![SLEIPNER logo] SLEIPNER
Ocean born. Tech bred.

User Manual
Including Installation Guide for Control Panels
PJC421 & PJC422

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LANGUAGE: EN

Contents

It is essential to follow all instructions within this document to avoid potential personal injury, death, or damage to existing products in the vessel, the vessel's hull integrity, and including this product during installation or operation. Failure to follow instructions within this document will render all warranties given by Sleipner Motor as VOID.

Warnings and situations requiring extra caution are outlined in the documentation. Take extra consideration when warnings are outlined.

> ⚠️ **WARNING**
> **Indicate a potentially hazardous situation that, if not avoided, could result in death or severe injury.**

> ⚠️ **CAUTION**
> Indicates a potentially hazardous situation that could result in minor or moderate injury or critical damage to vessel integrity if not avoided.

General Operation Consideration and Precaution Guidelines   MC_0444

For the operation of Sleipner thrusters systems: MC_0418

- When not in use or when leaving the boat, turn the control device off.

- When leaving the boat, always turn off the main power switch for the thruster.

- Never run the thruster while out of water.

- Stop running the thruster and turn it off if the thruster stops giving thrust while running. Running the thruster for more than a few seconds without resistance from the propeller can cause severe damage to the thruster drive components.

- The thruster will not run if two conflicting directions are input in two control panels simultaneously.

- 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.

> ⚠️ **WARNING**
> **Never use thrusters close to objects, persons, or animals in the water. The thruster will draw objects into the tunnel, as well as the rotating propellers. Contact with the rotating propellers will cause severe injuries and damage to the thruster.**
>
> **Turn off the main power switch before touching any part of the thruster. An incidental start while touching moving parts can cause serious injuries.**
>
> **Always plan on how to avoid damage to persons or other objects if the thruster stops giving thrust for while manoeuvring.**

PJC4 series

Control your thrusters with PJC4 – 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.

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
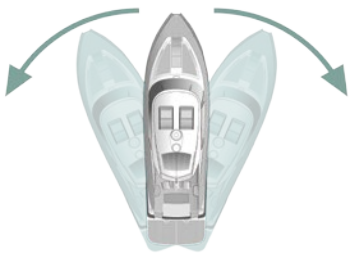
Activating the stern thruster

Stern thruster installation only
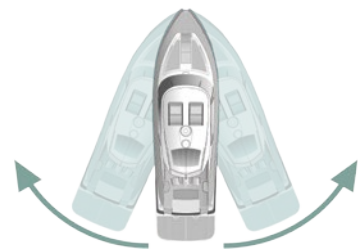
Activating both bow and stern thruster to push the boat sideways
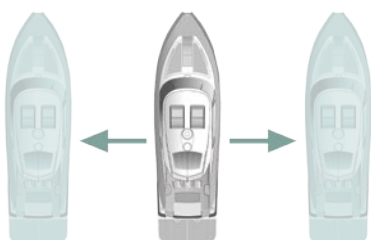
Activating both bow and stern thruster to rotate the boat on axis

MG_0459
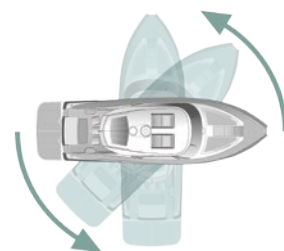
Parameter	Specification		
Supply Voltage	Min +9VDC	Typical +12VDC/+24VDC	Max +31VDC
Rated max input power X2 S-Link	4.5W		
Rated max input power X3 I/O	1.3W		
Rated power in off state X2 S-Link	0.65W		
Environmental testing	DNV-CG-0339 IACS E10 IEC 60945 IEC 60092-504 ABYC S-31		
EMC	IEC 60945:2002 IEC 60533:2015		
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		
Vibration	5-13.2 Hz ±1.0mm 13.2-100 Hz ±0.7g IEC 60068-2-6, test Fc		
Damp heat	+55°C, 95% humidity IEC 60068-2-30, test Db		
Salt mist	Method 1 IEC 60068-2-52, test Kb		
Compass Safe Distance	0.2m IEC 61000-4-8:2010 ISO 25862: 2009		
Internal buzzer sound level	Typical 76dB when installed. Dependant on installation. IEC 60945:2002		
External buzzer sound level	Typical 76dB with Sleipner buzzer installed. Dependant on buzzer type and installation. 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.

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 directly by scanning this QR code:

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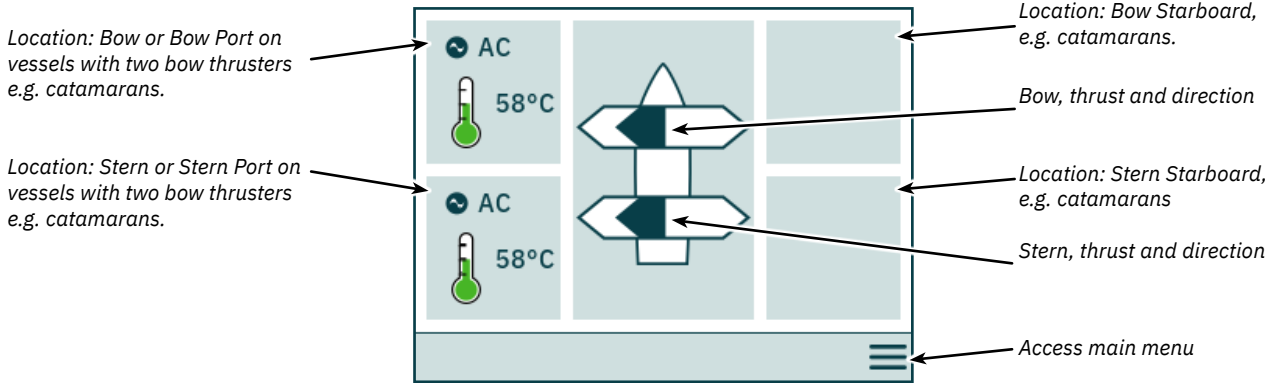Thrusters can be operated when the dashboard view is active. The only two other views that allow thruster operation is when the backlight menu is accessed from the ON/OFF button and when the Alarm List is displayed.

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.

Location: Bow or Bow Port on vessels with two bow thrusters e.g. catamarans.

Location: Stern or Stern Port on vessels with two bow thrusters e.g. catamarans.

Location: Bow Starboard, e.g. catamarans.

Bow, thrust and direction

Location: Stern Starboard, e.g. catamarans

Stern, thrust and direction

Access main menu

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.

AC Thruster	DC Thruster	Hydraulic thruster

Thruster type — *Measured motor temperature* — *Motor temperature indicator* — 58°C

Thruster type — *Battery capacity indicator* — *Motor temperature indicator*

Thruster type — *Measured hydraulic oil temperature* — *Hydraulic oil temperature indicator* — 28°C
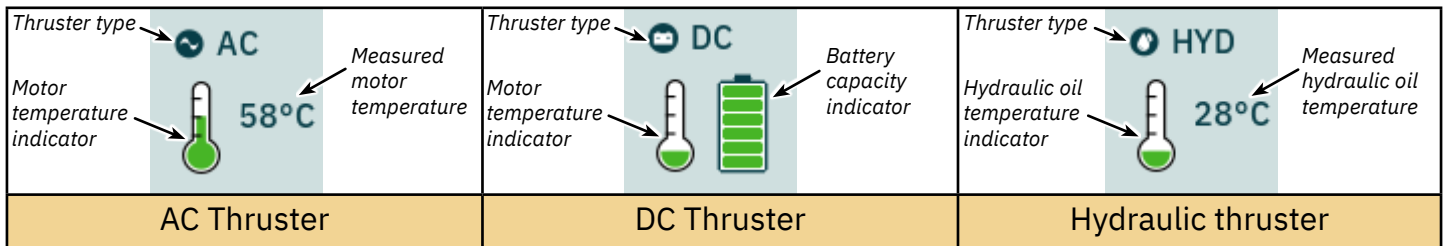
For hydraulic thrusters, the PHC-3 hydraulic controller can be used to control up to two hydraulic thrusters. Thus the dashboard shows only one hydraulic oil temperature symbol for installations where one PHC-3 hydraulic controller is used to control two thrusters.

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.

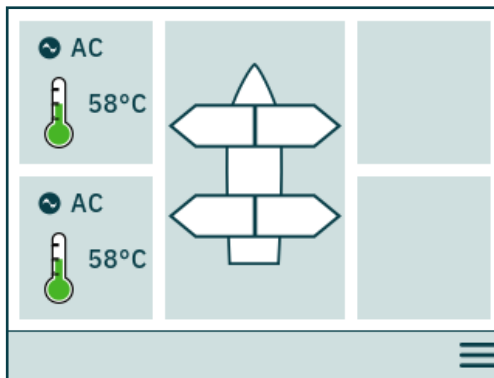**Operation with more than one Control Panel**

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.

Indication of thrust from joystick connected to remote panel

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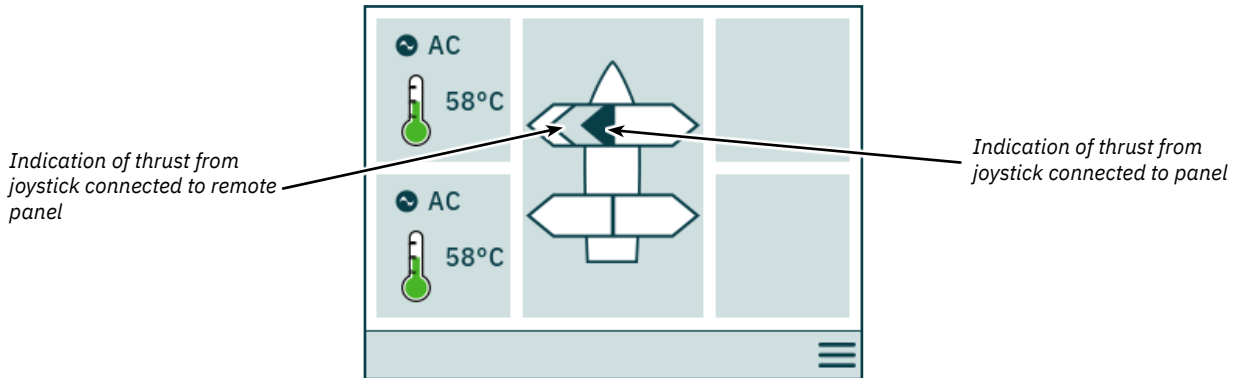
If joysticks are moved in the opposing direction on different control panels, the thruster will not respond. In such situations the panel will indicate no thrust, refer to image below. The thruster will not respond before one of the joysticks has returned to zero position.

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.
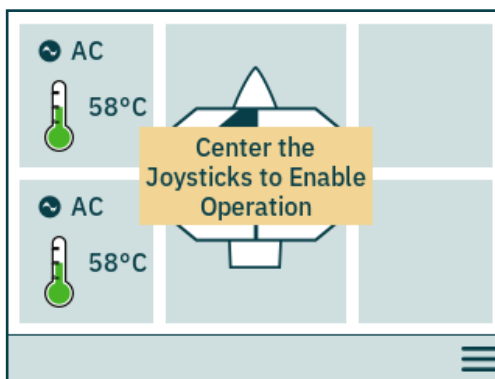
On PJC4xx models with part number ending on *-DNV,* alignment of levers can be disabled. When lever alignment is disabled there is no requirements of centring the joysticks when turning on the control panel or when exiting the main menu. See *Station Control Settings* section and *Control Panel - DNV Models* chapter for more information.

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 if fully deployed. Turning OFF the panel will fully retract the thruster.

Deploy symbol
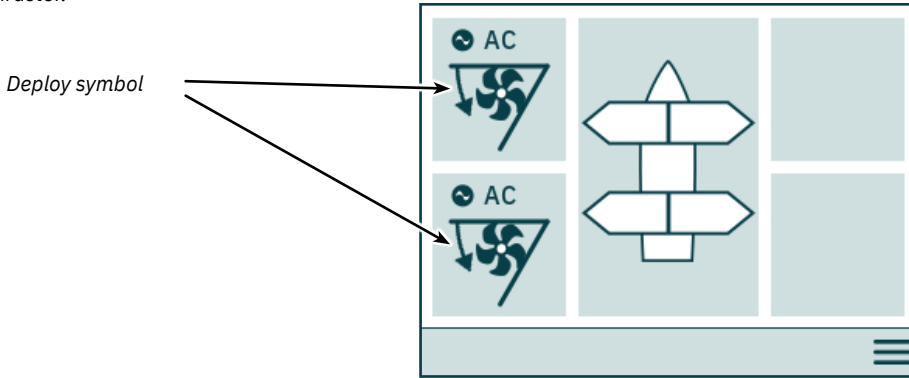
AC Thruster Power Management Status
Some vessels might not have AC power capabilities to run all consumers simultaneously. Such vessels typically use a power management system to control at which time different consumers can be operated. Due to other consumers having higher priority, power to the AC 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 second after turning the control panel ON.

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

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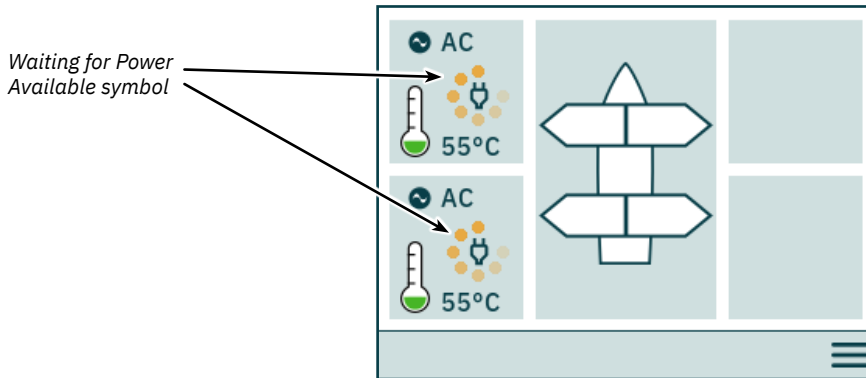
Inaccessible menu options
Some menu options might not be accessible on all product variants and a license code might be needed to enable these options. Inaccessible menu options will be displayed with greyed out text and graphics.

Inaccessible menu option

Scrollbar indicates menu items outside of the screen
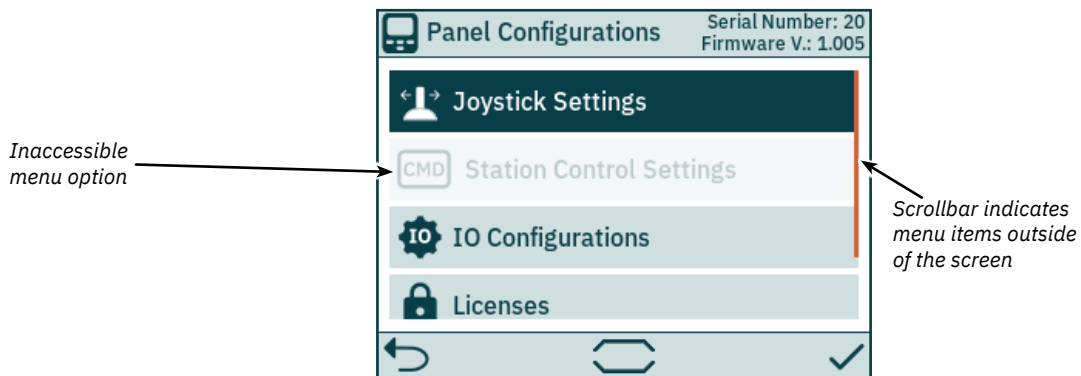
Device Configuration

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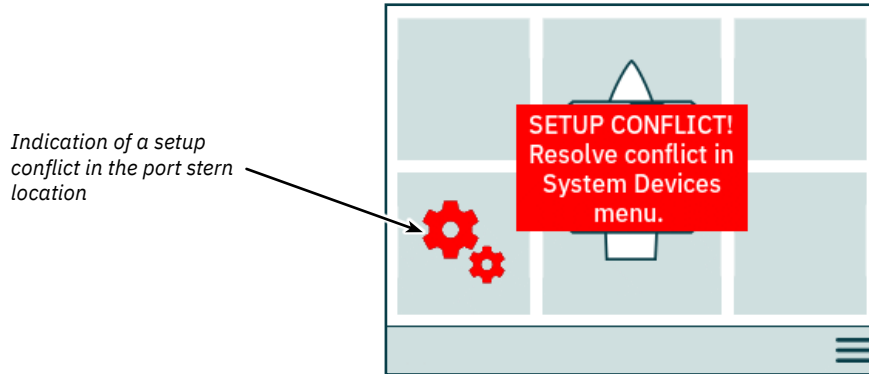
The image below shows an example of a setup conflict where more than one thruster controller has been configured to the port stern location.

Indication of a setup conflict in the port stern location

Adjustment of Backlight Level

Press and release the ON/OFF button to activate the backlight level adjustment menu. The backlight level adjustment menu can only be accessed from the Dashboard View. Note that 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 level can also be adjusted with 1% resolution using the slide bar on the touch screen. After 3 seconds of inactivity the backlight adjustment menu automatically closes.

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%.

