DOMETIC

MARINE STEERING SELECTION GUIDE



EN **BayStar/SeaStar/Optimus, Marine Steering**

Selection Guide — 2027

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1 Important Safety Information

Safe operation of Dometic marine steering systems depend on proper installation and maintenance of the system(s), as well as the operator's safe judgment, boating knowledge, and expertise.

The installer and operator must read and understand the safety requirements in the product manual(s) supplied before installing or using these steering systems. If you have any questions about safe installation or operation of these systems, contact Dometic Marine. Please don't guess.

1.1 Explanation of symbols

The symbols below are used throughout this publication to alert you to potential hazards involved with the operation and installation of this product. Observe these warnings and notices carefully. The safety alerts alone cannot eliminate hazards; strict compliance with any special instructions during installation, operation, and maintenance, along with common sense operation, are important measures to prevent hazardous situations.



DANGER!
Safety instruction: Indicates a hazardous situation that, if not avoided, will result in death or serious injury.



WARNING!
Safety instruction: Indicates a hazardous situation that, if not avoided, could result in death or serious injury.



CAUTION!
Safety instruction: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.



NOTICE!
Indicates a situation that, if not avoided, can result in property damage.



NOTE
Supplementary information for operating the product.

1.2 Safe operation



WARNING!
The safety information below is intended to inform you of hazards that may be present when operating a boat equipped with Dometic controls. Read and understand this information.

General

- Read and understand this guide and any other documentation provided with your product system.
- Know and obey all applicable federal, state, and municipal laws and regulations that govern boating in your area. Dometic recommends all boat operators take a boating safety course.
- Never operate a boat while under the influence of drugs or alcohol.

Before every use

- Perform the pre-trip inspection(s) described in your operator's manual.



WARNING!
Do not operate the boat if any component is not in proper working order. It may result in a loss of control, which could lead to a collision and/or ejection from the boat, causing property damage, personal injury, and/or death.

During use

- Wear a Coast Guard-approved personal flotation device (PFD).
- Attach the engine shut-off lanyard to your PFD.
- Do not allow anyone not familiar with the controls (steering, shift/throttle etc.) to operate the boat.

After use

- Rinse the steering cylinders thoroughly, using only fresh, clean water.
- Do not use acetone, or cleaners containing ammonia, acids, or any other corrosive ingredients, on any steering components.
- Some products formulated for cleaning fiberglass hulls are known to aggressively corrode stainless steel shafts. If using a hull cleaner, avoid overspray on the cylinders. Rinse off any overspray immediately with fresh, clean water.

1.3 Safety considerations for installers



CAUTION!
We recommend that the installation of any Dometic steering component(s) is performed by a certified marine technician.

Before installation

- Read and understand the manual(s) supplied with your product.
- Ensure you have all the required components on hand before you start.
- Do not use a wheel-mounted trim switch with coiled cord. The cord can wrap around the steering wheel shaft and inhibit steering.

During installation

- Install components as instructed in the installation manual. Some component parts and kits may contain additional installation instructions – refer also to those instructions.
- Do not substitute any component of the system without written authorization from Dometic. Dometic parts are rigorously engineered and tested to ensure system integrity. Substitution of components may compromise safety, performance, and reliability.
- All components must be compatible with, and rated for, the engine(s) installed on the boat.
- If an instruction is unclear, contradictory, or you are otherwise unsure how to proceed, do not guess. Contact Dometic Marine technical support at Tel: 1-800-730-4082 or email: marinetech@dometic.com.

After installation

- Perform the system inspection checks described in the installation manual.
- Correct any interference issues before handing the boat to the owner.



WARNING!
Failure to comply with Dometic instructions may result in loss of control, which could lead to a collision and/or ejection from the boat, causing property damage, personal injury, and/or death.

Notes

2 Dometic Marine Steering

2.1 Hydraulic steering overview

Our manual hydraulic steering systems are simple and efficient. The basic system consists of four main components;

1) the helm pump, 2) the cylinder, 3) the hose required to connect the cylinder to the helm pump, and 4) genuine SeaStar steering fluid.

These basic components are necessary in all applications. However, as the system variables increase (i.e.: multiple engines, rudders, steering stations, power assist and autopilots), additional components may be required.

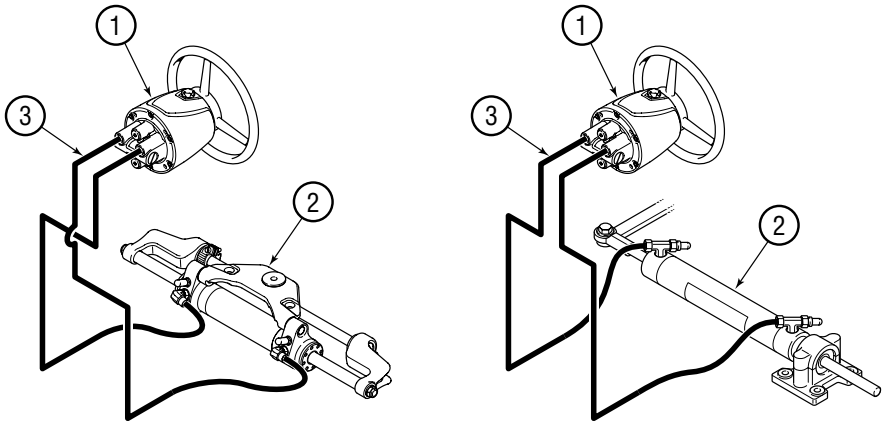


Figure 2-1.

1. The helm unit

The helm pump is an axial piston pump specifically designed for manual steering, it has a built-in lock valve to prevent the steering load from feeding back to the driver. The lock valve will not allow the rudder or drive unit to move until you move it with the steering wheel. The lock valve section of the helm also includes a relief valve. This relief valve provides over-pressure protection for mechanical components, hydraulic hoses and fittings.

2. The cylinder

The most important differences between the variety of steering systems available is the cylinder selection. Both BayStar and SeaStar systems have a cylinder for most steering applications.

3. Hoses and tubes

Required to provide a path for the fluid to flow under pressure from the helm pump to the cylinder.

SeaStar hoses are a custom multi-layered composite design, engineered specifically for our systems. They are designed to exceed SAE and ABYC specifications and provide precise steering control not achievable with hydraulic industry standard hoses. Due to performance and safety concerns, Dometic recommends that only SeaStar or SeaStar PRO hoses be used in SeaStar steering systems.

4. Steering fluid — important

Due to the precision operation of our steering systems, Dometic recommends use of SeaStar steering fluid only in our hydraulic steering systems. SeaStar steering systems have been engineered and validated using our proprietary SeaStar hydraulic steering fluid. SeaStar steering fluid is blended with a special additive package that contains anti-foaming and anti-rust agents, anti-oxidants, viscosity stabilizers, corrosion inhibitors, wear additives as well as water emulsification adders that were formulated not to harm or degrade our components. It is highly recommended that SeaStar steering fluid be used to ensure optimum system performance and safety.

The system: How it works

The system is a two-line system. This makes operation very simple.

1. The steering wheel, which is attached to the helm pump, is rotated in the desired direction (ie: a turn to starboard or clockwise rotation).
2. Steering fluid is pumped out the corresponding port from the rear of the helm into the starboard line and then into the cylinder.

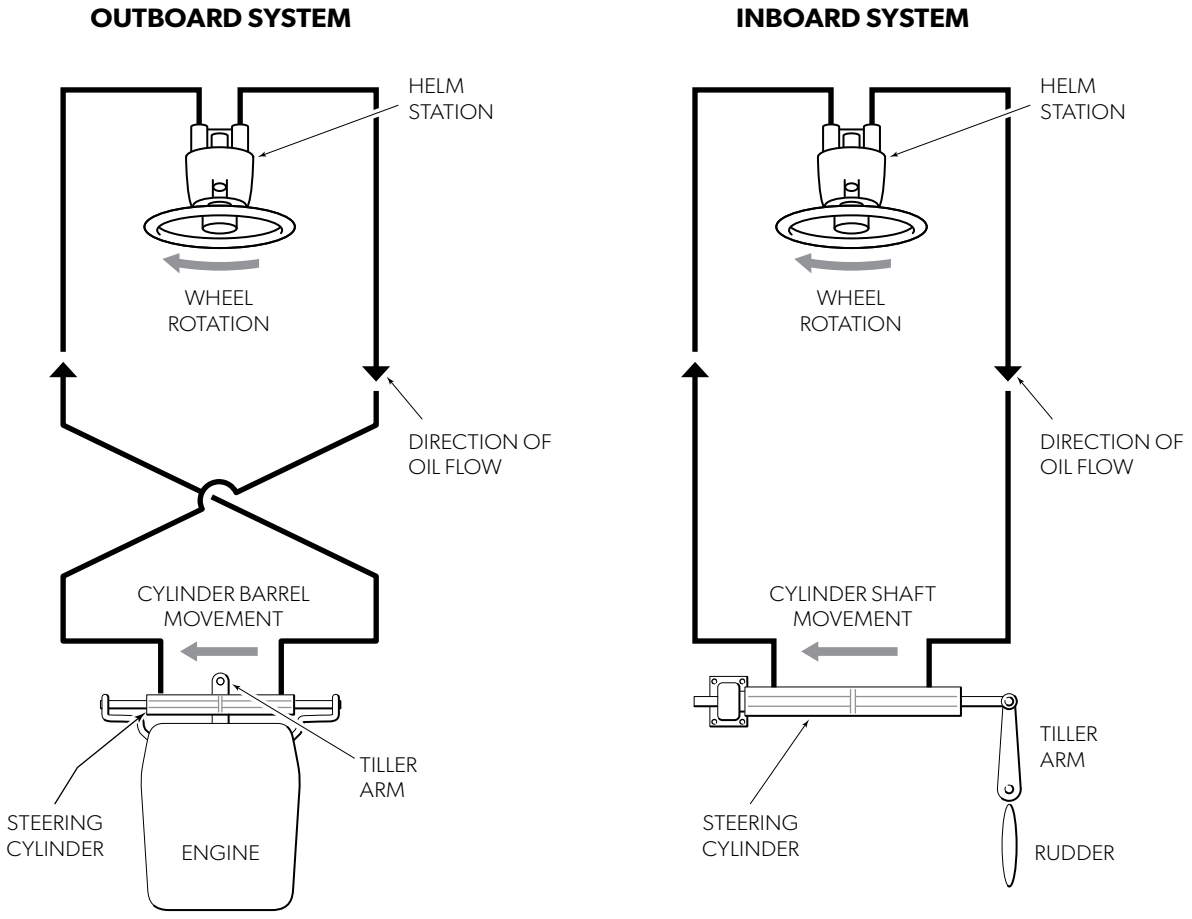


Figure 2-2.

3. This causes the cylinder rod, which is attached to the vessels rudder or drive unit, to move (ie: rod moves to port) thus causing the vessel to alter course.
4. Fluid displaced from the opposite end (ie: the port end) of the cylinder flows (ie: into the port line) back to the helm pump.
5. For steering in the opposite direction, simply turn the helm the other way.
6. When no course corrections are required, the integral No-Feed-Back design holds the rudder or drive unit stationary.

2.1.1 Dometic hydraulic steering

The BayStar Hydraulic Steering System is designed to add safety, reliability and comfort to single outboard powered boats to a maximum 150HP. The SeaStar hydraulic steering system is designed to provide that extra margin of muscle when needed (up to a maximum of 350HP). The SeaStar system conveniently handles outboards, sterndrive and inboard boats.

System selection, installation and service is substantially simplified with just four major components — helm, cylinder, hose, and genuine SeaStar steering fluid. SeaStar has a comprehensive range of cylinders to conveniently handle the variety of outboard, sterndrive and inboard steering applications. These are suitable for both pleasure and commercial applications. Extra steering stations and/or autopilots are easily added.

SeaStar hydraulic steering is a total commitment to quality, performance and simplicity.

SeaStar hydraulic steering systems are:

Easy to install...
- Only four essential components; helm, cylinder, hose, and SeaStar steering fluid
- Compact and attractive helm design
- Variety of helm mounting configurations
- Simple hose fitting connections
- Clear, complete installation instructions

Easy to fill and purge...
- Engineered bleed fittings on the cylinders
- A helm and lock valve design that enhances air removal
- A no-mess filler device
- A filling and purging time of normally less than 30 minutes
- Easy to check for proper installation
- Easy purging check via filler device
- No searching for difficult-to-find air leaks

Easy to turn...
- Seals optimized for low effort

Designed to provide many years of service...
- Precision built
- No corrosive materials exposed to marine environment
- Field replaceable helm and cylinder shaft seals
- A no-hassle warranty — 2 years for pleasure use
  — 1 year for commercial use (SeaStar)

Selecting the system

The objective is to match the steering system to the requirements of the vessel. This depends on four things;

1. hull type (ie: planing or displacement),
2. type of propulsion system in the vessel (ie: inboard, outboard, sterndrive, etc.),
3. the number of engines or rudders, and
4. the total power of the engines (ie: Horsepower).

Once the system and cylinder has been selected, the size of the helm pump must be determined. SeaStar systems also allow the following options to be specified;

1. the number of steering stations,
2. helm configuration (ie: standard or tilt helm),
3. additional features such as autopilots, and
4. power assist.



NOTE: Steering response versus steering effort

Steering wheel effort is directly proportional to the number of wheel turns lock to lock.

The number of wheel turns lock to lock is dependent on three things;

1. the volume of the cylinder,
2. the displacement of the helm pump,
3. the allowable movement of the rudder or drive unit.

Less wheel turns lock to lock results in more steering effort. Conversely, more wheel turns lock to lock results in less steering effort. However, additional factors that can influence steering effort are;

1. vessel speed,
2. rudder size,
3. unusual propeller selections,
4. hull type (ie: displacement, planing, etc.),
5. improperly aligned counter balance skeg, torque tab
6. trim/position, and
7. propeller height relative to water.



WARNING!

Recommendations made in this selection guide are based on our experience with typical installations, applications and usage. Do not use products in applications that they were not intended for. It is the boat manufacturer and the installer's responsibility to ensure the components selected are sufficiently validated on the boat application for safe and acceptable operation.

NOTE: www.dometicsystembuilder.com
The www.dometicsystembuilder.com utility can be used to help select a system.

Typical boat designs that use BayStar/SeaStar steering systems

1. **Inflatable**
   Boats manufactured from waterproofed fabric which are inflated with air in order to achieve their shape. The bottom of the hull may be made of fabric and/or fiberglass. They typically have narrow transoms. Boats may be single and/or twin engine, and
   is generally slower than 40 mph.
2. **Cruiser**
   Cuddy/express/bridge cruiser primarily designed for cruising. It has overnight accommodations. Typically rigged with two steering stations. Boats may be single and/or twin engine, and is generally slower than 45 mph.
3. **Runabout**
   Intended for day boating. Typically a single engine, but, can be a twin engine boat. This includes tournament Ski boats and performance outboards. Boat speeds are generally slower than 60 mph.
4. **Fish "N" Ski**
   Single engine boat designed for day fishing or skiing in protected waters. Boats speeds are generally slower than 40 mph.
5. **Fish Boat**
   Boat primarily designed and equipped for offshore fishing. May be rigged with a second station and may have single and/or dual outboards. Speeds are generally slower than 50 mph.
6. **Center Console**
   Boats with the control station located on the center line of the boat. Designed specifically for fishing, may be single and/or twin engine(s). Boat speeds are generally slower than 65 mph.
7. **Bass Boat**
   Single engine designed specifically for fishing in protected waters and has a flat bottomed hull. Generally performance orientated and speeds in excess of 60 mph.
8. **Pontoon**
   Twin or triple hull boats. Single and twin engine capable. Generally speeds to not exceed 60 mph. Note: High steering loads when equipped with engines over 115 HP.
9. **Catamaran**
   Twin hull vessels. Typically twin engine boats where the use of a mechanical tie bar is not possible. Speeds to not exceed 60 mph.
10. **Commercial/Work/Rescue/Race**
    Any of the above noted boats but used in a more severe environment. Take special care when selecting a system for these boats to ensure that you have both comfortable and safe steering.

2.1.2 Optimum performance chart for outboard engines

How can we help?

When researching a hydraulic steering system for your boat there are several systems to choose from. The chart noted below will assist with selecting the correct system for your outboard powered boat. It is recommended that boats with high steering loads (pontoons, bass boats and larger HP four stroke engines) use the SeaStar/SeaStar PRO steering. Doing so will reduce the steering effort due to the fact that the SeaStar steering systems provide more output power, resulting in lower steering effort. If you are unsure of what system to choose, consult with your marine dealer, or Dometic technical support.

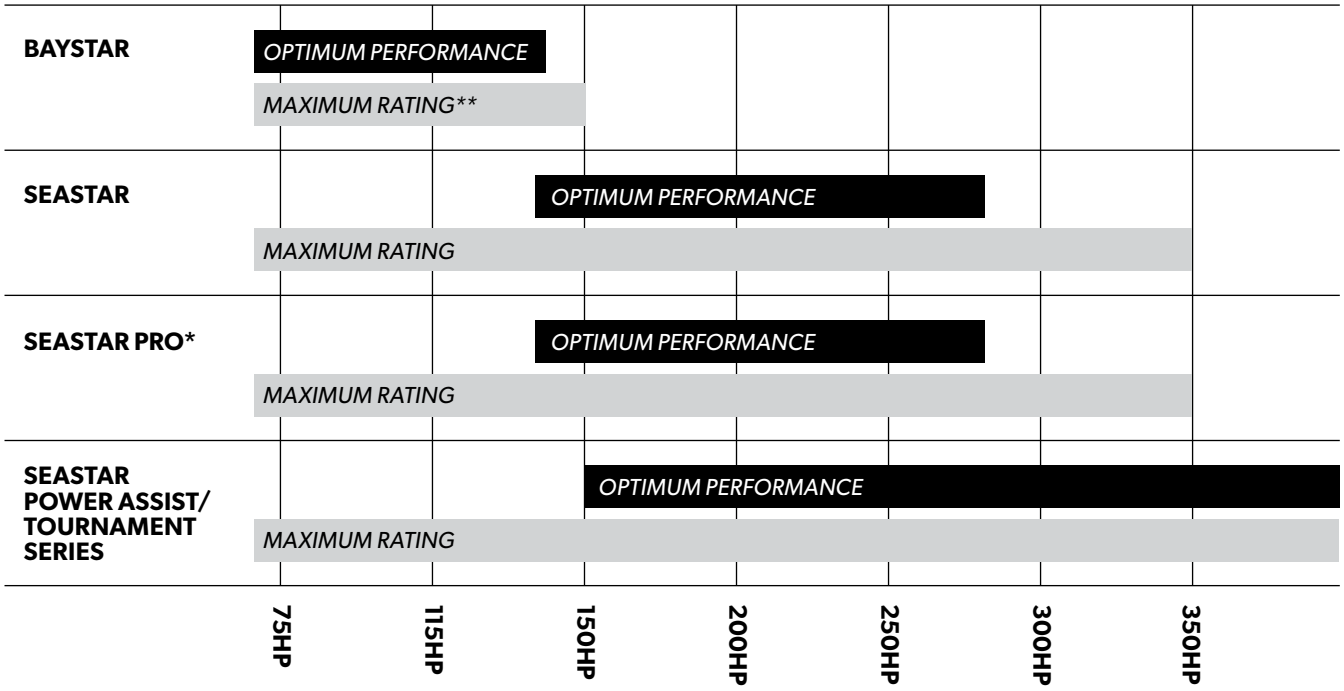


Figure 2-3.

Chart based on 'optimum comfort'

** Ideal for Bass and other high-performance boats requiring instant steering response.*

*** Any engine with a 4-3/4" or larger gear case should use SeaStar.*

2.2 Optimus steering overview

QR CODE: www.dometicsystembuilder.com
The Dometic system builder utility can be used to help select a system.

2.2.1 The technology behind the system

The incredible feel you get when you're behind the wheel of a boat equipped with Optimus EPS is the result of an innovative array of technology and engineering. Each component has been designed to complement the other, resulting in a seamless experience of steering control in virtually every situation on the water. The high level of engineering also extends to the reliability of the system, with quality materials, careful manufacturing and redundant systems, all to stand up to the rigors of life on the water.

2.2.2 Applications for Optimus EPS

Outboard applications

All single, twin, triple and quad outboard engine boats

- Electronic and mechanical controlled
- Single and multi-helm station boats
- Performance powerboats, bay boats, center console, saltwater fishing vessels, RIBS, catamarans, houseboats and pontoon boats

Inboard applications (20'—100')

Most single and twin inboard engine boats — electronic and mechanical controlled

- Single, twin and triple helm station yachts
- Performance motor yachts, express convertibles, and sport yachts

Inboard & sterndrive applications (under 40')

Most single and twin inboard engine boats — electronic and mechanical controlled

- Single, twin and triple helm station yachts
- Competition ski boats, cruisers, and sport fishing yachts

2.2.3 Advantages of Optimus EPS

- No oil at helm
- Boat that steers like a sports car
- Plug and play autopilot compatibility with drive by wire systems
- No autopilot pump or rudder feedback unit
- Adjustable speed sensitive wheel effort
- Adjustable speed sensitive turns lock to lock
- Can be retrofitted to existing mechanical controlled engines
- No liquid tie-bar catamarans
- On demand pumps which extend battery life
- Components based on existing Dometic reliability and quality
- NMEA 2000 Certified. Meets or exceeds NMMA, ABYC, CE, ISO, and SAE electrical & environmental requirements

QR CODE: www.dometicsystembuilder.com
Visit www.dometicsystembuilder.com for most steering applications.

Options for Optimus EPS

- Multi-station electronic helm
- Optimus 360 Joystick
- SeaWays Autopilot
- SeaWays Go Autopilot
- SeaStation

Specifications

Features & Benefits of the Optimus EPS System

- Optimus EPS is designed to be Optimus 360 ready
- ABYC, CE, ISO and SAE compliant — adheres to established safety standards
- Compatible with select autopilot models from Simrad, Garmin, and Raymarine
- When adding 2nd or 3rd station helm, no oil, just electrical connection

Autopilot interface

The Optimus EPS electronic control system interfaces directly with the latest generation of autopilots from Garmin, Raymarine and Simrad, without the need for a second pump and the lengthy installation and purging procedure.

Redundancy

Optimus EPS has multiple levels of redundancy using a fault tolerant CAN network, and each component has at least 2 continually monitored sensors.

Ackerman steering

Intelligent programming allows the Optimus EPS system to separately control the steering angle of inner and outer outboards. This eliminates under-steer caused by the outside outboard "pushing" against the curve of the turn. Ackerman steering is especially important in power catamarans where the engines are located farther apart.

Active sensitivity

Lock-to-lock turns and wheel effort are programmed to change with engine RPM. At slow speeds, Optimus EPS can be set to reduce the number of turns lock-to-lock, and make it easier to steer. When you're negotiating through traffic or in a tight spot, those smaller moves of the wheel give you precise control. When you're running at speed in open water, Optimus EPS can be set to increase lock-to-lock turns, for example, and increase steering effort giving the driver more stability to comfortably keep on course. And through it all, Optimus EPS does the work, so you can relax and take it easy.

Table 2-1.

3 Hydraulic Outboard Steering

3.1 BayStar front mount series

BayStar™ hydraulic steering is brought to you by Dometic, the manufacturer of SeaStar®, the most trusted name in pleasure boat steering. BayStar allows you to install all of the safety, reliability and comfort of hydraulic steering onto your single engine vessel with a Coast Guard approved transom/HP rating up to MAX 150 HP. Combine this with the superior design team, rigid ISO quality control and teamed with the finest materials and precision manufacturing, BayStar continues the tradition bringing comfort and safety to boating.

The BayStar steering system consists of a super low friction helm for smooth comfortable steering, a balanced cylinder–featuring a compact design that fits most splashwells. The systems are easy to install with "cut-to-length" tubing, or factory swaged SeaStar hoses. Available in steering kits or by individual components. For detailed application information go to www.dometic.com or the www.dometicsystembuilder.com



Figure 3-1. BayStar kit HK4300-4 shown.

NOTICE!
BayStar steering systems are not recommended for vessels with high steering loads. Some examples of high steering loads include Pontoon boats, Bass boats and high performance boats, or engines with 4-3/4" and larger gear cases. Customers with higher steering loads should consider upgrading to SeaStar or SeaStar Pro steering systems. SeaStar steering will reduce the steering effort with a higher output cylinder. SeaStar Pro is rated for higher speed / higher precision steering applications with outboards greater than 150 HP.

NOTICE!
BayStar tilt helms HH4315-4 and HH4316-4 are available separately. Not available in kit form.

3.1.1 Typical BayStar installation

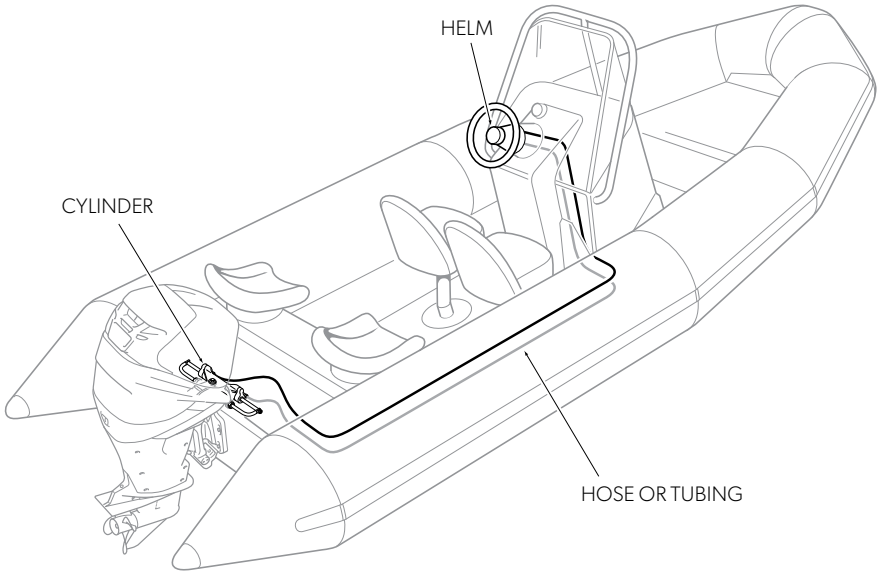
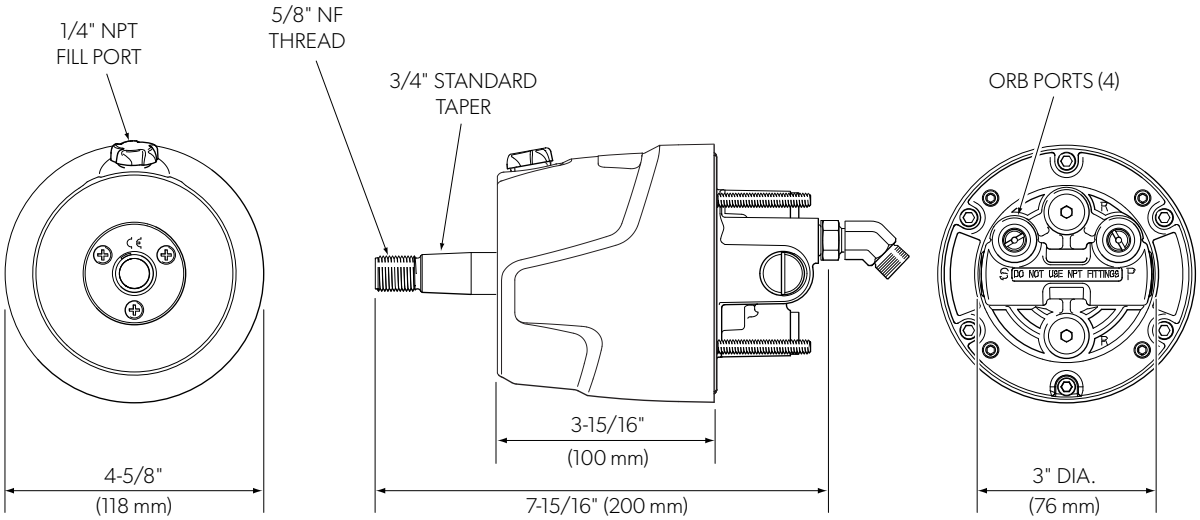


Figure 3-2.

3.1.2 Three easy steps to select your BayStar system

1. **Check helm dimension.** Both the Standard and Tilt helms require a 3" (7 6 mm) cut-out hole in the dash.

Standard helm part # HH4311-4 and HH4314-4



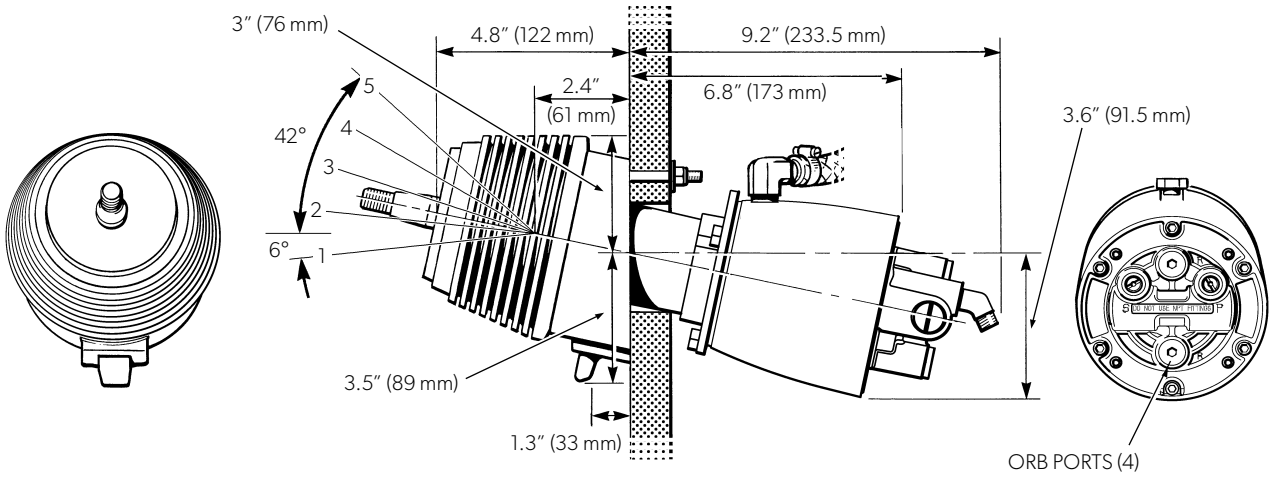
Seal kit = **HP6032**

HH4311-4 (1.1 cu.in) Gives 6.5 wheel turns lock-to-lock*
HH4314-4 (1.4 cu.in) Gives 5.2 wheel turns lock-to-lock*

** When using BayStar outboard cylinder models HC4645-3, HC4647-3, HC4648-3 or HC4658-3.*

Figure 3-3. Standard helm part # HH4311-4 and HH4314-4.

Sport tilt helm part # HH4315-4



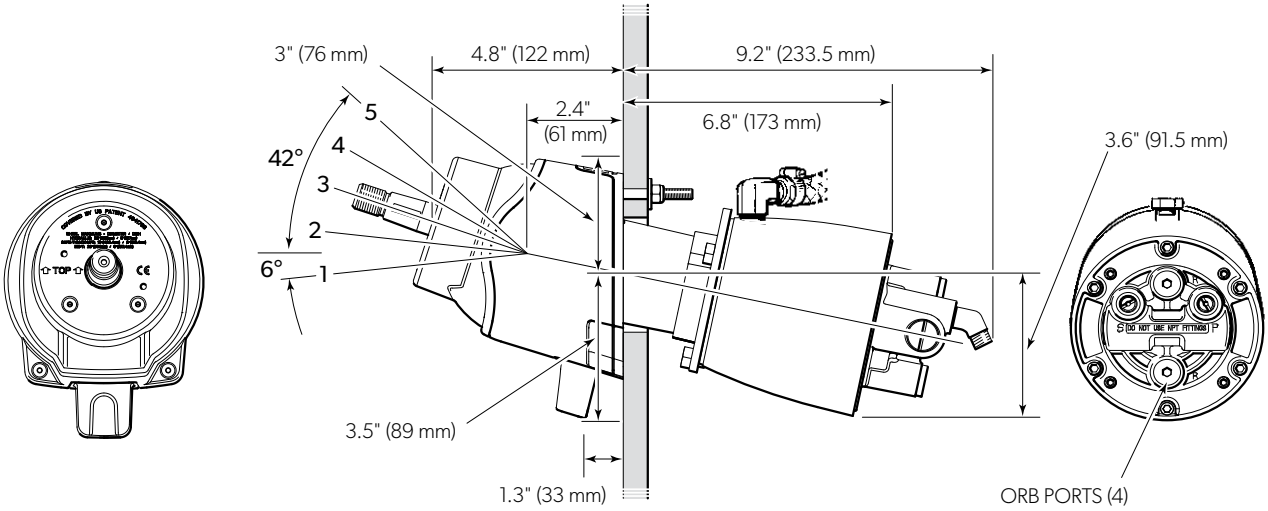
Seal kit = **HP6032**
Tilt mechanism kit = **HA6123**

HH4315-4 (1.4 cu.in) Gives 5.2 wheel turns lock-to-lock*

** When using BayStar outboard cylinder models HC4645-3, HC4647-3, HC4648-3 or HC4658-3.*

Figure 3-4. Sport tilt helm part # HH4315-4.

Sport Plus tilt helm part # HH4316-4



Seal kit = **HP6032**
Tilt mechanism kit = **HA6423**

HH4316-4 (1.4 cu.in) Gives 5.2 wheel turns lock-to-lock*

** When using BayStar outboard cylinder models HC4645-3, HC4647-3, HC4648-3 or HC4658-3.*

Figure 3-5. Sport Plus tilt helm part # HH4316-4.

2. Is the Splashwell wide enough?

The HC4645-3 / 47-3 / 48-3 / 58-3 require a minimum 21″ (534 mm) Splashwell width.

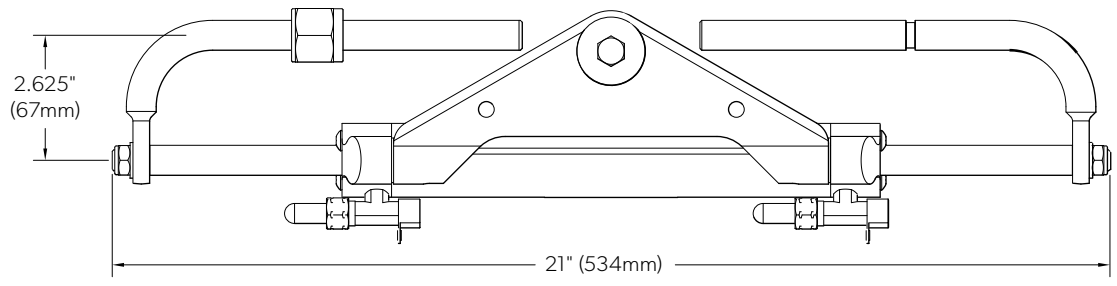
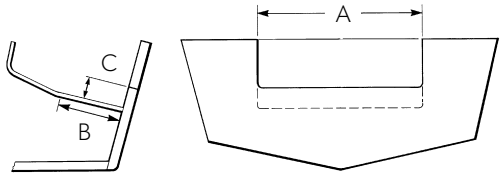


Figure 3-6. BayStar cylinder part # HC4645-3 / 47-3 / 58-3.

3. Is there enough room in the splashwell for full engine tilt?
Find the dimensions (B & C) of your splashwell. Check them against the minimum splashwell dimensions for full engine tilt for your engine and cylinder.

Motor well dimensions required for BayStar front mount outboard steering systems

Cylinder model No.	# of engines	A	B	C	Min. engine center distance
HC4645-3 / 47-3 / 48-3 / 58-3	1	21" (534 mm)	6" (153 mm)	5" (127 mm)	N/A
	2	Twin engine applications not available			



NOTES:

a) Ensure there is no interference between the BayStar cylinder rod and the splashwell boot or engine controls and cables.
b) Dimensional restrictions also apply to external motor mount brackets.
c) Ensure dimension 'A' maintained through full trim/tilt range.
d) Maximum transom thickness 3" (76 mm).
e) **Engines less than 70HP may require up to additional 1" (25 mm) of splashwell clearance.**
f) Consider a side mount cylinder if lacking space in the splashwell. Refer to section 3.7.

Figure 3-7.

3.1.3 BayStar steering kits

BayStar Steering kits come with everything needed for an install. Just add tubes or hoses, (some engines require additional kits and/or cylinder plate change, see application chart on page 3-6). The cylinder does not require the engine manufacturer drag link for connection.

NOTICE!
HC4645-3 compact cylinder is included in the BayStar steering kit. If your engine requires the use of a cylinder other than HC4645-3 or HC4658-3 (refer to application guide on page 3-6) then purchase of a replacement pivot plate (noted on page 3-6) will be required.



Figure 3-8. BayStar kit HK4300-4 shown.

BayStar steering kit — HK4300-4
Includes: BayStar helm, cylinder (HC4645-3), and fluid. Hose and tubing kits must be purchased separately. See Section 9.2.7 and section 9.2.8 for hose and tube requirements.

NOTE:
For easier steering effort, Dometic recommends:

- plumbing the system using SeaStar steering hoses. See page 9-1 .
- use of a BayStar 1.1 cu.in. helm pump (HH4311-4).
  NOTE: Number of wheel turns will increase to 6.6 hard over to hard over.

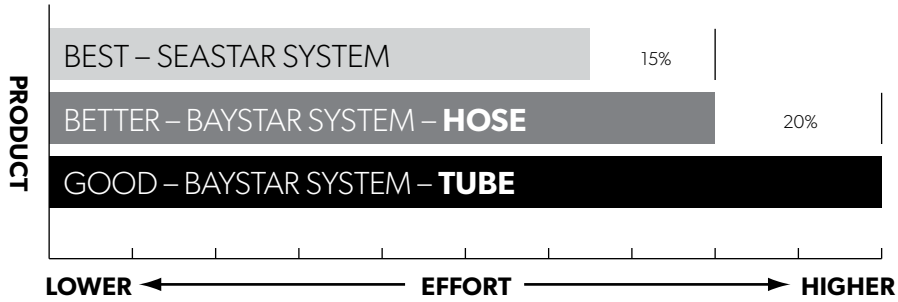


Figure 3-9.

Dometic makes every effort possible to ensure this information is accurate, but engine manufacturers may make changes without notice that affect the fit of our products. If a product selected based on the information in this guide does not fit, please contact Dometic Technical Services for assistance.

3.1.4 BayStar outboard steering application guide

(BayStar compact cylinders HC4645-3/47-3/48-3/58-3)

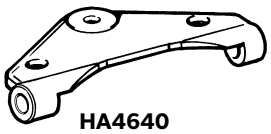
MANUFACTURER	YEAR	MODEL	CYLINDER	NOTES
HONDA	1992–DATE	30–50 HP 4-Stroke	HC4645-3	See note 2
	1996–DATE	75–90 HP 4-Stroke	HC4645-3	
	2015–DATE	100 HP 4-Stroke	HC4645-3	
	1998–2010	115-130 HP 4-Stroke	HC4647-3	
	2003–DATE	135–150 HP 4-Stroke	HC4645-3	
	2010–DATE	115 HP 4-Stroke	HC4645-3	
JOHNSON/EVINRUDE	1991–DATE	40–150 HP inc. E-Tec	HC4645-3	See note 2
NOTE: Johnson 115 HP 2-stroke engines, required the pivot plate to be flipped. See note 4 below.	1997–DATE	115 HP Ficht	HC4658-3	See note 4
	2017–DATE	75–150 HP Ficht	HC4645-3	
	1998–DATE	40–140 HP 4-Stroke	HC4658-3	See note 1, 2, 4
MERCURY/MARINER	1984–DATE	75–150 HP 2 & 4-Stroke	HC4645-3	
NOTE: Mercury Racing Engines HC5345-3. PRO XS Engines see SeaStar application guide.	1998–2007	40–60 HP 2 & 4-Stroke	HC4648-3	See note 2
	2008–DATE	40–60 HP 4-Stroke	HC4645-3	See note 2
	2016–DATE	115–150 HP Pro XS	N/A	
SELVA	2000–DATE	25-70 HP 4-Stroke	HC4648-3	See note 1, 2
	2000–DATE	90-150 HP 4-Stroke	HC4645-3	
	2011–2013	115 HP 4-Stroke	HC4658-3	
SUZUKI	1986–DATE	150 HP 2 & 4-Stroke	N/A	
	1987–2002	115–140 HP 2-Stroke	HC4645-3	See note 1
	1990–2000	90–100 HP 2-Stroke	HC4645-3	
	1998–DATE	40–70 HP 4-Stroke	HC4645-3	See note 1, 2
	2001–DATE	90–140 HP 4-Stroke	HC4658-3	See note 1, 4
TOHATSU	1990–DATE	40–140 HP 2-Stroke	HC4645-3	See note 2
	2014–DATE	60–150 HP 4-Stroke	HC4645-3	
	2023–DATE	40–150 HP 4-Stroke	HC4645-3	Tohatsu tiller bolt 3E0-84917-0
YAMAHA	1998–DATE	40–50 HP 2-Stroke	HC4645-3	See note 2
	1998–DATE	60 HP 2-Stroke	HC4645-3	See note 3
	1986–DATE	70–90 HP 2-Stroke	HC4645-3	See note 1
	1997–DATE	80–150 HP 4-Stroke	HC4645-3	See note 1, 2
	2000–DATE	25–70 HP 4-Stroke	HC4648-3	See note 4
	2011–2014	90–115 HP inc. A Series	HC4658-3	
	2014–DATE	90–115 HP inc. B Series	HC4645-3	

1. Requires Spacer kit part # HO5090
2. Engine clamp brackets must be cut or ground, and the engine through bolted onto the transom, or interference will occur, restricting engine trim and tilt.
3. Steering hook Yamaha Part # 63D-48511-00-4D must be installed
4. Cylinder HC4645-3 may be used in these applications. The pivot plate will need to be flipped before installation. Instructions provided with Owner's Manual.

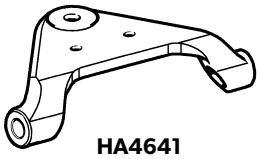
Revision Date: **SEPTEMBER 25th 2026**

NOTICE!

HC4645-3 compact cylinder is included in the BayStar Steering kit. If your engine requires the use of a cylinder other than HC4645-3 or HC4658-3 then please refer to the figure below for additional replacement pivot plate.



HA4640
Comes with cylinder HC4645-3



HA4641
Converts HC4645-3 to HC4647-3



HA4642
Converts HC4645-3 to HC4648-3



HA4643
Converts HC4645-3 to HC4658-3

Figure 3-10.

3.2 SeaStar front mount series

SeaStar outboard hydraulic steering offers many models of steering cylinders to suit most applications. The standard and most commonly used model is the Front Mount steering cylinder. Before ordering it is necessary to determine the best possible application for your boat, taking into account the hull design, speed and usage of the boat. Keep in mind that engines today have become larger, more powerful and heavier than in the past. Dometic encourages you to use the tables noted in this section and select your system accordingly or visit www.dometicsystembuilder.com and use our online system builder.

3.2.1 Selecting the outboard steering system best suited for your boat

1. Using the table on page 3-9, select your system as per speed, horsepower and driving style.
2. Using the Application chart on page 3-13 choose the proper cylinder and tie bar equipment as per your outboard engine. If your engine is not noted, contact Dometic or your distributor for details.
3. Proceed to page 9-12 for details on fitting kits and particular equipment that will be needed to add a second station and/or an autopilot.

Typical SeaStar installation

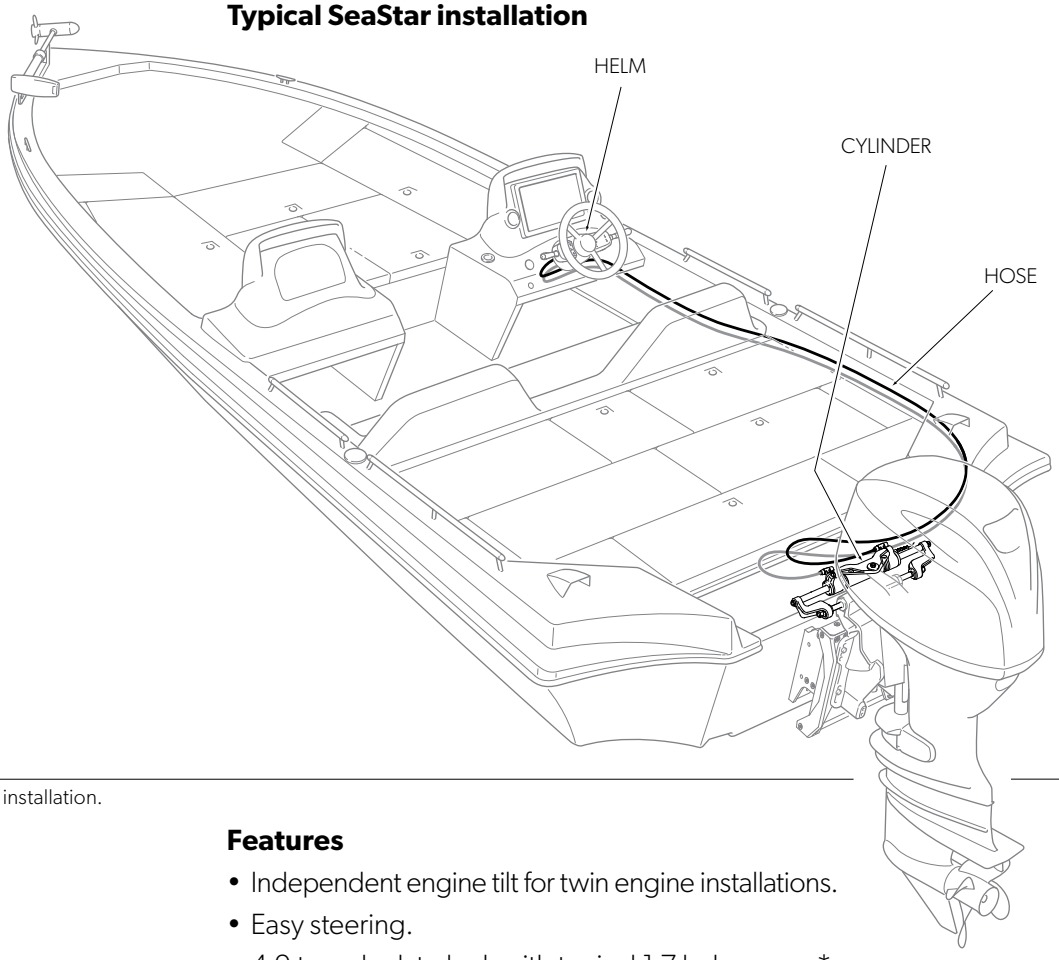


Figure 3-11. Typical SeaStar installation.

Features

- Independent engine tilt for twin engine installations.
- Easy steering.
- 4.9 turns lock to lock with typical 1.7 helm pump*.

** When using SeaStar outboard cylinder models HC5345-3, HC5347-3, HC5348-3, HC5358-3.*

Applications

- General purpose system.
- Single and multiple engine capability.
- Typical applications include center console fishboats and cruisers.

How to select a front mount outboard steering system

1. From the installation recommendations on page 3-9 select the system configuration based on:
   a) the number of engines,
   b) the total power of engine(s) to be installed and
   c) driving use.
2. From the application guides, confirm that the front mount cylinder will fit your specific make, model and year of engine. Select the adapter kit for single engines or the tie bar kit for twin engines.
3. From section 8 select the appropriate helms and accessory hardware for each steering station.
4. From Section 10 select the fitting and hose kits required for the installation.
5. Confirm that there is sufficient space available in the splashwell and dash areas for the steering components.
6. Determine if Power Assist is desired, section 6.



Figure 3-12. HC5345-3 cylinder shown.

CAUTION!
Not recommended for use in installations where;

a) chopper, cleaver or surface piercing propellers are used
b) the engine is highly elevated on the transom
c) engine trim tabs have been removed
d) the boat speed exceeds 75mph (120km/h), or
e) the power exceeds the max. Coast Guard rating, or the rating provided by the vessel's manufacturer

3.2.2 Front mount outboard installation recommendations

Outboard recommendations made in this section are based on our experience with typical installations, applications and usage. Ensure you select the system which provides the best comfort versus performance.

It is the boat manufacturer and the installer's responsibility to ensure the components selected are sufficiently validated on the boat for safe and acceptable operation. Do not use SeaStar steering in applications it is not intended for.

	NORMAL USE	**AGGRESSIVE USE** (See note 1)
ENGINE	**SEASTAR FRONT MOUNT** (Refer to Section 3.2)	**SEASTAR TOURNAMENT SERIES** (See note 1 – Refer to Section 3.5)
SINGLE ENGINE	**SINGLE CYLINDER** 350 HP max. 75 MPH max. HC53XX-3 cylinder (see note 2)	**SINGLE CYLINDER** 350 HP max HC6845S (Refer to Section 3.3)
TWIN ENGINE NON COUNTER ROTATING	**SINGLE CYLINDER** 450 HP max. 55 MPH max. HC53XX-3 cylinder HO60XX tie bar	**SINGLE CYLINDER** Tournament cylinders (Refer to Section 3.5)
	DUAL CYLINDER Tournament cylinders (Refer to Section 3.5) HC53XX-3 Cylinders HO60XX tie bar	**DUAL CYLINDER** Tournament cylinders (Refer to Section 3.5)
TWIN ENGINE COUNTER ROTATING	**SINGLE CYLINDER** 600 HP max. 55 MPH max. HC53XX-3 cylinder HO60XX tie bar	**SINGLE CYLINDER** Tournament cylinders (Refer to Section 3.5)
	DUAL CYLINDER 600 HP max. 55 MPH max. HC53XX-3 cylinder HO60XX tie bar (see note 3)	**DUAL CYLINDER** Tournament cylinders (Refer to Section 3.5)
TRIPLE ENGINE ONE WITH COUNTER ROTATING	**DUAL CYLINDER** Tournament cylinders (Refer to Section 3.5)	**DUAL CYLINDER** Tournament cylinders (Refer to Section 3.5)
	TRIPLE CYLINDER Tournament cylinders (Refer to Section 3.5)	Consider Optimus EPS or 360 (Refer to Section 11)

1. **Dometic has specific steering equipment for boats that are driven aggressively, used in severe conditions or with more than 300 HP per engine.**
2. **ALL ENGINES** over 300 HP and all boats that are driven aggressively must use a high strength tiller bolt, kit part # HA5822. All front mount cylinders built after June 15, 2007 will have this high strength bolt included in the box. High strength tiller bolts can be identified by the marking "DOMETIC ARP" on the head of the bolt.
3. Optional heavy duty Aggressive tie Bar available. Refer to Section 3.2.4.

3.2.3 SeaStar front mount order guide

(Normal use)

Front mount cylinder part# HC5345-3 is included in the SeaStar outboard steering kits HK6400-4. If your engine requires the use of a cylinder other than the HC5345-3 (see application guides on page 3-13 through page 3-15) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.



Figure 3-13.

SeaStar steering kit — HK6400-4

Includes: Cylinder (HC5345-3), Helm (HH5271-4), two bottles of SeaStar steering fluid (HA5430[H]). Hose and kits must be purchased separately. See Section 9.2.7 and section 9.2.8 for hose requirements.

3.2.4 SeaStar tie bar kits

Normal use tie bar kits

SeaStar normal use tie bar kits for normal use up to 600 HP in counter-rotating applications.

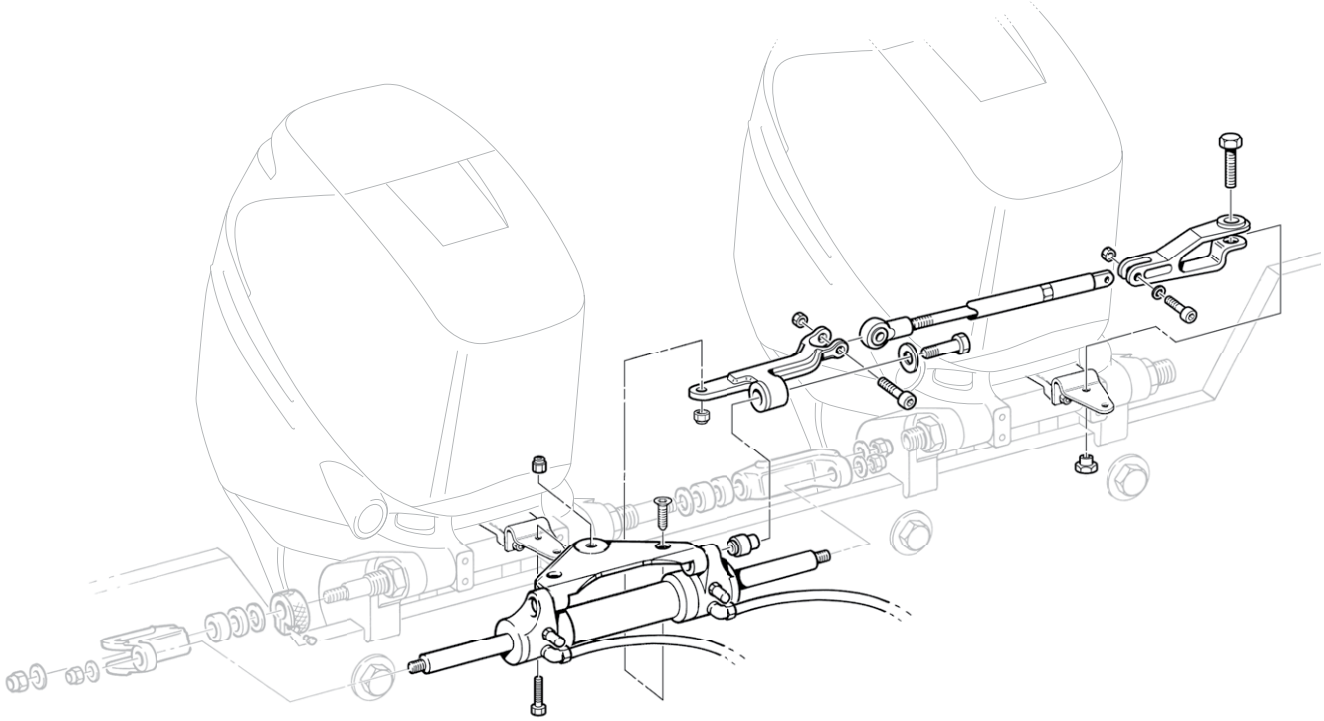


Figure 3-14. Tie bar kit # HO6001 shown, is used for most single cylinder twin engine applications. See 3.2.6.

Aggressive use tie bar kits

SeaStar heavy duty tie bar system for aggressive use. Fully adjustable, for single cylinder and dual cylinder applications.

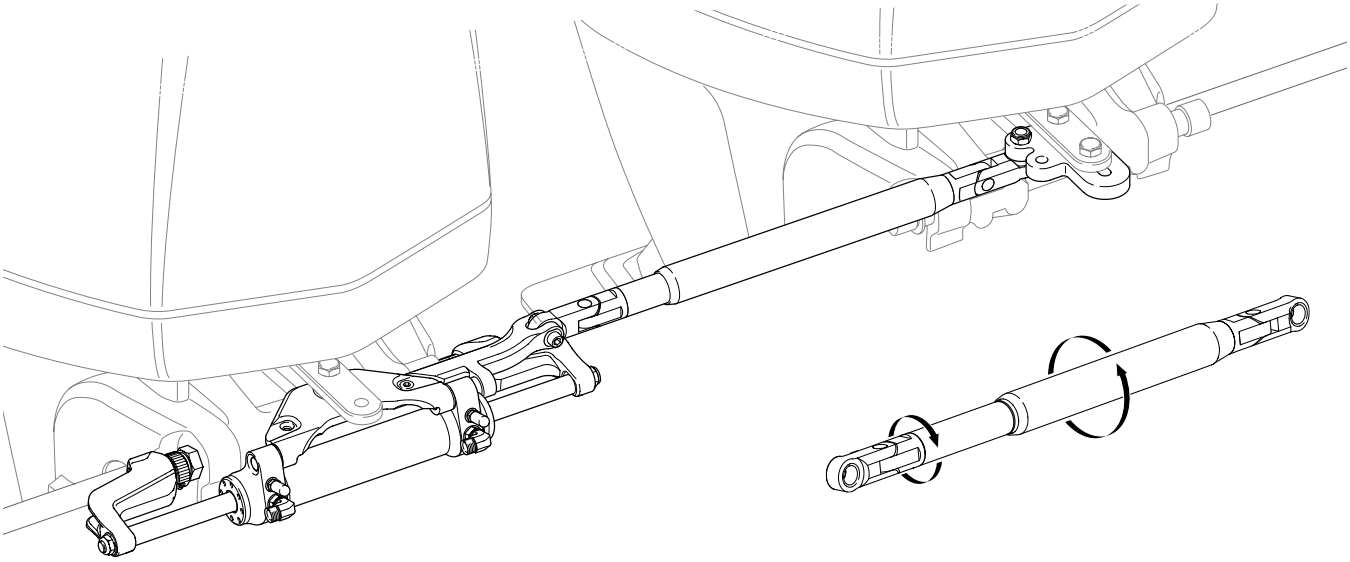


Figure 3-15. Twin engine, single cylinder tie bar kit part # HA5521.

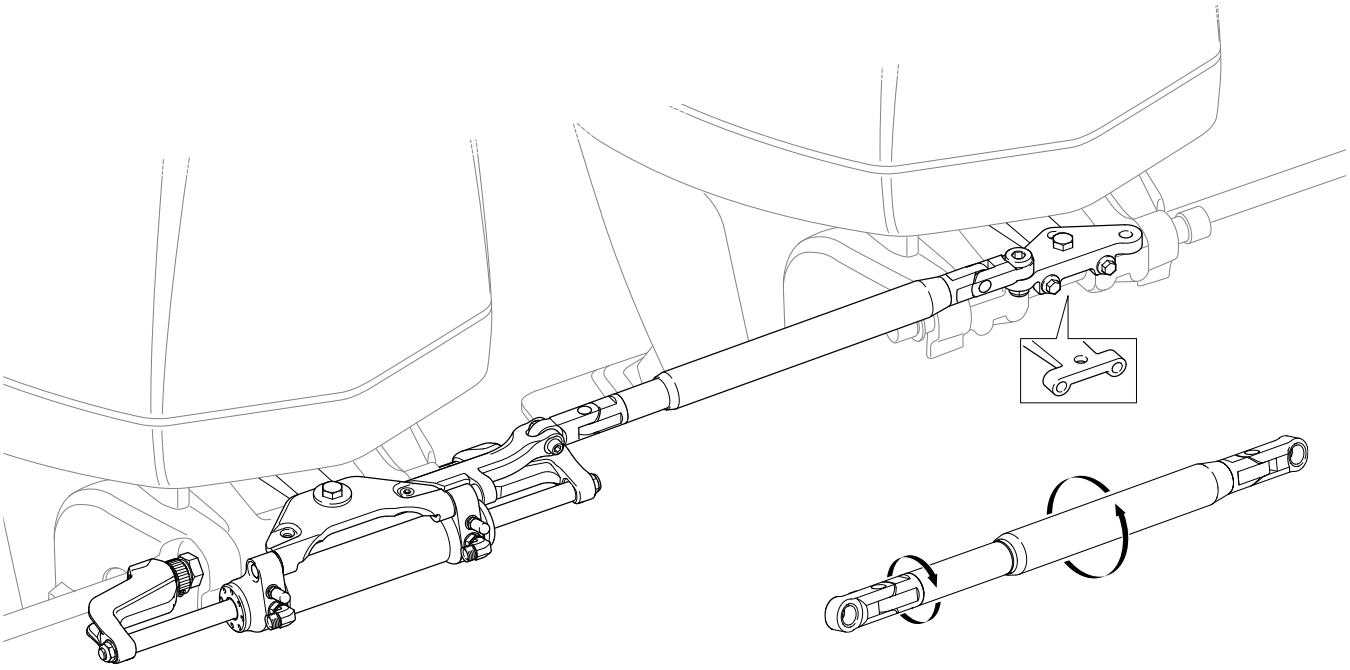


Figure 3-16. Single engine, dual cylinder tie bar kit part # HA5522 for Mercury CMS (conventional midsection) engines or Honda outboard engines using "O-O" style tiller arm only. Suzuki 115–140HP requires 2 steering cylinders (A series only).

NOTICE!



HA5522 must be used with Mercury or Honda outboard engines using this style of tiller arm and a single cylinder. In addition Honda BF75-115HP outboards require the HA5523 bolt kit. Contact Dometic Marine technical support at Tel: 1-800-730-4082 or email: marinetech@dometic.com to obtain HA5523.

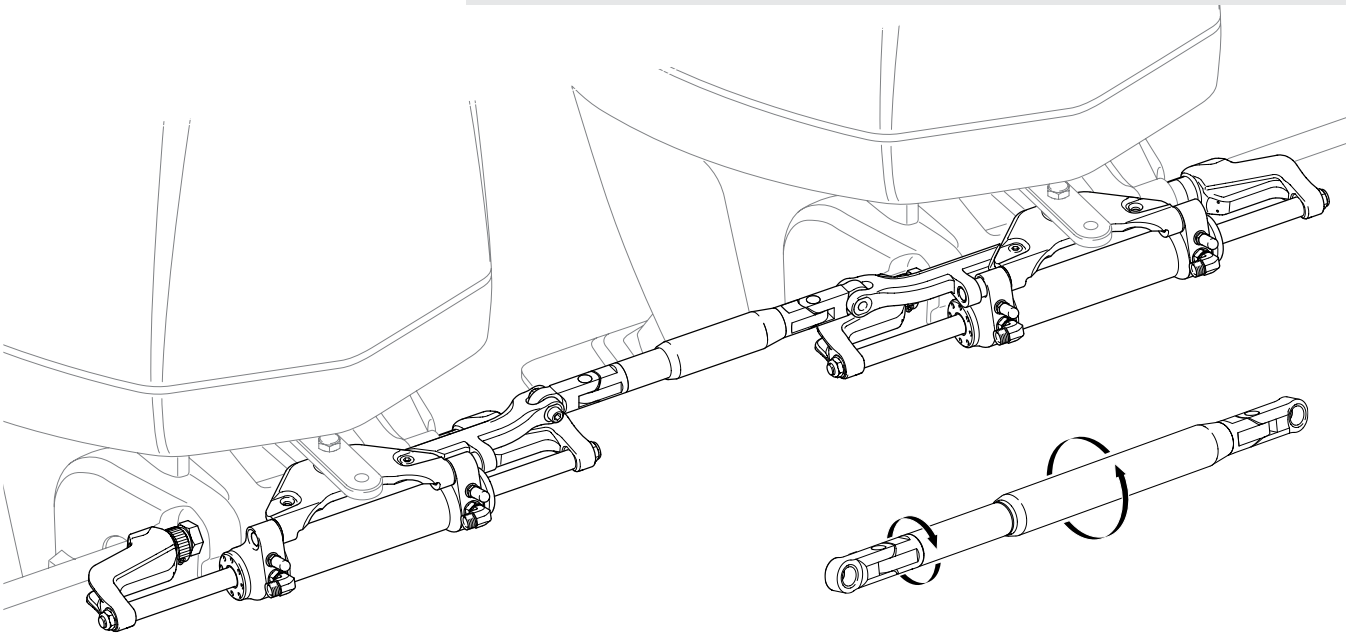


Figure 3-17. Twin engine, dual cylinder tie bar kit part # HA5520.

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CONFIGURATION	HARDWARE KIT		TIE BAR			NOTES
	Part #	Qty. Req.	Engine center to center distance – inches (mm)	Part #	Qty. Req.	
TWIN ENGINE – SINGLE CYLINDER	HA5521	1	25.0 – 25.7 (635 – 653)	HO6821	1	1, 3, 4, 5
	HA5521	1	25.8 – 30.7 (655 – 780)	HO6822	1	1, 3, 4, 5
	HA5521	1	30.8 – 39.3 (782 – 998)	HO6823	1	1, 3, 4
	HA5521	1	39.4 – 54.5 (1000 – 1384)	HO6824	1	1, 3, 4
Mercury CMS and Honda	HA5522	1	25.0 – 26.2 (635 – 667)	HO6821	1	1, 3, 4, 5, 6
	HA5522	1	26.3 – 31.2 (668 – 794)	HO6822	1	1, 3, 4, 5, 6
	HA5522	1	31.3 – 40.0 (795 – 1016)	HO6823	1	1, 3, 4, 6
	HA5522	1	40.1 – 55.0 (1017 – 1397)	HO6824	1	1, 3, 4, 6
TWIN ENGINE – DUAL CYLINDER	HA5520	1	28.0 – 29.0 (771 – 737)	HO6819	1	1, 2, 3, 4, 5
Engine centers under 28" must use HO6002	HA5520	1	29.1 – 30.6 (739 – 777)	HO6820	1	1, 2, 3, 4, 5
	HA5520	1	30.7 – 33.4 (779 – 848)	HO6821	1	1, 2, 3, 4, 5
	HA5520	1	33.5 – 38.4 (850 – 975)	HO6822	1	1, 2, 3, 4
	HA5520	1	38.5 – 47.1 (997 – 1196)	HO6823	1	1, 2, 3, 4
	HA5520	1	47.2 – 62.2 (1199 – 1580)	HO6824	1	1, 2, 3, 4

1. Installation may vary according to the following factors: engine mounting height, transom thickness, use of transom savers, tiller bolt location, engine tilt range, and engine size.
2. Cylinder's must be plumbed in parallel only, no series connections.
3. Tie bar length may vary depending on toe in/toe out setup. To allow for toe, add or subtract from your nominal engine center to center distance.
4. Based on recommended engine manufacturer minimum center to center distances. Deviating from these recommendations may require stroke limiting cylinders and/or engine tilt limiting, please consult Dometic technical support.
5. Cylinder interference may occur with independent trim/tilt of the engines.
6. Mercury or Honda outboard engines using "O-O" style tiller arm only.

Revision Date: **MARCH 5th 2025**

3.2.5 Single engine application guide (Normal use)

Prior to selecting a cylinder from this application guide, please refer to page 3-9 to ensure that you are selecting the correct cylinder for your engine/boat.

NOTICE!
Is your Splashwell wide enough? Check page 3-19 for space requirements.

MANUFACTURER	YEAR	MODEL	CYLINDER	NOTES
COX MARINE	2022–DATE	300–350 HP Diesel	HC5358-3	
HONDA	1996–DATE	60–90 HP 4-Stroke	HC5345-3	
	1998–2009	115–130 HP 4-Stroke	HC5347-3	
	1998–DATE	30–50 HP 4-Stroke	HC5345-3	See note 1
	2003–2022	200–250 4-Stroke	HC5445-3	See note 7
	2003–DATE	135 HP 4-Stroke	HC5345-3	
	2004–DATE	150 HP 4-Stroke	HC5345-3	See note 3
	2011–DATE	115HP 4-Stroke	HC5345-3	
	2015–DATE	100 HP 4-Stroke	HC5345-3	
	2023–DATE	200–250 4-Stroke	HC5345-3	See note 7
	2023–DATE	350HP 4-stroke	HC5345-3	See note 6
JOHNSON/EVINRUDE	1991–DATE	40–300 HP 2-Stroke	HC5345-3	Inc. ETech engines
	1997–DATE	75–300 HP Ficht	HC5345-3	
	1998–DATE	40–140 HP 4-Stroke	HC5358-3	See note 1
	2000–2003	115 HP Ficht	HC5358-3	See note 1
	2002–DATE	200–225 HP 4-Stroke	HC5345-3	
	2007–DATE	3.3L V6 200–250HP	HC5345-3	Inc. H.O. models

1. Requires Spacer Kit# HO5090.
2. PRO XS MUST use HC6345-3.
3. Optional cylinder part # HC5358-3. Slight interference may occur when using the HC5358-3, with the engine in the full tilt position.
4. Must use PA1200-3HP. Must use Optimus fluid HA5482.
5. HC5358-3 required when using a SeaStar SmartStick
6. Single engine application only. Refer to twin engine application guide.
7. Cylinder revised mid 2022, contact Dometic technical support.

Revision Date: **SEPTEMBER 24th 2026**

NOTE
Refer to notice on page 3-14.

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MANUFACTURER	YEAR	MODEL	CYLINDER	NOTES
MERCURY	1989–DATE	75–300 HP 2-Stroke	HC5345-3	
	1998–2007	40–60 HP 4-Stroke	HC5348-3	See note 1
	2003–DATE	150–200 HP Verado	HC6345-3	
	2004–DATE	115 HP PRO XS	HC5345-3	
	2004–DATE	150–300 HP PRO XS	HC6345-3	
	2008–DATE	40–60 HP 4-Stroke	HC5345-3	See note 1
	2017–DATE	175–225 HP 3.4L V6 4-Stroke	HC5345-3	See note 2
	2018–DATE	250–300 HP 4.6L V8 4-Stroke	HC5345-3	See note 2
	2022–DATE	60R HP 4-Stroke	HC5345-3	See note 1
	2022–DATE	150R HP 4-Stroke	HC5345-3	
	2022–DATE	200–300R HP 4-Stroke	HC6345-3	
OXE	2017–DATE	200 HP Diesel I4 2.4L	HC5345-3	HA6864 tiller bolt, or see note 1
	2020–DATE	300 HP Diesel	HC5345-3	
SELVA	2000–2013	90–115 HP 4-Stroke	HC5348-3	
	2014–DATE	115 HP 4-Stroke	HC5345-3	
	2000–DATE	150 HP 4-Stroke	HC5345-3	
	2007–DATE	200–300 HP 4.2L V6	HC5345-3	
SUZUKI	1986–2000	100 HP 2-Stroke	HC5345-3	
	1986–2002	115–140 HP 2-Stroke	HC5345-3	**NOT 1996**
	1998–DATE	75–140 HP 4-Stroke inc. A Series	HC5358-3	See note 1
	2020–DATE	115–140 HP 4-Stroke inc. B Series	HC5358-3	See note 1, 6
	1986–2013	150–225 HP 2 and 4-Stroke	HC5345-3	
	2004–DATE	200–300 HP V6	HC5358-3	See note 6
	2013–DATE	150–200 HP 4 Cylinder	HC5345-3	
	2017–DATE	300–350 HP Dual Prop 4.4L	HC5358-3	See note 4, 6
TOHATSU	1990–DATE	40–140 HP 2-Stroke	HC5345-3	
	2014–DATE	60–150 HP 4-Stroke BFT	HC5345-3	
	2014–2022	200–250 HP 4-Stroke BFT	HC5445-3	See note 7
	2023–DATE	200–250 HP 4 Stroke BFT	HC5345-3	
	2023–DATE	40–60 HP 4-Stroke MFS	HC5345-3	Tohatsu tiller bolt 3E0-84917-0
	2023–DATE	75–150 HP 4-Stroke MFS	HC5345-3	Tohatsu tiller bolt 3E0-84917-0
YAMAHA	1990–2003	40–90 HP 2-Stroke	HC5345-3	See note 1
	1986–DATE	100–300 HP 2-Stroke	HC5345-3	
	1997–DATE	80–250 HP 4-Stroke	HC5345-3	
	2000–DATE	150–300 HPDI	HC5345-3	
	2003–DATE	25–70 HP 4-Stroke	HC5348-3	See note 1
	2007–DATE	200–300 HP 4.2L V6 4-Stroke	HC5345-3	See note 3, 5
	2007–DATE	300–350 HP 5.3V8	HC5345-3	See note 3, 6
	2011–2014	90–115 HP inc. A Series	HC5358-3	
	2012–DATE	150–250 HP 2.8L & 3.3L	HC5345-3	
	2014–DATE	75–115 HP inc. B Series	HC5345-3	

1. Requires Spacer Kit# HO5090.
2. PRO XS MUST use HC6345-3.
3. Optional cylinder part # HC5358-3. Slight interference may occur when using the HC5358-3, with the engine in the full tilt position.
4. Must use PA1200-3HP. Must use Optimus fluid HA5482.
5. HC5358-3 required when using a SeaStar SmartStick
6. Single engine application only. Refer to twin engine application guide.
7. Cylinder revised mid 2022, contact Dometic technical support.

Revision Date: **SEPTEMBER 24th 2026**

NOTICE!
Front mount cylinder part# HC5345-3 is included in the SeaStar outboard steering kit HK6400-4. If your engine requires the use of a cylinder other than the HC5345-3. Twin engines may require a different cylinder to prevent interference. (See application guides on page 3-13 — page 3-14) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.

CAUTION!
Dometic recommends the use of SeaStar PRO (1500 psi) Kevlar steering hoses with SeaStar PRO helms.

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3.2.6 Twin engine application guide (Normal use)

Prior to selecting a cylinder from this application guide, please refer to page 3-9 to ensure that you are selecting the correct cylinder for your engine/boat.

NOTICE!
Is your Splashwell wide enough? Check page 3-19 for space requirements.

HO6001, HO6001EM, HO6002, & HO6003 are for engine centers 26" to 36". For wider engine centers consider an aggressive tie bar kit, page 3-11.

MANUFACTURER	YEAR	MODEL	CYLINDER	TIE BAR KITS		NOTES
				Twin Engine Single Cylinder	Twin Engine Dual Cylinder	
COX MARINE	2022–DATE	300–350 HP Diesel	HC5358-3	N/A	HA5520	See note 7
HONDA	1996–DATE	60–90 HP 4-Stroke	HC5345-3	HO6001	HO6002	See note 4
	1998–2009	115–130 HP 4-Stroke	HC5347-3	N/A	N/A	
	1998–DATE	30–50 HP 4-Stroke	HC5345-3	HO6001	HO6002	See note 2
	2001–DATE	150 HP 4-Stroke	HC5345-3	HO6001	HO6002	See note 6
	2003–DATE	135 HP 4-Stroke	HC5345-3	HO6003	HO6002	
	2011–DATE	115HP 4-Stroke	HC5345-3	HO6003	HO6002	
	2015–DATE	100 HP 4-Stroke	HC5345-3	HO6003	HO6002	See note 5
	2001–2022	200–250 HP 4-Stroke	HC5445-3	HO6001	HO6002	See note 9, 10
	2023–DATE	200–300 HP 4-Stroke	HC5345-3	HO6001	HO6002	See note 9, 10
	2023–DATE	350 HP 4-Stroke	*Must use Tournament cylinders. Refer to page 3-22.*			
JOHNSON/EVINRUDE	1991–DATE	40–300 HP 2-Stroke	HC5345-3	HO6003	HO6002	Inc. ETech engines
	1997–DATE	75–300HP Ficht	HC5345-3	HO6003	HO6002	
	1998–DATE	40–140 HP 4-Stroke	HC5358-3	HO6003	HO6002	See note 2
	2000–2003	115HP Ficht	HC5358-3	HO6003	HO6002	See note 2
	2002–DATE	200–225 HP 4-Stroke	HC5345-3	HO6003	HO6002	See note 12
	2005–DATE	250 HP DPX Vindicator	HC5348-3	HO6003	HO6002	
	2007–DATE	200–250 HP 3.3L V6	HC5345-3	HO6003	HO6002	Inc. H.O. models
MERCURY	1989–DATE	75–300 HP 2-Stroke	HC5345-3	HO6001	HO6002	See note 4
	1996–DATE	75–200 HP 2 and 4-Stroke	HC5345-3	HO6001	HO6002	See note 6
	1998–2007	40–60 HP 2 and 4-Stroke	HC5348-3	HO6001	HO6002	See note 2
	2008–DATE	40–60 HP 4-Stroke	HC5345-3	HO6001	HO6002	See note 2
	2002–2003	225 HP 4-Stroke	HC5358-3	HO6001	HO6002	See note 1
	2004–DATE	150–200 HP Verado	HC5345-3	HO6001	HO6002	
	2003–DATE	150–200 HP PRO XS	HC6345-3	HA5522	HA5520	See note 7
	2003–DATE	250–300 HP PRO XS	*Must use Tournament cylinders. Refer to page 3-22.*			
	2016–DATE	115–150 HP 2.1/3.0L 4-Stroke	HC5345-3	HO6001EM	HO6002	See note 10
	2017–DATE	175–225 HP 3.4L V6 4-Stroke	HC5345-3	HO6001EM	HO6002	See note 10
	2018–DATE	250–300 HP 4.6L V8 4-Stroke	HC6345-3	HA5522	HA5520	See note 7
	2022–DATE	60R HP	HC5345-3	HO6001EM	HO6002	See note 10
	2022–DATE	150R HP	HC5345-3	HO6001EM	HO6002	See note 10
	2022–DATE	200R HP	HC6345-3	HO6001EM	HO6002	See note 10
	2022–DATE	250R –300R HP	*Must use Tournament cylinders. Refer to page 3-22. See note 8*			
OXE	2017–DATE	200 HP Diesel I4 2.4L	*Must use Tournament cylinders. Refer to page 3-22.*			
	2020–DATE	300–350 HP Diesel				

1. HC5345-3 is optional for SINGLE ENGINE ONLY applications. Do not use HC5345-3 for twin engine applications as operational interference may occur.
2. Requires spacer kit HO5090 for each engine.
3. Requires Tohatsu tiller bolt 3E0-84971-0.
4. Minimum engine center = 27".
5. Customer supplied SS washer must be installed under rod end.
6. Slight interference may occur with HO6001 tie bar, contact Dometic technical support.
7. Refer to table on page 3-13 for tie bar part number.
8. Must use PA1200-3HP. Must use Optimus fluid HA5482.
9. Cylinder revised mid-2022, contact Dometic tech support.
10. Aggressive use tie bar and kit HA5522 can be used. Refer to table at top of page 3-13.
11. HC5345-3, mounted under tiller arm.
12. Must use HC5358-3 with a SeaStar SmartStick.

The above engine applications are current through the revision date shown. For up-to-date engine applications go to: **www.dometic.com**

Revision Date: **October 1st 2026**

MANUFACTURER	YEAR	MODEL	CYLINDER	TIE BAR KITS		NOTES
				Twin Engine Single Cylinder	Twin Engine Dual Cylinder	
SUZUKI	2002–DATE	90–140 HP 4-Stroke inc. A Series	HC5358-3	HO6003	HO6002	See note 2
	2013–DATE	150–200 HP 4-Stroke 4 Cylinder	HC5345-3	HO6001	HO6002	
	2004–DATE	200–300 HP 3.6 4.0L V6	HC5345-3	HO6001	HO6002	See note 10, 11
	2017–DATE	300–350 HP 4.4L V6	*Must use two Tournament cylinders. Refer to page 3-22. See notes 8, 11.*			
	2020–DATE	115–140 HP B Series	*Must use two Tournament cylinders. Refer to page 3-22.*			
TOHATSU	1990–DATE	40–140 HP 2-Stroke	HC5345-3	N/A	N/A	
	2014–DATE	60–150 HP 4-Stroke BFT	HC5345-3	HO6003	HO6002	
	2014–2022	200–250 HP 4-Stroke BFT	HC5445-3	HO6001	HO6002	See note 9, 10
	2023–DATE	200–300 HP 4 Stroke BFT	HC5345-3	HO6001	HO6002	See note 10
	2023–DATE	40–60 HP 4-Stroke MFS	HC5345-3	HO6003	HO6002	See note 3
	2023–DATE	75–140 HP 4-Stroke MFS	HC5345-3	HO6003	HO6002	See note 3
YAMAHA	1990–2007	40–90 HP 2 -Stroke	HC5345-3	HO6003	HO6002	
	1986–DATE	100–300 HP 2-Stroke	HC5345-3	HO6001	HO6002	
	2000–DATE	150–300 HPDI	HC5345-3	HO6001	HO6002	
	2001–2003	80–250 HP 4-Stroke	HC5358-3	HO6001	HO6002	See note 1
	2003–DATE	150–250 HP 2.8L	HC5358-3	HO6001	HO6002	
	2003–DATE	200–250 HP 3.3L	HC5358-3	HO6001	HO6002	See note 1
	2003–DATE	25–70 HP 4-Stroke	HC5348-3	HO6003	HO6002	See note 2, 4
	2007–DATE	200–300 HP 4.2L V6 4-Stroke	HC5345-3	HO6001	HO6002	See note 10, 12
	2007–DATE	300–350 HP 5.3V8	*Must use Tournament cylinders. Refer to page 3-22.*			
	2011–2014	90–115 HP inc. A Series	HC5358-3	HO6003	HO6002	
	2014–DATE	75–115HP inc. B Series	HC5345-3	HO6001	HO6002	

1. HC5345-3 is optional for SINGLE ENGINE ONLY applications. Do not use HC5345-3 for twin engine applications as operational interference may occur.
2. Requires spacer kit HO5090 for each engine.
3. Requires Tohatsu tiller bolt 3E0-84971-0.
4. Minimum engine center = 27".
5. Customer supplied SS washer must be installed under rod end.
6. Slight interference may occur with HO6001 tie bar, contact Dometic technical support.
7. Refer to table on page 3-13 for tie bar part number.
8. Must use PA1200-3HP. Must use Optimus fluid HA5482.
9. Cylinder revised mid-2022, contact Dometic tech support.
10. Aggressive use tie bar and kit HA5522 can be used. Refer to table at top of page 3-13.
11. HC5345-3, mounted under tiller arm.
12. Must use HC5358-3 with a SeaStar SmartStick.

