



INSTRUCTION MANUAL
FOR INMAC-KOLSTRAND
MULTI-SPOOL BRASS POWER GURDY



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Seattle, WA 98107
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www.kolstrand.com



GENERAL MULTI-SPOOL BRASS GURDY INSTRUCTIONS

1. DESCRIPTION

A. General Description

The **InMac-Kolstrand** Multi-Spool Brass Gurdy is designed to haul or pay-out trolling wire cable aboard by using the main drive spool as it rotates in the respective direction. The installation typically consists of a Pair of hydraulically powered Multi-spool Brass Power Gurdy Assemblies, and the ship's Hydraulic System. The hydraulic system may be used to operate other machinery. Contact InMac for recommendations and circuit diagrams before adding to your hydraulic system. See Figure 1 below for Basic Parts and Component Identifications.

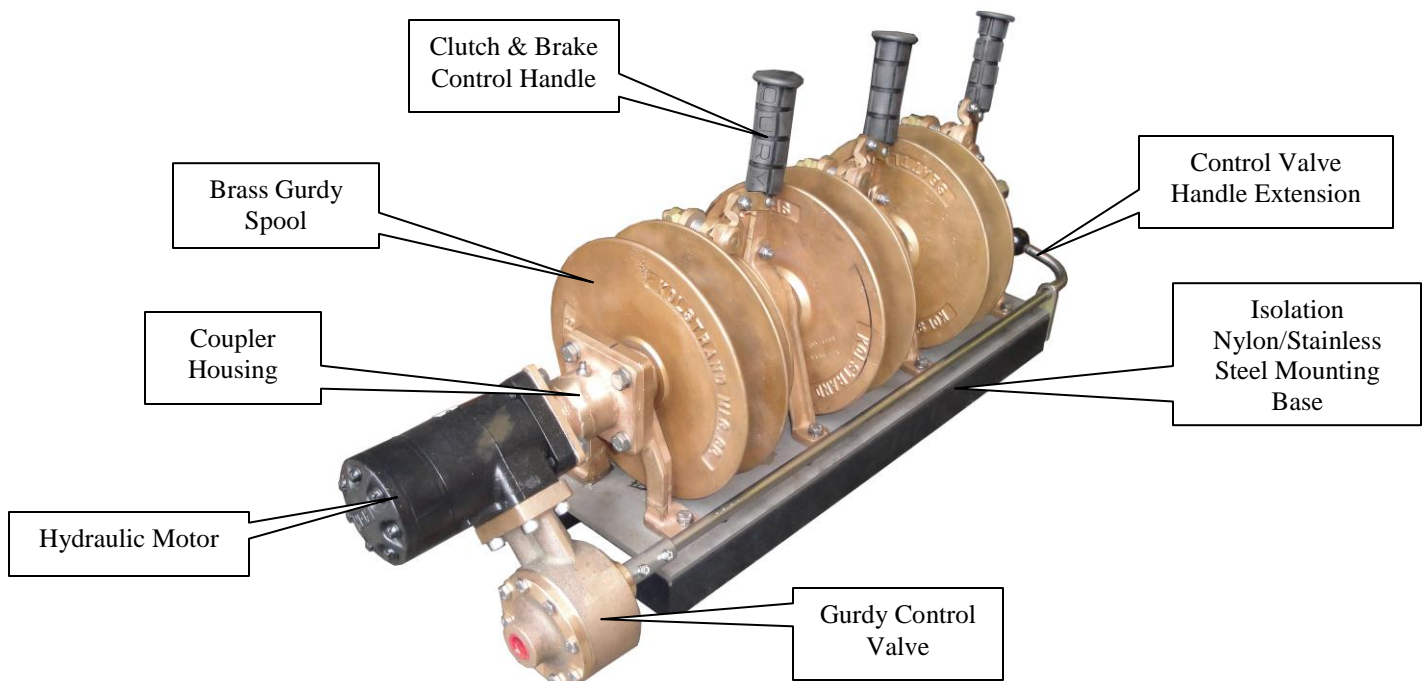


Figure 1 – Basic Parts and Components of the Multi-Spool Brass Power Gurdy

B. Power Gurdy Description

The hydraulic motor is flange mounted to the Coupler Housing, with Motor Shaft coupled to the Main Gurdy Drive Shaft by way of an internal coupling. The Brass Spools with Bearings are mounted directly onto the Main Gurdy Drive Shaft. The 9" Diameter Spool will store about 1,400 feet of 1/16 inch Trolling Wire. The Bronze Control Valve is mounted directly onto the hydraulic motor by way of (4) stainless steel socket-head Capscrews with O-rings sealing the two components

C. Hydraulic Components

The Typical components of your hydraulic system are identified on the 'Hydraulic Circuit Drawing'. Each system generally includes the following basic components: Hydraulic oil storage tank, filter, pump, relief valve, control valve and actuating motor. In some cases, several of these components are included and incorporated into one housing; for example, a hydraulic tank may be directly mounted onto the hydraulic pump (as in the case with the VTM Pump Arrangement), a relief valve might be contained in the pump or control valve, or a filter might be installed in the storage tank. Consult your 'Hydraulic Circuit Drawing' for specifications concerning the operation of the system.

2. ADJUSTMENTS AND MAINTENANCE

A. Lubrication

There is One Grease Lubrication Fitting provided for each Support Foot. This grease fitting provides a path for grease to be administered so as to lubricate the Foot Bearing and Main Drive Shaft. Depending on the use of the Gurdy, grease the zerk fitting(s) periodically with waterproof grease. See Figure 2 below for Foot Bearing Grease Fitting Locations.

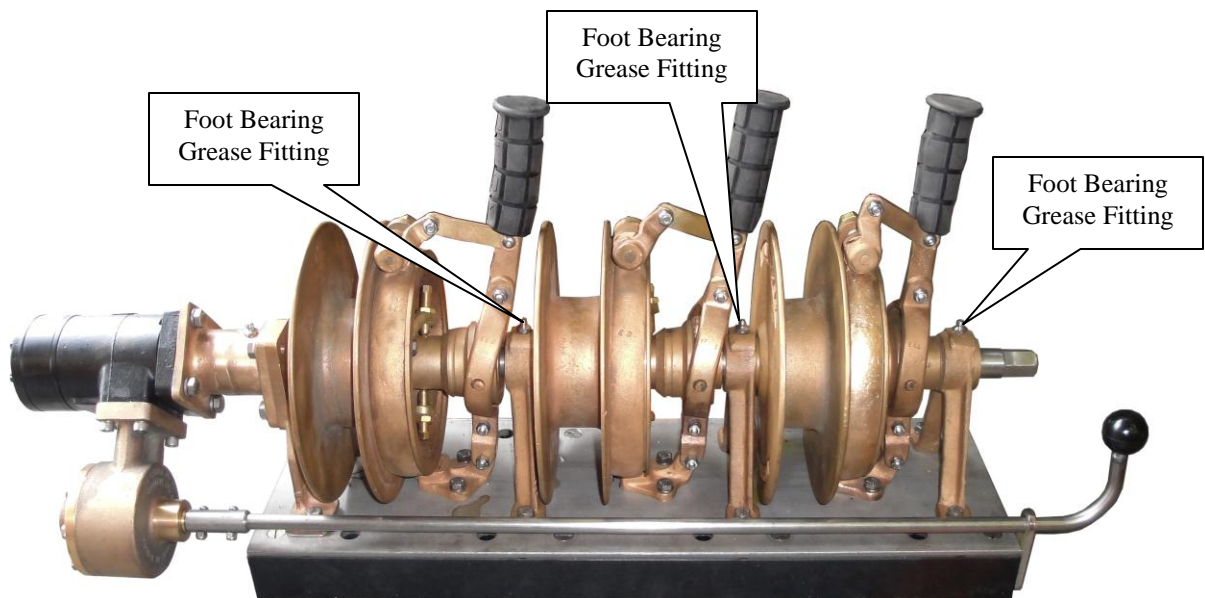


Figure 2 – Gurdy Foot Bearing Grease Fitting Locations

There is One Oil Fill Plug provided for each spool. This Oil Plug provides a path for oil to be administered so as to lubricate the Spool Bearing. Depending on the use of the Gurdy, the spool should be filled periodically. Rotate the spool so that the plug is in its most elevated position, remove the plug and fill the spool with AW32 Hydraulic Oil (or similar lubricating oil). Re-install the plug and check for leaks prior to operating the Gurdy. See Figure 3 below for Spool Fill Plug Locations.