Indication of configured backlight level in %

Sliding bar for adjustment of backlight level
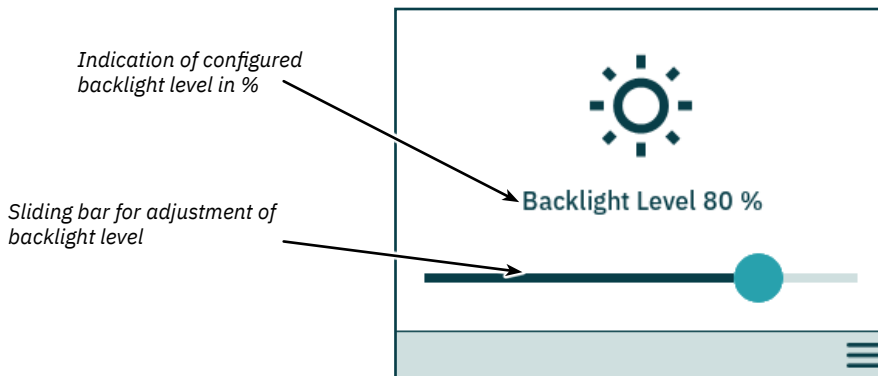
Backlight Level 80 %

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.
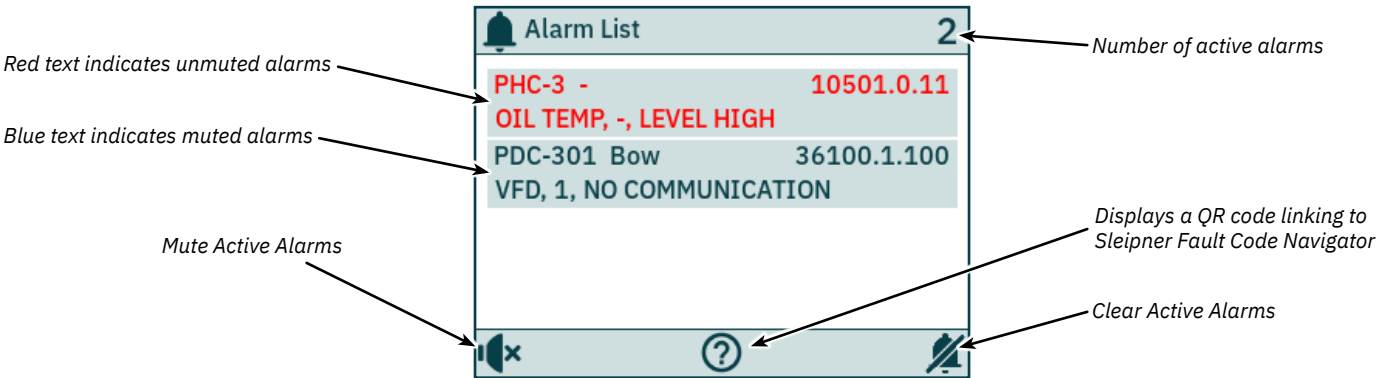

Red flashing background

Access Alarm List
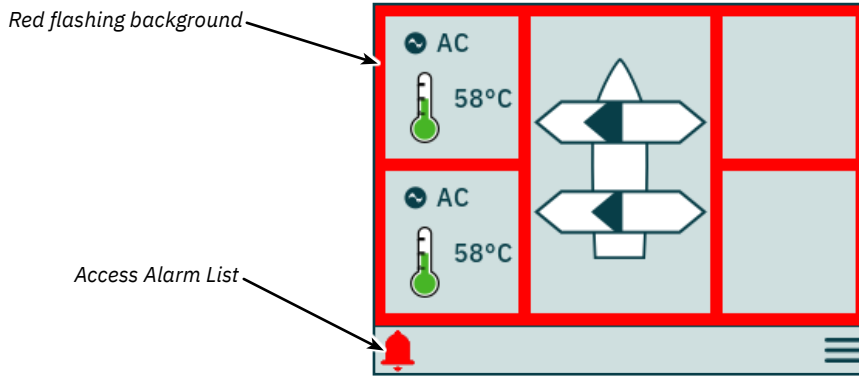
🔔	Show list of active alarms.

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.

Red text indicates unmuted alarms

Blue text indicates muted alarms

Mute Active Alarms

Number of active alarms

Displays a QR code linking to Sleipner Fault Code Navigator

Clear Active Alarms

PDC-301 Bow Starboard 36100.1.100 VFD, 1, NO COMMUNICATION	Selecting an alarm in the alarm list will display UTC time for when the alarm was triggered. See *Time Tagging of Alarms* section for details.
🔇	Mute audible alarm signal.
❓	Displays a QR code linking to Sleipner Fault Code Navigator. Refer to chapter Fault Code Navigator for more information.
🔕	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.

Muted alarms

Return to dashboard view

Number of active alarms

Displays a QR code linking to Sleipner Fault Code Navigator

Clear Active Alarms

Alarm List   **2**

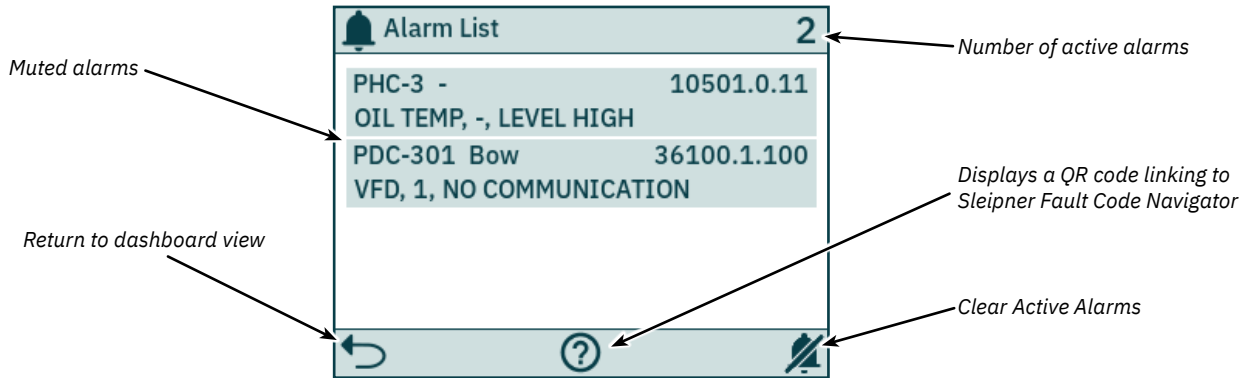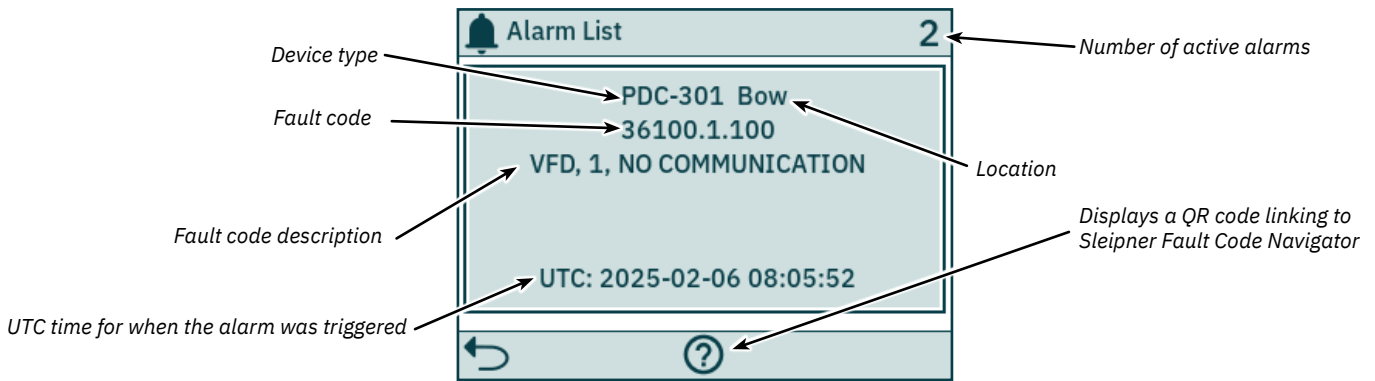| PHC-3 - | 10501.0.11 |
OIL TEMP, -, LEVEL HIGH	
PDC-301 Bow	36100.1.100
VFD, 1, NO COMMUNICATION	

PDC-301 Bow Starboard 36100.1.100 VFD, 1, NO COMMUNICATION	Selecting an alarm in the alarm list will display UTC time for when the alarm was triggered. See *Time Tagging of Alarms* section for details.
↩	Return to the dashboard view
?	Displays a QR code linking to Sleipner Fault Code Navigator. Refer to chapter Fault Code Navigator for more information.
🔇	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.

Device type

Fault code

Fault code description

UTC time for when the alarm was triggered

Number of active alarms

Location

Displays a QR code linking to Sleipner Fault Code Navigator

Alarm List   **2**

PDC-301 Bow
36100.1.100
VFD, 1, NO COMMUNICATION

UTC: 2025-02-06 08:05:52

↩	Return to the alarm list
?	Displays a QR code linking to Sleipner Fault Code Navigator. Refer to chapter Fault Code Navigator for more information.

Immediate Stop Alarm

Pushing the STOP button on a TP-35 that is turned on, sends a *STOP* message 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 on all Sleipner control panels that are turned ON. 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.
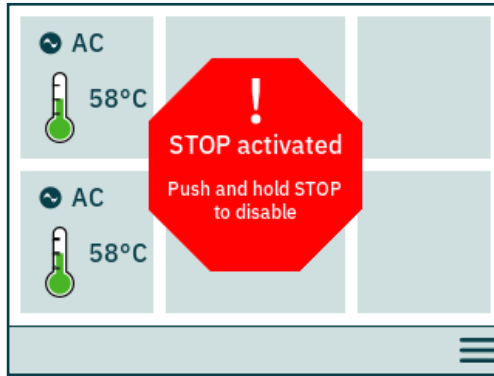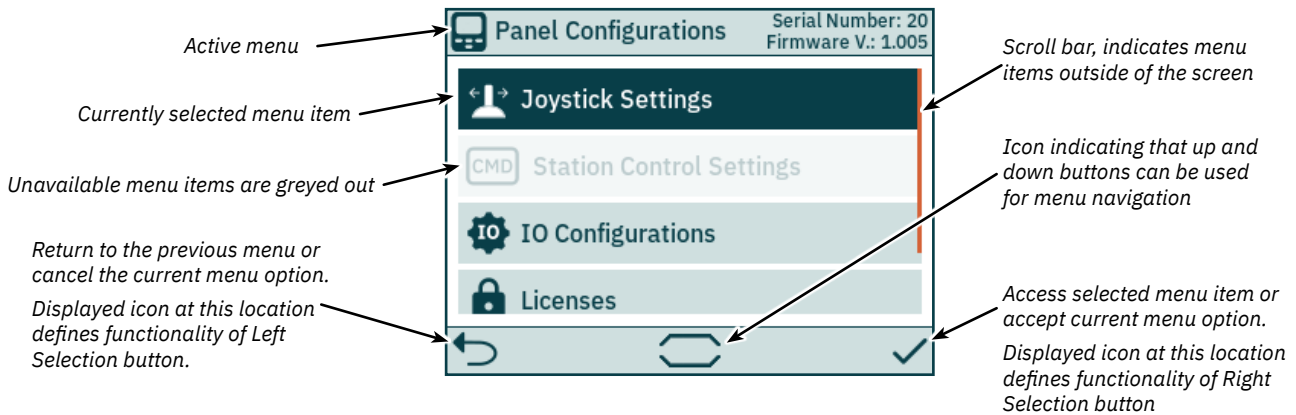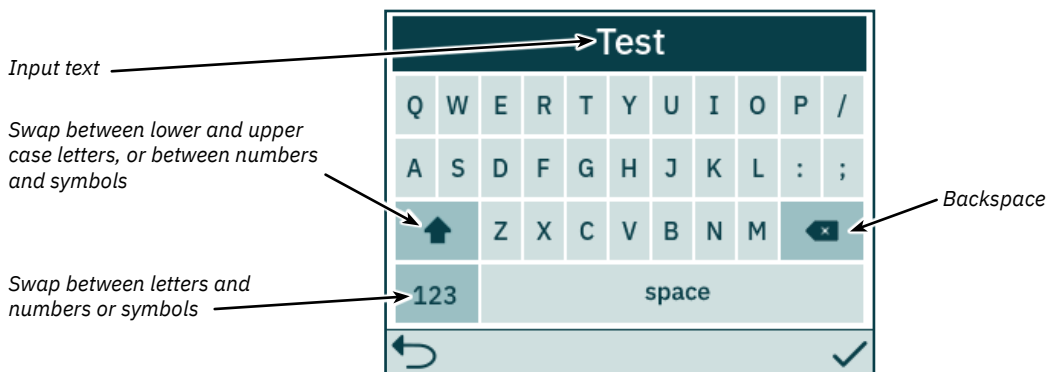
Menu Operation

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.
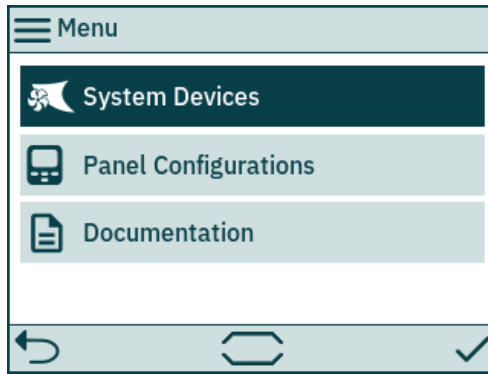
Active menu

Currently selected menu item

Unavailable menu items are greyed out

Return to the previous menu or cancel the current menu option.

Displayed icon at this location defines functionality of Left Selection button.

Scroll bar, indicates menu items outside of the screen

Icon indicating that up and down buttons can be used for menu navigation

Access selected menu item or accept current menu option.

Displayed icon at this location defines functionality of Right Selection button

Keyboard

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

Input text

Swap between lower and upper case letters, or between numbers and symbols

Backspace

Swap between letters and numbers or symbols

Main Menu

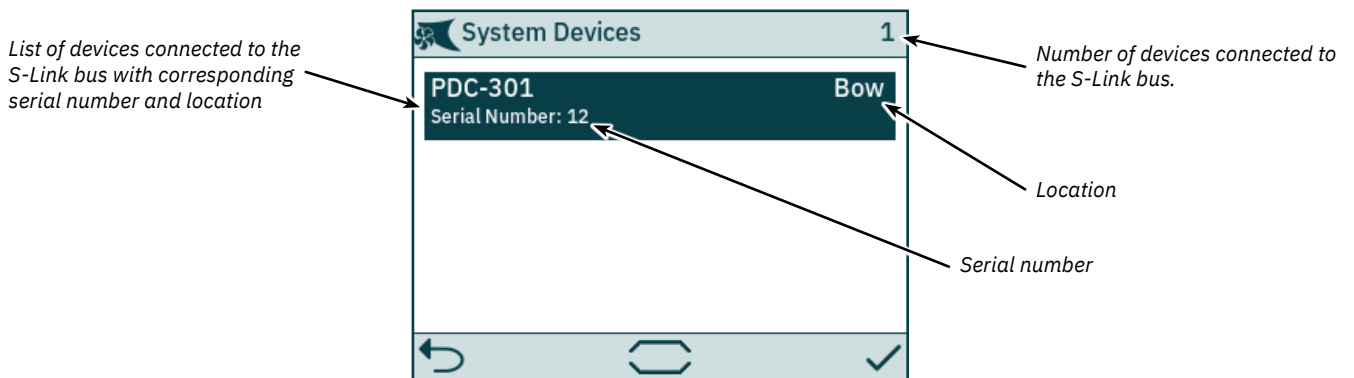| System Devices	Lists devices connected to the S-Link bus and enable configuration of listed devices.
Panel Configurations	Enables configuration of TP-35 behaviour and displays serial number and firmware version.
Documentation	Provides QR codes for easy access to the user manual and relevant documentation resources.

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*.

List of devices connected to the S-Link bus with corresponding serial number and location

Number of devices connected to the S-Link bus.

Location

Serial number

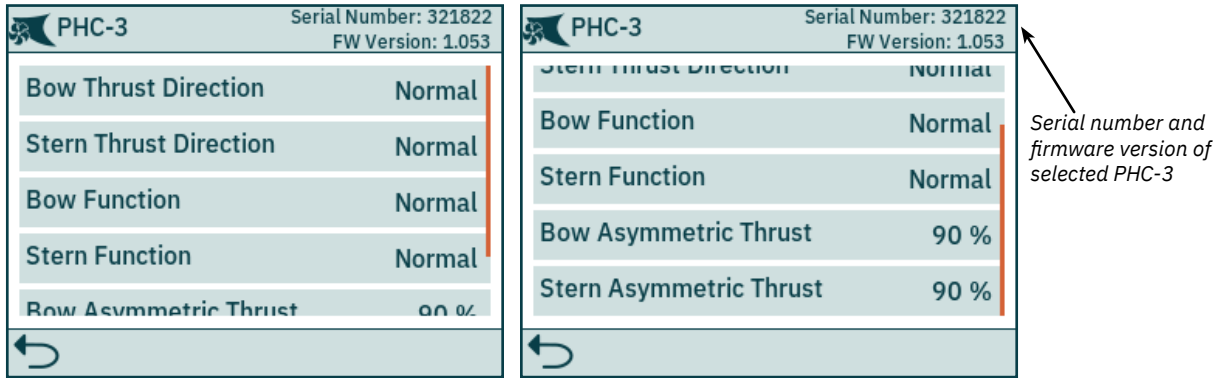| ↩	Exit the System Devices menu and associate all listed devices to the control panel.
✓	Select desired device for configuration.

PDC-301 Configuration

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

Serial number and firmware version of selected PDC-301

Location	Specify the physical location where the device is installed. In a system with two bow or two stern thrusters, e.g. catamarans, use *Bow or Stern* for port thruster. For starboard thrusters use *Bow Starboard* or *Stern Starboard*. • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	Set the running direction for the thruster. • Normal (default) • Swapped
Function	Configure thruster type. • SAC (default) - Tunnel thruster • SRAC - Retractable AC thruster
Max Output	Set the maximum thrust of the thruster. PDC-301 will scale the joystick signal to this value. • 50% to 100% (default 100%)
Load Share Limit	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. • 0% to 100% (default 100%)
Drive Type	Select the type of Variable Frequency Drive (VFD) to be controlled by PDC-301. • ABB ACS580/880 (default) • VACON
Asymmetric Thrust	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. 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. The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster. Thrusters with Location set to BOW or STERN will limit thrust towards port side and hence reduce the water flow towards starboard. Thrusters with Location set to BOW-STB/STERN-STB will limit thrust towards starboard side and hence reduce the water flow towards port. • 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.

