use of the different components is necessary for successful operation of the system.

6.1 Panel

The panel displays the gas route and the controls for that route. This includes the valves, gauges and other interactive components. There are also non-interactive components in the system. Both of these components can be displayed with symbols on the panel.

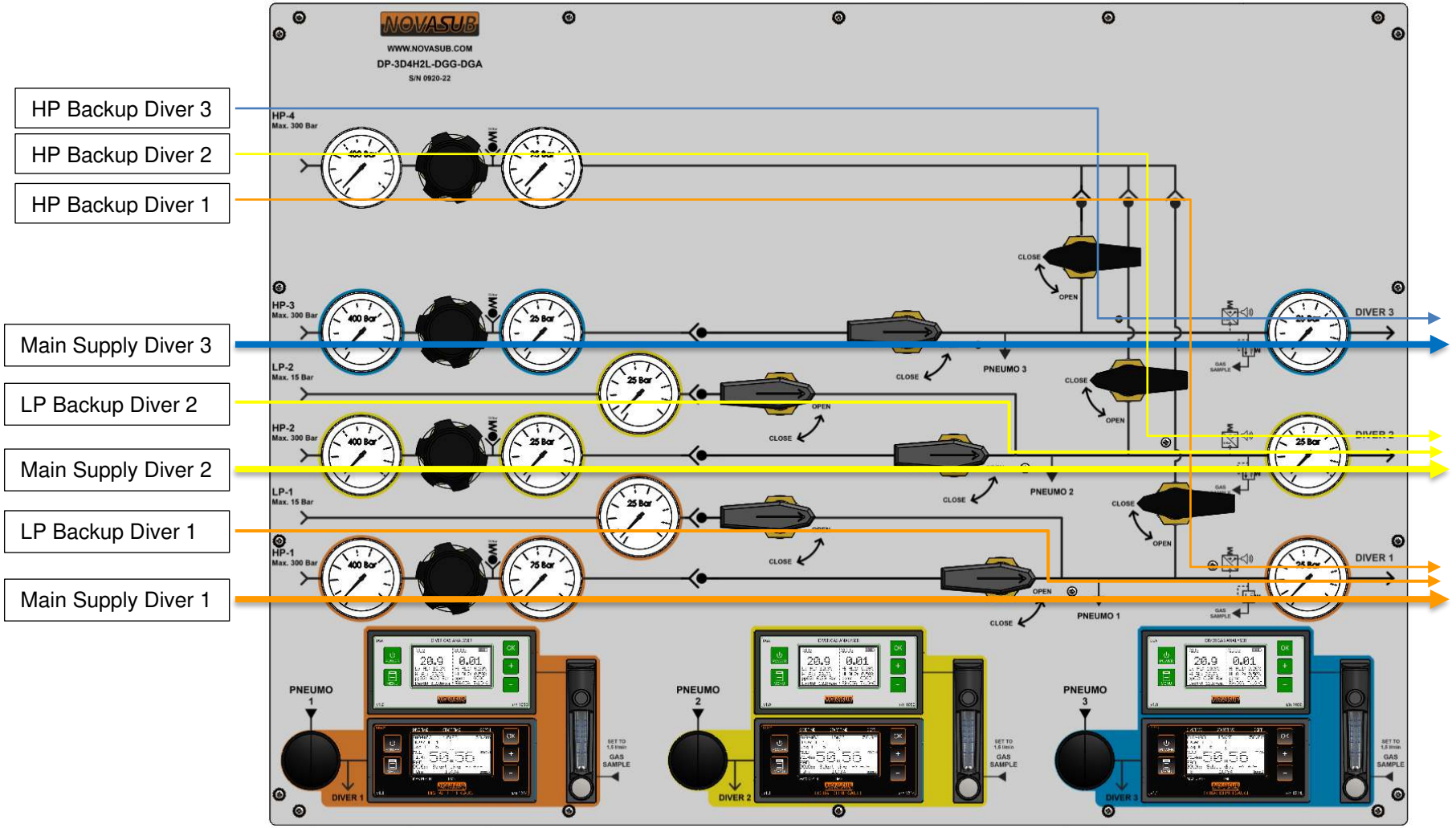
6.1.1 Symbols

Below is a list of all the symbols you might find on the Panel:

Symbol	Name	Description
	Pressure relief valve	This symbol show the location of a overpressure valve. The set pressure is specified below the symbol. If the pressure become higher than this pressure the valve will open to release that pressure.
	Non-return valve	This symbol shows the location of a non-return valve. Any gas can enter from the left and flow freely to the right but not the other way around.
	Open / Close Indicator	This symbol is always next to a ball-valve. When the valve points to open it is opened, when it points to close it is closed.
	Flow restrictor	This symbol shows the location of a flow restrictor. The set restriction is specified below the symbol. The flow will not be higher than this restriction.
	Pressure Reducer	This symbol show the location of a pressure reducer. The set value is specified in the symbol. The pressure after this symbol will not by any higher than that value.
	Low-pressure alarm	This symbol shows the location of a low pressure alarm. The set pressure is shown in the symbol. Once the pressure falls below this value the alarm will sound.
	Flow To	This symbol indicates a jump in the line plan on the panel. This is to make the panel more clear. This part is connected to the Flow From, this symbol can be seen below. The name indicates where the flow is sent to.
	Flow From	This symbol indicates a jump in the line plan on the panel. This is to make the panel more clear. This part is connected to the Flow To. The name indicates where the flow is coming from.

6.1.2 **Route**

Below you will find some examples of the route on a Dive Panel. The route on the panel is divided in the Main supply and the Backup supply, there can be multiple Backup Supplies in a system. There is also the possibility of Crossover Supply, although this is mostly avoided because of the loss of independency. Below you can see the panel of the system with the indicated supplies.



6.2 Air control

The Dive panel consist of different segments that are standard, these are for example the HP inputs, LP inputs and Diver supply. These are controlled with valves, gauges and reducers. The control of these different segments of the panel are explained below.

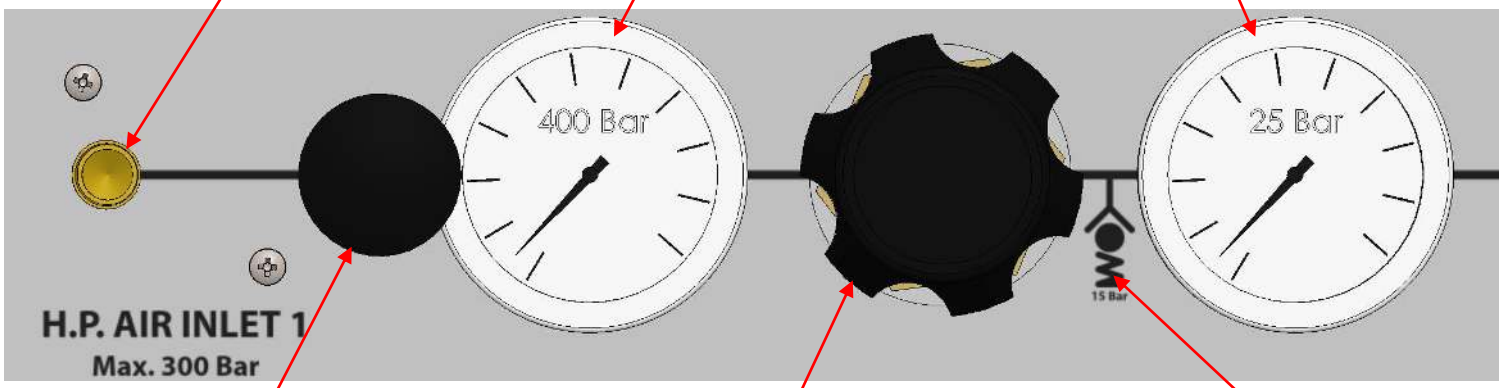
6.2.1 High Pressure Supply

The high pressure supply accepts high pressure breathing gas from bottles or any other suitable source. The supply consists anyway of an inlet coupling, a HP gauge, a pressure reducing regulator, a pressure relief valve and a LP gauge. It can also be equipped with a needle valve after the inlet.

Inlet Coupling
The coupling is located on front of the panel or on the side. The connection is a ¼" NPT Female.

HP Gauge
Reads the actual input pressure from the source. Ranges from 0-400 Bar, Accuracy is 1-1/2% of full scale.

LP Gauge
Reads the output pressure from the regulator. Ranges from 0-25 Bar, Accuracy is 1-1/2% of full scale.



Needle valve
This is optional. Is used to close the inlet.

Regulator
Used to reduce the pressure to the level required.

