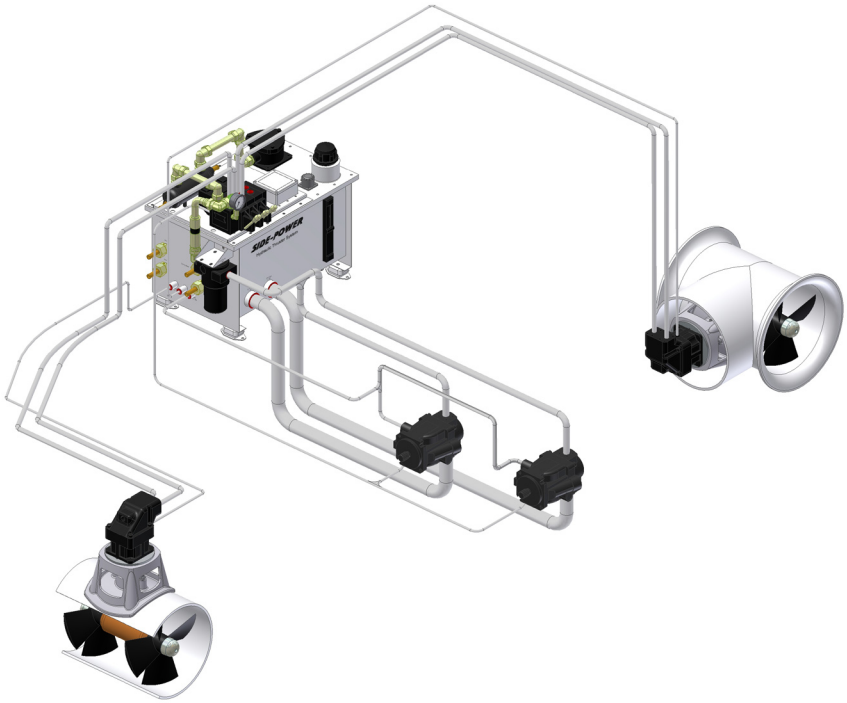
SIDE-POWER®

Hydraulic system

Keep this manual onboard !

Installation, start-up, user and service manual



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Made in Norway

Contents

DECLARATION OF CONFORMITY

CE

We, Sleipner Motor AS
P.O. Box 519
N-1612 Fredrikstad, Norway

declare that this product with accompanying standard remote control systems complies with the essential health and safety requirements according to the Directive 89/336/EEC of 23 May 1989 amended by 92/31/EEC and 93/68/EEC.

IMPORTANT!

This manual is only a guide for the installation, functional testing and servicing of the Sidepower hydraulic system, performed by qualified personell.

Warranty statement

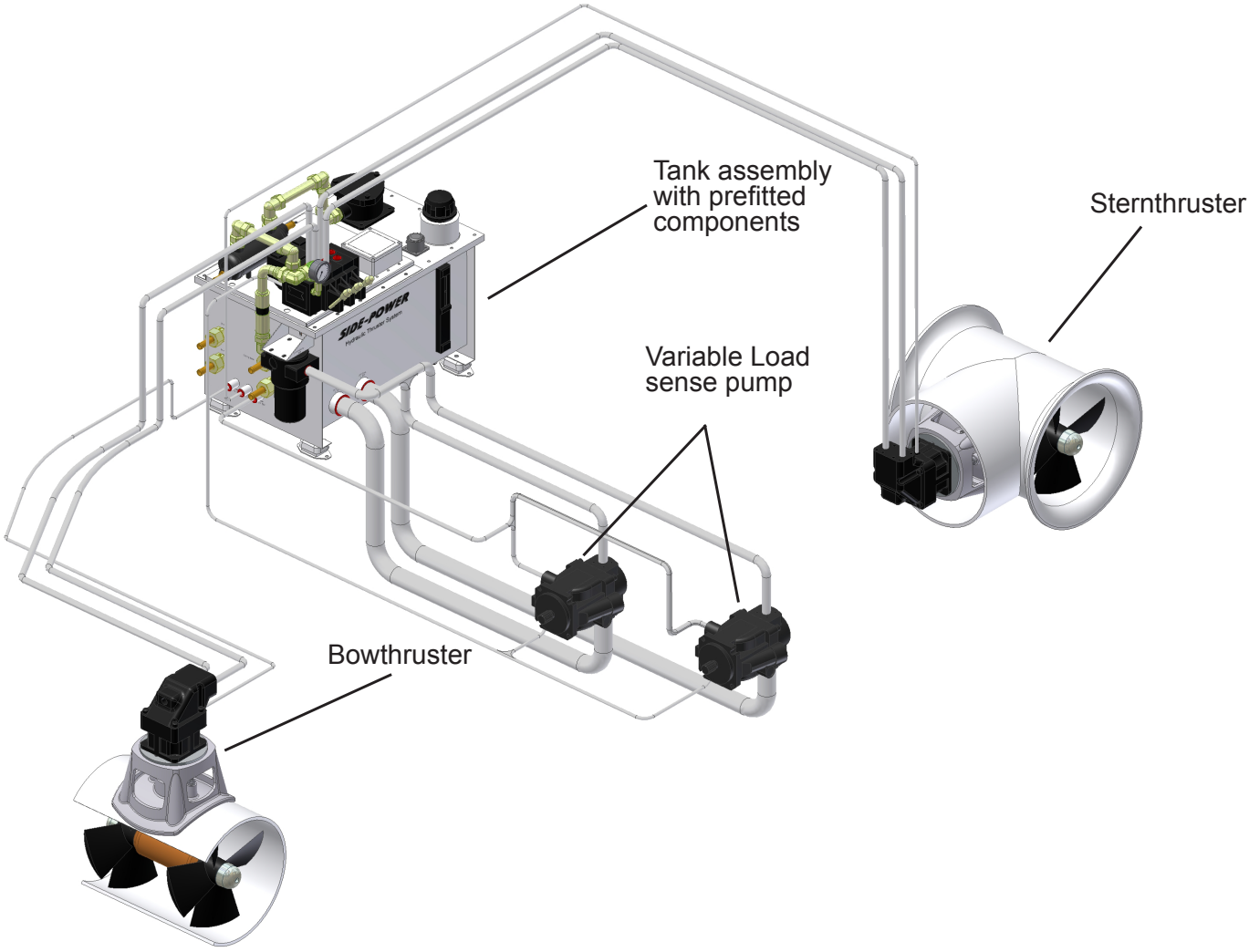
1. The equipment manufactured by Sleipner Motor AS (The "Warrantor") is warranted to be free from defects in workmanship and materials under normal use and service.
2. This Warranty is in effect for of two years from the date of purchase by the user. Proof of purchase must be included, to establish that it is inside the warranty period.
3. This Warranty is transferrable and covers the product for the specified time period.
4. In case any part of the equipment proves to be defective, other than those parts excluded in paragraph 5 below, the owner should do the following:
(a) prepare a detailed written statement of the nature and circumstances of the defect, to the best of the Owner's knowledge, including the date of purchase, the place of purchase, the name and address of the installer, and the Purchaser's name, adress and telephone number;
(b) the Owner should return the defective part or unit along with the statement referenced in the preceding paragraph to the warrantor, Sleipner Motor AS or an authorized Service Centre, postage/shipping prepaid and at the expense of the Purchaser;
(c) if upon the Warrantor's or Authorized Service Centre's examination, the defect is determined to result from defective material or workmanship, the equipment will be repaired or replaced at the Warrantor's option without charge, and returned to the Purchaser at the Warrantor's expense;
(d) no refund of the purchase price will be granted to the Purchaser, unless the Warrantor is unable to remedy the defect after having a reasonable number of opportunities to do so. Prior to refund of the purchase price, Purchaser must submit 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;
(e) warranty service shall be performed only by the Warrantor, or an authorized Service Centre, and any attempt to remedy the defect by anyone else shall render this warranty void.
5. There shall be no warranty for 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. No other express warranty is hereby given and there are no warranties which extend beyond those described in section 4 above. This Warranty is expressly in lieu of any other expressed or implied warranties, including any implied warranty of merchantability, fitness for the ordinary purposes for which such goods are used, or fitness for a particular purpose, and any other obligations on the part of the Warrantor or its employees and representatives.
7. There shall be no responsibility or liability whatsoever on the part of the Warrantor or its employees and representatives for injury to any person or persons, or damage to property, loss of income or profit, or any other consequential or resulting damage or cost which may be claimed to have been incurred through the use or sale of the equipment, including any possible failure or malfunction of the equipment, or part thereof.
8. The Warrantor assumes no liability for incidental or consequential damages of any kind including damages arising from collision with other vessels or objects.
9. This warranty gives you specific legal rights, and you may also have other rights which vary from country to country.