Serial number and firmware version of selected PHC-3

Bow Thrust Direction	Set the running direction for the bow thruster. • Normal (default) • Swapped
Stern Thrust Direction	Set the running direction for the stern thruster. • Normal (default) • Swapped
Bow Function	Configure bow thruster type. • Normal (default) - Tunnel thruster • SRHP - Retractable hydraulic thruster.
Stern Function	Configure stern thruster type. • Normal (default) - Tunnel thruster • SRHP - Retractable hydraulic thruster.
Bow Asymmetric Thrust	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. 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. The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster. The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the parameter 0101-INSTANCE of the PHC-3. PHC-3 with 0101-INSTANCE set to NONE or PORT will limit thrust towards port side and hence reduce the water flow towards starboard. PHC-3 with 0101-INSTANCE set to STARBOARD will limit thrust towards starboard side and hence reduce the water flow towards port. • 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.

eVision thruster model

Serial number and firmware version of selected eVision Thruster

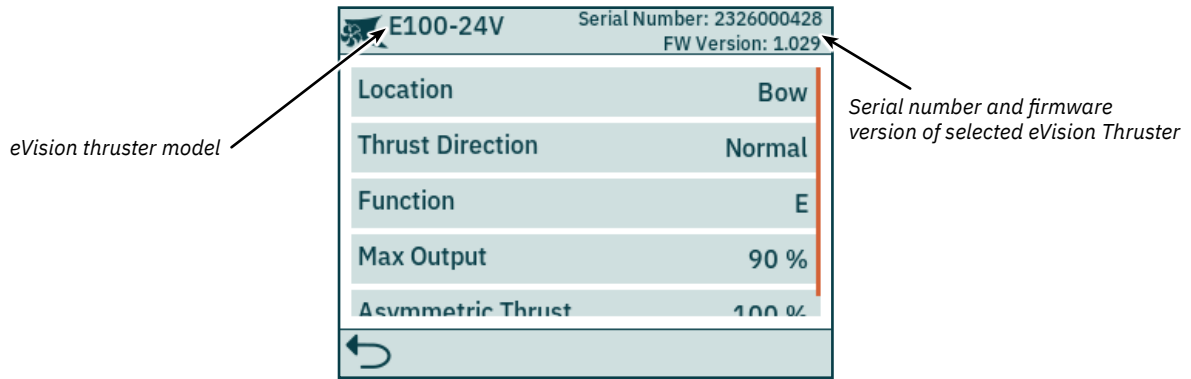|	
Location	Specify the physical location where the thruster is installed. In a system with two bow or two stern thrusters, e.g. catamarans, use *Bow or Stern* for port thruster. For starboard thrusters use *Bow Starboard* or *Stern Starboard*. • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	Set the running direction for the thruster. • Normal (default) • Swapped
Function	Configure thruster type. • E (default) - Tunnel thruster • ERV/ERL - Retractable eVision thruster
Max Output	Set the maximum thrust of the thruster. The eVision thruster will scale the joystick signal to this value. • 50% to 100% (default 100%)
Asymmetric Thrust	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. 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. The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster. Thrusters with Location set to BOW or STERN will limit thrust towards port side and hence reduce the water flow towards starboard. Thrusters with Location set to BOW-STB/STERN-STB will limit thrust towards starboard side and hence reduce the water flow towards port. • 0% to 100% (default 100%)

PPC Configuration

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

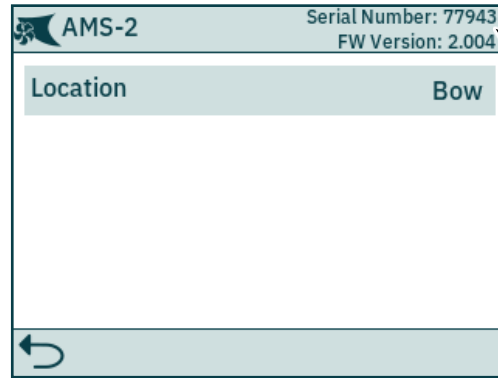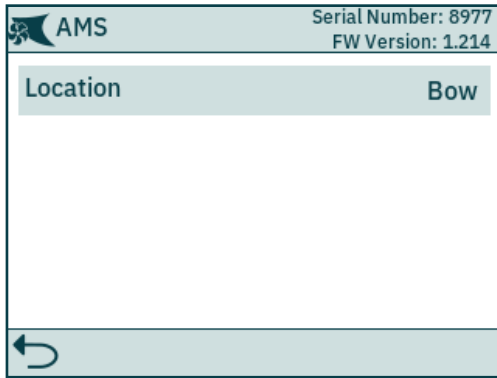| PPC 520	Serial Number: 312091 FW Version: 1.040
Location	Bow
Thrust Direction	Normal
Function	SEP
Max Output	100 %
Thermo Switch	Disable

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. • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	Set the running direction for the thruster. • Normal (default) • Swapped
Function	Configure thruster type. • 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. • 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. • 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. • OFF (default) - Turn OFF extended runtime function. • ON - Turn ON extended runtime function.
Asymmetric Thrust	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. 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. The Asymmetric Thrust value limits maximum thrust in one direction. The limiting direction is determined by the Location setting of the thruster. Thrusters with Location set to BOW or STERN will limit thrust towards port side and hence reduce the water flow towards starboard. Thrusters with Location set to BOW-STB/STERN-STB will limit thrust towards starboard side and hence reduce the water flow towards port. • 0% to 100% (default 100%)

AMS and AMS-2 Configuration
Configuration of two Automatic Main Switch products is supported, AMS and AMS-2. Both have one parameter that can be configured.
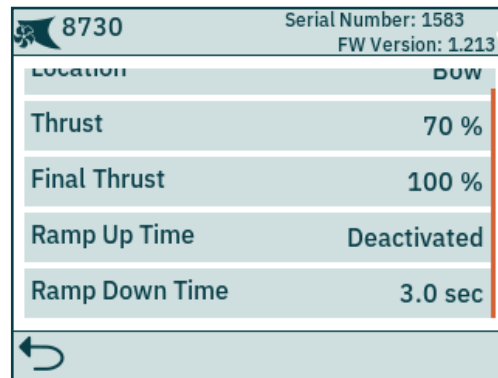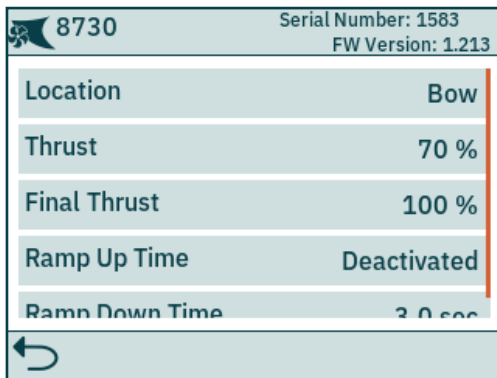
AMS	Serial Number: 8977 / FW Version: 1.214
Location	Bow

AMS-2	Serial Number: 77943 / FW Version: 2.004
Location	Bow

Serial number and firmware version of selected Automatic Main Switch

Location	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. • Bow (default) • Stern • Bow Starboard • Stern Starboard

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. RAMP mode can be enabled for variable thrust control when using ON/OFF control devices
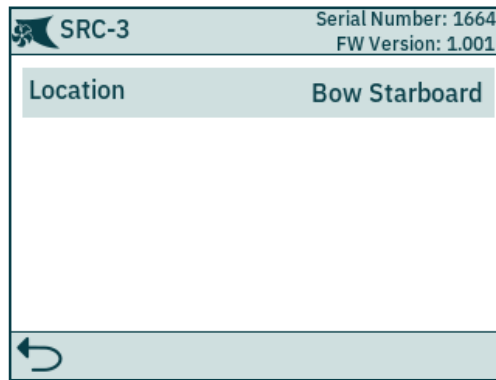
8730	Serial Number: 1583 / FW Version: 1.213
Location	Bow
Thrust	70 %
Final Thrust	100 %
Ramp Up Time	Deactivated
Ramp Down Time	3.0 sec

8730	Serial Number: 1583 / FW Version: 1.213
Location	Bow
Thrust	70 %
Final Thrust	100 %
Ramp Up Time	Deactivated
Ramp Down Time	3.0 sec

Serial number and firmware version of selected 8730

Location	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. • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust	Set the amount of thrust to be used when an input signal to 8730 is activated. 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. • 0% to 100% (default 70%)
Final Thrust	RAMP mode enables variable thrust control when using ON/OFF control devices, refer to 8730 user manual for detailed information. By selecting a value for Final Thrust and specifying a RAMP Up time, RAMP mode is enabled. The Final Thrust value must be larger than the configured Thrust value to enable RAMP mode. It is recommended to reduce the Thrust value below the default value of 70% to ensure a better user experience when RAMP mode is enabled. • 0% to 100% (default 100%), in steps of 1%
RAMP Up	The RAMP Up time defines the time from activating the input of 8730 until the Final Thrust level is requested. During this time the requested thrust is linearly increased from the specified Thrust value to the value of Final Thrust. • Deactivated or 0.1-20seconds (default Deactivated), in steps of 0.1 seconds
RAMP Down	The RAMP Down parameter can be used to control the thrust level when reactivating the input of 8730. This is typically applicable when pulsing the input of 8730 ON and OFF. The reactivation level will be linearly decreased from the thrust value used when 8730 input is disabled and down to the configured Thrust value. Thus if the time span before reactivating the thruster is longer than the RAMP Down time, the reactivation level will be set to the configured Thrust value. The reactivation level will be similar even if the direction of thrust is changed. • 0-20 seconds (default 0 seconds), in steps of 0.1 seconds

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.
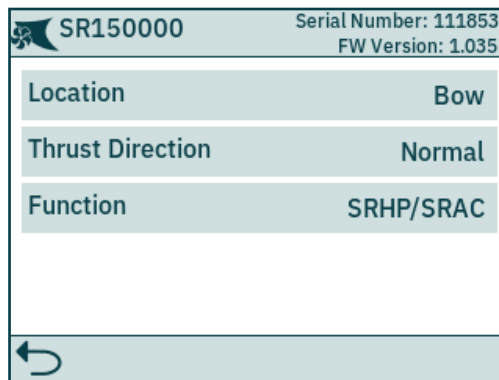

Serial number and firmware version of selected SRC-3

Location	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. • Bow (default) • Stern • Bow Starboard • Stern Starboard

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 SR15000 for more information on configuration and operation.

Serial number and firmware version of selected SR150000

Location	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. • Bow (default) • Stern • Bow Starboard • Stern Starboard
Thrust Direction	Set the running direction for the thruster. • Normal (default) • Swapped
Function	Configure thruster type controlled by the retract controller. • 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 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. • 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. • 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. • 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. • 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. • Normal (default) • Swapped
Temperature Sensor	Specify if the TMU-1 shall measure temperature and the source of the temperature measurement. • Disable (default) • Gearleg - Measures oil temperature in gearleg. TMU-1 temperature input connected to a PT1000 sensor in the gearleg.

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. • - (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.
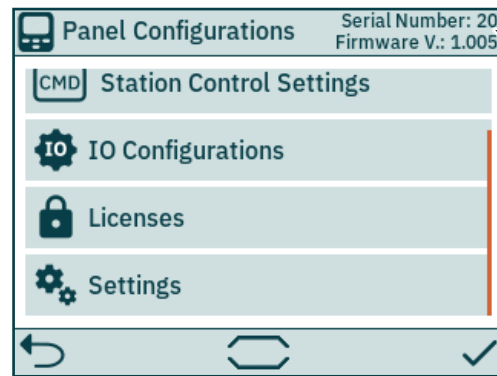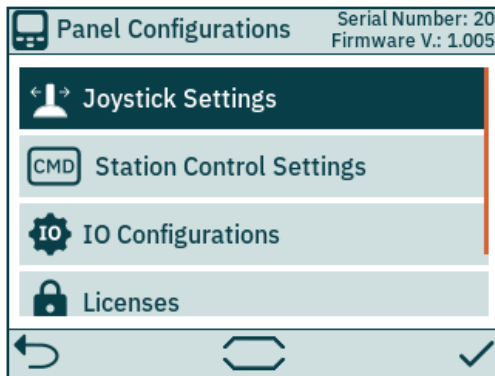
Serial number and firmware version of TP-35

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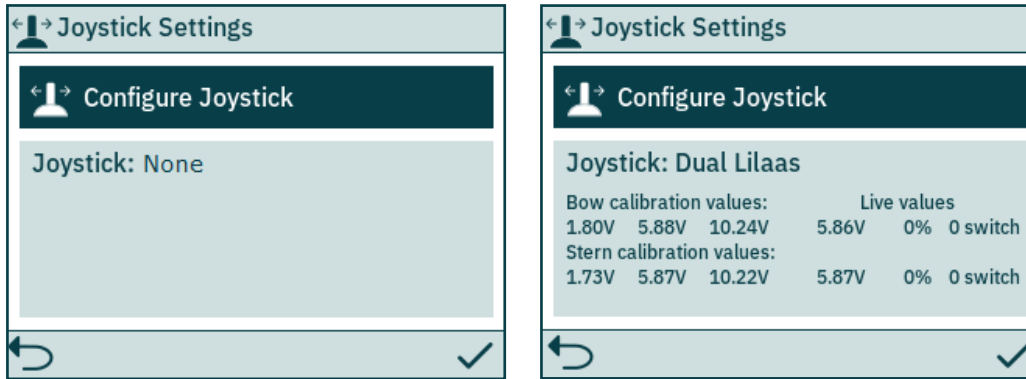
Calibration values show the measured voltage from the joystick potentiometer at fully port, centre and fully starboard position of the joystick.

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".

Joystick Settings	Joystick Settings
Configure Joystick	Configure Joystick
Joystick: None	Joystick: Dual Lilaas
	Bow calibration values: Live values
	1.80V 5.88V 10.24V 5.86V 0% 0 switch
	Stern calibration values:
	1.73V 5.87V 10.22V 5.87V 0% 0 switch

Configure Joystick	A new calibration is initiated.

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.

Select Joystick	Select Joystick
Single Danfoss PVREL	Single Lilaas LE90/LF90/LF90X
Dual Danfoss PVREL	Dual Lilaas LE90/LF90/LF90X
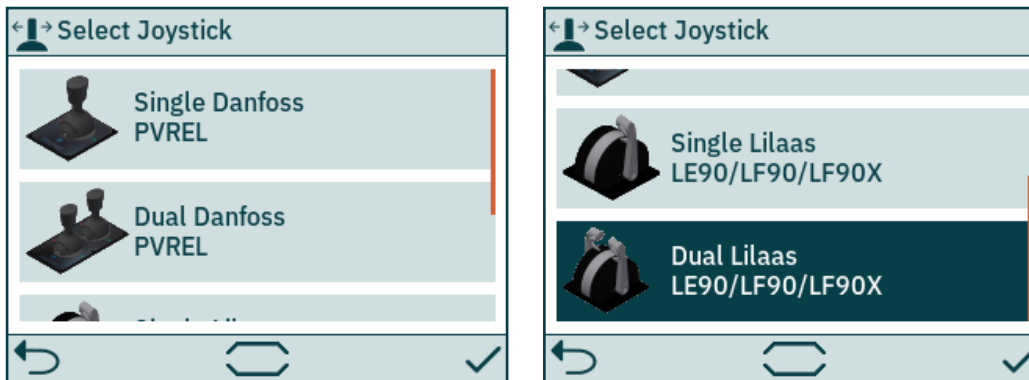
Single Danfoss PVREL	Select single Danfoss PVREL joystick for calibration.
Dual Danfoss PVREL	Select dual Danfoss PVREL joystick for calibration.
Single Lilaas LE90/LF90/LF90X	Select single Lilaas LE90, LF90 or LF90X joystick for calibration.
Dual Lilaas LE90/LF90/LF90X	Select dual Lilaas LE90, LF90 or LF90X joystick for calibration.
↩	Abort joystick calibration and return to *Joystick Setting* 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.

⬅🕹➡ Joystick Calibration

Ensure that both Joysticks are centered and press ✓

🕹 Bow
🕹 Stern

↩ ✓

⬅🕹➡ Joystick Calibration

Ensure that STERN Joystick is fully to PORT side and press ✓

🕹 Bow
🕹 Stern

↩ ✓

⬅🕹➡ Joystick Calibration

Ensure that STERN Joystick is fully to STARBOARD side and press ✓

🕹 Bow
🕹 Stern

↩ ✓

⬅🕹➡ Joystick Calibration

Ensure that BOW Joystick is fully to PORT side and press ✓

🕹 Bow
🕹 Stern

↩ ✓

⬅🕹➡ Joystick Calibration

Ensure that BOW Joystick is fully to STARBOARD side and press ✓

🕹 Bow
🕹 Stern

↩ ✓

↩	Abort joystick calibration and return to *Joystick Setting* 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.

⬅🕹➡ Joystick Calibration

Calibration Completed

↩
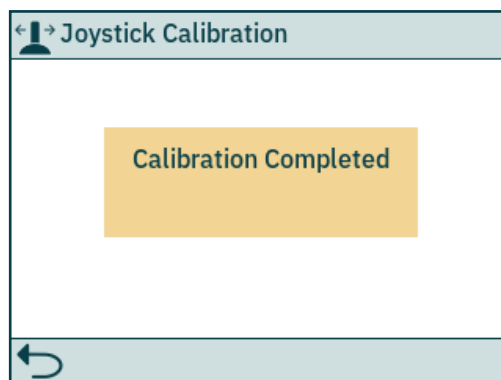
↩	Close notice and return to *Joystick Setting* menu.

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 *Select Station* functionality. By default *Select Station* is activated on all PJC4xx part numbers that ends with *-DNV*. • Activated (default) • Deactivated
Workstation	Defines the type of workstation, see *Select Station* chapter for detailed information. • Main (default) • Remote
Location	Defines the location of the control panel. Only used in systems with VDRI-1, see chapter *VDRI-1 Configuration* for more information. • Bridge • Port Wing • Starboard Wing • Engine Control Room • Engine • Wing (default)
Align Levers	Enables or disables the requirement for aligned levers when transferring command between control panels. Disabling this feature also removes the need to center the levers before engaging thruster operation when turning on the control panel, or exiting the main menu. • Enable (default) • Disable

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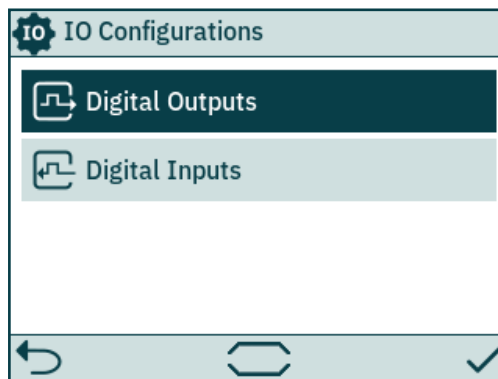
Digital Outputs	Configure functionality of digital output signals available on connector X3 I/O on the back of TP-35.
Digital Inputs	Configure functionality of digital input signals available on connector X3 I/O on the back of TP-35.

Digital Outputs

Configure functionality of digital outputs by selecting the desired output and functionality. Output signals are accessible via the IO connector at the back of TP-35. Refer to *Detailed IO Description* chapter for detailed information of the available IOs.

The following outputs are available for configuration:
- Two digital outputs, DO_0 and DO_1
- Two digital inputs/outputs, DIO_0 and DIO_1
- One isolated digital output, DO_ISO

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.

