SLEIPNER

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User Manual
Including Installation For
Hydraulic Proportional Controller
PHC-3

DOCUMENT ID:	**5267**
REVISION:	**23**
DATE:	**2023**
LANGUAGE:	**EN**

Contents

Hydraulic controller for S-Link™ thruster- and stabilizer systems

• S-Link™ CAN-bus communication
• IP65 water ingress rated enclosure
• Offering system status and control, both local and remote

• Intelligent load control of generators
• Plug & Play cables, waterproof and compact connectors
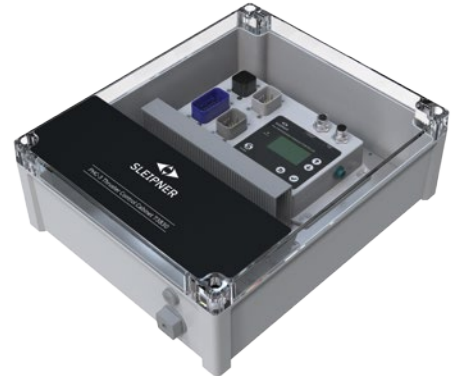• Preprogrammed and tested for system deliveries

The PHC-3 hydraulic control is normally fitted on Hydraulic Systems delivered by Sleipner. PHC-3 can also be delivered as a standalone product or pre-installed in a junction box with terminal blocks. The junction box solution 73830 Thruster Control Cabinet is only compatible with hydraulic thruster systems.

Hydraulic System   PHC-3 Standalone   73830 Thruster Control Cabinet   MG_0642

Output to thruster valves and configurable digital outputs.

System pressure / PTO pressure

Tank sensor, level and temperature.

RS485 connection for communication with VFD

S-Link connection

Page up and down or side to side

ENTER/SAVE

Input power
Power for ECI cooling pump
Configurable digital inputs and outputs.

Hydraulic cooling pump output
Stabilizer hydraulics connections

Page BACK/CANCEL

LED Status

Display and buttons for indication and configuration

Continuous GREEN	Flashing GREEN
PHC-3 is powered and has S-link communication and there are no faults	No S-link communication
Continuous RED	
PHC-3 have a fault, enter ACTIVE FAULTS menu for details.	

1. Main Menu
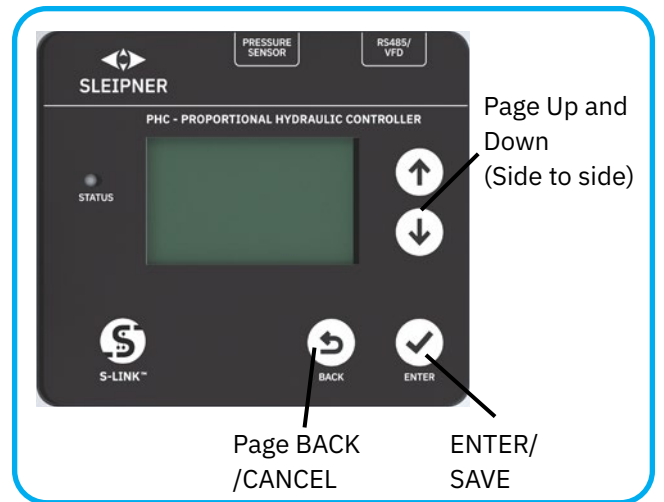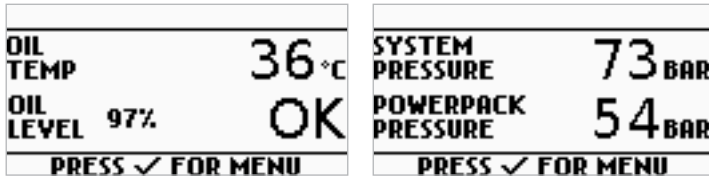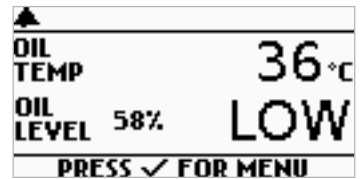
Use ↑↓ arrow buttons to switch between these views:

```
┌─────────────────────┐   ┌─────────────────────┐
│OIL          36°C     │   │SYSTEM       73 BAR   │
│TEMP                  │   │PRESSURE              │
│OIL   97%    OK       │   │POWERPACK    54 BAR   │
│LEVEL                 │   │PRESSURE              │
│ PRESS ✓ FOR MENU     │   │ PRESS ✓ FOR MENU     │
└─────────────────────┘   └─────────────────────┘
```


Page Up and Down (Side to side)

Page BACK /CANCEL

ENTER/ SAVE

1.2 MAIN SCREENS and SYMBOLS

1.2.1 Alarm Bell
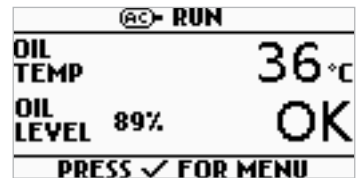
🔔 (alarm bell) is flashing in upper left corner when any fault has been triggered. When a fault is triggered the display will jump to the FAULTS menu. Pushing the ↰(back) button will bring you back to the previous menu.

```
┌─────────────────────┐
│🔔                    │
│OIL          36°C     │
│TEMP                  │
│OIL   58%    LOW      │
│LEVEL                 │
│ PRESS ✓ FOR MENU     │
└─────────────────────┘
```
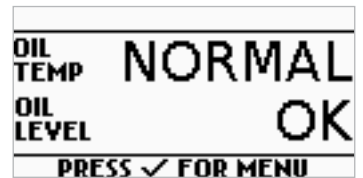
1.2.2 VFD

A symbol (AC) power-pack AC motor is showing status of the VFD at the top. The field will be blank when VFD is ready and not active. VFD must be configured in parameter 1001 for this symbol to show.

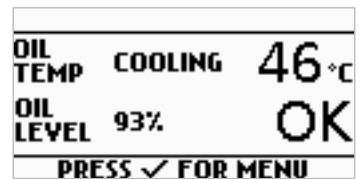| (AC)► | VFD is the active power source but motor is not running. |
(AC)► OFF	VFD is not connected or not powered.
(AC)► RUN	VFD is running.
(AC)► LOC	VFD is in local mode.
(AC)► ERR	VFD is not ready or any fault.
(AC)► ⧗	VFD is waiting for run enable signal from power management system.

```
┌─────────────────────┐
│      (AC)► RUN       │
│OIL          36°C     │
│TEMP                  │
│OIL   89%    OK       │
│LEVEL                 │
│ PRESS ✓ FOR MENU     │
└─────────────────────┘
```

1.2.3 OIL TEMP

Oil temp and oil level screen will not show if tank monitor sensor type parameter 0201 is deactivated.

```
┌─────────────────────┐
│OIL   NORMAL          │
│TEMP                  │
│OIL          OK       │
│LEVEL                 │
│ PRESS ✓ FOR MENU     │
└─────────────────────┘
```

Tank monitor sensor type set to analogue temp.
Flashing text "COOLING" when cooling pump is running.
Cooling starts at 45°C (113°F) and stops at 40°C (104°F).

```
┌─────────────────────┐
│OIL   COOLING 46°C    │
│TEMP                  │
│OIL   93%    OK       │
│LEVEL                 │
│ PRESS ✓ FOR MENU     │
└─────────────────────┘
```
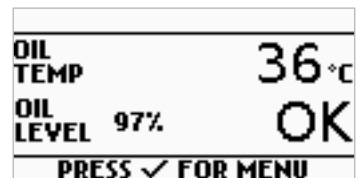
Tank monitor sensor type set to NC temp (temp switch).
Oil temp is indicated with NORMAL or HIGH.
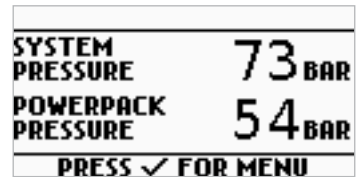Flashing text "COOLING" when cooling pump is running.

1.2.4 OIL LEVEL

Oil level is indicated with OK or LOW.
If oil level sensor is analogue then oil level is also indicated with level in percent (i.e. 97%).

```
┌─────────────────────┐
│OIL          36°C     │
│TEMP                  │
│OIL   97%    OK       │
│LEVEL                 │
│ PRESS ✓ FOR MENU     │
└─────────────────────┘
```

1.2.5 PRESSURE

Shows system pressure and power-pack pressure in bar.

```
┌─────────────────────┐
│SYSTEM       73 BAR   │
│PRESSURE              │
│POWERPACK    54 BAR   │
│PRESSURE              │
│ PRESS ✓ FOR MENU     │
└─────────────────────┘
```

2.   Menu - Active Faults

```
         MENU
ACTIVE FAULTS
DEVICE INFO
PARAMETERS
DIAGNOSTIC
                    1/5
```

2.1   FAULTS

⏏ flashing in upper left corner when any fault has been triggered.
Go to ACTIVE FAULTS menu for fault details.

``` FAULTS 0.0.0 NO FAULT ✓=RESET FAULTS 1/1 ```	Indicates that there are no active faults.
``` ⏏ FAULTS 10500.0.10 OIL LEVEL 10501.0.16 OIL TEMP ,SHORT CIRCUIT 10501.0.11 OIL TEMP ✓=RESET FAULTS 2/3 ```	Each fault is shown with a fault code number (i.e. 10501.0.16) followed by code name (OIL TEMP) and at the second line a fault condition (SHORT CIRCUIT). Pressing ✓ENTER will reset all faults. See PHC-3 Fault Codes chapter for fault code descriptions.

3.   Menu - Device Info

```
         MENU
ACTIVE FAULTS
DEVICE INFO
PARAMETERS
DIAGNOSTIC
                    2/5
```

3.1   DEVICE INFO - SERIAL NUMBER and FIRMWARE
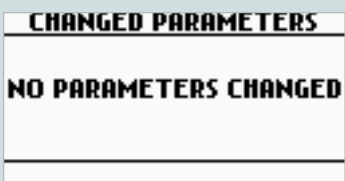
Displays PHC-3 serial number and firmware version.

```
     DEVICE INFO
SERIAL NUMBER
              301848
FIRMWARE
        VERSION 1.014
                    1/3
```

3.2   CHANGED PARAMETERS

Enter to see changed parameters.
The PHC-3 controller parameters are setup specifically for each system at the factory.
Changed parameters are parameters that do not match setup from factory.

```
     DEVICE INFO
FIRMWARE
        VERSION 1.014
CHANGED PARAMETERS

✓=ENTER             3/3
```

``` CHANGED PARAMETERS NO PARAMETERS CHANGED ```	If no parameters are changed.
``` CHANGED PARAMETERS 0501-D-OUTPUT 1 0502-D-OUTPUT 2 1001-STABILIZER CONFIG 2007-CROSSOVER ✓ 3sec=RESTORE 1/5 ```	- If one or more parameters is changed. - A list of all parameters that has been changed are viewed. - The list can be scrolled by using the ▲▼ arrow buttons. - In the down right corner, you can see how many parameters that has been changed and in this example there are 5 changed parameters. - Editing parameters cannot be done here. - To restore <u>all</u> parameters to default values as setup from factory, push and hold the enter button for 3 seconds. When screen shows DEVICE INFO menu, parameters are restored.