The above engine applications are current through the revision date shown. For up-to-date engine applications go to: **www.dometic.com**

Revision Date: **October 1st 2026**

3.2.7 Integrated cylinder application (pumps and tie bars)

MANUFACTURER	INTEGRATED CYLINDER	CAPACITY cu. in. (cc)	HELM PUMP	
			Displacement cu. in. (cc)	Number of turns
SUZUKI	DF350AMD	8.66 (142)	1.7 (28)	5.05
	DF300BMD		2.0 (33)	4.30
			2.4 (39)	3.60
No Liquid Tie Bar				
AMD & BMD can also use SeaStar Tournament or Optimus Electric Steering				

Multi Engine Application Using Tournament or EPS steering

From Suzuki:
- Steering attachment kit # 43700-87M00 (1 for each engine)
- Steering canceler kit black or white
  Nebular black
  part # 3150-87MA0-YAY
  Super cool white
  part # 43150-87MA0-QTN

From Dometic:
- Tie bar hardware kit p# HO6808 (x2 for triple engines)
- Tie bar for C-C part # HO68XX (x2 for triple engines
- 26.0"–31.9" part # HO6823
- 32.0"–48.0" part # HO6824

Power Assist pump part # PA1200-3HP

Optimus fluid part # HA5482 (1 bottle per component)

Dual cylinders part # HHXXXX-4 (2.4 SeaStar pump for 7.20 turns lock to lock)

Single cylinder part # HHXXXX-4 (1.7 SeaStar pump for 5.05 turns)

PRO hoses part # HO69XX

Optional bulkhead kits # HO7XXX

Catamaran EPS only

Revision Date: **MAY 4th 2025**

MANUFACTURER	INTEGRATED CYLINDER	CAPACITY cu. in. (cc)	HELM PUMP	
			Displacement cu. in. (cc)	Number of turns
YAMAHA	F150 F175 F200	9.06 (149)	1.7 (28) 2.0 (33) 2.4 (39)	5.32 4.53 3.77
No Liquid Tie Bar				

Multi Engine Application Using Tournament or EPS steering

From Yamaha:
- Tie bar kit # 6LR-61301-00, comes with CR engines
- 6E5 Tie bar range 23.7"–31.4", comes with CR engines
- Tie bar kit # 6LP-KRKIT-99-GR Kicker kit 9.9

From Dometic:
- Yamaha tie bar bolts kit # HA6810 for Tournament tie bars
- Tie bar for C-C part # HO68XX (x2 for triple engine)
- 26.0"–29.0" C-C part # HO6823
- 29.1"–44" C-C part # HO6824
- SeaStar tie bar on Yamaha hooks part # HO5009

Power Assist pump part # PA1200-3

SeaStar fluid part # HA5430 (1 bottle per component)

Dual cylinders part # HHXXXX-4 2.4 SeaStar pump for 7.55 turns lock to lock

Single cylinder part # HHXXXX-4 1.7 SeaStar pump for 5.32 turns

SeaStar hoses part # HO59XX

Optional PRO hoses part #HO69XX

Optional bulkhead kits # HO7XXX

Revision Date: **MAY 4th 2025**

MANUFACTURER	APPLICATION	CYLINDER CAPACITY cu. in. (cc)	HELM PUMP	
			Displacement cu. in. (cc)	Number of turns
MERCURY	Verado 135–200 4 cyl. Verado 200–300 V6 Verado 350s ci	10.00 (164)	2.00 (33) 2.44 (40) 3.05 (50)	5.00 4.10 3.05

Mercury Power Steering to SeaStar Power Assist

From Dometic:
- ORB bleeder tee part # HF6013 -6 ORB
- SeaStar Power Assist part # PA1200-3
- SeaStar hoses part # HO59XX or SeaStar PRO hoses part # HO69XX

SeaStar Helm
Dual cylinders part # HHXXXX-4 (2.4 cu.in. SeaStar pump for 8.33 turns)
Single cylinder HHXXXX-4 (2.0 cu.in. SeaStar pump for 5.0 turns)

MERCURY	Verado V-10 350HP Verado 400HP V-8 Verado 250–300HP with AMS	10.00 (164)	2.00 (33) 2.44 (40) 3.05 (50)	5.00 4.10 3.05

Mercury Power Steering to SeaStar Power Assist

From Dometic:
- ORB bleeder tee part # HF6013 -6 ORB
- SeaStar Power Assist part # PA1200-3HP
- SeaStar PRO hoses part # HO69XX
- Optimus fluid part # HA5482 (1 bottle per component)

SeaStar Helm
Dual cylinders part # HHXXXX-4 (2.4 cu.in. SeaStar pump for 8.33 turns)
Single cylinder HHXXXX-4 (2.0 cu.in. SeaStar pump for 5.0 turns)

Revision Date: **DECEMBER 19th 2025**

3.3 SeaStar PRO series

SeaStar PRO outboard steering systems are suited for all those critical high speed, single powered outboard boats, like Bass, Flats, combo Race/Ski and other performance orientated boats capable of speeds in excess of 65mph or boats susceptible to chine walking. Before ordering it is necessary to determine the proper cylinder and helm pump for your application. Using the table on page 3-19, choose the correct cylinder as per your outboard engine. Dometic recommends the use of a SeaStar PRO helm and SeaStar PRO (1500psi) reinforced Kevlar hoses with all SeaStar PRO systems.

There are characteristics of PRO steering that make it suitable for high speed boats but unsuitable for regular boats that do not chime walk.

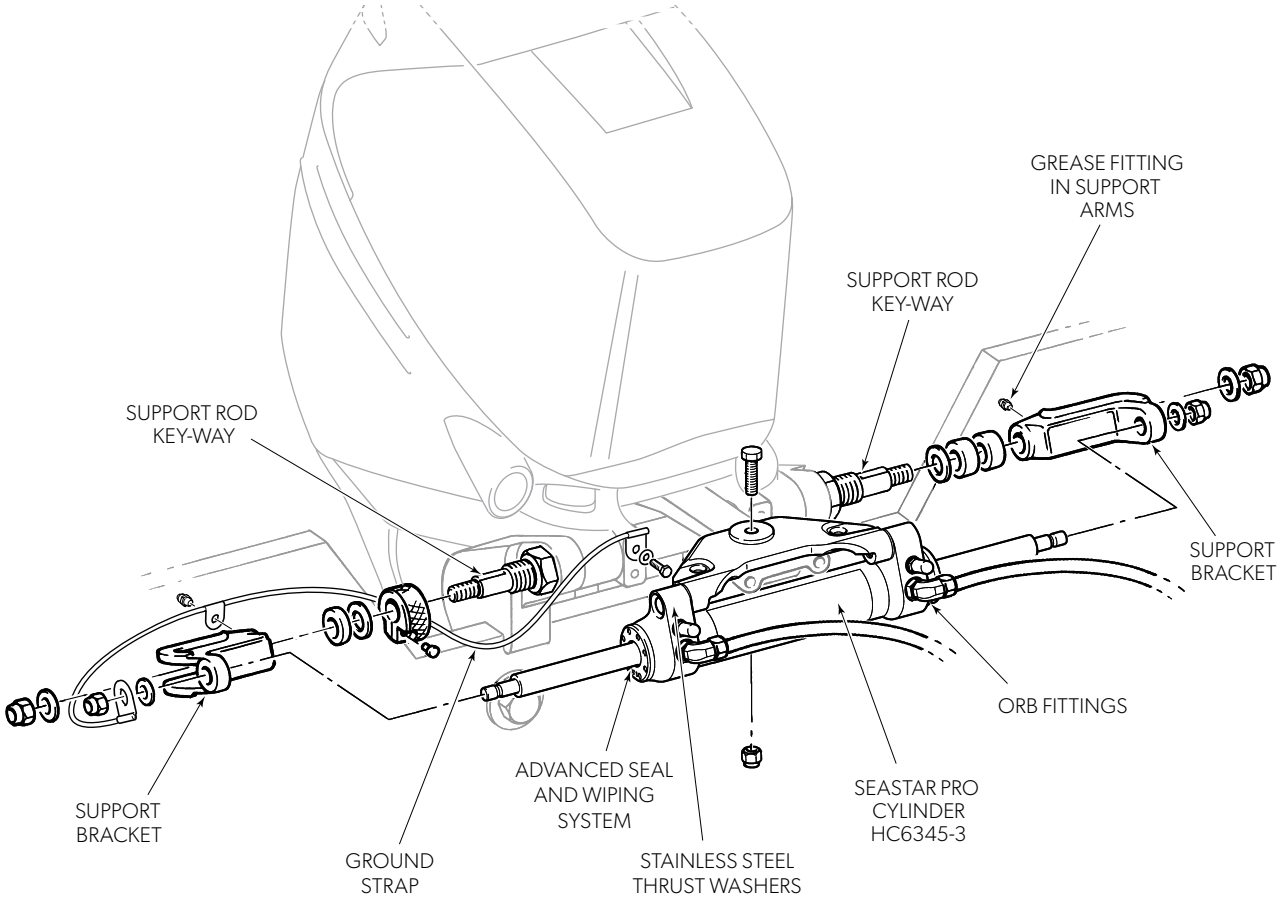


Figure 3-18. Cylinder part # HC6345-3 shown.

3.3.1 Helm pumps

SeaStar PRO steering systems have the option to install a standard front mounting helm, both classic and sport tilt as well as rear mount helm pumps. Please refer to Section 8 for style and PRO helm part numbers.

CAUTION!
Dometic recommends the use of SeaStar PRO hoses HO57/69XX with SeaStar PRO helms. Refer to Section 10 or other PRO hose options.

3.3.2 SeaStar PRO application guide

NOTICE!
Is your Splashwell wide enough? Check below for space requirements.

MANUFACTURER	YEAR	MODEL	CYLINDER	NOTES
HONDA	2001–DATE	150–350 HP 4-Stroke	HC6345-3	HA5472 stroke limit kit must be installed when using on 200–250 HP 4-Stroke (pre 2023 only)
JOHNSON/EVINRUDE	2002–DATE 2003–DATE 2005–DATE	150–250 HP 4-Stroke 150-300 HP ETech 250 HP DPX Vindicator	HC6345-3 HC6345-3 N/A	
MERCURY	1989–DATE	150–300 HP 2-Stroke, 4-Stroke and XS engines Inc. 4.6L V8	HC6345-3	
SUZUKI	1998–DATE 1986–2013 2013–DATE 2013–DATE 2017–DATE	115–140 HP 4-Stroke 150–225 HP 2-Stroke, 4-Stroke 150-–200 HP 4 Cylinder 200–350 HP 6 Cylinder 300–350 HP Dual Prop.	HC6358-3 HC6345-3 HC6345-3 HC6358-3 HC6358-3	Requires spacer kit HO5090
YAMAHA	1986–DATE	150–350 HP 2 and 4-Stroke	HC6345-3	

Revision Date: **SEPTEMBER 24th 2026**

QR CODE: www.dometicsystembuilder.com
Visit www.dometicsystembuilder.com for most steering applications.

NOTICE!
The HC6345-3 cylinder has the same fitment as the HC5345-3. The HC6358-3 cylinder has the same fitment as the HC5358-3. If your engine is not listed check page 3-13 through page 3-14 for compatibility.

WARNING!
SeaStar PRO steering helms can not be used with an unbalanced steering cylinder.

SeaStar PRO Front mount cylinder part# HC6345-3 is included in the SeaStar PRO outboard steering kit HK7500-4. Each kit comes with HC6345-3 PRO Steering cylinder, HH5770-4 PRO 2.0 Front mount helm pump, and two bottles of SeaStar steering fluid HA5430(H).

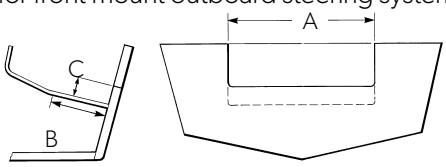
If your engine requires the use of a cylinder other than the HC6345-3 (see application guides on page 3-13 through page 3-15) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.

PART #	HOSE LENGTH
HK7500-4	Add PRO hoses HO57/69XX. See section 10 bulkhead hose options.

3.3.3 Cylinder installation, general dimensions and replacement parts

Motor well dimensions required for front mount outboard steering systems.

# of engines	A	B	C	Min. engine center distance	Max. transom thickness
1	22" (559 mm)	6" (152 mm)	5" (127 mm)	N/A	3"
2	49" (1,244 mm)	6" (152 mm)	5" (127 mm)	26" (660 mm)	3"



NOTES:
a) Dimensional restrictions also apply to external motor mount brackets.
b) Maximum engine center distance for twin engine applications is 36" (914mm) using the standard tie bar. Dimension 'A' would have to be increased proportional to the tie bar length.
c) Minimum engine center distance is 26" unless engine manufacturer recommendation is greater.
d) Splashwells of less than 30" in overall width may require engine removal in order to install and service the support rod.
e) HC5370-3 side mount cylinder can be considered if lack of space in splashwell. Not to be used with SeaStar PRO helm pumps.

WARNING!
Operational interference of the steering cylinder/cylinder fittings and jack plates/transom/splashwell can occur under certain conditions. Check installation thoroughly throughout the full range of motor tilt, jack plate height and trim before making final installation.

If interference is not eliminated total steering loss can occur, causing property damage and/or personal injury.

For specific trim limit options consult your engine manufacturer.

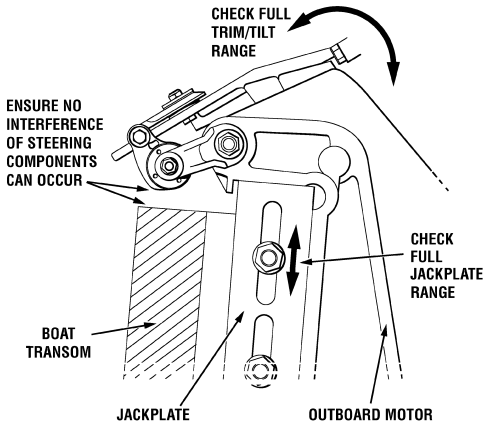


Figure 3-19.

Dimensions — SeaStar and SeaStarPRO front mount cylinders

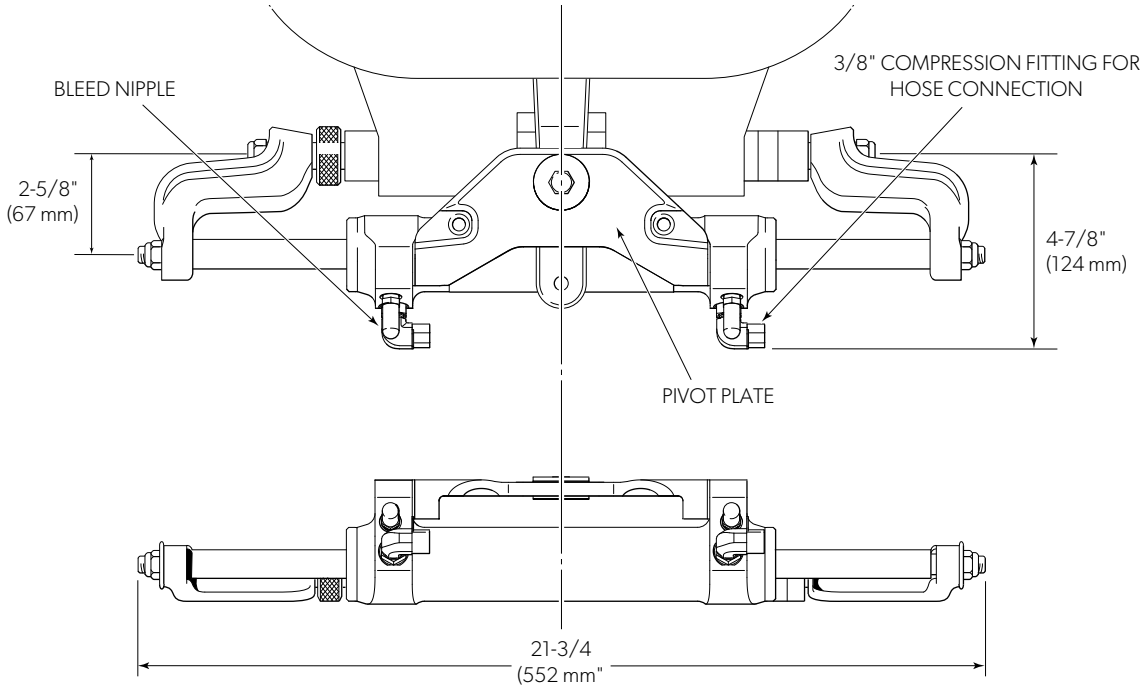


Figure 3-20.

NOTICE!
Pivot plate dimensions vary depending on exact cylinder model.

3.4 SeaStar commercial grade outboard cylinder

The SeaStar commercial grade steering cylinder part # HC5345-3CM is a direct replacement for vessels or applications using the current HC5345-3 cylinder. Enhanced features and improved salt water corrosion resistance make it commercial grade.

HC5345-3CM features

1. High grade stainless steel shaft with state-of-the-art surface treatment.
2. End glands equipped with metal scrapers keep ice and debris out of the wiper and seals.



Figure 3-21. HC5345-3CM SeaStar commercial grade steering cylinder for outboard engines.

NOTE
The metal scraper end glands used in this cylinder can be purchased separately to retrofit current SeaStar cylinders. Kit part # HS5167MS (includes 2 end glands).

NOTE
If you require assistance with applications, parts, or information about SeaStar commercial grade steering cylinder part # HC5345-3CM please contact Dometic technical support department at 1-800-730-4082 or email us at seastar@dometic.com.

3.5 SeaStar Tournament series

(Aggressive use)

Extreme heavy duty cylinders and tie bars designed for primarily high performance multiple engine applications. Also available for single engine applications.

Features

- Suitable for use with all SeaStar helms and SeaStar Power Assist.
- Heavy duty universal cylinder.
- Reversible, bolt on stainless steel tie bar plates.
- Robust design with heavy duty support brackets, barrel, shaft & seals.
- Superior corrosion resistance.
- New patented pivot plate design provides smooth articulation and a sealed joint.
- Heavy duty adjustable tie bar (patent pending).
- Equipped with stainless steel adjustable O-ring sealed elbow fittings which can be easily orientated.

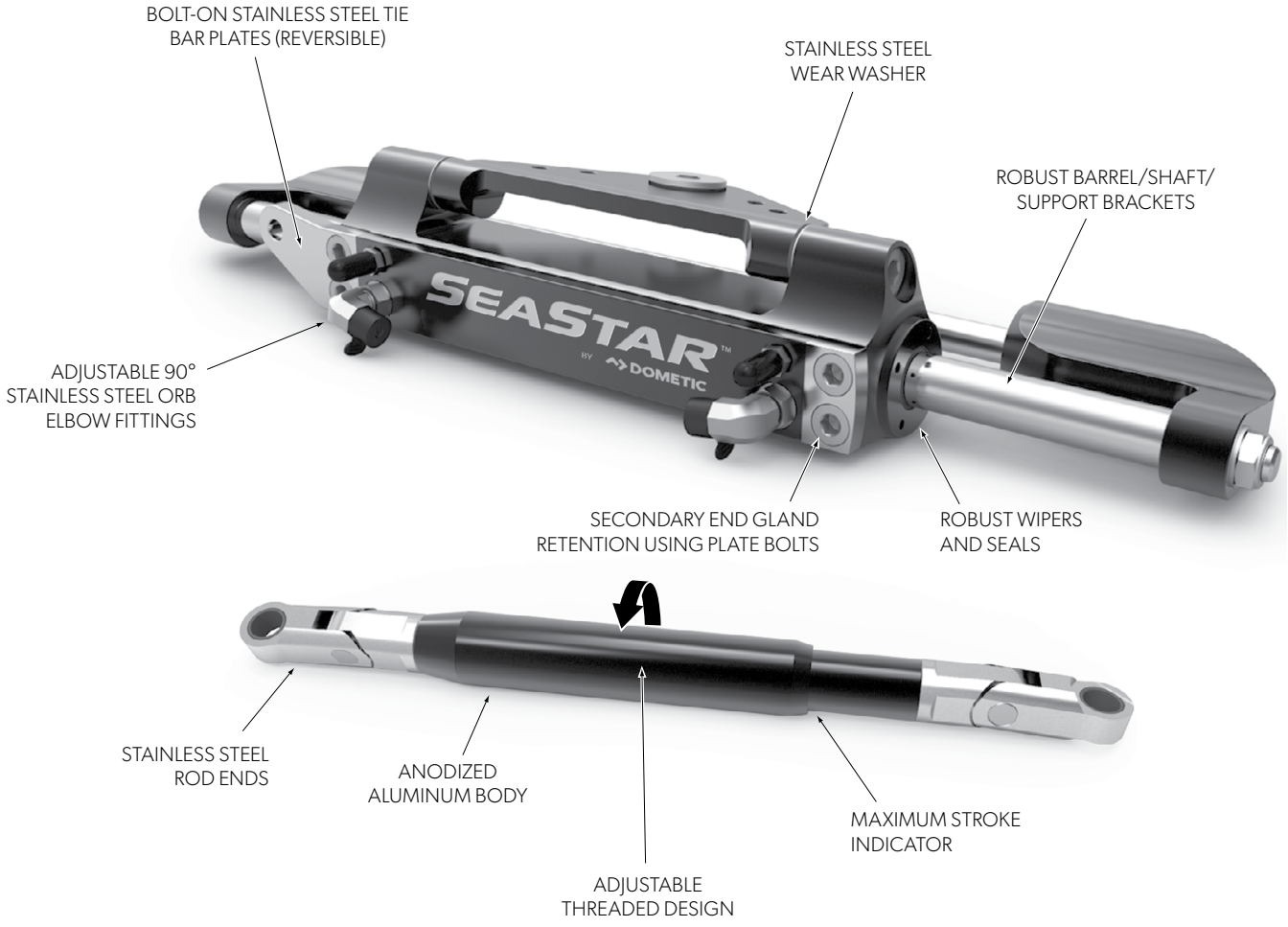


Figure 3-22.

3.5.1 Tournament series application guide

CONFIGURATION	CYLINDER		HARDWARE KIT		TIE BAR			NOTES
	Part #	Qty	Part #	Qty	Engine center distance inches (mm)	Part #	Qty	
SINGLE ENGINE — SINGLE CYLINDER	HC6845*	1	HA6801	1	N/A	N/A	N/A	1
TWIN ENGINE† — SINGLE CYLINDER Starboard drive bracket standard. Port drive bracket available	HC6845*	1	HA6802 & HA6802P	1	25.0 – 25.6 (635 – 650) 25.7 – 30.6 (653 – 777) 30.7 – 39.4 (780 – 1,001) 39.5 – 54.0 (1,003 – 1,372)	HO6821 HO6822 HO6823 HO6824	1 1 1 1	1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5
Mercury CMS	HC6845	1	HA6816	1	25.0 – 26.2 (635 – 667) 26.3 – 31.2 (668 – 794) 31.3 – 40.0 (795 – 1016) 40.1 – 55.0 (1017 – 1397)	HO6821 HO6822 HO6823 HO6824	1	1, 3, 4, 7 1, 3, 4, 7 1, 3, 4 1, 3, 4
TWIN ENGINE† — DUAL CYLINDER	HC6845*	2	HA6804	1	25.0 – 26.5 (635 – 673) 26.6 – 29.3 (676 – 744) 29.4 – 34.2 (747 – 869) 34.3 – 43.0 (871 – 1092) 43.5 – 58.0 (1,105 – 1,473)	HO6820 HO6821 HO6822 HO6823 HO6824	1 1 1 1 1	1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5
TRIPLE ENGINE† — DUAL CYLINDER	HC6845*	2	HA6806	1	25.0 – 27.9 (635 – 709) 28.0 – 36.0 (711 – 914) 36.0 – 51.0 (914 – 1,295)	HO6822 HO6823 HO6824	2 2 2	1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6 1, 2, 3, 4, 5, 6
QUAD ENGINE† — DUAL CYLINDER	HC6845*	2	HA6811	1	Consult Dometic technical service			1, 2, 3, 4, 5
QUINTUPLET ENGINE (+)	Consult Dometic technical service							1, 2, 3, 4, 5
SPECIAL ENGINE HARDWARE KITS	Suzuki integrated steering							
	N/A	N/A	HA6808	1	26.0 – 31.9 (660 – 811) 32.0 – 48.0 (812 –1219)	HO6823 HO6825	1	
	Yamaha integrated steering to max. power of 200 HP each engine							
	N/A	N/A	HA6810	1	26.0 – 29.0 (660 – 737) 29.1 – 44.0 (738 – 1117)	HO6823 HO6824	1	1, 8, 9 1, 8

1. Installation may vary according to the following factors: engine mounting height, transom thickness, use of transom savers, tiller bolt location, engine tilt range, and engine size.
2. For center engine drops greater than 3 inches (76 mm), please consult Dometic technical service.
3. Tie Bar length may vary depending on toe in/toe out setup. To allow for toe, add or subtract from your nominal engine center to center distance.
4. Based on recommended engine manufacturer minimum center to center distances. Deviating from these recommendations may require stroke limiting cylinders and/or engine tilt limiting, please consult Dometic technical service.
5. Cylinder's must be plumbed in parallel only, no series connections. Only exception is if cylinders are utilizing a liquid tie bar. HC6845 is not recommended for liquid tie bar applications.
6. Maximum drop: ≤ 3 inches (76 mm).
7. Cylinder interference may occur with independent trim/tilt of the engines.
8. Yamaha kit 6LR-61301-00 is required. This kit is included with the counter-rotating engine model.
9. See engine rigging guide for minimum center distance.

Revision Date: **AUGUST 17th 2026**

* HC6850 for Honda V6 or where stroke reduction is desired. Yamaha 3.3L engine requires one cylinder per engine.

† Mercury multi engine applications may require additional parts, contact Dometic technical support.
OXE 300 must use dual cylinder HC6850 for twin engine, no single cylinder option. For triple engine setup two HA6864 bolt kits must be used for center engine.

NOTICE!
Suzuki dual prop and Mercury 250–300R engines use PA1200-3HP High pressure Power Assist pumps. PA1200-3HP Power Assist pumps require HA5482 Optimus steering fluid.

CONFIGURATION	CYLINDER		HARDWARE KIT		TIE BAR			NOTES
	Part #	Qty	Part #	Qty	Engine center distance inches (mm)	Part #	Qty	
TRIPLE ENGINE — TRIPLE CYLINDER	HC6845*	3	HA6807	1	28.0 – 28.8 (711 – 736)	HO6819	2	1, 2, 3, 4
					28.9 – 30.5 (737 – 774)	HO6820		1, 2, 3, 4
					30.6 – 33.3 (775 – 847)	HO6821		1, 2, 3, 4
					33.4 – 38.3 (848 – 974)	HO6822		1, 3, 4, 6
					38.4 – 47.0 (975 – 1,194)	HO6823		1, 3, 5, 6
					47.1 – 62.1 (1,1 95 – 1,578)	HO6824		1, 3, 7

1. Installation may vary according to the following factors: engine mounting height, transom thickness, use of transom savers, tiller bolt location, engine tilt range, and engine size.
2. Will require trim limiting at 0" (0 mm) drop.**
3. Tie Bar length may vary depending on toe in/toe out setup. To allow for toe, add or subtract from your nominal engine center to center distance.
4. Maximum drop 1.5" (38 mm) with trim limiting.**
5. Maximum drop 1.5" (38 mm) without trim limiting.
6. Maximum drop 3" (76 mm) with trim limiting.**
7. Maximum drop 3" (76 mm) without trim limiting

Revision Date: **JUNE 11th 2021**

* HC6850 for Honda pre-2023 V6 or where stroke reduction is desired.

** Trim limiting required as interference between the tie bar and support bracket will occur during independent trim/tilt.

3.5.2 Engine configurations

It is important to note that each engine configuration requires a hardware kit and tie bar kit(s), with the exception of the single engine configuration, use the HC6845S.

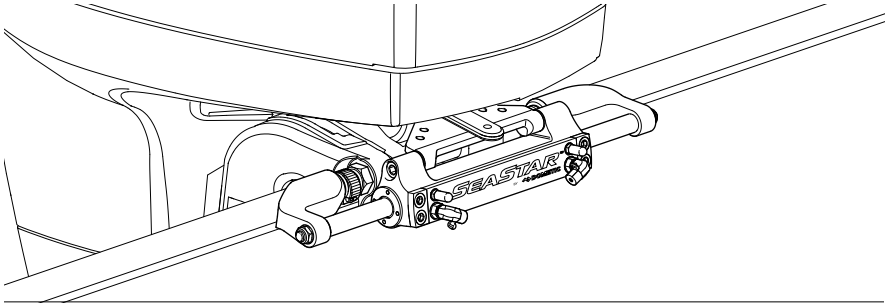


Figure 3-23. Single engine – single cylinder configuration.

CAUTION!
Before connecting the tie bars refer to Section 3.5 of book 48 "Tie bar adjustment and Installation".

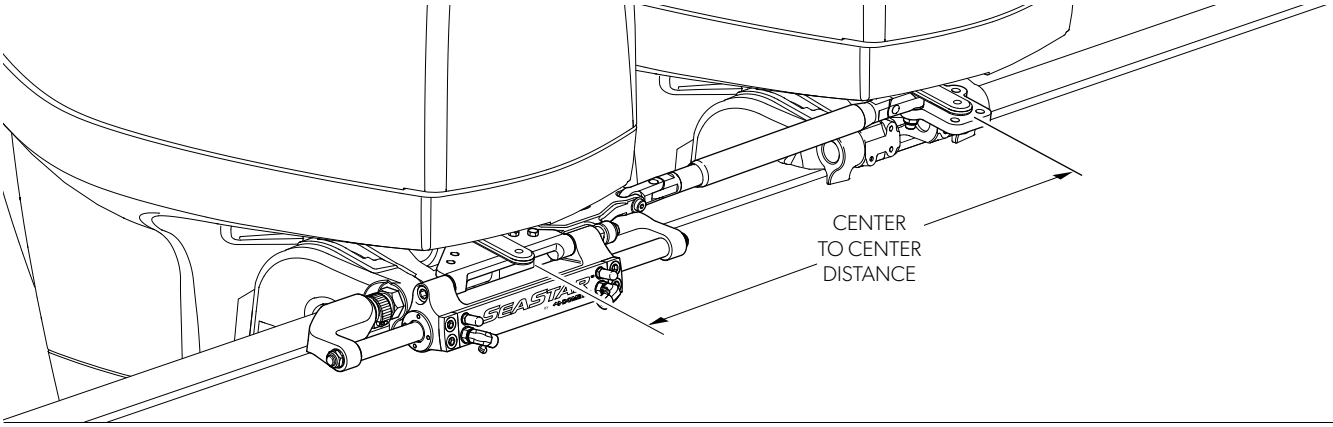


Figure 3-24. Twin engine – single cylinder (starboard) configuration.

NOTICE!
The twin engine – single cylinder configuration requires installation of the drive bracket before installing the steering cylinder onto the engine. (Refer to your installation manual.)

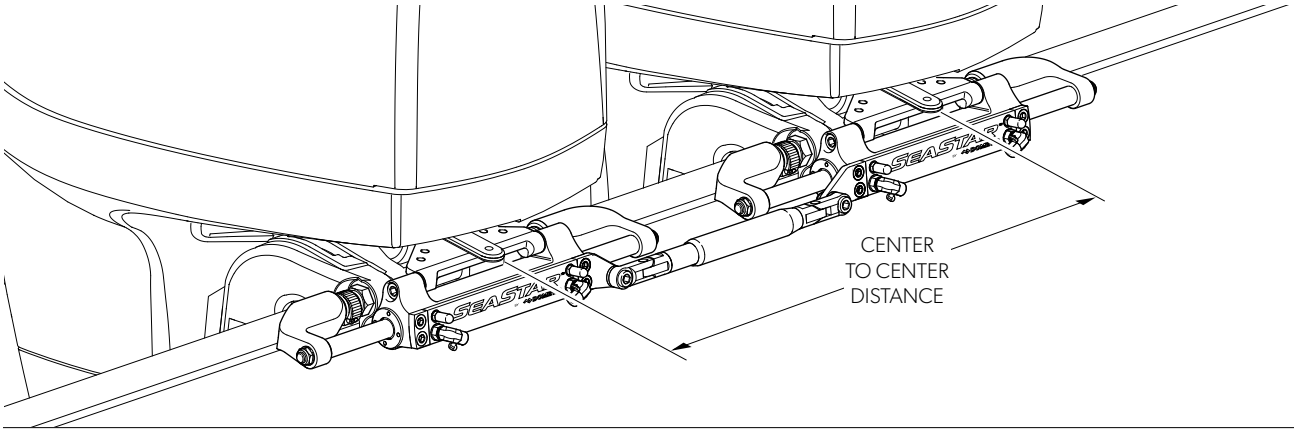


Figure 3-25. Twin engine – dual cylinder configuration

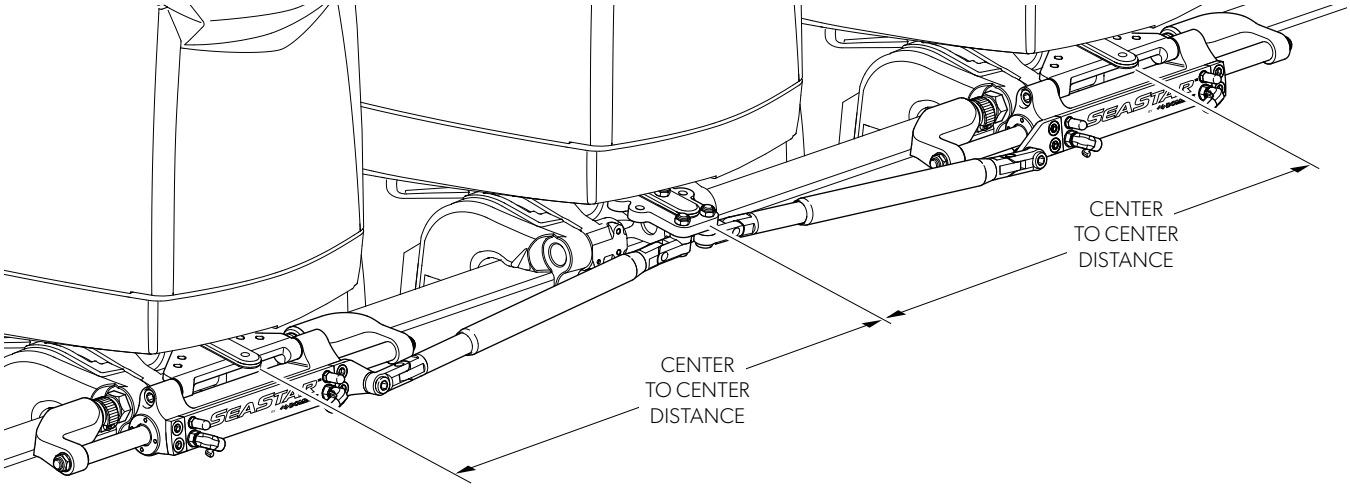


Figure 3-26. Triple engine – dual cylinder configuration.

NOTICE!
Depending on engine, the cylinder may be mounted different than that shown below. See application chart page 3-24.

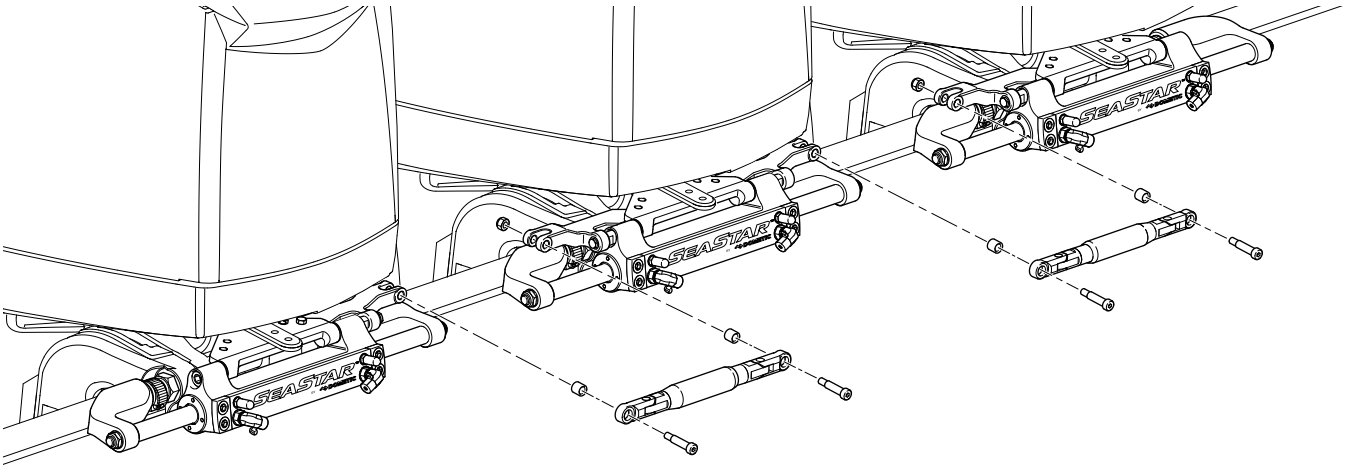


Figure 3-27. Triple engine – triple cylinder configuration.

3.5.3 Dimensions — Tournament series cylinder

Max. tilt angle shown – 67°. Typical transom thickness shown, but may vary.

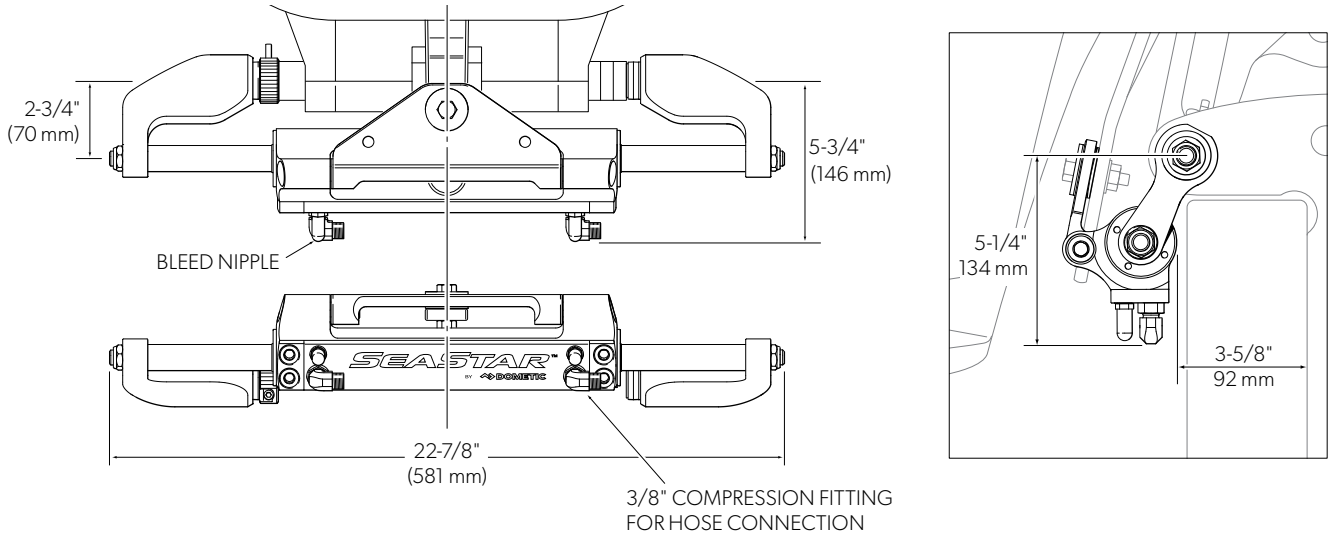
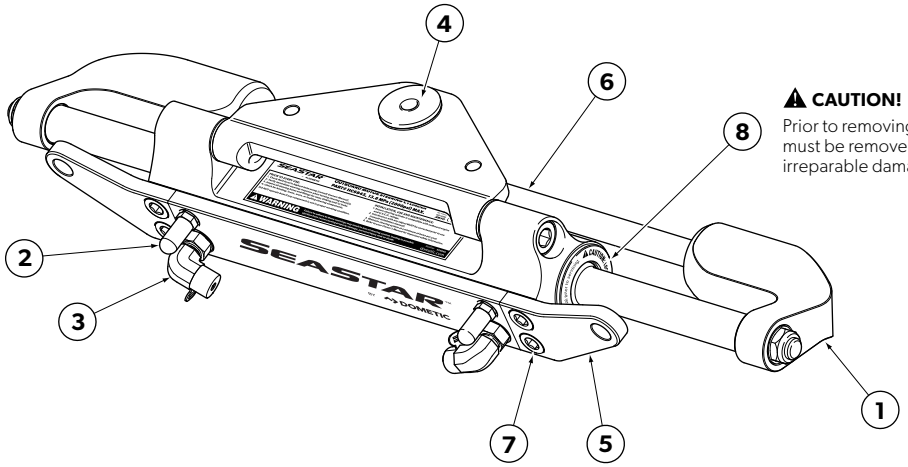


Figure 3-28. Tournament cylinder dimensions.

WARNING!

Operational interference of the steering cylinder/cylinder fittings and jack plates/transom/splashwell can occur under certain conditions. Check installation thoroughly throughout the full range of motor tilt, jack height and trim before making final installation. If interference is not eliminated total steering loss can occur, causing property damage and/or personal injury.

3.5.4 Spare parts — Tournament series cylinder



⚠ CAUTION!

Prior to removing end glands, both bolts (item 7) must be removed. Failure to remove will lead to irreparable damages to the cylinder.

Figure 3-29.

ITEM	PART #	QTY	DESCRIPTION
1	HP6162	2	Support bracket (inc. mounting hardware)
2	HF5548	2	Bleeder nipple
3	HF6004	2	Hose fitting (ORB fitting.)
4	HA5829	1	Tiller bushing kit (c/w high strength tiller bolt.)

ITEM	PART #	QTY	DESCRIPTION
5	Various	N/A	Hardware kits (refer to application chart, page 3-23 for details.)
6	HP6161	1	Support rod (c/w mounting hardware and keys)
7	HP6063	4	Tie bar plate bolts
8	202300	2	End gland seal kit

3.6 SeaStar catamaran series

The best solution for outboard catamarans is Dometic Optimus steering. It eliminates the need for a tie bar between the engines, which simplifies installation and provides a better user experience.

If traditional hydraulic steering is preferred, use a mechanical tie bar between engines where possible. If a mechanical tie bar cannot be fitted, the cylinders must be connected in series, forming a "liquid tie bar." When using a liquid tie bar, the engines will periodically need to be re-aligned by the user as they get out of sync due to seepage across the piston seals. For best results in a liquid tie bar system, Dometic recommends the parts below.

3.6.1 Steering components



Figure 3-30. Liquid tie bar valve HA5471-2.

HA5471-2, Liquid tie bar valve
Allows re-alignment of the engines without breaking into the hydraulic lines and simplifies air removal during installation.

HC5375-3, Catamaran steering cylinder
Replaces the HC5345-3 cylinder. This catamaran-specific cylinder features different piston seals, which will reduce the frequency of engine re-alignment.

Helm
A SeaStar 1.7 cu.in. helm pump is recommended for most applications. If the boat regularly" backs down hard" a SeaStar PRO 1.7 cu.in helm is recommended, but note it will make the steering feel heavier.

SeaStar PRO hose (Kevlar)
To further reduce engine misalignment, and increase system performance, Dometic recommends the use of SeaStar PRO steering hoses.

NOTICE!
Due to plumbing requirements, all "liquid tie bar" systems should use a 1.7 cu.in. helm pump. Even though there are physically two cylinders in the system, the total volume of the system is that of one cylinder. Use of a 2.4 helm will result in heavier steering effort.

NOTICE!
In high horsepower applications Dometic recommends using Optimus electric steering. SeaStar Power Assist is also a good option to reduce steering effort.

NOTICE!
Bleeding of a "liquid tie bar system" is different than a system fitted with a mechanical tie bar. Please refer to your installation and owner's manual that is shipped with the liquid tie bar valve.

3.7 SeaStar side mount series

Part # HC5370-3

Features

- Alternative to front mount cylinder.
- Unbalanced cylinder with 4.8/5.7 turns lock to lock (1.7 helm).
- Suitable for installation in shallow splashwells.

NOTICE!
For Outboard engine use only.

Applications

- All engines with threaded tilt (steering) tubes complying with ABYC P17/ ABYC P21/NMEA/BIA standards for mechanical steering.
- Cylinder attaches to the engine tilt tube as per ABYC/NMEA/BIA standard.
- Single and multiple outboard engine installations.
- Total power to 600HP in twin counter rotating application.
- Typical applications include center console fishboats and cruisers.
- Ease of installation.

How to select a side mount outboard steering system

1. From the order guide on page 3-29 select the system configuration based on;
   a) the number of engines, and
   b) the total power of engine(s) to be installed.
2. From the order guide select the cylinder(s) & tie bar kits required.
3. From the order guide select the appropriate helms and accessory hardware for each steering station.
4. From the order guide select the fitting and hose kits required for the installation.
5. Confirm that there is sufficient space available in the splashwell and dash areas for the steering components.

WARNING!
Not for use with SeaStar PRO helm pumps.



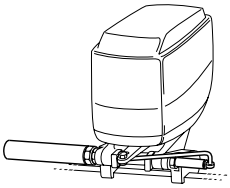
Figure 3-31. HC5370-3 cylinder shown.

NOTICE!

Not recommended for use in installations where;

a) chopper, cleaver, or surface piercing propellers are used,
b) the engine is highly elevated on the transom,
c) engine trim tabs have been removed,
d) the boat speed exceeds 60mph (97km/h), or
e) the power exceeds maximum Coast Guard or M.O.T. recommendations for the boat.

3.7.1 Order guide

ENGINE/CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ.	MODEL	PART #	REF. SECTION
SINGLE ENGINE (Single Cylinder) Applications up to 300 HP max. Number of turns 4.8/5.7 	Cylinder Helm Hose kit Steering fluid	1 1 1 3	Side mount SeaStar* Outboard hose SeaStar fluid	HC5370-3 HH5271-4 HO51XX HA5430	 Section 8 Section 10 Section 9
	For extra steering stations add				
	Helm Fitting kit Hose kit Steering fluid	1 1 1 1	SeaStar* Add a station Outboard hose SeaStar fluid	HH5271-4 HF6007 HO51XX HA5430	Section 8 Section 10 Section 10 Section 10
	Optional equipment	Back plate kit (for front mount helms) 20° wedge (for front mount helms) Autopilot fitting kit (for all -3 & -4 helms) Power assist steering		HA5418 HA5419 HF6007 PA1200-3	Section 8 Section 8 Section 10 Section 6
		*All non-pro helm designs can be used, see Section 7 for options.			

Revision Date: **AUGUST 17th 2026**

3.7.2 General dimensions

Dimensions — tie bar HO5009 for side mount cylinder

ENGINE CENTER DISTANCE
Maximum: 36″ (914 mm)
Minimum: 26″ (660 mm)

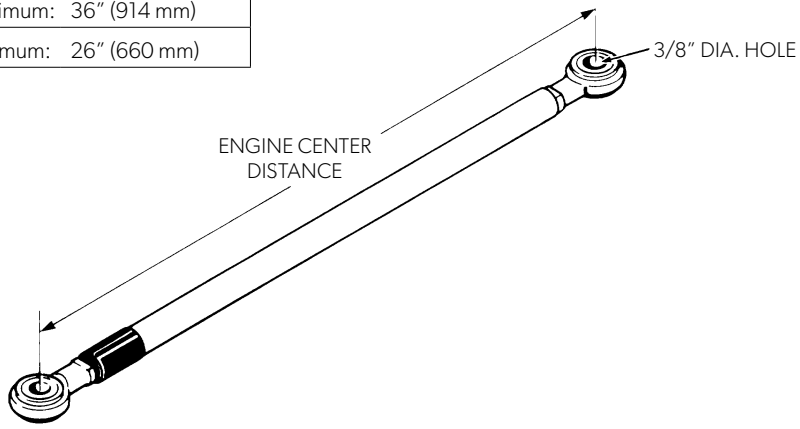


Figure 3-32. Tie bar part # HO5009.

Dimensions — side mount cylinder HC5370-3

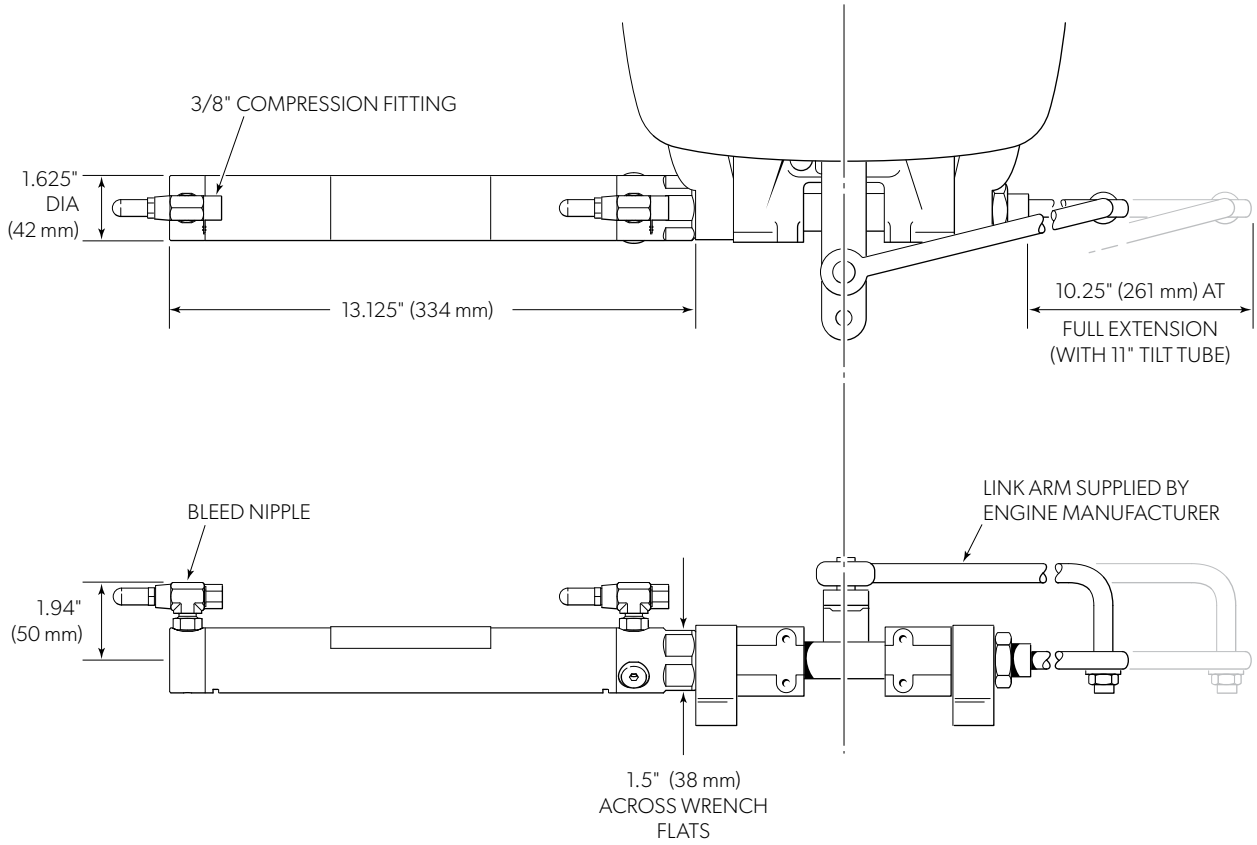


Figure 3-33. Side mount cylinder part # HC5370-3.

3.8 SeaStar splashwell mount series

Part # HC5380-3

Features

- Light duty alternative to front & side mount cylinders.
- Unbalanced cylinder with 5.5/6.5 turns lock to lock.
- Fits engines with/without support (steering) tube.

Applications

- 300HP.
- Transom mounted cylinder.
- Speeds to 60mph maximum (97km/h).

How to select a splashwell mount outboard steering system

1. From the order guide select the appropriate helms and accessory hardware for each steering station.
2. From the order guide select the fitting and hose kits required. You will have to determine the configuration, length, number of hose and fitting kits required for the installation (refer to page 3-32).
3. Confirm that there is sufficient space available in the splashwell and dash areas for the steering components.

WARNING!
Not for use with SeaStar PRO helm pumps.

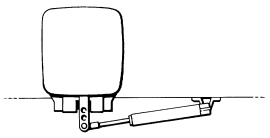


Figure 3-34. HC5380-3 cylinder shown.

NOTICE!
Not recommended for use in installations where;
a) chopper, cleaver, or surface piercing propellers are used,
b) the engine is highly elevated on the transom,
c) engine trim tabs have been removed,
d) the boat speed exceeds 60mph (97km/h), or
e) the power exceeds maximum Coast Guard or M.O.T. recommendations for the boat.

3.8.1 Order guide

The splashwell mount cylinder (part # HC5380-3) can be used on all engines complying with ABYC P17/NMEA/BIA standards provided they have a threaded attachment hole (3/8" – 24 UNF thread) in the steering arm. Not suitable for use on engines fitted with factory power steering.

ENGINE/CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ.	MODEL	PART #	REF. SECTION
SINGLE ENGINE (Single Cylinder) Applications up to 300 HP max. Number of turns 5.5/6.5 	Cylinder Helm Hose kit Steering fluid	1 1 1 3	Splashwell SeaStar* Outboard hose SeaStar fluid	HC5380-3 HH5271-4 HO51XX HA5430	 Section 8 Section 10 Section 9
	For extra steering stations add				
	Helm Fitting kit Hose kit Steering fluid	1 1 1 1	SeaStar* Add a station Outboard hose SeaStar fluid	HH5271-4 HF6007 HO51XX HA5430	Section 8 Section 10 Section 10 Section 9
	Optional equipment	Back plate kit (for standard helms) 20° wedge (for standard helms) Autopilot fitting kit (for all -3, -4 helms) Power assist steering		HA5418 HA5419 HF6007 PA1200-3	Section 8 Section 8 Section 10 Section 6
		*All non-pro helm designs can be used, see Section 7 for options.			

Revision Date: **AUGUST 17th 2025**

3.8.2 Mounting configuration — splashwell mount cylinder HC5380-3

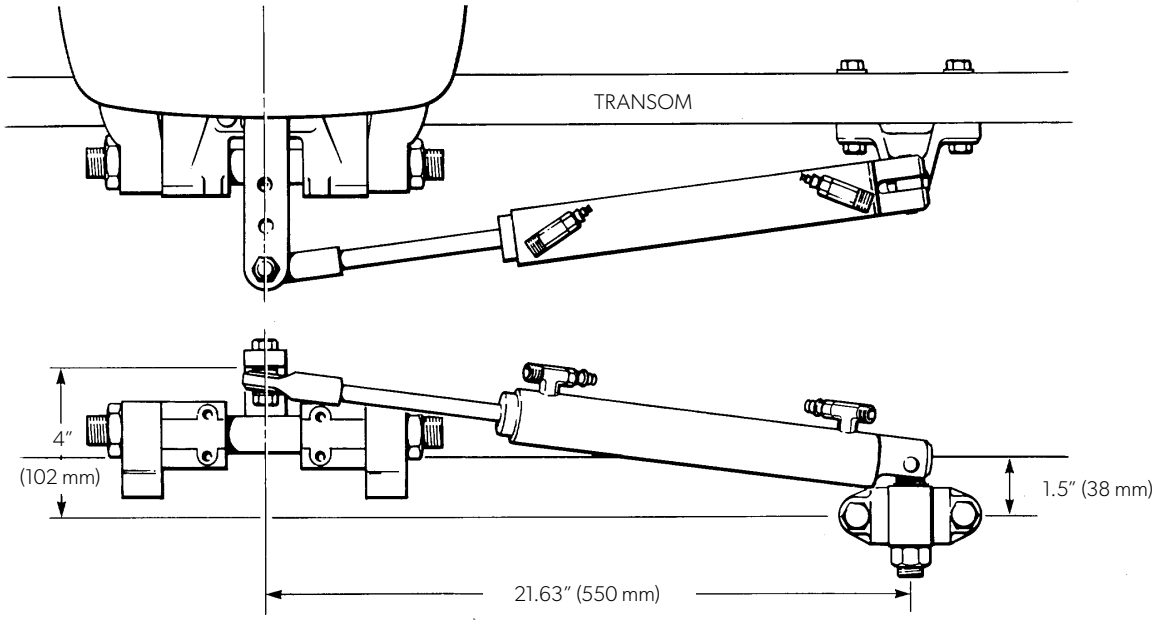


Figure 3-35. Splashwell mount cylinder part # HC5380-3.

NOTICE!
Do not use a PRO helm pump with splashwell mount cylinder HC5380-3, or any other unbalanced steering cylinder.

3.8.3 Dimensions — splashwell mount cylinder HC5380-3

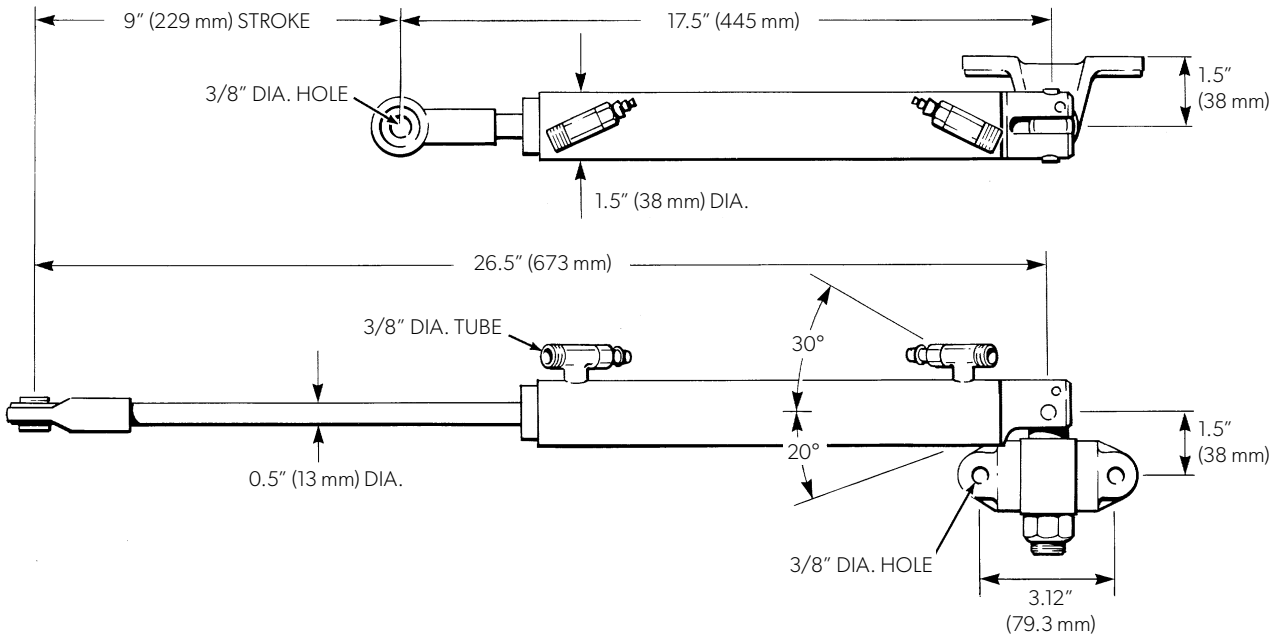


Figure 3-36. Splashwell mount cylinder part # HC5380-3.

CAUTION!
Do not attempt to install NPT pipe fittings into the cylinder fitting ports on this, or any other -3 steering cylinder model. Doing so will lead to irreparable damage to the cylinder. Only use ORB hose fittings provided by Dometic.

3.9 SeaStar kicker cable tie bar

This SeaStar kicker cable tie bar allows users to manually steer an auxiliary engine (kicker/trolling motor) using their existing SeaStar hydraulic steering system. This is accomplished with a variety of solid mechanical linkages between the main steering cylinder and the auxiliary engine. Dometic has developed a patent pending design that incorporates an Xtreme™ cable as the linkage between the two engines.

Features

- Flexible cable allows for adjustable locations of kicker motor.
- Allows independent trim/tilt of both engines.
- Allows full steering stroke of both engines.
- Suitable for Optimus (electric cylinders only).
- Simplified installation using universal ABYC steering connection (as per ABYC P17 and P21 standards) on kicker motors.
- Retrofitable to SeaStar front mount cylinders, part # HC5345, HC5358, HC5348, HC5345-3, HC5358-3, HC5348-3, HC5445, and HC5445-3.
- Incorporates unique patented cable technology.
- Kicker can be mounted on either side of the main engine(s).

NOTICE!
Maximum 20HP kicker engine.

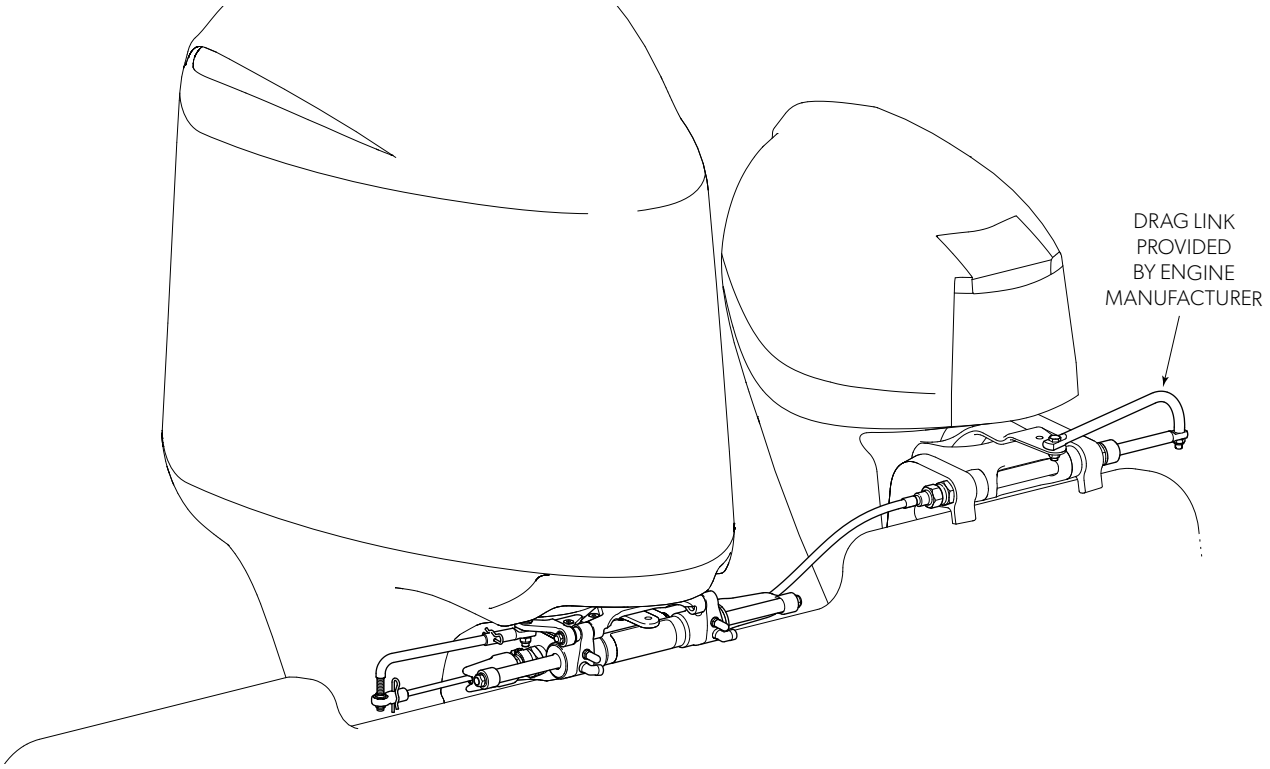
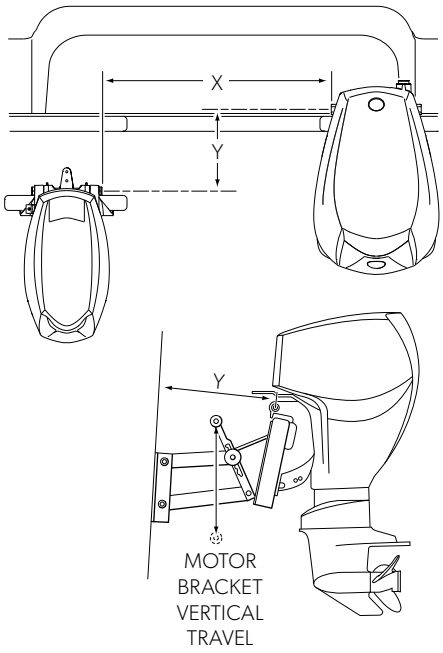


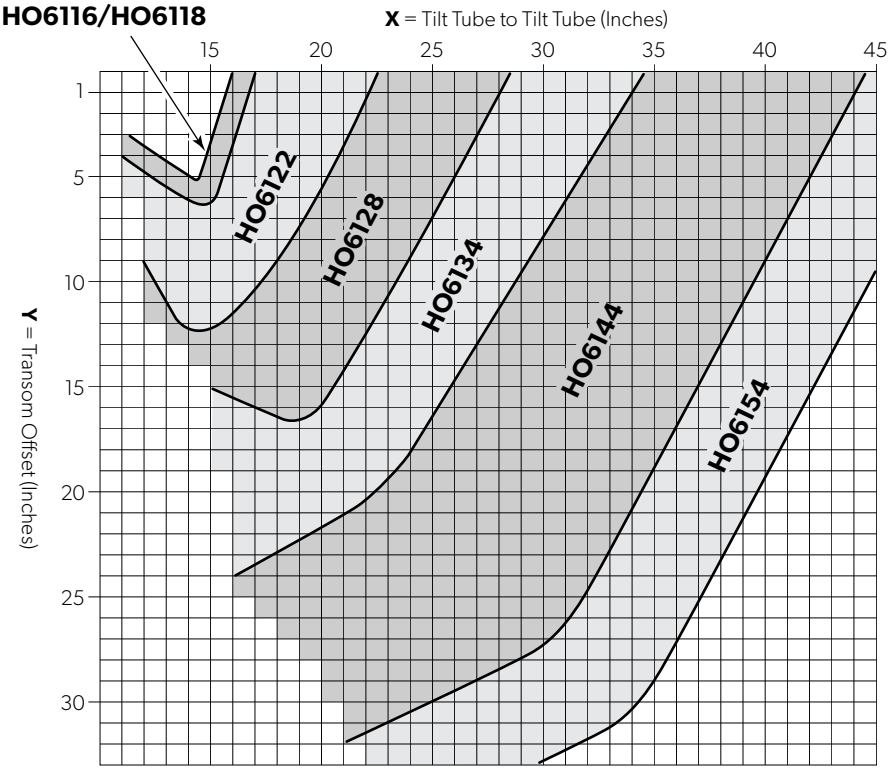
Figure 3-37. Kicker cable tie bar.

CAUTION!
Contact Dometic technical support when using on 2001–-2022, Honda BF200–250HP engines.

3.9.1 Measuring cable length

Jack plate vertical travel	Add to 'X' dimension
10″ — 12″	X + 3″
13″	X + 4″
14″ — 15″	X + 5″
16″ — 20″	X + 6″





1. For a Kicker installed on a motor bracket, add additional length to X dimension.
2. For Main engine installed on a motor bracket add an additional 2″ to X dimension.
3. Kicker cable tie bar systems require a minimum clearance of 14″ from the end of the tilt tube towards the motor side well gunnel on both sides.

Figure 3-38.

CAUTION!
Do not install on applications that are outside of the cable ranges. Doing so may lead to irreparable damage to the kicker cable tie bar.

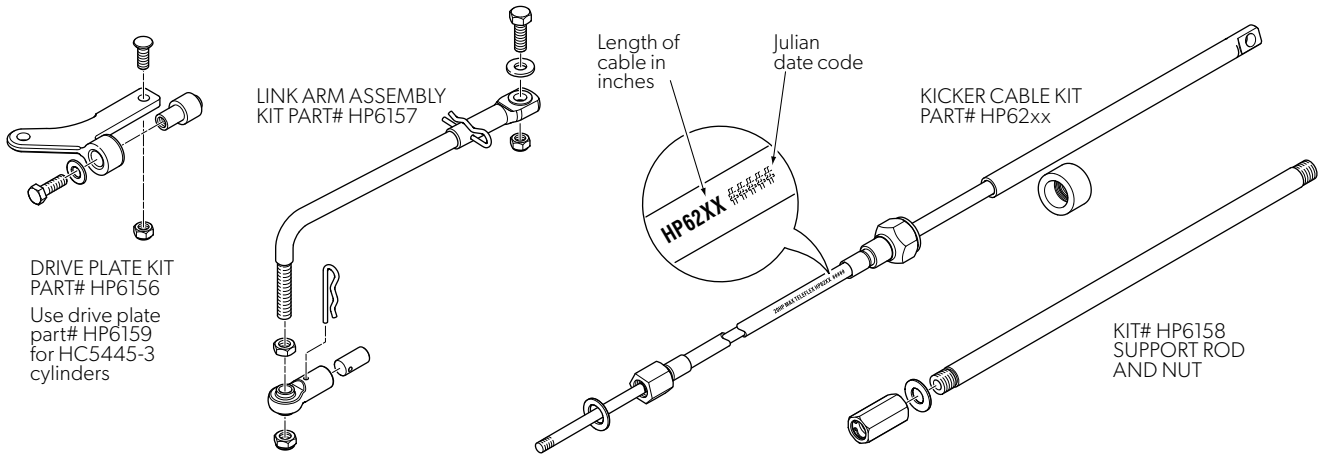


Figure 3-39.

Notes

4 Hydraulic Inboard Steering

4.1 BayStar inboard series

NOTICE!
May not be available in all markets, visit: www.dometic.com for availability.

Built in the same tradition as SeaStar inboard steering, these BayStar systems are designed for relatively low torque inboard applications, including inland waterway boats and other low speed displacement vessels.

Available as individual components. For detailed application information go to www.dometic.com

**If unsure of total steering loads, contact Dometic technical support for assistance*

Features

- Compact cylinder design
- HC4460-3 – 6.25" stroke
- HC4461-3 – 6.0" stroke
- Optional tilt helm available
- Helm fits standard 3" dash cut outs
- Fast easy installation

4.1.1 Order guide

ORDER INFORMATION	PART #
BayStar inboard cylinder	HC4461-3
BayStar inboard cylinder	HC4460-3
BayStar helm 1.1 cu-in	HH4311-4
BayStar helm 1.4 cu-in	HH4313-4
BayStar 20ft tubing kit	HT4420
1 Litre steering fluid	HA5430
BayStar Sport Tilt helm	HH4315-4
BayStar -4 Bezel kit (round)	HA5476-4
SeaStar hoses, available in pre made lengths	HO51/59XX

Table 4-1.

CAUTION!
If unsure of total steering loads, contact Dometic technical support for assistance.

4.1.2 Dimensions — BayStar standard helm

HH4311-4 (1.1 cu. in.) and **HH4314-4** (1.4 cu. in.). Refer to page 7-16 for total wheel turns.

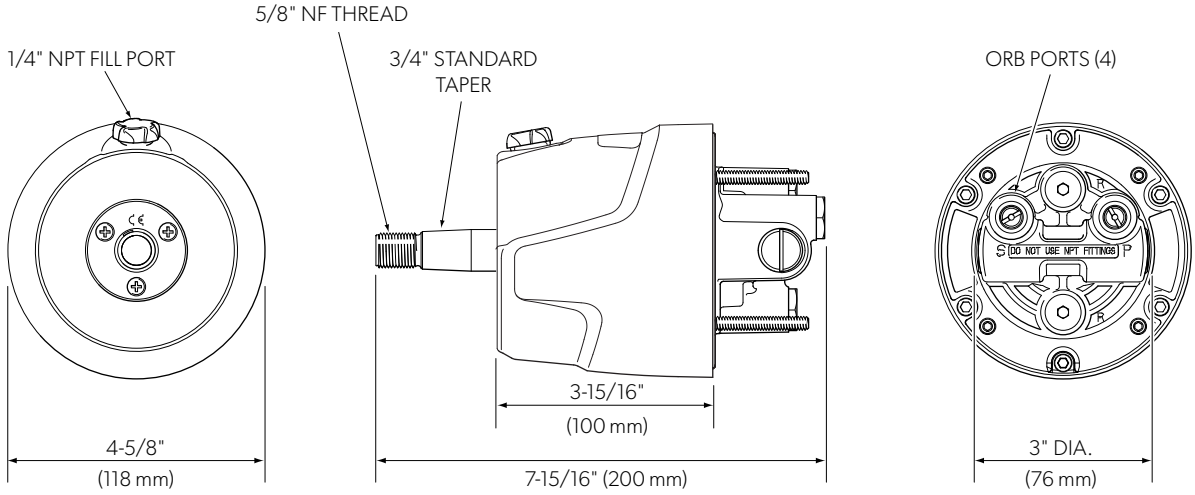
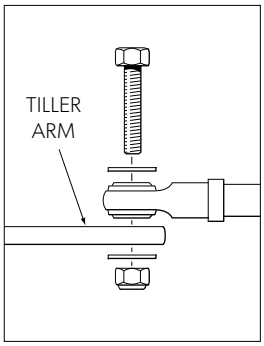


Figure 4-1.

4.1.2 Dimensions — BayStar inboard series cylinders

HC4461-3 BA100-6ATM



ATTACHMENT TO TILLER ARM

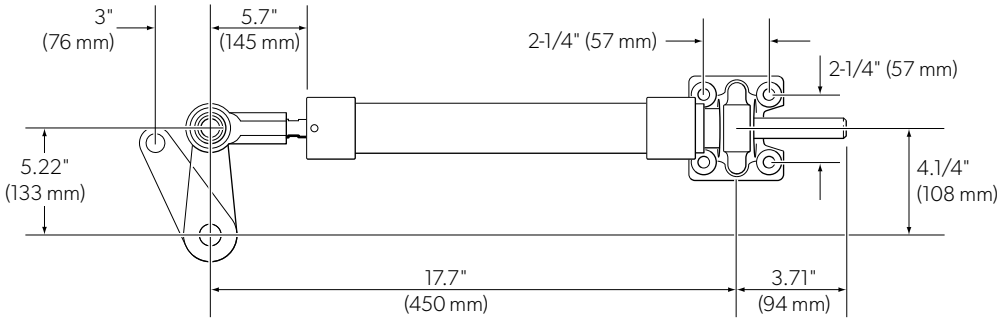
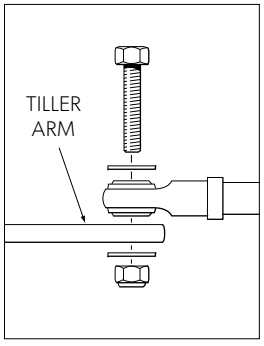


Figure 4-2.

HC4460-3 BA125-6.25 ATM



ATTACHMENT TO TILLER ARM

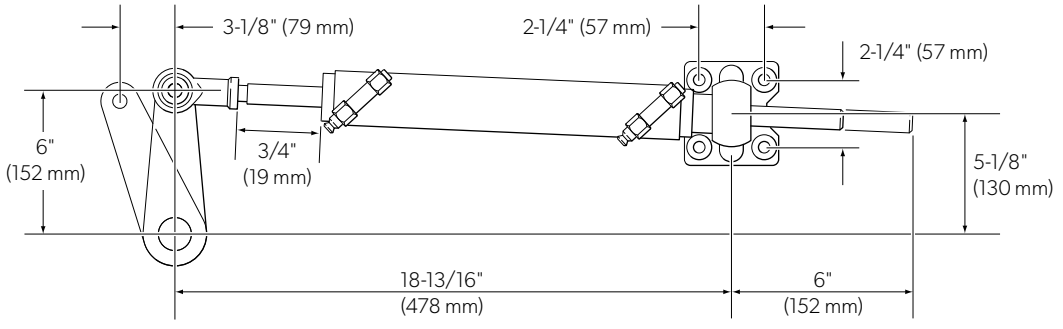


Figure 4-3.

4.2 SeaStar inboard series

Features

- Regular duty cylinders.
- Heavy duty cylinders.
- Easy installation for single and dual rudder vessels.
- Cylinders supplied with bleeder fittings.
- Two axis articulation.
- Easy autopilot interface.

4.2.1 Steps to select a steering system for an inboard powered boat

1. Using the cylinder flow chart on page 4-4 determine the steps required.
2. If applicable gather the information needed to complete a torque rudder sheet or consult your naval architect.
3. Confirm that you have sufficient space available in;
   a) the area the cylinder is to be mounted in
   b) the dash area for all steering components.

QR CODE: www.dometicsystembuilder.com
Visit www.dometicsystembuilder.com for most steering applications.



Figure 4-4.

4.2.2 Inboard cylinder selection flowchart

NOTICE!
If assistance is needed at any point contact Dometic technical service.

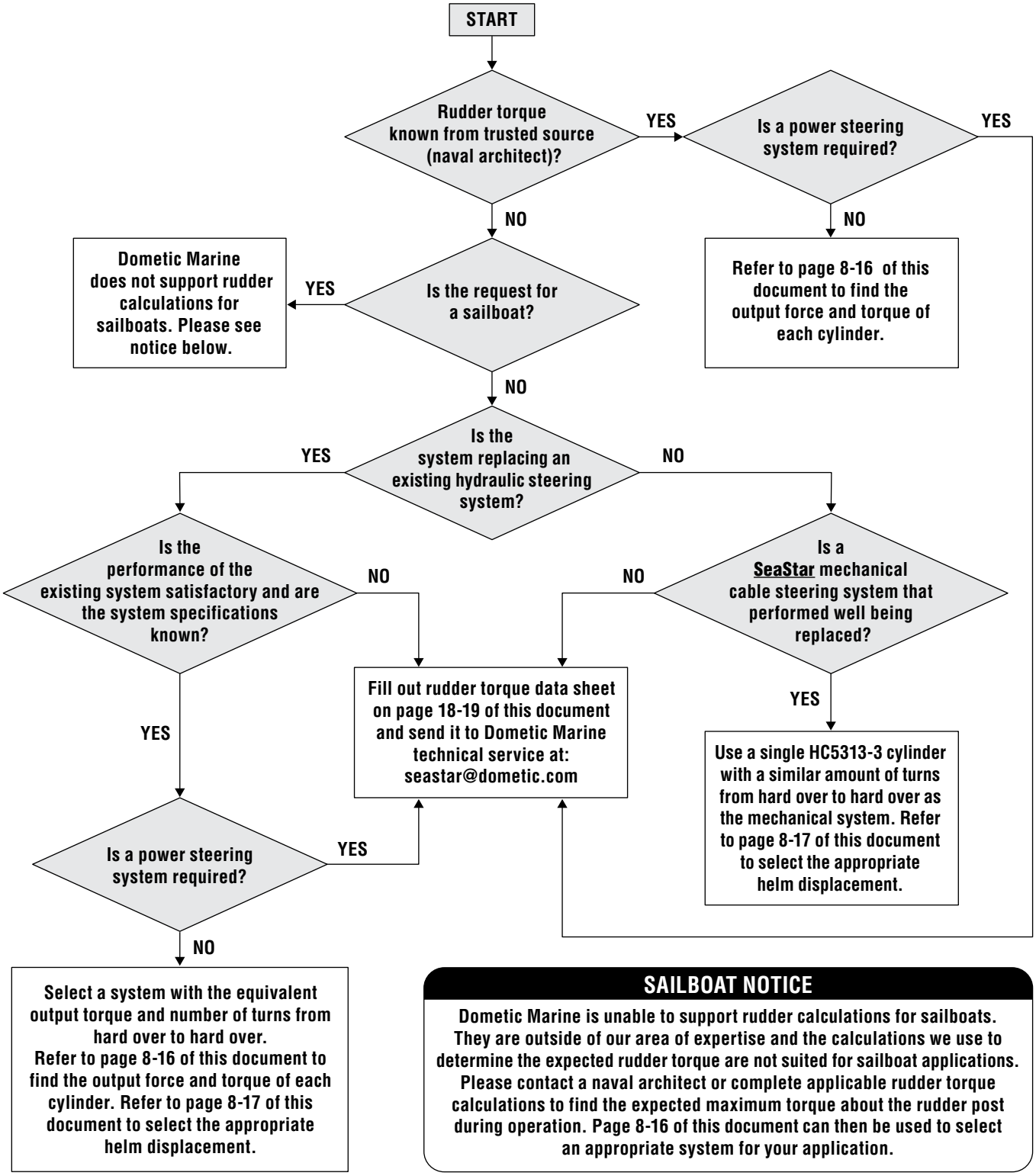


Figure 4-5.

4.2.3 Dimensions — SeaStar inboard series cylinders

WARNING!
Do not attempt to install NPT pipe fittings into the cylinder hose fitting ports on any -3 model cylinder. Doing so will lead to irreparable damage to the cylinder. Only use ORB hose fittings provided by Dometic.

HC5312-3 / HC5313-3 / HC5314-3 / HC5319-3 / HC5373-3

Cylinder dimensions specific to model

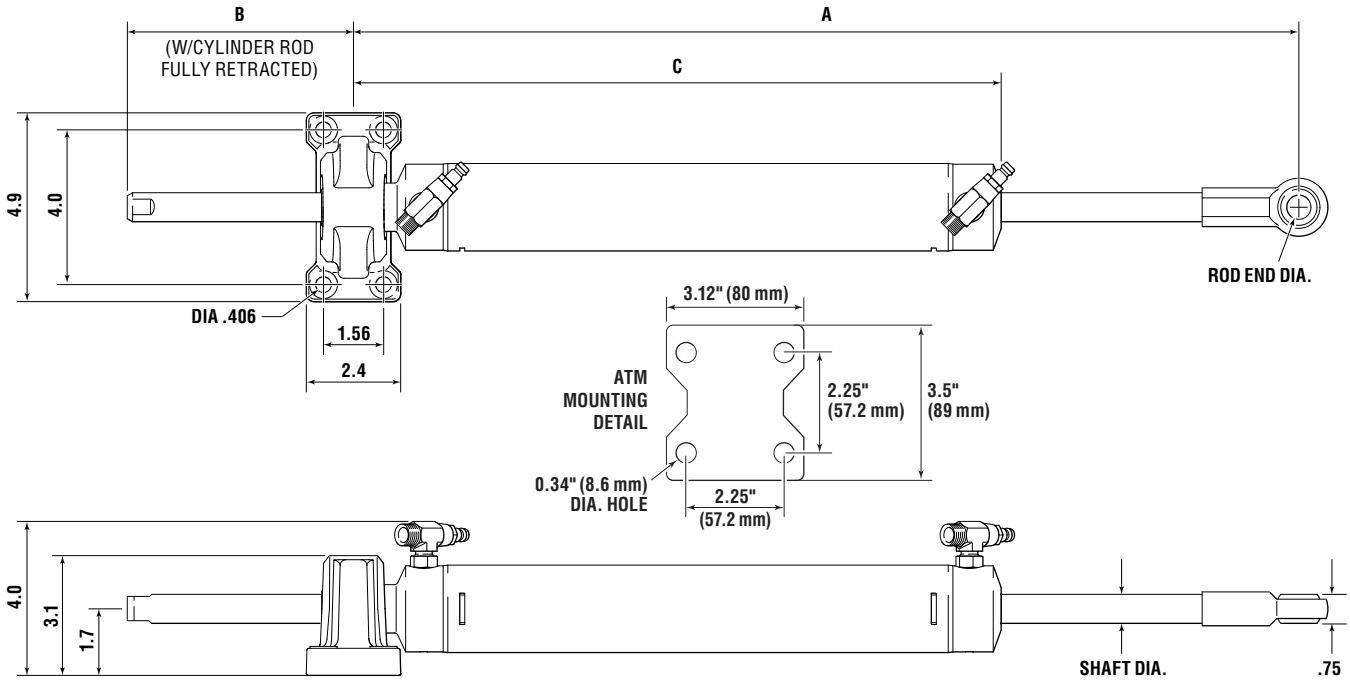


Figure 4-6. TM base shown.