Listed functionalities are available on all 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. Refer to *Control Panel - Alarms* chapter for more information of panel behaviour in case of alarm situations.

DIO already configured as input and not available as output. Indicated with greyed out colours

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. -3/3 In Command - Output is active if the control panel is IN COMMAND. 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 and functionality. Input signals are accessible via the IO connector at the back of TP-35. Refer to *Detailed IO Description* chapter for detailed information of the available IOs.
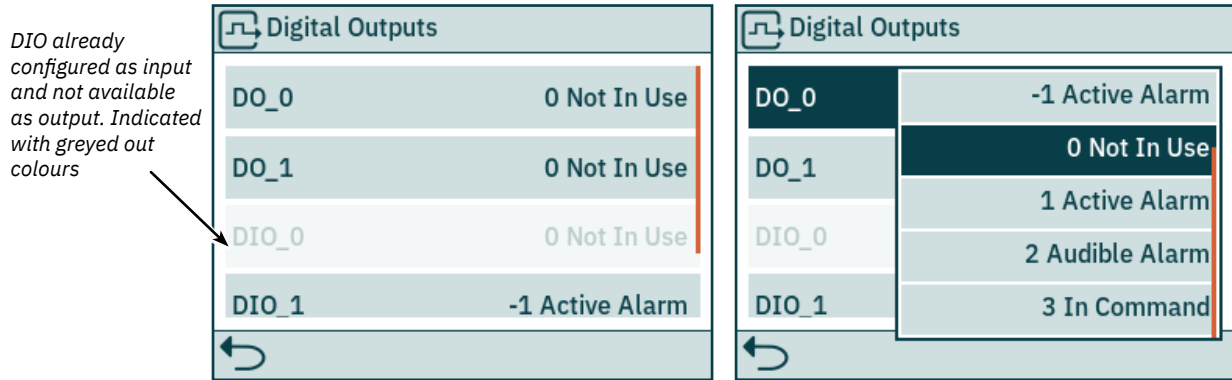
The following inputs are available for configuration:
- Two digital inputs/outputs, DIO_0 and DIO_1

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.

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.

See *Select Station* section for more information of transfer of command between control panels.

DIO configured as output and not available as input, indicated with greyed out colours

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.

Example of no license installed

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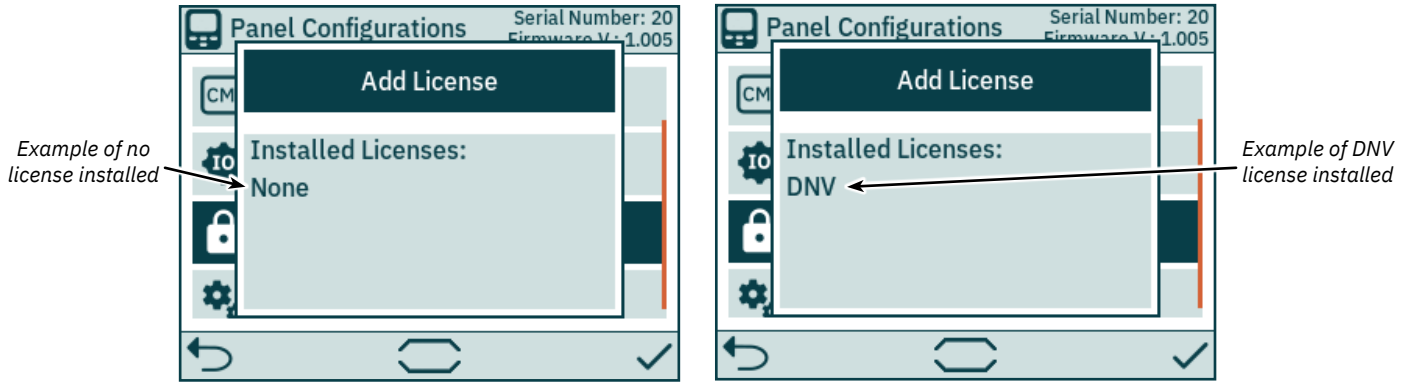
Add License	Keyboard is displayed for registration of license key, see chapter Menu navigation for description of the keyboard functionality.

Settings

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

Temperature Unit	Select between Celsius or Fahrenheit as the temperature unit to be used in the display. • °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. • 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. Does also adjust the current backlight level. • 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 *Functionality of DNV Models* for more information. • 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.

Press and hold for 3 seconds to confirm

Cancel factory reset
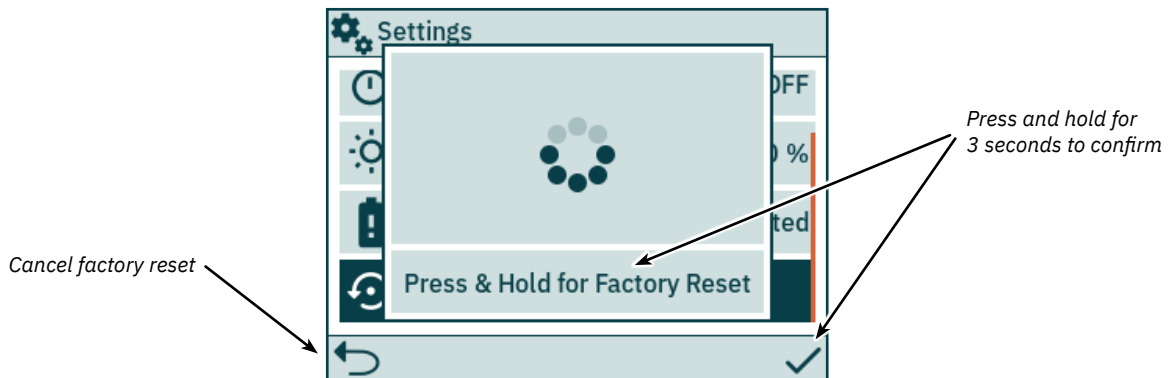
Documentation

The *Documentation* menu lists links to relevant documentation. Selecting a resource will display a QR code linking to the documentation.

Documentation		
📄 User Manual PJC4xx		
🔗 Fault Code Navigator		
🔗 FW Changelog		

Scan QR code to download PJC4xx user manual
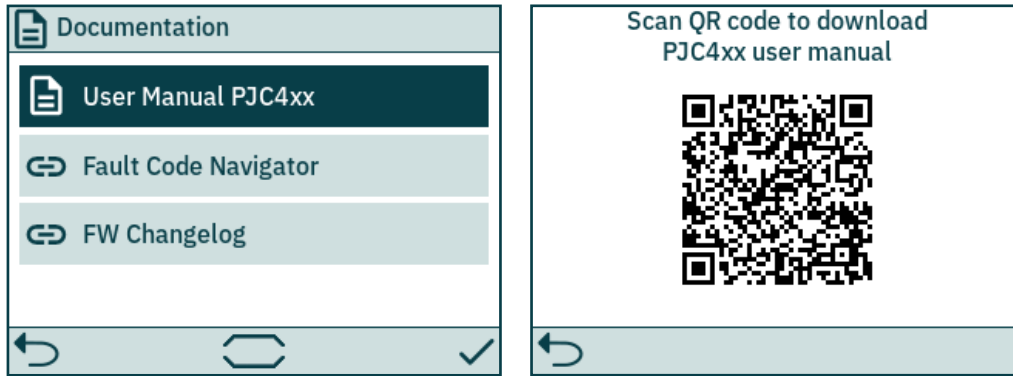
User Manual PJC4xx	Displays a QR code for downloading of the PJC4xx user manual.
Fault Code Navigator	Displays a QR code linking to Sleipner Fault Code Navigator. Refer to chapter *Fault Code Navigator* for more information.
FW Changelog	Displays a QR code linking to Sleipner *Firmware Changelog*. Refer to chapter *Firmware Changelog* for more information.

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.

Indication of port, bow and stern thruster RPM

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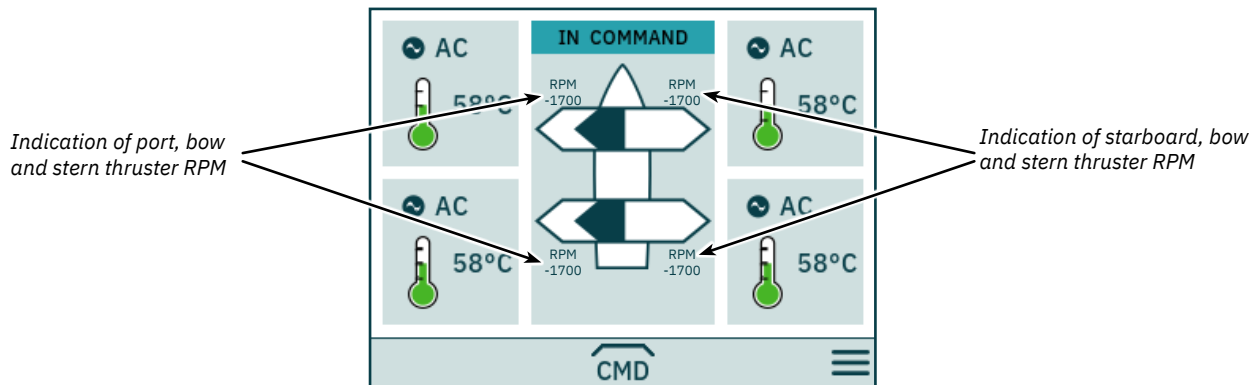
Select Station
This functionality ensures that the thrusters can only be operated by one control panel at a time. It requires that all control panels connected to the S-Link bus supports the *Select Station* functionality and that this functionality is enabled.

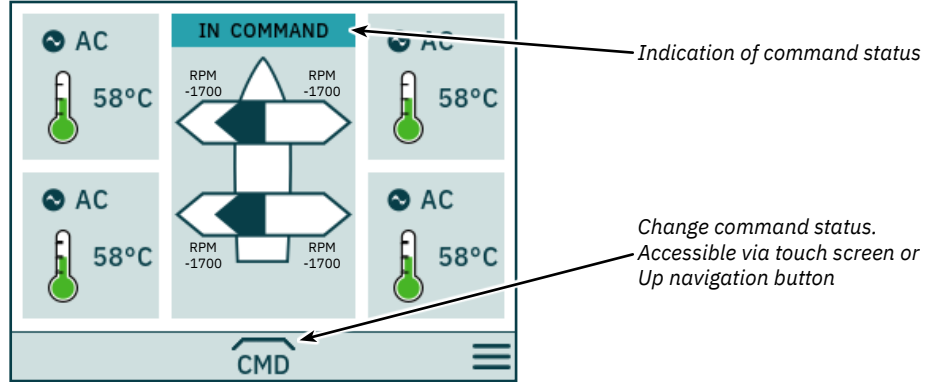The control panels installed on a vessel must be defined to be either Main Workstation or Remote Workstation. The type of workstation determines how the transfer of command can be conducted. It is only the workstation that is in the state IN COMMAND that can operate the thrusters. When turning ON a control 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.

Indication of command status

Change command status. Accessible via touch screen or Up navigation button

Transfer of Command
Main Workstation can always obtain command even when other station is in command.

Remote Workstation can only obtain command from other Remote Workstations or 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 control panel being IN COMMAND will be shown with light blue arrows on the thruster dashboard view of control panel NOT IN COMMAND, together with the measured RPM of the thruster motor.
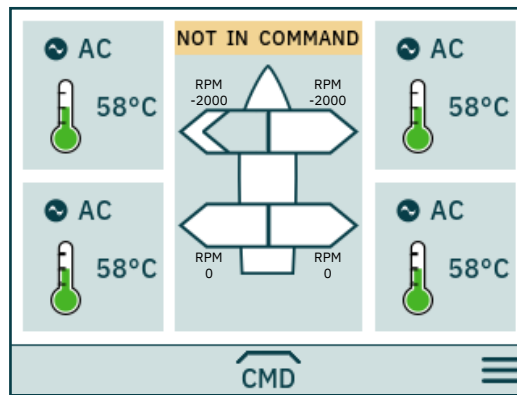
CMD	Take command, when not IN COMMAND.

For safety reasons alignment of levers is enabled by default. When alignment of levers is enabled, joysticks must be aligned with the levers of the control panel currently IN COMMAND before the 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 while the notice is displayed or the notice is manually closed, the workstation continues to be NOT IN COMMAND.

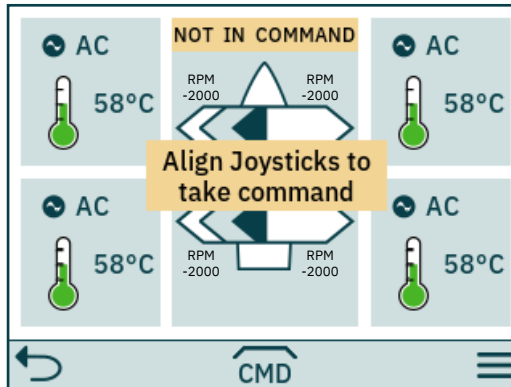If alignment of levers is disabled no alignment will be required to before taking command. Configuration of the Align Levers parameter is done in the *Station Control Settings* menu.

↰	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.
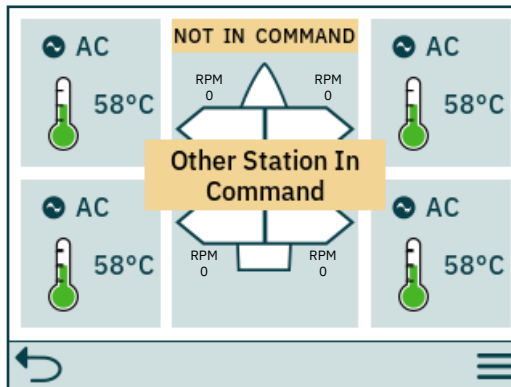
↰	Closes the notice.

Release Command
When 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.
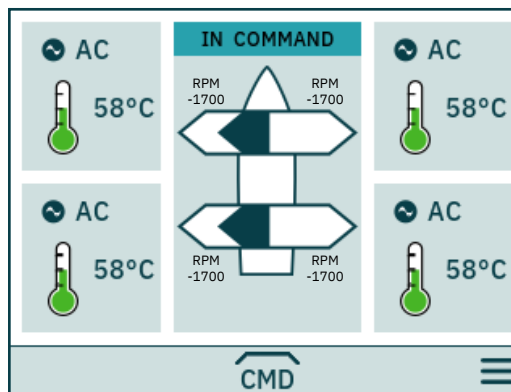
CMD	Release command.

Transfer of Command with External Button

If levers are installed far from the control panel or if using the TP-35 button or touch screen to transfer command is not preferable, transfer of command could be controlled by an external button. An external indicator lamp can be used to show whether the control panel is in command.

A normally open push button with spring return is required. The button must be connected to a digital input and the indicator lamp connected to a digital output. Refer to the chapter *Wiring Example - External Select Station Button* for further details.

The selected DO pin must be configured to "3 In Command" to turn on the indicator lamp when the control panel is IN COMMAND.
The selected DIO pin must be configured to "2 TP-35 ON-Take Command" to take command.
Refer to the *Digital Output* and *Digital Input* section in *Control Panel - Menu Navigation* chapter for further details on configuration of IOs.

Note that the configuration of the parameters *Workstation* and *Align Levers* will affect how transfer of command can be conducted, see Station Control Settings in *Control Panel - Menu Navigation* chapter for further details on parameter configuration.

S-Link Fault Codes

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

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

Fault Code Navigator

Scan the QR code below to access Sleipner's Fault Code Navigator. Fault codes can be entered in the Fault Code Navigator to receive fault description and guidance on resolving the issue.

A complete list of fault codes and troubleshooting tips can also be downloaded.

www.sleipnergroup.com/support/fault-code-navigator

Installation Guide

Responsibility of the installer

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 but not limited to health and safety procedures. It is the installers 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 familiar with the vessel, Sleipner products and applicable regulations if assistance is required.

- If local regulation requires any electrical work to be performed by a licensed professional, seek a licensed professional.

- When planning the installation of Sleipner products, ensure easy access to the products for future service and inspection requirements.

For Sleipner S-Link™ systems:

- 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.

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.