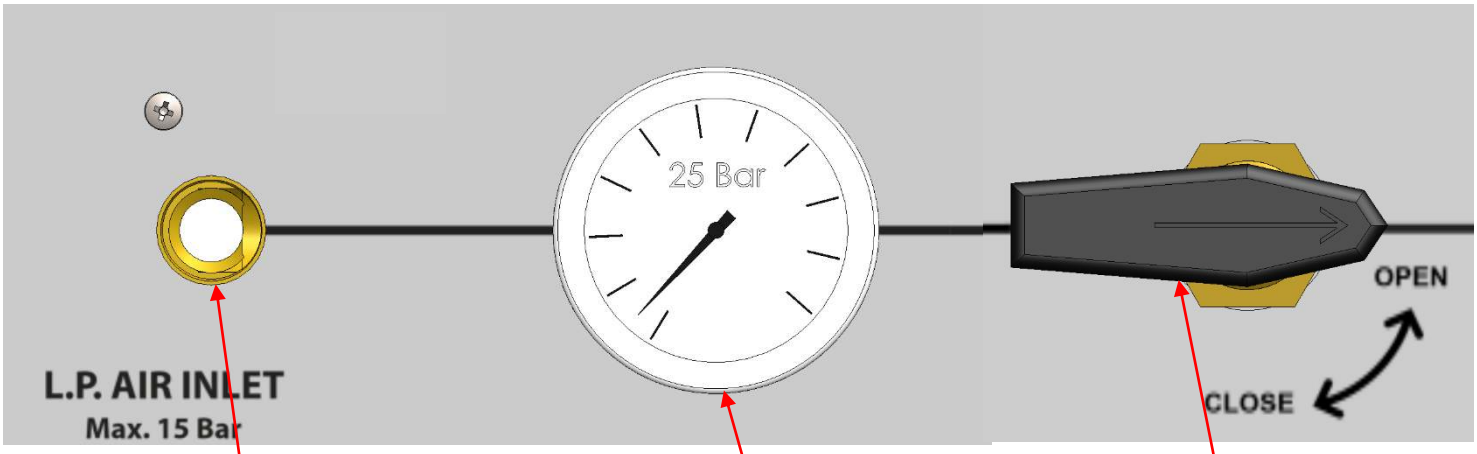
Increase pressure

Decrease pressure

Pressure relief valve
Factory set to 15 bar. Vents excess pressure to atmosphere

6.2.2 Low pressure Supply

The low pressure supply accepts low pressure from any source. The supply consists anyway of an inlet coupling and a LP gauge. It usually also has a ball valve to control the flow.



Inlet Coupling
The coupling is located on front of the panel or on the side. The connection is a ½ " NPT Female.

LP Gauge
Reads the inlet pressure from the source. Ranges from 0-25 Bar, Accuracy is 1-1/2% of full scale.

Ball valve
Is used to shut off the low pressure supply. *Can be located further away from the gauge.*

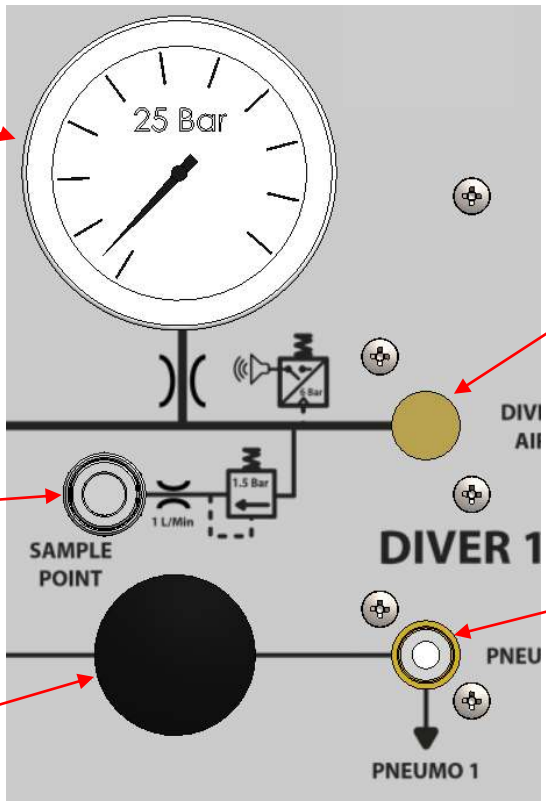
CAUTION

- Do not attach more than 15 bar to this inlet

6.2.3 Diver Supply

The diver supply is a low pressure segment that controls the flow to the diver and the pneumo. It consists of the couplings, a LP gauge and a needle valve.