CYLINDER MODEL	PART #	A			B	C	SHAFT DIA.	ROD END DIA.
		Retracted	Mid-Stroke	Extended				
BA125-7ATM	HC5312-3	16.5″ (419.1 mm)	20.0″ (508.0 mm)	23.5″ (596.9 mm)	8.30″ (210.8 mm)	13.62″ (345.1 mm)	0.50″ (12.7 mm)	1/2″
BA135-7ATM	HC5313-3	16.34 (415.0 mm)	19.83″ (503.6 mm)	23.32″ (592.3 mm)	8.30″ (210.8 mm)	13.62″ (345.1 mm)	0.63″ (15.9 mm)	1/2″
BA150-7ATM	HC5314-3	16.5" (419.1 mm)	20.0" (508.0 mm)	23.5" (596.9 mm)	8.30" (210.8 mm)	13.62" (345.1 mm)	0.63″ (15.9 mm)	1/2"
BA150-7ATM	HC5314-3*	16.875" (428.6 mm)	20.375" (517.5 mm)	23.875" (606.4 mm)	8.30" (210.8 mm)	13.62" (345.1 mm)	0.63″ (15.9 mm)	5/8"
BA175-7TM	HC5319-3	17.4" (441.1 mm)	20.9" (530.7 mm)	24.4" (619.8 mm)	8.77" (222.8 mm)	14.49" (368.1 mm)	0.75″ (19.1 mm)	5/8"
BA 175-9TM	HC5373-3	19.4" (492.8 mm)	23.9" (607.1 mm)	28.4" (721.4 mm)	10.77" (273.6 mm)	16.74" (425.2 mm)	0.75″ (19.1 mm)	5/8"

Table 4-2. *If using HC5314-3 with a 5/8″ rod end (HP6093) the mounting foot position will need to be adjusted.

HC5319-3 / HC5373-3

An updated series of SeaStar hydraulic aluminum inboard steering cylinders. These two cylinders are direct replacements for existing products and have updated features and enhanced appearance.

PART #	DESCRIPTION
HC5319-3	1.75" Bore x 7" Stroke, Aluminum, Ball Mount
HC5373-3	1.75" Bore x 9" Stroke, Aluminum, Ball Mount

Table 4-3.

Fittings — The cylinder fittings are made of corrosion resistant 316 stainless steel and now thread in to the cylinder via adjustable O-ring sealed ports. The fittings can be easily oriented in any direction to accommodate tube routing. Thread sealant is not required. Cylinders are shipped with SeaStar type hose fittings, if you require 3/8" SAE fittings, use the HF6003 fitting kit.
Seals — Gland and piston seals have been updated and optimized for lower friction and longer life.

Service Kits

	GLAND KIT	ROD END KIT	FITTING KIT
HC5319-3	HP6071	HP6013	HF6002*
HC5373-3	HP6071	HP6013	HF6002*

Table 4-4. * Alternate vertical fitting kit (HF6001), or 3/8" SAE fitting kit (HF6003), can also be used.

4.3 SeaStar catamaran inboard series

The best solution for inboard catamarans is Dometic Optimus steering. It eliminates the need for a tie bar between the rudders, which simplifies installation and provides a better user experience.

If traditional hydraulic steering is preferred, use a mechanical tie bar between rudders where possible. If a mechanical tie bar cannot be fitted, the cylinders must be connected in series, forming a "liquid tie bar." When using a liquid tie bar, the rudders will periodically need to be re-aligned by the user as they get out of sync due to seepage across the piston seals. For best results in a liquid tie bar system, Dometic recommends the parts below.

4.3.1 Steering cylinders



Figure 4-7. Liquid tie bar valve HA5471-2.

HA5471-2, Liquid tie bar valve
This valve assists with air removal and re-alignment of the rudders when required without having to break into the hydraulic system.

HC5319-3/HC5373-3 Catamaran steering cylinders
The HC5319-3 with a 7" stroke and the HC5373-3 with a 9" stroke are the recommended cylinders for catamarans as the internal seals decrease the amount of engine realignments you may encounter.

Helm
SeaStar or Capilano helm pumps are recommended for most applications. If the boat regularly "backs down hard" a SeaStar PRO helm is recommended.

SeaStar PRO hose (Kevlar)
To further reduce engine misalignment, and increase system performance, Dometic recommends the use of SeaStar PRO steering hoses.

NOTICE!
In high horsepower applications Dometic recommends using Optimus. SeaStar Power Assist pumps are also a good option to reduce steering effort.

NOTICE!
Two Power Assist pumps may be required due to the helm pump capacity. Power Assist is not recommended with PRO helms in this application.

NOTICE!
Bleeding of a "liquid tie bar system" is different than a system fitted with a mechanical tie bar. Please refer to your installation and owner's manual that is shipped with the liquid tie bar valve.

Notes

5 Hydraulic Sterndrive Steering

5.1 SeaStar sterndrive series

Features

- Easy installation.
- Simple autopilot interface.
- Simple multiple steering station connection.

Applications

- Fits most power and non-power assist sterndrives.
- Single and multiple drives.

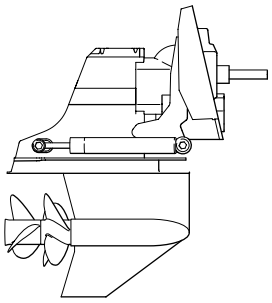
5.1.1 Steps to select a steering system for an sterndrive powered boat

1. From the order guide on page 5-2 select the drive configuration based on the number of drives.
2. From the application guide on page 5-3 confirm that a cylinder is available for your specific make, model and year of drive unit. Select the cylinder that is appropriate for the drive.
3. From the order guide select the appropriate helm and accessory hardware. Note that helm pumps of different displacements are available for power steered sterndrives. The displacement of the helm affects the number of turns lock to lock. Select the helm displacement on the basis of the desired steering response.
4. Select the appropriate hose and fitting kits.
5. Confirm that sufficient space is available in the dash and engine compartments for the equipment.



Figure 5-1.

5.1.3 Order guide

SYSTEM CONFIGURATION	DESCRIPTION	QTY REQ.	MODEL	PART #	REF. SECTION
SINGLE & DUAL STERNDRIVE For dual sterndrive applications use engine manufacturer's supplied tie bar. 	Cylinder	1	See application guide		
	Helm	1	SeaStar (see note 1)* SeaStar (see note 2)**	HH5271-4 HH5272-4	Section 8 Section 8
	Steering fluid Tube/hose	3	SeaStar fluid	HA5430	Section 9 Section 10
	For extra steering stations add				
	Helm	1	SeaStar (see note 1)* SeaStar (see note 2)**	HH5271-4 HH5272-4	Section 8 Section 8
	Fitting kit	1	Add a station – for use with SeaStar Steering hose – for use with SeaStar Steering tube/copper	 HF6007 HF6010	 Section 10 Section 10
	Steering fluid	1	SeaStar fluid		Section 9
	Optional equipment	Back plate kit (for standard helms) 20° wedge (for standard helms) Autopilot fitting kit – for use with SeaStar hose – for use with SeaStar tube/copper Power assist steering *All non-pro helm designs can be used, see Section 6 for options.		HA5418 HA5419 HF6007 HF6010 PA1200-3	Section 8 Section 8 Section 10 Section 10 Section 6

Revision Date: **MARCH 5th 2025**

1. SeaStar helms are the standard recommendation for both non-power and power steered applications.
2. SeaStar helms with a higher displacement can be specified for less wheel turns where faster response is desired.
   Consult the chart on page 7-16 for options.
3. For dual stern drives – use the tie bar supplied by the engine manufacturer.

NOTICE!
These recommendations apply to factory stock stern drives only. Modified installations and high performance applications may require a higher capacity steering system. If in doubt, contact Dometic technical service for assistance.

5.1.3 Application guide

ENGINE MANUFACTURER	STEERING CONFIG.	ENGINE/ DRIVE DESCRIPTION	YEAR	CYLINDER DESCRIPTION		NUMBER TURNS LOCK TO LOCK		NOTES
				Model #	Ordering Part #	SeaStar 1.7 Helm	SeaStar 2.4 Helm	
MERCRUISER	Non Power Assist	ALPHA I	2000 TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6 2,3,6,8
		BRAVO I	2000 TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6 2,3,6,8
		BRAVO II	2000 TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6 2,3,6,8
		BRAVO III	2000 TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6,7 2,3,6,8
	Power Assist	ALPHA I	2000 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		BRAVO I	2000 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		BRAVO II	2000 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		BRAVO III	2000 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
VOLVO	Non Power Assist	290	TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6,9 2,3,6,8,9
		DIESEL	TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6,9 2,3,6,8,9
		DPS	2000 TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	3.5 3.4/4.1	1,4,5,6,9 2,3,6,8,9
	Power Assist	290	TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		DIESEL	TO DATE	125-8VEM	HC5329-3	4.9/5.8	3.4/4.1	2
		DPS & SX	1996 TO DATE	125-6VPS	HC5331-3	4.8/5.5	3.4/4.1	2
YANMAR	Non Power Assist	ZT370	TO DATE	BA135-7EM	HC5332 or HC5386-3	5.0 4.9/5.8	5.0 3.4/4.1	1,4,5,6,7 2,3,6,8
	Power Assist	ZT370	TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2

1. Balanced system – ie: the number of turns lock to lock is equal port to starboard or vice-versa.
2. Unbalanced system – ie: the number of turns lock to lock is not equal port to starboard or vice-versa.
3. Requires cylinder rod end adapter HA5424 supplied by Dometic. Refer to diagram on page 5-5
4. HC5332 replaces HC5326-3 as of January 2000. If installing HC5326 additional clevis supplied by engine manufacturer required. Mastry Engine part # SUN144 *not provided by Dometic.
5. The installation of the HC5332 sterndrive cylinder requires the use of SeaStar hose only. Do not use 3/8" copper or nylon tube.
6. If engine outdrive is not equipped with a torque tab on the underside of the lower leg one must be installed to reduce prop torque.
7. Yanmar Engines using the Bravo III drives require the use of cylinder HC5328-3.
8. Use of a 2.4 helm is not recommended.
9. HC5332 is recommended if the Volvo transom shield looks like that shown in figure 5-2 below.

Revision Date: **SEPTEMBER 24th 2026**

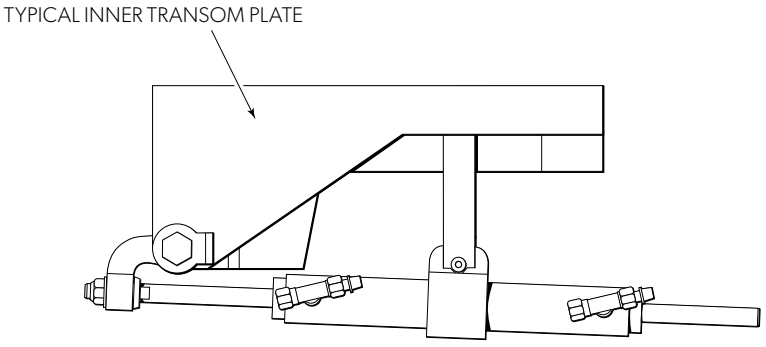


Figure 5-2.

5.1.4 General dimensions

WARNING!
Do not attempt to install NPT pipe fittings into the cylinder hose fitting ports on any -3 model cylinder. Doing so will lead to irreparable damage to the cylinder. Only use ORB hose fittings provided by Dometic.

HC5332 BA135-6.88EM

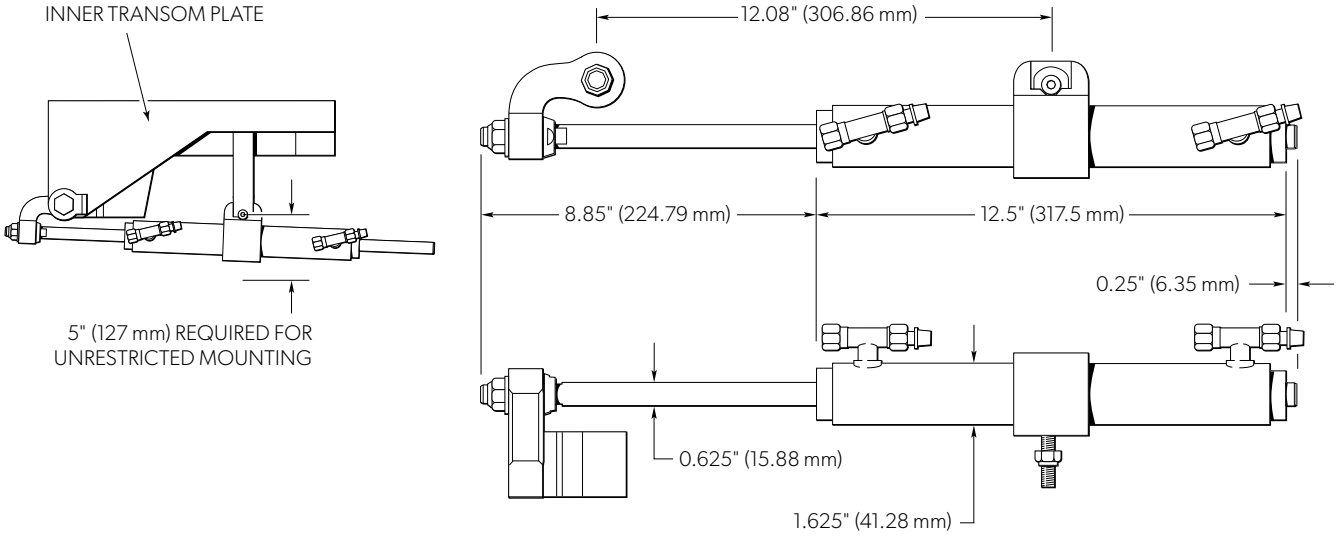


Figure 5-3.

NOTICE!
If engine outdrive is not equipped with a torque tab on underside of lower leg, one must be installed to reduce prop torque.

CAUTION!
Due to cylinder body movement during steering, this cylinder requires use of SeaStar hose (HO51/59XX), see Section 10 for details.

HC5386-3 (150-7EM)

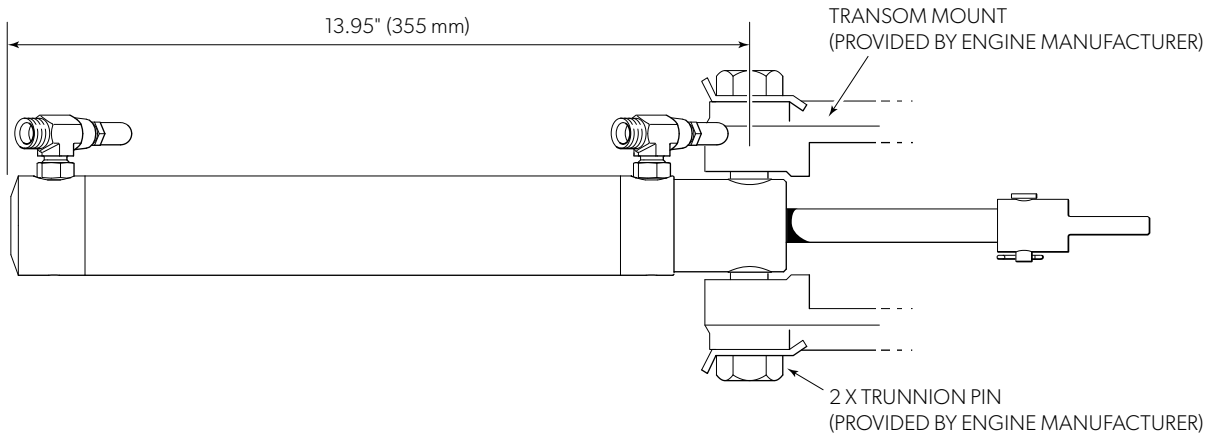


Figure 5-4.

HC5326-3 BA150-7EM

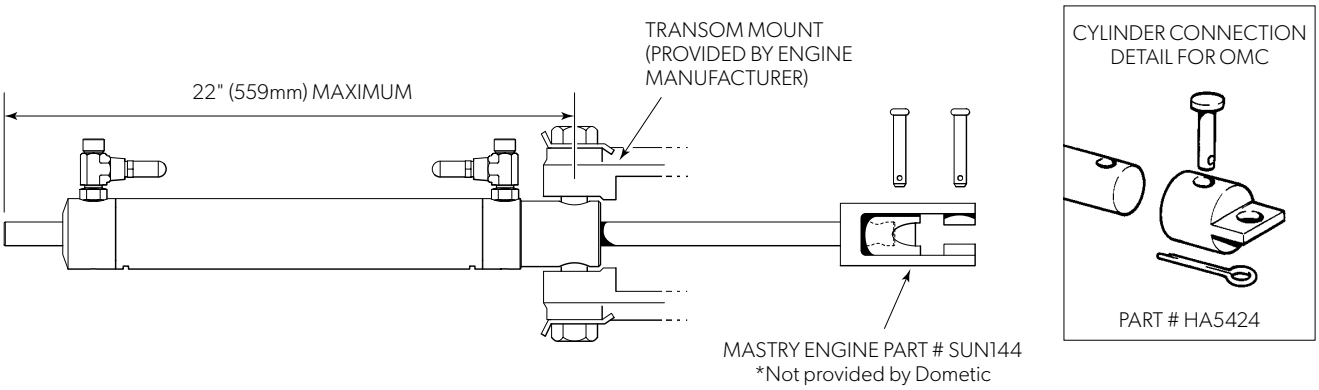


Figure 5-5.

HC5328-3 125-8EM

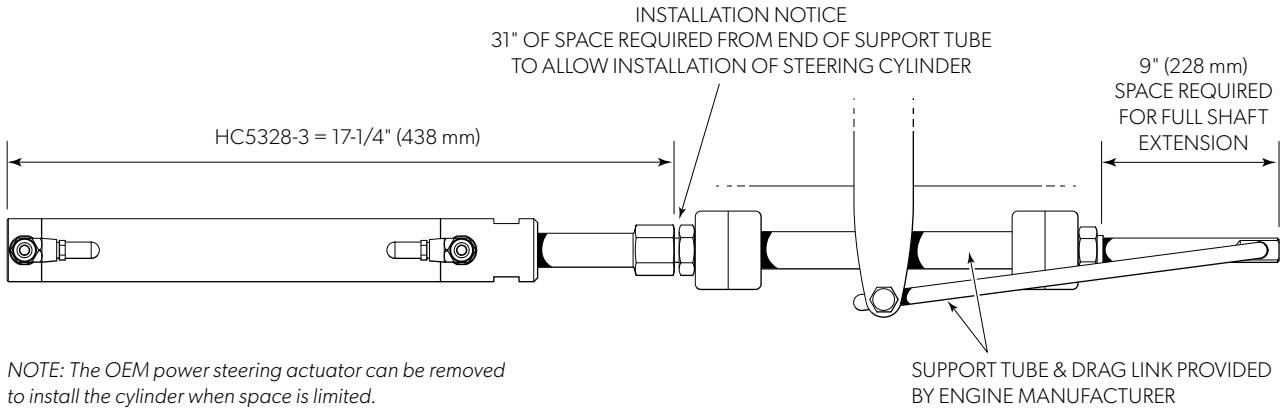
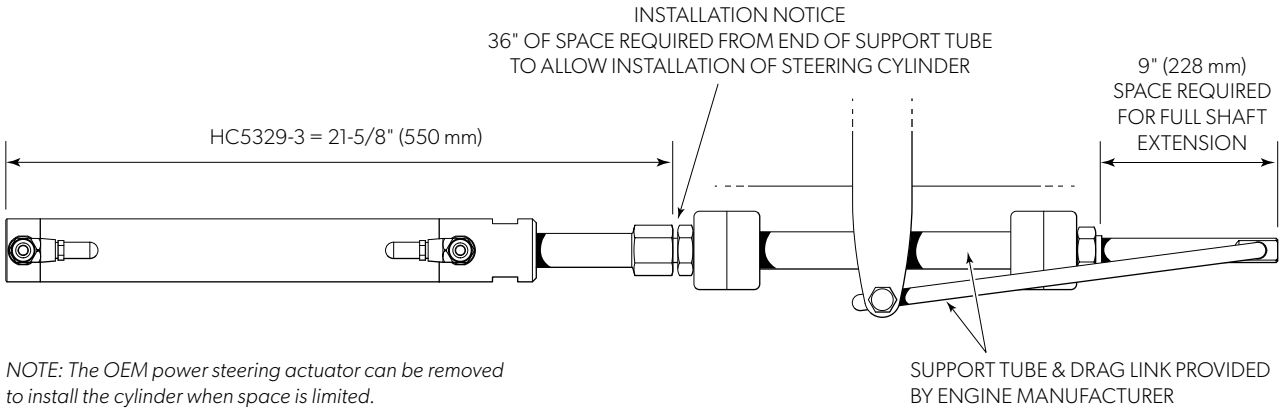


Figure 5-6.

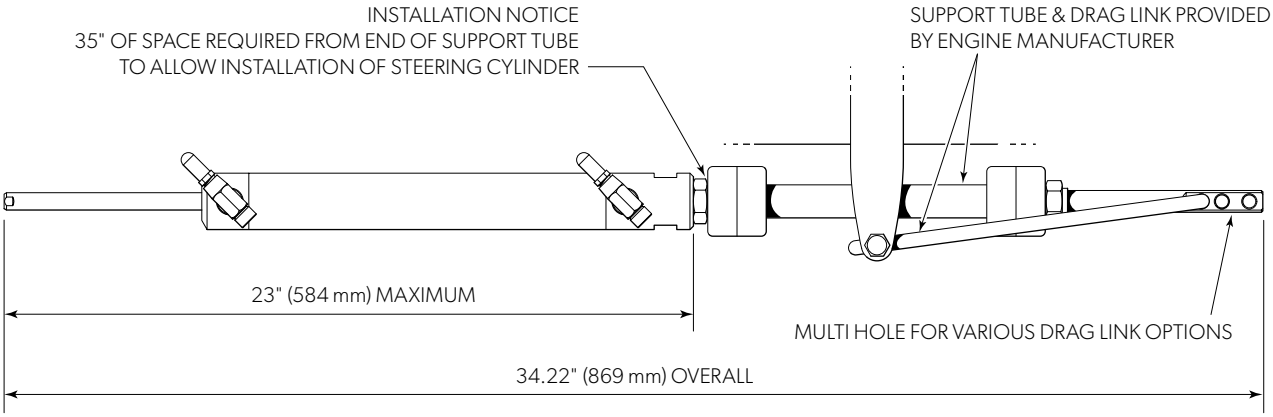
HC5329-3 125-8VPEM



NOTICE!
Do not use a PRO helm pump with this, or any other unbalanced steering cylinder.

Figure 5-7.

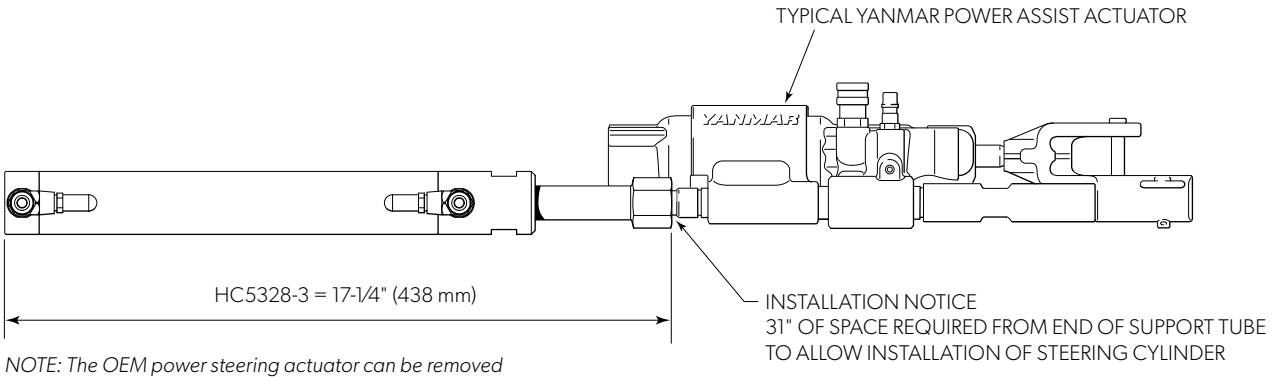
HC5330-3 BA125-8EMV



NOTE: The OEM power steering actuator can be removed to install the cylinder when space is limited.

Figure 5-8.

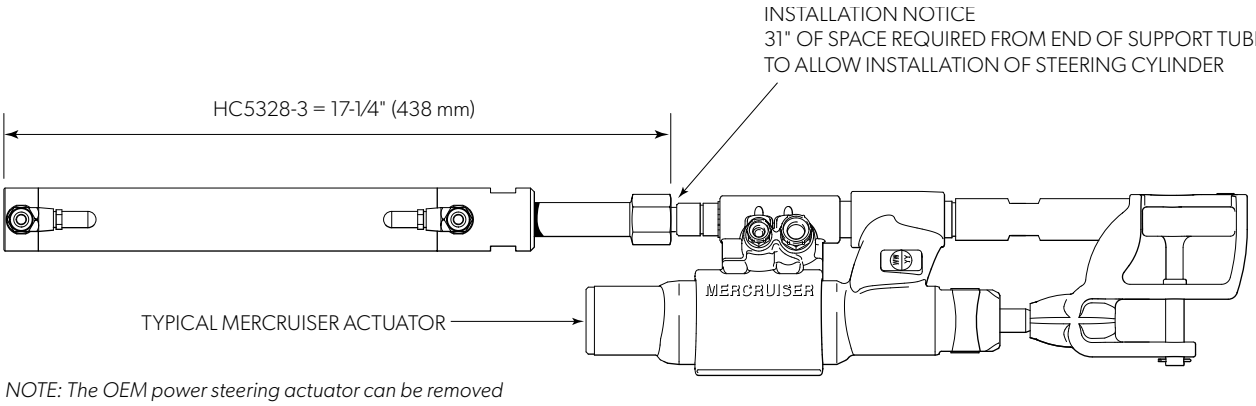
HC5328-3 Yanmar



NOTE: The OEM power steering actuator can be removed to install the cylinder when space is limited.

Figure 5-9.

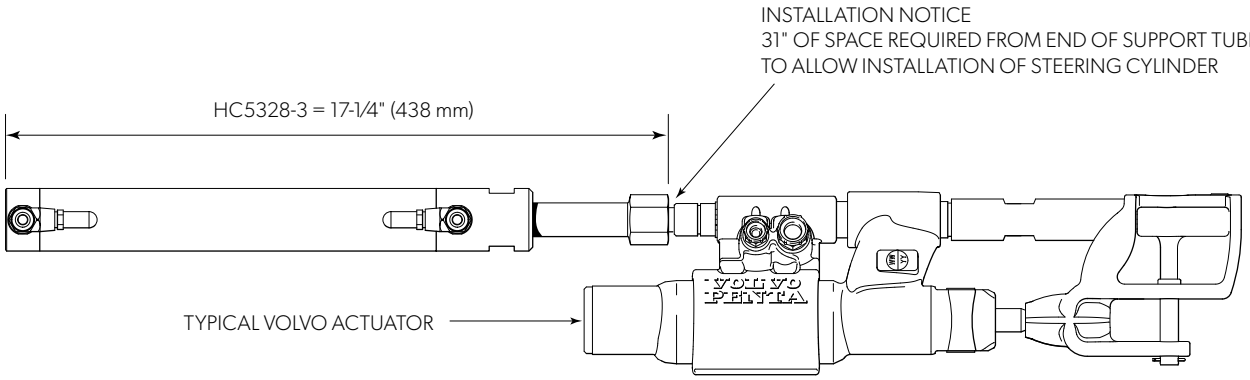
HC5328-3 Mercruiser



NOTE: The OEM power steering actuator can be removed to install the cylinder when space is limited.

Figure 5-10.

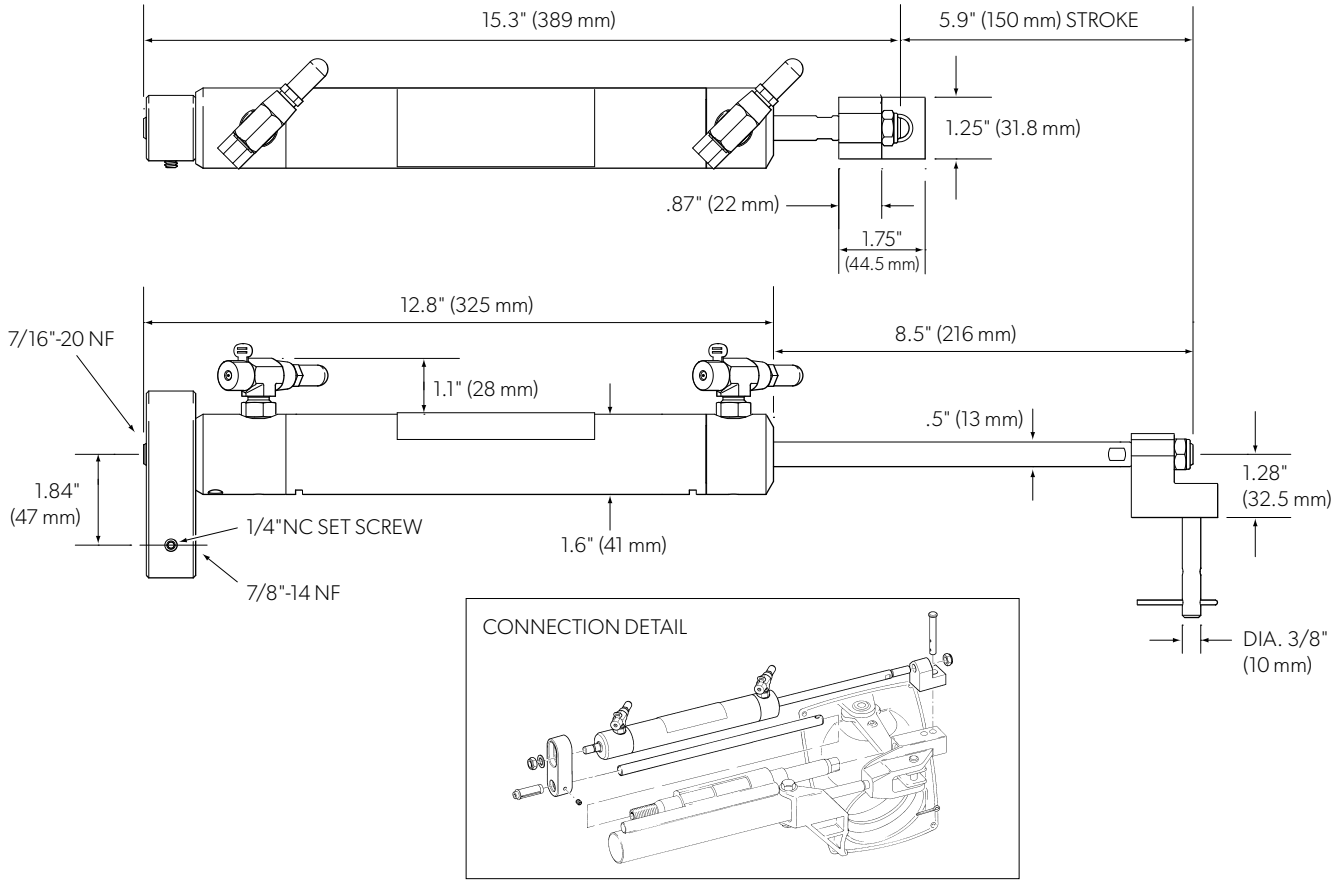
HC5328-3 Volvo



NOTE: The OEM power steering actuator can be removed to install the cylinder when space is limited.

Figure 5-11.

HC5331-3 125-6VPS



NOTICE!
Do not use a PRO helm pump with this, or any other unbalanced steering cylinder.

Figure 5-12. Volvo style shown.

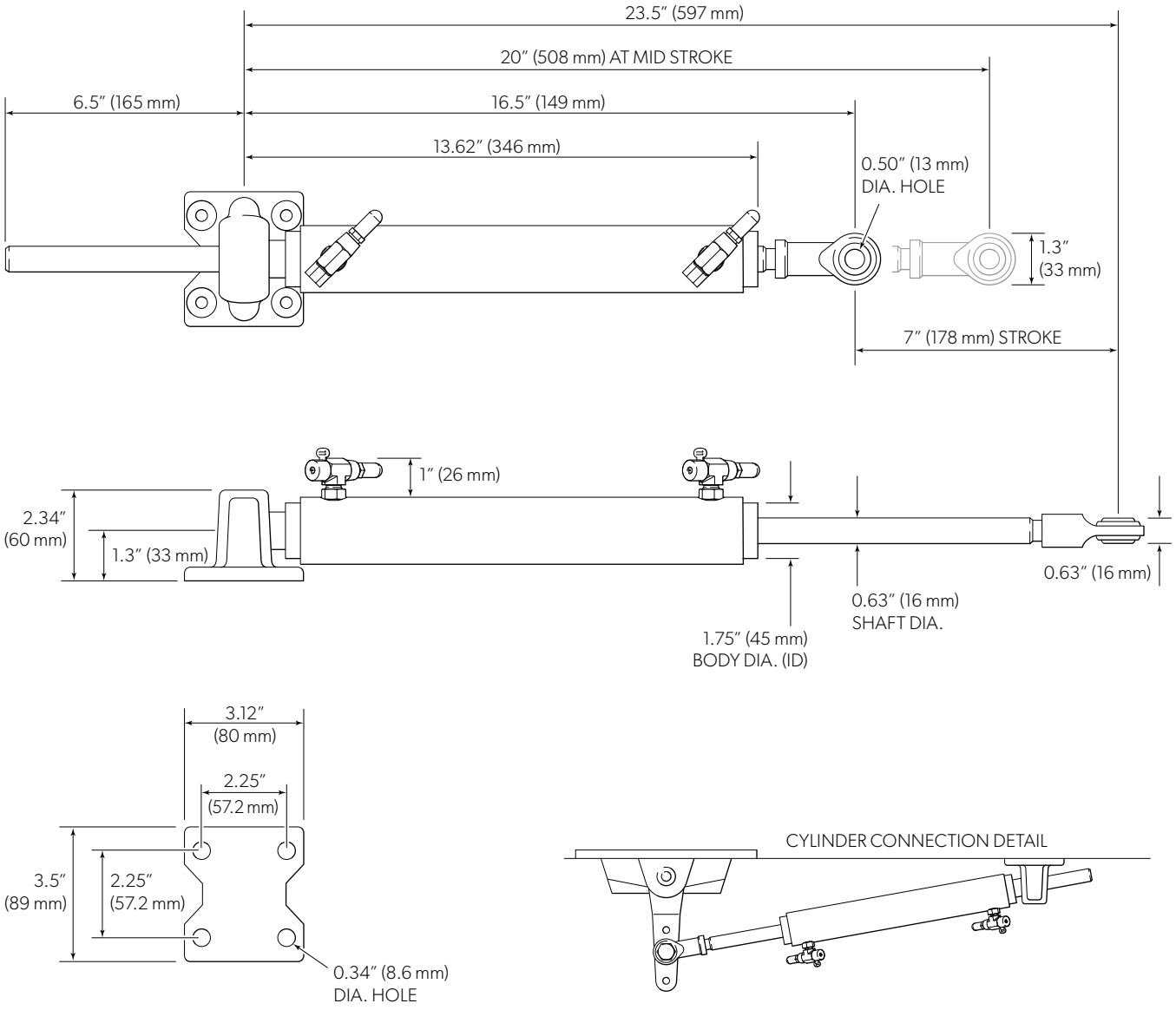


Figure 5-13. ATM mount shown.

6 Hydraulic Power Assist and Autopilot

6.1 SeaStar power assist steering

SeaStar Power Assist delivers comfortable, car-like steering on high-powered boats. It is an on-demand pump that draws almost no power when the user is not actively steering.

The SeaStar Power Assist is recommended for the following applications:

- Single engine boats
- Twin and triple engine applications
- Bass boats
- Pontoon boats
- Inboard powered cruisers without engine driven power assist



Figure 6-1. SeaStar Power Assist PA1200-3.

6.1.1 How the system works

SeaStar P/A (Power Assist) steering uses an electronically controlled on-demand hydraulic pump to provide "Power" for your SeaStar hydraulic steering system.

The SeaStar P/A system is comprised of two circuits: a hand operated manual system, which is the control element, and a hydraulic power pump, which is the working element.

The manual system consists of a helm pump with internal relief and check valves, as well as a built in reservoir. Two steering lines and a compensating line which provide a routing for fluid to transmit through the system, and a steering cylinder which moves the steering device on the boat from side to side.

The power system is an electronically controlled hydraulic pump that boosts the fluid being sent from the helm pump to the steering cylinder (this will result in much easier effort at the wheel—even when under heavy loads). A compensating line connects the P/A unit to the helm pump, allowing the P/A unit to share fluid with the helm reservoir.

The SeaStar P/A is compatible with multiple steering stations, and with the use of an autopilot. In the event of a P/A power loss or failure the hydraulic system will automatically revert to a manual hydraulic system.

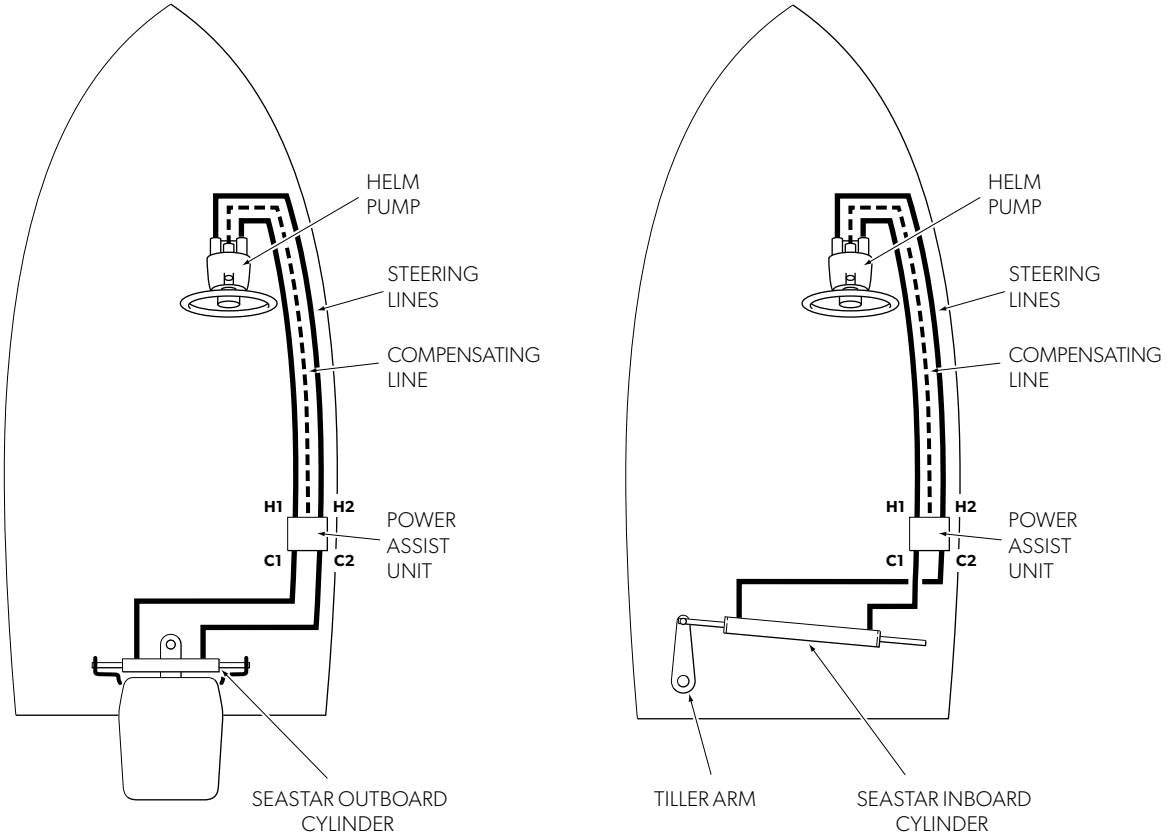


Figure 6-2. Typical installations shown. Please refer to your cylinder installation manual for proper hose installation diagrams.

6.1.2 SeaStar P/A compatibility



NOTICE!
For helm displacements greater than 2.4, twin power assist pumps must be used. Contact Dometic technical support for details.

The P/A is designed for use in recreational marine applications in conjunction with SeaStar hydraulic steering. Optimal performance will be obtained when used with SeaStar 1.4, 1.7, 2.0 and 2.4 cu in (1000 psi) helm pumps

Recommended convenience parts to be purchased

- Dual ignition control kit, part # HA1201
- 50 amp harness fuse kit, part # HA1206



NOTICE!
SeaStar nylon tube may only be used for the compensating line. Do not use SeaStar nylon tube to plumb any other portion of the steering system.



NOTICE!
Plan ahead. The power assist must be mounted in a dry location. Hose lengths must be at least 6' (feet) between the power assist and helm pump or between the power assist and steering cylinder(s). Any excess hose must be laid flat.



NOTICE!
When fitted with a PRO helm pump and SeaStar Power Assist there will be variations in steering effort. At the beginning of a trip the wheel will be very easy to turn and will get progressively heavier after several wheel turns are made. This is not considered a fault.



NOTICE!
Use only Dometic products with the P/A unit as with all SeaStar systems. Failure to do so may void your warranty.



NOTICE!
Retrofit kit part # HA1205 will be required to mount to a SeaStar autopilot pump to any power assist model.

6.1.3 Specifications

SeaStar Power Assist 12/24V

- 12/24 Volts (automatically recognized)
- 1000psi MAX system peak pressure (500psi working load)
- Relief pressure 2000 psi
- MAX current draw = 50 amps
- Typical current draw = ~3 amps
- Purple wire MAX current draw = 1 amp

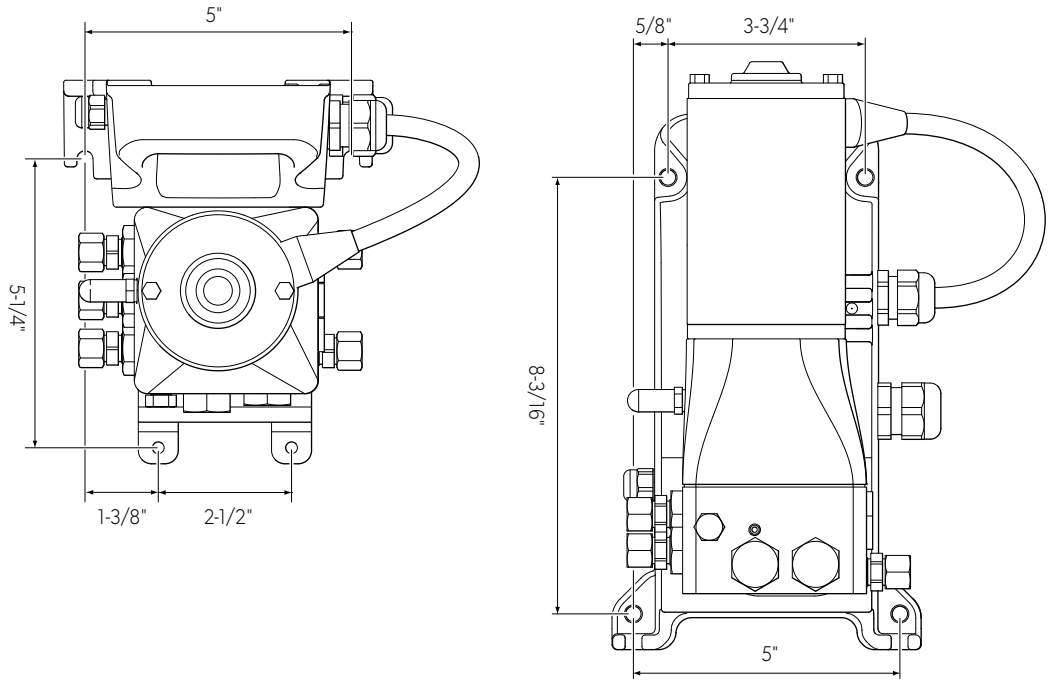


Figure 6-3.

PART #	HARNESS LENGTH (feet)	VOLTAGE (auto recognized)
PA1200-3	15′	12/24 Volt
PA1200-3HP*	15′	12/24 Volt
PA1206-3	6′	12/24 Volt
PA1225-3	25′	12/24 Volt

Table 6-1 * High pressure, recommended for all DF300/DF350 dual prop, Mercury 250–300R, and other high steering load applications.

NOTICE!
SeaStar Power Assist PA1200-3HP requires EPS fluid.
Part # HA5482 (1 US quart).

6.2 SeaStar autopilot pump

Part # AP1219, AP1233, AP2419, AP2433

The SeaStar autopilot pump is a fixed flow, reversible type set that uses an internal hydraulic gear pump, producing very little vibration or noise. It is offered in 12 and 24 volt configurations, as well as two different pump sizes (type 1 and type 2). It can be used as a stand alone pilot pump or can be mounted to a previously installed SeaStar Power Assist unit and can prevent the need for additional hydraulic lines.



Figure 6-4.

Features

- Long life DC Motor
- Compact design
- Simplified installation
- Low power consumption
- ABYC, CE and J1171 compliant
- Superior corrosion resistance
- Quiet operation
- Mounting bracket included
- Stand alone or mounts to SeaStar Power Assist unit
- Replaces other 12 and 24 volt pumps

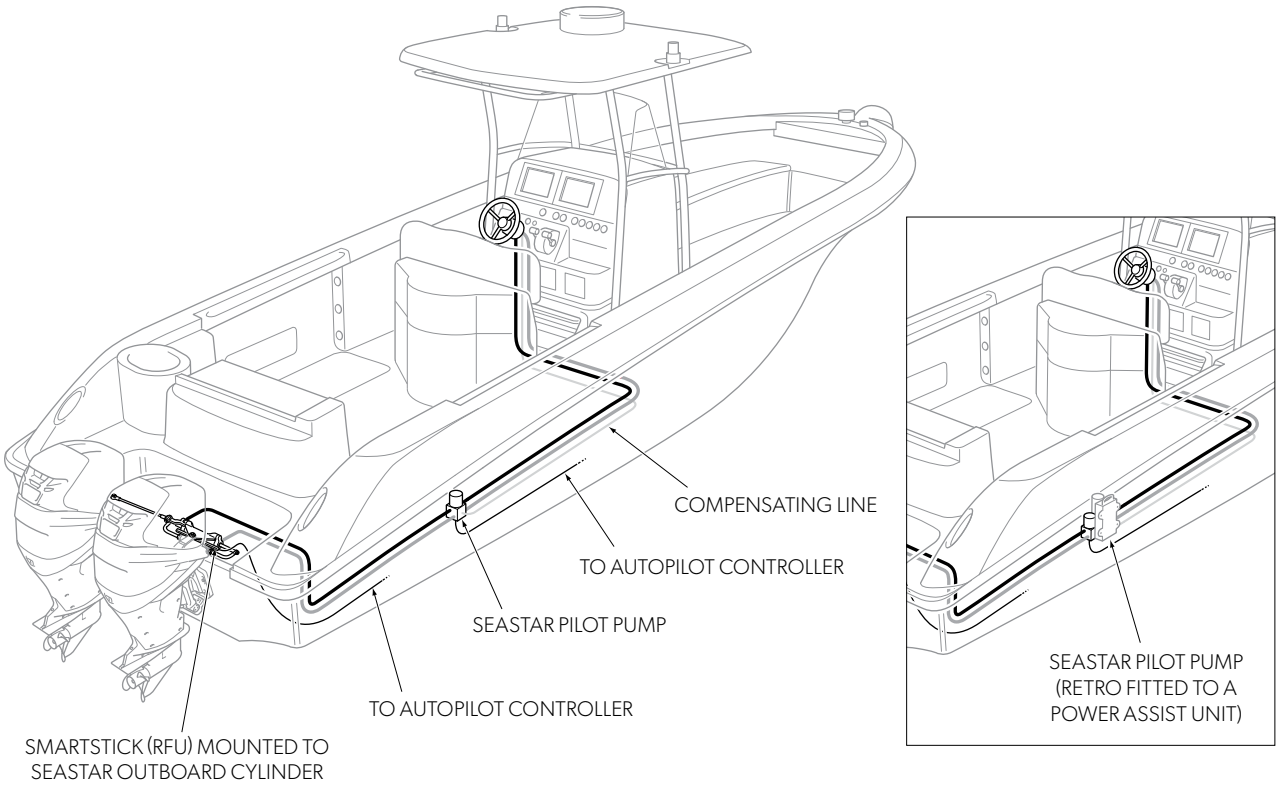


Figure 6-5.

6.2.1 Order guide

DESCRIPTION	PART #
Type 1: 12V – 60 cu.in/min	AP1219
Type 2: 12V – 100 cu.in/min	AP1233
Type 1: 24V – 60 cu.in/min	AP2419
Type 2: 24V – 100 cu.in/min	AP2433

Table 6-2.

NOTE
Retrofit kit part # HA1205 will be required to mount to a PA1200-3 power assist pump.

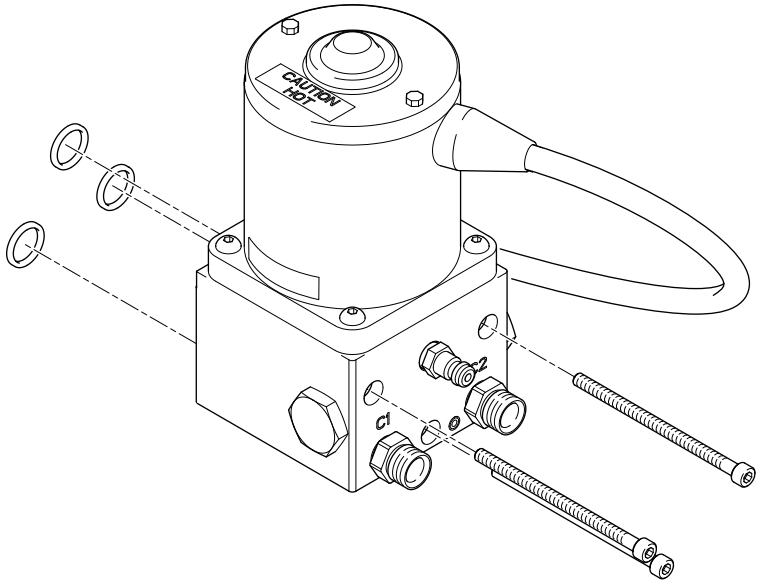


Figure 6-6. Retrofit kit part # HA1205.

6.2.2 Specifications

Voltage	12 or 24 Volts
Fittings	Compatible with standard SeaStar hoses (HO51XX, HO57XX, HO51/59XX, etc.)
Wire length	24"
Wire gauge	12 awg
Connector	None — bare leads
Oil compatibility	SeaStar steering fluids
Weight	4.9 lbs (2.2 Kg)
Autopilot pump sizes	Type 1: 60 in^3/min (no-load) Type 2: 100 in^3/min (no-load)
Maximum pressure	1000 psi
Typical current draw (depending on application)	12V Type 1: 4 — 8 amps 12V Type 2: 5 — 11 amps
Autopilot pump cylinder capacity	Type 1: 4.9 in^3 — 12.5 in^3 Type 2: 12.5 in^3 — 21.0 in^3

Table 6-3.

6.2.3 Technical data

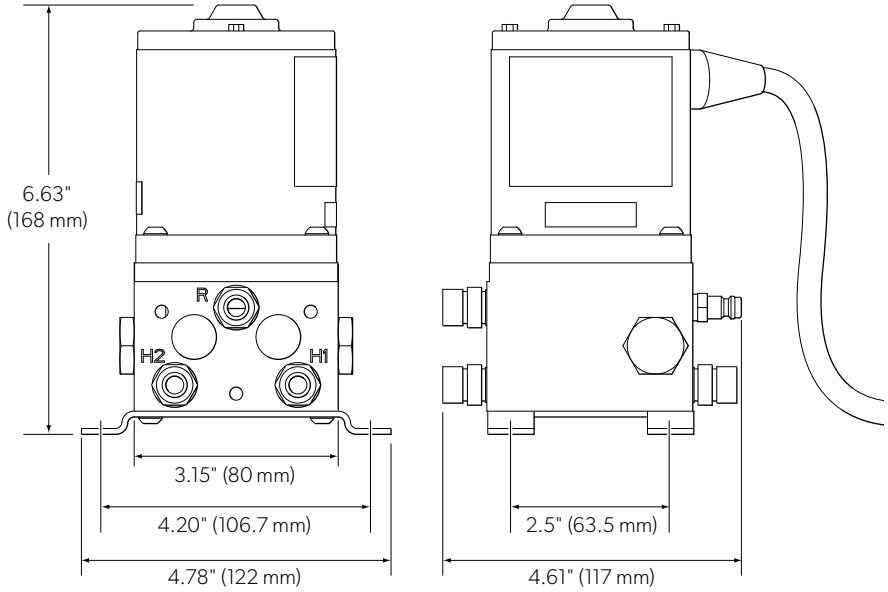


Figure 6-7.

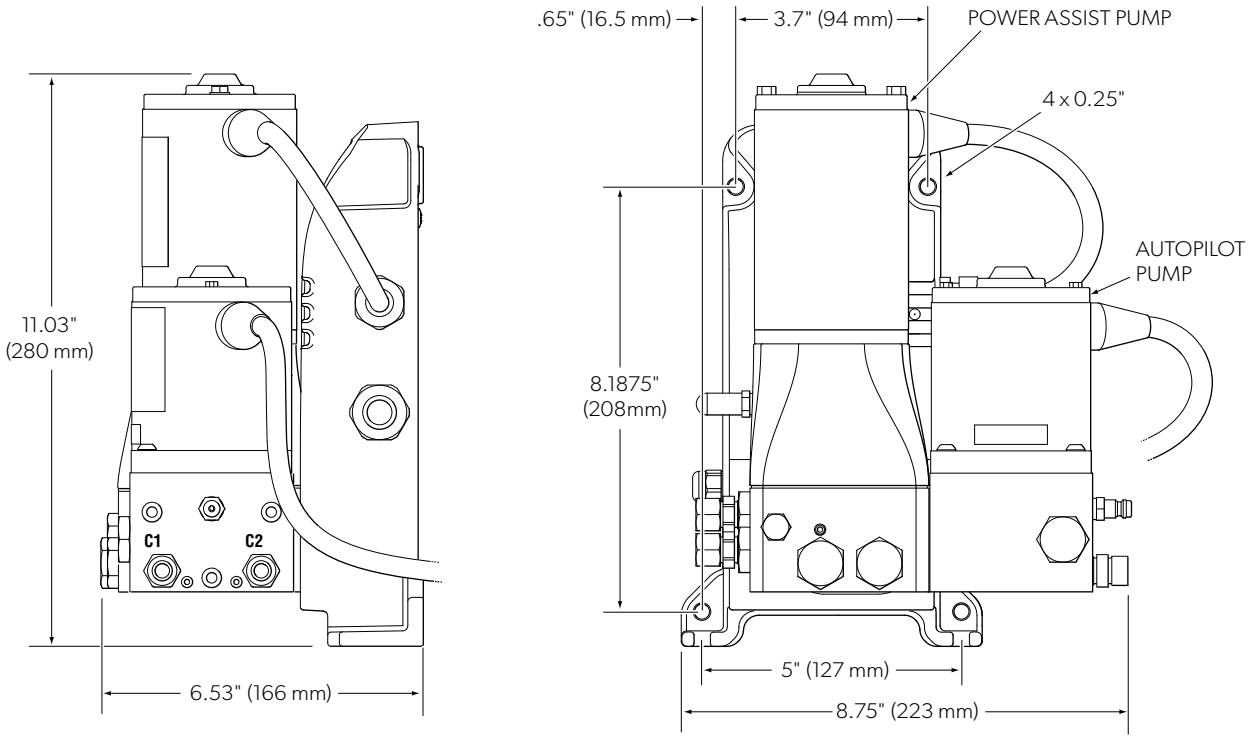


Figure 6-8. Dimensions shown with PA, AP, and retrofit kit part # HA1205.

6.3 SeaStar SmartStick

Part # AR4502RM, AR4502SI, AR4502

SmartStick is a non-contact autopilot position sensor that mounts to SeaStar outboard front mount cylinders (HC5345-3, HC5358-3*, HC5375-3).

These SmartStick models replace the previous generation AR4102 and AR4202 models. There are three SmartStick models available.

A retrofit kit (HP6014) for older pivot cylinders to adapt to new SmartStick models is also available.



Figure 6-9.

* HC5358-3 must be installed on Yamaha and Evinrude engines with AR4502 series SmartSticks to ensure adequate clearance. Installing AR4502 series with HC5345-3 on Yamaha and Evinrude outboards may result in interference between the sensor and the cylinder.

QR CODE: www.dometicsystembuilder.com
Visit www.dometicsystembuilder.com for most steering applications.

6.3.1 Applications

- Non-contact sensing — no moving parts to wear
- Convenient installation — no linkages or external parts to mount
- Electrical components sealed in potting — corrosion resistant

6.3.2 SmartStick enhancements

- No external black box — electronics integrated into sensor body, making cable easy to route through rigging with no splicing
- 35′ of cable can be trimmed to any length and jacket is labeled
- Digital electronics are more immune to electromagnetic interference (EMI) — cleaner signal allows autopilot to perform better
- Installation of sensor is more convenient and faster
- Part Numbers are autopilot specific, no jumpers to cut
- Lower cost

6.3.3 Order guide

DESCRIPTION	OUTPUT	PART #
Ray Marine installations only	2.2V — 2.8V	AR4502RM
Simrad AP20 installations only	2.8kHz — 4.0kHz	AR4502SI
Generic installations	0.5V — 4.5V	AR4502

Table 6-4.

6.3.5 Specifications

AR4502 SERIES	
Range	8.0″
Resolution	0.012″
Linearity	0.048″
Repeatability	0.024″
Environmental resistance	• Salt spray 1000 hours • IEC IP67 (submersible to 1m) • Immune to dirt, oil, SAE fluids • Thermal shock and vibration resistant (MIL-STD810F)

Table 6-5.

Notes

7 Hydraulic Helms and Technical Information

7.1 SeaStar helms

The SeaStar helm pump is the heart of the hydraulic steering system.

SeaStar helm pumps are the product of many years of research and experience by the world's foremost builder of manual hydraulic steering systems. Our efforts have resulted in a design which represents the ultimate in efficiency, safety and reliability, yet is easy to install and maintain. Superior design, teamed with the finest materials, precision manufacturing and rigid quality control all add up to an outstanding product which is certain to set industry standards for years to come.

Front mount helm features

- Compact, stylish design.
- Available in 1.4, 1.7, 2.0, 2.4 and 3.0 cubic inch displacements.
- Convenient front of dash fill.
- Small 3.0" hole cutout on dash.
- Can be retrofitted into old SeaStar 4.5" hole cutout.
- Complete with elbow fittings.

Front mount



Rear mount helm features

- Behind dash mounting configuration.
- Available 1.4, 1.7, 2.0, and 2.4 cubic inch displacements.
- Remote fill point.
- Complete with elbow fittings.
- 1-1/16" hole required.

Rear mount



Sport/Sport Plus tilt helm features

- 5 wheel positions allow adjustment to most comfortable steering position.
- 48° tilt range (12° down – 36° up).
- Available in 1.4, 1.7, 2.0 and 2.4 cubic inch displacements.
- Remote fill point.
- Complete with elbow fittings.
- 3" dash cutout.

Sport Plus tilt



Sport tilt



Classic tilt helm features

- 5 wheel positions allow adjustment to most comfortable steering position.
- 48° tilt range (18° down – 30° up).
- Available in 1.4, 1.7, 2.0 and 2.4 cubic inch displacements.
- Convenient front of dash fill.
- Complete with elbow fittings.
- 4.5″ hole cutout.



Classic tilt

7.1.1 Features of SeaStar helm pumps

1. Helm rotor supported by three roller bearings.
2. Ball bearing piston race.
3. Field replaceable shaft seal.
4. -5 ORB ports.
5. Built-in lock valve for positive rudder lock.
6. Patented bleed tubes.
7. Patented internal air pocket eliminates steering fluid expansion overflow.
8. Integral relief valves.
9. New patent-pending lockspool design.

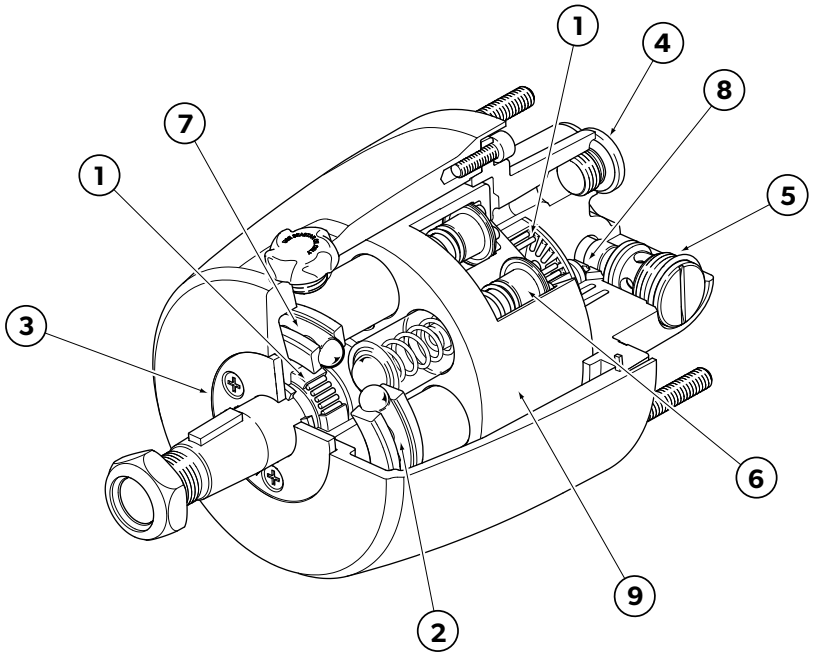


Figure 7-1.

NOTE
Illustration is not intended to assist in the repair of a helm pump. Any repair to a hydraulic steering system must be completed by an authorized repair center. Refer to Section 15 for authorized repair centers.

Commercial helms — part # HH5217-4, HH5224-4

Specifically designed to be used on smaller fishing vessels involved in the lobster and crabbing Industries. The commercial helm pumps are designed with a stainless steel shaft and heavy duty shaft seal and wiper. This new style shaft and seal help protect the helm pump from the abrasive effects of sediment that is brought on board by the operator handling traps or pots.

NOTE
For commercial use.

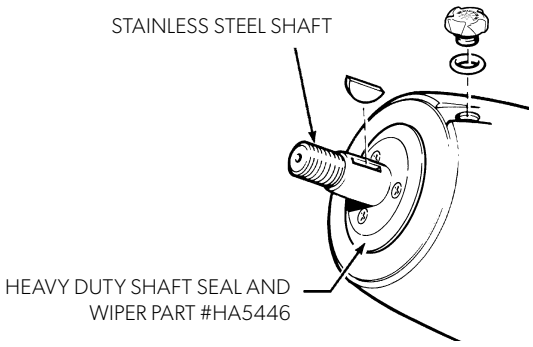


Figure 7-2.

HA5446 SS Helm shaft seal CVR HD
Converts a standard helm to one with the heavy duty seal plate.

7.1.2 Accessories

Backplate kit — part # HA5418

a) Used to retrofit a new SeaStar standard helm in the old 4.5" (115 mm) diameter hole, or

b) reduce the helm protrusion from the dash by the thickness of the dash, or

c) retrofit new SeaStar standard helm into hole cutouts for mechanical and hydraulic steering as per chart.

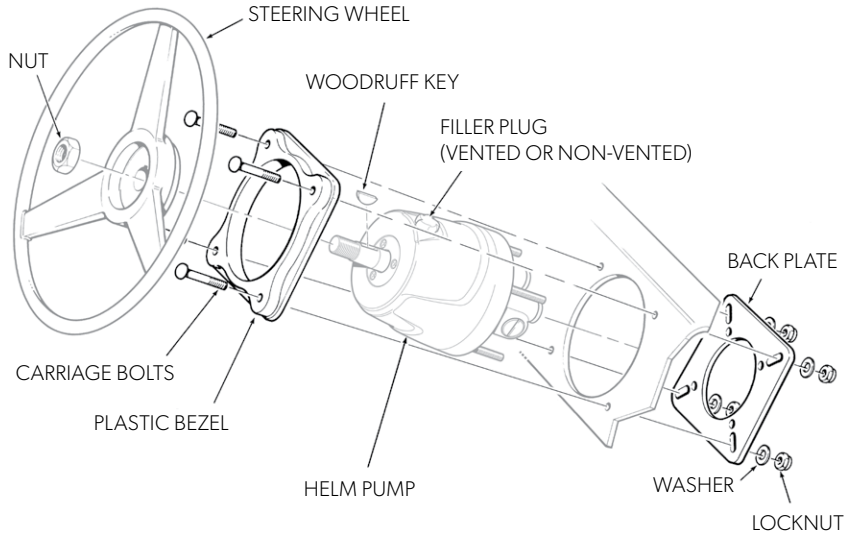


Figure 7-3.

STEERING MANUFACTURER	HELM MODEL TYPE	SYSTEM	BACKPLATE KIT REQ.
Dometic	Safe-T Big-T Rotary Rack and pinion Syten SeaStar I SeaStar II	Mechanical Mechanical Mechanical Mechanical Hydraulic Hydraulic Hydraulic	Yes Yes No No Yes Yes Yes
Morse	Front mount Rotary Rack and pinion	Hydraulic Mechanical Mechanical	Yes Yes Yes
Hynautic	H-50 series H-60 series H-80 series H-300 series	Hydraulic Hydraulic Hydraulic Hydraulic	Yes Yes Yes Yes

Table 7-1.

Round Bezel — part # HA5478-4 (SeaStar) **part # HA5476-4** (BayStar)

Reduces the distance the helm protrudes from the front of the dash to 3.75″ (93 mm).

NOTICE!
For -3 helms use part # HA5478 and HA5476. Both types are available.

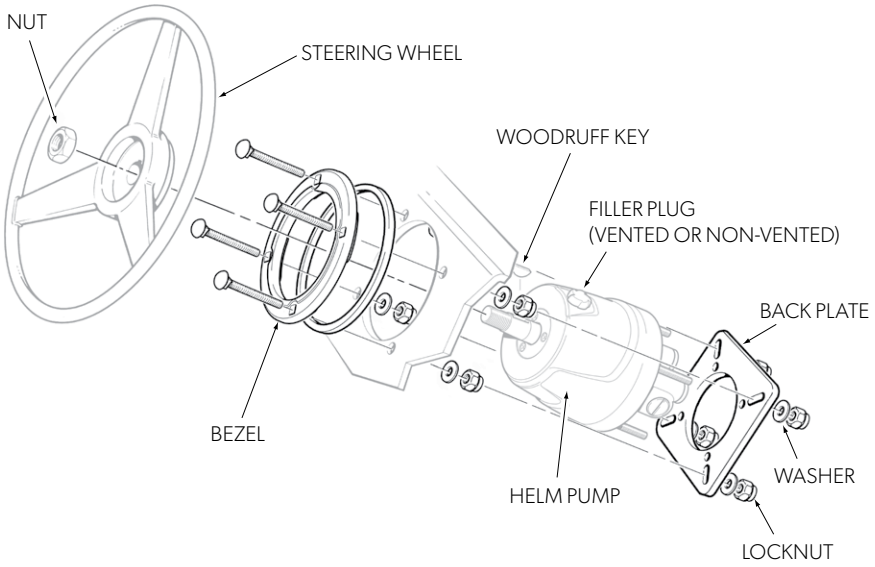


Figure 7-4.

Vent Plug "Black"
part # HP6126

- 5 per kit



Figure 7-5.

Non-Vent Plug "Black"
part # HP6000

- 2018+
- 5 per kit

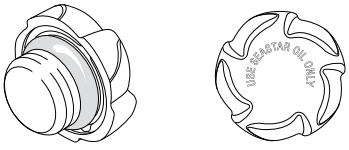


Figure 7-6.

20° Wedge – part # HA5419

This kit is designed to mount the helm at a 20° angle to the mounting surface. 4 possible mounting configurations are available.

NOTICE!
Not for use with BayStar helm pumps.

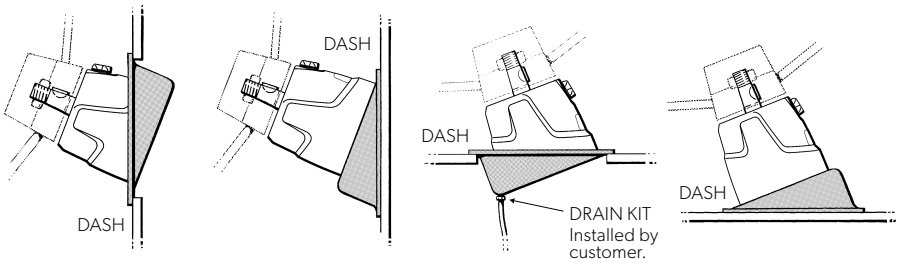
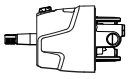
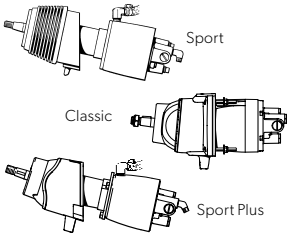
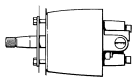


Figure 7-7.

7.1.3 Order guide — SeaStar helms

CAUTION!
-3 and -4 helm pumps are fitted with positionable O-ring style hose fitting ports (commonly referred to as ORB). Do not attempt to install an NPT pipe fitting into a -3 or -4 helm hose fitting port. Doing so will lead to irreparable damage to the helm. Only use Dometic O-ring style hose fittings (ORB).

HELM TYPE	PART #	DESCRIPTION	DISPLACEMENT cu.in./rev (cc/rev)	RELIEF VALVE SETTING PSI (Bar)	NOTES
SEASTAR FRONT MOUNT 	HH5269-4	Front mount	1.4 (23.0	1000 (70)	
	HH5271-4	Front mount	1.7 (27.8)	1000 (70)	
	HH5217-4	Front mount (commercial)	1.7 (27.8)	1000 (70)	2
	HH5273-4	Front mount	2.0 (33.0)	1000 (70)	
	HH5272-4	Front mount	2.4 (39.3)	1000 (70)	
	HH5224-4	Front mount (commercial)	2.4 (39.3)	1000 (70)	2
	HH5285-4	Front mount	3.0 (49.1)	1000 (70)	
SEASTAR TILT Note: All sport tilt helms are shipped with the remote filler tube. 	HH6193-4	Sport tilt	1.4 (23.0)	1000 (70)	
	HH6493-4	Sport Plus	1.4 (23.0)	1000 (70)	
	HH6544-4	Classic tilt	1.4 (23.0)	1000 (70)	Replaces HH5744
	HH6541-4	Classic tilt	1.7 (27.8)	1000 (70)	Replaces HH5741
	HH6191-4	Sport tilt	1.7 (27.8)	1000 (70)	Replaces HH5291
	HH6491-4	Sport Plus	1.7 (27.8)	1000 (70)	
	HH6543-4	Classic tilt	2.0 (33.0)	1000 (70)	Replaces HH5743
	HH6145-4	Sport tilt	2.0 (33.0)	1000 (70)	Replaces HH5745
	HH6445-4	Sport Plus	2.0 (33.0)	1000 (70)	
	HH6345-4	Sport Plus (spline shaft)	2.0 (33.0)	1000 (70)	
	HH6542-4	Classic tilt	2.4 (39.3)	1000 (70)	Replaces HH5742
	HH6192-4	Sport tilt	2.4 (39.3)	1000 (70)	Replaces HH5292
	HH6492-4	Sport Plus	2.4 (39.3)	1000 (70)	
SEASTAR REAR MOUNT Note: All rear mount helms are shipped with the remote filler tube 	HH5261-4	Rear mount	1.7 (27.8)	1000 (70)	
	HH5281-4	Rear mount (1" tapered shaft)	1.7 (27.8)	1000 (70)	6" shaft inc. straight shaft bushing
	HH5263-4	Rear mount	2.0 (33.0)	1000 (70)	
	HH5262-4	Rear mount	2.4 (39.3)	1000 (70)	

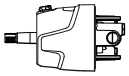
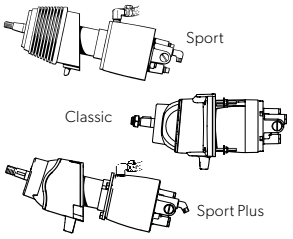
1. SeaStar PRO helms cannot be used with an unbalanced cylinder. SeaStar reinforced Kevlar outboard style hoses should be used with all SeaStar PRO helms.
2. Commercial helms use a stainless steel shaft and a better sealing top plate for use in extreme conditions and or commercial type applications.

Revision Date: **OCTOBER 17th 2025**

7.1.4 Order guide — SeaStar PRO helms

CAUTION!
-3 and -4 helm pumps are fitted with positionable O-ring style hose fitting ports (commonly referred to as ORB). Do not attempt to install an NPT pipe fitting into a -3 or -4 helm hose fitting port. Doing so will lead to irreparable damage to the helm. Only use Dometic O-ring style hose fittings (ORB).

WARNING!
Do not use with an unbalanced cylinder. Steering lock up will occur.

HELM TYPE	PART #	DESCRIPTION	DISPLACEMENT cu.in./rev (cc/rev)	RELIEF VALVE SETTING PSI (Bar)	NOTES
SEASTAR PRO FRONT MOUNT 	HH5779-4 HH5770-4 HH5772-4	Front mount Front mount (long studs) Front mount	1.7 (27.8) 2.0 (33.0) 2.4 (39.3)	1500 (103) 1500 (103) 1500 (103)	1 1 1
SEASTAR PRO TILT Note: All sport tilt helms are shipped with the remote filler tube. 	HH6573-4 HH6489-4 HH6574-4 HH6490-4 HH6190-4	Classic tilt Sport Plus Classic tilt Sport Plus Sport tilt	1.7 (27.8) 1.7 (27.8) 2.0 (33.0) 2.0 (33.0) 2.0 (33.0)	1500 (103) 1500 (103) 1500 (103) 1500 (103) 1500 (103)	1, Replaces HH5773 1 1, Replaces HH5774 1 1

1. SeaStar PRO helms cannot be used with an unbalanced cylinder. SeaStar reinforced Kevlar outboard style hoses should be used with all SeaStar PRO helms.

Revision Date: **MARCH 23rd 2025**

7.1.5 Dimensions — SeaStar / SeaStar PRO helms

CAUTION!
-3 and -4 helm pumps are fitted with positionable O-ring style hose fitting ports (commonly referred to as ORB). Do not attempt to install an NPT pipe fitting into a -3 or -4 helm hose fitting port. Doing so will lead to irreparable damage to the helm. Only use Dometic O-ring style hose fittings (ORB).

NOTICE!
All SeaStar helms can be mounted horizontally to vertically and anywhere in between. In all cases the filler port must be in the uppermost position.

Front mount helm pumps

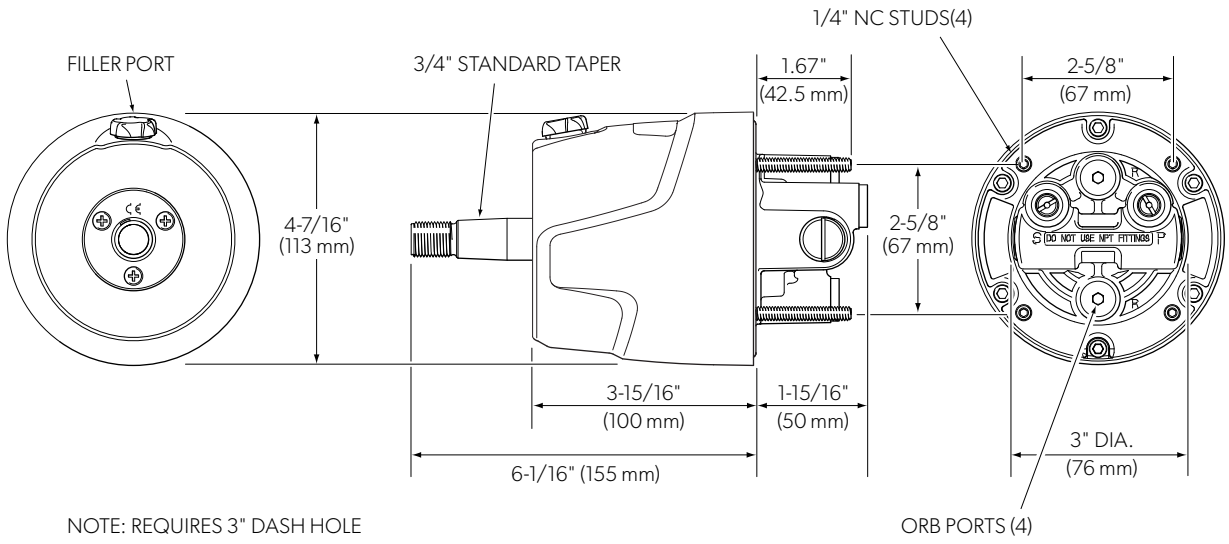


Figure 7-8.

NOTICE!

1" straight and tapered shafts are also available see Section 8 for details Max. steering wheel dia. 28" (711 mm). Max. dish depth 5" (127 mm).

Rear mount helm pumps

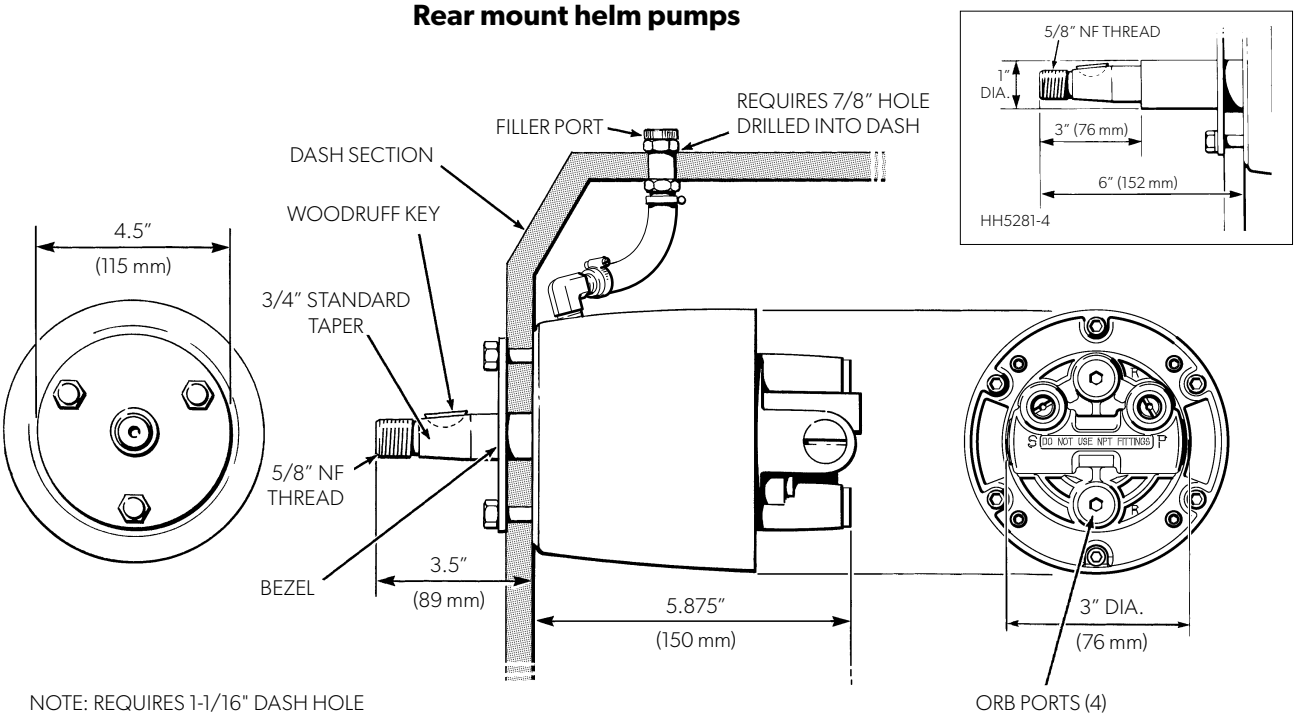


Figure 7-9.

NOTICE!

1" straight and tapered shafts are also available see page 7-5 for details Max. steering wheel dia. 28" (711 mm). Min. dash thickness 1" (25.5 mm), Max. dash thickness 1.5" (38 mm). Max. dish depth 5" 127 mm).

