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manual onboard!



User Manual

Including Installation Guide for Control Panels
PJC421 & PJC422



SLEIPNER GROUP

P.O. Box 519

N-1612 Fredrikstad

Norway

www.sleipnergroup.com

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Products

PJC421-PVREL - Single joystick, twist detent, thruster control and S-link Color LCD touch screen
PJC421-PVREL-DNV - Single joystick, twist detent, thruster control and S-link Color LCD touch screen
PJC421-LE90 - Single lever, detent, thruster control and S-link Color LCD touch screen
PJC421-LE90-DNV - Single lever, detent, thruster control and S-link Color LCD touch screen
PJC421-LF90 - Single lever, detent, thruster control and S-link Color LCD touch screen
PJC421-LF90-DNV - Single lever, detent, thruster control and S-link Color LCD touch screen
PJC421-LF90X - Single lever, detent, thruster control and S-link Color LCD touch screen
PJC421-LF90X-DNV - Single lever, detent, thruster control and S-link Color LCD touch screen

PJC422-PVREL - Dual joystick, twist detent, thruster control and S-link Color LCD touch screen
PJC422-PVREL-DNV - Dual joystick, twist detent, thruster control and S-link Color LCD touch screen
PJC422-LE90 - Dual lever, detent, thruster control and S-link Color LCD touch screen
PJC422-LE90-DNV - Dual lever, detent, thruster control and S-link Color LCD touch screen
PJC422-LF90 - Dual lever, detent, thruster control and S-link Color LCD touch screen
PJC422-LF90-DNV - Dual lever, detent, thruster control and S-link Color LCD touch screen
PJC422-LF90X - Dual lever, detent, thruster control and S-link Color LCD touch screen
PJC422-LF90X-DNV - Dual lever, detent, thruster control and S-link Color LCD touch screen



Sleipner Motor AS
P.O. Box 519, Arne Svendsensgt. 6-8
N-1612 Fredrikstad, Norway

MC_0451

General Operation Consideration and Precaution Guidelines

For the operation of thrusters

Never use thrusters when close to objects, persons or animals in the water. The thruster will draw objects into the tunnel and the rotating propellers. This will cause serious injuries and damage the thruster.

Always turn the main power switch off before touching any part of the thruster. An incidental start while touching moving parts can cause serious injuries.

It is the owner, captains or other responsible parties full responsibility to assess the risk of any unexpected incidents on the vessel. If the thruster stops giving thrust for some reason while manoeuvring you must have considered a plan on how to avoid damage to persons or other objects.

- Always turn the control device off when the thruster is not in use or when leaving the boat.
- When leaving the boat always turn off the main power switch for the thruster.
- Never use thrusters out of water
- If the thruster stops giving thrust while running, stop running the thruster and turn it off. Running the thruster for more than a few seconds without resistance from the propeller can cause serious damage to the thruster.
- If two control panels are operated in opposite directions at the same time, the thruster will not run. If both are operated in the same direction, the thruster will run in this direction.
- If you notice any faults with the thruster switch it off to avoid further damage.
- The purpose of the thruster is to manoeuvre or dock the vessel. Forward or reverse speed must not exceed 4 knots when operated.

Product Description

PJC4 series

Control your thrusters with PJC – joystick and control panel. PJC4 consists of TP-35 control panel and optional joystick design. See below for overview of available joystick types and order numbers. All models can be delivered with extended functionality to comply with DNV requirements, for control and monitoring of thruster systems.

Proportional thruster control for S-Link™ thruster systems

- Back-lit touch colour LCD
 - System status and diagnostics
 - Indication of power and direction of thrust
 - Interactive multi-language menus
- IPX7 water ingress rated control panel
- Flush or top mount control panel (HxW: 149x112mm)
- Built-in Wi-Fi module
- S-Link™ CAN-bus communication
- Built-in alarm buzzer
- Plug & Play cables, waterproof and compact connectors
- Dedicated connector for IO signals
- Supports various joystick designs

Environmental testing

- DNVGL-CG-0339:2019
- IACS E10:2018
- IEC 60945
- IEC 60092-504:2016

DNV Design Approved product variants available

- Power supply fault monitoring
- Display of propeller RPM
- Gear leg low oil level monitoring
- Select Station, command transfer between multiple operator stations



PJC421-LE90
PJC421-LE90-DNV*



PJC421-LF90
PJC421-LF90-DNV*



PJC421-LF90X
PJC421-LF90X-DNV*



PJC421-PVREL
PJC421-PVREL-DNV*



PJC422-LE90
PJC422-LE90-DNV*



PJC422-LF90
PJC422-LF90-DNV*



PJC422-LF90X
PJC422-LF90X-DNV*



PJC422-PVREL
PJC422-PVREL-DNV*

*DNV Design Approved product variant

Control Panel - Layout & Functions

LCD touch screen

Left selection button:
Functionality according to display information

Right selection button:
Functionality according to display information

Push and hold to turn the panel ON or OFF.
Adjustment of backlight level.

STOP

Push to immediate stop thruster operation.
Push for 2 seconds to disable the stop function.

Up and down menu navigation.
Dedicated functions in dashboard view.

X1 Joystick:
Connect cable from joystick

X2 S-Link:
Connect cable from S-Link bus

X3 I/O:
See *Detailed IO Description* chapter for more information.

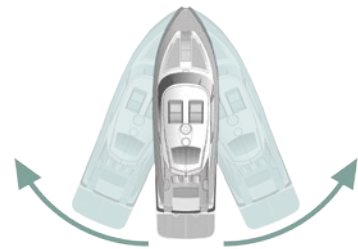
Activating the bow thruster

*Bow thruster installation only

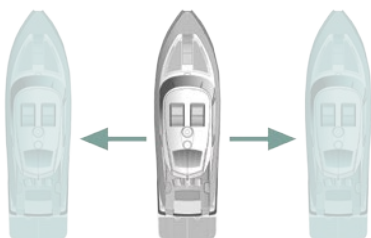


Activating the stern thruster

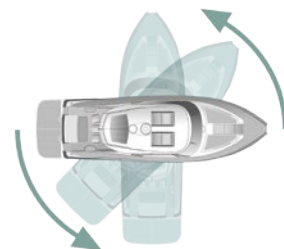
*Stern thruster installation only



Activating both bow and stern thruster to push the boat sideways



Activating both bow and stern thruster to rotate the boat on axis



Parameter	Specification		
Supply Voltage	Min +9VDC	Typical +12VDC/+24VDC	Max +31VDC
Rated max input power X2 S-Link	4.5W		
Rated max input power X3 I/O	1.3W		
Rated power in off state X2 S-Link	0.65W		
Environmental testing	DNV-CG-0339 IACS E10 IEC 60945 IEC 60092-504 ABYC S-31		
Ambient operating temperature	-25°C to + 70°C IEC 60068-2-1:2007 Cold test IEC 60068-2-2:2007 Dry heat test		
IP rating	IP x7 IEC 60529		
EMC	IEC 60945:2002 IEC 60533:2015		
Vibration	IEC 60068-2-6		
Damp heat	IEC 60068-2-30		
Salt mist	IEC 60068-2-52, Kb		
Compass Safe Distance	0.2m IEC 61000-4-8:2010 ISO 25862: 2009		
Internal buzzer sound level	IEC 60945:2002		
External buzzer sound level	IEC 60945:2002		
TP-35 weight	260g		
Display size	3.5 inch		

Joystick IP Rating

Part number	IP rating of joystick	Comment
PJC42x-LE90	IP66	Only on top side.
PJC42x-LF90	IP66	Only on top side.
PJC42x-LF90X	IP66	Only on top side.
PJC42x- PVREL	IP67	Complete enclosure.

Firmware Changelog

To ensure that all the functionality described in this document is available it is recommended that all Sleipner products are updated to the latest firmware version.

Sleipner Firmware upgrade tool kit for S-Link Programmer 6 1307 and the PC software S-Link Programmer can be used to upgrade Sleipner S-Link devices. S-Link Programmer enables access to a detailed FW changelog for Sleipner products. This changelog can be used to verify that the installed products have the required FW version for required functionality.

Download site and User Manual for S-Link Programmer can be accessed from www.sleipnergroup.com or by scanning this QR code:

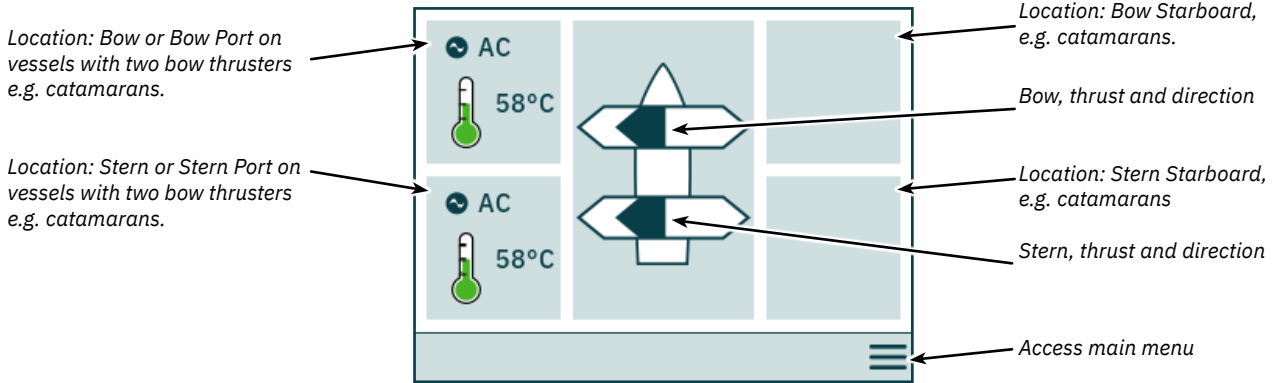


Dashboard View Detailed Information

Thrusters can be operated when the dashboard view is active. The only two other views that allow thruster operation is when the backlight menu is accessed from the ON/OFF button and when the Alarm List is displayed.

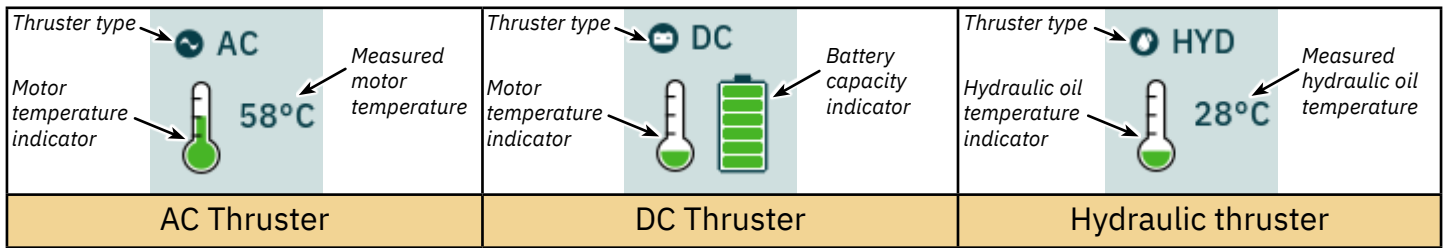
The thruster dashboard view shows thruster type, applied thrust, direction of thrust and status information from up to four thrusters. The status information is oriented on the dashboard according to the physical location of the thrusters. For installations with two bow thruster, one joystick is used to operate both bow thrusters. The same amount of thrust is therefore applied to both thrusters and there is one common indicator for the amount and direction of thrust of both bow thrusters on the dashboard view. The same applies for vessels with two stern thrusters.

Below is an example of a *Dashboard View* with bow and stern AC thrusters.



Thruster Status

Thrusters with AC, DC and hydraulic motors can be operated by the control panel. Below figure describes the status information for the different thruster types.



For hydraulic thrusters, the PHC-3 hydraulic controller can be used to control up to two hydraulic thrusters. Thus the dashboard shows only one hydraulic oil temperature symbol for installations where one PHC-3 hydraulic controller is used to control two thrusters.

Temperature Status

The temperature icon has five levels.

Green indicates normal temperature - Yellow indicates high temperature - Red indicates alarm stated due to too high temperature.



Battery Status

The battery status icon for DC thrusters has six levels.

The coloured area in the battery symbol indicates the remaining battery capacity.

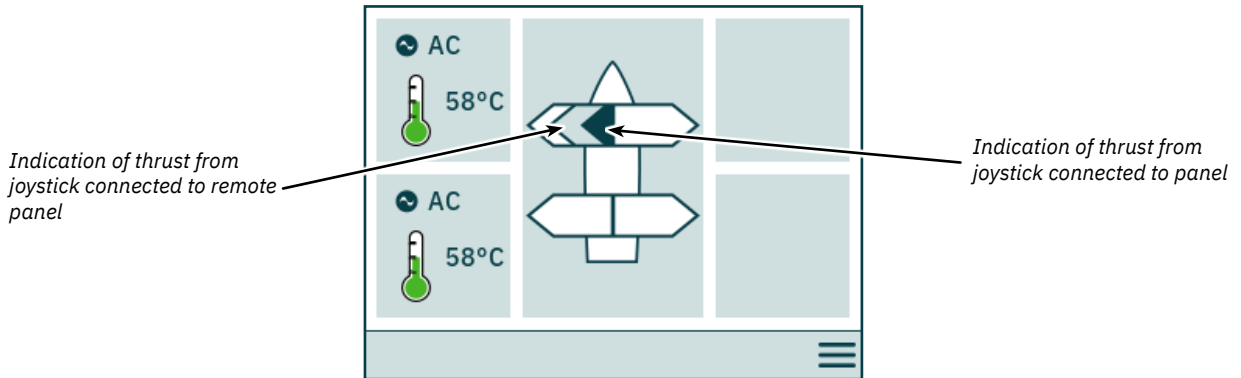
Green indicates normal battery voltage - Yellow indicates low battery voltage - Red indicates alarm stated due to too low battery voltage.



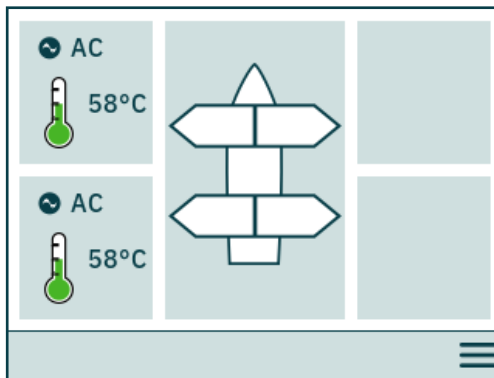
Operation with more than one Control Panel

Several control panels can be connected to the same S-Link bus and configured to control the same thruster. One example could be bridge and deck installation on the same vessel.

If joysticks are moved in the same direction on different control panels with different thrusts, the thruster will respond to the highest level. The panel will indicate thrust from the joystick connected to the panel with a dark blue coloured bar. If thrust from a remote panel is higher, it will be indicated with a light blue coloured bar.



If joysticks are moved in the opposing direction on different control panels, the thruster will not respond. In such situations the panel will indicate no thrust, refer to image below. The thruster will not respond before one of the joysticks has returned to zero position.

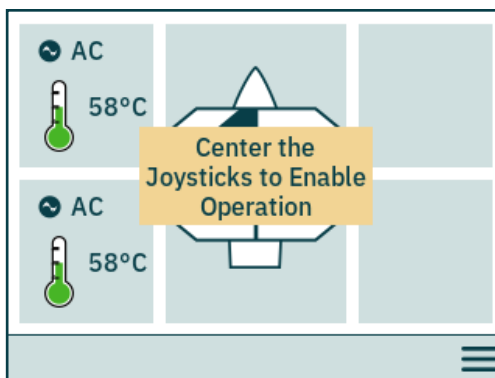


PJC4xx part numbers that end with -DNV has additional functionality to ensure that only one control panel at the time can operate the thrusters. See chapter *Functionality of DNV models* for more information.

Thruster Operation and Menu Navigation

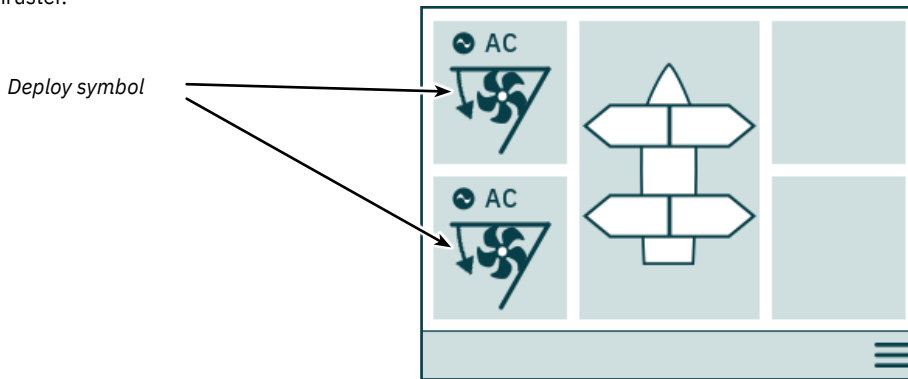
Thruster operation will be suspended if accessing Main Menu while running a thruster. If joysticks are not centred when returning to dashboard view the below notice will be shown and the joysticks must be centred to resume thruster operation. The same notice will be shown if the TP-35 is turned ON with a joystick positioned out of centre.

This functionality is implemented as a safety function to prevent unintentional thruster operation.



Retractable Thruster

Deployment and retracting of retractable thrusters is controlled by turning the control panel ON or OFF. When the control panel is turned ON the thrusters are deployed. The *Deploy* symbol is shown in the dashboard view until the thruster is fully deployed. Turning OFF the panel will fully retract the thruster.

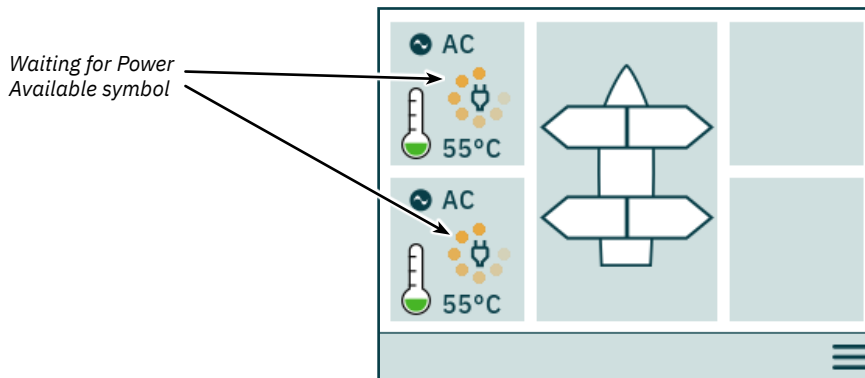


AC Thruster Power Management Status

Some vessels might not have AC power capabilities to run all consumers simultaneously. Such vessels typically use a power management system to control at which time different consumers can be operated. Due to other consumers having higher priority, power to the AC thrusters might not always be available. The following is only applicable for AC thrusters.

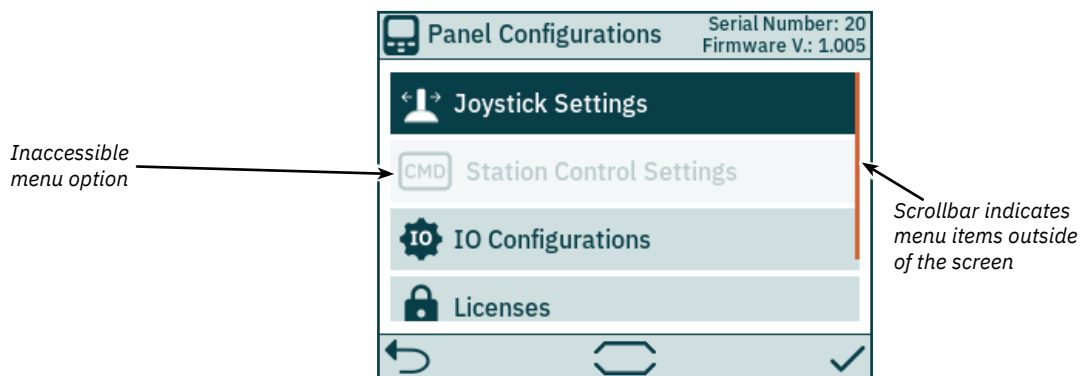
When the control panel is turned ON a request is sent from the Variable Frequency Drive (VFD) to the Power Management System (PMS) to request power for the thruster. While the control panel waits for power available confirmation, operation of the AC thruster is not permitted. The *Waiting for Power Available* symbol is displayed in the dashboard view while the control panel waits for confirmation that power is available for the AC thruster. An alarm is triggered if confirmation is not received within 60 seconds after turning the control panel ON.

See user manual of AC thruster for detailed information on power management operation.



Inaccessible menu options

Some menu options might not be accessible on all product variants and a license code might be needed to enable these options. Inaccessible menu options will be displayed with greyed out text and graphics.

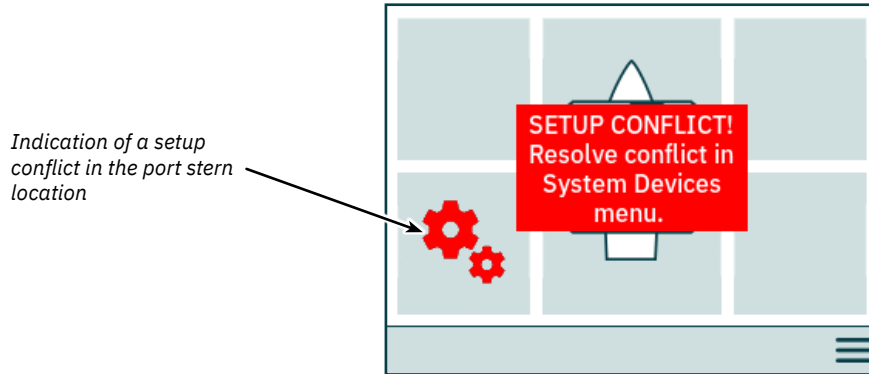


Device Configuration

To enable operation of a thruster from the control panel the thruster must be associated to the control panel. Additionally, the thruster must be configured to ensure correct location in the thruster dashboard view and correct response when operating the joystick. For detailed information on how to associate and configure devices see *System Devices* chapter.

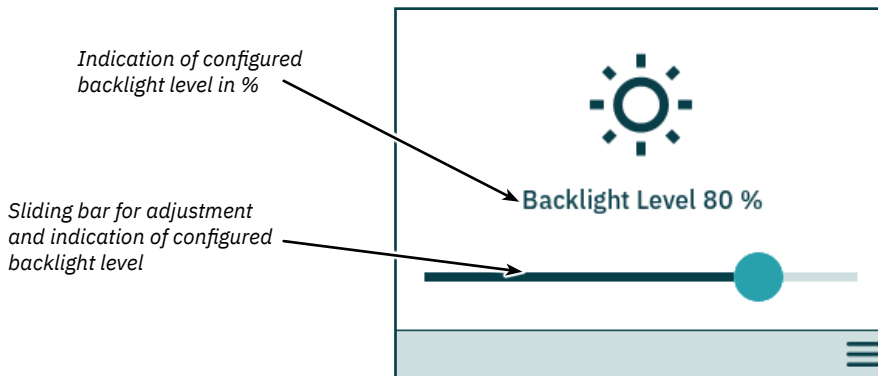
Configuring more than one associated device to be in the same location will result in a setup conflict. Thruster operation is suspended in the case of a setup conflict and a notice is displayed in the thruster dashboard view. Enter the System Devices menu to resolve such conflicts.

The image below shows an example of a setup conflict where more than one thruster controller has been configured to the port stern location.



Adjustment of Backlight Level

Press and release the ON/OFF button to activate the backlight level adjustment menu. Pressing the ON/OFF button for more than 2 seconds will turn the panel OFF. Pushing the ON/OFF button when the backlight menu is active steps the backlight level between 20% - 50% - 80%. The backlight menu automatically closes after 3 seconds of inactivity. When turning ON TP-35 the backlight level is always set to the default back light level configured in the *Settings* menu. Factory default value is 80%.



The backlight level can be adjusted with 1% resolution using the slide bar on the touch screen.

