BAYSTAR | SEASTAR | HYNAUTIC

HYDRAULIC STEERING
SELECTION GUIDE
2017

SEASTAR SOLUTIONS®

SEASTAR™ JACKPLATES

new high speed
hydraulic actuator

maximum
engine tilt

Superior
sealing system

Built and
prepared for the
toughest
environment

Heavy duty
equipment

exceptional
load capacity

tough and sleek

2" setback
increments

FOR SERIOUS COMPETITORS

SEASTAR SOLUTIONS

Visit **www.seastarsoultions.com**
for more information.

SEASTAR™ Jackplates

FEATURES

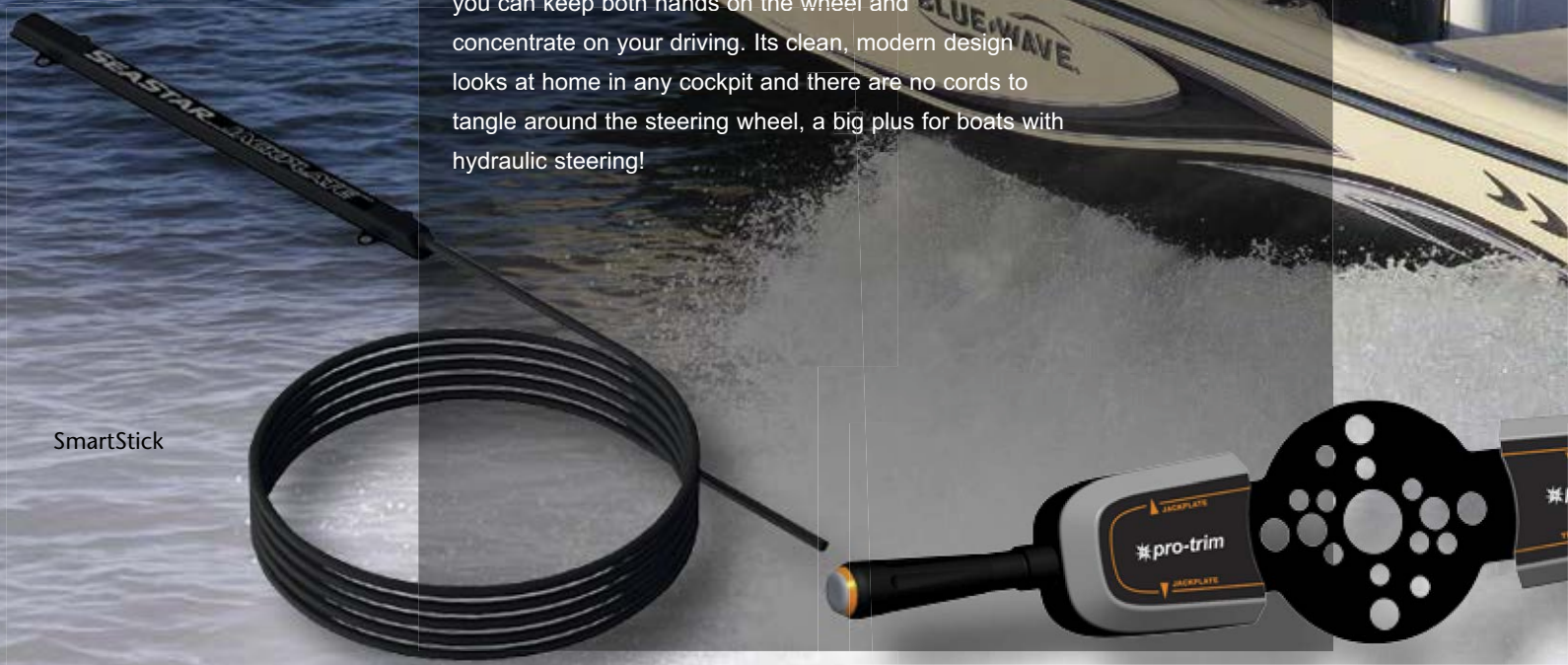
- Sleek, bold styling – redefining the look for Jackplates.
- Presenting a full range of plates in 4, 6, 8, 10 & 12 inch setbacks.
- Aesthetically matched to SeaStar steering cylinders.
- New high speed integrated hydraulic actuator, can lift the engines in 8.5 seconds.
- Rated for 300hp engines up to 625 pounds dry weight.
- Available with an environmentally sealed non-contact SmartStick position sensor for precise height information.
- Compatible with Power-Pole and Talon anchor systems.
- Easy mounting with SeaStar Accessory Adapter kit.
- Fully captured slide mechanism gives complete, rigid engine support at all lift positions.
- Anodized aluminum and stainless steel construction for good corrosion resistance.
- High visibility position scale for quick glance operation.
- Integrated circuit breaker gives electrical protection right at the battery post.

pro-trim

Pro-Trim Engine Trim Control

Trim control the way it's meant to be . . . at your fingertips. With Pro-Trim from SeaStar Solutions, you can keep both hands on the wheel and concentrate on your driving. Its clean, modern design looks at home in any cockpit and there are no cords to tangle around the steering wheel, a big plus for boats with hydraulic steering!

SmartStick



REDEFINING STEERING

SPEED ADJUSTING ELECTRONIC POWER STEERING FOR SINGLE, TWIN, TRIPLE AND QUAD ENGINE BOATS

OPTIMUS EPS BY SEASTAR

- Car-like steering and performance
- Autopilot ready
- Adjustable steering effort and turns lock to lock for maximum stability
- Optimus 360 Joystick ready

UPGRADE

Ask us about the Joystick Docking Control System

Optimus 360 upgrades for twin, triple and quad outboard engine boats - electronic and mechanical controlled.

OPTIMUS 360 BY SEASTAR

Visit **www.seastarsoultions.com** for more information.

Boating safety is everyone's responsibility.

As a boater, you are responsible for having all required safety equipment, for operating your boat safety and for ensuring the safety of those on board your vessel as well as those sharing the waterways. Boaters exercising courtesy and common sense will not create a hazard, threat, stress or an irritant to themselves, to others, to the environment, or to wildlife.

1. Wear an approved Personal Flotation Device (PFD).
2. **Read your owner's manual.**
3. Attach engine stop switch securely to your body or PFD.
4. Respect the speed limits and other boating restrictions.
5. Be cautious and courteous.
6. Navigate with care.
7. Understand the behavior characteristics of your vessel that might result from unexpected manoeuvers, such as sudden deceleration, high-speed obstacle avoidance, and other speed related issues.
8. It is good boating practice to rinse down your boat and exposed steering equipment with clean, fresh water after each use. DO NOT use corrosive materials on SeaStar products.

Become informed and stay informed!

"Take an accredited boating safety course"

⚠ 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.

Notice to Boat Manufacturer or Installer

NOTICE

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

Throughout this publication, Warnings and Cautions (accompanied by the International Hazard Symbol ⚠) are used to alert the manufacturer or installer to special instructions concerning a particular service or operation that may be hazardous if performed incorrectly or carelessly.

Observe Them Carefully!

These "safety alerts" alone, cannot eliminate the hazards that they signal. Strict compliance to these special instructions when performing the installation and maintenance plus "common sense" operation are major accident prevention measures.

DANGER	⚠ WARNING	CAUTION	NOTICE
Immediate hazards which WILL result in severe personal injury or death.	**Hazards or unsafe practices which COULD result in severe personal injury or death.**	**Hazards or unsafe practices which COULD result in minor injury or product or property damage.**	**Information which is important to proper installation or maintenance, but is not hazard-related.**

NOTICE

Marine Canada Acquisition Inc. DBA SEASTAR SOLUTIONS is referred to as SeaStar Solutions throughout this publication.

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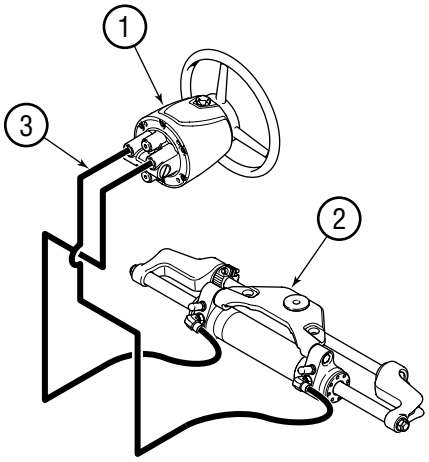
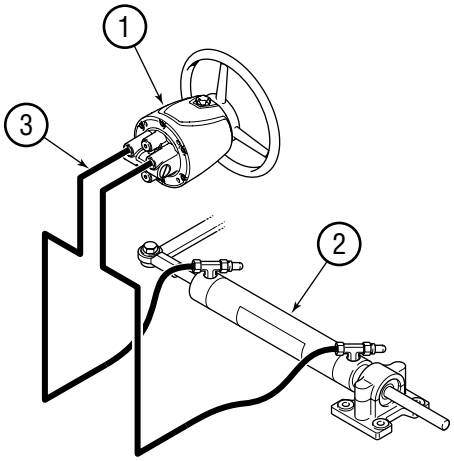


SeaStar Hydraulic Steering

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 or tubing 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.



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 and 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.

IMPORTANT

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, SeaStar recommends that **ONLY** SeaStar or SeaStar Pro hoses be used in SeaStar steering systems.

IMPORTANT

4. Steering Fluid

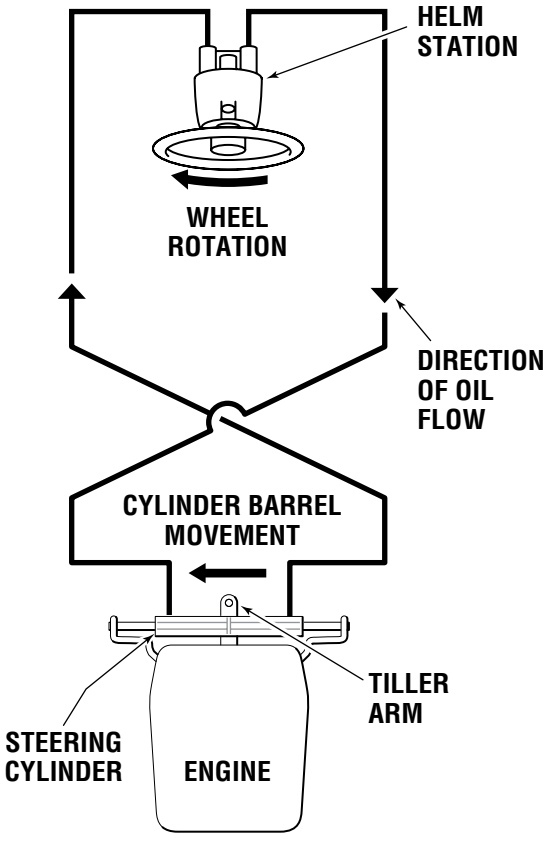
Due to recent upgrades to our steering system components, SeaStar Solutions recommends use of SeaStar Steering Fluid **ONLY** in our hydraulic steering systems. SeaStar steering systems have been engineered and validated using our proprietary SeaStar Hydraulic Steering Fluid. SeaStar steering fluid is engineered 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

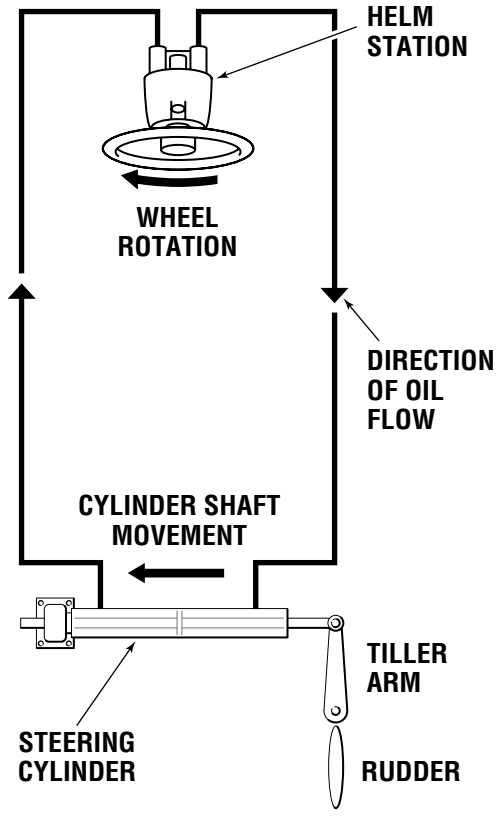
The system is a two-line system. This makes operation very simple.

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.
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.

OUTBOARD SYSTEM



INBOARD SYSTEM



SeaStar/BayStar 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. 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/tube and genuine SeaStar steering fluid. SeaStar has a comprehensive range of cylinders to 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.

BayStar & SeaStar, the hydraulic steering systems that are;

Easy to install...

- Only four essential components; helm, cylinder, tube/hose and SeaStar steering fluid
- Compact and attractive helm design
- Variety of helm mounting configurations
- Simple tube/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...

- Anti-friction piston points

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)

BayStar and SeaStar...

Simply the best!

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.

Notes on 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. 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,
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.

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 dual 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 dual engine, and is generally slower than 45 mph.

3. **RUNABOUT**
   Intended for day boating. Typically a single engine, but, can be a dual 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 dual 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 dual 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 tiebar 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.

Optimum Performance Chart

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 proper system. 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 SeaStar Solutions Technical Support.

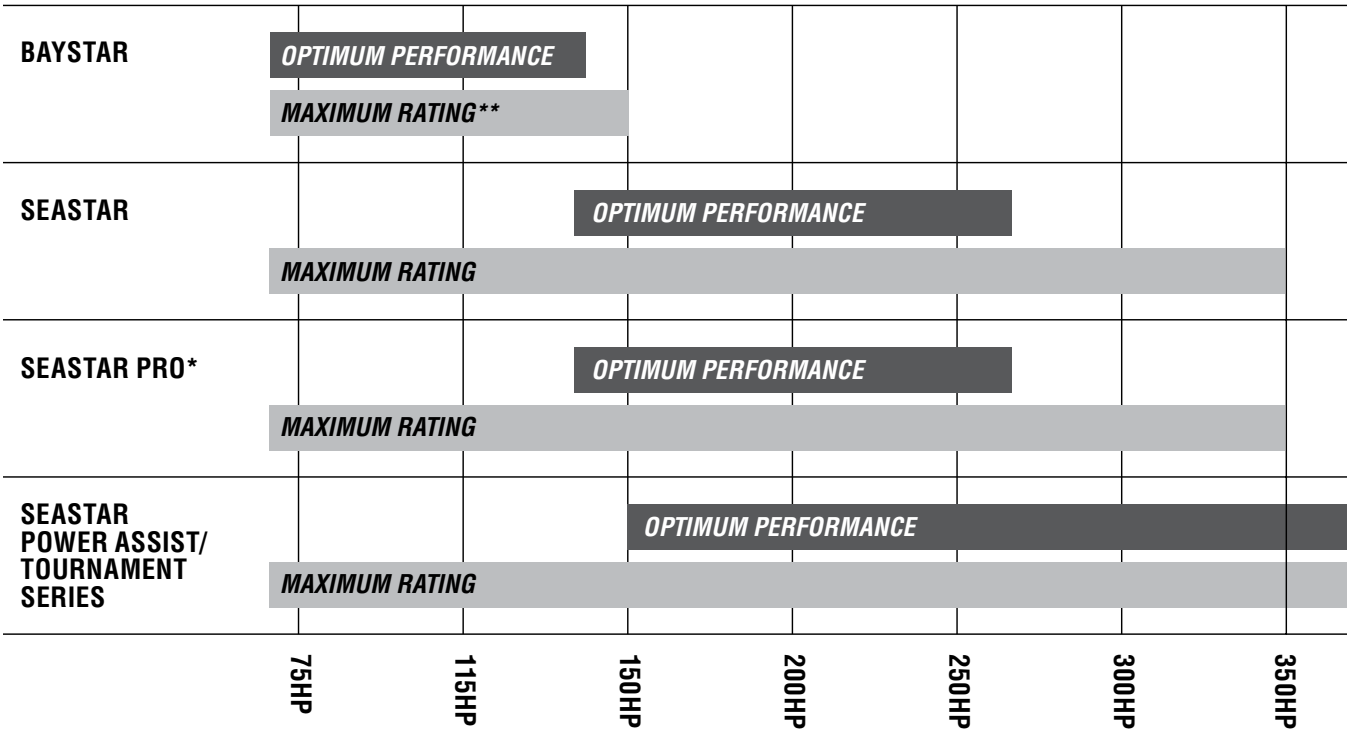


Chart based on 'Optimum Comfort'

** Ideal for single engine, high speed boats, such as bass boats.*

*** High performance 150HP engines, such as Mercury Optimax should use SeaStar.*

My Steering Components

Helm Model # ..... Cylinder Model # .....

Hose/Tube..... Other.....

Autopilot Equipped ☐ Yes ☐ No Date Purchased .....

Boat: Make..... Model ..... Length.....

Engine: Make..... H.P..... Quantity.....

CHAPTER

1

BAYSTAR™

OUTBOARD STEERING

Helm pumps now fitted with Positionable O-Ring fittings (ORB)

BayStar™ hydraulic steering is brought to you by the manufacturers 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 boats rated up to **MAX. 150HP.** 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.

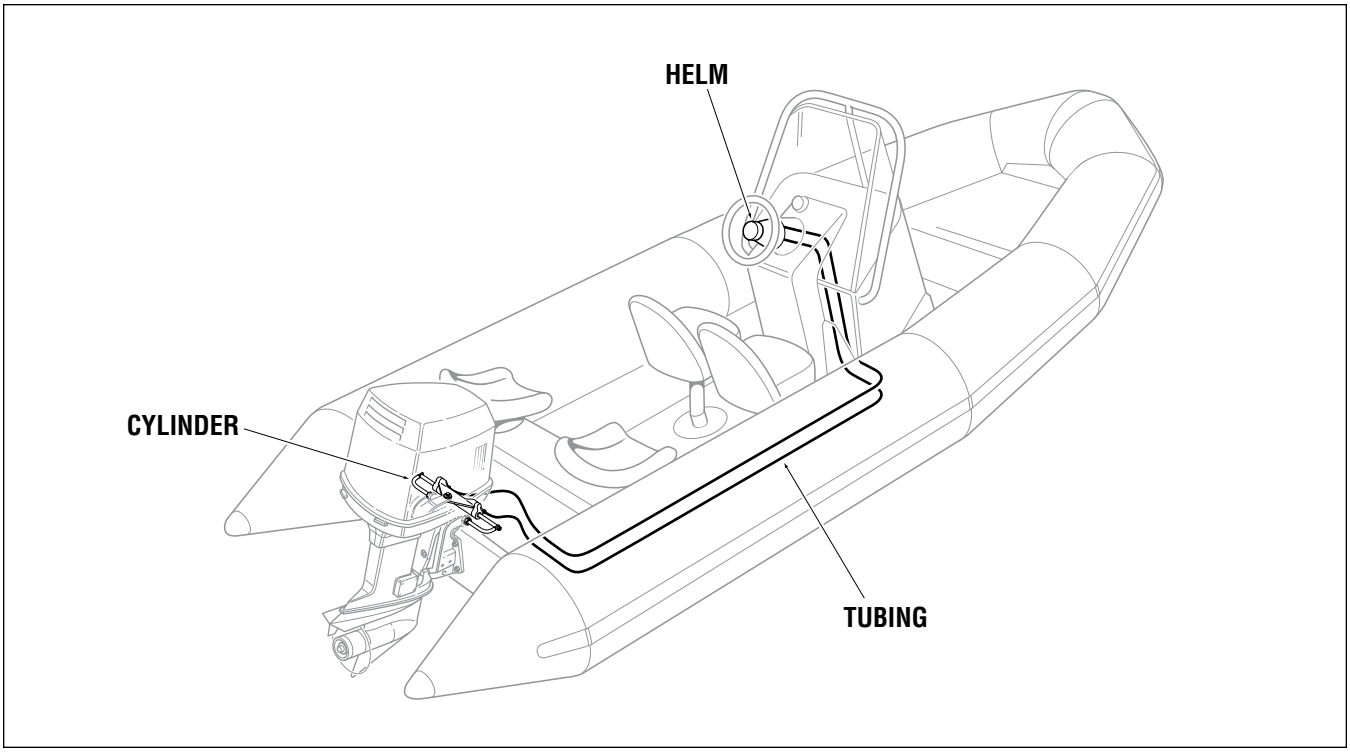
The BayStar steering system consists of a super low friction helm for smooth comfortable steering, a balanced cylinder–featuring a compact design that fits most splashwells. The systems are easy to install with "cut-to-length" tubing. Available in complete kits or by individual components. For detailed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

NOTICE

BayStar is NOT recommended in pontoon boats or applications with high steering effort (i.e. such as those using high performance engines or boats capable of attaining high speeds), customers should consider upgrading the system to SeaStar/SeaStar Pro steering. This will reduce the steering effort due to the fact that SeaStar steering provides more output power resulting in lower steering effort.

NOTICE

Tilt Helm HH4315-3 and HH4316-3 are available separately. Currently not available in kit form.



Typical BayStar Installation

⚠ CAUTION

Helm pumps now fitted with Positionable O-Ring fittings (ORB)

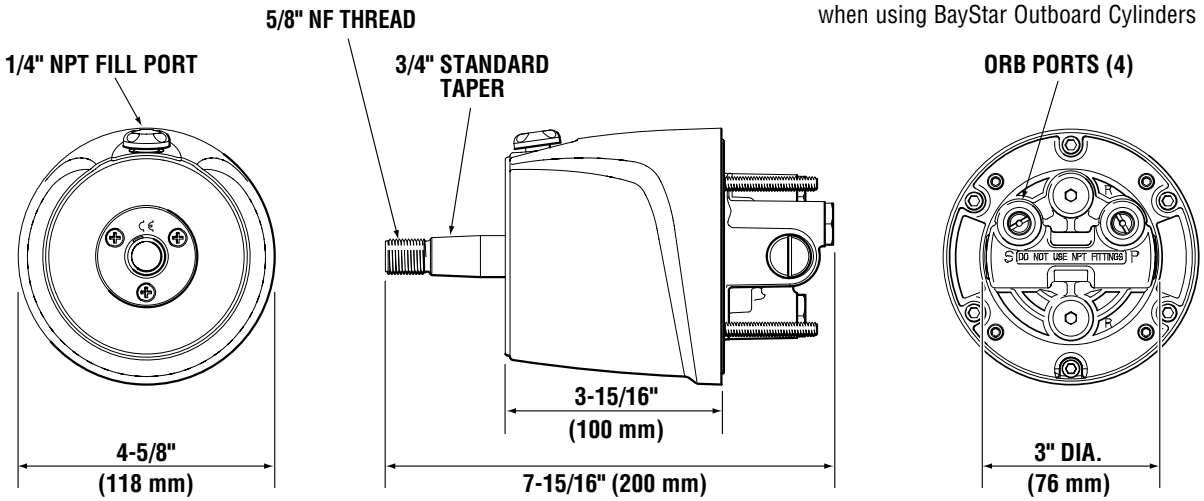
-3 helm pumps are fitted with positionable O-ring style hose fitting ports (commonly referred to as ORB). Do NOT attempt to install an NPT pipe fitting into a -3 helm hose fitting port. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar Solutions O-ring style hose fittings (ORB).

Three easy steps to select your BayStar System

1) **Check helm dimension.** Both the Standard and Tilt helms require a 3” (76mm) cut-out hole in the dash.

STANDARD HELM PART# HH4311-3 & HH4314-3

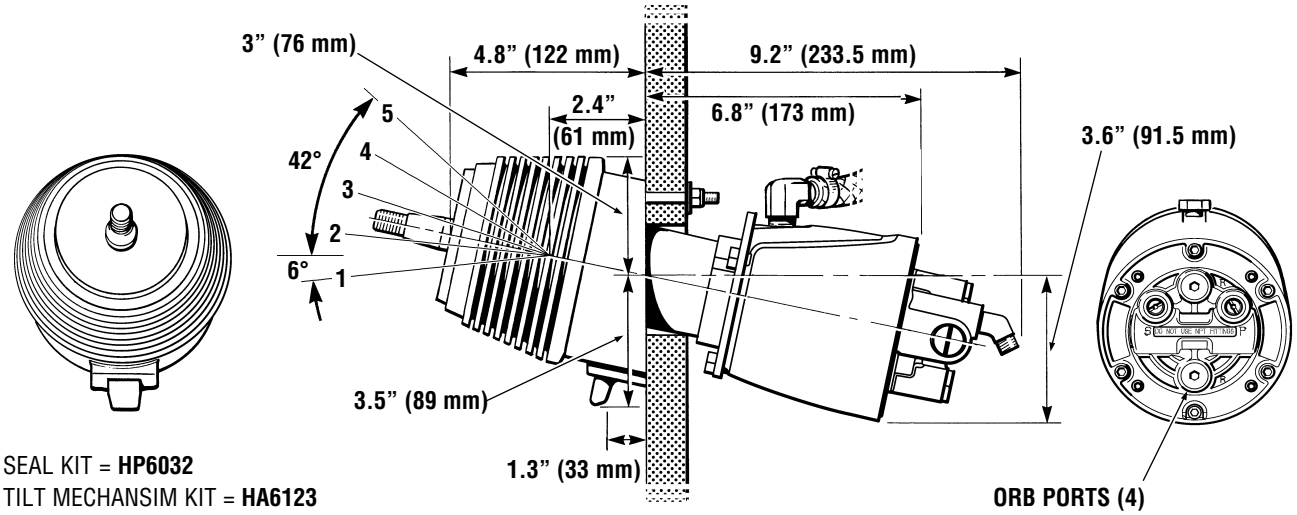
HH4311-3 (1.1 cu.in.) Gives 6.5 wheel turns lock to lock.
HH4314-3 (1.4 cu.in.) Gives 5.2 wheel turns lock to lock when using BayStar Outboard Cylinders



SEAL KIT = **HP6032**

SPORT TILT HELM PART# HH4315-3

HH4315-3 (1.4 cu.in.) Gives 5.2 wheel turns lock to lock.



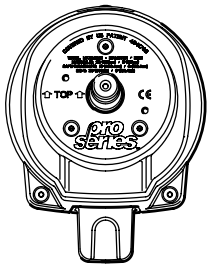
SEAL KIT = **HP6032**
TILT MECHANSIM KIT = **HA6123**

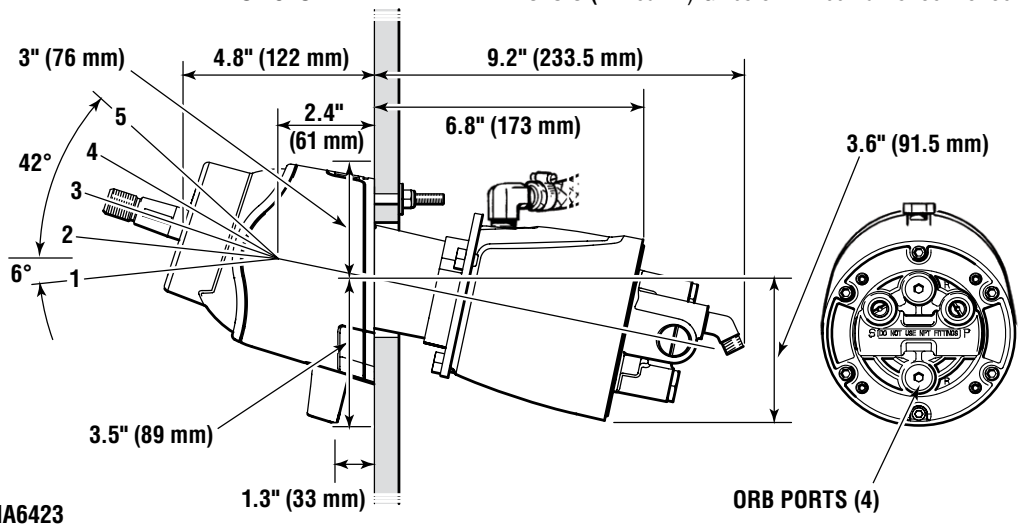
SPORT PLUS TILT HELM PART# HH4316-3

HH4315-3 (1.4 cu.in.) Gives 5.2 wheel turns lock to lock.

NOTICE

Comes with newly designed tilt mechanism.

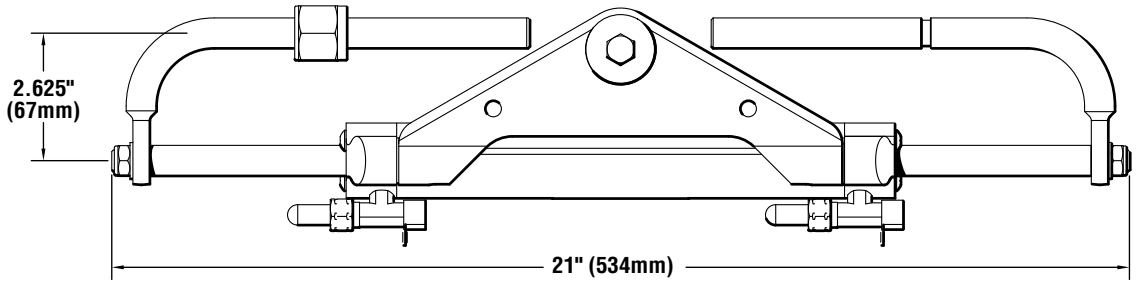




SEAL KIT = **HP6032**
TILT MECHANSIM KIT = **HA6423**

2) Is the Splashwell wide enough? The HC4645H/47H/48H/58H require a minimum 21" (534mm) Splashwell width.

BAYSTAR CYLINDER PART# HC4645H/47H/48H/58H

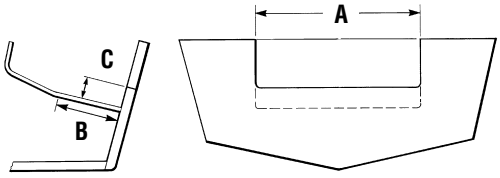


SEAL KIT = **HP4600** TEE/BLEEDER KIT = **HF4202** SUPPORT ROD/NUT/CLIP = **HP6050** PIVOT PLATE SEE page 1-5

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
HC4645H/47H/ 48H/58H	1	21" (534mm)	6" (153mm)	5" (127mm)	N/A
	2	Twin engine applications not available at this time			



NOTES:

i) Ensure there is no interference between the BayStar cylinder rod and the splashwell boot or engine controls & cables.

ii) Dimensional restrictions also apply to external motor mount brackets.

iii) Ensure dimension 'A' maintained through full trim/tilt range.

iv) Maximum transom thickness 3" (76mm).

v) **Engines less than 70HP <u>may</u> require up to an additional 1" (25mm) of splashwell clearance.**

BayStar Steering Kits PID# HK4200A-3, HK4230A-3

BayStar Steering kits come complete with everything needed for an install, (some engines require additional kits and/or cylinder plate change, see application chart on *page 1-5*) the cylinder does not require the engine manufacturer drag link for connection. For your convenience two lengths of 20' cut to fit tubing are supplied with the HK4200A-3 and two lengths of 30' cut to fit tubing are supplied with the HK4230A-3 kit.

NOTICE

HC4645H compact cylinder is included in both BayStar Steering Kits. If your engine requires the use of a cylinder other than HC4645H or HC4658H (refer to application guide on page 1-5) then purchase of a replacement Pivot Plate (noted on page 1-5) will be required.

BayStar Steering Kit (HK4200A-3)

Includes:
1 x BayStar helm pump (HH4314-3)
1 x BayStar Cylinder (HC4645H)
1 x BayStar Tubing kit (HT4420H, comes with two 20' hoses)
2 x Hydraulic Steering Fluid (HA5430)
1 x Filler Kit (HA5438)

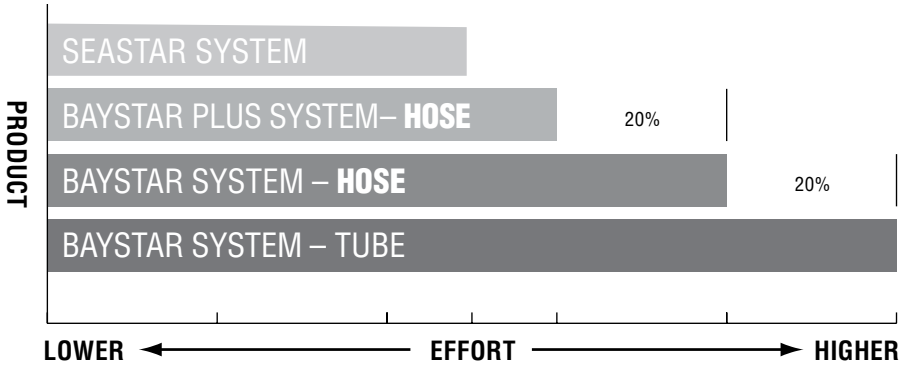
BayStar Steering Kit (HK4230A-3)

includes:
1 x BayStar helm pump (HH4314-3)
1 x BayStar Cylinder (HC4645H)
1 x BayStar Tubing kit (HT4430H, comes with two 30' hoses)
2 x Hydraulic Steering Fluid (HA5430)
1 x Filler Kit (HA5438)

NOTICE

Effort Reduction — SeaStar Solutions has recently updated the BayStar cylinder. These updates include low friction main piston seals as well as low friction wiper and gland seals. If one chooses to further reduce steering effort, the following additional changes can be made:

- *Consider plumbing the system using SeaStar Steering hoses. See page 9-2.*
- *Consider use of a BayStar Plus 1.4 cu.in. helm pump (HH4513-3/ HH4514-3).*
- *Consider use of a BayStar 1.1 cu.in. helm pump (HH4311-3).*
  NOTE: *Number of wheel turns will increase to 6.6 hard over to hard over.*



BayStar Outboard Steering Application Guide

(BayStar Compact Cylinders HC4645H/47H/48H/58H)

BAYSTAR™

OUTBOARD–FRONT MOUNT

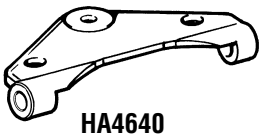
MFG	YEAR	MODEL	CYLINDER	NOTES
HONDA	1992–DATE	30-50HP	HC4645H	
	1996–DATE	75-90HP	HC4645H	
	2015–DATE	BF100	HC4645H	
	1998–2010	115-130HP	HC4647H	
	2003–DATE	135-150HP	HC4645H	
	2010–DATE	115HP	HC4645H	
JOHNSON/ EVINRUDE	1977–1990	65–150 HP	HC4648H	
	1991–DATE	40–150 HP	HC4645H	
NOTICE *Johnson 115 HP 2-stroke engines, required the pivot plate to be flipped. See note #4 below*	1997–DATE	115 HP FICHT	HC4658H	See Note 4
	1997–DATE	75–150 HP FICHT	HC4645H	See Note 5
	1998–DATE	40–140 HP 4-Stroke	HC4658H	See Note 1, 4
MERCURY/ MARINER	1984–DATE	75–150 HP	HC4645H	See Note 5
	1998-DATE	40–60 HP	HC4648H	See Note 1
NISSAN	1990–DATE	120–140 HP	HC4645H	
SUZUKI	1986–DATE	150 HP	HC4645H	See Note 5
	1996 ONLY	115–140 HP	N/A	
	1987–2002	115–140 HP	HC4645H	See Note 1
	1990–2000	90–100 HP	HC4645H	
	1998–DATE	40–70 4-Stroke	HC4645H	See Note 1
	2001–DATE	115–140 HP 4-Stroke	HC4658H	See Note 1, 4
TOHATSU	1990–DATE	40–140 HP	HC4645H	
	2014–DATE	BFT60 - BFT150	HC4645H	
YAMAHA	1998–DATE	40–50 HP	HC4645H	See Note 2
	1998–DATE	60 HP	HC4645H	See Note 3
	1986–DATE	70–90 HP	HC4645H	See Note 1
	1997–DATE	80–150 HP 4-Stroke	HC4645H	See Note 5
	2000–DATE	25-70 HP 4-Stroke	HC4648H	See Note 1
	2011–2013	F115A	HC4658H	
	2014–DATE	F115B	HC4545H	

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 HC4645H may be used in these applications. The pivot plate will need to be flipped before installation. Instructions provided with Owner's Manual.
5. High performance 150HP engines should use SeaStar.

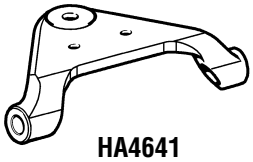
REVISION DATE: SEPT. 22nd 2016

NOTICE

HC4645H compact cylinder is included in the BayStar Steering kits. If your engine requires the use of a cylinder other than HC4645H or HC4658H then please refer to the figure below for additional replacement pivot plate.



HA4640
Comes with cylinder HC4645H



HA4641
Converts HC4645H to HC4647H

HA4642
Converts HC4645H to HC4648H

HA4643
Converts HC4645H to HC4658H

Note: *This page left blank intentionally.*

CHAPTER

2

BAYSTAR™

INBOARD STEERING

NOTICE

May not be available in all markets, visit www.seastarsolutions.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.

The systems are easy to install with "cut-to-length" tubing. Available in complete kits or by individual components. For detailed application information go to www.seastarsolutions.com

**If unsure of total steering loads, contact SeaStar Solutions Technical Support for assistance.*

Features

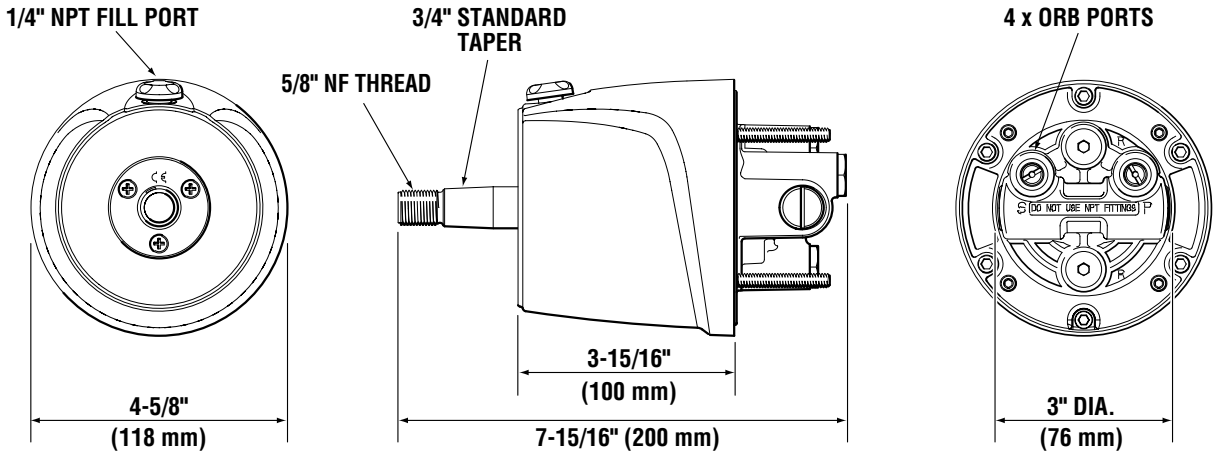
- Compact cylinder design
- HC4460-3 – 6.25" stroke
- HC4461-3 – 6.0" stroke
- Optional Tilt helm available
- Helm fits standard 3" dash cut outs
- Fast easy installation

Order Guide

Helm pumps now fitted with Positionable O-Ring fittings (ORB)

ORDER INFORMATION	PART NO.
BayStar 30kg/m (2600 in-lbs) Inboard cylinder	HC4461-3
BayStar 52kg/m (4500 in-lbs) Inboard cylinder	HC4460-3
BayStar Helm 1.1 cu-in	HH4311-3
BayStar Helm 1.4 cu-in	HH4313-3
BayStar 20ft tubing kit	HT4420
1 Litre Steering Fluid	HA5430
BayStar Sport Tilt Helm	HH4315-3
BayStar Mounting Kit	HA5476
BayStar 30kg/m (2600 in-lbs) Inboard Steering Kit *(comprising: HH4314 helm, HC4461 cylinder, HT4420 tubing kit, 2 x HA5430 fluid)*	HK4401
BayStar 52kg/m (4500 in-lbs) Inboard Steering Kit *(comprising: HH4314 helm, HC4460 cylinder, HT4420 tubing kit + 2 x HA5430 fluid)*	HK4400H

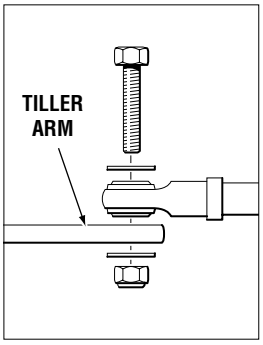
STANDARD HELM PART# HH4311-3 & HH4314-3



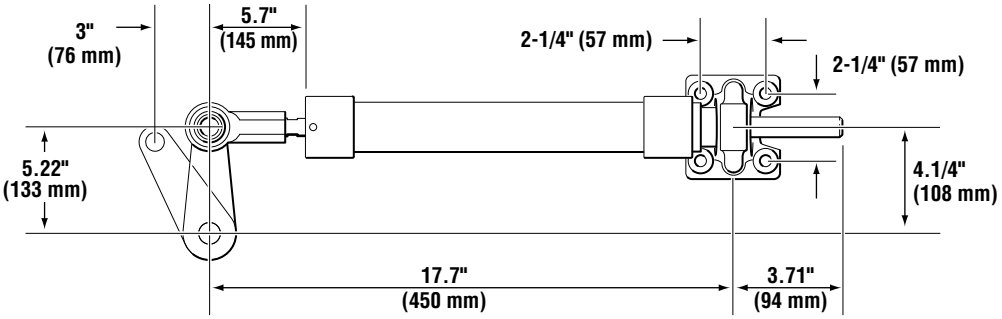
HH4311-3 (1.1 cu.in.) **HH4314-3** (1.4 cu.in.) *Refer to page 12-7 for total wheel turns.*

HC4461-3

BA100-6ATM (2600 in-lbs)

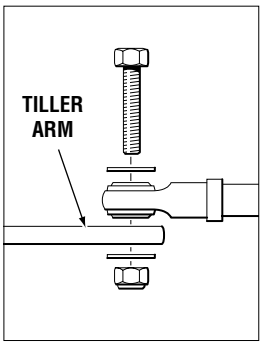


ATTACHMENT TO TILLER ARM

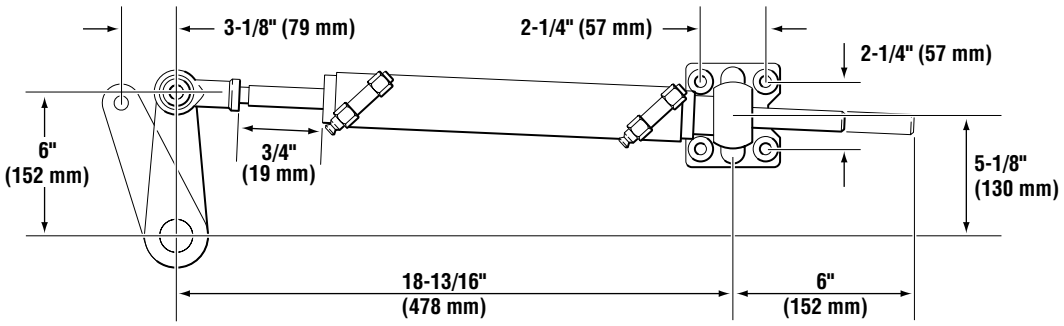


HC4460-3

BA125-6.25 ATM (4500 in-lbs)



ATTACHMENT TO TILLER ARM



⚠ CAUTION

If unsure of total steering loads, contact SeaStar Solutions Technical Support for assistance.

CHAPTER

3

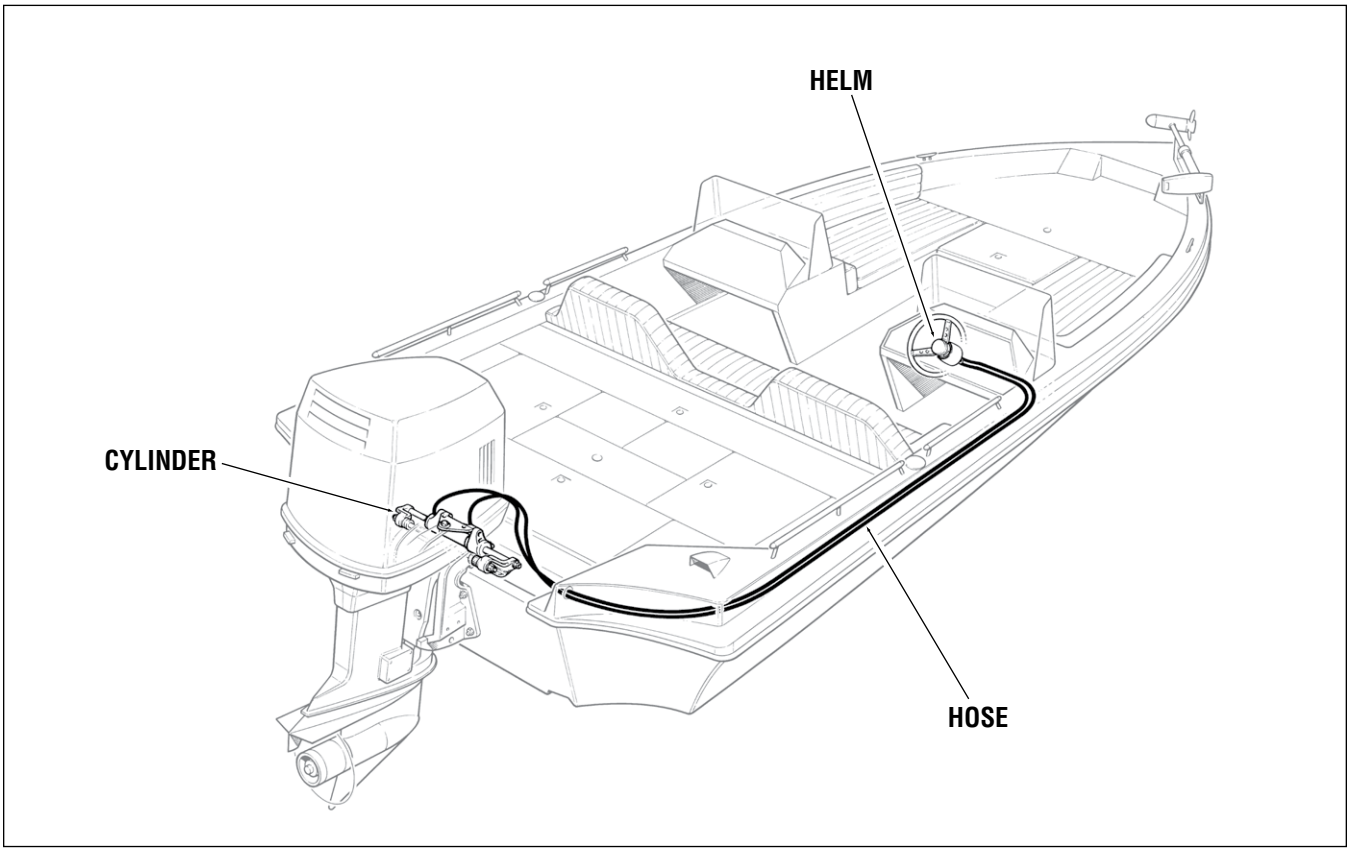
SEASTAR™

OUTBOARD STEERING

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. SeaStar Solutions encourages you to use the tables noted in this section and select your system accordingly.