General planning and important precautions

Prior to installation, it is important that the installer reads this guide to ensure necessary acquaintance with this product.

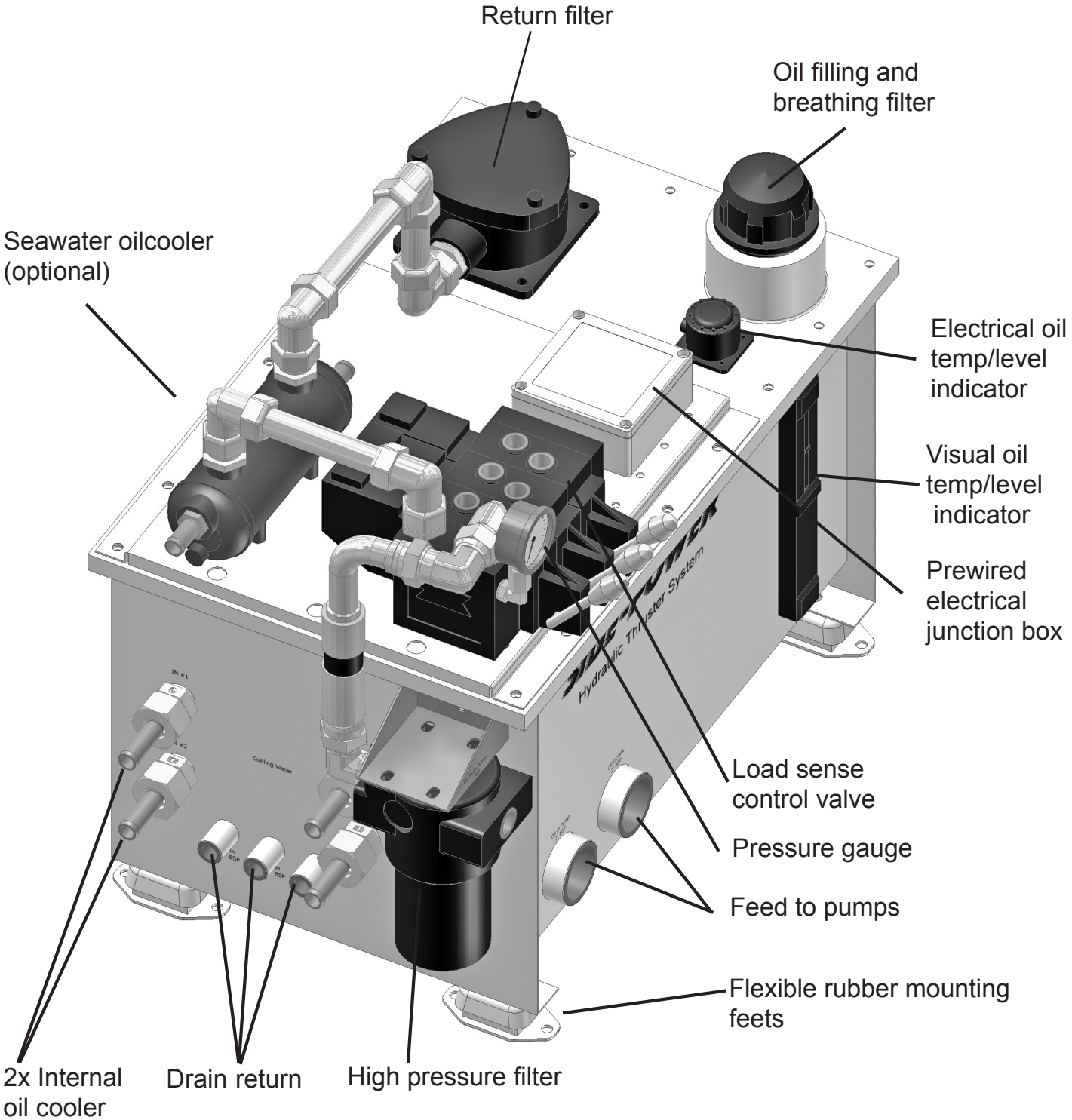
- This manual is intended to support educated / experienced staff and is therefore not sufficient in all details for the correct installation.
- Before installing the hydraulic system, you must ensure that you are in posession of, and have read the following additional manuals:
  - Thruster installation and user manual
  - The unique hydraulic system manual with complete system drawings
  - Relevant control panel installation guides and user manuals
- Prior to starting the installation procedure, make sure that no parts are missing or damaged during transportation.
- When installed in boats approved or classified according to international or special national rules, the installer is responsible for following the demands in accordance with these regulations / classification rules. The instructions in this guide can not be guaranteed to comply with all different regulations / classification rules.

NB ! Faulty installation of any part of the hydraulic system, tunnel, thruster or control panel will render all warranty given by Sleipner Motor AS void.

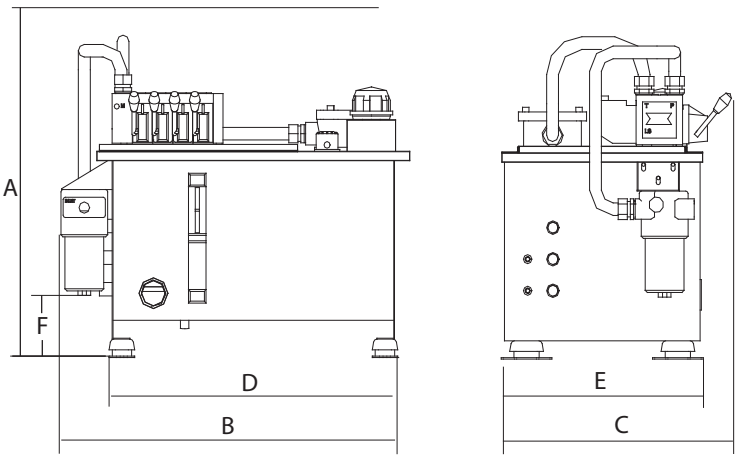


A complete Sidepower hydraulic thruster system consists of one or more hydraulic pumps, one or two thrusters and an oil tank with pre-fitted load sense controlvalve, oil cooler, high-pressure and return filter, oil filling filter, level and temp indictors and internal hoses. Valves and pumps are pre-adjusted at our factory before delivery.