4.   Menu - Parameters

For edit parameter press ✓Enter.
While editing press ✓Enter to save new value and press ⤺ Back for cancel editing.

4.1   PARAMETERS - 01 Device Settings

No.	Name/Value	Description
0101	INSTANCE	Defines PHC-3 controller instance.
	NONE (default)	Use this for mono hull boats with one PHC-3 controller
	PORT	Catamaran use, with PHC-3 at PORT side
	STARBOARD	Catamaran use, with PHC-3 at STARBOARD side
0102	THRUSTER CONFIG	Defines relationship between control signals and thruster valve outputs. If thruster is operated in wrong direction, use parameter 2002 to swap bow valve output and parameter 2102 to swap stern valve output.
	BOW/STERN (default)	Bow control signal operates bow valve. Stern control signal operates stern valve.
	BOW/BOW	Bow control signal operates bow and stern valve as one thruster.
	STERN/STERN	Stern control signal operates bow and stern valve as one thruster.
0103	PUMP2 OUTPUT	Defines how PUMP2 shutdown valve are operated
	DEACTIVATED	PUMP2 output function is deactivated and output is 0V.
	ALWAYS ON	PUMP2 output is always on (activated) and pressure from PUMP2 is shutdown.
	AUTOMATIC (default)	The system will automatically control load sharing between two PTO pumps by shutting down the second PTO pump (PUMP2 OUTPUT) when not needed (two PTO pumps/control valves required) to reduce heat generation in the system and save fuel/energy. When any thruster is running, both PTO pumps will be active to ensure good performance. When a stabilizer system is active, PUMP2 OUTPUT will be +12/24V. Second PTO pump is then shutdown to save power. If stabilizers are active and the stabilizer pressure drops 30% lower than set-point, the system will change PUMP2 OUTPUT to 0V to wakeup second pump for 15 minutes to increase the flow capacity and maintain required pressure. After 15 minutes PUMP2 OUTPUT will be reverted to +12/24V (shutdown) unless the stabilizer pressure is still 30% lower than set-point. When stabilizer system is turned off, all pumps will be activated (0V).
0104	SYSTEM PRESSURE	Defines system pressure sensor type.
	INPUT DEACTIVATED	No system pressure sensor connected
	ANALOG INPUT (default)	0-400bar pressure sensor (4-20mA)
	SWITCH INPUT	Standby pressure switch

4.2   PARAMETERS - 02 Tank Monitor

```
PARAMETERS                 TANK MONITOR
01-DEVICE SETTINGS         0201-SENSOR TYPE
02-TANK MONITOR               AN-LEVEL/AN-TEMP
03-COOLING PUMP            0202-OIL ALARM LEVEL
05-DIGITAL OUTPUTS         0203-TANK HEIGHT
                    2/8    ✓=EDIT              1/4
```

No.	Name/Value	Description
0201	SENSOR TYPE	Defines the oil tank level and temperature sensor type
	DEACTIVATED	No tank sensor connected
	NC-LEVEL/NC-TEMP	Normally Closed level switch and Normally Closed temp switch
	NO-LEVEL/AN-TEMP	Normally Open level switch and analog temp sensor (NTC 10K), part no.: 10 2540 & 10 2542
	AN-LEVEL/AN-TEMP (default)	Analog level sensor (0-180ohm) and analog temp sensor (NTC 10K), part no.: 10 2543
0202	OIL ALARM LEVEL	Sets the oil alarm level
	0-100% (default 65%)	Alarm level in steps of 5%
0203	TANK HEIGHT	The height of the oil tank. If tank don't have flat bottom then measure from center of the tank. This parameter is important for correct alarm level.
	300mm – 15000mm (default 350mm)	Height in steps of 1mm
0204	OIL LEVEL 100%	Defines the 100% oil level from the bottom of the tank. If tank doesn't have flat bottom then measure from center of the tank. This parameter is important for correct alarm level.
	150mm – 15000mm (default 270mm)	Level in steps of 1mm

4.3 PARAMETERS - 03 Cooling Pump

```
PARAMETERS              COOLING PUMP
01-DEVICE SETTINGS      0301-PUMP TYPE
02-TANK MONITOR          D-OUT 4 BLUE HARNESS
03-COOLING PUMP         0302-PUMP MODE
05-DIGITAL OUTPUTS      0303-ECI PUMP SPEED
                 3/8    ✓=EDIT           1/7
```

No.	Name/Value	Description
0301	PUMP TYPE	Defines the cooling pump type
	NONE	No cooling pump is connected
	D-OUT 4 BLUE HARNESS (default)	Cooling pump is connected to Digital Output 4 on the blue harness. See also DIGITAL OUTPUTS parameter for more information
	HYDRAULIC GREY HARNESS	Hydraulic cooling pump on the grey harness
	ELECTRIC ECI	Electric ECI cooling pump
	CC MODULE	Cooling Control Module The CC Module is an external enclosed unit that controls one AC pump and one DC pump. The AC pump is prioritized when AC power-pack is running, in other operating states the 24V DC pump is prioritized. If one pump fails, the system will try to use the second pump.
0302	PUMP MODE	Defines how the cooling pump are operated
	DEACTIVATED	Cooling pump will not be activated (used if cooling is provided by external system)
	ALWAYS ON	Cooling pump is activated and always running (5 seconds delay before start of hydraulic cooling pump when starting power-pack)
	TEMP CONTROLLED (default)	Cooling pump is activated at 45°C (113°F) and deactivated at 40°C (104°F) if system use temperature sensor. If system use temperature switches, cooling is controlled by switch state.
0303	ECI PUMP SPEED	Sets ELECTRIC ECI pump speed if selected as PUMP TYPE
	800rpm – 1600rpm (default 1400rpm)	Speed in steps of 100rpm.
0304	POWER SAVE	Cooling pump power save function.
	DEACTIVATED	POWER SAVE is deactivated and cooling pump will act accordingly to PUMP MODE setting (parameter 0302).
	ACTIVATED (default)	Cooling pump will go into power save mode and stop cooling pump and set selected output to 0V when there is no system pressure and power-pack is inactive (VFD not running) for more than 10 seconds. When power save mode is not triggered the cooling pump will act accordingly to PUMP MODE setting (parameter 0302).
0305	TRIM FUNCTION	Cooling pump trim function. Cooling pump trim function is to run the cooling pump for 30 seconds on regular basis to reduce the risk of corrosion, growing and sticking seal. ***(NB! For hydraulic cooling pump to rotate there must be hydraulic pressure applied).*** Apply for all cooling pump types.
	DEACTIVATED	Cooling pump trim function is deactivated
	ACTIVATED (default)	Cooling pump starts: • 60 seconds after PHC-3 has been powered • every time system-pressure or stabilizer-pressure is applied • every 6 days if PHC-3 has continuous power
0380	ECI FIRMWARE	Shows the ECI cooling pump firmware version. This is read only
	VERSION 1.5.0	The Version number is requested from the ECI pump
	NA	Not Available, ECI pump is not connected
0381	CCM FIRMWARE	Shows the CCM cooling module firmware version. This is read only
	VERSION 1.00	Version number is requested from the CC Module
	NA	Not Available, CC Module is not connected

4.4 PARAMETERS - 05 Digital Outputs

	PARAMETERS		DIGITAL OUTPUTS	
	01-DEVICE SETTINGS		0501-D-OUTPUT 1	
	02-TANK MONITOR		0 NOT IN USE	
	03-COOLING PUMP		0502-D-OUTPUT 2	
	05-DIGITAL OUTPUTS		0503-D-OUTPUT 3	
		4/8	✓=EDIT	1/6

No.	Name/Value	Description
0501 0502 0503 0504 0505 0506	D-OUTPUT 1 D-OUTPUT 2 D-OUTPUT 3 D-OUTPUT 4 D-OUTPUT 5 D-OUTPUT 6	Sets a function for the selected digital output. Any function can be set to any digital output. If the number in front of the value/function name is negative (like -1 BOW CROSSOVER) then the output is inverted. Digital output feeds +24V to the output and max load is 2.0A per output.
	0-NOT IN USE (default)	Output is not in use and set to 0V
	-1/1-BOW CROSSOVER	Output is activated when input thrust from bow joystick is more than 5%. Remember to set RAMP DECREASE time to preferred 3000ms at parameter 2005. This function is automatically set to D-OUTPUT 1 when parameter 2007 is set to DO-1 BOW CROSSOVER.
	-2/2-STERN CROSSOVER	Output is activated when input thrust from stern joystick is more than 5%. Remember to set RAMP DECREASE time to preferred 3000ms at parameter 2105. This function is automatically set to D-OUTPUT 2 when parameter 2107 is set to DO-2 STERN CROSSOVER.
	-3/3-COOLING PUMP	Output is activated according to parameter 0302 PUMP MODE This function is automatically set to D-OUTPUT 4 when parameter 0301 is set to D-OUT 4 BLUE HARNESS.
	-4/4- BOW THRUST ACTIVE	Output is activated when bow thruster is running.
	-5/5-STERN THRUST ACTIVE	Output is activated when stern thruster is running.
	-6/6-ANY THRUST ACTIVE	Output is activated when bow or stern thruster is running.
	-7/7-THRUSTER ENABLED	Output is activated when any joystick panel is ON. This requires PHC-3 FW V1.009 and PJC222/221 FW V2.024 or newer
	-8/8-STAB.PTO P.UNLOAD	Output is activated when stabilizer is running from PTO pressure. This function is used on nonstandard option systems (10 4450B-W-X02). Enabling this function also require setting of parameter 1011-PTO ENGINE INSTANCE.
	-9/9-LOW OIL LEVEL ALARM	Output is active when there is a low oil level fault
	-10/10-BOW CROSSOVER WITH BREAK	10-NO Valve: Output is Low (0V) when PVG feed is ON and input thrust from bow joystick is less than 5%. Rest of the time the output is High (+24V). -10-NC Valve: Output is High (+24V) when PVG feed is ON and input thrust from bow joystick is less than 5%. Rest of the time the output is Low (0V). The purpose of this output function is to prevent the propeller to rotate while running the boat in high speed and reduce the noise. Remember to set RAMP DECREASE time to preferred 3000ms at parameter 2005.
	-11/11-STERN CROSSOVER WITH BREAK	11-NO Valve: Output is Low (0V) when PVG feed is ON and input thrust from bow joystick is less than 5%. Rest of the time the output is High (+24V). -11-NC Valve: Output is High (+24V) when PVG feed is ON and input thrust from bow joystick is less than 5%. Rest of the time the output is Low (0V). The purpose of this output function is to prevent the propeller to rotate while running the boat in high speed and reduce the noise. Remember to set RAMP DECREASE time to preferred 3000ms at parameter 2105.
	-12/12 – ACTIVE FAULT	Output is activated when PHC-3 has any active fault
	-13/13 – SYSTEM PRESSURE AVAILABLE	Output is activated when system pressure is available. Parameter 0104 SYSTEM PRESSURE, sensor must be selected. -ANALOG INPUT: Pressure available when system pressure is higher than parameter 1009 PTO PUMP PRESSURE DETECT LEVEL -SWITCH INPUT: Pressure available when standby pressure switch detects pressure. -D-OUTPUT function STAB.PTO P.UNLOAD used on any digital outputs: Pressure available when motor speed is >500RPM