Selecting the outboard steering system best suited for your boat:

1) Using the table on page 3-3, select your system as per speed, horsepower and driving style.
2) Using the Application chart on page 3-5 choose the proper cylinder and tiebar equipment as per your outboard engine. If your engine is not noted, contact SeaStar Solutions or your Distributor for details.
3) Proceed to page 9-9 for details on fitting kits and particular equipment that will be needed to add a second station and/or an autopilot.



Typical SeaStar Installation.

SEASTAR FRONT MOUNT OUTBOARD STEERING SYSTEM

Features

- Independent engine tilt for twin engine installations.
- Easy steering.
- 5 turns lock to lock steering response (1.7 standard system).

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

Cylinder now fitted with Positionable O-Ring fittings (ORB)

1) From the installation recommendations on page 3-3 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 dual engines.
3) From Section 6 select the appropriate helms and accessory hardware for each steering station.
4) From Section 9 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 7.

⚠ 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 75 mph (120 km/h), or

e) the power exceeds the maximum Coast Guard or M.O.T. recommendations for the boat.

HC5345-3

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 Solutions Steering in applications they are not intended for.

	AGGRESSIVE USE (SEE NOTE 1)	NORMAL USE	
ENGINE	**SEASTAR TOURNAMENT SERIES** *(See Note 1 – Refer to page 3-7 through page 3-11)*	**SEASTAR FRONT MOUNT** *(Refer to page 3-4 through page 3-6)*	**HYNAUTIC K-6** *(Normal Use ONLY – Refer to page 3-23)*
SINGLE ENGINE	**SINGLE CYLINDER** 350 HP Max HC63xx-3 Pro Cylinder *page 3-7 through page 3-9 (See Notes 2 & 3)* or HC6845S *(See page 3-11)*	**SINGLE CYLINDER** 350 HP Max 75 MPH Max HC53xx-3 Cylinder *(See Note 2)*	**SINGLE CYLINDER** 300 HP Max 55 MPH Max
DUAL ENGINE NON COUNTER ROTATING	**SINGLE CYLINDER** Tournament Cylinders *(See page 3-10 through page 3-11)*	**SINGLE CYLINDER** 450 HP Max 55 MPH Max HC53xx-3 Cylinder HO60xx Tie Bar	**SINGLE CYLINDER** 400 HP Max 55 MPH Max
	DUAL CYLINDER Tournament Cylinders *See page 3-10 through page 3-11)*	**DUAL CYLINDER** 600 HP Max HC53xx-3 Cylinders HO60xx Tie Bar	**DUAL CYLINDER** 500 HP Max 55 MPH Max
DUAL ENGINE COUNTER ROTATING	**SINGLE CYLINDER** Tournament Cylinders *(See page 3-10 through page 3-11)*	**SINGLE CYLINDER** 600 HP Max 55 MPH Max HC53xx-3 Cylinder HO60xx Tie Bar	**SINGLE CYLINDER** 500 HP Max 55 MPH Max
	DUAL CYLINDER Tournament Cylinders *(See page 3-10 through page 3-11)*	**DUAL CYLINDER** 600 HP Max 55 MPH Max HC53xx-3 Cylinders HO60xx Tie Bar	**DUAL CYLINDER** 500 HP Max 55 MPH Max
TRIPLE ENGINE ONE WITH COUNTER ROTATING	**DUAL CYLINDER** Tournament Cylinders *(See page 3-10 through page 3-11)*	**DUAL CYLINDER** 600 HP Max 55 MPH Max HC53xx-3 Cylinders HO60xx Tie Bar **MAX center engine drop <.75"*	**NOT RECOMMENDED**
	Consult SeaStar Solutions Technical Service	**TRIPLE CYLINDER** 900 HP Max 55 MPH Max HC53xx-3 Cylinders HO60xx Tie Bar **MAX center engine drop <.75"*	Consult SeaStar Solutions Technical Service

1. **SeaStar Solutions 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 "SEASTAR ARP" on the head of the bolt (refer to NOTICE page 3-5).
3. HC63xx PRO Cylinders are designed for all those critical high speed, single outboard engine boats, such as Bass, Flats combo Race/Ski and other performance orientated boats capable of speeds in excess of 65 mph. For optimal performance, the use of SeaStar PRO helms and PRO Hoses are recommended.

SeaStar Front Mount Order Guide
(Normal Use)

NOTICE

Front Mount Cylinder part# HC5345-3 is included in the SeaStar Outboard Steering Kits HK6400A-3/HK63xxA-3. If your engine requires the use of a cylinder other than the HC5345-3 (see application guides on page 3-5 through page 3-6) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.

ENGINE/ CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ		MODEL	PART NUMBER	REF. PAGE #
SINGLE ENGINE (SINGLE CYLINDER) APPLICATIONS UP TO 350 HP MAX NUMBER OF TURNS 5	CYLINDER	1		FRONT MOUNT	† HC5345-3	
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	HOSE KIT	1		OUTBOARD HOSE	‡ HO51xx	PAGE 9-3
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATION ADD:					
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	‡ HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1
NOTICE HC5345-3 is not compatible with all engines. Refer to Application Guides on page 3-5 to page 3-11 to ensure you have the correct cylinder for your application	† *Refer to Application Guides on page 3-5 to page 3-11 for correct cylinder* ‡ *Refer to page 9-3 for measuring hose distance*					
DUAL ENGINE (SINGLE CYLINDER) NON-COUNTER ROTATING APPLICATIONS UP TO 450 HP MAX COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 5	CYLINDER	1		FRONT MOUNT	† HC5345-3	
	TIE BAR KIT	1			¥ HO60xx	
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	HOSE KIT	1		OUTBOARD HOSE	‡ HO51xx	PAGE 9-3
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATION ADD:					
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	‡ HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1
	† *Refer to Application Guides on page 3-5 to page 3-11 for correct cylinder* ‡ *Refer to page 9-3 for measuring hose distance* ¥ *Refer to application guide on page 3-6 for correct tiebar*					
DUAL ENGINE (DUAL CYLINDERS) NON-COUNTER ROTATING APPLICATIONS UP TO 600 HP MAX ALL COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 6.5	CYLINDER	2		FRONT MOUNT	† HC5345-3	
	TIE BAR KIT	1			¥ HO60xx	
	HELM	1	*	SEASTAR	HH5272-3	PAGE 6-6
	HOSE KIT	3		OUTBOARD HOSE	‡ HO51xx	PAGE 9-3
	FITTING KIT	1		TEE FITTINGS	HF5530	PAGE 9-9
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATION ADD:					
	HELM	1	*	SEASTAR	HH5272-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	‡ HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1
	† *Refer to Application Guides on page 3-5 to page 3-11 for correct cylinder* ‡ *Refer to page 9-3 for measuring hose distance* ¥ *Refer to application guide on page 3-6 for correct tiebar*					

OPTIONAL EQUIPMENT

BACK PLATE KIT	**(FOR STANDARD HELMS)**	**HA5418**	**PAGE 6-3**
20 DEGREE WEDGE	**(FOR STANDARD HELMS)**	**HA5419**	**PAGE 6-3**
AUTOPILOT FITTING KIT	**(FOR ALL -3 HELMS)**	**HF6007**	**PAGE 9-12**
POWER ASSIST STEERING	**PA1200-2**		**PAGE 7-1**

*** ALL HELM DESIGNS CAN BE USED, SEE PAGE 6-6 FOR OPTIONS.**

Single Engine Application Guide
(Normal Use)

Prior to selecting a cylinder from this application guide, please refer to page 3-4 to ensure that you are selecting the correct cylinder for your engine/boat.

NOTICE

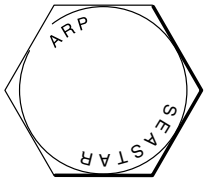
Is your Splashwell wide enough? Check page 3-9 for space requirements.

NOTICE

Front Mount Cylinder part# HC5345-3 is included in the SeaStar Outboard Steering Kits HK6400A-3/HK63xxA-3. If your engine requires the use of a cylinder other than the HC5345-3 (see application guides on this page through page 3-6) you will need to purchase the individual components (helm, cylinder, hoses, etc.) separately.

NOTICE

High Strength Tiller bolt, part# HA5822. ALL cylinders shipped after June 15th, 2007 have this bolt included in the cylinder package.



MFG	YEAR	MODEL	CYL	NOTES
HONDA	1996-DATE	75-90 HP	HC5345-3	
	1998-2009	115-130 HP	HC5347-3	
	1998-DATE	30-50 HP	HC5345-3	See Note 1
	2001-DATE	BF200-250	HC5445-3	
	2003-DATE	BF135 HP	HC5345-3	
	2010–DATE	115HP	HC5345-3	
	2015–DATE	BF100 HP	HC5345-3	
JOHNSON/ EVINRUDE	1977-1990	65-300 HP	HC5348-3	
	1988-1997	250-300 HP V8	HC5342	*Discontinued*
	1991-DATE	40-300 HP	HC5345-3	*Inc. ETech*
	1997-2006	75 - 300HP Ficht	HC5345-3	
	1998-DATE	40-140 HP 4-Stroke	HC5358-3	See Note 1
	2000-2003	115HP 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*
	2007-DATE	33.4L V6 250HO - 300HP	HC5345-3	*Inc. H.O. Models*
MERCURY	1984-1994	2.4/2.5 HP EFI	HC5345-3	See Note 2
	1989-DATE	75-300 HP	HC5345-3	
	1998-DATE	30-60 HP	HC5348-3	See Note 1
	2003-DATE	150-300 HP XS	HC6345-3	See Note 3
	2004-DATE	150-200HP VERADO	HC5345-3	
NISSAN	1990-DATE	90-140HP	HC5345-3	
TOHATSU	1990-DATE	40–140HP	HC5345-3	
	2014–DATE	BFT60 - BFT150	HC5345-3	
	2014–DATE	BFT200 - BFT250	HC5445-3	
SUZUKI	1986-2000	DT-100 HP	HC5345-3	
	1998-DATE	40-140 HP 4-Stroke	HC5358-3	See Note 1
	1986-2002	115-140 HP	HC5345-3	**NOT 1996**
	1996 ONLY	150-140 HP 2-Stroke	HC5348-3	
	1986-DATE	150-225 HP 2 & 4-Stroke	HC5345-3	
	2004-DATE	DF200-DF300 3.6-4.0L V6	HC5345-3	
	2017-DATE	DF350 4.4L V6	HC5345-3	
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	
	2007-DATE	F300-F350 HP 5.3V8	HC5345-3	See Note 4
	2011-2013	F115A	HC5358-3	
	2012-DATE	2.8L 200HP	HC5345-3	
	2014-DATE	F115B	HC5345-3	

1. Requires Spacer Kit# HO5090.
2. May Require Extensive Cowling Modifications.
3. **MUST** use High Strength Tiller bolt, part # HA5822. Refer to the NOTICE on this page identifying the high strength bolt.
4. Optional cylinder part # HC5358-3. Slight interference may occur when using the HC5358-3, with the engine in the full tilt position.

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

REVISION DATE: AUG. 15th 2017

⚠ CAUTION

SeaStar Solutions recommends the use of SeaStar PRO (1500 psi) Kevlar steering hoses with SeaStar PRO Helms.

SEASTAR™

OUTBOARD–FRONT MOUNT

Twin Engine Application Guide
(Normal Use)

NOTICE

Is your Splashwell wide enough? Check page 3-9 for space requirements.

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

NOTICE

HO6001, HO6002 and HO6003 are for engine centers up to 36". For wider engine centers please contact SeaStar Solutions Technical Support.

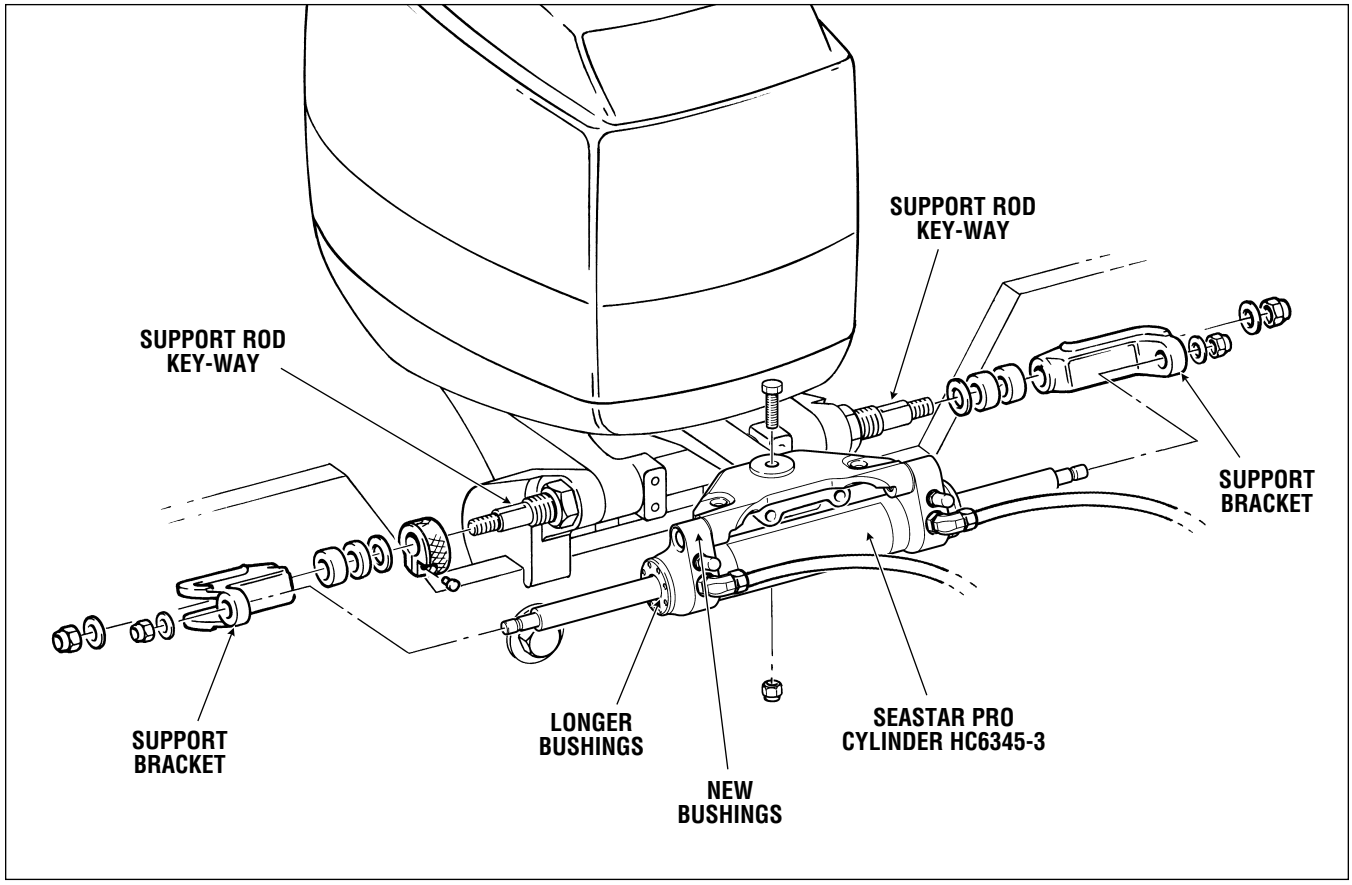
MFG	YEAR	MODEL	CYLINDER	TIE BAR KITS		NOTES
				Twin Engine Single Cylinder	Twin Engine Dual Cylinder	
FORCE	1985-DATE	90-150 HP	HC5345-3	HO5008A	HO5008A	
HONDA	1996-DATE	75-90 HP	HC5345-3	HO6001	HO6002	See Note 3
	1998-2009	115-130 HP	HC5347-3	HO5063	HO5064	See Note 5
	1998-DATE	30-50 HP	HC5345-3	HO6001	HO6002	See Note 2
	2001-DATE	150 HP 4-Stroke	HC5345-3	HO6001	HO6002	See Note 8
	2001-DATE	BF200-250	HC5445-3	HO6001	HO6002	
	2003-DATE	BF135 HP	HC5345-3	HO6003	HO6002	
	2010-DATE	115HP	HC5345-3	HO6003	HO6002	
	2015-DATE	BF100	HC5345-3	HO6003	HO6002	See Note 7
JOHNSON/ EVINRUDE	1977-1990	65-300 HP	HC5348-3	HO6003	HO6002	
	1988-1997	250-300 HP V8	HC5342	HO5001A	HO5030	See Note 5. *Discontinued*
	1991-DATE	40-300 HP	HC5345-3	HO6003	HO6002	*Inc. ETech Engines.*
	1996-DATE	75-250 HP Ficht	HC5345-3	HO6003	HO6002	
	1998-DATE	40-140 HP 4-Stroke	HC5358-3	HO6003	HO6002	See Note 2
	2000-DATE	115 HP FICHT	HC5358-3	HO6003	HO6002	See Note 2
	2002-DATE	200-225 HP 4-Stroke	HC5345-3	HO6003	HO6002	
	2005-DATE	E250 DPX Vindicator	HC5348-3	HO6003	HO6002	
	2007-DATE	3.3L/3.4L 200-250HP	HC5345-3	HO6003	HO6002	*Inc. H.O. Models.*
MERCURY	1984-1994	2.4/2.5 HP EFI	HC5345-3	HO6001	HO6002	See Note 4
	1989-DATE	75-300 HP	HC5345-3	HO6001	HO6002	See Note 3
	1996-DATE	75-200 HP 2 & 4-Stroke	HC5345-3	HO6001	HO6002	
	1998-DATE	30-60 HP	HC5345-3	HO6001	HO6002	See Note 2
	2002-2003	225 HP 4-Stroke	HC5358-3	HO6001	HO6002	See Note 1
	2004-DATE	150-200HP VERADO	HC5345-3	HO6001	HO6002	
	2003-DATE	150-200XS	*MUST Use Tournament Cylinders. Contact tech. support for details.*			
	2003-DATE	250-300 HP XS	*MUST Use Tournament Cylinders. Refer to page 3-10.*			
NISSAN	1990-DATE	90-140HP	HC5345-3	HO6001	HO6002	
SUZUKI	1986-DATE	100 HP	HC5345-3	HO6003	HO6002	
	1986-2002	115-140 HP	HC5345-3	HO6001	HO6002	**NOT 1996**
	1986-DATE	150-300 HP 2 & 4-Stroke	HC5345-3	HO6003	HO6002	
	1996 ONLY	115-140 HP	HC5348-3	HO6001	HO6002	
	1998-DATE	40-140 HP 4-Stroke	HC5358-3	HO6003	HO6002	See Note 2
	2003-DATE	90 HP 4-Stroke	HC5358-3	HO6003	HO6002	See Note 2
	2013-DATE	DF150-DF175 HP	HC5345-3	HO6001	HO6002	
	2017-DATE	DF350 4.4L V6	*MUST Use Tournament Cylinders. Refer to page 3-10.*			
YAMAHA	1990-2007	40-90 HP	HC5345-3	HO6003	HO6002	
	1986-DATE	100-250 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	F200-F250 3.3L	HC5358-3	HO6001	HO6002	
	2003-DATE	25-70 HP 4-Stroke	HC5348-3	HO6003	HO6002	See Note 2
	2007-DATE	200-300 HP 4.2L V6 4-Stroke	HC5345-3	HO6001	HO6002	
	2007-DATE	F300-F350 HP 5.3V8	*MUST Use Tournament Cylinders. Refer to page 3-10.*			
	2011-2013	F115A	HC5358-3	HO6003	HO6002	
	2014-DATE	F115B	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 Kit HO5090.
3. Minimum Engine Center = 27".
4. May Require Extensive Cowling Modifications.
5. HO5030 and HO5064 comes without Tie Bar.
6. One cylinder per engine. Must use Mercury supplied tiller bolt for installation.
7. customer supplied SS washer must be installed under rod end.
8. Slight interference may occur with HO6001 tie-bar, contact SeaStar Solutions technical support.

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

SEASTAR PRO STEERING SYSTEMS

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. Before ordering it is necessary to determine the proper cylinder and helm pump for your application. Using the table onpage 3-8 , choose the correct cylinder as per your outboard engine. SeaStar Solutions recommends the use of a SeaStar PRO helm and SeaStar PRO (1500psi) reinforced Kevlar hoses with All SeaStar PRO systems.



Cylinder Part# HC6345-3 shown.

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 page 6-1 for style and page 6-5 for PRO Helm part numbers.

⚠ CAUTION

SeaStar Solutions recommends the use of SeaStar PRO (1500 psi) Kevlar steering hoses with SeaStar PRO Helms.

SeaStar Pro Application Guide

NOTICE

Is your Splashwell wide enough? Check page 3-9 for space requirements.

MFG	YEAR	MODEL	CYLINDER	NOTES
HONDA	1996-DATE	150-300 HP	HC6345-3	HA5472 stroke limit kit must be installed when using on BF200-BF250.
JOHNSON/ EVINRUDE	1977-1990	150-300 HP	N/A	
	2002-DATE	150-250 HP 4-Stroke	HC6345-3	
	2003-DATE	150-300 HP ETech	HC6345-3	
	2005-DATE	E250 HP Vindicator	N/A	
MERCURY	1989-DATE	150-300 HP 2-Stroke, 4-Stroke and XS Engines	HC6345-3	
SUZUKI	1986-DATE	150-300 HP 2 and 4-Stroke	HC6345-3	Includes ALL models.
YAMAHA	1986-DATE	150-350 HP 2 and 4-Stroke	HC6345-3	

REVISION DATE: SEPT. 9th 2016

⚠ WARNING

SeaStar PRO Steering Helms can not be used with an unbalanced steering cylinder.

SeaStar Solutions offers the following SeaStar PRO kits. Every kit ships with the HC6345-3 PRO Steering cylinder, HH5770-3 PRO helm pump, two bottles of SeaStar Steering fluid and two equal lengths of SeaStar PRO, Kevlar steering hoses.

Part Number	Hose Length
HK7516A-3	16’
HK7518A-3	18’
HK7520A-3	20’
HK7522A-3	22’
HK7524A-3	24’

Cylinder Installation, General Dimensions & Replacement Parts

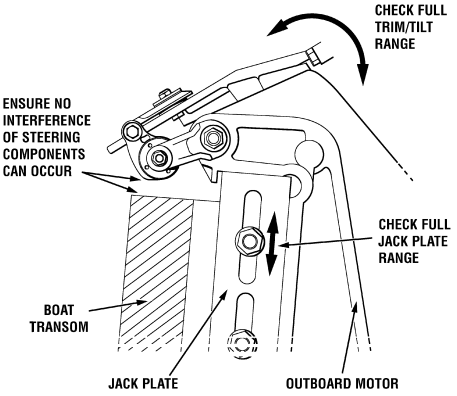
⚠ WARNING

Operational interference of the steering cylinder/cylinder fittings and jackplates/transom/splashwell can occur under certain conditions. Check installation thoroughly throughout the full range of Motor Tilt, Jackplate Height and Trim before making final installation.

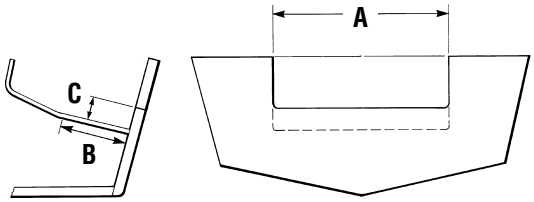
If interference is not eliminated total steering loss can occur, causing property damage and/or personal injury.

SEAL KIT = **HS5157**
SUPPORT BRACKETS = **HP6018**
SUPPORT ROD = **HP6016**
SPACER KIT = **HP6033**

HOSE ELBOW FITTING = **HF6004**
PIVOT PLATE = **N/A** (cylinder replacement/ repair is required)



Motor Well dimensions required for front mount outboard steering systems

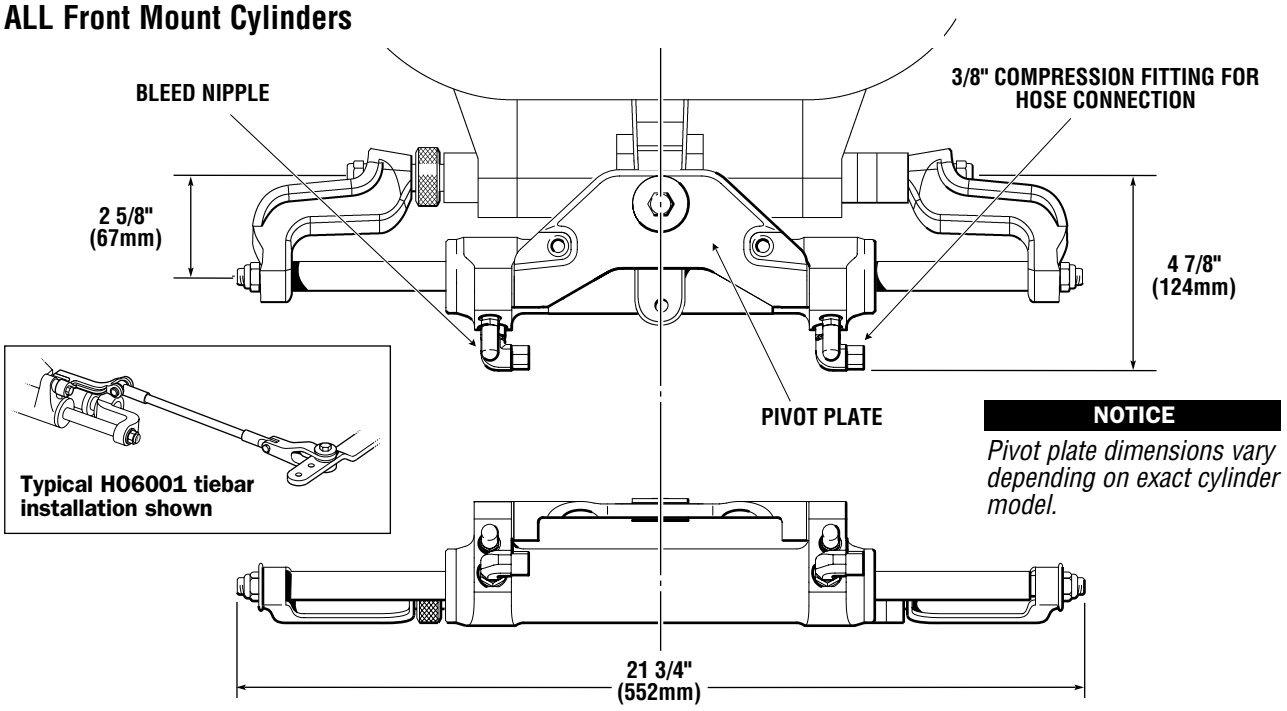


# OF ENGINES	A	B	C	MIN. ENGINE CENTER DISTANCE
1	22” (559mm)	6” (152mm)	5” (127mm)	N/A
2	49” (1244mm)	6” (152mm)	5” (127mm)	26” (660mm)

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 tiebar. Dimension ‘A’ would have to be increased proportional to the tiebar 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.

ALL Front Mount Cylinders



Typical HO6001 tiebar installation shown

NOTICE

Pivot plate dimensions vary depending on exact cylinder model.

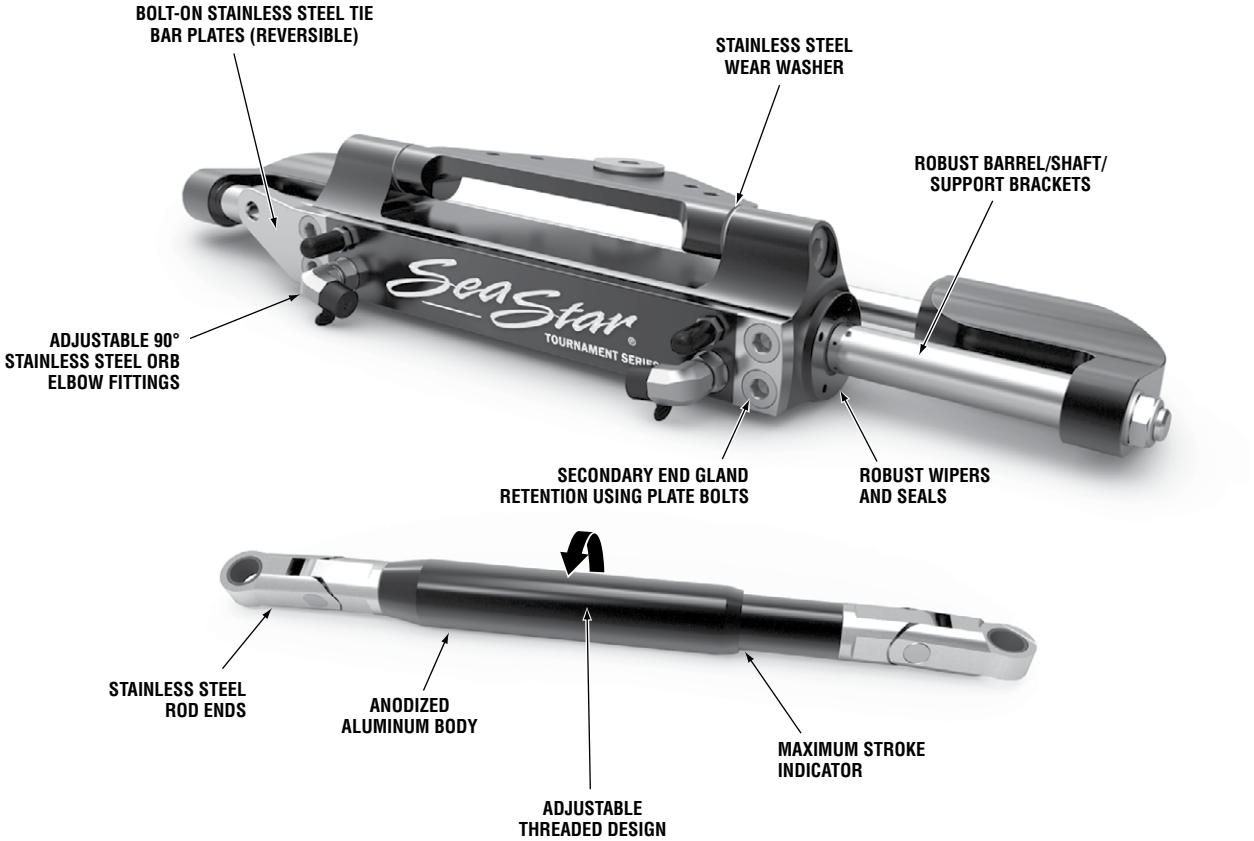
SEASTAR TOURNAMENT SERIES

(Aggressive Use)

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

Features

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



Tournament Series Application Guide

CONFIGURATION	CYLINDER		HARDWARE KIT		TIEBAR				NOTES
	PART#	QTY	PART#	QTY	ENGINE CENTER DISTANCE (IN)	ENGINE CENTER DISTANCE (mm)	PART#	QTY	
SINGLE ENGINE – SINGLE CYLINDER	HC6845	1	HA6801	1	N/A	N/A N/A	N/A	N/A	1
TWIN ENGINE – SINGLE CYLINDER (Starboard)	HC6845	1	HA6802	1	25.0" – 25.6" 25.7" – 30.6" 30.7" – 39.4" 39.5" – 54.0"	635 mm – 650 mm 653 mm – 777 mm 780 mm – 1001 mm 1003 mm – 1372 mm	HO6821 HO6822 HO6823 HO6824	1 1 1 1	1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5 1, 3, 4, 5
TWIN ENGINE – DUAL CYLINDER	HC6845	2	HA6804	1	25.0" – 26.5" 26.6" – 29.3" 29.4" – 34.2" 34.3" – 43.0" 43.5" – 58.0"	635 mm – 673 mm 676 mm – 744 mm 747 mm – 869 mm 871 mm – 1092 mm 1105 mm – 1473 mm	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" 28.0" – 36.0" 36.0" – 51.0"	635 mm – 709 mm 711 mm – 914 mm 914 mm – 1295 mm	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 SeaStar Solutions Technical Service				1, 2, 3, 4, 5
QUINTUPLET Engine (Plus)	Consult SeaStar Solutions Technical Service								1, 2, 3, 4, 5

NOTES

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 (76mm), please consult SeaStar Solutions Technical Service.
3. Tiebar 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 SeaStar Solutions 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.
6. Maximum drop: ≤ 3 inches (76mm).

NOTICE

Required for triple engine installs on Mercury Optimax and PROxs and engines with a single tiller hole. May fit other applications, call SeaStar Solutions technical support for more information.

CONFIGURATION	CYLINDER		HARDWARE KIT		TIEBAR				NOTES
	PART#	QTY	PART#	QTY	ENGINE CENTER DISTANCE (IN)	ENGINE CENTER DISTANCE (mm)	PART#	QTY	
TRIPLE ENGINE – TRIPLE CYLINDER	HA6845*	3	HA6807	1	28.0" – 28.8" 28.9" – 30.5" 30.6" – 33.3" 33.4" – 38.3" 38.4" – 47.0" 47.1" – 62.1"	711 mm – 736 mm 737 mm – 774 mm 775 mm – 847 mm 848 mm – 974 mm 975 mm – 1,194 mm 1,195 mm – 1,578 mm	HO6819 HO6820 HO6821 HO6822 HO6823 HO6824	3	1, 2, 3, 4 1, 2, 3, 4 1, 2, 3, 4 1, 3, 4, 6 1, 3, 5, 6 1, 3, 7

NOTES

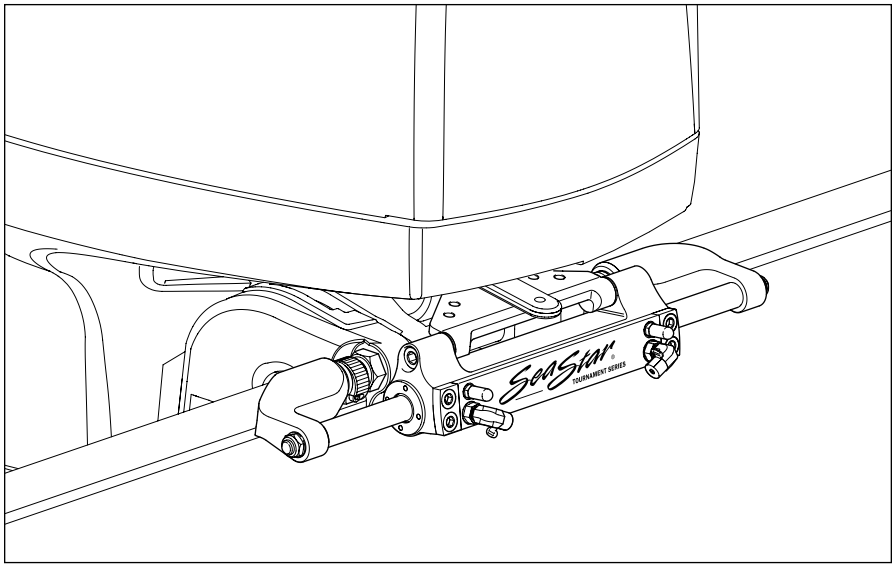
1. Installation may vary according to the following factors: engine mounting height, transom thickness, use of transom savers, tiller bolt location, engine tilt range, and engine size.
2. Will require trim limiting at 0" (0 mm) drop.**
3. Tiebar length may vary depending on toe in/toe out setup. To allow 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

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

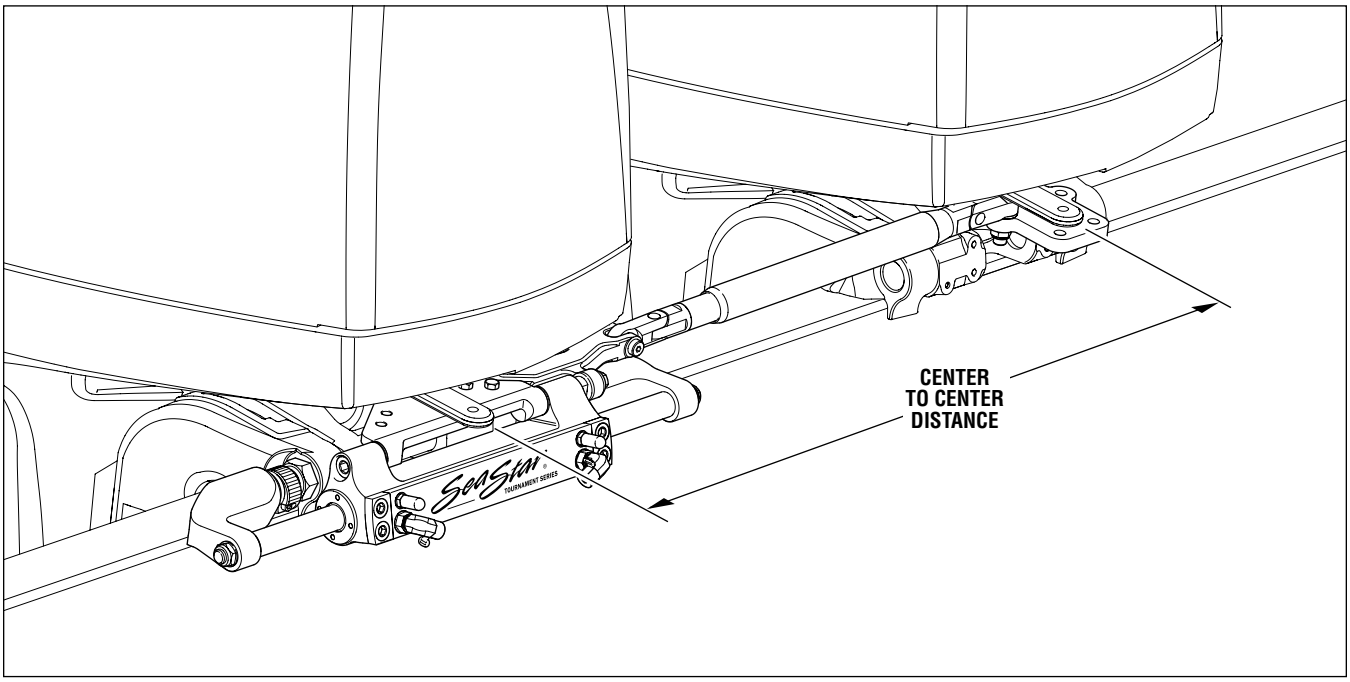
*** Trim limiting required as interference between the tiebar and support bracket will occur during independent trim/tilt.*

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.



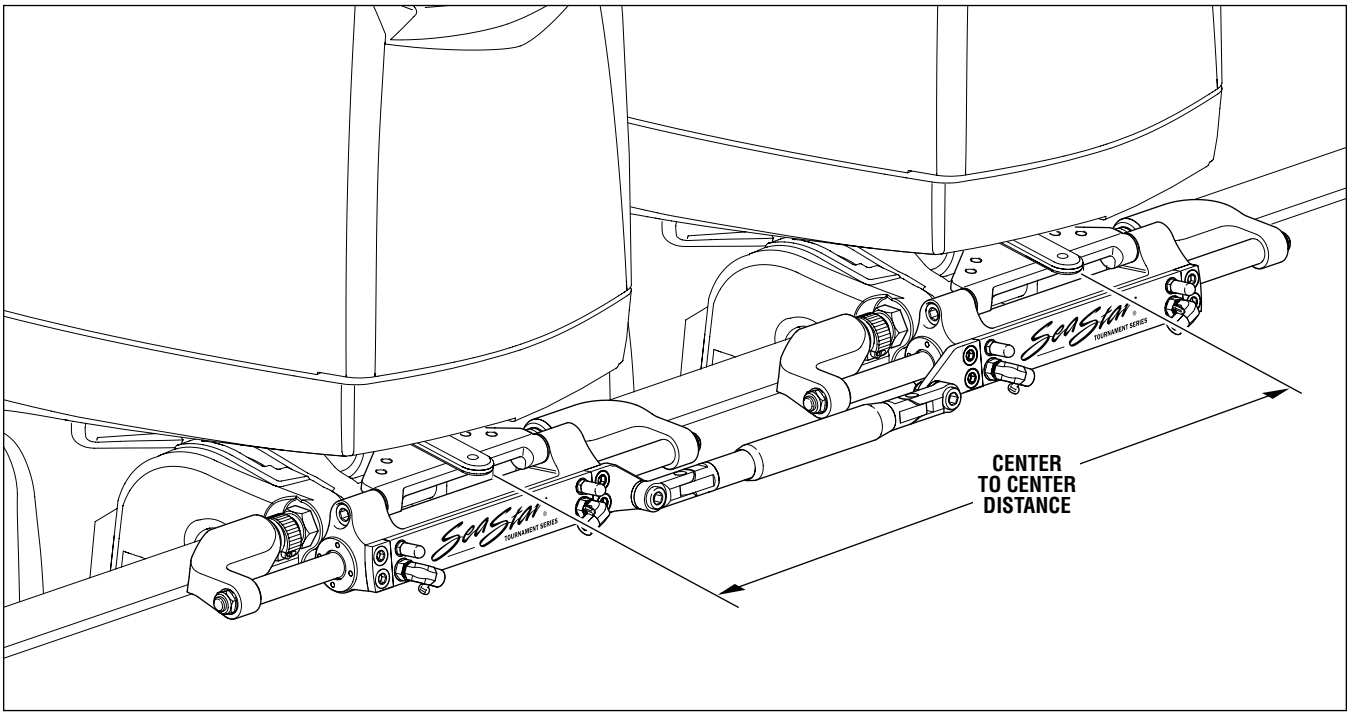
Single Engine – Single Cylinder Configuration.



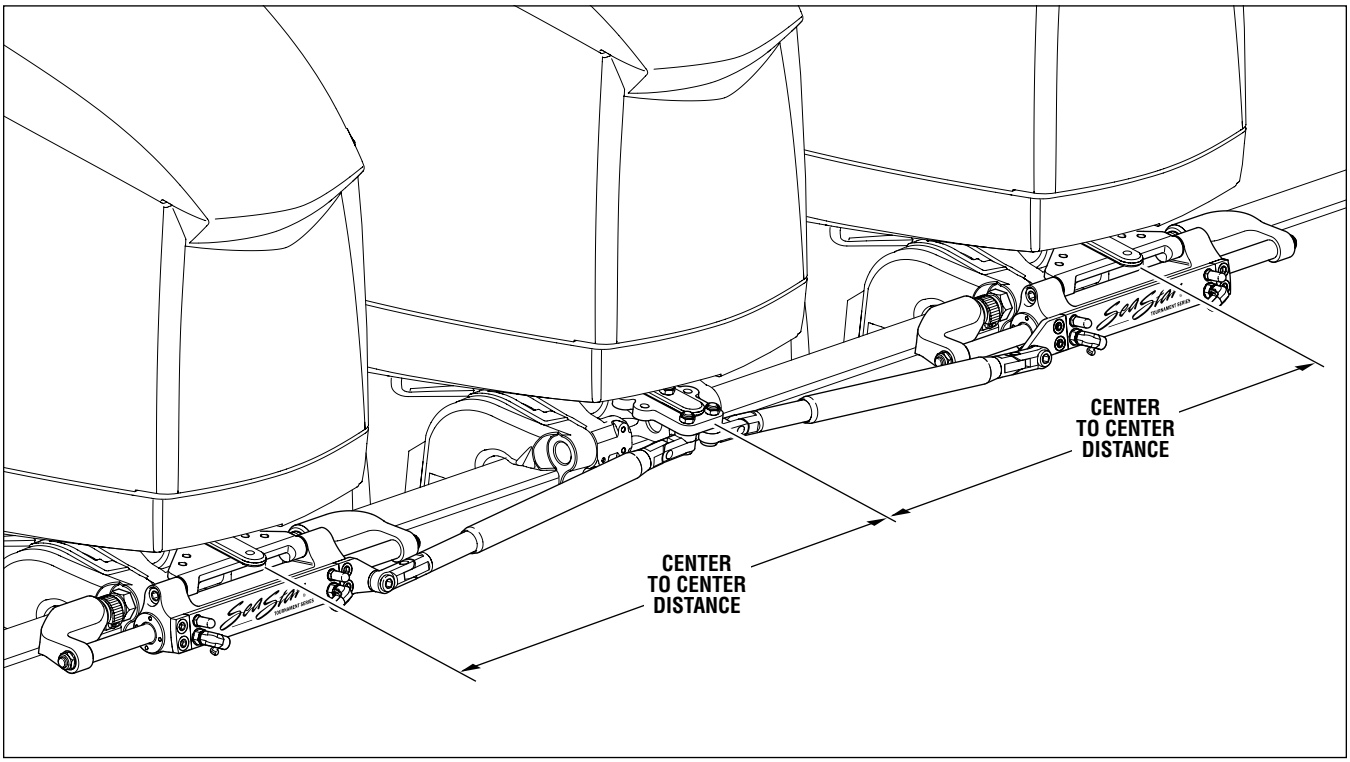
Twin Engine – Single Cylinder (Starboard) Configuration.

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.)