Sidepower hydraulic tank and components



Floor mounted



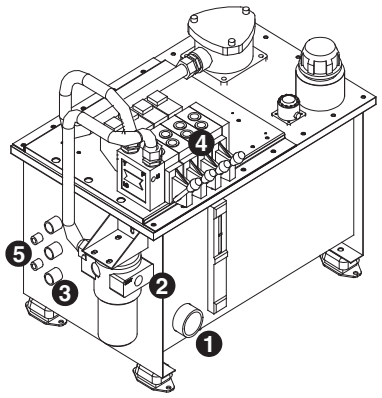
Tank kit	40 ltr	60 ltr	90 ltr	120 ltr
Tank volume (ltr · usg)	52.8 · 13.9	93.9 · 24.8	122.3 · 32.3	160 · 42.3
Oil volume (ltr · usg)	40 · 10.6	60 · 15.9	90 · 23.8	120 · 31.7
Dry weight* (kg · lbs)	46 · 101	60 · 132	68 · 154	77 · 170
A Build height (mm · in)	690 · 27.2	690 · 27.2	800 · 31.5	800 · 31.5
B Build length (mm · in)	785 · 30.9	800 · 31.5	800 · 35.1	1000 · 39.4
C Build depth (mm · in)	400 · 15.7	550 · 21.7	550 · 21.7	550 · 21.7
D Tank length (mm · in)	615 · 24.2	683 · 26.9	683 · 26.9	883 · 34.8
E Tank depth (mm · in)	340 · 13.4	479 · 18.9	479 · 18.9	479 · 18.9
F Filter change (mm · in)	100 · 4.0	100 · 4.0	100 · 4.0	100 · 4.0

* with valve block for single thruster only

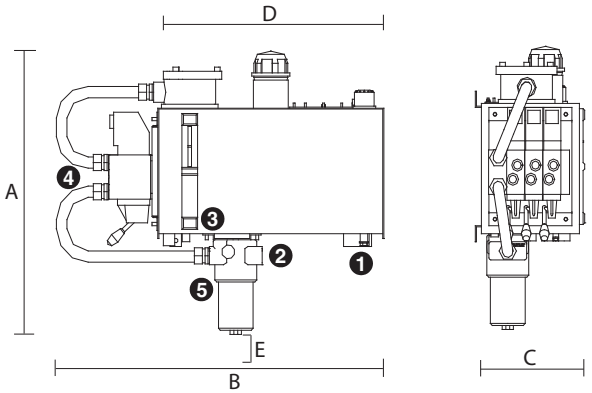
Connections on tank

1 Tank to pump	2" BSP
2 Pump to valve	1" BSP
3 Bleed returns (3x)	1/2" BSP
4 Valve ports to users	1/2" BSP
5 Water to/from oil cooler	3/4" Nipple

JIC thread kit available



Bulkhead mounted



Tank kit	40 ltr	60 ltr
Tank volume (ltr · usg)	52.7 · 13.9	80 · 21.2
Oil volume (ltr · usg)	40 · 10.6	60 · 15.9
Dry weight* (kg · lbs)	45 · 99	59 · 130
A Build height (mm · in)	705 · 27.8	860 · 33.6
B Build length (mm · in)	870 · 34.3	890 · 35.0
C Build depth (mm · in)	330 · 13.0	330 · 13.0
D Tank length (mm · in)	600 · 23.6	600 · 23.6
E Filter change (mm · in)	100 · 4.0	100 · 4.0

* with valve block for single thruster only

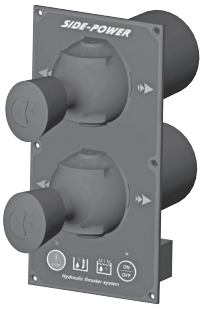
Connections on tank

1 Tank to pump	2" BSP
2 Pump to valve	1" BSP
3 Bleed returns (3x)	1/2" BSP
4 Valve ports to users	1/2" BSP
5 Water to/from oil cooler	3/4" Nipple

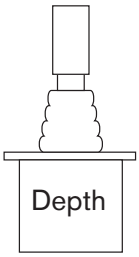
JIC thread kit available

Control panels



	Yacht Single	Yacht Dual	Pro Single	Pro Dual
Height (mm • in)	71 • 2.80	122 • 4.80	125 • 4.92	206 • 8.11
Width (mm • in)	71 • 2.80	71 • 2.80	106 • 4.17	106 • 4.17
Depth (mm • in) A/B	60 • 2.36/42 • 1.65	60 • 2.36/42 • 1.65	115 • 4.43/100 • 3.94	115 • 4.43/100 • 3.94
Item code (12 V)	895112-S	895112-D	896112-S	896112-D
Item code (24 V)	895124-S	895124-D	896124-S	896124-D



	Info panel
H (mm • in)	70 • 2.76
W (mm • in)	70 • 2.76
Item code (12V/ 24V)	8980-12V/8980-24V


	Dual Joystick panel	Docking panel
H (mm • in)	120 • 4.72	120 • 4.72
W (mm • in)	70 • 2.76	70 • 2.76
Item code (12 & 24V)	8940	8909 A


	Touch panel	Round touch panel
H (mm • in)	70 • 2.76	-
W (mm • in)	70 • 2.76	Ø86.5
Item code (12 & 24V)	8950	8909 A


	Joystick panel	Boat switch panel
H (mm • in)	70 • 2.76	-
W (mm • in)	70 • 2.76	Ø86.5
Item code (12 & 24V)	8950	8955

	Radio remotes
H (mm • in)	95 • 3.74 (transmitter)
W (mm • in)	48 • 1.89 (transmitter)

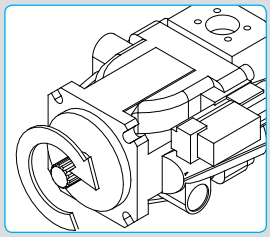
Installation planning and important precautions

- Observe safety precautions (wear protective goggles, gloves and other appropriate safety equipment when installing the hydraulic system and working with hydraulic oil).
- The thrusters should already be installed (please see the mechanical thruster installation manual).
- Hydraulic components can be damaged by dust and dirt, keep these away from the boat until you have finished the «dirty» part of the installation (grinding, drilling etc.) and cleaned up.
- All hydraulic components must be assembled in a clean environment.
- Make sure that all parts are handled with care.
- Find a good location for the hydraulic tank installation, in terms for maintenance accessabilities, height of oil level in hydraulic tank in relation to hydraulic pumps (for details, refer to "Installing tank assembly")
- Check that the power source direction is in accordance to the pump directions (see "Hydraulic pump installation")
- The hydraulic system is delivered without hoses, make sure to contact professionals that can assist with the planning of the installation, supplying neccessary hoses and fittings, and installing these parts

Hydraulic pump installation

Warning !

- Check that the power source direction is in accordance with pump direction ! Pump direction is decided as seen on picture, facing the pump shaft, i.e the pump direction will be the opposite of engine / PTO / generator. NB ! Please see pump nameplate L=CCW and R=CW
- Ensure that the power source and connection point can handle the torque and load from the hydraulic pump.
- As soon as the pump is connected to the power source, it is very important NOT to start the power source before the installation is complete and the pump is prefilled with hydraulic oil.



The pump can with a great advantage be connected to a generator. The advantage with this type of installation is that the pump will be driven at a higher and more stabile speed than installed to the main engine.You can thereby use a smaller pump in such an installation.