LP Gauge
Reads pressure to the diver. Ranges from 0-25 Bar, Accuracy is 1-1/2% of full scale.



Diver Air Outlet
Outlet for the breathing gas to the diver. This connection is a ¼ " NPT female.

Sample Point Outlet
Outlet for a sample point. If a DGA is built in this will not be available. This is preset to 1 L/min 1.5 bar. This is an Aignep 110 series Mignon DN5.

Pneumo Outlet
Outlet for the pneumo. This connection is a ¼ " NPT female.

Needle Valve
Needle valve to control the pneumo.

6.3 Pressure alarm

Each diver supply has a pressure switch which activates when the pressure to the diver falls below 6 Bar. The switches are either connected to an internal audible alarm or the build in DDG (digital depth gauge).

6.3.1 Internal Alarm

When the system does not have a DDG then the alarm is connected directly to the pressure switches and a buzzer. The buzzer will sound automatically when the pressure to the diver drops below the 6 Bar. The alarm can be switched off with the rocker switch built in the panel. The battery is charged with the supplied external power supply adapter.

- NiCD battery, 7.2v 1000 mAh
- Buzzer 100dB
- Power supply, 100-240 vac / 12vdc 2A

6.3.2 DDG Alarm

When the DDG is installed for the Diver depth measurements, then the pressure switch is connected to the DDG alarm input. The Buzzer is then connected to the DDG alarm output. In the DDG settings the alarm input can be activated to trigger the alarm output at which the buzzer is connected. See the DDG manual

6.4 Depth Monitoring

The system has two ways to monitor the depth of the diver. Either a DDG or a Pneumo gauge can be used for displaying the diver depth, both can use the pneumo hose to measure the depth. The pressure of the pneumo hose is restricted to 6.5 bar (65 MSW) to prevent overpressure of the gauges. Pneumo readings are made by pressurizing the diver's pneumo hose. Air is forced through the pneumo hose until all water is displaced. The air is then shut off and the pressure is read on the analog gauge or DDG. The DDG can also use a digital depth sensor.

6.4.1 DDG

The DDG is a Digital Depth Gauge, this is a digital way to display the dive depth and to log dives. The DDG can either measure the pressure from the Pneumo line or use an external depth sensor. The pneumo readings are made by pressurizing the diver's pneumo hose. The DDG also has the possibility to store all date from a dive and to create a depth profile. This can then be extracted.

6.4.2 Pneumo Gauges

The pneumo gauges are the analog way to show the diver depth. Pneumo gauges are 6" high, precision 0.25% of full-scale accuracy, dual scale 0-200 FSW/0-60 MSW.

6.5 Gas Analyzing

The system can be fitted with gas sample points or built in DGA, Diver Gas Analyzer.
The connection of the gas sample point is just before the output of the diver umbilical connection. This assures the correct gas is analyzed.

6.5.1 Gas sample point

The Gas sample point has a quick-coupling with an automatic closing valve when no fitting is connected.
The air flow from the gas sampling is set to a fixed flow of 1-2 l/min. This is internal realized by using a pressure regulator set to 1 Bar and flow restriction set to 1 to 2 l/min. To analyze to air connect an oxygen analyzer by using the supplied quick-coupling fitting.

6.5.2 Digital Gas Analyzer

The DGA is internally connected directly to the pressure regulator and flow restriction. The DGA has a build in rechargeable battery and is recharged automatic when the external power supply is connected.
The DGA can log the measurements and when connected to the DDG, the O2 values will also be logged in the DDG diver logs. The DGA will use the diver depth readings from the DDG to calculate the ppO2. The DGA has alarms settings which can be set and activated. The alarms will be visible and when activated hearable on the Buzzer.
See the DGA manual for detail description and operations

7 Procedures

All procedures follow IMCA regulations.