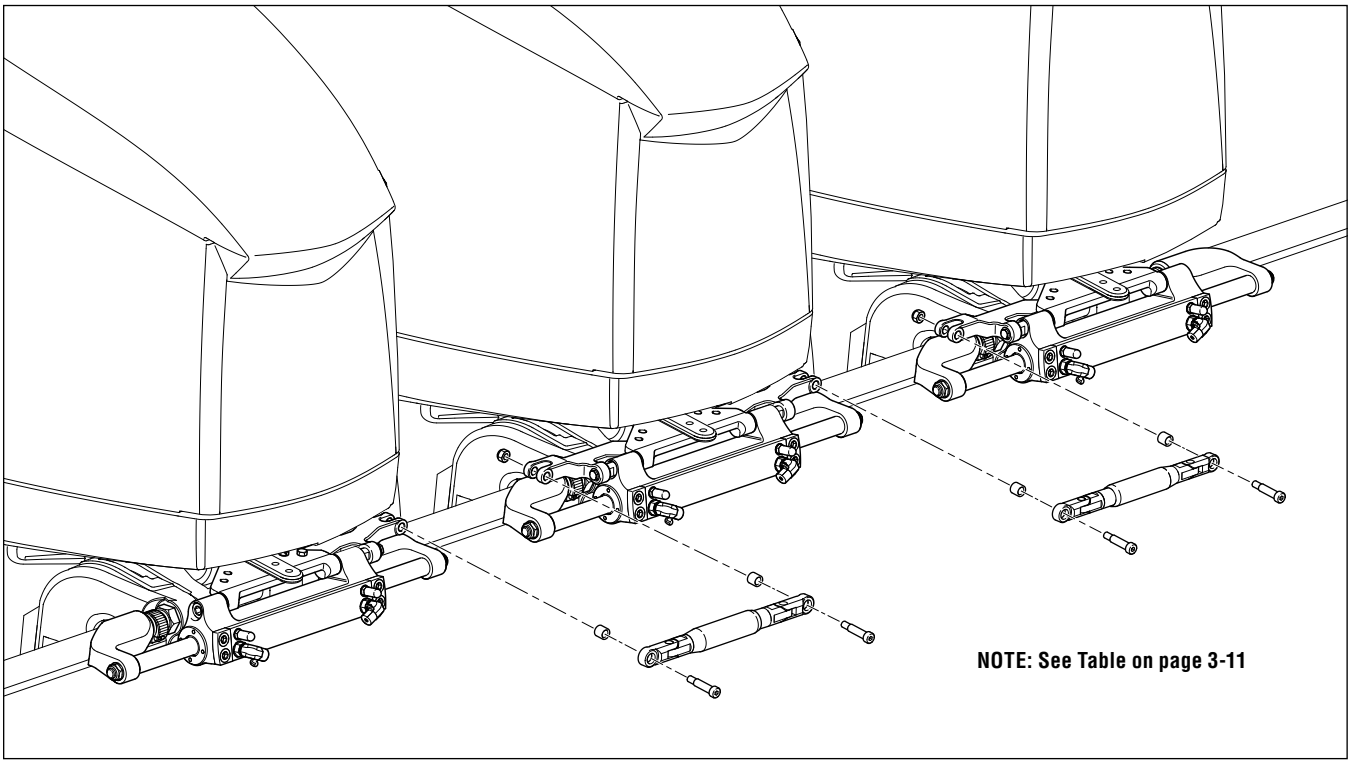
Twin Engine – Dual Cylinder Configuration.



Triple Engine – Dual Cylinder Configuration.

NOTICE

Depending on engine, the cylinder may be mounted different than that shown below.



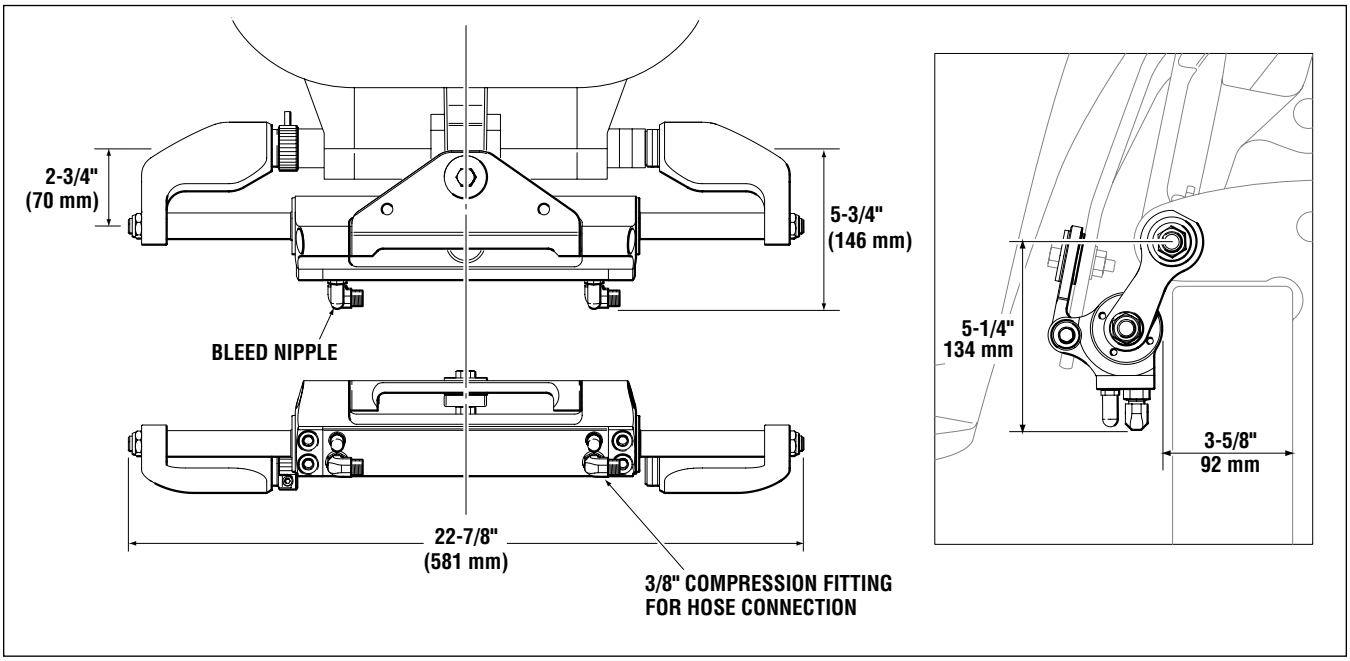
Triple Engine – Triple Cylinder Configuration.

⚠ CAUTION

Before connecting the tiebars Refer to Section 3.5 of book 48 “Tiebar Adjustment and Installation”.

Cylinder Dimensions

Maximum tilt angles shown – 67°.
Typical transom thickness shown, but will vary.



Tournament Cylinder Dimensions.

⚠ WARNING

Operational interference of the steering cylinder/cylinder fittings and jackplates/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.

CATAMARAN OUTBOARD SYSTEMS

SeaStar Solutions always recommends a mechanical tiebar between engines where possible. In applications where a mechanical tiebar cannot be fitted, it is recommended that you use a “Liquid Tiebar Valve”. This valve will serve two purposes; assisting with the air removal from the system and allows the user to re-align the engines when they come out of sync. Regardless of the application, a mechanical, or, liquid tiebar must be fitted. Due to the potential of leakage across the piston seals, use of standard SeaStar Outboard cylinders may require frequent engine realignment. If you must use a “Liquid Tiebar”, SeaStar Solutions recommends that you order the following parts below. Doing so will decrease the amount of re-alignment required.

Steering Cylinders

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

HC5375-3, Catamaran Steering Cylinder
The HC5375-3 steering cylinder has the same mounting and design properties as the HC5345-3 front mount cylinder. The internal piston seals are different. This difference decreases the amount of engine re-alignment that you may encounter.

SeaStar PRO Helm
Use of a SeaStar PRO helm coupled with the HC5375-3 steering cylinders will drastically reduce the amount of engine realignment that you may encounter.

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

NOTICE

Due to plumbing requirements, all “Liquid Tiebar” 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

As with all other, high horsepower engines, SeaStar Power Assist is recommend to reduce steering effort.

NOTICE

Bleeding of a “Liquid Tiebar System” is different than a system fitted with a mechanical tiebar. Please refer to your Installation and Owner’s Manual that is shipped with the liquid tiebar valve.

Now fitted with Positionable O-ring fittings

SEASTAR SIDE MOUNT OUTBOARD STEERING SYSTEM

Part# HC5370-3

Features

NOTICE

For Outboard engine use ONLY.

- Ease of installation.
- 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.

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. (see order guide)
- Typical applications include center console fishboats and cruisers.

How to select a side mount outboard steering system

⚠ WARNING

Not for use with SeaStar-Pro Helm Pumps.

1) From the order guide on page 3-18 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) and 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.

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 75 mph (120 km/h), or

e) the power exceeds maximum Coast Guard or M.O.T. recommendations for the boat.

HC5370-3

Order Guide

ENGINE/ CYLINDER CONFIGURATION	DESCRIPTION	QTY REQ		MODEL	PART NUMBER	REF. PAGE #
SINGLE ENGINE (SINGLE CYLINDER) APPLICATIONS UP TO 300 HP MAX NUMBER OF TURNS 4.8/5.7	CYLINDER	1		SIDE MOUNT	HC5370-3	
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATIONS ADD:					
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1
DUAL ENGINE (SINGLE CYLINDER) NON-COUNTER ROTATING APPLICATIONS UP TO 300 HP MAX COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 4.8/5.7	CYLINDER	1		SIDE MOUNT	HC5370-3	
	TIE BAR KIT	1		TIE BAR ONLY	HO5009	
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATIONS ADD:					
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1
DUAL ENGINE (DUAL CYLINDERS) NON-COUNTER ROTATING APPLICATIONS UP TO 600 HP MAX ALL COUNTER ROTATING ENGINE APPLICATIONS NUMBER OF TURNS 7.5	CYLINDER	2		SIDE MOUNT	HC5370-3	
	TIE BAR KIT	1		TIE BAR ONLY	HO5009	
	HELM	1	*	SEASTAR	HH5272-3	PAGE 6-6
	HOSE KIT	3		OUTBOARD HOSE	HO51xx	PAGE 9-3
	FITTING KIT	1		TEE FITTINGS	HF5530	PAGE 9-9
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATIONS ADD:					
	HELM	1	*	SEASTAR	HH5272-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1

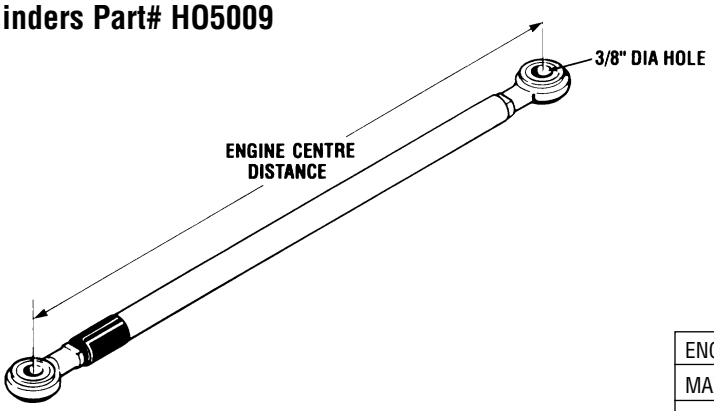
OPTIONAL EQUIPMENT

BACK PLATE KIT	**(FOR STANDARD HELMS)**	**HA5418**	**PAGE 6-3**
20 DEGREE WEDGE	**(FOR STANDARD HELMS)**	**HA5419**	**PAGE 6-3**
AUTOPILOT FITTING KIT	**(FOR ALL -3 HELMS)**	**HF6007**	**PAGE 9-12**
POWER ASSIST STEERING		**PA1200-2**	**PAGE 7-1**

*** ALL NON-PRO HELM DESIGNS CAN BE USED, SEE PAGE 6-7 FOR OPTIONS.** **PAGE 6-7**

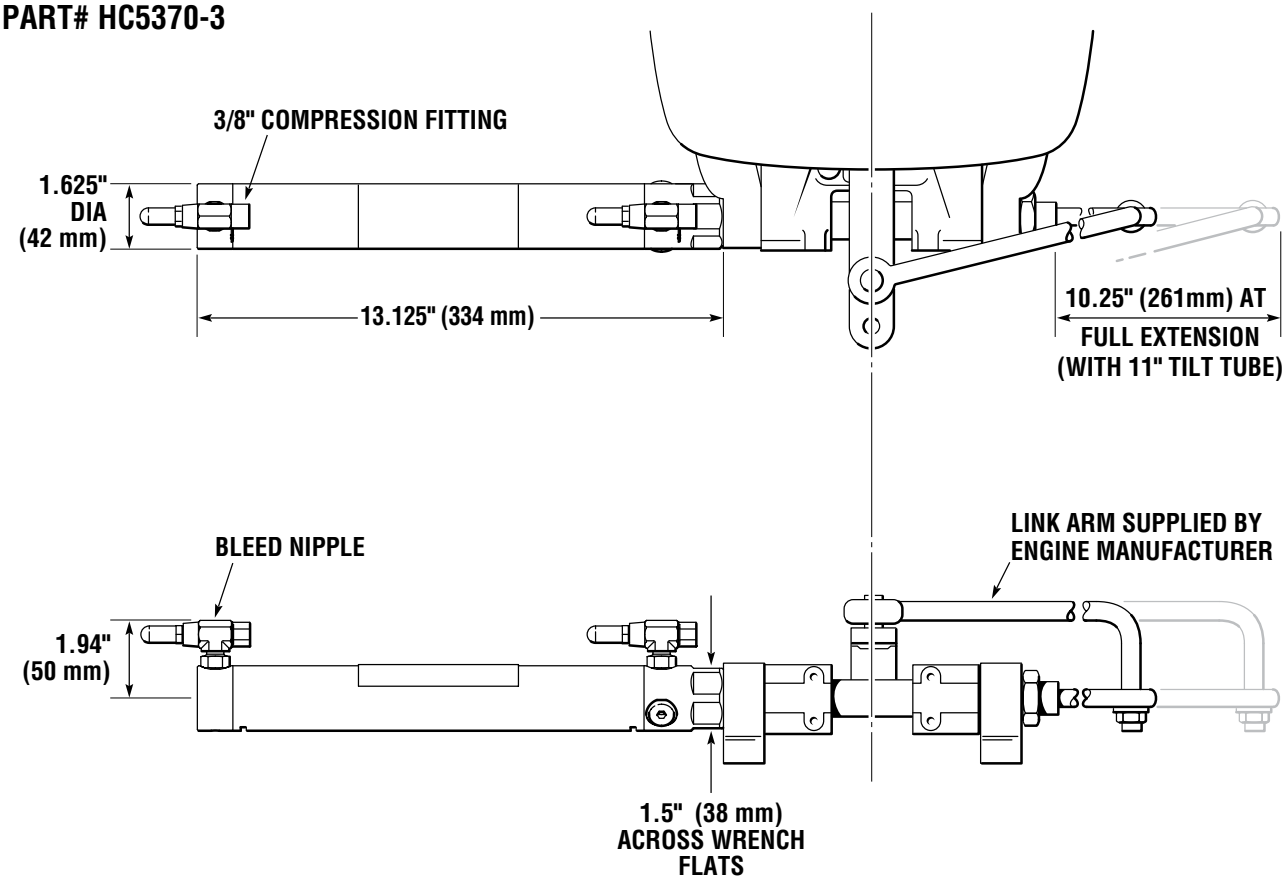
General Dimensions

Tie Bar for Side Mount Cylinders Part# HO5009



ENGINE CENTRE DISTANCE	
MAXIMUM:	36” (914mm)
MINIMUM:	26” (660mm)

PART# HC5370-3



⚠ 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 SeaStar Solutions.

Now fitted with Positionable O-ring fittings

SEASTAR SPLASHWELL MOUNT OUTBOARD STEERING SYSTEM

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

- Single & multiple engine capability.
- Total power to 600HP in twin counter rotating applications. (see order guide)
- Transom or hull mounted cylinder.
- Speeds to 60mph maximum (97km/h).

How to select a splashwell mount outboard steering system

1) From the order guide on page 3-21 select the system configuration based on;
   a) the number of engines, and
   b) the total power of engine(s) to be installed.
2) Select the cylinder and tie bar kit 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. You will have to determine the configuration, length, number of hose and fitting kits required for the installation (refer to page 9-2).
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 Helms.

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

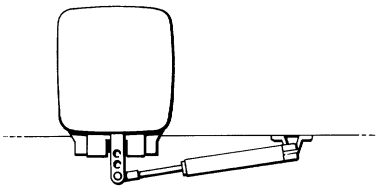
e) the power exceeds maximum Coast Guard or M.O.T. recommendations for the boat.

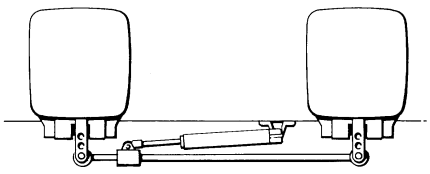
HC5380-3

Order Guide

The splashwell mount cylinder (part no. 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 NUMBER	REF. PAGE #
SINGLE ENGINE (SINGLE CYLINDER) APPLICATIONS UP TO 300 HP MAX NUMBER OF TURNS 5.5/6.5	CYLINDER	1		SPLASHWELL	HC5380-3	
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATIONS ADD:					
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1
DUAL ENGINE (SINGLE CYLINDER) NON-COUNTER ROTATING APPLICATIONS UP TO 300 HP MAX COUNTER ROTATING ENGINE APPLICATIONS UP TO 600 HP MAX NUMBER OF TURNS 5.6/6.5	CYLINDER	1		SPLASHWELL	HC5380-3	
	TIE BAR KIT	1		SPLASHWELL MOUNT TIE BAR	HO5010	
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	3		SEASTAR FLUID	HA5430	PAGE 10-1
	FOR EXTRA STEERING STATIONS ADD:					
	HELM	1	*	SEASTAR	HH5271-3	PAGE 6-6
	FITTING KIT	1		ADD A STATION	HF6007	PAGE 9-12
	HOSE KIT	1		OUTBOARD HOSE	HO51xx	PAGE 9-3
	STEERING FLUID	1		SEASTAR FLUID	HA5430	PAGE 10-1





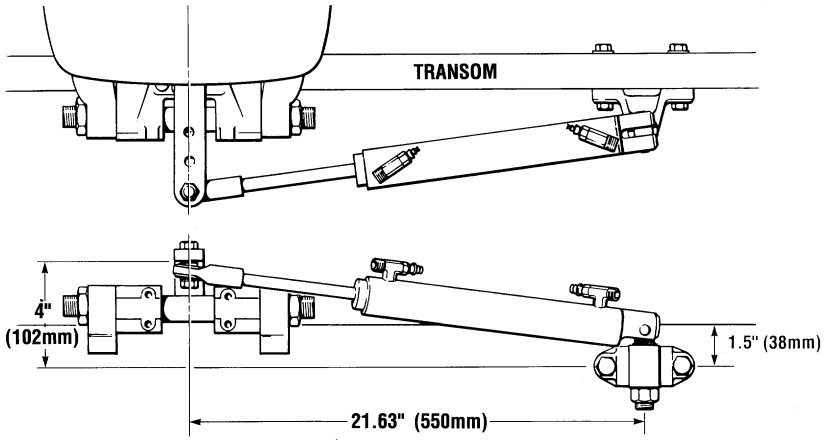
OPTIONAL EQUIPMENT

BACK PLATE KIT	**(FOR STANDARD HELMS)**	**HA5418**	**PAGE 6-3**
20 DEGREE WEDGE	**(FOR STANDARD HELMS)**	**HA5419**	**PAGE 6-3**
AUTOPILOT FITTING KIT	**(FOR ALL -3 HELMS)**	**HF6007**	**PAGE 9-12**
POWER ASSIST STEERING		**PA1200-2**	**PAGE 7-1**

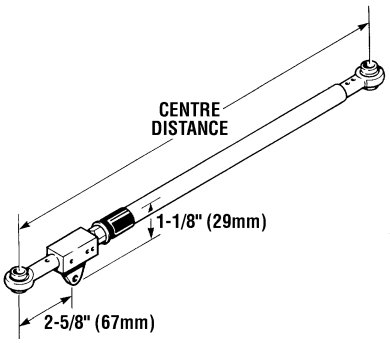
*** ALL NON-PRO HELM DESIGNS CAN BE USED, SEE PAGE 6-7 FOR OPTIONS.** **PAGE 6-7**

General Dimensions

Mounting Configuration



Tie Bar Kit# HO5010

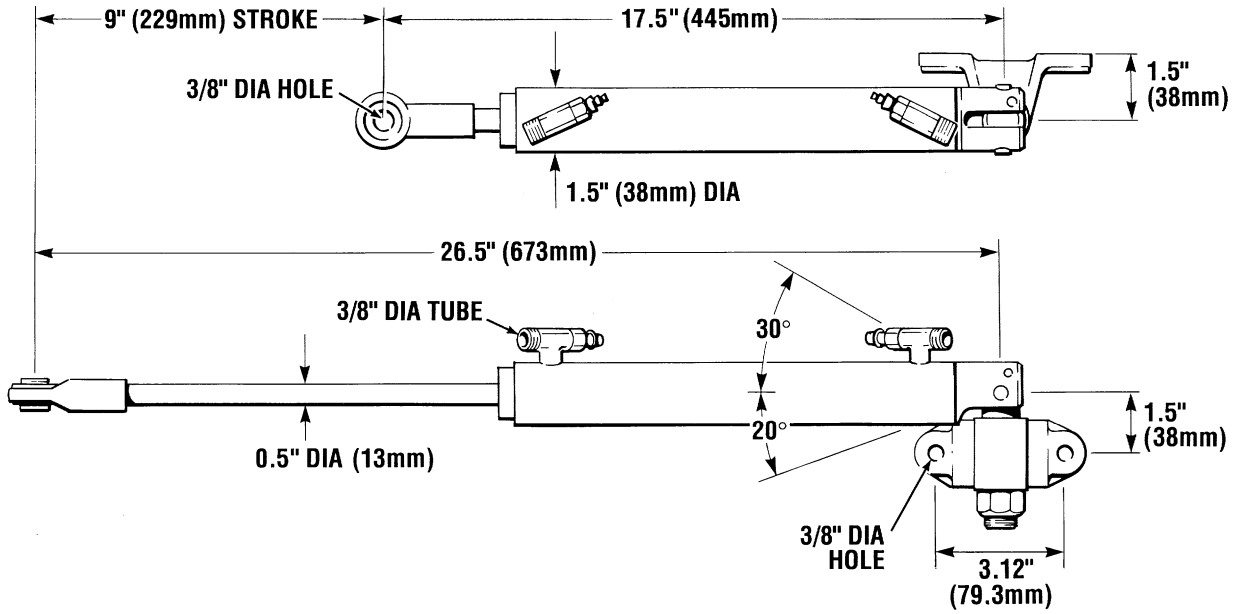


36" (914mm)	MAXIMUM ENGINE CENTRE DISTANCE
26" (660mm)	MINIMUM ENGINE CENTRE DISTANCE

PART# HC5380-3

NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.



⚠ CAUTION

DO NOT attempt to install NPT pipe fittings into the cylinder hose 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 SeaStar Solutions.

HYNAUTIC STEERING CYLINDER

Part# K-6

Description

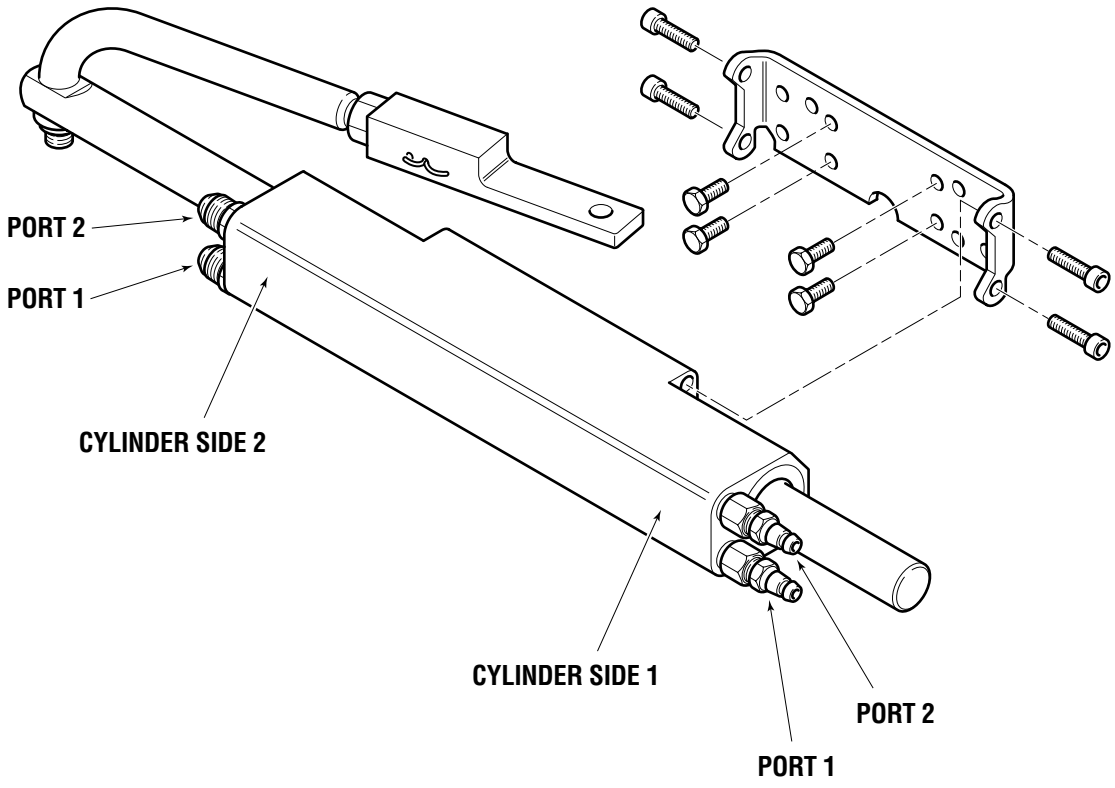
The K-6 is a balanced cylinder with the ends retained by internal wire ties. Cylinder end wire ties can be removed by using a spanner wrench with two .125” diameter pins spaced 1.2” apart.

The .875” diameter rod has a .5” diameter hole for load attachment at one end, and a .25” threaded cavity at the other end for connecting an autopilot feedback cylinder. The cylinder body mounting area is 5.75” between parallel faces, with 1/4”–28 tapped holes spaced 1.31” apart on each face, and is designed for mounting on a bracket we supply using four socket head screws.

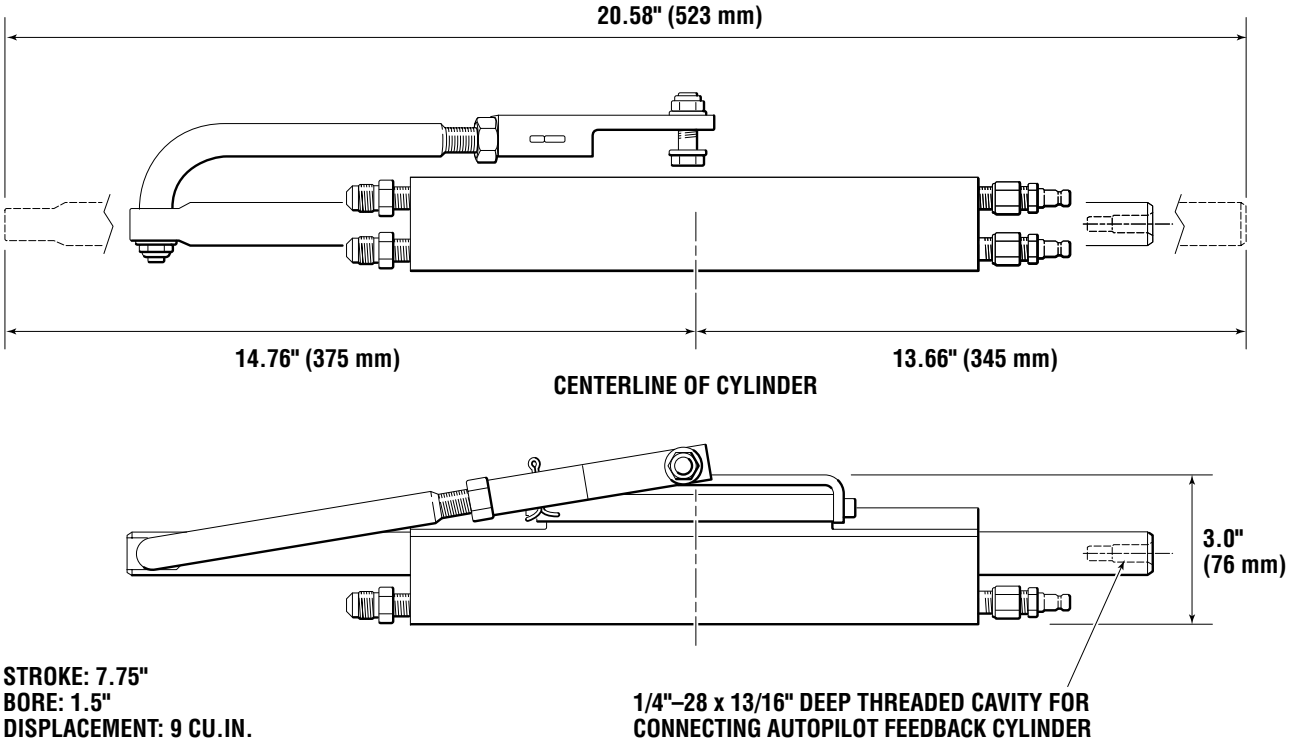
Two ports run lengthwise through the cylinder, with each port having a 1/4” NPTF thread. Each of the two lengthwise ports routes’ fluid to opposing sides of the piston. Port 1 routes fluid to Cylinder Side 1, and Port 2 to Cylinder Side 2.

The cylinder tube and cylinder ends are made of a 6000 series aluminum, coated for protection. The rod is polished stainless steel.

PART# K-6



PART# K-6



⚠ WARNING

The Hynautic K-6 cylinder is NOT recommended for aggressive use or in applications where speeds exceed 55 mph. See page 3-3 for outboard recommendations.

CHAPTER

4

SEASTAR™ Hynautic

INBOARD STEERING

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.

Four steps to select a steering system for an inboard powered boat

1) From the Application Guide on page 4-2 select the System Number appropriate for the vessel based on;
   a) hull type - displacement or planing,
   b) length of vessel,
   c) number of rudders, and
   d) usage of vessel.
2) From the Order Guide on page 4-2 select the appropriate helms and accessory hardware for each steering station.
3) From the Order Guide select the fitting and hose kits required for the installation.
4) Confirm that you have sufficient space available in;
   a) the area the cylinder is to be mounted, and
   b) the dash area for the steering components.

SEASTAR™

INBOARD STEERING

Application Guide

NOTICE

Want automotive type steering? Refer to page 7-1 for Power Assist Details.

BOAT LENGTH UP TO	PLANING HULL SINGLE ENGINE		PLANING HULL TWIN ENGINE		DISPLACEMENT HULL SINGLE ENGINE		DISPLACEMENT HULL TWIN ENGINE		SAIL SINGLE ENGINE	
										
	PLEASURE	WORK	PLEASURE	WORK	PLEASURE	WORK	PLEASURE	WORK	PLEASURE	WORK
26FT (8m)	**1**	**4**	**1**	**4**	**2**	**4**	**2**	**4**	**4**	**4**
32FT (10m)	**2**	**4**	**1**	**4**	**3**	**4**	**3**	**4**	**4**	**4**
38FT (11.5m)	**3**	**5**	**2**	**5**	**5**	**5**	**3**	**5**	**4**	**5**
44FT (13.5m)	**5**	**-**	**3**	**5**	**-**	**-**	**5**	**-**	**5**	**-**
50FT (15m)	**-**	**-**	**5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

a) Displacement Hull - maximum hull speed does not normally exceed 18 knots.
b) Planing Hull - maximum hull speed normally exceeds 18 knots.

ORDER GUIDE

1 — 4 TURNS LOCK TO LOCK

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
HELM	1	* SEASTAR	HH5271-3	6-6
CYLINDER	1	BA125 - 7ATM	HC5312-3	
STEERING FLUID	3	SEASTAR FLUID	HA5430	10-1
TUBE	1	3/8" DIA NYLON (NOTE 1 & 3)	HT5xxx	9-7
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR	HH5271-3	6-6
FITTING KIT	1	ADD A STATION	HF6010	9-13
STEERING FLUID	1	SEASTAR FLUID	HA5430	10-1
EXTRA TUBE		3/8" DIA NYLON (NOTE 1 & 3)		9-7

2 — 5 TURNS LOCK TO LOCK

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
HELM	1	* SEASTAR	HH5271-3	6-6
CYLINDER		BA135 - 7ATM	HC5313-3	
STEERING FLUID	3	SEASTAR FLUID	HA5430	10-1
TUBE	1	3/8" DIA NYLON (NOTE 1 & 3)	HT5xxx	9-7
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR	HH5271-3	6-6
FITTING KIT	1	ADD A STATION	HF6010	9-13
STEERING FLUID	1	SEASTAR FLUID	HA5430	10-1
EXTRA TUBE		3/8" DIA NYLON (NOTE 1 & 3)		9-7

3 — 6 TURNS LOCK TO LOCK

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
HELM	1	* SEASTAR	HH5271-3	6-6
CYLINDER	1	BA150 - 7ATM	HC5314-3	
STEERING FLUID	3	SEASTAR FLUID	HA5430	10-1
TUBE	1	3/8" DIA NYLON (NOTE 1 & 3)	HT5xxx	9-7
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR	HH5271-3	6-6
FITTING KIT	1	ADD A STATION	HF6010	9-13
STEERING FLUID	1	SEASTAR FLUID	HA5430	10-1
EXTRA TUBE		3/8" DIA NYLON (NOTE 1 & 3)		9-7

4 — 4-1/4 TURNS LOCK TO LOCK

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
HELM	1	* SEASTAR	HH5272-3	6-6
CYLINDER	1	BA150 - 7TM	HC5318	
STEERING FLUID	3	SEASTAR FLUID	HA5430	10-1
HOSE KIT	1	HOSE KIT	HF5508	9-14
COPPER TUBE		3/8" DIA.(NOTE 2 & 3)		9-7
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR	HH5272-3	6-6
FITTING KIT	1	ADD A STATION	HF6010	9-13
STEERING FLUID	1	SEASTAR FLUID	HA5430	10-1
EXTRA TUBE		AS ABOVE (NOTE 2 & 3)		9-7

5 — 5-1/2 TURNS LOCK TO LOCK

COMPONENT DESCRIPTION	QTY REQ	MODEL	PART #	PAGE REF
HELM	1	* SEASTAR	HH5272-3	6-6
CYLINDER	1	BA175 - 7TM	HC5319	
STEERING FLUID	3	SEASTAR FLUID	HA5430	10-1
HOSE KIT	1	HOSE KIT	HF5508	9-14
COPPER TUBE		3/8" DIA.(NOTE 2 & 3)		9-7
FOR EXTRA STEERING STATION ADD:				
HELM	1	* SEASTAR	HH5272-3	6-6
STEERING FLUID	1	SEASTAR FLUID	HA5430	10-1
EXTRA TUBE		AS ABOVE (NOTE 2 & 3)		9-7
FITTING KIT	1	ADD A STATION	HF6010	9-13

OPTIONAL EQUIPMENT

BACK PLATE KIT	**(FOR STANDARD HELMS)**	**HA5418**	**6-3**
20 DEGREE WEDGE KIT	**(FOR STANDARD HELMS)**	**HA5419**	**6-3**
AUTOPILOT FITTING KIT	**(FOR ALL -3 HELMS)**	**HF6010**	**9-13**
POWER ASSIST STEERING		**PA1200-2**	**7-1**

*** MANY HELM STYLES AVIALABLE, SEE PAGE 6-1 FOR OPTIONS.** **6-1**

1. For systems 1, 2 & 3 – nylon tubing (3/8" dia.) is the standard requirement for plumbing the system. Copper tubing (3/8" dia.) can be substituted but Fitting Kit HF5507 is required. (Refer to page 9-14).
2. For systems 4 & 5 – copper tubing (3/8" dia.) is the standard requirement for plumbing the system. Fitting Kit HF5508 is required. (Refer to page 9-14).
3. For systems 1, 2, 3, 4, & 5 – Seastar outboard hose can be substituted for nylon or copper tube. These hoses must be ordered in standard lengths. They cannot be cut to length. (Refer to page 9-2).

NOTICE

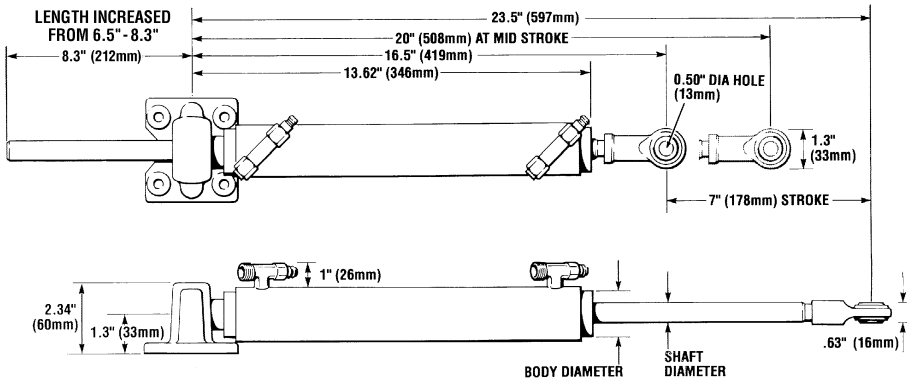
If your vessel is beyond system 1 to 5, please go to page 8-4 for SeaStar Power Steering Systems.

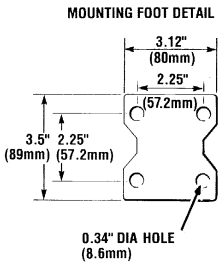
General Dimensions–SeaStar

⚠ CAUTION

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 SeaStar Solutions.

ATM CYLINDERS (ALUMINUM): HC5312-3/ HC5313-3/ HC5314-3

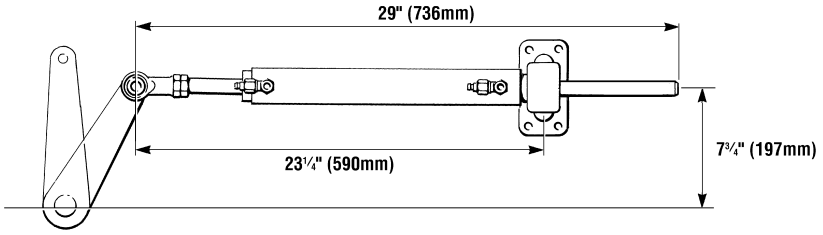


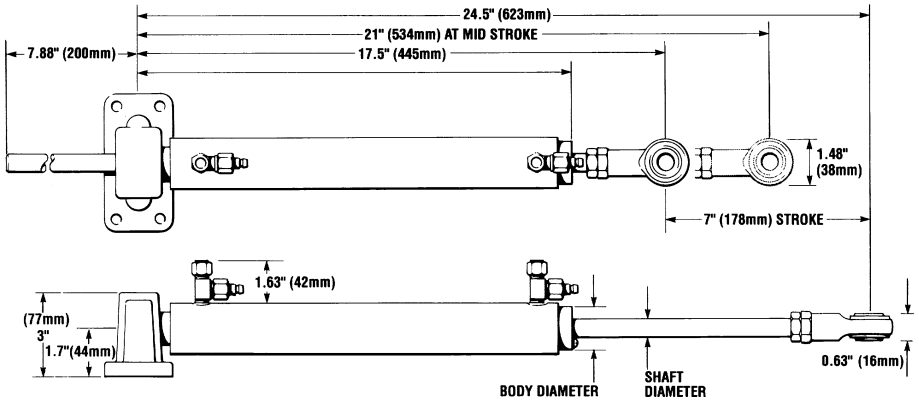


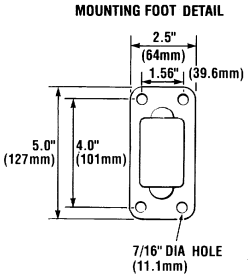
TM CYLINDERS (BRASS): HC5318/ HC5319/HC5369

NOTICE

Inc. CAT cylinder HC5318CAT and HC5319CAT







Cylinder Dimensions Specific to Model

NOTE: *If replacing a 'BJ' type cylinder adapter kit part # HA5425 is required.*

CYLINDER MODEL	PART No.	BODY DIA. (ID)	SHAFT DIA.
BA125-7ATM	HC5312-3	1.25" (32 mm)	0.50" (12.7 mm)
BA135-7ATM	HC5313-3	1.35" (34 mm)	0.63" (15.9 mm)
BA150-7ATM	HC5314-3	1.50" (38 mm)	0.63" (15.9 mm)
BA150-7TM*	HC5318	1.50" (38 mm)	0.63" (15.9 mm)
BA175-7TM*	HC5319	1.75" (45 mm)	0.75" (19.1 mm)
BA150-9TM	HC5369	1.50" (38 mm)	0.63" (15.9 mm)

** CAT cylinders have the same dimensions (HC5318CAT & HC5319CAT)*

General Dimensions–Hynautic

⚠ CAUTION

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 SeaStar Solutions.

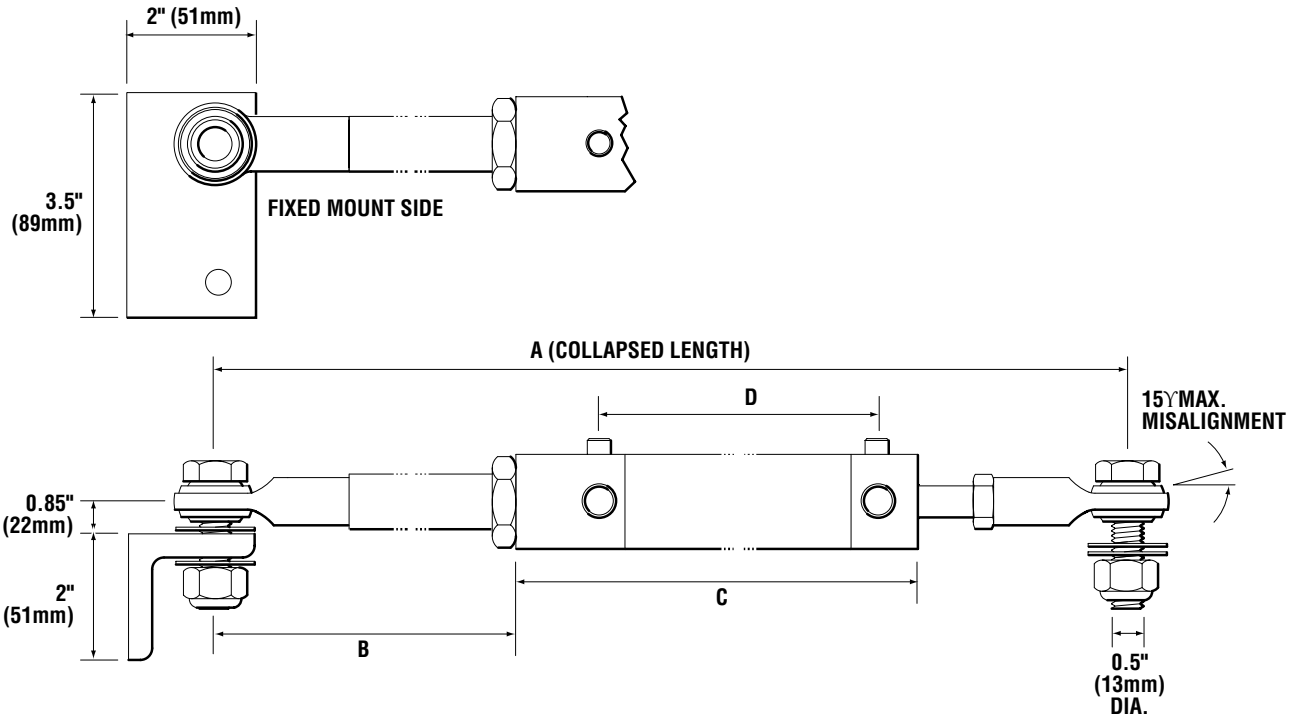
Universal Mount Cylinders

HC5322-3 *(K-18 cylinder replacement)*

HC5323-3 *(K-19 cylinder replacement)*

These balanced cylinders are double rod ended, each end held in place with internal wire ties. Every cylinder is equipped with a swivel joint at each end. One provides for a fixed mount attachment point at the end of the housing to protect the moving rod. The other swivel joint, located at the rod end, allows for free movement of the cylinder without binding when attached to the rudder arm.

HC5322-3 *(K-18 cylinder replacement)* **HC5323-3** *(K-19 cylinder replacement)*



CYL MODEL	DIMENSIONS A	B	C	D	BORE	STROKE	DISP
HC5322-3	24.5” (662mm)	9.31” (237mm)	11.75” (299mm)	9.875” (251mm)	1.25” (32mm)	7” (178mm)	7cu in
HC5323-3	28.5” (724mm)	11.31” (287mm)	13.75” (350mm)	11.875” (302mm)	1.25” (32mm)	9” (229mm)	9cu in

Above cylinders can be used on the following boats:
HC5322-3 = ALL System #1 as noted on page 4-2.
HC5323-3 = ALL Systems #1 through #3 as noted on page 4-2.

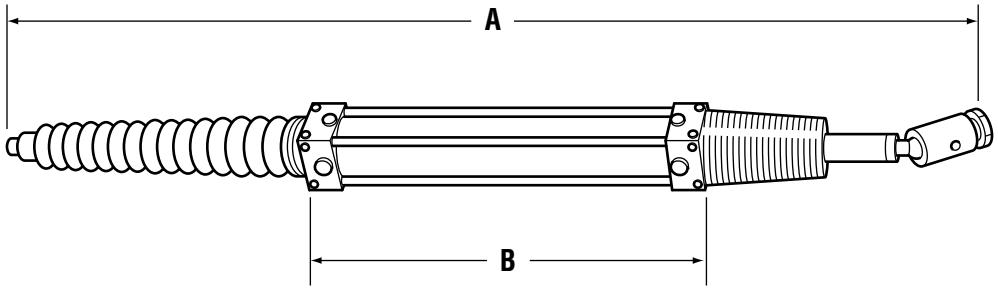
Fixed Mount and Pivot Mount models: K-22 and K-31

These Brass cylinders are for larger boats up to approximately 70 ft. Tubes, ends, and external rods are brass: cylinder rods are 17-4 stainless steel: mounts are manganese bronze. There are two different types of mounting packages for Brass cylinders: fixed mount and pivot mount.