Due to our experience with hydraulic thrusters, we know there are usually three methods of connecting a hydraulic pump to the engine or generator:

- Power Take Off (PTO) at the gearbox or the engine
- Front mounted to the engine crankshaft with use of a bracket and a flexible coupling
- AC power pack

Belt drive installations is not recommended due to the high stress and torque requirements. Please concact your Side-Power distributor if belt drive installation is the only option

PTO mounted pump
SIde-Power standard pumps comes with SAE flange and spline to fit directly to a wide range of live ore clutched PTOs. Our pumps comes standard with one of the following SAE standards:

- SAE-B (2 bolt, 13 teeth)
- SAE-C (4 bolt, 14 teeth)
- SAE-CC (4 bolt, 17 teeth)

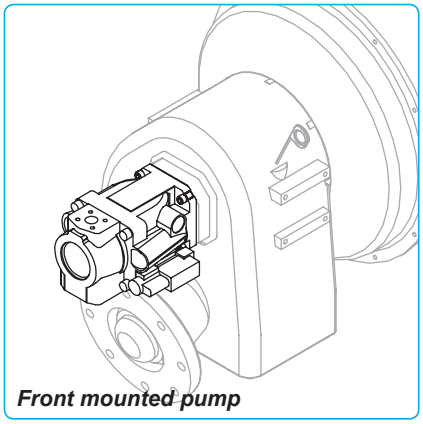
For other shaft and flange options or special adapters, contact your local Side-Power distributor.
When fitted to a wet or pressurised PTO, make sure that sealing is maintained to avoid draining the PTO

Front mounted pump
A very reliable way to install the pump is to connect the pump to the crankshaft in front of the engine with use of a bracket and a flexible coupling. Even when using a flexible coupling, it's very important to get the best possible alignment of the pump shaft and crankshaft to reduce stress on the engine/pump shaft bearings.

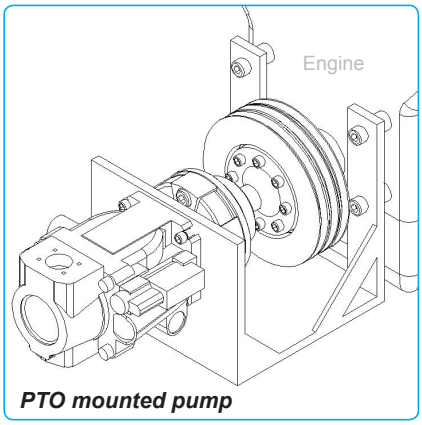
It is important that the hydraulic pump is fixed to the bracket, and the bracket itself is locked to the engine. The pump has to move with the engine.

AC Power pack
A 3-phase AC motor is designed to run both directions. It's important to to match the drive direction of the AC motor and the pump. A trained professional should be responsible for the electrical installation of the motor.

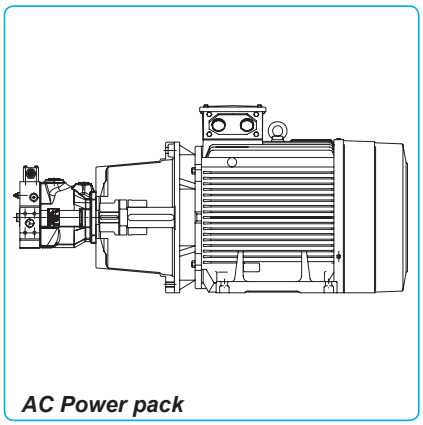
If high start-up current is a problem, please contact your Side-Power distributor for a sotfstarter solution or star/delta switch.



Front mounted pump



PTO mounted pump



AC Power pack

Tank assembly installation

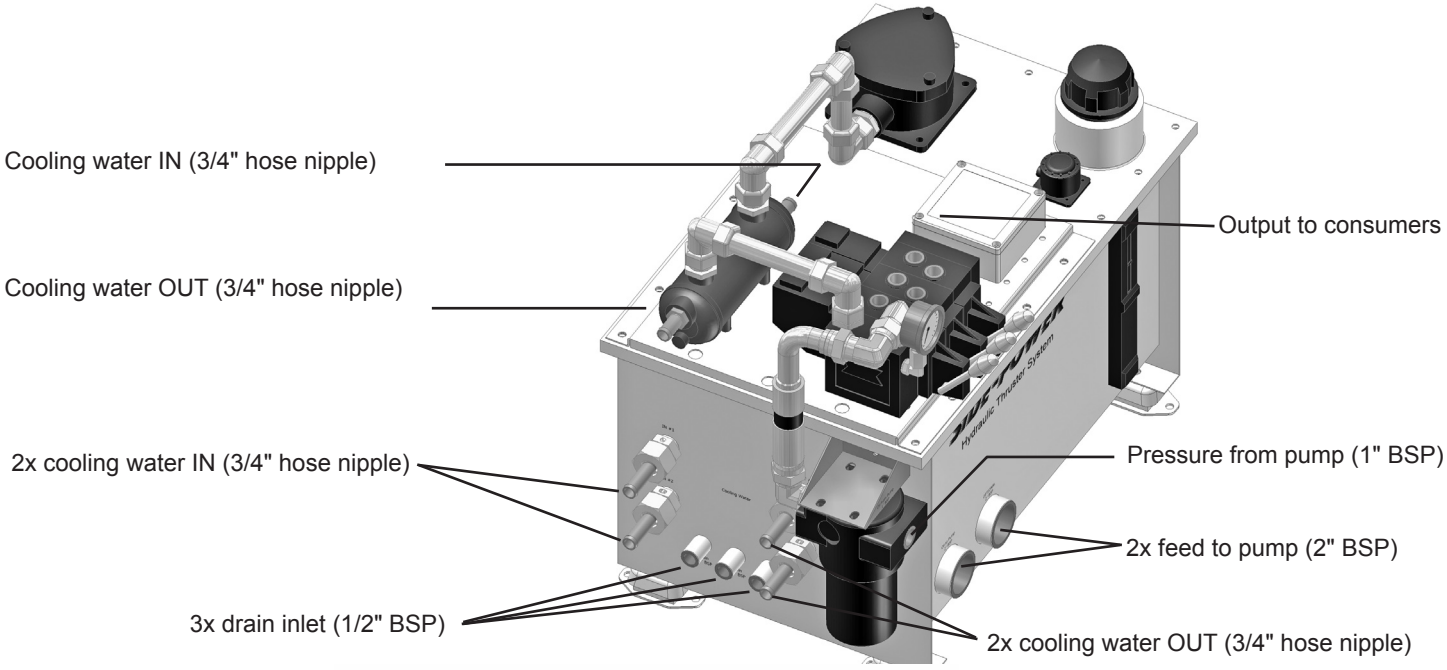
- Place the tank in a position where you have access to connection and inspection points. Ensure that there is enough space to lift out and replace the filters. Keep in mind to make room for access to the oil filling point.
- **NB: Place the tank high enough to get the oil level above the hydraulic pump. The system requires overpressure in the pumps suction line.**
- Fasten the tank assembly properly.
- Ground the tank electrically to the boats bonding system.
- **Ensure that the tank and other components are thoroughly clean before you start installation of fittings and hoses. Also, make sure that the fittings and hoses are thoroughly clean (avoid ingress of dirt, water and other contamination).**