Sport tilt helm pumps

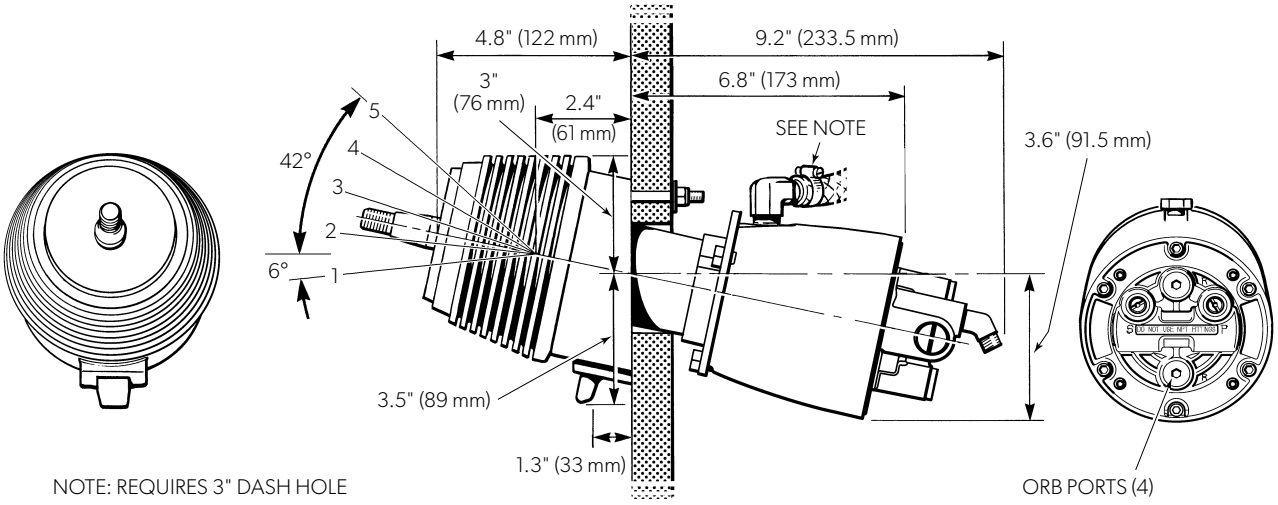


Figure 7-10.

Replacement tilt kit part # HA6123 available, cover only 18-HA6150.

NOTICE!

Remote fill and vent kit (included with helm pump) requires a 7/8" hole to be drilled into the dash board and above the helm pump. Please refer to page 7-13, HA6450 for details.

Max. steering wheel dia. 20" (508 mm). Max. dish depth 5" 127 mm).

Sport Plus tilt helm pumps

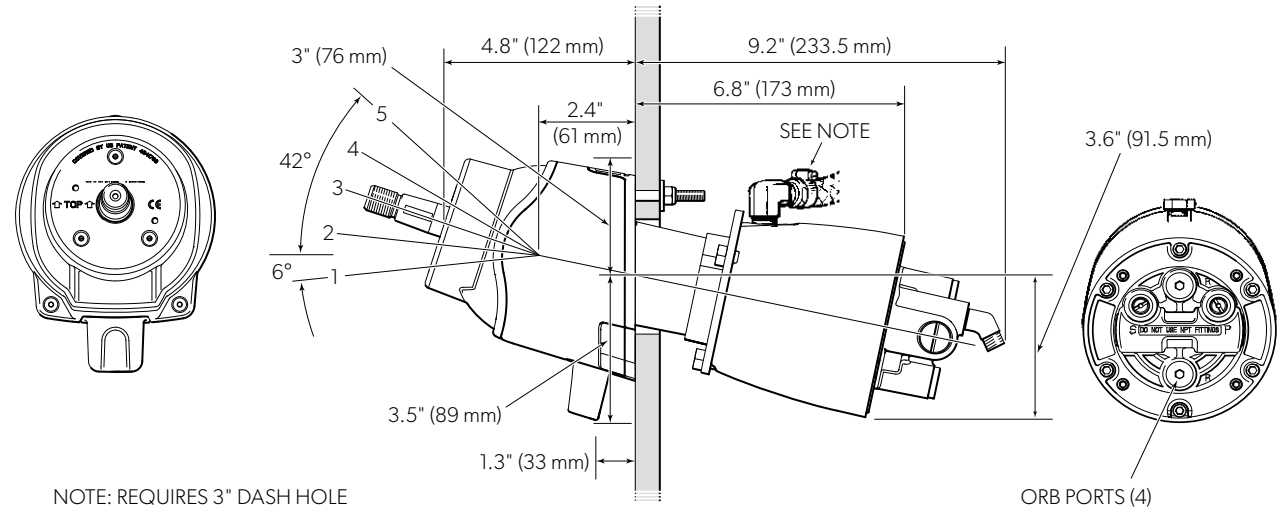


Figure 7-11.

Replacement tilt kit part # HA6423 available , cover only 18-HA6450.

NOTICE!

Remote fill and vent kit (included with helm pump) requires a 7/8" hole to be drilled into the dash board and above the helm pump. Please refer to page 7-13, HA6450 for details.

Max. steering wheel dia. 20" (508 mm). Max. dish depth 5" 127 mm).

Classic tilt helm pumps

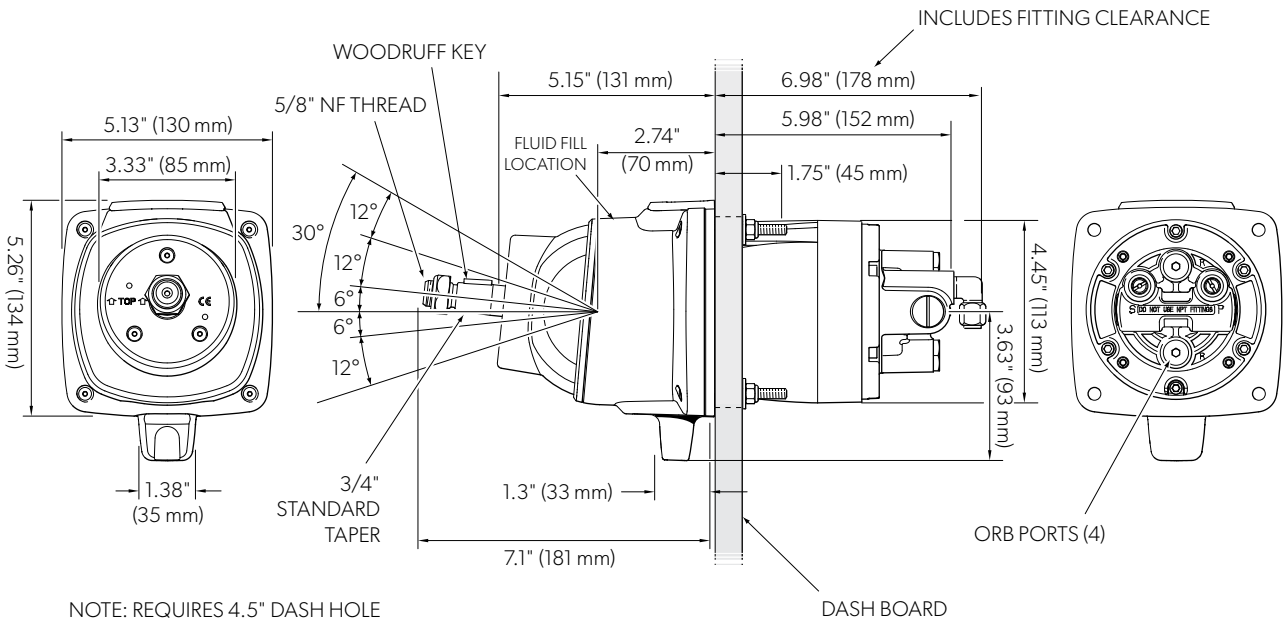


Figure 7-12.

Replacement tilt kit part # HA6523 available, cover only 18-HA6550.

NOTICE!

Max. steering wheel dia. 20" (508 mm). Max. dish depth 5" 127 mm).

7.1.6 Capilano helms: **1250V** HH5250 (1.7—3.4 cu. in.) **1275V** HH5275 (2.7—5.4 cu. in.)

A unique variable displacement feature on these helms allows the number of steering wheel turns to be adjusted by the helms-person to their preference within a predetermined range.

Recommended wheel size for 1250V (HH5250) is between 20" and 36".

Recommended wheel size for 1275V (HH5275) is between 26 " and 36".

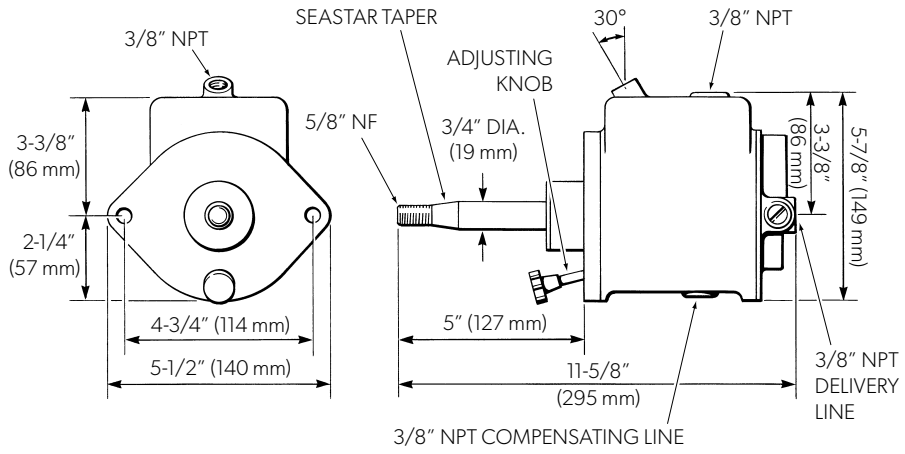


Figure 7-13. Uses remote fill kit HA5450.

7.2 Tools including Power Purge Jr.

7.2.1 SeaStar Power Purge JR. part # HA5445-3

SeaStar/BayStar Power Purge Jr. is the quickest way to bleed a SeaStar/ BayStar system in the field and assure a rock-solid steering feel every time!

The Power Purge Jr. reduces installation and warranty costs while enhancing the quality of the boat to the end user. A typical manual fill and purge takes the average experienced installer or service technician about 30 minutes per boat — by using the Power Purge Jr. this can be reduced to 10 minutes or less.



Figure 7-14. Power Purge JR. HA5445-3.

Advantages

- Steering feel is solid every time
- Complete Fill & Purge in 10 minutes or less
- Fast and efficient
- Easy to operate
- Screens large contaminants from steering fluid
- Quick connect fittings
- Convenient portable size
- Convenient electrical hook-up utilizing 12 volt boat battery
- Optional Dual Cylinder Purging Kit HA5461 available
- Optional 50' Hose Extension Kit HA5462, for longer runs



Figure 7-15. Dual cylinder purge kit HA5461.

NOTICE!

Larger SeaStar Power Purge Sr. also available for high volume users, part # HA5447. Contact Dometic technical support for details.



Figure 7-16. Helm adapter kit HP6148.

Replacement parts list

- Service kit, kit # HP6125
- Helm adapter, kit # HP6148 (one per kit)
- Quick connect fitting replacement, kit # HP6170 (includes all quick connect fittings, no hose)
- Hose/quick connect replacement, kit # HP6171
- Power Purge motor replacement, kit # HP6116
- Low profile cylinder bleed adapter, kit # HP6149.



Figure 7-17. Service kit HP6125.



Figure 7-18. Quick connect kit HP6170.



Figure 7-19. Hose/quick connect kit HP6171.



Figure 7-20. Low profile bleed adapter HP6149.



Figure 7-21. Power Purge motor kit HP6116.

7.2.2 SeaStar hydraulic cylinder service kit part # HS5300

- This kit is designed for easier servicing of the hydraulic cylinder. A compact bleeder wrench simplifies access of hard to reach places. While the end gland wrench is conveniently adaptable to fit both 4-hole and 8-hole end glands. Specially designed for Dometic SeaStar steering systems, the kit includes bleeder wrench, end gland wrench pin and instruction sheet.

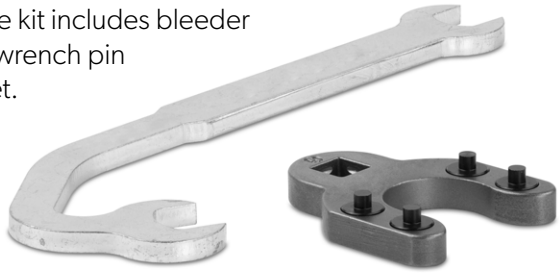


Figure 7-22.

7.2.3 SeaStar hose coupler kit part # HF5527

- This kit includes; 3 x 3/8" hose fittings, and is used to bypass and isolate steering components for maintenance and troubleshooting.



Figure 7-23.

7.2.4 SeaStar fitting cap kit part # HF5524

- This kit includes 3 x 3/8" hose fitting caps, and is used to plug fittings for maintenance and trouble shooting.



Figure 7-24.

7.2.5 SeaStar bleed nipple cap kit part # HP6044

- This kit includes; 12 x bleed nipple caps.



Figure 7-25.

7.2.6 SeaStar gland seal kit part # HS5168 (NEW)

- This kit includes; 12 x gland seals with guide and replacement bleed fitting o-rings.



Figure 7-26.

7.2.7 SeaStar bleed hose part # HA5438

- This kit is needed to properly bleed the SeaStar outboard steering kit
- Screws onto the SeaStar and equivalent fluid to bleed the SeaStar system
- Makes for a clean bleed when used properly

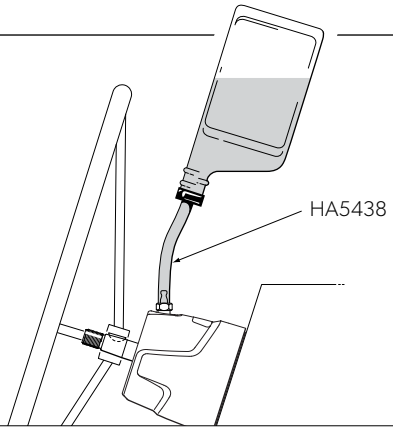


Figure 7-27.

7.2.8 Remote fill part # HA6450 – SeaStar, HA5450 – Capilano

- Can be used with all SeaStar helm pumps
- Can be used with Power Purge Jr. as extension for HP6148 helm adapter
- Relocate your fill plug to a more convenient or hidden place

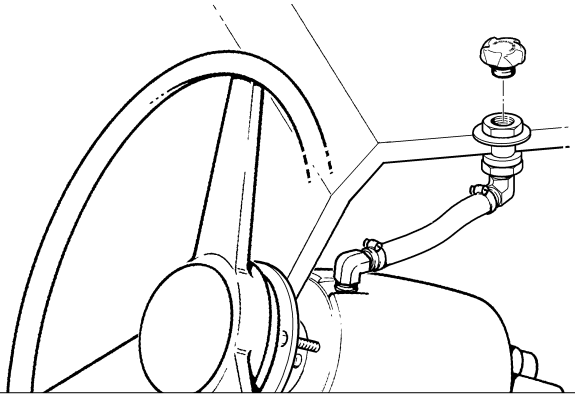


Figure 7-28.

NOTICE!
Requires 7/8" hole to be drilled onto dash above helm pump.

7.3 Technical info/specifications

NOTICE!

Contact your nearest dealer or distributor to order replacement parts.

7.3.1 BayStar/SeaStar helm pump shaft details

Taper: 3/4" standard taper (1" per foot), wheel shaft threads: 5/8"–18 UNF, Key: #606 woodruff key (3/16"), port sizes: -5 ORB Hose (F).

NOTICE!

Theoretical torque about pivot point at 35° rudder arc with 1000 psi (70 bar) system pressure.

7.3.2 BayStar/SeaStar/PRO helm pumps

HELM DESCRIPTION		PART #	DISPLACEMENT cu.in./rev (cc/rev)	RELIEF VALVE SETTING PSI (Bar)	MAX WHEEL DIA. in (mm)	SEAL KIT	NOTES
BayStar	Front mount	HH4311-4	1.1 (18.02)	1000 (70)	28 (711)	HP6032	
BayStar	Front mount	HH4314-4	1.4 (23.0)	1000 (70)	28 (711)	HP6032	
BayStar	Sport tilt	HH4315-4	1.4 (23.0)	1000 (70)	20 (508)	HP6032	
BayStar	Sport Plus tilt	HH4316-4	1.4 (23.0)	1000 (70)	20 (508)	HP6032	
SeaStar	Front mount	HH5269-4	1.4 (23.0)	1000 (70)	28 (711)	HP6032	
SeaStar	Front mount	HH5271-4	1.7 (27.8)	1000 (70)	28 (711)	HP6032	
SeaStar	Front mount	HH5273-4	2.0 (33.0)	1000 (70)	28 (711)	HP6032	
SeaStar	Front mount	HH5272-4	2.4 (39.3)	1000 (70)	28 (711)	HP6032	
SeaStar	Front mount	HH5217-4	1.7 (27.8)	1000 (70)	28 (711)	HP6037	Commercial helm (stainless shaft)
SeaStar	Front mount	HH5224-4	2.4 (39.3)	1000 (70)	28 (711)	HP6037	Commercial helm (stainless shaft)
SeaStar	Front mount	HH5285-4	3.0 (46.16)	1000 (70)	28 (711)	HP6032	
SeaStar	Rear mount	HH5261-4	1.7 (27.8)	1000 (70)	28 (711)	HP6032	
SeaStar	Rear mount	HH5263-4	2.0 (33.0)	1000 (70)	28 (711)	HP6032	
SeaStar	Rear mount	HH5262-4	2.4 (39.3)	1000 (70)	28 (711)	HP6032	
SeaStar	Rear mount	HH5281-4	1.7 (27.8)	1000 (70)	28 (711)	HS5201	6" tapered shaft with 1" hub bushing
SeaStar	Sport tilt	HH6193-4	1.4 (23.0)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport tilt	HH6191-4	1.7 (27.8)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport tilt	HH6145-4	2.0 (33.0)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport tilt	HH6192-4	2.4 (39.3)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport Plus tilt	HH6491-4	1.7 (27.8)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport Plus tilt	HH6445-4	2.0 (33.0)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport Plus tilt	HH6492-4	2.4 (39.3)	1000 (70)	20 (508)	HP6032	
SeaStar	Sport Plus tilt	HH6345-4	2.0 (33.0)	1000 (70)	20 (508)	HP6032	Splined shaft
SeaStar	Classic tilt	HH6544-4	1.4 (23.0)	1000 (70)	20 (508)	HP6032	
SeaStar	Classic tilt	HH6541-4	1.7 (27.8)	1000 (70)	20 (508)	HP6032	
SeaStar	Classic tilt	HH6543-4	2.0 (33.0)	1000 (70)	20 (508)	HP6032	
SeaStar	Classic tilt	HH6542-4	2.4 (39.3)	1000 (70)	20 (508)	HP6032	
SeaStar PRO	Front mount	HH5779-4	1.7 (27.8)	1500 (103)	28 (711)	HP6032	
SeaStar PRO	Front mount	HH5770-4	2.0 (33.0)	1500 (103)	28 (711)	HP6032	
SeaStar PRO	Front mount	HH5772-4	2.4 (39.3)	1500 (103)	28 (711)	HP6032	
SeaStar PRO	Sport tilt	HH6190-4	2.0 (33.0)	1500 (103)	20 (508)	HP6032	
SeaStar PRO	Sport Plus tilt	HH6489-4	1.7 (27.8)	1500 (103)	20 (508)	HP6032	
SeaStar PRO	Sport Plus tilt	HH6490-4	2.0 (33.0)	1500 (103)	20 (508)	HP6032	
SeaStar PRO	Classic tilt	HH6573-4	1.7 (27.8)	1500 (103)	20 (508)	HP6032	
SeaStar PRO	Classic tilt	HH6574-4	2.0 (33.0)	1500 (103)	20 (508)	HP6032	

Table 7-2.

7.3.3 Capilano helm pumps

HELM DESCRIPTION	PART #	DISPLACEMENT cu.in./rev (cc/rev)	SHAFT STYLE	KEY WAY	SEAL KIT	NOTES
Capilano	1250V	1.7–3.4 (27.8–55.7)	3/4" tapered	3/16"	HS5161	Replaces 250V
Capilano	1275V	2.7–5.4 (44.2–88.4)	3/4" tapered	3/16"	HS5161	Replaces 275V

Table 7-3.

7.3.4 BayStar/SeaStar outboard cylinders

MAKER	PART #	CYLINDER TYPE	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	VOLUME cu. in (cc)	NOTES
BayStar	HC4645-3	Outboard	.63 (16.0)	8 (203)	HP4601	7.24 (118.6)	
BayStar	HC4647-3	Outboard	.63 (16.0)	8 (203)	HP4601	7.24 (118.6)	
BayStar	HC4648-3	Outboard	.63 (16.0)	8 (203)	HP4601	7.24 (118.6)	
BayStar	HC4658-3	Outboard	.63 (16.0)	8 (203)	HP4601	7.24 (118.6)	
SeaStar	HC5345-3	Outboard	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	.
SeaStar	HC5345-3CM	Outboard Commercial	.75 (19.0)	8 (203)	HS5167MS*	8.34 (136.6)	Pin wrench not inc.
SeaStar	HC5347-3	Outboard	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
SeaStar	HC5348-3	Outboard	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
SeaStar	HC5358-3	Outboard	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
SeaStar	HC5445-3	Outboard Ltd. stroke	.75 (19.0)	6.75 (171)	HS5157	7.04 (115)	
SeaStar	HC5370-3	Outboard Side mount	.50 (12.7)	8 (203)	HP6088	8.3 (135.2)	
SeaStar	HC5380-3	Outboard Splashwell	.50 (12.7)	9 (228)	N/A	9.3 (152.1)	
SeaStar	HC5375-3	Outboard Catamaran	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
SeaStar	HC6845	Outboard Tournament	.875 (22.2)	8 (203)	HP6160	8.34 (136.6)	
SeaStar	HC6845S	Outboard Tournament	.875 (22.2)	8 (203)	HP6160	8.34 (136.6)	Single cylinder application
SeaStar	HC6850	Tournament Ltd. stroke	.875 (22.2)	7 (178)	HP6160	7.04 (115.0)	
SeaStar PRO	HC6345-3	Outboard PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
SeaStar PRO	HC6358-3	Outboard PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	

Table 7-4.

* Seal kit HS5167MS can be used as a substitute for HS5167 in applications where ice and/or debris is causing seal failure.

7.3.5 SeaStar/Capilano inboard cylinders

MAKER	PART #	MODEL #	BORE DIA. in (mm)	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	TORQUE in-lb (Kg-m)	VOLUME cu. in (cc)	NOTES
SeaStar	HC5322-3	BA125-7ATM	1.25 (31.7)	.50 (12.7)	7 (178)	HP6026	N/A	7.0 (115)	International only
SeaStar	HC5323-3	BA125-9ATM	1.25 (31.7)	.50 (12.7)	9 (229)	HP6026	N/A	9.0 (147)	International only
SeaStar	HC1503-3	BA150-3ATM	1.50 (38.1)	.63 (16.0)	3 (76)	HP6025	7177 (82.0)	4.37 (71.6)	
SeaStar	HC5303-3	BA125-3ATM	1.25 (31.7)	.50 (12.7)	3 (76)	HP6026	N/A	3.12 (51)	
SeaStar	HC5312-3	BA125-7ATM	1.25 (31.7)	.50 (12.7)	7 (178)	HP6026	5025 (57.9)	7.2 (118)	
SeaStar	HC5313-3	BA135-7ATM	1.35 (34.9)	.63 (16.0)	7 (178)	HP6025	5741 (66.1)	8.3 (136)	
SeaStar	HC5314-3	BA150-7ATM	1.50 (38.1)	.63 (16.0)	7 (178)	HP6025	7117 (82.0)	10.2 (167)	
SeaStar	HC5319-3	BA175-7TM	1.75 (44.4)	.75 (19.1)	7 (178)	HP6071	9569 (110.2)	13.7 (225)	Rec for Catamarans
SeaStar	HC5373-3	BA175-9TM	1.75 (44.4)	.75 (19.1)	9 (229)	HP6071	12600 (145.5)	17.7 (290.0)	Rec for Catamarans
SeaStar	HC5802	BA200-9TM	2.00 (50.8)	1 (25.4)	9 (229)	HS5198	15140 (174.4)	21.25 (345)	Brass cylinder
SeaStar	HC5804	BA200-11TM	2.00 (50.8)	1 (25.4)	11 (279)	HS5198	18500 (213.1)	26.0 (426)	Brass cylinder
SeaStar	HC5806	BA250-9.5TM	2.50 (63.5)	1 (25.4)	9.5 (241)	KS-18	33065 (389.0)	37.11 (608)	Brass cylinder
Capilano	HC5351	BA200-7TM	2.00 (50.8)	.75 (19.0)	7 (178)	HS5184	13200 (151)	18.9 (310)	Brass cylinder
Capilano	HC5357	BA200-7TMC	2.00 (50.8)	.75 (19.0)	7 (178)	HS5184	13200 (151)	18.9 (310)	Brass cylinder clevis
Capilano	HC5378	BA200-11TM	2.00 (50.8)	1 (25.4)	11 (279)	HS5185	18500 (213.1)	26.0 (426)	Brass cylinder
Capilano	HC5379	BA200-11TMC	2.00 (50.8)	1 (25.4)	11 (279)	HS5185	18500 (213.1)	26.0 (426)	Brass cylinder clevis

Table 7-5.

7.3.6 SeaStar sterndrive cylinders

MAKER	PART #	MODEL #	BORE DIA. in (mm)	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	TORQUE in-lb (Kg-m)	VOLUME cu. in. (cc)	NOTES
SeaStar	HC5326-3	BA150-7EM	1.50 (38.1)	.625 (15.9)	7.0 (178)	HP6086	8853 (102.0)	10.2 (167.0)	
SeaStar	HC5328-3	125-8EM	1.25 (31.7)	.500 (12.7)	8.0 (203)	HP6087	7142 (82.3)	8.3 (135.2)	
SeaStar	HC5329-3	125-8VPEM	1.25 (31.7)	.500 (12.7)	8.0 (203)	HP6087	N/A	8.3 (135.2)	
SeaStar	HC5330-3	BA125-8EMV	1.25 (31.7)	.500 (12.7)	8.0 (203)	HP6027	7142 (82.3)	8.3 (135.2)	
SeaStar	HC5331-3	125-6VPS	1.25 (31.7)	.500 (12.7)	5.9 (150)	N/A	N/A	6.2 (101.6)	
SeaStar	HC5332	BA135-6.88EM	1.35 (34.9)	.625 (15.9	7.0 (178)	HS5155	5741 (66.1)	8.3 (135.2)	
SeaStar	HC5386-3	150-7EM	1.50 (38.1)	.625 (15.9)	7.0 (178)	N/A	N/A	10.2 (167.0)	

Table 7-6.

7.3.7 BayStar helm pumps quick reference turns chart

					GOOD	OPTIMAL
		BAYSTAR HELM DISPLACEMENT (in^3/rev)				
OUTBOARD CYLINDERS	**DISP.** (in^3)	**1.1**	**1.4**			
HC4645-3 – Single	7.17	6.6	**5.2**			
INBOARD CYLINDERS	**DISP.** (in^3)					
BA125-6.25	6.7	6.1	**4.8**			
BA100-6	3.53	3.2	**2.5**			

Table 7-7.

7.3.8 SeaStar helm pumps quick reference turns chart

					GOOD	OPTIMAL
		SEASTAR HELM DISPLACEMENT (in^3/rev)				
FRONT MOUNT, OUTBOARD PIVOT CYLINDERS* **	**DISP.** (in^3)	**1.4**	**1.7**	**2.0**	**2.4**	**3.0**
Single	8.3	5.9	**4.9**	**4.2**	3.5	2.8*
Single (stroke reduced)	7.02	5.0	**4.2**	**3.5**	2.92	2.34*
Dual**	16.6	11.9	9.8	8.3	**6.9**	**5.5***
Triple**	24.9	17.8	14.6	12.5	10.4	**8.3***
Quad**	33.2	23.7	19.5	16.6	13.8	**11.1***
INBOARD CYLINDERS	**DISP.** (in^3)					
BA125-7	7.2	**5.1**	**4.2**	**3.6**	3	2.4*
BA135-7	8.2	**5.9**	**4.8**	**4.1**	3.4	2.7*
BA150-7	10.2	7.3	**6.0**	**5.1**	**4.3**	3.4*
BA175-7	13.7	9.8	8.1	6.9	**5.7**	4.6*
BA150-9	13.1	9.4	7.7	6.6	**5.5**	**4.4***
BA175-9	17.7	12.6	10.4	8.9	**7.4**	**5.9***
BA200-7	18.9	13.5	11.1	9.5	**7.9**	**6.3***
BA200-9	21.25	15.2	12.5	10.6	**8.9**	**7.1***
BA200-11	26.0	18.6	15.3	13.0	10.8	8.6*

Table 7-8.

* Any system using a helm greater than 2.4 in^3 /rev. and Power Assist, requires dual SPA's in parallel.
** Displacement is total effective cylinder volume (assumes cylinders are plumbed in parallel not series).
*** Includes Tournament series and -3 outboard cylinders.

7.3.9 Capilano helm pumps quick reference turns chart

					GOOD
		CAPILANO HELM DISPLACEMENT (in^3/rev)			
		1250V MIN	**1250V MAX**	**1275 MIN**	**1275 MAX**
FRONT MOUNT, OUTBOARD PIVOT CYLINDERS***	**DISP.** (in^3)	**1.7**	**3.4**	**2.7**	**5.4**
Single	8.3	4.9*	2.4*	3.1*	1.5*
Dual**	16.6	9.8*	4.9*	6.1*	3.1*
Triple**	24.9	14.6*	7.3*	9.2*	4.6*
Quad**	33.2	19.5*	9.5*	**12.3***	**6.1***
INBOARD CYLINDERS	**DISP.** (in^3)				
BA125-7	7.2	4.2*	2.1*	2.7*	1.3*
BA135-7	8.2	4.8*	2.4*	3.0*	1.5*
BA150-7	10.2	6.0*	3.0*	3.8*	1.9*
BA175-7	13.7	8.1*	4.0*	5.1*	2.5*
BA150-9	13.1	7.7*	3.9*	4.9*	2.4*
BA175-9	17.7	**10.4***	**5.2***	6.6*	3.3*
BA200-7	18.9	**11.1***	**5.6***	7.0*	3.5*
BA200-9	21.25	**12.5***	**6.25***	**7.9***	**3.9***
BA200-11	26.0	15.3*	7.65*	**9.6***	**4.8***
BA250-9.5	37.11	21.89*	10.9*	**13.74***	**6.87***

Table 7-9.

* Any system using a helm greater than 2.4 in^3 /rev. and Power Assist, requires dual SPA's in parallel.
** Displacement is total effective cylinder volume (assumes cylinders are plumbed in parallel not series).
*** Includes Tournament series and -3 outboard cylinders.

7.4 Obsolete products

7.4.1 Obsolete BayStar/SeaStar/PRO helm pumps

HELM DESCRIPTION		PART #	DISP. cu.in./rev (cc/rev)	RELIEF VALVE SETTING PSI (Bar)	WHEEL DIA. Max. in (mm)	SEAL KIT	REPLACES	REPLACED BY
BayStar	Front mount	HH4016	1.6 (26.2)	800 (55)	26 (660)	HS5147		HH4314-4
BayStar	Sport tilt	HH4015	1.6 (26.2)	800 (55)	26 (660)	HS5147		HH4315-4
BayStar	Front mount	HH4314-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	HH4016	HH4314-4
BayStar	Sport tilt	HH4315-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	HH4315	HH4315-4
BayStar	Sport plus tilt	HH4316-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	HH4316	HH4616-4
BayStar Plus	Front mount	HH4514-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	HH4514	HH5269-4, HH4314-4
BayStar Plus	Sport tilt	HH4513-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	HH4513	HH6193-4, HH4315-4
SeaStar I	Front mount	HH5201	1.7 (27.8)	1000 (70)	28 (711)	HS5201		HH5271, HA5418
SeaStar II	Front mount	HH5202	2.4 (39.3	1000 (70)	28 (711)	HS5201		HH5272, HA5418
SeaStar	Front mount	HH5269-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	HH5269	HH5269-4
SeaStar	Front mount	HH5271-3	1.7 (27.8)	1000 (70)	28 (711)	HP6032	HH5271	HH5271-4
SeaStar	Front mount	HH5225-3	1.7 (27.8)	1000 (70)	28 (711)	HP6032	HH5225	HH5271-4
SeaStar	Front mount	HH5273-3	2.0 (33.0)	1000 (70)	28 (711)	HP6032	HH5273	HH5273-4
SeaStar	Front mount	HH5272-3	2.4 (39.3)	1000 (70)	28 (711)	HP6032	HH5272	HH5272-4
SeaStar	Front mount	HH5217-3	1.7 (27.8)	1000 (70)	28 (711)	HP6037	HH5217	HH5217-4
SeaStar	Front mount	HH5224-3	2.4 (39.3)	1000 (70)	28 (711)	HP6037	HH5224	HH5224-4
SeaStar	Front mount	HH5285-3	3.0 (46.16)	1000 (70)	28 (711)	HP6032	HH5285	HH5285-4
SeaStar	Front mount	HH5971-3	1.7 (27.8)	1000 (70)	28 (711)	HP6032	HH5971	No replacement
SeaStar	Rear mount	HH5260-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	HH5260	No replacement
SeaStar	Rear mount	HH5261-3	1.7 (27.8)	1000 (70)	28 (711)	HP6032	HH5261	HH5261-4
SeaStar	Rear mount	HH5263-3	2.0 (33.0)	1000 (70)	28 (711)	HP6032	HH5263	HH5263-4
SeaStar	Rear mount	HH5262-3	2.4 (39.3)	1000 (70)	28 (711)	HP6032	HH5262	HH5262-4
SeaStar	Rear mount	HH5265-3	3.0 (49.1)	1000 (70)	28 (711)	HP6032	HH5265	No replacement
SeaStar	Rear mount	HH5279-3	1.4 (23.0)	1000 (70)	28 (711)	HS5201	HH5297	HH5281-4
SeaStar	Rear mount	HH5281-3	1.7 (27.8)	1000 (70)	28 (711)	HS5201	HH5281	HH5281-4
SeaStar	Sport tilt	HH6193-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	HH6191	HH6191-4
SeaStar	Sport tilt	HH6191-3	1.7 (27.8)	1000 (70)	20 (508)	HP6032	HH5291, HH6191	HH6191-4
SeaStar	Sport tilt	HH6145-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	HH5745, HH6451	HH6145-4
SeaStar	Sport tilt	HH6192-3	2.4 (39.3)	1000 (70)	20 (508)	HP6032	HH5292, HH6192	HH6192-4
SeaStar	Sport Plus tilt	HH6491-3	1.7 (27.8)	1000 (70)	20 (508)	HP6032	HH6491	HH6491-4
SeaStar	Sport Plus tilt	HH6445-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	HH6445	HH6445-4
SeaStar	Sport Plus tilt	HH6492-3	2.4 (39.3)	1000 (70)	20 (508)	HP6032	HH6492	HH6492-4
SeaStar	Sport Plus tilt	HH6493-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032		HH6493-4
SeaStar	Sport Plus tilt	HH6345-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	HH6345	HH6345-4
SeaStar	Classic tilt	HH6544-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	HH5744, HH6544	HH6544-4
SeaStar	Classic tilt	HH6541-3	1.7 (27.8)	1000 (70)	20 (508)	HP6032	HH5741, HH6541	HH6541-4
SeaStar	Classic tilt	HH6543-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	HH5743, HH6543	HH6543-4
SeaStar	Classic tilt	HH6542-3	2.4 (39.3)	1000 (70)	20 (508)	HP6032	HH5742, HH6542	HH6542-4
SeaStar PRO	Front mount	HH5779-3	1.7 (27.8)	1500 (103)	28 (711)	HP6032	HH5779	HH5779-4
SeaStar PRO	Front mount	HH5770-3	2.0 (33.0)	1500 (103)	28 (711)	HP6032	HH5770, HH5970	HH5770-4
SeaStar PRO	Front mount	HH5772-3	2.4 (39.3)	1500 (103)	28 (711)	HP6032	HH5772	HH5772-4
SeaStar PRO	Front mount	HH5218-3	1.7 (27.8)	1500 (103)	28 (711)	HP6037	HH5218	HH5779-4
SeaStar PRO	Rear mount	HH5778-3	1.7 (27.8)	1500 (103)	28 (711)	HP6032	HH5778	No replacement
SeaStar PRO	Rear mount	HH5771-3	2.0 (33.0)	1500 (103)	28 (711)	HP6032	HH5771	No replacement
SeaStar PRO	Sport tilt	HH6189-3	1.7 (27.8)	1500 (103)	20 (508)	HP6032	HH6189	HH6190-4
SeaStar PRO	Sport tilt	HH6190-3	2.0 (33.0)	1500 (103)	20 (508)	HP6032	HH6190	HH6190-4
SeaStar PRO	Sport Plus tilt	HH6489-3	1.7 (27.8)	1500 (103)	20 (508)	HP6032	HH6489	HH6490-4
SeaStar PRO	Sport Plus tilt	HH6490-3	2.0 (33.0)	1500 (103)	20 (508)	HP6032	HH6490	HH6490-4
SeaStar PRO	Classic tilt	HH6573-3	1.7 (27.8)	1500 (103)	20 (508)	HP6032	HH5773, HH6573	HH6573-4
SeaStar PRO	Classic tilt	HH6574-3	2.0 (33.0)	1500 (103)	20 (508)	HP6032	HH5774, HH6574	HH6574-4

Table 7-10.

7.4.2 Obsolete Hynautic helm pumps

MAKER	PART #	DISPLACEMENT cu.in./rev (cc/rev)	SHAFT STYLE	KEY WAY	SEAL KIT	SUGGESTED REPLACEMENT	NOTES
Hynautic	H-21	2.75 (45.1)	1" straight	1/4" square	HS-02	HH5250	Must use HB0573
Hynautic	H-22	2.00 (32.8)	1" straight	1/4" square	HS-02	HH5250	Must use HB0573
Hynautic	H-25	2.75 (45.1)	3/4" tapered	#9 woodruff	HS-02	HH5250	
Hynautic	H-26	2.00 (32.8)	3/4" tapered	#9 woodruff	HS-02	HH5250	
Hynautic	H-29	2.75 (45.1)	1" straight	1/4" square	HS-02	HH5250	Must use HB0573
Hynautic	H-31	2.75 (45.1)	1" straight	1/4" square	HS-02	HH5250	Must use HB0573
Hynautic	H-41	5.50 (90.1)	1" straight	1/4" square	HS-04	HH5275	Must use HB0573
Hynautic	H-41-02	5.50 (90.1)	3/4" tapered	#9 woodruff	HS-04 (1979 – Date)	HH5275	
Hynautic	H-42	4.00 (65.5)	1" straight	1/4" square	HS-04	HH5275	Must use HB0573
Hynautic	H-42-02	4.00 (65.5)	3/4" tapered	#9 woodruff	HS-04	HH5275	
Hynautic	H-42-04	4.00 (65.5)	1" straight	1/4" square	HS-04 (1979 – Date)	HH5275	Must use HB0573
Hynautic	H-50	2.00 (32.8)	3/4" tapered	#9 woodruff	HS-05	HH5273-4	Use HA5418 backplate kit and HF6012 fitting kit
Hynautic	H-51	2.75 (45.1)	3/4" tapered	#9 woodruff	HS-05	HH5272-4	Use HA5418 backplate kit and HF6012 fitting kit
Hynautic	H-52	1.65 (27.1)	3/4" tapered	#9 woodruff	HS-05	HH5271-4	Use HA5418 backplate kit and HF6012 fitting kit

Table 7-11.

7.4.3 Obsolete Capilano helm pumps

HELM DESCRIPTION		PART #	DISPLACEMENT cu.in./rev (cc/rev)	RELIEF VALVE SETTING PSI (Bar)	MAX WHEEL DIA. in (mm)	SEAL KIT	NOTES
Syten		H-10	1.7 (27.9)	650 (45)	22 (559)	N/A	Replaced by HH5271-4, HA5418 Backplate kit and SeaStar hoses HO51/59XX
Capilano		250V	1.7–3.4 (28–56)	1000 (70)	36 (914)	HS5161	3/4" tapered shaft. Replaced with 1250V
Capilano		275V	2.7–5.4 (44–89)	1000 (70)	36 (914)	HS5161	3/4" tapered shaft. Replaced with 1275V
Capilano		1350	8.1 (132.7)	1000 (70)	N/A	HS5171	1-1/4" straight shaft
Capilano		1450	17.7 (290.1)	1000 (70)	N/A	HS5181	1-1/4" straight shaft

Table 7-12.

7.4.4 Obsolete inboard cylinders

MAKER	PART #	MODEL #	BORE DIA. in (mm)	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	TORQUE in-lb (Kg-m)	VOLUME cu. in (cc)	NOTES
SeaStar	HC5303	BA125-3ATM	1.25 (31.7)	.50 (12.7)	3 (76)	HS5154		3.12 (51)	Replaced by HC5303-3
SeaStar	HC5312 & HC5312-2	BA125-7ATM	1.25 (31.7)	.50 (12.7)	7 (178)	HS5154	5025 (57.9)	7.2 (118)	Replaced by HC5312-3
SeaStar	HC5313	BA135-7ATM	1.35 (34.9)	.63 (16.0)	7 (178)	HS5155	5741 (66.1)	8.3 (136)	Replaced by HC5313-3
SeaStar	HC5314	BA150-7ATM	1.50 (38.1)	.63 (16.0)	7 (178)	HS5156	7117 (82.0)	10.2 (167)	Replaced by HC5314-3
SeaStar	HC5318	BA150-7TM	1.50 (38.1)	.63 (16.0)	7 (178)	HS5182	7117 (82.0)	10.2 (167)	Replaced by HC5314-3 or HC5319-3
SeaStar	HC5319	BA175-7TM	1.75 (44.4)	.75 (19.0)	7 (178)	HS5183	9569 (110.2)	13.7 (225)	Replaced by HC5319-3
SeaStar	HC5369	BA150-9TM	1.50 (38.1)	.63 (16.0)	9 (229)	HS5182	9375 (107.7)	13.1 (215)	Replaced by HC5373-3
SeaStar	HC5801-2	PSC200-9	2.00 (50.8)	1.00 (25.4)	9 (229)	Multiple*	18900 (217.8)	21.25 (348)	Replaced by Optimus
SeaStar	HC5803-2	PSC200-11	2.00 (50.8)	1.00 (25.4)	11 (279)	Multiple*	23140 (266.6)	26.00 (426)	Replaced by Optimus
SeaStar	HC5805	PSC250-9	2.50 (63.5)	1.00 (25.4	9 (229)	HS5180**	33065 (180.9)	37.11 (608)	Replaced by Optimus
Capilano	HC5349	BA150-7TM	1.50 (38.1)	.63 (16.0)	7 (178)	HS5182	7117 (82.0)	10.2 (167)	Replaced by HC5319-3 or HC5314-3
Capilano	HC5350	BA175-7TM	1.75 (44.4)	.75 (19.0)	7 (178)	HS5183	9569 (110.2)	13.7 (225)	Replaced by HC5319-3
Capilano	HC5373	BA175-9TM	1.75 (44.4)	.75 (19.0)	9 (229)	HS5183	12600 (145.5)	17.7 (290)	Replaced by HC5373-3

Table 7-13.

* Seal kit: HS5196 Servo Valve.
HS5197 Servo Cylinder
HS5198 Main cylinder 2.0" bore.

** Seal kit: HS5180 includes all 3 seal kits.
Main cylinder 2.5" bore.

7.4.5 Obsolete outboard cylinders

MAKER	PART #	CYLINDER TYPE	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	VOLUME cu. in (cc)	NOTES
BayStar	HC4600	Front Mount	.63 (16.0)	8 (203)	HP5608/07	7.24 (118.6)	
BayStar	HC46XXH	Front Mount	.63 (16.0)	8 (203)	HP4600	7.24 (118.6)	
SeaStar	HC5340-42	Slide Mount	.75 (19.0)	10 (254)	HS5157	8.34 (133.2)	Replaced by front mount see Sec. 3.2.5
SeaStar	HC5342	Slide Mount	.75 (19.0)	10 (254)	HS5157	8.34 (133.2)	Replaced by front mount see Sec. 3.2.5
SeaStar	HC5345	Front Mount	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC5345-3
SeaStar	HC5348	Front Mount	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC5348-3
SeaStar	HC5358	Front Mount	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC5358-3
SeaStar	HC5445	Front Mount	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC5445-3
SeaStar	HC5375	Catamaran Front Mount	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC5375-3
SeaStar PRO	HC6345	PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC6345-3
SeaStar PRO	HC6345RED	PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC6345-3
SeaStar PRO	HC6345SIL	PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC6345-3
SeaStar PRO	HC6358	PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC6358-3
SeaStar PRO	HC6358RED	PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC6358-3
SeaStar PRO	HC6358SIL	PRO	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	Replaced by HC6358-3
SeaStar	HC6750	Tournament	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	See Sec. 3.5
SeaStar	HC6751	Tournament	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	See Sec. 3.5
SeaStar	HC6752	Tournament	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	See Sec. 3.5
SeaStar	HC6753	Tournament	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	See Sec. 3.5
SeaStar	HC6754	Tournament	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	See Sec. 3.5
SeaStar	HC6755	Tournament	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	See Sec. 3.5
SeaStar	HC5370-71	Side Mount	.50 (12.7)	8 (203)	HS5153	8.30 (135.2)	Replaced by HC5370-3
SeaStar	HC5380	Splashwell Mount	.50 (12.7)	9 (228)	HS5154	9.30 (152.1)	Replaced by HC5380-3
SeaStar	HC5374	Catamaran fixed	.75 (19.0)	10 (254)	KS-06	13.3 (217.9)	Replaced by liquid tie bar
SeaStar	HC5343	Catamaran fixed	.75 (19.0)	10 (254)	HS5157	8.13 (133.2)	Replaced by liquid tie bar
Hynautic	K-6-NI	Outboard	.875 (22.2)	7.75 (197)	KS-19	9	No replacement

Table 7-14.

7.4.6 Obsolete sterndrive cylinders

MAKER	PART #	MODEL #	BORE DIA. in (mm)	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	TORQUE in-lb (Kg-m)	VOLUME cu. in. (cc)	NOTES
SeaStar	HC5311	BA125-6.25ATM	1.25 (31.7)	.63 (16.0)	6.25 (159)	HS5154*	N/A	5.66 (92.7)	Obsolete
SeaStar	HC5326	BA150-7EM	1.50 (38.1)	.625 (15.9)	7 (178)	HS5156*	8853 (102.0)	10.2 (167.0)	Replaced by HC5326-3
SeaStar	HC5327	BA135-8EM	1.35 (34.9)	.63 (16.0)	8 (203)	HS5155*	6557 (75.5)	9.5 (155.4)	Replaced by HC5330-3
SeaStar	HC5328	125-8EM	1.25 (31.7)	.50 (12.7)	8 (203)	HS5154*	7142 (82.3)	8.3 (135.2)	Replaced by HC5328-3
SeaStar	HC5329	125-8VPEM	1.25 (31.7)	.50 (12.7)	8 (203)	HS5154*	N/A	8.3 (135.2)	Replaced by HC5329-3
SeaStar	HC5330	BA125-8EMV	1.25 (31.7)	.50 (12.7)	8 (203)	HS5154*	7142 (82.3)	8.3 (135.2)	Replaced by HC5330-3
SeaStar	HC5331	125-8 92VPS	1.25 (31.7)	.50 (12.7)	8 (203)	HS5154*	N/A	8.3 (135.2)	Replaced by HC5331-3
SeaStar	HC5339	125-6.5EM	1.25 (31.7)	.50 (12.7)	6.5 (165)	N/A	N/A	6.25 (102.4)	Replaced by HC5339-3
SeaStar	HC5339-3	125-6.5EM	1.25 (31.7)	.50 (12.7)	6.5 (165)	N/A	N/A	6.25 (102.4)	Obsolete

Table 7-15.

* Seal kit with glands: HS5154 use HS5162, HS5155 use HS5163, HS5156 use HS5164.

7.4.7 Obsolete Hynautic cylinders

MAKER	PART #	CYLINDER TYPE	SHAFT DIA. in (mm)	STROKE in (mm)	SEAL KIT	VOLUME cu. in (cc)	NOTES
Hynautic	K-1	Universal balanced	.75 (19.0)	9.0 (229)	KS-11	11.9 (195)	Replaced by HC5373-3
Hynautic	K-2	Universal balanced	.75 (19.0)	9.0 (229)	KS-12	17.7 (290)	Replaced by HC5373
Hynautic	K-3	Universal balanced	.875 (22.2)	9.0 (229)	KS-13, or KS-17	22.9 (375)	Replaced by HC5802
Hynautic	K-4	Universal balanced	.875 (22.2)	12.0 (305)	KS-13, or KS-17	30.5 (500)	Replaced by HC5378
Hynautic	K-5	Universal unbalanced	.875 (22.2)	9.0 (229)	KS-15	15.9 (261)	Discontinued
Hynautic	K-6	Base mount balanced	.875 (22.2)	7.75 (197)	KS-19	9.0 (147)	Discontinued
Hynautic	K-8	Universal balanced	1.00 (25.4)	9.5 (241)	KS-09 or KS-18	39.2 (642)	Replaced by HC5806
Hynautic	K-9	Universal balanced	1.00 (25.4)	14.5 (168)	KS-09 or KS-18	55.0 (901)	Replaced by Optimus
Hynautic	K-10	Engine MT balanced	.75 (19.0)	9.5 (241)	KS-07	7.5 (123)	Replaced by HC53XX-3
Hynautic	K-11	Ball joint unbalanced	.75 (19.0)	9.0 (229)	KS-01	11.0 (117)	Replaced by HC5323-3
Hynautic	K-12	Ball joint unbalanced	.75 (19.0)	7.0 (178)	KS-01	8.6 (141)	Replaced by HC5322-3
Hynautic	K-13	Sidemount unbalanced	.75 (19.0)	9.0 (229)	KS-01	11.0 (117)	Replaced by HC5370-3
Hynautic	K-14	Sidemount unbalanced	.75 (19.0)	7.0 (178)	KS-01	8.6 (141)	Replaced by HC5370-3
Hynautic	K-18	Ball joint balanced	.75 (19.0)	7.0 (178)	KS-02	7.0 (115)	Replaced by HC5322-3
Hynautic	K-19	Ball joint balanced	.75 (19.0)	9.0 (229)	KS-02	9.0 (147)	Replaced by HC5323-3
Hynautic	K-22/27	Tie Rod	.75 (19.0)	10.0 (254)/ 12.0 (305)	KS-04 or KS-06	13.2 (216)/ 15.8 (259)	Discontinued Discontinued
Hynautic	K-28/29	Tie Rod	.75 (19.0)	12.0 (305)	KS-04 or KS-06	16.0 (262)	Discontinued
Hynautic	K-30	Pivot MT	.875 (22.2)	10.0 (254)	KS-05	25.5 (416)	Discontinued
Hynautic	K-51	Universal	.625 (15.9)	7.0 (178)	KS-14	10.2 (167)	Replaced by HC5314-3

Table 7-16.

Notes

7.5 Torque rudder data

Name: _____

Contact: _____

Displacement Hull: ..... ☐ Yes ☐ No

Planning Hull: ..... ☐ Yes ☐ No

Sail Boat: ..... ☐ Yes ☐ No

Catamaran: ..... ☐ Yes ☐ No

Vessel – Length: ..... _____ ft.

Vessel – Make/Model: _____

Vessel – Top Speed: ..... _____ Knots

Vessel – Cruising Speed: ..... _____ Knots

Vessel – Displacement: ..... _____

Vessel – Use: ..... _____

Number of Engines: ..... _____

Each Engine Shaft Horsepower ..... _____ HP

Prop. Diameter: ..... _____ in.

Rudder Arc: (Midship to Hardover) ..... _____ Degrees

Number of Rudders: ..... _____

Rudder Cross Section:

☐ Foil ☐ Flat Plate ☐ Other (please specify)

_____

Estimated load per rudder: ..... _____ ft-lbs.
(It is suggested that you confirm load with your Naval Architect.)

Perpendicular distance from the rudder shaft to the propeller: ..... ___ ft. ___ in.
(See figure 7-29, dimension 'A'.)

Distance parallel to the rudder shaft from rudder base to the center of lower rudder bearing ..... ___ ft. ___ in.
(See figure 7-29, dimension 'B'.)

Perpendicular distance from the waterline to the rudder base: ..... ___ ft. ___ in.
(See figure 7-29, dimension 'C'.)

Rudder drawing included: ..... ☐ Yes
(See notice below left.)

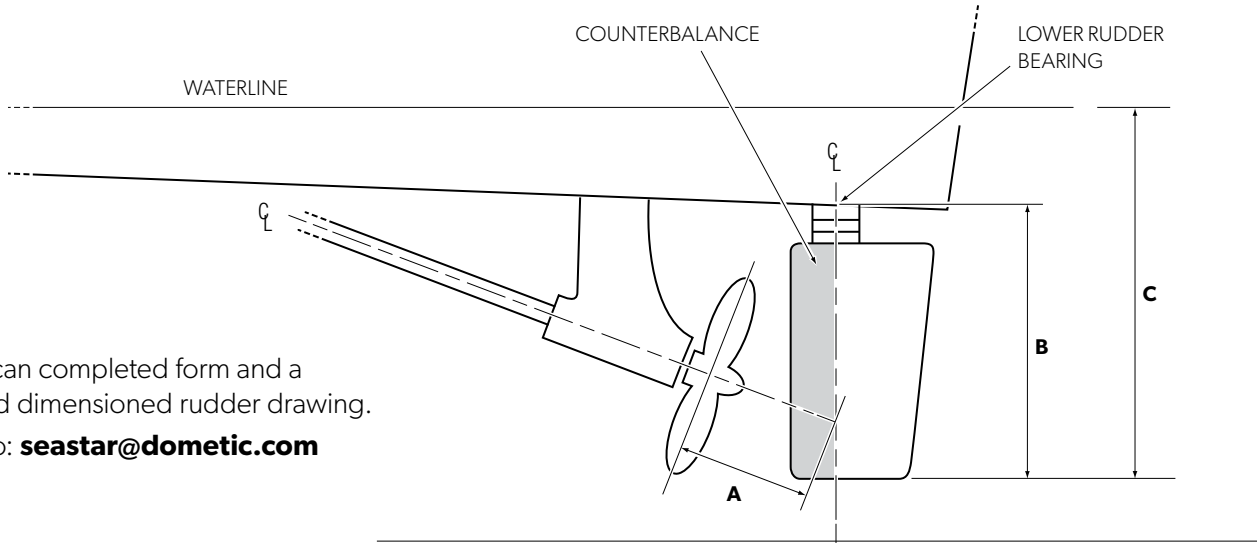


Figure 7-29.

Print/scan completed form and a detailed dimensioned rudder drawing.
email to: **seastar@dometic.com**

NOTE
See reverse side (page 8-20) for important Warning and Notice.

WARNING! SAIL BOATS

Dometic's expected rudder torque calculations are not suitable for sail boat applications. Please contact a naval architect for loads to determine expected maximum torque about rudder post.

NOTICE!

Please include a detailed dimensioned rudder drawing including the location of the rudder post. This must be provided to get a steering system recommendation.

8 SeaStar Hydraulic Fluid

WARNING!
Any non-approved fluid may cause serious damage to the steering system resulting in possible loss of steering, causing property damage, personal injury and/or death.

Due to recent upgrades in our steering system components, Dometic recommends use of SeaStar steering fluid only in our hydraulic steering systems. Dometic steering systems have been engineered and validated using our proprietary SeaStar hydraulic steering fluid. SeaStar steering fluid is engineered with a special additive package that contains anti-foaming and anti-rusting agents, anti-oxidants, viscosity stabilizers, corrosion inhibitors, wear additives as well as water emulsification additives. It is highly recommended that SeaStar steering fluid be used to ensure optimum system performance and safety.



Figure 8-1. HA5430–1L, HA5440–1G, HA5458–5G



Figure 8-2. Optimus fluid HA5482-1L.

Use of any non-approved fluid may result in the following;

- Higher steering effort, particularly at ambient or lower temperatures and/or over time due to steering fluid degradation and breakdown.
- Increased steering slip and/or drift resulting in lost motion.
- Foaming or air entrapment causing a bumpy feel during steering.
- High rates of moisture absorption causing internal component corrosion.
- Scratched steering cylinder bores and shafts due to contamination or elevated wear rates.
- Seal degradation — incompatibility with various proprietary seal compounds used in our products.

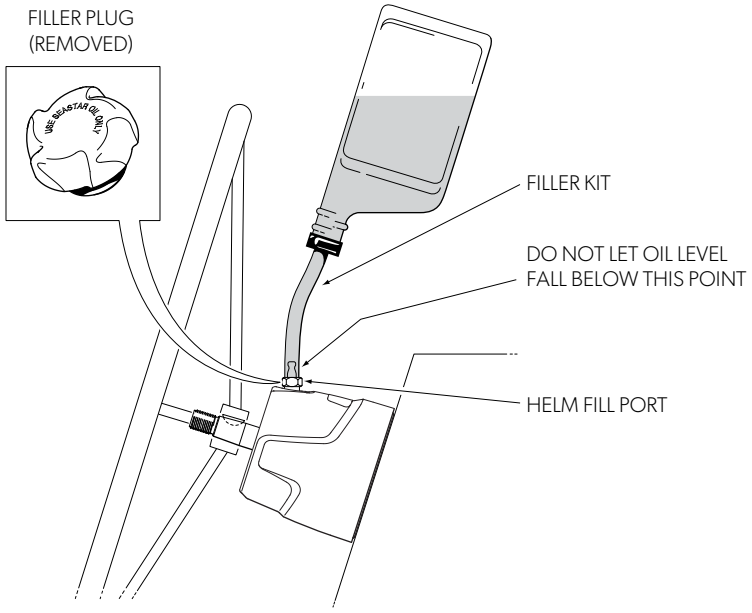


Figure 8-3. Fluid fill kit part# HA5438.

In an emergency, SeaStar EPS fluid, any MD-3/4 rated ATF or MIL-PRF-5606H equivalent fluid that is filtered through a fine mesh screen can be used. The system must be thoroughly flushed as soon as possible with genuine SeaStar steering fluid after using an emergency fluid.

In an extreme emergency, any non-toxic, non-flammable fluid that is filtered through a fine mesh screen may provide temporary steering.



WARNING!
Use of non-standard fluids will require an immediate and complete system flush using approved fluids, by an approved steering technician.



WARNING!
Never fill or mix brake fluids, triglycerides or polyalkylene glycols within a hydraulic steering system.



NOTICE!
SeaStar hydraulic steering fluid is recommended for all BayStar, SeaStar, Capilano, and Hynautic steering systems..



NOTICE!
Help protect your boating environment by ensuring that all used steering fluid is disposed of properly.

9 Hose and Fittings

9.1 SeaStar hose/tube

SeaStar Steering hoses are a custom multi-layered composite design, engineered specifically for our systems. They are designed to exceed SAE and ABYC specifications and provide precise steering control not achievable with hydraulic industry standard hoses.

SeaStar Hoses are engineered to provide the system with very low thermal expansion properties and are kink and abrasion resistant. Our hoses also feature a swaged solid fitting connection with an O-ring seal and a metal to metal backup to the primary seal.

Due to performance and safety concerns, Dometic recommends that only SeaStar or SeaStar PRO steering hoses be used in SeaStar Steering Systems. It is recommended for hose lengths over 30ft that SeaStar PRO hose is used.

Tubing/hose

The tubing or hose requirements depend on the type of steering system being considered. Please double check the application in which you are using as in some cases nylon or copper tube is not to be used.

WARNING!
Do not cut outboard hydraulic hose.

APPLICATION	TUBING/HOSE REQ.	PAGE #
Outboards, inboards, SeaStar Power Assist, or sterndrive cylinder # HC5332	Outboard Hose	page 9-2

Table 9-1.

CAUTION!
Do not use nylon tubing in outboard and/or power assist steering applications.

General considerations

In most hydraulic steering installations the cylinder body moves as the motor, outdrive or tiller arm is articulated. Provide sufficient hose length to allow full-uninterrupted steering motion including trim and tilt. If your splashwell is rated for a twin engine application or you are mounting the engines on an extension bracket you must provide enough steering hose to rig either twin or single engines. Inboard or sterndrive steering installations that use 3/8" copper or extruded nylon tube must have a swaged hydraulic hose kit (# HF5508) between the steering cylinder and the rigid tube to provide a flexible connection.

WARNING!
Do not use extruded nylon tubing with SeaStar outboard cylinder, HC5332, sterndrive cylinders and/or SeaStar Power Assist applications.

9.2 SeaStar hose

WARNING!
SeaStar PRO helm systems require the use of SeaStar PRO (1500 psi) reinforced Kevlar hoses only.

SeaStar and SeaStar PRO steering hoses are available in kits (two, equal lengths of hose per kit). Before ordering you must consider the following areas to ensure that you order the correct length for the cleanest installation. In all applications, hydraulic hose should be secured along the routing path where possible and should not be allowed to hang free in any area where they may become a safety hazard. Dometic recommends the use of a rigging tube, PVC piping or conduit for the safe installation and protection of the steering hose/tube. Do not install hoses in such a way that they become exposed to high heat areas such as engine components (i.e. manifolds or exhaust components), or in highly corrosive areas such as battery fumes or electrical connections. Each part number contains two hoses of equal length.

Dometic offers two different types of steering hoses;

- Standard (straight line hoses, not passing through bulkheads) from 2′ to 6′ (1′ increments), 8′ to 30′ (2′ increments), both SeaStar standard and SeaStar PRO available.
- Bulkhead hoses (for use where the hose is required to pass through a bulkhead). Available from 2′ to 6′ (1′ increments) 8′ to 30′ (2′ increments), both SeaStar standard and SeaStar PRO available.

NOTICE!
SeaStar bulkhead hoses provide the cleanest hose routing through the splashwell or transom.

9.2.1 How to order SeaStar hose kits

Each part number contains two hoses of equal length.

PART #	KIT DESCRIPTION
* HO51/59XX	SeaStar standard outboard hose kit
* HO57/69XX	SeaStar PRO hose kit
HO57/69XXSS	SeaStar PRO hose kit with stainless steel fittings
** HO81/83XX	SeaStar bulkhead hose kit, standard
** HO82/84XX	SeaStar bulkhead hose kit, PRO
HO82/84XXSS	SeaStar PRO bulkhead hose kit with stainless steel fittings

Table 9-2.

* SeaStar standard and PRO hose kits are available in lengths from 2′ – 30′.
** SeaStar standard and PRO bulkhead hose kits are available in lengths from 2′ – 30′.
XX = Substitute length required in feet. 2′ – 6′, in 1 foot increments. 8′ – 30′, in even numbers.

For stainless bulkhead plates use field installable fittings. Use standard SeaStar and PRO hoses. See 9.2.3

NOTICE!
Outboard hoses are supplied with pre-attached hose fittings on both ends In order to prevent hose kinking, bend restrictors are supplied on one end of each hose in the kit. The end of the hose with the bend restrictor is to be attached to the cylinder.

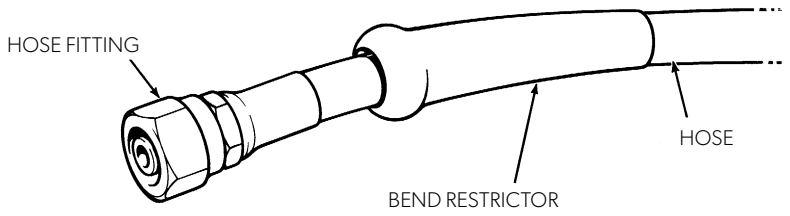


Figure 9-1. Standard hose kit.

9.2.2 Bulkhead hose kits

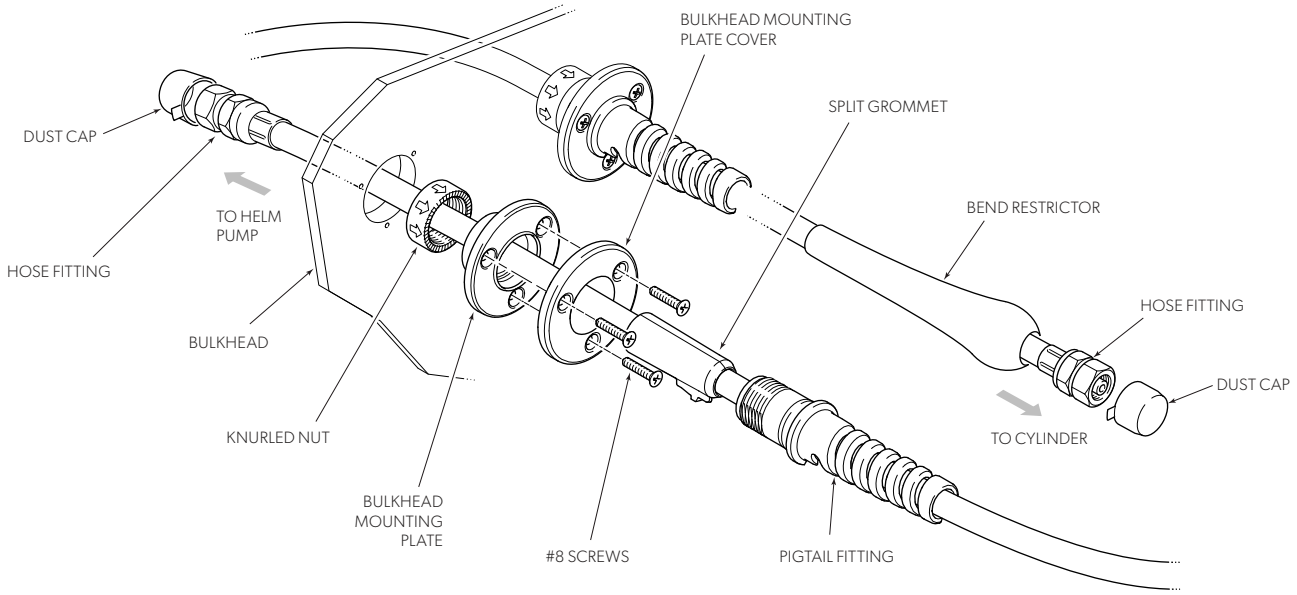


Figure 9-2. Field installed bulkhead, single hose kit, stainless bezels shown.

9.2.3 Field installed bulkhead fitting kits

Dometic field installed bulkhead fitting kits are available in for either single or dual hose applications.

Offering boaters a simple solution to cleanly route hoses through the hull while maintaining safety and aesthetics.

PART #	DESCRIPTION	REPLACES
HO7100	Field installed bulkhead, single hose, pair, stainless bezels	HO87XX and HO86XX
HO7105	Field installed bulkhead, single hose, pair, plastic mounts	HO81XX and HO82XX
HO7200	Field installed bulkhead, dual hose, stainless bezel	HO88XX and HO89XX
HO7205	Field installed bulkhead, dual hose, plastic mount	New

Table 9-3.

- Split grommet design allows for easy installation onto a hose assembly.
- Split pigtail with snap fit tabs provides positive feel.
- Increased inner diameter of plastic base plate allows crimped hose fitting to pass through the base plate.
- Stainless steel cover plates are available for both single and dual applications, providing cleaner styling and corrosion resistance while blending in with the boat's stainless trim.

9.2.4 How to measure hoses; single station, single cylinder, no bulkhead

NOTICE!

Correct hose length is crucial to the operation of your SeaStar steering system, please be sure that you take all the following measurements correctly to avoid damage to the steering hose.

Helm to steering cylinder. Using the illustrations below:

1. Measure from center of steering wheel to the starboard side wall.
2. Measure the intended path of the hoses from the starboard side wall to the center of the engine.
3. Round up the measurement to the nearest 'even' number and add 2 feet (0.6m). This is the length of hose kit required.
4. Order hose kit part no. HO59XX or HO69XX (item 1). The last two digits correspond to the length of hose.

Figure A. Single front mount cylinder
Note: cylinder body moves.

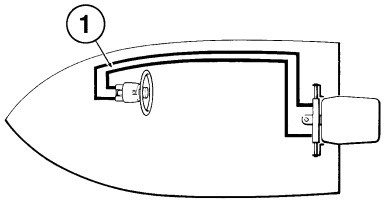


Figure B. Single side mount cylinder
Note: cylinder body stationary.

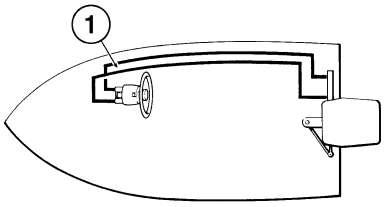


Figure C. Single splashwell mount cylinder Note: cylinder body stationary.

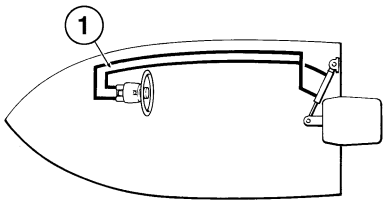


Figure 9-3.

9.2.5 How to measure hoses; single station, dual cylinders, no bulkhead

Helm to hose tee fittings. Using the illustrations below:

1. Measure from center of steering wheel to the starboard side wall.
2. Measure from the starboard side wall to the transom.
3. Measure from the transom to your hose tee fittings (item 6).
4. Round up the measurement to the nearest 'even' number. This is the length of hose kit required.
5. Order hose kit part no. HO59XX or HO69XX (item 1). The last two digits correspond to the length of hose.

Hose tee fittings to steering cylinders. Using the illustrations below:

1. Measure the intended path of the hoses from the tee fitting (item 6) to the center of the port side engine.
2. Round up the measurement to the nearest 'even' number and add 2 feet (0.6m). This is the length of the hose kit required.

3. Order hose kits part no. HO59XX or HO69XX (items 2 and 3). The last two digits correspond to the length of hose.

Figure D. Dual front mount cylinders

Note: cylinder body moves.

Figure E. Dual side mount cylinders

Note: cylinder body stationary.

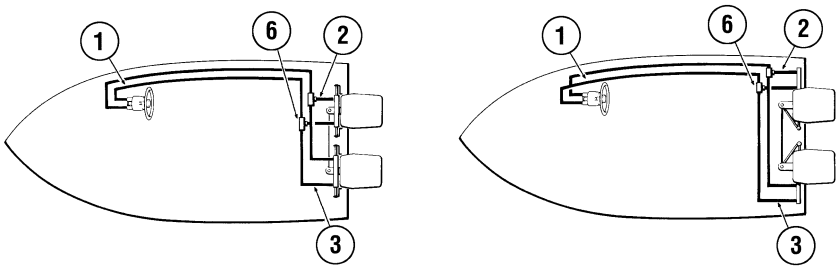


Figure 9-4.

NOTICE!

This configuration also requires the purchase of Tee fitting kit # HF5530.

9.2.6 How to measure hoses; single station, single cylinder, with bulkhead

Helm to steering cylinder. Using the illustrations below:

1. Measure from center of steering wheel to the starboard side wall.
2. Measure the intended path of the hoses from the starboard side wall to the center of the engine.
3. Round up the measurement to the nearest 'even' number and add 2 feet (0.6m). This is the length of the bulkhead hose kit required.
4. Refer to table 9-2 on page 9-2 to select a style of hose kit (item 4). The last two digits correspond to the length of hose.

Figure F. Single front mount cylinder

Note: cylinder body moves.

Figure G. Single side mount cylinder

Note: cylinder body stationary.

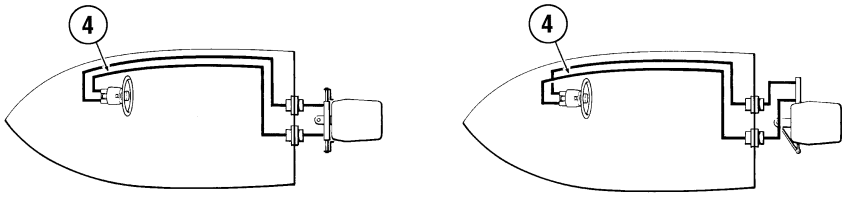


Figure 9-5.

9.2.7 How to measure hoses; single station, dual cylinders, with bulkhead

Helm to hose tee fittings. Using the illustrations below:

1. Measure from center of steering wheel to the starboard side wall.
2. Measure from the starboard side wall to the transom.
3. Measure from the transom to your hose tee fittings (item 6).
4. Round up the measurement to the nearest 'even' number. This is the length of hose kit required.
5. Order hose kit part no. HO59XX or HO69XX (item 1). The last two digits correspond to the length of hose.

Hose tee fittings to steering cylinders. Using the illustrations below:

1. Measure the intended path of the hoses from the tee fitting (item 6) to the center of the PORT side engine.
2. Round up the measurement to the nearest 'even' number and add 2 feet (0.6m). This is the length of hose kit required.
3. Order bulkhead hose kits part no. HO83XX, HO84XX, or field installable kits (items 4 and 5. The last two digits correspond to the length of hose. Refer to section 9.2.8.

Figure H. Dual front mount cylinders

Note: cylinder body moves.

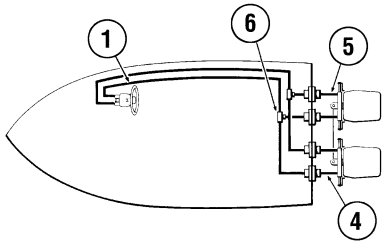


Figure I. Dual side mount cylinders

Note: cylinder body stationary.

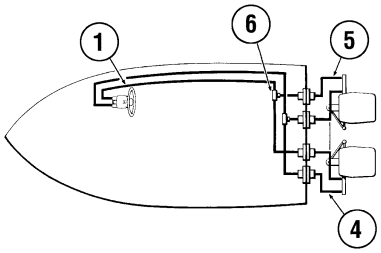


Figure 9-6.

NOTICE!

This configuration also requires the purchase of Tee fitting kit # HF5530.

9.2.8 Part numbers for figures A, B, C, D, E, F, G, H, and I

ITEM #	PART #	DESCRIPTION
1	HO59XX or HO69XX	Hose kit
2	HO59XX or HO69XX	Hose kit
3	HO59XX or HO69XX	Hose kit
4	HO83XX or HO84XX	Bulkhead hose kit (see Section 9.2 , and 9.3)
5	HO83XX or HO84XX	Bulkhead hose kit (see Section 9.2 , and 9.3)
6	HF5530	Tee fitting kit (3 per kit)

Table 9-4.

NOTICE!

See section 9.5 'Fittings and Fitting Kits' for add a station and/or autopilot fitting kits.

9.3 Additional stations or autopilot integration

9.3.1 Additional steering station or autopilot power pack

1. Determine the location of the 2nd station or power pack.
2. Measure along the intended path of the hose routing from the upper helm pump to the 2nd station or autopilot power pack.
3. Round up the measurement to the next even digit. This is the length of hose kit required.
4. Order hose kit(s) part number HO59XX or HO69XX. The last two digits correspond to the length of hose.

NOTICE!

a) All hoses should be routed with a gradual rise so that air will not be trapped in the lower station.

b) Some installations require more than 1 hose kit and additional fitting kits.

c) Minimum bend radius for hose is 2-1/2" (6 cm).

d) A compensating line is required between helm stations or the helm and autopilot power pack.

WARNING!

Do not cut hydraulic hose.

Figure J. 2nd steering station or autopilot power pack installation

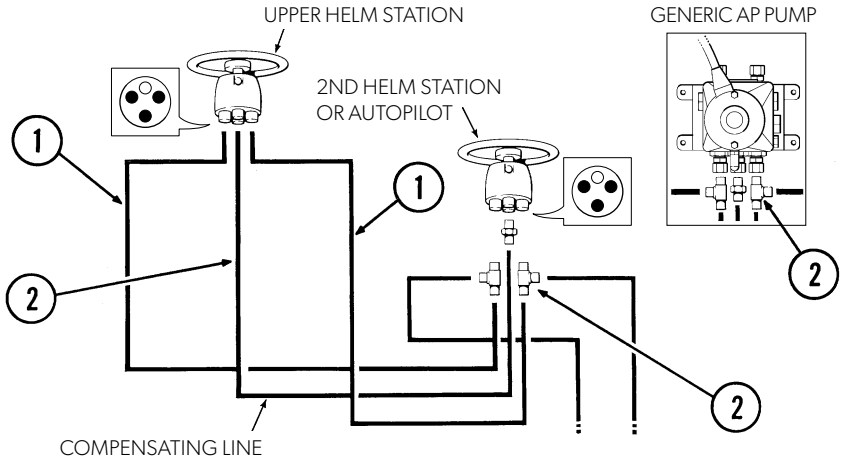


Figure 9-7. Note: Tee can be in helm or AP pump.

Parts list for figure J

ITEM #	PART #	DESCRIPTION	QTY. REQ.
1	HO59XX or HO69XX	Hose kit	1
2	HF6007	Fitting kit* (For use with -3 and -4 helms only)	1

Table 9-5. *Includes 25' of 3/8" dia. nylon tubing to be used for the compensating line only.

NOTICE!

For NPT helm pumps use kit # HF5501.

9.4 SeaStar inboard/sterndrive tubing

Two types of tubing materials are available for plumbing inboards & sterndrives.

1. Copper tubing 3/8" OD is recommended for long runs.
2. Nylon tubing 3/8" OD can be used on short runs, the smaller ID tubing will increase steering effort. (Used with 1.4 or 1.7 cu-in pumps only.)

Dometic recommends using SeaStar hoses in all inboard applications SeaStar hoses provide 20% less effort over nylon tubing.

NOTICE!
Nylon tubing can not replace hoses on systems with Autopilot or Power Assist systems. Nylon tubing can be used as the return or compensation line.

9.4.1 Nylon tubing

SeaStar 3/8" outside diameter nylon tubing can be used for;

a) SeaStar inboard and sterndrive systems with a 1.4 or 1.7 cu-in pump
b) BayStar steering tubing
c) Compensate line tubing

SeaStar 3/8" outside diameter nylon tubing is available in the following lengths:

LENGTH		TUBING PART #
FEET	(METERS)	
25' 50' 75'	(7.6 m) (16.2 m) (22.8 m)	HT5092 HT5095 HT5097

LENGTH		TUBING PART #
FEET	(METERS)	
100' 1000'	(30.5 m) (305.0 m)	HT5100 HT5101

Table 9-6.

NOTICE!
SeaStar 3/8" extruded nylon is not to be used as autopilot steering lines. Okay for compensation line tubing

NOTICE!
SeaStar 3/8" extruded nylon is not recommended for use in systems with SeaStar 2.0, 2.4 or any SeaStar PRO helm pumps. It is also not to be used in systems where total tubing runs exceed 100', in these cases SeaStar hoses and/or 3/8" copper tubing must be used.

WARNING!
Dometic recommends the use of SeaStar PRO (1500 psi) reinforced Kevlar hoses with SeaStar PRO helm systems.

9.4.2 Copper tubing

3/8" outside diameter copper tubing is recommended for SeaStar steering systems where the total length of tubing run exceeds 100 ft. [50 ft. x 2] (30.5 m [15.25m x2]).

Additional SeaStar hose kit part number HF5508 is required to connect the tubing to the cylinder.

3/8" copper tubing should be obtained through a local vendor based on the following tubing specifications.

Specification for copper tubing:
Soft annealed copper tubing, type 'L' produced under ASTM B280.

9.4.3 Determining the required length of tubing for single station configurations

From the illustrations (figures A and B), select the situation which best suits your application and note;

i) the type of drive system, and, **ii**) the number of steering stations.

Single station

1. From the illustration which best suits your application note the number of lengths of tubing and fitting kits required.
2. Measure along the intended path of tube routing for each of the tubing runs.
3. Determine if 3/8" nylon tube can be used or if copper tubing is required based on lengths of tubing runs required.
4. Total up the entire length of tubing required and round up to the next available tube kit length.

Figure A. Single inboard cylinder. Fittings required supplied with helm and cylinder.

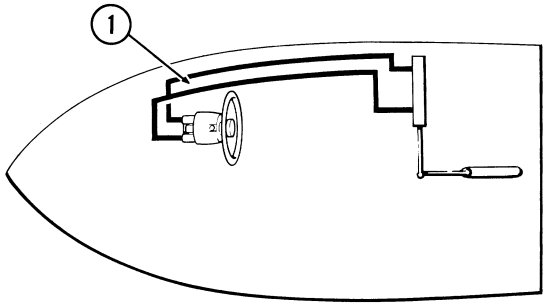


Figure 9-8.

Figure B. Single sterndrive cylinder. Fittings required supplied with helm and cylinder.

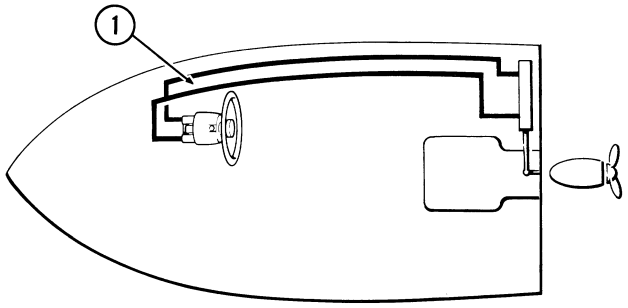


Figure 9-9.

Parts list for figure A and B

ITEM #	DESCRIPTION	QTY. REQ.
1	3/8" dia. nylon or copper tube (or SeaStar hose)	As measured

Table 9-7.

9.5 SeaStar fittings and fitting kits

9.5.1 Positionable O-ring hose fittings (ORB)

These fittings are made of corrosion resistant stainless steel and now thread into the cylinders/helms via positionable O-ring hose ports. Fittings can be easily orientated in any direction to accommodates tube routing.

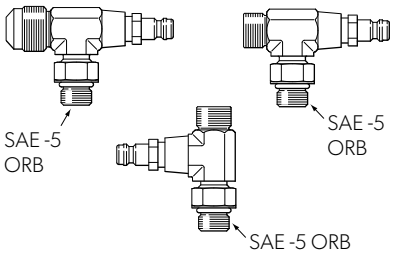
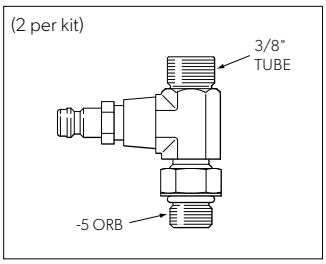


Figure 9-10.