NOTICE

SeaStar Solutions has discontinued the manufacturing of the K-27 steering cylinder. If replacement is required, order cylinder part # K-22 and adapter kit part # HP6039.

K-22

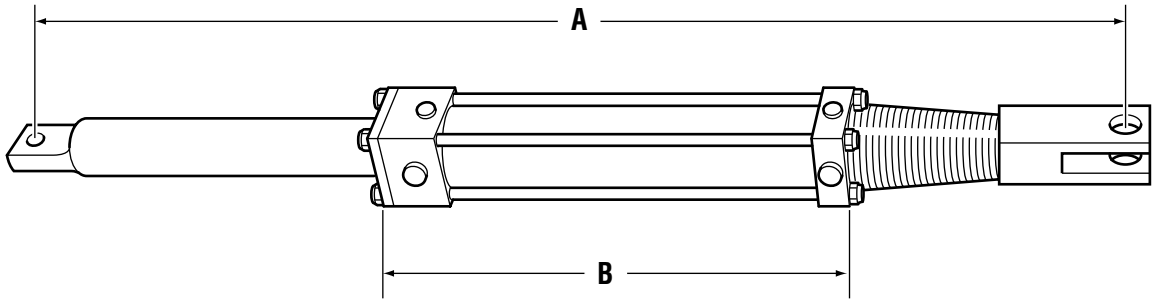


CYL MODEL	DIMENSIONS A	B	BORE	STROKE	DISP
K-22	*34.12" (867mm)	13.25" (337mm)	1.5" (38mm)	10" (254mm)	13.20cu in

** Dimensions are with the cylinder rod centered.*

For use in Systems #3 through #4 as noted on page 4-2.

K-31



CYL MODEL	DIMENSIONS A	B	BORE	STROKE	DISP
K-31	*38.37" (975mm)	14.12" (359mm)	2.0" (51mm)	10" (254mm)	25.5cu in

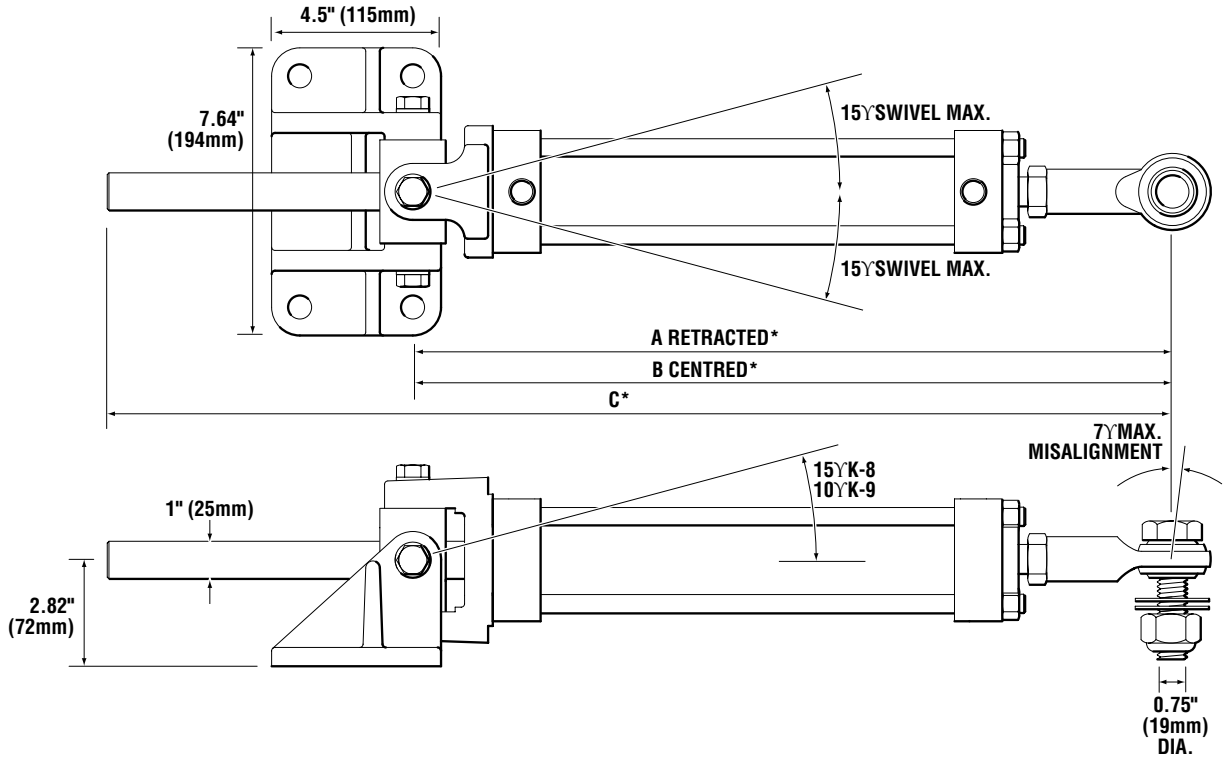
** Dimensions are with the cylinder rod centered.*

For use in System #5 as noted on page 4-2.

Large I/B Cylinders K-9

The K-9 cylinders are double rod end, tie rod constructed hydraulic cylinders. Each has a universal mount, which allows two planes of pivot freedom. Each cylinder is equipped with a stainless steel ball joint. Porting is through two 1/4" NPT ports at each end of the cylinder.

K-9



CYL MODEL	DIMENSIONS A*	B*	C*	BORE	STROKE	DISP
K-9	24.74" (629mm)	31.99" 813(mm)	37.92" (962mm)	2.5" (64mm)	14.5" (369mm)	59.8cu in

** Clevis option increases length by 0.44" (12mm)*

CHAPTER

5

SEASTAR™ Hynautic

STERNDRIVE STEERING

Features

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

Applications

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

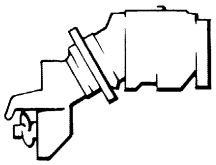
How to select a steering system for a stern drive

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 tube or hose and fitting kits.
5) Confirm that sufficient space is available in the dash and engine compartments for the equipment.

SEASTAR™

STERNDRIVE STEERING

Order Guide

SYSTEM CONFIGURATION	COMPONENT DESCRIPTION	QTY REQ		MODEL	PART #	PAGE REF #
SINGLE & DUAL STERNDRIVE (For dual sterndrive applications use engine manufactures supplied tie bar.) 	CYLINDER	1		SEE APPLICATION GUIDE		
	HELM	1	*	SEASTAR (SEE NOTE 1)	HH5271-3	6-6
			**	SEASTAR (SEE NOTE 2)	HH5272-3	6-6
	STEERING FLUID	3		SEASTAR FLUID	HA5430	10-1
	TUBE/HOSE			SEE NOTE 3		9-7
	FOR EXTRA STEERING STATION ADD:					
	HELM	1	*	SEASTAR (SEE NOTE 1)	HH5271-3	6-6
			**	SEASTAR (SEE NOTE 2)	HH5272-3	6-6
	FITTING KIT	1		ADD A STATION		
				- FOR USE WITH SEASTAR STEERING "HOSE"	HF6007	9-12
				- FOR USE WITH SEASTAR TUBE/COPPER	HF6010	9-13
	STEERING FLUID	1		SEASTAR FLUID		10-1
	EXTRA TUBE/HOSE			SEE NOTE 3		9-7
	BACK PLATE KIT			**(FOR STANDARD HELMS)**	**HA5418**	**6-3**
	20 DEGREE WEDGE KIT			**(FOR STANDARD HELMS)**	**HA5419**	**6-3**
	AUTOPILOT FITTING KIT			**(FOR USE WITH SEASTAR HOSE)**	**HF6007**	**9-12**
				(FOR USE WITH SEASTAR TUBE/COPPER)	**HF6010**	**9-13**
	POWER ASSIST STEERING				**PA1200-2**	**7-1**

*** ALL HELM DESIGNS CAN BE USED, SEE PAGE 6-1 FOR OPTIONS.**

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 chart on page 5-3 for options.
3. * To ensure performance, select the appropriate tube/hose kit as noted below
   A) For SeaStar 1.7 Helms: use SeaStar 3/8" Extruded Nylon tubing, part # HT5xxx.
   B) For SeaStar 2.0, 2.4 or 3.0 helms: use SeaStar/SeaStar PRO **Outboard Steering Hose**, or, 3/8" diameter copper tube and copper tube hose kit HF5508 (Refer to page 9-7 for details).
4. 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 our technical service for assistance.

Application Guide

ENGINE MANUFACTURER	STEERING CONFIGURATION	ENGINE/DRIVE DESCRIPTION	YEAR	CYLINDER DESCRIPTION		NUMBER TURNS LOCK TO LOCK		NOTES
				MODEL No.	ORDERING PART No.	SEASTAR 1.7 HELM	SEASTAR 2.4 HELM	
BMW	NON POWER ASSIST	ALL	TO DATE	BA125-8EMV	HC5330-3	4.9	N/A	1
	POWER ASSIST	ALL	TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
MERCRUISER	NON POWER ASSIST	MERCRUISER 1	1983 & PRIOR	BA125-8EMV	HC5330-3	4.9	N/A	1,6
		ALPHA I	1984 TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6
		BRAVO I	1984 TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6
		BRAVO II	1984 TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6
		BRAVO III	1984 TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6,7
	POWER ASSIST	MERCRUISER I	1983 & PRIOR	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		ALPHA I	1984 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		BRAVO I	1984 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		BRAVO II	1984 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		BRAVO III	1984 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
OMC	NON POWER ASSIST	400/800 SERIES	1985 & PRIOR	N/A	N/A	N/A	N/A	
		COBRA	1986 TO DATE	BA150-7EM	HC5326-3	6.0	N/A	1,3
		KING COBRA	1986 TO DATE	BA150-7EM	HC5326-3	6.0	N/A	1,3
	POWER ASSIST	400/800 SERIES	1985 & PRIOR	N/A	N/A	N/A	N/A	
		COBRA	1986 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
		KING COBRA	1986 TO DATE	125-8EM	HC5328-3	4.9/5.8	3.4/4.1	2
VOLVO	NON POWER ASSIST	270	TO DATE	BA125-8EMV	HC5330-3	4.9	N/A	1.6
		275	TO DATE	BA150-7ATM	HC5314-3	6.0	N/A	1,6
		280	TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6
		290	TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6
		DIESEL	TO DATE	BA135-7EM	HC5332-3	5.0	3.5	1,4,5,6
	POWER ASSIST	275	TO DATE	N/A	N/A	N/A	N/A	
		280	TO DATE	125-8EM	HC5328-3	4.8/5.8	3.4/4.1	2
		290	TO DATE	125-8EM	HC5328-3	4.8/5.8	3.4/4.1	2
		DIESEL	TO DATE	125-8VEM	HC5329-3	4.9/5.8	3.4/4.1	2
		32, DIESEL	1997 TO DATE	125-6VPS	HC5331-3	4.8/5.5	3.4/4.1	2
		41-42, DIESEL	1992 TO DATE	125-6VPS	HC5331-3	4.8/5.8	3.4/4.1	2
		DPS & SX	1996 TO DATE	125-6VPS	HC5331-3	4.8/5.5	3.4/4.1	2

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 SeaStar Solutions. Refer to diagram on page 5-4.
4. **HC5332-3 replaces HC5326-3 as of January 2000.** If installing HC5326 additional clevis supplied by engine manufacturer required. Mastry Engine part # SUN144 *not provided by SeaStar Solutions.
5. **The installation of the HC5332-3 sterndrive cylinder requires the use of SeaStar Outboard 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 HC5326**-3**.

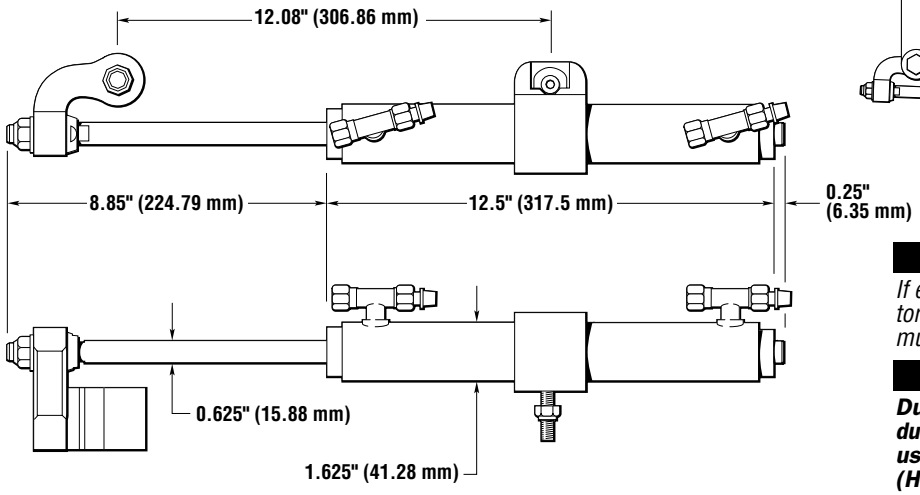
REVISION DATE: APRIL 24th 2015

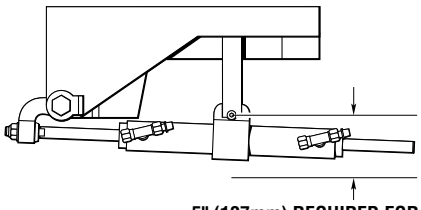
General Dimensions

⚠ CAUTION

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 SeaStar Solutions.

HC5332 BA135-6.88EM





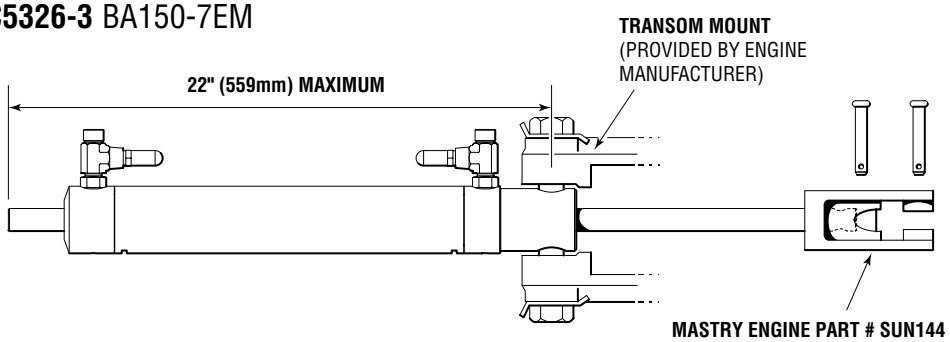
NOTICE

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

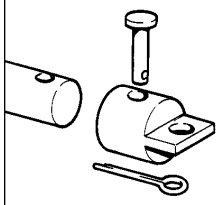
⚠ CAUTION

Due to cylinder body movement during steering, this cylinder requires use of SeaStar outboard hose (H051xx), see page 9-2 for details.

HC5326-3 BA150-7EM



CYLINDER CONNECTION DETAIL FOR OMC

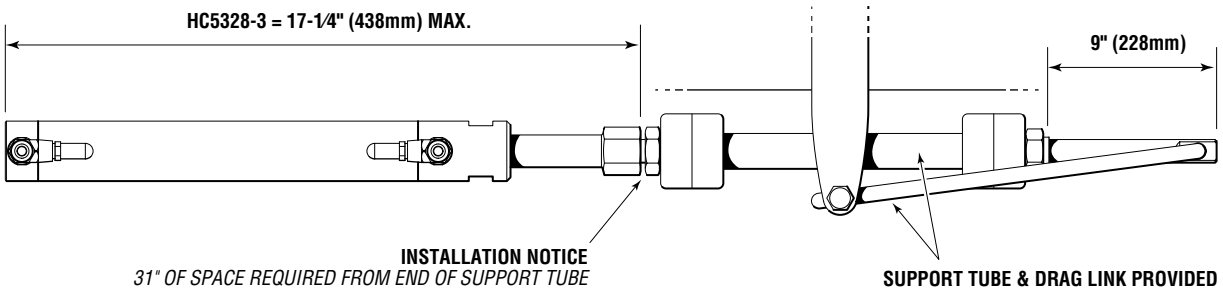


PART # HA5424

HC5328-3 125-8EM

NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

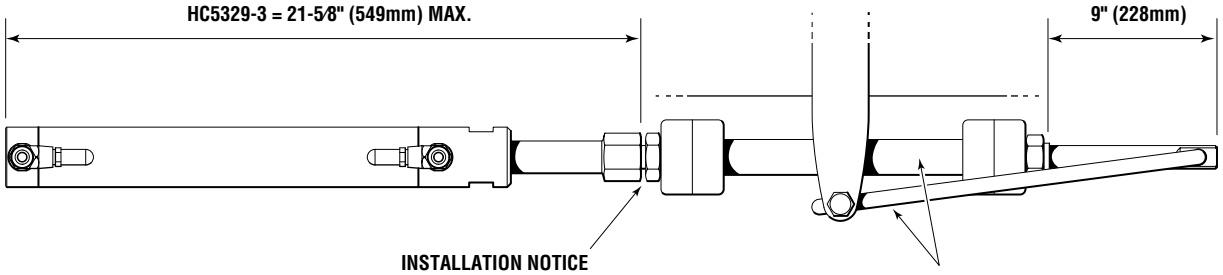


General Dimensions

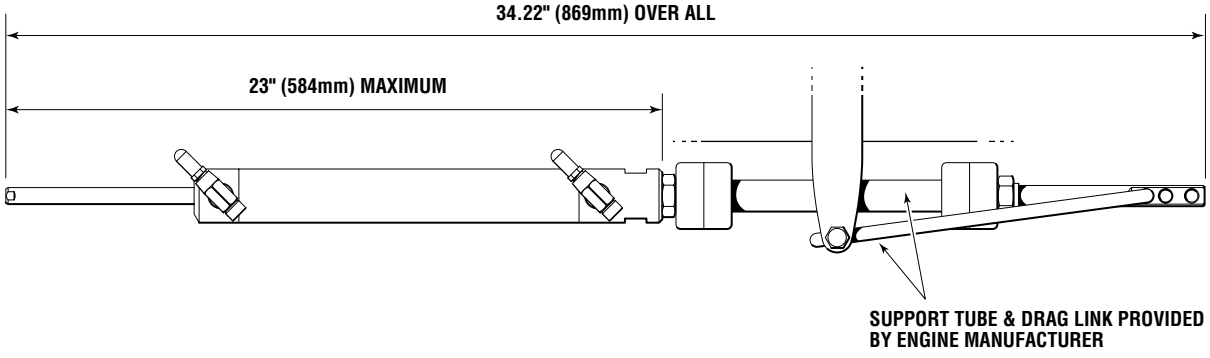
HC5329-3 125-8VPEM

NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

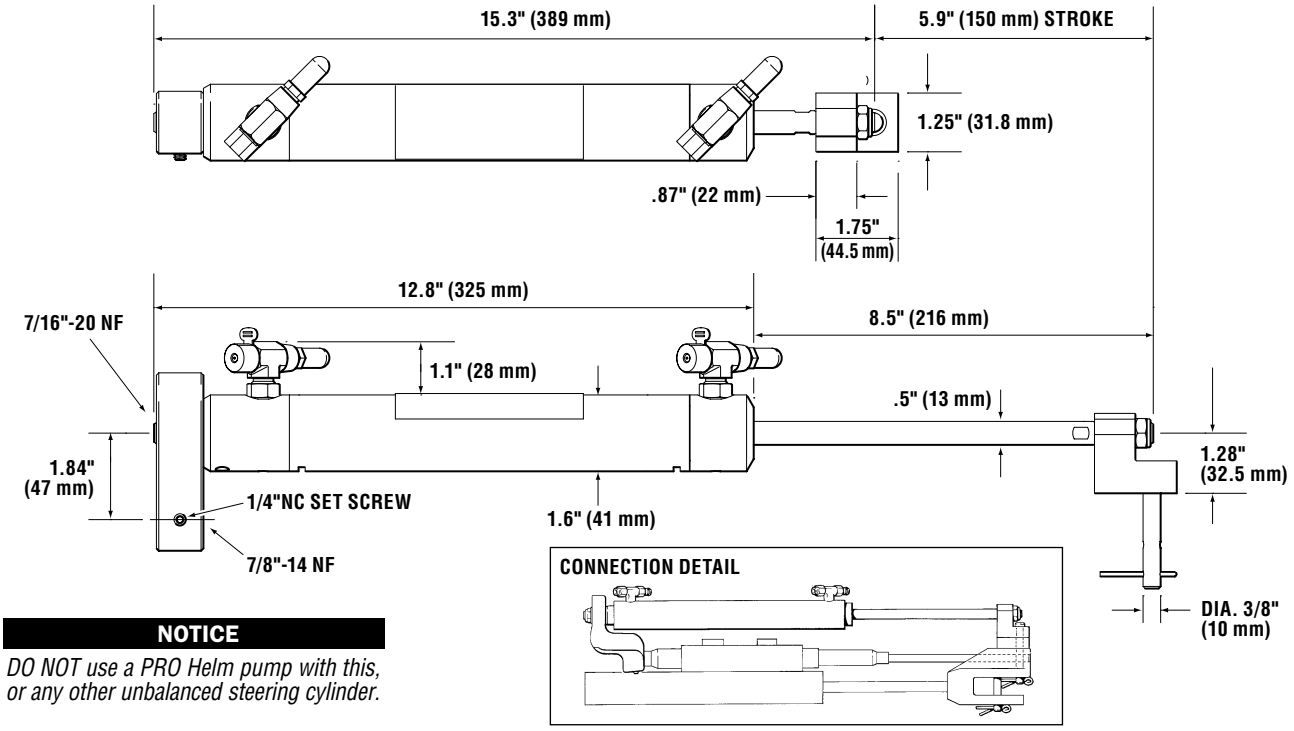


HC5330-3 BA125-8EMV



General Dimensions

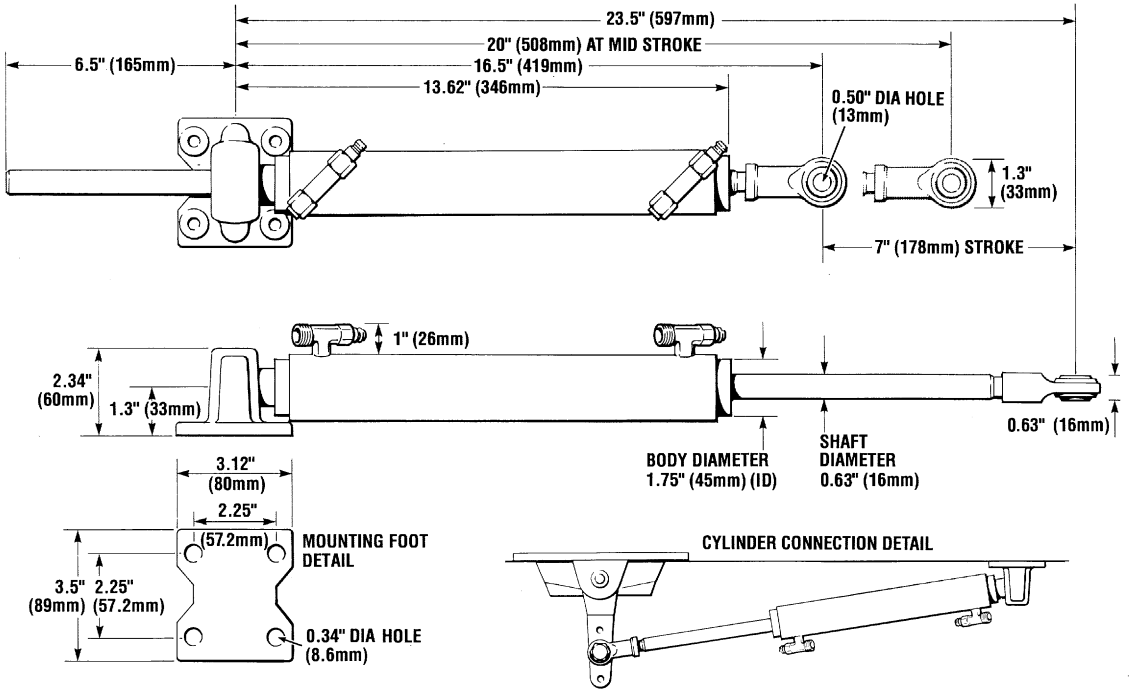
HC5331-3 125-6VPS



NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

HC5314-3 BA150-7ATM



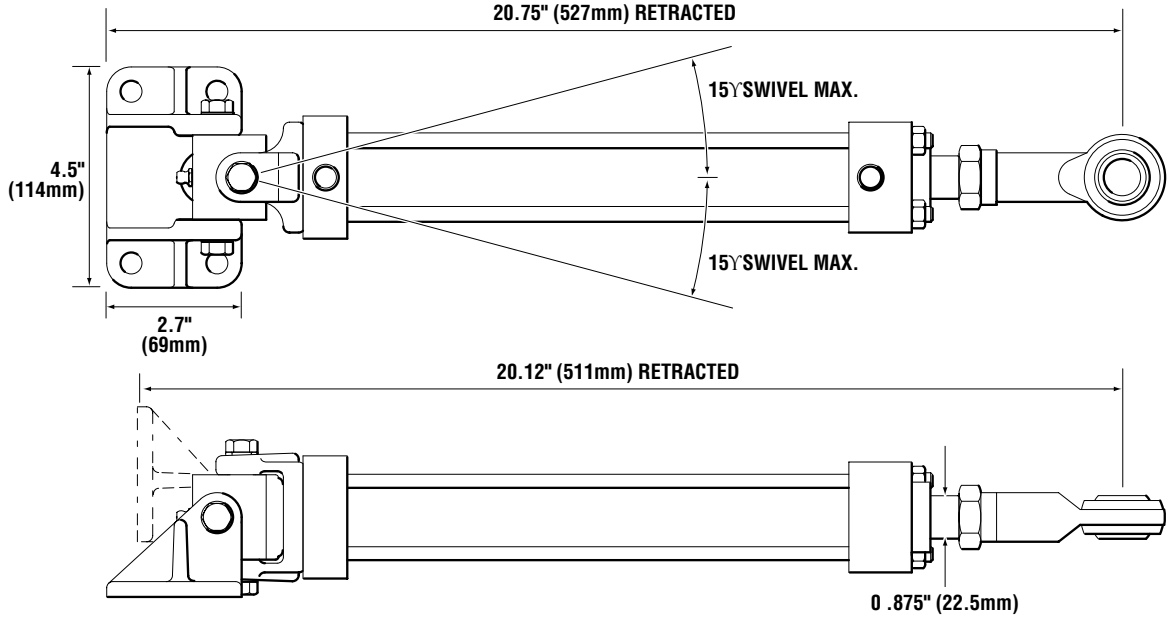
Performance I/O and Outboard Cylinders

The K-5-B cylinder was designed for inboard/outboard boats requiring external cylinders of substantial size and strength. The K-5 cylinders are nickel plated for aesthetics and protection against the elements. This cylinder does not include the wing plates or hardware required for mounting to the outdrive. Porting is through two through-transom 1/4" NPT ports located at the mounting end of the cylinder.

NOTICE

K-5-B steering cylinders have a large volume. To keep total wheel turns at a reasonable amount, it is recommended to use a larger displacement helm pump, such as Capilano HH5275 (5.4 cu.in. displacement MAX).

K-5-B



BORE	STROKE	DISP EXT.	DISP RET.
1.5" (38mm)	9" (229mm)	15.9cu in	10.5cu in

NOTICE

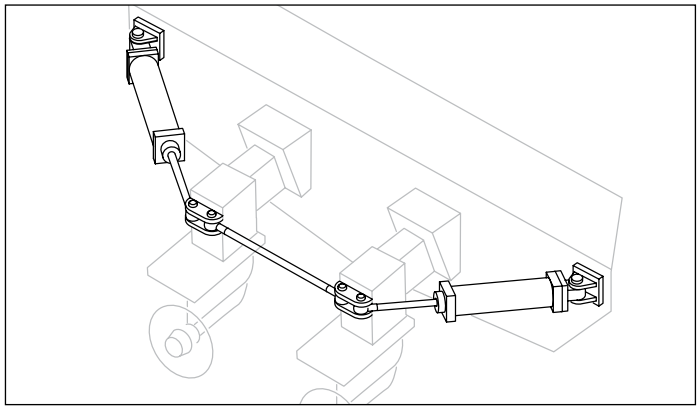
K-5 Cylinders are UN-balanced Cylinders, unequal amount of fluid on either side of the piston.

NOTICE

DO NOT use a PRO Helm pump with this, or any other unbalanced steering cylinder.

NOTICE

SeaStar Solutions does NOT make connecting hardware to attach this cylinder to the out drive.



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CHAPTER

6

SEASTAR™ Hynautic CAPILANO™

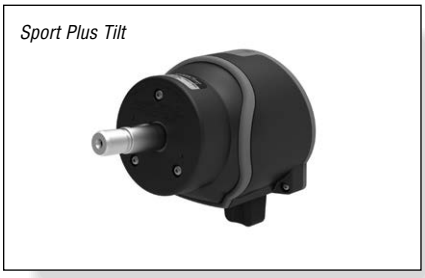
HELMS

Now fitted with Positionable O-ring fittings

Front Mount

Rear Mount

Sport Tilt



Sport Plus Tilt

Classic Tilt

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.

Rear mount helm features

- Behind dash mounting configuration.
- Available 1.4, 1.7, 2.0, 2.4 and 3.0 cubic inch displacements.
- Remote fill point.
- Complete with elbow fittings.

Sport/Sport Plus Tilt helm features

- 5 wheel positions allow adjustment to most comfortable steering position.
- 48 degree 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.
- Comes with newly designed tilt mechanism.

Classic Tilt helm features

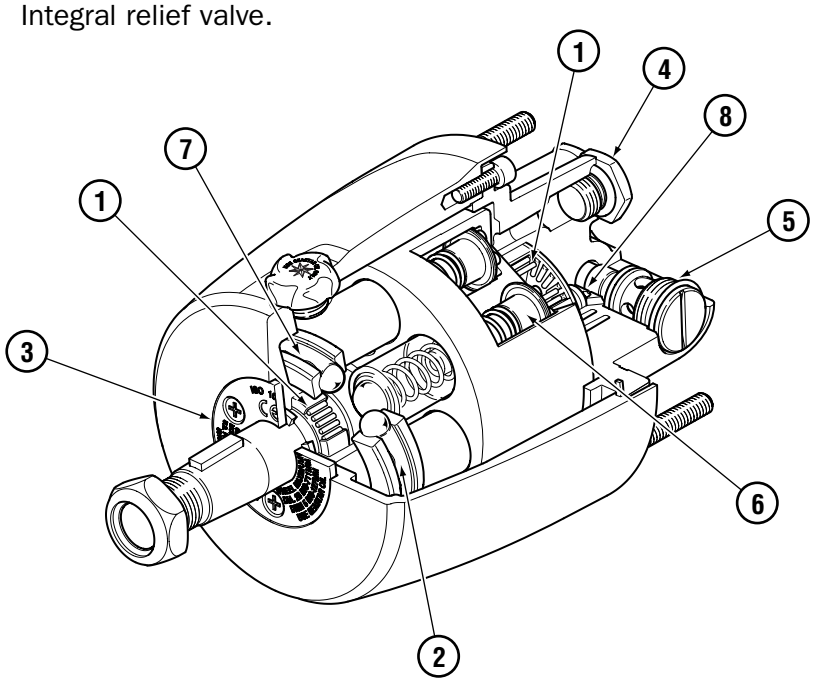
- 5 wheel positions allow adjustment to most comfortable steering position.
- 48 degree tilt range (18 down - 30 up).
- Available in 1.7, 2.0 and 2.4 cubic inch displacements.
- Convenient front of dash fill.
- Complete with elbow fittings.

Features of SeaStar Helm Pumps

Features

Now fitted with Positionable O-ring fittings

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. Internal air pocket eliminates steering fluid expansion overflow.
8. Integral relief valve.

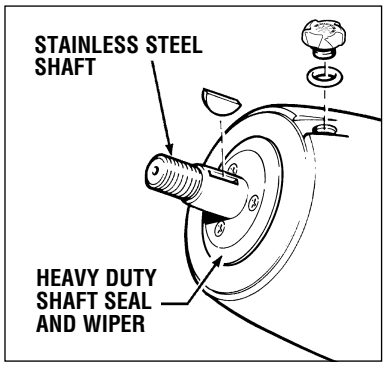


NOTICE

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 page 13-1 for authorized repair centers.

Commercial Helms

Part# HH5217-3, HH5218-3, HH5224-3 and HH5225-3



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 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.

NOTICE

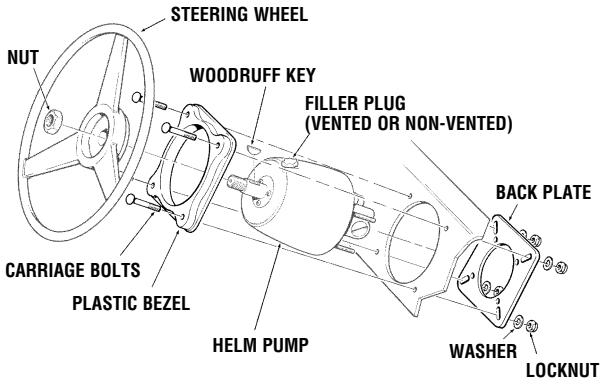
For Commercial Use.

Accessories

Backplate Kit (part # HA5418)

a) Used to retrofit a new Seastar standard helm in the old 4.5" (115mm) 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.

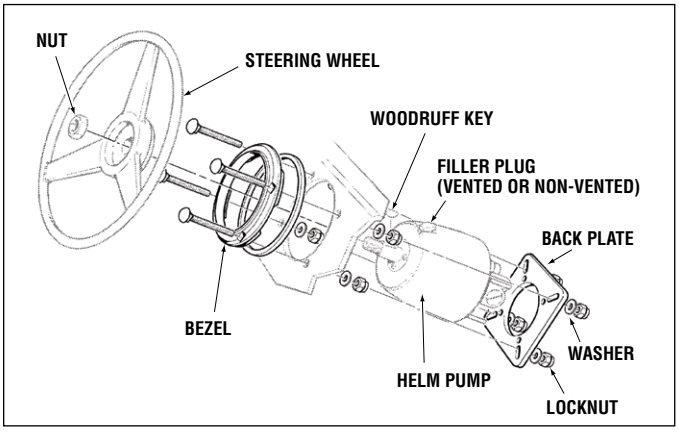
STEERING MANUFACTURER	HELM MODEL TYPE	SYSTEM	BACKPLATE KIT REQ
SEASTAR SOLUTIONS	SAFE-T	MECHANICAL	YES
	BIG-T	MECHANICAL	YES
	ROTARY	MECHANICAL	NO
	RACK AND PINION	MECHANICAL	NO
	SYTEN	HYDRAULIC	YES
MORSE	ROTARY	MECHANICAL	NO
	RACK AND PINION	MECHANICAL	NO
HYNAUTIC	H-50 SERIES	HYDRAULIC	YES
	H-60 SERIES	HYDRAULIC	YES
	H-80 SERIES	HYDRAULIC	YES
	H-300 SERIES	HYDRAULIC	YES



Round Bezel

(part # HA5478 SeaStar) (part # HA5476 BayStar)

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



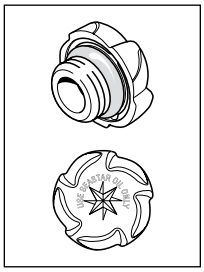
Vent Plug (part # HP6126)

(5 per kit)

Supplied with SeaStar Helm Pump

Must be used with Helm Pump on all single steering station systems.

Must be used on uppermost Helm Pump on multi steering station systems.

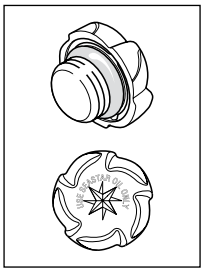


Non-Vent Plug (part # HP6000)

(5 per kit)

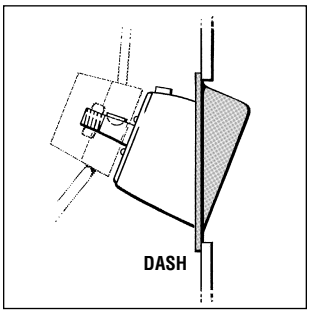
Must be used on all Helm Pumps other than uppermost Helm Pump on multi steering station systems.

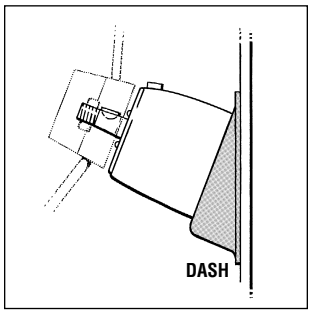
A Non-Vent cap is supplied with both "Add A Station Fitting Kits" Part No. HF6007 & HF6010.

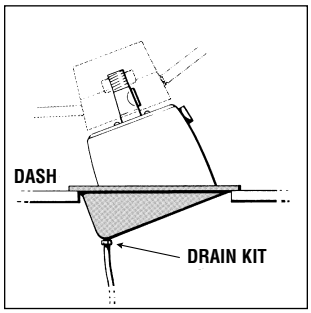


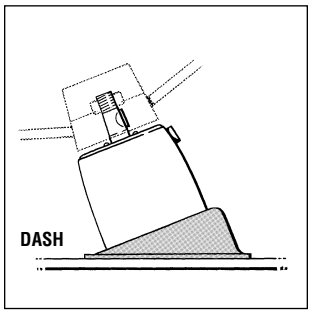
20° Wedge (part # HA5419)

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









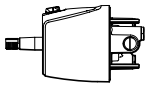
NOTICE *Not for use with BayStar helm pumps.*

SeaStar Helm–Order Guide

⚠ CAUTION

-3 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 helm hose fitting ports. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar Solutions O-ring style hose fittings (ORB).

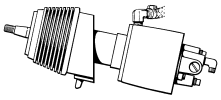
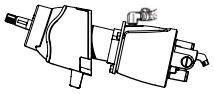
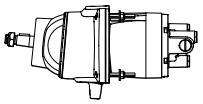
SeaStar Front Mount



PART NUMBER	HELM DESCRIPTION	DISPLACEMENT CU. IN./REV (CC/REV)	RELIEF VALVE SETTING PSI (BAR)	NOTES
HH5269-3	FRONT MOUNT	1.4 (23.0)	1000 (70)	
HH5271-3	FRONT MOUNT	1.7 (27.8)	1000 (70)	
HH5217-3	FRONT MOUNT (Commercial)	1.7 (27.8)	1000 (70)	2
HH5273-3	FRONT MOUNT	2.0 (33.0)	1000 (70)	
HH5272-3	FRONT MOUNT	2.4 (39.3)	1000 (70)	
HH5224-3	FRONT MOUNT (Commercial)	2.4 (39.3)	1000 (70)	2
HH5285-3	FRONT MOUNT	3.0 (49.1)	1000 (70)	New product

SeaStar Tilt

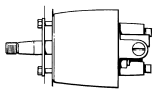
NOTE: *All sport tilt helms are shipped with the remote filler tube.*

HH6193-3	SPORT TILT	1.4 (23.0)	1000 (70)	New Product
HH6544-3	CLASSIC TILT	1.4 (23.0)	1000 (70)	Replaces HH5744
HH6541-3	CLASSIC TILT	1.7 (27.8)	1000 (70)	Replaces HH5741
HH6191-3	SPORT TILT	1.7 (27.8)	1000 (70)	Replaces HH5291
HH6491-3	SPORT PLUS	1.7 (27.8)	1000 (70)	New product
HH6543-3	CLASSIC TILT	2.0 (33.0)	1000 (70)	Replaces HH5743
HH6145-3	SPORT TILT	2.0 (33.0)	1000 (70)	Replaces HH5745
HH6445-3	SPORT PLUS	2.0 (33.0)	1000 (70)	New product
HH6345-3	SPORT PLUS (Spline Shaft)	2.0 (33.0)	1000 (70)	New product
HH6542-3	CLASSIC TILT	2.4 (39.3)	1000 (70)	Replaces HH5742
HH6192-3	SPORT TILT	2.4 (39.3)	1000 (70)	Replaces HH5292
HH6492-3	SPORT PLUS	2.4 (39.3)	1000 (70)	New product

SeaStar Rear Mount

NOTE: *All rear mount helms are shipped with the remote filler tube.*



HH5260-3	REAR MOUNT	1.4 (23.0)	1000 (70)	
HH5279-3	REAR MOUNT (1" Straight Shaft)	1.4 (23.0)	1000 (70)	
HH5261-3	REAR MOUNT	1.7 (27.8)	1000 (70)	
HH5281-3	REAR MOUNT (1" Tapered Shaft)	1.7 (27.8)	1000 (70)	
HH5263-3	REAR MOUNT	2.0 (33.0)	1000 (70)	
HH5262-3	REAR MOUNT	2.4 (39.3)	1000 (70)	
HH5265-3	REAR MOUNT	3.0 (49.1)	1000 (70)	New product

NOTES

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.

SeaStar PRO Helm–Order Guide

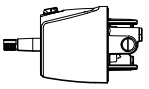
⚠ CAUTION

-3 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 helm hose fitting ports. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar Solutions O-ring style hose fittings (ORB).

⚠ WARNING

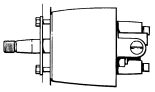
DO NOT use with an unbalanced cylinder. Steering lock up WILL occur.

SeaStar PRO Front Mount



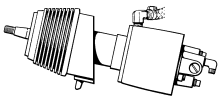
PART NUMBER	HELM DESCRIPTION	DISPLACEMENT CU. IN./REV (CC/REV)	RELIEF VALVE SETTING PSI (BAR)	NOTES
HH5779-3	FRONT MOUNT	1.7 (27.8)	1500 (103)	1
HH5218-3	FRONT MOUNT, COMMERCIAL	1.7 (27.8)	1500 (103)	1, 2
HH5770-3	FRONT MOUNT	2.0 (33.0)	1500 (103)	1
HH5772-3	FRONT MOUNT	2.4 (39.3)	1500 (103)	1

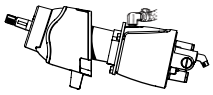
SeaStar PRO Rear Mount

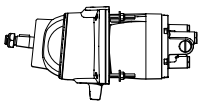


HH5778-3	REAR MOUNT	1.7 (27.8)	1500 (103)	1
HH5771-3	REAR MOUNT	2.0 (33.0)	1500 (103)	1

SeaStar PRO Classic and Sport Tilt







HH6573-3	CLASSIC TILT	1.7 (27.8)	1500 (103)	Replaces HH5773
HH6489-3	SPORT PLUS	1.7 (27.8)	1500 (103)	New Product
HH6574-3	CLASSIC TILT	2.0 (33.0)	1500 (103)	Replaces HH5774
HH6490-3	SPORT PLUS	2.0 (33.0)	1500 (103)	New product
HH6189-3	SPORT TILT	1.7 (27.8)	1500 (103)	1
HH6190-3	SPORT TILT	2.0 (33.0)	1500 (103)	1

NOTES

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.

Front/Rear Mount Helm Dimensions

⚠ CAUTION

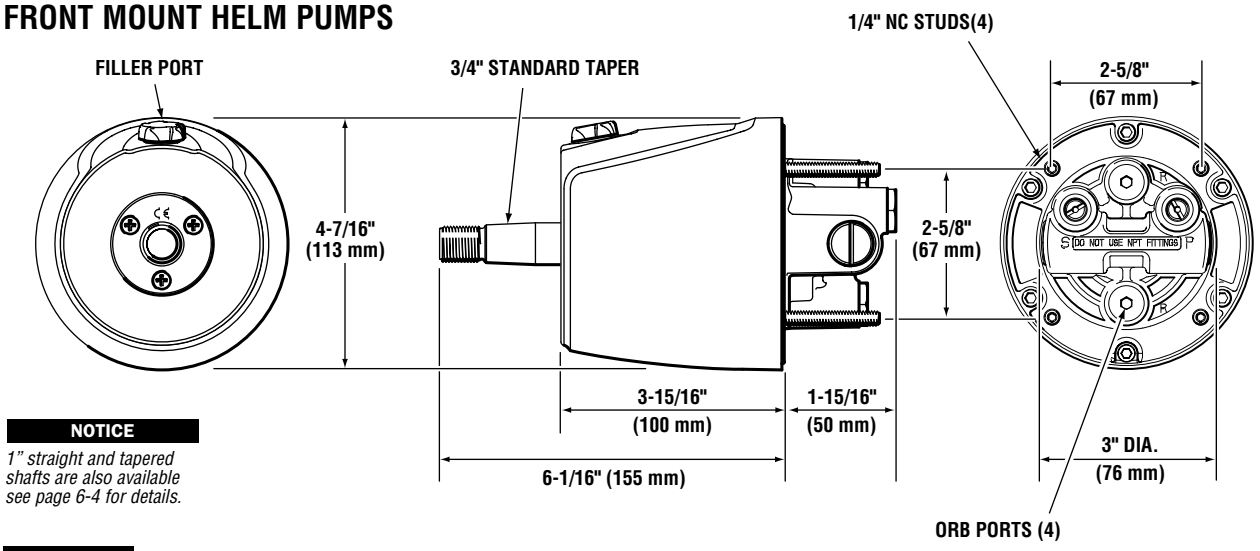
Now fitted with Positionable O-ring fittings

-3 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 helm hose fitting ports. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar Solutions O-ring style hose fittings (ORB).

NOTICE

ALL SeaStar helm pumps can be mounted horizontally to vertically and anywhere in between. In ALL cases the filler port must be in the uppermost position.