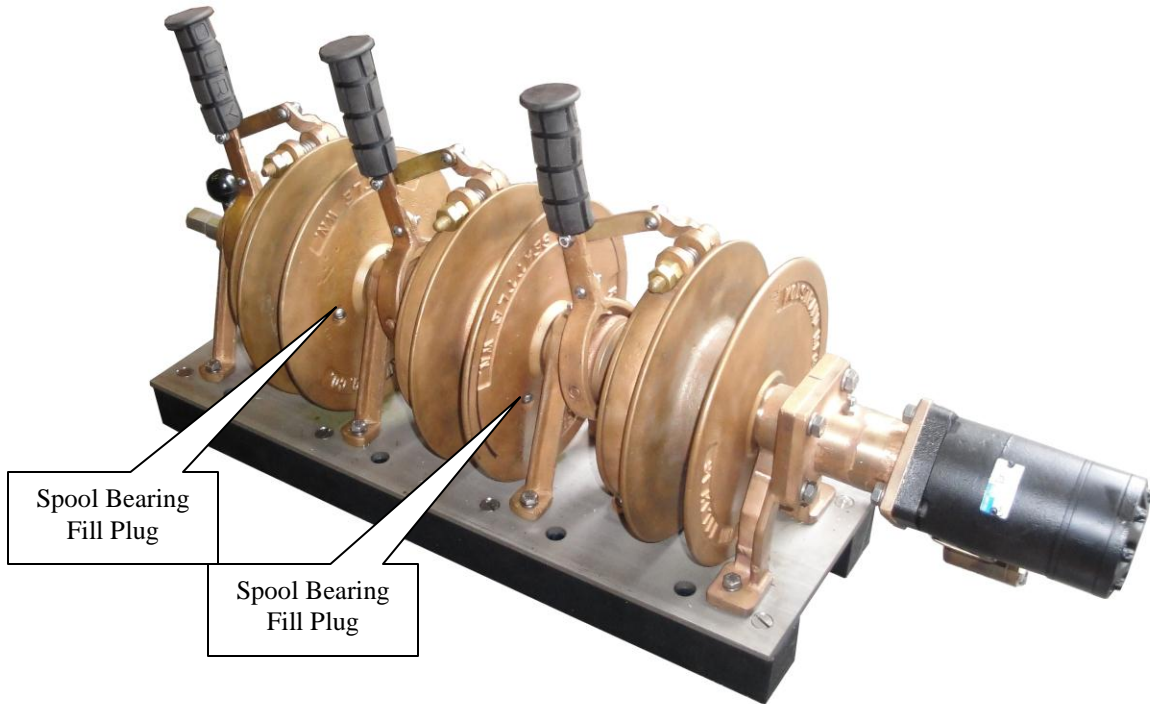


Figure 3 – Spool Oil Fill Plug Locations

Additionally, there is One Grease Fitting provided to lubricate the Motor Coupler in the Motor Mount, which connects the Hydraulic Motor Shaft to the Main Drive Shaft. This Grease Fitting provides continuous lubrication for the coupler. Depending on the use of the, grease the zerk fitting periodically with waterproof grease. See Figure 4 below for Coupler Grease Fitting Location.

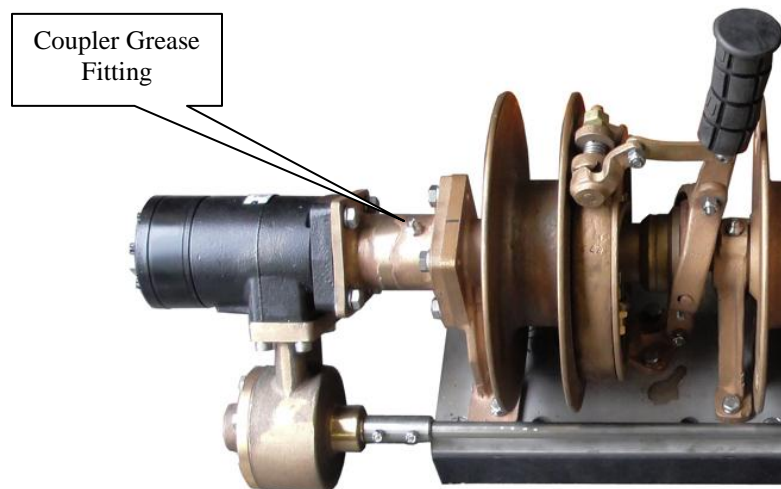


Figure 4 – Coupler Grease Fitting Location

B. Relief Valves

The hydraulic system typically has one or more relief valves incorporated in it. Their location and recommended pressure settings are specified on the “Hydraulic Circuit Diagram”. The pressure setting and adjustment procedure of the main relief valves is very important, as excessive system pressure will cause damage to the equipment.

C. Seals and O-Rings

There are Two O-Rings which Seal between the Control Valve and the Hydraulic Motor. Should they need to be replaced due to age or hydraulic oil leakage, replace with #2-112 Buna O-Rings, to restore hydraulic system integrity between the Control Valve and Hydraulic Motor.

Additionally, the Gurdy Valve relies on One O-Ring to seal the valve cover to the body, and Two O-Rings to seal the internal ports of the control valve. Should the Cover O-Ring need to be replaced, restore with a #2-230 Buna O-Ring. Should the Control Valve experience excessive internal leakage, replace the internal O-Rings with #2-114 Buna O-Rings.

D. Installation and Mounting Instructions

The **InMac-Kolstrand** Multi-Spool Brass Gurdy is equipped with a Mounting Base, which when installed will isolate the Gurdy from the Vessel. This ‘New Style’ Gurdy UHMW Base is far superior to older Gurdy Bases, in that the black UHMW rails will insulate the installed Gurdy from the vessel, eliminating electrolysis issues and preventing stray currents from passing through the boat and conducting down thru the Gurdy wire.

When Installing the Gurdy to the Rail, use the provided mounting holes to bolt the Gurdy securely to the rail. See Figure 5 below for the correct mounting holes to use.