Hose connections

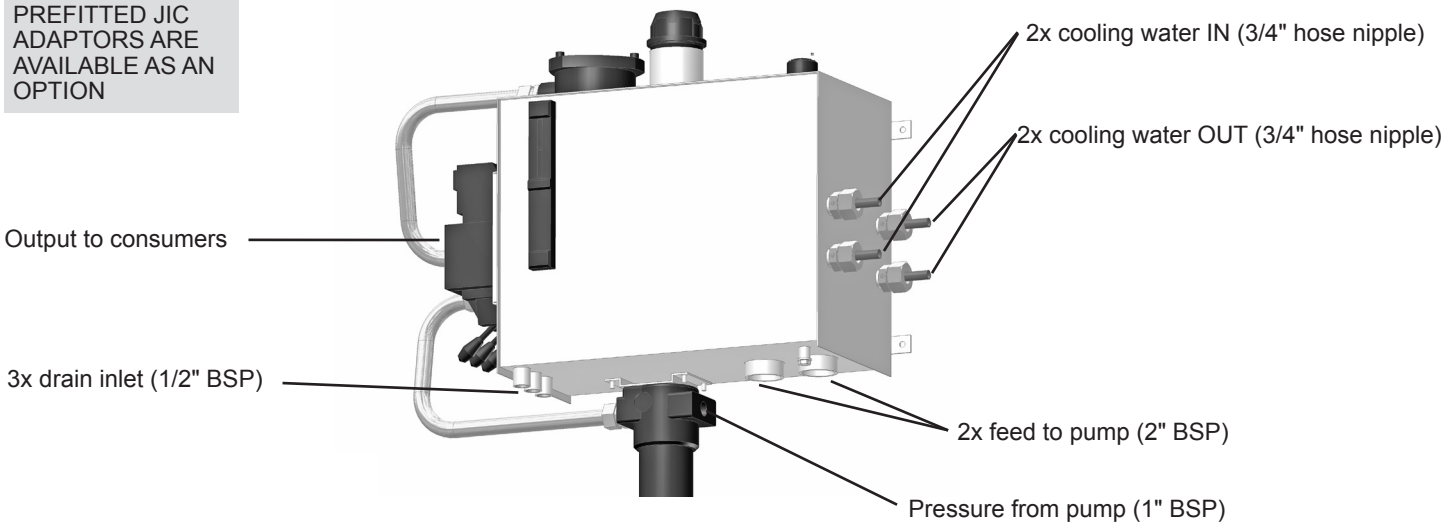
Each thruster system is calculated and set up individually by Sidepower. Please see the enclosed system drawings in the enclosed unique system manual for the actual installation to get the right hoses and fittings. We advice that you let professionals make the hoses and fittings. Make sure to clean the hoses internally before assembly. To ensure easy and trouble free connection, apply a small amount of oil to threads and mating faces before joining. Different kinds of fittings will require different tightening torque to avoid leakage. If in doubt, please contact a skilled professional to get the best results.

NB: Using sharp 90° elbows, T-connections and smaller hoses than recommended in the hydraulic schematic will increase the resistance in the system and reduce the efficiency/performance.

Using plumbing tape, hemp, similar products or excessive amounts of tread sealant can contaminate the hydraulic oil and cause blockage inside valves and pumps.



PREFITTED JIC ADAPTORS ARE AVAILABLE AS AN OPTION

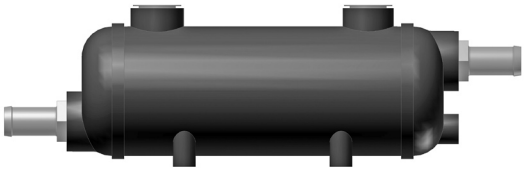


Cooling water

The hydraulic tank comes prefitted with two internal oil coolers that will need cooling water (approx. 15 l/min seawater at max 30°C) For maximum cooling efficiency, we advice to install a separate seawater intake to supply the cooling water. This solution will require a separate water circulation pump. If an electrical pump is choosen, the electrical temperature/level indicatior on the tank has a separarate 50°C switch that can control the function of the water circulation pump, in relation to the oil temperature. See electrical schematics for more detailed information. If a separate water intake is used, the coolers can be connected in series/loop.

If a separate water intake is not an option, the cooling water can bee bleed from the engine seawater cooling system. Please verify with the engine manufacturer that this is accepted. If two engines is used, make sure to connect one oil cooler to each of the engine cooling system. It is important to keep the engine cooling systems separate. If only one engine is installed, the oil coolers can be connected in series/loop.

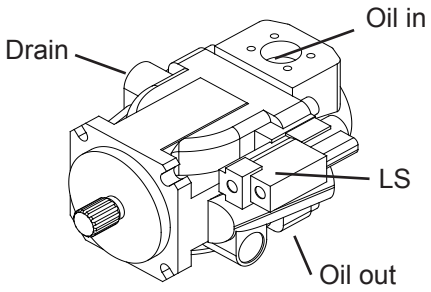
For extra cooling requirements, an optional external oil cooler can be installed. To achieve maximum cooling effect in this cooler, the direction of the oil flow in a oil cooler has to be opposite to the waterflow direction. This oil cooler can be connected in series with the internal oil coolers.



Optional external oil cooler

Pump hose connections

- Fit the LS-hose from the «LS»-port at the valve to the «X»-port on the pump. Using too long/deep threads (e.g. JIC threads) will jam the pump pressure regulator spring, causing the pump to malfunction.
- The drain hose should be connected to the highest position of port «L1» and «L2» at the pump (please see pump drawings) to ensure best priming of the pump. Use one of the three drains (1/2" BSP-connections) at the tank.
- Suction hose can be mounted with nipples and hose clamps at pump inlet (2" SAE 3000 PSI). Use a reinforced hose that will not collapse due to suction in the hose. To avoid pump damaging cavitation in the suction line, try to avoid using sharp 90° elbows or T-connections close to the pump.
- Pressure hose has to be mounted at pump outlet (1" SAE 3000 PSI) and at the free 1" BSP port at the high-pressure filter on the oil tank.



Valve connections and connections for additional consumers

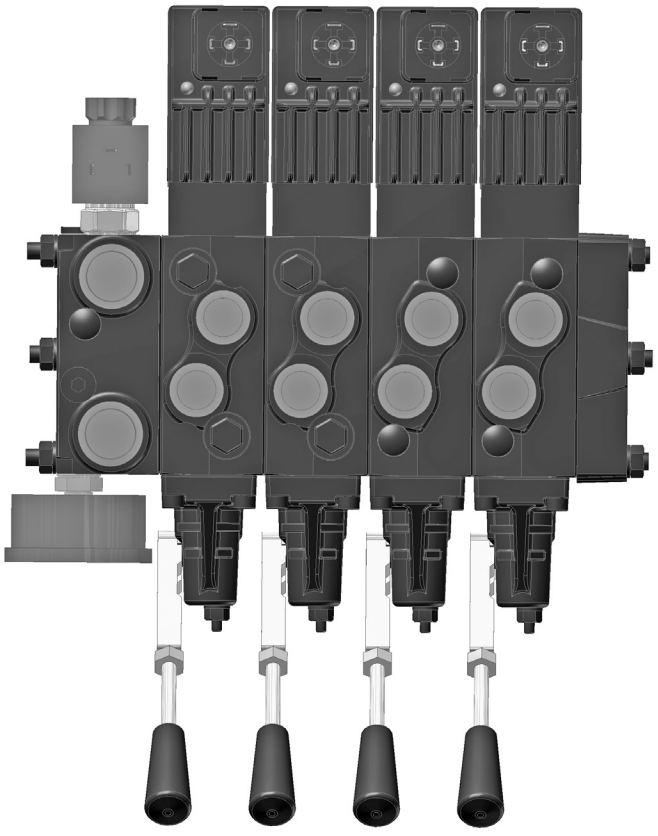
Sidepower hydraulic thruster systems can be delivered with various numbers of modules and set-ups. Please see enclosed system drawings and valve documentation for Flow/Pressure settings at the actual valve module.

Be sure to connect your consumers to the correct modules (correct set-up for correct consumer). Attach each consumer to the A and B consumer ports.

Please see the consumers installation manual for how to install additional consumers that are not Side-Power products.

Connect drain from consumers to drain port at tank.

If resetting or fine tuning of the valves is neccessary, please contact your Side-Power distributor.



Electrical wiring

Before you start to install the electric wiring and connections, it's important to remove the positive battery terminal.
Side-Power hydraulic systems comes with a prewired electrical control/junction box.
Cables to be installed are:
• 12V or 24V DC power feed to control/junction box. Use 1.5 mm^2 wire size.
• From the junction box to each of the control and info panels. Use 1 mm^2 wire size (3-9 lead multi cable, depending on type of control panel).
• Non-Thruster consumers are not prewired by Side-Power. Use 1 mm^2 multi cable.

More detailed information is found in the unique electrical wiring schematic.