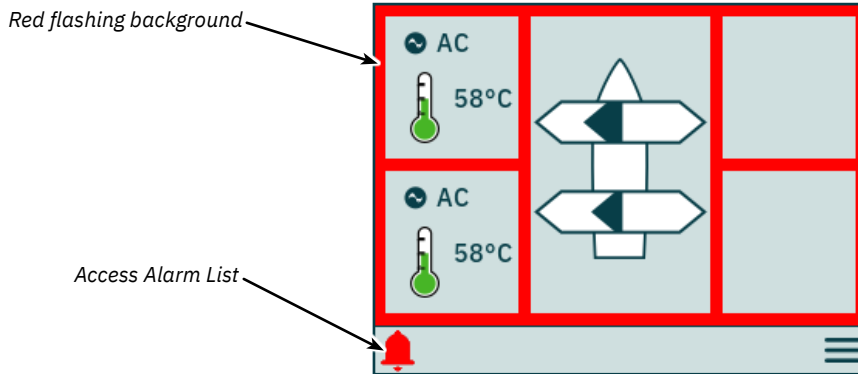
Active Alarm

All TP-35 control panels that are connected to the S-Link bus enters alarm state if they receive an alarm code, regardless if the panel is turned ON or OFF. Communication alarms, due to lost communication with associated devices on the S-Link bus, will only be triggered when the panel is turned ON.

The alarm state is indicated by a blinking red background, an audible alarm signal, and the *Access Alarm List* icon displayed in the lower-left corner. If an alarm code is received while the panel is turned OFF, the panel will automatically be turned ON and enter the alarm state. Turning the panel OFF when in an alarm state will mute the audible alarm signal, but not clear the active alarm. Generation of additional alarm codes will again turn the panel ON and activate the audible alarm signal.

Since configurations performed in the System Devices sub menus might affect potential alarm states, audible alarms are muted when entering the System Devices menu and all active alarms are cleared when exiting the System Devices menu.

It is not possible to operate a thruster with active alarms. Exceptions are *Oil over temperature* alarm, *Low oil level* alarm generated by PHC-3, and *AUX Power - Undervoltage* alarm on -DNV product variants. Other devices not experiencing active alarms can still be operated.

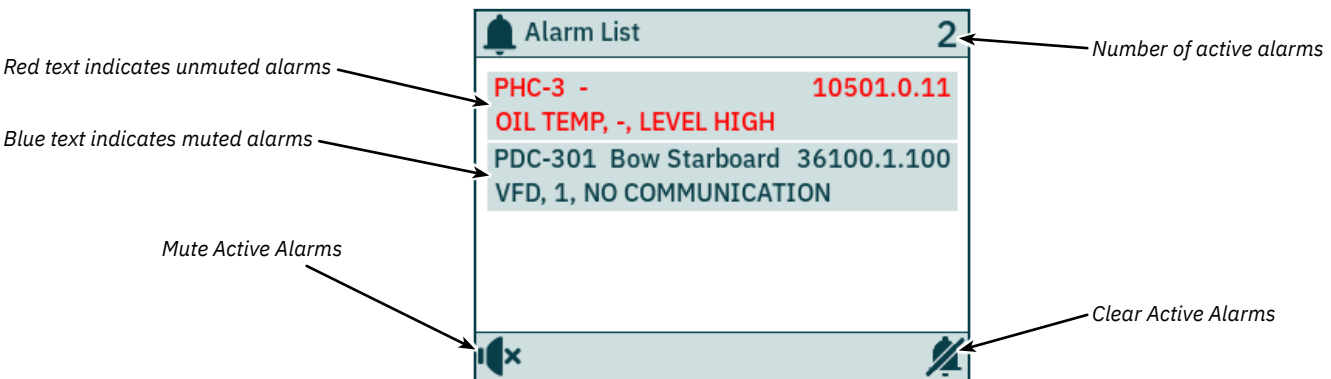


	Show list of active alarms.
--	-----------------------------

Alarm List, Audible Alarm Signal Active

Push *Mute Active Alarms* on one TP-35 to mute the audible alarm signals on all Sleipner control panels that are turned ON and connected to the S-Link bus. Turning OFF a control panel with active audible alarm will mute the alarm on that panel, but the alarm will still be active on the other control panels connected to the S-Link bus.

Unmuted alarms are listed in red, and muted alarms are listed in dark blue. Active alarms are not automatically cleared, even if the alarm state is no longer present in the device. Active alarms must always be cleared by the user to be removed from the alarm list. Pushing *Clear Active Alarms* will not turn OFF control panels that were automatically turned on when the alarm state was triggered.

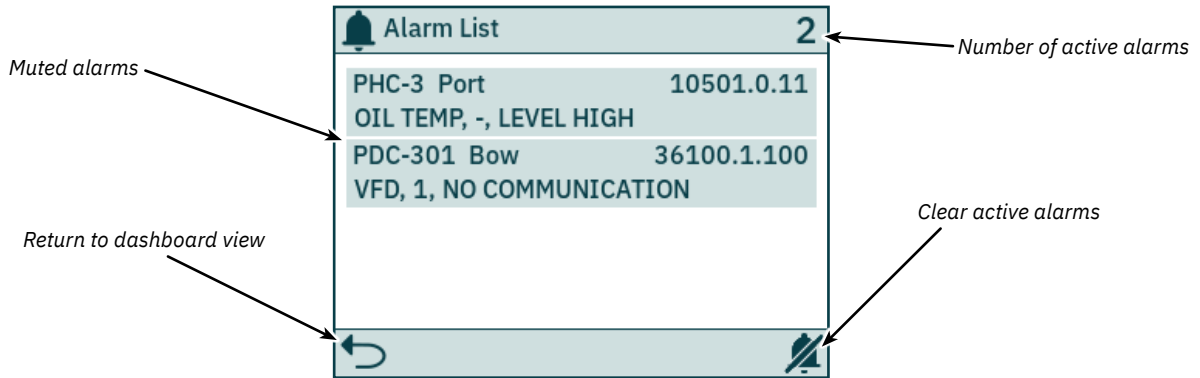


	Selecting an alarm in the alarm list will display UTC time for when the alarm was triggered. See <i>Time Tagging of Alarms</i> section for details.
	Mute audible alarm signal.
	Clear all active alarms and mute audible alarm signal. A command to clear active alarms is sent to all devices connected to the S-Link bus. If an alarm state is still present in a device, a new alarm will be triggered in TP-35, and the audible alarm signal will be reactivated.

Alarm List, Muted Audible Alarm Signal

All active alarms are still listed after the audible alarm signal is muted.

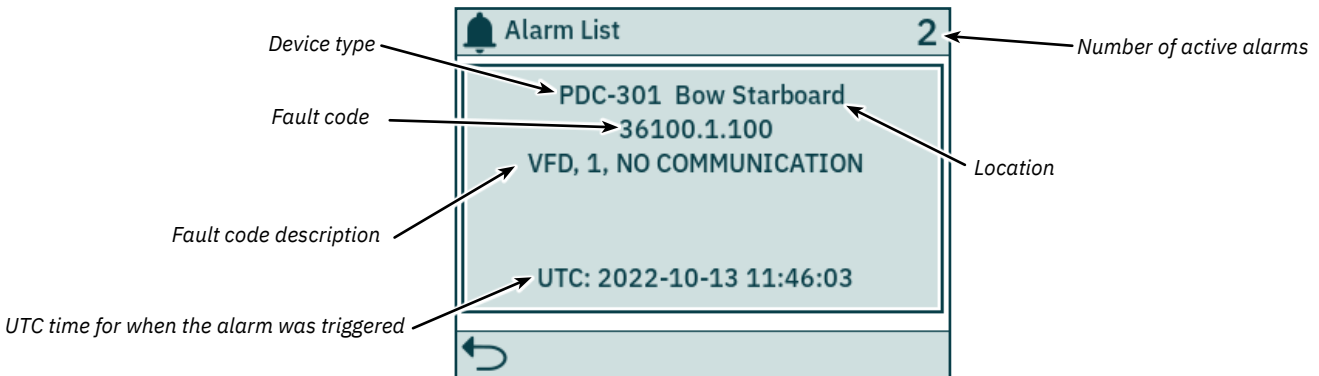
Clear active alarms have the same functionality as when the audible alarm signal is not muted.



	Selecting an alarm in the alarm list will display UTC time for when the alarm was triggered. See <i>Time Tagging of Alarms</i> section for details.
	Return to the dashboard view
	Clear all active alarms. A command is sent to all devices connected to the S-Link bus to clear active alarms. If the alarm state is still present in a device, a new alarm will be triggered in TP-35 and the audible alarm signal will be reactivated.

Time Tagging of Alarms

UTC time for when the alarm was triggered is displayed together with the device and fault code information.



	Return to the alarm list
--	--------------------------

Immediate Stop Alarm

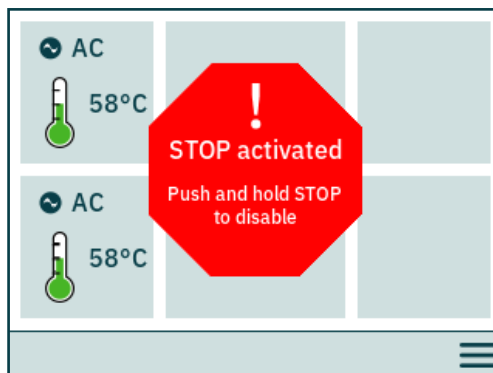
If the STOP button on TP-35 is pushed, a *STOP* message will be sent to all thrusters connected to the S-Link bus. An audible alarm signal will be given, and a notice will be displayed on the screen. The thrusters will immediately stop after receiving the *STOP* message and then broadcast the *STOP Activated* message.

If the *STOP Activated* message is not received by TP-35 within 1 second after the STOP button is pushed, the STOP notice will be closed.

The STOP button must be pushed for 2 seconds to disable the stop function.

Pressing the STOP button with a hydraulic controller connected to the S-Link bus will activate the load sense dump valve and the oil pressure will be reduced to the standby pressure, which typically is 20 bar. Reducing to standby pressure will disable thruster operation, but other low consumption equipment connected to the same hydraulic system might be operable.

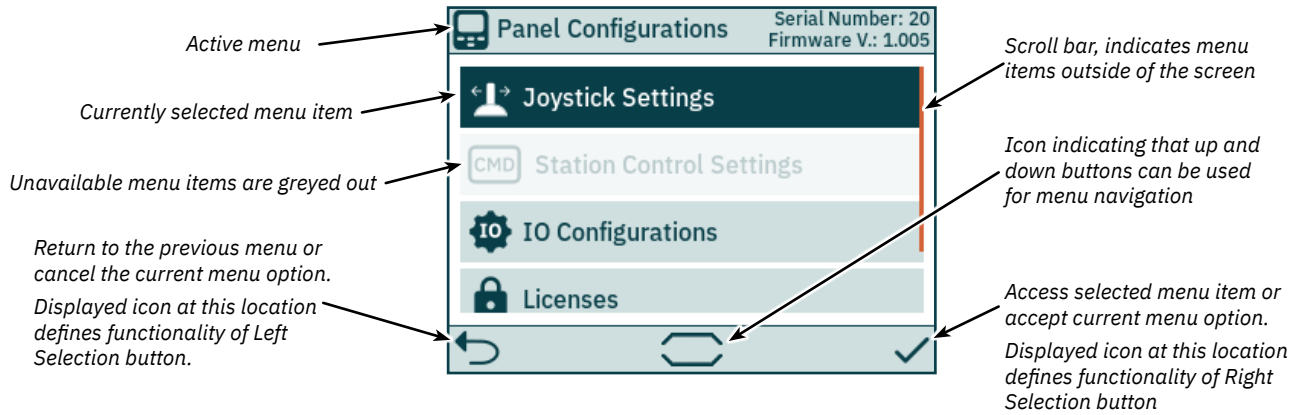
The STOP notice will be displayed on all Sleipner control panels that are turned ON.



Menu Operation

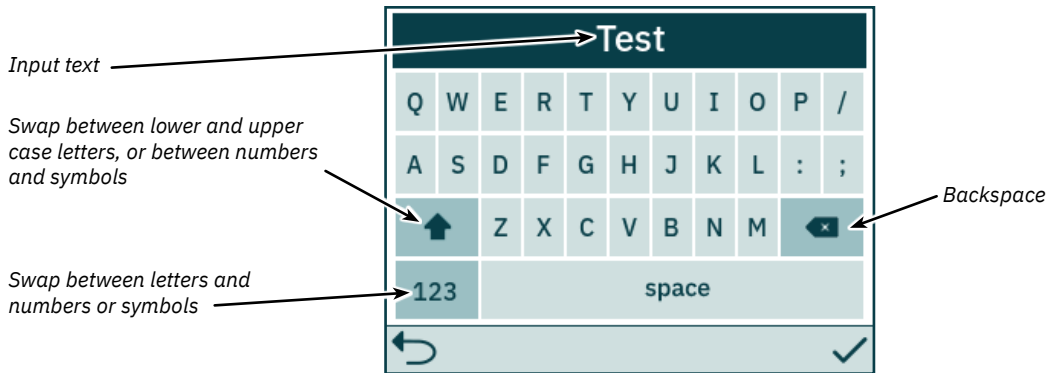
Both the panel buttons and the touch screen can be used to operate the TP-35 control panel. The functionalities of the Selection buttons are defined by different icons located in lower left and lower right corner of the screen. The up and down buttons can be used to navigate between menu items when the button icon is displayed in the bottom center of the screen.

Some menu options might not be accessible on all product variants and a license code might be needed to enable these options. Inaccessible menu options will be displayed with greyed out text and graphics.

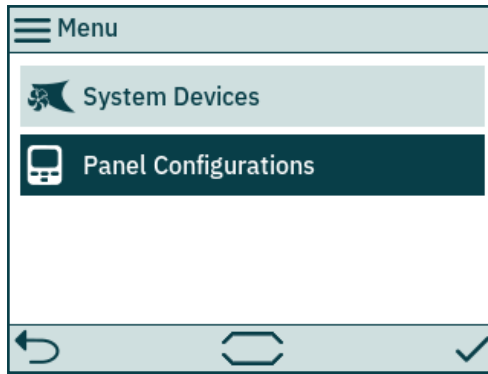


Keyboard

Some menu dialogues require input of characters. A keyboard will then be displayed. The keyboard can only be operated by the touch screen.



Main Menu



System Devices	Lists devices connected to the S-Link bus and enable configuration of listed devices.
Panel Configurations	Enables configuration of TP-35 behaviour and displays serial number and firmware version.

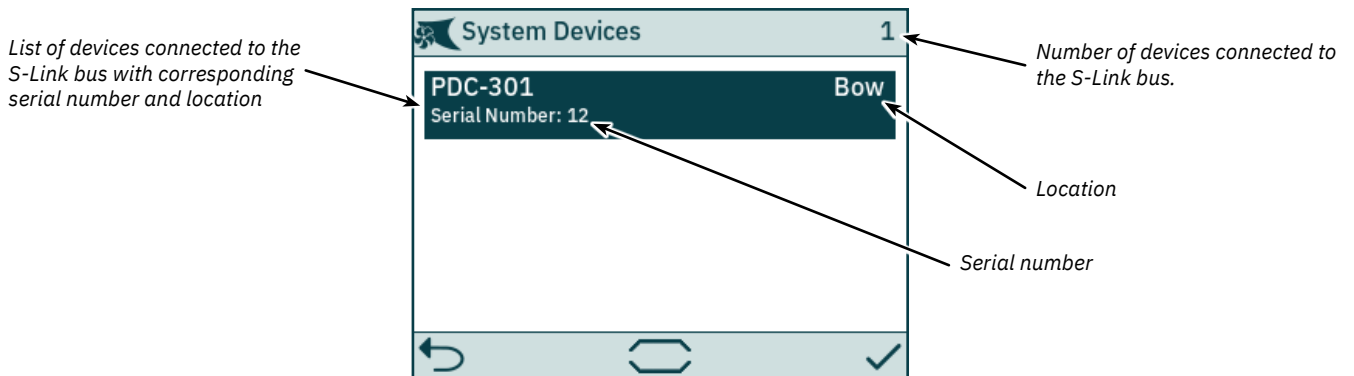
System Devices

The *System Devices* menu lists units on the S-Link bus discovered by TP-35. All listed devices are automatically associated to the control panel when exiting the *System Devices* menu. By associating the listed devices to the control panel, communication errors can be reported. Association of connected devices must be done individually on all connected control panels.

The *System Devices* menu can also be used to configure the listed devices.

To disassociate a device that is disconnected from the S-Link bus the *System Devices* menu must be accessed. The disconnected device will no longer be present in the list, and when exiting the *System Devices* menu it will automatically be disassociated from the control panel.

To ease the installation and configuration of connected devices it is recommended to fill out the list found in chapter *List of installed S-Link Devices*.



	Exit the System Devices menu and associate all listed devices to the control panel.
	Select desired device for configuration.

PDC-301 Configuration

The proportional drive controller PDC-301 for AC thrusters has several parameters that can be configured.

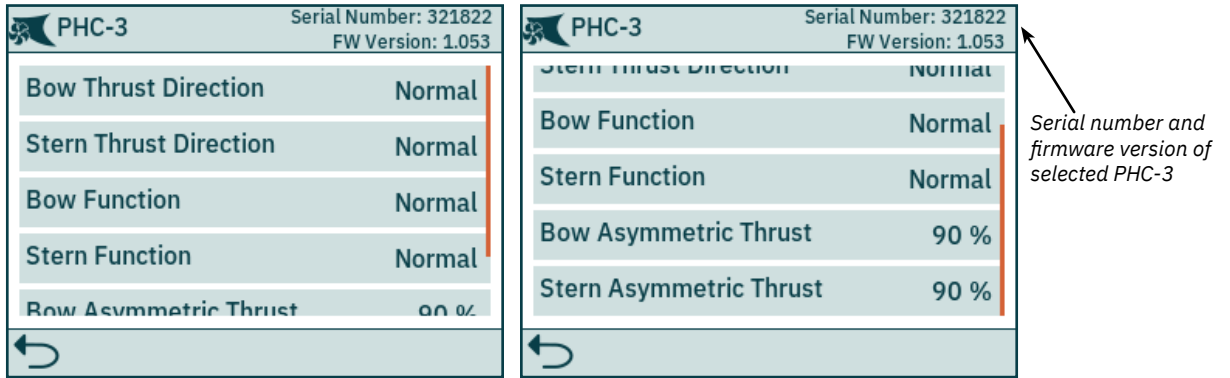
Serial Number: 317046 FW Version: 2.015	Serial Number: 317046 FW Version: 2.015
Location: Bow	Function: SAC
Thrust Direction: Normal	Max Output: 90 %
Function: SAC	Load Share Limit: 100 %
Max Output: 90 %	Drive Type: ABB ACS580/880
Load Share Limit: 100 %	Asymmetric Thrust: 100 %

Serial number and firmware version of selected PDC-301

Location	<p>Specify the physical location where the device is installed. In a system with two bow or two stern thrusters, e.g. catamarans, use <i>Bow</i> or <i>Stern</i> for port thruster. For starboard thrusters use <i>Bow Starboard</i> or <i>Stern Starboard</i>.</p> <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	<p>Set the running direction for the thruster.</p> <ul style="list-style-type: none"> • Normal (default) • Swapped
Function	<p>Configure thruster type.</p> <ul style="list-style-type: none"> • SAC (default) - Tunnel thruster • SRAC - Retractable AC thruster
Max Output	<p>Set the maximum thrust of the thruster. PDC-301 will scale the joystick signal to this value.</p> <ul style="list-style-type: none"> • 50% to 100% (default 100%)
Load Share Limit	<p>Set the maximum thrust if both bow and stern thrusters are operated at the same time. The Load Sharing limitation allows the system to limit the combined load on the generator when bow and stern thrusters are operated at the same time. The load sharing will dynamically limit the thrust request for each thruster depending on the joystick position and limit settings. For a detailed explanation and setup guide, see AC series thruster user manual, document ID 6054.</p> <ul style="list-style-type: none"> • 0% to 100% (default 100%)
Drive Type	<p>Select the type of Variable Frequency Drive (VFD) to be controlled by PDC-301.</p> <ul style="list-style-type: none"> • ABB ACS580/880 (default) • VACON
Asymmetric Thrust	<p>This setting can be used to improve performance of dual bow or stern thruster installations such as those found on catamarans or vessels with stern drive units. Pushing water at high flow into an adjacent tunnel may result in cavitation and reduction of thrust for the nearby tunnel.</p> <p>Pushing water towards the drive unit, above a certain flow rate, might not further increase the thrust. Thus for vessels with stern drive and dual thruster installation the current consumption could potentially be improved by reducing flow towards the drive unit while not reducing maximum achieved thrust.</p> <p>The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster.</p> <p>Thrusters with Location set to BOW or STERN will limit thrust towards port side and hence reduce the water flow towards starboard.</p> <p>Thrusters with Location set to BOW-STB/STERN-STB will limit thrust towards starboard side and hence reduce the water flow towards port.</p> <ul style="list-style-type: none"> • 0% to 100% (default 100%)

PHC-3 Configuration

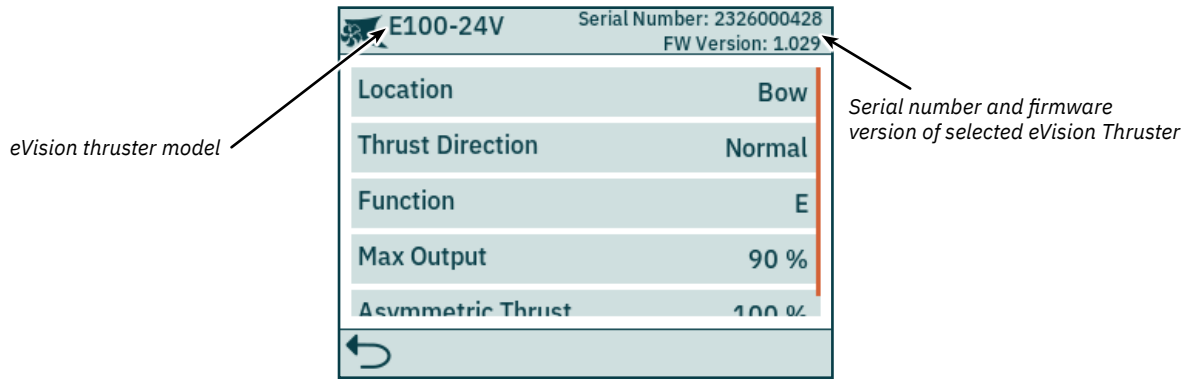
The proportional hydraulic controller PHC-3 has several parameters that can be configured. All these parameters are available for configuration on the PHC-3 controller's display. See PHC-3 User Manual for more information, document ID 5267. Both Thrust Direction and Function of PHC-3 can be configured from TP-35. Thruster operation is suspended if configured to SRHP and no retract controller is detected on the S-Link bus. In such cases no interlock alarm will occur.



Bow Thrust Direction	Set the running direction for the bow thruster. <ul style="list-style-type: none"> • Normal (default) • Swapped
Stern Thrust Direction	Set the running direction for the stern thruster. <ul style="list-style-type: none"> • Normal (default) • Swapped
Bow Function	Configure bow thruster type. <ul style="list-style-type: none"> • Normal (default) - Tunnel thruster • SRHP - Retractable hydraulic thruster.
Stern Function	Configure stern thruster type. <ul style="list-style-type: none"> • Normal (default) - Tunnel thruster • SRHP - Retractable hydraulic thruster.
Bow Asymmetric Thrust	<p>This setting can be used to improve performance of dual bow or stern thruster installations such as those found on catamarans or vessels with stern drive units. Pushing water at high flow into an adjacent tunnel may result in cavitation and reduction of thrust for the nearby tunnel.</p> <p>Pushing water towards the drive unit, above a certain flow rate, might not further increase the thrust. Thus for vessels with stern drive and dual thruster installation the current consumption could potentially be improved by reducing flow towards the drive unit while not reducing maximum achieved thrust.</p> <p>The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster.</p> <p>The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the parameter 0101-INSTANCE of the PHC-3.</p> <p>PHC-3 with 0101-INSTANCE set to NONE or PORT will limit thrust towards port side and hence reduce the water flow towards starboard.</p> <p>PHC-3 with 0101-INSTANCE set to STARBOARD will limit thrust towards starboard side and hence reduce the water flow towards port.</p> <ul style="list-style-type: none"> • 0% to 100% (default 100%)
Stern Asymmetric Thrust	Same configuration options as Bow Asymmetric Thrust.

eVision Thruster Configuration

eVision thrusters has several parameters that can be configured.