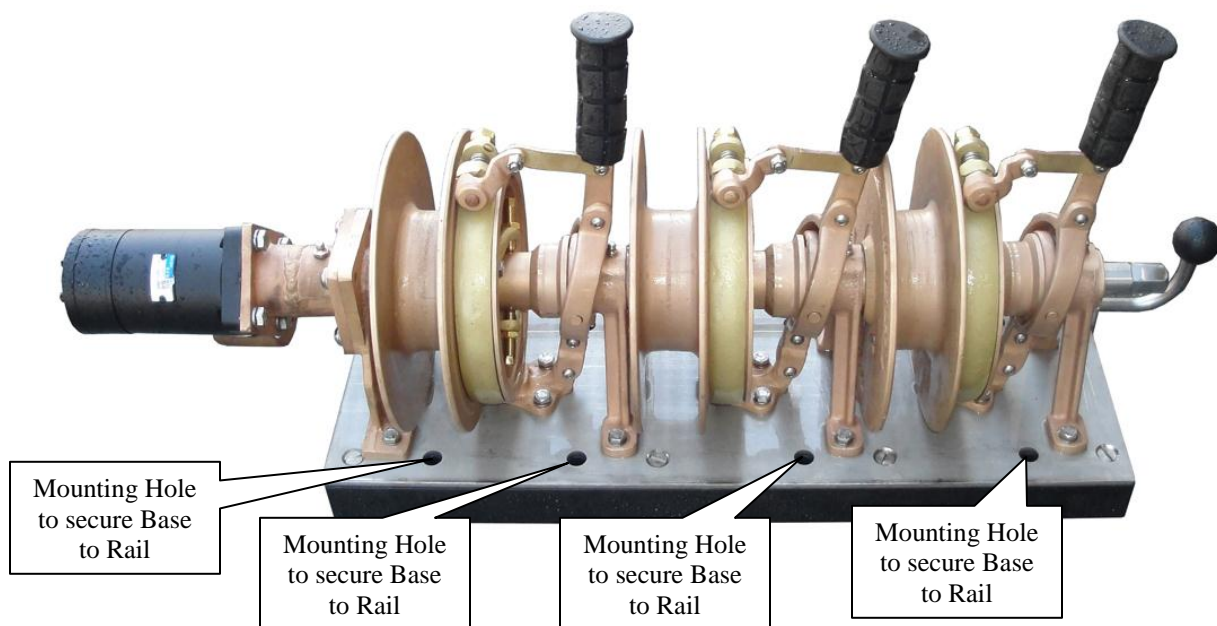


Figure 5 – Correct Mounting Holes for installing Isolation Gurdy

Use the Provided Socket Head Capscrews to mount the Gurdy. You'll notice that the Capscrews **Do Not** Bolt the Stainless Steel Plate to the Vessel... The Capscrews are to be inserted through the provided plate holes, securing only the Black UHMW Rails to the vessel. See Figure 6 Below for additional guidance.

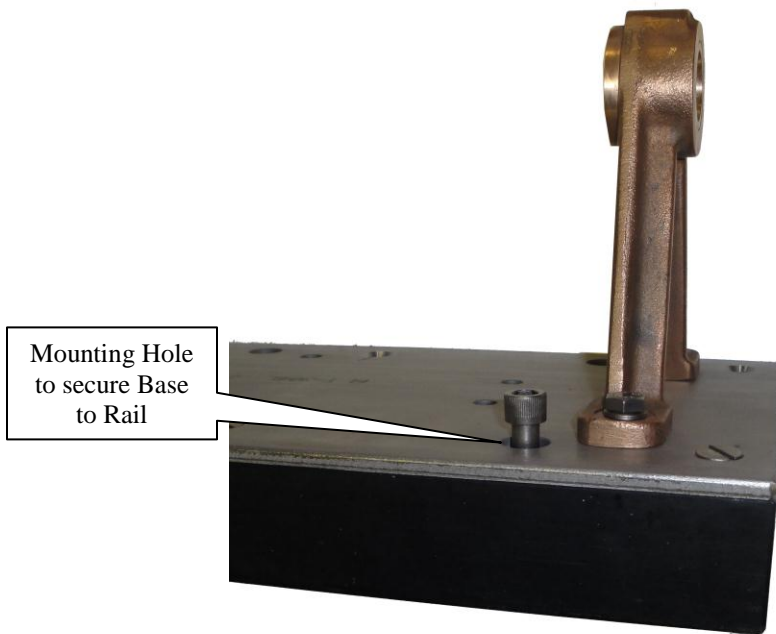


Figure 6 – Mounting Bolts are to be inserted into the hole, Securing the Black UHMW Rails to the Vessel

Installation Tip: After installing Gurdys to the vessel, fill the Capscrew Holes with Silicone, to prevent water from pooling on top of the Capscrews, and breaking the isolation feature of the base.



Note: The InMac-Kolstrand Multi-Spool Brass Gurdys are assembled and adjusted to function as best as possible using 'Bench Adjustments' during the assembly of the Gurdys. The Customer may have to make further adjustments to the Clutches and Brakes (on the vessel during initial fishing trials).

3. OPERATION

A. Multi-spool Brass Gurdy Operation

With the Gurdy Control Valve handle in the center position, oil flows from the hydraulic pump through the Gurdy Valve unrestricted, and then returns to tank. When the rotary valve handle is moved to either extreme position, oil flows through the Gurdy Hydraulic Motor, back through the Control Valve and to tank. See Figure 7 below for Gurdy Motor/Valve Plumbing Assistance.



InMac-Kolstrand Power Gurdy Manifold-Style Control Valve

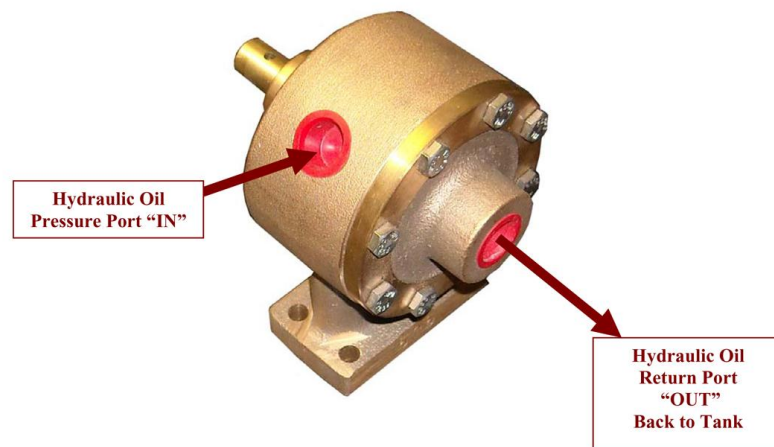


Figure 7 – Valve Ports

B. Multi-spool Brass Gurdy Clutch & Brake Operation

Each Spool is controlled by way of a Clutch & Brake Handle, in order to dis-engage the spool from the Main Drive Shaft (for 'Free-Spooling'), controlling the free turning spool speed by moving the handle to feather the Brake, or to engage the spool to the Main Drive Shaft by the clutch (for Positive Hauling). The Direction of the engaged Spools is determined by moving the Control Valve Extension Handle, directing hydraulic fluid through the motor to drive the Main Drive Shaft.