7.1 Pre-Dive

7.1.1 Set up

- When a case is used, place it on a flat surface that can support the unit. Select a working area which is secure, stable, convenient, and suitable for use during the period of the dive.
- Conduct a visual inspection of unit to insure no damage has occurred during transportation to the job site, or since the last time the unit was used.
- Attach HP and/or LP Supplies
- Connect the Diver umbilical's air and pneumo hoses at the Diver 1 and 2 output connections

7.1.2 Checks

- Be sure both the pneumo valve and air supply valve are in the 'off' (closed) position.
- Regulator should be set to a low pressure, turn knob counter clockwise until the knob stops.
- Turn on HP supply. *Note: Always open high pressure valves slowly, allow system to fill slowly before opening valves for maximum flow.*
- Check inlet air pressure by reading all the HP supply gauge.
- Adjust regulator to desired setting by turning knob while monitoring the diver air supply gauge. Clockwise increases the set pressure. Set above the 5 to 6 Bar to avoid the pressure alarm to be triggered.

7.1.3 Pneumo test

- Pressurize the LP section of diver 1 by opening the ball-valves.
- Open Pneumo valve slowly, while watching the depth gauge, check that the gauge needle is slowly rising and that air is exhausting through the diver's pneumo connection (or diver's pneumo hose if connected).
- Close valve; check depth gauge to see that it reads zero. The gauge should be within +/- 0.5 m of zero. Zero will be affected by changes in atmospheric pressure and/or changes in altitude. If zero is off by more than 0.5 m and there has not been a significant change in either atmospheric pressure or altitude, suspect that the gauge has been subjected damage. Cross-check the gauge or have the gauge calibrated before using.
- Seal the output of the pneumo section. This can be done by capping off the Pneumo output, or preferable sealing the end of the pneumo hose. Pressurize the Pneumo to 60 MSW and close the pneumo valve. This reading should hold, without a decrease in reading. If the reading decreases you have a leak in the system, correct before proceeding.
- Repeat above for all Divers

NOTE! **Have your depth gauges calibrated every 6 month**

7.1.4 Pressure Alarm Test

- Pressurize the LP section of diver 1 by opening the ball-valves.
- Switch on the Pressure alarm by setting the rocker switch to on, or activate the pressure alarm input in the DDG (see the DDG manual)
- When the diver air supply gauges indicated more than 6 Bar, the audible pressure alarm will not sound.
- Reduce the pressure by lowering the pressure with the HP regulator, Turn counter clock wise
- When the diver air supply gauges drops below 5 to bar to pressure alarm buzzer should sound. If the alarm does not sound, have your system checked by an authorized technician.

7.2 Operation

7.2.1 Pressure regulation

- Check the depth and pressure to the diver regularly.
- Turn the regulator to reach 9 bar when the diver is above water. The pressure should be increased with 1 bar for each 10 MSW. Clockwise is increase, Counterclockwise is decrease.

7.2.2 Switching to backup supply

- Open the backup line to the diver.
- Close the Main supply line.
- Check that pressure to diver remains stable.
- If it was an emergency switch, advise diver to end dive.

7.2.3 Monitoring depth

- Advise the diver that a pneumo reading is to be taken.
- The diver will place the end of the pneumo hose at the point at which the measurement shall be taken. Diver will advise the tender he is ready for the pneumo reading.
- Slowly open the Pneumo valve corresponding to the diver whose depth is being measured. The Pneumo gauge reading will increase and stabilize at a value greater than the depth of the diver. The value will depend upon the flow rate, and pressure drop over the length of the pneumo hose. The diver will advise the tender of bubbles coming from the end of the hose.
- Close the pneumo valve, the reading will begin to decrease to the value of the diver's depth. Once the reading has stabilized, this is the depth at the end of the pneumo hose.