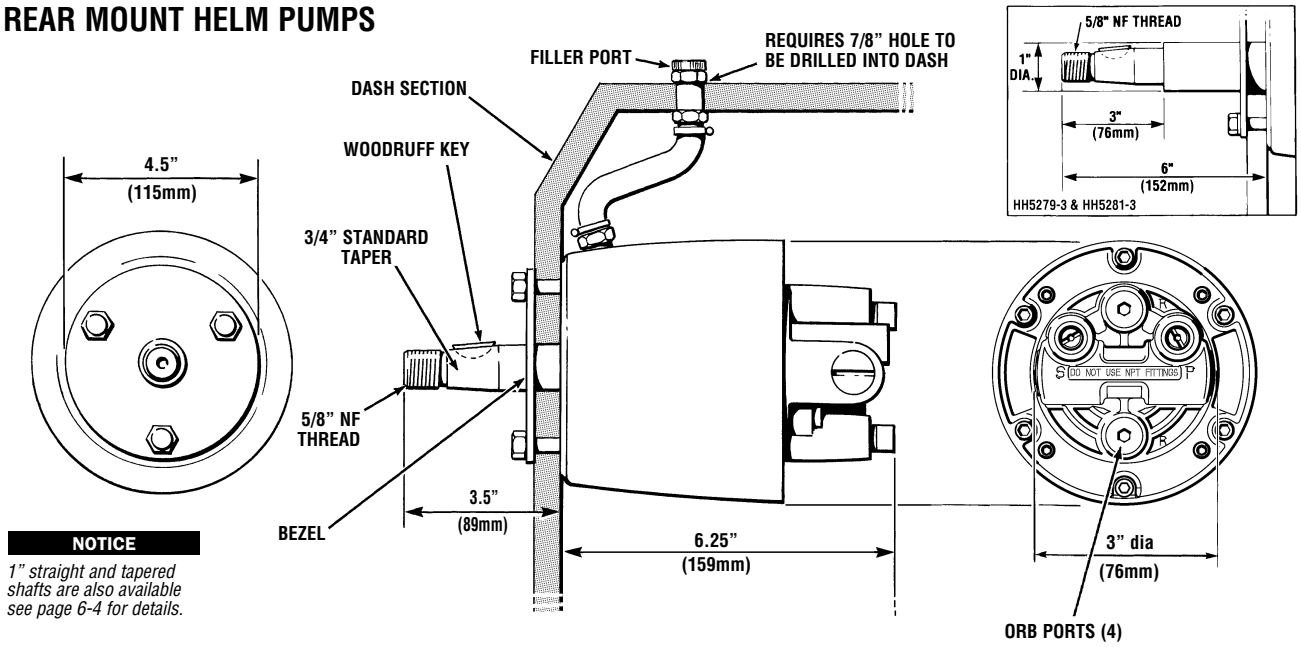
FRONT MOUNT HELM PUMPS



NOTICE
1" straight and tapered shafts are also available see page 6-4 for details.

NOTICE Max. steering wheel diameter 28" (711mm).

REAR MOUNT HELM PUMPS



NOTICE
1" straight and tapered shafts are also available see page 6-4 for details.

NOTICE Max. steering wheel diameter 28" (711mm). Min. dash thickness 1" (25.5mm), Max. dash thickness 1.5" (38mm).

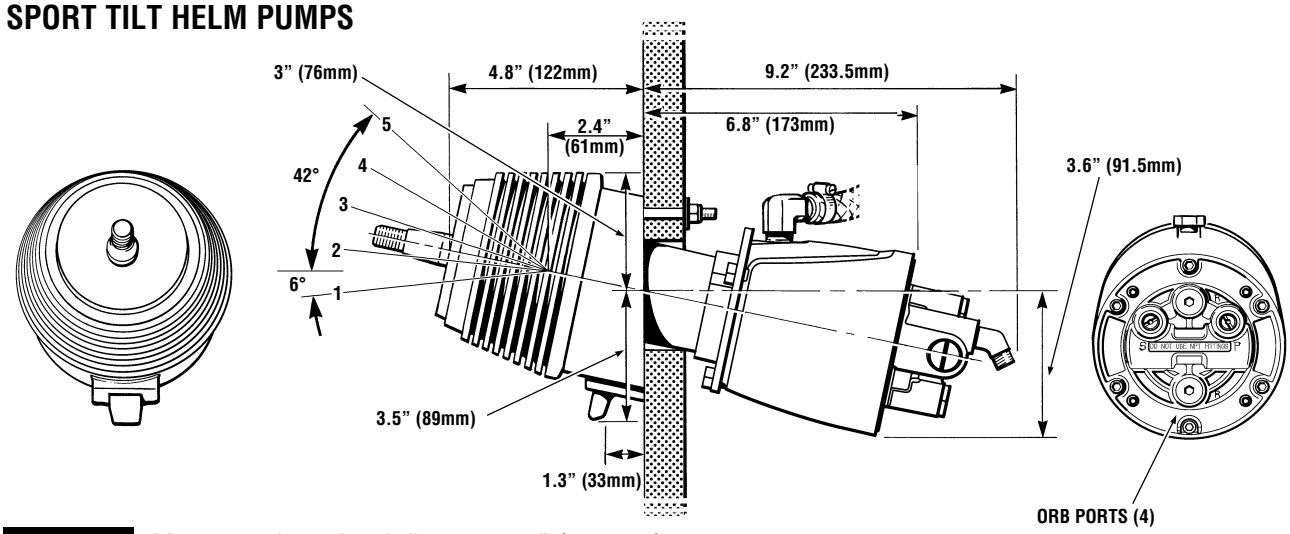
Tilt/Sport Tilt Helm Dimensions

⚠ CAUTION

Now fitted with Positionable O-ring fittings

-3 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 helm hose fitting ports. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar Solutions O-ring style hose fittings (ORB).

SPORT TILT HELM PUMPS

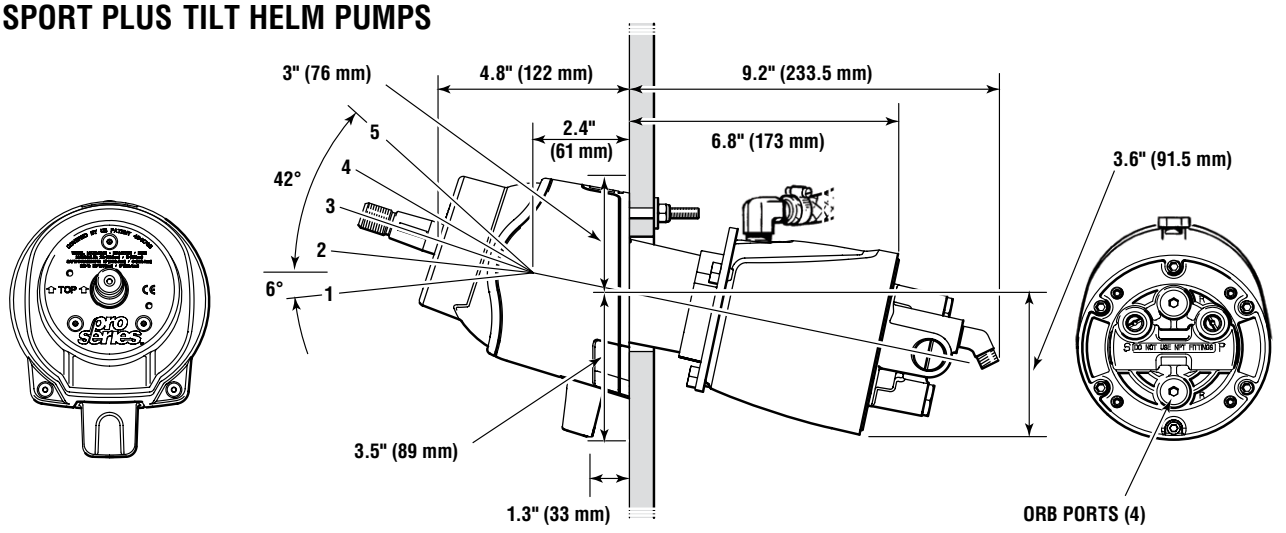


NOTICE Max. steering wheel diameter 20" (508mm)

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 9-22, HA6450 for details.

SPORT PLUS TILT HELM PUMPS



NOTICE Max. steering wheel diameter 20" (508mm)

NOTICE

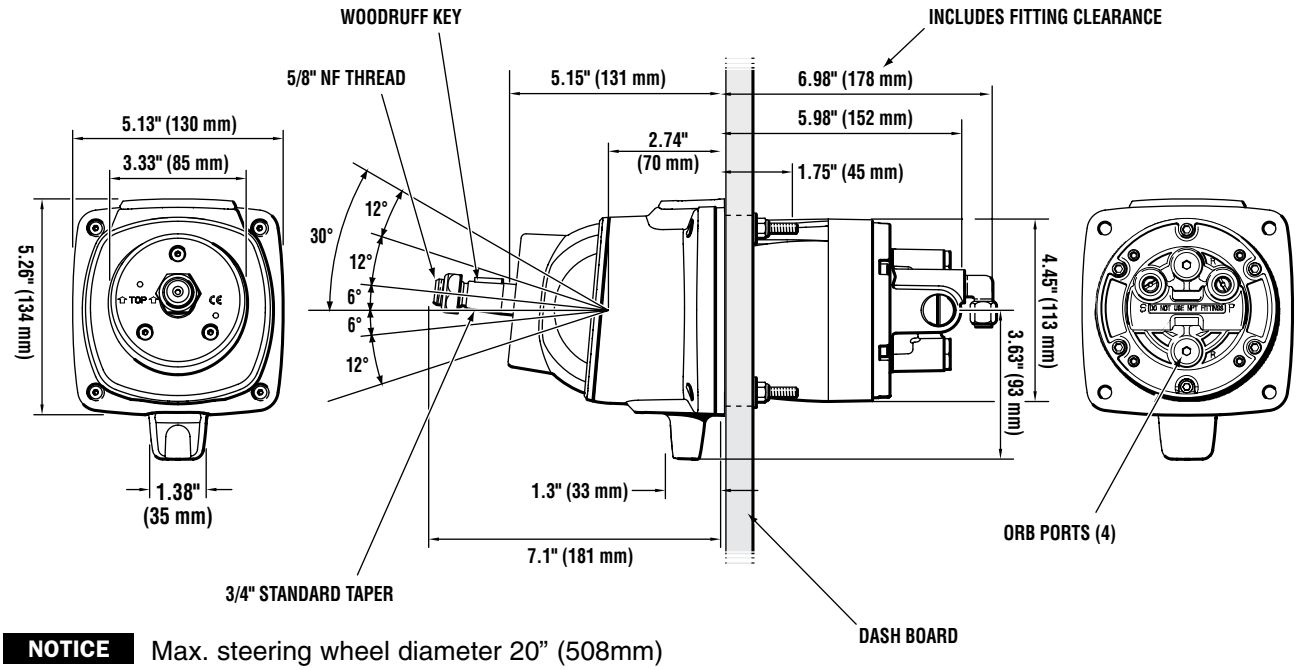
Remote fill and vent kit (included with helm pump) requires a 7/8" hole to be drilled into the dash board and above the helm pump. Please refer to page 9-22, HA6450 for details.

⚠ CAUTION

Now fitted with Positionable O-ring fittings

-3 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 helm hose fitting ports. Doing so will lead to irreparable damage to the helm. ONLY use SeaStar Solutions O-ring style hose fittings (ORB).

CLASSIC STYLE TILT HELM PUMPS



NOTICE Max. steering wheel diameter 20” (508mm)

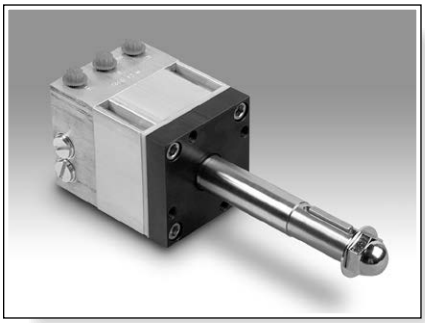
Hynautic Helm Pumps

Heavy Duty Helm Pump H-20 Series

HELM		DISPL	SHAFT STYLE DIA. & TYPE	KEYWAY	INTEGRAL VALVING
20 Series	H-21	2.75cu in	1 Straight	1/4" Square	Yes
	H-25	2.75cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes
	H-26	2.00cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes

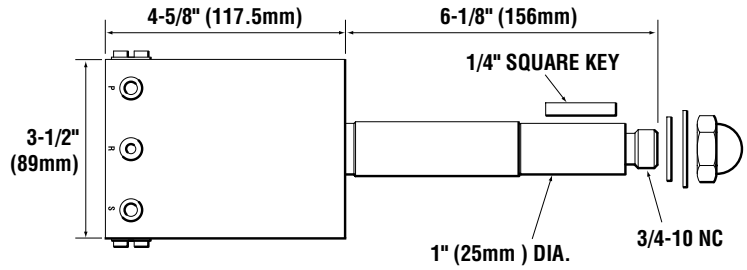
NOTICE

HF-07 trim plate sold separately.



Max steering wheel diameter 36" (914 mm).

H-21

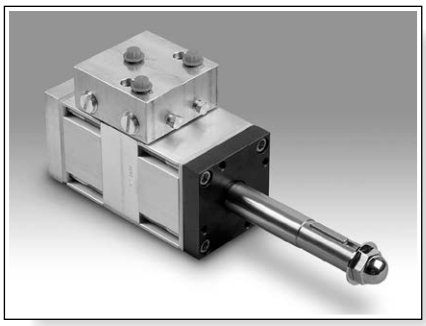


Heavy Duty Helm Pump H-40 Series

HELM		DISPL	SHAFT STYLE DIA. & TYPE	KEYWAY	INTEGRAL VALVING
40 Series	H-41	5.50cu in	1 Straight	1/4" Square	Yes
	H-41-2	5.50cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes
	H-42	4.00cu in	1 Straight	1/4" Square	Yes
	H-42-02	4.00cu in	3/4", 1"/ft Tapered	#9 Woodruff	Yes

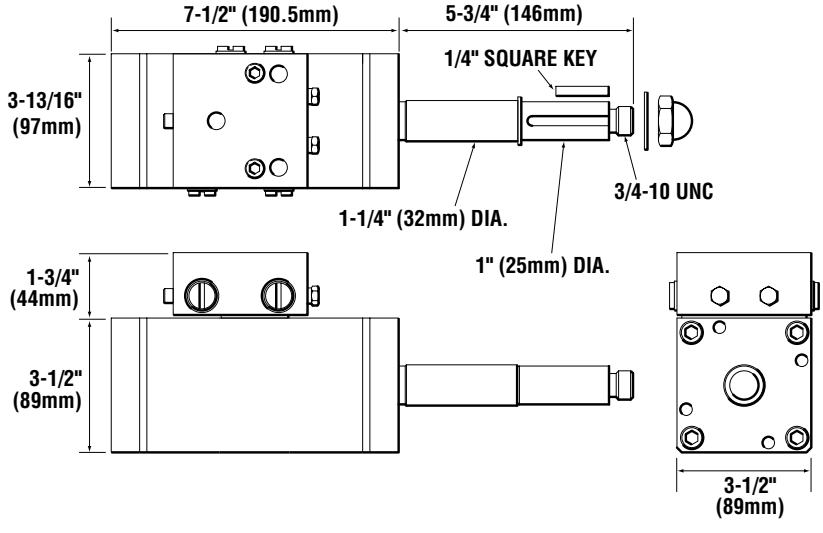
NOTICE

HF-07 trim plate sold separately.



Max steering wheel diameter 47" (1193 mm).

H-41



NOTICE

Hynautic H-20/40 Series helms require the use of an external Pressure relief valve (Part # MSV-21) and an external fluid reservoir (part #HP5810).

Capilano Helm Pumps

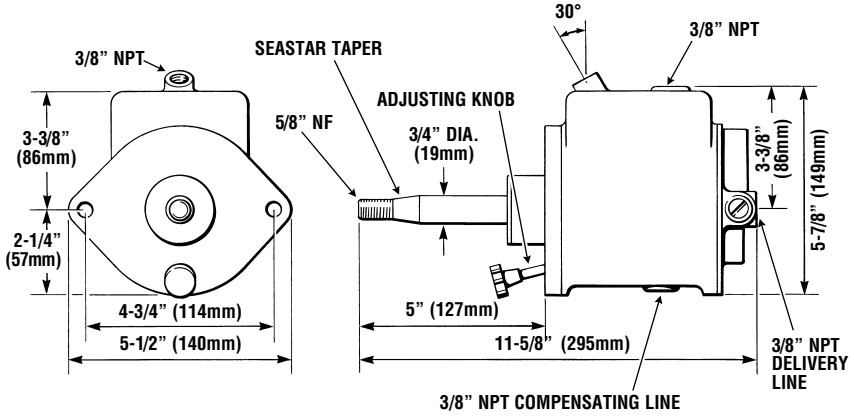
1250V & 1275V Models

Model	Part #
1250V	HH5250
1275V	HH5275

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 (1250V) is between 20” and 36”.

Recommended wheel size (1275V) is between 26” and 36”.

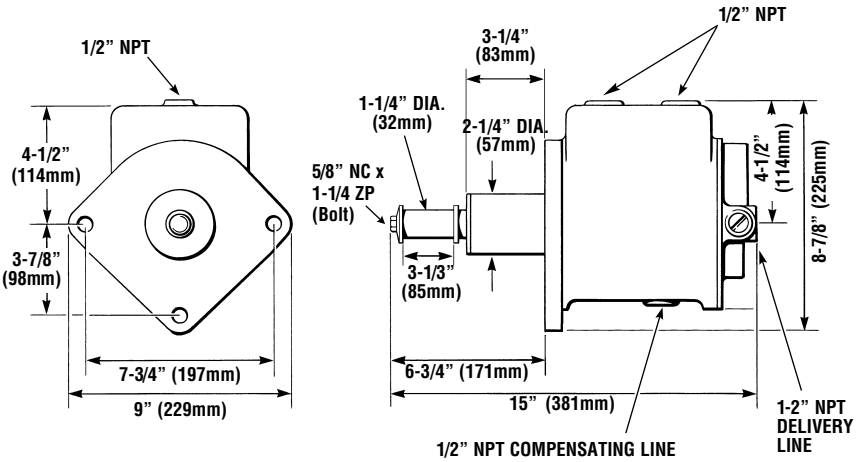


1350 Models

Model	Part #
1350	HH0426

This steering system is designed for pleasure and commercial boats where the steering torque is between 28,000 in/lbs and 62,900 in/lbs.

Recommended wheel size (1350) is between 30” and 48”.



⚠ WARNING

Use self-locking type fasteners only; substituting non-self locking fasteners can result in loosening or separation of equipment and loss of steering control.

DO NOT exceed 110 in-lbs. (12 Nm) torque on helm nuts & bolts.

CHAPTER

7

SEASTAR P/A™

POWER ASSIST

The Marine Industry is continually introducing heavier outboard engines, higher horse power engines, more aggressive propellers, bigger/faster boats...

Boat operators are asking for increased comfort and lighter steering loads... These were the driving forces behind the design of SeaStar and SeaStar PRO Power Assist.

This innovative product is highly recommended on any 150HP and above outboard application to give your boat the same, easy steering you are accustomed to in your car. Power Assist is also recommended for the following;

- Twin and Triple engine applications
- Bass Boats
- Pontoon Boats (150HP+)
- Power Catamarans
- Inboard powered cruisers without engine driven power assist.

How the System Works

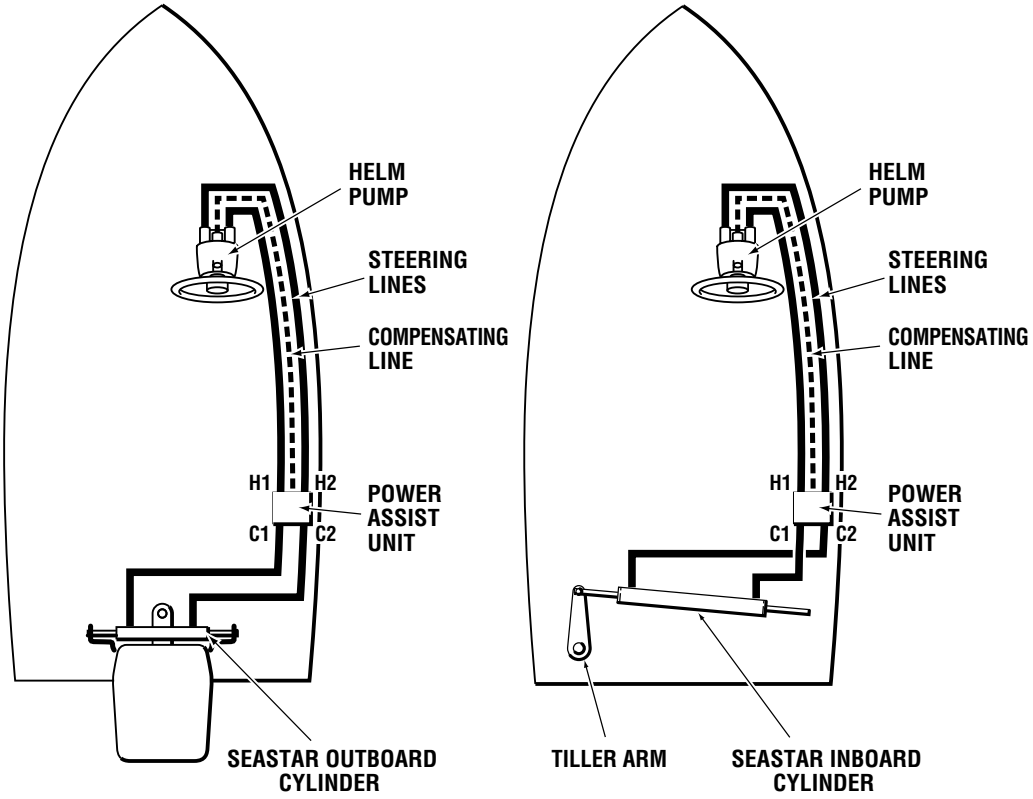
SeaStar P/A (Power Assist) steering uses an electronically controlled on-demand hydraulic pump to provide “Power” for your SeaStar Hydraulic Steering system.

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.



Typical installations shown (please refer to you cylinder installation manual for proper hose installation diagrams).

SeaStar P/A Compatibility

NOTICE

For helm displacements greater than 2.4, twin power assist pumps MUST be used. Contact 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 and 2.0 cu in (1000psi) helm pumps, or, 2.0 cu in (1500 psi) SeaStar P/A PRO Hydraulic Steering.

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 and/or between the power assist and steering cylinder(s).*

NOTICE

When fitted with a SeaStar PRO helm pump and a Power Assist pump 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.

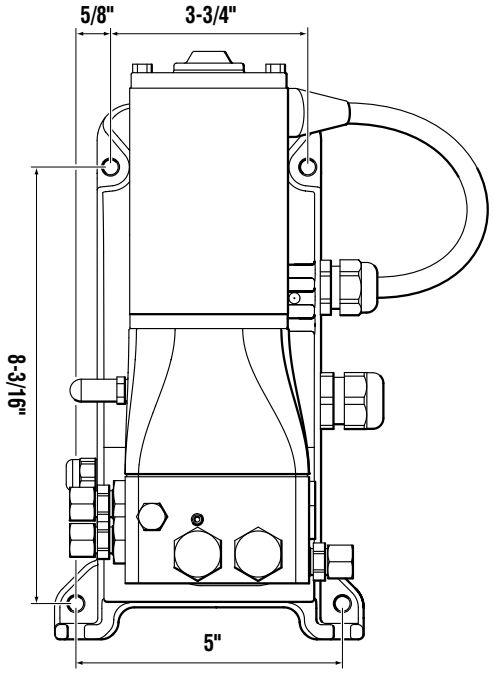
NOTICE

Use ONLY SeaStar Solutions products with the P/A unit as with ALL SeaStar Solutions systems. Failure to do so may void your warranty.

NOTICE

Retrofit kit part # HA1205 will be required to mount to a PA1200-2 Power Assist Pump.

Specifications



SEASTAR POWER ASSIST 12/24V (PA1200-2 & PA1225-2)
- 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 ignition wire MAX current draw = 1 amp

SEASTAR PRO POWER ASSIST, 12/24V (PA1315-2)
- 12/24 Volts (automatically recognized)
- 1500psi MAX System peak pressure (500psi working load)
- Relief pressure 2000 psi
- MAX current draw = 50 amps
- Typical current draw = ~3 amps
- Purple ignition wire MAX current draw = 1 amp

Part No.	Harness Length	Voltage (auto recognized)
PA1200-2	15'	12/24 Volt
PA1206-2	6'	12/24 Volt
PA1225-2	25'	12/24 Volt
PA1315-2	15'	12/24 Volt

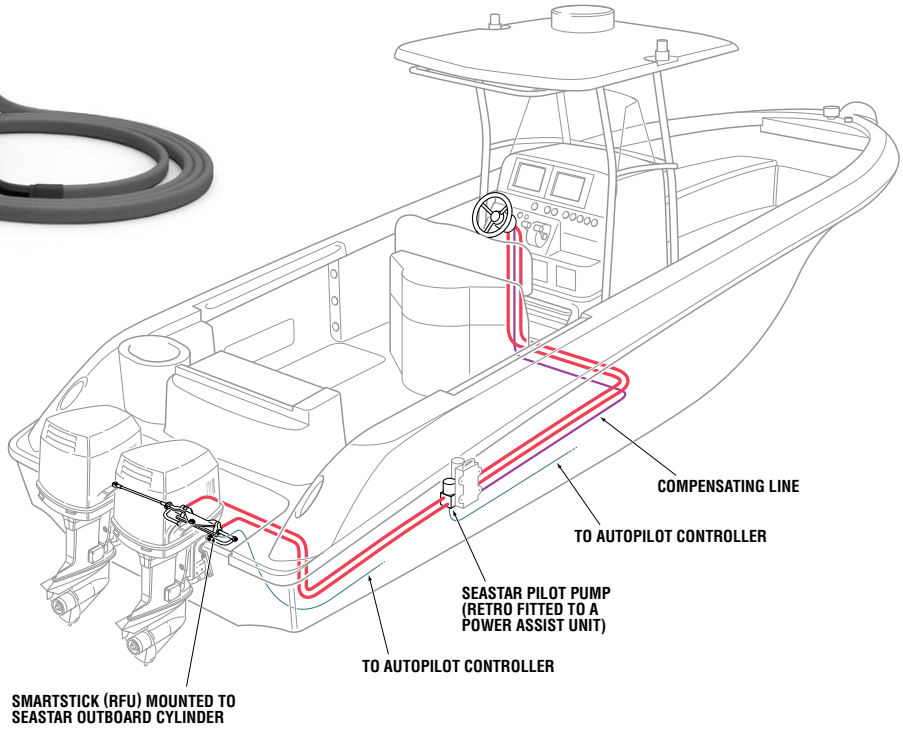
NOTICE

Use SeaStar PRO Power Assist with a SeaStar PRO helm for best performance.

POWER ASSIST AUTOPILOT

Converts manual hydraulic steering for dramatic reduction in steering wheel torque and at the same time provides a pump for an autopilot installation.

The SeaStar Power Assist Autopilot pump is the standard power assist product with the addition of a Type 1 or Type 2 autopilot pump. The SeaStar Autopilot pump is a fixed flow, reversible pump 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 & type 2).



Features

- Autopilot ready – a single installation (i.e. no need to break into system for install of pump)
- Converts manual hydraulic steering to power steering
- Dramatic reduction in steering wheel torque
- Easy installation
- OEM or Retrofit
- Simple add on to an existing SeaStar manual system
- (from 1.4-2.4 SeaStar helm pumps)
- Compatible with power purge system
- Ignition protected (SAE J-1171)
- ABYC, CE, NMMA, ISO 10592 Approved
- Replaces other 12 & 24 volt systems

Specifications

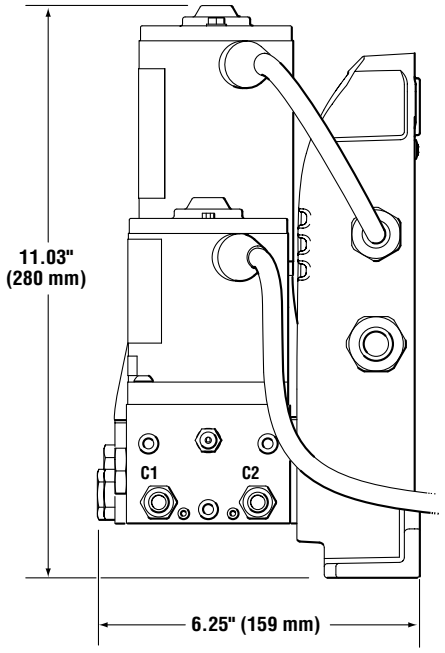
Voltage	12 or 24 Volts
Fittings	Compatible with Standard SeaStar Hoses (HO51xx etc.)
Wire Length	24”
Wire Gauge	12 awg
Connector	None – Bare Leads
Oil Compatibility	SeaStar Steering Fluid (MIL 5606)
Weight	4.9 lbs (2.2 Kg)
Autopilot Pump Sizes	Type 1: 60 in^3/min (no-load) Type 2: 100 in^3/min (no-load)
Maximum Pressure	1000 psi
Typical Current Draw *(Depending on Application)*	12V Type 1: 4 – 8 amps 12V Type 2: 5 – 11 amps 24V Type 1: 2 – 4 amps 24V Type 2: 3 – 6 amps
Autopilot Pump Cylinder Capacity	Type 1: 4.9 in^3 – 12.5 in^3 Type 2: 2.5 in^3 – 21.0 in^3

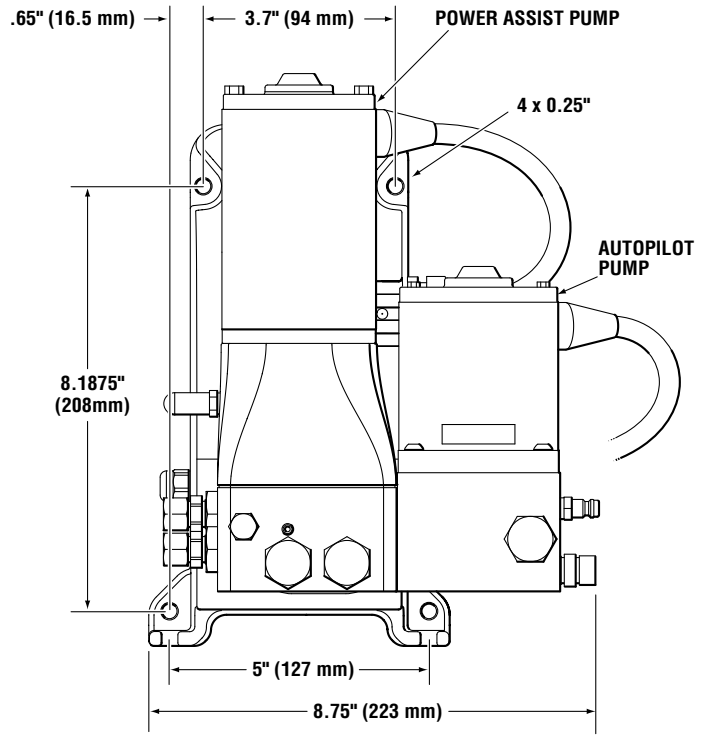
Order Guide

SeaStar PA unit complete with Pilot Pump fitted

ORDER INFORMATION	PART NO.
Standard SPA plus Type 1 12V pump	PA6010
Standard SPA plus Type 2 12V pump	PA6020
Standard SPA plus Type 1 24V pump	PA7010
Standard SPA plus Type 2 24V pump	PA7020

Technical Data





Note: *This page left blank intentionally.*

CHAPTER

8

SEASTAR™

POWER STEERING SYSTEMS

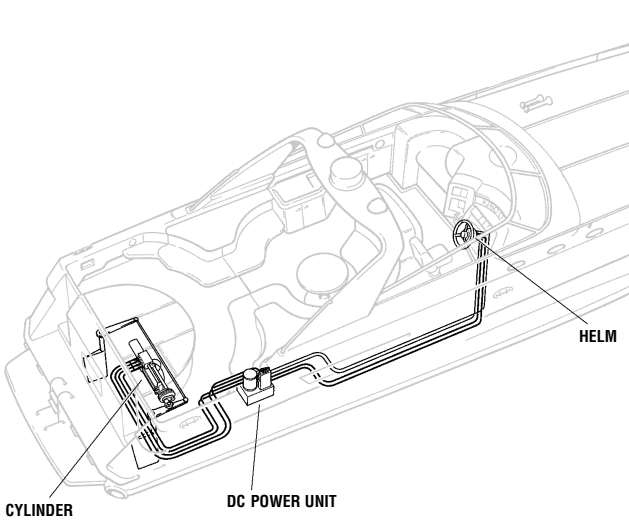
Introduction

Larger yachts require a larger steering system to handle the higher loads typically seen at the rudder(s). This system consists of two distinct operating circuits;

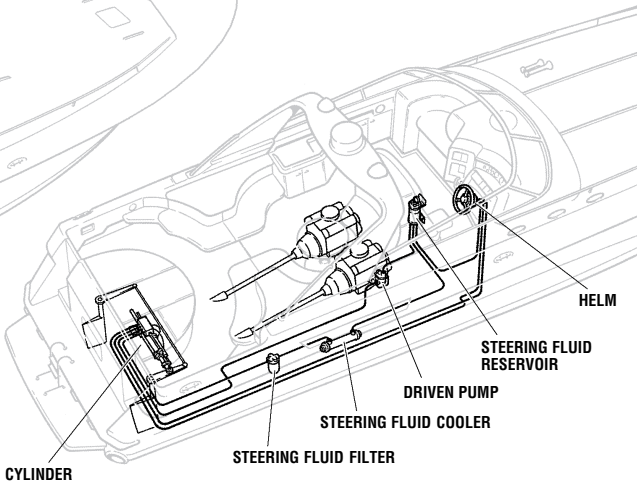
- a “manual” operated hydraulic system, consisting of a standard SeaStar Helm pump and a hydraulic steering cylinder (fitted with integral servo cylinder and power steering valve), and
- a “power” steering system consisting of either an engine driven pump (conventional), or, an eclectically driven power assist pump (electric).

The manual circuit provides the control portion of the steering system and the power circuit provides the power to turn the rudder(s). SeaStar manufactures two options for the power circuit. Regardless of the power option you choose, the correct steering cylinder(s) and helm pump(s) (manual circuit) will need to be determined first (see page 8-2 for selection process). The power steering cylinders as well as the helm pump are common between the two “power” systems. Before choosing your preferred “power” option, you must determine what cylinder is required for your application.

If you have any questions regarding the selection of your steering system, please contact Technical Support for assistance “before” you select your system.



DC Power Steering shown.



Conventional Power Steering shown.

Steering Cylinder(s) and Helm Pump Selection

Review the Cylinder selection guide below to choose the correct cylinder for your application, then, consult with helm pump selection to determine what helm you wish to purchase to provide your desired wheel turns from hard over to hard over.

NOTICE

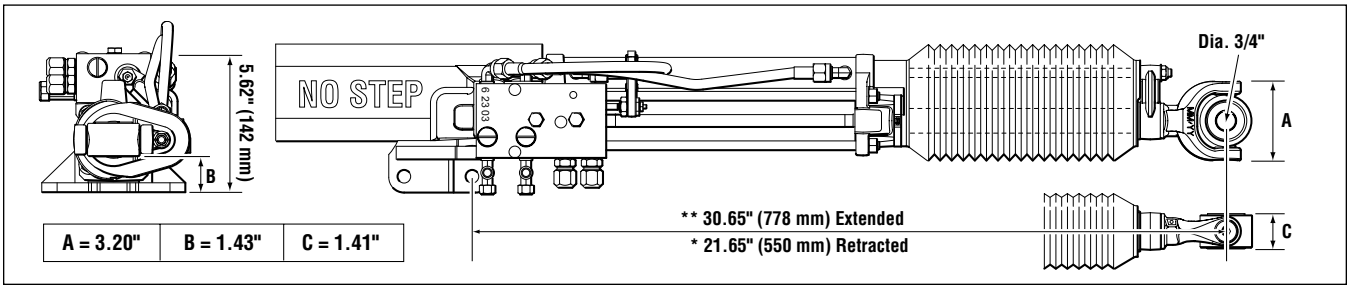
The Cylinder Selection Guide below is for vessels fitted with "standard" rudders currently using SeaStar Steering Systems. For all boats over 70' and boats that are fitted with large and/or articulating rudders, steering loads should be reviewed by SeaStar Solutions Technical Service prior to selecting your cylinder (see Rudder Torque Data Sheets on page 9-24 and page 9-25).

Cylinder Selection Guide

All boats over 70' should have steering loads reviewed by factory.

CYLINDER PART NUMBER	DISPLACEMENT HULLS (standard)	DISPLACEMENT HULLS (heavy duty)	PLANING HULLS
SINGLE 9" x 1 CYLINDER (HC5801-2)	UP TO .....50' (15m)	UP TO .....40' (12m)	UP TO .....65' (20m)
TWIN 9" x 2 CYLINDER (HC5802)	UP TO .....75' (22m)	UP TO .....55' (17m)	UP TO .....85' (26m)
SINGLE 11" x 1 CYLINDER (HC5803-2)	UP TO .....60' (18m)	UP TO .....50' (15m)	UP TO .....75' (23m)
TWIN 11" x 2 CYLINDER (HC5804)	UP TO .....85' (26m)	UP TO .....60' (18m)	UP TO .....100' (31m)
*SINGLE 9" x 2.5 CYLINDER (HC5805)	UP TO .....100' (31m)	UP TO .....70' (22m)	UP TO .....110' (34m)
*TWIN 9" x 2.5 CYLINDER (HC5806)	UP TO .....110' (34m)	UP TO .....80' (25m)	UP TO .....120' (37m

** Larger 2.5" cylinder bore than HC5801-2 and HC5802.*



** Add 2" (50 mm) to this dimension for HC5803-2. ** Add 4" (101 mm) to this dimension for HC5803-2.*

Technical Data

CYLINDER PART NUMBER	DISPLACEMENT	BORE	STROKE	OUTPUT FORCE	MAX. TORQUE (35° from centre)
SINGLE 9" CYLINDER (HC5801-2)	21.25 in^3 (348cc)	2.0" (51mm)	9" (229mm)	2946 lbs_f (13,090 N)	18,900 in–lbs (2130 Nm)
SINGLE 11" CYLINDER (HC5803-2)	26.00 in^3 (426cc)	2.0" (51mm)	11" (280mm)	2946 lbs_f (13,090 N)	23,140 in–lbs (2610 Nm)
TWIN 9" CYLINDER (HC5802)	42.50 in^3 (697cc)	2.0" (51mm)	9" (229mm)	5892 lbs_f (26,190 N)	37,800 in–lbs (4260 Nm)
TWIN 11" CYLINDER (HC5804)	52.00 in^3 (853cc)	2.0" (51mm)	11" (280mm)	5892 lbs_f (26,190 N)	46,280 in–lbs (5220 Nm)
SINGLE 9" CYLINDER (HC5805)	37.11 in^3 (608cc)	2.5" (64mm)	9" (229mm)	5154 lbs_f (22,926 N)	33,065 in–lbs (3736 Nm)
TWIN 9" CYLINDER (HC5806)	74.22 in^3 (1216cc)	2.5" (64mm)	9" (229mm)	10,308 lbs_f (45,852 N)	66,130 in–lbs (7472 Nm)

Helm Pump Selection

NOTE: *wheel turns and autopilot additions are based on the 'servo cylinder' volume 7.24 cu.in.*

	CYLINDER PART NUMBER											
	HC5801-2 (Single and Twin)				HC5803-2 (Single and Twin)				HC5805 (Single and Twin)			
HELM PUMP	1.4	1.7	2.0	2.4	1.4	1.7	2.0	2.4	1.4	1.7	2.0	2.4
WHEEL TURNS (Hard Over to Hard Over)	4.3	3.5	3.0	2.5	5.3	4.3	3.7	3.1	4.3	3.5	3.0	2.5

NOTICE

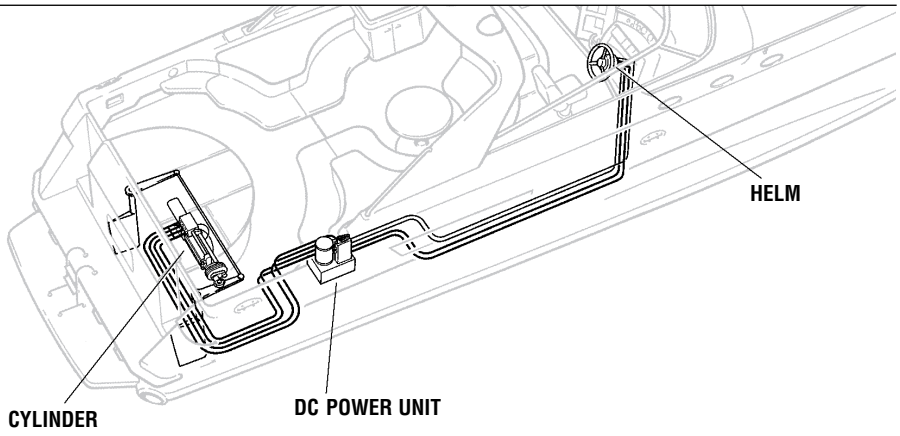
DC Power Steering System is ONLY to be used with a SeaStar 1.4 or 1.7 helm pump. Larger displacement helm pumps CANNOT be used with DC Power Steering.

DC POWER STEERING

(Electric, Power Assist)

Features

- Easy to troubleshoot
- No PTO, no separate filter, no separate reservoir, no cooler required
- Highly responsive, effortless steering performance at all speeds
- Low number of turns lock to lock (based on helm selection)
- Few components to spec and install, reduced install time
- Semi-Auto purge feature
- Suitable for multi-station applications
- Integrated autopilot pump
- Suitable for use with most SeaStar helms (including tilt versions)
- Automatic manual back up system

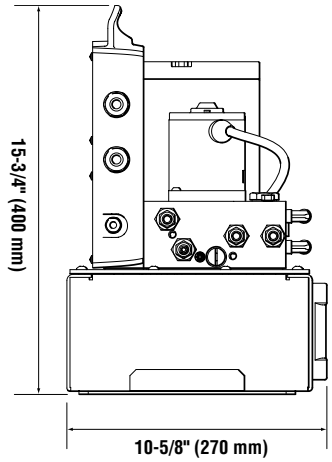


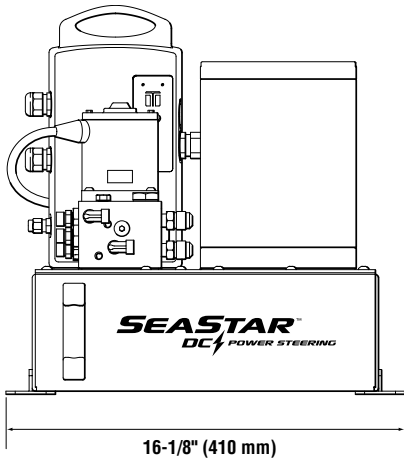
SeaStar Power Steering provides super responsive automotive style steering performance for todays' large motor yachts. The SeaStar DC Power Steering Unit is the heart of the system providing reliable and economical hydraulic flow to the steering cylinder whenever the wheel is turned. Whether docking or cruising at high speed, the system will deliver 100% power regardless of engine speed.

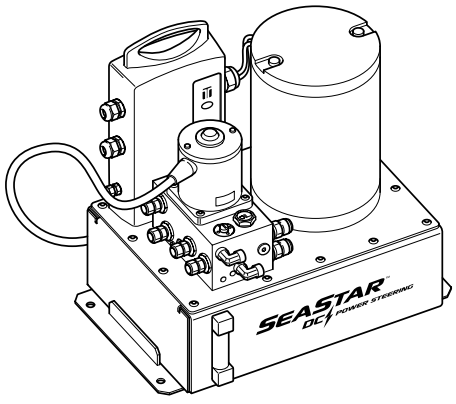
SeaStar's superior design and selection of materials, precision manufacturing and rigid quality control all add up to an outstanding robust and versatile system for all large boat applications.

Technical Data

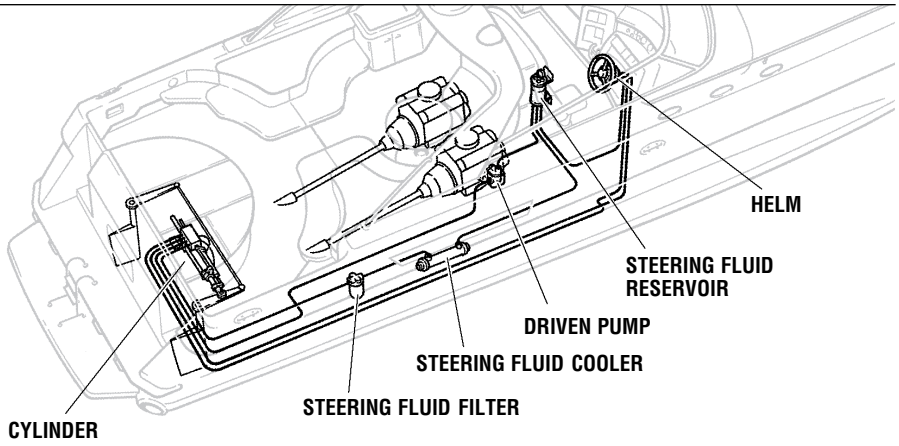
MODEL	DC1000	DC2000
Main Motor	24 Volts	24 Volts
Autopilot Motor	12 Volts	24 Volts
Peak Current Draw @ 1250psi	72 amps	72 amps
Idle Current Draw	0.2 amps max	0.2 amps max
Average Current Draw *(Depending on application)*	10-12 amps	10-12 amps
Weight *(Dry)*	55lbs (25 kg)	55lbs (25 kg)
Tank Capacity	7 Liters	7 Liters
Adjustable Flow Autopilot	0 – 60 in^3/min (984cc)	0 – 60 in^3/min (984cc)







CONVENTIONAL POWER STEERING



Power Circuit Options

Features

- Effortless steering from docking to top speed
- Responsive steering 3-1/2, turns lock to lock (or to suit)
- Automatic manual back up steering
- Multiple steering stations
- Easy autopilot interface

How it works

SeaStar hydraulic power steering uses the ship's engine(s) to provide the "power" for the steering system, via an engine or electric motor driven hydraulic pump.