<p>Location</p>	<p>Specify the physical location where the thruster is installed. In a system with two bow or two stern thrusters, e.g. catamarans, use <i>Bow or Stern</i> for port thruster. For starboard thrusters use <i>Bow Starboard</i> or <i>Stern Starboard</i>.</p> <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
<p>Thrust Direction</p>	<p>Set the running direction for the thruster.</p> <ul style="list-style-type: none"> • Normal (default) • Swapped
<p>Function</p>	<p>Configure thruster type.</p> <ul style="list-style-type: none"> • E (default) - Tunnel thruster • ERV/ERL - Retractable eVision thruster
<p>Max Output</p>	<p>Set the maximum thrust of the thruster. The eVision thruster will scale the joystick signal to this value.</p> <ul style="list-style-type: none"> • 50% to 100% (default 100%)
<p>Asymmetric Thrust</p>	<p>This setting can be used to improve performance of dual bow or stern thruster installations such as those found on catamarans or vessels with stern drive units. Pushing water at high flow into an adjacent tunnel may result in cavitation and reduction of thrust for the nearby tunnel.</p> <p>Pushing water towards the drive unit, above a certain flow rate, might not further increase the thrust. Thus for vessels with stern drive and dual thruster installation the current consumption could potentially be improved by reducing flow towards the drive unit while not reducing maximum achieved thrust.</p> <p>The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster.</p> <p>Thrusters with Location set to BOW or STERN will limit thrust towards port side and hence reduce the water flow towards starboard.</p> <p>Thrusters with Location set to BOW-STB/STERN-STB will limit thrust towards starboard side and hence reduce the water flow towards port.</p> <ul style="list-style-type: none"> • 0% to 100% (default 100%)

PPC Configuration

The Proportional Power Controller models PPC520, PPC820 and PPC840 have the same configurable parameters.

PPC 520		Serial Number: 312091	FW Version: 1.040
Location	Bow		
Thrust Direction	Normal		
Function	SEP		
Max Output	100 %		
Thermo Switch	Disable		

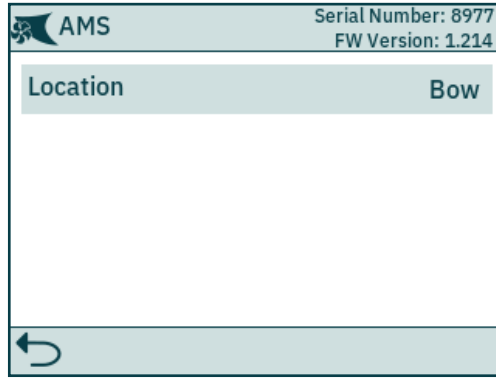
PPC 520		Serial Number: 312091	FW Version: 1.040
Function	SEP		
Max Output	100 %		
Thermo Switch	Disable		
Extended Runtime	OFF		
Asymmetric Thrust	100 %		

Serial number and firmware version of selected PPC

Location	Specify the physical location of the thruster which the PPC controls. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard. <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	Set the running direction for the thruster. <ul style="list-style-type: none"> • Normal (default) • Swapped
Function	Configure thruster type. <ul style="list-style-type: none"> • SRP - Retract SR61242 with PPC • SRVP/SRLP - Retract SR150000 with PPC • SEP - Tunnel thruster with PPC
Max Output	Set the maximum thrust of the thruster. The eVision thruster will scale the joystick signal to this value. <ul style="list-style-type: none"> • 50% to 100% (default 100%)
Thermo Switch	Disable or enable the thermo switch input on the PPC. The thermo switch is normally closed and opens at high temperature. If the thermo switch input is connected to GND at power-up then this parameter is automatically set to Enable. <ul style="list-style-type: none"> • Disable (default) • Enable
Extended Runtime	The extended runtime function will increase the thruster's maximum runtime, by reducing the maximum thrust when the motor temperature is high. Extended runtime can be used when thruster runtime needs to be extended, e.g. dynamic positioning- or docking systems. <ul style="list-style-type: none"> • OFF (default) - Turn OFF extended runtime function. • ON - Turn ON extended runtime function.
Asymmetric Thrust	<p>This setting can be used to improve performance of dual bow or stern thruster installations such as those found on catamarans or vessels with stern drive units. Pushing water at high flow into an adjacent tunnel may result in cavitation and reduction of thrust for the nearby tunnel.</p> <p>Pushing water towards the drive unit, above a certain flow rate, might not further increase the thrust. Thus for vessels with stern drive and dual thruster installation the current consumption could potentially be improved by reducing flow towards the drive unit while not reducing maximum achieved thrust.</p> <p>The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster.</p> <p>Thrusters with Location set to BOW or STERN will limit thrust towards port side and hence reduce the water flow towards starboard.</p> <p>Thrusters with Location set to BOW-STB/STERN-STB will limit thrust towards starboard side and hence reduce the water flow towards port.</p> <ul style="list-style-type: none"> • 0% to 100% (default 100%)

AMS Configuration

The Automatic Main Switch have one parameter that can be configured.

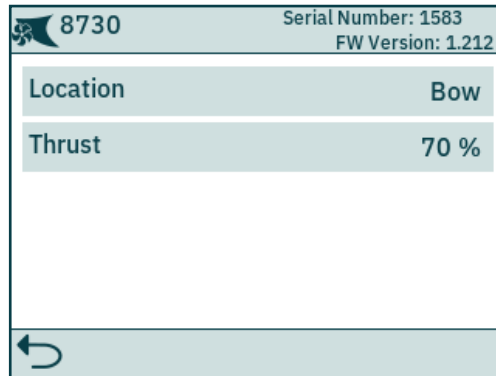


Serial number and firmware version of selected AMS

Location	<p>Specify the physical location of the thruster which the AMS is connected to. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard.</p> <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
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8730 S-Link Interface Configuration

8730 enables control of S-Link thrusters from control devices with an ON/OFF signal, e.g. ON/OFF control panels, RF remote control receiver or foot switches. The S-Link Interface models 8730 B and 8730 S have the same configurable parameters. The only difference between the two products is that 8730 B has the Location parameter preprogrammed to Bow and 8730 S has the Location parameter preprogrammed to Stern.



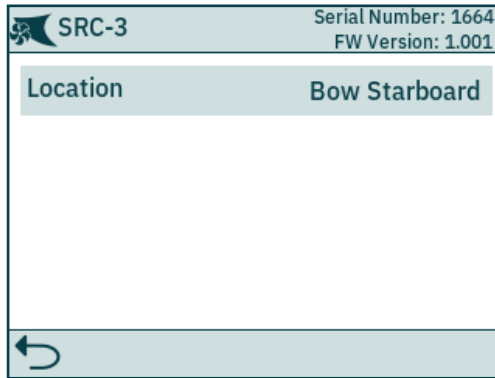
Serial number and firmware version of selected 8730

Location	<p>Specify the physical location of the thruster which the 8730 is controlling. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard.</p> <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
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Thrust	<p>Set the amount of thrust to be used when an input signal to 8730 request engagement of the thruster.</p> <p>In an installation with both bow and stern thrusters it is recommended to balance the thrust so that the boat moves straight sideways when both thrusters are operated simultaneously and in the same direction.</p> <ul style="list-style-type: none"> • 0% to 100% (default 70%)
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SRC-3 Configuration

The Sleipner Retract Controller (SRC-3) is used to control and monitor deployment of retractable thrusters. One parameter can be configured for SRC-3. See User Manual of retractable thrusters using SRC-3 for more information on configuration and operation.

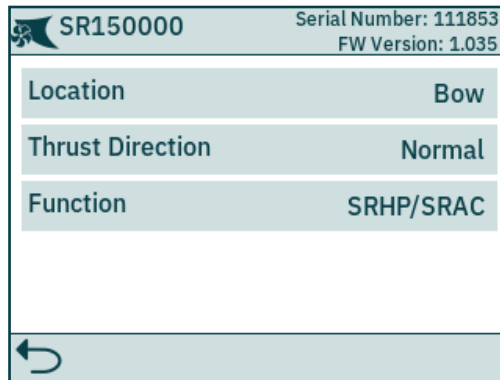


Serial number and firmware version of selected SRC-3

Location	<p>Specify the physical location of the retractable thruster which SRC-3 is connected to. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard.</p> <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
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SR150000 Configuration

The Sleipner Retract Controller (SR150000) is used to control and monitor deployment of retractable thrusters. Several parameters can be configured for SR150000. See User Manual of retractable thrusters using SR150000 for more information on configuration and operation.





Serial number and firmware version of selected SR150000

Location	<p>Specify the physical location of the retractable thruster which SR150000 is connected to. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard.</p> <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	<p>Set the running direction for the thruster.</p> <ul style="list-style-type: none"> • Normal (default) • Swapped
Function	<p>Configure thruster type controlled by the retract controller.</p> <ul style="list-style-type: none"> • SR(V/L) ON/OFF (default) - DC thruster without speed controller. The joystick needs to be moved beyond 50% of its range for the thruster to run. • SRVP/SRLP - DC thruster with PPC • SRHP/SRAC - Hydraulic or AC thruster • ERV/ERL - eVision thruster

TMU-1 Configuration

The Thruster Monitoring Unit (TMU-1) can be used to monitor additional thruster parameters such as motor RPM for AC and hydraulic thruster motors and low oil level on thruster gearlegs. Four parameters can be configured for TMU-1. See TMU-1 User Manual for more information on configuration, document ID 6995.

 Serial Number: 1 FW Version: 0.500		 Serial Number: 1 FW Version: 0.500	
Location	Stern	Location	Stern
Oil Level Sensor	Activated	Oil Level Sensor	Activated
Speed Sensor	Activated	Speed Sensor	Activated
Speed Sensor Resolution	1024 PPR	Speed Sensor Resolution	1024 PPR
Speed Sensor Direction	Normal	Speed Sensor Direction	Normal
←		←	

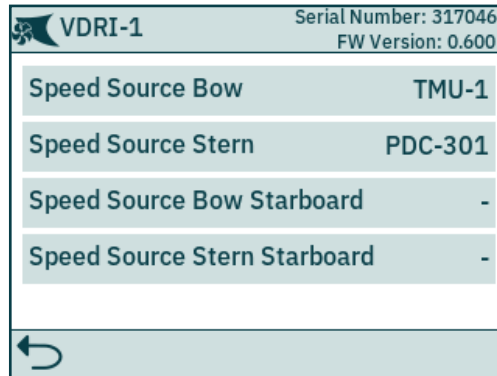
Serial number and firmware version of selected TMU-1

Location	Specify the physical location of the thruster which TMU-1 is connected to. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard. <ul style="list-style-type: none"> • Bow (default) • Stern • Bow Starboard • Stern Starboard
Oil Level Sensor	Specify if the TMU-1 shall monitor the state of the level switch on the gearleg oil tank. <ul style="list-style-type: none"> • Enable (default) • Disable
Speed Sensor	Specify if the TMU-1 shall measure motor speed based on signals from RPM sensor mounted on the thruster motor. <ul style="list-style-type: none"> • Enable (default) • Disable
Speed Sensor Resolution	Specify the number of pulses per revolution for the RPM sensor mounted on the thruster motor. Consult TMU-1 User Manual for a list of Pulses Per Revolution (PPR) values for different motor models. <ul style="list-style-type: none"> • 1024 (default)
Speed Sensor Direction	Set the sign of the reported RPM value. Swapped should be used if the Normal setting does not give positive reading for starboard direction and negative for port direction. <ul style="list-style-type: none"> • Normal (default) • Swapped

VDRI-1 Configuration

The Voyage Data Recorder Interface (VDRI-1) can log thruster data from up to four thruster and the control panels operating these thrusters. To enable logging of all required parameters, control panels with Station Control functionality must be used. Sleipner control panel PJC4xx supports Station Control, see *Station Control Settings* chapter for more information.

For more information about VDRI-1, see *VDRI-1 User Manual*, document ID 6996.

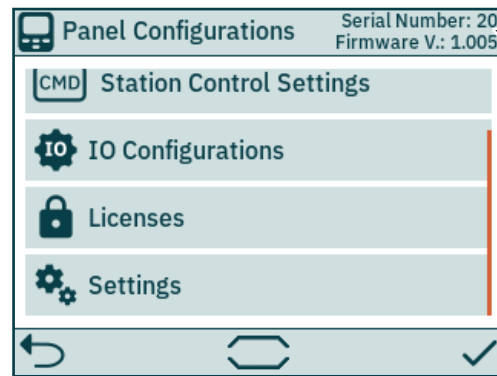
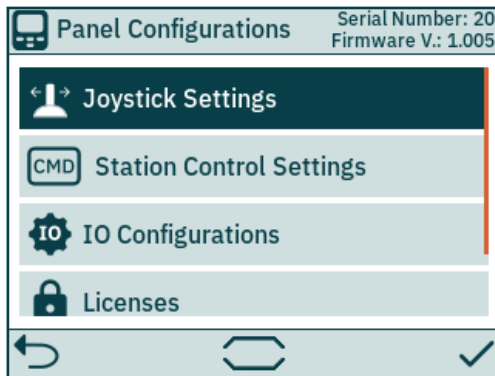


Serial number and firmware version of selected VDRI-1

Speed Source Bow	Configure Speed Source for installed thrusters. Use Bow or Stern in conventional thruster system. In a system with two bow or two stern thrusters, for instance a catamaran, use Bow or Stern for port thruster. For starboard thrusters use Bow Starboard or Stern Starboard. <ul style="list-style-type: none"> - (default) - No thruster data to be logged. PDC-301 - Logged RPM data is based on calculated values from Variable Frequency Drive. Only available for AC thrusters. TMU-1 - Logged RPM data is based on measurement performed by RPM sensor requires TMU-1 to be installed and interfaced with an RPM sensor. eVision - Logged RPM data is based on measurement performed by RPM sensor in eVision thruster motor.
Speed Source Stern	Same configuration options as Speed Source Bow.
Speed Source Bow Starboard	Same configuration options as Speed Source Bow.
Speed Source Stern Starboard	Same configuration options as Speed Source Bow.

Panel Configurations

The *Panel Configurations* menu lists configuration options for TP-35 behaviour. Serial number and firmware version of TP-35 is also displayed in the *Panel Configuration* menu.



Serial number and firmware version of TP-35

Joystick Settings	Select joystick type and perform calibration. If calibration is done, live values and current calibration data is displayed.
Station Control Settings	Only available on -DNV product variants. Activate and configure the transfer of command functionality.
IO Configurations	Configure functionality of input and output signals available on the X3 I/O connector on the back of TP-35.
Licenses	List installed licenses. Option for adding new licenses.
Settings	Access control panel setting.

Joystick Settings

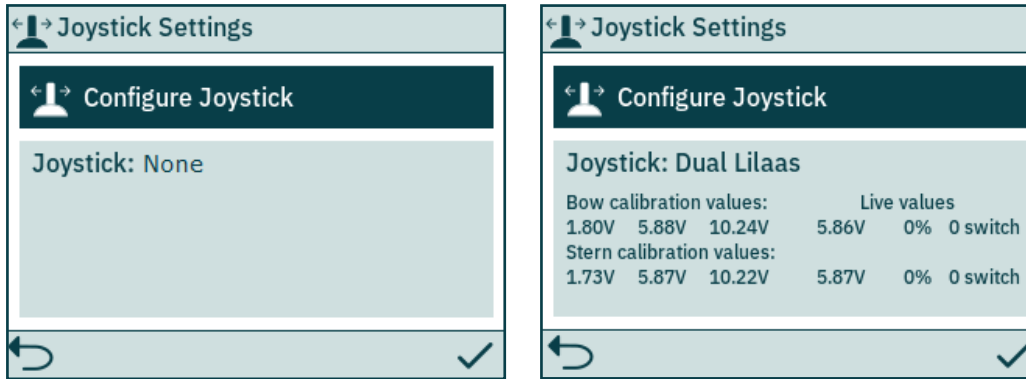
The Joystick Settings menu is used to initiate joystick calibration and display live values and calibration data.

Calibration is done prior to delivery and is not required during installation. If TP-35 or the joystick is replaced a new calibration must be conducted.

If no calibration has been conducted, Joystick: None will be displayed. If a calibration has been completed the selected joystick type, calibration values and live values will be shown.

Calibration values show the measured voltage from the joystick potentiometer at fully port, centre and fully starboard position of the joystick.

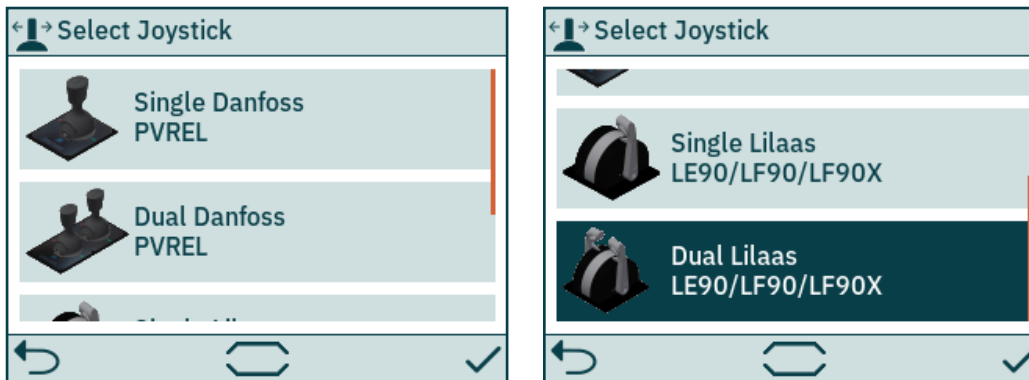
Live values show the measured voltage from the joystick potentiometer and percentage of thrust according to the current joystick position. For joysticks with a centre switch, "0 switch" indicates joystick being centred and switch not triggered. "1 switch" indicates that the joystick has been moved out of centre and switch is triggered. Joysticks with no centre switch will always show "0 switch".



Configure Joystick	A new calibration is initiated.
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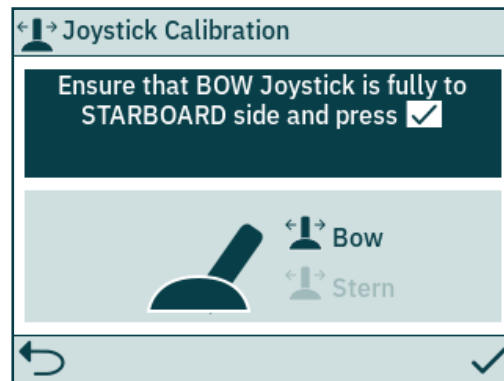
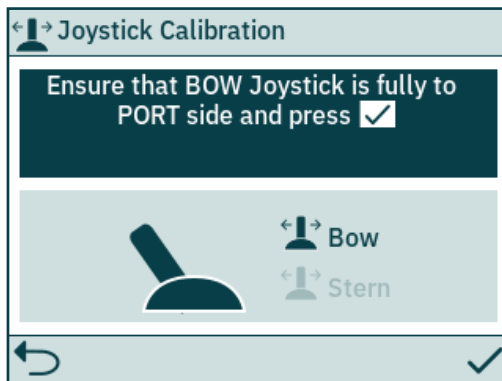
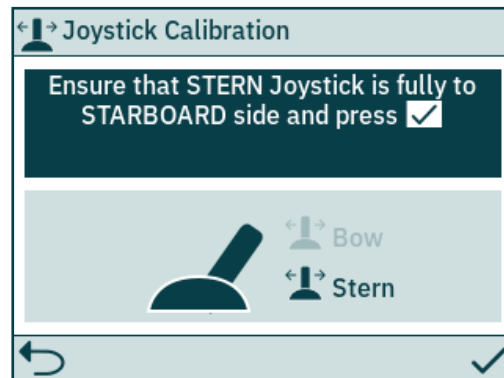
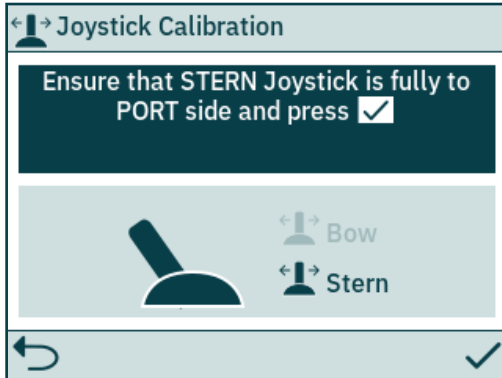
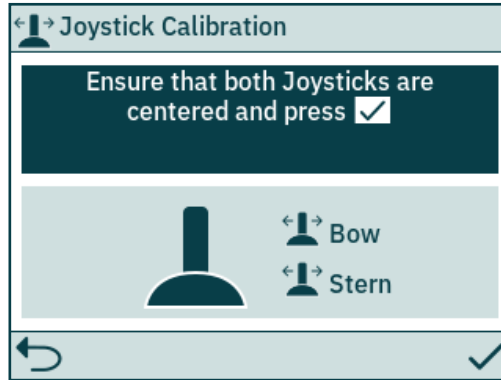
Configure Joystick

Select the joystick type which is connected to TP-35 and start the calibration. In case of dual bow and/or dual stern thruster installation the same joystick is used to operate both bow and/or both stern thrusters.



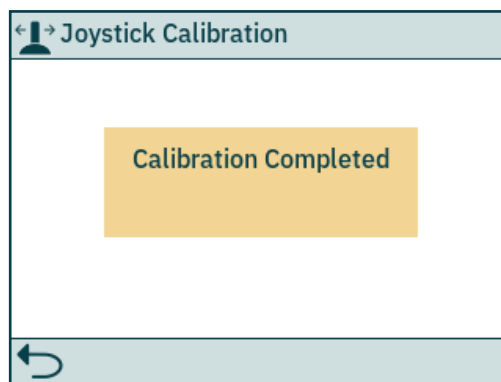
Single Danfoss PVREL	Select single Danfoss PVREL joystick for calibration.
Dual Danfoss PVREL	Select dual Danfoss PVREL joystick for calibration.
Single Lilaas LE90/LF90/LF90X	Select single Lilaas LE90, LF90 or LF90X joystick for calibration.
Dual Lilaas LE90/LF90/LF90X	Select dual Lilaas LE90, LF90 or LF90X joystick for calibration.
	Abort joystick calibration and return to <i>Joystick Setting</i> menu.
	Confirm joystick selection and initiate joystick calibration.

Follow the on-screen instructions to calibrate the joystick. It is important to keep the joystick in the specified position while pressing . Below is an example of the steps for calibrating a dual joystick.



	Abort joystick calibration and return to <i>Joystick Setting</i> menu.
	Confirm current calibration step.

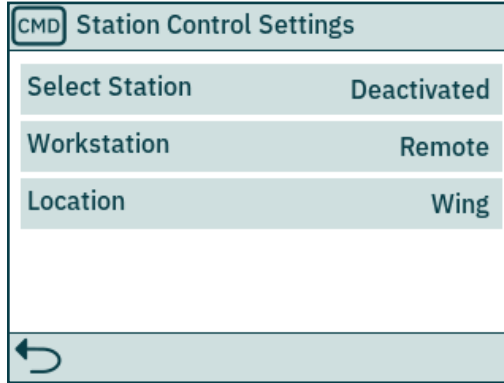
After the last calibration step a notice is displayed for 3 seconds to confirm that the joystick calibration is completed.



	Close notice and return to <i>Joystick Setting</i> menu.
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Station Control Settings

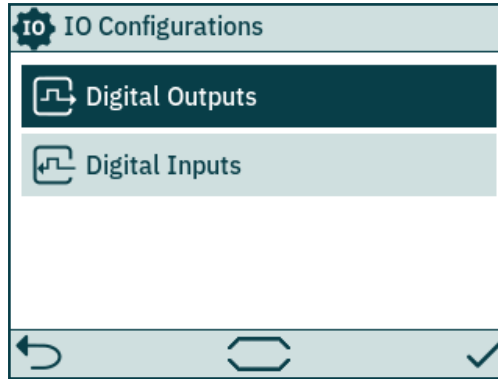
The *Station Control Settings* menu is only available on control panels with PJC4xx part numbers that end with *-DNV*. See detailed description in the *Functionality of DNV Models* chapter.