CHECK LIST

Before startup:

- ☐ Hoses and fittings are in accordance to the hose list in the unique hydraulic system drawing. (Sizes and pressure ratings)
- ☐ All connections are tight and secure.
- ☐ Oil level is ok.
- ☐ The oil tank is properly fastened and grounded.
- ☐ There is enough space arond the oil tank to change filters, fill oil and inspect the gauges and indicators.
- ☐ The oil tank is placed high enough to pressurize the pump feed port. (oil level above the pump)
- ☐ Cooling water is connected to the oil coolers. (approx 15 l/min, max 30°C)
- ☐ Pump drive direction will correspond with the power source drive direction
- ☐ Front mounted pump is alligned to the power source crank shaft, and fixed to move with the power source.
- ☐ The pump is prefilled with oil.
- ☐ The drain line is connected to the upper drain port at the pump.
- ☐ The LS line is connected to the pump. Correct adaptor/fittings is used (NOT JIC threads).
- ☐ A drain line is connected to the thruster(s).

After *startup:*

- ☐ Standby pressure is 10-30 bar. (seen at the pressure gauge at the control valve on the oil tank)
- ☐ No leakages.
- ☐ Oil level/temp is ok.
- ☐ The thrust direction is in accordance to the joystick movement.
- ☐ All control stations are connected and working properly.
- ☐ The oil pressure when running each of the hydraulic consumers is in accordance to the setup in the system manual.
- ☐ The filter indicators are ok when running a large consumer (high oil flow).

Hydraulic system serial no.: .....

Standby pressure: ..... bar

System work pressure (bowthruster): ..... bar *System work pressure (sternthruster): ..... bar*

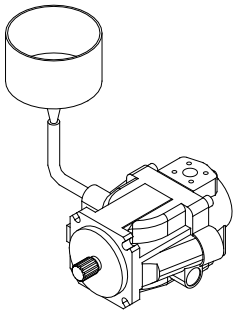
System work pressure (extra consumer #1): ..... bar *(..#2): ..... bar* *(..#3): ..... bar*

The hydraulic thruster system has been installed as per the instructions in this manual and all points in checklist above have been controlled.

Signed: .....

Date: .....

System fill-up



Prior to filling the tank, prime the pump(s) through their upper drain port.

Fill the oil tank with correct hydraulic oil through the oil filling filter. Use new and clean mineral based hydraulic oil with anti-wear additives, viscosity ISO VG 32.00 (by ISO 3448)

The oil level in the tank should be approximately 3/4 full, or at the middle of the upper indicator of the sight glass. Because vessels heels and the fact that we have an air breathing filter in the oil filler cap, avoid higher oil level than what the sight glass can indicate.

Pump damages caused by running pumps without oil is not covered by warranty.

Starting up and functional testing of the hydraulic system

Ensure that the hydraulic system and components are installed in accordance with the provided system manual.

Ensure that the vessel is secured. (In the event of undesired directional movement of the thruster(s))

Observe safety precautions (wear protective goggles and gloves).

Disconnect all electrical plugs from the valve block.

Check that the valve block manual lever(s) are in their central position (no load).

Ensure that the oil tank is filled with oil in accordance with system manual.

Start the engine(s) / hydraulic pump(s) at idle while observing the pressure gauge installed at the control valve. As soon as the pump is running, you should read a standby pressure at 10-30 bar. If no pressure is present, the pump is probably running in the wrong direction. Stop the engines immediately to minimize potential pump damage. If pump pressure is ok, keep running for approximately 30 sec.

Stop the engine(s).

Check oil level in the tank and refill if necessary.

Check system for leakage and adjust if necessary.

Restart the engine(s) / hydraulic pump(s).

Run the thruster to approximately 30% effect in both directions, using the manual lever at the valve block. Be aware that there can be a delayed response from the hydraulic consumer until all air is purged from the system. Manual air bleeding should not be necessary.

Check the oil level in the tank and refill if necessary and re-check system for leakage.

Repeat the above procedure on additional thruster or other hydraulic consumers as required.

Run each hydraulic consumer separately at full power manually (e.g. additional thruster, windlass etc.) Ensure their individual pressure indications are in accordance with their system manuals. Monitor the filter indicators making sure the filters working properly and not in need of replacement.

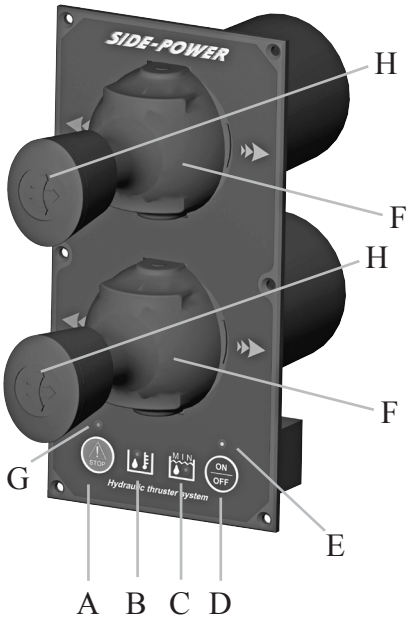
Re-connect all electrical plugs on the valve block and ensure correct functionality.

Ensure that the standby pressure is less than 40 bar at the valve block pressure gauge when thruster and other consumers are not in use (system in standby mode).

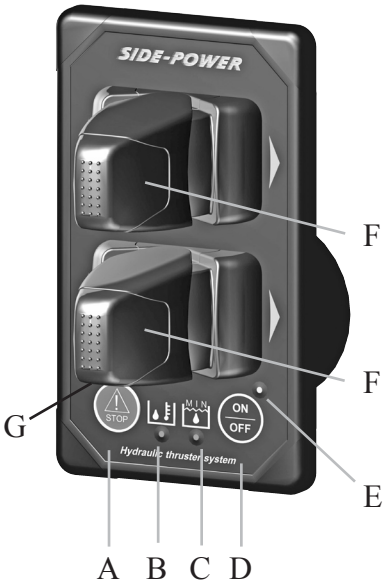
Continuously monitor the system oil temperature and filter bypass indicators during the first hours of running. Especially when initially throttling the engines to full power. The oil temperature should not increase to more than 60° C.

WARNING:
Overheating over 60° C will reduce the lifetime of your oil. Overheating over 90° C can seriously damage your hydraulic system components.

Pro control panel, proportional



Yacht control panel, proportional



PROPORTIONAL CONTROL PANELS
A: Emergency stop button
B: Oil temperature alarm
C: Oil level alarm
D: On/Off button
E: Active station indicator
F: Proportional joystick
G: Emergency stop indicator
H: Joystick lock knob

On/Off control panel / info panel

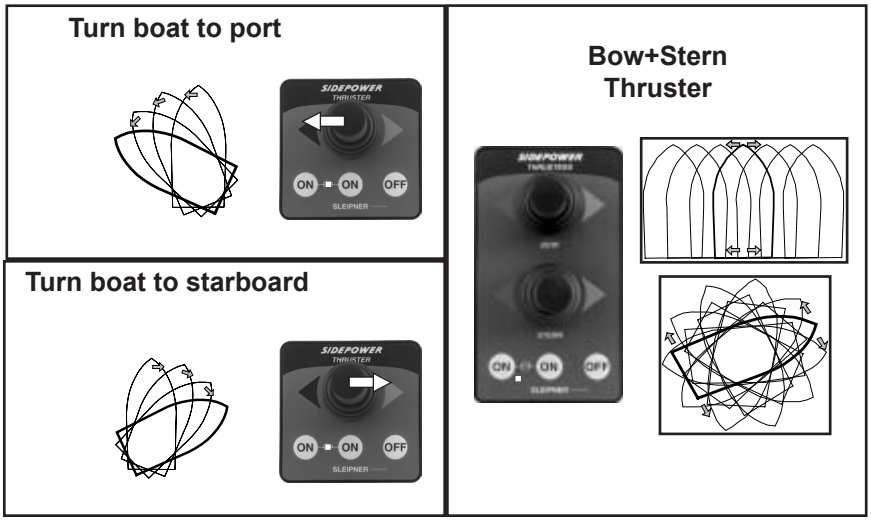
ON/OFF CONTROL PANELS
1: Joystick
2: On button
3: Active station indicator
4: On button
5: Off button
6: Oil temperature alarm
7: Emergency stop indicator
8: Oil level alarm
9: Emergency stop button