Top Mount

Flush Mount
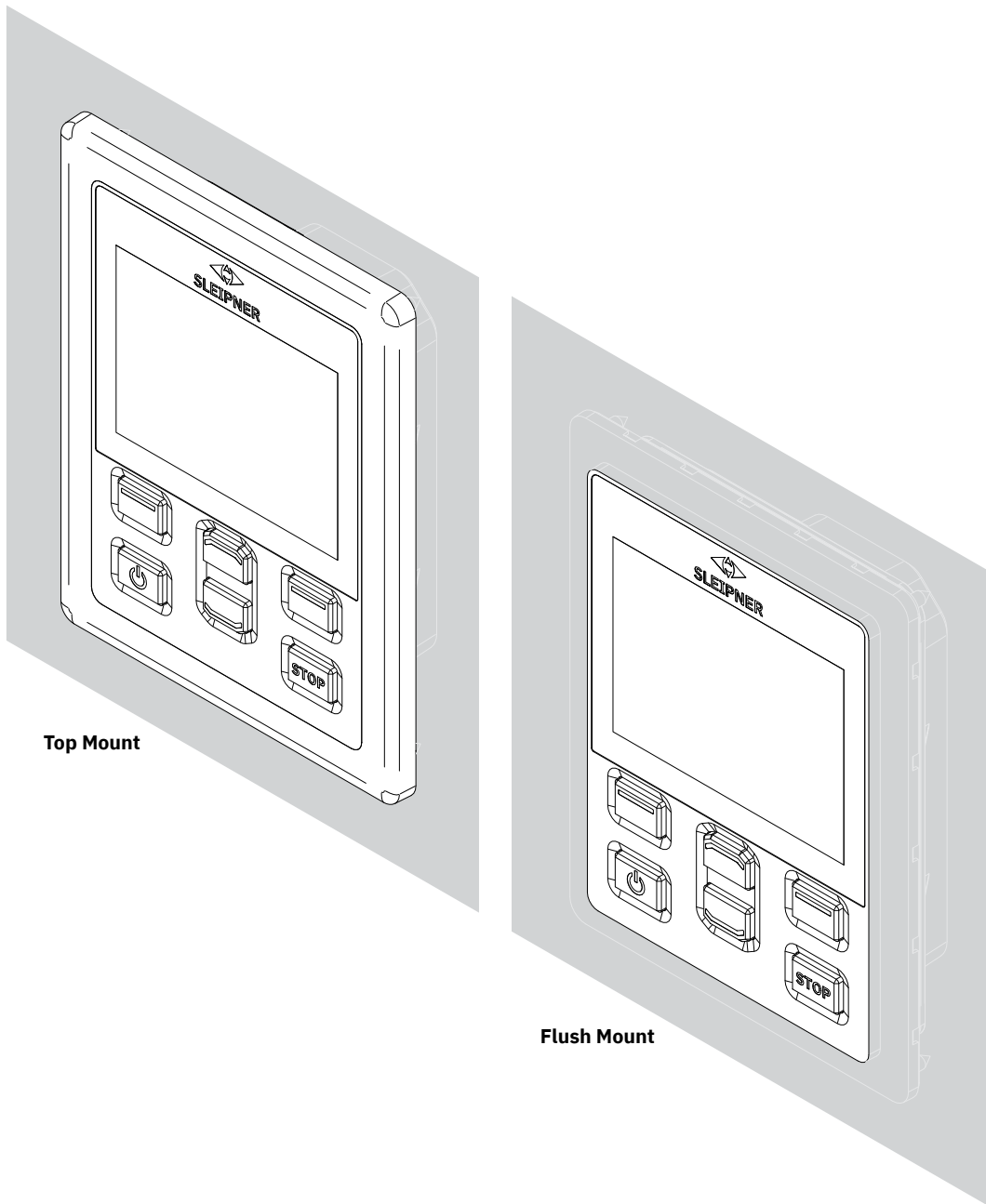
MG_0463

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
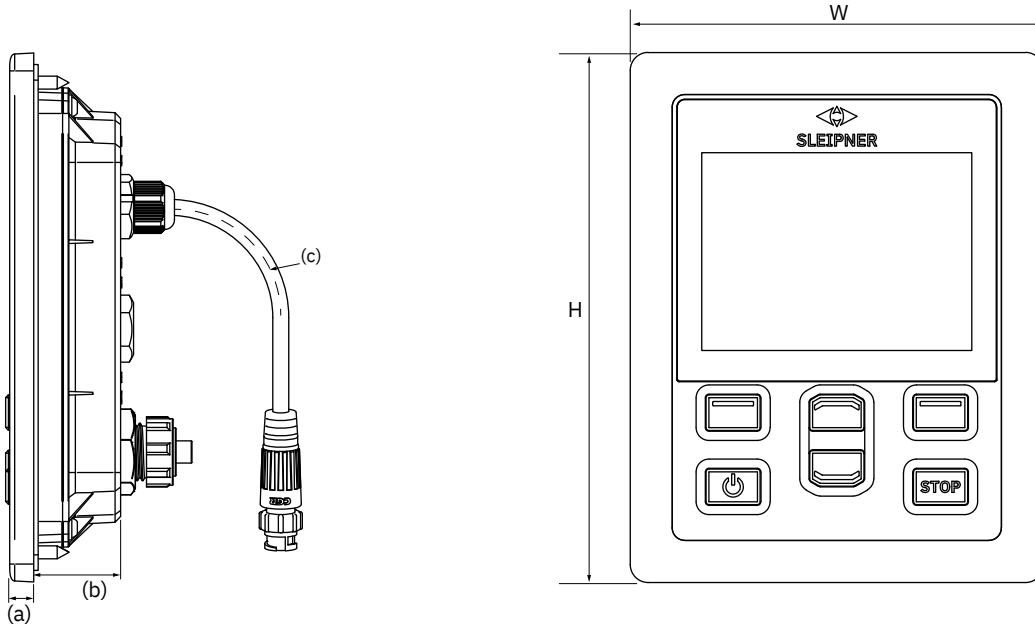
MG_0455

Cutout Template

Top mount cutout

Ø2,5

Ø10,5

Ø10,5

127

125,4

93,9

95,5
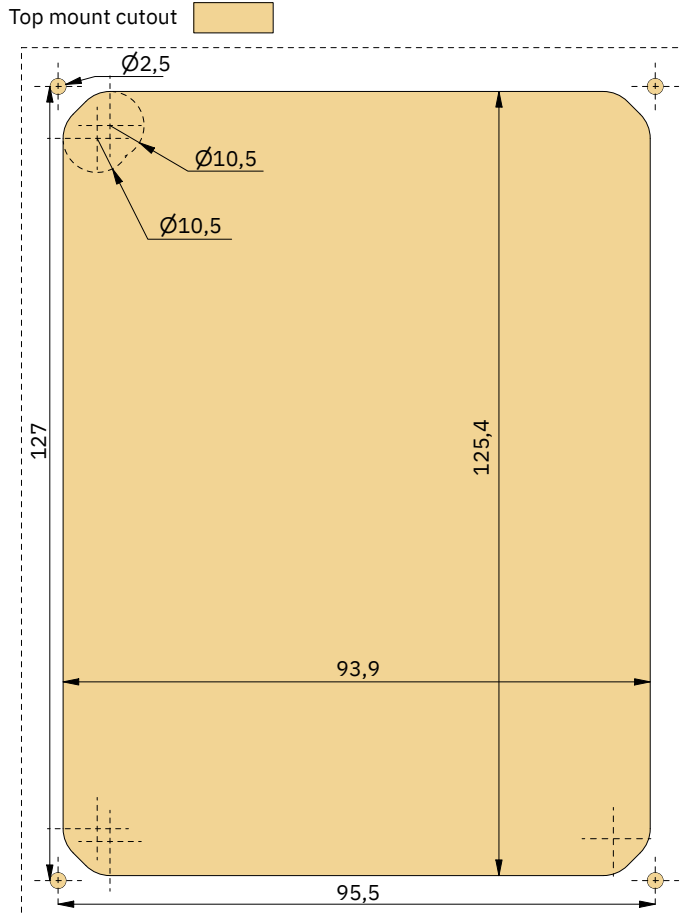
TP-35 Top Mount installation.

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

If the surface area is jagged or chipped use sealant to assist the gasket

S-Link Backbone cable

*Optional

X1 Joystick: **Required**.
Connect joystick cable

X2 S-Link: **Required**.
Connect S-Link Spur cable

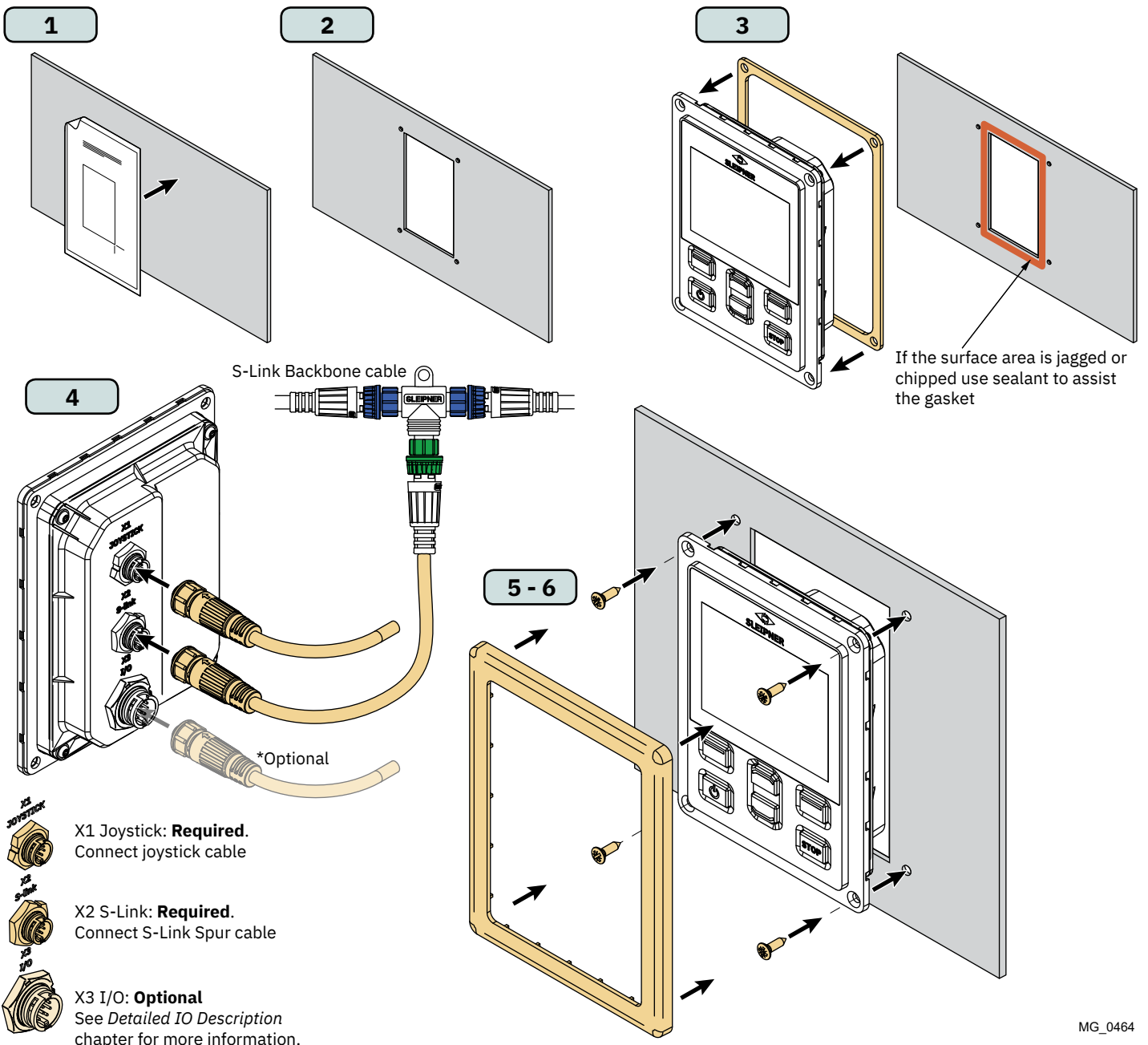X3 I/O: **Optional**
See *Detailed IO Description* chapter for more information.

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

Flush mount cutout

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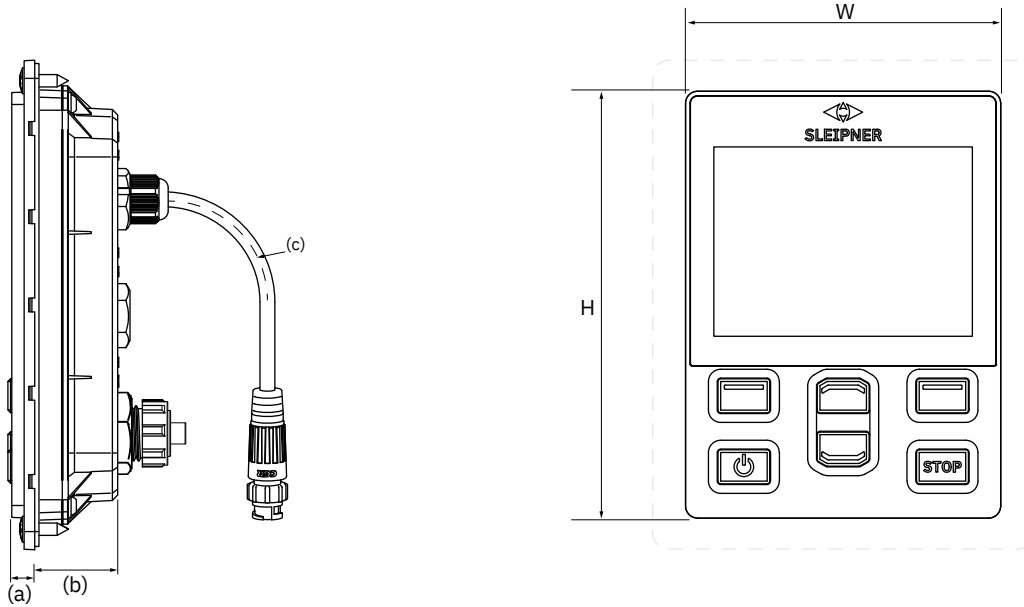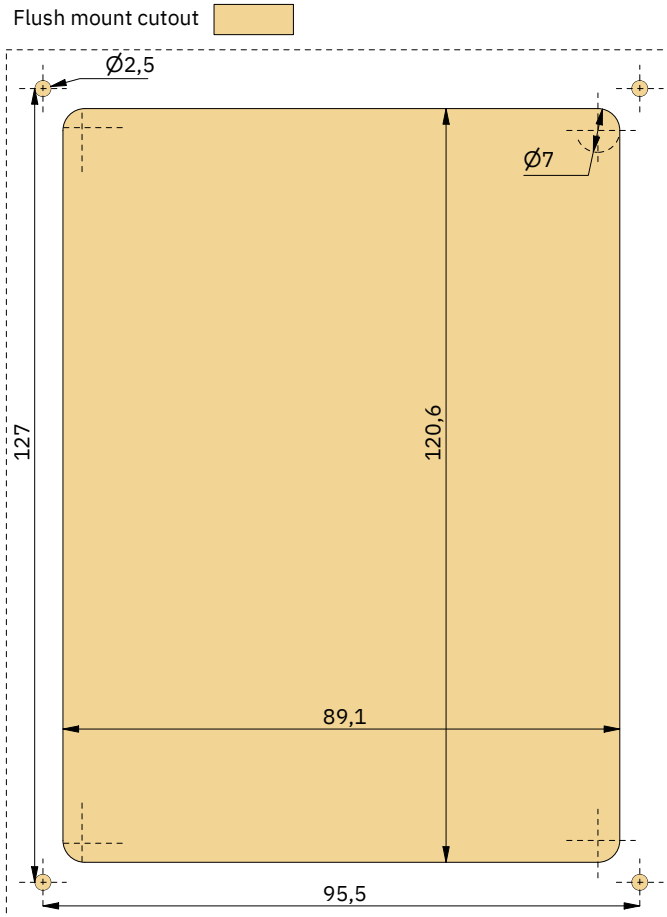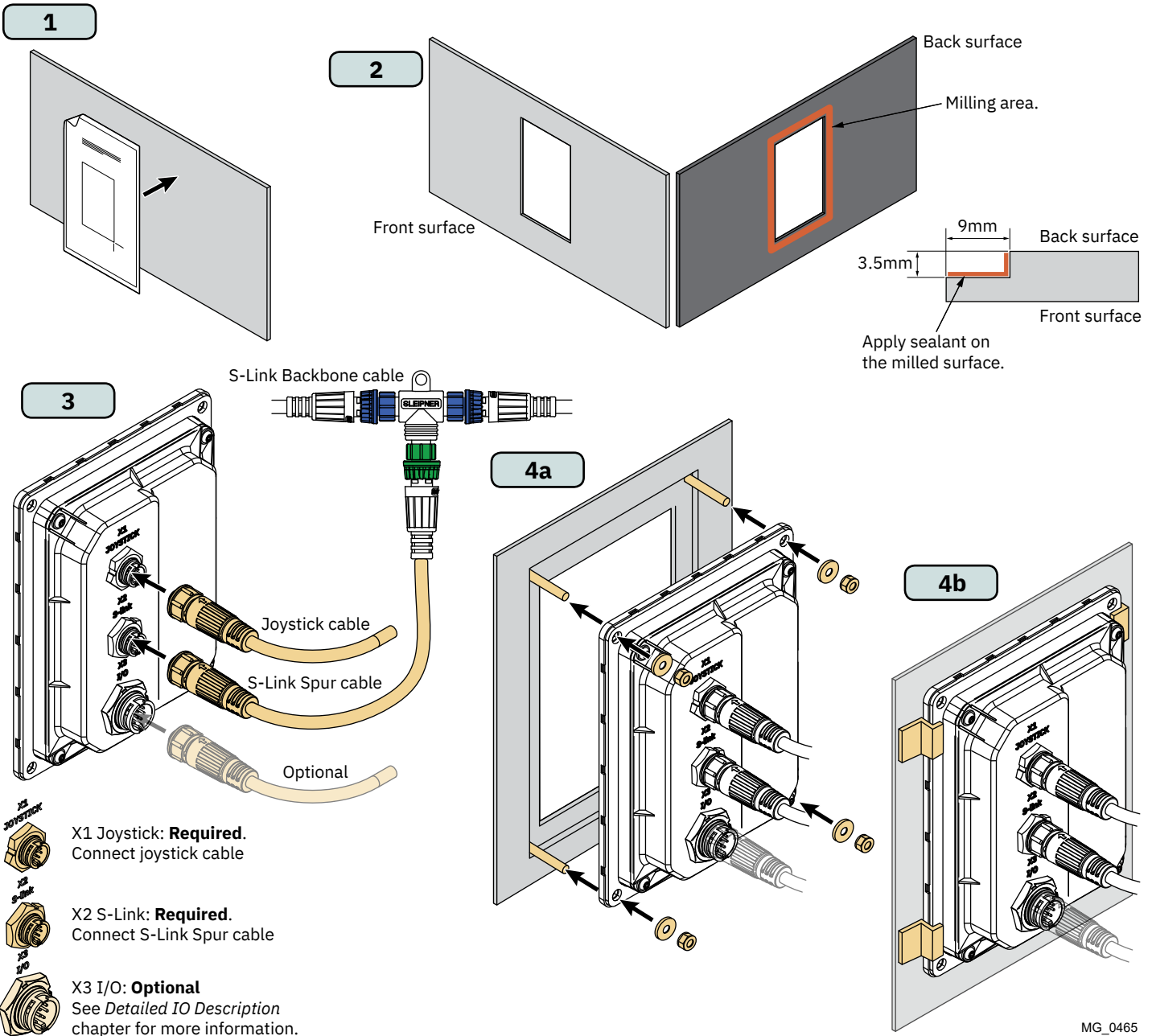
Flush mount installations can be installed in multipliable ways. Two options are using fastening studs or fastening brackets to hold the TP-35 in place.

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.

1

2

Back surface

Milling area.

Front surface

9mm

Back surface

3.5mm

Front surface

Apply sealant on the milled surface.