Select Station	Enables or disables the <i>Select Station</i> functionality. By default <i>Select Station</i> is activated on all PJC4xx part numbers that ends with <i>-DNV</i> . <ul style="list-style-type: none"> • Activated (default) • Deactivated
Workstation	Defines the type of workstation, see <i>Select Station</i> chapter for detailed information. <ul style="list-style-type: none"> • Main (default) • Remote
Location	Defines the location of the control panel. Only used in systems with VDRI-1, see chapter <i>VDRI-1 Configuration</i> for more information. <ul style="list-style-type: none"> • Bridge • Port Wing • Starboard Wing • Engine Control Room • Engine • Wing (default)

IO Configurations

This sub menu enables configuration of available IO signals. Two digital output pins, one isolated relay output and two digital IO pins are available on the X3 I/O connector of TP-35.



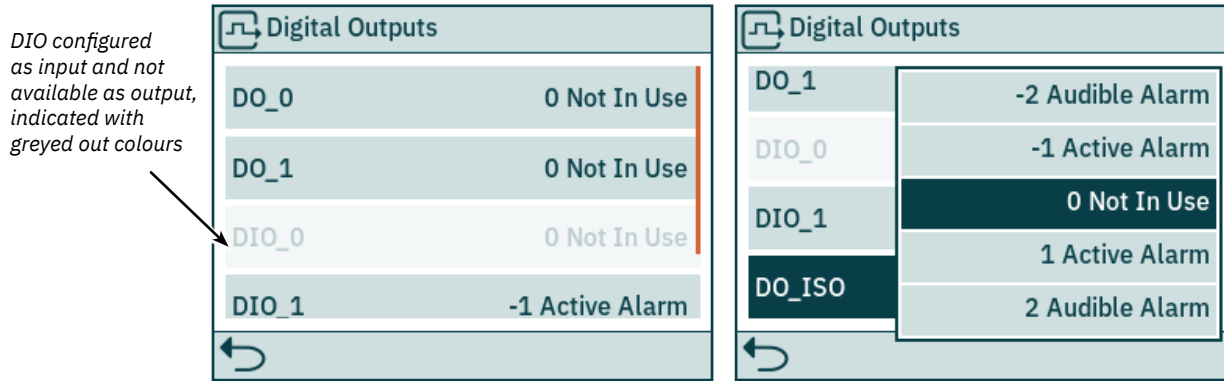
Digital Outputs	Configure functionality of digital output signals available on connector X3 I/O on the back of TP-35.
Digital Inputs	Configure functionality of digital input signals available on connector X3 I/O on the back of TP-35.

Digital Outputs

Configure functionality of digital outputs by selecting the desired output signal and functionality. Listed functionalities are available on all digital outputs and the same functionality can be configured to multiple outputs. A negative value in front of the functionality inverts the output. E.g. if an active alarm exists *1 Active Alarm* will result in a high output, typical +12V or +24V, and *-1 Active Alarm* would result in a low output of 0V. If a DIO is configured as an input, it will not be possible to configure it as an output until the corresponding input is set to "Not In Use". See *Digital Inputs* section for more information.

The DO_ISO is an isolated relay output where high corresponds to closed connection and low would result in an open connection.

See *Control Panel - Alarms* chapter for more information of panel behaviour in case of alarm situations.
See *Detailed IO Description* chapter for more information of the available IOs.

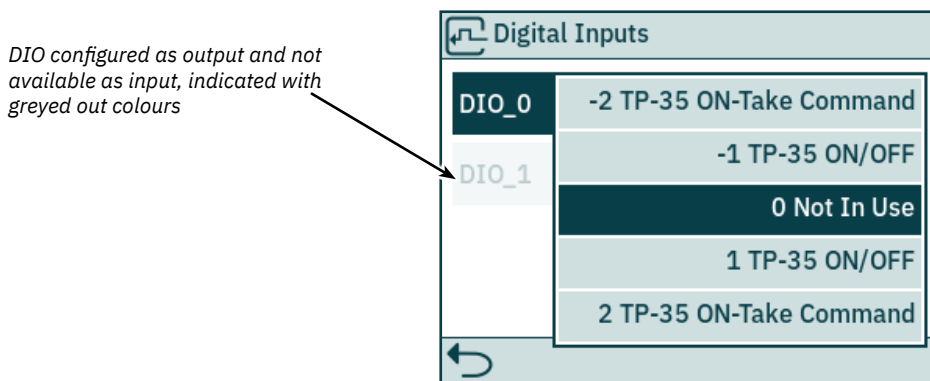


DO_0	0 Not in use (default) - Digital IO pin can be used as Digital Input. -1/1 Active alarm - Output is active if a device has an active alarm, regardless if panel is ON or OFF -2/2 Audible alarm - Output is active if the control panel has an audible alarm signal. Negative number in front of the function inverts the output.
DO_1	Same configuration options as DO_0.
DIO_0	Same configuration options as DO_0.
DIO_1	Same configuration options as DO_0.
DO_ISO	Same configuration options as DO_0.

Digital Inputs

Configure functionality of digital inputs by selecting the desired input signal and functionality. Listed functionalities are available on all digital inputs and the same functionality can be configured to multiple inputs. A negative value in front of the functionality inverts the input. E.g. if an input is configured to *1 TP-35 ON/OFF* a transition from low to high will result in TP-35 being turned ON, and *-1 TP-35 ON/OFF* would require transition from high to low to turn ON TP-35. If a DIO is configured as an output, it will not be possible to configure it as an input until the corresponding output is set to "Not In Use". See *Digital Outputs* section for more information.

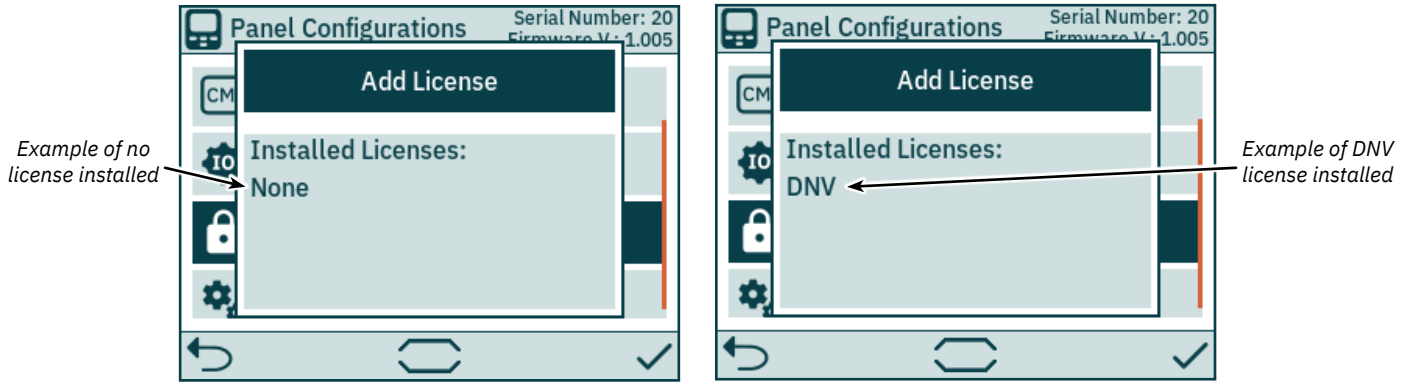
See *Select Station* section for more information of transfer of command between control panels.
See *Detailed IO Description* chapter for more information of the available IOs and trigger levels of digital inputs.



DIO_0	0 Not in use (default) - Digital IO pin can be used as Digital Output. -1/1 TP-35 ON/OFF - Activation of input turns TP-35 ON, and deactivation of the input turns TP-35-OFF. -2/2 TP-35 ON-Take Command - Activation of input turns TP-35 ON and request command. If TP-35 is already turned ON, activation of input only request command. Deactivation of input results in no action. Negative number in front of the function inverts the input.
DIO_1	Same configuration options as DIO_0.

Licenses

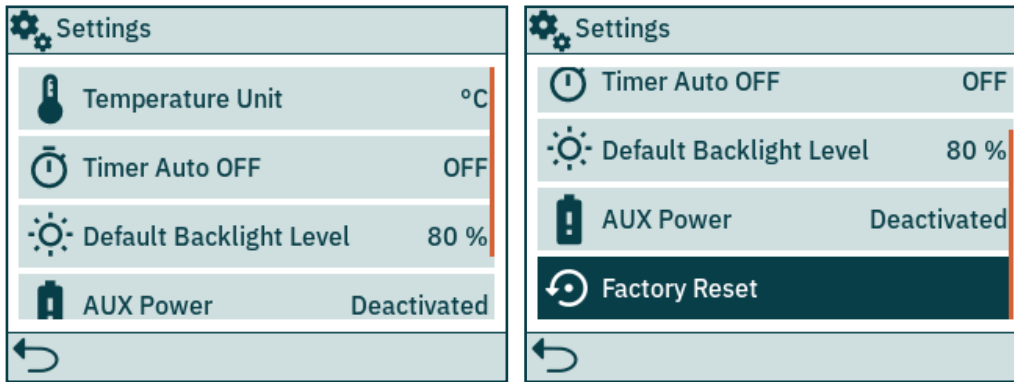
Installed licenses are listed. The DNV license gives access to the functionality described in chapter *Functionality of DNV Models*. All PJC4xx part numbers that end with -DNV have the DNV license installed prior to shipment.



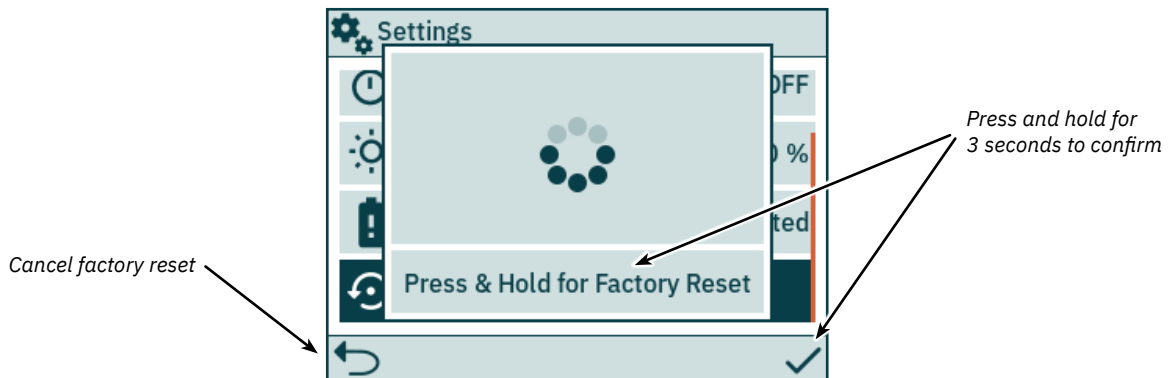
Add License Keyboard is displayed for registration of license key, see chapter Menu navigation for description of the keyboard functionality.

Settings

The *Settings* menu enables configuration of TP-35 parameters. These settings are panel specific.



Temperature Unit	Select between Celcius or Farenheit as the temperature unit to be used in the display. <ul style="list-style-type: none"> • °C (default) • °F
Timer Auto OFF	Configure timer for automatic shut OFF of TP-35. The control panel will automatically turn OFF when the timer expires. The timer is reset by alarms, and operation of buttons, touch screen or joysticks. When set to OFF the panel will not turn off automatically. <ul style="list-style-type: none"> • OFF (default), 5min, 10min, 15min, 20min, 25min, 30min, 45min, 60min
Default Backlight Level	Set the default back light level to be used when TP-35 is turned ON. <ul style="list-style-type: none"> • 80% (default) - Values between 20% and 100% can be chosen.
AUX Power	Configure auxiliary power supply. Only available with PJC-4xx part numbers that end with -DNV. See chapter <i>Functionality of DNV Models</i> for more information. <ul style="list-style-type: none"> • Deactivated (default) • Activated
Factory Reset	Reset all settings to factory default. Once selected press and hold for 3 seconds to confirm resetting all parameters to factory default.



Functionality of DNV Models

All PJC4xx part numbers that end with *-DNV* have additional functionality for compliance with DNV-RU-SHIP Pt.4 Ch.9 - Control and monitoring systems.

The following features are only available with part numbers that end with *-DNV*:

- Power supply failure alarm
- Display of thruster motor RPM
- Gear leg low oil level alarm
- Select Station

Display of thruster motor RPM, gear leg low oil level alarm and *Select Station* functionality is required for compliance with DNV-RU-SHIP Pt.4 Ch.9. In addition an independent emergency stop must be installed to ensure compliance with DNV-RU-SHIP Pt.4 Ch.9.

The power supply failure alarm is an optional safety feature.

Power Supply Failure Alarm

An auxiliary power supply input is available on the X3 I/O connector. When powering TP-35 from both the S-Link interface and the I/O connector, an alarm will be triggered if one of the power supplies falls outside the rated input voltage range. See *Detailed IO Description* chapter for information on auxiliary power supply connection.

A failure on the S-Link power supply will suspend thruster operation from the control panel. If the auxiliary power supply falls outside rated voltage ratings, an alarm will be triggered, but thruster operation will be allowed.

An IO cable that mates with connector X3 I/O is included in all PJC4xx part numbers that end with *-DNV*.

Display of Motor RPM and Gear Leg Low Oil Level Alarm

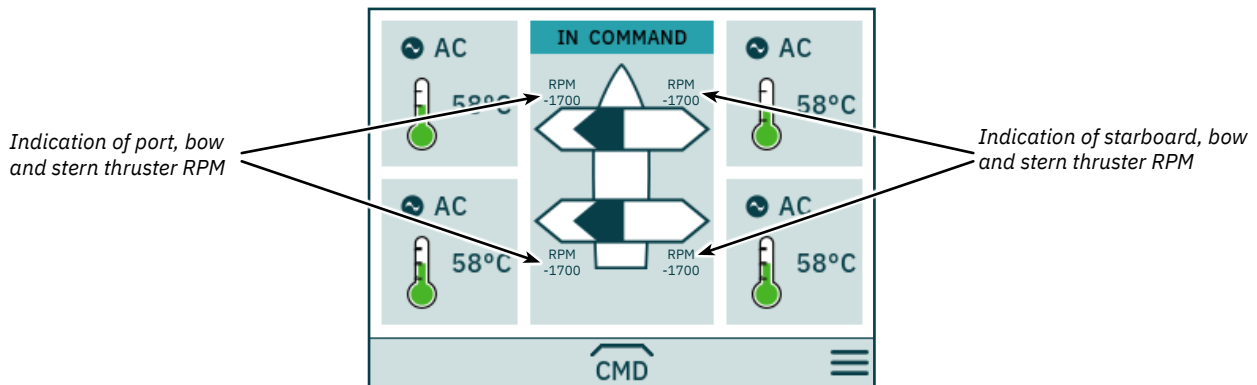
Sleipner *Thruster Monitoring Unit-1 (TMU-1)* must be installed and connected to the S-Link bus to display measured motor RPM and gear leg low oil level alarm on TP-35. For AC thrusters, estimated RPM from the VFD is displayed if TMU-1 is not installed.

The thruster motor must be equipped with an RPM sensor connected to TMU-1. An oil tank with a level switch must be installed and connected to TMU-1. RPM sensor signal and oil tank level switch signal from one thruster shall be connected to the same TMU-1, and there must be one TMU-1 for each thruster. See TMU-1 user manual for more information.

The RPM of the thruster is positive for starboard direction and negative for port.

When configuring the TMU-1 Location parameter, it is important to select the option that matches the physical installation of the thruster to ensure that the read RPM value is displayed at the correct location in the thruster dashboard view. See the *System Devices* chapter for more information on configuring the TMU-1.

The thruster dashboard view example below shows an installation with four AC thrusters with an RPM sensor.

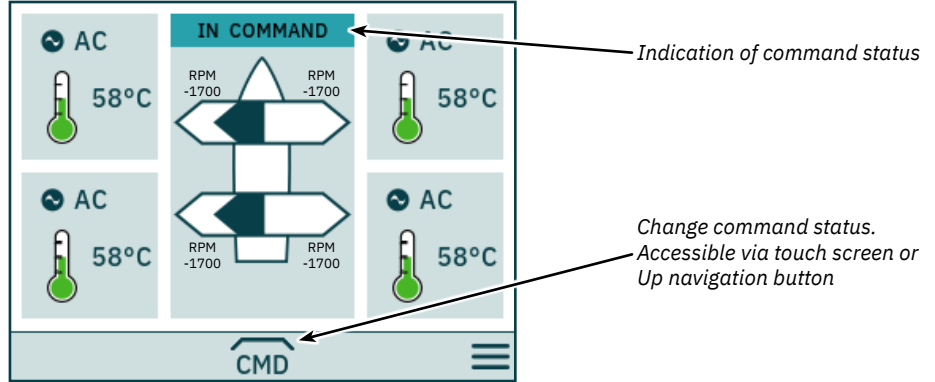


Select Station

This functionality ensures that the thrusters can only be operated by one control panel at a time. It requires that all control panels connected to the S-Link bus supports the *Select Station* functionality and that this functionality is enabled.

The control panels installed on a vessel must be defined to be either Main Workstation or Remote Workstation. The type of workstation determines how the transfer of command can be conducted. It is only the workstation that is in the state IN COMMAND that can operate the thrusters. When turning ON a control panel, it will automatically be IN COMMAND if none of the control panels connected to the S-Link bus is IN COMMAND.

Configuration of the *Select Station* functionality is described in the *Station Control Settings* chapter.



Transfer of Command

Main Workstation can obtain command from other Main Workstations and Remote Workstations.

Remote Workstation cannot obtain command from any other Workstation.

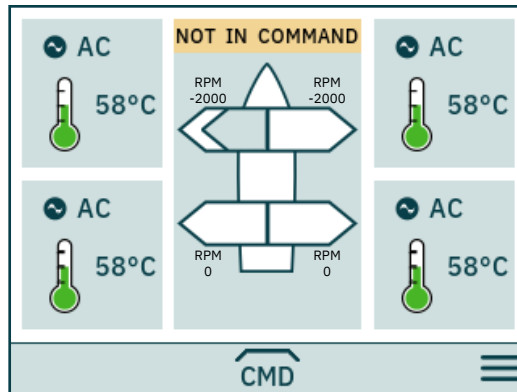
Remote Workstation and Main Workstation can obtain command when no other station is in command.

The control panel must be IN COMMAND to operate thrusters.

When the control panel is NOT IN COMMAND, thruster operation is suspended. If the connected joysticks are adjusted, no joystick signal is shown in the thruster dashboard view.

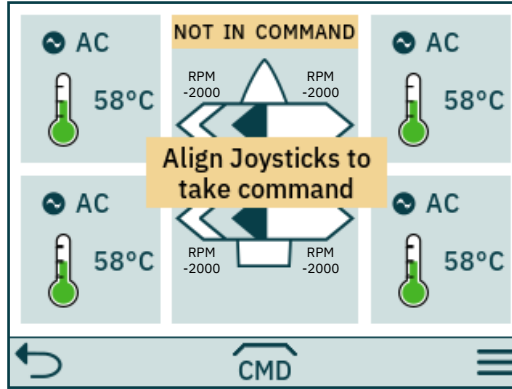
Operation of joysticks connected to a remote control panel being IN COMMAND will be shown with light blue arrows on the thruster dashboard view.

The measured RPM of the thruster motor is always displayed even if the control panel is NOT IN COMMAND.



	Take command, when not IN COMMAND.
--	------------------------------------

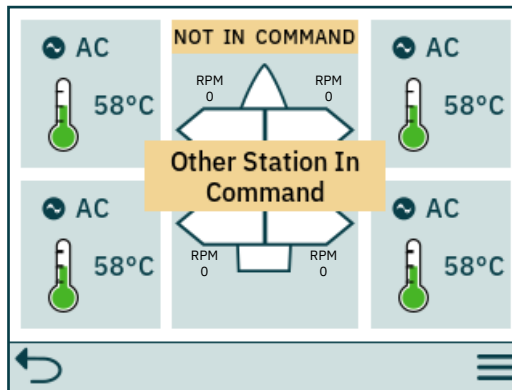
Joysticks must be aligned before a workstation can take command. If joysticks are not aligned when command is requested, a notice is displayed for 10 seconds. If the operator aligns the joysticks while this notice is displayed, command is taken, and an audible signal is given. If the joysticks are not aligned during the time the notice is displayed or the notice is manually closed, the workstation continues to be NOT IN COMMAND.



↶	Closes the notice.
Joysticks aligned	Command is transferred.

If a Remote Workstation request command when another Main or Remote Workstation is in command, a notice is displayed informing that another workstation is in command. The notice disappears after 3 seconds, or it can be manually closed.

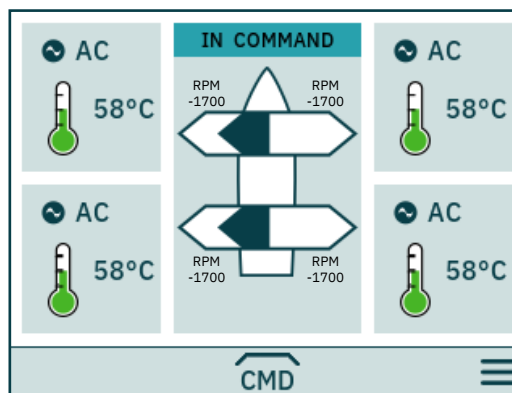
In such a situation, the other workstation must release the command before the command can be transferred.



↶	Closes the notice.
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Release Command

When the control panel is IN COMMAND, Main Workstations and Remote Workstations can release command to allow for other workstations to take command. When command is released, an audible signal will be given to indicate that the state of the control panel has changed from IN COMMAND to NOT IN COMMAND. If command is released when thrusters are running, the thrusters will stop. Turning OFF the control panel will release command.



CMD	Release command.
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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.

eVision and EHP Fault Codes

Fault Code	Fault Name	Fault Description	Action
100.0.0	System Error - -	Internal error	-Consult Side-Power dealer
107.0.24	Bootloader fault code - Fault	Bootloader failed upgrading.	-Check S-link cables and T-connectors. -If problem persist, consult Sleipner dealer.
155.0.24	Internal Voltage - Fault	Internal error	-If problem persist, consult Sleipner dealer.
10000.106.55	Motor Temp eVision Controller uC Overtemp	Stator over temperature	-Wait for motor to cool down
10002.0.13	Stator Temperature - Open Circuit	Stator temperature sensor not connected	-If problem persist, consult Sleipner dealer.
10002.0.16	Stator Temperature - Short Circuit	Stator temperature sensor short circuit	-If problem persist, consult Sleipner dealer.
10003.0.13	Transistor Temperature - Open Circuit	Transistor temperature sensor not connected	-If problem persist, consult Sleipner dealer.
10003.0.16	Transistor Temperature - Short Circuit	Transistor temperature sensor short circuit	-If problem persist, consult Sleipner dealer.
10101.106.55	Device CPU Temp eVision Controller uC Overtemp	Main MCU temperature above max limit	-Wait for motor to cool down
10101.107.55	Device CPU Temp eVision Motor uC Overtemp	Motor MCU temperature above max limit	-Wait for motor to cool down.
10102.106.55	Device Board Temperature eVision Controller uC Overtemp	Transistor over temperature	-Wait for motor to cool down
10104.106.24	Motor Speed eVision Controller uC Fault	Motor speed outside valid range.	-Check propeller blades and flexible coupling.
10104.107.212	Motor Speed eVision Motor uC Overspeed	Motor speed outside valid range	-Check propeller blades and flexible coupling. -If not resolved consult Sleipner representative.
10200.106.53	System Voltage eVision Controller uC Overvoltage	Main MCU temperature above max limit	-Measure voltage at battery terminals and thruster terminals.
10200.106.54	System Voltage eVision Controller uC Undervoltage	Motor supply voltage below min limit	-Measure voltage at battery terminals and thruster terminals.
10200.107.53	System Voltage eVision Motor uC Overvoltage	Motor supply voltage above max limit	-Measure voltage at battery terminals and thruster terminals.
10200.107.54	System Voltage eVision Motor uC Undervoltage	Motor supply voltage below min limit	-Measure voltage at battery terminals and thruster terminals.
10301.0.100	Motor Position - No Communication	Communication with speed sensor failed	-If problem persist, consult Sleipner dealer.
10301.107.212	Motor Position eVision Motor uC Overspeed	Motor fails to stop correctly	-If problem persist, consult Sleipner dealer.
10302.107.24	uC Communication eVision Motor uC Fault	Communication between internal MCUs failed	-If problem persist, consult Sleipner dealer.
10302.107.100	uC Communication eVision Motor uC No Communication	Communication between internal MCUs timeout	-If problem persist, consult Sleipner dealer.
10303.107.20	Motor Torque eVision Motor uC Over Limit	Motor torque above max limit	-Check if propeller is obstructed. -If not resolved consult Sleipner dealer.
10600.0.24	Retract Controller - Fault	Fault detected on retract	-Check retract faults
10600.0.208	Retract Controller - INTERLOCK	Function or Location configuration does not match retract controller configuration	-Check configuration of installed devices.
30100.0.13	Thruster Motor Current - Open Circuit	Motor phase not connected.	-If problem persist, consult Sleipner dealer.
30100.107.57	Thruster Motor Current eVision Motor uC Overcurrent	Measured motor phase current above max limit	-Check if propeller is blocked. -If not resolved consult Sleipner dealer.
60000.0.13	Main Fan - Open Circuit	Cooling fan temperature measurement open circuit	-If problem persist, consult Sleipner dealer.
60000.0.16	Main Fan - Short Circuit	Cooling fan temperature measurement short circuit	-If problem persist, consult Sleipner dealer.
60000.0.50	Main Fan - Current Low	Cooling fan current consumption below min limit	-If problem persist, consult Sleipner dealer.
60000.0.51	Main Fan - Current High	Cooling fan current consumption above max limit	-If problem persist, consult Sleipner dealer.
60000.0.53	Main Fan - Overvoltage	Cooling fan supply voltage above max limit	-If problem persist, consult Sleipner dealer.
60000.0.54	Main Fan - Undervoltage	Cooling fan supply voltage below min limit	-If problem persist, consult Sleipner dealer.
60000.0.55	Main Fan - Overtemp	Cooling fan power supply temperature above max limit	-Wait for motor to cool down
60000.0.211	Main Fan - Underspeed	Cooling fan speed below limit	-If problem persist, consult Sleipner dealer.
60000.0.212	Main Fan - Overspeed	Cooling fan speed above limit	-If problem persist, consult Sleipner dealer.