A manual hydraulic steering system, consisting of a standard SeaStar helm and a hydraulic steering cylinder, (fitted with an integral servo cylinder and a power steering valve) supplies the "control" portion of the steering system.

Under normal conditions, with engines running, a hydraulic fluid supply is in a stand-by mode, ready to be directed to the steering cylinder as dictated by the steering wheel, servo cylinder and power steering valve.

Turning the steering wheel left or right makes the system go from stand-by into operating mode and move the steering cylinder accordingly.

In the event of a power source failure, hydraulic fluid, from the steering helm, is automatically diverted directly into the servo and steering cylinder, providing the helmsman with manual back-up steering.

An engine room mounted steering fluid reservoir allows easy system fill and assists the in-line steering fluid cooler in cooling the hydraulid fluid. An in-line steering fluid filter helps to protect the steering system components against contaminants.

Hose, Tube and Hydraulic Fluid

Recommend 100R1 for power circuit, 5/16"ID hose or tube for manual circuit.
System designed to use SeaStar Steering Fluid (SeaStar EPS Fluid) or Dexron II (ATF) if using 1250V or 1275V helms.

Power Circuit Selection

Power Steering Cylinders	Part #
9" (228mm) stroke	HC5801-2
See page 8-2 for correct cylinder selection.	
11" (279mm) stroke	HC5803-2
See page 8-2 for correct cylinder selection.	
9" (228mm) stroke	HC5805
See page 8-2 for correct cylinder selection.	

Add-On Cylinders	Part #
9" (228mm) stroke	HC5802
See page 8-2 for correct cylinder selection.	
11" (279mm) stroke	HC5804
See page 8-2 for correct cylinder selection.	
9" (228mm) stroke	HC5806
See page 8-2 for correct cylinder selection.	

Steering Helms (For 3-1/2 Turn System)	Part #
SSI Helm, Standard Mount	HH5271-3
SSI Helm, Rear Mount	HH5261-3
SSI Helm, Tilt	HH6541-3
SSI Helm, Rear Mount, 1" Shaft	HH5281-3

Power Steering Pumps	Part #
Outlet Check Power Pump	HP5820
Press Relief Twin Pump	HP5822
R.H. Rotation, Belt Drive	HP5830
L.H. Rotation, Belt Drive	HP5831
R.H. Rotation, Keyed Shaft, Direct Drive	HP5832
R.H. Rotation, 11 Tooth Splined Shaft	HP5833
R.H. Rotation, Direct Drive, Heavy Duty	HP5835
R.H. Rotation, 9 Tooth Splined Shaft, Direct Drive	HP5837
R.H. Rotation, 11 Tooth Splined Shaft, Direct Drive	HP5838
R.H. Rotation, Direct Drive, No Flow Control	HP5836
R.H. Rotation, 9 Tooth Splined Shaft, Direct Drive	HP5839
L.H. Rotation, 11 Tooth Splined Shaft, Direct Drive	HP5840
L.H. Rotation, Direct Drive	HP5841
L.H. Rotation, 11 Tooth Splined Shaft, Direct Drive	HP5842
L.H. Rotation, 9 Tooth Splined Shaft, Direct Drive	HP5843
R.H. Rotation, 6 Tooth B Flange, Direct Drive	HP5844
L.H. Direct Drive, 9 Tooth Splined Shaft	HP5845
R.H. Direct Drive, 9 Tooth Splined Shaft	HP5846
R.H. Direct Drive, 11 Tooth Splined Shaft	HP5847
R.H. Keyed Shaft	HP5848
L.H. Direct Drive, 11 Tooth Splined Shaft	HP5849
L.H. Keyed Shaft	HP5850
L.H. direct drive, 13 Tooth Splined Shaft	HP5852

Steering Fluid Reservoir, Cooler and Filter	Part #
Steering Fluid Reservoir	HP5810
Steering Fluid Cooler, 2.25 KW, 1" water lines	HP5825
Steering Fluid Cooler, 6.25 KW, 2" water lines	HP5826
Steering Fluid Filter	HP5815

Miscellaneous	Part #
Outlet Check Valve (Power Pump)	HP5820
Auto Flow Control (Twin Pump)	HP5821
Crossover Pressure Relief	HP5822
System Pressure Gauge Kit	HA5821
Adapter Kit, Twin Disk #5050	HA5823
Adapter Kit, Twin Disk #5061	HA5824
Adapter Kit, MAN to V10 Pump	HA5827
SeaStar Steering Fluid, 1 liter	HA5430
SeaStar Steering Fluid, 4 liter	HA5440
Pressure Relief Valve, (1250psi setting)	*HP5818

* *Required in a system where the Power pump does NOT have a built in pressure relief valve. ALL SeaStar Power Pumps have built in Pressure Relief Valves.*

Note: *This page left blank intentionally.*

CHAPTER

9

SEASTAR™

HOSE, TUBING, FITTINGS, ACCESSORIES & TOOLS

SeaStar Steering Hose Introduction

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, SeaStar Solutions recommends that **ONLY** SeaStar or SeaStar PRO steering hoses be used in SeaStar Steering Systems.

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 – Page 9-6
STERNDRIVES, SEADRIVES, INBOARDS, SEASTAR 1.4/1.7	3/8” DIA. NYLON or ASTM B280 COPPER TUBING	Page 9-7 – Page 9-11
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 dual engine application or you are mounting the engines on a gill 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 stern drive cylinders and/or SeaStar Power Assist Applications.

SEASTAR OUTBOARD 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/tubing 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. SeaStar Solutions 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.

NOTICE

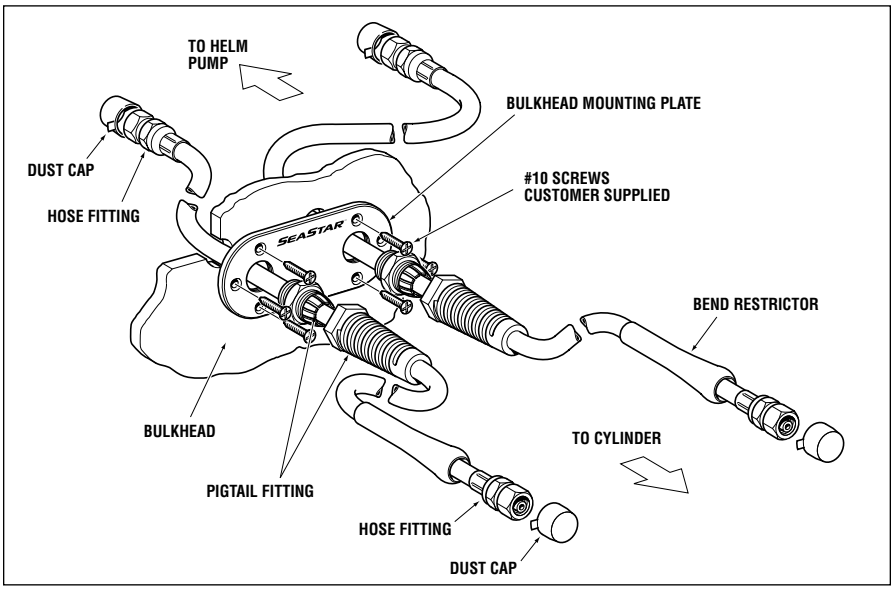
SeaStar Bulkhead hoses provide the cleanest hose routine.

SeaStar Solutions offers two different types of steering hoses;

- Standard (straight line hoses, not passing through bulkheads) from 1’ to 5’ (1’ increments), 6’ 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 5’ (1’ increments) 6’ to 30’ (2’ increments), both SeaStar standard and SeaStar PRO available.

Bulkhead Hose Kits

For the cleanest Installation.



HO88xx Dual Polished Plate shown.

SeaStar Hose Kits: How to Order

Each part number contains two hoses of equal length.

PART NO.	KIT DESCRIPTION
* HO51xx	SeaStar Standard Outboard Hose Kit (2 hoses)
* HO57xx	SeaStar Pro Hose Kit (2 hoses)
** HO81xx	SeaStar Bulkhead Hose Kit, Standard (2 hoses)
** HO82xx	SeaStar Bulkhead Hose Kit, Pro (2 hoses)
** HO86xx	SeaStar Bulkhead Hose Kit, Polished Plate (2 hoses)
** HO87xx	SeaStar PRO Bulkhead Hose Kit, Polished Plate (2 hoses)
** HO88xx	SeaStar Bulkhead Hose Kit, Polished Plate double (2 hoses)
** HO89xx	SeaStar PRO Bulkhead Hose Kit, Polished Plate double (2 hoses)

* *SeaStar Standard and Pro Hose Kits are available in lengths from 2’ – 30’.*

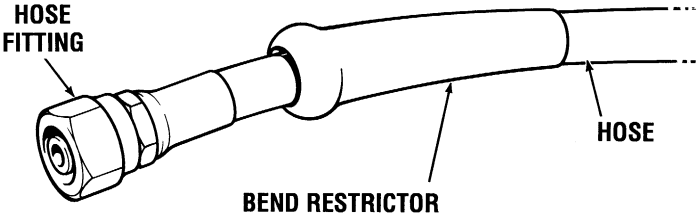
** *SeaStar Standard and Pro Bulkhead Hose Kits are available in lengths from 12’ – 30’.*

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.

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.



Standard Hose Kit

How to Measure Hoses

Select from the illustrations that follow (figures A through I), the situation which best suits your application and note the:

a) cylinder location,
b) number of cylinders,
c) type of cylinders,
d) number of steering stations, and
e) the number of hose and fitting kits required.

NOTICE

⚠ CAUTION

DO NOT cut the hose. This will destroy the hose. Once cut there is no means to field swage fittings to the ends of the hose.

- *Measure from center of the cylinder(s) and helm(s)*
- *Some installations require more than 1 hose kit and additional fitting kits (see parts list for each figure).*
- *Minimum bend radius for outboard hose is 2–1/2" (6 cm).*
- *Outboard cylinders move. They are subject to engine trim & tilt. Enough slack must be left in the hoses to prevent kinking.*

How to Measure Hoses: Single Station, Single Cylinder, NO 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 hose kit required.
4) Order hose kit part no. HO51xx (item 1). The last two digits correspond to the length of hose.

Figure A
Single Front Mount Cylinder
Note: cylinder body moves

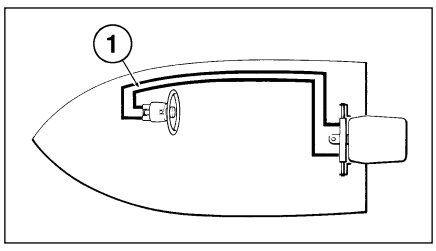


Figure B
Single Side Mount Cylinder
Note: cylinder body stationary

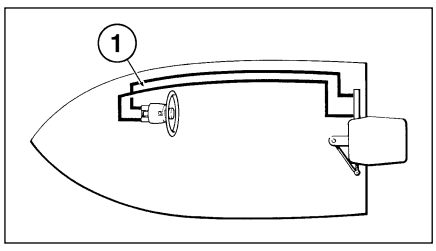
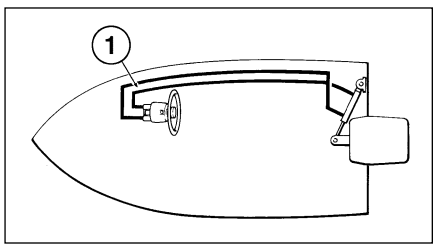


Figure C
Single Splashwell Mount Cylinder
Note: cylinder body stationary



Single Station

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. HO51xx (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. HO51xx (items 2 & 3). The last two digits correspond to the length of hose.

NOTICE

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

Figure D

Dual Front Mount Cylinders
Note: cylinder body moves

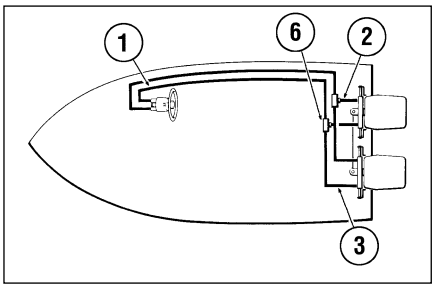
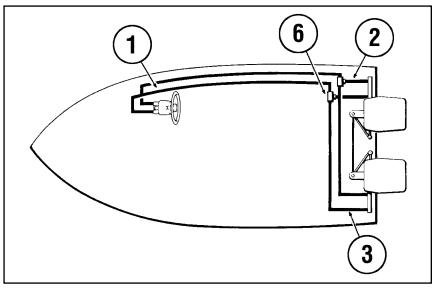


Figure E

Dual Side Mount Cylinders
Note: cylinder body stationary



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) Order hose kit part no. HO81xx (item 4). The last two digits correspond to the length of hose.

Figure F

Single Front Mount Cylinder
Note: cylinder body moves

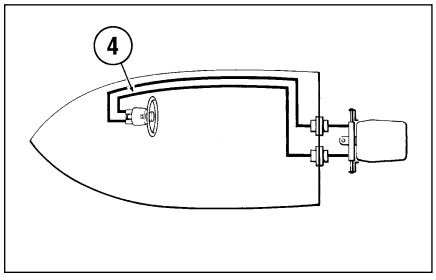
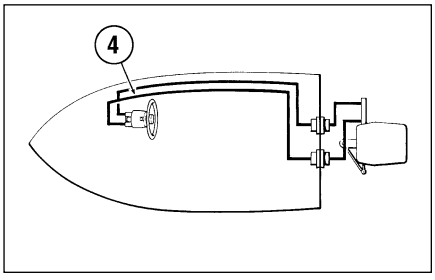


Figure G

Single Side Mount Cylinder
Note: cylinder body stationary



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. HO51xx (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. HO81xx (items 4 & 5). The last two digits correspond to the length of hose.

NOTICE

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

Figure H
Dual Front Mount Cylinders
Note: cylinder body moves

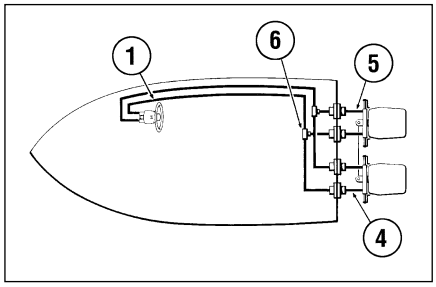
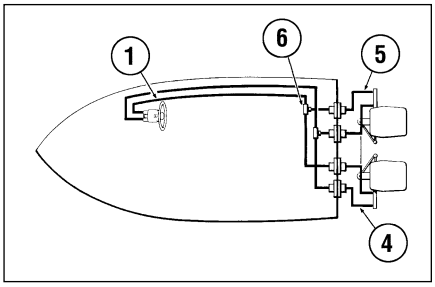


Figure I
Dual Side Mount Cylinders
Note: cylinder body stationary



Part Numbers for Figures A, B, C, D, E, F, G, H & I

ITEM	PART #	DESCRIPTION
1	HO51xx	Hose Kit
2	HO51xx	Hose Kit
3	HO51xx	Hose Kit
4	HO81xx	Bulkhead Hose Kit
5	HO81xx	Bulkhead Hose Kit
6	HF5530	Tee Fitting Kit (3 per Kit)

NOTICE

See page 9-9 'Fittings and Fitting Kits' for add a station and/or autopilot fitting kits.

Additional Stations or Autopilot Integration

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 HO51xx the last two digits correspond to the length of hose.

Note:

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 outboard hose is 2-1/2" (6 cm).

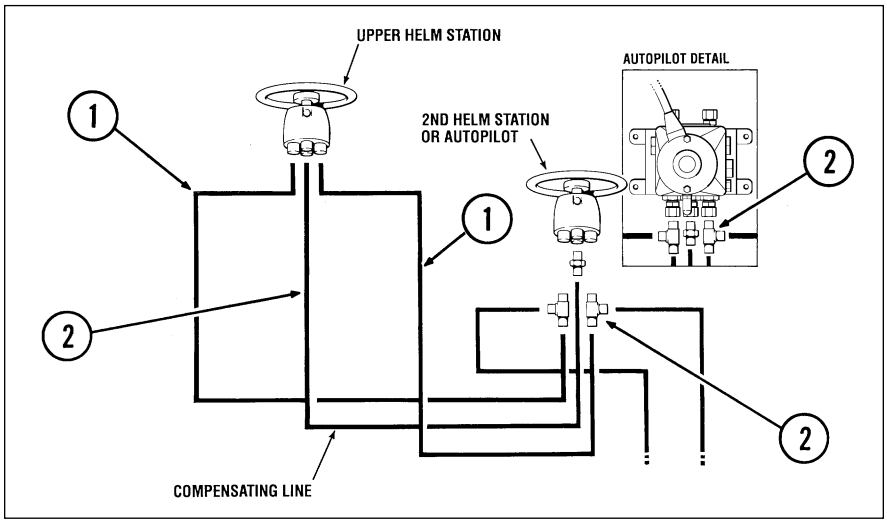
d) A compensating line is required between helm stations or the helm and autopilot power pack.

Figure J

2nd Steering Station or Autopilot Power Pack Installation

⚠ WARNING

DO NOT CUT HYDRAULIC HOSE.



Parts list

For Figure J

ITEM #	DESCRIPTION	PART NUMBER	QUANTITY REQUIRED	REF PAGE #
1	HOSE KIT	HO51xx	1	
2	FITTING KIT* *(For use with -3 helms ONLY)*	HF6007	1	9-12

* Includes 25' of 3/8" dia. Nylon tubing to be used for the compensating line ONLY.

For NPT helm pumps use Kit # HF5501.

SEASTAR INBOARD/STERNDRIVE TUBING

Two types of tubing materials are available for plumbing Inboards and Sterndrives.

1) SeaStar 3/8" outside diameter nylon tubing
2) 3/8" outside diameter copper refrigeration tubing

Nylon Tubing

NOTICE

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

SeaStar 3/8" outside diameter nylon tubing is recommended for;
a) Inboard,
b) Sterndrive, and
c) Seadrive steering systems with SeaStar (1.7 cubic inch/rev displacement) helms only.

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

LENGTH FEET	(METERS)	TUBING PART #'S
25'	(7.6m)	HT5092
50'	(15.2m)	HT5095
75'	(22.8m)	HT5097
100'	(30.5m)	HT5100
1000'	(305.0m)	HT5101

⚠ WARNING

SeaStar Solutions recommends the use of SeaStar PRO (1500 psi) reinforced Kevlar Hoses with SeaStar PRO Helm systems.

Copper Tubing

3/8" outside diameter copper tubing is recommended for;
a) inboard,
b) sterndrive, and
c) seadrive steering systems with SeaStar (2.4 cubic inch/rev displacement) helms only, or where the length of tubing run exceeds 100 feet (30.5m).

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.

To determine the required length of tubing for single and dual configurations:

From the illustrations (figures A and B), select the situation which best suits your application and note;
a) the type of drive system, and
b) 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

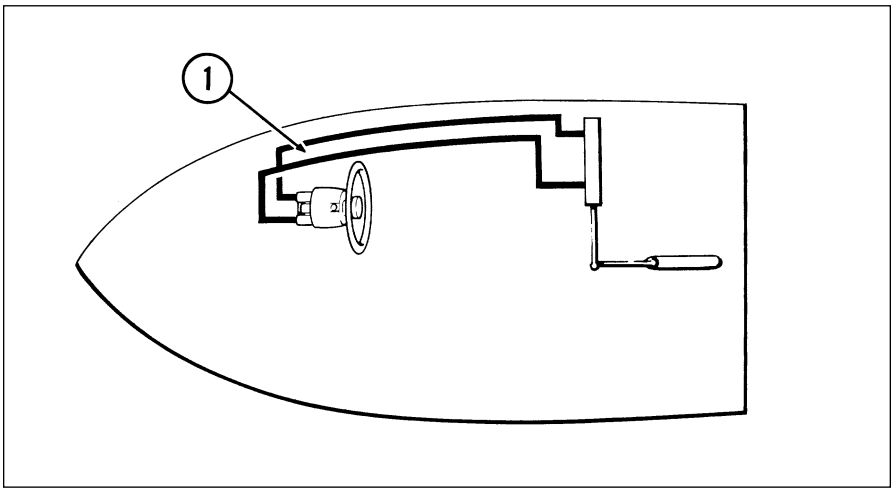
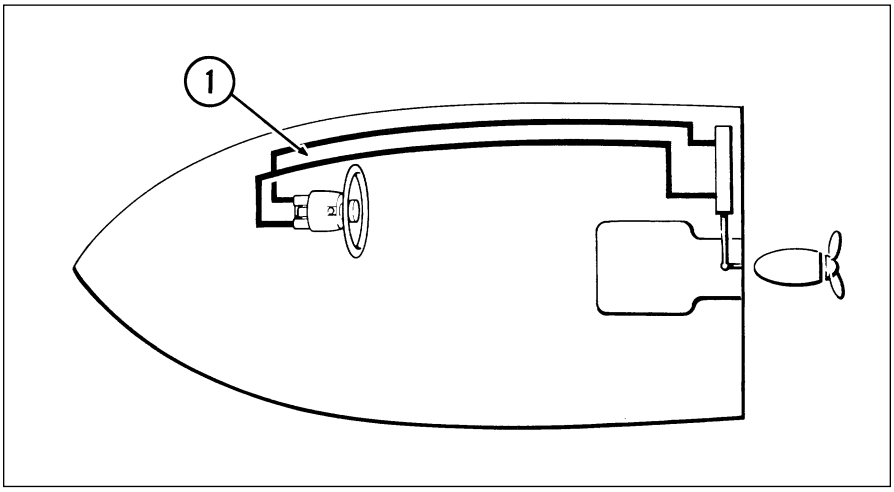


Figure B

Single Sterndrive Cylinder
- fittings required supplied with helm and cylinder



Parts list

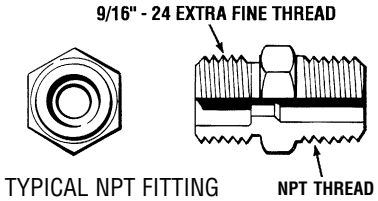
For Figures A, B

ITEM #	DESCRIPTION	PART NUMBER	QUANTITY REQUIRED
1	3/8” DIA NYLON OR COPPER TUBE		AS MEASURED

FITTINGS AND FITTING KITS

Fittings

All SeaStar Manual Hydraulic steering systems utilize the same style of fittings for all applications. These are 3/8" compression fittings which utilize a 9/16"–24 extra fine thread. See page 9-10 for NPT fitting details.



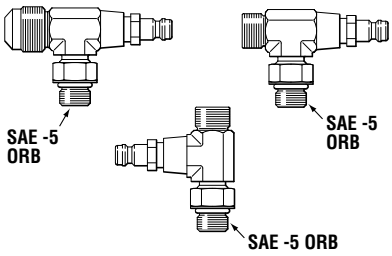
TYPICAL NPT FITTING

ORB Fittings

⚠ CAUTION

For use with -3 helms and cylinders only.

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. see this page through page 9-13 for details.



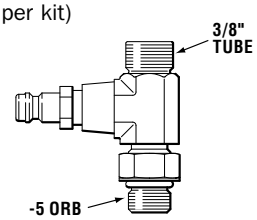
Positionable O-Ring Hose Fittings (ORB)

⚠ CAUTION

NOT for use in an NPT helm/ cylinder hose fitting port.

HF6001 Vertical Bleeder Tee

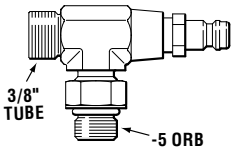
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6002 Horizontal Bleeder Tee

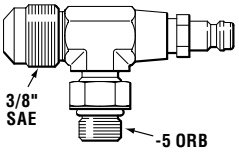
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6003 Hynautic Bleeder Tee

(2 per kit)

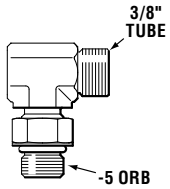


For use with Hynautic 5/16" or 3/8" HOSE

ORB, -3 cylinders/helms ONLY.

HF6004 Elbow Fitting

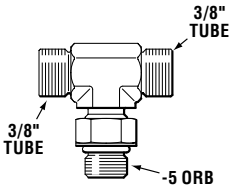
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6005 Tee Fitting

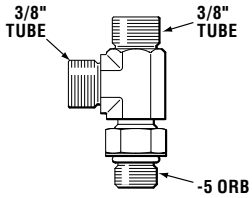
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6006 Tee Fitting

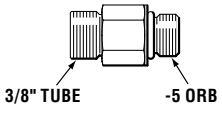
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6009 Straight Fitting

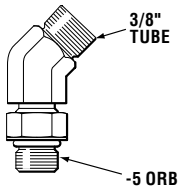
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6011 45° Fitting

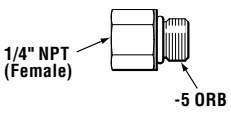
(2 per kit)



ORB, -3 cylinders/helms ONLY.

HF6012 -5 ORB (M)–1/4 NPT (F)

(3 per kit)



ORB, -3 cylinders/helms ONLY.

NPT Fittings

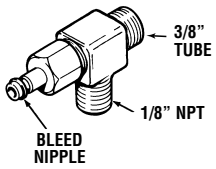
All SeaStar Manual Hydraulic steering systems utilize the same style of fittings for all applications. These are 3/8" compression fittings which utilize a 9/16"–24 extra fine thread. Refer to page 9-9.

⚠ CAUTION

NPT fittings are not to be used in a -3 helm and/or cylinder. Doing so will result in irreparable damage to the helm/cylinder. ONLY use a SeaStar Solutions ORB Hose Fitting in a -3 helm and/or cylinder.

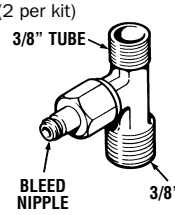
HF4202 Horiz. Bleeder Tee

(2 per kit) *For use with BayStar cylinders **ONLY**.*



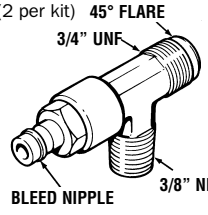
HF5518 Vertical Bleeder Tee

(2 per kit)



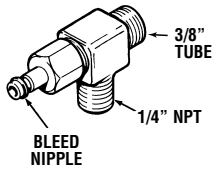
HF5519 Bleed Tee (TM Cylinders)

(2 per kit) **45° FLARE**



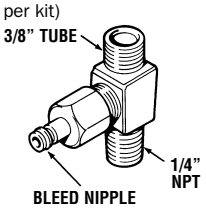
HF5520 Horiz. Bleeder Tee

(2 per kit)



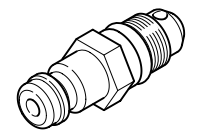
HF5521 Vertical Bleeder Tee

(2 per kit)



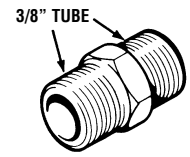
HF5548 Bleed Nipple

(2 per kit inc. O-Ring) *For use with Front Mount Cylinders ONLY*



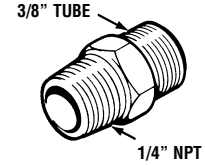
HF5527 Union Coupling Fitting

(3 per kit)



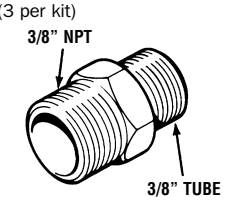
HF5528 Straight Fitting

(3 per kit)



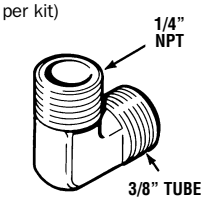
HF5532 Connector Fitting

(3 per kit)



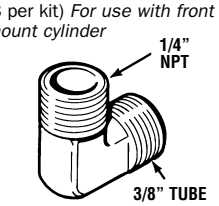
HF5529 Elbow Fitting

(3 per kit)



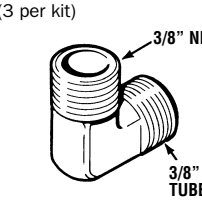
HF6145 SS Elbow Fitting

(3 per kit) *For use with front mount cylinder*



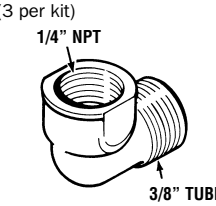
HF5534 Elbow Fitting

(3 per kit)



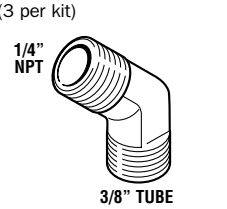
HF5538 Street Elbow

(3 per kit)



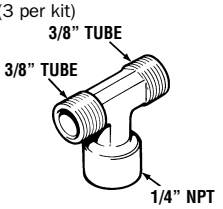
HF5540 45° Fitting

(3 per kit)



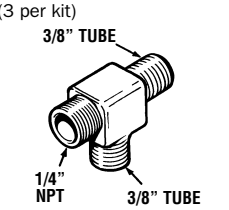
HF5533 Tee Fitting

(3 per kit)



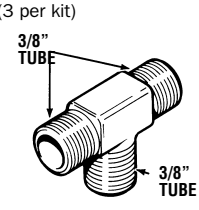
HF5531 Tee Fitting

(3 per kit)



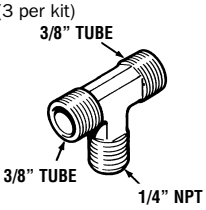
HF5530 Tee Fitting

(3 per kit)



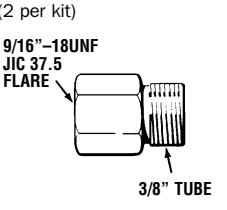
HF5536 Tee Fitting

(3 per kit)



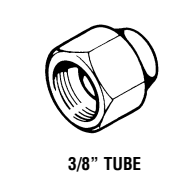
HF5566 Adapter Fitting

(2 per kit)



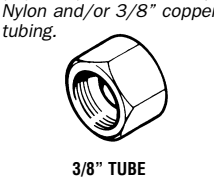
HF5524 Cap Plug Nut

(3 per kit)



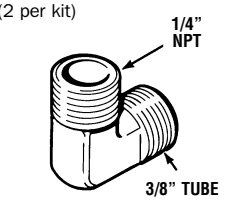
HF5526 Tube Nut

(6 per kit) *For use with 3/8" Nylon and/or 3/8" copper tubing.*



HF6145 Hose Fitting (Pivot Cyl.)

(2 per kit)



ADDITIONAL SEASTAR STEERING STATION OR AUTOPILOT KIT

1) Refer to illustration Figure E.
2) Determine the location of the second station or autopilot power pack.
3) Measure along the path of the tube routing from the upper helm pump to the second station or autopilot power pack. Multiply this length by three for the amount of tubing required.
4) Select the tubing kit based on the total system tubing requirement.

Figure E

2nd Steering Station/autopilot when using 3/8" nylon tubing, or, 3/8" copper tubing.

⚠ CAUTION

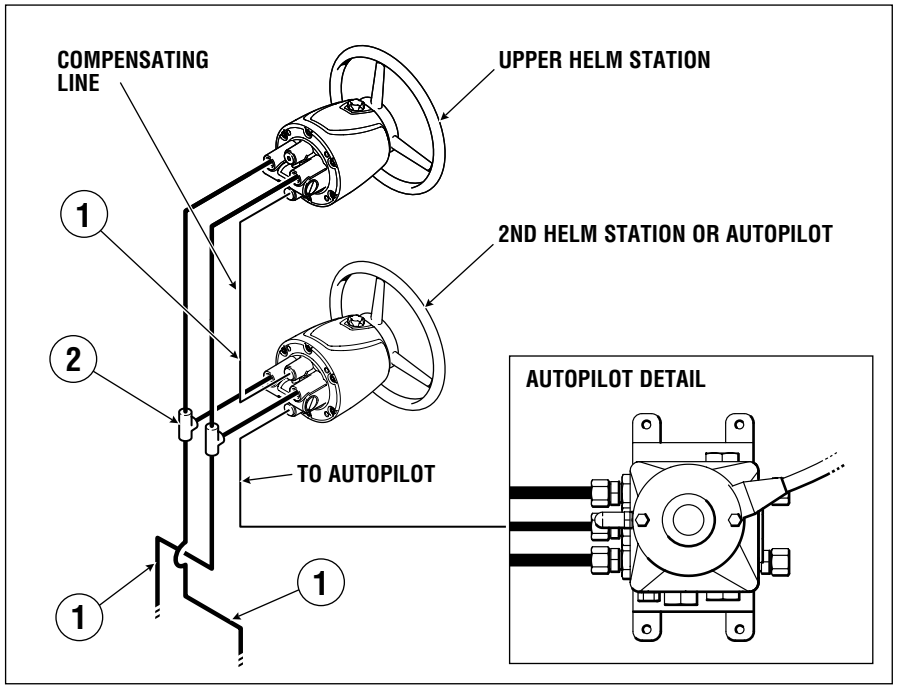
DO NOT cut SeaStar Steering Hose.

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.



ITEM #	DESCRIPTION	PART NUMBER	QUANTITY REQUIRED	REF PAGE #
1	3/8" DIA NYLON OR COPPER TUBE	HT5_ _ _	AS MEASURED	
2	FITTING KIT*	HF6010	1	Page 9-13

**For NPT helms use HF5502.*

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 12-2 for cylinder specifications.

HF6007

⚠ CAUTION

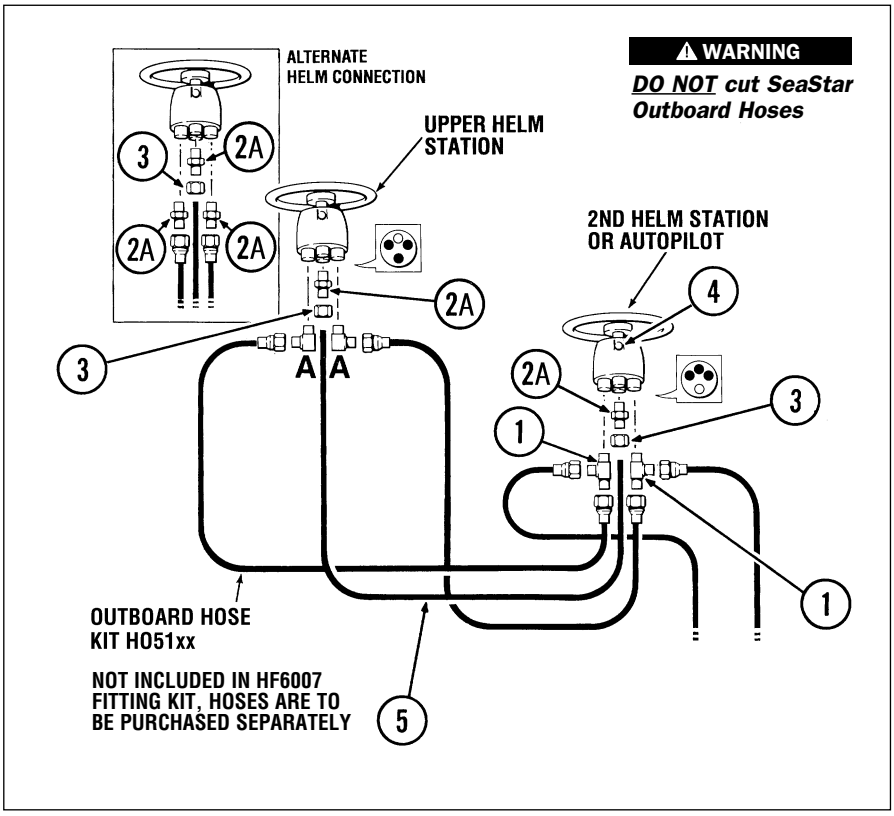
For use with -3 helms ONLY.

Application

Fitting kit to add a 2nd station or autopilot to an outboard system.

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Tee Fitting** 1 End – -5 ORB 1 End – 3/8" Tube Center – 3/8" Tube	2	343196
2A	**Connector Fitting** -5ORB – 3/8" Tube	2	343088
2B	**Connector Fitting** 1/4" NPT – 3/8" Tube	3	600602
3	**Tube Nut** – 3/8" Dia.	6	280327
4	**Non-Vented Filler Plug**	1	HA5432
5	**SeaStar Nylon Tube** 3/8" Dia.	25ft	HT5092
A*	**Elbow** 3/8" Tube (M) – -5 ORB	2	

* SUPPLIED WITH HELM PUMP.
NOTE: HF6007 FITTING KIT IS TO BE USED WHEN THE SYSTEM HAS BEEN PLUMBED WITH SEASTAR OUTBOARD STEERING HOSE ONLY.



Autopilot powerpack connection

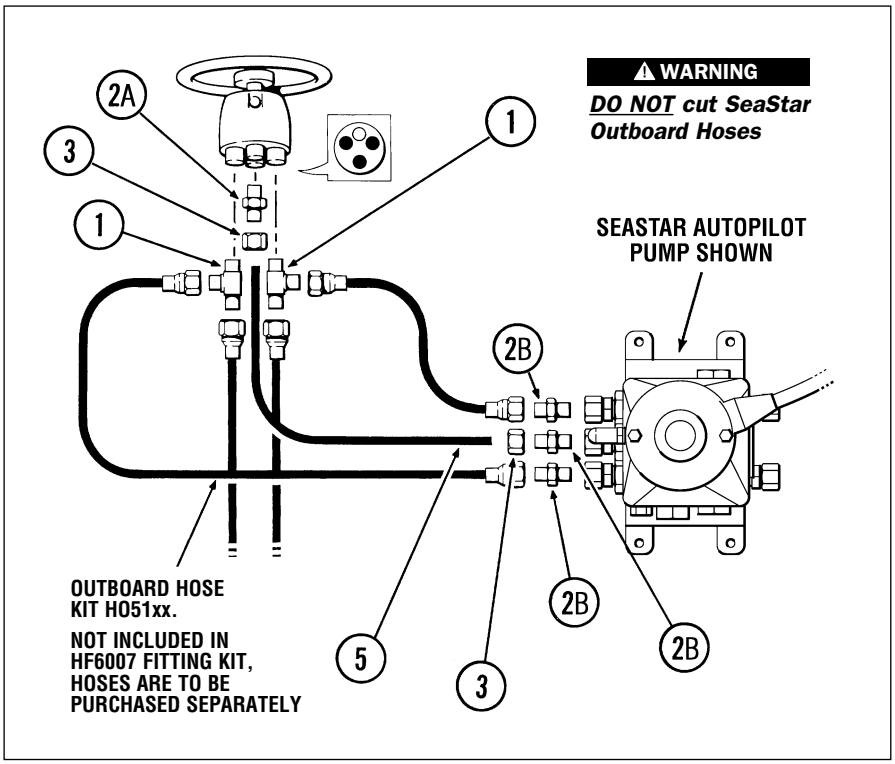
NOTICE

Typical plumbing layout shown.

When using a SeaStar Autopilot Pump, ALWAYS refer to the Installation Manual shipped with your autopilot pump.

⚠ CAUTION

DO NOT cut SeaStar Outboard Steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.



HF6010

⚠ CAUTION

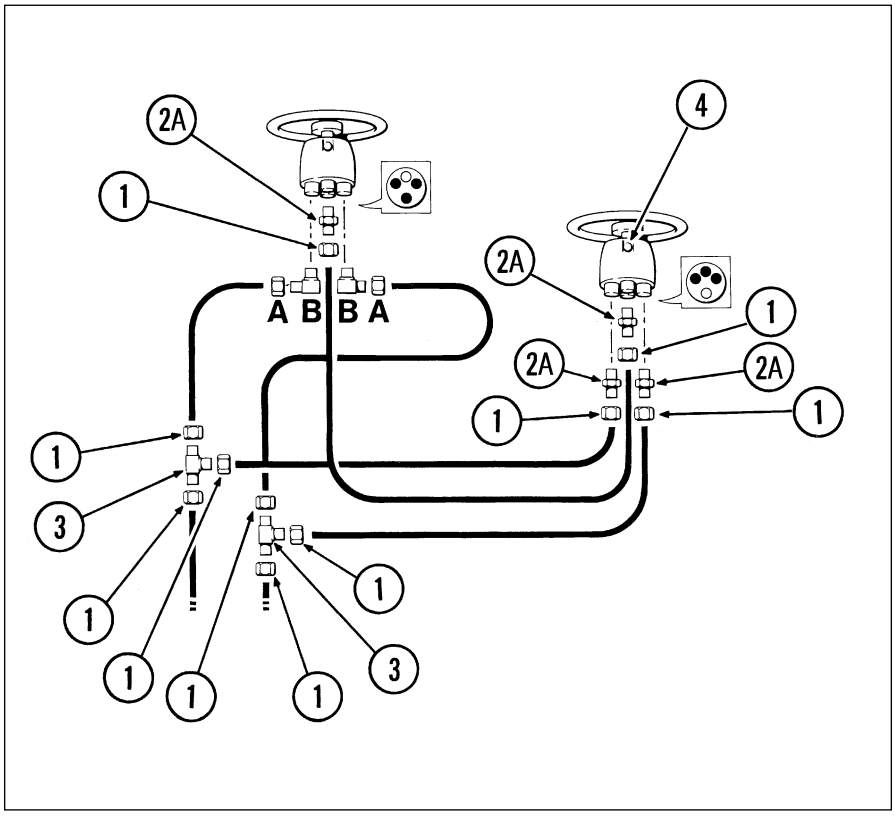
For use with -3 helms ONLY.

Application

Fitting kit to add a 2nd station or autopilot to an inboard or sterndrive system.

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Tube Nut** – 3/8" Dia.	12	280327
2A	**Connector Fitting** -5ORB – 3/8" Tube	2	343088
2B	**Connector Fitting** 1/4" NPT – 3/8" Tube	3	600602
3	**Tee Fitting** 3 Ends – 3/8" Tube	2	600605
4	**Non-Vented Filler Plug**	1	HA5432
A*	**Tube Nut** – 3/8" +Dia.	2	
B*	**3/8" Elbow** -5 ORB	2	

* SUPPLIED WITH HELM
NOTE: USED IN SYSTEMS PLUMBED WITH 3/8" DIAMETER NYLON OR COPPER TUBE

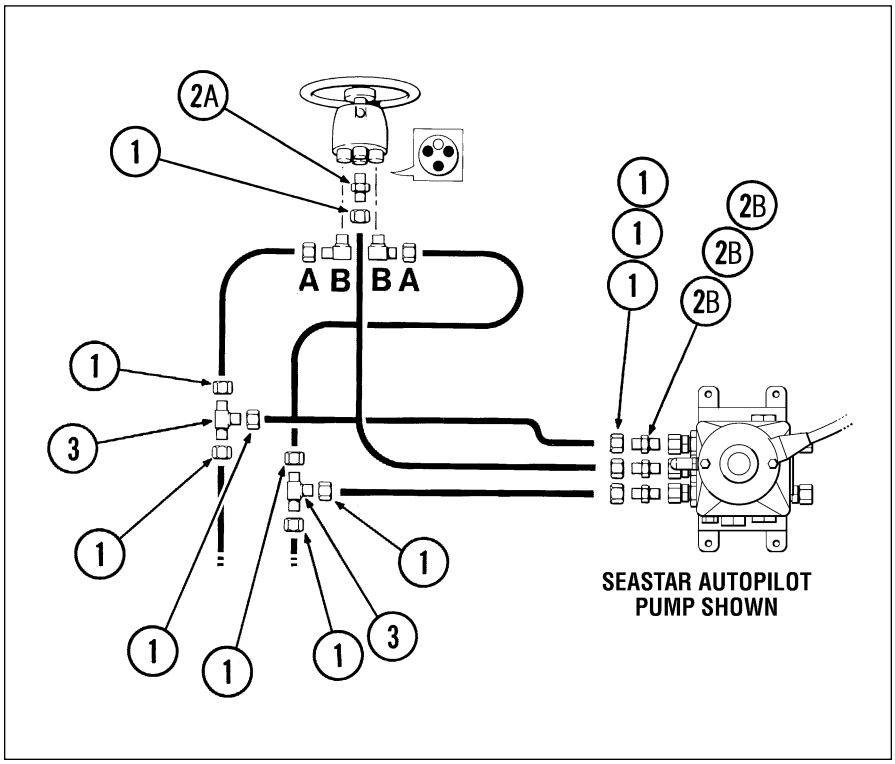


Autopilot powerpack connection

NOTICE

Typical plumbing layout shown.

When using a SeaStar Autopilot Pump, ALWAYS refer to the Installation Manual shipped with your autopilot pump.



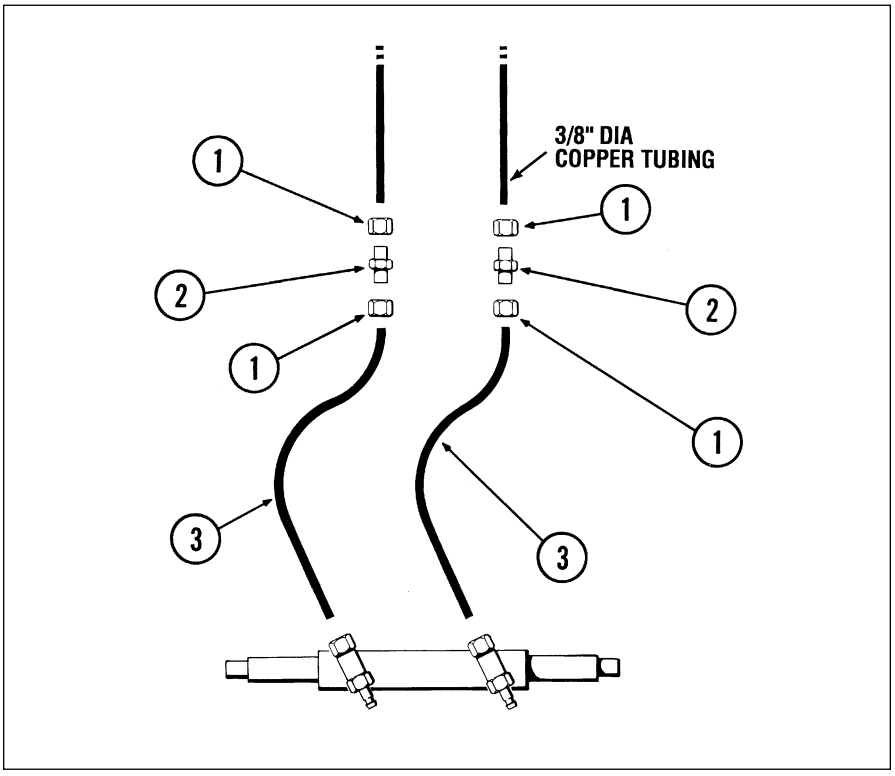
HF5507

Application
Kit to connect 3/8” diameter copper tubing to SeaStar cylinders (using 3/8” diameter nylon tubing)

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Tube Nut** – 3/8” Dia.	4	280327
2	**Connector Fitting** 3/8” Tube 3/8” Tube	2	280929
3	**Nylon Tubing** 3/8” Dia.	6ft	795628

NOTICE

DO NOT use with SeaStar Outboard Cylinders and/or SeaStar Sterndrive cylinder # HC5332.