CAUTION!
For use with -3 and -4 helms and cylinders only. Not for use in an NPT helm/cylinder hose fitting port.

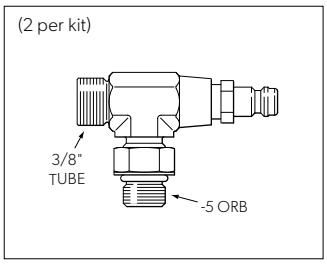
WARNING!
-3 and -4 helms and cylinders use ORB fittings. **Do not use NPT fittings**!

HF6001 Vertical bleeder tee



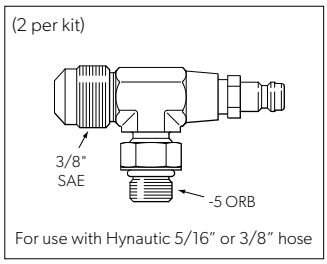
ORB cylinders/helms ONLY.

HF6002 Horizontal bleeder tee



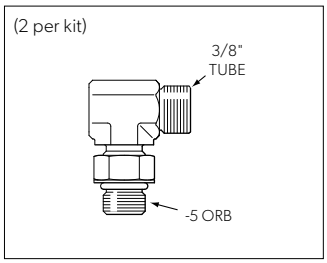
ORB cylinders/helms ONLY.

HF6003 Hynautic bleeder tee



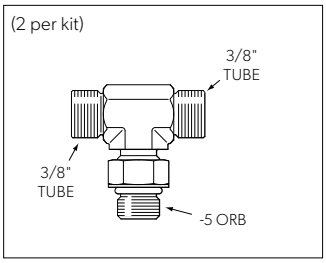
ORB cylinders/helms ONLY.

HF6004 Elbow fitting



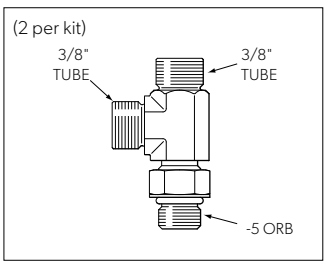
ORB cylinders/helms ONLY.

HF6005 Tee fitting



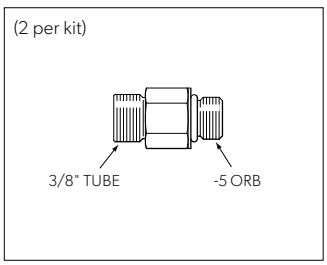
ORB cylinders/helms ONLY.

HF6006 Tee fitting



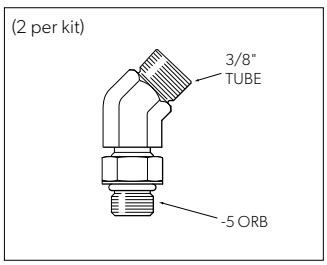
ORB cylinders/helms ONLY.

HF6009 Straight fitting



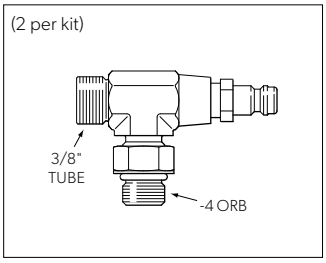
ORB cylinders/helms ONLY.

HF6011 45° fitting



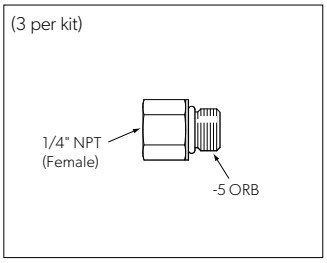
ORB cylinders/helms ONLY.

HF4203 Horizontal bleeder tee



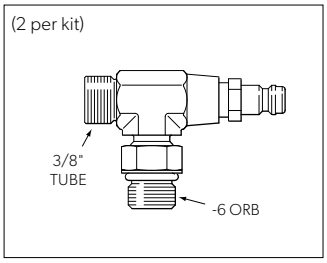
ORB BayStar cylinders ONLY.

HF6012 -5 ORB (M) – 1/4 NPT (F)



ORB cylinders/helms ONLY.

HF6013 Horizontal Bleeder Tee



ORB, Mercury Verado ONLY.

HF6007 Fitting Kit



ORB, add autopilot or second station.

EN

9.5.2 NPT fittings

All SeaStar manual hydraulic steering systems use the same style of fittings for all applications. These are 3/8" compression fittings which utilize a 9/16"–24 extra fine thread on the hose side of the fitting.

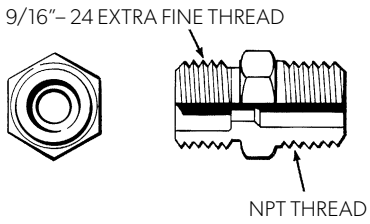
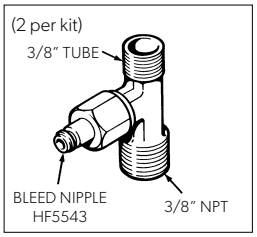


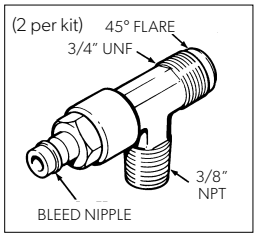
Figure 9-11. Typical NPT fitting.

CAUTION!
NPT fittings are not to be used in a -3 or -4 helm and/or cylinder (except HF5548). Doing so will result in irreparable damage to the helm/cylinder. Only use a SeaStar ORB hose fitting in a -3 or -4 helm and/or cylinder.

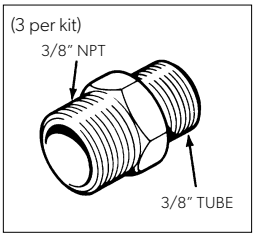
HF5518 Vertical bleeder tee



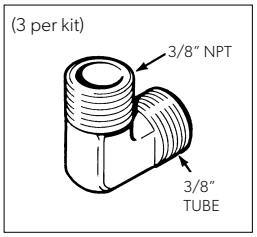
HF5519 Bleed tee (TM cyl.)



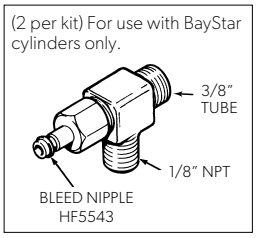
HF5532 Connector fitting



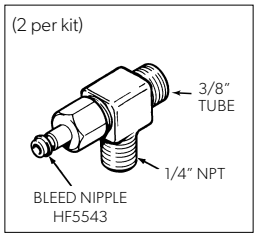
HF5534 Elbow fitting



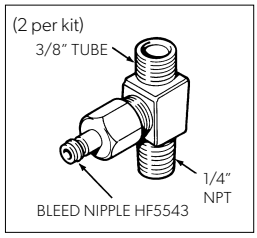
HF4202 Horiz. bleeder tee



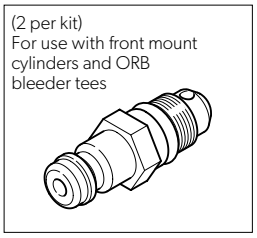
HF5520 Horiz. bleeder tee



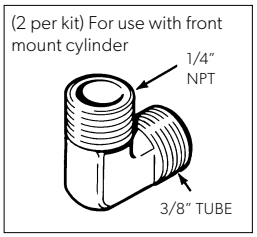
HF5521 Vertical bleeder tee



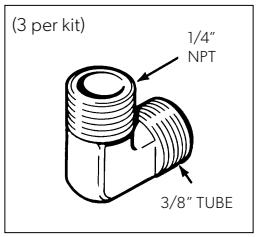
HF5548 Bleed nipple



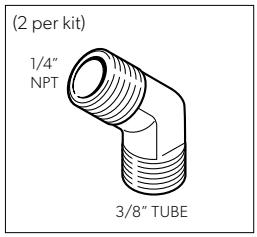
HF6145 SS elbow fitting



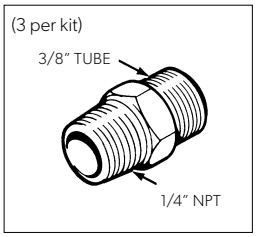
HF5529 Elbow fitting



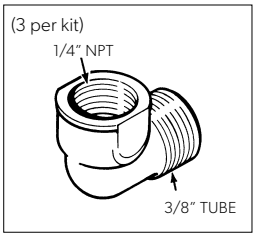
HF5540 45° fitting



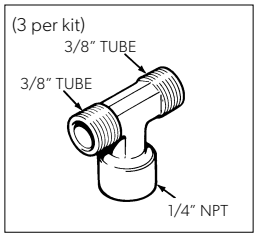
HF5528 Straight fitting



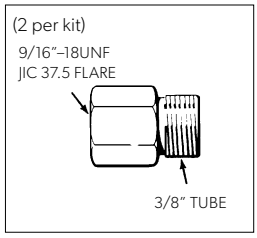
HF5538 Street elbow



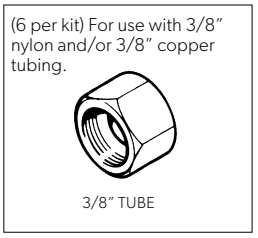
HF5533 Tee Fitting



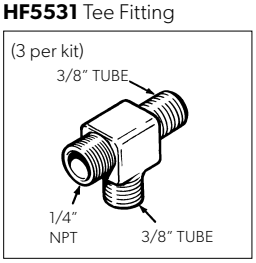
HF5566 Adapter Fitting



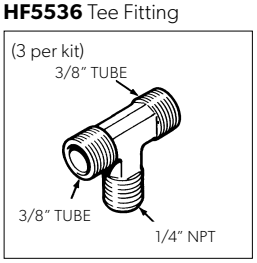
HF5526 Tube nut



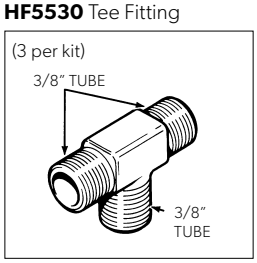
HF5531 Tee Fitting



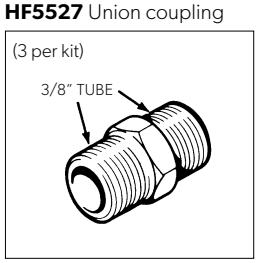
HF5536 Tee Fitting



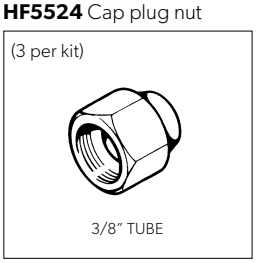
HF5530 Tee Fitting



HF5527 Union coupling



HF5524 Cap plug nut



9.6 Additional SeaStar steering station or autopilot kit

1. Refer to illustration figure 9-12.
2. Determine the location of the second station or autopilot power pack.
3. Measure along the path of the hose routing from the upper helm pump to the second station or autopilot power pack.
4. Select the steering hoses and compensate tubing required.

WARNING!
Do not cut SeaStar steering hose.

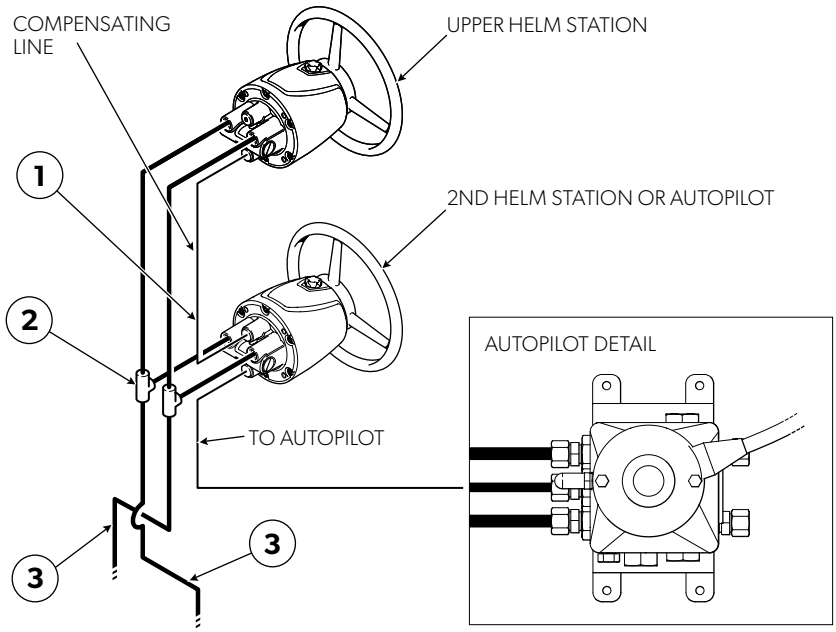


Figure 9-12.

ITEM #	DESCRIPTION	QTY. REQ.	REFERENCE
1	Compensate line	As measured	Section 10-4
2	Tee fittings	As required	Section 10-5
3	Steering hoses	As measured	Section 10-2

Table 9-8.

NOTICE!

a) A compensating line is required between helm stations or the helm and autopilot power pack.

b) All hoses should be routed with a gradual rise (particularly the compensating line) so that air will not be trapped in the lower helm station.

c) The second helm station or autopilot power pack may be connected at any location between the upper helm station and the cylinder. For existing single station installations the nylon or copper tubing may be cut and the tee fittings installed at any convenient location.

d) Tee fittings can be remote or installed in helm or autopilot.

Required details for the addition of an autopilot

1. SeaStar Helm pumps are fitted with a built in check valve which are required for installations of additional steering stations and/or autopilot pumps. If your helm pump is not fitted with an internal check valve an external valve will be required.
2. Autopilot mfg. requires the volume of your steering cylinder(s) to provide an adequate autopilot pump, refer to page 7-15 for cylinder specifications.

9.6.1 SeaStar hose fitting kit – part # HF6007

Application; add a 2nd station or autopilot with SeaStar hoses.

CAUTION!
For use with ORB helms only. (For NPT helms use kit# HF5501.)

NOTE
HF6007 fitting kit is to be used when the system has been plumbed with SeaStar steering hose only.

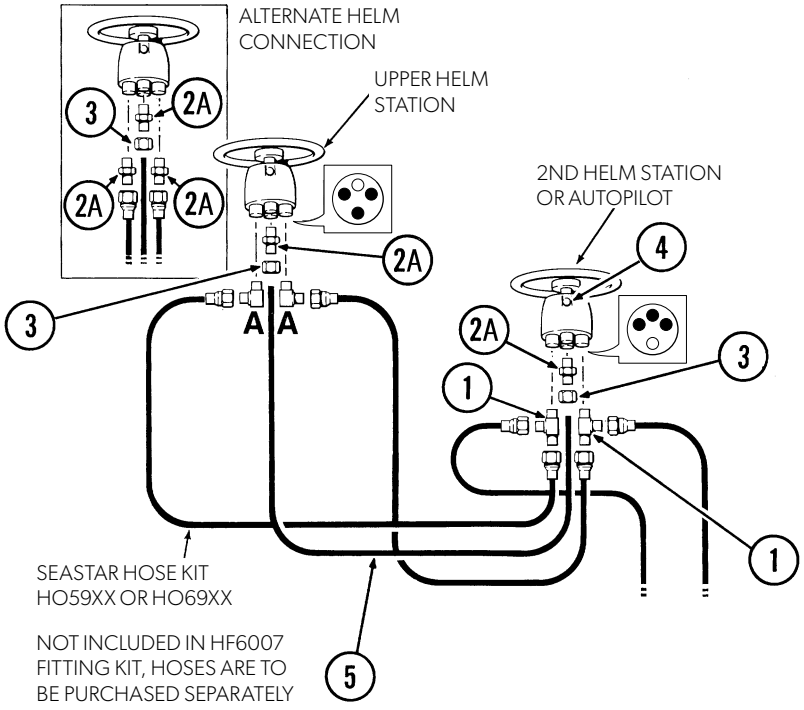


Figure 9-13.

ITEM #	PART #	DESCRIPTION	QTY. PER KIT
1	HF6006	Tee Fitting, 1 End = -5 ORB, 1 end = 3/8" tube, center = 3/8" tube	2
2A	HF6009	Connector fitting, -5ORB — 3/8" tube	2
2B	HF5528	Autopilot adapter fitting, 1/4" NPT — 3/8" tube	3
3	HF5526	Nylon tube nut, 3/8" dia.	6
4	HA5432	Non-vented filler plug	1
5	HT5092	SeaStar nylon tube, 3/8" dia.	25ft
A*	HF6004	Elbow, 3/8" tube (m) — -5 ORB	2

Table 9-9. * Supplied with helm pump.

NOTICE!

Typical single station plumbing layout shown.

When using other autopilot pumps, Tee fittings can be in either the helm or autopilot pump.

SeaStar hose autopilot powerpack connection

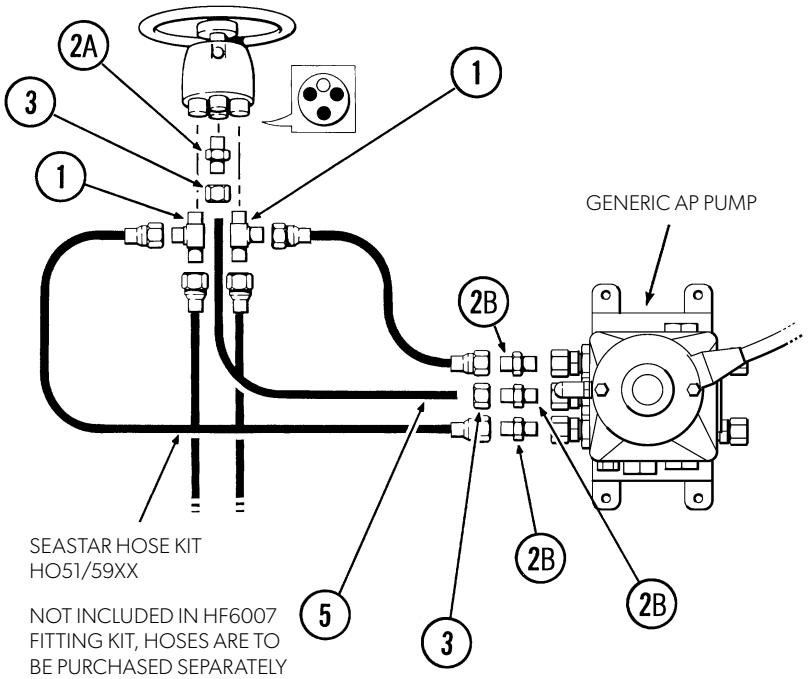


Figure 9-14.

CAUTION!

Do not cut SeaStar steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.

9.6.2 Inboard or sterndrive system fitting kit using 3/8 OD copper tubing – part # HF6010

Application; fitting kit to add a 2nd station or autopilot to an inboard or sterndrive system using 3/8" OD copper tubing only..

CAUTION!

For use with ORB helms only. (For NPT helms use kit# HF5502.)

NOTE

Used in systems plumbed with 3/8" diameter copper tube. Nylon tubing ID is too small for autopilot pumps.

NOTICE!

Typical plumbing layout shown.

When using a SeaStar autopilot pump, always refer to the installation manual shipped with your autopilot pump.

NOTICE!

When using other autopilot pumps, Tee fittings can be in either the helm, autopilot pump, or remote.

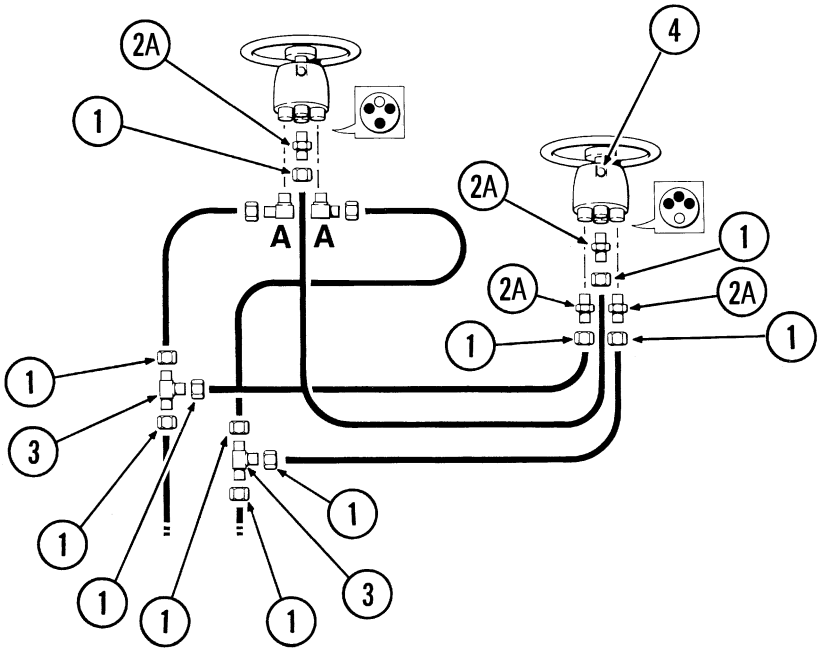


Figure 9-15.

ITEM #	PART #	DESCRIPTION	QTY. PER KIT
1	HF5526	Tube nut, 3/8" dia.	12
2A	HF6009	Connector fitting, -5ORB – 3/8" tube	2
2B	HF5528	Autopilot adapter fitting, 1/4" NPT – 3/8" tube	3
3	HF5530	Tee fitting 3 ends, 3/8" tube	2
4	HA5432	Non-vented filler plug	1
A*	HF6004	3/8" elbow, -5 ORB	2

Table 9-10. * Supplied with helm pump.

Inboard or sterndrive system autopilot powerpack connection using 3/8 OD copper tubing

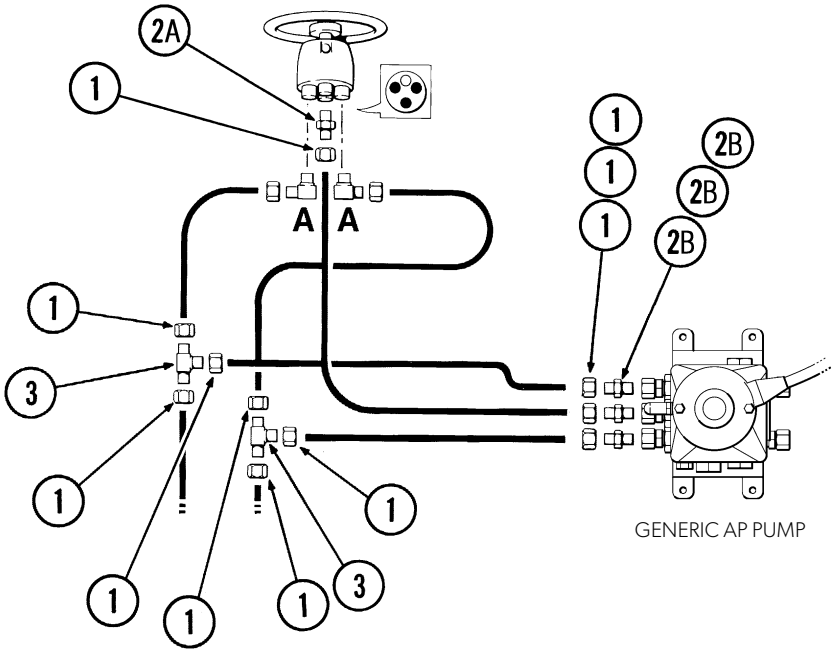


Figure 9-16.

9.6.3 Copper tube to nylon tube fitting kit – part # HF5507

Application; fitting kit to connect 3/8" diameter copper tubing to SeaStar cylinders using 3/8" diameter nylon tubing.

NOTICE!

Do not use with SeaStar outboard cylinders and/or SeaStar sterndrive cylinder # HC5332. Only use with 1.4 cu-in and 1.7 cu-in helm pumps.

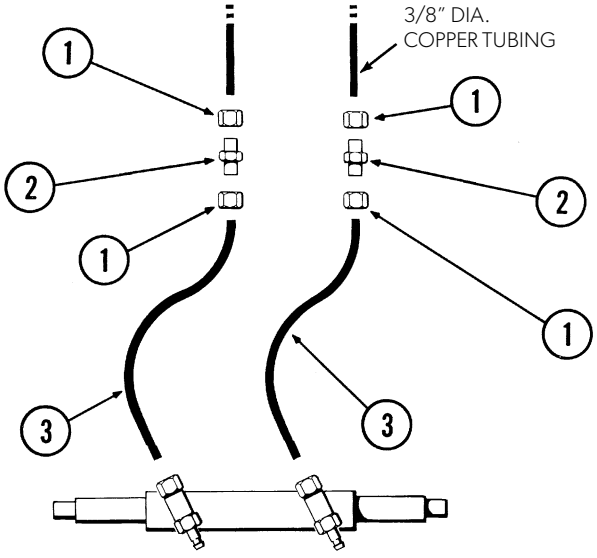


Figure 9-17.

ITEM #	PART #	DESCRIPTION	QTY. PER KIT
1	HF5526	Tube nut , 3/8" dia.	4
2	HF5527	Connector fitting, 3/8" tube — 3/8" tube	4
3	795628	Nylon tubing, 3/8" dia.	6ft

Table 9-11.

9.6.4 Copper tube to SeaStar hose fitting kit – part # HF5508

Application; fitting kit to connect 3/8″ diameter copper tubing to SeaStar cylinders using SeaStar hose.

CAUTION!
Do not cut SeaStar steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.

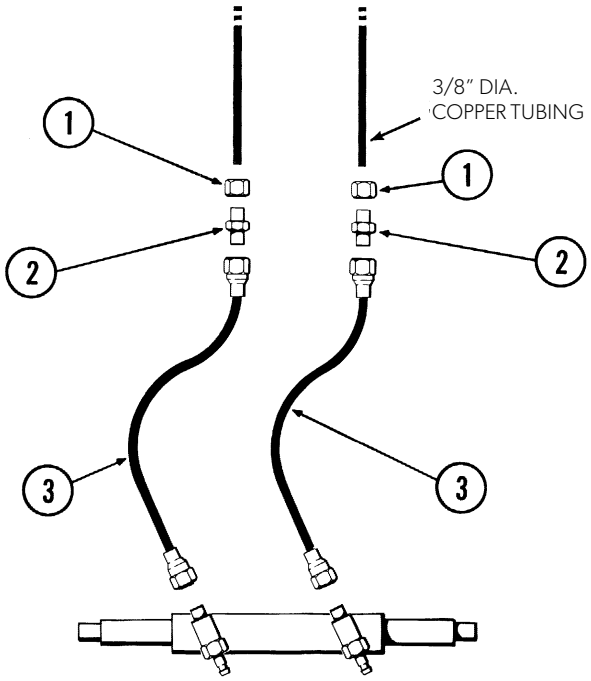


Figure 9-18.

ITEM #	PART #	DESCRIPTION	QTY. PER KIT
1	HF5526	Tube nut, 3/8″ dia.	2
2	HF5527	Connector fitting, 3/8″ tube — 3/8″ tube	2
3	N/A	18″ Hose c/w fittings	2

Table 9-12.

Notes

10 Electric Steering

Welcome to the world of electronic power steering. Please take a few minutes to familiarize yourself with the system overview and the first time operation sections. An understanding of the system will assure your safety and help you get the most enjoyment from your Optimus EPS steering system.

NOTE
All Optimus products are only available from an Optimus dealer please refer to www.dometic.com for more information and to find a dealer near you.

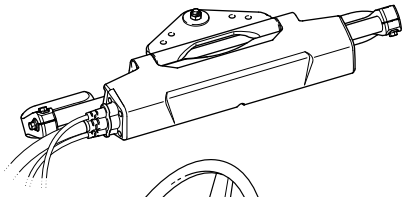
10.1 Optimus EPS — electric actuator

10.1.1 Overview

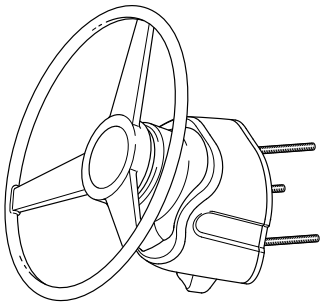
Optimus EPS with electric actuator is the marine industry's first fully electric, retrofitable, steer-by-wire system for outboard engines. This premium system is engineered for simple installation, with fewer parts than our standard electro-hydraulic EPS, no hoses to route, and no hydraulic system to purge. Extensive safety features including redundant communications, self-monitoring, and fault alerts, give years of safe and reliable operation.

The system consists of the major components listed below. Figure 10-2 shows these components in a schematic system diagram.

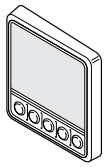
A single actuator and twin engines with tie bar option is also available. visit www.dometicsystembuilder.com



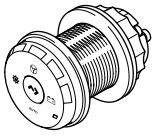
Electric steering actuator and steering control unit (SCU)
The electric steering actuator is a state-of-the-art device that converts the rotation of a brushless DC motor into precise linear motion and position control. It mounts directly to the outboard motor in place of a conventional hydraulic steering cylinder.



Electronic helm
The helm converts steering wheel movement into digital messages that are sent over CAN1 to the SCU. A system of friction plates in the helm allow the steering effort to be adjusted according to a set-point received from the SCU. (A steering wheel is not included with the Optimus EPS system.)



CANtrak display
The CANtrak displays system status and fault information and enables the operator to make changes to user-adjustable steering settings (when so configured by the installer). It is also used to activate the optional SeaWays autopilot and SeaStation GPS anchoring features on boats with the Optimus 360 joystick control system. Authorized installers have access to additional menus with system setup and calibration tools.



Optimus Link
The new Optimus Link UI introduces a refined design that occupies less dash space, creating a clean, organized dashboard layout. This minimalist look complements any vessel's interior, while enhancing usability with intuitive controls. Offered as a lower-cost alternative to the color display, the Optimus Link UI makes electronic power steering more accessible than ever. Single electric actuator or twin engines with tie bar.

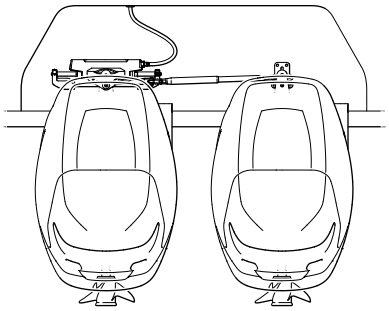


Figure 10-1. Single actuator twin engines.

CAN networks

CAN (controller area network) is a serial network protocol that is widely used in marine and automotive control systems. Each device (node) on the network can send and receive data using specially formatted messages. The ability to reliably communicate data between devices is what enables the steer-by-wire functionality of Optimus EPS.

Optimus EPS uses up to three independent CAN networks, designated CAN1, CAN2, and CAN3.

- CAN1 is a low-speed, fault-tolerant network with redundant power wiring. It is used for safety-critical communication between the helm and SCU.
- CAN2 is a high-speed network used to communicate with a third-party autopilot, and with a joystick and shift/throttle controls on an Optimus 360 joystick control system. Use of this network is optional on single-engine systems.
- CAN3 is a public network using the NMEA 2000 protocol. The Optimus system broadcasts public messages onto this network and monitors the network for engine RPM.

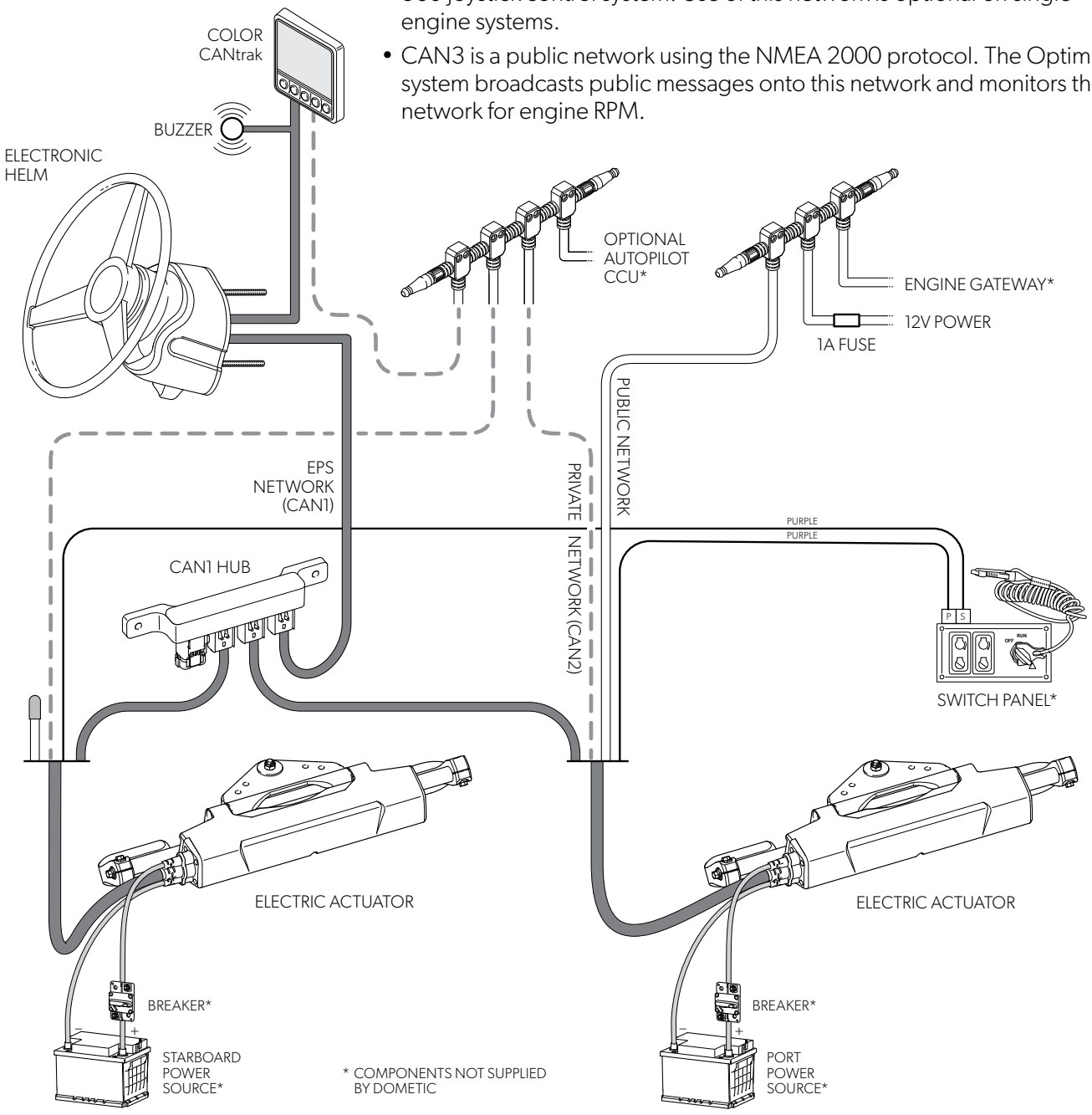


Figure 10-2. Optimus EPS electric actuator system diagram, single station, twin engine.

10.1.2 Electric actuator parts list

Typical installation shown. Refer to dometicsystembuilder.com for engine applications.

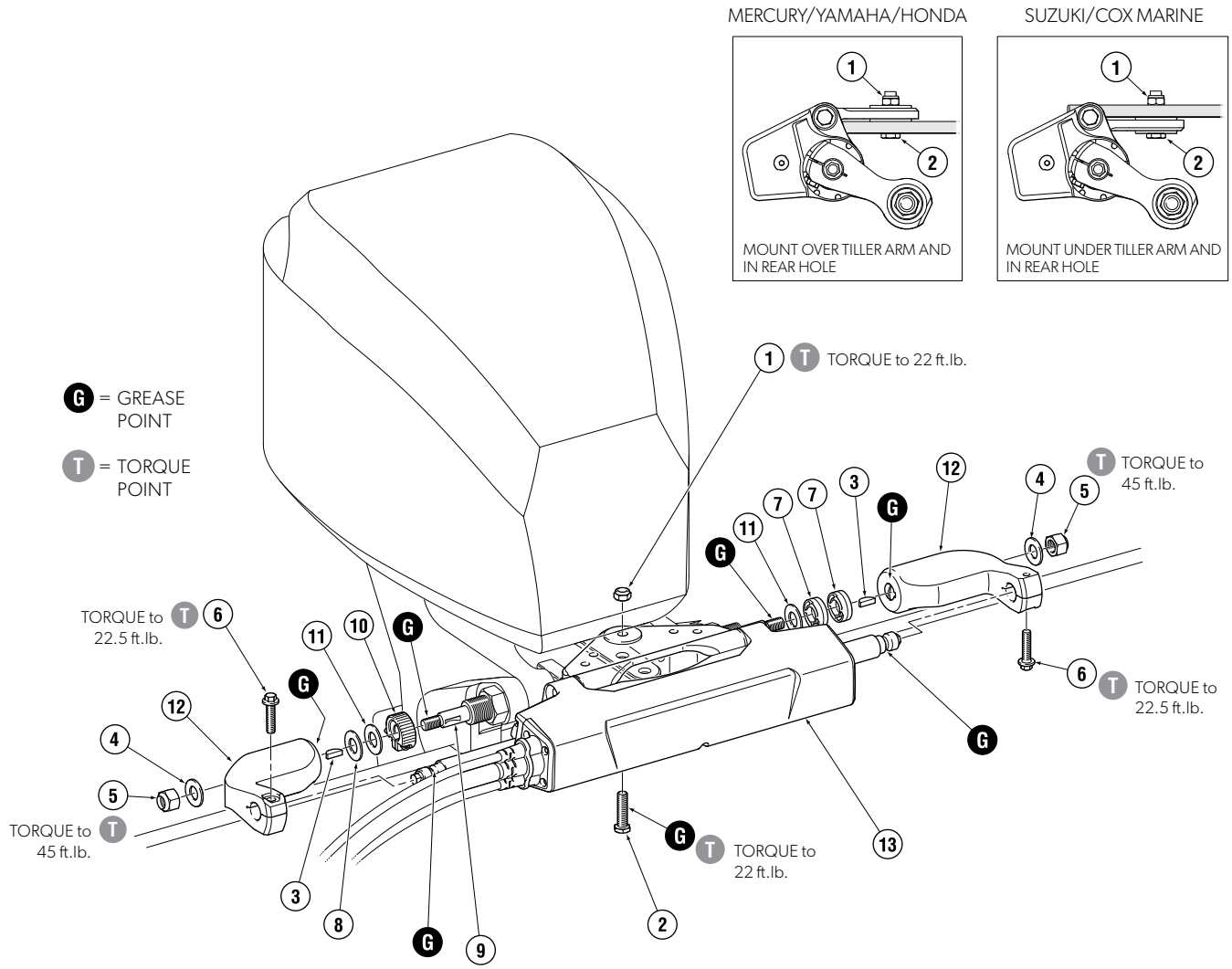


Figure 10-3.

ITEM	PART #	QTY	DESCRIPTION
1	HA5822	1	Nut, 3/8" NF Nyloc® SS
2	HA5822	1	HHCS 3/8" UNJFX 1.35 HSS
3	HP6192	2	Key, support rod
4	HP6192 HP6097	2	Washer, flat, 1/2" SS
5	HP6192 HP6097	2	Nut, 1/2" NF Nyloc® NI plate Br
6	HP6192	2	Screw, flange, 5/16"
7	HP6033	2	Spacer, thick

ITEM	PART #	QTY	DESCRIPTION
8	HP6033	1	Spacer, thin
9	HP6097	1	Support rod
10	HP6033	1	Adjusting nut and screw, SS, teflon coated
11	HP6033	2	Washer, flat, 5/8" SS
12	HP6192	2	Support brackets
13	EA1XXX	1	Electric actuator

10.1.3 System specifications

Operating voltage	12V DC nominal (9V min/16V max per SAE J1455)
Current draw, average	8A per actuator
Current draw, peak operating	40A per actuator
Current draw, maximum	55A per actuator
Circuit breaker rating	60A per actuator (not supplied by Dometic)
Number of wheel turns	Variable from 3.5 to 8
Steering angle	Up to 30° in each direction

10.1.4 Actuator harnesses

The actuator harness, ordered separately from the actuator, is a bundle of three cables: two DC power supply cables and a communications cable with multiple pigtails.

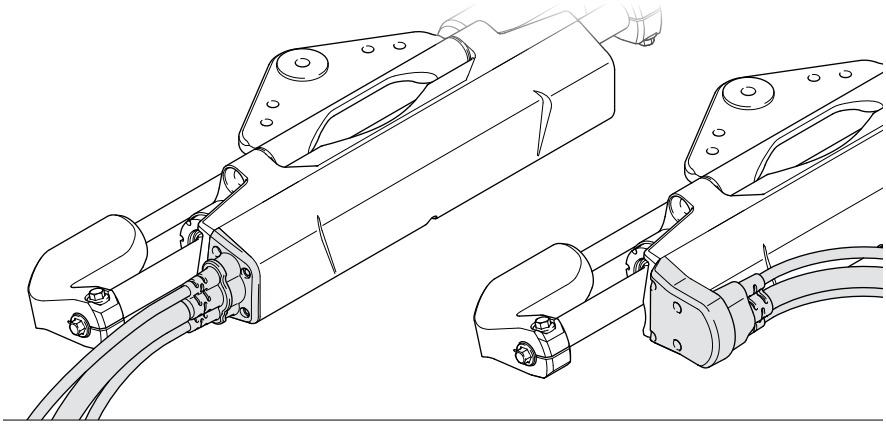


Figure 10-4. Straight actuator harness, and 180° actuator harness.

The harness is available with different CAN1 lengths, and in straight and 180° connector styles, to suit your installation requirements. Not all parts of the harness are the same length; table 10-1 shows the length of each component of the harness. When determining which harness to order, consider:

- Two harness styles are available for the actuator in order to meet the minimum bend radius of the cables. The straight harness is for boats with tight clearance to the bottom of the splashwell and the 180° harness is for boats with tight clearance to the side of the splashwell. The splashwell clearance requirement for the two harness styles are shown in figure 10-5 and figure 10-6.
- The longer harnesses are designed for single-engine applications in which the helm station can be reached without extending the CAN1 harness.
- In multi-engine applications you will need to use a CAN1 hub or a Y-harness to join both CAN1 harnesses together at the aft of the boat. You may need to use different harness lengths for the port and starboard actuator if you locate the hub/Y-harness on one side of the boat.

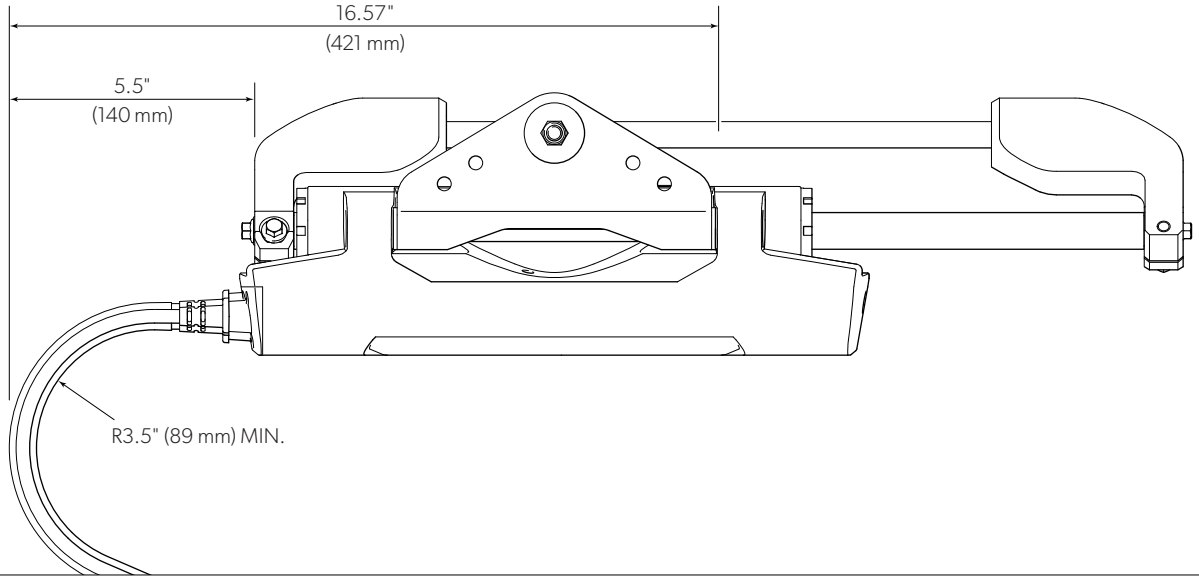


Figure 10-5. Minimum clearance for straight actuator harness.

The 180° actuator harness exits out toward the port side of the actuator, wrapping around the front of the actuator housing. This is useful for boats with limited splashwell side clearance. Be sure to check for adequate splashwell depth when using the 180° harness as it protrudes farther out from the front of the actuator.

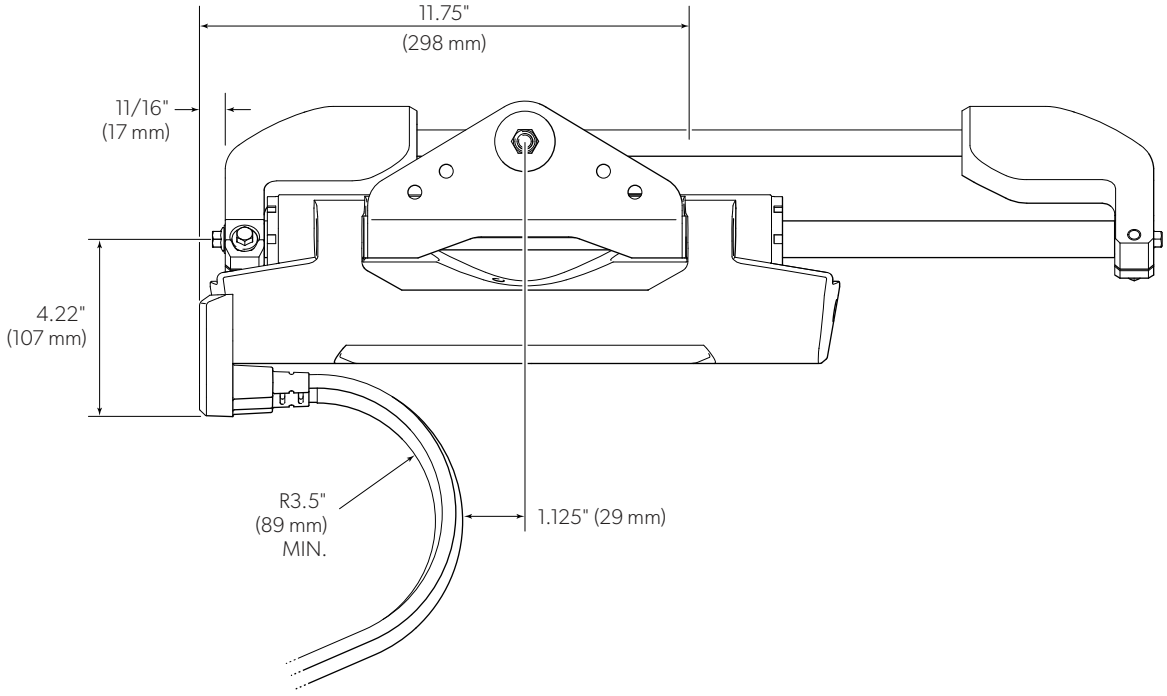


Figure 10-6. Minimum clearance for 180° actuator harness.

			HARNESS COMPONENT LENGTH, FT (M)				
NOMINAL LENGTH	**PART NO.**	**STYLE**	**BATTERY**	**IGNITION**	**CAN1**	**CAN2**	**CAN3**
12′	CM30012	Straight	12 (3.6)	30 (9.1)	12 (3.6)	12 (3.6)	12 (3.6)
18′	CM30018	Straight	12 (3.6)	30 (9.1)	18 (5.5)	18 (5.5)	18 (5.5)
12′	CM31012	180°	12 (3.6)	30 (9.1)	12 (3.6)	12 (3.6)	12 (3.6)
18′	CM31018	180°	12 (3.6)	30 (9.1)	18 (5.5)	18 (5.5)	18 (5.5)

Table 10-1.

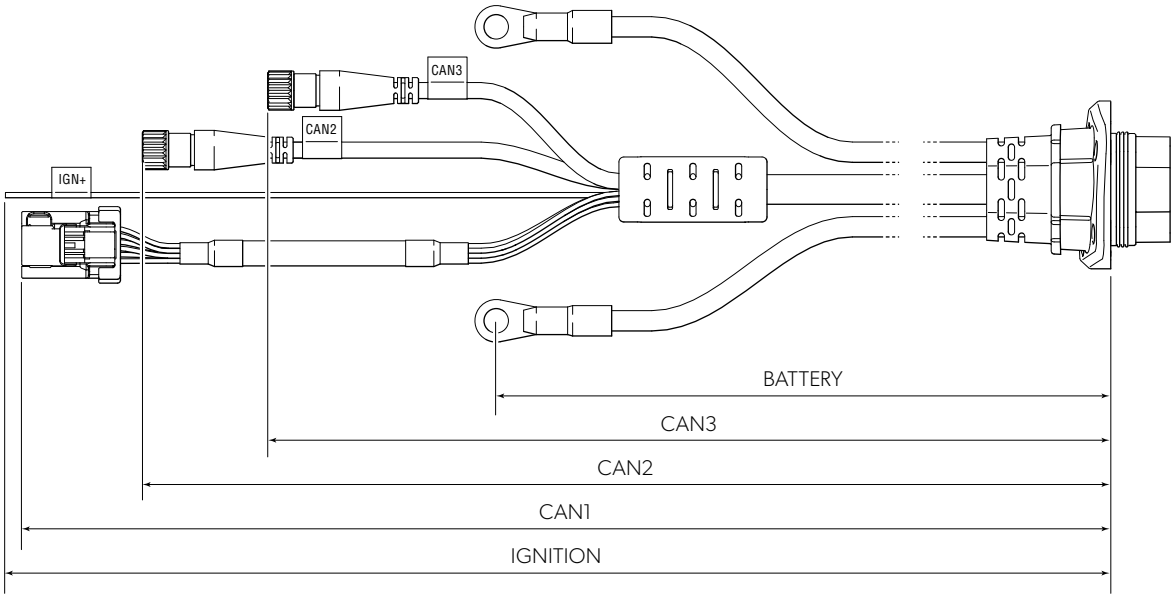


Figure 10-7. Nominal harness lengths.

10.1.5 Electric actuator for Bass boats

The EA1300 and EA1400 steering systems are specifically developed for traditional Bass boats. Listed below are the performance differences from the standard EA1000 and EA1100 models. Vessels that are not Bass style boats are best served by the EA1000 and EA1100 steering actuators.

Features

- Very low free play at steering wheel — helps control chine walk.
- Steering response time and speed is much quicker with little effort.
- Symmetric helm feel when turning to port or starboard.
- Faster steering response with no load dependent variation.
- Higher precision control which means no steering creep.
- Higher position holding power against back driving load.
- Programmed helm resistance for high speed steering wheel stability.
- Number of turns default set to 3.5 with no variation due to load.
- The electric steering system removes all hydraulic steering fluid from the boat — no bleeding.
- Simpler and faster installation with fewer splash well perforations.

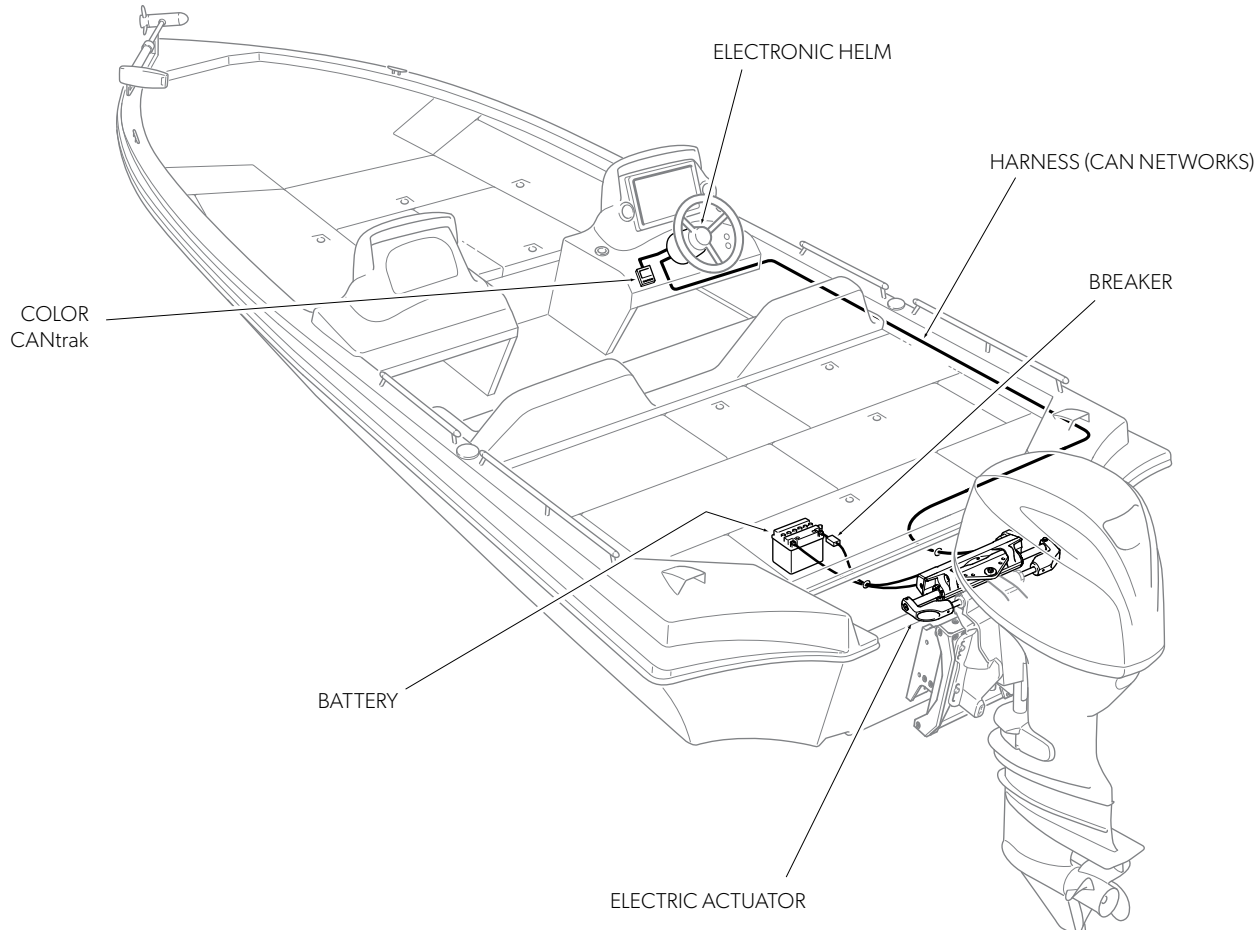


Figure 10-8. Electric bass boat (for reference only).

Electric vs. Hydraulic comparison

	(OPTIMUS EPS)	HYDRAULIC (SEASTAR PRO)
Steering system weight	Total 30 lbs (Helm 4 lbs, Cylinder 17 lbs, Harness 8 lbs, Display 1 lb)	Total 23 lbs (Helm 6.5 lbs, Cylinder 10 lbs, 16ft Hose 3 lbs, Oil 3.5 lbs)
Current draw	Low speed 4 amps average Medium speed 8 amps average High speed 12 amps average	Low speed 0 amps Medium speed 0 amps High speed 0 amps
Speed	3.5 turns LTL 30° a second: center to hard over 1 second	4.2 turns LTL varies with load: At load: center to hard over >2 seconds
Reaction time at load	100 milliseconds from movement at helm to movement at cylinder	300 milliseconds from movement at helm to movement at cylinder
Running dead band	1°	2°
Symmetric helm feel	Yes	No
Running backlash	0°	5°
Servicing	Annual greasing of support rod and brackets	Annual greasing of support rod and brackets Flush and change hydraulic fluid 2 years Annual bleeding

Table 10-2.

Order guide

The bass boat electric steering is compatible with the following engines. It is currently not rated for engines greater than 250 HP.

ENGINE MFR.	MODEL	BASS BOAT ACTUATOR
Yamaha	VF150 HP – VF250HP SHO	EA1300
Mercury	All 150 HP ProXS – 250 HP ProXS	EA1300
Suzuki	DF250 HP SSTL	EA1400

Table 10-3.

NOTE
For bass boats using any engine not on this listed in table 10-3, please contact your Dometic representative.

- In accordance with ABYC guidelines, the steering system should be installed utilizing the 4 inch color display (CANtrak) set in a position where the vessels operator can clearly see the screen. This is required in order to observe steering systems status and receive warnings.
- A CANtrak display is not required if any of the following compatible Garmin products are fitted, which are able to display the Optimus steering systems status (please refer to the Garmin website for a current list of compatible displays).
  - GPSMAP® 74xx / 7600
  - GPSMAP® 7x2 / 9x2 / 12x2
  - GPSMAP® 10x2 / 12x2 (Keyed)
  - GPSMAP® 8400 / 8600
  - GPSMAP® 7x2 / 9x2 / 12x2 Plus
  - GPSMAP® 8700 Black Box
  - Yamaha CL7
  - Simrad (coming soon)*

NOTE
A CANtrak display is required for system updates and troubleshooting

** Please visit Simrad website for a current list of compatible displays.*

QR CODE: www.dometicsystembuilder.com
The www.dometicsystembuilder.com utility can be used to select a system.

10.1.6 Electric actuator for inboard boats

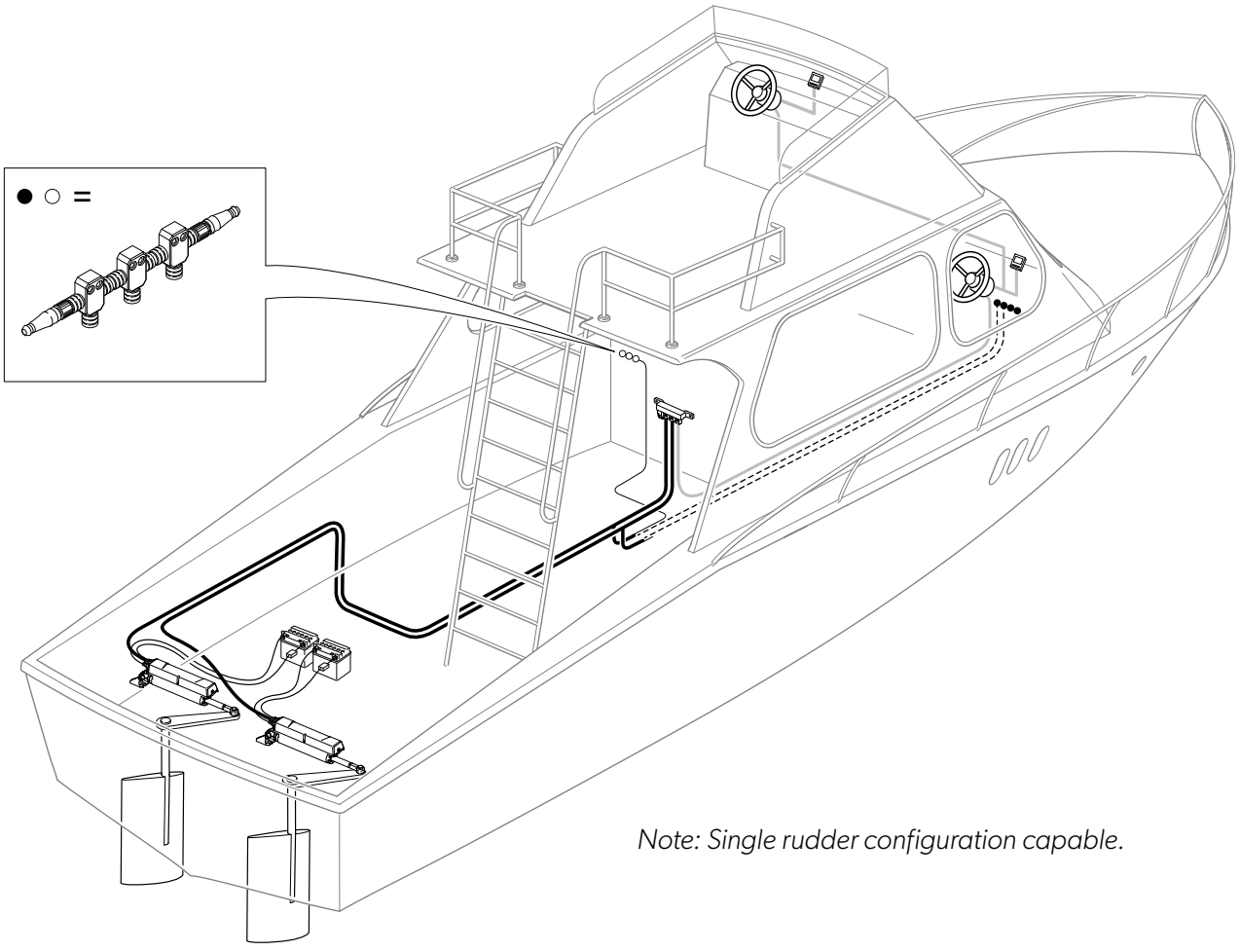
The Optimus 3000 series electric steering system is designed to enhance the handling capability of your inboard boat.

Features

- No load on the steering wheel provides effortless smooth steering
- Zero free play at steering wheel – quick response
- Rapid steering response time
- Symmetric helm feel when turning to port or starboard
- Programmed helm resistance for high and low speed steering wheel stability
- Number of turns vary from 3.5-8.5 based on speed and application
- NMMA, ABYC, CE, ISO and SAE electrical and environmental requirements
- 12 VDC
- Single and dual rudder applications

Ideal for vessels approx. under 40 feet inc.

- Most single and twin inboard propulsion boats
- Single and multi-helm (up to 3) station boats
- Inboard yachts, catamarans, cruisers, and sport fishing yachts
- Electric propulsion vessels



Note: Single rudder configuration capable.

Figure 10-9. Electric inboard boat (for reference only).

Mounting dimensions

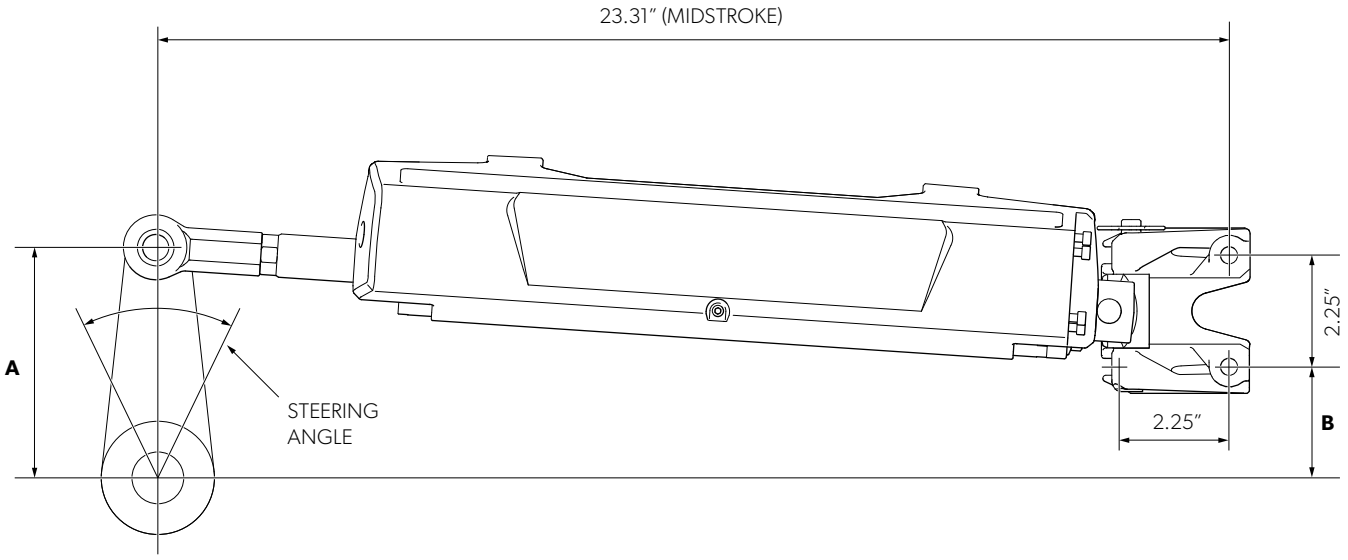


Figure 10-10. Electric inboard actuator EA3000 dimensions.

STEERING ANGLE							
25°		30°		35°		40°	
A	B	A	B	A	B	A	B
9.46"	7.45"	8.00"	5.80"	6.97"	4.58"	6.22"	3.64"
240 mm	189 mm	203 mm	147 mm	177 mm	116 mm	158 mm	92 mm
12860 in-lb		10390 in-lb		8565 in-lb		7150 in-lb	
1453 Nm		1051 Nm		968 Nm		808 Nm	

Table 10-4.

Dimension **A**: Tiller arm length.
Dimension **B**: Foot bracket location.

NOTE
For reference only, please contact sales representative for assistance.

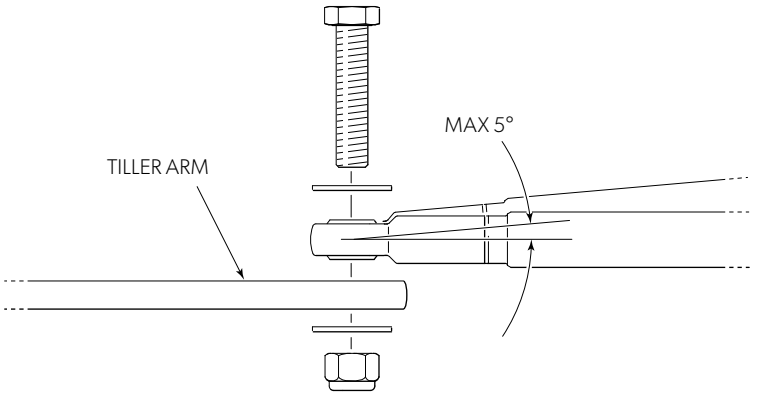


Figure 10-11. Electric inboard actuator attachment to tiller arm, recommended per ABYC.

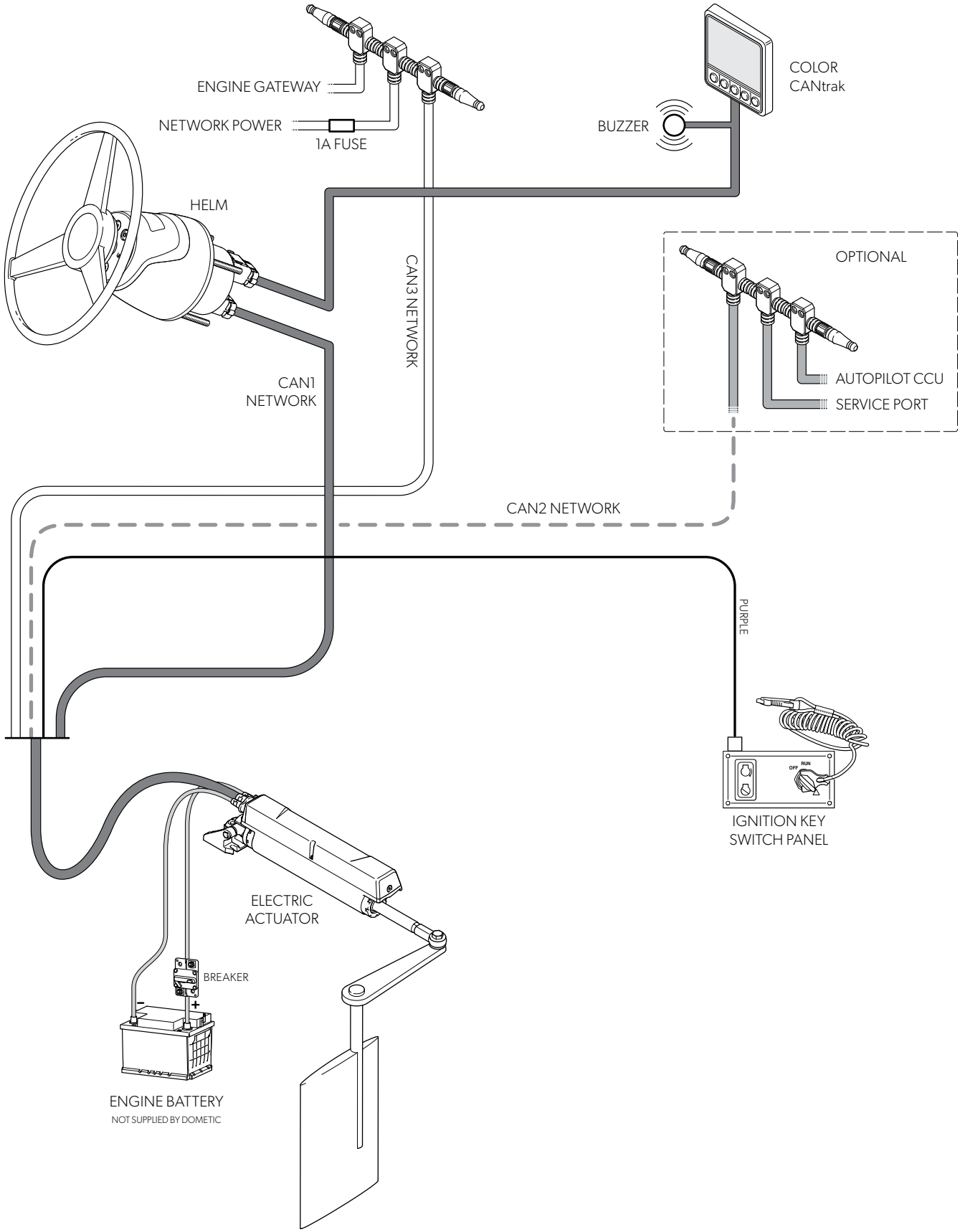


Figure 10-12. Electric inboard system diagram, single actuator (for reference only).

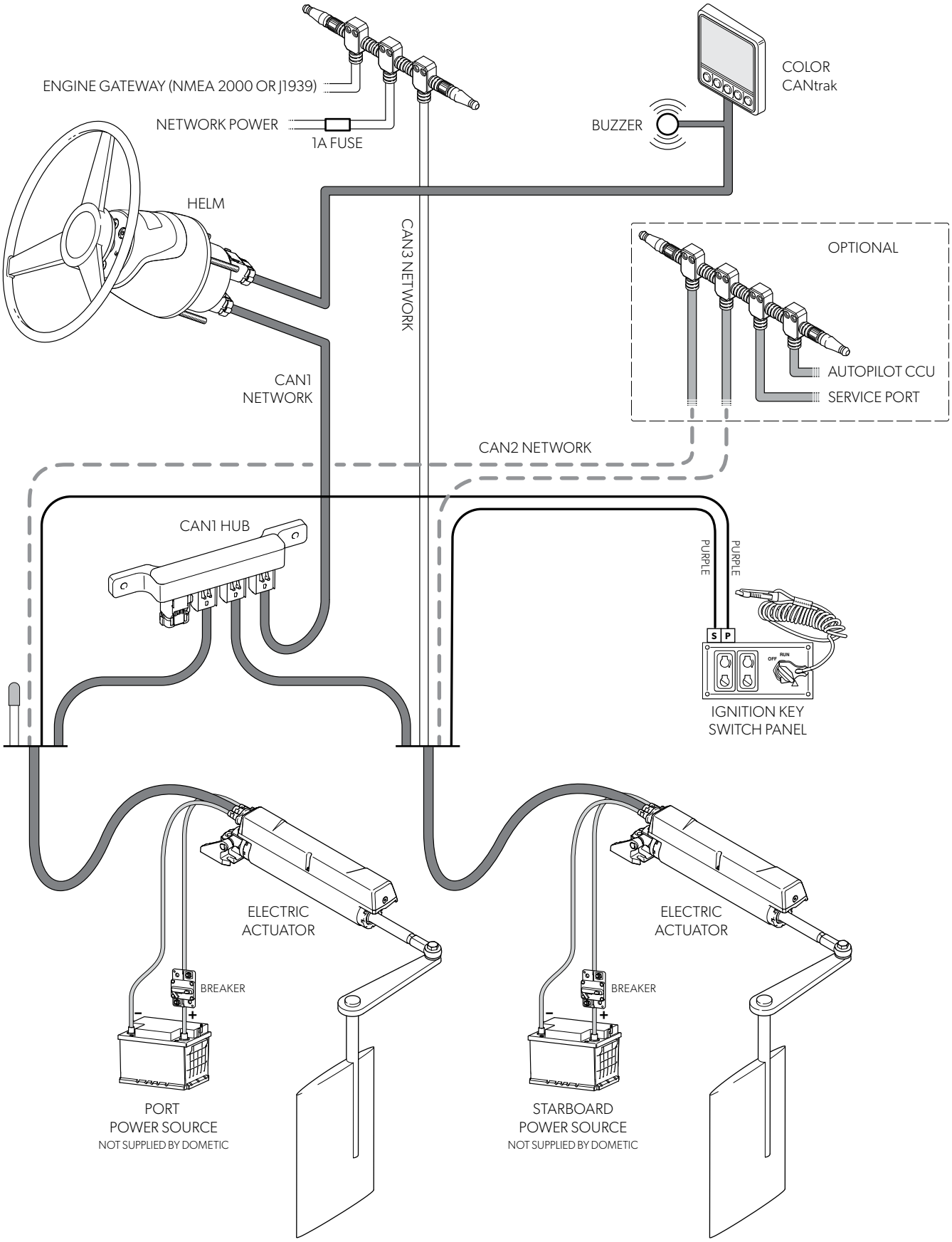


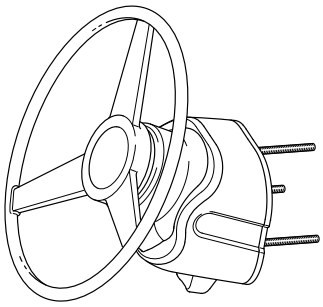
Figure 10-13. Electric inboard system diagram, dual actuator (for reference only).

10.2 Optimus EPS — electro/hydraulic

10.2.1 Overview

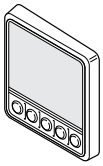
Optimus EPS is a steer-by-wire system that replaces a traditional hydraulic helm with an electronic helm that communicates over a serial data network. This state-of-the-art system incorporates many advanced features to make it safe and reliable. These features include redundant sensors, fault-tolerant communications, extensive self-monitoring, and fault communications to notify and advise the operator in case of a system fault.

The Optimus EPS system consists of several major components, listed below. Refer to figure 10-14 through figure 10-17 to see these components in a schematic system diagram.



Electronic helm

The helm converts steering wheel movement into digital messages that are sent over the network to the pump control module (PCM).
A system of friction plates in the helm allow the steering effort to be adjusted according to a set-point received from the PCM. (A steering wheel is not included with the Optimus EPS system.)



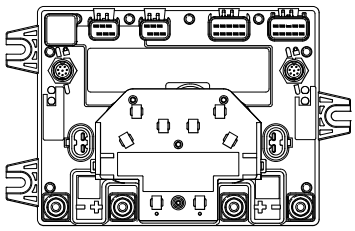
CANtrak display

The CANtrak display is a small color LCD that displays system status and fault information to the operator. It can also be used to make changes to user-adjustable steering settings, such as helm effort and number of turns, when enabled by the boat builder or dealer.



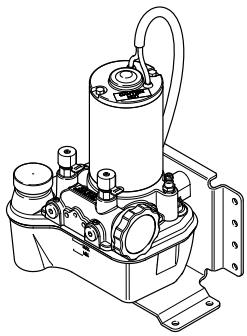
Dash panel

Standard on single-engine outboard systems, the dash panel has an LED to indicate system status and a pushbutton for alarm acknowledgment.



Pump control module (PCM)

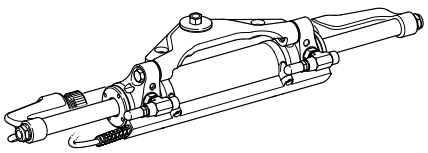
The PCM receives wheel movement messages from the helm(s) and operates the hydraulic steering pumps to steer the vessel as required. The PCM uses position feedback from the SmartCylinders for precise steering control and fault detection. The PCM can also respond to inputs from a certified autopilot system.



Power steering pumps

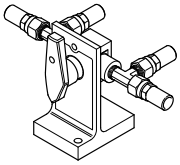
The power steering pumps supply pressurized fluid to the SmartCylinders in order to steer the boat. The PCM controls a 12V DC motor that drives a small gear pump. The pump assembly has an integral fluid reservoir and pressure relief valves.

The steering pumps have an integral service valve that can be opened to bypass the pumps and allow the engines to be manually repositioned. They are used for service or in the case of an emergency.



SmartCylinders

The SmartCylinder is a hydraulic steering cylinder fitted with a magnet and a position sensor (RFU). Each SmartCylinder can steer a single outdrive, or up to two rudders or outboard engines connected with a tie-bar.



Remote-mounted steering service valves (optional)

When the service valves on the power steering pumps are not easily accessible these optional remote-mounted valves can be installed in a convenient location.

10.2.2 System diagrams

The figures on the following pages illustrate the Optimus EPS system schematically. Not every possible system configuration or cylinder type can be represented here, but these figures will illustrate the key components and connections.

Single-Engine Systems

Figure 10-14 illustrates a single-engine EPS system with the standard dash panel. Figure 10-15 shows the same system, but with the optional CANtrak display.

Multi-Engine Systems

Figure 10-16 and figure 10-17 illustrate a twin-engine EPS system with single and dual control stations, respectively. A triple- or quad-engine EPS system will have the same general arrangement, with the addition of tie bar(s) to steer the additional engine(s).

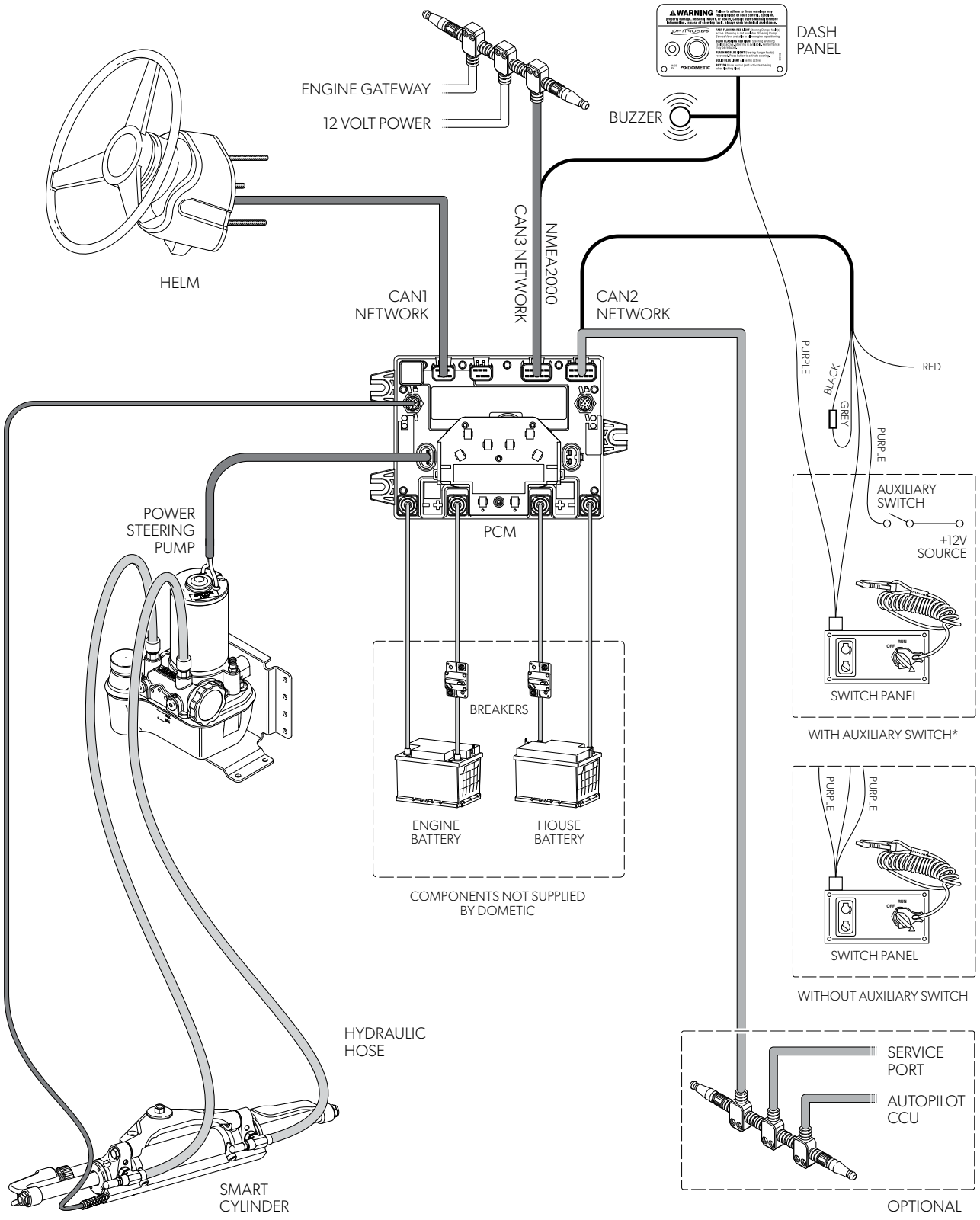


Figure 10-14. Optimus EPS electro/hydraulic system diagram, single station, single engine, with dash panel.

WARNING!

* The auxiliary power switch provides backup power to the steering system and should only be used in emergency situations. The dash panel warning lamp and buzzer are disabled when this switch is used.