PDC-301 Fault Codes

MC_0119

Fault Code	Fault Name	Fault Description	Action
10600.0.208	Retract Controller - INTERLOCK	Retract Interlock	-Check if retract is deployed. -No communication with Retract Controller, check if Retract Controller has power. -Check PDC-301 and Retract Controller setup.
36100.1.24	VFD Instance 1 Fault	VFD faulted	-See VFD for more information
36100.1.100	VFD Instance 1 No Communication	PDC-301 has no MODBUS communication with VFD.	-Check communication cable with VFD -Check if VFD has power
36101.1.200	VFD PMS Instance 1 Timeout	VFD is not ready within 60 after power request.	-Check if VFD has power
36101.1.204	VFD PMS Instance 1 SIGNAL LOST	Lost Power Management signal from VFD, VFD not available anymore.	-Check VFD for more information.
36103.1.0	VFD IN LOCAL Instance 1 -	VFD in Local or Hand Mode	-Change mode in VFD panel.

PHC-3 Fault Codes

MC_0117

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.

Fault Code	Fault Name	Fault Description	Action
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
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"

PPC Fault Codes

MC_0538

Fault Code	Fault Name	Fault Description	Action
10000.0.11	Motor Temp - Level High	Motor temperature is higher than 120C/248F	- Motor must cool down to below 110C/230F
10000.0.13	Motor Temp - Open Circuit	Motor temperature sensor open circuit	-Check for open circuit on the temperature sensor on the motor
10000.0.16	Motor Temp - Short Circuit	Motor temperature sensor short circuit	-Check for short circuit on the temperature sensor on the motor
10001.0.13	Motor Thermo Switch - Open Circuit	Thermoswitch input is activated	-Motor needs to cool down before operated again -If motor is not warm then check for thermoswitch open circuit or wrong setup
10100.0.11	Device Cooling Fin Temp - Level High	PPC controller temperature is higher than 80C/176F	-PPC must cool down to below 45C/113F
10200.0.10	System Voltage - Level Low	Low motor voltage when motor is running. 12V thruster below 8.0V 24V thruster below 12.0V	-Reset or power OFF, wait 30sec and power ON the PPC -Recharge thruster battery
20000.0.73	IPC - Contact Before Energized	IPC error, motor relay fault before energized	-Turn off thruster battery main switch. -Thruster must be serviced by authorized personnel
20000.200.70	IPC Starboard No Contact Energized	IPC error, motor relay no contact when energized to starboard side	-Turn off thruster battery main switch. -Thruster must be serviced by authorized personnel
20000.201.70	IPC Port No Contact Energized	IPC error, motor relay no contact when energized to port side	-Turn off thruster battery main switch. -Thruster must be serviced by authorized personnel
30000.200.51	Thruster Solenoid Starboard Current High	Motor starboard contact fault	-Check motor contact connections -Check for short circuit -Check for dead relay
30000.201.51	Thruster Solenoid Port Current High	Motor port contact fault	-Check motor contact connections -Check for short circuit -Check for dead relay
30100.0.51	Thruster Motor Current - Current High	Motor current too high	-Reset or power OFF, wait 30sec and power ON the PPC -Check groining on the propeller -Check obstacles in the thruster tunnel -If not resolved, thruster must be serviced by authorized personnel
30100.0.52	Thruster Motor Current - Current Critical	Motor current critical high	-Reset or power OFF, wait 30sec and power ON the PPC -If not resolved, thruster must be serviced by authorized personnel
30300.0.19	Cooling Fan Speed - Under Limit	Cooling fan stopped or running to slow	PPC must be serviced by authorized personnel

AMS Fault Codes

MC_0537

Fault Code	Fault Name	Fault Description	Action
153.0.24	Supply Voltage - Fault	Supply Voltage Fault	-Check power connections
22000.0.0	AMS Manual Override - -	Main switch manually overridden	-Pull main switch
22001.0.0	AMS Fuse Blown - -	Fuse blown	-Replace fuse -Check if main cable from battery and main cable to thruster has been switched

TMU-1 Fault Codes

MC_0470

Fault Code	Fault Name	Fault Description	Action
10103.0.10	Gearleg Oil - Level Low	Gearleg oil level is low	-Check level indicator on the external oil tank. If low oil level in tank, refill oil and check gearleg for leakage. -If oil level is ok, check that cable between TMU-1 and oil tank sensor is connected and not damaged.
10104.0.212	Motor Speed - Overspeed	Motor speed higher than 5.000 RPM	-Verify that Pulse Per Revolution configuration on TMU-1 matches RPM sensor specification. -Check that cable between TMU-1 and RPM sensor is connected and not damaged.

VDRI-1 Fault Codes

MC_0449

Fault Code	Fault Name	Fault Description	Action
109.0.0	Configuration Error - -	-No Speed Source configured. At least one instance must be configured for VDRI to log data. -Instance configured to receive data from PDC-301, but receive data from TMU-1 or vice versa. -An instance receives data when no Speed Source is configured, or vice versa.	Check configuration and installed devices on S-Link bus.

TP-35 Fault Codes

MC_0665

Fault Code	Fault Name	Fault Description	Action
151.0.54	S-Link Power - Undervoltage	S-Link supply voltage below 9.0V or missing	Check S-Link power
152.0.54	AUX Power - Undervoltage	AUX supply voltage below 9.0V or missing	Check AUX power

Fault Code	Fault Name	Fault Description	Action
100.0.0	System Error - -	System Error	Contact Sleipner Dealer
153.0.151	Supply Voltage - Self-Test Fault	Failed to determine voltage level of the system / Out of range.	Verify that the correct battery was chosen for this system and that it is properly charged.
10600.0.101	Retract Controller - Bus Off	Actuator CAN experienced Bus Off/Bus error.	Verify CAN cables to the actuators are correctly connected.
10600.0.210	Retract Controller - Service Mode	In Service Mode.	Exit service mode by using button controls.
10602.0.22	Retract Motion OUT Fault - Out of position	Lift or Lock Actuators went past their expected end-position when hatch deploying.	Inspect actuators and lifting arms for visual damage. Check fault specific data for more info. Contact Sleipner Dealer if problem is not resolved.
10602.0.51	Retract Motion OUT Fault - Current High	Blocked while deploying hatch.	Find and remove cause of mechanical blockage.
10603.0.22	Retract Motion IN Fault - Out of position	Lift or Lock Actuators went past their expected end-position when hatch retracting.	Inspect actuators and lifting arms for visual damage. Verify that the hatch fits the hull according to specification. Check fault specific data for more info. Contact Sleipner Dealer if problem is not resolved.
10603.0.51	Retract Motion IN Fault - Current High	Blocked while retracting hatch.	Find and remove cause of mechanical blockage.
10605.1.24	Lift Actuator Instance 1 Fault	Lift Actuator 1 Reported a Fatal Error	Contact Sleipner Dealer.
10605.1.53	Lift Actuator Instance 1 Overvoltage	Lift Actuator 1 Measured Overvoltage	Verify that the correct battery was chosen for this system.
10605.1.54	Lift Actuator Instance 1 Undervoltage	Lift Actuator 1 Measured Undervoltage	Verify that battery is charged.
10605.1.55	Lift Actuator Instance 1 Overtemp	Lift Actuator 1 Temperature Exceeding >85C	Find and eliminate cause of high temperature.
10605.1.100	Lift Actuator Instance 1 No Communication	Lift Actuator 1 Not Communicating	Verify that CAN and supply cables are correctly connected, and that no fuses have gone out.
10605.1.209	Lift Actuator Instance 1 MOTION FAULT	Lift Actuator 1 experienced linear motion while it was supposed to be in a fixed position. Load might have caused backdrive.	Look for mechanical obstruction/causes for the backdrive and remove them.
10605.2.24	Lift Actuator Instance 2 Fault	Lift Actuator 2 Reported a Fatal Error	Contact Sleipner Dealer.
10605.2.53	Lift Actuator Instance 2 Overvoltage	Lift Actuator 2 Measured Overvoltage	Verify that the correct battery was chosen for this system.
10605.2.54	Lift Actuator Instance 2 Undervoltage	Lift Actuator 2 Measured Undervoltage	Verify that battery is charged.
10605.2.55	Lift Actuator Instance 2 Overtemp	Lift Actuator 2 Temperature Exceeding >85C	Find and eliminate cause of high temperature.
10605.2.100	Lift Actuator Instance 2 No Communication	Lift Actuator 2 Not Communicating	Verify that CAN and supply cables are correctly connected, and that no fuses have gone out.
10605.2.209	Lift Actuator Instance 2 MOTION FAULT	Lift Actuator 2 experienced linear motion while it was supposed to be in a fixed position. Load might have caused backdrive.	Look for mechanical obstruction/causes for the backdrive and remove them.
10606.1.24	Lock Actuator Instance 1 Fault	Lock Actuator 1 Reported a Fatal Error, could be broken.	Contact Sleipner Dealer.
10606.1.53	Lock Actuator Instance 1 Overvoltage	Lock Actuator 1 Measured Overvoltage	Verify that the correct battery was chosen for this system.
10606.1.54	Lock Actuator Instance 1 Undervoltage	Lock Actuator 1 Measured Undervoltage	Verify that battery is charged.
10606.1.55	Lock Actuator Instance 1 Overtemp	Lock Actuator 1 Temperature Exceeding >85C	Find and eliminate cause of high temperature.
10606.1.100	Lock Actuator Instance 1 No Communication	Lock Actuator 1 Not Communicating	Verify that CAN and supply cables are correctly connected, and that no fuses have gone out.
10606.1.209	Lock Actuator Instance 1 MOTION FAULT	Lock Actuator 1 experienced linear motion while it was supposed to be in a fixed position. Load might have caused backdrive.	Look for mechanical obstruction/causes for the backdrive and remove them.
10607.0.209	Actuator Alignment Fault - MOTION FAULT	There was a position discrepancy between the lift actuators, but alignment failed.	Look for mechanical obstruction/causes for alignment failure.
40008.0.206	Sensor Fault 6 - WRITE FAIL	EEPROM failed to write.	Contact Sleipner Dealer.

Fault Code	Fault Name	Fault Description	Action
10000.0.11	Motor Temp - Level High	Motortemp has been over 120C (248F)	Motor cool down below 110C (230F)
10000.0.13	Motor Temp - Open Circuit	Motor temperature sensor open circuit	-Check motor temperature sensor wires for open circuit.
10000.0.16	Motor Temp - Short Circuit	Motor temperature sensor short circuit	-Check motor temperature sensor wires for short circuit.
10003.0.11	Transistor Temperature - Level High	Actuator transistor temperature is high	-Control box needs to cool down
10200.0.54	System Voltage - Undervoltage	"Low motor voltage alarm when motor is running. 12V thruster below 8.00V 24V thruster below 12.00V"	-Recharge battery, reset or power OFF/ON device.
10600.0.210	Retract Controller - DEVICE IN MANUAL MODE	Retract controller in service mode. Switch no. 4 is ON.	-Check dip switch setting on retract control box.
10601.0.24	Retract Position Sensor - Fault	Position sensor fault	-Check position sensor cables and sensor for damage
10602.0.50	Retract Motion OUT Fault - Current Low	Actuator current is below 0.5A when deploying	"-Check actuator connection or power to actuator. -If actuator is warm, try again when actuator has cooled down."
10602.0.51	Retract Motion OUT Fault - Current High	Retract obstructed while deploying	-Turn off all panels. Go for lower speed/deeper water and retry
10603.0.50	Retract Motion IN Fault - Current Low	Actuator current is below 0.5A when retracting	"-Check actuator connection or power to actuator. -If actuator is warm, try again when actuator has cooled down."
10603.0.51	Retract Motion IN Fault - Current High	Retract obstructed while retracting	-Turn panel on and manually override main switch. Remove obstruction and try again.
10604.0.203	Retract Shaft - Not Calibrated	Shaft Not Calibrated	-See manual for how to calibrate.
20000.0.72	IPC - Contact After Deenergized	Solenoid has contact after de-energized	-Turn off thruster battery main switch. Thruster must be serviced by authorized personnel.
20000.0.73	IPC - Contact Before Energized	Solenoid has contact when not energized	-Turn off thruster battery main switch. Thruster must be serviced by authorized personnel.
20000.200.70	IPC Starboard No Contact Energized	Solenoid has no contact when energized to starboard side	-Turn off thruster battery main switch. Thruster must be serviced by authorized personnel.
20000.201.70	IPC Port No Contact Energized	Solenoid has no contact when energized to port side	-Turn off thruster battery main switch. Thruster must be serviced by authorized personnel.
30000.200.51	Thruster Solenoid Starboard Current High	Motor starboard solenoid high current	-Check starboard solenoid connections for short circuit
30000.201.51	Thruster Solenoid Port Current High	Motor port solenoid high current	-Check port solenoid connections for short circuit

Responsibility of the Installer

MC_0038

General:

- The installer must read this document to ensure necessary familiarity with the product before installation.
- Directions outlined in this document cannot be guaranteed to comply with all international and national regulations including to but not limited to health and safety procedures. It is the installer's responsibility to adhere to all applicable international and national regulations when installing Sleipner products.
- This document contains general installation guidelines intended to support experienced installers. Contact professional installers for assistance familiar with the vessel and applicable regulations if required.
- If local regulation requires any electrical work to be performed by a licensed professional, seek a licensed professional.
- Ensure appropriate access to Sleipner products during installation planning for future service and inspection requirements.

When installing an S-Link™ system, connect ONLY original Sleipner S-Link™ products or other authorized control equipment directly to the S-Link™ bus. When connecting non-authorized third-party equipment, it must always be connected through a Sleipner-supplied interface product. Any attempt to directly control or connect to the S-Link™ control system without a designated and approved interface from Sleipner will void all warranties and responsibilities of the connected Sleipner products. If you interface 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

The TP-35 has two mounting options.

Top Mount

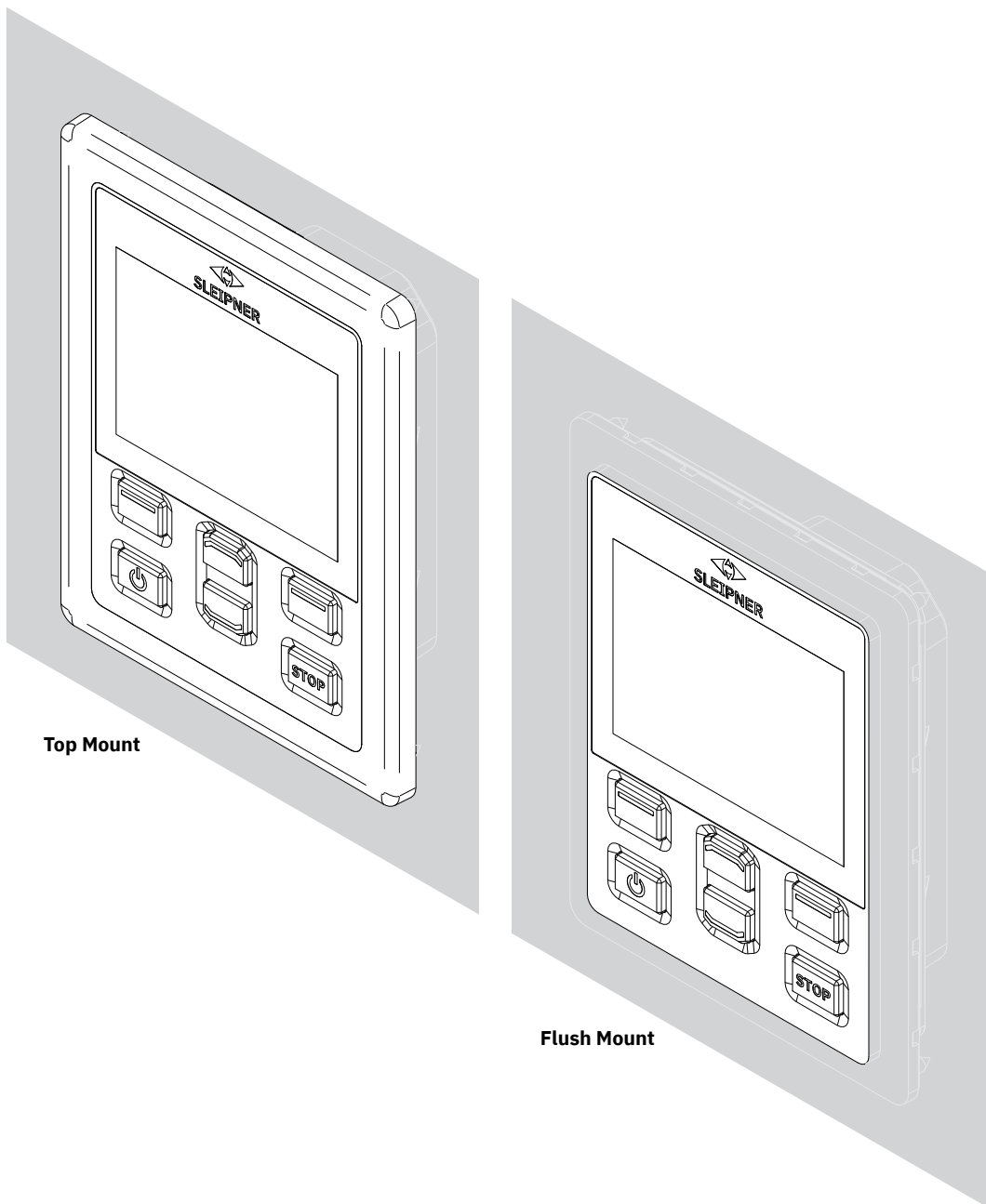
For the simplest installation the top mount design sits on the console board.

Flush Mount

The flush mount allows for a sleek and seamless display option exposing only the main screen, operation buttons and minimised panel surface. Note that flush installations require adequate access to the back surface of the dashboard to allow for the installation process.

When deciding your installation preference ensure to.

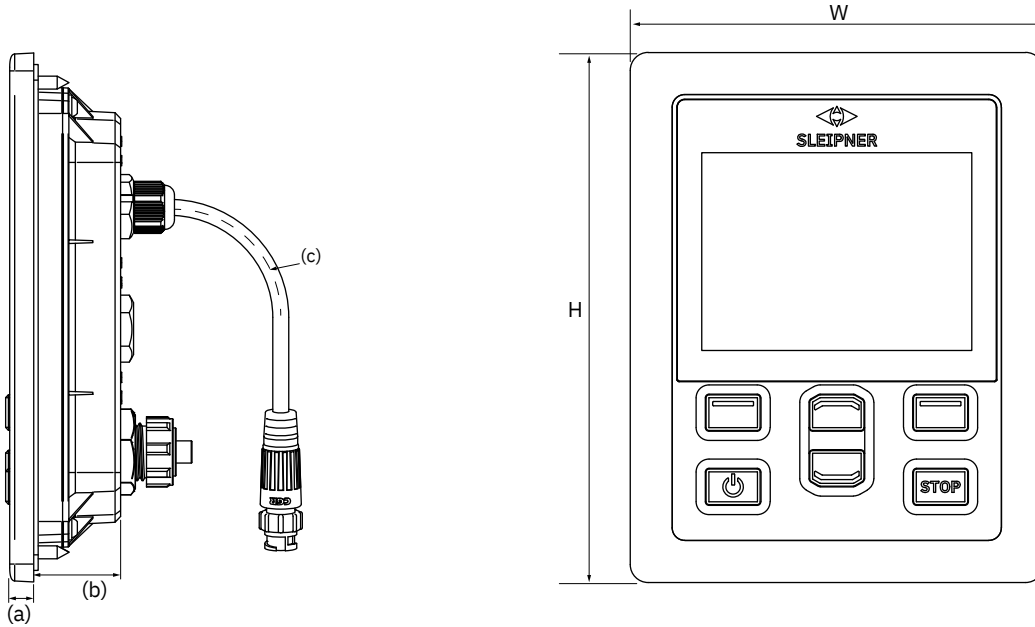
1. Find a suitable location for the control panel where it does not obstruct or is obstructed by other devices. Install the control panel on a flat surface where it is easy to use.
2. Ensure the panel should be mounted 20 cm away from any compass to ensure that the accuracy of the compass is not affected.
3. If the panel is mounted in a weather exposed location mounting the covering is recommended when the panel is not used.