C. Spare Parts Recommendation

- (1 Only) Part No. AKPGRIP Handle Grip Kit (Per Spool)
- (1 Only) Part No. AKPBGHP-TG2C Clutch Adjustment Screw with Nut (Per Spool)
- (1 Only) Part No. AKPBGHP-TG4C Brake Dog Spring (Per Spool)
- (1 Only) Part No. AKPBGHP-TG4E Clutch & Brake Link (Per Spool)



AKPBGHP-TG2C Adjustment Screw



AKPBGHP-TG4C Brake Dog Spring

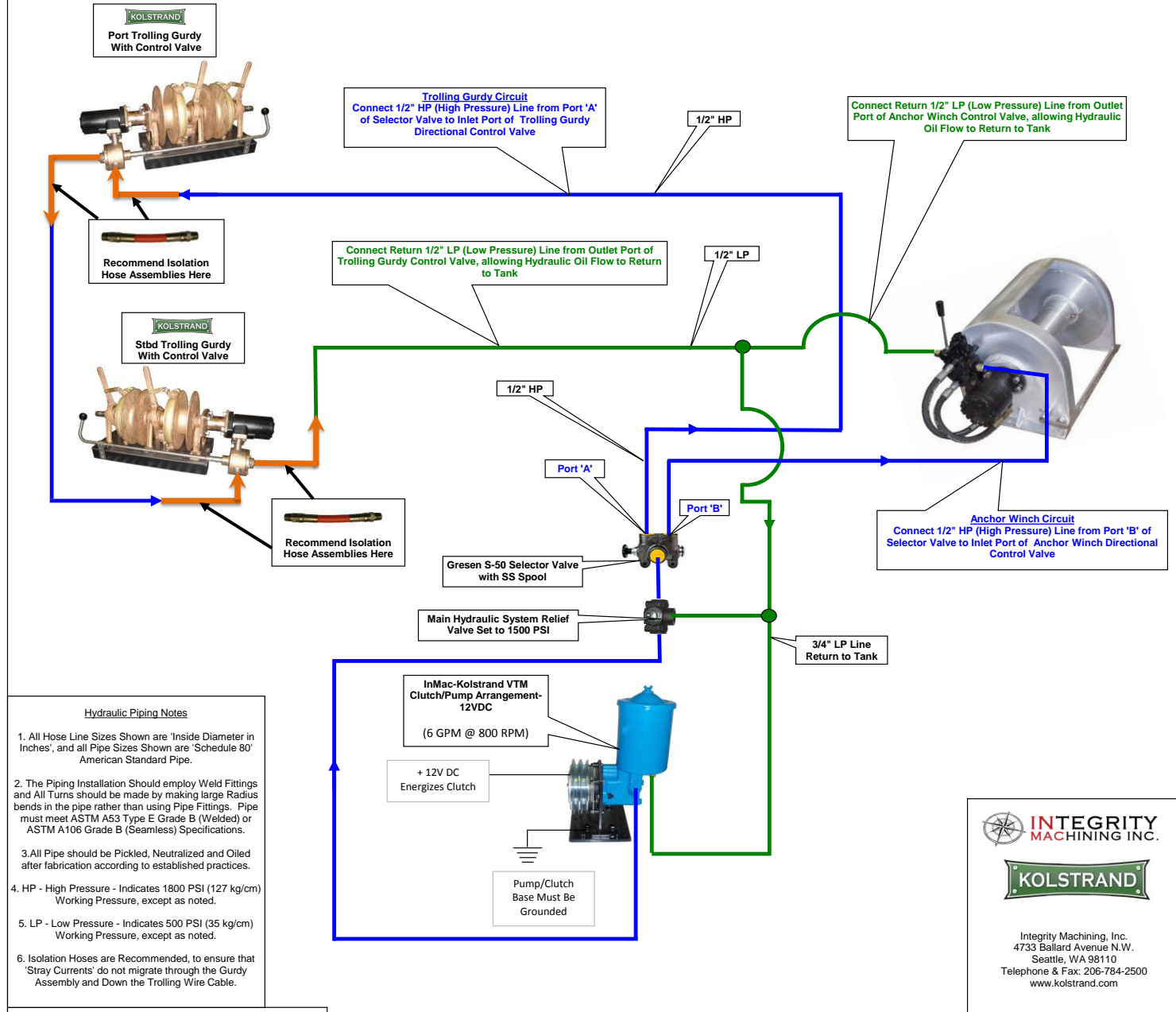


AKPBGHP-TG4E Link

These Parts, among other parts for the Multi-Spool Brass Gurdy, are Available On-line from InMac-Kolstrand at: www.kolstrand.com



Integrity Machining, Inc.
4733 Ballard Avenue N.W.
Seattle, WA 98107 USA
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Drawing No. E46-1-1181
Typical Hydraulic Circuit for Trolling Gurdys with VTM-Electric Clutch Pump Unit and Anchor Winch Selector Valve

This Drawing is the Property of Integrity Machining, Inc. of Seattle, Washington, USA, and Must be Returned. It shall not be used for Construction or Manufacture, or Duplicated, or Copied, or Distributed to Outside Parties, Without our Written Consent.



VENDOR DATA AND INFORMATION

For Service and Parts Assistance, Please Contact:



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Contents:

CharLynn 'H' Hydraulic Motor Information

EATON

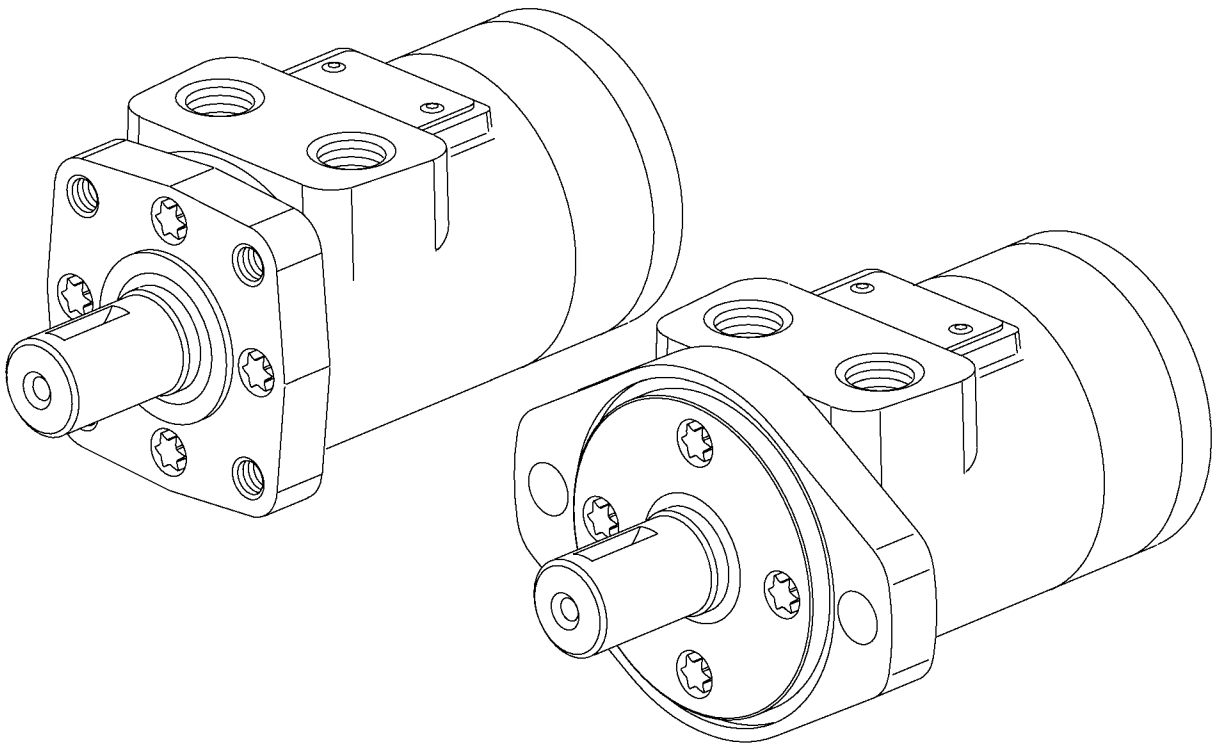
Char-Lynn®

Hydraulic Motors

General Purpose
H Series Motors

007 008 009

Parts Information



Char-Lynn General Purpose Motors — H Series

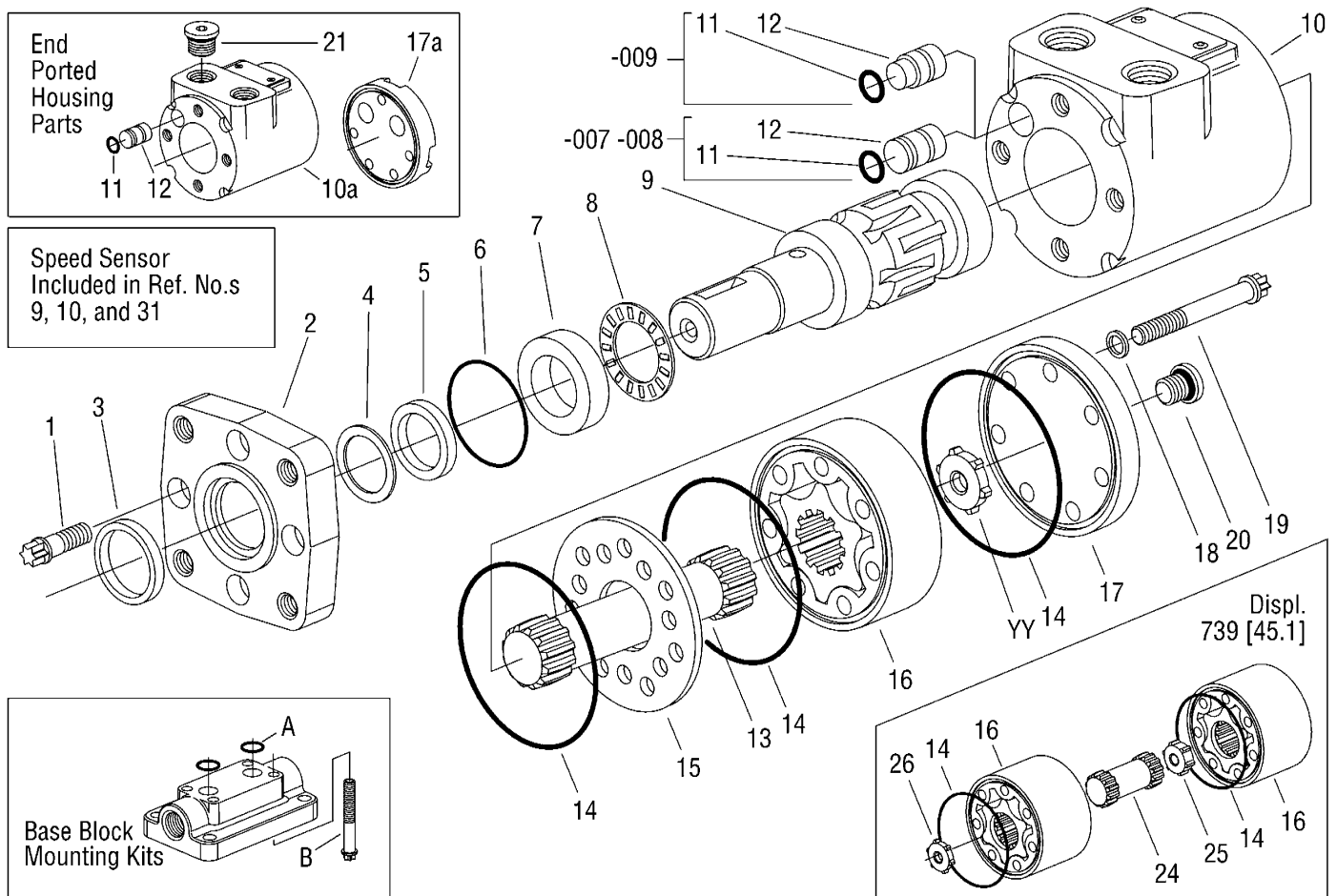


-007 Design Code

Displ. cm ³ /r [in ³ /r]	Ref. No. 13		Ref. No. 16		Ref. No. YY		Ref. No. 19	
	Drive	Length mm [in.]	Gerotor	Width mm [in.]	Spacer	Width mm [in.]	Screw, Cap	Length mm [in.]
49 [3.0]	602-000	76,2 [3.00]	8277-001	6,4 [.25]	N/A		16294-150	38,1 [1.50]
74 [4.5]	602-000	76,2 [3.00]	8277-002	9,7 [.38]	N/A		16294-162	41,4 [1.62]
102 [6.2]	616-000	81,8 [3.22]	8277-003	13,2 [.52]	N/A		16294-175	44,5 [1.75]
169 [10.3]	616-000	81,8 [3.22]	8277-004	21,8 [.86]	6901-002	7,9 [.31]	16294-212	54,1 [2.12]
195 [11.9]	616-000	81,8 [3.22]	8277-005	25,4 [1.00]	6901-003	12,2 [.48]	16294-225	57,1 [2.25]
244 [14.9]	616-000	81,8 [3.22]	8277-006	31,7 [1.25]	6901-005	18,5 [.73]	16294-250	63,5 [2.50]
277 [16.9]	616-000	81,8 [3.22]	8277-007	38,1 [1.50]	6901-006	24,9 [.98]	16294-275	69,8 [2.75]
390 [23.8]	616-000	81,8 [3.22]	8277-008	50,8 [2.00]	6901-008	37,6 [1.48]	16294-325	82,6 [3.25]

-008 Design Code

Displ. cm ³ /r [in ³ /r]	Ref. No. 13		Ref. No. 16		Ref. No. YY		Ref. No. 19	
	Drive	Length mm [in.]	Gerotor	Width mm [in.]	Spacer	Width mm [in.]	Screw, Cap	Length mm [in.]
49 [3.0]	602-000	76,2 [3.00]	8277-001	6,4 [.25]	N/A		16294-150	38,1 [1.50]
74 [4.5]	602-000	76,2 [3.00]	8277-002	9,7 [.38]	N/A		16294-162	41,4 [1.62]
102 [6.2]	616-000	81,8 [3.22]	8277-003	13,2 [.52]	N/A		16294-175	44,5 [1.75]
169 [10.3]	8664-000	91,7 [3.61]	8277-004	21,8 [.86]	N/A		16294-212	54,1 [2.12]
195 [11.9]	8664-000	91,7 [3.61]	8277-005	25,4 [1.00]	6901-009	3,4 [.14]	16294-225	57,1 [2.25]
244 [14.9]	8664-000	91,7 [3.61]	8277-006	31,7 [1.25]	6901-002	7,9 [.31]	16294-250	63,5 [2.50]
277 [16.9]	8634-000	107,4 [4.24]	8277-007	38,1 [1.50]	N/A		16294-275	69,8 [2.75]
390 [23.8]	8634-000	107,4 [4.24]	8277-008	50,8 [2.00]	6901-004	14,0 [.55]	16294-325	82,6 [3.25]