4.5   PARAMETERS - 06 Digital Inputs

```
PARAMETERS
02-TANK MONITOR
03-COOLING PUMP
05-DIGITAL OUTPUTS
06-DIGITAL INPUTS
                    5/8
```

```
DIGITAL INPUTS
0601-D-INPUT 1
         0 NOT IN USE
0602-D-INPUT 2
0604-D-INPUT 4
✓=EDIT           1/3
```

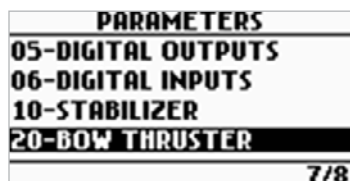| No.	Name/Value	Description
0601 0602 0604	D-INPUT 1 D-INPUT 2 D-INPUT 4	Sets a function for the selected digital input. Any function can be set to any digital input. The input is activated when the potential free contact is Closed to B+ or input is +24V. If the number in front of the value/function name is negative (like -1 START POWERPACK) then the input is activated when the potential free contact is Open or input is 0V. If two or more inputs is set for the same function, then the function will be activated if only one of the inputs is active and all inputs must be deactivated to deactivate the function.
	0-NOT IN USE (default)	Digital input is not in use and deactivated
	-1/1-START POWERPACK	When the input is activated the AC power-pack will start running. For this function to work the VFD(AC) must be selected in parameter 1001-STABILIZER CONFIG and parameter 1002-AUTO-START AC PUMP must also be set to ON.
	-2/2-PRESSURE FILTER	When the input is activated for 5 seconds a pressure filter warning signal will be sent to all joystick panels and alert the captain that the filter needs to be replaced.
	-3/3-RETURN FILTER	When the input is activated for 5 seconds a return filter warning signal will be sent to all joystick panels and alert the captain that the filter needs to be replaced.
	-4/4 – E-STOP BOW	Use this EMERGENCY STOP BOW input with an external emergency stop button. When the input is activated, the BOW thruster will stop and trig a "Emergency Stop" fault code. This fault will not auto reset when deactivated but need an acknowledge from panel or on PHC-3.
	-5/5 – E-STOP STERN	Use this EMERGENCY STOP STERN input with an external emergency stop button. When the input is activated, the STERN thruster will stop and trig a "Emergency Stop" fault code. This fault will not auto reset when deactivated but need an acknowledge from panel or on PHC-3.

4.6   PARAMETERS - 10 Stabilizer

```
PARAMETERS                    STABILIZER
03-COOLING PUMP               1001-STABILIZER CONFIG
05-DIGITAL OUTPUTS              PTO and YFD(AC)
06-DIGITAL INPUTS             1002-AUTO-START AC PUM
10-STABILIZER                 1003-PRESSURE SETPOINT
                    6/8       ✓=EDIT              1/17
```

No.	Name/Value	Description
1001	STABILIZER CONFIG	Activating stabilizer configuration.
	NONE (default)	Disables stabilizer power pack function
	PTO and VFD(AC)	Enables stabilizer to run from PTO and VFD
	PTO ONLY	Enables stabilizer to run from PTO pressure only
	VFD(AC) ONLY	Enables stabilizer to run from AC power only
1002	AUTO-START AC PUMP	Defines if the AC power pack should start automatically.
	OFF	Stabilizer system cannot start AC power pack automatically. PHC-3 manual operation and START POWERPACK digital input function can start power pack.
	ON (default)	AC power pack starts automatically when stabilizer required it to run.
1003	PRESSURE SETPOINT	Stabilizer AC power pack pressure setpoint
	10bar – 1010 PRESSURE SENSOR RANGE (default 70bar)	Pressure in steps of 1bar
1004	PID P FACTOR	AC power pack PID P factor
	0.1 - 1000.0 (default 8.0)	In steps of 0.1
1005	PID I FACTOR	AC power pack PID I factor
	0.0 - 1000.0 (default 0.0)	In steps of 0.1
1006	PID D FACTOR	AC power pack PID D factor
	0.0 - 1000.0 (default 0.0)	In steps of 0.1
1007	REDUCED POWER	
	DISABLE (default)	Disables the function and AC power pack will operate at set-point set in parameter 1003
	ENABLE	Will operate the AC power pack with a lower set-point to save power
1008	REDUCED POW.LEVEL	Setting the reduced power level to operate at percent level of pressure set-point (parameter 1003). The reduced level in bar must not go lower than the working pressure of the accumulator.
	50% - 100% (default 70%)	Level in steps of 1%.
1009	PTO PUMP PRESSURE DETECT LEVEL	Defines detection level for PTO standby pressure if parameter 0104 SYSTEM PRESSURE is set to ANALOG INPUT. Pressure above level indicates that main engines are running.
	0bar – 100bar (default 10bar)	Pressure in steps of 1bar.
1010	PRESSURE SENSOR RANGE	Sets the stabilizer pressure sensor range (4-20mA sensor)
	50bar - 1000bar (default 160bar)	Range in steps of 10bar.
1011	PTO ENGINE INSTANCE	This parameter is only in use when any digital output is set to function -8/8-STAB.PTO P.UNLOAD. Then this parameter must define the instance of the engine which the PTO pump is connected to. This also require that the engine is connected to the NMEA2000 bus on a GW-1 gateway and that the engine are broadcasting PGN127488 Engine Parameters.
	0-255 (default 255)	Engines begins on the Port side with instance number 0 and increments towards Starboard. When editing one up from value 255 will jump to value 0.
1012	VFD FLOW COMPENSATION	If the AC power-pack is having a hard time to retain the pressure at set-point. Then this factor will give a compensation to the stabilizer pressure regulation when running from AC power-pack. If value is set to 0.0 then there is no compensation.
	0.0 - 2.0 (default 0.0)	In steps of 0.1
1013	PTO OVER-PRESSURE FAULT LEVEL	The stabilizer overpressure fault level when stabilizer gets oil pressure from PTO.
	50bar-500bar (default 130bar)	In steps of 1bar

4.6 PARAMETERS - 10 Stabilizer (Cont......)

1020	VFD MIN SPEED	Sets VFD Minimum Speed
	MIN LIMIT – MAX SPEED (default 200rpm)	The value is limited to VFD settings and parameter 1021 VFD MAX SPEED. ACS580 – sets parameter 4606 'Speed ref zero scaling' (must be higher than ACS580 parameter 3011 'minimum speed') . In steps of 10rpm.
1021	VFD MAX SPEED	Sets VFD Maximum Speed
	MIN SPEED – MAX LIMIT (default 1500rpm)	The value is limited to VFD settings and parameter 1020 VFD MIN SPEED. ACS580 – sets parameter 4601 'Speed scaling' (must be lower than ACS580 parameter 3012 'maximum speed'). In steps of 10rpm.
1022	VFD TYPE	Selects VFD type
	ABB ACS550	ABB ACS550 Drive with Modbus connection
	VACON	VACON NX Drive with MODBUS/N2 option board with Modbus connection
	ABB ACS580 (default)	ABB ACS580 Drive with Modbus connection
	EHP	eVision Hydraulic Powerpack, DC motor. This is a S-link device and RS485/VFD connector shall not be used.
1023	VFD BAUD	Defines VFD Modbus communication speed. VFD must be set to same communication speed. Changing value requires power off/on of PHC-3 to take action. Changing communication settings on VFD will also require power off/on of VFD. This parameter is not in use if 1022 VFD TYPE is set to EHP.
	BAUD19200,8,EVEN,1	19.2 Kbit, 8bit data, parity EVEN, 1 stop bit
	BAUD38400,8,EVEN,1	34.8 Kbit, 8bit data, parity EVEN, 1 stop bit
	BAUD57600,8,EVEN,1 (default)	57.6 Kbit, 8bit data, parity EVEN, 1 stop bit
	BAUD115200,8,EVEN,1	115.2Kbit, 8bit data, parity EVEN, 1 stop bit

4.7 PARAMETERS - 20 Bow Thruster


```
PARAMETERS
05-DIGITAL OUTPUTS
06-DIGITAL INPUTS
10-STABILIZER
20-BOW THRUSTER
                      7/8
```
```
BOW THRUSTER
2001-VALVE TYPE
       DEACTIVATED
2002-DIRECTION
2003-MAX SPOOL TRAVEL
✓=EDIT              1/7
```

No.	Name/Value	Description
2001	VALVE TYPE	Defines the bow proportional thruster valve
	DEACTIVATED	Deactivates the bow thruster function
	DANFOSS PVG (default)	Defines Danfoss PVG valve
2002	DIRECTION	Defines thruster direction. If the thruster operates to the wrong direction just change the setting here instead swapping hydraulic hoses on the installation. This parameter will affect the BOW valve output direction for all parameter 0102-THRUSTER CONFIG settings.
	NORMAL (default)	Normal thruster direction
	SWAPPED	Swapped thruster direction
2003	MAX SPOOL TRAVEL	Scaling of valves spool travel (valve opening) for optimized oil flow and dynamics. For bow spool travel optimization see 5.1. DIAGNOSTIC – BOW THRUSTER.
	50% - 100% (default 100%)	In steps of 1%
2004	RAMP INCREASE	Defines the time the output signal uses to go from 0% to 100%
	100ms – 10000ms (default 200ms)	In steps of 100ms
2005	RAMP DECREASE	Defines the time the output signal uses to go from 100% to 0%
	100ms – 10000ms (default 200ms)	In steps of 100ms
2006	DIRECTION LOCK	Defines the time from thruster has stopped to the output can change direction of thrust
	500ms – 10000ms (default 1000ms)	In steps of 100ms

4.7 PARAMETERS - 20 Bow Thruster (Cont......)

2007	CROSSOVER	All 412mm (16inch), 513mm (20inch) and 610mm (24inch) tunnel thrusters, are supplied with hydraulic bypass/crossover valve and must therefore enable crossover. Disable crossover for all other thrusters. This crossover valve is normally open to protect the thruster during deceleration and will close while thruster is running. When changing to enable crossover the RAMP DECREASE parameter is set to 3000ms, and if changing to disable the RAMP DECREASE parameter are set to default value. Crossover can also be enabled to other D-OUTPUT's, see PARAMETERS - 05-DIGITAL OUTPUTS.
	DISABLE	Disables crossover
	DO-1 BOW CROSSOVER	Enables crossover to D-OUTPUT 1, NO Valve
	DO-1 -BOW CROSSOVER	Enables crossover to D-OUTPUT 1 Inverted output, NC Valve
2008	FUNCTION	Sets the bow thruster function to tunnel thruster or retract thruster. If PHC-3 detects and bow retract controller, then it will change function automatically to SRHP. Changing back to SH must be done manually.
	NORMAL (default)	Tunnel proportional thruster
	SRHP	Retract proportional thruster. With this function set the bow thruster will not run before the retractable tunnel is deployed.