3

S-Link Backbone cable

4a

4b

Joystick cable

S-Link Spur cable

Optional

X1 Joystick: **Required**.
Connect joystick cable

X2 S-Link: **Required**.
Connect S-Link Spur cable

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

MG_0465

Measurement code	Measurement description	PJC421 mm	PJC421 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

MG_0435
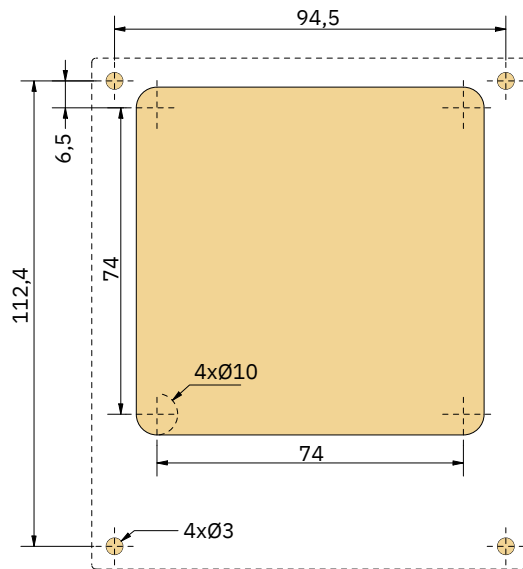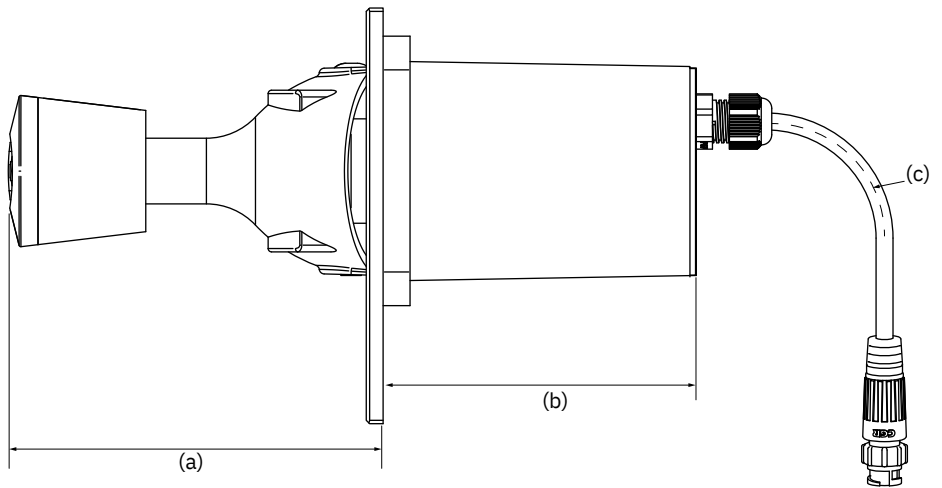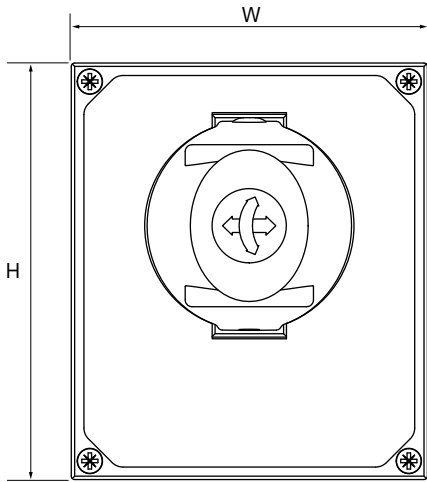
1. Place the supplied cut-out template on the desired installation location.

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.

1

2

3

S-Link Backbone cable

Connect the cable from connector X1 Joystick on TP-35 to the cable coming from the joystick.

4

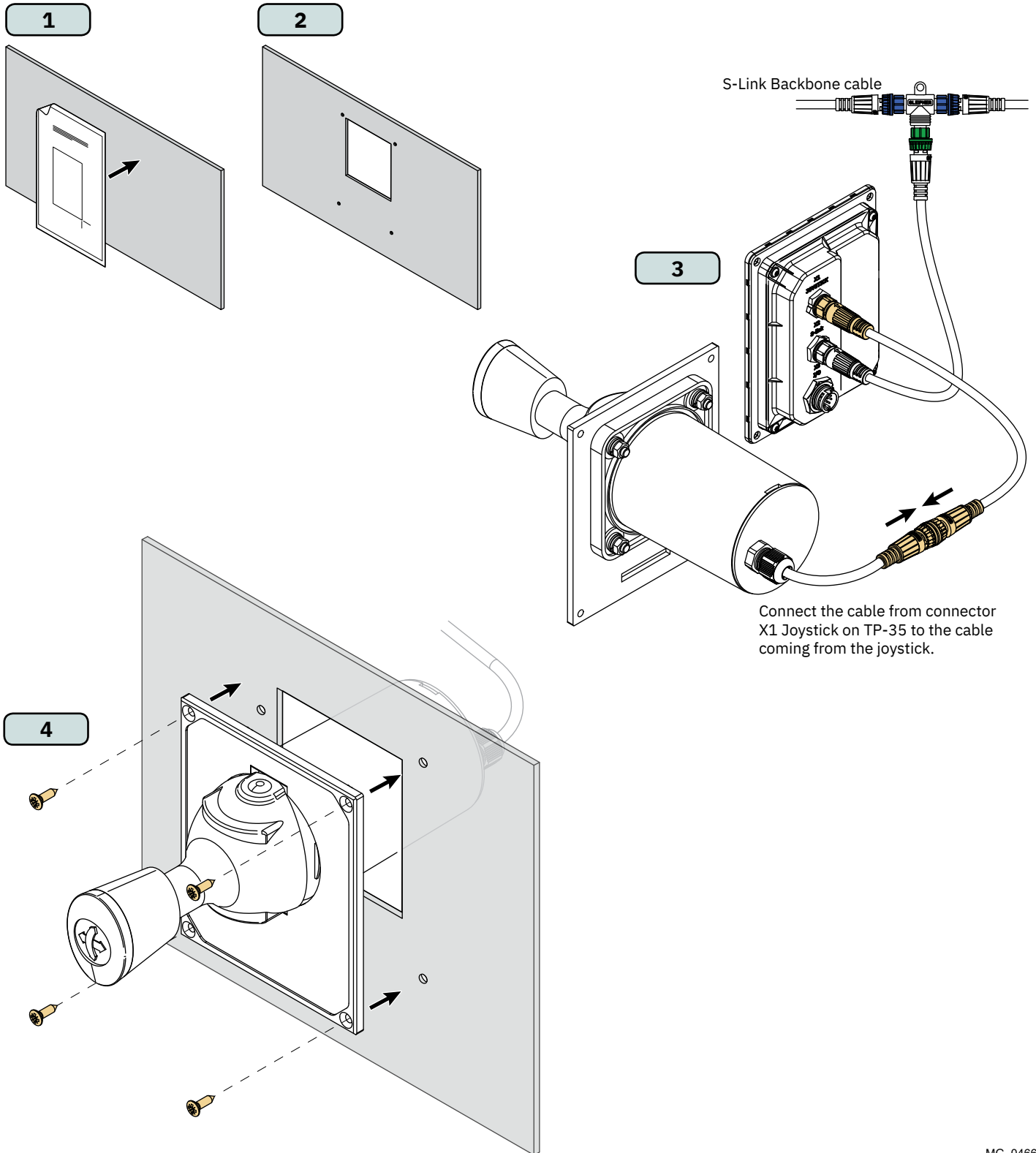MG_0466

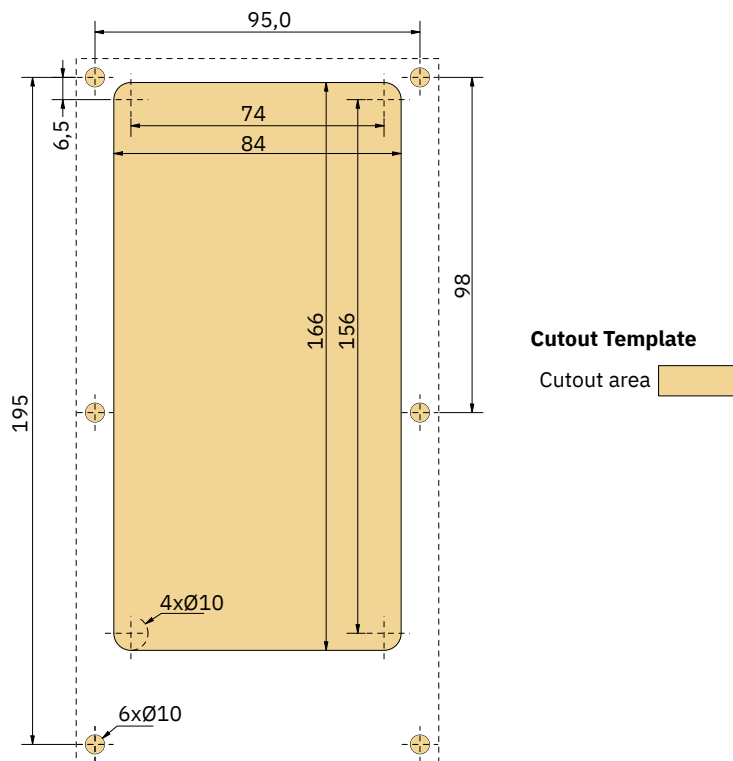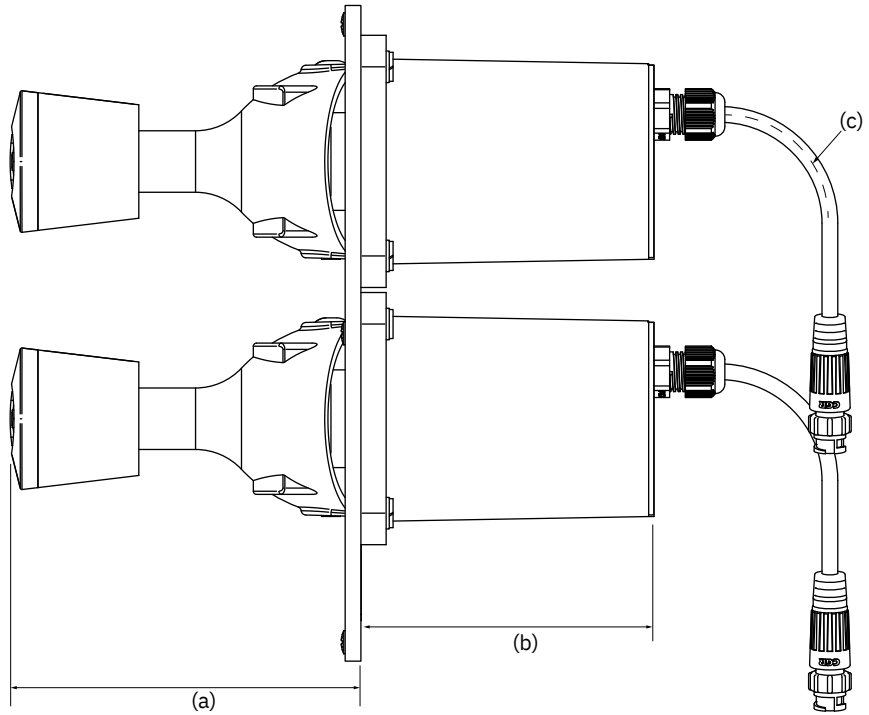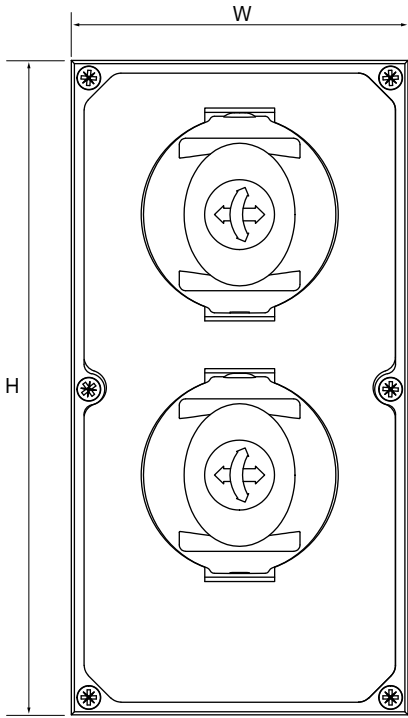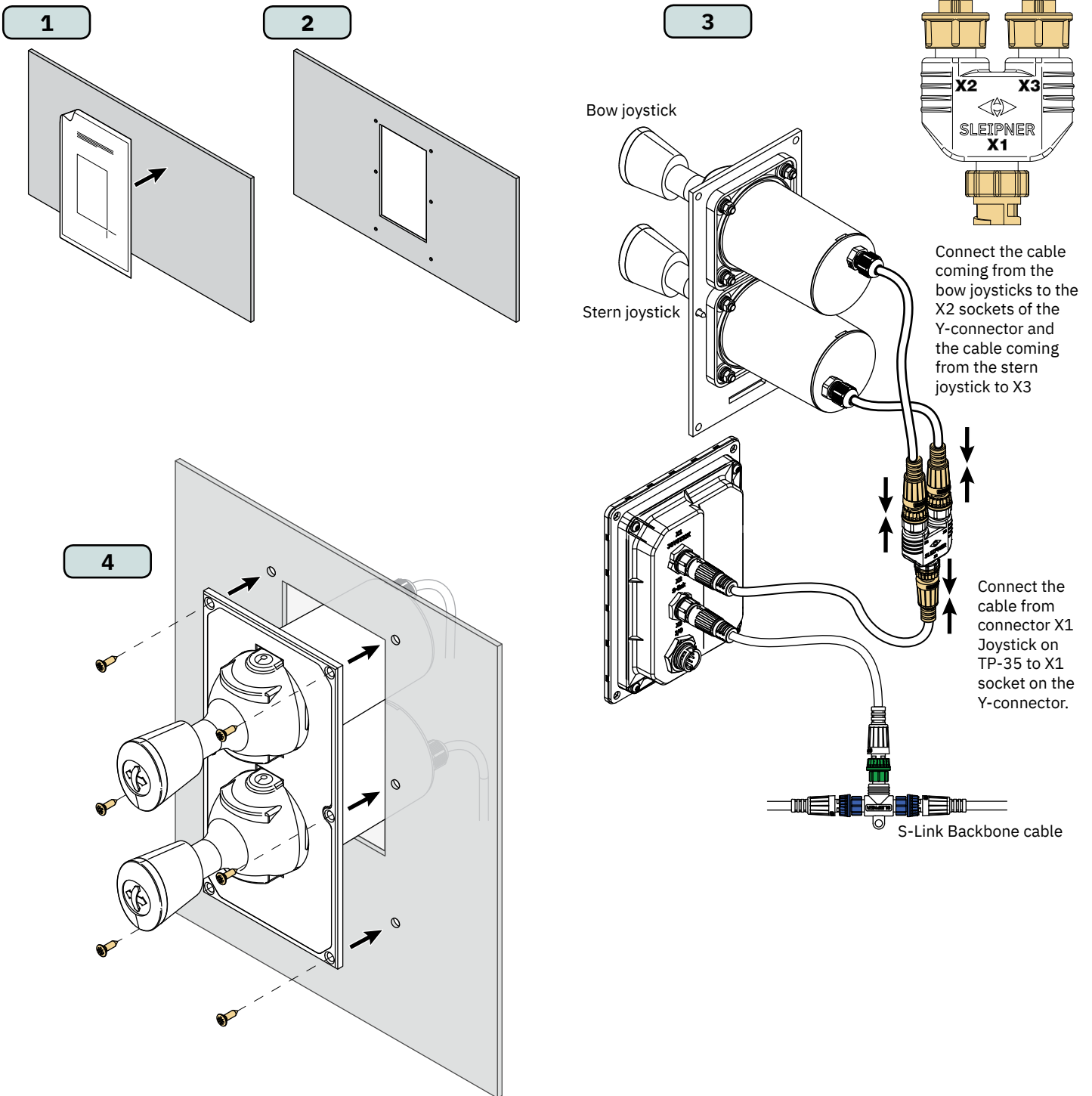| Measurement code	Measurement description	PJC422	
		mm	inch
H	Panel Height	206	8.1
W	Panel width	106	4.2
(a)	Raised height above the dashboard	111.3	4.4
(b)	Depth behind the dashboard (not inc. cables)	94.7	3.7
(c)	Cable bend radius	35	1.4

Cutout Template

Cutout area

MG_0433

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.

1

2

3

Bow joystick

Stern joystick

Connect the cable coming from the bow joysticks to the X2 sockets of the Y-connector and the cable coming from the stern joystick to X3

Connect the cable from connector X1 Joystick on TP-35 to X1 socket on the Y-connector.