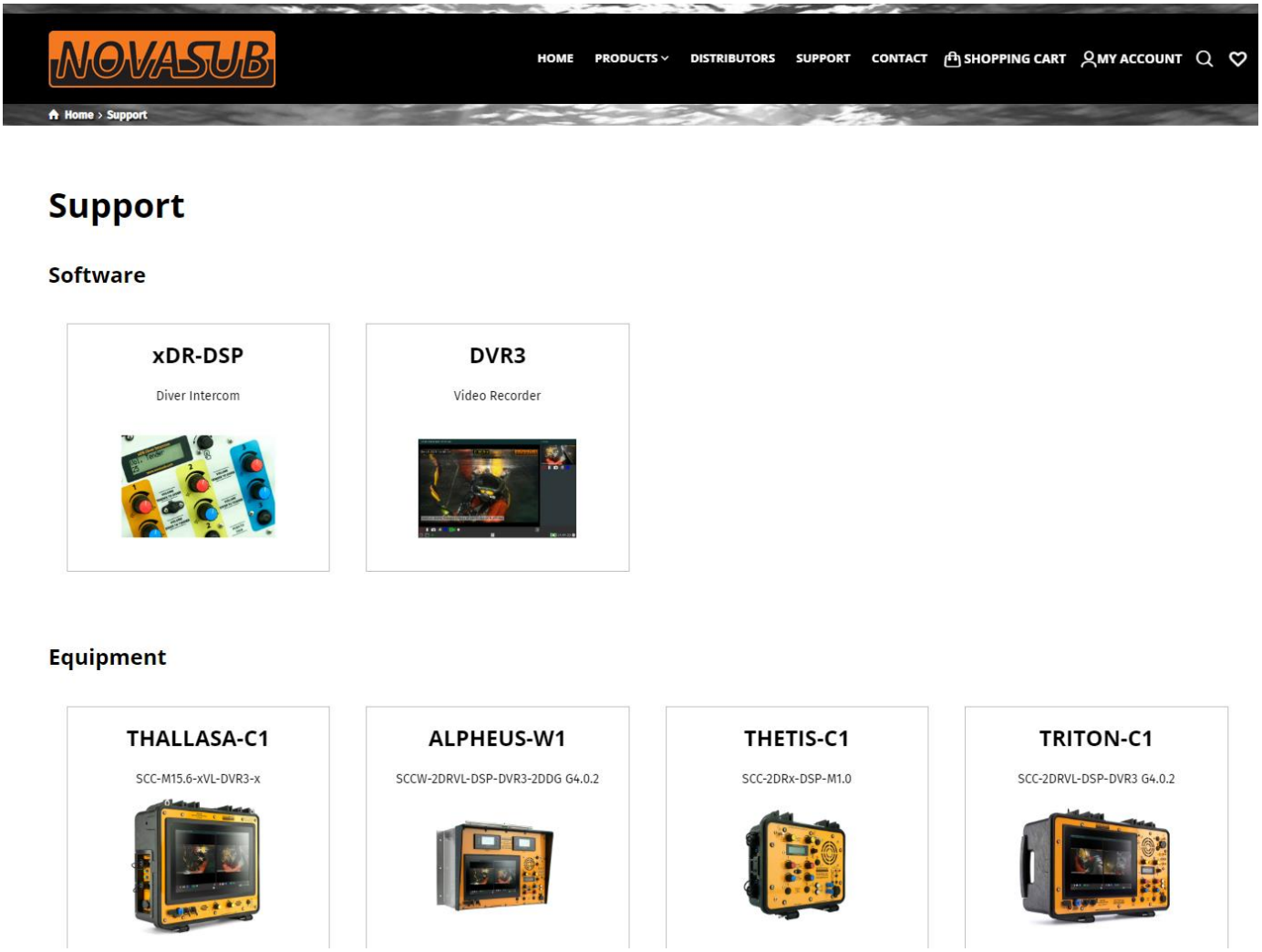
8 DDG – Diver Depth Gauge

All information for the controls of this subsystem can be found in the manual:

DDG manual customer_v4

If your system has a DVR3 it can also be found in the “Help” function. That can be opened with the question mark in the bottom of the screen.

All manuals and resources can be found under the “Support” tab on the website: www.novasub.com/support/