4.8 PARAMETERS - 21 Stern Thruster

No.	Name/Value	Description
2101	VALVE TYPE	Defines the stern proportional thruster valve
	DEACTIVATED	Deactivates the stern thruster function
	DANFOSS PVG (default)	Defines Danfoss PVG valve
2102	DIRECTION	Defines thruster direction. If the thruster operates to the wrong direction just change the setting here instead swapping hydraulic hoses on the installation. This parameter will affect the STERN valve output direction for all parameter 0102-THRUSTER CONFIG settings.
	NORMAL (default)	Normal thruster direction
	SWAPPED	Swapped thruster direction
2103	MAX SPOOL TRAVEL	Scaling of valves spool travel (valve opening) for optimized oil flow and dynamics. For stern spool travel optimization see 5.2. DIAGNOSTIC – STERN THRUSTER.
	50% - 100% (default 100%)	In steps of 1%
2104	RAMP INCREASE	Defines the time the output signal uses to go from 0% to 100%
	100ms – 10000ms (default 200ms)	In steps of 100ms
2105	RAMP DECREASE	Defines the time the output signal uses to go from 100% to 0%
	100ms – 10000ms (default 200ms)	In steps of 100ms
2106	DIRECTION LOCK	Defines the time from thruster has stopped to the output can change direction of thrust
	500ms – 10000ms (default 1000ms)	In steps of 100ms

4.7   PARAMETERS - 21 Stern Thruster (Cont......)

2107	CROSSOVER	All 412mm (16inch), 513mm (20inch) and 610mm (24inch) tunnel thrusters, are supplied with hydraulic bypass/crossover valve and must therefore enable crossover. Disable crossover for all other thrusters. This crossover valve is normally open to protect the thruster during deceleration and will close while thruster is running. When changing to enable crossover the RAMP DECREASE parameter is set to 3000ms, and if changing to disable the RAMP DECREASE parameter are set to default value. Crossover can also be enabled to other D-OUTPUT's, see PARAMETERS - 05-DIGITAL OUTPUTS.
	DISABLE	This crossover valve is normally open to protect the thruster during
	DO-2 STERN CROSSOVER	Enables crossover to D-OUTPUT 2, NO Valve
	DO-2 -STERN CROSSOVER	Enables crossover to D-OUTPUT 2 Inverted output, NC Valve
2108	FUNCTION	Sets the stern thruster function to tunnel thruster or retract thruster. If PHC-3 detects and stern retract controller, then it will change function automatically to SRHP. Changing back to SH must be done manually.
	NORMAL (default)	Tunnel proportional thruster
	SRHP	Retract proportional thruster. With this function set the stern thruster will not run before the retractable tunnel is deployed.

5. Menu - Diagnostic

```
           MENU
ACTIVE FAULTS
DEVICE INFO
PARAMETERS
DIAGNOSTIC
                    4/5
```

5.1 DIAGNOSTIC - Bow Thruster

```
        DIAGNOSTIC
BOW THRUSTER
STERN THRUSTER
STABILIZER
DIGITAL OUTPUTS
                    1/7
```
Shows live update of inputs and outputs related to bow thruster function.

```
      BOW THRUSTER
Joystick:        25%
Output:    15.8V 63%
Crossover:         1
Sys.Pressure:  49 bar
Spool Travel:   100%
```

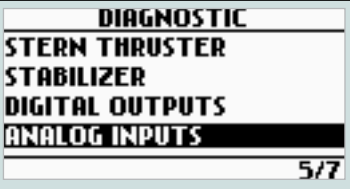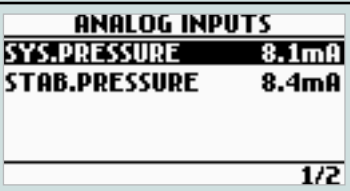| In Display	Description
Joystick: 25%	The amount of thrust from the joystick/control device. Negative value indicates thrust to port side.
Output: 15.8V 63%	Valve signal voltage and spool travel (valve opening) in percent. Negative value indicates thrust to the opposite direction.
Crossover: 1	Indicates if the crossover valve is activated. 0=deactivated, 1=activated, - =no crossover output defined
Sys.Pressure: 49 bar	System pressure
Spool Travel: 100%	Shows what the MAX SPOOL TRAVEL parameter 2003 is set to. Output are limited to this value.

	Bow spool travel optimization:
	  1. Set MAX SPOOL TRAVEL parameter 2003 to 100%.
	  2. Enter this menu DIAGNOSTIC – BOW THRUSTER.
	  3. With a joystick panel (PJC) increase the bow thrust slowly to you reach maximum thrust and maximum Sys.Pressure.
	  4. Set MAX SPOOL TRAVEL parameter 2003 to what Output in % shows at maximum thrust and maximum Sys.Pressure.

5.2 DIAGNOSTIC - Stern Thruster

```
        DIAGNOSTIC
BOW THRUSTER
STERN THRUSTER
STABILIZER
DIGITAL OUTPUTS
                    2/7
```
Shows live update of inputs and outputs related to stern thruster function.

```
      STERN THRUSTER
Joystick:       -27%
Output:    8.1V -65%
Crossover:         1
Sys.Pressure:  49 bar
Spool Travel:   100%
```

In Display	Description
Joystick: -27%	The amount of thrust from the joystick/control device. Negative value indicates thrust to port side.
Output: 8.1V -65%	Valve signal voltage and spool travel (valve opening) in percent. Negative value indicates thrust to port side.
Crossover: 1	Indicates if the crossover valve is activated. 0=valve open, 1=valve closed, - =no crossover output defined
Sys.Pressure: 49 bar	System pressure
Spool Travel: 100%	Shows what the MAX SPOOL TRAVEL parameter 2103 is set to. Output is limited to this value.

	Stern spool travel optimization:
	  1. Set MAX SPOOL TRAVEL parameter 2103 to 100%.
	  2. Enter this menu DIAGNOSTIC – STERN THRUSTER.
	  3. With a joystick panel (PJC) increase the stern thrust slowly to you reach maximum thrust and maximum Sys.Pressure.
	  4. Set MAX SPOOL TRAVEL parameter 2103 to what Output in % shows at maximum thrust and maximum Sys.Pressure.

5.3   DIAGNOSTIC - Stabilizer

DIAGNOSTIC BOW THRUSTER STERN THRUSTER **STABILIZER** DIGITAL OUTPUTS 3/7	Shows live update of inputs and outputs related stabilizer function.
STABILIZER Sys.Pressure: 113 bar Stab.Pressure: 90 bar Power Request: YES Source: PTO Stab:1 Unload:0 Dump:1	

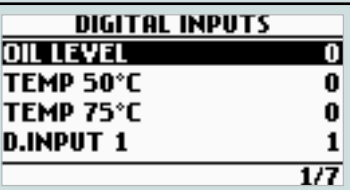| In Display	Description
Sys.Pressure: 113 bar	System Pressure (PTO/PVG pressure)
Stab.Pressure: 90 bar	Stabilizer Pressure
Power Request YES	Stabilizer Request Power
Source: PTO	Stabilizer Power Source. NONE, PTO or VFD (AC)
Stab:1 Unload:0 Dump:1	Stabilizer Vales Status. 0=0V, 1=valve has power (24V) Stab=Stabilizer, Unload=AC Pump Unload, Dump=Accumulator Dump
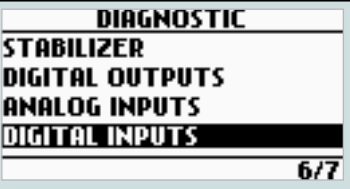
5.4   DIAGNOSTIC - Digital Outputs

DIAGNOSTIC BOW THRUSTER STERN THRUSTER STABILIZER **DIGITAL OUTPUTS** 4/7	Shows live update of a valve output or digital output. 0 = output is 0 Volt 1 = output is energized When an output is highlighted, the output will be toggled as long as the ✓Enter button is being pushed and held.
DIGITAL OUTPUTS **LS-Dump** 0 Pump #2 Shutdown 1 Stabilizer 0 AC Pump Unload 0 ✓ TOGGLES OUTPUT 1/12	

In Display	Description
LS-Dump	LS-Dump Valve
Pump #2 Shutdown	Pump #2 Shutdown Valve
Stabilizer	Stabilizer Valve
AC Pump Unload	AC Pump Unload valve
Accumulator Dump	Accumulator Dump Valve
Cooling Hydraulic	Hydraulic Cooling Pump
D-OUTPUT 1	Digital Output 1, See Parameter 0501 for output function
D-OUTPUT 2	Digital Output 2, See Parameter 0502 for output function
D-OUTPUT 3	Digital Output 3, See Parameter 0503 for output function
D-OUTPUT 4	Digital Output 4, See Parameter 0504 for output function
D-OUTPUT 5	Digital Output 5, See Parameter 0505 for output function
D-OUTPUT 6	Digital Output 6, See Parameter 0506 for output function

5.5 DIAGNOSTIC - Analogue Inputs

DIAGNOSTIC screen	
DIAGNOSTIC STERN THRUSTER STABILIZER DIGITAL OUTPUTS **ANALOG INPUTS** 5/7	Shows live update of analog inputs.
ANALOG INPUTS **SYS.PRESSURE 8.1mA** STAB.PRESSURE 8.4mA 1/2	Shows analog input values in mA

In Display	Description
SYS.PRESSURE	System Pressure in mA. 4.0mA = 0bar
STAB.PRESSURE	Stabilizer Pressure in mA. 4.0mA = 0bar

5.6 DIAGNOSTIC - Digital Inputs

DIAGNOSTIC screen	
DIAGNOSTIC STABILIZER DIGITAL OUTPUTS ANALOG INPUTS **DIGITAL INPUTS** 6/7	Shows live update of digital inputs. 0 = input is shorted to 0 Volt (activated) 1 = input is open (deactivated) Scroll down to view more inputs.
DIGITAL INPUTS **OIL LEVEL 0** TEMP 50°C 0 TEMP 75°C 0 D.INPUT 1 1 1/7	

In Display	Description
OIL LEVEL	Oil Level
TEMP 50°C	Temp switch 50°C, warning level
TEMP 75°C	Temp switch 75°C, alarm level
D.INPUT 1	Digital Input 1
D.INPUT 2	Digital Input 2
D.INPUT 3	Digital Input 3
D.INPUT 4	Digital Input 4
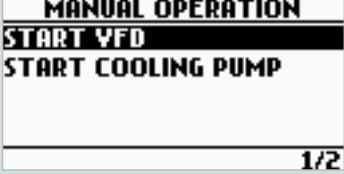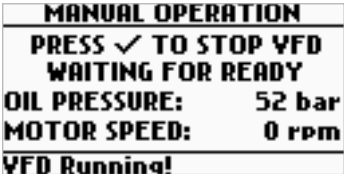
5.7   DIAGNOSTIC - S Link Bus

DIAGNOSTIC DIGITAL OUTPUTS ANALOG INPUTS DIGITAL INPUTS S-LINK BUS 7/7	Shows live update of S-link bus (CAN-bus) error status for PHC-3.
S-LINK BUS Rx Error Count: 0 Tx Error Count: 0 Last Error: No Error Flag:	Showing no error and signal condition is good.
S-LINK BUS Rx Error Count: 52 Tx Error Count: 0 Last Error: BitDominant Flag: WARNING BUS OFF	Example showing lots of error and very bad signal conditions. NB! When S-link devices are hot plugged or disconnected to the bus or powered (when AMS is engaged and powering PPC and retract), it is not unusual to see some values been incremented. But they will quickly decrement to 0 again. This will not cause any communication issues.