PROPORTIONAL CONTROL PANELS

1. To activate the control station, press the on/off button (D). The active station indicator (E) will turn on to indicate that the control station is active.
2. To run the truster(s), you can now move the joystick(s) (F) in the choosen direction. The joysticks will return to center position when released.
3. For PRO panels only, you can also run the thruster(s) by twisting the knob (H) on the top of the joystick(s). The joystick will engage more according to how much you twist the knob. The joystick will stay in this position until the knob is twisted back or the joystick is forced back to center position. This feature will allow you to lock the thruster(s) in running position at any speed setting for continous thrust.
4. Proportional control panels will allow you to regulate the speed of the thruster by how much the joystick(s) are engaged, the more engagement the more thrust will be delivered by the thruster(s),
5. To stop the thruster(s) immediately in an emergency situation, press the red emergency stop button (A). The emergency stop indicator (G) will turn on to confirm that the emergency stop button is enganged. When this emergency button is engaged, the hydraulic system will go to safe mode. To deactive the emergency stop function, press the emergency stop button (A) on any control station. The active emergency stop indicator (G) will turn off.
6. The hydraulic oil temperature indicator (B) and an audiable alarm will engage in a situation where the hydraulic oil temperature is above 70°C. **High oil temperature will reduce the lifetime of the oil and in worst case scenario damage hydraulic components.** It is therefore important to find and eliminate the reason for the alarm. The alarm will stay active as long as the temperature is above 70°C. Pressing the red emergency stop button will stop the audible alarm, but the indicator (G) will stay active.
7. The hydraulic oil level indicator (C) and an audiable alarm will engage when the oil level is below recommended minimum level. **Running the hydraulic pump(s) dry, or with limited available oil flow, can damage the pump(s).** It is therefore important to find and eliminate the reason for the alarm. The alarm will stay active as long as the oil level is low. Pressing the red emergency stop button will stop the audible alarm, but the indicator (G) will stay active.
8. When using more than one control station, you will deactive all other control stations when activating a new control station, by pressing the on/off button (D). The active station indicator (E) will turn on at the activated station, and turn off at all other stations.
9. To deactive a active control station, press the on/off button (D). The active station indicator (E) will turn off to indicate that the control station is not active.

ON/OFF CONTROL PANELS/INFO PANEL

1. To activate the control station, press both on buttons (2 and 4). The active station indicator (3) will turn on to indicate that the control station is active.
2. To run the truster(s), you can now move the joystick(s) (1) in the choosen direction. The joysticks will return to center position when released.
3. To stop the thruster(s) immediately in an emergency situation, press the red emergency stop button (9) on the info panel. The active emergency stop indicator (7) will turn on to confirm that the emergency stop button is enganged. When this emergency button is engaged, the hydraulic system will go to safe mode. If more than one info panel are installed, the active emergency stop indicator (7) at the info panel that was engaged will have a continous red light. The active emergency stop indicator (7) on the other info panel(s) will have a flashing red light, to indicate that the emergency stop button (9) is engaged somewhere else in the hydraulic system. To deactive the emergency stop function, make sure to press the emergency stop button (9) on the info panel that has a continous red light on the acitve emergency stop indicator (7), this would be the same info panel that was originally engaged.
5. The hydraulic oil temperature indicator (6) and an audiable alarm will engage in a situation where the hydraulic oil temperature is above 70°C. **High oil temperature will reduce the lifetime of the oil and in worst case scenario damage hydraulic components.** It is therefore important to find and eliminate the reason for the alarm. The alarm will stay active as long as the temperature is above 70°C. Pressing the red emergency stop button will stop the audible alarm, but the indicator will stay active.
6. The hydraulic oil level indicator (8) and an audiable alarm will engage when the oil level is below recommended minimum level. **Running the hydraulic pump(s) dry, or with limited available oil flow, can damage the pump(s).** It is therefore important to find and eliminate the reason for the alarm. The alarm will stay active as long as the oil level is low. Pressing the red emergency stop button will stop the audible alarm, but the indicator will stay active.
8. To deactive a active control station, press the off button (5). The active station indicator (3) will turn off to indicate that the control station is not active.



How to use a bowthruster

1. Please take some time to exercise thruster usage in open water to avoid damages to your boat.
3. Acivate the control panel
4. Move the joystick in the direction you wish the bow to move. Other controls like footswitches or toggle-switches on the throttle can be used. These are normally logically installed, so by engaging the port control, the bow goes port etc. In case of any doubts, try in open waters first.
5. Depending on the sideways speed of the bow, you must disengage the control device shortly before the bow is in the desired direction, as the boat will continue to move after stopping the bowthruster.

How to use a single stern thruster

Some boats might however have installed a single stern thruster because of space limitation in the bow. In this case the stern thruster is used in the same way as a single bow thruster (see above) for moving the boat's stern.

How to use a bow and stern thruster combined

The combination of a bow and stern thruster offers total manoeuvrability to the boat and the opportunity to move the bow and the stern separately from each other. This enables you to move the boat sideways in both directions and to turn the boat around its own axis staying at the same place.

- Again, if in doubt, try in open water first!

Servicing the hydraulic system

- Check filter indicators (A and G) periodically. A large hydraulic consumer must run at full speed for the dirt indication gauges to work.

- Check oil level (E) periodically.

- We recommend to replace hydraulic oil and filters (B and H) after the initial start up and test period. This is to eliminate all debris and dirt from installation and start up, to ensure a trouble free and long service life. After this first service, oil and filters should be replaced every 2000 engine hours / every 3 year.

- Between service intervals, make sure to replace the oil and filters (B and H) if misscolouring or a distinctive smell is present.