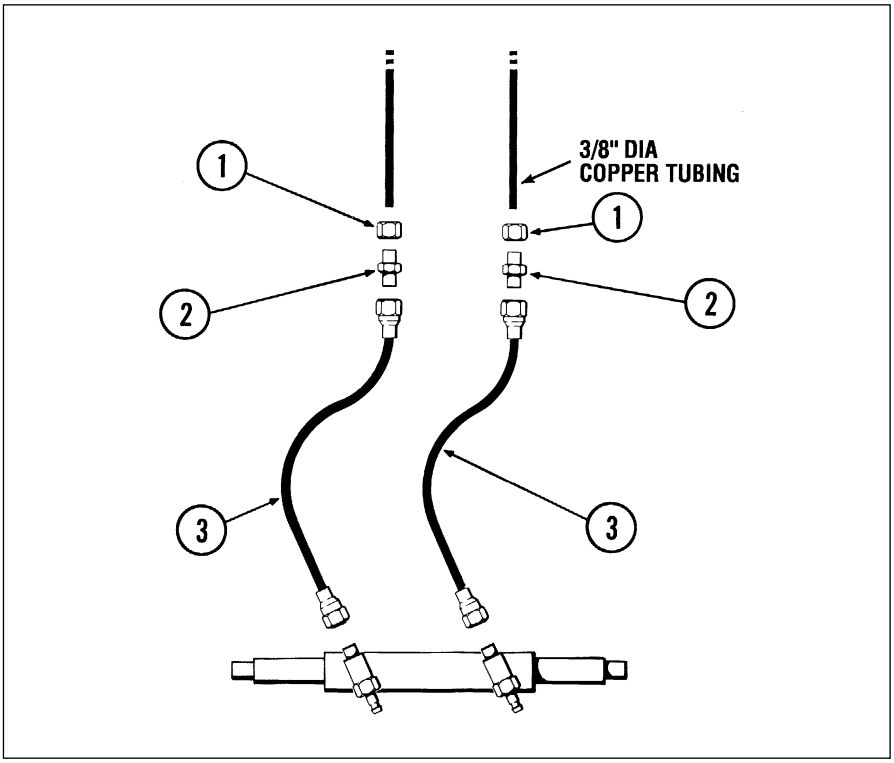
HF5508

Application
Kit to connect 3/8” diameter copper tubing to SeaStar cylinders (using SeaStar outboard hose)

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Tube Nut** – 3/8” Dia.	2	280327
2	**Connector Fitting** 3/8” Tube 3/8” Tube	2	280929
3	**18” Hose** c/w Fittings	2	338621

⚠ CAUTION

DO NOT cut SeaStar Outboard Steering hose. Once cut there is no means to field swage fittings to the ends of the hoses.



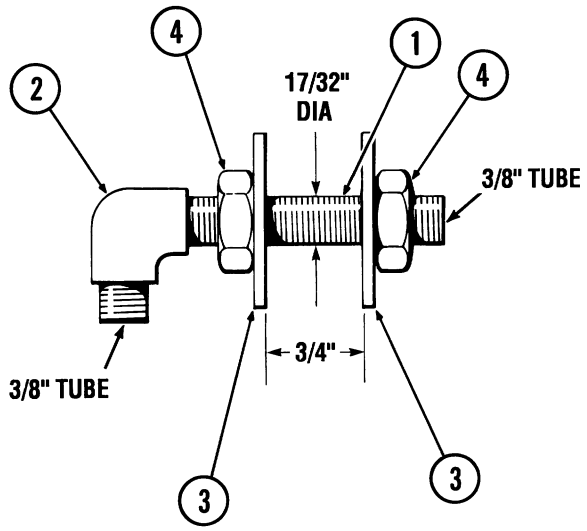
HF5512

3/4” bulkhead fitting kit

Application: Single cylinder installations

2 Assemblies per kit

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Connector Fitting**	2	286323
2	**Street Elbow** 3/8” Tube (M) – 1/4” NPT(F)	2	600606
3	**Washer**	4	202224
4	**Nut**	4	191621

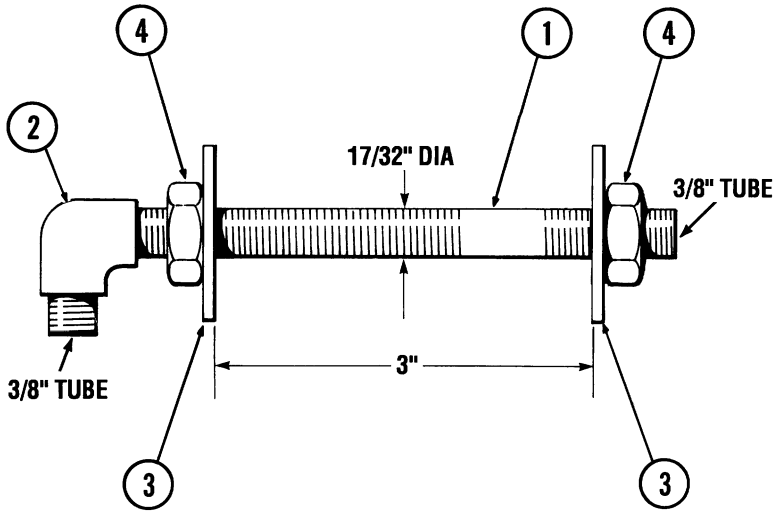


2 OF EACH ILLUSTRATED INCLUDED IN KIT

HF5513

3” bulkhead fitting kit
Application: Single cylinder installations
2 Assemblies per kit

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Connector Fitting**	2	600608
2	**Street Elbow** 3/8” Tube (M) – 1/4” NPT(F)	2	600606
3	**Washer**	4	202224
4	**Nut**	4	191621



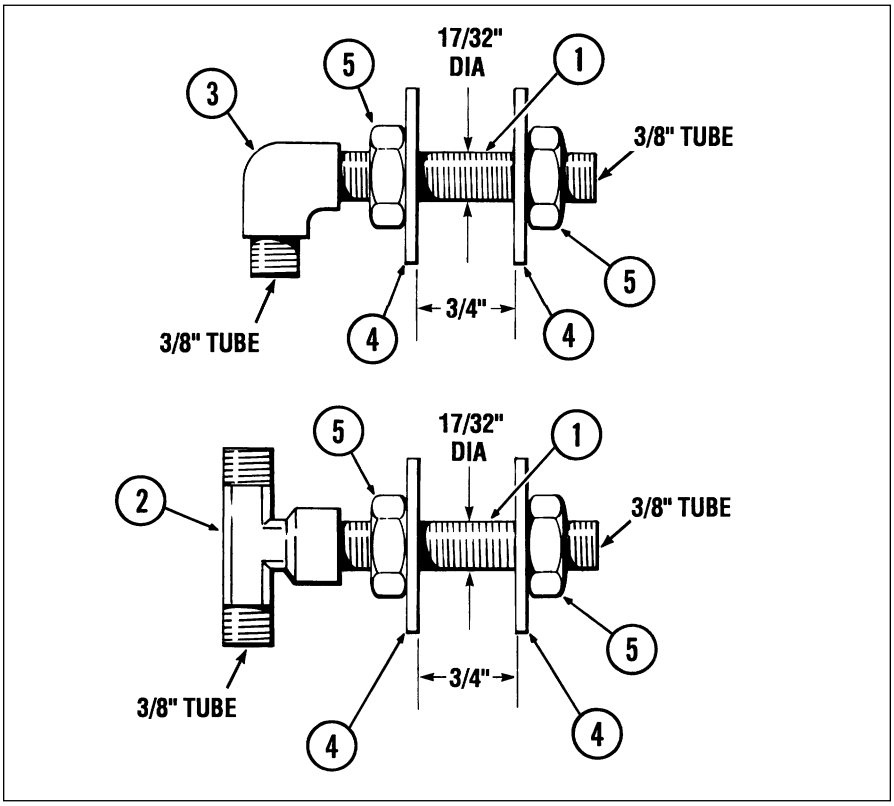
2 OF EACH ILLUSTRATED INCLUDED IN KIT

HF5514

3/4” bulkhead fitting kit
Application: Dual cylinder installations

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Connector Fitting**	4	286323
2	**Tee Fitting** 2 Ends – 3/8” Tube (M) Center – 1/4” NPT (F)	2	284826
3	**Street Elbow** 3/8” Tube (M) – 1/4” NPT(F)	2	600606
4	**Washer**	8	202224
5	**Nut**	4	191621

2 OF EACH ILLUSTRATED INCLUDED IN KIT

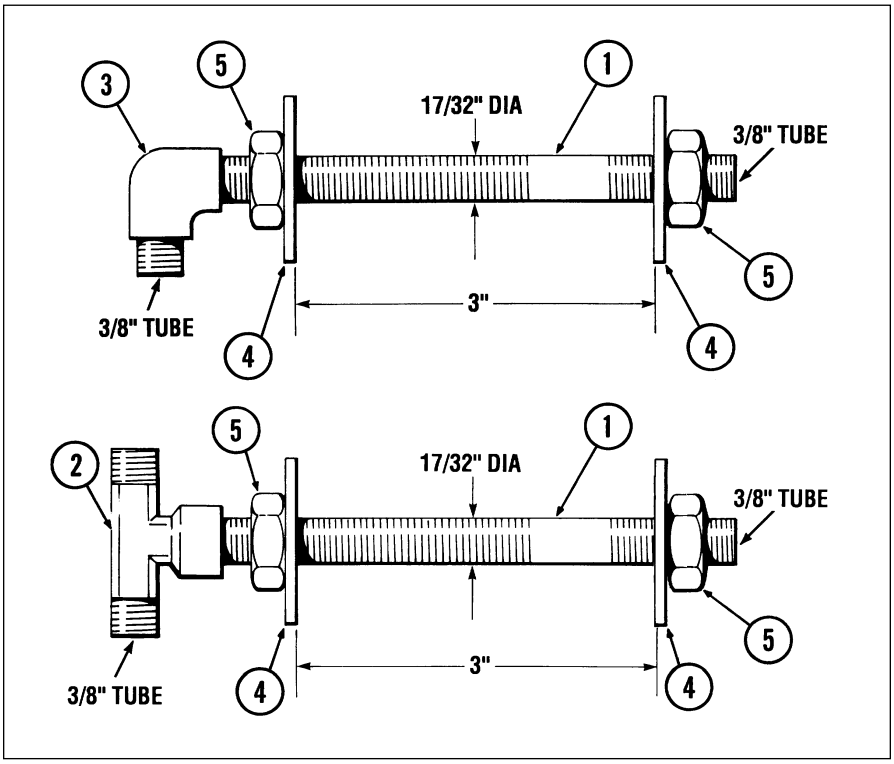


HF5515

3” bulkhead fitting kit
Application: Dual cylinder installations

ITEM NO.	DESCRIPTION	QUANTITY PER KIT	PART NO.
1	**Connector Fitting**	4	286323
2	**Tee Fitting** 2 Ends – 3/8” Tube (M) Center – 1/4” NPT (F)	2	284826
3	**Street Elbow** 3/8” Tube (M) – 1/4” NPT(F)	2	600606
4	**Washer**	8	202224
5	**Nut**	4	191621

2 OF EACH ILLUSTRATED INCLUDED IN KIT



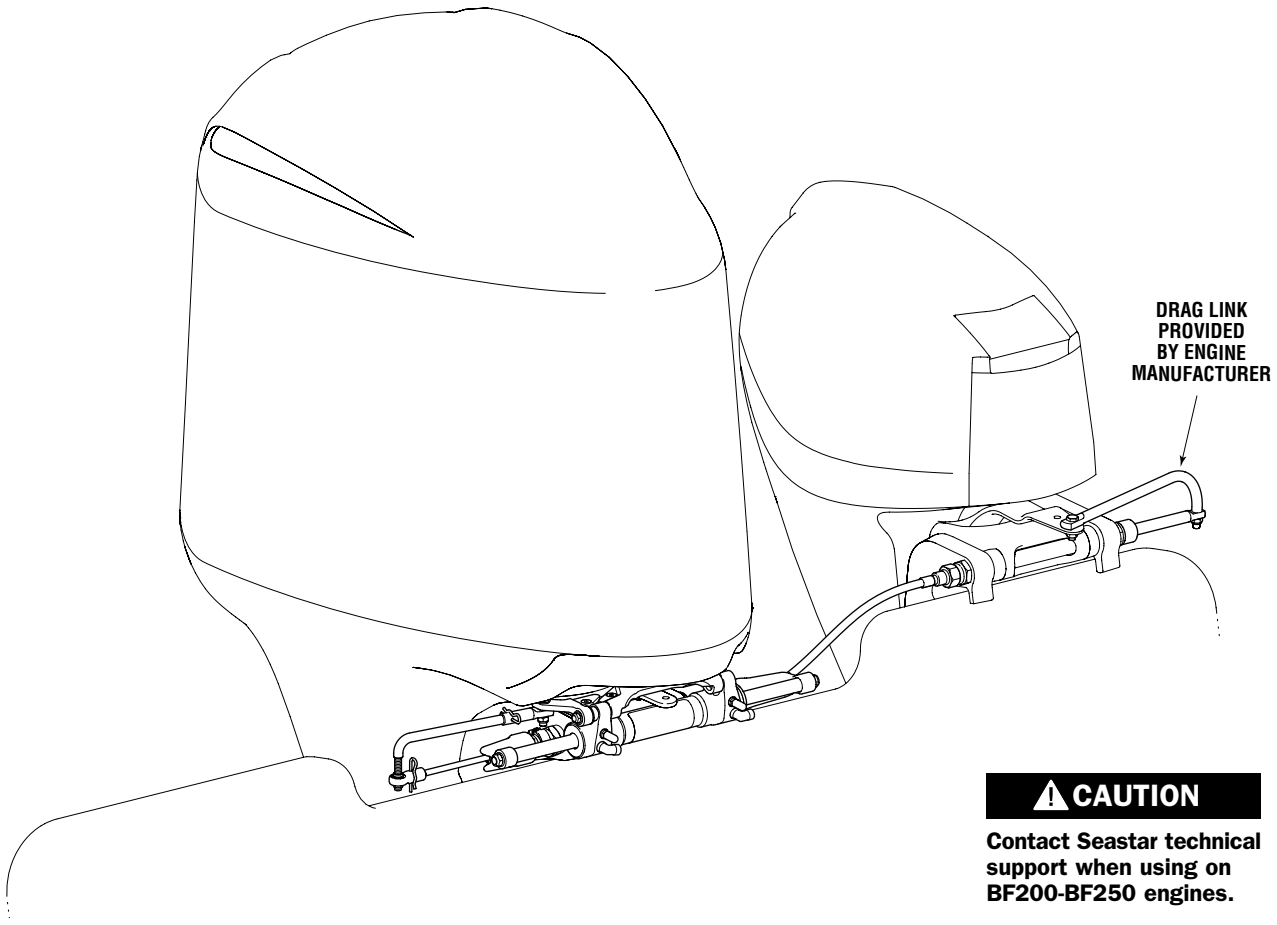
SEASTAR KICKER CABLE TIEBAR

xtreme

This new member of the SeaStar family 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. SeaStar Solutions has developed a patent pending design that incorporates a XTREME cable as the linkage between the two engines.

Key Features

- Flexible cable allows for adjustable locations of kicker motor.
- Allows independent trim/tilt of both engines.
- Allows full steering stroke of both engines.
- Simplified installation using universal ABYC steering connection (as per ABYC P17 & P21 standards) on kicker motors.
- Retrofitable to SeaStar Front Mount Cylinders (Part numbers HC5345, HC5358, HC5348, HC5345-3, HC5358-3 and HC5348-3 ONLY).
- Incorporates unique patented cable technology.
- Kicker can be mounted on either side of the main engine(s)

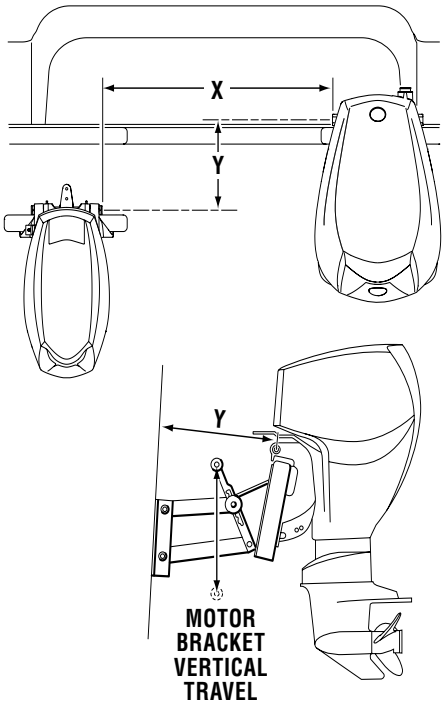


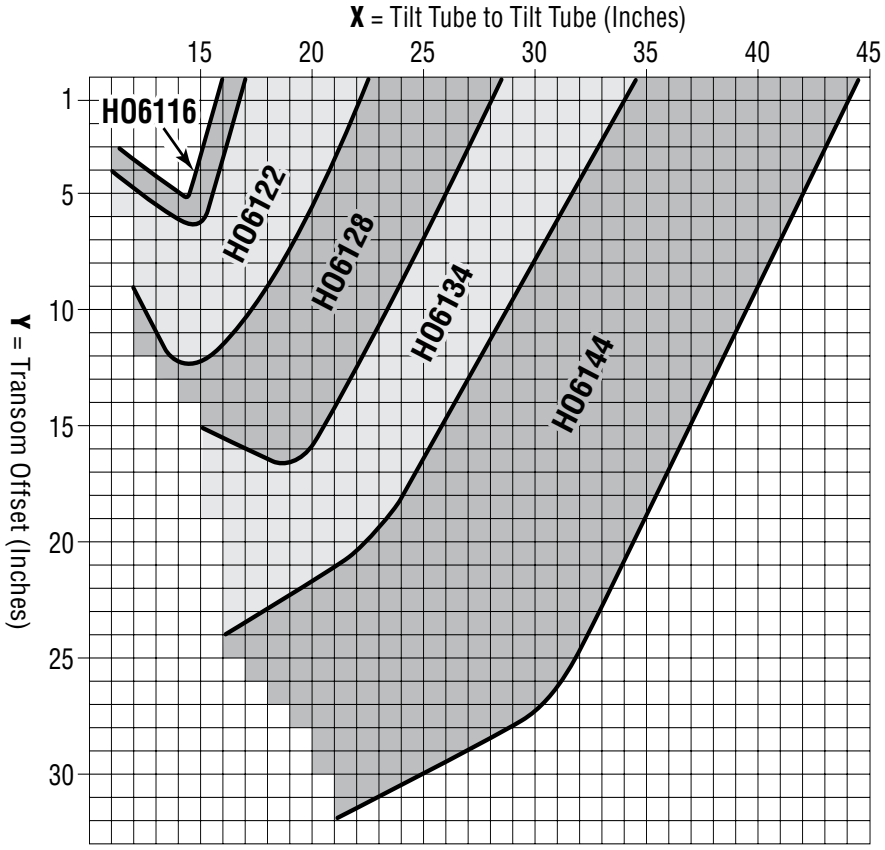
⚠ CAUTION

Contact Seastar technical support when using on BF200-BF250 engines.

Measuring Cable Length

Jackplate Vertical Travel	Add to 'X' Dimension
10" — 12"	X + 3"
13"	X + 4"
14" — 15"	X + 5"
16" — 20"	X + 6"

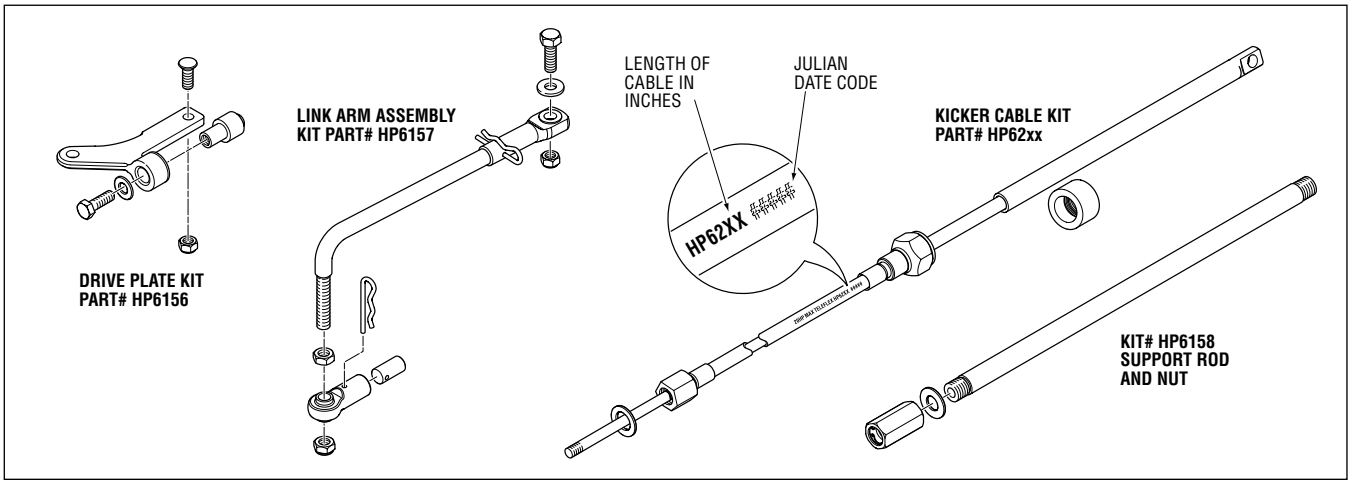




1. *For a Kicker installed on a motor bracket, add additional length to X dimension.*
2. *For Main engine installed on a motor bracket add an additional 2" to X dimension.*
3. ***Kicker cable tiebar systems require a minimum clearance of 14" from the end of the tilt tube towards the motor side well gunnel.***
4. *Longer cable lengths are available. Contact SeaStar Solutions for more information.*

⚠ CAUTION

DO NOT install on applications that are outside of the cable ranges. Doing so may lead to irreparable damage to the Kicker Cable Tiebar.



SEASTAR AUTOPILOT PUMPS AND SMARTSTICKS

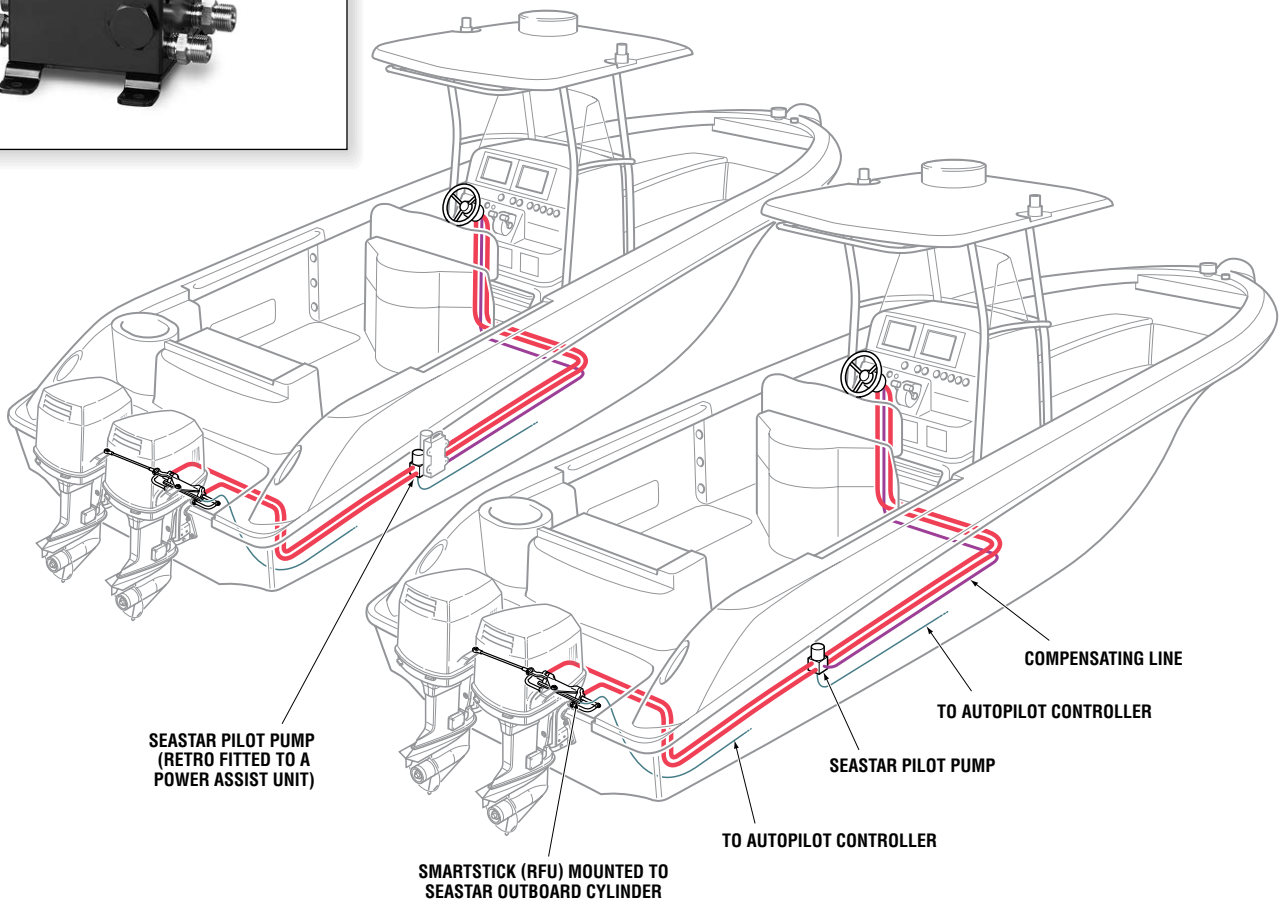
SeaStar Autopilot Pump

Part# AP1219, AP1233
AP2419, AP2433

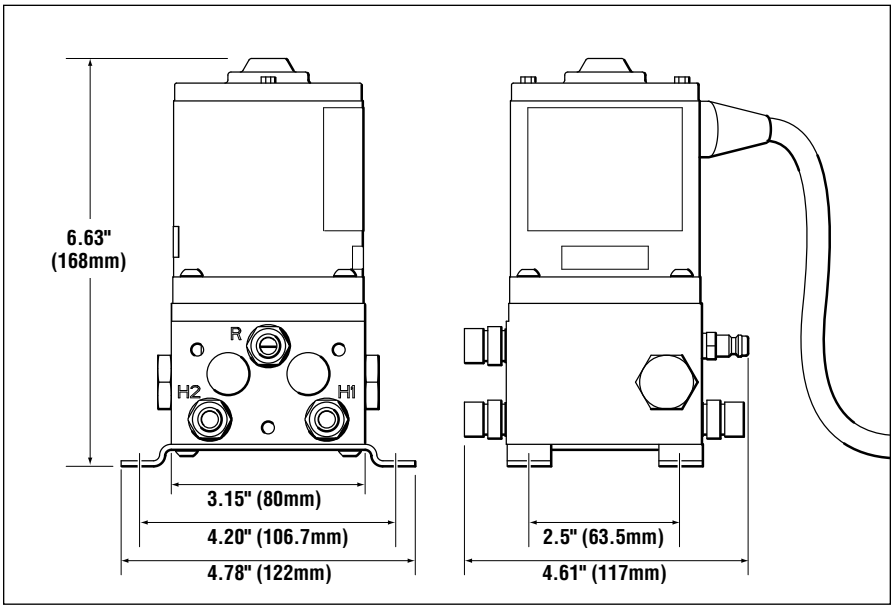
The SeaStar Autopilot pump is a fixed flow, reversible type set that uses an internal hydraulic gear pump, producing very little vibration or noise. It is offered in 12 and 24 volt configurations, as well as two different pump sizes (type 1 & type 2). It can be used as a stand alone pilot pump or can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

Features:

- Long life DC Motor *(i.e. long life brushes)*
- 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 & 24 volt pumps



Technical Data



Technical Specifications

Voltage	12 Volt or 24 Volt
Fittings	Compatible with Standard SeaStar Hoses (HO51xx etc)
Wire: Length / Gauge / Connector	24" / 12 awg / None–Bare Leads
Oil Compatibility	SeaStar Steering Fluid (MIL 5606)
Weight	4.9 lbs (2.2 kg)
Autopilot Pump Size	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 24V Type 1: 2 – 4 amps 24V Type 2: 3 – 6 amps
Autopilot Cylinder Capacity	Type 1 4.9 in^3 - 12.5 in^3 Type 2 12.5 in^3 - 21 in^3

Ordering Information

Description	Part #
Type 1 – 12V – 60cu.in/min	AP1219
Type 2 – 12V – 100cu.in/min	AP1233
Type 1 – 24V – 60cu.in/min	AP2419
Type 2 – 24V – 100cu.in/min	AP2433

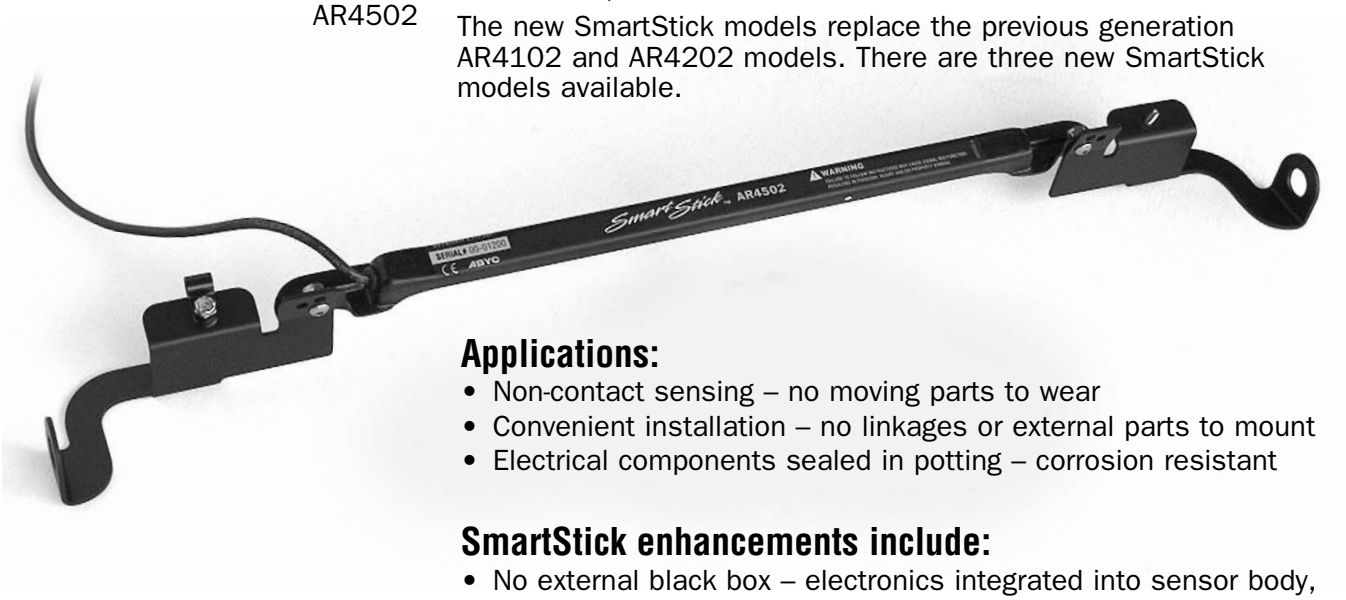
NOTE: *Retrofit kit part # HA1205 will be required to mount to a PA1200-2 Power Assist Pump.*

SeaStar SmartStick

Part# AR4502RM, AR4502SI
AR4502

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

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



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

SmartStick enhancements include:

- 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 labelled
- 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

Technical Specifications

AR4502 SERIES	
Range	8.0"
Resolution	0.012"
Linearity	0.048"
Repeatability	0.024"
Environmental Resitstance	• Salt Spray 1000 hours • IEC IP67 (Submersible to 1m) • Immune to dirt, oil, SAE Fluids • Thermal Shock and Vibration Resistant (MIL-STD810F)

Ordering Information

Model	Autopilot	Output
AR4502RM	Ray Marine Installations Only	2.2V to 2.8V
AR4502SI	SimRad Installations Only	2.8kHz to 4.0kHz
AR4502	Generic	0.5V to 4.5V

HA5479 – Low Profile Magnet is required for -3 cylinders.

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

TOOLS AND RUDDER TORQUE DATA SHEETS

SeaStar Power Purge JR.

Part# HA5445-2

SeaStar/BayStar Power Purge Jr. is the quickest way to bleed a SeaStar/ BayStar system in the field & 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.

Advantages:

- Steering feel is solid every time
- Complete Fill & Purge in 10 minutes or less
- Fast and efficient
- Easy to operate
- Screens 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 those longer runs

NOTICE

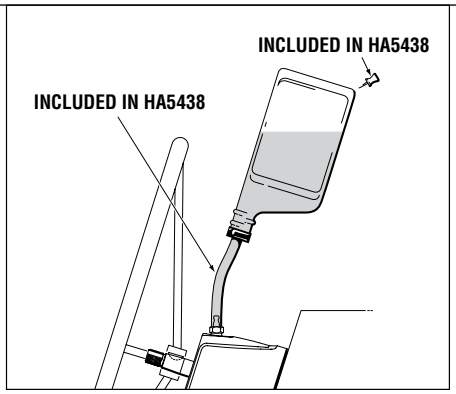
Larger SeaStar Power Purge Sr. also available for high volume users, part # HA5447. Contact Technical Support for details.

Replacement Parts List

- Service 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, # HP6149.

SeaStar Bleed Hose

Part# HA5438



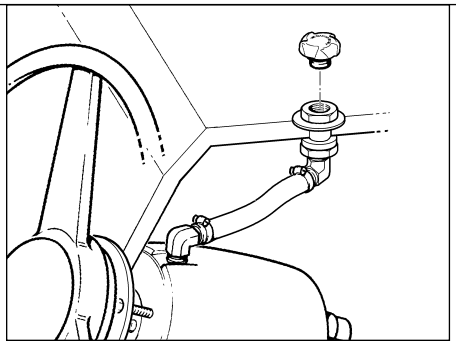
- This kit is needed to properly bleed the SeaStar Outboard steering kit
- Screws onto the SeaStar and equivalent fluid to bleed the SeaStar system
- Makes for a clean bleed when used properly

SeaStar Remote Fill

Part# HA6450

NOTICE

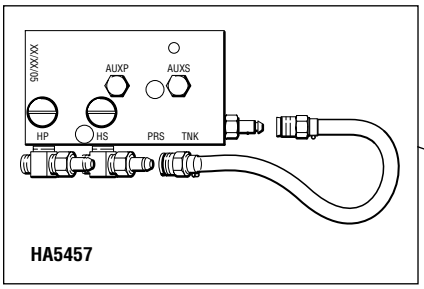
Requires 7/8” hole to be drilled onto dash above helm pump.



- Can be used with ALL SeaStar Helm pumps
- Relocate your fill plug to a more convenient or hidden place

SeaStar Power Steering Purge Kit Part# HA5457

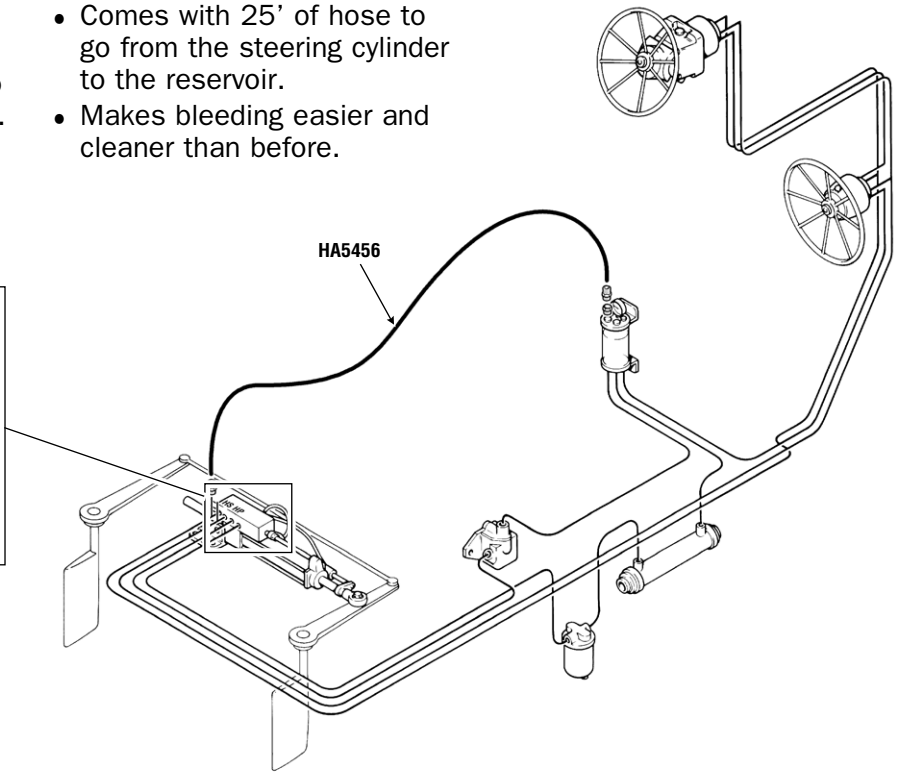
- Makes bleeding even easier than before.
- Central bleeding location—no need to run hoses to reservoir.
- Can only be used with Power Steering Cylinders made after October 2005.



HA5457

SeaStar Power Steering Purge Kit Part# HA5456

- Comes with 25' of hose to go from the steering cylinder to the reservoir.
- Makes bleeding easier and cleaner than before.

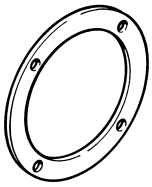


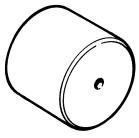
SeaStar Helm Pump Drill Jigs

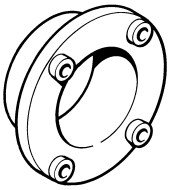
HA5466 Drill Jig for drilling mounting holes for standard SeaStar and SeaStar Pro helms. A 3 inch dashboard hole is required.

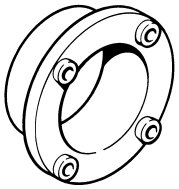
HA5467 Drill Jig for drilling mounting holes for standard SeaStar and SeaStar Pro helms where dashboard has a 3-1/4 inch hole from a previously mounted mechanical helm.

HA5468 Drill Jig for drilling mounting holes for SeaStar and SeaStar Pro Classic Tilt helms (HH6541-3, HH6542-3, HH6543-3). Also back Mount Kit (HA5418). A 4-1/2 inch dashboard hole is required.


HA5405


HA5465


HA5466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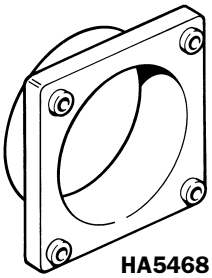

HA5468

SEASTAR™

TORQUE DATA SHEETS

Rudder Torque Data Sheet

NAME: _____

CONTACT: _____

DISPLACEMENT HULLS ONLY

HULL DATA

HULL DIMENSIONS:

LOA _____ SAIL _____

BEAM _____ OTHER _____

DISPLACEMENT _____ TOP SPEED _____ Knots

DRAFT _____ USE: _____

NO. STEERING STATIONS _____

POWER DATA

EACH SHAFT HORSEPOWER _____

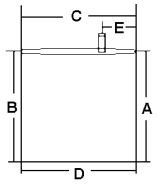
PROP DIAMETER: _____

SINGLE ENGINE ☐

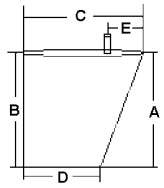
TWIN ENGINE ☐

RUDDER DATA

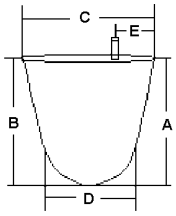
(CIRCLE TPYE OF RUDDER)



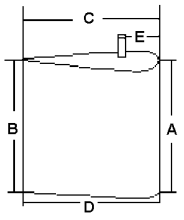
FLAT PLATE



WEDGE



SPADE



HYDROFOIL

RUDDER ARC (Midship to Hardover): _____ **Degrees**

RUDDER AREA: _____ **Square Ft.**

NO. RUDDERS ☐ One ☐ Two

RUDDER DIMENSIONS:

(A) Height _____ **In.**

(B) Height _____ **In.**

(C) Width _____ **In.**

(D) Width _____ **In.**

(E) Counter-balance _____ **In.**

Print/Scan COMPLETED form.
email to: **seastar@seastarsolutions.com** or, fax to: **604-270-7172**

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

Please include a detailed dimensioned drawing of your rudder.

Rudder Torque Data Sheet

PLANING HULLS ONLY

Name: _____

Contact: _____

Speed of vessel: ..... _____ knots

Length of vessel: ..... _____ ft. _____ in.

Catamaran: ..... ☐ Yes ☐ No

Number of rudders: ..... _____

Propeller diameter: ..... _____ ft. _____ in.

Perpendicular distance from the rudder shaft to the propeller: ..... _____ ft. _____ in.
*(See diagram, dimension '**A**'.)*

Distance parallel to the rudder shaft from rudder base to the center of lower rudder bearing: _____ ft. _____ in.
*(See diagram, dimension '**B**'.)*

Perpendicular distance from the waterline to the rudder base: ..... _____ ft. _____ in.
*(See diagram dimension '**C**'.)*

Average rudder chord length: _____ ft. _____ in.
*(See diagram, dimension '**D**'.)*

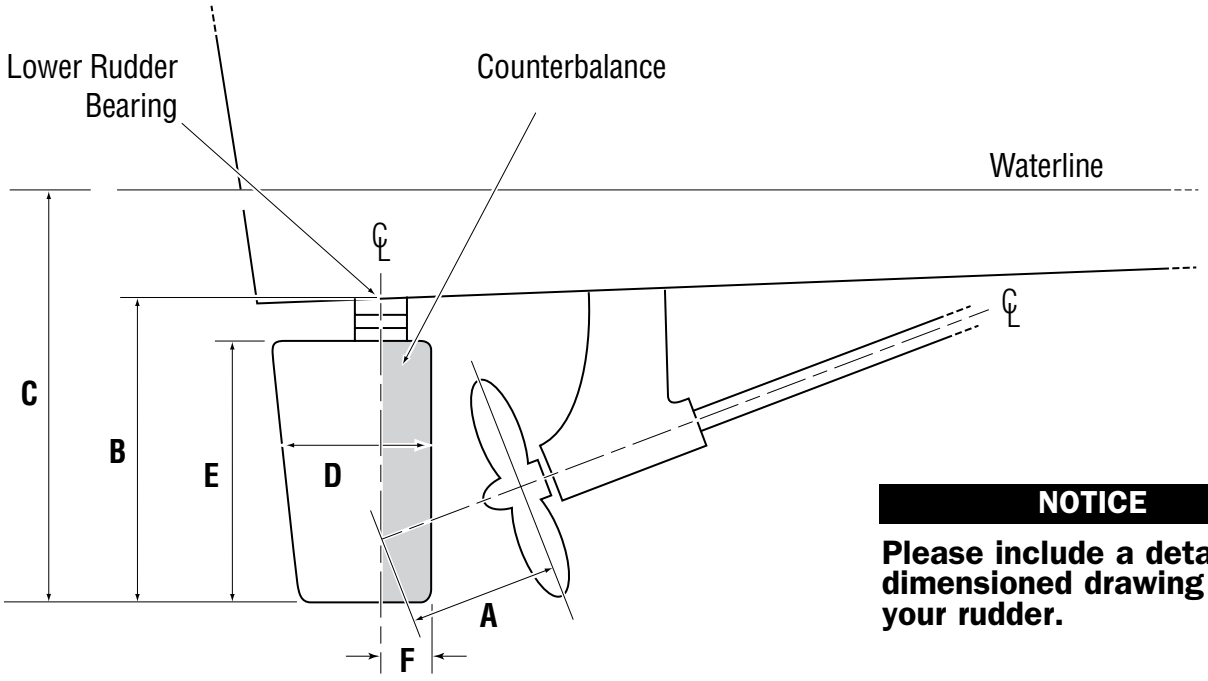
Rudder shaft diameter: ..... _____ in.

Engine power: ..... _____ HP

Rudder *(projected)* area: ..... _____ sq. ft.
*(Rudder height x width minus counterbalance height x width. See diagram, dimensions ('**D**' x '**E**') – ('**F**' x '**E**'.)*

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

***NOTE:** Formula presumes a 23% – 27% counterbalance.*



NOTICE

Please include a detailed dimensioned drawing of your rudder.

Print/Scan COMPLETED form. email to: **seastar@seastarsolutions.com** or, fax to: **604-270-7172**

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CHAPTER

10

BAYSTAR™ SEASTAR™ Hynautic

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.

HA5430–1L, HA5440–1G, HA5458–5G.

Due to recent upgrades in our steering system components, SeaStar Solutions 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 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.

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

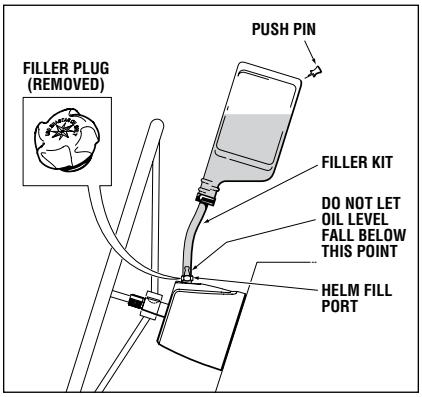
- Higher steering effort, particularly at ambient or lower temperatures and/or over time due to steering fluid degradation and breakdown
- Increased steering slip and/or drift resulting in lost motion
- Foaming or air entrapment causing a bumpy feel during steering
- High rates of moisture absorption 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

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.