In Display	Description
Rx Error Count	Receive error counter. Error during reception increments the value. After every successful reception the value is decremented.
Tx Error Count	Transmit error counter. Error during transmit increments the value. After every successful transmit the value is decremented.
Last Error	Indicates the error condition of the last error detected. If a message has been transferred or received without error, it will show No Error. Conditions: No Error, STUFF, FORM, ACK(Acknowledgment), BitRecessive, BitDominant & CRC.
Flag	BUS OFF: when Tx Error Count is greater than 255 and overflowed. (Tx Error Count will show 0 when in BUS OFF state) **WARNING:** when Rx Error Count or Tx Error Count has reached 96 counts **PASSIVE:** when Rx Error Count or Tx Error Count is more than 127 counts

6. **Menu - Manual Operation**

```
         MENU
DEVICE INFO
PARAMETERS
DIAGNOSTIC
MANUAL OPERATION
                      5/5
```

6.1 MANUAL OPERATION - Start VFD

MANUAL OPERATION **START VFD** **START COOLING PUMP** 1/2	Option to manually operate VFD for service or commission purposes. Enter this menu to operate the VFD when having problems, and the information in the display can give useful feedback to service personnel.

In Display	Description
MANUAL OPERATION **PRESS ✓ TO START VFD** **OIL PRESSURE: 41 bar** **MOTOR SPEED: 0 rpm**	VFD are ready and pressing ✓Enter will start VFD.
MANUAL OPERATION **PRESS ✓ TO STOP VFD** **OIL PRESSURE: 52 bar** **MOTOR SPEED: 1400 rpm** **VFD Running!**	VFD is running. Stabilizer pressure and motor speed is displayed. While VFD is running it is possible to press ⮌Back and go to parameters and change parameter values like 1003 PRESSURE SETPOINT, or view DIGITAL OUTPUTS.
MANUAL OPERATION **PRESS ✓ TO STOP VFD** **WAITING FOR READY** **OIL PRESSURE: 52 bar** **MOTOR SPEED: 0 rpm** **VFD Running!**	Waiting for power management system to allow VFD start.
MANUAL OPERATION **NO COMM. WITH VFD** **VFD CAN'T BE STARTED**	Error screen informing that the PHC-3 controller is not able to communicate with the VFD, probable causes is: - VFD not powered up - VFD communication cable not connected to PHC - VFD communication cable is incorrectly wired to VFD terminals
MANUAL OPERATION **VFD NOT READY** **VFD CAN'T BE STARTED**	VFD in local (LOC) mode, switch to remote (REM) to be able to run VFD from PHC-3.

6.2 MANUAL OPERATION - Start Cooling Pump

MANUAL OPERATION START YFD **START COOLING PUMP** 2/2	Option to manually start cooling pump for service or commission purposes. The status information in the display can give useful feedback to service personnel. While cooling pump is running it's possible to press ↰Back and go to parameters and change parameter values like 0303 ECI PUMP SPEED, or view DIGITAL OUTPUTS.

In Display	Description
MANUAL OPERATION ELECTRIC ECI OIL TEMP 33°C ECI S:00 M:82 0rpm DCA: 0.0A MOTA: 0.0A ✓ TO START COOLING	ECI cooling pump is selected in parameter 0301 and is ready to be operated.
MANUAL OPERATION ELECTRIC ECI OIL TEMP 33°C ECI S:00 M:82 1406rpm DCA: 3.1A MOTA: 12.4A ✓ TO STOP COOLING	ECI cooling pump is running and the following data is shown in this example: -Hydraulic oil temperature 33°C -ECI cooling pump S: 00 (controller status) -ECI cooling pump M: 82 (motor status) -ECI cooling pump motor speed 1406rpm -ECI cooling pump DC current 3.1A -ECI cooling pump motor peak current 12.4A
MANUAL OPERATION HYDRAULIC GREY HARNESS OIL TEMP 36°C ✓ TO START COOLING	Hydraulic cooling pump is selected in parameter 0301 and is ready to be operated. The following data is shown in this example: -Hydraulic oil temperature 36°C If you just want to test the output when there is no oil pressure, see chapter 1.5.4 DIAGNOSTIC – DIGITAL OUTPTS.
MANUAL OPERATION D-OUT 4 BLUE HARNESS OIL TEMP 33°C ✓ TO START COOLING	Electric cooling pump on D-OUT 4 is selected in parameter 0301 and is ready to be operated. The following data is shown in this example: -Hydraulic oil temperature 33°C
MANUAL OPERATION CC MODULE OIL TEMP 36°C CCM AC STATUS: 0x00 CCM DC STATUS: 0x00 ✓ TO START COOLING	CC Module (Cooling Control Module) is selected in parameter 0301. -Hydraulic oil temperature 36°C -CCM AC STATUS: 0000 (AC pump status from CC Module) xxx1 = AC Cooling pump is running xx1x = AC Cooling pump is forced running 1xxx = AC Cooling pump fault -CCM DC STATUS: 0000 (DC pump status from CC Module) xxx1 = DC Cooling pump is running xx1x = DC Cooling pump is forced running 1xxx = DC Cooling pump fault

S-Link Fault Codes

Fault situations in S-Link compliant products generates Fault Codes which are broadcasted on the S-Link bus. If a control panel receives a Fault Code, it will trigger an alarm in the control panel and the user will be able to get information about which product that reports the fault and the reason for the fault. Please see the user manual of your S-Link compliant control panel for more information on how to access Fault Code information in case of an alarm situation.

All Sleipner S-Link compliant products have product specific Fault Codes. For legacy reasons some control panels display Generic Fault Codes for certain products.

Fault Code	Fault Name	Fault Description	Action
106.202.0	Emergency Stop Bow -	Bow emergency stop is button activated	-Release bow emergency stop
106.203.0	Emergency Stop Bow Starboard -	Bow Starboard emergency stop is button activated	-Release bow starboard emergency stop
106.204.0	Emergency Stop Bow Port -	Bow Port emergency stop is button activated	-Release bow port emergency stop
106.205.0	Emergency Stop Stern -	Stern emergency stop is button activated	-Release stern emergency stop
106.206.0	Emergency Stop Stern Starboard -	Stern Starboard emergency stop is button activated	-Release stern starboard emergency stop
106.207.0	Emergency Stop Stern Port -	Stern Port emergency stop is button activated	-Release stern port emergency stop
10500.0.10	PHC Oil Level - Level Low	Hydraulic oil level is low	-Limit use of thruster -Inspect hydraulic oil level -Check system for leaks and refill hydraulic oil
10500.0.13	PHC Oil Level - Open Circuit	Analog oil level sensor open circuit	-Sensor not connected or wire break. -Verify sensor type in parameter 0201 -Disconnect sensor and measure that sensor resistance value is in range 0-180ohm.
10501.0.11	PHC Oil Temp - Level High	Oil temperature higher than 75°C (167°F)	-Limit use of thruster to prevent temperature to rise. -Check if cooling pump is running and there is cooling water flow. -Inspect seawater filter -Verify that cooling pump is enabled in parameter 0301
10501.0.13	PHC Oil Temp - Open Circuit	Analog oil temp sensor open circuit	-Sensor not connected or wire break. - Disconnect sensor and measure that sensor resistance value is in range 104ohm-147Kohm -Wrong sensor is defined in parameter 0201
10501.0.16	PHC Oil Temp - Short Circuit	Analog oil temp input short circuit	-Input shorted to GND, check wiring/sensor -Disconnect sensor and measure that sensor resistance value is in range 104ohm-147Kohm
10501.0.55	PHC Oil Temp - Overtemp	Hydraulic oil temperature has been higher than 120°C (248°F).	-Wait for oil temperature to cool down. -Check oil level and refill if level is low. -Check if cooling pump is running. -Check if cooling system gets water
10502.0.13	PHC Stabilizer Pressure - Open Circuit	Stabilizer pressure sensor open circuit	-Sensor not connected or wire break. -System incorrectly configured with stabilizer, parameter 1001 -Replace sensor
10502.0.16	PHC Stabilizer Pressure - Short Circuit	Stabilizer pressure sensor short circuit	-Wires shorted or sensor defective, check wiring/sensor -Replace sensor
10502.0.19	PHC Stabilizer Pressure - Under Limit	Stabilizer pressure has dropped below 20bar.	-Check accumulator charge pressure -Check PTO pressure (if PTO powered) -Check system for oil leaks -Check generator power supply to the VFD (is VFD motor speed maximum when pressure alarming low)
10502.0.20	PHC Stabilizer Pressure - Over Limit	Stabilizer pressure is higher than: parameter 1013 PTO OVER-PRESSURE FAULT LEVEL running from PTO (FW V1.029 an older, set point + 30bar running from PTO) or set point + 15bar running from AC motor	-Check Parameter 1013 PTO OVER-PRESSURE FAULT LEVEL -Check PTO pressure setting -Check accumulator charge pressure -Check unload valve operation
10502.0.26	PHC Stabilizer Pressure - VALUE MAX	Stabilizer pressure reached sensor max value.	-Check that correct sensor is fitted -Check that sensor range parameter 1010 match the sensor -Check PTO pressure setting
10502.0.200	PHC Stabilizer Pressure - Timeout	Stabilizer pressure has not reached 60% of set point parameter 1003 after 30sec.	-Check pump feed shutoff valve. -Check PTO pressure (if PTO powered) -Check system for oil leaks
10503.0.13	PHC System Pressure - Open Circuit	System pressure sensor open circuit	-Sensor not connected or wire break. -Verify system pressure, parameter 0104
10503.0.16	PHC System Pressure - Short Circuit	System pressure sensor short circuit	-Wires shorted or sensor defective, check wiring/sensor -Replace sensor
10504.0.13	PHC AI 1 - Open Circuit	Analog Input 1 (4-20mA) sensor open circuit	-Sensor not connected or wire break.
10504.0.16	PHC AI 1 - Short Circuit	Analog Input 1 (4-20mA) sensor short circuit	-Wires shorted or sensor defective, check wiring/sensor -Replace sensor
10505.0.13	PHC AI 2 - Open Circuit	Analog Input 2 (4-20mA) sensor open circuit	-Sensor not connected or wire break.
10505.0.16	PHC AI 2 - Short Circuit	Analog Input 2 (4-20mA) sensor short circuit	-Wires shorted or sensor defective, check wiring/sensor -Replace sensor
10508.0.13	PHC DOUT AC PUMP UNLOAD - Open Circuit	AC Pump Unload valve open circuit	-Check for open circuit, power consumption < 5.0 Watt -System incorrectly configured with stabilizer, parameter 1001
10508.0.51	PHC DOUT AC PUMP UNLOAD - Current High	AC Pump Unload valve current higher than 4.0A	-Check wires and connections for short circuit
10509.0.13	PHC DOUT ACCUMULATOR DUMP - Open Circuit	Accumulator Dump valve open circuit	-Check for open circuit, power < 5.0 Watt -System incorrectly configured with stabilizer, parameter 1001
10509.0.51	PHC DOUT ACCUMULATOR DUMP - Current High	Accumulator Dump valve current higher than 4.0A	-Check wires and connections for short circuit
10510.0.13	PHC DOUT STABILIZER - Open Circuit	Stabilizer valve open circuit	-Check for open circuit, power consumption < 5.0 Watt -System incorrectly configured with stabilizer, parameter 1001
10510.0.51	PHC DOUT STABILIZER - Current High	Stabilizer valve current higher than 4.0A	-Check wires and connections for short circuit
10511.0.13	PHC DOUT COOLING PUMP HYDRAULIC - Open Circuit	Hydraulic Cooling Pump valve open circuit	-Check for open circuit, power consumption < 5.0 Watt -Wrong cooling pump configured, parameter 0301
10511.0.51	PHC DOUT COOLING PUMP HYDRAULIC - Current High	Hydraulic Cooling Pump valve current higher than 4.0A	-Check wires and connections for short circuit