MG_0463

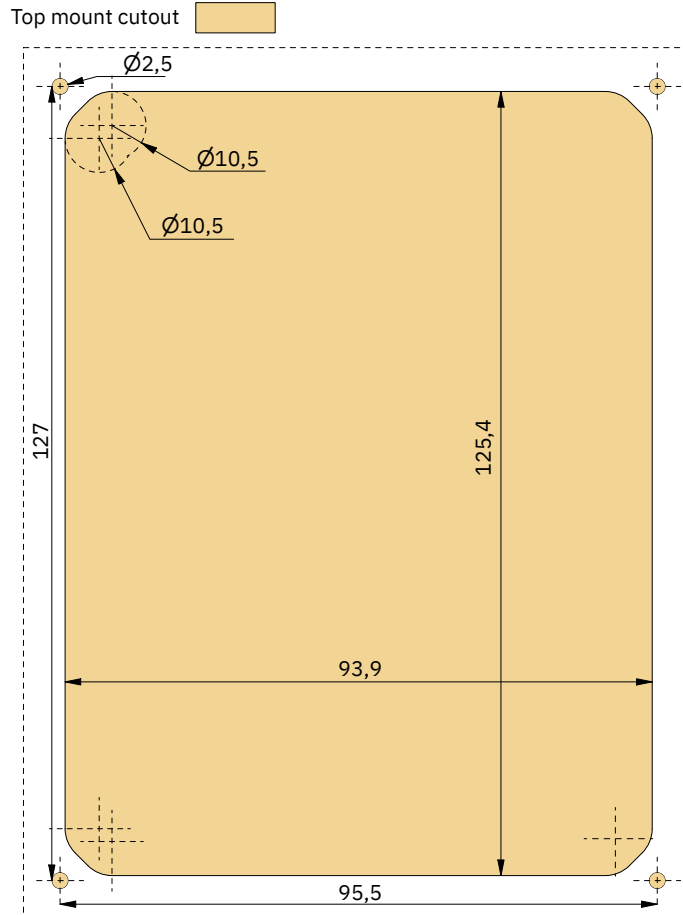
Measurement code	Measurement description	TP-35 Top Mount	
		mm	inch
H	Panel Height	143.1	5.6
W	Panel width	111.6	4.4
(a)	Raised height above the dashboard	6.5	0.26
(b)	Depth behind the dashboard (not inc. cables)	23.5	0.9
(c)	Cable bend radius	35	1.4

Top mount



MG_0455

Cutout Template



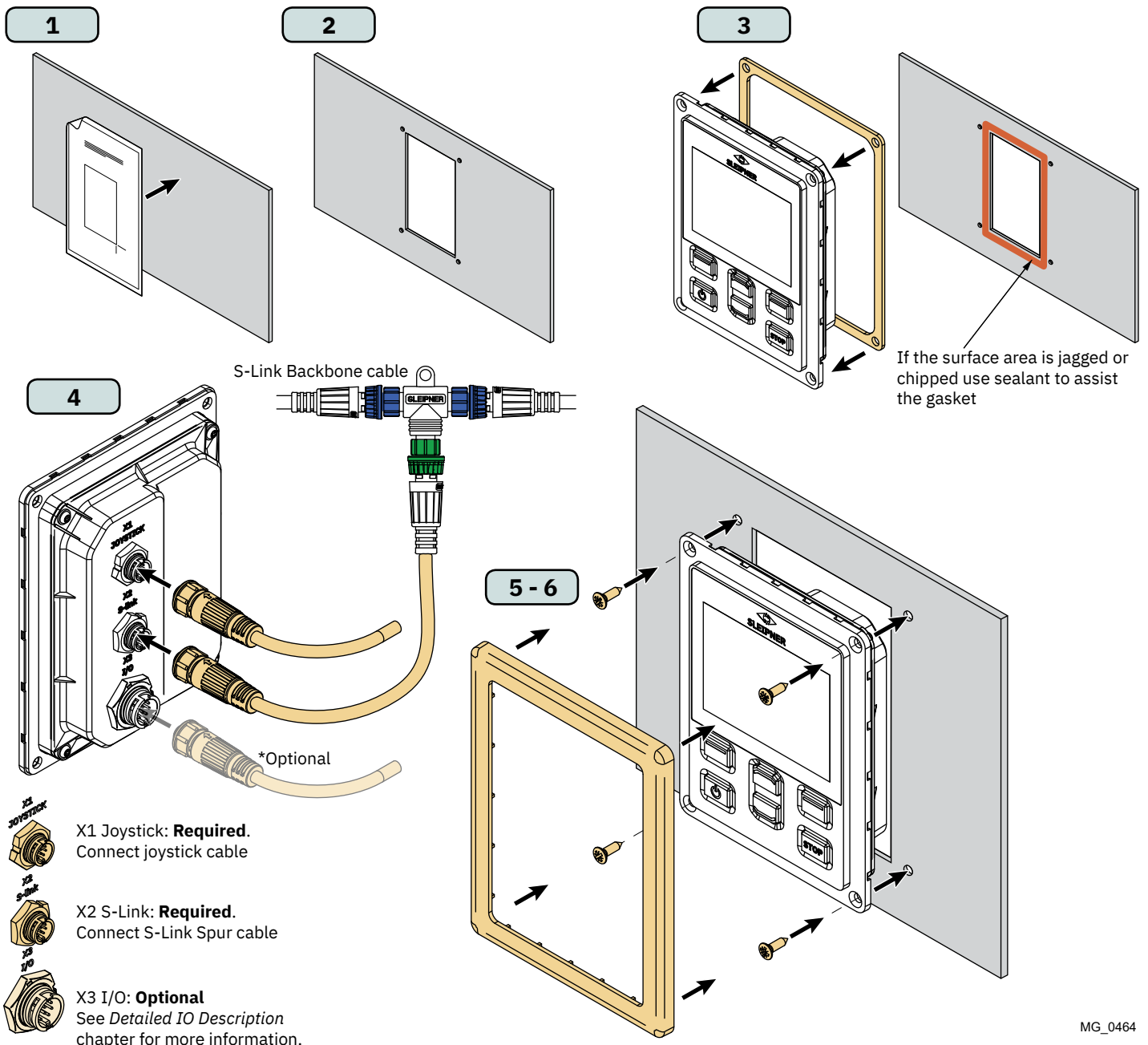
TP-35 Top Mount installation.

1. Place the supplied cut-out template on the desired installation location.
2. Cut out the area according to the template.
3. Place the gasket to the back face of the panel. If the front surface around your cut out is jagged or chipped, use a sealant to assist the gasket.
4. Plug cables into the connectors at the rear of the control panel. Note that access to the back of the control panel might be impossible after installation. The included joystick cable is 1.5 meter long. If longer distance between control panel and joystick is required, a 2-meter joystick extension cable can be ordered, order number: SM909741. The joystick cable is unshielded and a long cable is therefore more susceptible to noise. To ensure proper performance it is not recommended to connect more than five extension cables in series.

For the product variants *-LF90* and *-LF90X* the joystick cable is terminated in the joystick. If it is impossible to access the back of the control panel after installation, the joystick must be installed and joystick cable routed before fastening of the control panel.

Choose a S-Link spur cable with sufficient length to reach the nearest Backbone T-connector, see S-Link System Description chapter for detailed information about S-Link.

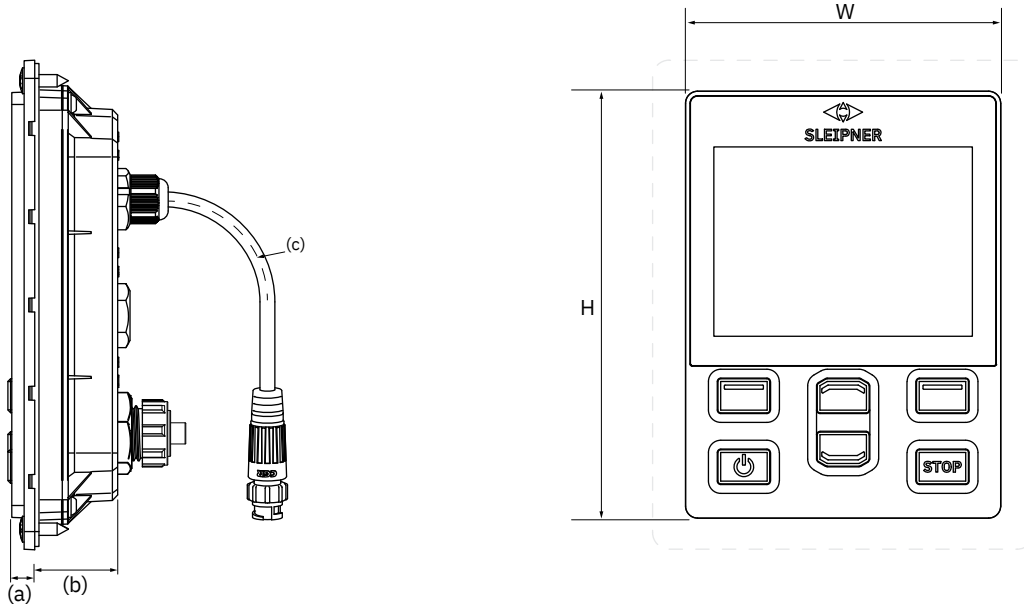
5. Insert the control panel in place and fasten screws.
6. Mount cover frame



MG_0464

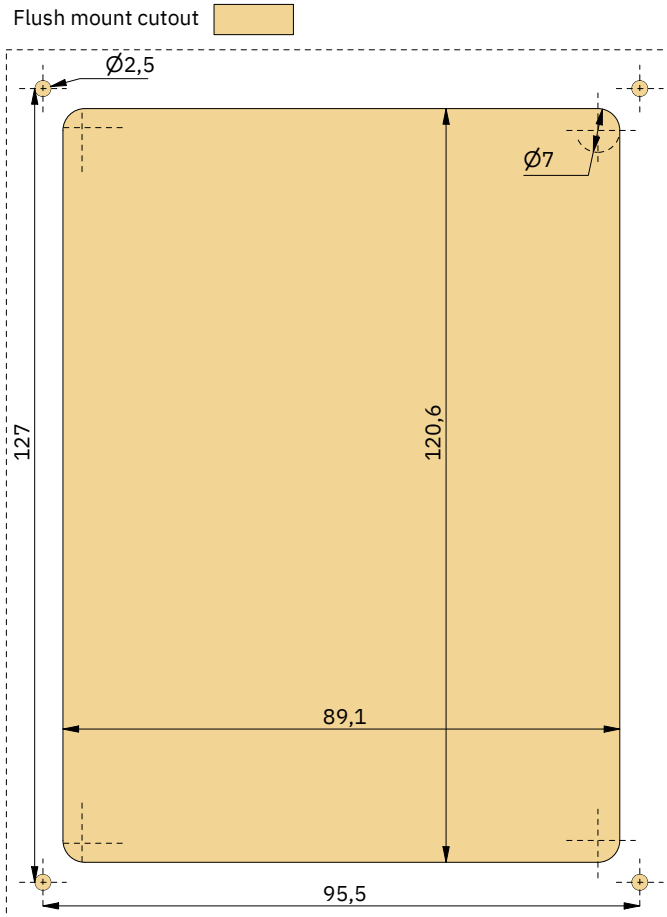
Measurement code	Measurement description	TP-35 Flush Mount	
		mm	inch
H	Panel Height	120.5	4.7
W	Panel width	89	3.5
(a)	Raised height above the dashboard	6.5	0.26
(b)	Depth behind the dashboard (not inc. cables)	23.5	0.9
(c)	Cable bend radius	35	1.4

Flush mount



MG_0475

Cutout Template



TP-35 Flush Mount installation.

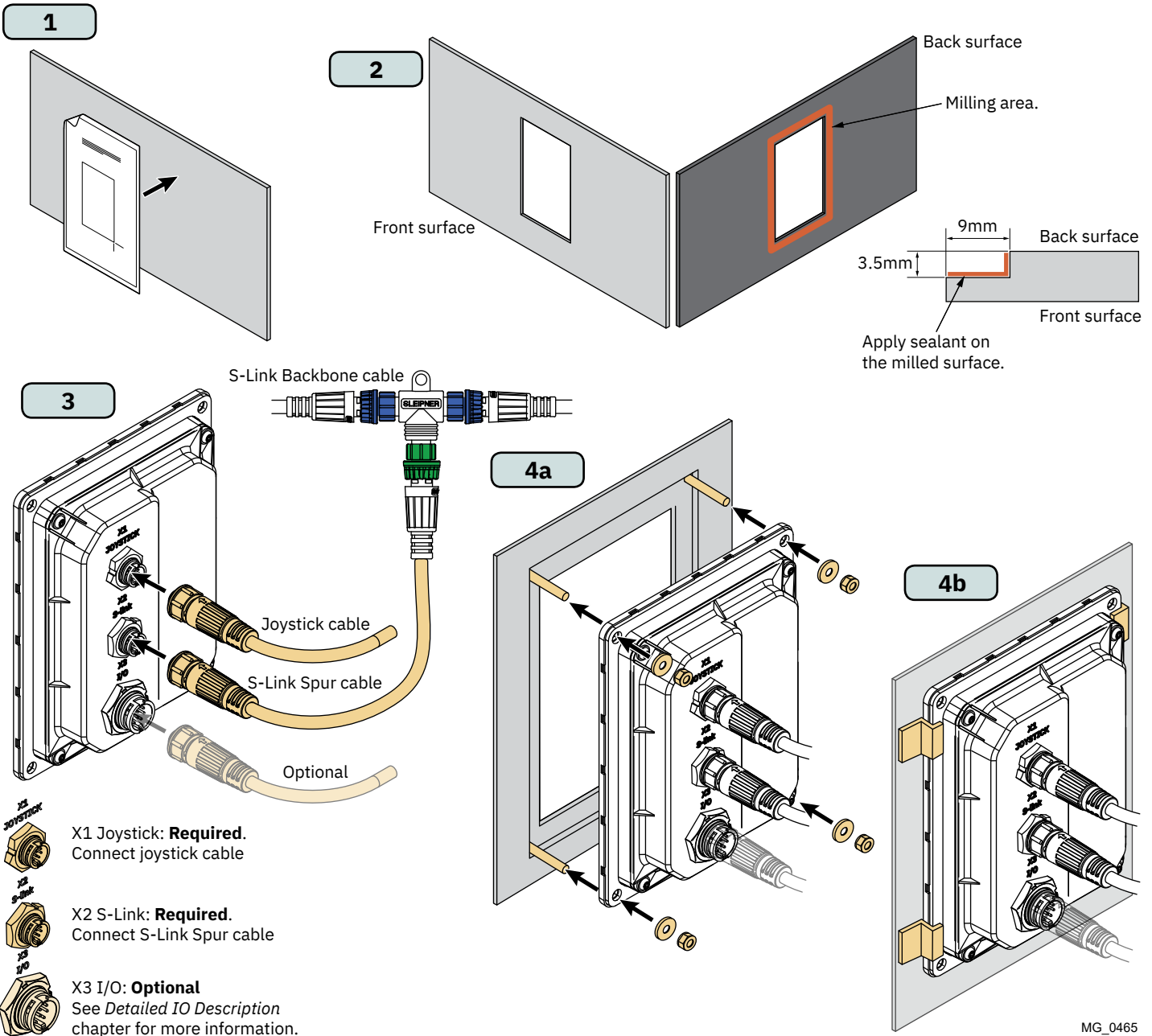
1. Place the supplied cut-out template on the desired location.
2. Cut out and mill the marked area on the template. Use a sealant on the milled surface to protect against water ingress around the panel.
3. Plug cables into the connectors at the rear of the control panel. Note that access to the back of the control panel might be impossible after installation. The included joystick cable is 1.5 meter long. If longer distance between control panel and joystick is required, a 2-meter joystick extension cable can be ordered, order number: SM909741. The joystick cable is unshielded and a long cable is therefore more susceptible to noise. To ensure proper performance it is not recommended to connect more than five extension cables in series.

For the product variants *-LF90* and *-LF90X* the joystick cable is terminated in the joystick. If it is impossible to access the back of the control panel after installation, the joystick must be installed and joystick cable routed before fastening of the control panel.

Choose a S-Link spur cable with sufficient length to reach the nearest Backbone T-connector, see S-Link System Description chapter for detailed information about S-Link.

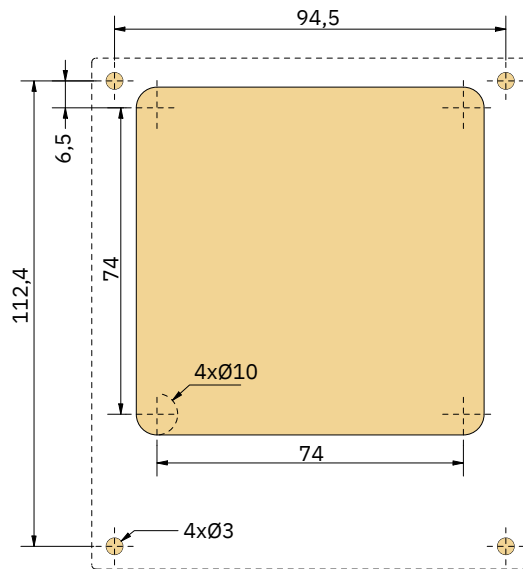
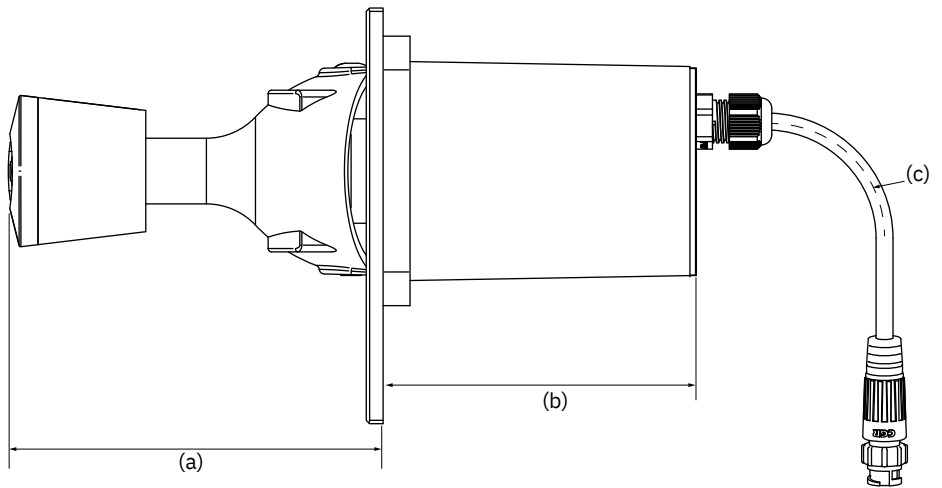
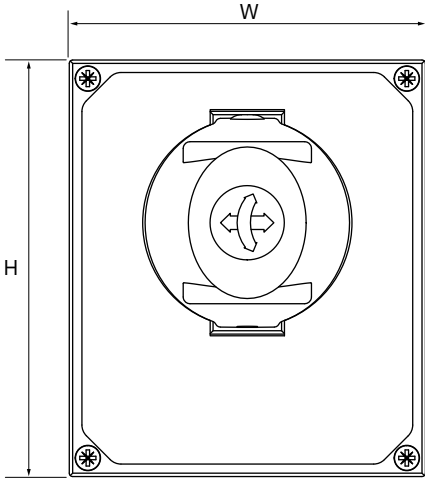
Flush mount installations can be installed in multipliable ways. Two options are using fastening studs or fastening brackets to hold the TP-35 in place.

- 4a. On the rear face secure four studs in the milled area using the template as a guide. How to secure these studs will depend on the material of the dashboard. Insert the control panel in place and fasten with a washer and nut. Fastening studs, washers and nuts are not included.
- 4b. Insert the control panel in place. Create fastening brackets to secure the TP-35 in place on the rear face of the dashboard. Fastening brackets are not included and must be customized by the installer.



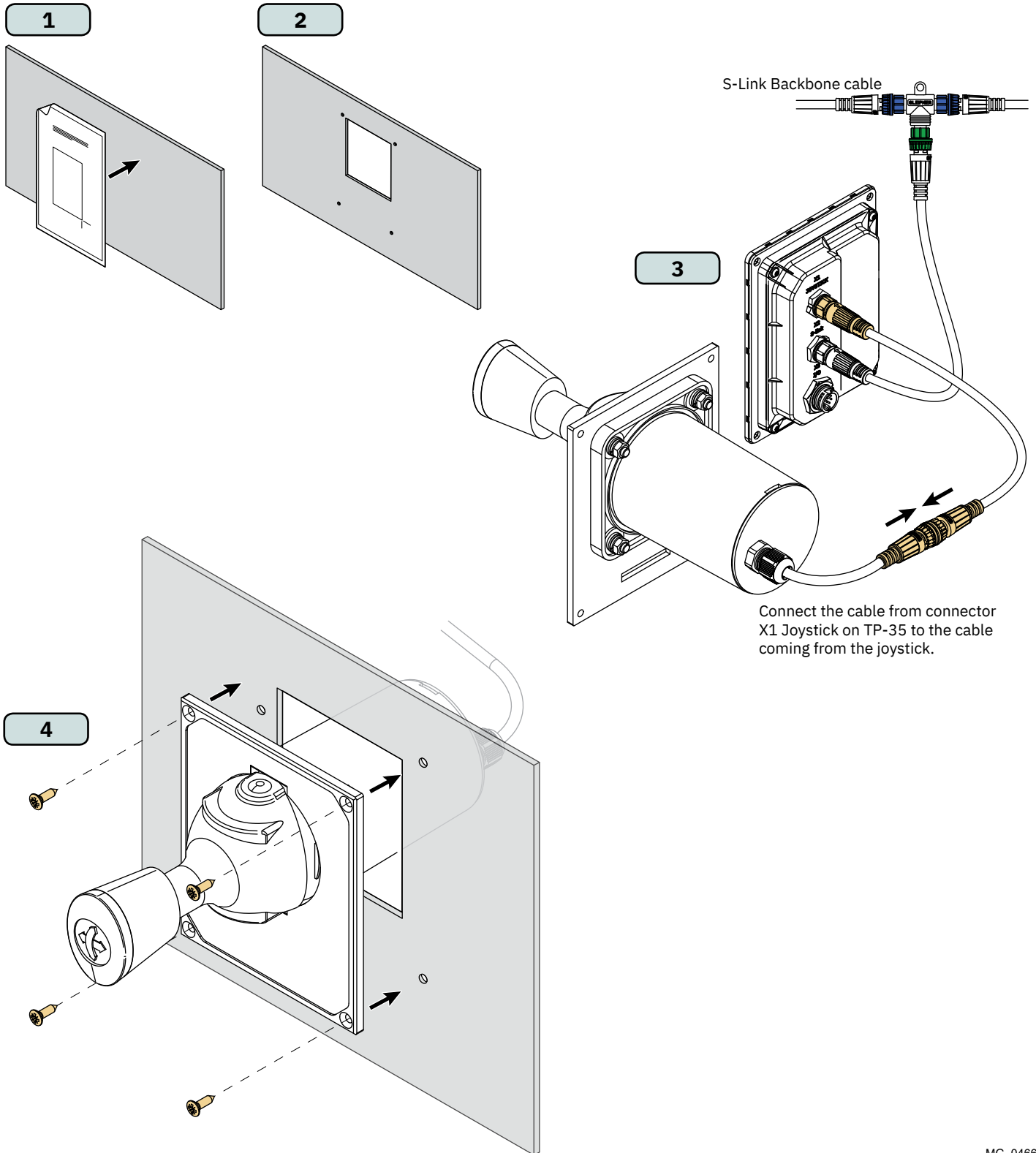
MG_0465

Measurement code	Measurement description	PJC421	
		mm	inch
H	Panel Height	123.4	4.9
W	Panel width	105.5	4.1
(a)	Raised height above the dashboard	111.3	4.4
(b)	Depth behind the dashboard (not inc. cables)	94.7	3.7
(c)	Cable bend radius	35	1.4

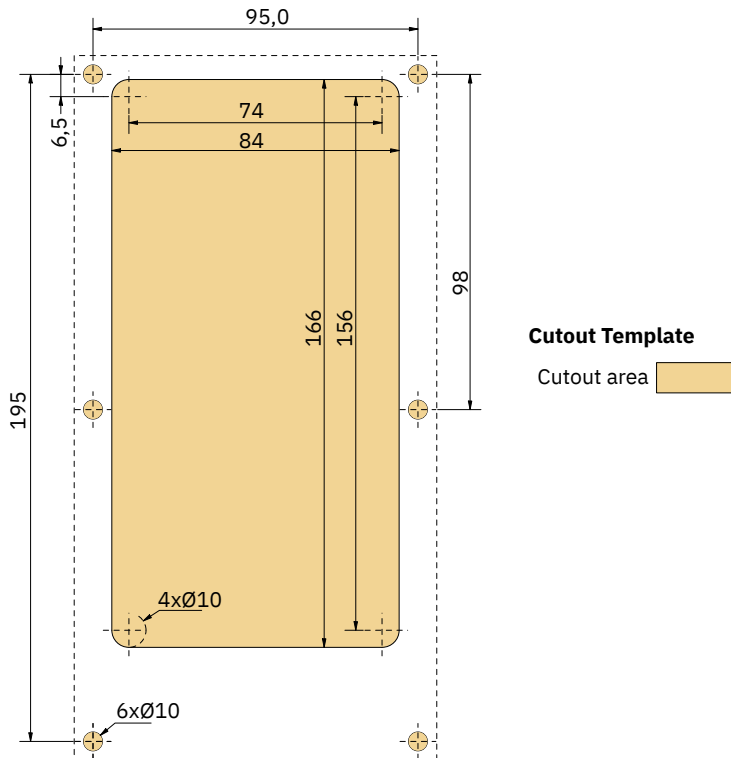
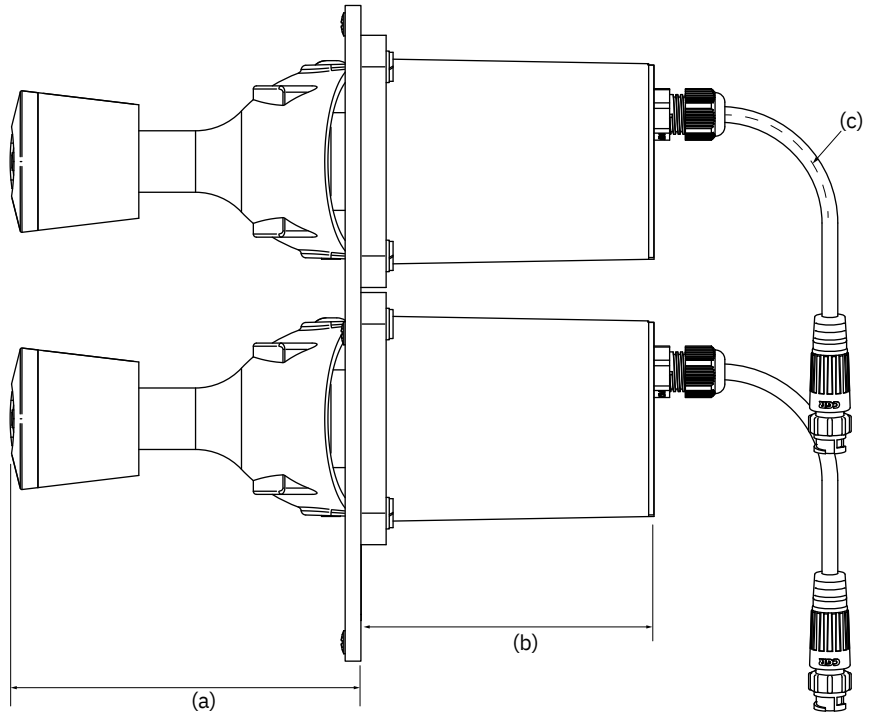
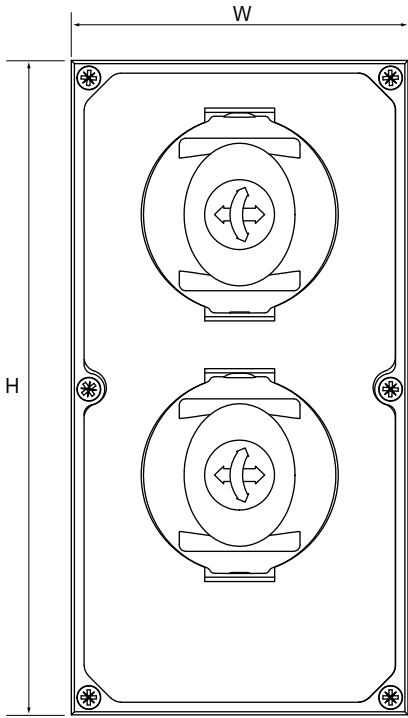


Cutout Template
Cutout area

1. Place the supplied cut-out template on the desired installation location.
2. Cut out the area according to the template.
3. Plug cable from joystick into the cable coming from TP-35 (X1 Joystick).
4. Insert the joystick and fasten with screws.