Optional Filler Kit

Part# HA5438



⚠ 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, TRIGYCERIDES OR POLYALKYLENE GLYCOLS WITHIN A HYDRAULIC STEERING SYSTEM.

NOTICE

SeaStar Hydraulic Steering Fluid can be used in Hynautic, BayStar and BayStar Plus steering systems.

NOTICE

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

Note: *This page left blank intentionally.*

CHAPTER

11

Hynautic TRIM TABS

Introduction

The effort required to keep large pleasure yachts and commercial boats trim and level is usually too great for most fiberglass nylon trim cylinders, even when used in multiple combinations. This is especially true when backing down hard.

Based on an understanding of these forces, Hynautic offers a heavy duty brass trim cylinder powerful enough to move and maintain the position of even the largest trim planes.

And, this patented product is more durable because it resists corrosion by eliminating all external hoses, isolating dissimilar metals, and protecting vital seals.

Coupled with a Hynautic 12 volt or 24 volt pump the cylinder will extend quickly enough to make an immediate difference in the trim of your yacht or work boat.

Applications

The Hynautic cruiser trim system is designed for yachts and commercial vessels. One brass trim cylinder provides a force equal to approximately 2.5 times that of the typical nylon cylinders.

Therefore, a Hynautic TCS-1-02 trim system, which includes separate port and starboard cylinder/pump assemblies is effective for most yachts to 65 feet using properly reinforced stainless planes. When more hydraulic muscle is needed, two cylinders per tab may be pressurized from a single pump as in the TCS-2-01 system.

Similarly, Hynautic can supply a system as complex as four cylinders moving a single trim plane from a single power pump source.

Because of the diversity of tab shapes and materials, the design is left to the builder and not included in the basic system.

Features

Double acting brass cylinder with a patented porting design:

All plumbing is left inside the transom. No external plumbing fittings to be damaged or corroded. The patented, double wall cylinders are pressurized in each direction which means they work equally as well at either holding the plane down against a force from below or preventing it from being pushed down from a force from above.

Simple, effective marine power pumps:

Available in 12 or 24 volt, and easy to install and purge. The use of marine rated relays and switches adds to the product's durability.

A design mechanics can appreciate:

The cylinder is designed to be disassembled from outside the boat without removing the complete assembly from the transom. Where dissimilar metals might come in contact, they are separated by a neutral material to reduce the effects of electrolytic corrosion.

Designed to be filled with Dextron III Automatic Transmission Fluid or equivalent.

Trim Tab–Order Guide

NOTICE

Pressure and plate dimensional requirements are to be calculated by your Naval Architect.

TCS-1-01 TAB CYLINDER SYSTEM, 24 VOLT

Control switch	1 ea	TC-03
Tab cyl. – cruiser	2 ea	TK-01
Power pump	2 ea	TP-01
Manual	1 ea	182037
Hose – 2ft.	4 ea	207402

TCS-1-02 TAB CYLINDER SYSTEM, 12 VOLT

Control switch	1 ea	TC-03
Tab cyl. – cruiser	2 ea	TK-01
Power pump	2 ea	TP-02
Manual	1 ea	182038
Hose – 2ft.	4 ea	207402

TCS-2-02 TAB CYLINDER SYSTEM, 12 VOLT

Control switch	1 ea	TC-03
Tab cyl. – cruiser	4 ea	TK-01
Power pump	2 ea	TP-02
Manual	1 ea	182038
Hose – 2ft.	4 ea	207402

OPTIONAL PUMP

Pump 24V DC (110cu. in./minute) TP-03

Cylinder Specification

MODEL	DISPLACEMENT	MOTOR
TP-02	57in.³/min	12V
TP-01	80in.³/min	24V
TP-03	110in.³/min	24V

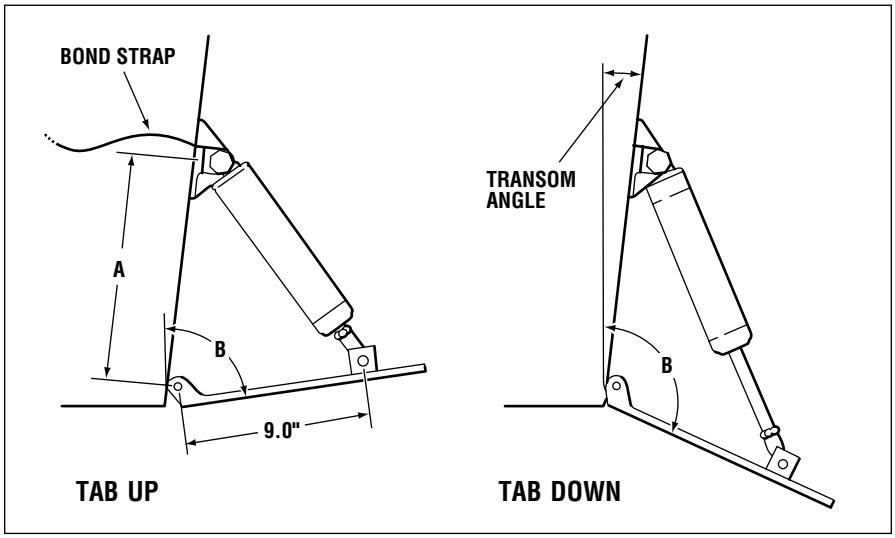
Stroke = **4”**
Displacement = **5.94 cu in**.
Force = **2230 ft-lb** @ rated pressure

Cylinder Seal Kit Part # = **TKS-01**

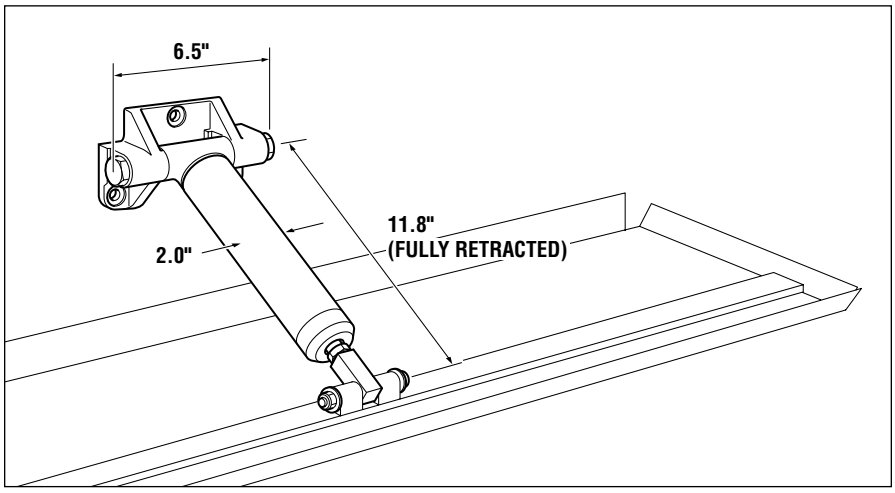
Transom Angle and Mounting Position Calculations

Using the table below and the diagrams on the next page, determine your transom angle, then choose the corresponding mounting position for the trim cylinder bracket (Length A).

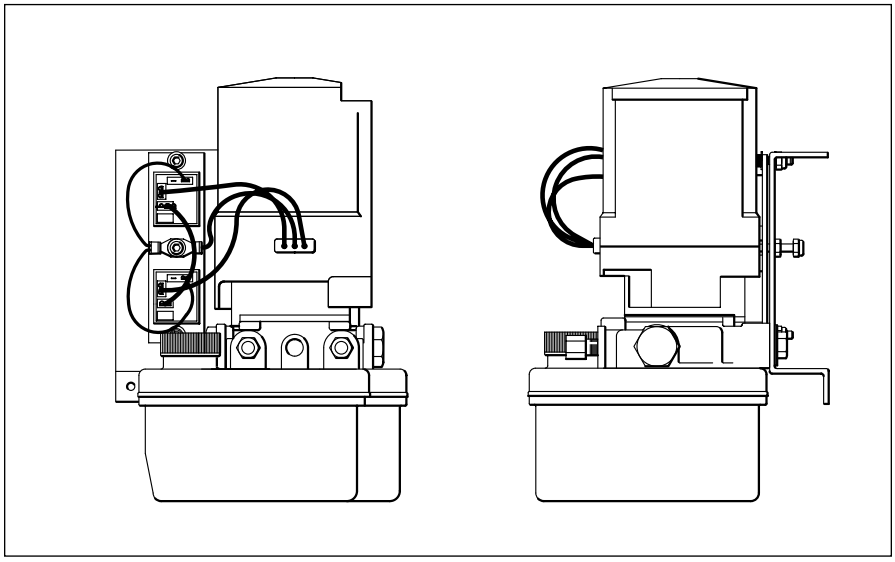
TRANSOM ANGLE	LENGTH ‘A’	TAB UP ‘B’	TAB DOWN ‘B’
0˚	10.125”	80˚	115˚
1˚	10.250”	80˚	115˚
2˚	10.344”	81˚	115˚
3˚	10.469”	81˚	115˚
4˚	10.594”	81˚	115˚
5˚	10.688”	82˚	115˚
6˚	10.812”	82˚	115˚
7˚	10.938”	83˚	115˚
8˚	11.062”	83˚	115˚
9˚	11.188”	83˚	115˚
10˚	11.312”	84˚	115˚
11˚	11.438”	84˚	115˚
12˚	11.562”	84˚	115˚
13˚	11.719”	85˚	115˚
14˚	11.844”	85˚	115˚



Tab Cylinder Part# TK-01



Optional Pump Part# TP-03



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CHAPTER

12

BAYSTAR™ SEASTAR™ Hynautic

TECHNICAL INFORMATION/ SPECIFICATIONS

NOTICE

Contact your nearest dealer or distributor to order replacement parts.

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° articulation with 1000 psi (70 bar) system pressure.

Table A: BayStar/SeaStar Helm Pumps

HELM DESCRIPTION		PART NUMBER	DISPLACEMENT CU. IN./REV (cc)	RELIEF VALVE SETTING PSI (BAR)	MAXIMUM WHEEL DIA. INCHES (mm)	SEAL KIT	NOTES
BAYSTAR	FRONT MOUNT	HH4311-3	1.1 (18.02)	1000 (70)	28 (711)	HP6032	
BAYSTAR	FRONT MOUNT	HH4314-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	
BAYSTAR	SPORT TILT	HH4315-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	
BAYSTAR	SPORT PLUS TILT	HH4316-3	1.4 (23.0)	1000 (70)	26 (660)	HP6032	
BAYSTAR	FRONT MOUNT	HH4016	1.6 (26.2)	800 (55)	26 (660)	HS5147	*Discontinued*
BAYSTAR	SPORT TILT	HH4015	1.6 (26.2)	800 (55)	26 (660)	HS5147	*Discontinued*
BAYSTAR PLUS	FRONT MOUNT	HH4514-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	
BAYSTAR PLUS	SPORT TILT	HH4513-3	1.4 (23.0	1000 (70)	28 (711)	HP6032	
SEASTAR	FRONT MOUNT	HH5269-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	
SEASTAR	FRONT MOUNT	HH5271-3	1.7 (27.8)	1000 (70)	28 (711)	HP6032	
SEASTAR	FRONT MOUNT	HH5273-3	2.0 (33.0)	1000 (70)	28 (711)	HP6032	
SEASTAR	FRONT MOUNT	HH5272-3	2.4 (39.3)	1000 (70)	28 (711)	HP6032	
SEASTAR	FRONT MOUNT	HH5217-3	1.7 (27.8)	1000 (70)	28 (711)	HP6037	*Commercial Helm (Stainless Shaft)*
SEASTAR	FRONT MOUNT	HH5224-3	2.4 (39.3)	1000 (70)	28 (711)	HP6037	*Commercial Helm (Stainless Shaft)*
SEASTAR	FRONT MOUNT	HH5285-3	3.0(46.16)	1000 (70)	28 (711)	HP6032	
SEASTAR PRO	FRONT MOUNT	HH5779-3	1.7 (27.8)	1500 (103)	28 (711)	HP6032	
SEASTAR PRO	FRONT MOUNT	HH5770-3	2.0 (33.0)	1500 (103)	28 (711)	HP6032	
SEASTAR PRO	FRONT MOUNT	HH5772-3	2.4 (39.3)	1500 (103)	28 (711)	HP6032	
SEASTAR PRO	FRONT MOUNT	HH5218-3	1.7 (27.8)	1500 (103)	28 (711)	HP6032	*Commercial Helm (Stainless Shaft)*
SEASTAR	REAR MOUNT	HH5260-3	1.4 (23.0)	1000 (70)	28 (711)	HP6032	
SEASTAR	REAR MOUNT	HH5261-3	1.7 (27.8)	1000 (70)	28 (711)	HP6032	
SEASTAR	REAR MOUNT	HH5263-3	2.0 (33.0)	1000 (70)	28 (711)	HP6032	
SEASTAR	REAR MOUNT	HH5262-3	2.4 (39.3)	1000 (70)	28 (711)	HP6032	
SEASTAR	REAR MOUNT	HH5265-3	3.0 (49.1)	1000 (70)	28 (711)	HP6032	
SEASTAR PRO	REAR MOUNT	HH5778-3	1.7 (27.8)	1500 (103)	28 (711)	HP6032	
SEASTAR PRO	REAR MOUNT	HH5771-3	2.0 (33.0)	1500 (103)	28 (711)	HP6032	
SEASTAR	SPORT TILT	HH6193-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	*New Product*
SEASTAR	SPORT TILT	HH6191-3	1.7 (27.8)	1000 (70)	20 (508)	HP6032	*Replaces HH5291*
SEASTAR	SPORT TILT	HH6145-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	*Replaces HH5745*
SEASTAR	SPORT TILT	HH6192-3	2.4 (39.3)	1000 (70)	20 (508)	HP6032	*Replaces HH5292*
SEASTAR PRO	SPORT TILT	HH6189-3	1.7 (27.8)	1500 (103)	20 (508)	HP6032	*Replaces HH5289*
SEASTAR PRO	SPORT TILT	HH6190-3	2.0 (33.0)	1500 (103)	20 (508)	HP6032	*Replaces HH5190*
SEASTAR	SPORT PLUS TILT	HH6491-3	1.7 (27.8)	1000 (70)	20 (508)	HP6032	*New Product*
SEASTAR	SPORT PLUS TILT	HH6445-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	*New Product*
SEASTAR	SPORT PLUS TILT	HH6492-3	2.4 (39.3)	1000 (70)	20 (508)	HP6032	*New Product*
SEASTAR	SPORT PLUS TILT	HH6345-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	*Splined Shaft*

Table A: BayStar/SeaStar Helm Pumps Continued

HELM DESCRIPTION		PART NUMBER	DISPLACEMENT CU. IN./REV (cc)	RELIEF VALVE SETTING PSI (BAR)	MAXIMUM WHEEL DIA. INCHES (mm)	SEAL KIT	NOTES
SEASTAR PRO	SPORT PLUS TILT	HH6489-3	1.7 (27.8)	1500 (103)	20 (508)	HP6032	
SEASTAR PRO	SPORT PLUS TILT	HH6490-3	2.0 (33.0)	1500 (103)	20 (508)	HP6032	
SEASTAR	CLASSIC TILT	HH6544-3	1.4 (23.0)	1000 (70)	20 (508)	HP6032	*Replaces HH5775*
SEASTAR	CLASSIC TILT	HH6541-3	1.7 (27.8)	1000 (70)	20 (508)	HP6032	*Replaces HH5741*
SEASTAR	CLASSIC TILT	HH6543-3	2.0 (33.0)	1000 (70)	20 (508)	HP6032	*Replaces HH5743*
SEASTAR	CLASSIC TILT	HH6542-3	2.4 (39.3)	1000 (70)	20 (508)	HP6032	*Replaces HH5742*
SEASTAR PRO	CLASSIC TILT	HH6573-3	1.7 (27.8)	1500 (103)	20 (508)	HP6032	*Replaces HH5773*
SEASTAR PRO	CLASSIC TILT	HH6574-3	2.0 (33.0)	1500 (103)	20 (508)	HP6032	*Replaces HH5774*

Table B: Hynautic Helm Pumps

HELM DESCRIPTION	PART NUMBER	DISPLACEMENT CU. IN./REV (cc)	SHAFT STYLE	KEY WAY	SEAL KIT
HYNAUTIC	H-21	2.75 (45.1)	1" STRAIGHT	1/4" SQUARE	HS-02
HYNAUTIC	H-22	2.00 (32.8)	1" STRAIGHT	1/4" SQUARE	HS-02
HYNAUTIC	H-29	2.75 (45.1)	1" STRAIGHT	1/4" SQUARE	HS-02
HYNAUTIC	H-25	2.75 (45.1)	3/4" TAPERED	#9 WOODRUFF	HS-02
HYNAUTIC	H-26	2.00 (32.8)	3/4" TAPERED	#9 WOODRUFF	HS-02
HYNAUTIC	H-41	5.50 (90.1)	1" STRAIGHT	1/4" SQUARE	HS-04
HYNAUTIC	H-42	4.00 (65.5)	1" STRAIGHT	1/4" SQUARE	HS-04
HYNAUTIC	H-42-2	4.00 (65.5)	3/4" TAPERED	#9 WOODRUFF	HS-04

Table C: Capilano Helm Pumps

HELM DESCRIPTION	PART NUMBER	DISPLACEMENT CU. IN. (cc)	SHAFT STYLE	KEY WAY	SEAL KIT
CAPILANO	1250V	1.7–3.4 (27.8–55.7)	3/4" TAPERED	3/16"	HS5161
CAPILANO	1275V	2.7–5.4 (44.2–88.4)	3/4" TAPERED	3/16"	HS5161
CAPILANO	1350	8.00 (131.0)	1-1/4" STRAIGHT	3/16"	HS5171

Table D: BayStar/SeaStar/Hynautic Outboard Cylinders

MAKER	PART NUMBER	MODEL NUMBER	SHAFT DIA IN (mm)	STROKE IN (mm)	SEAL KIT	VOLUME CU. IN (cc)	NOTES
BAYSTAR	HC4600	OUTBOARD	.63 (16.0)	8 (203)	HP5608/HP5607	7.24 (118.6)	*Discontinued*
BAYSTAR	HC4645H	OUTBOARD	.63 (16.0)	8 (203)	HP4600	7.24 (118.6)	
BAYSTAR	HC4647H	OUTBOARD	.63 (16.0)	8 (203)	HP4600	7.24 (118.6)	
BAYSTAR	HC4648H	OUTBOARD	.63 (16.0)	8 (203)	HP4600	7.24 (118.6)	
BAYSTAR	HC4658H	OUTBOARD	.63 (16.0)	8 (203)	HP4600	7.24 (118.6)	
SEASTAR	HC5345-3	OUTBOARD	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
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 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)	
SEASTAR	HC6750	OUTBOARD TOURNAMENT	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	*Discontinued (See page 3-10)*
SEASTAR	HC6751	OUTBOARD TOURNAMENT	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	*Discontinued (See page 3-10)*
SEASTAR	HC6752	OUTBOARD TOURNAMENT	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	*Discontinued (See page 3-10)*
SEASTAR	HC6753	OUTBOARD TOURNAMENT	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	*Discontinued (See page 3-10)*
SEASTAR	HC6754	OUTBOARD TOURNAMENT	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	*Discontinued (See page 3-10)*
SEASTAR	HC6755	OUTBOARD TOURNAMENT	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	*Discontinued (See page 3-10)*
SEASTAR	HC5370-3	OUTBOARD SIDE MOUNT	.50 (12.7)	8 (203)	HP6088	8.3 (135.2)	*Replaces HC5370-71*
SEASTAR	HC5380-3	OUTBOARD SPLASHWELL	.50 (12.7)	9 (228)	N/A	9.3 (152.1)	*Replaces HC5380*
SEASTAR	HC5375-3	OUTBOARD CATAMARAN	.75 (19.0)	8 (203)	HS5157	8.34 (136.6)	
SEASTAR	HC5343-3	OUTBOARD CAT FIXED	.75 (19.0)	10 (254)	HS5157	8.13 (133.2)	
SEASTAR	HC5445-3	OUTBOARD LIMITED STROKE	.75 (19.0)	6.75 (171)	HS5157	7.04 (115)	
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)	
HYNAUTIC	K-6-NI	OUTBOARD	.875 (22.2)	7.75 (197)	KS-19	9.00	

Table D: BayStar/SeaStar Cylinders Continued

MAKER	PART NUMBER	MODEL NUMBER	SHAFT DIA IN (mm)	STROKE IN (mm)	SEAL KIT	VOLUME CU. IN (cc)	NOTES
SEASTAR	HC5374-3	OUTBOARD CAT FIXED	.75 (19.0)	10 (254)	KS-06	13.3 (217.9)	
SEASTAR	HC5340-42	OUTBOARD SLIDE	.75 (19.0)	10 (254)	HS5157	8.34 (133.2)	*Discontinued*
SEASTAR	HC5342	OUTBOARD SLIDE	.75 (19.0)	10 (254)	HS5157	8.34 (133.2)	*Discontinued*

NOTICE

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

Table E: SeaStar Sterndrive Cylinders *(For NEW -3 cylinders see table H.)*

MAKER	PART NUMBER	MODEL NUMBER	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)	0.63 (16.0)	6.25 (15.9)	HS5154	N/A	5.66 (92.7)	*Obsolete*
SEASTAR	HC5332	BA135-7EM	1.35 (34.9)	.625 (15.9)	7 (178)	HS5155	5741 (66.1)	8.3 (135.2)	
SEASTAR	HC5327	BA135-8EM	1.35 (34.9)	.63 (16.0)	8 (203)	HS5155	6557 (75.5)	9.5 (155.4)	*Obsolete*
SEASTAR	HC5326	BA150-7EM	1.50 (38.1)	.625 (15.9)	7 (178)	HS5156	8853 (102.0)	8.3 (135.2)	*Replaced by HC5326-3*
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)	*Obsolete*
SEASTAR	HC5331	92VPS	1.25 (31.7)	.50 (12.7)	8 (203)	HS5154	N/A	8.3 (135.2)	*Replaced by HC5331-3*
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*

Table F: SeaStar/Capilano Inboard Cylinders *(For NEW -3 cylinders see table H.)*

MAKER	PART NUMBER	MODEL NUMBER	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)	.63 (16.0)	3 (76)	HS5154		3.12 (51)	*Replaced by HC5303-3*
SEASTAR	HC5312 & HC5312-2	BA125-7ATM	1.25 (31.7)	.63 (16.0)	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)	*Brass Cylinder*
SEASTAR	HC5319	BA175-7TM	1.75 (44.4)	.75 (19.0)	7 (178)	HS5183	9569 (110.2)	13.7 (225)	*Brass Cylinder*
SEASTAR	HC5369	BA150-9TM	1.50 (38.1)	.63 (16.0)	9 (229)	HS5182	9375 (107.7)	13.1 (215)	*Brass Cylinder*
CAPILANO	HC5349	BA150-7TM	1.50 (38.1)	.63 (16.0)	7 (178)	HS5182	7117 (82.0)	10.2 (167)	*Brass Cylinder*
CAPILANO	HC5350	BA175-7TM	1.75 (44.4)	.75 (19.0)	7 (178)	HS5183	9569 (110.2)	13.7 (225)	*Brass Cylinder*
CAPILANO	HC5351	BA200-7TM	2.00 (50.8)	.75 (19.0)	7 (178)	HS5184	13200 (151)	18.9 (310)	*Brass Cylinder*
CAPILANO	HC5373	BA175-9TM	1.75 (44.4)	.75 (19.0)	9 (229)	HS5183	12600 (145.5)	17.7 (290)	*Brass Cylinder*
CAPILANO	HC5378	BA200-11TM	2.00 (50.8)	1 (25.4)	11 (279)	HS5185	23140 (267.2)	26.0 (426)	*Brass Cylinder*
CAPILANO	HC5379	BA200-11TMC	2.00 (50.8)	1 (25.4)	11 (279)	HS5185	23140 (267.2)	26.0 (426)	*Brass Cylinder Clevis Connection*
SEASTAR	HC5802	BA200-9TM	2.00 (50.8)	1 (25.4)	9 (229)	HS5198	18900 (218.3)	21.25 (345)	*Brass Cylinder*
SEASTAR	HC5804	BA200-11TM	2.00 (50.8)	1 (25.4)	11 (279)	HS5198	23140 (267.2)	26.0 (426)	*Brass Cylinder*

Table G: Hynautic Cylinders

MAKER	PART NUMBER	MODEL NUMBER	SHAFT DIA IN (mm)	STROKE IN (mm)	SEAL KIT	VOLUME CU. IN. (cc)	NOTES
HYNAUTIC	K-1	N/A	.75 (19.0)	9 (229)	KS-11	11.9 (195)	*Replaced by HC5369*
HYNAUTIC	K-2	N/A	.75 (19.0)	9 (229)	KS-12	17.7 (290)	*Replaced by HC5373*
HYNAUTIC	K-3	N/A	.875 (22.2)	9 (229)	KS-13, or KS-17	22.9 (375)	*Replaced by HC5802*
HYNAUTIC	K-4	N/A	.875 (22.2)	12 (305)	KS-13, or KS-17	30.5 (500)	*Replaced by HC5378*
HYNAUTIC	K-5	UNBALANCED	.875 (22.2)	9 (229)	KS-15	15.9 (261)	
HYNAUTIC	K-6	N/A	.875 (22.2)	7.75 (197)	KS-19	9 (147)	
HYNAUTIC	K-8	N/A	1 (25.4)	9.5 (241)	KS-09 or KS-18	39.2 (642)	*Replaced by HC5806*
HYNAUTIC	K-9	N/A	1 (25.4)	14.5 (168)	KS-09 or KS-18	55 (901)	
HYNAUTIC	K-10	N/A	.75 (19.0)	9.5 (241)	KS-07	7.5 (123)	*Replaced by HC53XX*
HYNAUTIC	K-11	UNBALANCED	.75 (19.0)	9 (229)	KS-01	11 (117)	*Replaced by HC5370-3*
HYNAUTIC	K-12	UNBALANCED	.75 (19.0)	7 (178)	KS-01	8.6 (141)	*Replaced by HC5370-3*
HYNAUTIC	K-13	N/A	.75 (19.0)	9 (229)	KS-01	11 (117)	*Replaced by HC5380-3*
HYNAUTIC	K-14	N/A	.75 (19.0)	7 (178)	KS-01	8.6 (141)	*Replaced by HC5380-3*
HYNAUTIC	K-18	N/A	.75 (19.0)	7 (178)	KS-02	7 (115)	*Replaced by HC5322-3*
HYNAUTIC	K-19	N/A	.75 (19.0)	9 (229)	KS-02	9 (147)	*Replaced by HC5323-3*

Table H: NEW -3 Steering Cylinders

MAKER	PART NUMBER	MODEL NUMBER	BORE DIA IN (mm)	SHAFT DIA IN (mm)	STROKE IN (mm)	SEAL KIT	TORQUE IN-LB (Kg-m)	VOLUME CU. IN. (cc)	NOTES
SEASTAR	HC5303-3	BA125-3ATM	1.25 (31.7)	.63 (16.0)	3 (76)	HP6026	N/A	3.12 (51)	
SEASTAR	HC5312-3	BA125-7ATM	1.25 (31.7)	.63 (16.0)	7 (178)	HP6026	5025 (57.9)	7.2 (118)	
SEASTAR	HC313-3	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	HC5326-3	BA150-7EM	1.50 (38.1)	.63 (16.0)	7 (178)	HP6086	8853 (102.0)	8.3 (136.2)	
SEASTAR	HC5328-3	125-8EM	1.25 (31.7)	.50 (12.7)	8 (203)	HP6087	7142 (82.3)	8.3 (136.2)	
SEASTAR	HC5329-3	125-8VPEM	1.25 (31.7)	.50 (12.7)	8 (203)	HP6027	N/A	8.3 (136.2)	
SEASTAR	HC5331-3	125-8EM 92VPS	1.25 (31.7)	.50 (12.7)	8 (203)	HP6027	N/A	8.3 (136.2)	
SEASTAR	HC5330-3	BA125-8EMV	1.25 (31.7)	.50 (12.7)	8 (203)	HP6027	7142 (82.3)	8.3 (136.2)	

SPARE PARTS/CROSS REFERENCE

PART No.	KIT No.	MAKER	DESCRIPTION	NOTES
010924	HP6130	SEASTAR	Washer 5/16 Flat 3/4 OD SS – Various Uses	20 Per Kit
058733	HP6000	SEASTAR	Non-Venting Cap Aka HA5432	5 Per Kit
082021	HP6107	SEASTAR	Power Steering Non-2 Model Rod End Ball	1 Per Kit
112249	HP6024	CAPILANO	Clevis, BA150-7 Cylinder	1 Per Kit
113021	HP6131	SEASTAR	Nut 5/16nc Nyloc® Thin SS – Various Uses	10 Per Kit
113225	HP6001	SEASTAR	Hhcs 3/8 x 1.35 HSS (and Nut) High Strength Tiller	3 Per Kit
116320	HP6048	SEASTAR	Hhcs 3/8 NF x 1-1/2 SS – Various Uses	10 Per Kit
116527	HP6003	SEASTAR	Rod End Ball 1/2" SS Modified (Tiebars Only)	1 Per Kit
135725	HP6068	SEASTAR	Trunnion Foot – All Brass Inboard Cylinder	1 Per Kit
160041	HP6122	HYNAUTIC	All Reservoir Dill Valve Only	1 Per Kit
160042	HP6005	HYNAUTIC	Rear Mount 0-60 psi Gauge	1 Per Kit
168625	HP6082	SEASTAR	Power Steering Reservoir Air Valve	1 Per Kit
170001	HP6006	HYNAUTIC	Boot Cover (K22/27, K31/33 Cylinder)	1 Per Kit
183818	HP6053	SEASTAR	Sport Tilt Bezel (Hard Plastic)	1 Per Kit
185921	HP6007	SEASTAR	FHSCS 3/8"NF x 1-5/8" SS Bolt (HC5342 Tiller)	3 Per Kit
186426	HP6054	SEASTAR	Hhcs 3/8"NF x 2-1/4 SS – Various Uses	10 Per Kit
186540	HP6132	SEASTAR	Shcs 3/8"OD x 1-1/4 Shldr – Various Uses	10 Per Kit
192126	HF6008	SEASTAR	1/2" NF Nyloc® Brass NP	6 Per Kit
192126	HP6008	SEASTAR	1/2" NF Nut (Larger Nut For Support Rod)	6 Per Kit
192324	HP6133	CAPILANO	Remote Fill Bulkhead Fitting (Plastic)	6 Per Kit
202027	HP6134	SEASTAR	Washer 1/2ID x 1-1/16 Od SS – Various Uses	10 Per Kit
202300	HP6017	SEASTAR	Washer, 5/8" (Various Uses)	5 Per Kit
240317	HP6061	HYNAUTIC	SHCS 1/4" NC x 3/8 SS – Various Uses	6 Per Kit
241297	HP6022	HYNAUTIC	SHCS 1/4" NF x 7/8 SS	4 Per Kit
260126	HP6135	SEASTAR	Wheel Shaft Key – Several Systems	20 Per Kit
260130	HP6136	SEASTAR	Wheel Shaft Key – Various Uses	20 Per Kit
279047	HP6046	SEASTAR	Sport Tilt Rubber Bellows	6 Per Kit
287824	HP6009	SEASTAR	Hose Swage Fitting (OEM Only)	8 Per Kit
287824	HP6010	SEASTAR	Hose Swage Fitting (OEM Only)	50 Per Kit
292135	HP6137	SEASTAR	1/2" Rod End Ball, All BA125-7ATM I/B Cylinder	1 Per Kit
293721	HP6044	SEASTAR	F/Mnt O/B Cylinder, Bleeder Covers – Soft	12 Per Kit
337826	HP6069	SEASTAR	Wheel Bushing (Use with HH5279, HH5280 and HH5281	1 Per Kit
340041	HP6057	HYNAUTIC	H-20/40 Series Helm Acorn Nuts	6 Per Kit
340061	HP6049	HYNAUTIC	Nut For K-22, 27, 28 and K-29 (Tierod Nuts)	10 Per Kit
345324	HP6123	CAPILANO	Clevis Ba200-11TM/TMC Cylinder	1 Per Kit
380020	HP6040	HYNAUTIC	Air Valve/Plug Assembly	1 Per Kit
432720	HP6011	SEASTAR	Hose Bend Restrictor (OEM Only)	8 Per Kit
432720	HP6012	SEASTAR	Hose Bend Restrictor (OEM Only)	50 Per Kit
444006	HP6113	SEASTAR	HC5358 Cylinder Replacement (No Rod, Brackets Or Hardware)	1 Per Kit
449721	HP6055	SEASTAR	Side Mount Cylinder Ext Rod (c/w Pin)	1 Per Kit
449824	HP6055	SEASTAR	Side Mount Cylinder Ext Rod (c/w Pin)	1 Per Kit
520061	HP6108	HYNAUTIC	H-20 Series Trim Ring (Mirrored)	1 Per Kit
529602	HP6104	SEASTAR	Helm Mnt Hardware Kit	1 Per Kit
560930	HP6013	SEASTAR	Ba175-7TM Rod End Ball Joint	1 Per Kit
560948	HP6093	SEASTAR	Rod End Ball, 5/8" All Brass BA150-7 Cylinder	1 Per Kit
590040	HP6050	BAYSTAR	Support Rod Bent, B/S O/B Cylinder Only	2 Per Kit
600606	HF6023	SEASTAR	Elbow Nickle Plate used in Transom Fittings	4 Per Kit
600620	HF6145	SEASTAR	Pivot Cylinder Hose Fittings	2 Per Kit

PART No.	KIT No.	MAKER	DESCRIPTION	NOTES
600620	HP6145	SEASTAR	Pvt F/Mnt Cylinder Hose Fittings/Elbow	2 Per Kit
650036	HP6090	HYNAUTIC	H-29/30 Helm Woodruff Key	12 Per Kit
650047	HP6091	HYNAUTIC	H-20 Series Woodruff Key	12 Per Kit
652123	HF6146	SEASTAR	Remote Fill Hose Elbow (Plastic)	6 Per Kit
652123	HP6147	SEASTAR	Hose Barb 1/2 - 1/4, Remote Fill Kits	6 Per Kit
653220	HF6024	HYNAUTIC	Tube Tee Flare	3 Per Kit
670030	HP6039	HYNAUTIC	K-22/27/28 And K-29 Ball Joint Assembly.	1 Per Kit
680080	HP6045	HYNAUTIC	K-6 Mounting Hardware Kit c/w Drag Link Assembly	1 Per Kit
690011	HF6025	HYNAUTIC	1/4" NPT – Flare, Straight	3 Per Kit
690511	HF6026	HYNAUTIC	Tee 1/4" NPT x 3/8" Flare	4 Per Kit
690751	HF6027	HYNAUTIC	Union 3/8" Flare x 3/8" Flare	3 Per Kit
690941	HF6014	HYNAUTIC	MSH-6 Hyn Hose End Ftg Swage	8 Per Kit
691231	HF6028	HYNAUTIC	Long Ftg Nut	4 Per Kit
704525	HP6146	SEASTAR	Nut 5/16"NC Nyloc®. Various Apps	12 Per Kit
722222	HP6031	SEASTAR	Front Mount Slide Cylinder, Plate and Hardware	1 Per Kit
722829	HP6041	SEASTAR	Clamping Plate – Extension Plates	6 Per Kit
730229	HP6016	SEASTAR	Support Rod (All SS F/Mount Cylinders)	1 Per Kit
730230	HP6111	SEASTAR	Pro Pivot Cylinder Support Rod	1 Per Kit
750027	HP6098	SEASTAR	Hhcs 5/16"NF x 1-1/4 – Various Uses	10 Per Kit
750824	HP6052	SEASTAR	Traditional Tilt Helm Covers (Top/Bottom)	1 Per Kit
750928	HP6052	SEASTAR	Traditional Tilt Helm Covers (Top/Bottom)	1 Per Kit
752021	HP6142	SEASTAR	Hhcs 5/16"NF x 3-1/2 SS – Various Uses	12 Per Kit
753428	HP6041	SEASTAR	Bottom Washer	6 Per Kit
757927	HP6047	SEASTAR	Shcs #10-24 x 7/8" SS – Various Uses	10 Per Kit
785255	HP6092	SEASTAR	HC5331 / HC5331-3 Tube Support Kit	1 Per Kit
794926	HF6029	SEASTAR	Tube Nut (Used to Hold Bleeder in Place)	6 Per Kit
800136	HP6148	SEASTAR	Power Purge Helm Adapter	1 Per Kit
800300	HP6060	SEASTAR	Power Purge Spare Parts Kit	1 Per Kit
809900	HP6035	SEASTAR	F/M Slide Cylinder Support Brackets c/w Hardware	2 Per Kit
821723	HP6140	SEASTAR	Power Steering Filter	1 Per Kit
823105	HP6112	SEASTAR	Power Steering Shaft Shield (No Step)	1 Per Kit
823115	HP6118	SEASTAR	HC5805 Cylinder Shaft Shield (No Step)	1 Per Kit
823203	HP6067	SEASTAR	Power Steering Cylinder Boot Cover 01/03 Cylinder	1 Per Kit
823207	HP6100	SEASTAR	Power Steering Cylinder, HC5805 Boot	1 Per Kit
823673	HP6065	SEASTAR	Locking Tab –Various Uses	6 Per Kit
825128	HP6004	SEASTAR	Bottom Mount 0-60 psi Gauge	1 Per Kit
825128	HP6121	SEASTAR	HP5810 Air Press Gauge 0-60 psi	1 Per Kit
828020	HP6033	SEASTAR	Front Mount Pivot Cylinder, Spacer/Adjusting Nut Kit	1 Per Kit
828085	HP6034	SEASTAR	Adjusting Nut, All F/M Pivot Cylinder	1 Per Kit
833529	HP6081	SEASTAR	R/Mnt Helm Mnt Kit (c/w Remote Fill)	1 Per Kit
839120	HP6018	SEASTAR	Pivot Cylinder Support Bracket	2 Per Kit
839121	HP6101	SEASTAR	Pro Pivot Cylinder Support Brackets	2 Per Kit
860028	HP6064	HYNAUTIC	Rv-60 Valve Assembly Only (No Reservoir)	1 Per Kit
860071	HP6102	HYNAUTIC	K-6H Mnt Kit (Honda 115-130 HP Only)	1 Per Kit
870360	HP6084	HYNAUTIC	TP-01/02 Trim Pump Relay	2 Per Kit
928137	HP6019	SEASTAR	BA200-9TM Cylinder Rod End Ball Joint	1 Per Kit
961490	HP6143	SEASTAR	HO6000 Series Tiebar Slave Brkt Assembly	1 Per Kit
961660	HP6144	SEASTAR	Drive Bracket HO60xx Series Tiebars	1 Per Kit
961665	HP6119	SEASTAR	HO6000 Series Tiebar Drive Brkt Assembly	1 Per Kit
961685	HP6124	SEASTAR	HO6000 Series Rod End Ball (Slave Connection)	1 Per Kit
984829	HP6106	SEASTAR	CB 1/4"UNC x 2" – Various Uses	10 Per Kit
680080A	HP6120	HYNAUTIC	K-6 Drag Link	1 Per Kit
HA5431	HP6126	SEASTAR	Venting Cap, All Helms	5 Per Kit

QUICK REFERENCE TURNS CHART

BayStar Helm Pumps Turns

GOOD OPTIMAL

		BAYSTAR HELM DISPLACEMENT (in³/rev)				
		1.1	**1.4**			
OUTBOARD CYLINDERS	**DISP. (in³)**					
HC4645H – SINGLE	7.3	6.6	5.2			
INBOARD CYLINDERS	**DISP. (in³)**					
BA125-6.25	6.7	6.1	4.8			
BA100-6	3.53	3.2	2.5			

SeaStar Helm Pumps Turns

GOOD OPTIMAL

		SEASTAR HELM DISPLACEMENT (in³/rev)				
FRONT MOUNT, OUTBOARD PIVOT CYLINDERS* **	**DISP. (in³)**	**1.4**	**1.7**	**2.0**	**2.4**	**3.0**
SINGLE	8.3	5.9	4.9	4.2	3.5	2.8
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. (in³)**					
BA125-7	7.2	5.1	4.2	3.6	3.0	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	29.7	21.2	17.5	14.9	12.4	9.9

Capilano Helm Pumps Turns

GOOD OPTIMAL

		CAPILANO HELM DISPLACEMENT (in³/rev)				
		1250V MIN	**1250V MAX**	**1275 MIN**	**1275 MAX**	**1350**
FRONT MOUNT, OUTBOARD PIVOT CYLINDERS* **	**DISP. (in³)**	**1.7**	**3.4**	**2.7**	**5.4**	**8.0**
SINGLE	8.3	4.9	2.4	3.1	1.5	1.0
DUAL**	16.6	9.8	4.9	6.1	3.1	2.1
TRIPLE**	24.9	14.6*	7.3*	9.2*	4.6*	3.1
QUAD**	33.2	19.5*	9.5*	12.3*	6.1*	4.2
INBOARD CYLINDERS	**DISP. (in³)**					
BA125-7	7.2	4.2	2.1	2.7	1.3	0.9
BA135-7	8.2	4.8	2.4	3.0	1.5	1.0
BA150-7	10.2	6.0	3.0	3.8	1.9	1.3
BA175-7	13.7	8.1*	4.0*	5.1	2.5	1.7
BA150-9	13.1	7.7*	3.9*	4.9	2.4	1.6
BA175-9	17.7	10.4*	5.2*	6.6*	3.3*	2.2
BA200-7	18.9	11.1*	5.6*	7.0*	3.5*	2.4
BA200-9	21.25	12.5*	6.25*	7.9*	3.9*	2.7
BA200-11	29.7	17.5	8.7	11.0*	5.5*	3.7

** Any system using a helm greater than 2.4 in 3 /rev & 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.*

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CHAPTER

13 CONTACT INFORMATION

SeaStar Solutions Technical Service

web: www.seastarsolutions.com Tel: 604.248.3858
e-mail: seastar@seastarsolutions.com

NOTICE

SeaStar Solutions has authorized the following service centers through in-house training and product support. These Authorized Service Centers are to be used for rebuilding of non-warranty components ONLY. SeaStar Solutions does not set pricing at these locations and they are not that of a SeaStar Solutions owned company.

New locations are being added on a frequent basis. For the most up-to-date listings of Repair Centers, please go to our web page at www.seastarsolutions.com

Authorized Service Centers

CANADA

Crescent Beach Marina Tel: 604.538.9666
Surrey, BC

USA

Pacific Northwest (Inc. Alaska)

Redden Marine, Tel: 360-733-0250
Bellingham, WA

West Coast:

Fishing Boats Unlimited Tel: 949-642-0882
Costa Mesa, CA

Central—Mexico Gulf Coast

Boat Steering Solutions LLC Tel: 941-484-6060
North Venice, FL

Pier 21 Marine Tel: 504-305-5300
Kenner, LA

East Coast:

Fluid Technologies Tel: 904-384-9659
Jacksonville, FL

Florida Rigging and Hydraulics Tel: 561-863-7444
Riviera Beach, FL

Marine Control Systems Tel: 828-508-4201
Franklin, NC
(Hynautic preferred location)

Rose's Marine
Gloucester, MA Tel. 877-283-3334

Authorized Distributors

For a current listing of all our authorized distributors please visit:
www.seastarsolutions.com

2 YEAR LIMITED WARRANTY

We warrant to the original retail purchaser that Marine Canada Acquisition Inc. DBA SEASTAR SOLUTIONS (herein forward referred to as SeaStar Solutions) products have been manufactured free from defects in materials and workmanship. This warranty is effective for two years from the date of original retail purchase, excepting that where SeaStar Solutions products are used commercially or in any rental or other income producing activity, then this warranty is limited to 1 year from the date of original purchase.

We will provide replacement product without charge, for any SeaStar Solutions product meeting 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 SeaStar Solutions products found to be defective and covered by this warranty, will be replaced or repaired at SeaStar Solutions' option, and returned to the customer.

SeaStar Solutions' sole responsibility under this warranty is limited to the repair or replacement of product which is, in SeaStar Solutions' opinion, defective. SeaStar Solutions is not responsible for charges connected with the removal of such product or re-installation of replacement or repaired parts.

We will have no obligations under this warranty for any product:

- Which has been improperly installed.
- which has been used in an installation other than as recommended in our installation or operation instructions or specifications.
- Which has failed or has been damaged due to an accident or abnormal operation including racing, misuse or alterations outside our factory.
- Which has been repaired or modified by other than SeaStar Solutions.
- Which has been used on an engine/boat combination where the engine horsepower exceeds the boat horsepower rating established by the boat manufacturer.
- Which has been used with other products which, in SeaStar Solutions' opinion, are incompatible with the SeaStar Solutions product.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES, OBLIGATIONS OR LIABILITIES ON THE PART OF SEASTAR SOLUTIONS AND WILL BE THE CUSTOMER'S EXCLUSIVE REMEDY EXCEPT FOR ANY APPLICABLE IMPLIED WARRANTIES UNDER STATE LAW WHICH ARE HEREBY LIMITED IN DURATION TO TWO YEARS FROM THE DATE OF ORIGINAL PURCHASE. IN NO EVENT WILL SEASTAR SOLUTIONS BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY RELATING TO THE PRODUCTS. Some states do not allow limitations on an implied warranty, or the exclusion of incidental or consequential damages, so the above exclusions may not apply to you. You may have other rights which vary from state to state.

If SeaStar Solutions products are to be returned to SeaStar Solutions under warranty, you must obtain a Return Goods authorization number (claim number) prior to shipping. Be sure to label the goods with:

a) the name and address of the sender, and

b) the return goods authorization number (claim number).

Please address the returned goods as follows:

From U.S.A.

RGA # ?
SeaStar Solutions
c/o UPS-SCS
19308 70th Ave S.
Kent, WA 98032

From CANADA and Overseas:

RGA # ?
SeaStar Solutions
3831 No.6 Road
Richmond, B.C.
Canada V6V 1P6

SEASTAR SOLUTIONS®

SEASTAR SOLUTIONS
3831 NO.6 ROAD
RICHMOND, B.C.
CANADA V6V 1P6

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