H Series Motors

-009 Design Code

Displ. cm ³ /r [in ³ /r]	Ref. No. 13		Ref. No. 16		Ref. No. YY		Ref. No. 19	
	Drive	Length mm [in.]	Gerotor	Width mm [in.]	Spacer	Width mm [in.]	Screw, Cap	Length mm [in.]
37 [2.2]	602-000	76,2 [3.00]	21850-022	6,4 [.25]	N/A		16294-150	38,1 [1.50]
46 [2.8]	602-000	76,2 [3.00]	8277-001	6,4 [.25]	N/A		16294-150	38,1 [1.50]
59 [3.6]	22250-000	80,0 [3.15]	21850-023	10,2 [.40]	N/A		16294-162	41,1 [1.62]
74 [4.5]	22250-000	80,0 [3.15]	8277-024	10,2 [.40]	N/A		16294-162	41,1 [1.62]
96 [5.9]	616-000	81,8 [3.22]	8277-003	13,2 [.52]	N/A		16294-175	44,5 [1.75]
120 [7.3]	22251-000	86,4 [3.40]	8277-009	16,5 [.65]	N/A		16294-188	47,8 [1.88]
146 [8.9]	22252-000	89,9 [3.54]	8277-020	20,1 [.79]	N/A		16294-200	50,8 [2.00]
159 [9.7]	8664-000	91,7 [3.61]	8277-004	21,8 [.86]	N/A		16294-212	53,8 [2.12]
185 [11.3]	22189-000	95,8 [3.77]	8277-005	25,4 [1.00]	N/A		16294-225	57,1 [2.25]
231 [14.1]	22190-000	102,1 [4.02]	8277-025	31,7 [1.25]	N/A		16294-250	63,5 [2.50]
293 [17.9]	22253-000	110,5 [4.35]	8277-026	40,4 [1.59]	N/A		16294-288	73,2 [2.88]
370 [22.6]	22191-000	121,2 [4.77]	8277-027	50,8 [2.00]	N/A		16294-325	82,6 [3.25]
739 [45.1]	8634-000	107,4 [4.23]	21850-028 (2)	50,8 [2.00] (ea.)	(See Ref. 25 and 26)		16294-525	133,3 [5.25]

Ref. No.	Design Code/Part Number			Description	Quantity
	-007	-008	-009		
1	16292-088	16292-088	16292-088	Screw, Cap (6 Point (E10) Drive 5/16-24 UNF x 7/8)	4
2	7463-000	22000-001	22000-001	Flange Mounting (2 Bolt)	1
	7464-000	22000-002	22000-002	Flange Mounting (4 Bolt) 3/8-16 UNC	1
	—	22000-006	22000-006	Flange Mounting (4 Bolt) M10 x 1,5	1
	—	22000-004	22000-004	Flange Mounting (2 Bolt SAE B)	1
	—	22000-005	22000-005	Flange Mounting (4 Bolt Magneto)	1
X 3	9121-002	9121-002	9121-002	Seal, Exclusion	1
X 4	N/A	22002-000	22002-000	Washer, Backup	1
X 5	9057-001	9057-014	9057-014	Seal, Pressure	1
X 6	9091-001	9091-001	9091-001	Seal	1
7	7462-000	7462-000	7462-000	Race, Thrust Bearing	1
8	7537-000	7537-000	7537-000	Bearing, Thrust Needle	1
9	7360-001	7360-001	7360-001	Shaft, Output (1 in. Dia. Straight with Woodruff Key Slot)	1
			220879-001	Shaft, Output (1 in. Dia. Straight with Woodruff Key Slot — <i>Sensor Shaft</i>)	1
	7360-002	7360-002	7360-002	Shaft, Output (SAE 6B Splined)	1
	7360-007	7360-007	7360-007	Shaft, Output (1 in. Dia. Straight with .315 Dia. Crosshole)	1
	7360-008	7360-008	7360-008	Shaft, Output (1 in. Dia. Straight with .406 Dia. Crosshole)	1
	7360-024	7360-024	7360-024	Shaft, Output (25 mm Dia. Straight)	1
	7360-016	7360-016	7360-016	Shaft, Output (7/8 in. Dia. SAE B 13 T Splined)	1
	7360-017	7360-017	7360-017	Shaft, Output (7/8 in. Dia. Straight SAE B Straight)	1
	7360-018	7360-018	7360-018	Shaft, Output (1 in. Dia. Tapered)	1
	14193-000	14193-000	14193-000	Key, Woodruff (1 in. Dia. Straight Shaft)	1
	14193-000	14193-000	14193-000	Key, Woodruff (for Tapered Shaft)	1
	14391-004	14391-004	14391-004	Key, Straight (for 7/8 in. Dia. Shaft)	1
	14462-006	14462-006	14462-006	Key, Straight (for 25 mm Dia. Shaft)	1
14381-000	14381-000	14381-000	Nut (for Tapered Shaft)	1	

Continued on Next Page (Page 4)

Char-Lynn General Purpose Motors — H Series



Continued from Page 3

Ref. No.	Design Code/Part Number			Description	Quantity
	-007	-008	-009		
10	7359-001	7359-001	22230-001	Housing, 7/8-14 O-ring Ports	1
			201225-001	Housing, 7/8-14 O-ring Ports — <i>Sensor Housing</i>	1
	7359-002	7359-002	22230-002	Housing, 1/2 NPTF Ports	1
			201225-002	Housing, 1/2 NPTF Ports — <i>Sensor Housing</i>	1
	7359-003	7359-003	22230-003	Housing, Manifold Ports (5/16-18 UNC)	1
	7359-006	7359-006	22230-006	Housing, G 1/2 (BSP) Ports	1
	7359-004	7359-004	22230-004	Housing, Manifold Ports (M8 x 1.5)	1
10a	21388-000	21388-000	22294-001	Housing, End Ported Motor	1
X 11	15007-000	15007-000	250001-011	O-ring	1
12	8985-000	8985-000	22229-000	Plug	1
13	*	*	*	Drive	1
X 14	9086-002	9086-002	9086-002	Seal (Displ. 739 [45.1] — Qty. 4)	3
15	7358-000	7358-000	7358-000	Plate, Spacer	1
16	*	*	*	Gerotor (Displ. 739 [45.1] — Qty. 2)	1
17	7461-000	7461-000	7461-000	Cap, End (without Port(s))	1
	7611-000	7611-000	7611-000	Cap, End (with 7/16-20 O-ring Drain Port)	1
	21779-000	21779-000	21779-000	Cap, End (with G 1/4 (BSP) Drain Port)	1
17a	21387-001	21387-001	21387-001	Cap, End (with 3/4-16 O-ring Ports (2))	1
	21387-002	21387-002	21387-002	Cap, End (with 3/4-16 O-ring Ports (2) and 7/16-20 O-ring Drain Port)	1
	21387-003	21387-003	21387-003	Cap, End (with G 1/2 (BSP) Ports (2) and G 1/4 (BSP) Drain Port)	1
X 18	14488-000**	14488-000**	14488-000**	Seal, Washer	7
19	*	*	*	Screw, Cap (6 Point (E10) Drive 5/16-24 UNF) (End Ported— Qty. 5)	7
20	9072-003	9072-003	9072-003	Plug/ O-ring (7/16-20 Drain Port)	1
X	250003-904	250003-904	250003-904	O-ring for 7/16-20 Drain Port Plug	1
	9170-002	9170-002	9170-002	Plug/O-ring (G 1/4 (BSP) Drain Port)	1
	—	—	—	O-ring for G 1/4 (BSP) Drain Port Plug	1
21	9072-007	9072-007	9072-007	Plug/ O-ring, Housing (7/8-14 Plug S/A used w/End Ported Motors)	2
X	250003-910	250003-910	250003-910	O-ring for 7/8-14 Housing Port Plug	2
	9179-007	9179-007	9179-007	Plug/ O-ring (Viton), Housing (7/8-14 Plug S/A used w/End Ported Motors)	2
	250017-910	250017-910	250017-910	O-ring (Viton) for 7/8-14 Housing Port Plug	2
24	—	—	45-000	Drive (Displ. 739 [45.1] Only)	1
25	—	—	6901-002	Spacer (Displ. 739 [45.1] Only)	1
26	—	—	6901-009	Spacer (Displ. 739 [45.1] Only)	1
YY	*	*	N/A	Spacer	1
31			201137-001	Sensor, Speed (127mm [5.0 in.] Lead Wire)	1
Seal Kit	60023-000	60540-000	60540-000	Seal Kit (Buna N) — Contains Parts Indicated by X	
	60032-000	60545-000	60545-000	Seal Kit (Viton) — Contains Parts Indicated by X (Part No.s Differ from those Shown)	
Mounting Kit	123-1007	123-1007	123-1007	Base Block Mounting Kit (1/2 NPTF Ports (Manifold Mount Motors Only))	
	123-1008	123-1008	123-1008	Base Block Mounting Kit (7/8-14 O-ring Ports (Manifold Mount Motors Only))	
X A	15058-000	15058-000	15058-000	Seal, O-ring (2)	
	267512-019	267512-019	267512-019	Screw, Cap (5/16-18 Thread (4))	
	—	—	14474-003	Screw, Cap (M8 x 1.5) Thread (4))	