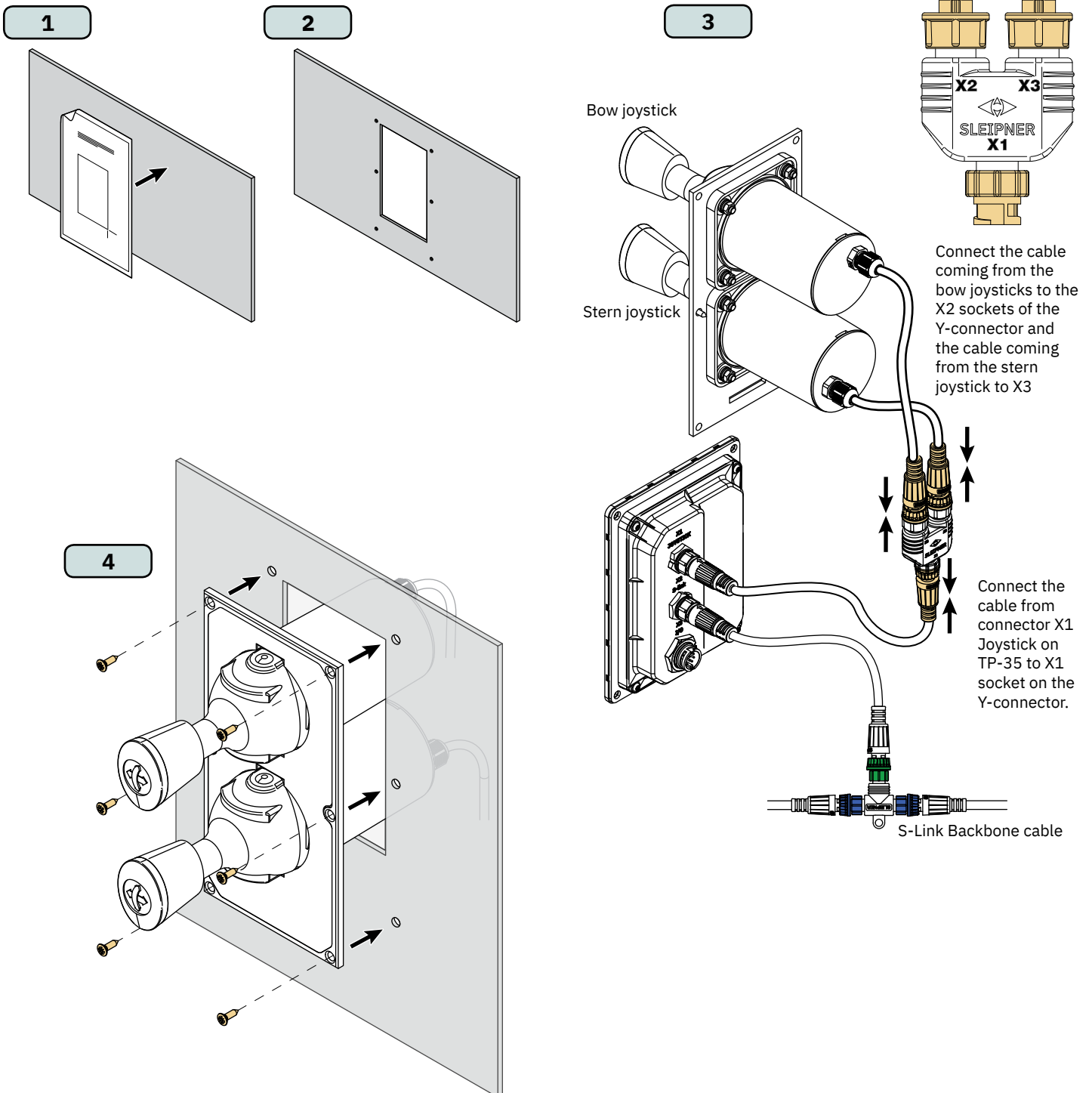
Measurement code	Measurement description	PJC422	
		mm	inch
H	Panel Height	206	8.1
W	Panel width	106	4.2
(a)	Raised height above the dashboard	111.3	4.4
(b)	Depth behind the dashboard (not inc. cables)	94.7	3.7
(c)	Cable bend radius	35	1.4



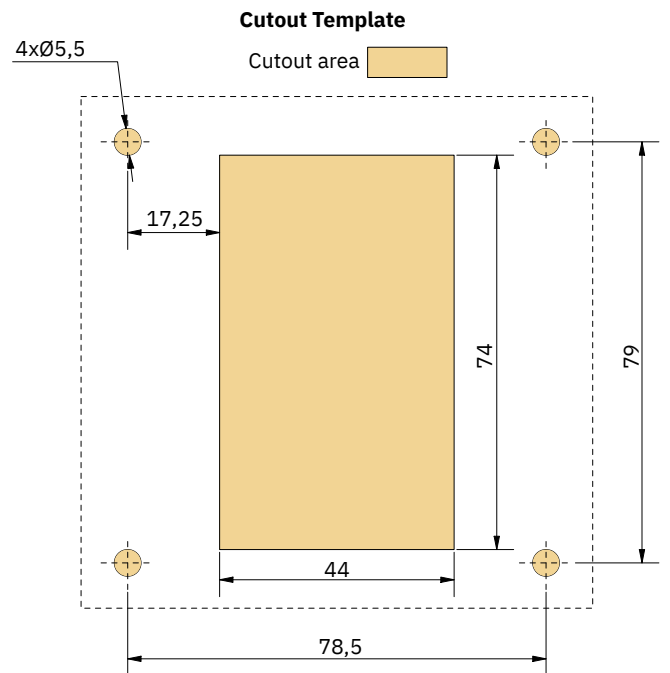
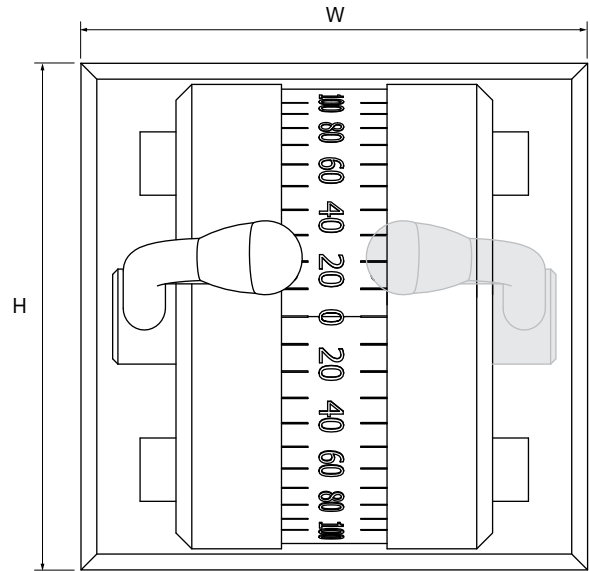
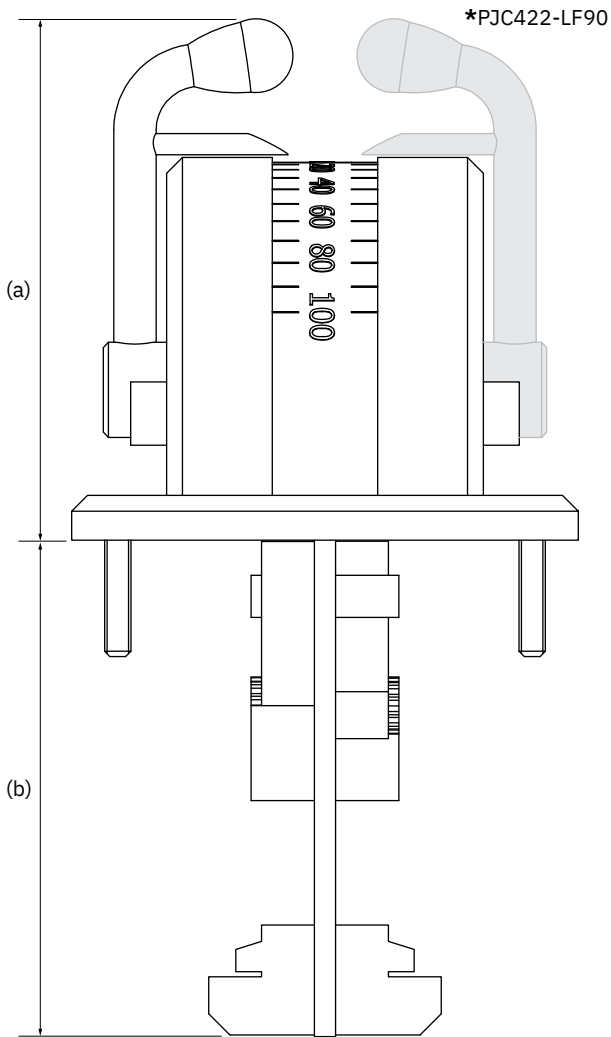
1. Place the supplied cut-out template on the desired installation location.
2. Cut out the area according to the template.
3. If not already attached, connect both cables from the joystick to the upper sockets of the Y-connector. Please note that these cables can be attached in any arrangement to the two upper sockets. However, swapping these cables will also change which joystick operating the bow and stern thruster. Selecting which joystick to control the bow and stern thruster can also be done by performing a joystick calibration. See chapter *Joystick Settings* for more information.

Connect the cable coming from TP-35 (X1 Joystick) to the lower socket of the Y-connector.

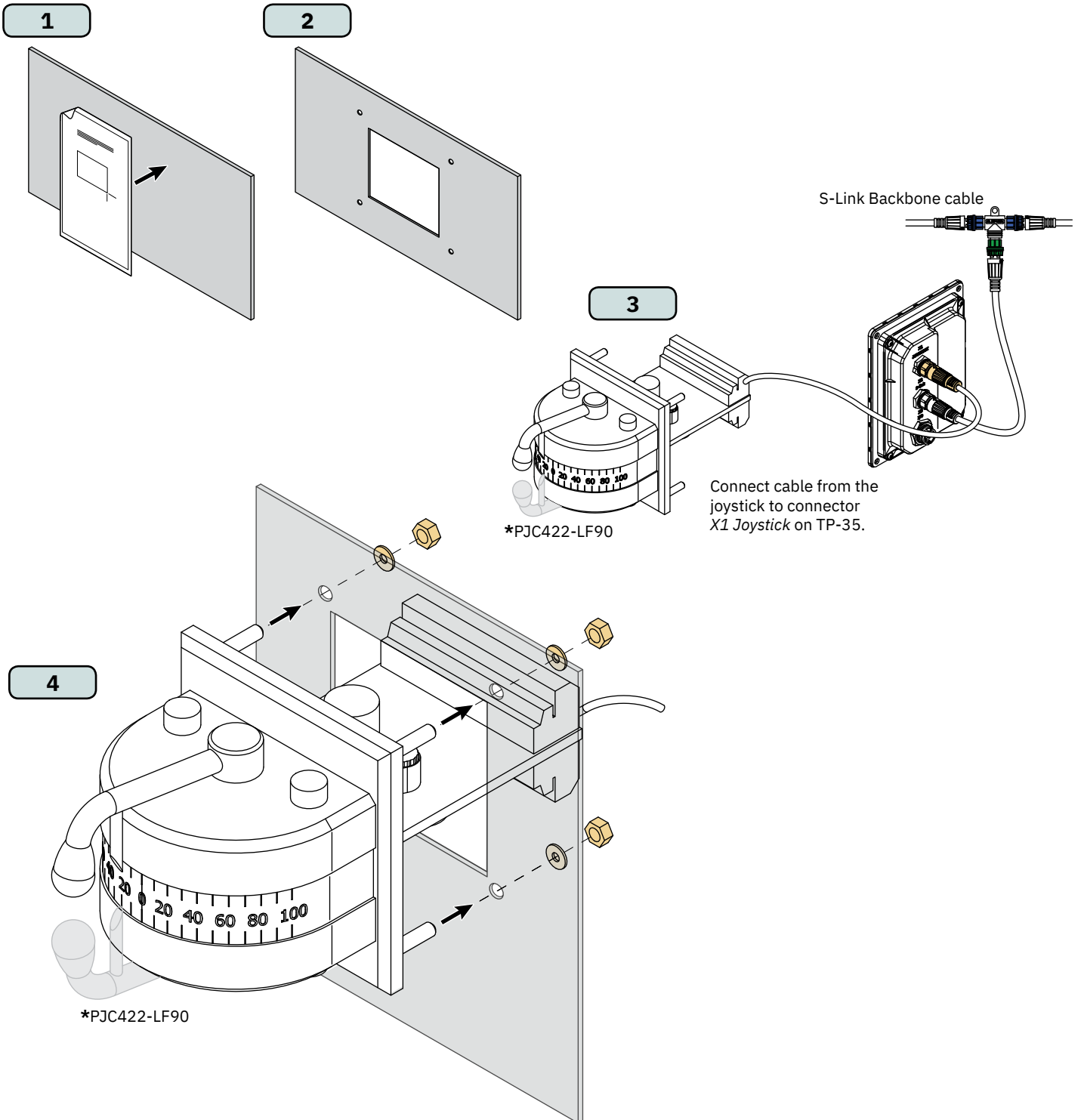
4. Insert the joystick and fasten with screws.



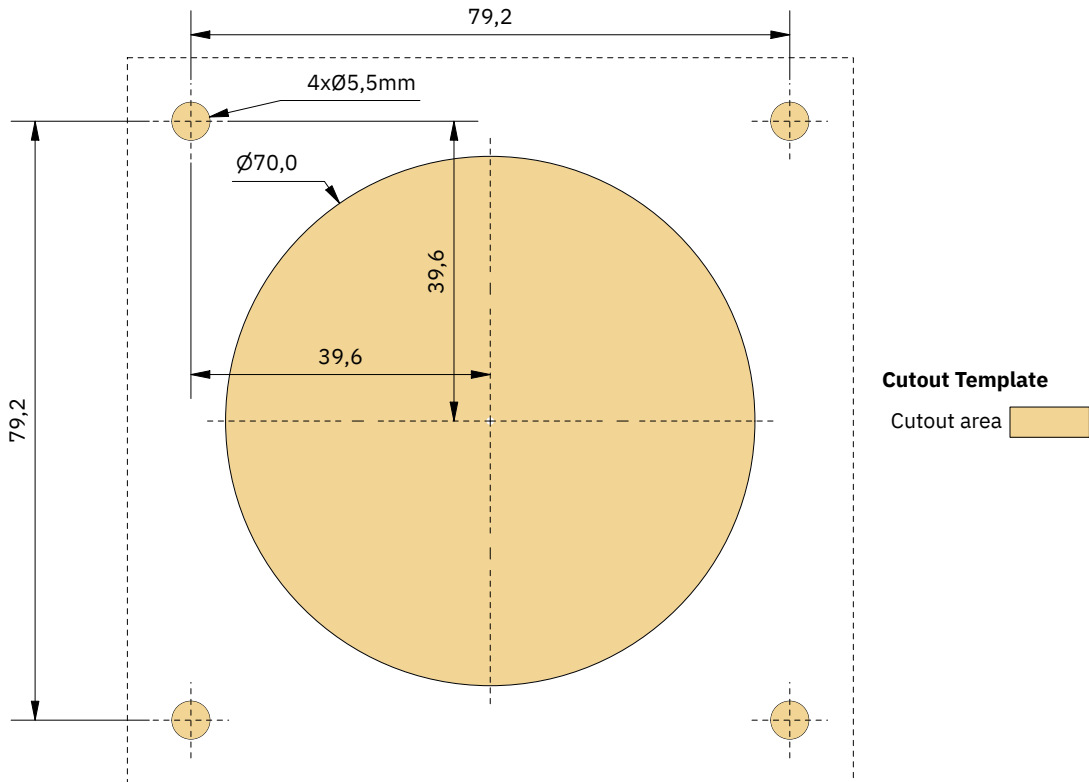
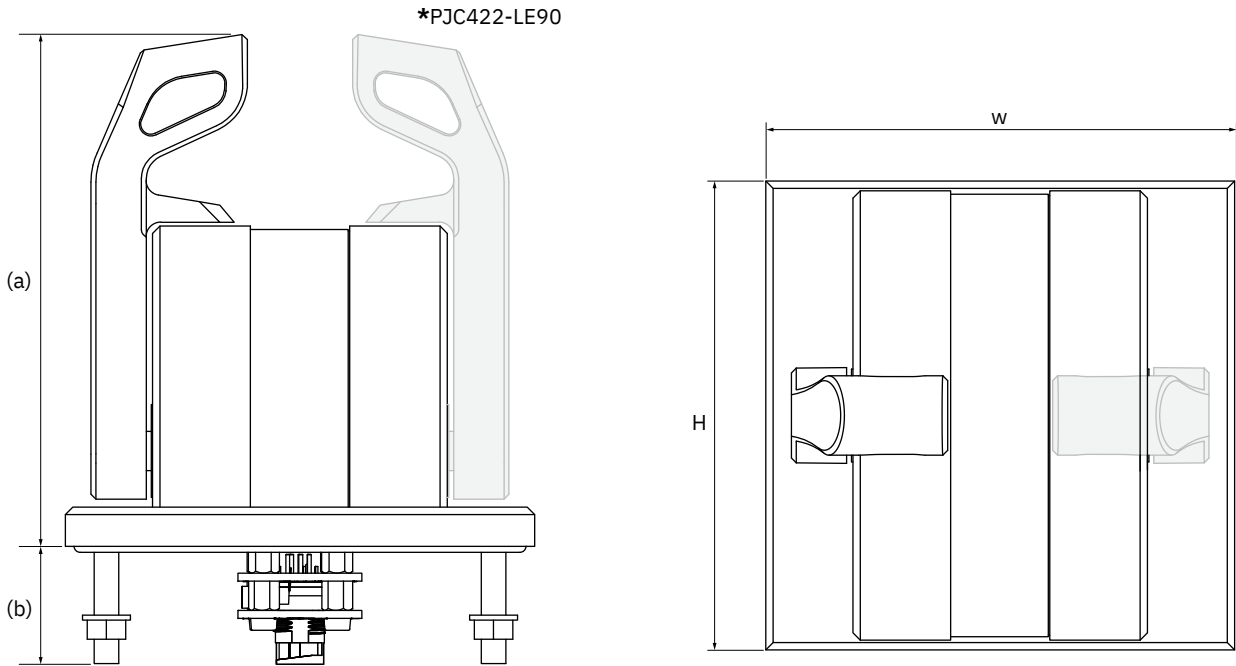
Measurement code	Measurement description	PJC421 LF90/-DNV		PJC422 LF90/-DNV	
		mm	inch	mm	inch
H	Panel Height	96	3.8	96	3.8
W	Panel width	96	3.8	96	3.8
(a)	Raised height above the dashboard	98.8	3.9	98.8	3.9
(b)	Depth behind the dashboard (not inc. cables)	94	3.7	94	3.7



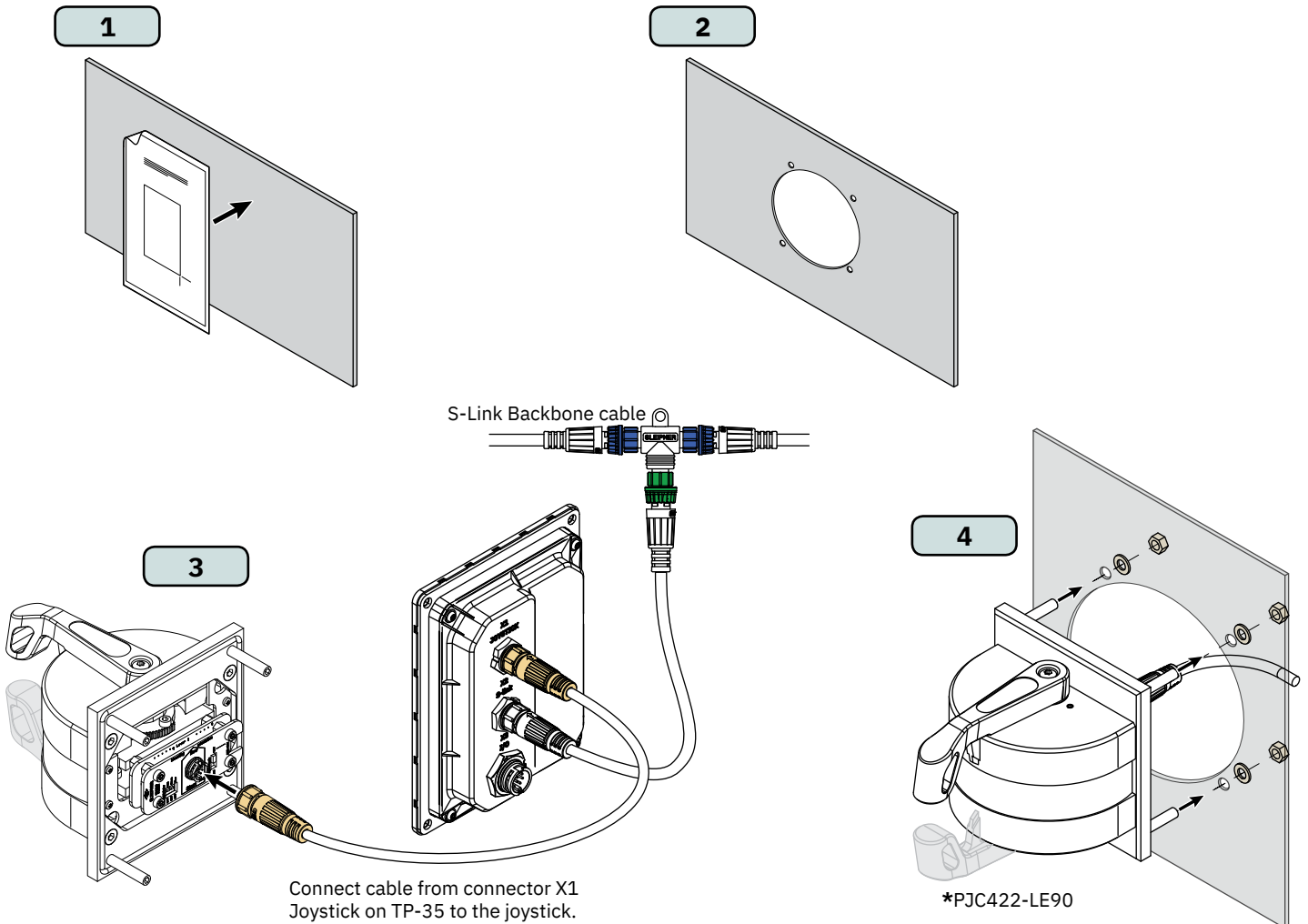
1. Place the supplied cut-out template on the desired installation location.
2. Cut out the area according to the template.
3. Plug the cable coming from the joystick into the *X1 Joystick* connector on TP-35.
4. Insert the joystick in place and fasten screws.