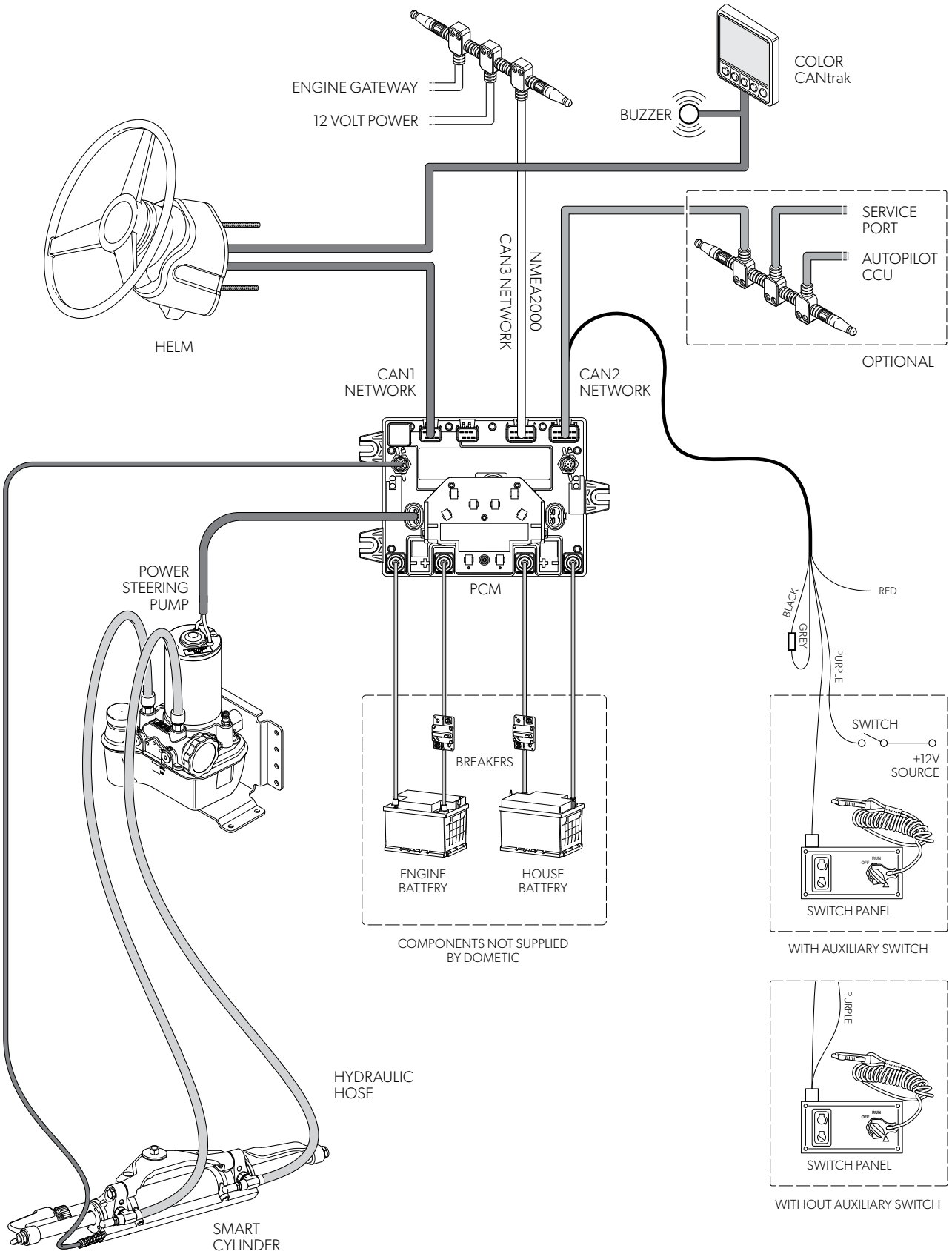


Figure 10-15. Optimus EPS electro/hydraulic system diagram, single station, single engine, with optional CANtrak.

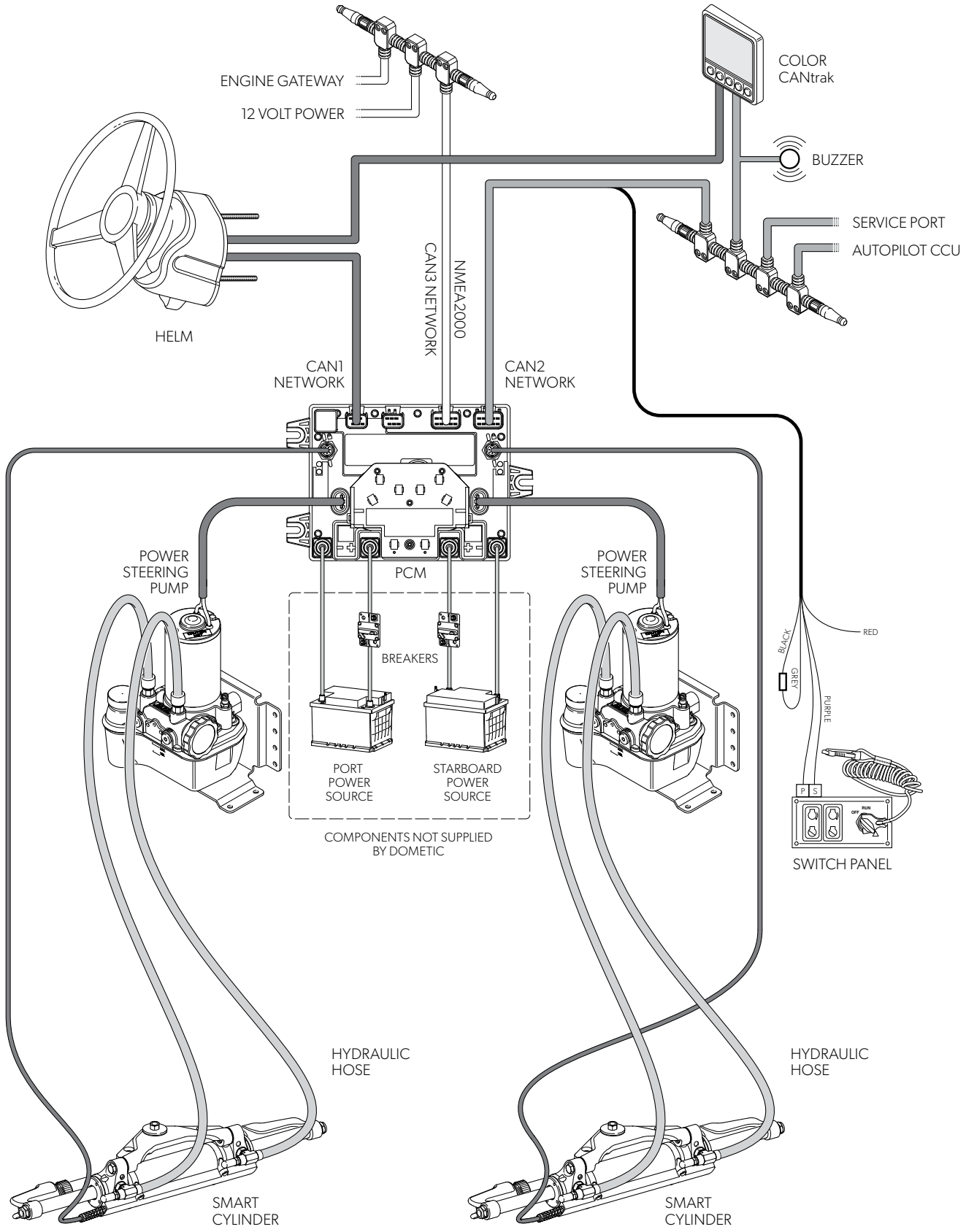


Figure 10-16. Optimus EPS electro/hydraulic system diagram, single station, twin engine.

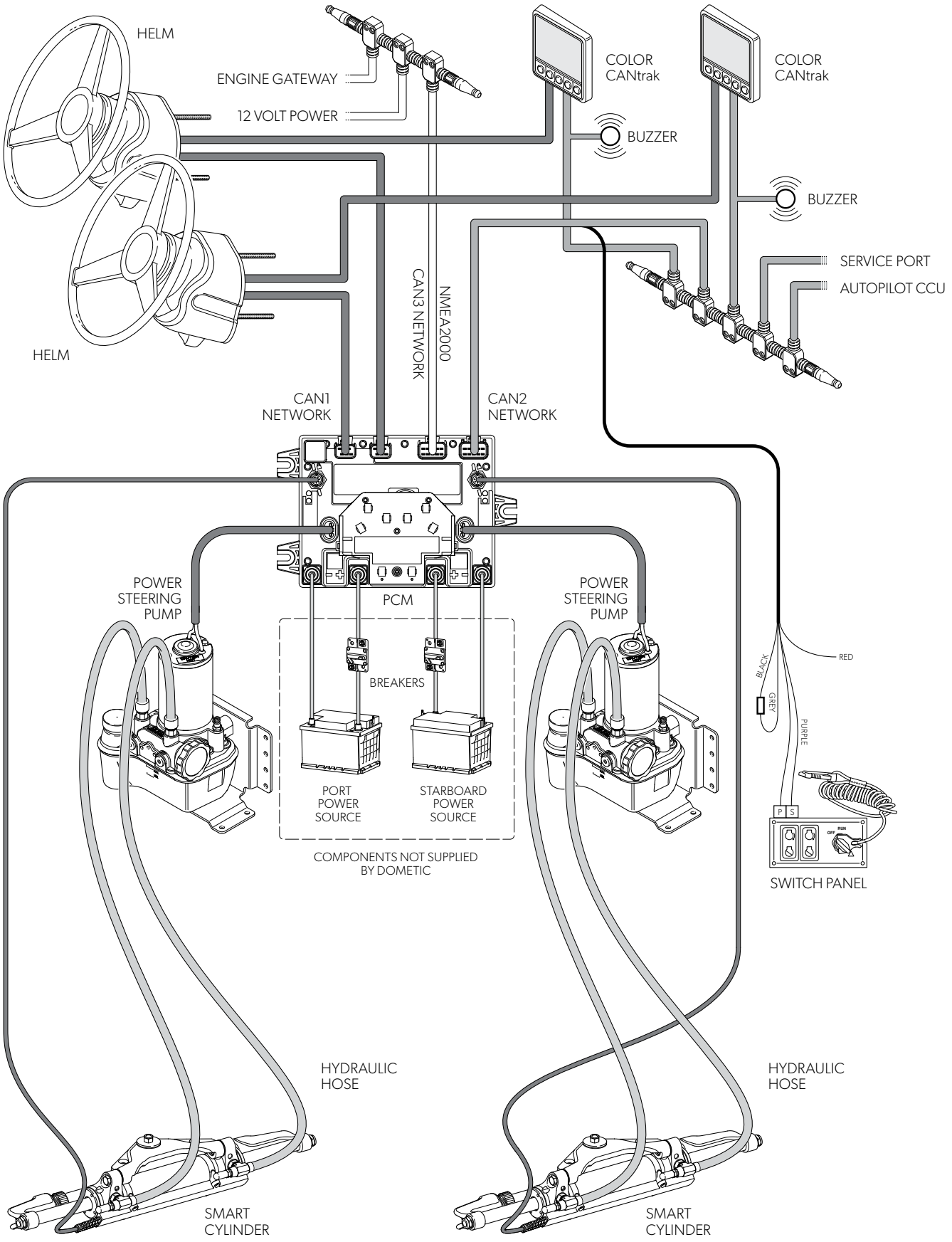


Figure 10-17. Optimus EPS electro/hydraulic system diagram, dual station, twin engine.

10.2.3 Pump control module (PCM)

The PCM is located in a dry area and can usually be found inside the center console, in the area behind the dash, or in a compartment near the engines or batteries. The PCM is always located close to the steering pumps. There will be one PCM on most boats (except for some triple and quad engine configurations that use two PCMs).

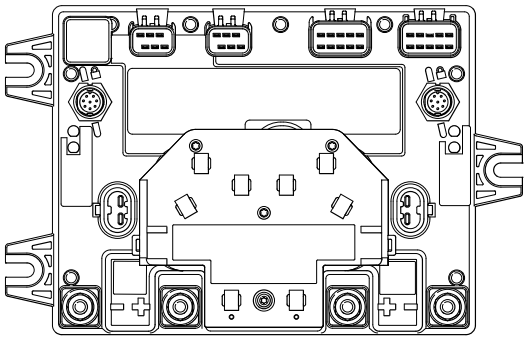


Figure 10-18. Pump control module.

10.2.4 Hydraulic steering pump(s)

The hydraulic steering pump(s) supply pressurized fluid to the SmartCylinders to steer the engines, and are located near the PCM. They can usually be found in a compartment near the engines, the center console, or behind the dash.

There is one pump for each steering cylinder. The steering fluid reservoir is mounted directly to the pump; it is here that you will check the fluid level and add steering fluid as necessary.

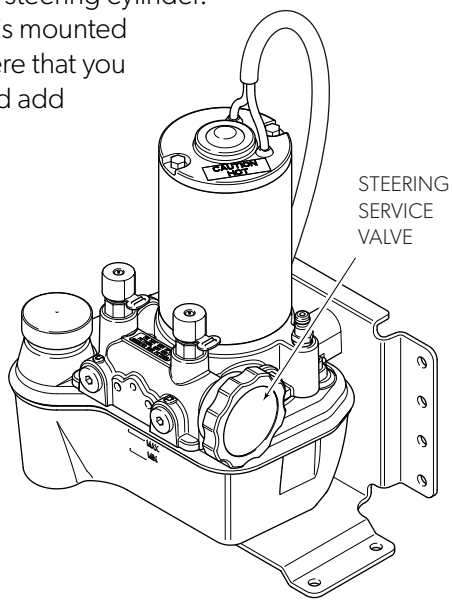


Figure 10-19. Power steering pump and reservoir.

NOTE

These hydraulic steering pumps look similar to the trim pumps that tilt the engines. They can be distinguished by the integrated steering service valve.

10.2.5 SmartCylinder(s)

Outboards: mounted to the engine tilt tube just below the engine cowling.



Figure 10-20. Outboard SmartCylinder with sensor.

10.2.6 Steering service valve(s)

The steering service valves permit the bypass of the EPS system and allow the engines to be manually positioned. They should only be used in the event of an EPS system failure, in which case instructions will be given on the CANtrak (if so equipped).

The service valves are integrated into the power steering pumps. To open the valve, turn the knob fully counter-clockwise until it stops (about three turns). Turn the knob fully clockwise to close it. Turn just until you feel the valve contact the stop — do not use tools or over-tighten.

Some vessels may be fitted with remote service valves as shown in figure 10-21.



Figure 10-21. Remote steering service valve.

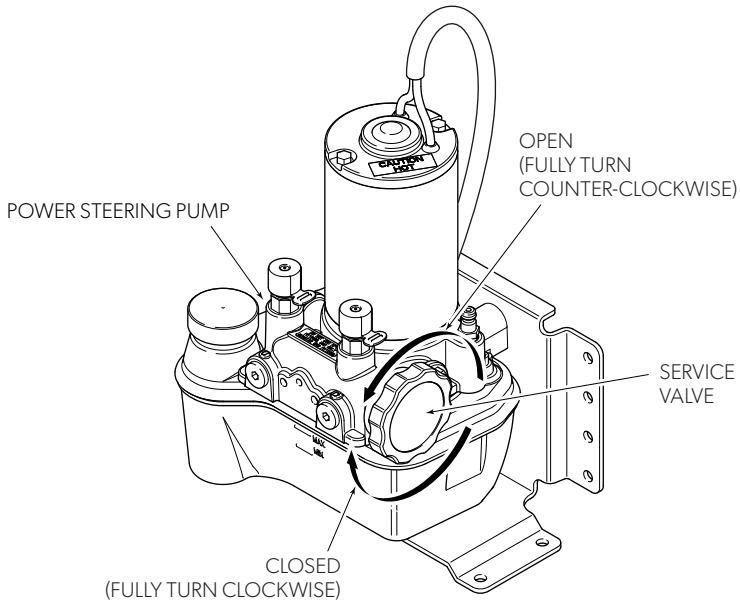


Figure 10-22. Service valve location.

WARNING!
Wear a coast guard-approved personal flotation device (PFD) when manually realigning engines.

CANtrak display

On all multi-engine systems (optional on single-engine systems) a color display at the main helm station shows system status and fault notifications. When enabled by the dealer or builder it can also be used to make adjustments to steering parameters. A CANtrak display may also be installed at additional helm stations.

The CANtrak display is supplied with a plastic cover to protect it from the weathering effects of sunlight. Remove and stow the cover before using the boat, and replace it when finished.



Figure 10-23. CANtrak display.

10.3 Optimus 360 — joystick control

10.3.1 Overview



The optional Optimus 360 joystick control system converts an operator's inputs into steering, shift, and throttle commands using this three-axis joystick controller. The joystick can rotate, move forward and back, and side to side. Combinations of these movements give the operator precise control of the boat's direction and speed. The Joystick is compatible with both electro/hydraulic and electric actuators.

10.3.2 Joystick fundamentals

The joystick is the primary user interface for the optional Optimus 360 joystick control system. It offers the ultimate control of the vessel for docking and maneuvering at slow speeds and is especially useful in confined or difficult circumstances. It is intuitive to use, as the boat follows the actions of the handle. This section of the manual gives a detailed description of all of its capabilities and how to get the maximum benefit from this powerful feature. The Optimus 360 joystick quick reference guide, provided with the system, gives summary and reminder information on its operation and should be kept on the vessel at all times.

NOTE

While the joystick is active the turning resistance of the steering wheel will increase to remind the user that the helm is disengaged.



Figure 10-24.

Handle motion

The handle can be moved in any direction or rotated left or right. When released the spring-loaded joystick will return to center and put the engine in neutral at idle throttle.

Moving the handle away from center or rotating it will cause the engines to shift into the correct gear for the desired motion. Further handle motion in the same direction will apply throttle and provide more thrust in the chosen direction. The joystick is proportional and guided in each axis.

Boost button

Increases the power the engines can apply and may be turned on or off at any time. It can be very handy when handling the boat in wind or current. The system will remember the boost mode status so if it is left on, it will be on again next time the joystick is activated.

A blue LED on the Boost button will illuminate when in boost mode.

Take Command button

Activates the joystick and allows the joystick to take control of the vessel when both control head levers are in the neutral position.

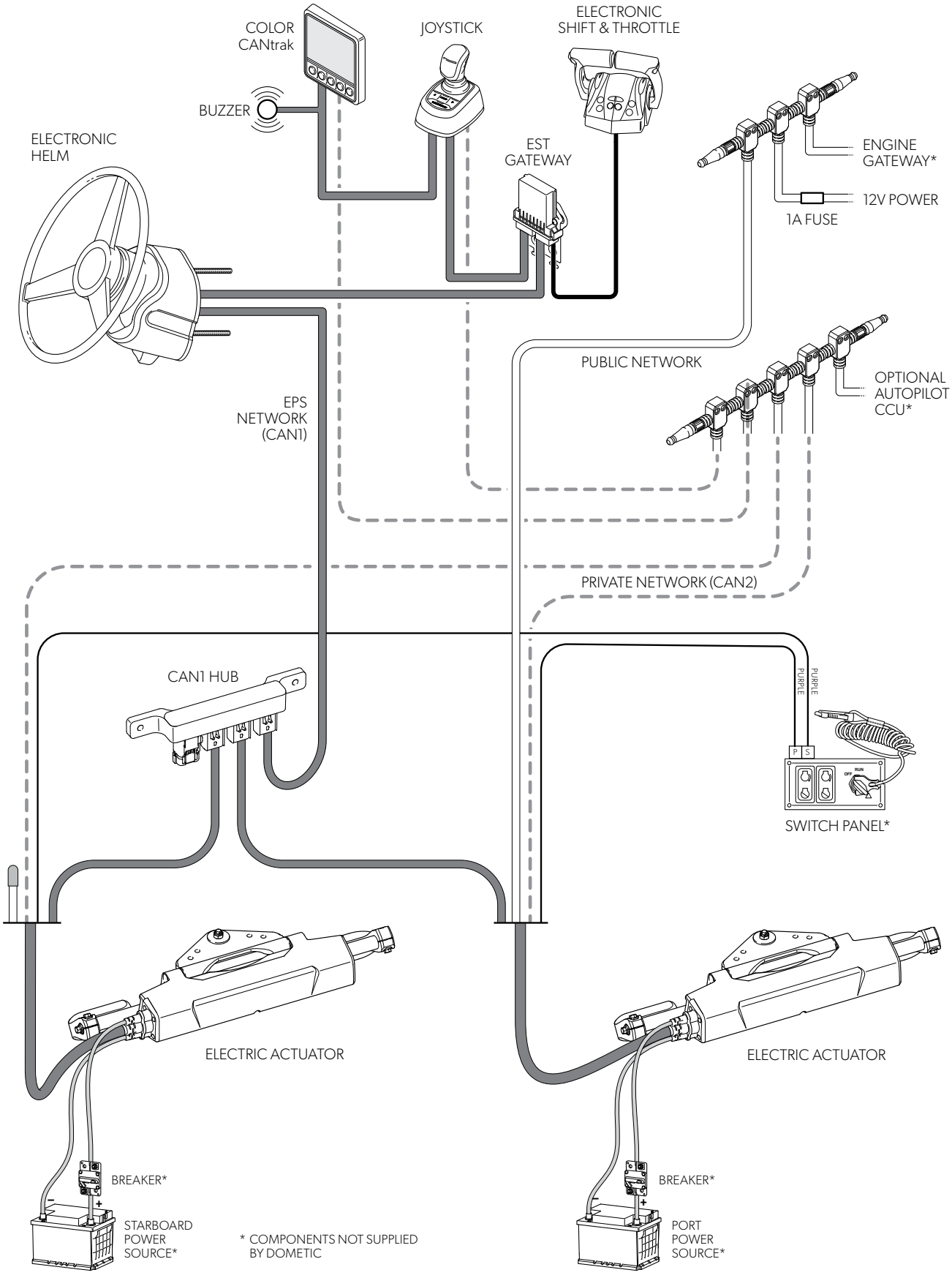


Figure 10-25. Optimus 360 electric actuator system diagram, single station, twin engine. (For reference only.)

10.4 SeaStation and SeaWays

10.4.1 SeaStation overview

SeaStation holds vessel position and heading via GPS.

When you are trying to locate that ideal spot over a reef or a wreck, SeaStation is ideal. Just hold your position and heading, drop your lines and see if you have success, if not, simply move to another location and engage SeaStation. No physical anchor required.

Dometic applied the same smart algorithms to SeaStation as with Optimus 360 joystick control to reduce unnecessary shifting and jockeying of the engines while providing superior position and heading functions for a large selection of engine platforms.

10.4.2 SeaStation modes

1. **Position mode** — hold position regardless of heading. Applications include; bait fishing and wreck/reef fishing. Finding the natural heading when in position hold could be the best option.
2. **Heading mode** — regardless of position. Applications include; kite fishing/drift fishing. Easier setup/maximize fishing time.
3. **Position and Heading mode** — stay in position and hold heading. Applications include; waiting for a bridge to open, a spot at the dock to become available and bait fishing near a structure.

10.4.3 SeaStation system specifications

Requires Optimus 360 joystick control system to be installed on vessel.

Accuracy (target)

± 3 Meters position hold, ± 10° Heading hold

Sensor and mounting information

Dimensions

without mount:	25.9 L x 12.9 W x 4.5 H (cm) 10.2 L x 5.1 W x 1.8 H (in)
with mount:	25.9 L x 12.9 W x 12.8 H (cm) 10.2 L x 5.1 W x 5.0 H (in)

Weight

without mount:	0.42 kg (0.9 lb)
with mount	0.51 kg (1.1 lb)

SeaStation kits

- EPSK1625 — SeaStation compass sensor core pack pole mount
- EPSK1630 — SeaStation compass sensor core pack surface mount

10.4.4 SeaWays overview

SeaWays and SeaWays GO are integrated autopilot systems. SeaWays builds off of an Optimus EPS or Optimus 360 system by adding a GPS and heading sensor. The system uses position and heading data to steer the vessel automatically.

The SeaWays GPS sensor allows heading, track, and route modes whereas the SeaWays GO compass allows heading mode.

Once your Optimus EPS or Optimus 360 system is installed, adding SeaWays is simple:

1. Install the SeaWays or SeaWays GO sensor
2. Route network cable from sensor to Optimus network backbone
3. Apply sensor license provided with kit
4. SeaWays commissioning

10.4.5 SeaStation/SeaWays sensor positioning

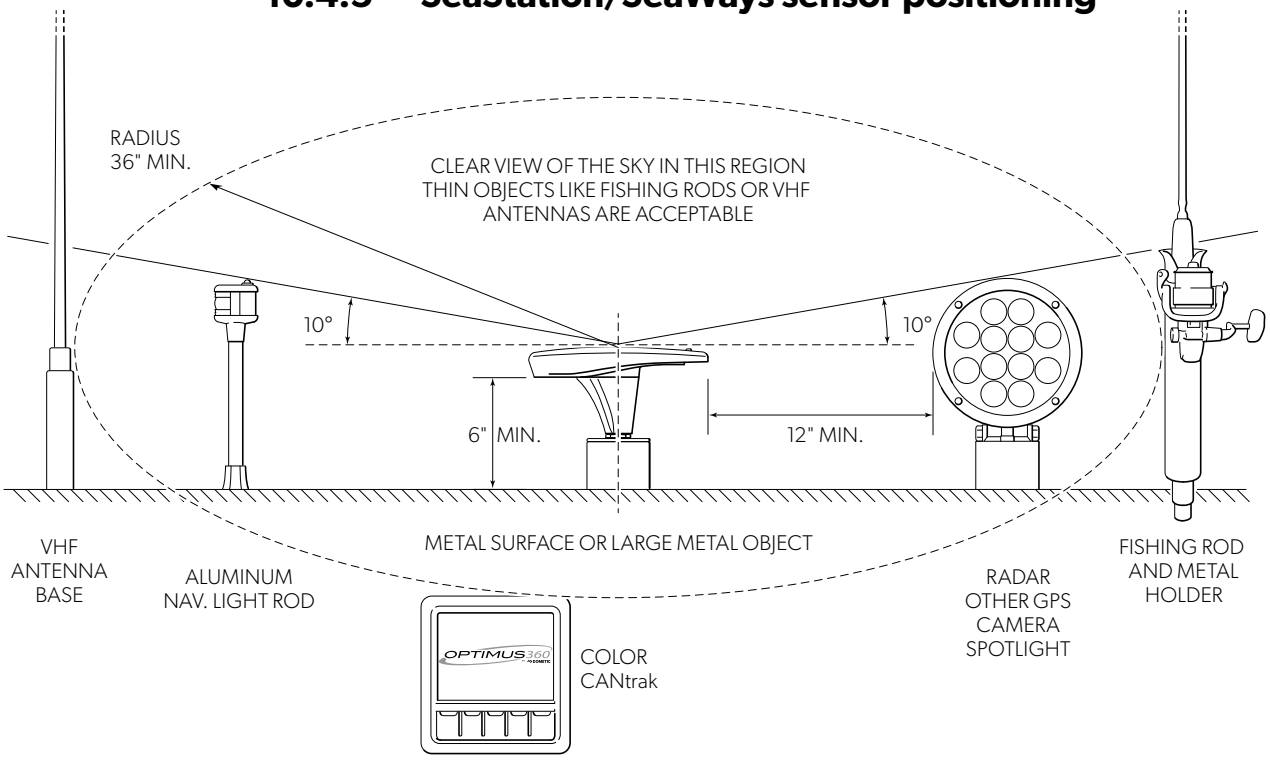


Figure 10-26. Sensor mounting distance from nearby VHF antennas and other equipment.

NOTICE!

The sensor should be mounted as low as possible while still maintaining good sky visibility. This will reduce false movement due to the boat rocking back and forth.

The sensor is designed to withstand harsh environmental conditions.

ITEM	SPECIFICATION
Operating temperature	-30°C to +70°C (-22°F to +158°F)
Storage temperature	-40°C to +85°C (-40°F to +185°F)
Humidity	100% non-condensing

Table 10-5. Environmental conditions.

10.4.6 SeaStation/SeaWays sensor dimensions

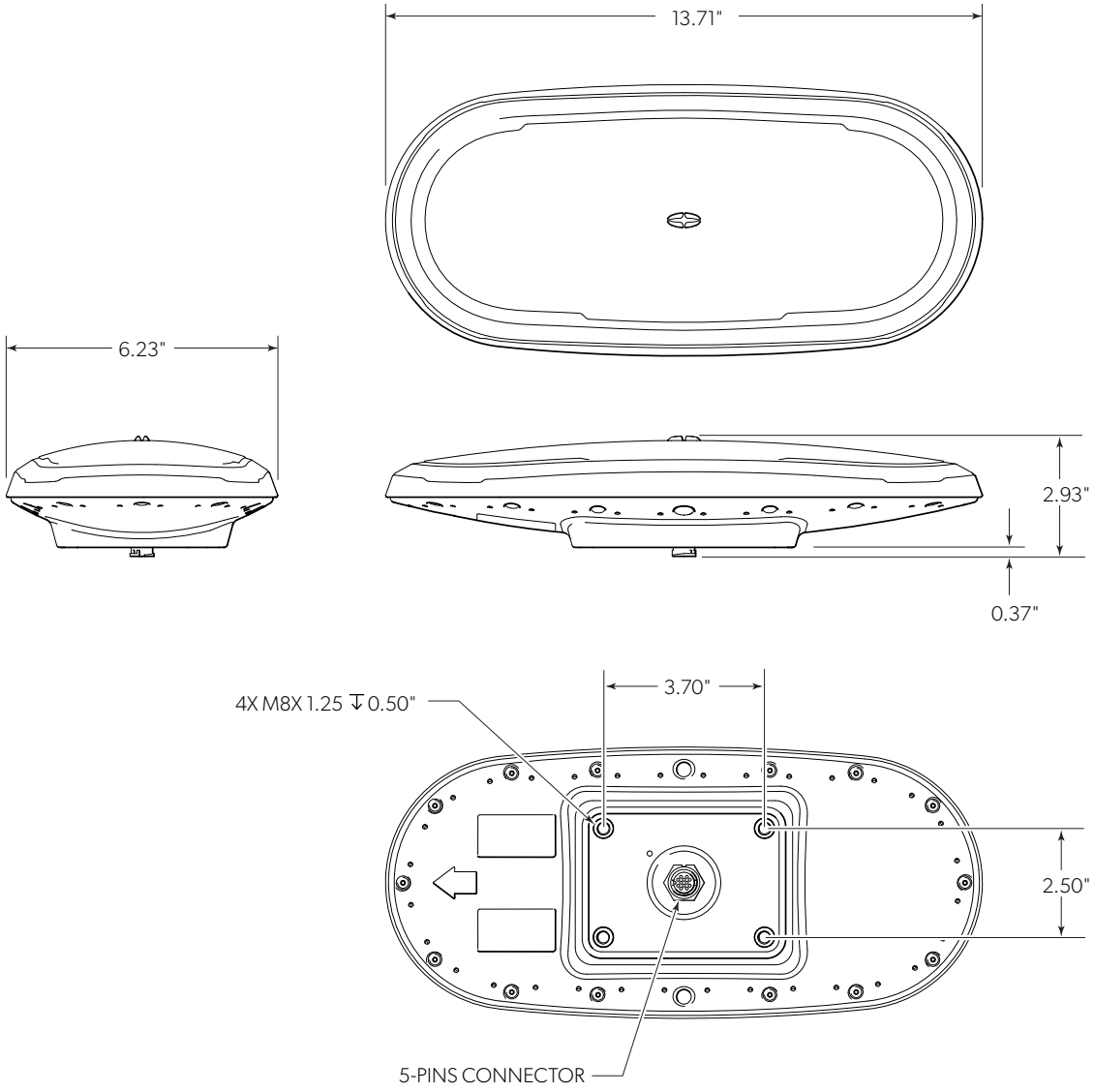


Figure 10-27. Sensor dimensions without mounting hardware.

10.4.6 SeaStation/SeaWays surface mount dimensions

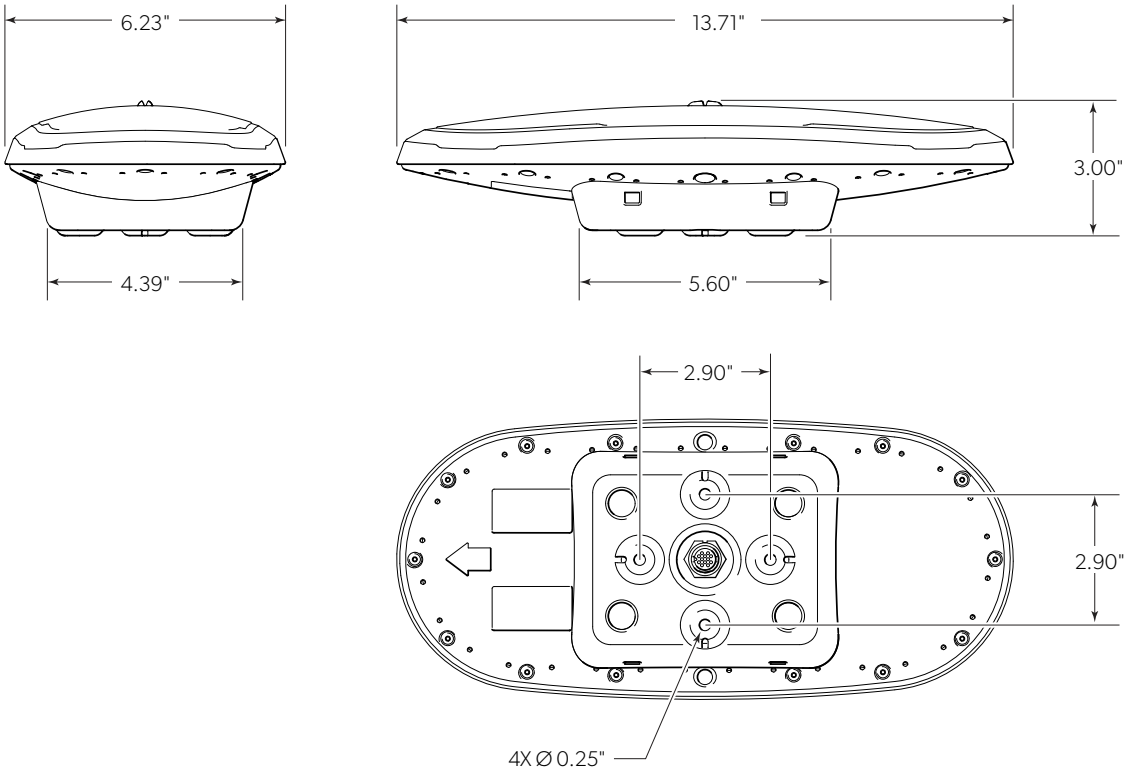


Figure 10-28. Sensor with low profile mount accessory dimensions.

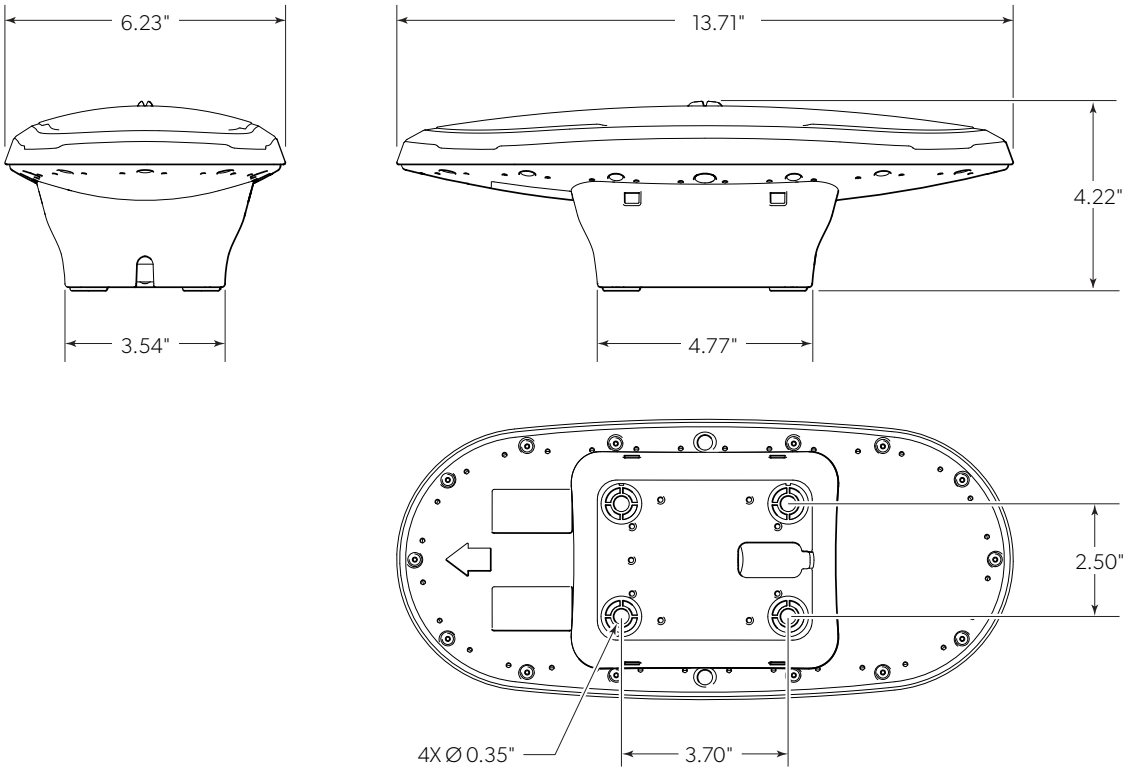


Figure 10-29. Sensor with high profile mount accessory dimensions.

10.4.7 SeaStation/SeaWays pole mount dimensions

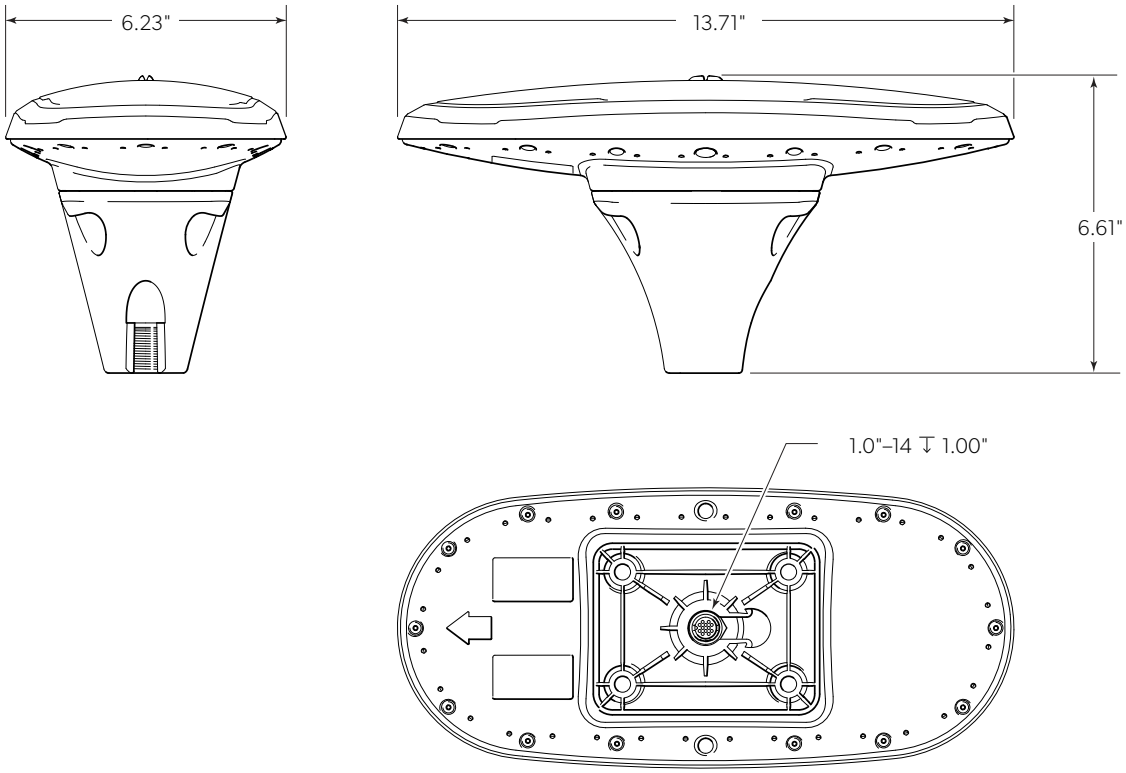


Figure 10-30. Sensor with pole mount accessory dimensions.

10.4.8 SeaWays GO sensor dimensions

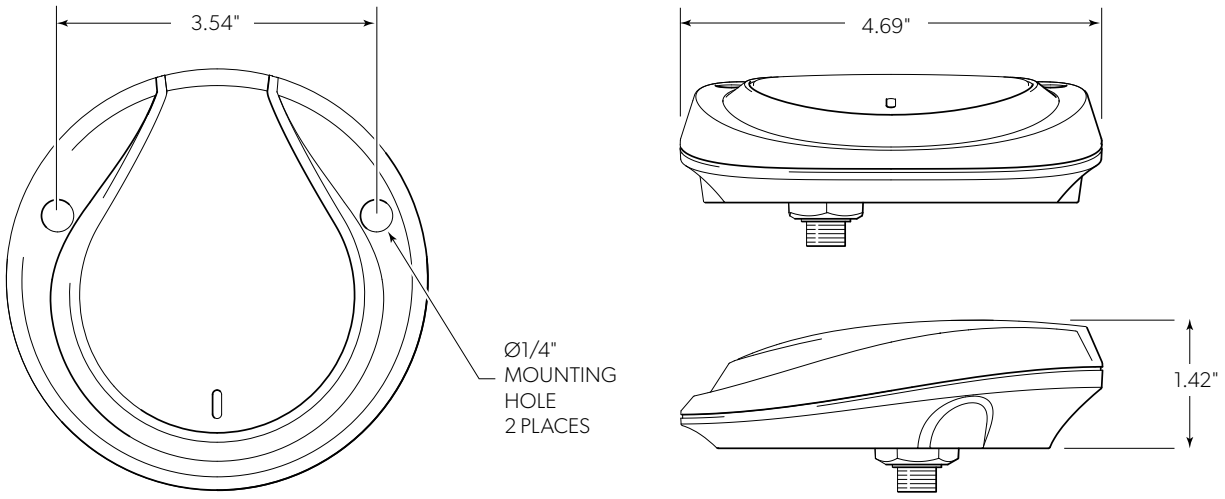


Figure 10-31. SeaWays GO sensor dimensions.

NOTE

SeaWays GO heading sensor kit, part # EPSK1700 available.

10.2.8 Dash panel (single-engine outboard vessels)

Single-engine outboard vessels may be equipped with a dash panel in place of the optional CANtrak display. System status and faults are indicated by a bi-color LED lamp and an audible buzzer. The button is used to mute alarms, re-activate steering after a recovered fault, and to cycle through five levels of brightness on the LED.



Figure 10-32. Dash panel.

WARNING!
Do not operate the vessel without a functioning CANtrak display or dash panel warning lamp.

10.2.9 Electronic helm(s)

The steering wheel is attached to this unit, which may be located immediately under the wheel or just behind the dash panel. The images below show the available helm styles.



EPS Compact Helm
Part No. EH1542
(3/4" shaft)
Part No. EH1545
(splined shaft)



EPS Rear Mount Helm
Part No. EH1582



EPS Rear Mount Helm
Part No. EH1596
(1" straight shaft)

Figure 10-33. EPS helm configurations.

CAUTION!
Keep magnets away from the helm. They may interfere with proper helm operation.

NOTICE!
Max. steering wheel dia. 20" (508 mm). Max. dish depth 5" (127 mm).

Notes

11 Electronic Inboard and Sterndrive Steering

11.1 3000 series

11.1.1 Applications

Electronic Power Steering (EPS) system suitable for vessels from approximately 18 ft to 50 ft* with single or dual rudders.

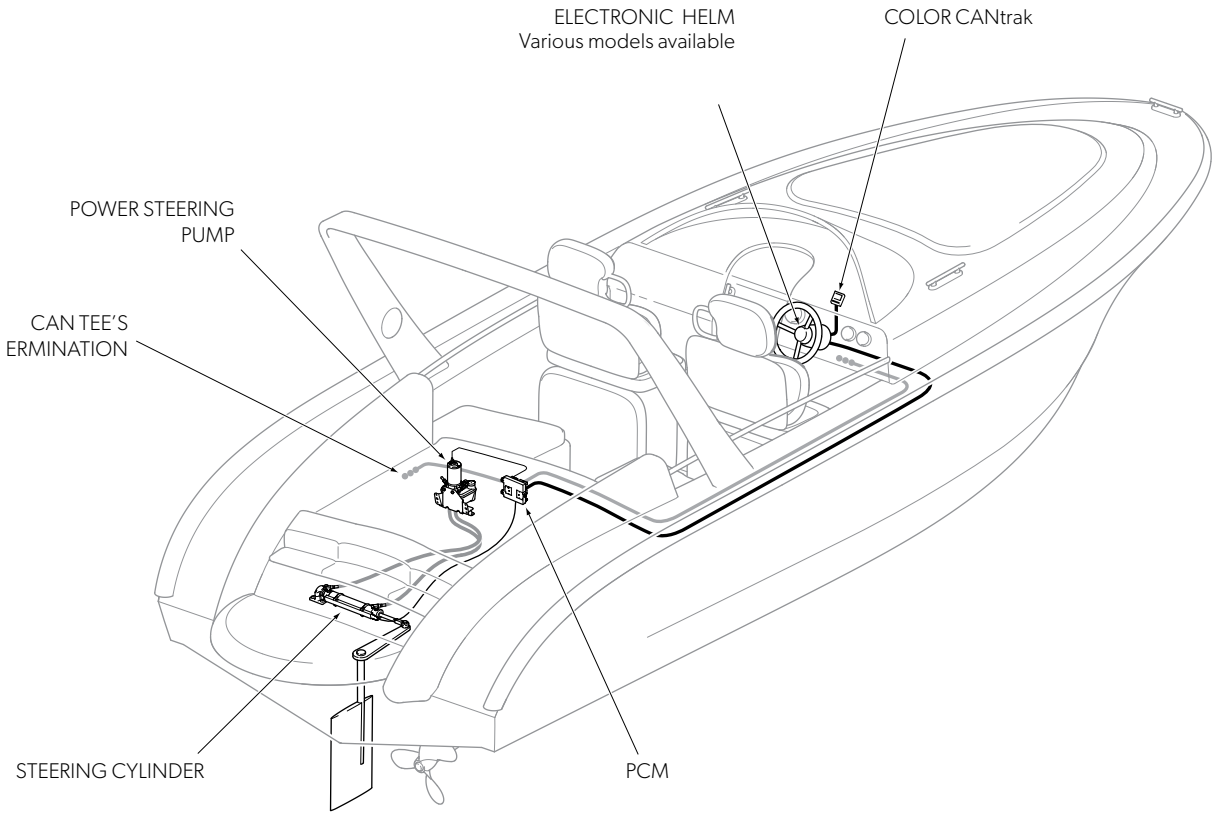


Figure 11-1. System components. Single rudder system shown. * Subject to submission of survey form and rudder load calculation.

11.1.2 Environmental

- Operating temperature: -18 C to +77 C [ISO 25197]
- Storage temperature: -40 C to +85 C [ISO 25197]
- Corrosion resistance: 300 hours salt spay [ASTM B117]
- Water ingress protection: IPX7 [IEC 60529]
- Random vibration: 0.0284 g^2/Hz [ABYC P-28]
- Resonant vibration: 4 G zeropeak, 20-2000 Hz [ABYC P-28]
- Mechanical shock: 50 G, 11 m-sec half-sine shape [ISO 25197]
- Ignition protection: SAEJ-1171
- Meets EN60945 electromagnetic compatibility requirement

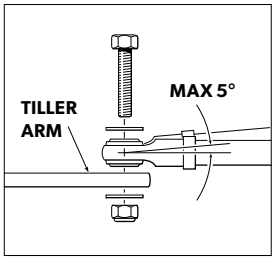
11.1.3 Features

- Up to three helms stations
- Automatic battery management with sensing, warnings, and best battery selection
- On demand hydraulic steering pump minimizing power consumption
- No oil at the helm
- Rugged electronics for 12 or 24 VDC applications
- Color dash display showing rudder command and rudder position graphic
- Displays system health
- Display provides system setup interface
- Communicates faults and any special handling instructions to the operator
- No requirement for tie-bars depending on rudder loads (twin rudder systems)
- Simple software updating via USB port)
- Programmable number of turns lock to lock with speed
- Auto-adjusting steering end stops and resistance with speed
- Dual redundant position sensing on all moving components
- Compact helm with 3/4" tapered shaft. Rear mount helms available including 1" straight shaft
- Utilizes fault tolerant CAN network
- Full autopilot CANbus connectivity and integration. No additional pumps or sensors required
- Adjustable max rudder hard over angle with speed range 25° to 40° center to hard over
- Rudder toe in or out up to 5° with speed (twin rudder systems)
- Position proportional rudder gain for faster steering response near neutral rudder position
- RPM input: NMEA 2000, J1939 or analog pulse compatible
- Pump features an Integrated service/bypass valve allows a limp home mode
- Meets or exceeds ABYC, CE, ISO and SAE electrical and environmental requirements

11.1.4 Mounting configurations and system schematic

While using the table below be sure that your steering cylinder is at mid-stroke as shown in the figure right to ensure the cylinder operates correctly.

ATTACHMENT TO TILLER ARM, RECOMMENDED PER ABYC



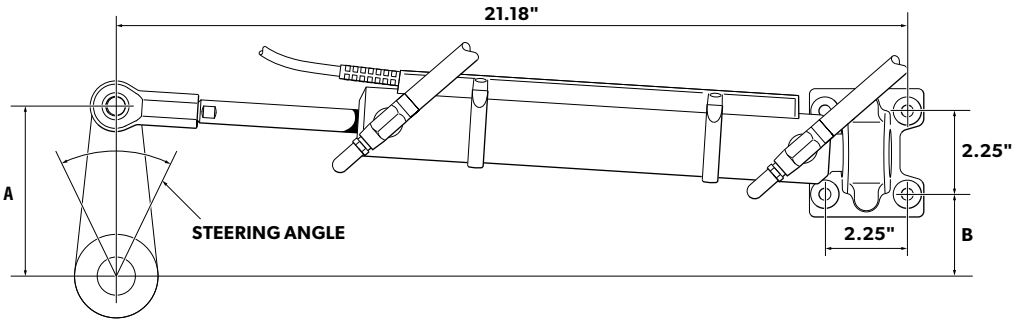


Figure 11-2. Cylinder at mid-stroke.

MODEL EC5380 STEERING ANGLES							
50°		60°		70°		70°	
A	B	A	B	A	B	A	B
8.33″	6.43″	7.04″	4.98″	6.14″	3.91″	5.48″	3.07″
11,004 in-lbs*		8,887 in-lbs*		7,328 in-lbs*		6,115 in-lbs*	

Table 11-1. * Torque shown is per cylinder. Twin rudder example: two cylinders at 60° steering angle will give a combined total of 17,774 in-lbs of torque.

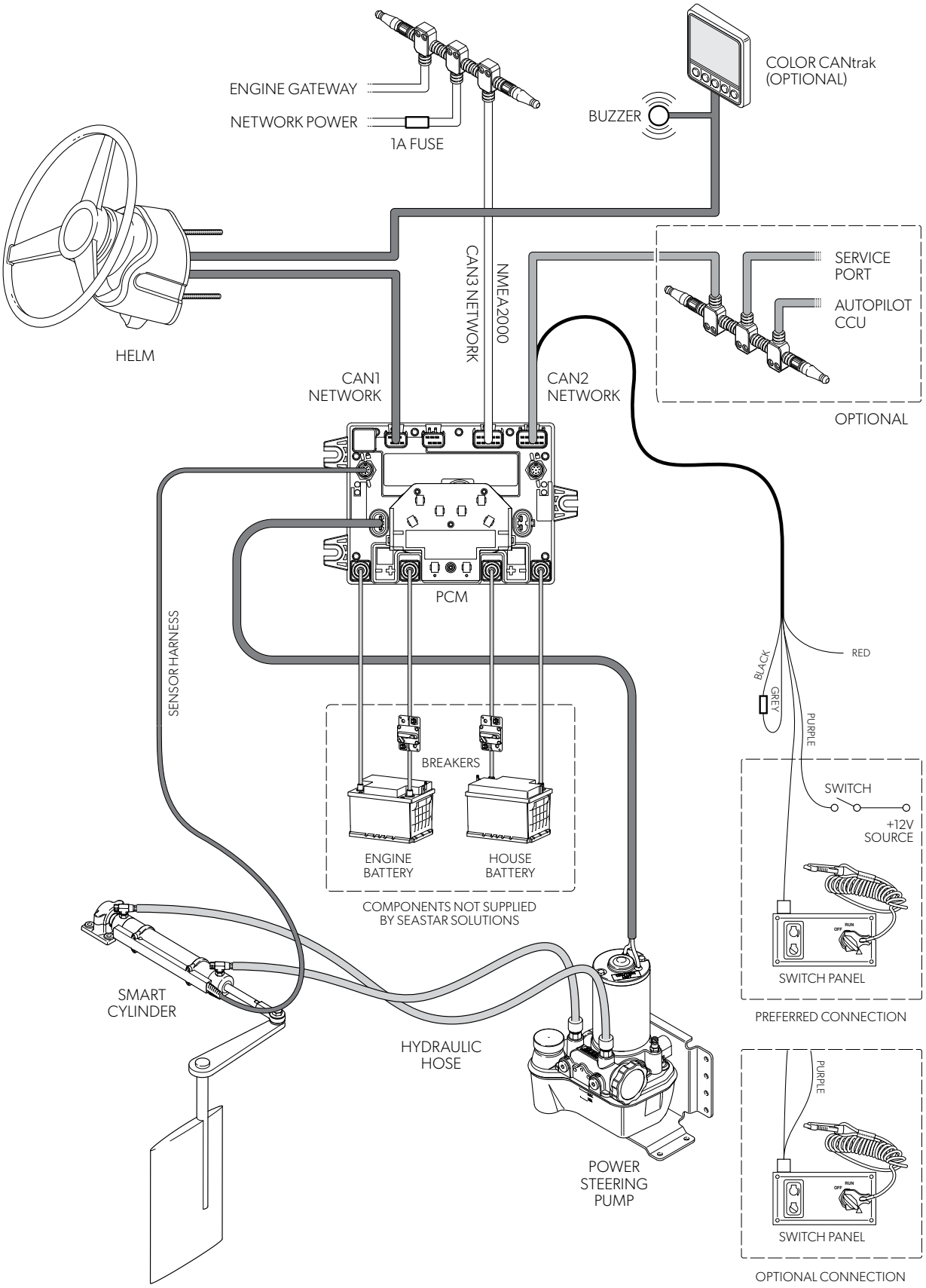


Figure 11-3. Optimus EPS system diagram, single station, single rudder.

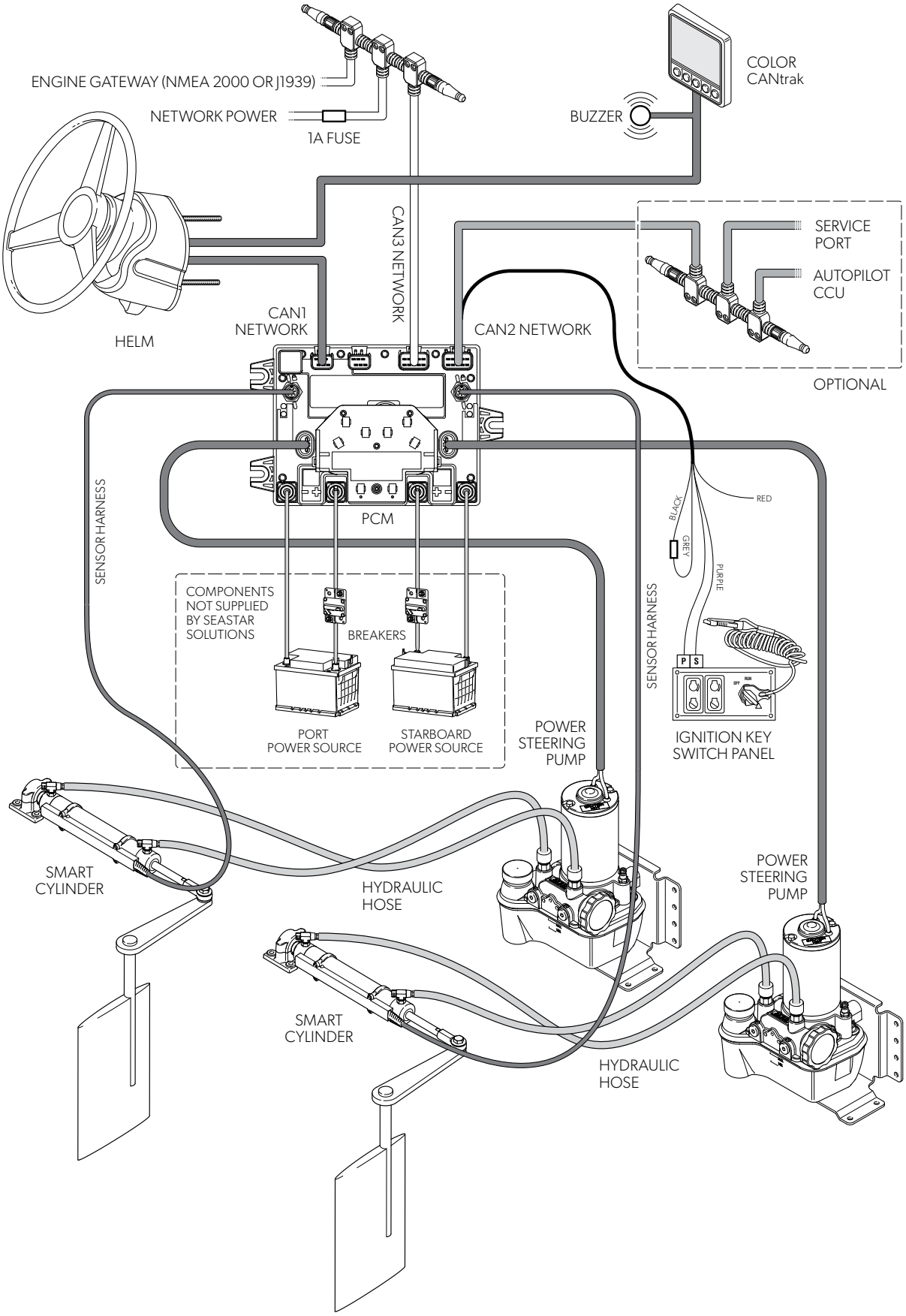


Figure 11-4. Optimus EPS system diagram, single station, twin rudder.

11.2 4000 series

11.2.1 Applications

Electronic Power Steering (EPS) system suitable for vessels from approximately 40 ft to 60 ft* performance yachts with single or dual rudders.

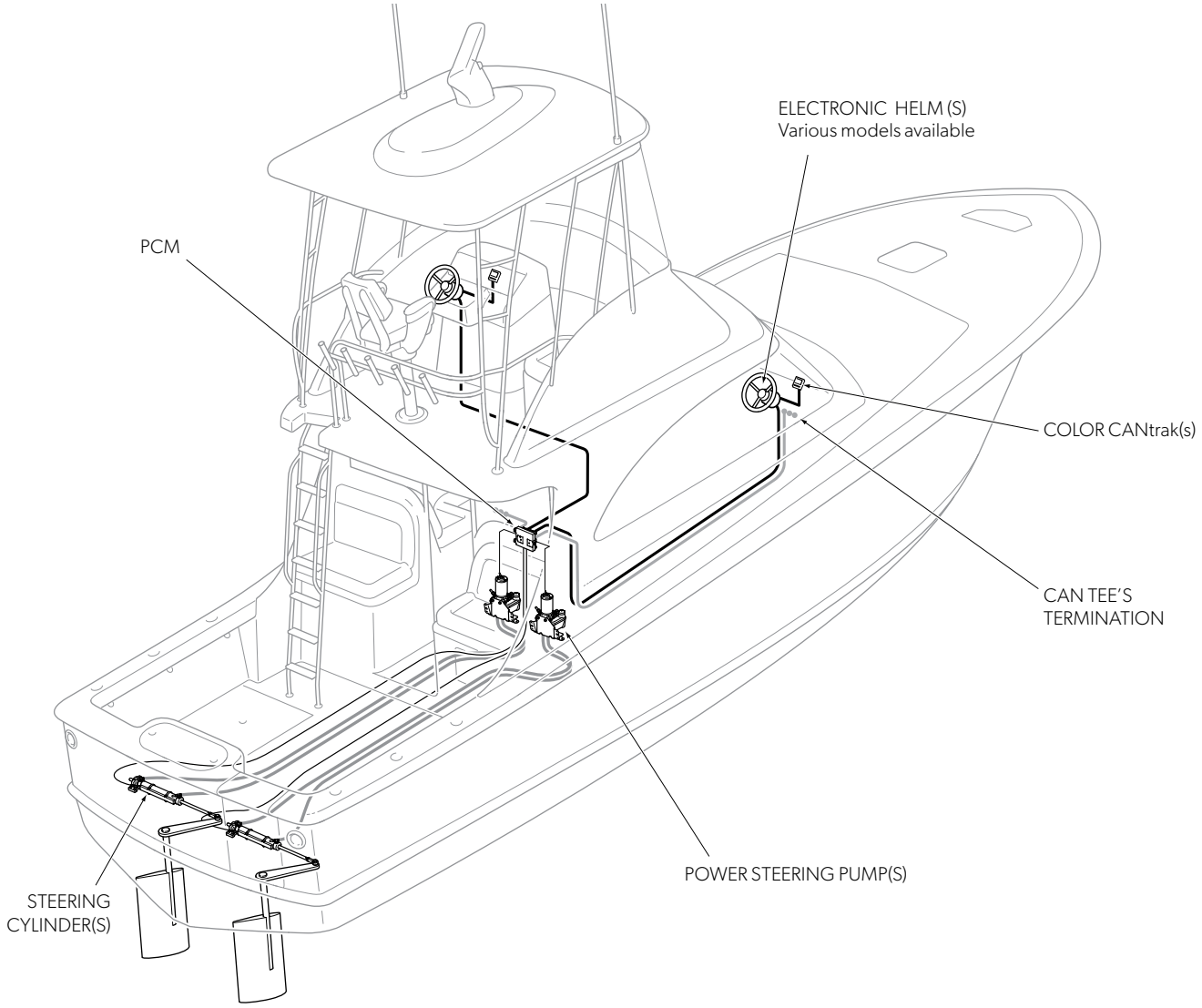


Figure 11-5. System components. Twin rudder system shown. * Subject to submission of survey form and rudder load calculation.

11.2.2 Environmental

- Operating temperature: -18°C to +77°C [ISO 25197]
- Storage temperature: -40°C to +85°C [ISO 25197]
- Corrosion resistance: 300 hours salt spay [ASTM B117]
- Water ingress protection: IPX7 [IEC 60529]
- Random vibration: 0.0284 g^2/Hz [ABYC P-28]
- Resonant vibration: 4 G zero-peak, 20-2000 Hz [ABYC P-28]
- Mechanical shock: 50 G, 11 m-sec half-sine shape [ISO 25197]
- Ignition protection: SAEJ-1171
- Meets EN60945 electro-magnetic compatibility requirement

11.2.3 Features

- Up to three helm stations
- Automatic battery management with sensing, warnings & best battery selection
- On demand hydraulic steering pump minimizing power consumption
- No oil at the helm
- Rugged electronics for 12 or 24 VDC applications
- Color dash display showing rudder command and rudder position graphic
- Displays system health
- Display provides system setup interface
- Communicates faults and any special handling instructions to the operator
- No requirement for tie-bars depending on rudder loads
- Simple software updating via USB port
- Programmable number of turns lock to lock with speed
- Auto-adjusting steering end stops and resistance with speed
- Dual redundant position sensing on all moving components
- Compact helm with 3/4" tapered shaft. Rear mount helms available including 1" straight shaft
- Utilizes fault tolerant CAN network
- Full autopilot CANbus connectivity and integration. No additional pumps or sensors required
- Adjustable max rudder hard over angle with speed range 25° to 40° Center to hard over
- Rudder toe in or out up to 5° with speed
- Position proportional rudder gain for faster steering response near neutral rudder position
- RPM input: NMEA 2000, J1939 or analog pulse compatible
- Pump features an integrated service/bypass valve allows a limp home mode
- Meets or exceeds ABYC, CE, ISO and SAE electrical and environmental requirements

11.2.4 Mounting configurations and system schematic

While using the table below be sure that your steering cylinder is at mid-stroke as shown in the figure right to ensure the cylinder operates correctly.

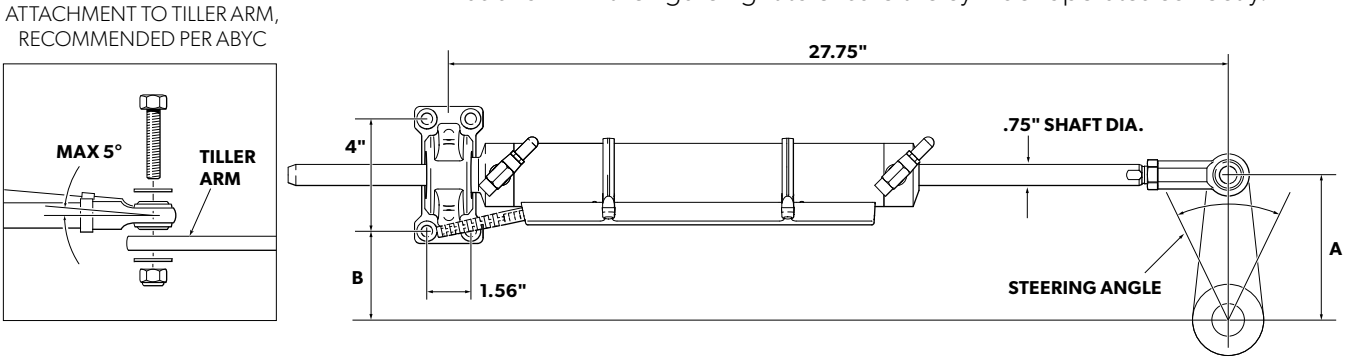


Figure 11-6. Cylinder at mid-stroke.

MODEL EC5390 (9" STROKE) STEERING ANGLES							
50°		60°		70°		70°	
A	B	A	B	A	B	A	B
10.64"	7.65"	9.00"	5.79"	7.84"	4.247"	7.00"	3.36"
37,782 in-lbs*		30,515 in-lbs*		25,161 in-lbs*		20,996 in-lbs*	

Table 11-2. *Torque shown is per cylinder. Twin rudder example: two cylinders at 60° steering angle will give a combined total of 61,030 in-lbs of torque.

EN

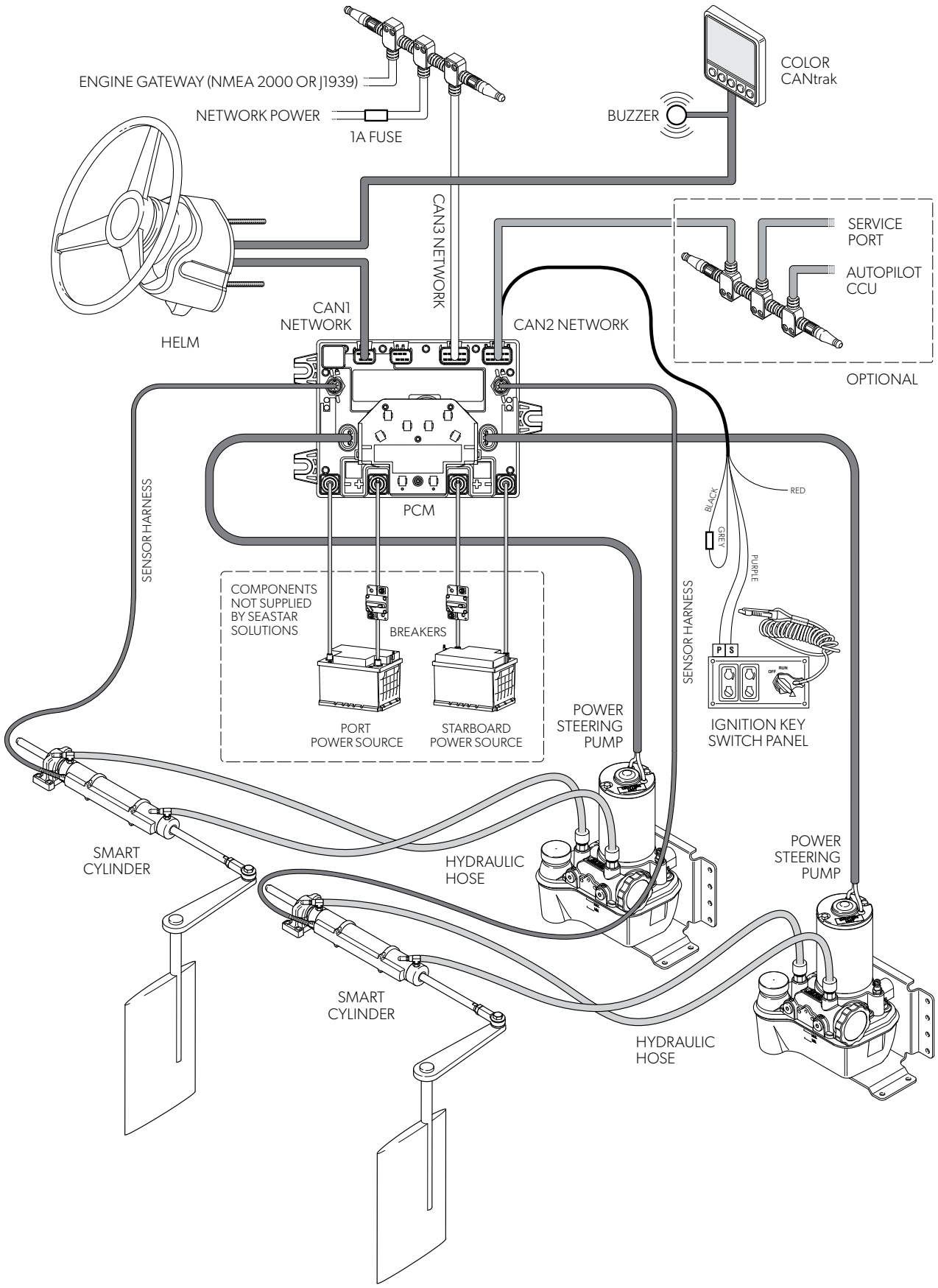


Figure 11-7. Optimus EPS system diagram, single station, twin rudder.

11.3 5000 series

11.3.1 Applications

Electronic Power Steering (EPS) system suitable for vessels from 60 ft. to 100 ft. with single or dual rudders.

The incredible feel you get when you're behind the wheel of a boat equipped with Optimus EPS is the result of an innovative array of technology and engineering. Each component has been designed to complement the other, resulting in a seamless experience of steering control in virtually every situation on the water. The high level of engineering also extends to the reliability of the system, with quality materials, careful manufacturing and redundant systems, all to stand up to the rigors of life on the water.

As the captain of your vessel you know how important it is to have command of your yacht, Optimus EPS gives you the steering control, performance and comfort you expect. With Optimus EPS, you can take command of your yacht without having to arm-wrestle for control.

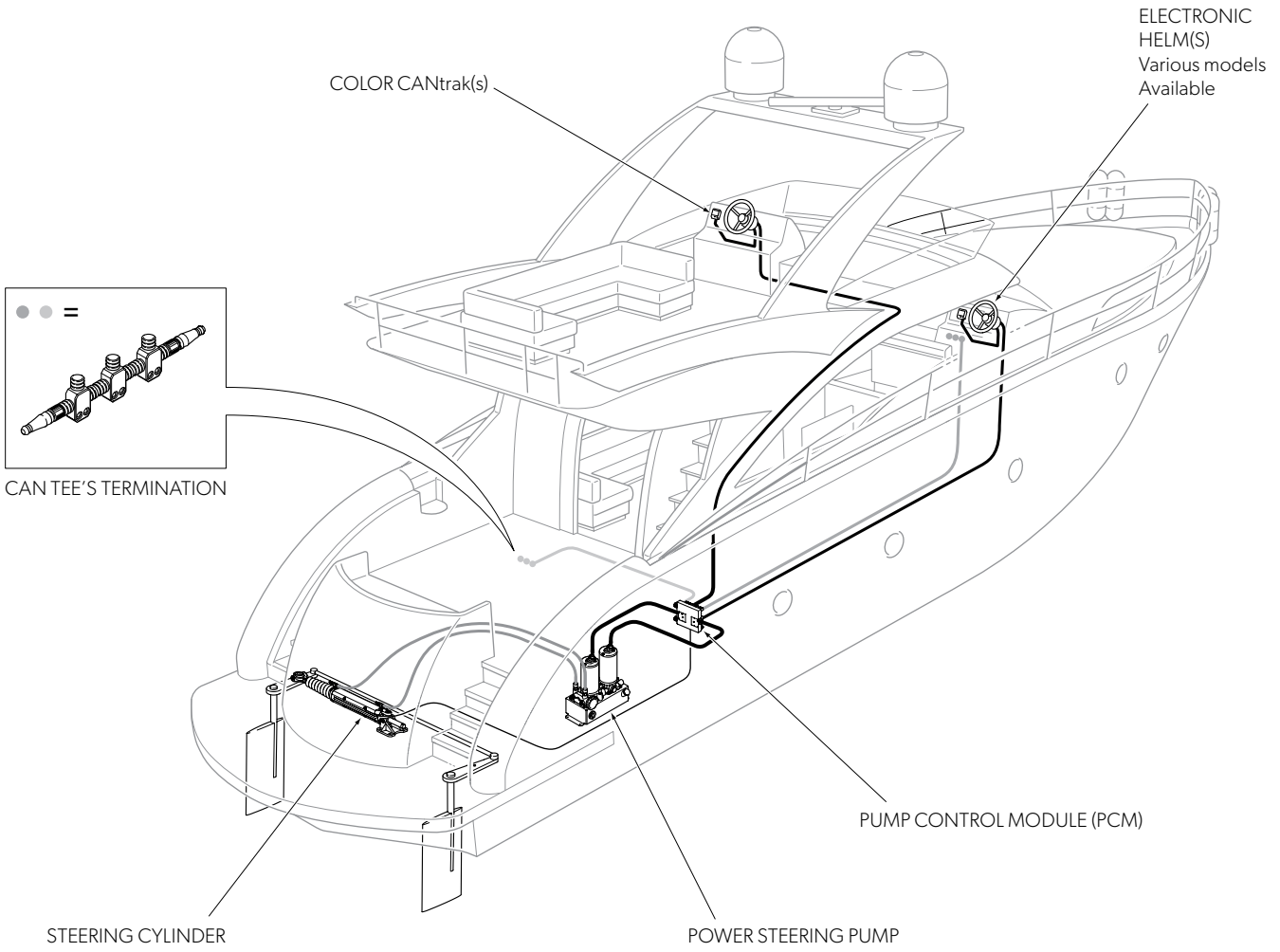


Figure 11-8. System components, dual station, single cylinder (twin rudders).

11.3.2 Environmental

- Operating temperature: -18°C to +77°C [ISO 25197]
- Storage temperature: -40°C to +85°C [ISO 25197]
- Corrosion resistance: 300 hours salt spray [ASTM B117]
- Water ingress protection: IPX7 [IEC 60529]
- Random vibration: 0.0284 g^2/Hz [ABYC P-28]
- Resonant vibration: 4 G zero-peak, 20-2000 Hz [ABYC P-28]
- Mechanical shock: 50 G, 11 m-sec half-sine shape [ISO 25197]
- Ignition protection: SAEJ-1171
- Meets EN60945 electro-magnetic compatibility requirement

11.3.3 Features

- Up to three helm stations
- Automatic battery management with sensing, warnings and best battery selection
- On demand hydraulic steering pump minimizes power consumption
- No oil at the helm
- Rugged electronics for 24 VDC applications
- Color dash display showing rudder command and rudder position graphic
- Displays system health
- Display provides system setup interface
- Communicates faults and any special handling instructions to the operator
- No requirement for tie-bars depending on rudder loads.
- Simple software updating via USB port
- Programmable number of turns lock to lock with speed
- Auto-adjusting steering end stops and resistance with speed
- Dual redundant position sensing on all moving components
- Compact helm with 3/4" tapered shaft. Rear mount helms available including 1" straight shaft
- Utilizes fault tolerant CAN network
- Full autopilot CANbus connectivity and integration. No additional pumps or sensors required
- Adjustable max rudder hard over angle with speed range 25° to 40° center to hard over
- Rudder toe in or out up to 5° with speed
- Position proportional rudder gain for faster steering response near neutral rudder position
- RPM input: NMEA 2000, J1939 or analog pulse compatible
- Pump features an Integrated service/bypass valve allows a limp home mode
- Meets or exceeds ABYC, ISO and SAE electrical and environmental requirements

11.3.3 Mounting configurations and system schematic

While using the table below be sure that your steering cylinder is at mid-stroke as shown in the figure right to ensure the cylinder operates correctly.

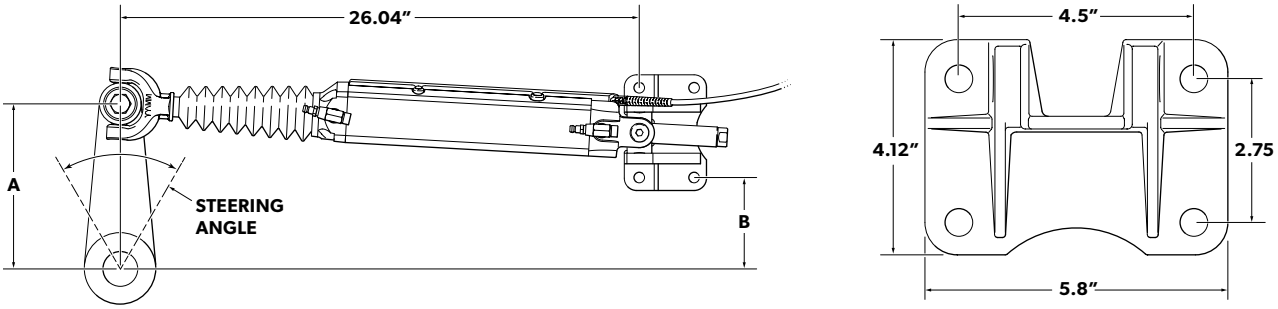


Figure 11-9. Cylinder at mid-stroke.

MODEL EC5810 STEERING ANGLES							
50°		60°		70°		70°	
A	B	A	B	A	B	A	B
11.27"	7.96"	9.50"	5.98"	8.25"	4.50"	7.40"	3.41"
56,300 in-lbs*		45,400 in-lbs*		37,400 in-lbs*		31,200 in-lbs*	

Table 11-3. *Torque shown is per cylinder. Twin rudder example: two cylinders at 60° steering angle will give a combined total of 90,000 in-lbs of torque.

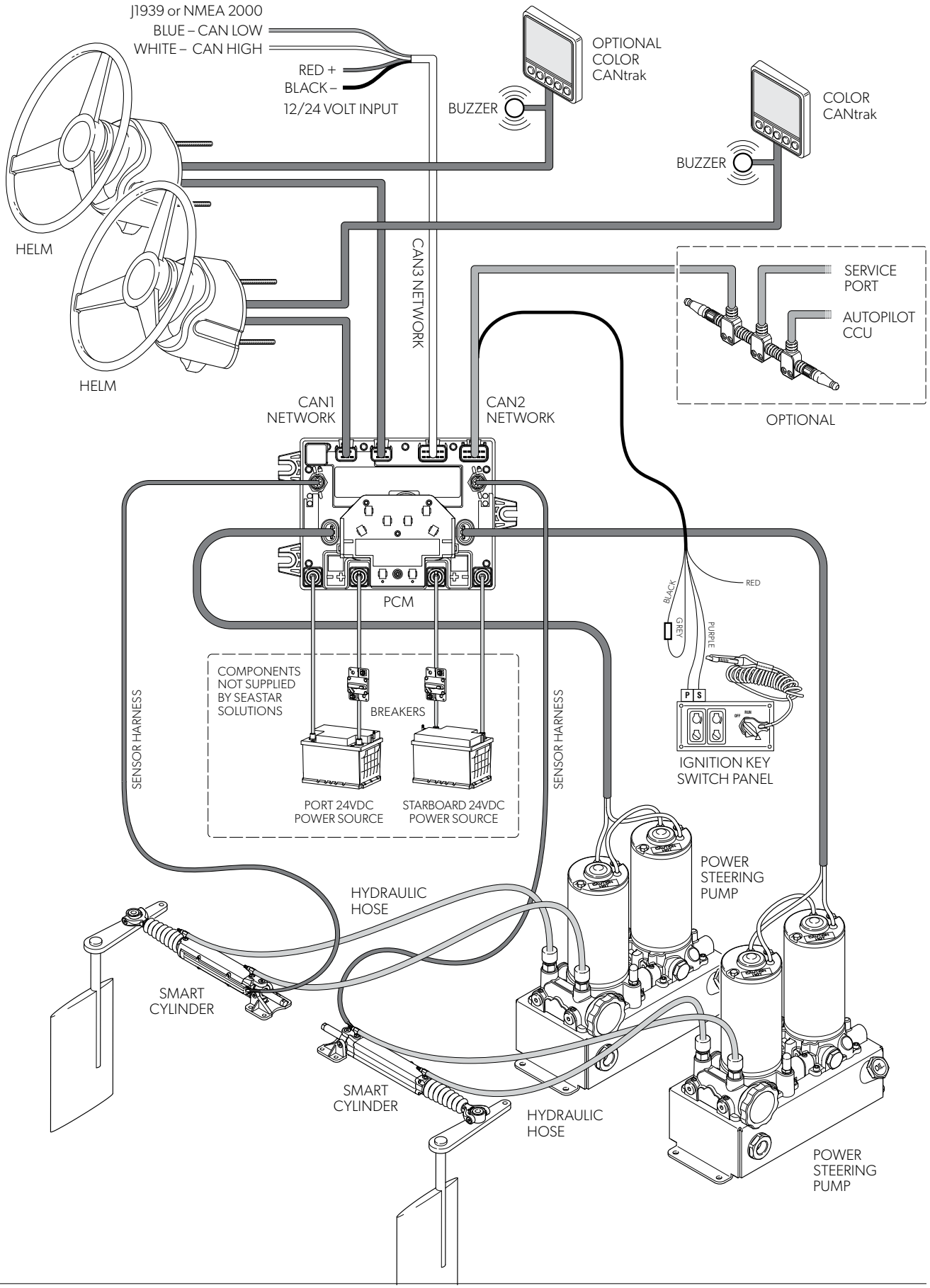


Figure 11-10 . Optimus EPS system diagram, dual station, dual cylinder (twin rudders).