Fault Code	Fault Name	Fault Description	Action
10512.0.13	PHC DOUT LS DUMP - Open Circuit	LS-Dump valve open circuit	-Check for open circuit, power consumption < 5.0 Watt -System wrong configured with thrusters, parameter 2001 or 2101
10512.0.51	PHC DOUT LS DUMP - Current High	LS-Dump valve current higher than 4.0A	-Check wires and connections for short circuit
10513.0.51	PHC DOUT PUMP #2 - Current High	Pump #2 valve current higher than 4.0A	-Check wires and connections for short circuit
10514.0.13	PHC DOUT 5 - Open Circuit	Digital Output 5 is configured as crossover and output is open circuit	-Check for open circuit, power consumption < 5.0 Watt -Output configured wrong, parameter 0505
10514.0.51	PHC DOUT 5 - Current High	Digital Output 5 current higher than 4.0A	-Check wires and connections for short circuit
10515.0.13	PHC DOUT 6 - Open Circuit	Digital Output 6 is configured as crossover and output is open circuit	-Check for open circuit, power consumption < 5.0 Watt -Output configured wrong, parameter 0506
10515.0.51	PHC DOUT 6 - Current High	Digital Output 6 current higher than 4.0A	-Check wires and connections for short circuit
10516.0.13	PHC DOUT 3 - Open Circuit	Digital Output 3 is configured as crossover and output is open circuit	-Check for open circuit, power consumption < 5.0 Watt -Output configured wrong, parameter 0503
10516.0.51	PHC DOUT 3 - Current High	Digital Output 3 current higher than 4.0A	-Check wires and connections for short circuit
10517.0.13	PHC DOUT 2 - Open Circuit	Digital Output 2 is configured as crossover and output is open circuit	-Check for open circuit, power consumption < 5.0 Watt -Output configured wrong, parameter 0502
10517.0.51	PHC DOUT 2 - Current High	Digital Output 2 current higher than 4.0A	-Check wires and connections for short circuit
10518.0.13	PHC DOUT 1 - Open Circuit	Digital Output 1 is configured as crossover and output is open circuit	-Check for open circuit, power consumption < 5.0 Watt -Output configured wrong, parameter 0501
10518.0.51	PHC DOUT 1 - Current High	Digital Output 1 current higher than 4.0A	-Check wires and connections for short circuit
10519.0.13	PHC DOUT 4 - Open Circuit	Digital Output 4 is configured as crossover and output is open circuit	-Check for open circuit, power consumption < 5.0 Watt -Output configured wrong, parameter 0504
10519.0.51	PHC DOUT 4 - Current High	Digital Output 4 current higher than 4.0A	-Check wires and connections for short circuit
10520.0.51	PHC ECI PUMP POWER FEED - Current High	ECI cooling pump power current higher than 8.0A	-Check pump cable for damage and short circuits -Make sure the connector on the cooling pump is correct inserted. -Replace cooling pump
10521.0.51	PHC Bow Thruster Power - Current High	Bow thruster PVG feed current higher than 3.0A	-Check PVG wires and connections for short circuit
10522.0.51	PHC Stern Thruster Power - Current High	Stern thruster PVG feed current higher than 3.0A	-Check PVG wires and connections for short circuit
10523.0.51	PHC Thruster Power - Current High	Bow or Stern PVG feed current higher than 3.3A	Check all bow and stern PVG signal wires for short circuits
10524.0.51	PHC ECI Cooling Pump - Current High	ECI cooling pump current higher than 13.0A	-Check ECI cooling pump cable for damage and short circuits -Replace ECI cooling pump
10524.0.53	PHC ECI Cooling Pump - Overvoltage	ECI cooling pump overvoltage, voltage higher than 33.0V	-Check PHC-3 input voltage is below 33.0V -Replace ECI cooling pump
10524.0.54	PHC ECI Cooling Pump - Undervoltage	ECI cooling pump under voltage, voltage is lower than 18.0V	-Check PHC-3 input voltage is higher than 18.0V -Replace ECI cooling pump
10524.0.55	PHC ECI Cooling Pump - Overtemp	ECI cooling pump temperature higher than 100°C (212°F).	-Check ECI cooling pump for damages -Replace ECI cooling pump
10524.0.100	PHC ECI Cooling Pump - No Communication	No communication with ECI cooling pump	-Check if ECI pump is connected -Check wires to ECI pump for open circuits -Check power supply cooling pump -Wrong cooling pump configured, parameter 0301
10524.0.205	PHC ECI Cooling Pump - HW FAULT	ECI cooling pump hardware fault	-Replace ECI cooling pump
10526.0.0	PHC ECI Cooling Pump Blocked - -	ECI cooling pump is blocked	-Reset fault and if fault reappears, cooling pump need service or replacement. -Check pump inlet for obstacles
10527.1.0	PHC VFD Not Ready Instance 1 -	VFD not ready	-VFD external run enable/power available signal is lost.
10528.1.10	PHC VFD ABB Parameter Instance 1 Level Low	ABB ACS550 parameter values 2001 or 2002 cannot be a negative value.	-Check ABB ACS550 parameter 2001 and 2002.
10529.0.19	PHC ECI Cooling Pump Speed - Under Limit	ECI pump motor speed under limit. Motor speed is below 100 rpm, or not getting minimum 750 rpm within 3 seconds.	-Check hose for dirt -Check pump inlet for obstacles
10530.0.201	PHC PTO ENGINE INSTANCE - INIT FAIL	Parameter 1011-PTO ENGINE INSTANCE is not defined	-Set parameter 1011-PTO ENGINE INSTANCE
10531.0.100	CC MODULE - No Communication	No communication with CC Module	-Check if CC Module is connected -Check wires to CC Module for open circuits -Check power supply CC Module
10532.0.24	CC MODULE AC PUMP - Fault	The CC Module AC pump circuit is open and pump is not running	-Check if AC generator is running -Check if the AC pump contactor is tripped -Check wires to the pump for open circuit
10533.0.24	CC MODULE DC PUMP - Fault	The CC Module DC pump circuit is open and pump is not running	-Check if DC pump contactor has 24VDC -Check if the DC pump contactor is tripped -Check wires to the DC pump for open circuit
36000.1.24	ABB ACS550 Instance 1 Fault	ABB ACS550 fault	Se ABB ACS550 drive for more details
36002.1.24	VACON Instance 1 Fault	VACON VFD Fault	Se VACON drive for more details
36003.1.24	ABB ACS580 Instance 1 Fault	ABB ACS580 fault	Se ABB ACS580 drive for more details
36004.1.24	EHP Instance 1 Fault	EHP Fault	-See fault from EHP for more details
36100.1.100	VFD Instance 1 No Communication	Lost communication with VFD	-VFD not powered up -VFD communication cable not connected or incorrectly wired -On the VFD make sure the RS485 BUS TERMINATION is in ON position
36103.1.0	VFD IN LOCAL Instance 1 -	VFD in local mode	-Switch VFD to remote mode

Installation Guide

Responsibility of the Installer	MC_0038

The installer must read this document to ensure necessary familiarity with the product before installation.

Instructions in this document cannot be guaranteed to comply with all international and national regulations. It is the responsibility of the installer to follow all applicable international and national regulations when installing Sleipner products.

The recommendations given in this document are guidelines ONLY, and Sleipner strongly recommends that advice is obtained from a person familiar with the particular vessel and applicable regulations.

This document contains general installation instructions intended to support experienced installers. If you are not skilled in this type of work, please contact professional installers for assistance.

If required by local regulation, electrical work must be done by a licensed professional.

Appropriate health and safety procedures must be followed during installation.

Faulty installation of Sleipner products will render all warranties given by Sleipner Motor AS.

Ensure appropriate access to Sleipner products during installation planning for service, inspection and component replacement.

When installing an S-Link™ system connect ONLY original Sleipner S-Link™ products or other authorized control equipment directly to the S-Link™ bus. Connecting non-authorized third-party equipment, it must always be connected through a Sleipner supplied interface product.
Any attempt to directly control or connect into the S-Link™ control system without a designated and approved interface will render all warranties and responsibilities of all of the connected Sleipner products. If you are interfacing the S-Link™ bus by agreement with Sleipner through a designated Sleipner supplied interface, you are still required to install at least one original Sleipner control panel to enable efficient troubleshooting if necessary.
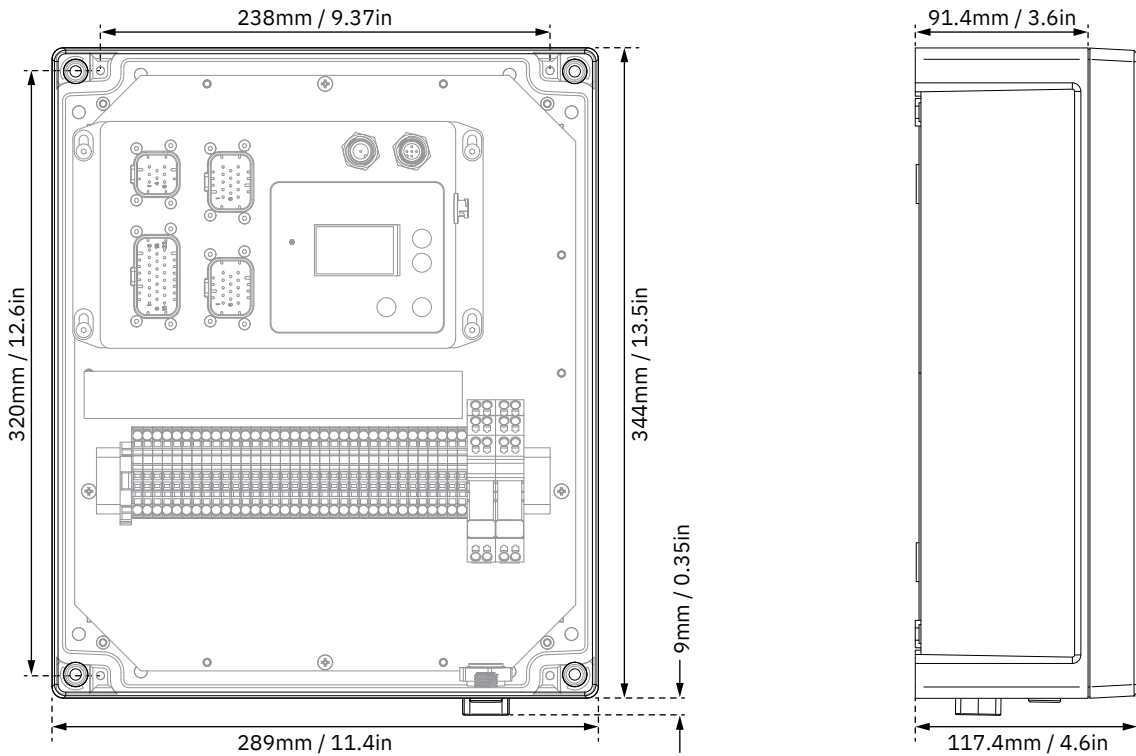MC_0105