* See Chart on Page 2

** Used with 12 Point Cap Screws Only (Replacement Screws are 6 Point (E10) Drive, no Seal Washer Required).

H Series Motors

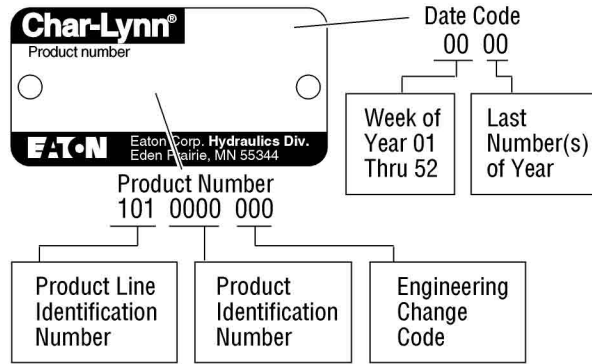
How to Order Replacement Parts

Each Order Must Include the Following:

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts

For More Detailed Information Contact Eaton Corp. Hydraulics Division 15151 Highway 5 Eden Prairie, MN 55344.

- Specifications and performance data, Catalog No. 11-885
- When servicing H Series Motors refer to Repair Information No. 7-117. This repair manual lists tools required, and step by step disassembly and reassembly procedures.



Eaton
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Eden Prairie, MN 55344
USA
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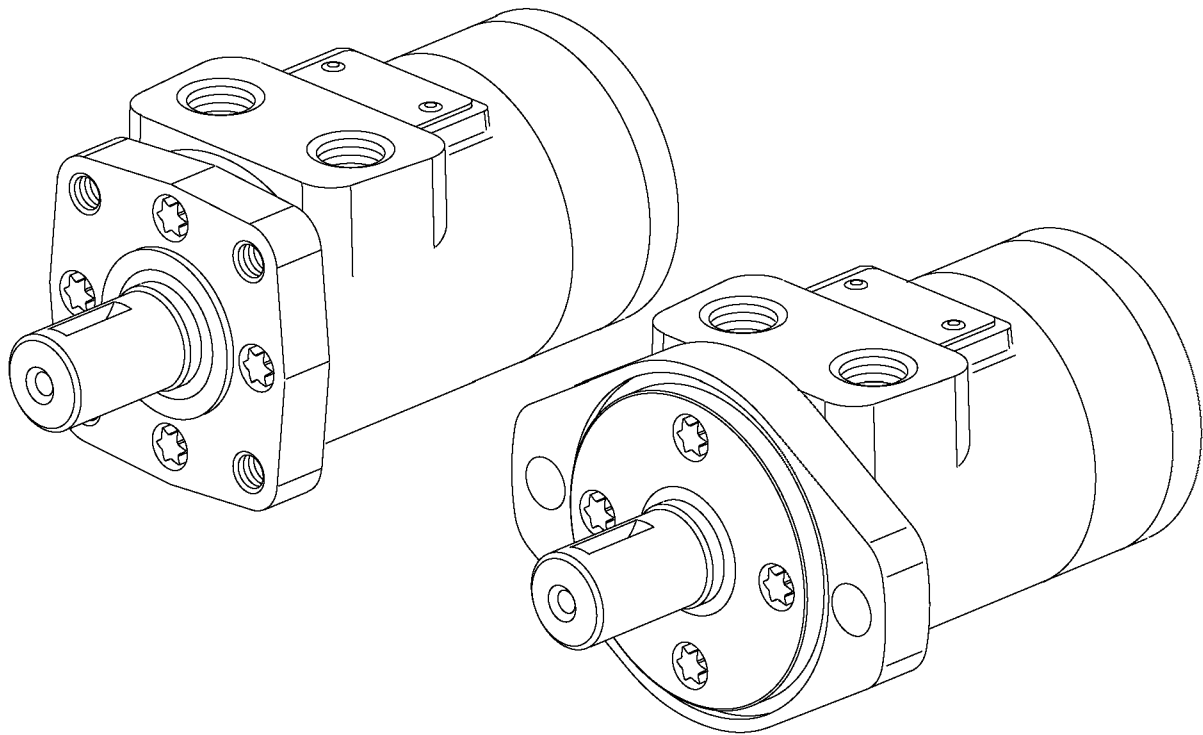
Eaton
Fluid Power Group
Hydraulics Business Asia Pacific
11th Floor Hong Kong New World Tower
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Shanghai 200021
China
Tel: 86-21-6387-9988
Fax: 86-21-6335-3912