11.4 5000 series — class certified

11.4.1 Applications

Electronic Power Steering (EPS) system suitable for vessels requiring class certification.

The class certified Optimus EPS 5000 series system meets RINA's and ABS' stringent "fit for purpose" safety standard for vessels less than 500 gt.

With type approval this class certified system is ready to install out of the box, simplifying vessel inspection and the final sign off process.

The incredible feel you get when you're behind the wheel of a boat equipped with Optimus EPS is the result of an innovative array of technology and engineering. Each component has been designed to complement the other, resulting in a seamless experience of steering control in virtually every situation on the water. The high level of engineering also extends to the reliability of the system, with quality materials, careful manufacturing and redundant systems, all to stand up to the rigors of life on the water.

As the captain of your vessel you know how important it is to have command of your yacht. Optimus EPS gives you the steering control, performance and comfort you expect. With Optimus EPS, you can take command of your yacht without having to arm-wrestle for control.

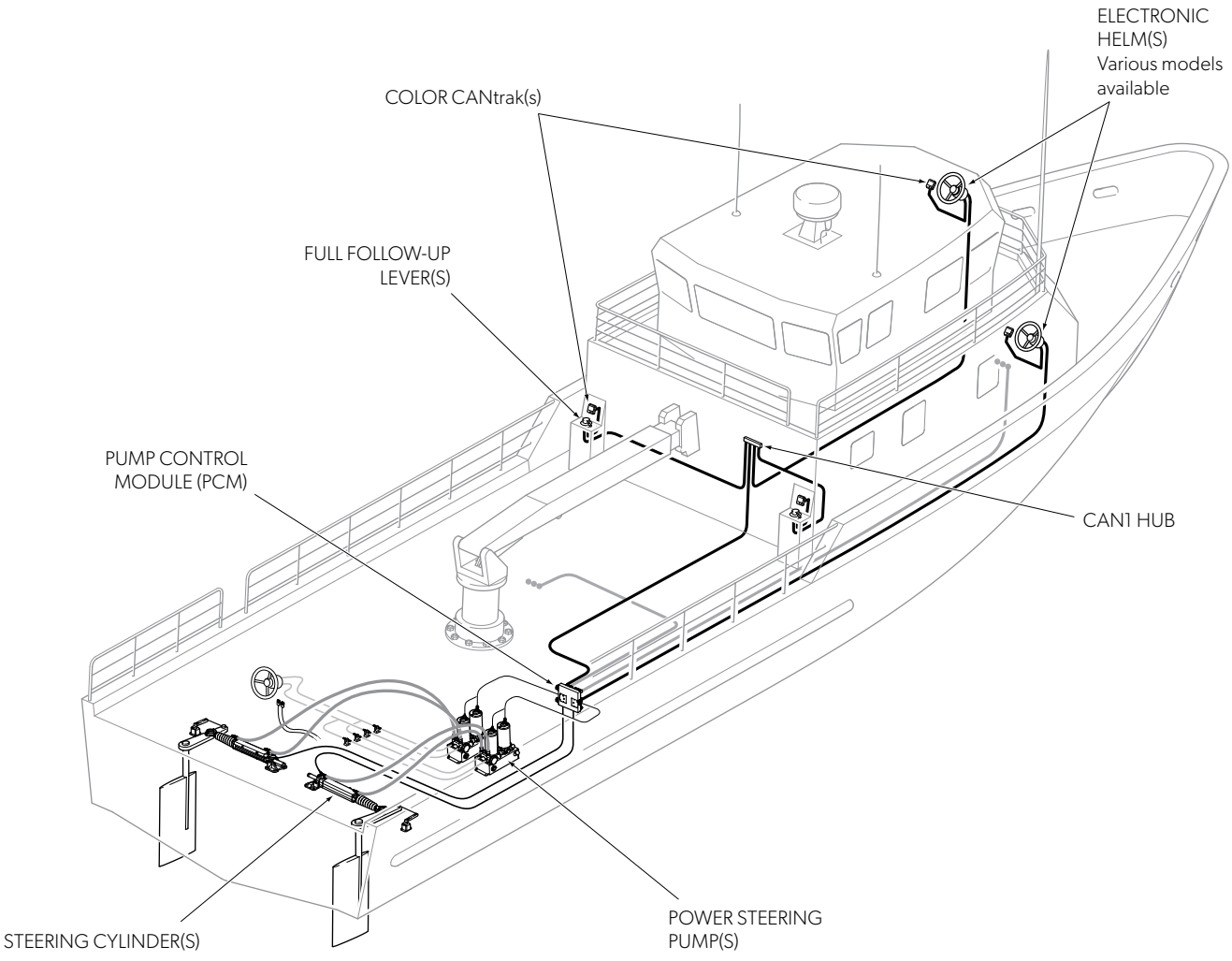


Figure 11-11. System components.

11.4.2 Environmental

- Operating temperature: -18°C to +77°C [ISO 25197]
- Storage temperature: -40°C to +85°C [ISO 25197]
- Corrosion resistance: 300 hours salt spray [ASTM B117]
- Water ingress protection: IPX7 [IEC 60529]
- Random vibration: 0.0284 g^2/Hz [ABYC P-28]
- Resonant vibration: 4 G zero-peak, 20-2000 Hz [ABYC P-28]
- Mechanical shock: 50 G, 11 m-sec half-sine shape [ISO 25197]
- Ignition protection: SAEJ-1171
- Meets EN60945 electro-magnetic compatibility requirement
- Flammability tested: IEC 60332-1-2, IEC 60332-1-3, SAE J1128

11.4.3 Features

- Up to a maximum four helm/full follow up lever stations
  - 1 helm 3 full follow up levers
  - 2 helms 2 full follow up levers
  - 3 helms 1 full follow up lever
  - 3 helms only
- Automatic battery management with sensing, warnings and best battery selection
- On demand hydraulic steering pump minimizes power consumption
- Rugged electronics for 24 VDC applications
- Color dash display showing rudder command and rudder position graphic
- Displays system health and provides setup interface
- Communicates faults and any special handling instructions to the operator
- Simple software updating via USB port
- Programmable number of turns lock to lock with speed
- Auto-adjusting steering end stops and resistance with speed
- Dual redundant position sensing on all moving components
- Compact helm with 3/4" tapered shaft. Rear mount helms available including 1" straight shaft
- Utilizes fault tolerant CAN network
- Full autopilot CANbus connectivity and integration
  - No additional pumps or sensors required
- Adjustable with speed, maximum rudder angle to 70°
- Rudder toe in or out up to 5° auto adjusts with speed
- Position proportional rudder gain for faster steering response near neutral rudder position
- RPM input: NMEA 2000, J1939 or analog pulse compatible
- Pump features an integrated service/bypass valve for manual rudder centering
- Meets or exceeds ABYC, ISO requirements.

11.4.3 Mounting configurations and system schematic

Manual hydraulic steering system shown in schematic.
Kit number HA6501 contains:

- HH5271-4, Hydraulic helm
- 214457, Shut off valve kit inc. fittings
- 682684, Electrical switch
- 60065, Hydraulic tee
- 343088, Straight hydraulic fitting

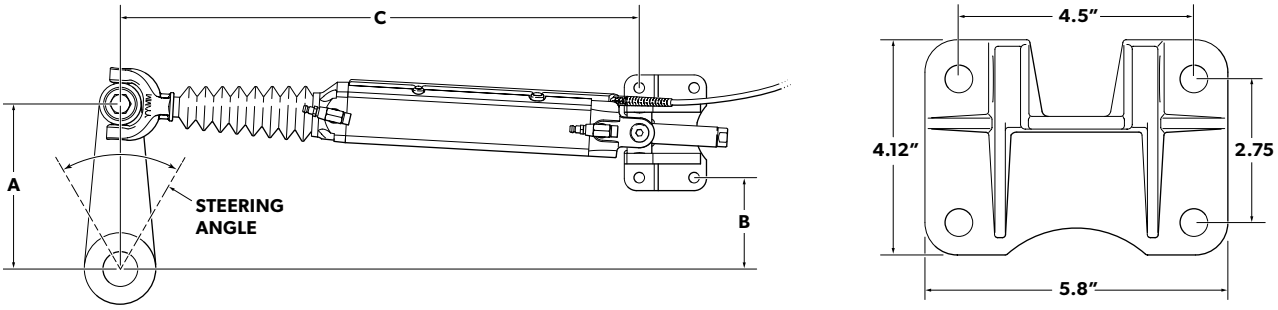


Figure 11-12.

MODEL EC5810-CL*					
70° STEERING ANGLE		STROKE LENGTH			TORQUE
A	**B**	**C** (Extended)	**C** (Mid-stroke)	**C** (Retracted)	37,400 in-lbs (4,191 Nm)
8.25” (210 mm)	4.50” (114 mm)	30.8” (782 mm)	26.0” (660 mm)	21.1” (536 mm)	

Table 11-4. *Dometic reserves the right to make changes to specifications without notice.

MODEL EC5850-CL*					
70° STEERING ANGLE		STROKE LENGTH			TORQUE
A	**B**	**C** (Extended)	**C** (Mid-stroke)	**C** (Retracted)	47,100 in-lbs (5,320 Nm)
10.46” (266 mm)	6.32” (166 mm)	36.6” (930 mm)	30.4” (772 mm)	24.2” (615 mm)	

Table 11-5. *Dometic reserves the right to make changes to specifications without notice.

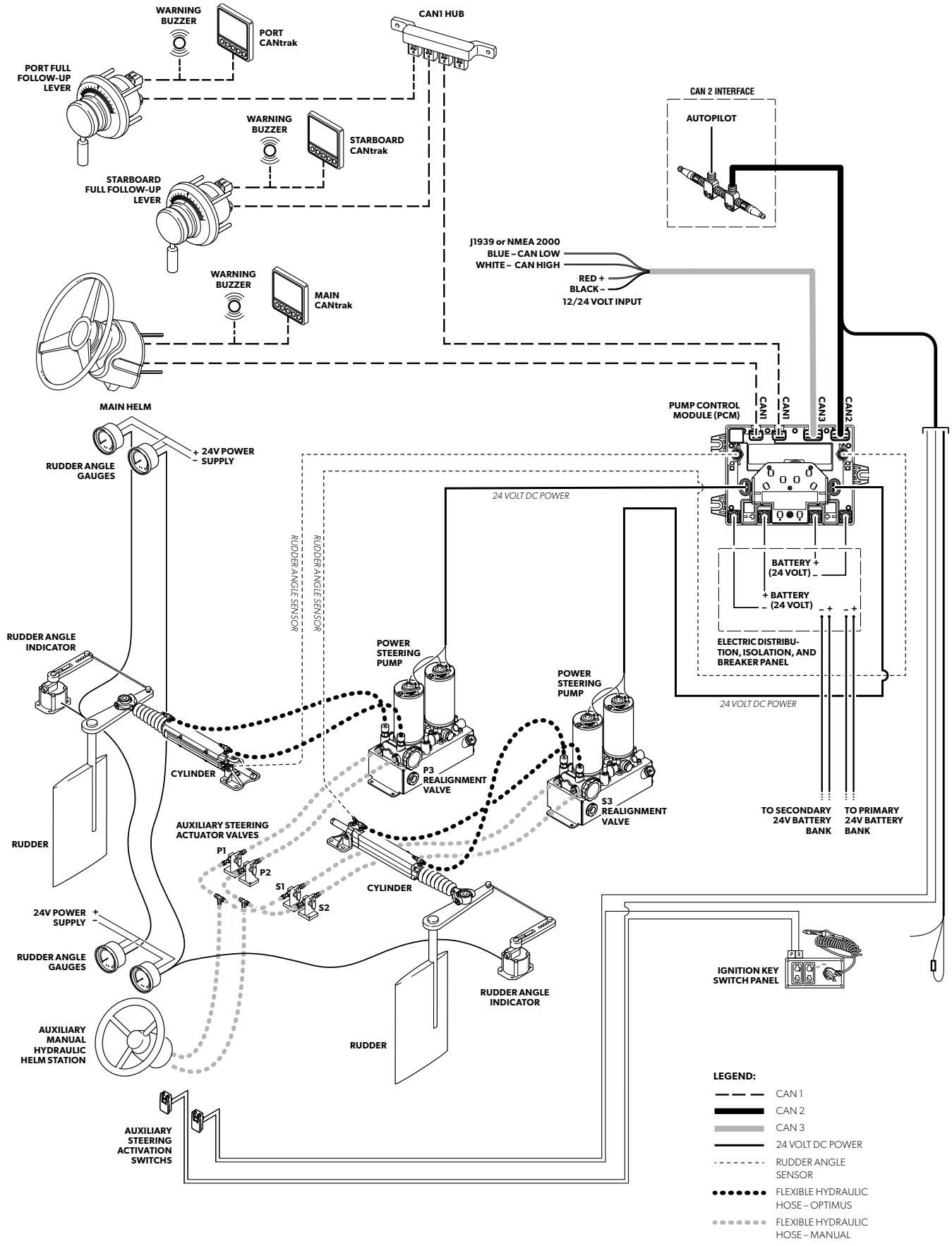


Figure 11-13 . Optimus EPS system diagram, class system with port and starboard wing stations.

11.5 Optimus sterndrive series

11.5.1 Applications

- Most single and twin sterndrive engine boats under 40' — electronically and mechanically controlled
- Single and twin helm station boats
- Competition ski boats, cruisers, sport fishing yachts

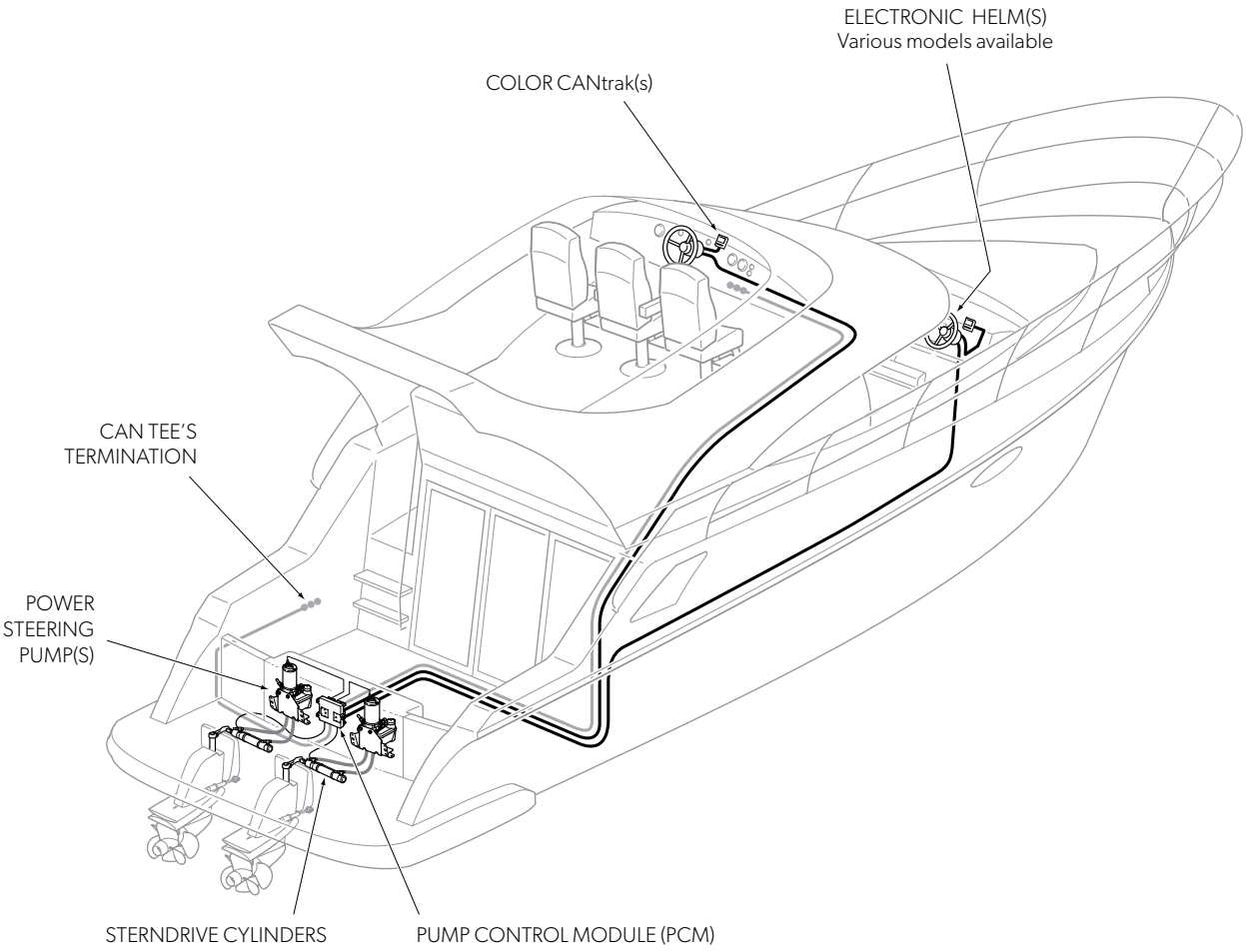


Figure 11-14. System components.

11.5.2 Environmental

- Operating temperature: -18 C to +77 C [ISO 25197]
- Storage temperature: -40 C to +85 C [ISO 25197]
- Corrosion resistance: 300 hours salt spay [ASTM B117]
- Water ingress protection: IPX7 [IEC 60529]
- Random vibration: 0.0284 g^2/Hz [ABYC P-28]
- Resonant vibration: 4 G zero-peak, 20-2000 Hz [ABYC P-28]
- Mechanical shock: 50 G, 11 m-sec half-sine shape [ISO 25197]
- Ignition protection: SAEJ-1171
- Meets EN60945 electro-magnetic compatibility requirement

11.5.3 Features

- Up to three helms stations
- Automatic battery management with sensing, warnings & best battery selection
- On demand hydraulic steering pump minimizing power consumption
- No oil at the helm
- Rugged electronics for 12 or 24 VDC applications
- Color dash display showing rudder command and rudder position graphic
- Displays system health
- Display provides system setup interface
- Communicates faults and any special handling instructions to the operator
- Simple software updating via USB port
- Programmable number of turns lock to lock with speed
- Auto-adjusting steering end stops and resistance with speed
- Dual redundant position sensing on all moving components
- Compact helm with 3/4" tapered shaft. Rear mount helms available
- Utilizes fault tolerant CAN network
- Full autopilot CANbus connectivity and integration. No additional pumps or sensors required
- Adjustable max rudder hard over angle with speed range 20° to 30° center to hard over
- Position proportional rudder gain for faster steering response near neutral rudder position
- RPM input: NMEA 2000, J1939 or analog pulse compatible
- Pump features an Integrated service/bypass valve allows a limp home mode
- Meets or exceeds ABYC, CE, ISO and SAE electrical and environmental requirements

11.5.4 Mounting configurations and system schematic

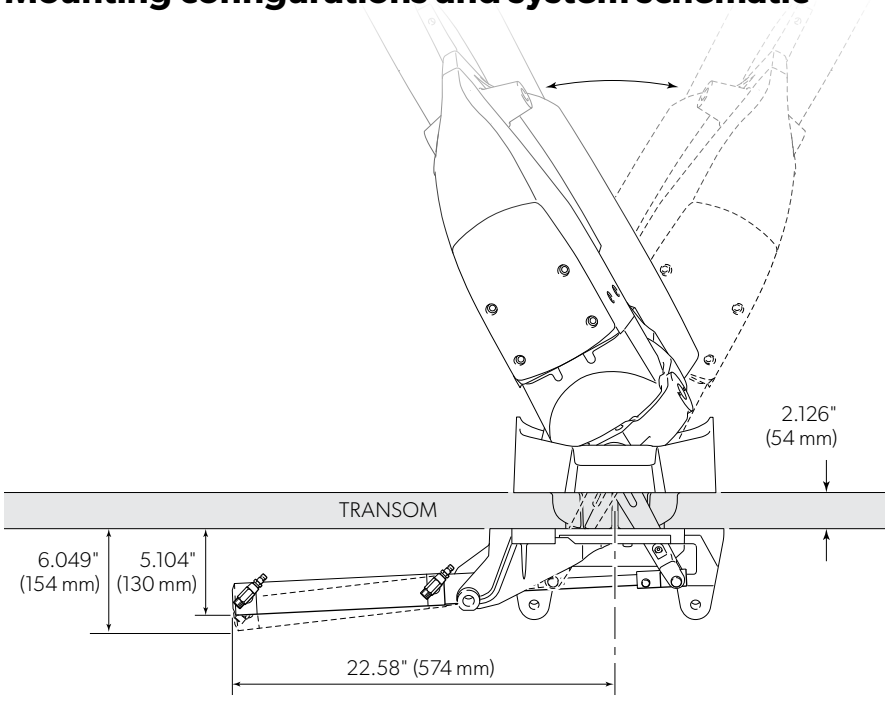


Figure 11-15.

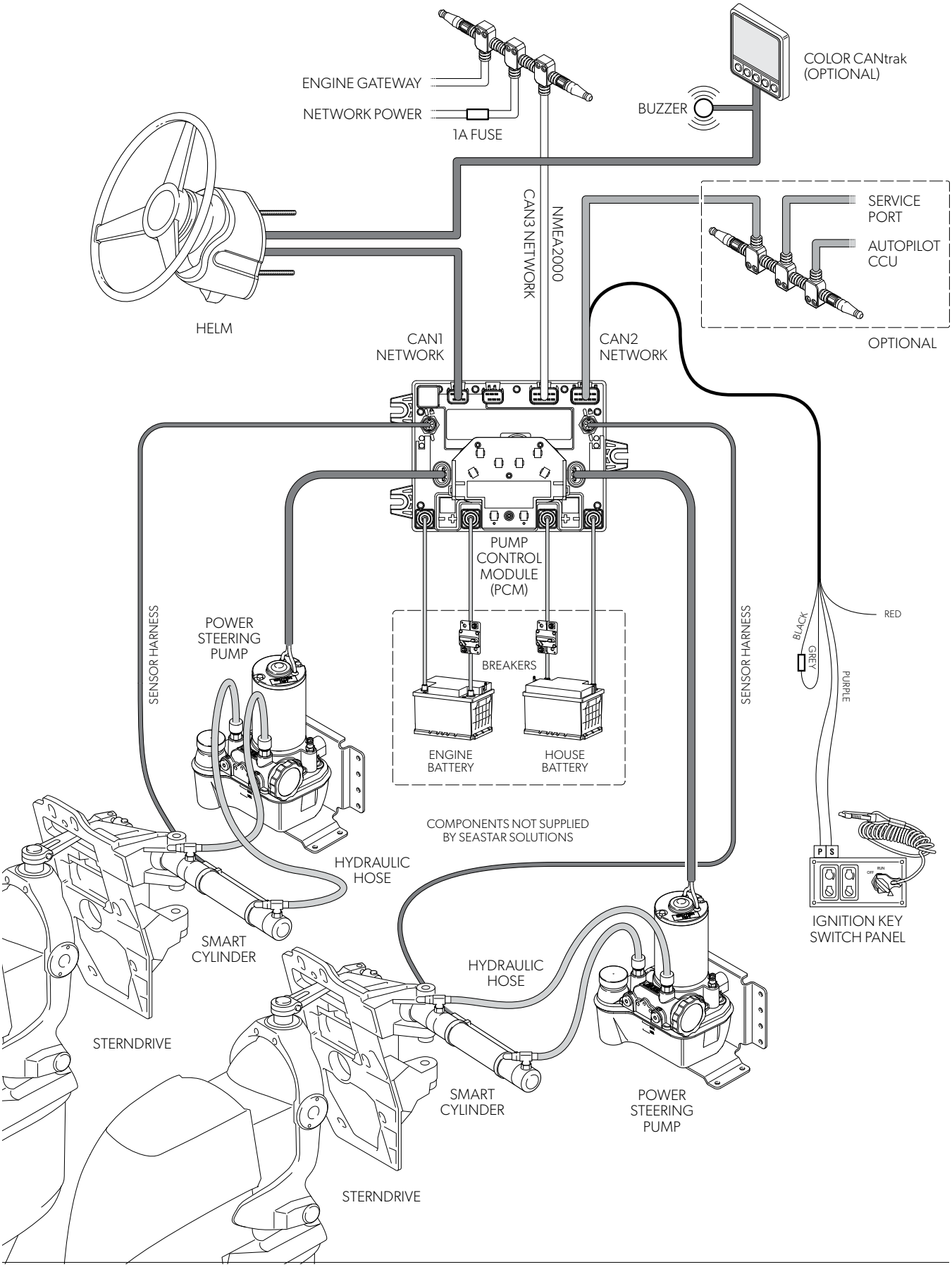


Figure 11-16. Optimus EPS twin sterndrive system diagram. For reference only and subject to change.

11.5.5 Optimus EPS/360 compatibility information

		OPTIMUS EPS	OPTIMUS 360 JOYSTICK
VOLVO	DPH DUOPROP	N/A	N/A
	DPR DUOPROP	N/A	N/A
	DPS DUOPROP	✓	✓
	DPS-A	✓	✓
	DPS-A OXI	✓	✓
	DPS-B	✓	✓
	DPS-B1	✓	✓
	DPS-M	✓	✓
	DP-E	N/A	N/A
	DP-G	N/A	N/A
	DP-X	N/A	N/A
	OCEAN X (DPS-B OXI)	✓	✓
	XDP	✓	✓
	XDP-B	✓	✓
	SX	✓	✓
	SX-A	✓	✓
MERCURY	BRAVO I	✓	✓
	BRAVO II	✓	✓
	BRAVO II	✓	✓
	ALPHA I GEN 1	✓	✓
	ALPHA I GEN 2	✓	✓
	BRAVO X I	✓	✓
	BRAVO X II	✓	✓
	BRAVO X III	✓	✓
	BRAVO X R	✓	✓
	BRAVO X R ITS	N/A	N/A
	BRAVO X SPORTSMAN	✓	✓
YANMAR	ZT 370	✓	N/A
	ZT 350	✓	N/A

Table 11-6.

Information is subject to change.
N/A — Currently not available.
JS Upgrade — Can add joystick control to an existing Optimus EPS vessel.
Optimus 360 is available for twin engine sterndrives with Optimus steering when used with i7800 control system.

Notes

12 Trim Tabs

12.1 Overview

12.1.1 Trim tab principles of operation

Trim tabs are plates, installed in pairs, used to control the pitch and roll of a boat by directing water as it flows past the transom. They work by harnessing the hydrodynamic forces exerted by moving water, so the boat must be in motion for the tabs to have an effect.



Figure 12-1.

When a tab is lowered, the directed water flow will exert an upward force at the stern of the boat. If both tabs are lowered at the same time the upward force at the stern will force the bow down (pitch control). If only one tab is lowered it will force the bow down on the opposite side, causing the boat to roll (roll control). The combination of pitch and roll is the boat's attitude.

By adjusting the boat's attitude, the boat operator can get on plane faster, stay on plane at lower speeds, increase top speed, correct a small list, improve ride quality and visibility, reduce porpoising, and improve fuel economy.

12.1.2 Trim tab safe operation

- The trim tab actuators are powerful mechanical devices that can cause injury. Ensure no one is at risk of being injured before operating a tab when swimmers are in the water, or when operating the tabs on a trailer with people or children around.
- Only use the trim tab system as intended.
- Do not use tabs as a boarding step.
- When lifting the boat, do not place the lifting straps or forks on the tabs or actuators.
- Do not push or pull on the tabs or actuators when putting the boat on or off a trailer.
- Do not tie off or secure anything to the actuators.
- See a marine technician for repairs if the trim tabs, actuators, or controller are modified, damaged or not working correctly.
- The controller and actuators are not user serviceable; do not attempt to disassemble.
- The trim tab system is not a toy. Do not allow children to operate the system.

WARNING!
Exercise sound judgment when using trim tabs in challenging sea conditions. In some cases the safest action is to run with tabs fully retracted.

12.2 Tab and actuator installation

12.2.1 Planning

When deciding where to mount the tabs, there are several things to consider. Be sure you have considered all these items and perform a test fit before drilling any holes in the hull.

- The outboard edge of the tab should be inboard 1"-4" (25-100 mm) from the chine. The further outboard the tab, the more effective it is for controlling the side-to-side level of the boat.
- The edges of the tab should be at least 2" (51 mm) from a hull strake, if possible.
- To avoid interference with the engine, the tab must be at least 8" (205 mm) from the drive centerline.

WARNING!
Read all provided instructions and manuals thoroughly before beginning any installation.

Before drilling holes in the hull, always check that there is nothing in the hull that might be damaged, such as fuel or water tanks, electrical wiring, hydraulic steering hoses, etc.

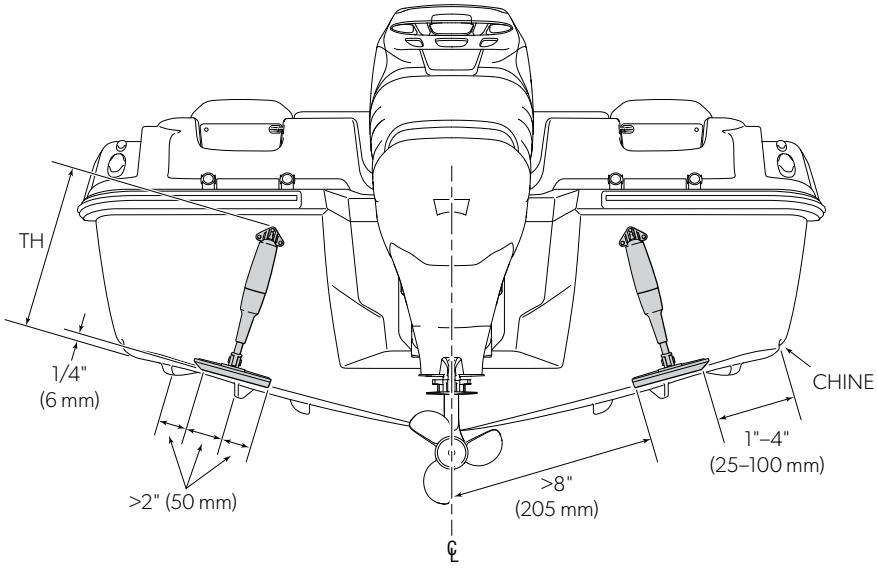


Figure 12-2.

- There must be space behind the transom for the actuator harness to enter the boat in a dry location away from sources of heat.
- There are different tab configurations available and they will have different transom height (TH) requirements as shown in figure 12-3. The actual transom height will vary with the angle of the transom, so the maximum value for TH is shown.
- To ensure the tabs do not drag when retracted, they must be tilted up from the hull level. The longer the tab, the greater the height above the hull level at the trailing edge of the tab, as shown in figure 12-4.

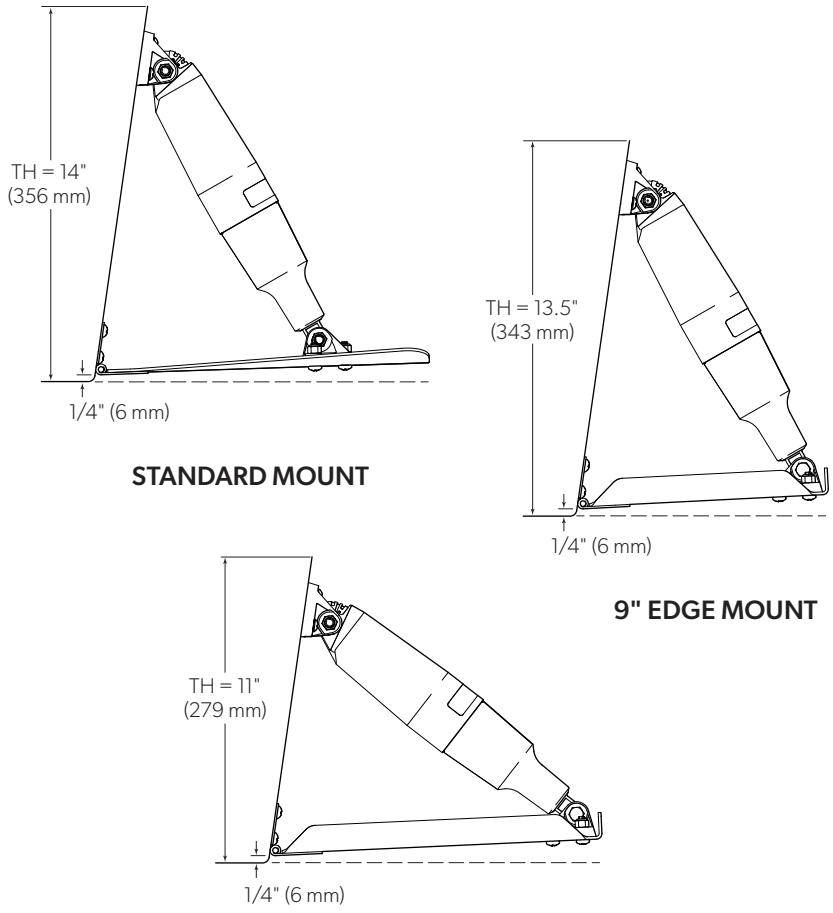


Figure 12-3. Dimensions shown apply to standard 2.25"" actuator only.

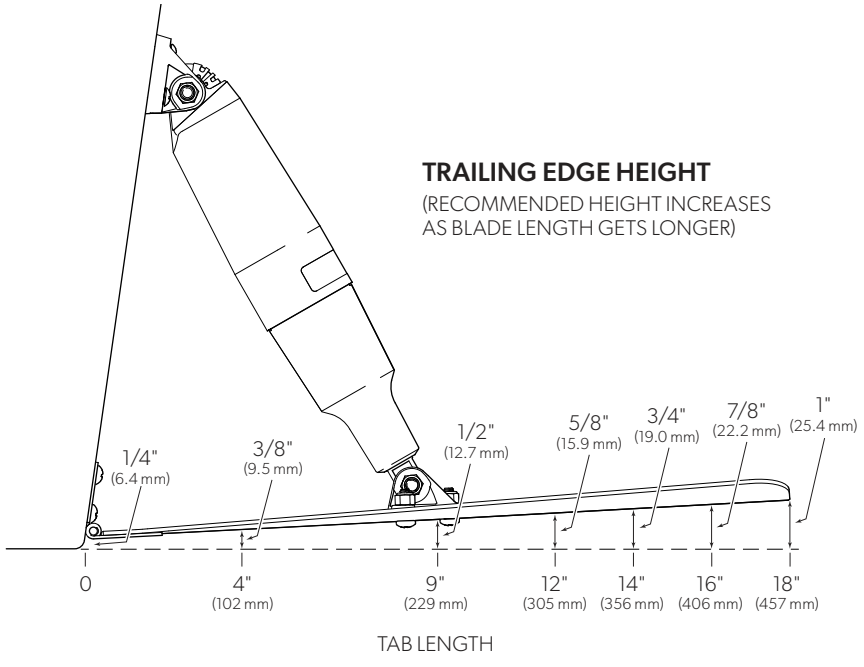


Figure 12-4.

12.3 Standard series

12.3.1 Technical description

The Trim Tab system consists of three primary components: the actuators, the sheet metal tabs, and the dial controller. The dial controller is unique in the industry with smart function buttons and an intuitive dial control that makes roll adjustment simple and obvious.

The system operates on 12VDC and supports two actuators and up to two dial controllers.

NOTICE!

Dometic trim tabs work as part of an integrated system, and cannot combined with other makes of controls and/or actuators.

12.3.2 System components

The Trim Tab system consists of three primary components: the actuators, the sheet metal tabs, and the dial controller. The dial controller is unique in the industry with smart function buttons and an intuitive dial control that makes roll adjustment simple and obvious.

The system operates on 12VDC and supports two actuators and up to two dial controllers.

Item No.	Description
1	Dial Controller
2	Transom bracket
3	Actuator
4	Trim tab

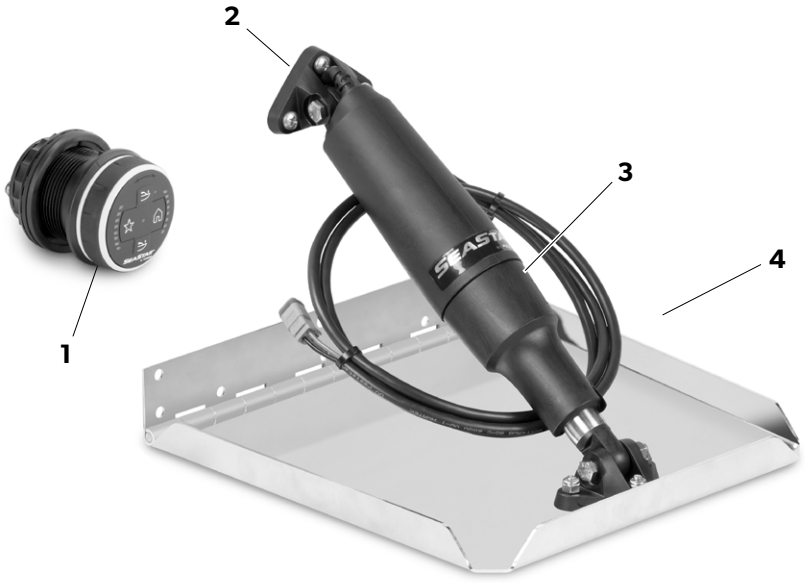


Figure 12-5.

12.3.3 Controller operating and display elements

Item No	Description
1	Favorite button
2	Port tab position indicator
3	Control dial
4	Bow down button
5	Auto Brightness ambient light sensor
6	System status indicator
7	Starboard tab position indicator
8	Home button
9	Bow up button



Figure 12-6.

12.3.4 Basic features and operation

The dash-mounted Dial Controller is designed for intuitive operation. The function of each interface feature is described below.

System Status Indicator

Displays the status of the trim tab system.

Steady green	System is ready
Flashing cyan	The system has memorized the favorite position
Flashing blue	System is in manual LED brightness adjustment mode
Flashing yellow	Controller has a non-critical fault
Flashing red	Controller has a critical fault

Tab Position Indicator LEDs

Shows the position of port and starboard tabs. At full retraction a single LED is shown at the top. As the tabs are extended the LEDs will illuminate to show the tab position.

Bow Down



Lowers both tabs simultaneously, causing the bow to drop. Press and hold until the desired pitch is achieved.

Bow Up



Raises both tabs simultaneously, causing the bow to rise. Press and hold until the desired pitch is achieved.

Control Dial

Rolls the boat in the direction of rotation. Rotating the dial to starboard (clockwise) will cause the port tab to lower and the starboard tab to raise, causing the boat to roll to starboard. Turning the dial to port (counterclockwise) will have the opposite effect.

Use this control with caution: turn one click at a time and wait a moment to see how the boat reacts before making further adjustments. While this control can be used to correct a list due to uneven loading, best practice is to load your boat as evenly as possible, and to keep passenger movement at a minimum while underway at high speeds.

The relative positions of the tabs are maintained when using the Bow Down and Bow Up controls, so if you've used the roll control to correct for a list it will remain corrected as you alter the bow position.

Home



Press once to retract actuators to their fully retracted home position. Use this button when:

- you encounter difficult sea conditions and need to raise the bow,
- preparing to load the boat onto a trailer,
- preparing the boat for lifting.

Favorite



Press and hold the button for three seconds to save the current tab position. Press the button at any time to automatically return the tabs to this position.

Auto LED Brightness

The controller uses an ambient light sensor to automatically adjust the LED brightness. You can disable the automatic brightness control and adjust it manually if you prefer.



CAUTION! Varying sea conditions

If sea conditions have changed since you last set a favorite position, use caution when recalling it.

Preparing to trailer or lift the boat

➤ Press the Home button.

✓ The actuators will retract. When both tab position indicators show only one LED the tabs are fully retracted.

➤ You are ready to trailer or lift the boat.



NOTICE! Material damage

Trailering or lifting the boat with the trim tabs extended may cause irreparable damage to the tabs and actuators.

Automatic retraction

The trim tabs will automatically retract to the home position:

- when the ignition is switched on,
- when the ignition is switched off.

12.3.5 System configuration options

Manual LED brightness adjustment

By default, the LED brightness is controlled automatically with an ambient light sensor. If manual control is preferred, you can disable the automatic function (see section 7.6) and adjust it manually. To adjust manually:

➤ Press and hold both the Favorite and Home buttons together.

✓ The status LED and the starboard position indicator LEDs will flash blue to indicate you are in manual brightness mode. (If they do not flash, the auto-brightness function has not been disabled.)

✓ As you continue to hold the buttons the brightness of the LEDs will cycle through the five available levels.

➤ Release the buttons at the desired level.

Roll sensitivity adjustment

The roll sensitivity refers to how much the tabs move for a given movement of the control dial. The default sensitivity will work for most users, but you can increase or decrease the sensitivity if desired.

12.3.6 Technical data

Connection voltage	12V DC nominal (9/16V min/max per SAE J1455)
Current draw at load	5.0A at 300 lbf (1340 N) 9.0A at 600 lbf (2680 N)
Max. static load, tension	1000lbf (4.4 kN)
Max. static load, compression	1000lbf (4.4 kN)
Weight, actuator	2.25" stroke: 3.6 lb (1.6 kg) 4.25" stroke: 3.9 lb (1.8 kg)
Weight, controller	.5 lb (.24 kg)
Weight, tab	Varies with tab, approximately .036 lb/square inch (2.54 g/ square cm) of tab, exclusive of brackets and hinges

Table 12-1.

12.3.7 Part numbers

DESCRIPTION	PART #
2.25" Kit — Stroke 11.5" standard actuator and controller, 9" x 12" standard tabs	STT3103R
2.25" Kit — Stroke 11.5" standard actuator and controller, 12" x 12" standard tabs	STT3105R
2.25" Kit — Stroke 11.5" standard actuator and controller, 12" x 9" standard tabs	STT3107R
2.25" Kit — Stroke 10" standard actuator and controller, 9" x 12" standard tabs	STT3131R
2.25" Kit — Stroke 10" standard actuator and controller, 12" x 12" standard tabs	STT3133R
2.25" Kit — Stroke 11.5" standard actuator and controller, 12" x 12" edge mount tabs	STT3205R
2.25" Kit — Stroke 11.5" standard actuator and controller, 12" x 9" edge mount tabs	STT3207R
2.25" Kit — Stroke 10" standard actuator and controller, 12" x 12" edge mount tabs	STT3231R
2.25" Kit — Stroke 10" standard actuator and controller, 12" x 9" edge mount tabs	STT3233R
2.25" Kit — Stroke 11.5" standard actuator and controller, no tabs	STT3601R
4.25" Kit — Stroke, 13" standard actuators and dial controller, harness, no tabs	STT3701R

Table 12-2. Reference information only, subject to change at any time.

12.3.8 Wiring diagrams

NOTICE! This system is designed for use with 12VDC only.

It is not compatible with 24VDC. Connecting to 24VDC will damage the electrical components.

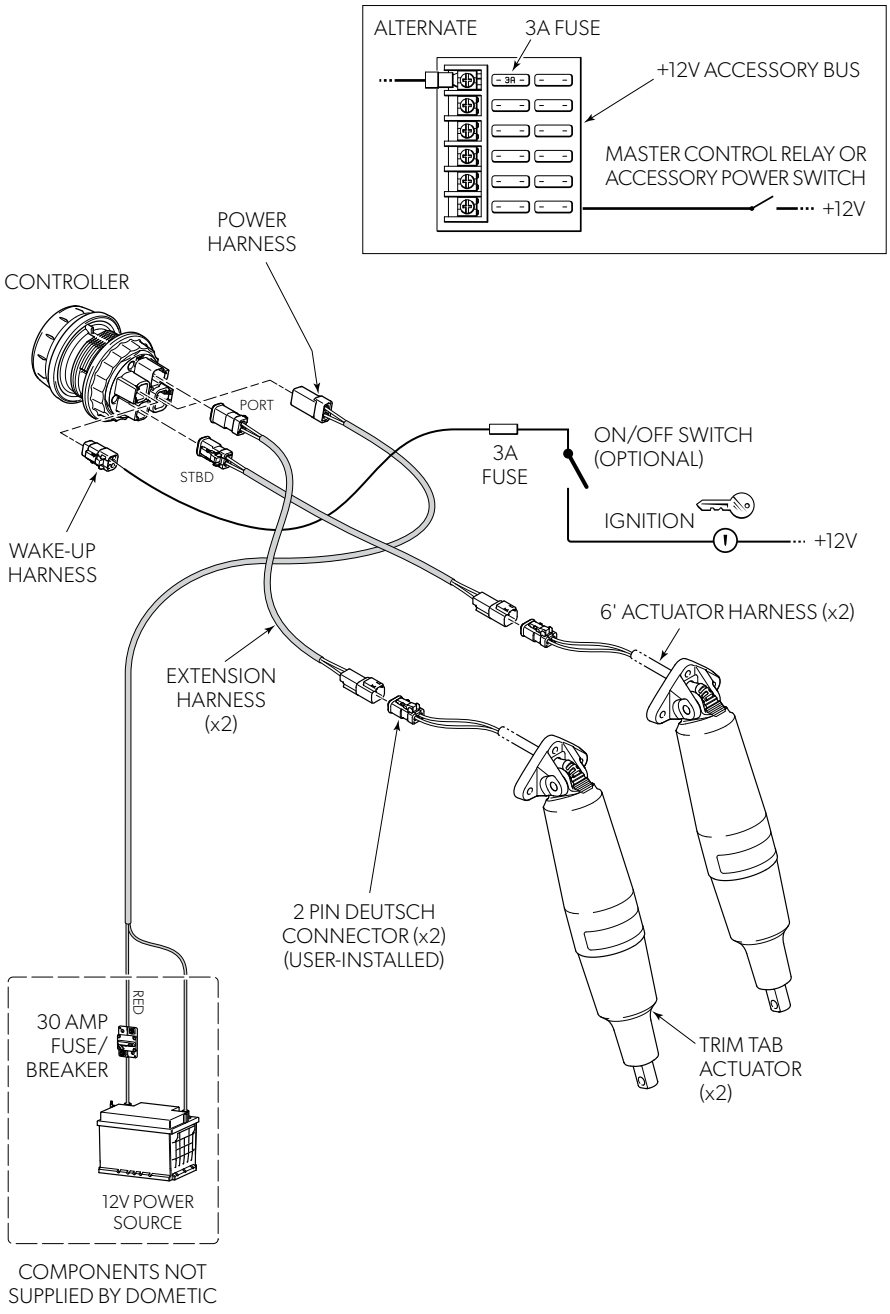


Figure 12-7. Single station (standard series shown).

WARNING!
All parts of the electrical installation must comply with relevant ABYC or ISO standards. Harnesses and wiring must be rated for 105°C and comply with the latest revisions of SAE J1128 or ISO 6722.

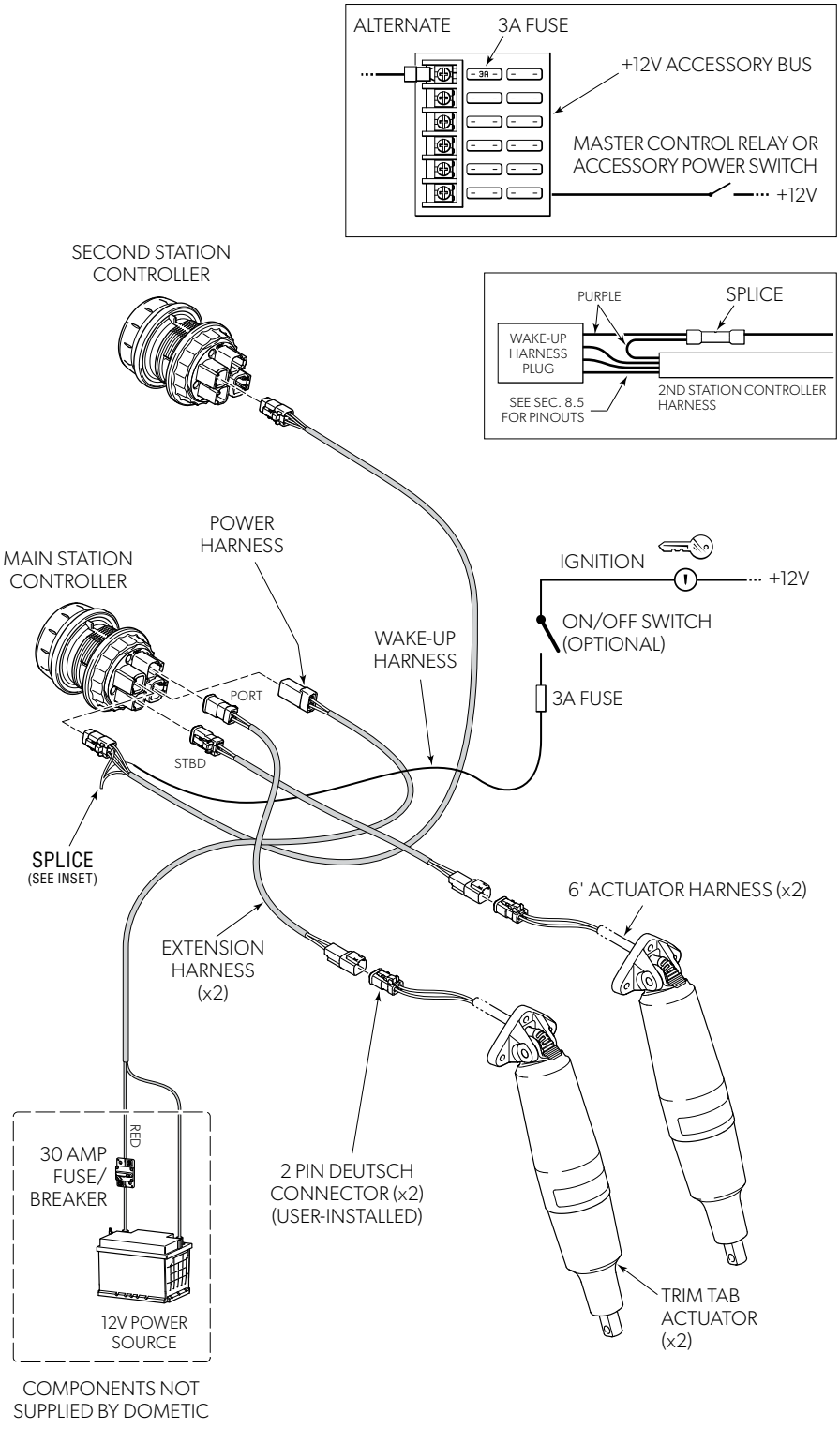


Figure 12-8. Dual station (standard series shown).

12.4 Adaptive/Optimus adaptive series

12.4.1 Technical description

Your Adaptive Trim Tab System is the industry's first trim system with position feedback. This state-of-the-art system gives you immediate, precise, and repeatable control of vessel trim. With built-in intelligence, it can be integrated with Optimus Electronic Power Steering for complete vessel control. When integrated with Optimus, the system is called the Optimus Adaptive Trim Tab System.

The Adaptive Trim Tab System consists of three primary components: the adaptive actuators, the sheet metal tabs, and the adaptive dial controller. The adaptive dial controller is unique in the industry with smart function buttons and an intuitive dial control that makes roll adjustment simple and obvious.

The system operates on 12VDC, and uses a Controller Area Network (CAN) bus for communications. The controller can control up to four trim tab actuators and precisely synchronize their movement.

NOTICE!

Dometic trim tabs work as part of an integrated system, and cannot combined with other makes of controls and/or actuators.

12.4.2 System components

Item No.	Description
1	Adaptive Dial Controller
2	Transom bracket
3	Actuator
4	Trim tab

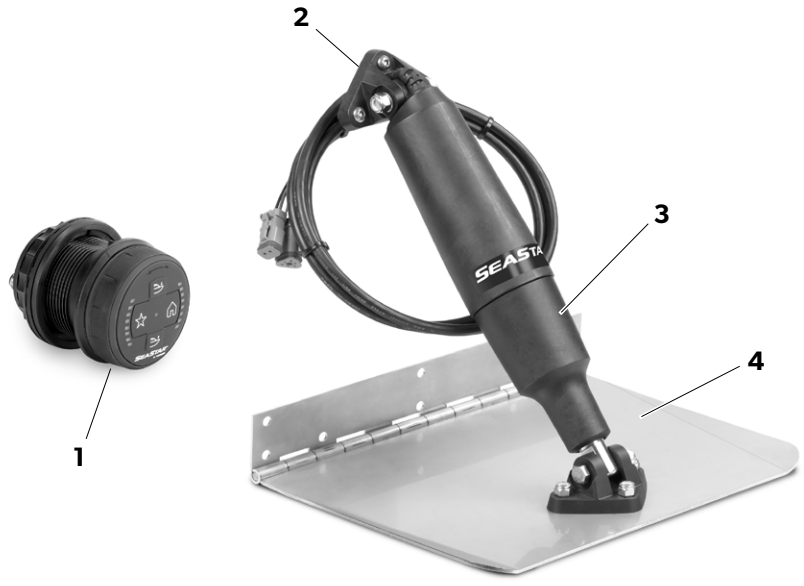


Figure 12-9.

12.4.3 Controller operating and display elements

Item No	Description
1	Favorite button
2	Port tab position indicator
3	Control dial
4	Bow down button
5	System status indicator
6	Starboard tab position indicator
7	Home button
8	Bow up button



Figure 12-10.

12.4.4 Basic features and operation

The dash-mounted Adaptive Dial Controller is designed for intuitive operation. The function of each interface feature is described below.

System Status Indicator

Displays the status of the trim tab system.

Steady green	System is ready
Steady magenta	Holeshot mode is activated, based on SOG
Steady lime green	Holeshot mode is activated, based on RPM
Flashing blue	System is in LED brightness adjustment mode
Flashing cyan	The system has memorized the favorite position
Steady blue	Tabs retracted automatically
Flashing yellow	Controller has a non-critical fault
Flashing red	Controller has a critical fault

Tab Position Indicator LEDs

Shows the position of port and starboard tabs. At full retraction a single LED is shown at the top. As the tabs are extended the LEDs will illuminate to show the tab position.

Bow Down



Lowers both tabs simultaneously, causing the bow to drop. Press and release to move both tabs a preset increment, or press and hold until the desired pitch is achieved. To enable fine control, the actuator speed is reduced for the first second the button is held, after which the actuators move at full speed for larger adjustments.

Bow Up



Raises both tabs simultaneously, causing the bow to rise. Press and release to move both tabs a preset increment, or press and hold until the desired pitch is achieved. To enable fine control, the actuator speed is reduced for the first second the button is held, after which the actuators move at full speed for larger adjustments.

Control Dial

Rolls the boat in the direction of rotation. Rotating the dial to starboard (clockwise) will cause the port tab to lower and the starboard tab to raise, causing the boat to roll to starboard. Turning the dial to port (counterclockwise) will have the opposite effect.

Use this control with caution: turn one click at a time and wait a moment to see how the boat reacts before making further adjustments. While this control can be used to correct a list due to uneven loading, best practice is to load your boat as evenly as possible, and to keep passenger movement at a minimum while underway at high speeds.

The relative positions of the tabs are maintained when using the Bow Down and Bow Up controls, so if you've used the roll control to correct for a list it will remain corrected as you alter the bow position.

Home



Press once to retract actuators to their fully retracted home position. Use this button when:

- you encounter difficult sea conditions and need to raise the bow,
- preparing to load the boat onto a trailer,
- preparing the boat for lifting.

The home button will immediately override any automatic operation of the trim tab actuators and return them to home position. When the tabs reach the home position the trim tab position indicator LED will blink three times.

Favorite



The Favorite button has two functions:

1. Set and recall a Favorite trim tab position.
2. Toggle Holeshot mode on or off.

You can switch between these functions by pressing and holding the Favorite and Bow Up buttons together for three seconds. The system status indicator will briefly flash magenta to show the Holeshot function is enabled, or green to show the Favorite function is enabled.

LED Brightness

The controller provides manual adjustment of the LED brightness.

Preparing to trailer or lift the boat

➤ Press the Home button.

✓ The actuators will retract. When both tab position indicators show only one LED the tabs are fully retracted.

➤ You are ready to trailer or lift the boat.

NOTICE! Material damage

Trailering or lifting the boat with the trim tabs extended may cause irreparable damage to the tabs and actuators.

12.4.5 Advanced features and operation

Setting and recalling a favorite position

With this function you can memorize a trim tab position and return to it at any time with a single press of a button.

To set a favorite position:

➤ Press the Favorite button (see figure 12-10) for five seconds.

✓ The system status indicator will flash cyan three times to confirm the position has been saved.

To recall a favorite position:

➤ Press the Favorite button.

✓ The tabs will adjust to the saved favorite position.

CAUTION! Varying sea conditions

If sea conditions have changed since you last set a favorite position, use caution when recalling it.

Adaptive Cruising Favorite set-point

As you operate your boat and adjust the trim settings the system stores the latest stable setting as an Adaptive Cruising Favorite set-point. A stable setting is one that is maintained for twenty seconds while Holeshot mode is activated and the engine RPM or speed over ground meets a preset minimum. The system status indicator will flash cyan when the system has memorized a favorite position.

The Adaptive Cruising Favorite set-point is used by the Holeshot mode, and is only available in systems in which Holeshot mode is enabled by the builder/dealer.

Holeshot mode

NOTE: Holeshot mode prerequisites

- Holeshot mode requires an engine gear signal and either an engine RPM or GPS speed-over-ground source.
- If your boat is equipped with Optimus Electronic Power Steering (EPS), or has an NMEA2000 network with an engine gateway, you will likely have the engine gear and RPM signal, and you may have an SOG source.

Holeshot mode is a semi-automatic mode designed to get your boat up on plane quickly, with a minimum of operator involvement. It allows you to keep your focus on the water ahead of you and the safe operation of your boat.

When activated, Holeshot mode simplifies getting on plane. It will automatically deploy the trim tabs when it detects a Holeshot (a minimum engine RPM is reached), then retract them to the Adaptive Cruising Favorite set-point as speed increases and the boat gets on plane.

To perform a Holeshot:

➤ Trim your outboard or sterndrive as you normally would for launch.

➤ Press the Favorite button (see figure 12-10).

✓ The system status indicator (see figure 12-10) will light up magenta or lime green. Magenta indicates that SOG is used to control deployment, while lime green indicates RPM is used.

➤ Increase throttle to your normal launch RPM.

✓ The Adaptive Trim Tab System manages tab deployment to get you up on plane quickly.

➤ Manually adjust engine trim and trim tabs as necessary for the conditions.

WARNING!
If sea conditions have changed since the last Adaptive Cruising Favorite set-point was stored, the trim position may be unsuitable, and could potentially put the boat in a poor attitude for the conditions. Trim the tabs manually in this case. Always use your best judgment before activating Holeshot mode.

NOTE: Planing time limit
When RPM is used to control the tab deployment (i.e. no SOG source), there is a time limit between activation and when you must initiate the holeshot (by throttling up). The default limit is 15 seconds.

NOTE: Holeshot performance
The performance of holeshot mode is sensitive to tab size, system tuning, and throttle application. If holeshot performance is unsatisfactory, contact your dealer for assistance.

NOTE
If you cannot activate Holeshot mode:
- Your boat may not have an engine RPM or GPS speed-over-ground source.
- Holeshot mode may be disabled.
- Check that at least one engine is running, no engines are in reverse gear, and that an Optimus joystick (if equipped) is not active.

NOTE: Holeshot automatic deactivation
If Holeshot mode is activated, it will automatically deactivate when:
- all engines are switched off
- any engine is shifted into reverse
- an Optimus joystick is activated

Holeshot mode will automatically reactivate when at least one engine is running, no engines are in reverse, and the joystick is not active.

Automatic retraction

The trim tabs will automatically retract:

- when the ignition is switched off*,
- when the engine(s) are placed in reverse gear**,
- when Optimus joystick control or SeaStation are activated (when boat is so equipped).

Homing

When the trim tab controller is powered on, the system will go through a homing cycle. The trim tabs will retract at slow speed until the end of travel is detected.
This ensures the accuracy of the position feedback.

During the homing cycle the tab position indicator LEDs will light up sequentially from bottom to top. When the home position is detected the top LED will blink three times.

* Battery switches must remain on.
** Requires a gear position signal. Standard on Optimus systems.

12.4.6 Technical data

	STANDARD ACTUATOR	HIGH-SPEED ACTUATOR
Connection voltage	12V DC nominal (9/16V min/max per SAE J1455)	
Current draw at load	9.5A at 300 lbf (1340 N) 17.5A at 600 lbf (2680 N)	16A at 200 lbf (890 N) 33A at 300 lbf (1340 N)
Maximum static load, tension	1000lbf (4.4 kN)	
Maximum static load, compression	1000lbf (4.4 kN)	
Weight, actuator	2.25" stroke: 3.6 lb (1.6 kg) 4.25" stroke: 3.9 lb (1.8 kg)	
Weight, controller	.5 lb (.24 kg)	
Weight, tab	Varies with tab, approximately .036 lb/square inch (2.54 g/square cm) of tab, exclusive of brackets and hinges	

Table 12-3.

12.4.7 Part numbers

DESCRIPTION	PART #
Kit, 9 x 12 standard, electro polished	ATT4103
Kit, 12 x 12 standard, electro polished	ATT4105
Kit, 12 x 12 edge mount, electro polished	ATT4205
Kit, 12 x 9 edge mount, electro polished	ATT4207
Kit, 2.25" Actuators plus all the components minus the tabs	ATT4601
Kit, 4.25" Actuators plus all the components minus the tabs	ATT4701
Kit, 9 x 12 standard mount, electro polished, short actuator 10" P-P	ATT4131
Kit, 12 x 12 standard mount, electro polished, short actuator 10" P-P	ATT4133
Kit, 12 x 12 edge mount, electro polished, short actuator 10" P-P	ATT4231
Kit, 12 x 9 edge mount, electro polished, short actuator 10" P-P	ATT4233
Harness, communication, CM20043	4471004578
Harness, power, CM20044	4471004579
Can tee, CM10060	4471004629
Harness, extension 3' CAN, CM10003	4471004630
Controller, dial adaptive, CON2000	4471006308
Controller, dial adaptive, 2nd station CON1000	4471004580
Actuator, adaptive, 2.25" CA1000	4471004581
Actuator, adaptive, 2.25", 10" P-P, short, CAL200	4471006450
Actuator, adaptive, 4.25" CA3000	4471005248
Kit, hardware tab fasteners, for 1 tab, HA7000	4471004582
Kit, connectors trim tab 2 position 3 pole, Deutsch, for 1 actuator, HA7004	4471004631
Kit, hardware mount, adaptive actuator, std. mount for 1 tab, (11.5" or 13"), HA7008	4471004583
Kit, hardware mount, adaptive actuator, edge mount for 1 tab, (11.5" or 13"), HA7010	4471004584
Kit, hardware mount, adaptive actuator, edge mount for 1 tab, (11.5" or 13"), HA7011	4471006604
Kit, hardware mount, adaptive actuator, edge mount for 1 tab, (11.5" or 13"), HA7012	4471006607
Tab, one standard mount 9 x 12 electro polished w/screws	4471004546
Tab, one standard mount 12 x 12 electro polished w/screws	4471004545
Tab, one edge mount 12 x 12 electro polished w/screws	4471004542
Tab, one edge mount 12 x 9 electro polished w/screws	4471004547

Table 12-4.

12.4.8 Wiring diagram

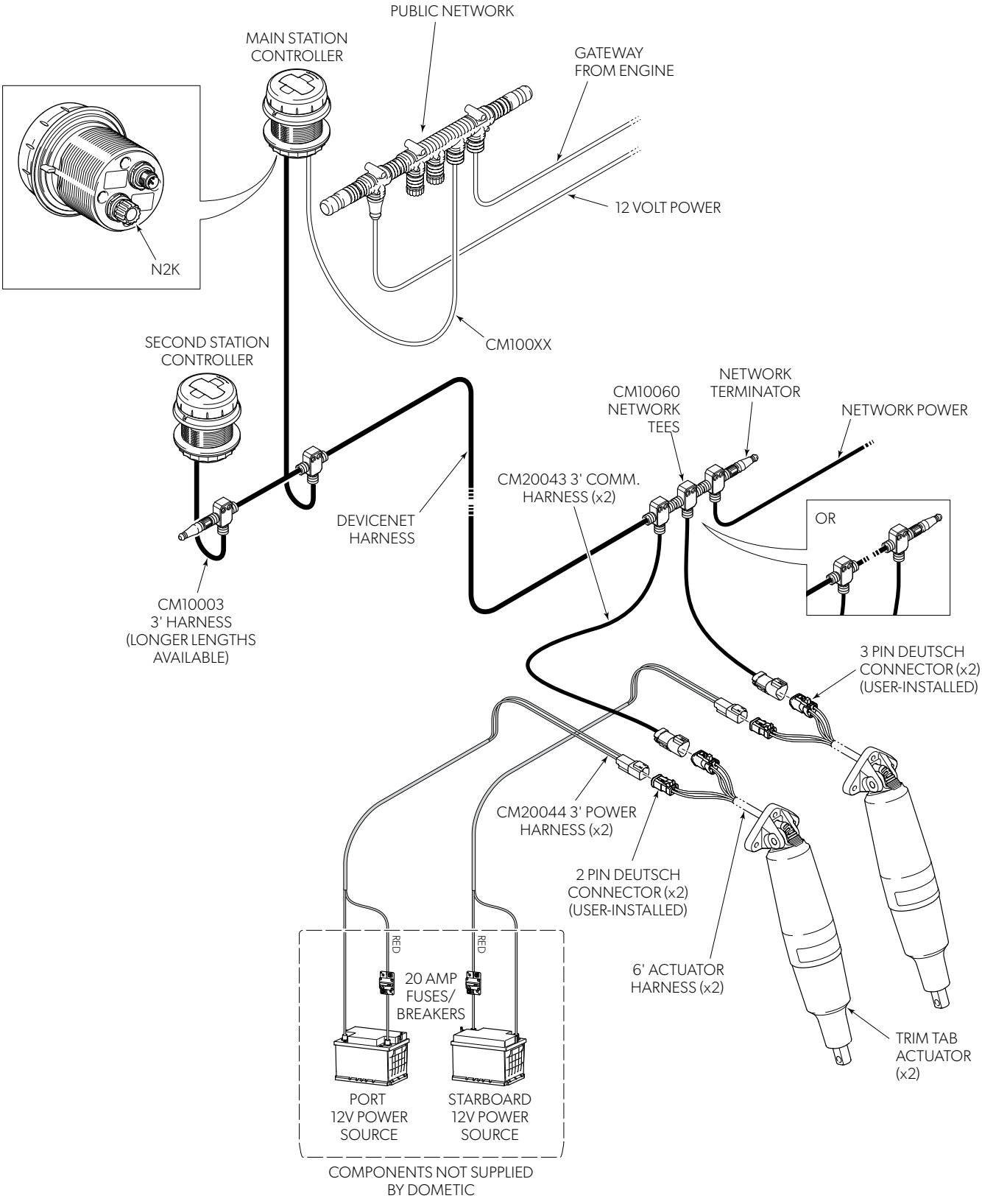


Figure 12-11. Dual station (adaptive series shown).

Notes

13 Jack Plates

13.1 SeaStar Gen2 jack plates

Features

- Utilizing high strength materials the SeaStar Xtreme jack plates are easily capable of handling up to 400 HP engines
- The standard SeaStar jack plates are capable of handling up to 300 HP engines
- Rapid hydraulic response in 8.5 seconds — 5.6" of movement
- Complete rigid engine support at full thrust
- Easily moves engine up or down at full thrust
- Composite bushings ensure smooth operation
- Easy wrench access to engine bolts from side
- Compatible with Power Pole® and Talon®

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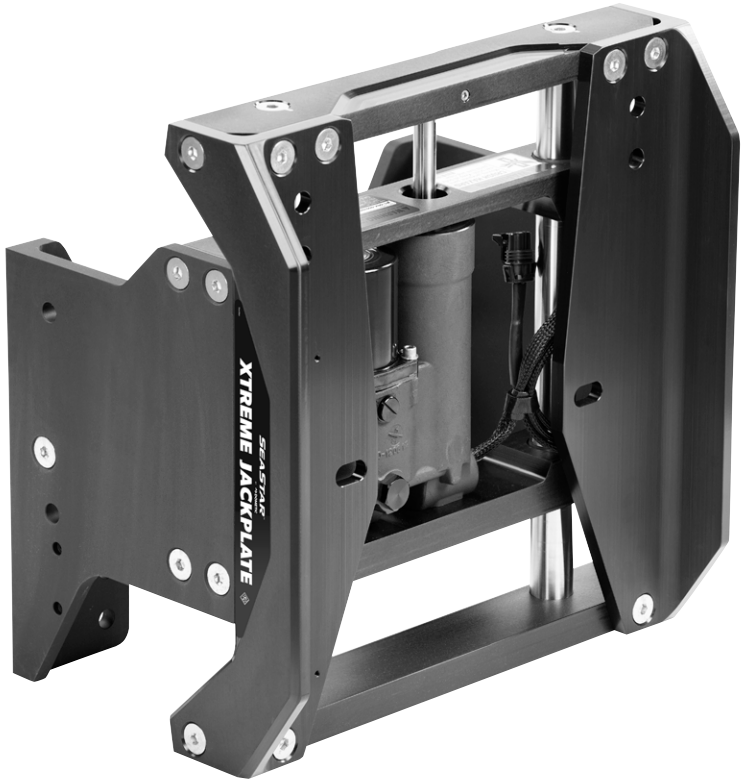


Figure 13-1.

13.1.1 Part numbers

RATED FOR 300 HP (No Diesel)	
Hydraulic jack plate 4.5″ setback — standard	JP5040R*
Hydraulic jack plate 6″ setback — standard	JP5060R
Hydraulic jack plate 8″ setback — standard	JP5080R
Hydraulic jack plate 10″ setback — standard	JP5100R
Hydraulic jack plate 12″ setback — standard	JP5120R

Table 13-1.

RATED FOR 400 HP (Max. Diesel — 200HP OXE/COX)	
Hydraulic jack plate 4.5″ setback — Xtreme	JP5040X*
Hydraulic jack plate 6″ setback — Xtreme	JP5060X
Hydraulic jack plate 8″ setback — Xtreme	JP5080X
Hydraulic jack plate 10″ setback — Xtreme	JP5100X
Hydraulic jack plate 12″ setback — Xtreme	JP5120X

Table 13-2.

* Accessory adapter DK4600 required for installation of Power Pole® or Talon® on JP5040R and JP5040X.

13.1.2 Horse power (HP) rating (gas engines only)

PART #	75 HP	105 HP	115 HP	200 HP	250 HP	300 HP*	350 HP	400 HP
JP5040R								
JP5060R								
JP5080R								
JP5100R								
JP5120R								
JP5040X								
JP5060X								
JP5080X								
JP5100X								
JP5120X								

Table 13-3.

* 300 HP OXE/COX diesel must use MEGA jack plate (refer to page 13-6).
200 HP OXE must use Extreme.

13.1.3 Dimensions and weights

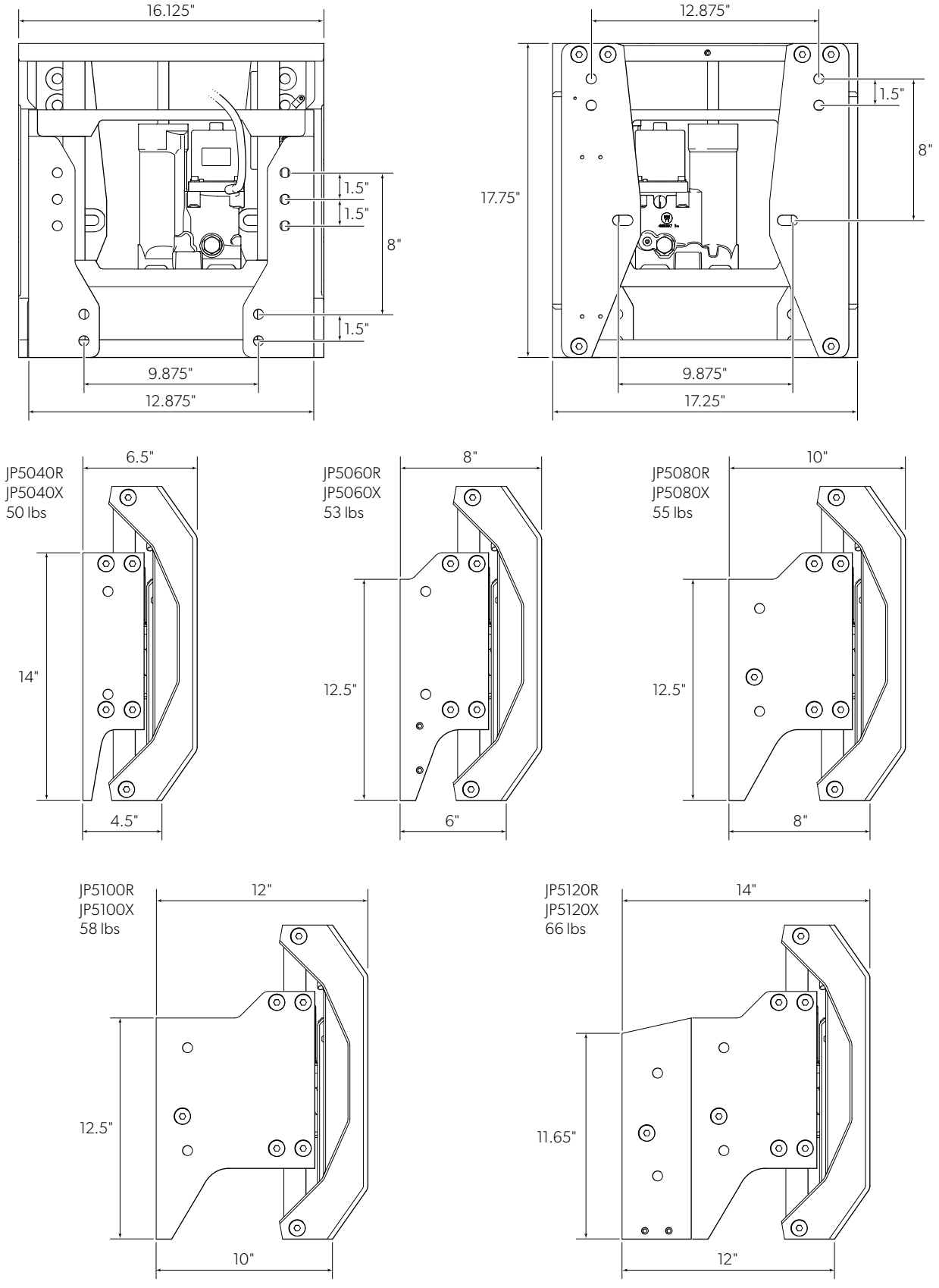


Figure 13-2.

13.1.4 Accessories

DESCRIPTION	PART #
Hole shot plate 6"	HSP5060
Hole shot plate 8"	HSP5080
Hole shot plate 10"	HSP5100
Hole shot plate 12"	HSP5120
Bolt kit, 1/2–13 UNC 2.5" L, 4 pack	DK6125
Bolt kit, 1/2–13 UNC 3.5" L, 4 pack	DK6135
Bolt kit, 1/2–13 UNC 4.5" L, 4 pack	DK6145
Bolt kit, 1/2–13 UNC 6.5" L, 4 pack	DK6165
Basic rocker switch	DK4020*
ProTrim switch single function	PT1000-1P
ProTrim switch dual function	PT2000-1P
SmartStick and gauge kit	DK4220
SmartStick, replacement	DK4250
Gauge and harness kit	DK4320
Accessory adapter	DK4600
Jack plate replacement relay	DK3010
Jack plate wire harness	DK4420
Actuator kit, 3/8" mount bolt, 5/16"socket	DK4710**
Actuator kit, 7/16" mount bolt, 3/8" socket	DK4720***
SeaStar stabilizer clips, (pack of 2)	HYCL-001
Transom plate, small, 2" x 15"	18-79987
Transom plate, large, 4" x 17"	18-79988
Anode, aluminum — all water types	DK4850

Table 13-4.

* Included with jack plate harness.

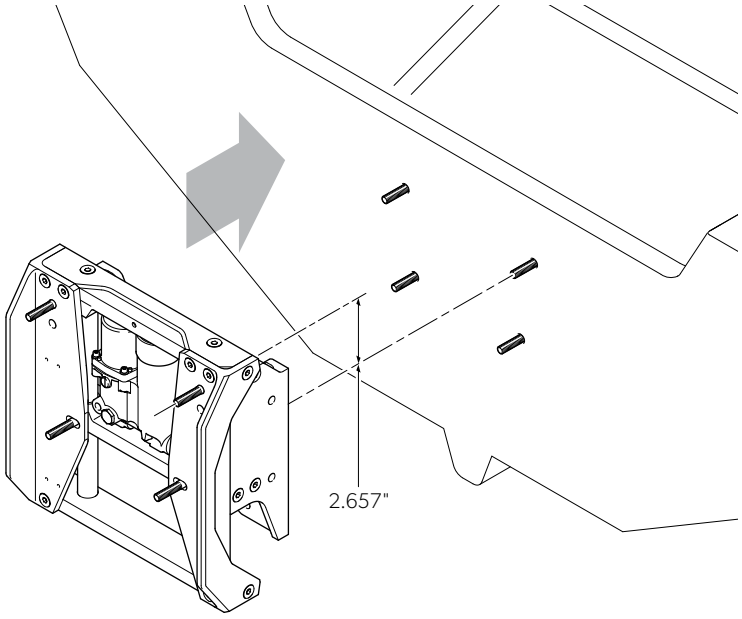
** Used on jack plates with serial numbers D4000-00001 to D4000-001843.

*** Used on jack plates with serial numbers above D4000-001843 and any jack plate serial number starting with JPXXXX.

13.1.5 Engine lift per setback

With jack plates in fully lowered position there is a prebuilt lift of 2.657" from top transom bolts to top engine bolts. On a 12° transom, the actual engine lift to water level changes as a function of a setback. See figure 7-3 below.

Example: Engine lift is 0" to horizontal on a 12" setback when placed on 12° transom.



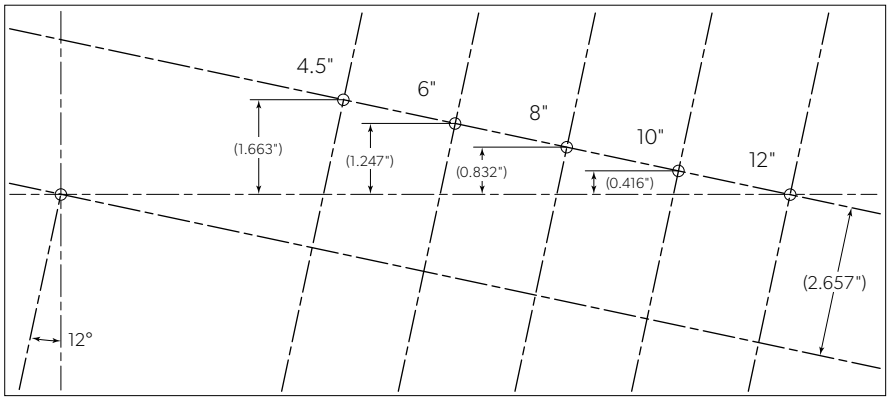


Figure 13-3.

13.2 SeaStar Mega jack plates

Dometic's Mega jack plate has been developed to withstand the power of high performance engines and provide boaters with the ability to maximize the output of their engines while offering more flexibility in shallow water. The Mega jack plate is rated to 600 HP and is an extension of existing product line.

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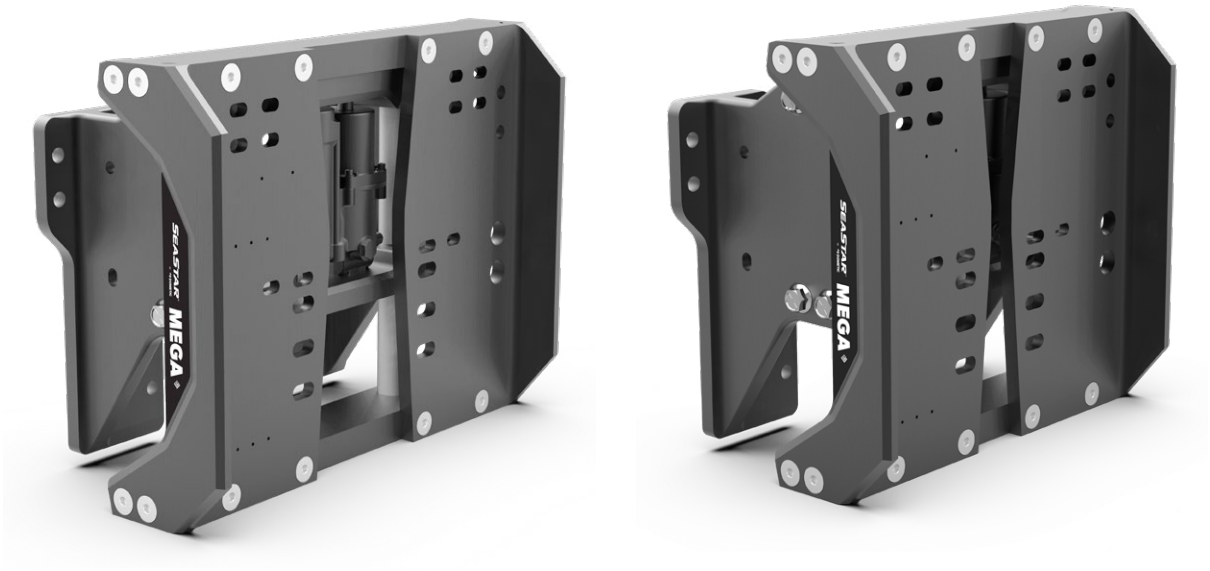


Figure 13-4.