S-Link Backbone cable

4

MG_0467

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

*PJC422-LF90

Cutout Template

Cutout area

4xØ5,5

17,25

74

79

44

78,5

MG_0457
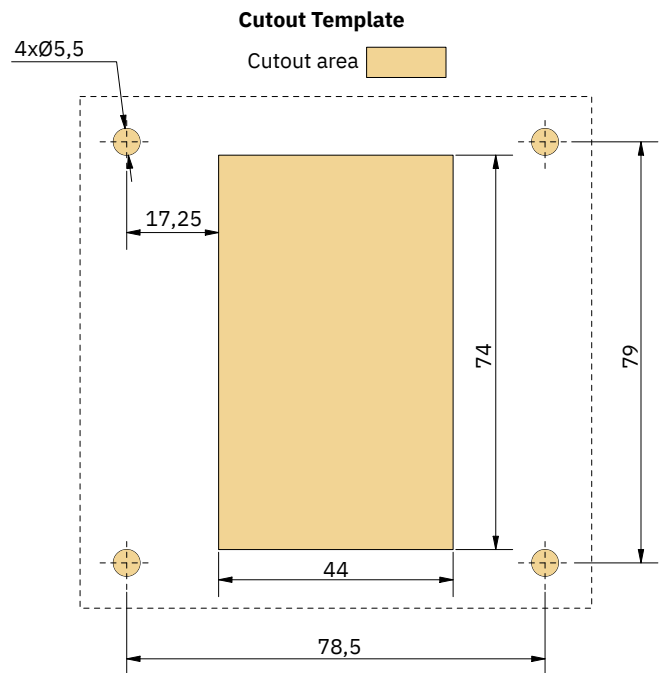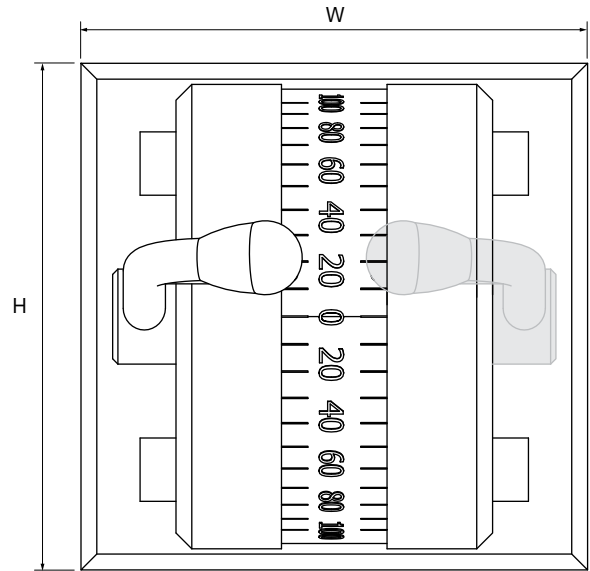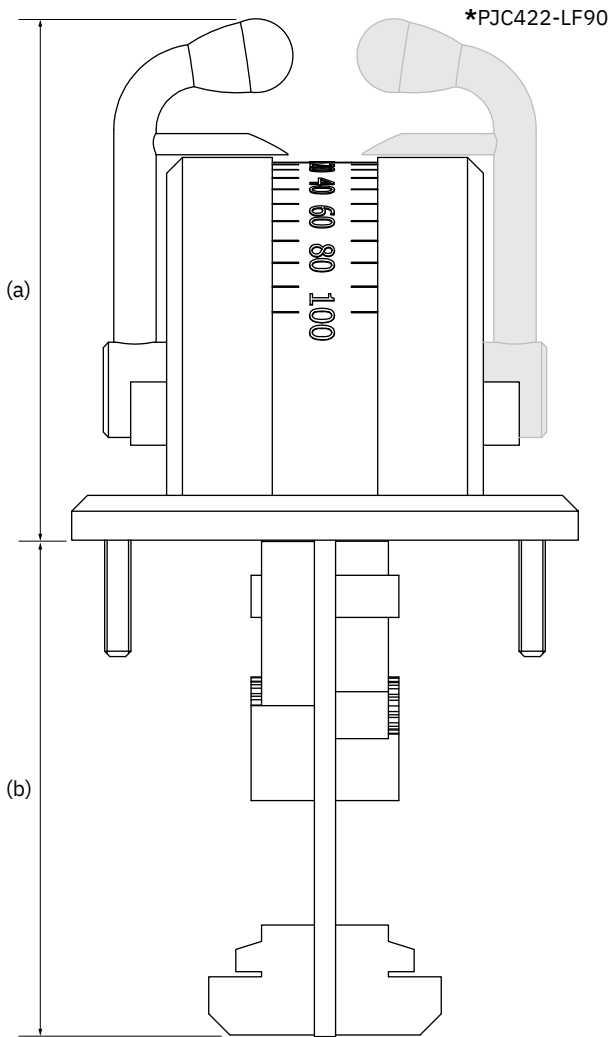
1. Place the supplied cut-out template on the desired installation location.

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.

1

2

3

S-Link Backbone cable

Connect cable from the joystick to connector *X1 Joystick* on TP-35.

*PJC422-LF90

4

*PJC422-LF90

MG_0470
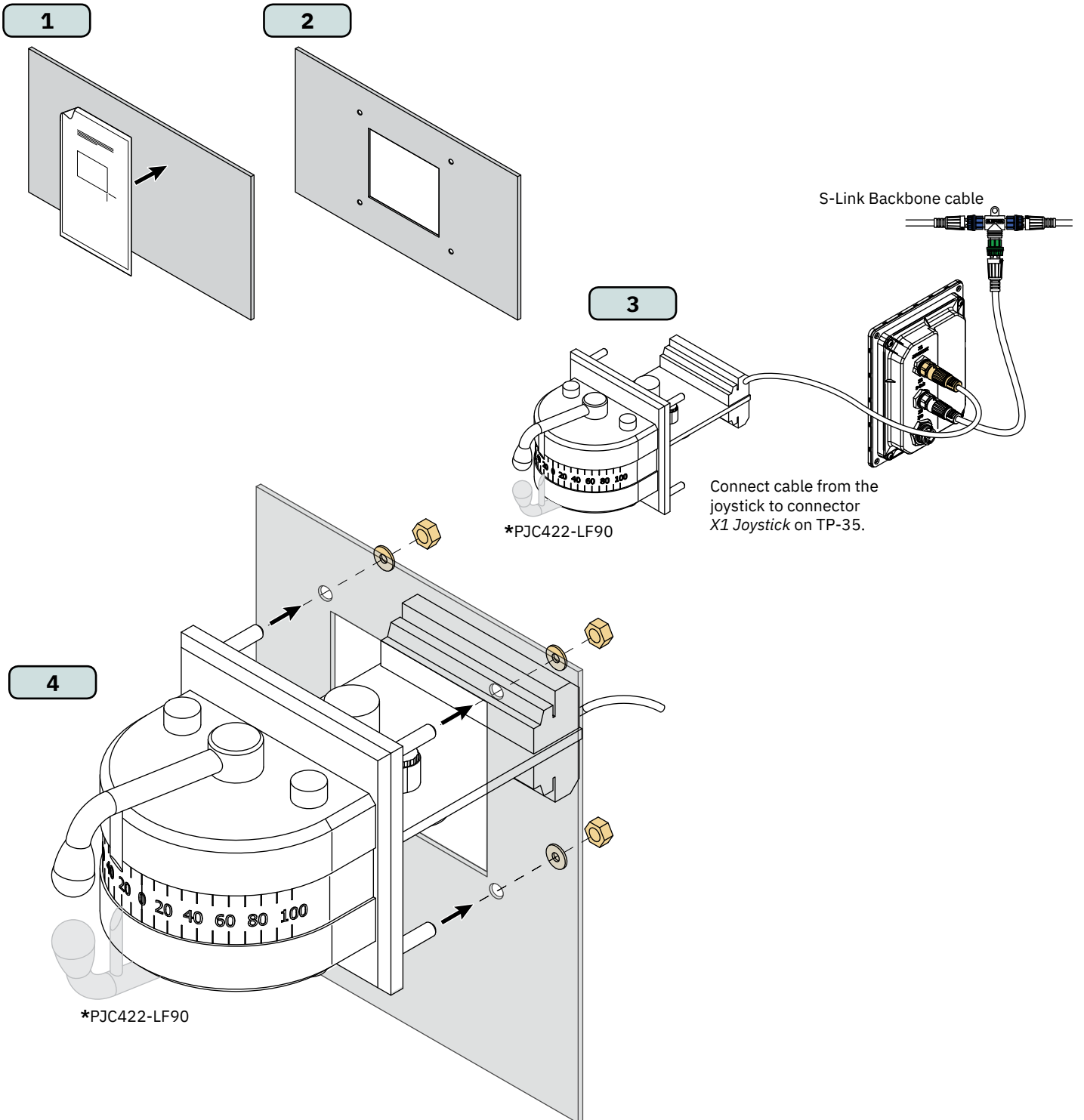
Measurement code	Measurement description	PJC421 LE90/-DNV		PJC422 LE90/-DNV	
		mm	inch	mm	inch
H	Panel Height	96	3.8	96	3.8
W	Panel width	96	3.8	96	3.8
(a)	Raised height above the dashboard	104.7	4.1	104.7	4.1
(b)	Depth behind the dashboard (not inc. cables)	17.2	0.7	17.2	0.7
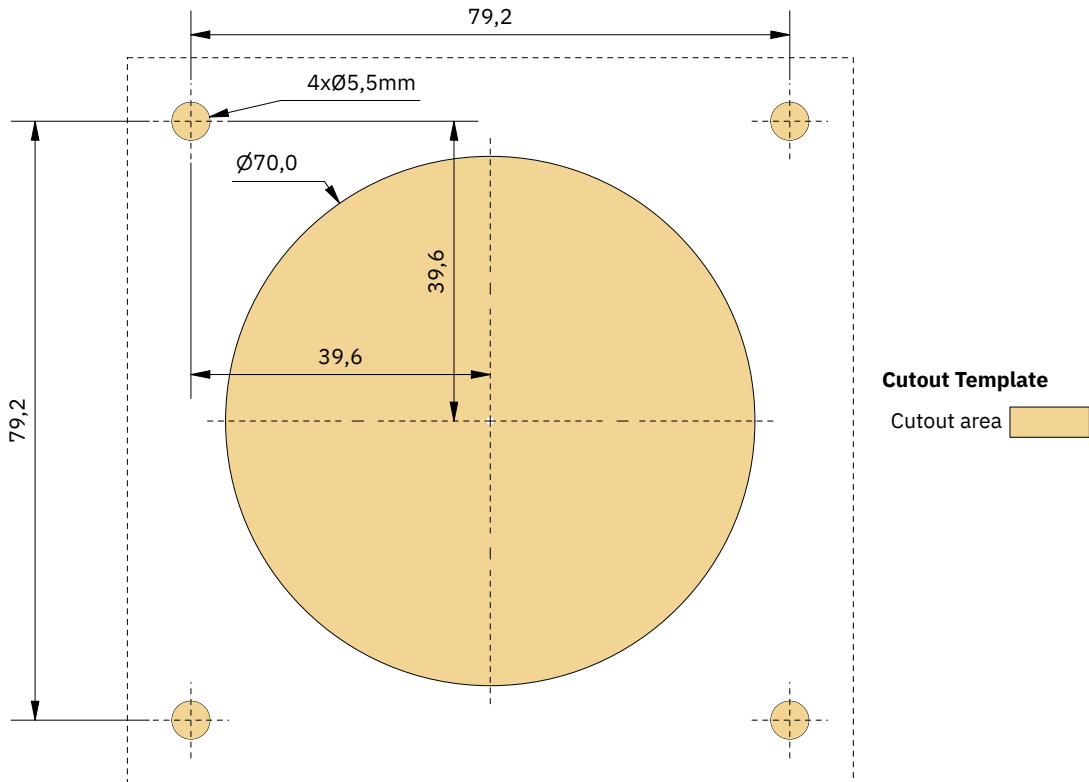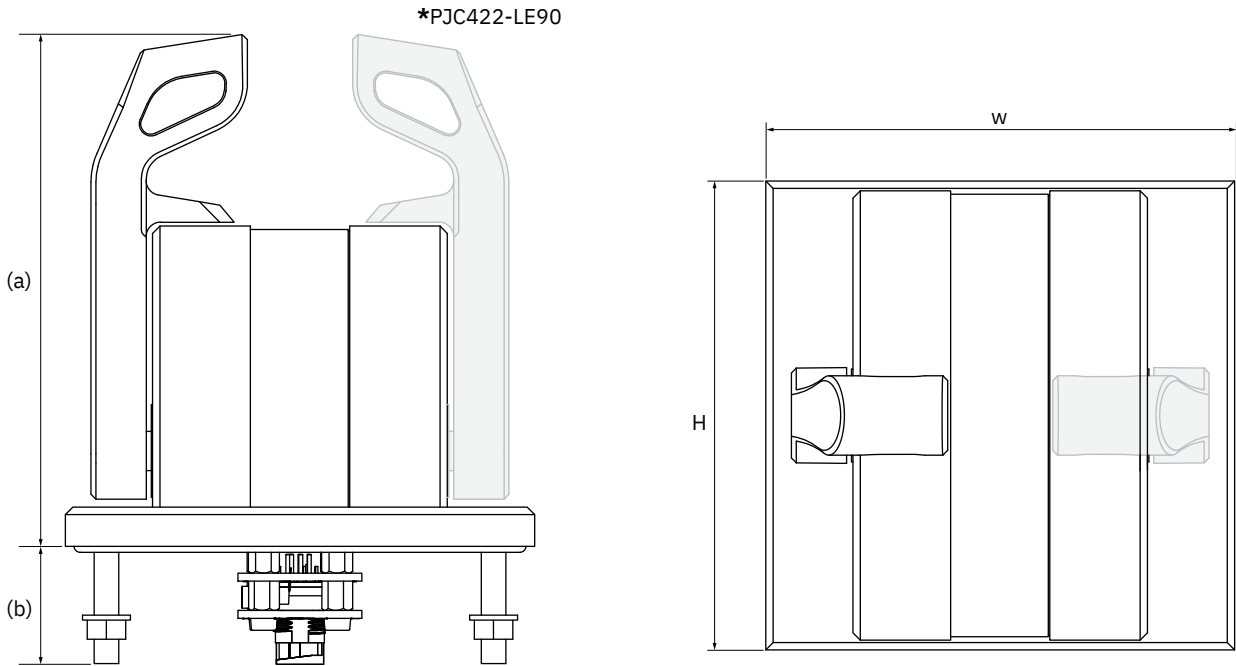
*PJC422-LE90

Cutout Template

Cutout area

MG_0456

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.

1

2

S-Link Backbone cable

3

Connect cable from connector X1
Joystick on TP-35 to the joystick.

4
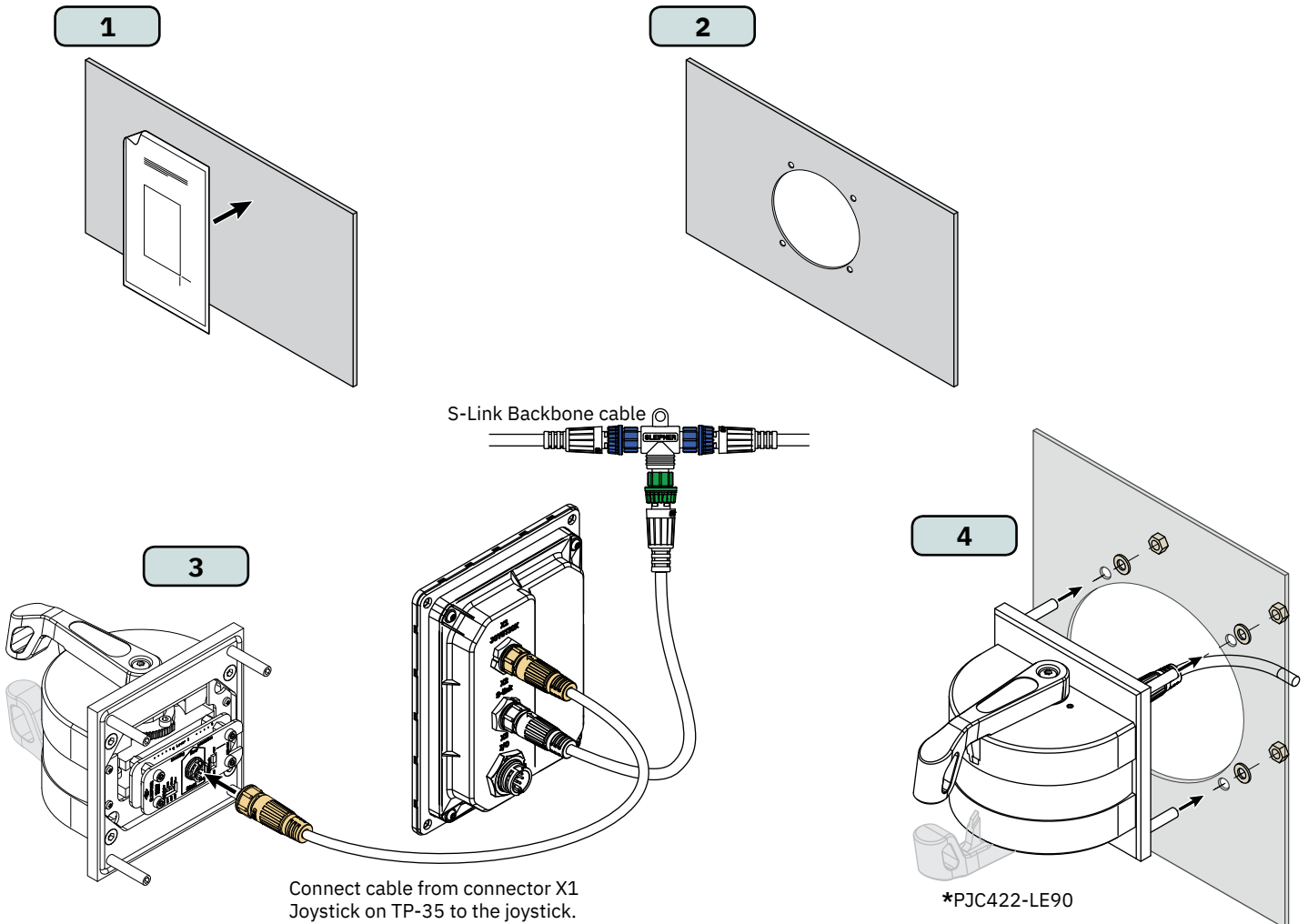
*PJC422-LE90

PJC421-LE90 and PJC422-LE90 Configuration

LE90 Detent and friction adjustment

Set screw for removing handle
detent point at ±10%.
Use 3mm hex key.
±10% detent disabled by default.

DIP switch

Set screw for removing handle
detent point at 0%.
Use 3mm hex key.
0% detent enabled by default.

Switch

Set screw for adjusting friction.
Use 1.5mm hex key.

LE90 Backlight configuration

Use DIP switch to set backlight
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.