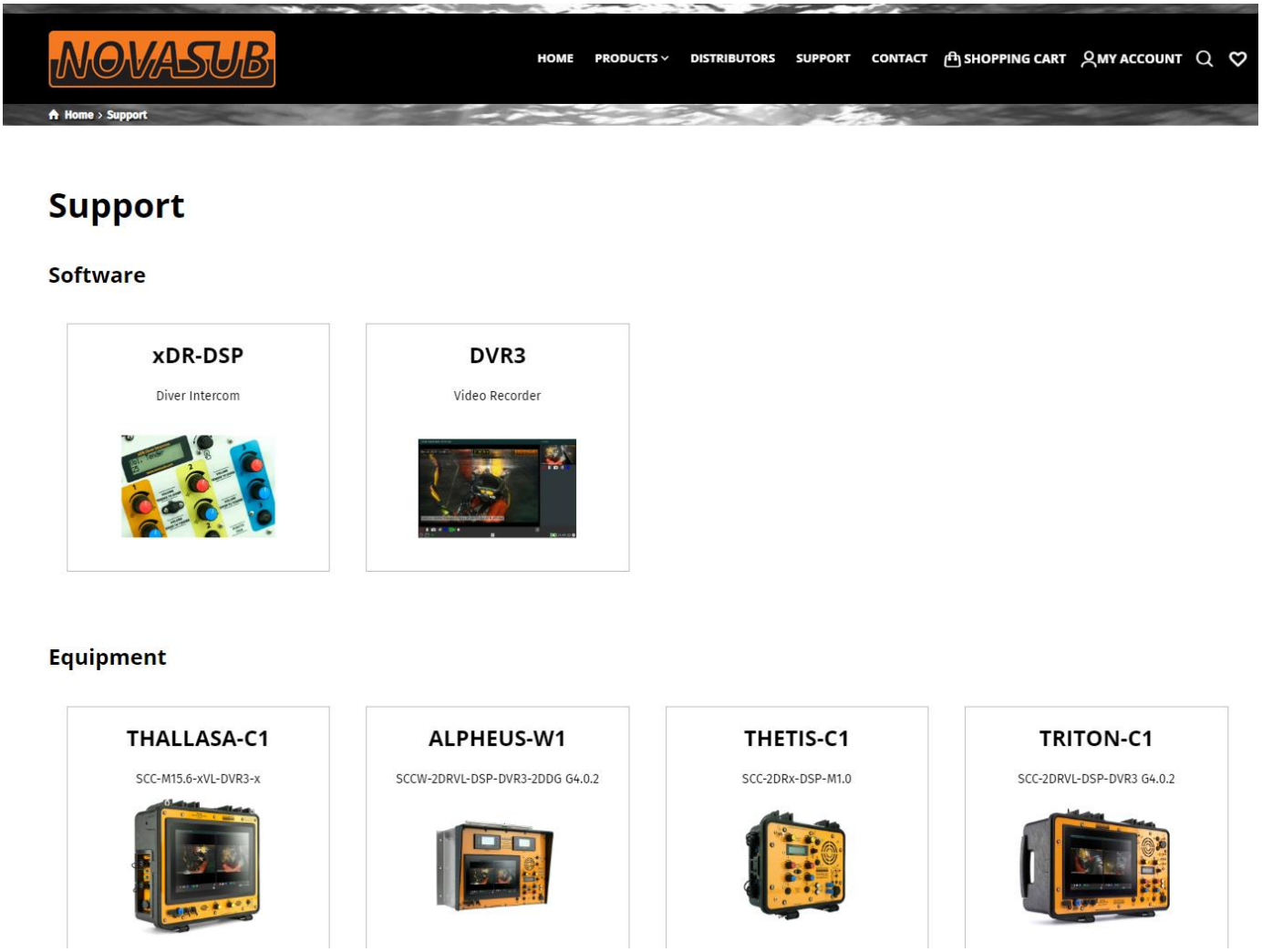
9 DGA – Diver Gas Analyzer

All information for the controls of this subsystem can be found in the manual:

NSDGA manual customer v1.5

If your system has a DVR3 it can also be found in the “Help” function. That can be opened with the question mark in the bottom of the screen.

All manuals and resources can be found under the “Support” tab on the website: www.novasub.com/support/



10 Connectors

Below you will find all the pin diagrams that can be used. Note that not all are in this system.

IEC	Power 100-240 vac	
Type	C14	
Mating type	C13	

SCC 01-032	SCC with external 10-36 vdc input	
Type	Hirschmann CA3GS	
Mating type	CA3LD	
Function	***Pin layout***	
GND	3	
+VDC	4	

DP-DDG-013	Depth sensor & Novabus interconnection	
Type	Souriau, UTS 710E7S	
Mating type	UTS6JC10E7P	
Function	***Pin layout***	
Depth sensor1 +	A	
Depth sensor1 -	B	
Depth sensor2 +	C	
Depth sensor2 -	D	
rs485B	E	
rs485A	F	
GND	G	

Layout

SCC 01-10	NovaBus, rs485	
Type	Bulgin,PX0412/08S	
Mating type	PX0410/08P	
Function	***Pin layout***	
GND	3	
rs485B	7	
rs485A	8	

DP-012	Divepanel external 12-24 vdc input	
Type	Hirschmann CA3GS	
Mating type	CA3LD	
Function	***Pin layout***	
+VDC	1	
GND	2	

11 Help & Support

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

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.

12.3 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.

12.4 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.