|	
Supply Voltage	9-31 VDC
Power consumption	Less than 1.0 Watt in stand-by
Digital output 1 to 6	Max load 2.0 Amp pr. output
Digital inputs	0-31 VDC
Operating temperature	-20°C to +70°C / -4°F to +158°F
Weight	700g / 24,7oz
IP rating PHC-3	IP65
IP rating 73830 Thruster Control Cabinet	IP65 (Gland for S-Link: IP54)

PHC-3 Dimensions
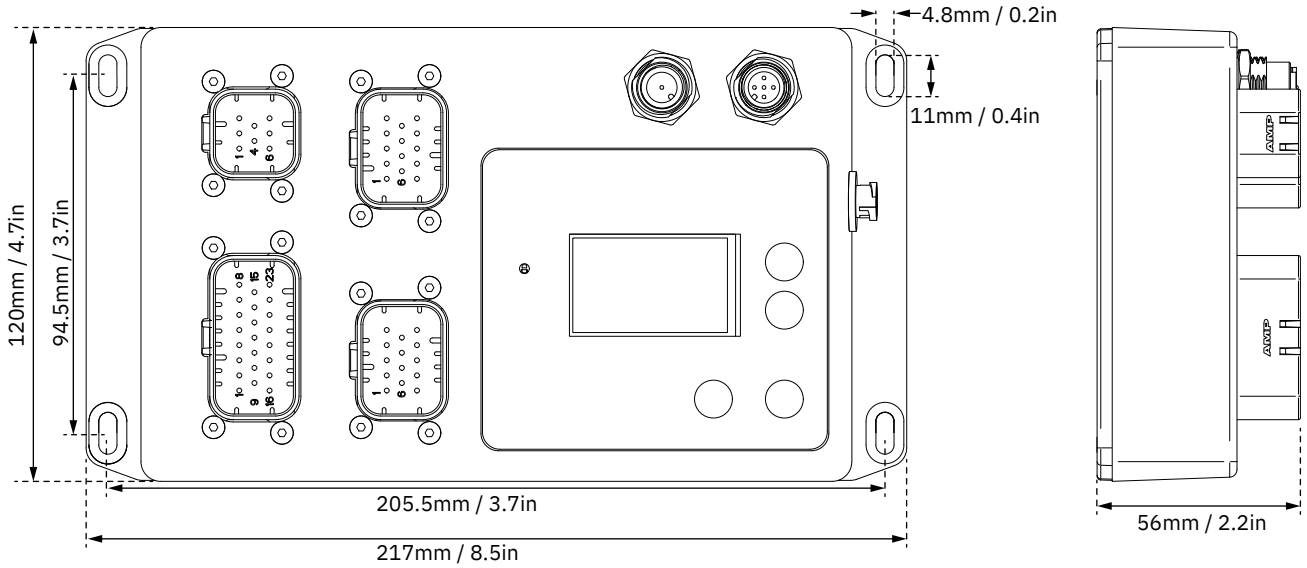
MG_0652

73830 Thruster Control Cabinet Dimensions

MG_0653

Hydraulic System

For Hydraulic Systems the PHC-3 controller is pre-mounted on the frame.
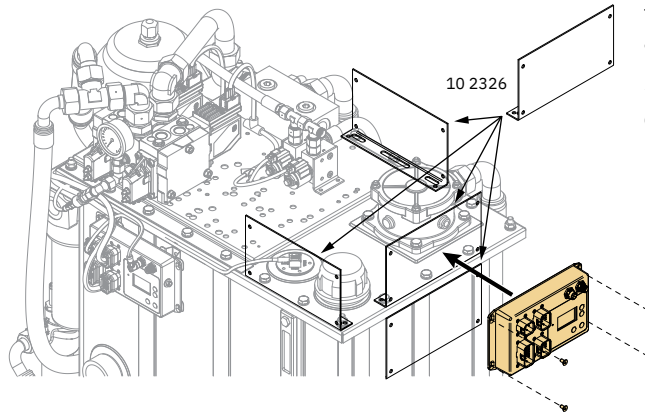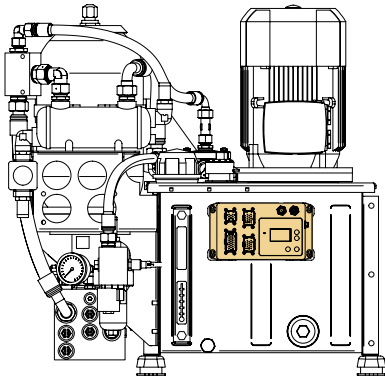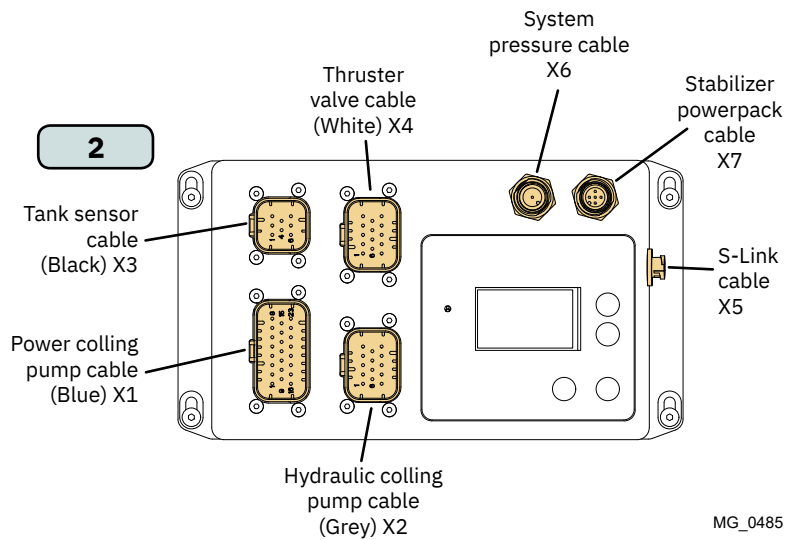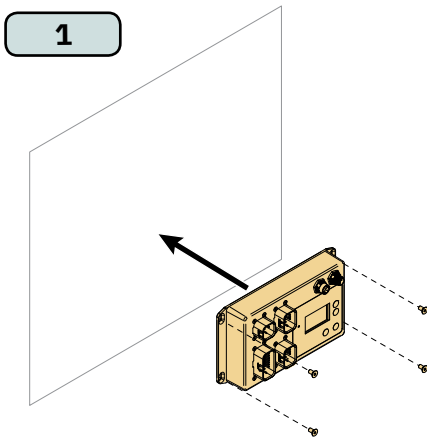

10 2326

To improve access to the PHC-3 after the Hydraulic System is installed in a vessel, the bracket 10 2326 with order nr. SM178023 can be used. Ensure that the cable harness reaches the new location before mounting the bracket.

MG_0672

Standalone

1. Mount PHC-3 in the desired location using four counter sunk screws, max 1Nm. Excessive force might damage the mounting flange.

2. Attach the required cables to the PHC-3

1

2

Thruster valve cable (White) X4

System pressure cable X6

Stabilizer powerpack cable X7

Tank sensor cable (Black) X3

S-Link cable X5

Power colling pump cable (Blue) X1

Hydraulic colling pump cable (Grey) X2

MG_0485

Junction Box

1. Drill holes and mount the required number og cable glands. It is recommended to mount the cable glands on the bottom wall of the enclosure.

2. Remove lid and mount the 73830 Thruster Control Cabinet in the desired location, using four screws.

3. Connect wires to terminal blocks according to project specific drawings. Connect S-Link Spur cable of desired length and enter the junction box through the split grommet
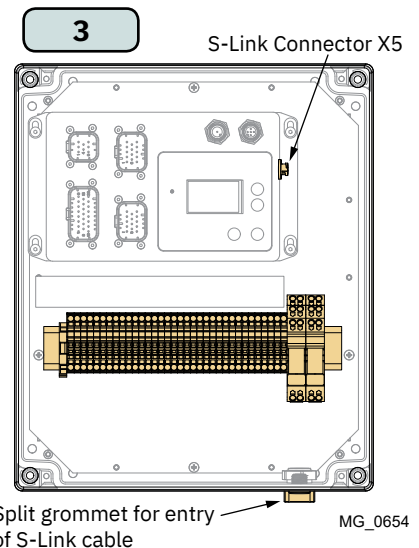

1

2

3

S-Link Connector X5

Lid

Junction box screws
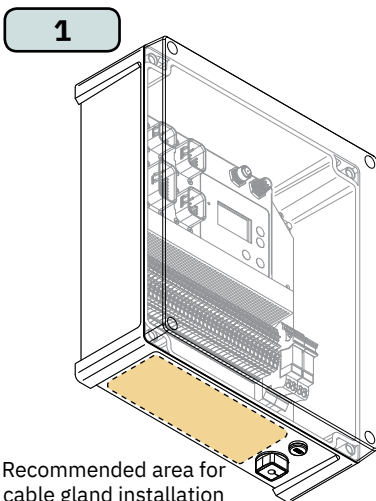
Recommended area for cable gland installation
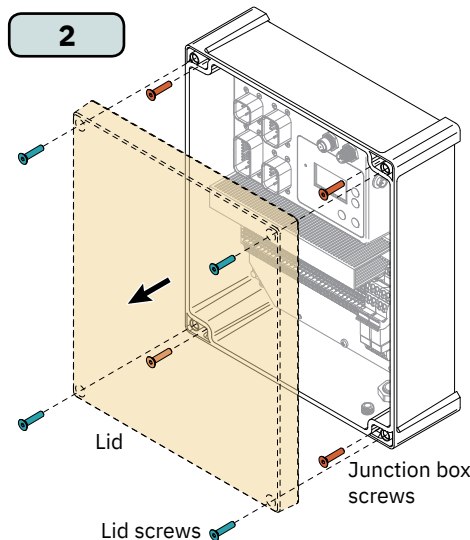
Lid screws

Split grommet for entry of S-Link cable

MG_0654

S-Link is a CAN-based control system used for communication between Sleipner products installed on a vessel. The system uses BACKBONE Cables as a common power and communication bus with separate SPUR Cables to each connected unit. Only one S-Link POWER cable shall be connected to the BACKBONE Cable. Units with low power consumption are powered directly from the S-Link bus.