Mega jack plate — a meticulously engineered and robustly built electric jack plate system designed for today's large, heavy and powerful outboard motors. It is offered in 6.5", 8" and 10" setbacks. There will be 2 versions available, a standard bolt pattern designed to fit engines like Yamaha XTO, Mercury, and a wide bolt pattern designed to fit Mercury 500/600HP.

13.2.1 Benefits of Mega jack plate

- Rated up to 600HP
- Can fit all outboard engines on the market
- Rigorously designed and tested for high impact and cyclic loads
- Comes with corrosion protection anodes
- Built in linear position sensor easily integrates with Dometic digital switching
- Mega wide accepts standard mounts.

13.2.2 Ordering information

MODEL	JP6060	JP7060	JP6080	JP7080	JP6100	JP7100
SKU	9600050077	9600050836	9600050834	9600050837	9600050835	9600050838
BOLT PATTERN	Standard	Standard/Wide	Standard	Standard/Wide	Standard	Standard/Wide

Table 13-5.

13.2.3 Dimensions and weights

	STANDARD MEGA JACK PLATE			WIDE MEGA JACK PLATE		
MODEL	**JP6060**	**JP6080**	**JP6100**	**JP7060**	**JP7080**	**JP7100**
WEIGHT	117 lbs.	122 lbs.	127 lbs.	121 lbs.	126 lbs.	131 lbs.
DIMENSION A	6.5″	8″	10″	6.5″	8″	10″
DIMENSION B	9″	10.5″	12.5″	9″	10.5″	12.5″

Table 13-6.

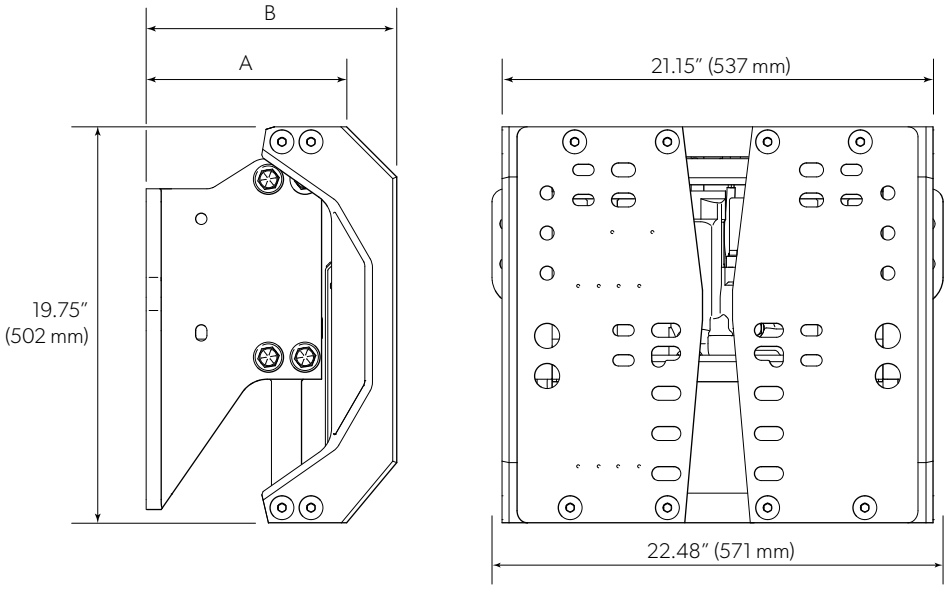


Figure 13-5. Standard (OMC) Mega jack plate.

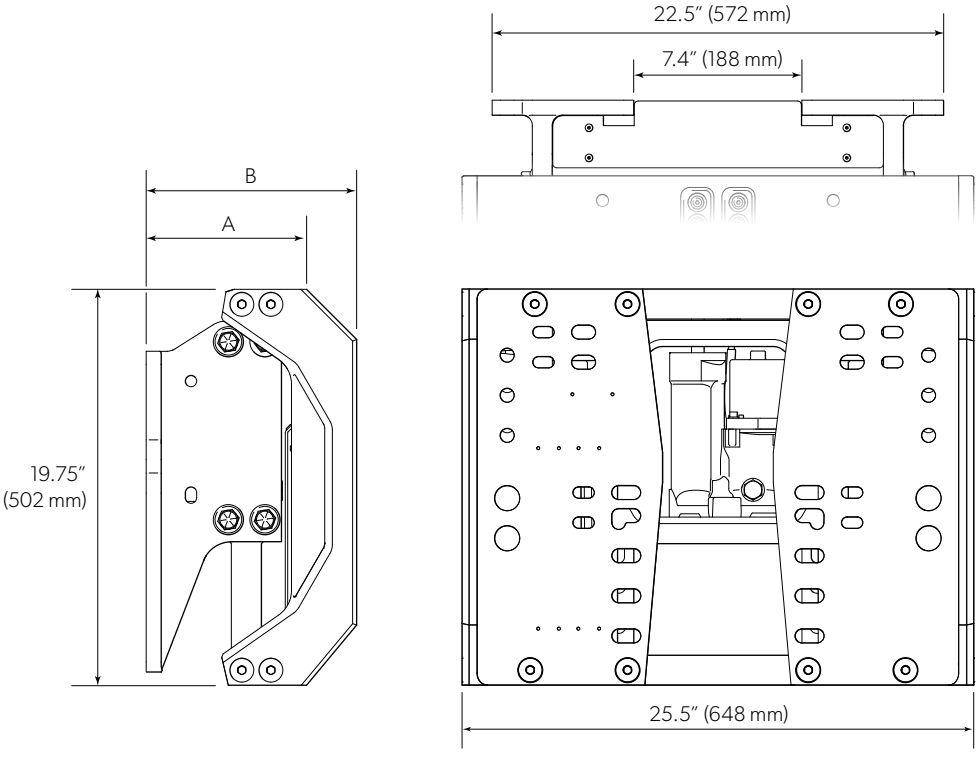


Figure 13-6. Wide (Mercury) Mega jack plate — also accepts Standard mounting engines.

13.2.4 Engine lift per setback — Standard Mega jack plate

With jack plate in fully lowered position there is a prebuilt lift of 2.7" from the top transom bolts to top engine bolts. On a 12° transom, the actual engine lift to water level changes as a function of a setback. See figure 7-7 below.

Example: Engine lift is 0.590" to horizontal on a 10" setback when placed on 12° transom.

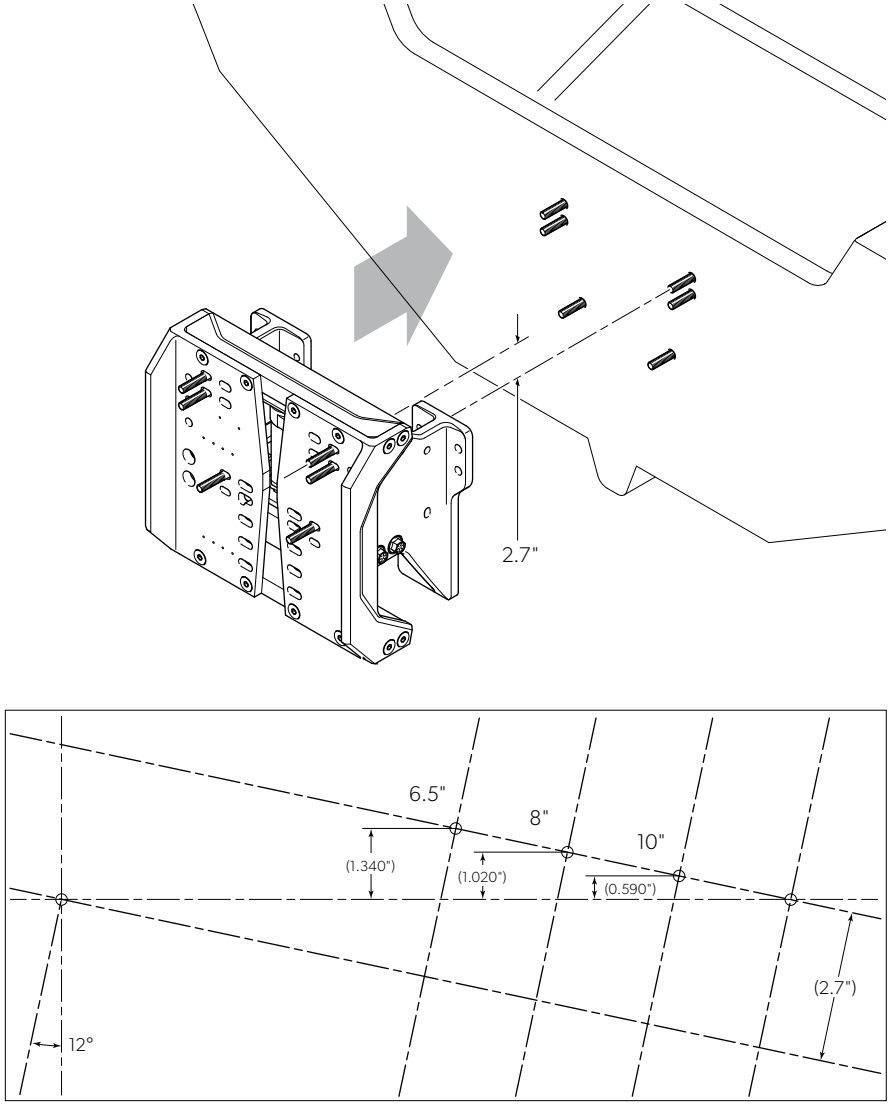


Figure 13-7. Engine lift per setback — Standard (OMC) Mega jack plate. Not to scale.

WARNING!
Always use the 6 sets of mounting hardware for installation of a standard or wide SeaStar Mega jack plate to the transom. Follow engine manufacturer's guide for installation of outboard engines.

13.2.5 Engine lift per setback — Wide Mega jack plate

With jack plate in fully lowered position there is a prebuilt lift of 1.5" from the top transom bolts to top engine bolts. On a 12° transom, the actual engine lift to water level changes as a function of a setback. See figure 7-8 below.

Example: Engine lift is -0.610" to horizontal on a 10" setback when placed on 12° transom.

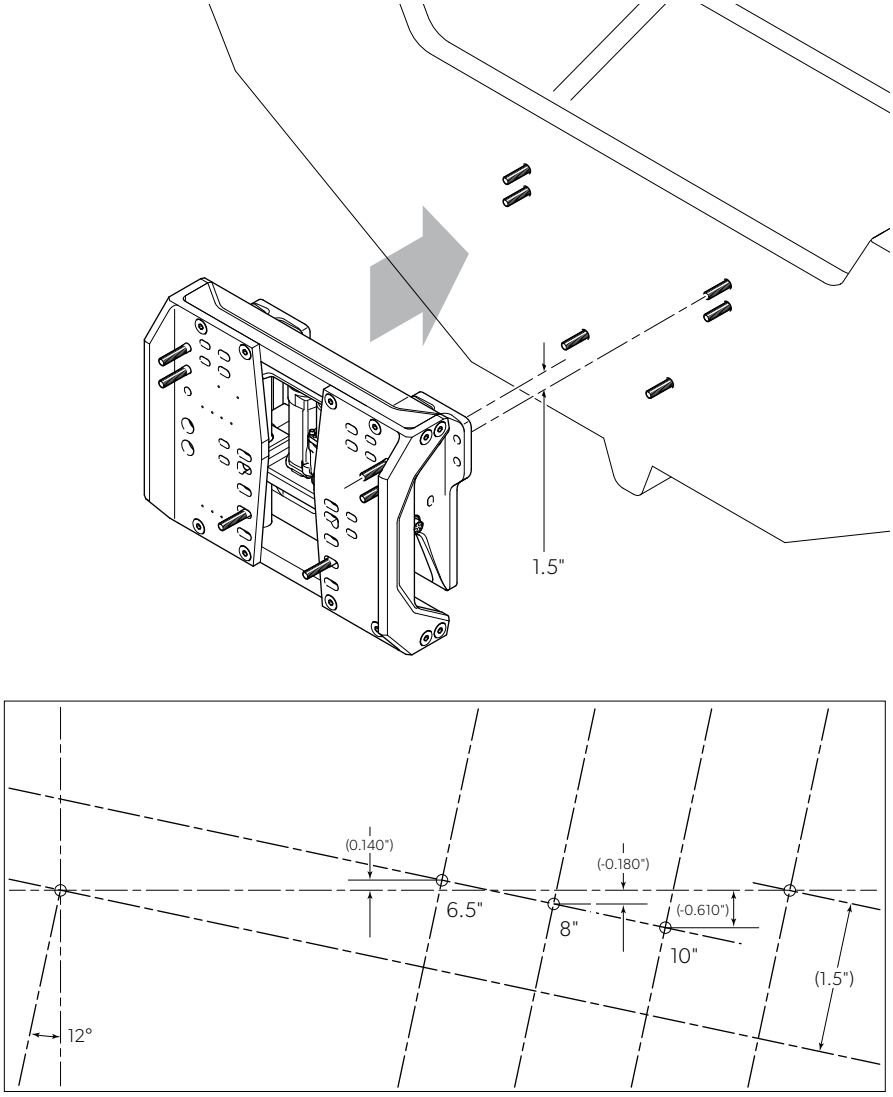


Figure 13-8. Engine lift per setback — Wide (Mercury) Mega jack plate. Not to scale.

NOTICE!

For standard or wide Mega jack plate to transom connections use:

- Stainless steel outboard engine bolts supplied by or approved by the engine manufacturer.
- Stainless steel washers supplied by or approved by the engine manufacturer.
- Stainless steel nuts with nylon locking elements supplied by or approved by the engine manufacturer.

13.2.6 Parts included in kit

WARNING!
Use the engine manufacturer's recommend fasteners to mount the engine to the Mega jack plate.

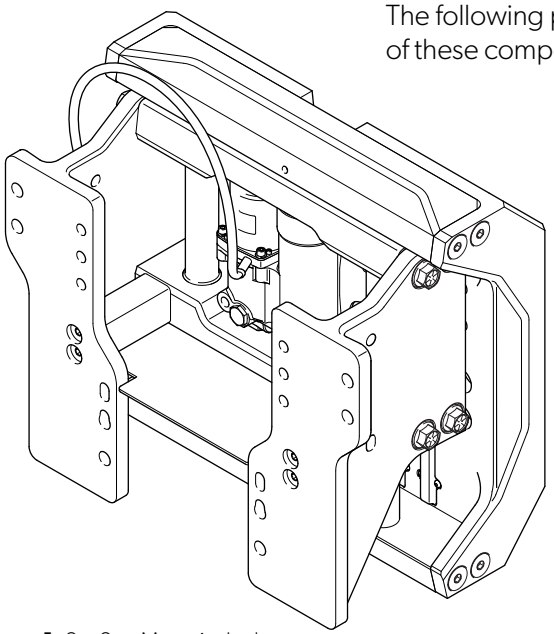
WARNING!
If the outboard engine manufacturer has supplied installation instructions, those guidelines must be followed during installation.

NOTICE!
The use of a transom stiffener for the top bolts on the transom side of the jack plate-to-transom connection is recommended.

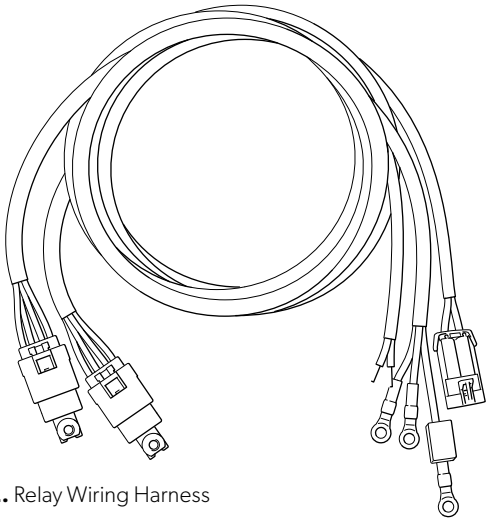
WARNING!
Check the outboard engine manufacturer's instructions carefully for specifications regarding connection hardware. Ensure the outboard engine manufacturer's requirements are followed.

NOTICE!
Refer to ABYC TH-12 standard "Transom crushing at bolt location" for guidelines on mounting the jack plate to the transom.

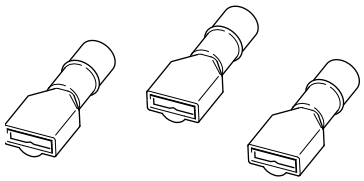
The following parts are included with your Mega jack plate product. If any of these components are missing, contact your dealer or Dometic.



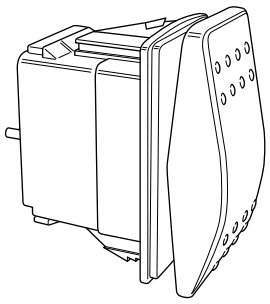
1. SeaStar Mega jack plate



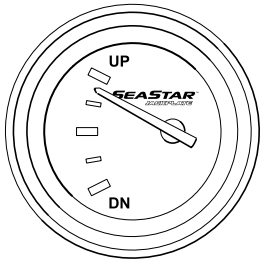
2. Relay Wiring Harness



3. Spade Terminals (Female)



4. Rocker Switch



5. Gauge Kit

Figure 13-9. Included parts.

13.3 Interact Drive engine position controller

Interact Drive (formerly known as ProTap) offers the ultimate in outboard engine position control

- Gets your boat to max speed at the touch of a button
- Memorizes jack plate and engine trim positions
- Provides fine jack plate and engine trim adjustment
- Synchronizes 2 jack plates with each other
- Provides 0–5V jack plate height signal
- Provides engine tilt protection

Features

- Get to max. speed faster with Interact Drive controller
- Experience fast shallow water reaction time with Interact Drive controller in flats mode
- Engine tilt protection
- Syncs two jack plates



Figure 13-10.

13.3.1 Part numbers

INTERACT DRIVE KIT	
Interact Drive	JC4500
Interact Drive/SmartStick kit	JC4550

Table 13-5.

HARNESS OPTIONS OF TILT/TRIM	
Interact Drive, NMEA 2000	PTK5010
Yamaha, 2 wire sender, V-6 or smaller	PTK5020
Yamaha, 3 wire sender, V-8	PTK5021
Mercury, Smartcraft digital sender	PTK5040
Mercury, Verado	PTK5041

Table 13-6.

13.3.2 JC4500

Designed to get the boat quickly up to speed by quickly getting the jack plate and engine trim to the pre-memorized setting set by the user.

- Two memory presets: Memorize your favorite jack plate or engine trim positions by holding the switch up or down for more than 5 seconds.
- Two memory recall: Quickly transition to your memorized position by holding the jack plate or engine trim switch up or down for 1–5 seconds.
- Bump mode: Tap the jack plate or engine trim switch up or down and the plate will move in 1/4" increments while engine trim moves in 1/20 of trim range increments.
- Bump memory: Sequential taps on the switch will be memorized for a continuous jack plate or engine trim movement.

13.3.3 Mounting dimensions

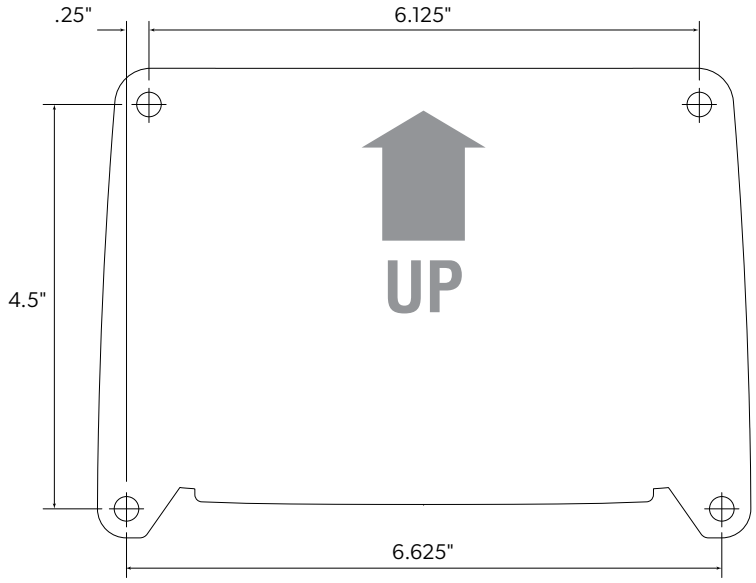
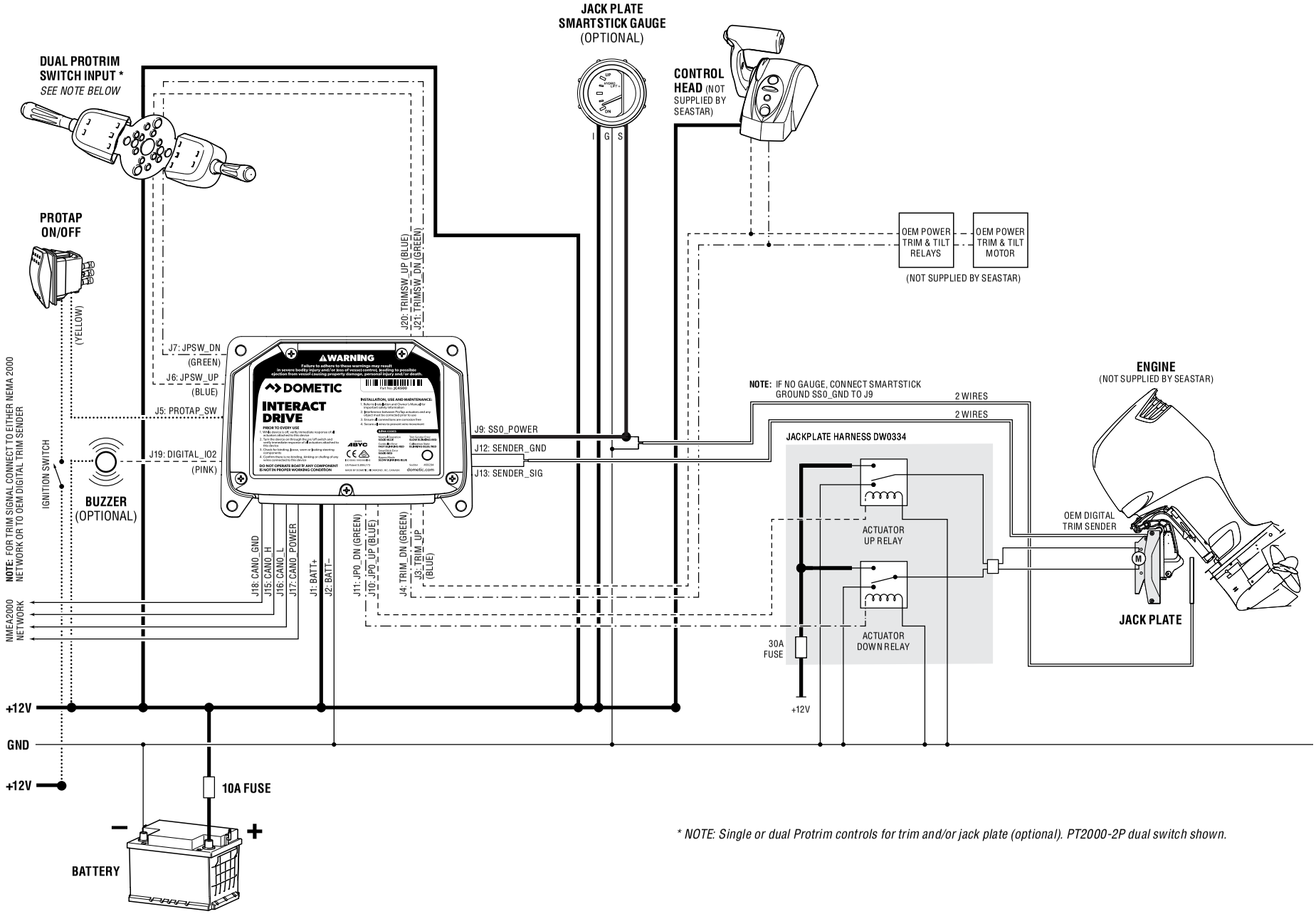


Figure 13-11.

NOTE
Mounting dimensions diagram not to scale. For reference only.

13.3.4 System schematic

An example of a single jack plate and trim system schematic is shown on page 13-13. Other options available.



** NOTE: Single or dual Protrim controls for trim and/or jack plate (optional). PT2000-2P dual switch shown.*

Figure 13-12. Interact Drive system schematic.

Notes

14 Electronic Controls

14.1 i7X00 series

14.1.1 System description

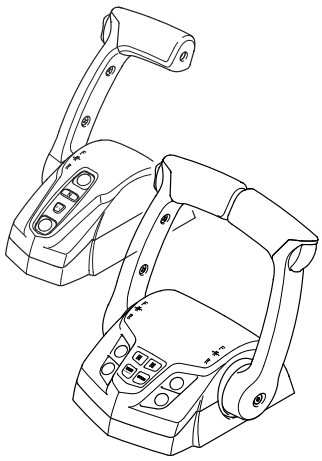
SeaStar i7X00 is an electromechanical system that replaces a traditional cable-operated engine remote control with an electronic control. Shift and throttle settings are sent over a serial data network to electro-mechanical actuators, where they are converted to cable motion. The elimination of mechanical cables to the control head simplifies multi-station installations, especially when a station is installed onto a flybridge or tower that is removed for shipping. The system supports the installation of up to three control heads.

The i7X00 system consists of the major components listed below.

CAN Network

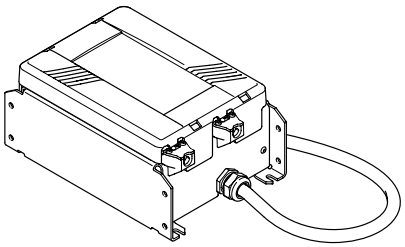
CAN (controller area network) is a serial network protocol that is widely used in marine and automotive control systems. Each device (node) on the network can send and receive data using specially formatted messages. The ability to reliably communicate data between devices is what enables the functionality of i7X00.

i7X00 implements the high-speed CAN protocol using DeviceNet harnesses and connectors. We refer to the network as CAN2 in the documentation to distinguish it from other CAN protocols used on SeaStar products.



Control Head

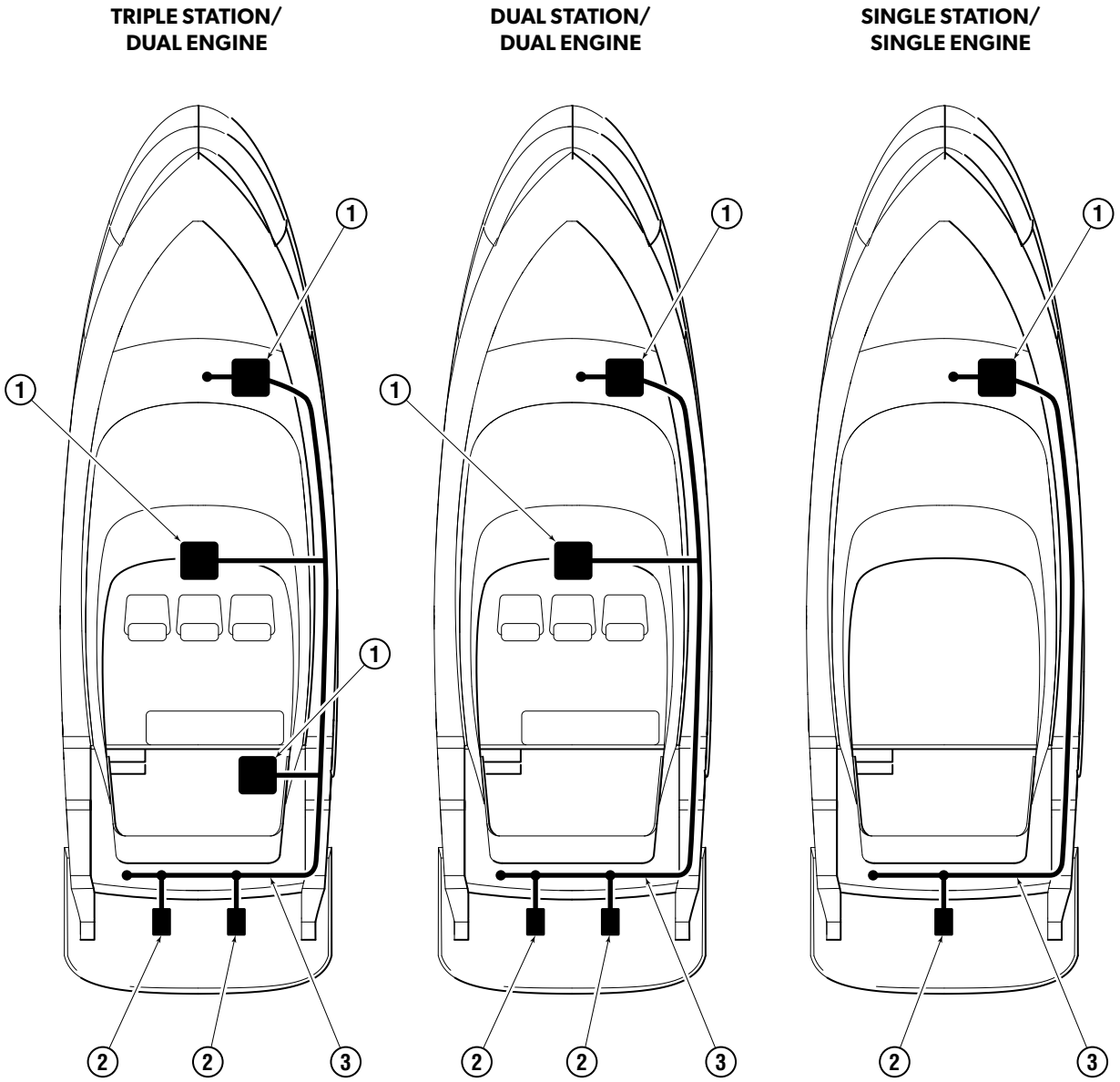
The control head looks much like a conventional mechanical remote control, but it is an electromechanical device that converts lever position into digital messages that are sent over CAN2 to the shift and throttle actuators. The control head features adjustable lever feel, status lights, a synchronous trim switch (optional), and control buttons for added functionality.



Shift and Throttle Actuator

The actuators are electromechanical devices that receive digital commands on the CAN2 network and convert these commands into movement of a mechanical cable for gear selection and throttle control.

14.1.2 System overview diagram



1. Control Head
2. Throttle/Shift Actuator
3. CAN Network Bus

Figure 14-1. System overview.

14.1.3 First time use

WARNING!
Be very cautious when first engaging the gears to establish that forward is truly forward and reverse is truly reverse. A quick in-and-out of gear test is recommended. Ensure that the boat is clear of all obstacles forward and aft before conducting this test.

Before starting the engines for the first time, familiarize yourself with the shift and throttle controls and the features described in section 14.1.4. With the engines and control system off, move the control levers over the full range until you are familiar with the feel. The lever feel can be adjusted if desired. See section 14.1.7.

14.1.4 Control head operation

The control head is the user interface for shift and throttle control. There are two types of control head used with the i7X00 system: single lever (STM), used on single-engine applications, and dual lever (DTM), used on multi-engine applications. Both types of control head are top-mounted; a side-mount single lever control head is not available for the i7X00 system.

The i7X00 Quick Reference Guide provides a summary of the control head operation and should be kept on the vessel at all times.

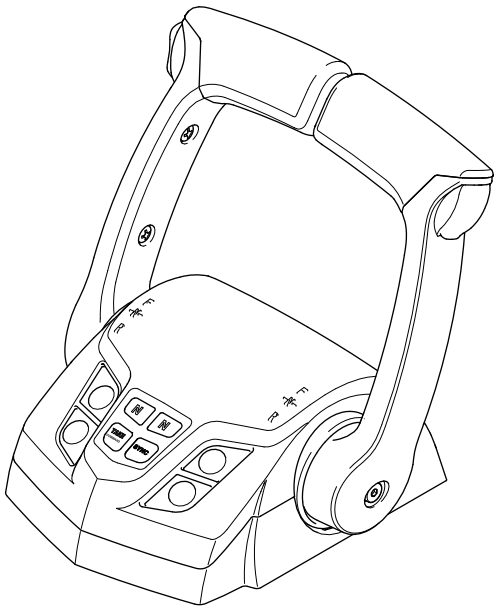


Figure 14-2. i7X00 dual lever control head.

14.1.5 Identification — Dual lever (DTM)

The following figures identify the components and features of the control head. This information is also found on your i7X00 Quick Reference Guide. Please take some time to familiarize yourself with the controls and features before going out on the water for the first time.

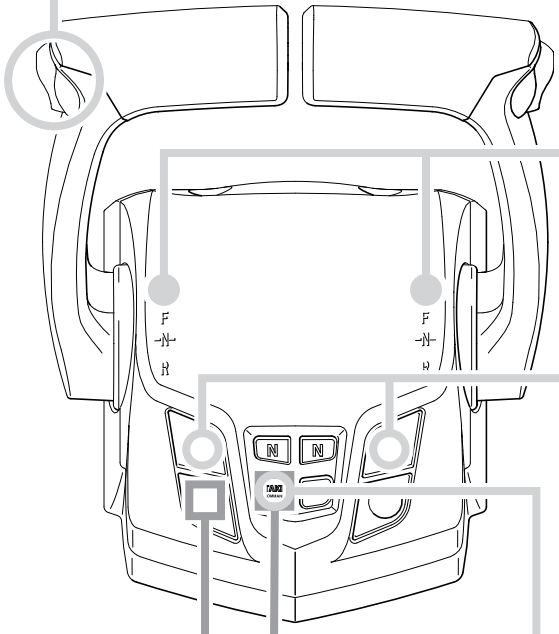


Figure 14-3.

ENGINE TRIM CONTROL (OPTIONAL):
Provides simultaneous trim control of all engines.

LEVER POSITION INDICATORS

NEUTRAL INDICATOR LAMPS:
These lamps have four states:
Steady green – engine is in neutral
Slow flashing green (0.5s on, 0.5s off) – Neutral Throttle Warm-up is engaged
Very slow flashing green (1s on, 2s off) – Trolling Mode is engaged
Fast flashing red – A danger fault is active

INDICATOR DIMMING FEATURE:
When the control head is active, pressing **Take Command** repeatedly will cycle through five available indicator brightness levels.

TAKE COMMAND BUTTON AND LAMP:
Used to activate a control head.

To take command with a control head:

- Put control levers in neutral and press **Take Command**.
- The adjacent lamp signals the transfer status as follows:

  Steady blue – station is active and in control of shift and throttle.

  Flashing blue – station transfer from one station to another is underway. You have five seconds to match the control lever positions with those of the active station to complete the transfer.

  Fast flashing blue – A warning fault is active.

  Lamp off – station is inactive

NOTE
If the lamp does not come on when you press **Take Command**, Station Protection may be enabled. See section 14.1.8.

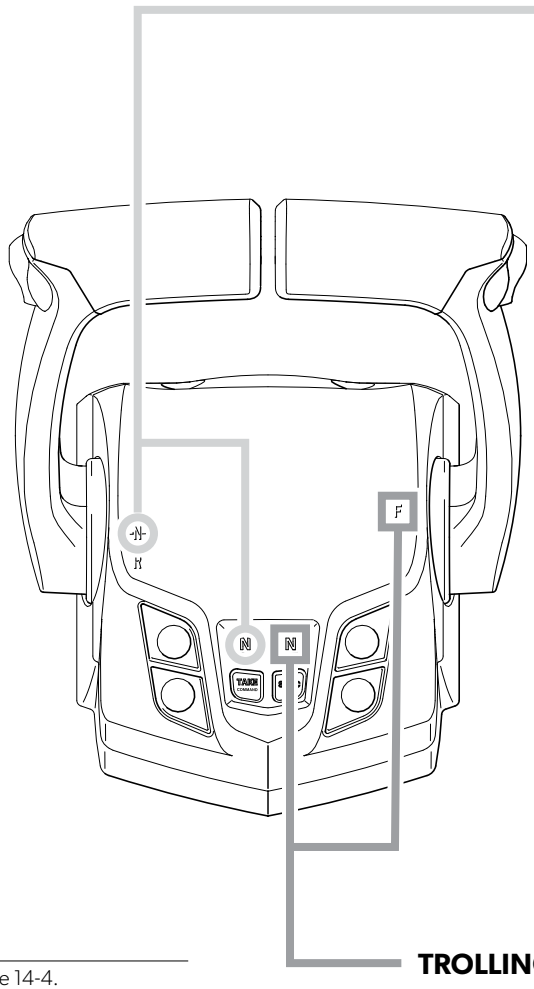


Figure 14-4.

NEUTRAL THROTTLE WARM-UP (NTW):

NTW allows you to control engine throttle without gear engagement, so that you can warm up your engines at a higher RPM. A slow flashing green neutral indicator lamp tells you that NTW is engaged for the corresponding engine. ☼

To engage Neutral Throttle Warm-up:

- Move the engine's control lever to the Neutral position. The neutral indicator lamp will light steady green. ●
- Press the corresponding **N** button. The neutral indicator lamp will flash green to indicate that NTW is engaged. ☼
- You can now increase throttle and the engine will stay in neutral.

To disengage Neutral Throttle Warm-up:

- Return the engine's lever to the Neutral position.
- Press the corresponding **N** button. The lamp will light steady green. The engine and transmission will now respond normally to lever commands. ●

TROLLING MODE (TM):

- Provides greater throttle sensitivity: moving an engine's control lever to full forward will only produce a percentage of wide open throttle. The default TM throttle limit is 50% in forward gear, 100% in reverse gear.
- Very slow flashing (one second on, two seconds off) green neutral indicator lamps indicate that trolling mode is engaged. ☼

TO ENGAGE Trolling Mode:

- Move one or both control levers to the forward idle or reverse idle positions. The other lever must be in the same position or in neutral.
- Press either **N** button. Both lamps will flash green slowly to indicate that TM is engaged. ☼

TO DISENGAGE Trolling Mode:

- Move both control levers to forward idle, reverse idle, or neutral position.
- Press either **N** button. The flashing green lamps will go out to indicate that TM is disengaged. ○

POWER TRAIN SYNC (PTS) BUTTON AND LAMP:

PTS synchronizes engines and transmissions so that the port lever controls shift and throttle of all engines.

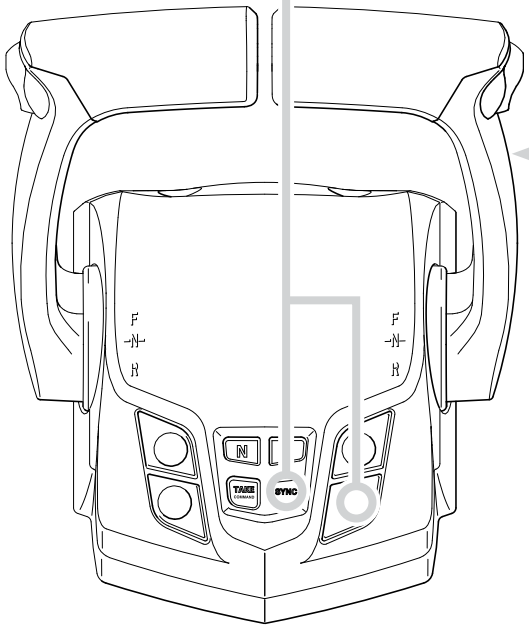
The lamp adjacent to the **Sync** button indicates PTS status. A steady blue lamp means PTS is engaged. ●

To engage Power Train Sync:

- Press **Sync**. The blue lamp will flash. ☼
- Match control lever positions within 5% of each other. The lamp will go steady blue to indicate that power trains are in sync. ●

To disengage Power Train Sync:

- Press **Sync**. The blue lamp will flash. ☼
- Match control lever positions within 5% of each other. The blue lamp will go off – PTS is now disengaged. ○



ADJUSTABLE LEVER FEEL

Turn screw in to tighten the lever feel, and turn screw out to loosen the lever feel.

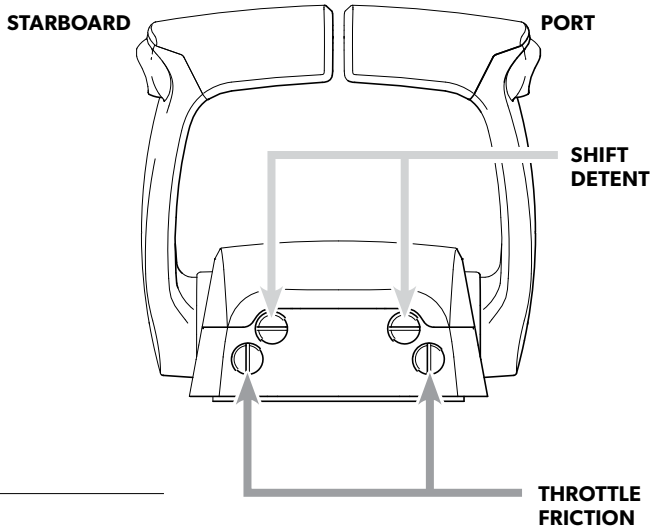


Figure 14-5.

14.1.6 Identification — Single lever (STM)

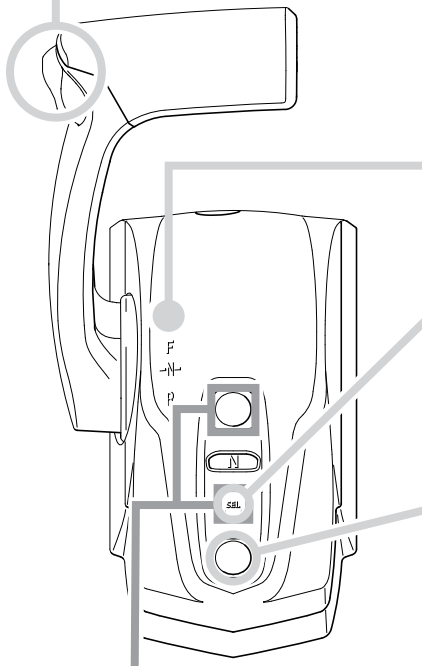


Figure 14-6.

ENGINE TRIM CONTROL (OPTIONAL)

LEVER POSITION INDICATOR

INDICATOR DIMMING FEATURE:

When the control head is active, pressing **SEL** repeatedly will cycle through the available indicator brightness levels.

NEUTRAL INDICATOR LAMP:

This lamp has four states:

Steady green – engine is in neutral ●

Slow flashing green (0.5s on, 0.5s off) – Neutral Throttle Warm-up is engaged ☼

Very slow flashing green (1s on, 2s off) – Trolling Mode is engaged ☼

Fast flashing green, with fast flashing amber – A danger fault is active ☼

SEL BUTTON:

Used to activate a control head.

To activate a control head:

- Put control lever in neutral and press **SEL**.
- The amber lamp signals the transfer status as follows:

  Steady amber – station is active and in control of shift and throttle. ●

  Slow flashing amber – station transfer from one station to another is underway. You have five seconds to match the control lever positions with those of the active station to complete the transfer. ☼

  Fast flashing amber – A warning fault is active.

  Lamp off – station is inactive

NOTE

If the lamp does not come on when you press **SEL**, Station Protection may be enabled. See section 14.1.8.

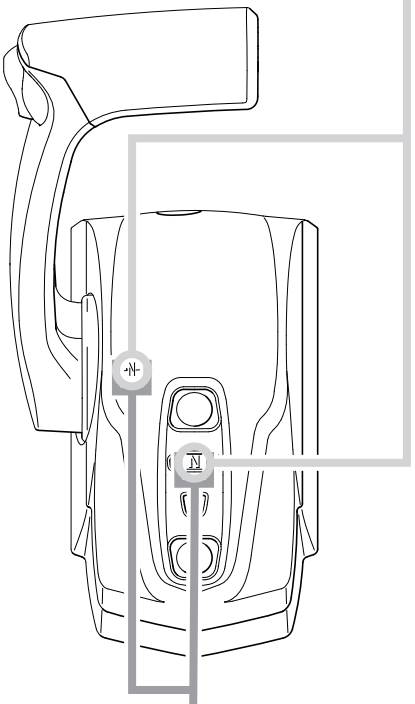


Figure 14-7.

NEUTRAL THROTTLE WARM-UP (NTW):

NTW allows you to control engine throttle without gear engagement, so that you can warm up your engine at a higher RPM. A slow flashing green neutral indicator lamp tells you that NTW is engaged. ☼

To engage Neutral Throttle Warm-up:

- Move the control lever to the Neutral position. The neutral indicator lamp will light steady green. ●
- Press the **N** button. The neutral indicator lamp will flash green to indicate that NTW is engaged. ☼
- You can now increase throttle and the engine will stay in neutral.

To disengage Neutral Throttle Warm-up:

- Return the lever to the Neutral position.
- Press the **N** button. The lamp will light steady green. The engine and transmission will now respond normally to lever commands. ●

TROLLING MODE (TM):

- Provides greater throttle sensitivity: moving the control lever to full forward will only produce a percentage of wide open throttle. The default TM throttle limit is 50% in forward gear, 100% in reverse gear.
- A very slow flashing (one second on, two seconds off) green neutral indicator lamp indicates that trolling mode is engaged. ☼

TO ENGAGE Trolling Mode:

- Move the control lever to the forward idle or reverse idle positions.
- Press the N button. The lamp will flash green slowly to indicate that TM is engaged. ☼

TO DISENGAGE Trolling Mode:

- Move the control lever to forward idle or reverse idle position.
- Press the **N** button. The flashing green lamp will go out to indicate that TM is disengaged. ○

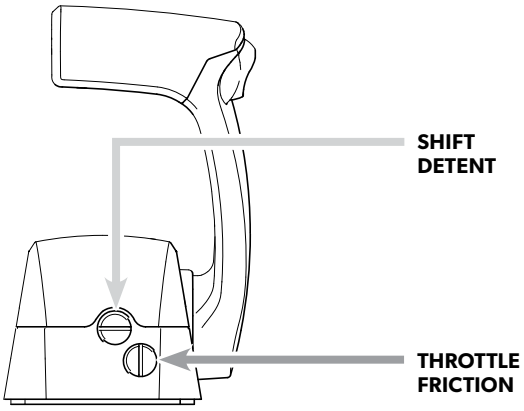


Figure 14-8.

14.1.7 Lever adjustment

The control lever feel can be adjusted by means of adjusting screws on the forward face of the control head.

- The friction drag on the lever is adjusted with the throttle friction adjuster screw (see figure 14-5 or figure 14-8). Turn the screw clockwise to increase the friction on the lever, counter-clockwise to reduce the friction.
- The force required to move in and out of the shift detents is adjusted with the Shift Detent adjuster screw. The detents are meant to prevent accidental gear engagement, so bear that in mind as you make adjustments. Clockwise increases force, counter-clockwise decreases.

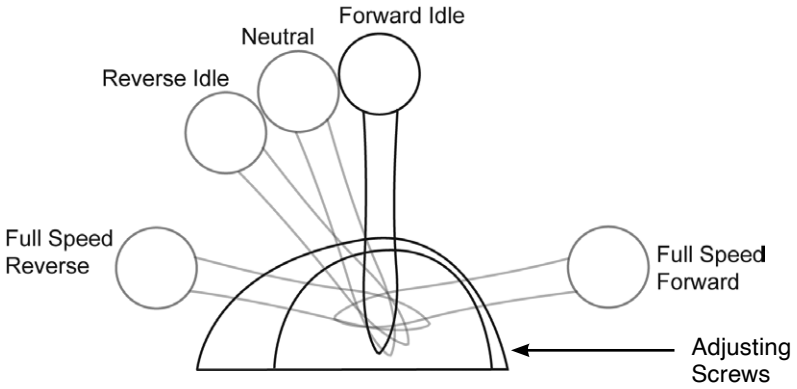


Figure 14-9. Control head lever positions.

14.1.8 Station selection and station select protection

The way in which you activate a control station depends on whether the Station Select Protection (SSP) feature has been enabled. SSP prevents unauthorized or inadvertent activation of a control head and can only be enabled by an authorized dealer. By default, SSP is not enabled.

SSP not enabled (default)

On single station boats the control head is always active when the ignition is on, but on multi-station boats the control head must be activated. This can be done in two ways:

- the Smart Select feature will automatically activate a control head if the levers are moved out of the neutral position. This feature only works when the ignition is first turned on.
- the control head can be manually activated using the **SEL** button (STM control heads) or the **Take Command** button (DTM control heads) with the lever(s) in neutral.

An active control head is indicated by an LED lamp: solid amber (STM) or solid blue (DTM).

SSP Enabled

When SSP is enabled there is no automatic activation of control heads. A specific sequence of button presses is always required to activate a control head.

Dual lever control head:

1. Press **Take Command** twice.
2. Press **N** once.
3. Press **Take Command** again.
4. If the blue light turns on solid the station is active.
5. If the blue light flashes, match the lever position with the originally active station and the blue light will go solid to indicate that the transfer has been completed.

Single lever control head:

1. Press **SEL** twice.
2. Press **N** once.
3. Press **SEL** again.
4. If the amber light turns on solid the station is active.
5. If the amber light flashes, match the lever position with the originally active station and the amber light will go solid to indicate that the transfer has been completed.



WARNING!
Until the blue (DTM) or amber (STM) light is on solid, the original active station retains control of the shift and throttle.

14.1.9 i7800 Electronic engine control kits

TOOL REQUIRED TO SET UP SYSTEM	REQUIRES EST DISPLAY SETUP TOOL FOR CONFIGURATION (EPSK1207)								
Base Systems — Single Station Kits	Kit Part #	**i7811** Chrome Single Engine	**i7811-BE** Black Single Engine	**i7851** Chrome Single Engine w/Trim	**i7851-BE** Black Single Engine w/Trim	**i7812** Chrome Twin Engine	**i7812-BE** Black Twin Engine	**i7852** Chrome Twin Engine w/Trim	**i7852-BE** Black Dual Engine w/Trim
ACTUATORS									
Actuator, i7700 Universal	AC7700	1	1	1	1	2	2	2	2
CONTROL HEAD KITS									
Single Top Mount, Control Head Kit	CH7810NT	1	-	-	-	-	-	-	-
Single Top Mount, Control Head Kit, black	CH7810NT-BE	-	1	-	-	-	-	-	-
Single Top Mount, Control Head Kit, with Trim	CH7810	-	-	1	-	-	-	-	-
Single Top Mount, Control Head Kit, with Trim, Black	CH7810-BE	-	-	-	1	-	-	-	-
Dual Top Mount Control Head Kit	CH7800NT	-	-	-	-	1	-	-	-
Dual Top Mount Control Head Kit, Black	CH7800NT-BE	-	-	-	-	-	1	-	-
Dual Top Mount Control Head Kit, with Trim	CH7800	-	-	-	-	-	-	1	-
Dual Top Mount Control Head Kit, with Trim, Black	CH7800-BE	-	-	-	-	-	-	-	1
HARNESSES/TEES									
NMEA Communication Kit (2 tees, 1 male & 1 female terminator)	CM20001	1	1	1	1	1	1	1	1
Single Can Bus Tee	CM10060	-	-	-	-	1	1	1	1
Micro C Ext, M-F (6ft CAN bus harness)	CM10006	1	1	1	1	1	1	1	1
Micro C Ext, M-F (12ft CAN bus harness)	CM10012	1	1	1	1	1	1	1	1
Micro C Ext, M-F (20ft CAN bus harness)	CM10020	1	1	1	1	1	1	1	1
MANUALS									
Book # 79 i7700 User Manual (stand alone)	710465	1	1	1	1	1	1	1	1
Book # 77 i7700 Installation Manual	710351	1	1	1	1	1	1	1	1
Quick Ref. — Single	710038	1	1	1	1	-	-	-	-
Quick Ref. — Dual	710013	-	-	-	-	1	1	1	1
OPTIONAL ACCESSORIES									
Dual trim switch panel for independent operation	HA5491	-	-	-	-	-	-	-	-

Table 14-1.

TOOL REQUIRED TO SET UP SYSTEM	REQUIRES EST DISPLAY SETUP TOOL FOR CONFIGURATION (EPSK1207)								
Additional Stations Kits	Kit Part #	**i7811A**	**i7811A-BE**	**i7851A**	**i7851A-BE**	**i7812A**	**i7812A-BE**	**i7852A**	**i7852A-BE**
		Chrome Single Engine	Black Single Engine	Chrome Single Engine w/Trim	Black Single Engine w/Trim	Chrome Twin Engine	Black Twin Engine	Chrome Twin Engine w/Trim	Black Dual Engine w/Trim
CONTROL HEAD KITS									
Single Top Mount, Control Head Kit	CH7810NT	1	-	-	-	-	-	-	-
Single Top Mount, Control Head Kit, black	CH7810NT-BE	-	1	-	-	-	-	-	-
Single Top Mount, Control Head Kit, with Trim	CH7810	-	-	1	-	-	-	-	-
Single Top Mount, Control Head Kit, with Trim, Black	CH7810-BE	-	-	-	1	-	-	-	-
Dual Top Mount Control Head Kit	CH7800NT	-	-	-	-	1	-	-	-
Dual Top Mount Control Head Kit, Black	CH7800NT-BE	-	-	-	-	-	1	-	-
Dual Top Mount Control Head Kit, with Trim	CH7800	-	-	-	-	-	-	1	-
Dual Top Mount Control Head Kit, with Trim, Black	CH7800-BE	-	-	-	-	-	-	-	1
HARNESSES/TEES									
Single Tee	CM10060	1	1	1	1	1	1	1	1
Micro C Ext, M-F (30ft CAN bus harness)	CM10030	1	1	1	1	1	1	1	1

Table 14-2.

ADDITIONAL NMEA HARNESS LENGTHS			
Part No.	**Length (feet)**	**Part No.**	**Length (feet)**
CM10001	1′	CM10012	12′
CM10003	3′	CM10020	20′
CM10006	6′	CM10030	30′
CM10009	9′		

Table 14-3.

14.1.10 Mounting dimensions/template Control head, dual lever

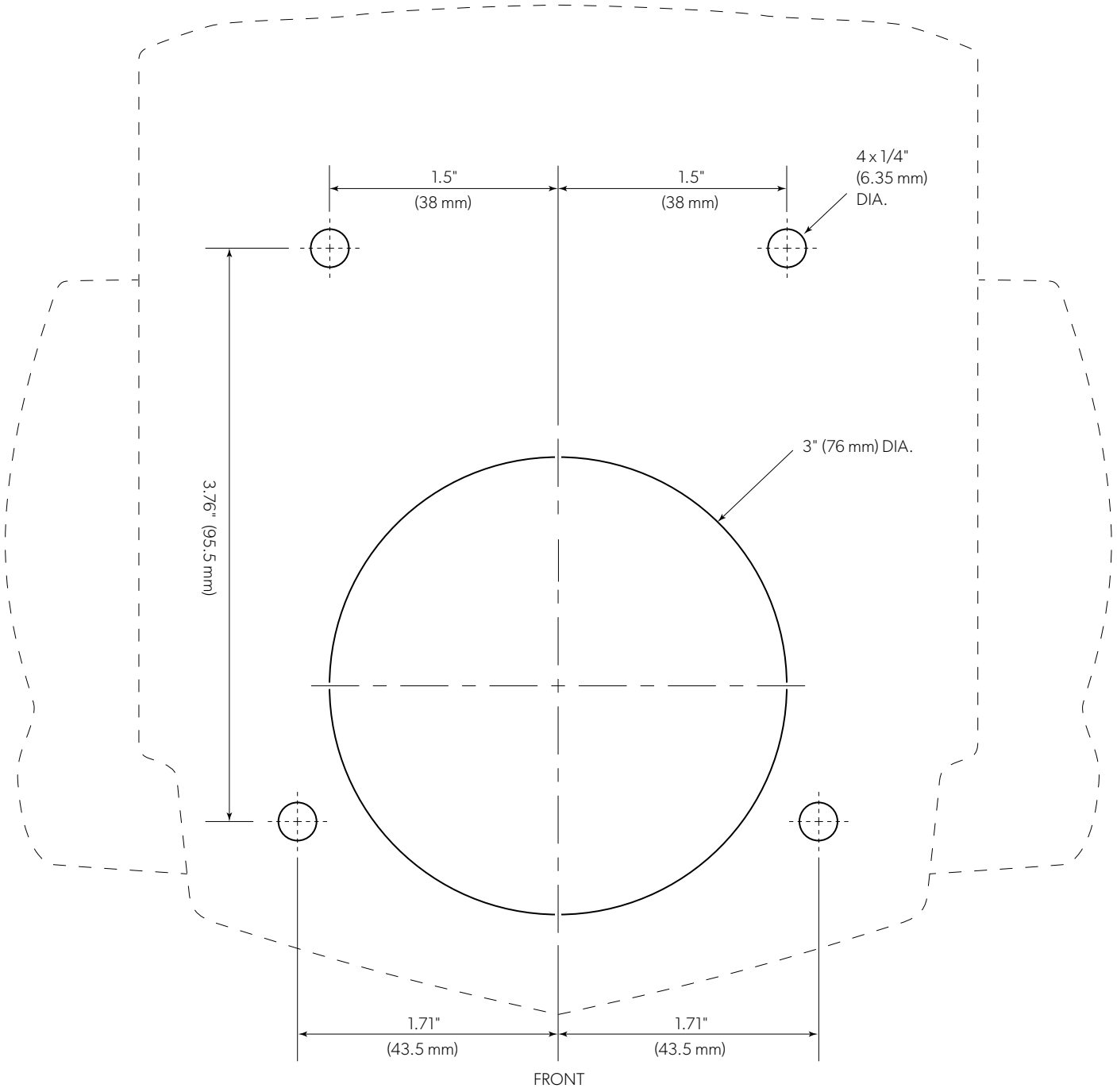


Figure 14-10. Control head – dual lever mounting dimensions. Scale = 1:1.

14.1.11 Mounting dimensions/template Control head, single lever

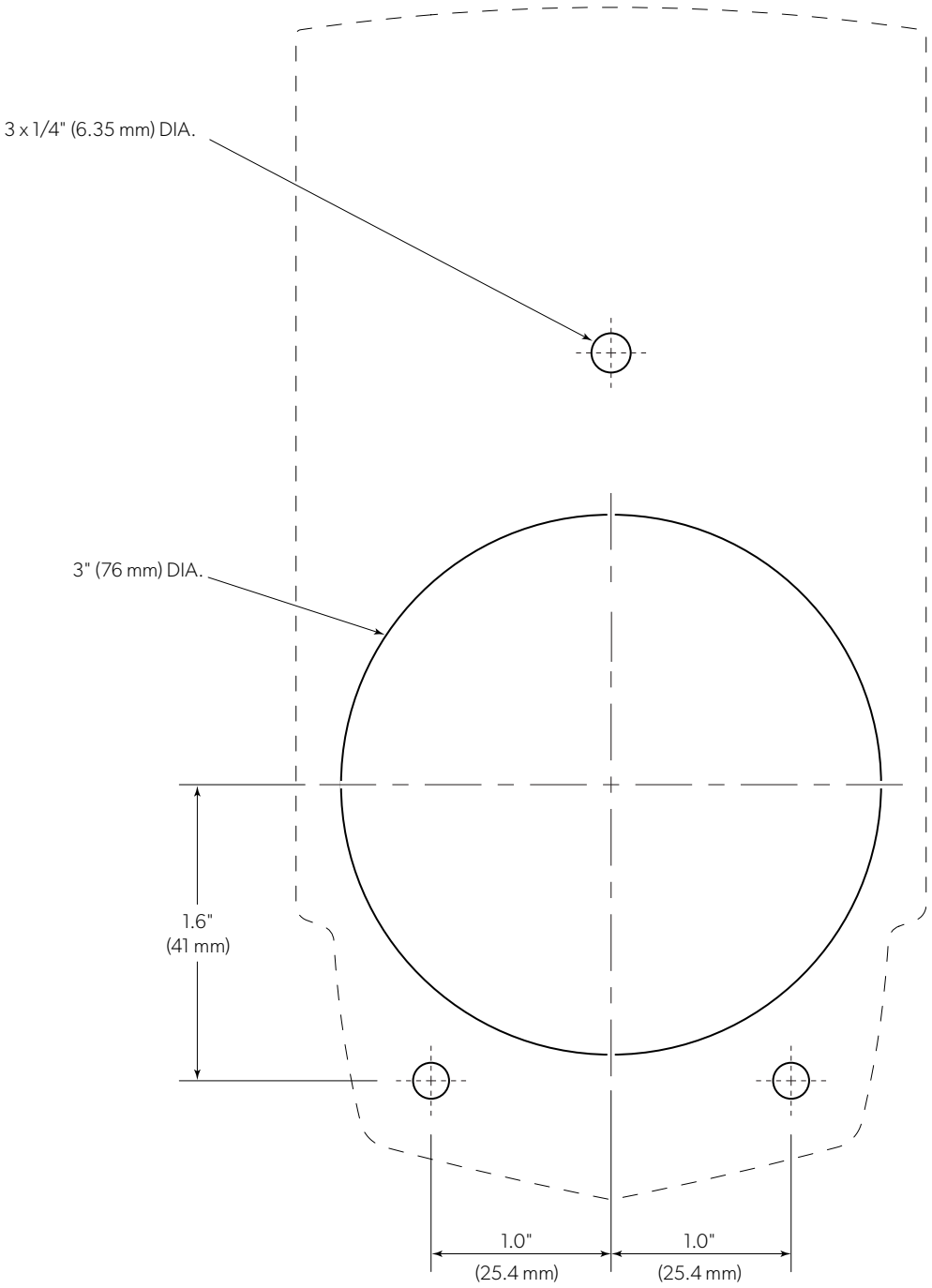


Figure 14-11. Control head – single lever mounting dimensions. Scale = 1:1.

14.1.12 Mounting dimensions — Actuator

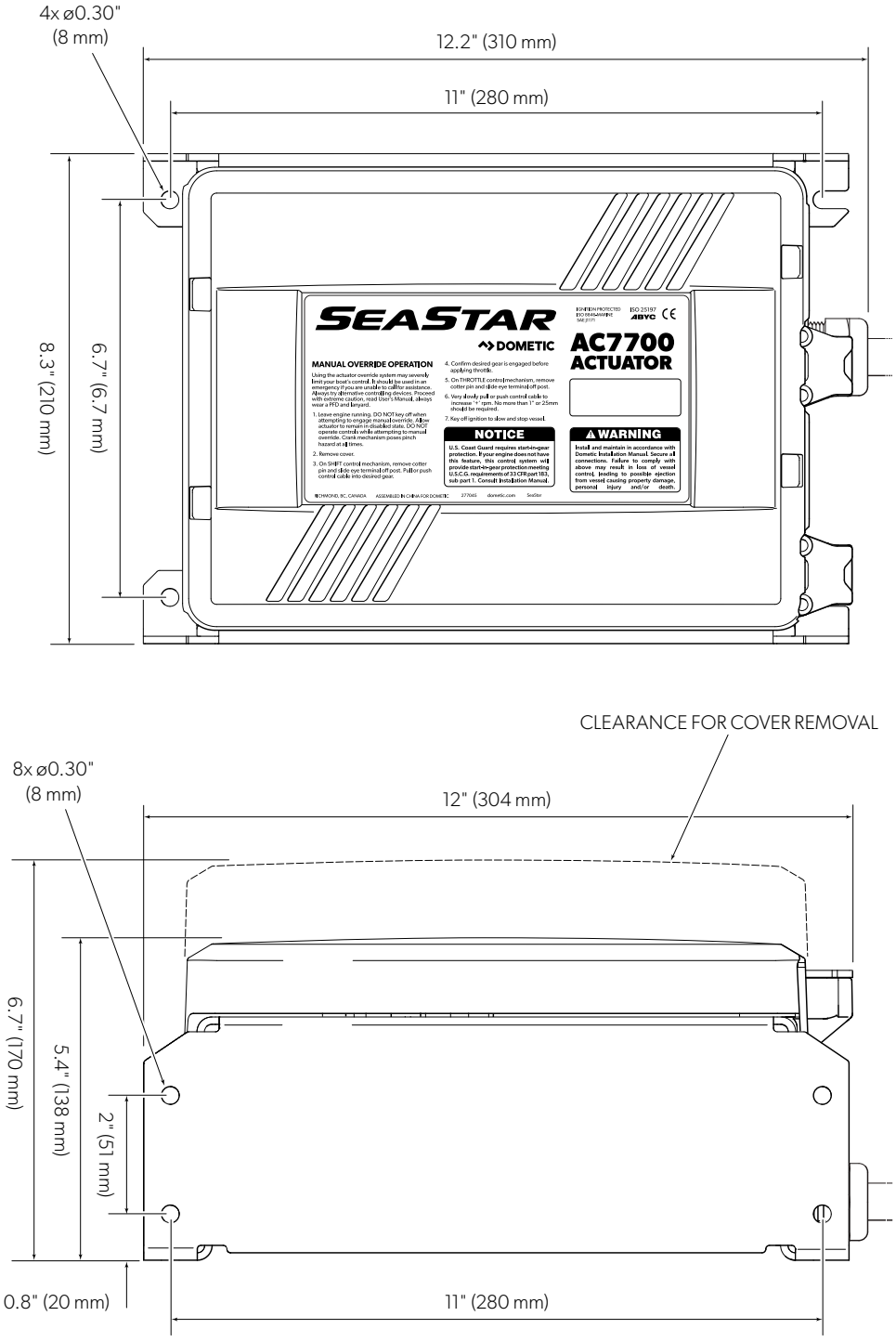


Figure 14-12. Actuator – mounting dimensions. Scale = 1:3.

14.1.13 Mounting dimensions — Single lever interface

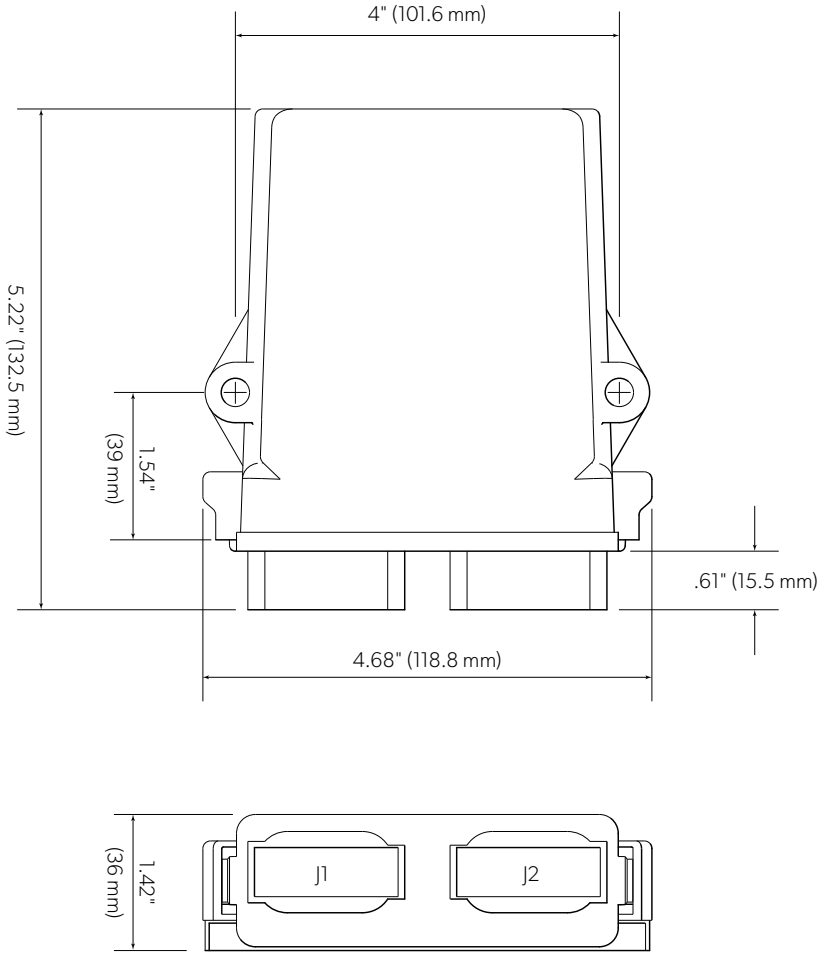
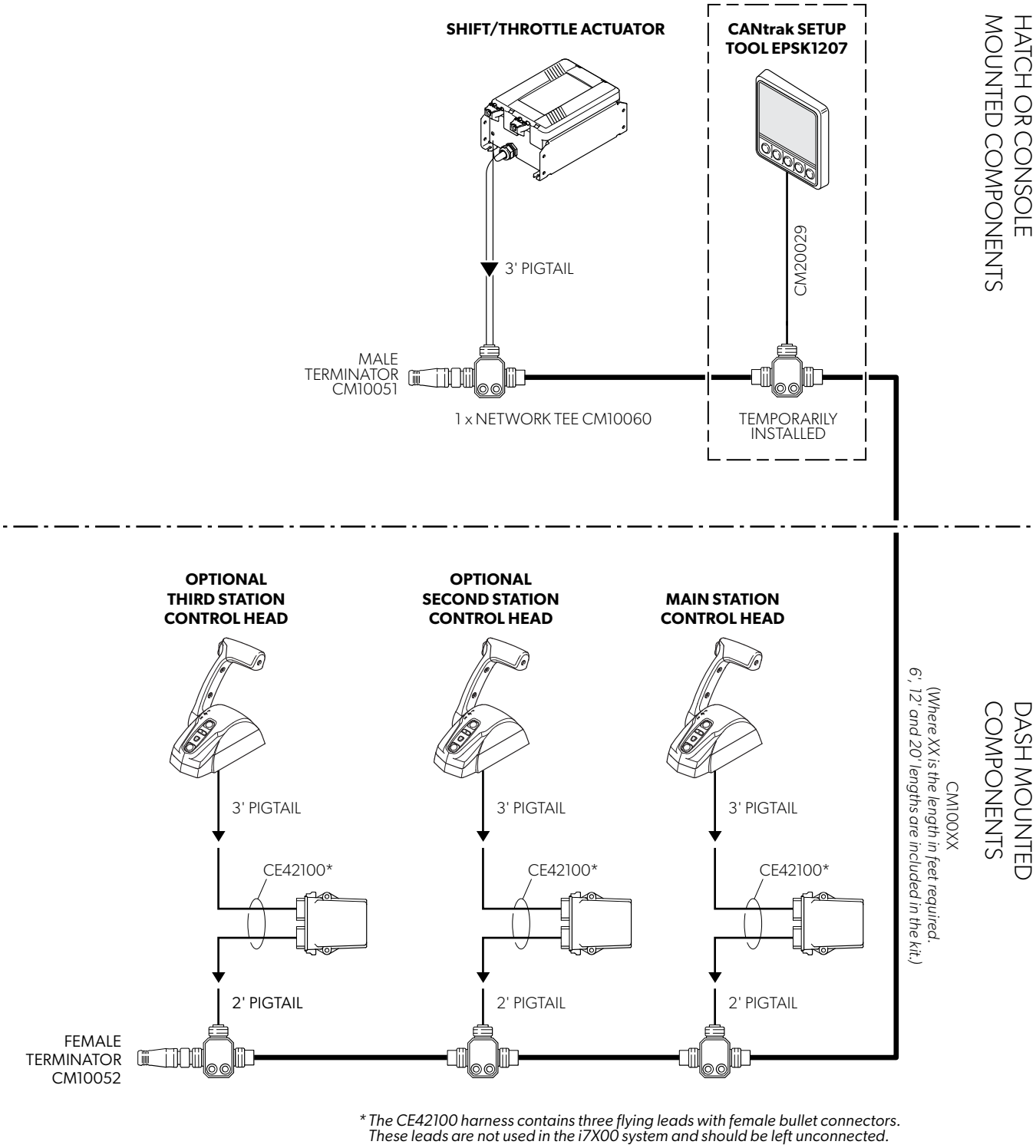


Figure 14-13. Single lever interface – mounting dimensions. Scale = 1:2.

14.1.14 Wiring diagram



** The CE42100 harness contains three flying leads with female bullet connectors. These leads are not used in the i7X00 system and should be left unconnected.*

Figure 14-13. CAN2 wiring diagram, triple station, single engine.

Notes

15 Contact and Warranty Information

15.1 SeaStar technical service

web: www.dometic.com Tel: 1-800-730-4082

email: seastar@dometic.com

NOTICE!

Dometic has authorized the following service centers through in-house training & product support. These authorized service centers are to be used for rebuilding of non-warranty components only. Dometic does not set pricing at these locations and they are not that of a Dometic owned company.

For the most up-to-date listings of Authorized Service Centers visit : https://www.dometic.com/en-us/support

15.2 Locations and addresses

15.2.1 Authorized service centers

INTERNATIONAL INQUIRIES

Hypro Marine (International distributor)
Mount Pleasant Lane, Lymington,
Hampshire, England SO41 8LS U.K.
Tel: +44 1590 681445
Fax: +44 1590 681446
email: info@hypromarine.co.uk

Services: SeaStar, BayStar, Capilano, Hynautic, Power Steering, Optimus, SeaStar jack plates, and hoses

SWEDEN

Comstedt (International distributor)
Jan Comstedt, ABTraneredsvägen
112, 426 53 Västra Frölunda
Tel: +46 31 775 65 30
email: info@comstedt.se
web: www.comstedt.se

Services: SeaStar, BayStar, Capilano, and hoses

ITALY

Indemar SpA (International distributor)
Via Guido Rossa 42,
16012 Busalla,
GE Italy
Tel: +39 010 9641927
Fax: +39 010 9641920
email: info@indemar.com
web: www.indemar.com

Services: SeaStar, SeaStar Power Assist, Baystar, Hynautic, Optimus, and hoses

CANADA

PSI Fluid Power
13771 Mayfield Place, Richmond
BC V6V 2G9
Tel: 604-278-4481
email: mlythgoe@psifp.com
web: www.psifp.com

Services: SeaStar, BayStar, Capilano

WESTERN USA — SERVICING PACIFIC

LFS, Inc.
3625 East End Rd. Homer,
AK 99603
Tel: 907-235-7993
Fax: 360-733-7180
email: bessex@lfsinc.com
web: www.go2marine.com

Services: SeaStar, BayStar, Capilano, Hynautic, and hoses

LFS, Inc.
851 Coho Way, Bellingham,
WA 98225
Tel: 800-426-8860
Fax: 360-734-4058
email: gene@lfsinc.com
web: www.go2marine.com

Services: SeaStar, BayStar, and Capilano

Seatech Marine Products
2805 Canon Street, Suite 101
San Diego, CA 92106
Tel: 619-222-9613
email: info@seatechmarineproducts.com
web: www.seatechmarineproducts.com

Services: SeaStar, BayStar, Capilano, SeaStar Power Steering, SeaStar Power Assist, Hynautic, and hoses

Fishing Boats Unlimited
624 Terminal Way, Costa Mesa,
CA 92627
Tel: 949-642-0882
Fax: 949-642-0419
email: info@fishingboatsunlimited.com
web: www.fishingboatsunlimited.com

Services: SeaStar, BayStar, Capilano, Hynautic, and hoses

NORTHERN USA

Dans South Side Marine
1900 West 98th Street,
Bloomington, MN 55431
Tel: 952-881-0077
email: Parts@danssouthsidemarine.com
email: mkrepair@danssouthsidemarine.com
web: www.danssouthsidemarine.com

Services: SeaStar, and BayStar

SOUTHERN USA — SERVICING CARIBBEAN & ATLANTIC

Pier 21 Marine
Pier 21, 1359 Veterans Memorial Blvd,
Kenner, LA 70062
Tel: 504-305-5300
email: pier21sales@gmail.com
web: www.pier21steering.com

Services: All SeaStar, BayStar, Capilano, and SeaStar Power Assist

Boat Steering Solutions LLC.
1070 Endeavor Court, North Venice,
FL 34275
Tel: 941-484-6060
email: sales@boatsteer.com
web: www.boatsteer.com

Services: Optimus steering, SeaStar, BayStar, Capilano, SeaStar jack plates, SeaStar Power Assist pumps, SeaStar Power Steering, DC2000, Hynautic steering & controls, trim tabs, and custom hoses.

Florida Rigging & Hydraulics
3905 Investment Lane,
#9 Riviera Beach, FL 33404
Tel: 561-863-7444
Fax: 561-863-7711
email: service@rigginghydraulics.com
web: www.rigginghydraulics.com

Services: SeaStar, BayStar, Capilano, and Hynautic

Marine Control Systems Inc. Tel: 828-508-4201
76 May Apple Lane, Franklin, NC 28734 email: marinecontrolsystemsnc@gmail.com
web: www.marinecontrol.net

Services: SeaStar, BayStar, Capilano, SeaStar Power Steering, and Hynautic steering & controls

15.3 Return goods

Contact our warranty department at Marine.Warranty@dometic.com for instructions.

15.4 Technical support

Phone: 1-800-730-4082
email: seastar@dometic.com
Hours: Monday to Friday 05:00 – 15:30 PST

15.5 Owner's limited warranty

This Warranty is made to a purchaser ("owner" or "you"), who acquires the Dometic Corporation ("Dometic")-manufactured product or component (the "Dometic product") for his or her own use.

1. WHAT'S COVERED

What does the Limited Warranty cover?
The Dometic products under this limited warranty are to be free from defects in material and workmanship at the time of sale and under normal use. If Dometic determines to its satisfaction that a Dometic product contains such a defect during the applicable Warranty Periods set out within **Section 4 COVERAGE PERIOD**, then Dometic shall, at Dometic's sole option, repair or replace the Dometic product, or refund the original purchase price.

Note: Where labor is included for a particular Dometic product covered under this Limited Warranty (See Section 4 COVERAGE PERIOD), Dometic is not responsible for additional labor charges associated with the removal, reinstallation, or replacement of any equipment or furnishings beyond the particular covered Dometic product. Any additional travel time is the owner's sole responsibility.

This Limited Warranty is made in lieu of all other express warranties, obligations, or liabilities on the part of Dometic. In those instances in which Dometic chooses to make a cash refund of the original purchase price, such refund shall effect the cancellation of the contract of sale without reservation of rights on the part of the owner. **Such refund shall constitute full and final satisfaction of all claims which the owner has or may have against Dometic resulting from any actual or alleged breach of warranty, either express or implied.**

IN NO EVENT SHALL DOMETIC BE LIABLE FOR EITHER INCIDENTAL OR CONSEQUENTIAL DAMAGES. THIS INCLUDES ANY DAMAGE TO ANOTHER PRODUCT OR PRODUCTS RESULTING FROM SUCH A DEFECT. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. ANY IMPLIED WARRANTY, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR ANY PURPOSE, IS LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THIS WARRANTY GIVES SPECIFIC LEGAL RIGHTS, YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

Dometic reserves the right to improve or change the design of any Dometic product without notice and with no obligation to make corresponding changes in Dometic products previously manufactured.

2. WHAT'S NOT COVERED

What does this Limited Warranty not cover?
What does this Limited Warranty not cover? We will have no obligations under this warranty for any product which:

- has been improperly installed;
- has been used in an installation other than as recommended in our installation or operation instructions or specifications;

- has failed or has been damaged due to an accident or abnormal operation including racing, misuse or alterations outside our factory;
- has been repaired or modified by entities other than Dometic;
- has been used on an engine/boat combination where the engine horsepower exceeds the rating established by the boat manufacturer;
- has been used with other or as specified in the Dometic's Owners Manual for the purchased product/product(s) which, in Dometic's opinion, are incompatible with the Dometic's product.

Installation and application of Dometic products are not warranted by Dometic because Dometic has no control or authority over the selection, location, application, or installation of Dometic products.

3. GETTING SERVICE

How do you get service?
Please read the following Warranty Procedure:
In order to obtain the benefits of this Warranty, the owner has the following three options during the applicable Warranty Coverage Period

1. **Preferred option:** Have a Dometic authorized Servicing Dealer perform the work needed. The customer needs to contact Dometic Tech Support 800-730-4082, marinesupport@dometic.com for a recommendation as to the closest authorized Servicing Dealer. If the customer already knows of an authorized Servicing Dealer, the Servicing Dealer should be contacted directly.
2. **Second option:** If the customer contacts the Dometic Customer Service Department for an authorized Servicing Dealer and there are none in the particular area, Dometic may authorize the use of a local Servicing Dealer, in which event Dometic will work with the local Servicing Dealer to assist in any way possible.
3. **Third option:** The customer may send the Dometic product back to the factory to have the repair work done. Dometic will make every effort to return the equipment to the customer within a three-week time period. If the claim represents a valid warranty issue, Dometic will pay the freight both ways. Dometic prefers option one first, option two second, and option three only if option one or two are not available.

Refer to the **Dometic Tech Support** section 15.4 for contact information.

Any Dometic product returned in the manner described above will be examined by the Servicing Dealer and/ or by Dometic. If it is found that the returned item was defective in material or workmanship at the time of sale, the Servicing Dealer will contact Dometic for Warranty coverage. Dometic shall, at Dometic's sole option, repair or replace the Dometic product, or refund the original purchase price. If Dometic determines that repairs to the Dometic product are to be made, then only authorized Dometic parts will be used.

Dometic does not authorize any person or company to create any Warranty obligations or liability on its behalf.

No action to enforce this Warranty shall be commenced later than ninety (90) days after the expiration of the applicable Warranty Coverage Period as set out within **Section 4 COVERAGE PERIOD AND TABLE OF WARRANTY PERIODS**. Claims must be submitted in writing to the Dometic Marine Division Warranty Department.

4. COVERAGE PERIOD

What is the Warranty Coverage Period?

Dometic warrants its products for a period of two years from the date of original retail purchase. For Dometic products used commercially or in any rental or other income producing activity, Dometic warrants its products for a period of one year from the date of original retail purchase.

We will provide replacement product without charge for any Dometic product covered by this warranty, which is returned (freight prepaid) within the warranty period to the dealer from whom such products were purchased, or to us at the appropriate address. In any such case, Dometic products found to be defective and covered by this warranty from the date of original purchase will be replaced or repaired at Dometic' option, and returned to the customer.

Dometic' sole responsibility under this warranty is limited to the repair or replacement of product which is, in Dometic' opinion, defective. Dometic is not responsible for charges connected with the removal of such product or reinstallation of replacement or repaired parts.

Notes

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