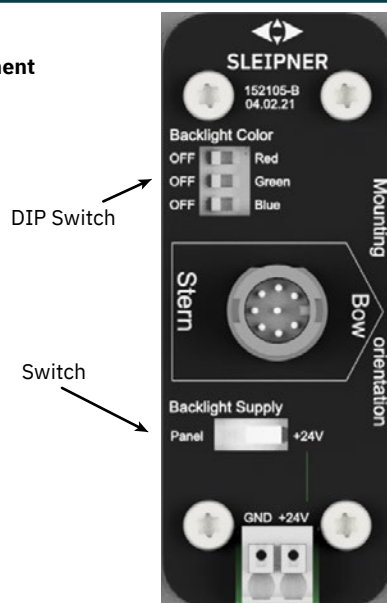
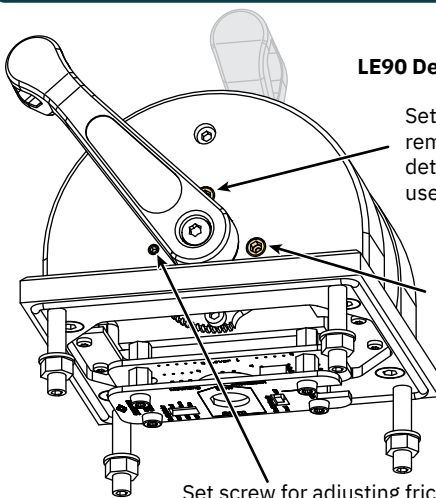
Measurement code	Measurement description	PJC421 LE90/-DNV		PJC422 LE90/-DNV	
		mm	inch	mm	inch
H	Panel Height	96	3.8	96	3.8
W	Panel width	96	3.8	96	3.8
(a)	Raised height above the dashboard	104.7	4.1	104.7	4.1
(b)	Depth behind the dashboard (not inc. cables)	17.2	0.7	17.2	0.7



1. Place the supplied cut-out template on the desired installation location.
2. Cut out the area according to the template.
3. Plug the cable coming from the X1 Joystick connector on TP-35 into the connector on the back of the joystick.
4. Insert the control panel in place and fasten screws.



PJC421-LE90 and PJC422-LE90 Configuration



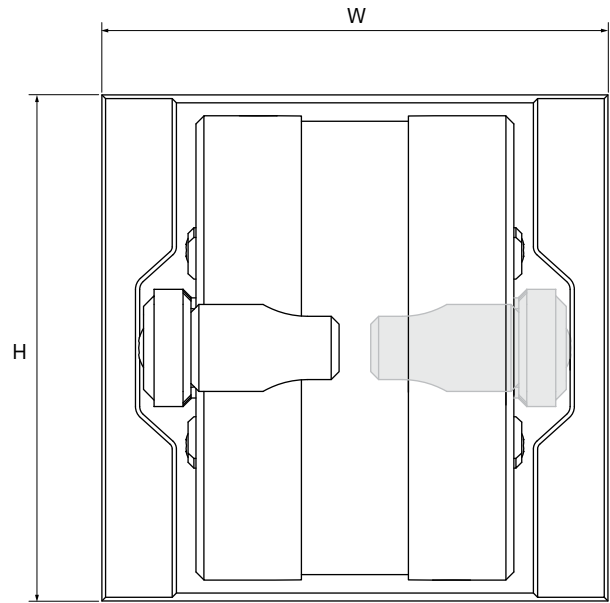
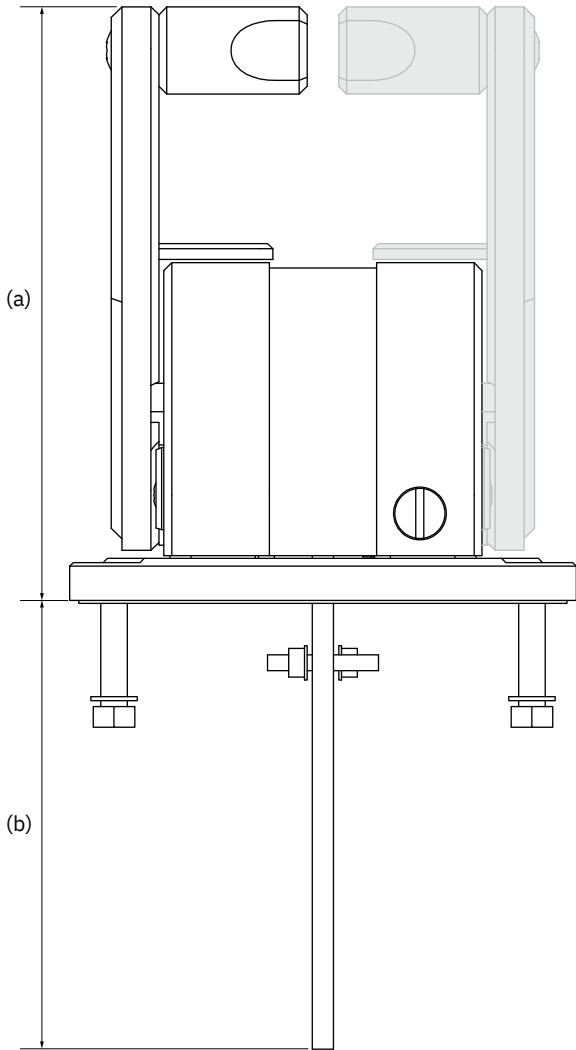
LE90 Backlight configuration

Use DIP switch to set back light color of LE90. Turning ON all three colours enables white light.

Use switch to configure power source for LE90 backlight. Choose "Panel" to power backlight from TP-35. The backlight intensity can then be controlled from TP-35. Choose +24V to power backlight from terminal block connection. This is typically used on installations with a common bridges backlight control.

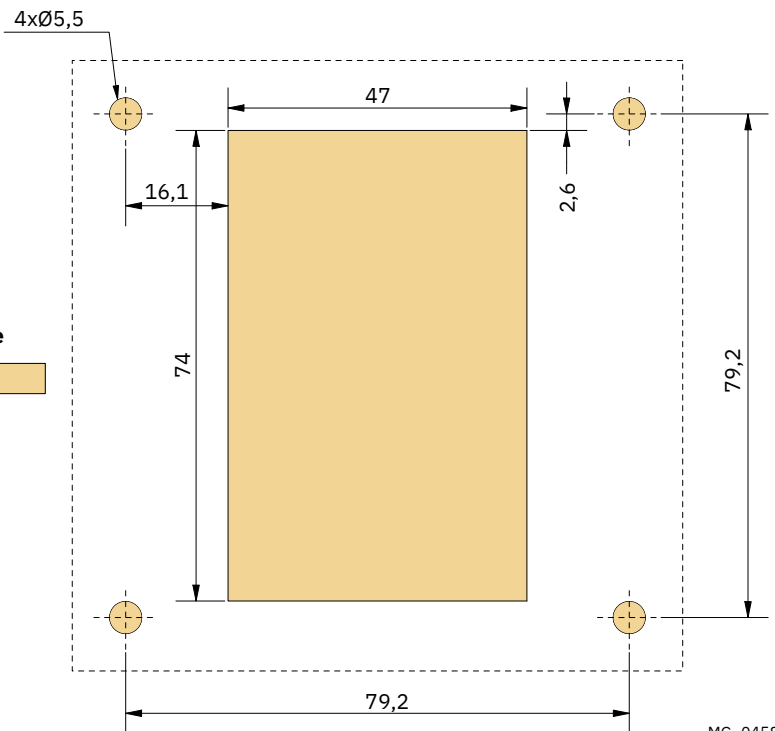
Measurement code	Measurement description	PJC421 LF90X/-DNV		PJC422 LF90X/-DNV	
		mm	inch	mm	inch
H	Panel Height	96	3.8	96	3.8
W	Panel width	96	3.8	96	3.8
(a)	Raised height above the dashboard	112.5	4.4	112.5	4.4
(b)	Depth behind the dashboard (not inc. cables)	85	3.3	85	3.3

*PJC422-LF90X



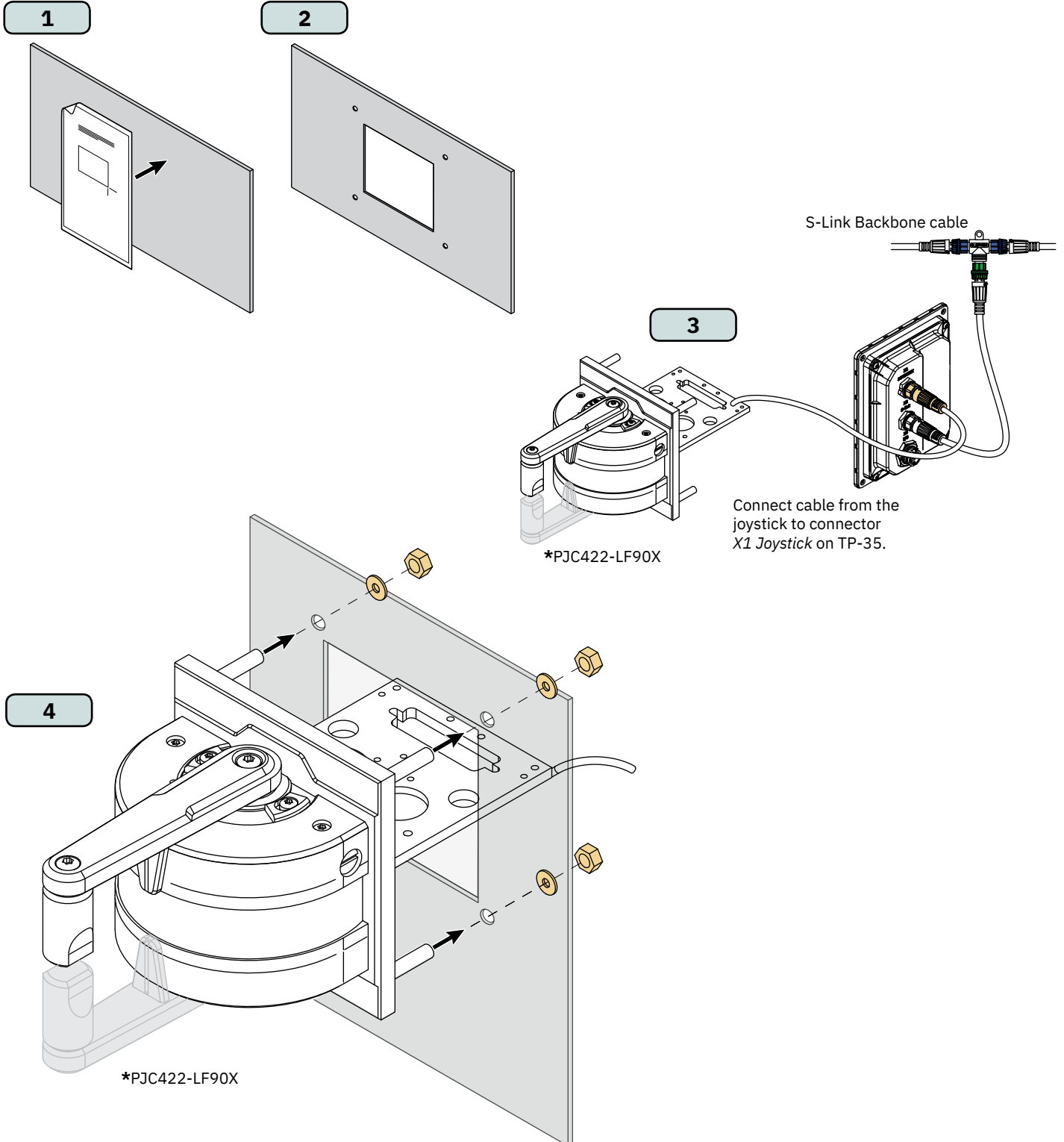
Cutout Template

Cutout area



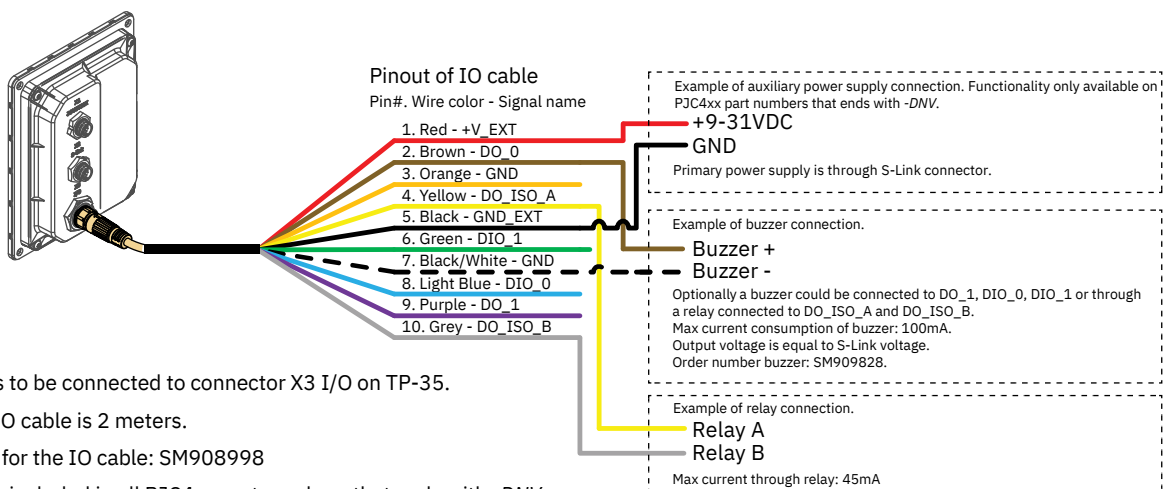
MG_0458

1. Place the supplied cut-out template on the desired installation location.
2. Cut out the area according to the template.
3. Plug the cable coming from the joystick into the *X1 Joystick* connector on TP-35.
4. Insert the control panel in place and fasten screws.



Description	Value	Comment
Available interfaces	X1 Joystick -1x +12V/+5V to joystick -1x AGND -2x analog inputs -2x digital input -1x +5V to joystick LED -1x LIN data	8 pin, male connector Max current drawn on: +12V to joystick - 40mA* +5V to joystick - 40mA* +5V to joystick LED - 80mA**
	X2 S-Link -Vin -GND -CANH -CANL	5 pin, S-Link male connector
	X3 IO -2x digital output -2x digital IO -2x GND -1x DO_ISO_A -1x DO_ISO_B -1x Vin Ext -1x GND Ext	10 pin, male connector Digital out signals on DO_0, DO_1, DIO_0 and DIO_1 are only available when TP-35 is powered through the S-Link interface. Digital out puts are high side drivers. DO_ISO_A and DO_ISO_B is an isolated relay output.
Output voltage on digital output pins	Same as supply voltage	
Max total current drawn on digital output pins	100mA	
Max current drawn on one digital output pin	100mA	
Max current drawn thru isolated relay output	45mA	DO_ISO_A and DO_ISO_B
IO protection	31VDC and 0VDC	All accessible IOs tolerate connection to GND and the same voltage as the used supply voltage, maximum +31V.
Voltage level digital input	High = >4.5 VDC Low = <0.5 VDC	

*Intended for joystick potentiometers
**Intended for joystick backlight



The IO cable is to be connected to connector X3 I/O on TP-35.
Length of the IO cable is 2 meters.
Order number for the IO cable: SM908998
The IO cable is included in all PJC4xx part numbers that ends with -DNV.

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.

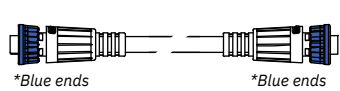
Installation of S-Link cables:

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.

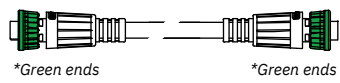
The POWER Cable should ideally be connected around the middle of the BACKBONE bus to ensure an equal voltage drop at each end of the BACKBONE Cable. The yellow and black wire in the POWER Cable shall be connected to GND and the red wire connected to +12VDC or +24VDC.

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.

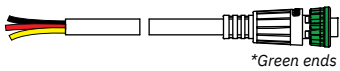
SPUR cables can be left unterminated to prepare for the installation of future additional equipment. In such cases, ensure to protect open connectors from water and moisture to avoid corrosion in the connectors.



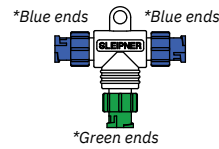
BACKBONE Cable
Forms the communication and power bus throughout a vessel. Available in different standard lengths.



SPUR Cable
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.



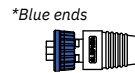
POWER Cable
Required in all installations for connection of BACKBONE Cable to a power supply and should be protected with a 2A fuse.



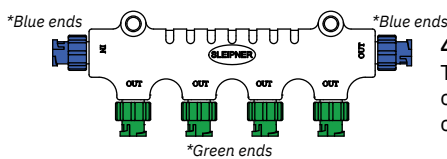
T-Connector
Used for connection of SPUR or POWER Cable to the BACKBONE Cable. One T-Connector for each connected cable.



BACKBONE Extender
Connects two BACKBONE Cables to extend the length.

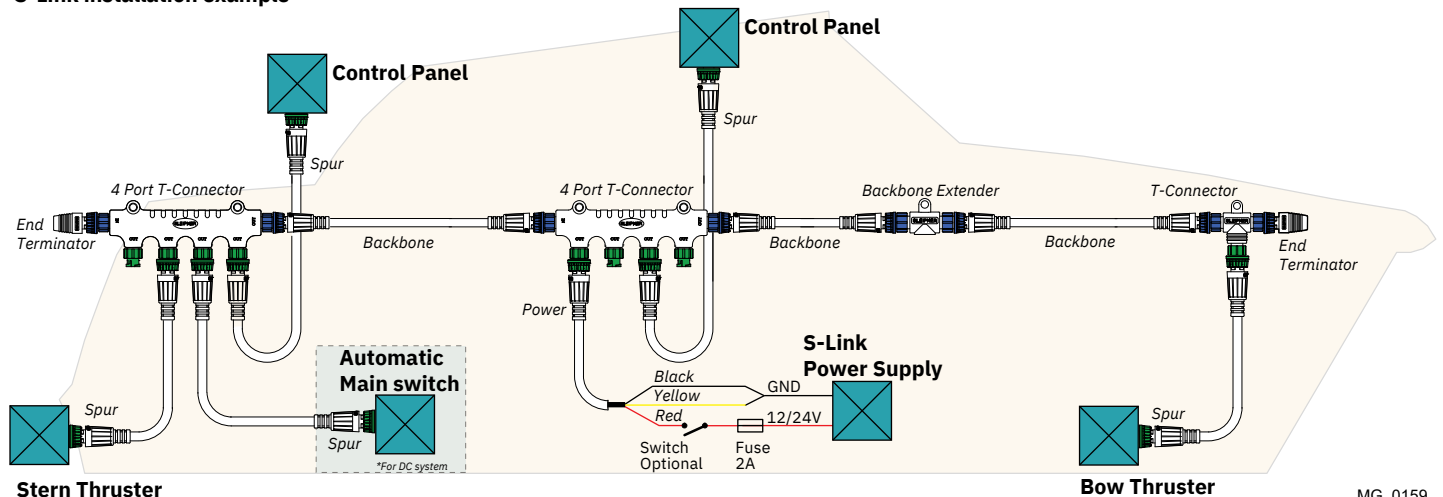


END Terminator
Must be one at each end of the BACKBONE bus.



4-Port T-Connector
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



Find your local professional dealer from our certified worldwide network for expert service and support. visit our website www.sleipnergrouper.com/support

Product Spare Parts and Additional Resources

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

Warranty statement

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.sleipnergrouper.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

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.sleipnergrouper.com/patents


CE Declaration of conformity (DoC)

We, The Manufacturer:	Sleipner Motor AS Arne Svendsens gate 6-8, NO 1612 Fredrikstad, Norway		
With ISO 9001 certificate:	1484-2007-AQ-NOR-NA, issued by DNV-GL		
Declare that the product:			
Product Description: Thruster Proportional Joystick Control			
Model Numbers:			
PJC421-PVREL	PJC421-LE90	PJC421-LF90X	PJC421-LF90
PJC421-PVREL-DNV	PJC421-LE90-DNV	PJC421-LF90X-DNV	PJC421-LF90-DNV
PJC422-PVREL	PJC422-LE90	PJC422-LF90X	PJC422-LF90
PJC422-PVREL-DNV	PJC422-LE90-DNV	PJC422-LF90X-DNV	PJC422-LF90-DNV
Subject to installation, maintenance and use conforming to their intended purpose, is in conformity with the provisions of the following EU Directives:			
<ul style="list-style-type: none"> • Radio equipment - Directive 2014/53/EU • Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) - Directive 2011/65/EC 			
The product is tested to meet the standards and criteria outlined in:	Radio	EN 300328 V2.1.1	
	EMC	EN 60945:2002 IEC 60533:2015 EN 301489-1 V2.2.0 EN301489-17 V3.2.0	
	Safety	EN609501:2006 /A11:2009/A1:2010/A12:2011/A2:2013 EN 62311:2008 EN 62368-1 2020	
	RoHS	EN 63000:2018	

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.

Fredrikstad, 28th of April 2022

Ronny Skauen, President and CEO



UK Declaration of conformity (DoC)

We, The Manufacturer:	Sleipner Motor AS Arne Svendsens gate 6-8, NO 1612 Fredrikstad, Norway		
With ISO 9001 certificate:	1484-2007-AQ-NOR-NA, issued by DNV-GL		
Declare that the product:			
Product Description: Thruster Proportional Joystick Control			
Model Numbers:			
PJC421-PVREL	PJC421-LE90	PJC421-LF90X	PJC421-LF90
PJC421-PVREL-DNV	PJC421-LE90-DNV	PJC421-LF90X-DNV	PJC421-LF90-DNV
PJC422-PVREL	PJC422-LE90	PJC422-LF90X	PJC422-LF90
PJC422-PVREL-DNV	PJC422-LE90-DNV	PJC422-LF90X-DNV	PJC422-LF90-DNV
Subject to installation, maintenance and use conforming to their intended purpose, is in conformity with the provisions of the following UK Regulations:			
<ul style="list-style-type: none"> • Radio Equipment Regulations 2017 • The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations - 2012 			
The product is tested to meet the standards and criteria outlined in:	Radio EN 300328 V2.1.1 EMC EN 60945:2002 IEC 60533:2015 EN 301489-1 V2.2.0 EN301489-17 V3.2.0 Safety EN609501:2006 /A11:2009/A1:2010/A12:2011/A2:2013 EN 62311:2008 EN 62368-1 2020 RoHS EN 63000:2018		

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.

Fredrikstad, 28th of April 2022

Ronny Skauen, President and CEO



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Learn more about our products at
www.sleipnergroun.com



SLEIPNER GROUP

P.O. Box 519

N-1612 Fredrikstad

Norway

www.sleipnergroun.com

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