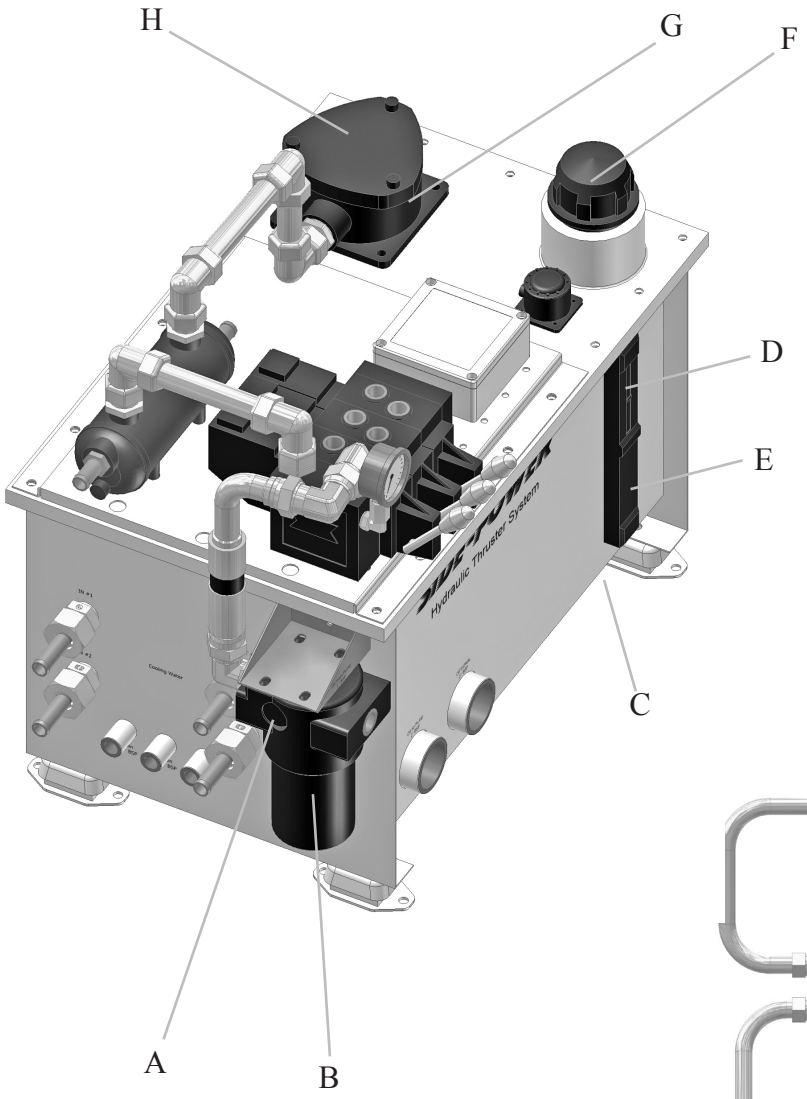
- Check that all electrical connections are clean and fastened firmly.

- We advice to drain a little bit of oil out of the drain plug (C) of the tank once a year to let any possible sedimentation and water out.

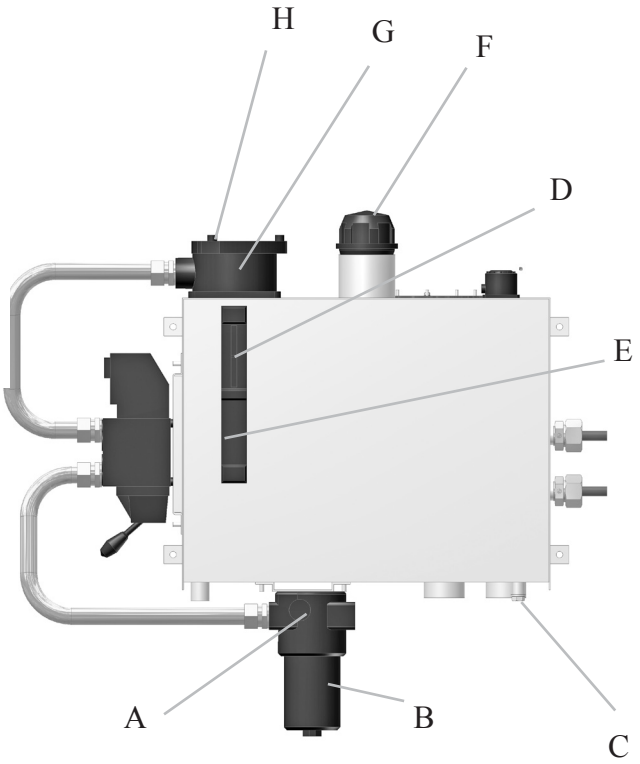
- Minimum once a year, the hoses and hose fittings must be checked for wear and leakages. Make sure that all fittings are tight and secure. This must be done more often on a commercial vessel with lots of usage of the hydraulic system.

- For high pressure filter element replacement, please unscrew filter element bowl (B) to get access to the element. Make sure to use clean tools and avoid getting dirt in the system. Use a bucket, or similar, to collect the oil spill when dissasembling and assembling the filter. Proceed to replace the old element with the new one. After replacement, make sure to tighten the filter element bowl (B) properly.

- For return filter element replacement, please open the top cover (H) on the return filter to get access to the filter element. Make sure to use clean tools and avoid getting dirt in the system. Use a CLEAN towel, or similar, to collect the oil spill when dissasembling and assembling the filter. Proceed to replace the old element with the new one. After replacement, make sure to secure the top cover (H) and tighten the three bolts properly.



(A) High pressure filter dirt indicator
(B) High pressure filter
(C) Drain port
(D) Visual oil level sight glass
(E) Visual oil temperature sight glass
(F) Oil filling point
(G) Return filter dirt indicator
(H) Return filter

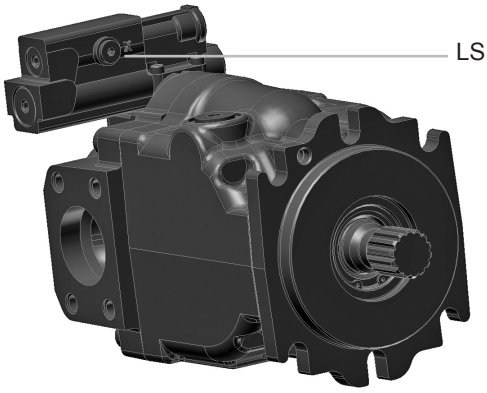


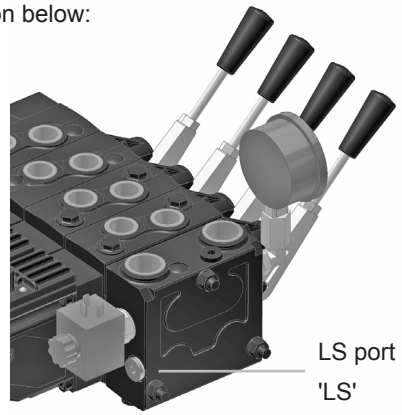
No standby pressure on the system when pump(s) are running

- The pumps drive direction is incorrect. Stop the pump(s) immediately to minimize potential pump damage. Contact Sidepower for further assistance / new pumps.

Max pressure on the system is 20-30 bar when running a consumer

- The LS hose is not installed / connected to wrong port. See illustration below:





- The red emergency stop button on the hydraulic info panel is activated.
  - Repress the red STOP button to deactivate the emergency stop function.
- The pump is not connected to the power source (PTO)
  - Check if clutchable PTO is engaged
  - Check if that pump drive shaft is correct size and engaging the spline sleeve inside the PTO.

Standby pressure too high (above 40 bar)

- The LS hose connector is jamming the spring inside the pump pressure regulator.
  - Use shorter connector (JIC threads can NOT be used)

Oil level is too low

- Check for leakages. After initial startup and test period, the oil level should not change.
  - Fix the leakage, and refill.

Oil temperature is too high

- Oil coolers are not working properly
  - Avoid using the system until the problem is fixed or the oil temperature is beck below 60ºC.
  - Check that you have 15-20 l/min cooling water at max 30ºC.
- If not ok, check that strainers are clean and valves are in full open position.
- If strainers and valves are ok, reroute your cooling water supply.
- The system is generating more heat than normal
  - Check that no consumers are running unintentionally
  - Check that no safety relief valves are open. Open relief valves will make a howling / whining sound.
- If open, the system pressure settings must be adjusted. Contact Sidepower for more detailed instructions.
- If both of the two checkpoints above is ok, please contact Sidepower for additional cooling.

The thruster is running in wrong direction.

- If on/off electrical control, swap the blue and grey wires from the control panel, or swap the hydraulic hoses between the valve and the thruster.
- If proportional control, turn the joystick 180 degrees or swap the hydraulic hoses between the valve and the thruster.

Reduced thruster performance.

- Grids in the tunnel opening, sharp tunnel openings deep tunnel installation or barnickels on propeller / gear leg / inside tunnel will reduce the thrust and increase the pressure.
- Check that no filters are blocked (dirt indicator show green area).
- Do not adjust performance settings without first contacting Sidepower for more detailed instructions.

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