MG_0468

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

4xØ5,5

47

16,1

2,6

74

79,2

Cutout Template

Cutout area

79,2
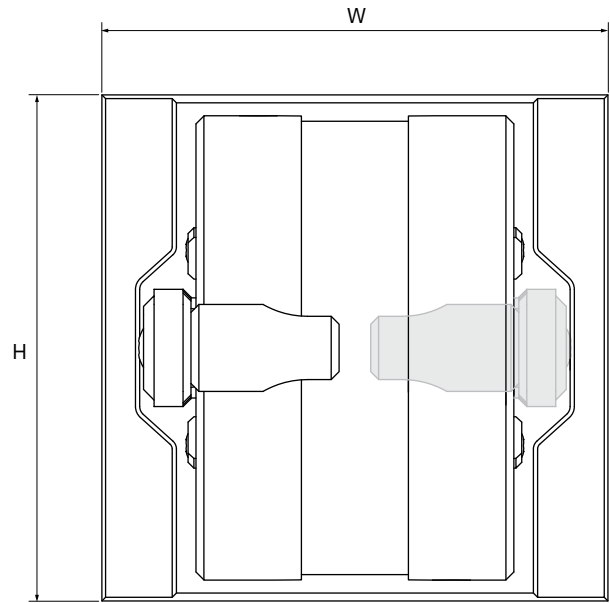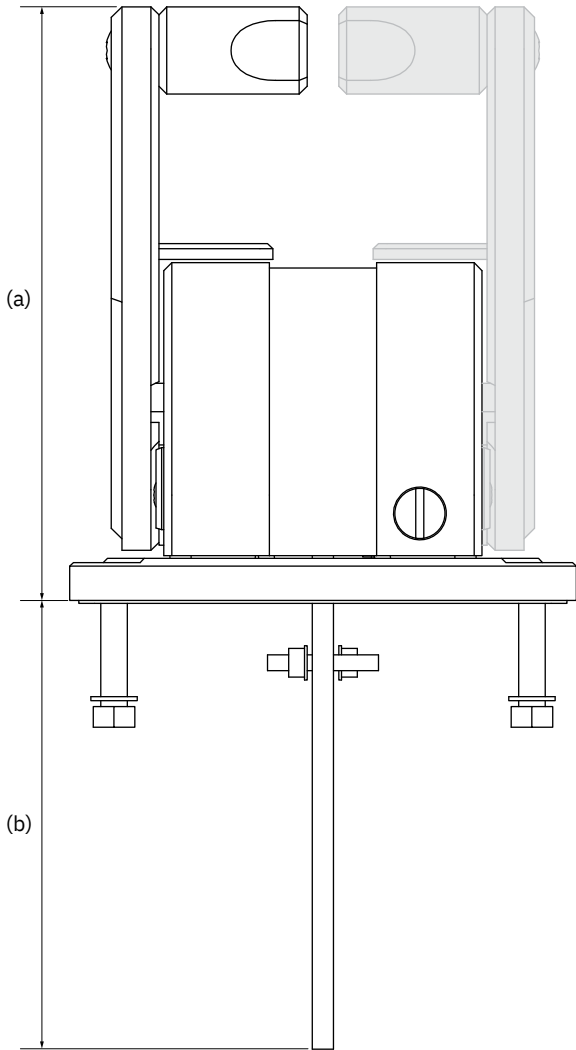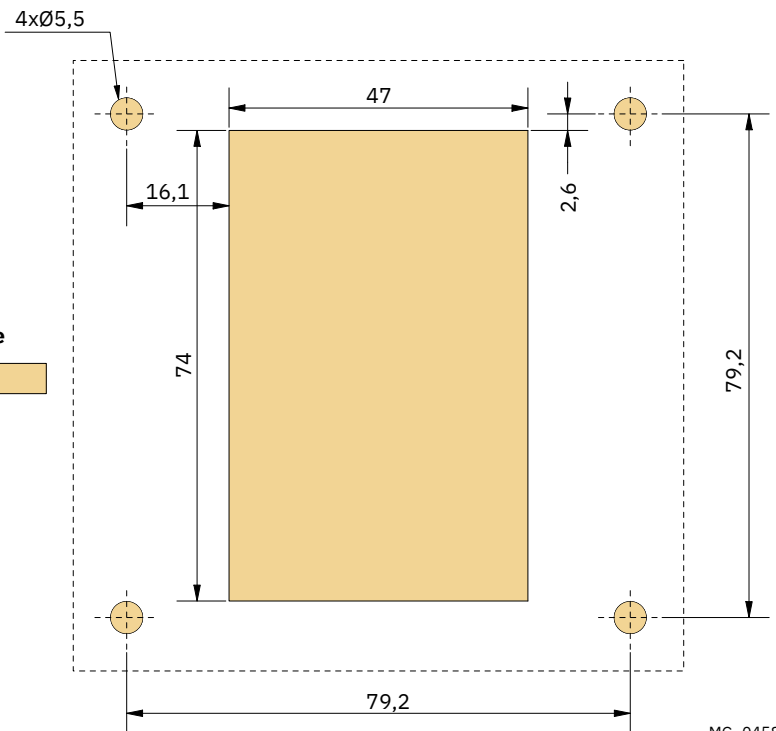
MG_0458

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.

1

2

S-Link Backbone cable

3

Connect cable from the joystick to connector *X1 Joystick* on TP-35.

*PJC422-LF90X

4

*PJC422-LF90X

MG_0469
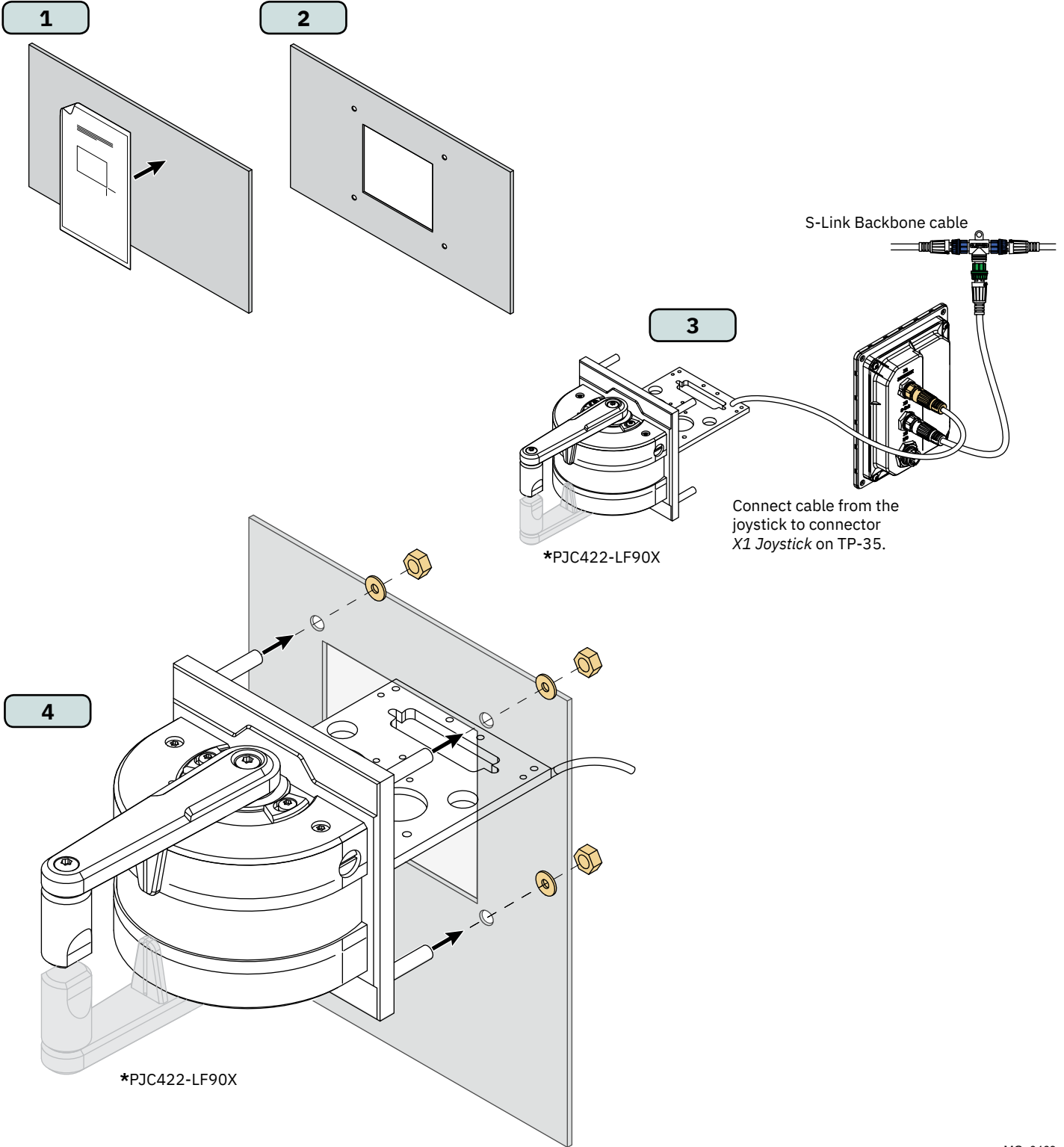
Description	Value	Comment
Available interfaces	X1 Joystick -1x +12V/+5V to joystick -1x AGND -2x analog inputs -2x digital input -1x +5V to joystick LED -1x LIN data	8 pin, male connector Max current drawn on: +12V to joystick - 40mA* +5V to joystick - 40mA* +5V to joystick LED - 80mA**
	X2 S-Link -Vin -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.
Digital input voltage level	High >4.5 VDC Low <0.5 VDC	
Digital input minimum pulse width	High >200 ms Low >200 ms	

*Intended for joystick potentiometers
**Intended for joystick backlight

Pinout of IO cable
Pin#. Wire color - Signal name
1. Red - +V_EXT
2. Brown - DO_0
3. Orange - GND
4. Yellow - DO_ISO_A
5. Black - GND_EXT
6. Green - DIO_1
7. Black/White - GND
8. Light Blue - DIO_0
9. Purple - DO_1
10. Grey - DO_ISO_B

Example of auxiliary power supply connection. Functionality only available on PJC4xx part numbers that ends with -DNV.
+9-31VDC
GND
Primary power supply is through S-Link connector.

Example of buzzer connection.
Buzzer +
Buzzer -
Optionally a buzzer could be connected to DO_1, DIO_0, DIO_1 or through a relay connected to DO_ISO_A and DO_ISO_B.
Max current consumption of buzzer: 100mA.
Output voltage is equal to S-Link voltage.

Example of relay connection.
Relay A
Relay B
Max current through relay: 45mA

MG_0481

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.

Any type of buzzer complying with specified supply voltage and rated current could be used. Refer to chapter *Detailed IO Description* for buzzer ratings.

Below drawing shows dimensions of external buzzer with sound Level of 85dB, that could be order from Sleipner.
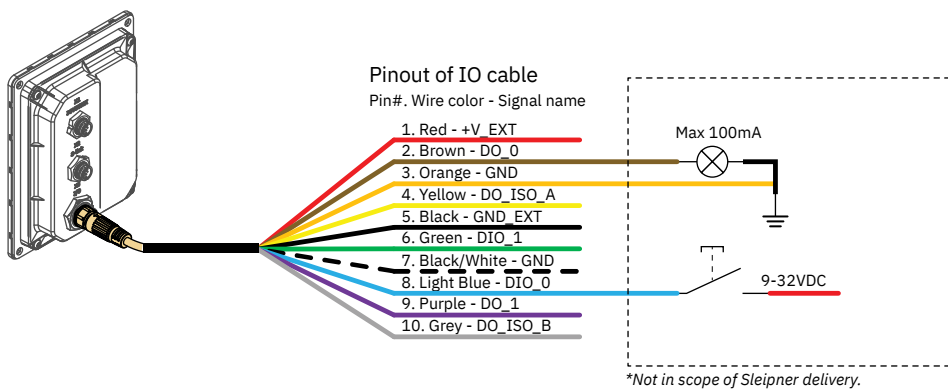Order number: SM909828.

Wiring Example – External Select Station Button

MC_0994
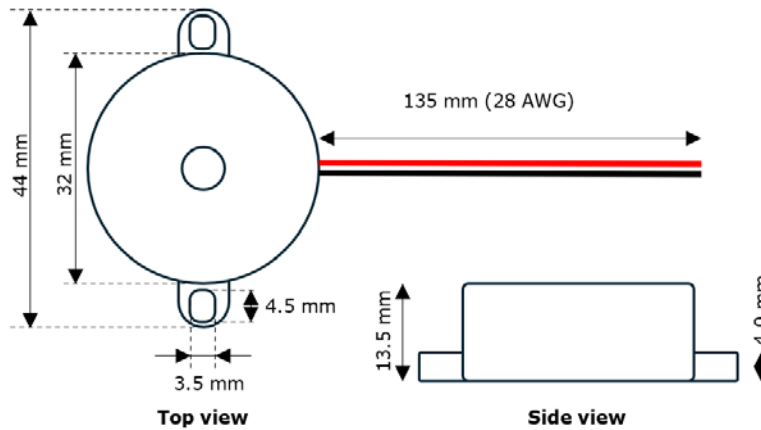
Connecting the IO cable to TP-35 enables the Select Station functionality to be controlled using an external button. A normally open push button with spring return must be used. An external indicator lamp can be connected to show whether the control panel is in command. S-Link supply must have common GND with OI cable wiring, see wiring diagram example below for details.

Refer to the *External Select Station Button* section in chapter *Control Panel -DNV Models* for detailed description on configuring the control panel for use with an external select station button.

See chapter *Detailed IO Description* for ordering information of IO cable.

Pinout of IO cable
Pin#. Wire color - Signal name
1. Red - +V_EXT
2. Brown - DO_0
3. Orange - GND
4. Yellow - DO_ISO_A
5. Black - GND_EXT
6. Green - DIO_1
7. Black/White - GND
8. Light Blue - DIO_0
9. Purple - DO_1
10. Grey - DO_ISO_B

Max 100mA

9-32VDC

Not in scope of Sleipner delivery.

MG_1003

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.
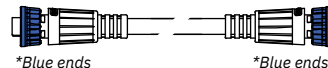
Installation of S-Link cables:
Select appropriate cables to keep the length of BACKBONE- and SPUR Cables to a minimum. In case of planned installation with total BACKBONE Cable length exceeding 100 meters please consult your local distributor. The S-Link cables should be properly fastened when installed 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 recommended to install cables in such a way that water and condensation do not flow along the cables into the connectors. This can be done for example by introducing a u-shape bend before the cable enters the product connector.
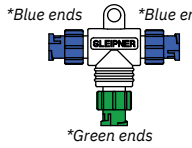
Ideally, the POWER Cable should be connected to the middle of the BACKBONE bus to ensure an equal voltage drop at both ends of the BACKBONE Cable. The yellow and black wire in the POWER Cable shall be connected to GND and the red wire connected to +12VDC or +24VDC.

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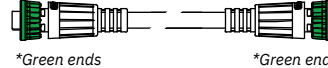
SPUR cables can be left unterminated to prepare for the installation of future additional equipment. In such cases, ensure to protect open connectors from water and moisture to avoid corrosion in the connectors.

Blue ends   *Blue ends*

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

Green ends   *Green ends*

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.

Green ends

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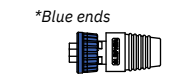

Blue ends   *Blue ends*
Green ends

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

Blue ends   *Blue ends*
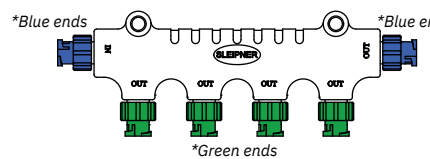
BACKBONE Extender
Connects two BACKBONE Cables to extend the length.

Blue ends

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

Blue ends   *Blue ends*
Green ends

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

MG_0159
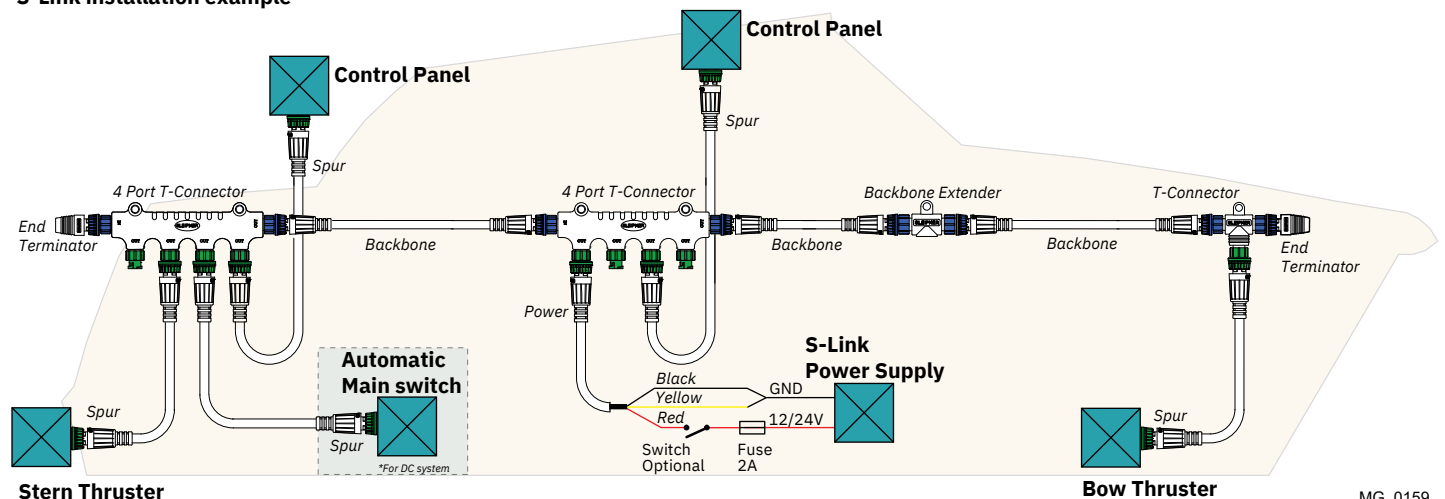
Fill in the type, location and serial numbers of the S-Link devices installed.
Keeping this as a reference will make the setup procedure easier!

S-Link device	Location	Serial number
(ie Thruster, AMS, PPC etc)	(Bow, Bow-STB, Stern, Stern-STB)	

Introduction:

At Sleipner Group, we prioritize sustainability and encourage the repair and re-manufacturing of products to extend their life cycles. If disposal is necessary, please follow these guidelines to recycle and manage waste responsibly, ensuring our efforts align with environmental protection efforts.

Electric Motors and Electronics:
- Disconnect from any power sources and dismantle them carefully.
- Recycle components through certified e-waste recycling centers that can adequately handle and recover electronic materials.
- Dispose of any non-recyclable electronic parts according to local environmental regulations.

Metals:
- Collect and sort metal parts for recycling as scrap metal.
- To increase recycling efficiency, ensure that metals are clean and free from non-metal attachments.

Plastics:
- Identify recyclable plastics based on local recycling guidelines.
- Remove any non-plastic components and clean them before recycling to improve the quality of the recycled material.

Hazardous Materials:
- Correctly identify any hazardous substances within components, such as batteries or capacitors etc.
- Follow local regulations for the safe disposal of hazardous materials to prevent pollution and protect environmental health.

General Disposal Instructions:
- Consult local recycling programs to determine the acceptability of various materials.
- Use authorized disposal services to ensure compliance with environmental standards.

Safe Disposal Practices:
- Adhere to local laws and regulations for waste management to minimize environmental impact and ensure community safety.

This guide is designed to help reduce our products' environmental footprint through responsible end-of-life management. Please contact your local waste management supplier or our support team for more specific disposal information or further assistance.

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

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

Warranty statement MC_0024

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

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

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

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

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

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

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

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

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

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

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

Patents MC_0024

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

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

SLEIPNER

Ocean born. Tech bred.

SLEIPNER MOTOR AS

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Norway

www.sleipnergroup.com

Made in Norway

MC_0030