Main advantages of S-Link system:
- Compact and waterproof plugs.
- BACKBONE and SPUR Cables have different colour coding and keying to ensure correct and easy installation. BACKBONE Cables have blue connectors and SPUR Cables have green connectors.
- Different cable lengths and BACKBONE Extenders make the system scalable and flexible to install.
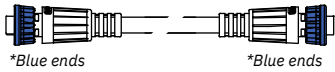
Installation of S-Link cables:
Select appropriate cables to keep the length of BACKBONE- and SPUR Cables to a minimum. In case of planned installation with total BACKBONE Cable length exceeding 100 meters please consult your local distributor. The S-Link cables should be properly fastened when installed to avoid sharp bend radius, cable chafing and undesired strain on connectors. Locking mechanism on connectors must be fully closed. To ensure long lifetime, cables, T-Connectors and Extenders should not be located so that they are permanently immersed in water or other fluids. It is also recommended to install cables such that water and condensation do not run along the cables and into the connectors.
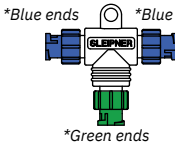
The POWER Cable should ideally be connected around the middle of the BACKBONE bus to ensure an equal voltage drop at each end of the BACKBONE Cable. The yellow and black wire in the POWER Cable shall be connected to GND and the red wire connected to +12VDC or +24VDC.

To reduce the risk of interference, avoid routing the S-Link cables close to equipment such as radio transmitters, antennas or high voltage cables. The backbone must be terminated at each end with the END Terminator.
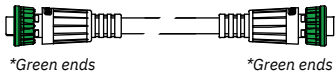
SPUR cables can be left unterminated to prepare for the installation of future additional equipment. In such cases, ensure to protect open connectors from water and moisture to avoid corrosion in the connectors.

BACKBONE Cable
Blue ends

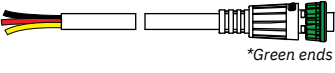Forms the communication and power bus throughout a vessel. Available in different standard lengths.
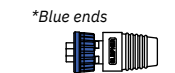
SPUR Cable
Green ends

Used to connect S-Link compliant products to the backbone cable. One SPUR Cable must be used for each connected component, with no exceptions. Recommended to be as short as practically possible. Available in different standard lengths.
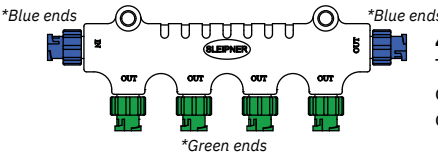
POWER Cable
Green ends

Required in all installations for connection of BACKBONE Cable to a power supply and should be protected with a 2A fuse.

T-Connector
Blue ends *Blue ends* *Green ends*

Used for connection of SPUR or POWER Cable to the BACKBONE Cable. One T-Connector for each connected cable.

BACKBONE Extender
Blue ends *Blue ends*

Connects two BACKBONE Cables to extend the length.

END Terminator
Blue ends

Must be one at each end of the BACKBONE bus.

4-Port T-Connector
Blue ends *Blue ends* *Green ends*

The 4-PORT T-connector allows multiple SPUR Cables to be connected. The 4-PORT T-connector comes with two sealing caps to protect unused ports.

S-Link installation example

MG_0159

Fill in the type, location and serial numbers of the S-link devices installed.
Keeping this as a reference will make the setup procedure easier!

S-link device	Location	Serial number
(ie Thruster, AMS, PPC etc)	(Bow, Bow-STB, Stern, Stern-STB)	
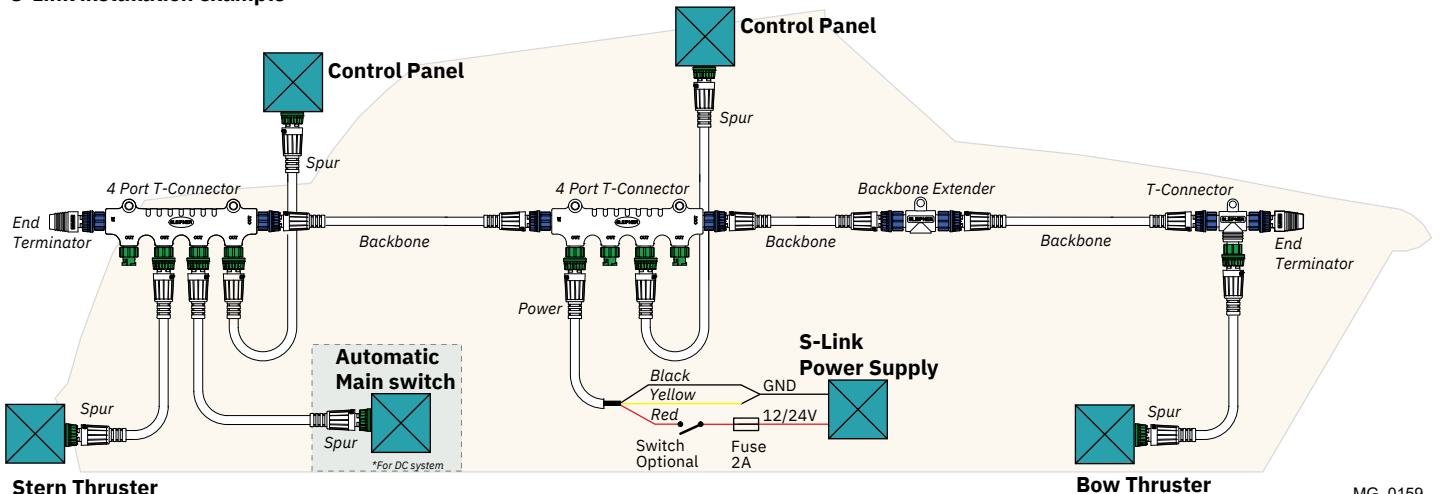
**Find your local professional dealer from our certified
worldwide network for expert service and support.
visit our website www.sleipnergroup.com/support**

Product Spare Parts and Additional Resources `MC_0024`

**For additional supporting documentation, we advise you
to visit our website www.sleipnergroup.com and find your
Sleipner product.**

Warranty statement `MC_0024`

1. Sleipner Motor AS (The "Warrantor") warrants that the equipment (parts, materials, and embedded software of products) manufactured by the Warrantor is free from defects in workmanship and materials for purpose for which the equipment is intended and under normal use and maintenance service (the "Warranty").

2. This Warranty is in effect for two years (Leisure Use) or one year (Commercial and other Non-leisure Use) from the date of delivery/purchase by the end user, with the following exceptions;
(a) For demonstration vessels, or vessels kept on the water, the dealer is considered as the end user from 6 months after their launch of the vessel;
(b) The warranty period starts no later than 18 months after the first launch of the vessel.
Please note that the boat manufacturer and dealer must pay particular attention to correct maintenance and service both by the products manuals as well as general good practice for the location the boat is kept in the period the boat is in their care. In cases where the 6 and 18 months grace periods for boat builders and dealers are passed, it is possible to obtain a full warranty upon inspection and approval of the warrantor or such representative.

3. Certain parts, classified as wearable or service parts, are not covered by the warranty. A failure to follow the required maintenance and service work as described in the product manual render all warranty on parts or components directly or indirectly affected by this void. Please also note that for some parts, time is also a factor separately from actual operational hours.

4. This Warranty is transferable and covers the equipment for the specified warranty period.

5. The warranty does not apply to defects or damages caused by faulty installation or hook-up, abuse or misuse of the equipment including exposure to excessive heat, salt or fresh water spray, or water immersion except for equipment specifically designed as waterproof.

6. In case the equipment seems to be defective, the warranty holder (the "Claimant") must do the following to make a claim:
(a) Contact the dealer or service centre where the equipment was purchased and make the claim. Alternatively, the Claimant can make the claim to a dealer or service centre found at www.sleipnergroup.com. The Claimant must present a detailed written statement of the nature and circumstances of the defect, to the best of the Claimant's knowledge, including product identification and serial nbr., the date and place of purchase and the name and address of the installer. Proof of purchase date should be included with the claim, to verify that the warranty period has not expired;
(b) Make the equipment available for troubleshooting and repair, with direct and workable access, including dismantling of furnishings or similar, if any, either at the premises of the Warrantor or an authorised service representative approved by the Warrantor. Equipment can only be returned to the Warrantor or an authorised service representative for repair following a pre-approval by the Warrantor's Help Desk and if so, with the Return Authorisation Number visible postage/shipping prepaid and at the expense of the Claimant.

7. Examination and handling of the warranty claim:
(a) If upon the Warrantor's or authorised service Representative's examination, the defect is determined to result from defective material or workmanship in the warranty period, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense. If, on the other hand, the claim is determined to result from circumstances such as described in section 4 above or a result of wear and tear exceeding that for which the equipment is intended (e.g. commercial use of equipment intended for leisure use), the costs for the troubleshooting and repair shall be borne by the Claimant;
(b) No refund of the purchase price will be granted to the Claimant, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so. In the event that attempts to remedy the defect have failed, the Claimant may claim a refund of the purchase price, provided that the Claimant submits a statement in writing from a professional boating equipment supplier that the installation instructions of the Installation and Operation Manual have been complied with and that the defect remains.

8. Warranty service shall be performed only by the Warrantor, or an authorised service representative, and any attempt to remedy the defect by anyone else shall render this warranty void.

9. No other warranty is given beyond those described above, implied or otherwise, including any implied warranty of merchantability, fitness for a particular purpose other than the purpose for which the equipment is intended, and any other obligations on the part of the Warrantor or its employees and representatives.

10. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives based on this Warranty for injury to any person or persons, or damage to property, loss of income or profit, or any other incidental, consequential or resulting damage or cost claimed to have been incurred through the use or sale of the equipment, including any possible failure or malfunction of the equipment or damages arising from collision with other vessels or objects.

11. This warranty gives you specific legal rights, and you may also have other rights which vary from country to country.

Patents `MC_0024`

At Sleipner we continually reinvest to develop and offer the latest technology in marine advancements. To see the many unique designs we have patented visit our website www.sleipnergroup.com/patents

PHC-3

**Learn more about our products at
www.sleipnergroup.com**

SLEIPNER

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P.O. Box 519

N-1612 Fredrikstad

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MC_0030