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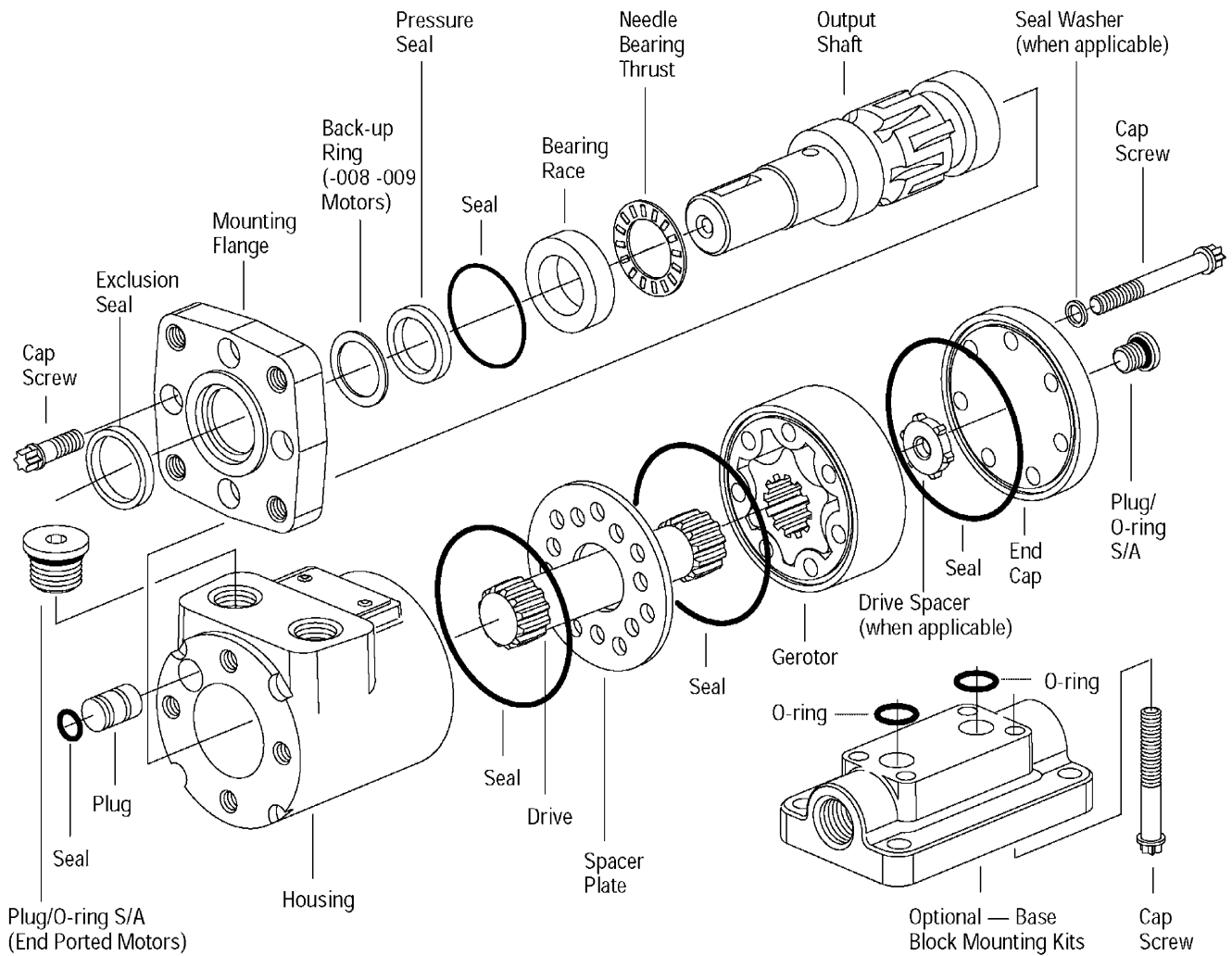
Char-Lynn®

H Series
General Purpose Gerotor Motor

007 008 009



Disassembly



Tools required for disassembly and reassembly.

- Torque wrench (34Nm [300 lb-in] capacity)
- 300-400mm [12-16 in.] breaker bar
- 5/16 in.-12 point socket no. 5422 (Heavy Duty 56Nm [500 lb-in] Capacity)
- Small screwdriver (150-200 x 6mm [6-8 x 1/4 in.] flat blade), see page 4 for tooling information.
- 5mm [3/16 in.] hex key
- Shaft pressure seal installation tool for 007 motor P/N 600470, for 008 and 009 motors P/N 600523
- Seal sleeve or bullet P/N 600304 (1 in. dia. shaft), P/N 600466 (7/8 in. dia. shaft)
- Tools available—by special order—through our service department.

Reassembly

Instructions in this manual are for H Series motors (101-XXXX-007, 008 and 009).

Cleanliness is extremely important when repairing these motors. Work in a clean area. Before disconnecting lines, clean port area of motor. Remove key when used. Check shaft and key slot. Remove burrs, nicks and sharp edges. Before disassembly, drain oil from motor. Then plug ports and thoroughly clean exterior of motor.

Although not all drawings show the motor in a vise, we recommend that you keep the motor in a vise during disassembly. Follow the clamping procedures explained throughout the manual.

Gerotor End

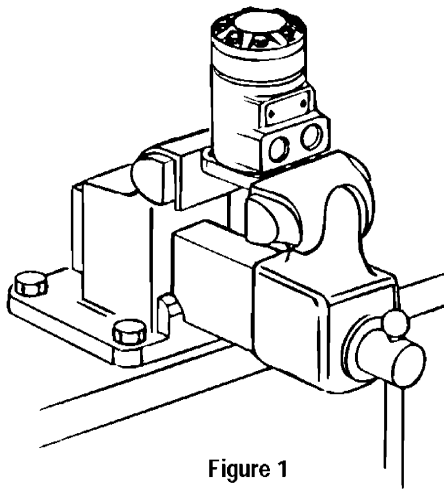


Figure 1

1 Place motor in vise and clamp across edge of flange with output shaft down. When clamping, use protective device on vise such as special soft jaws, pieces of hard rubber or board (see Figure 1).

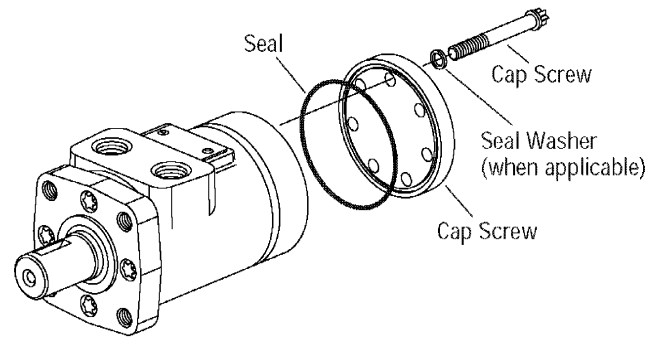


Figure 2

2 Remove cap screws and seal washers (when applicable – see Figure 2).

3 Remove end cap.

4 Remove seal from end cap.

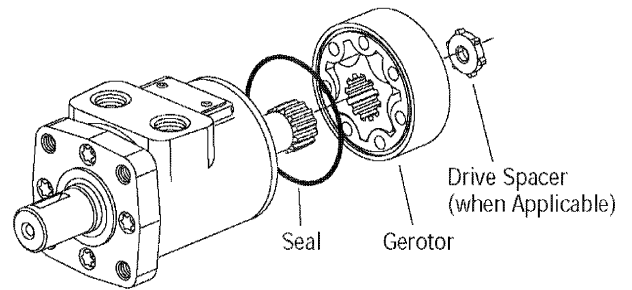


Figure 3

5 Remove gerotor.

6 Remove seal from gerotor (see Figure 3).

7 Remove drive spacer if applicable.

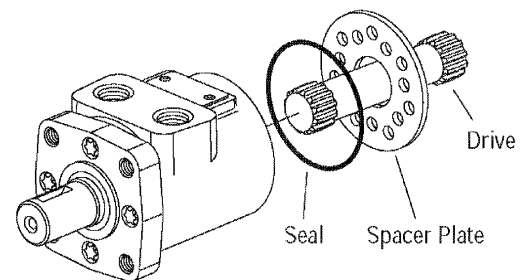


Figure 4

8 Remove drive (see Figure 4).

9 Remove spacer plate.

10 Remove seal from housing.

Disassembly

- 11 Remove output shaft from housing.
- 12 Remove needle thrust bearing from shaft or housing.

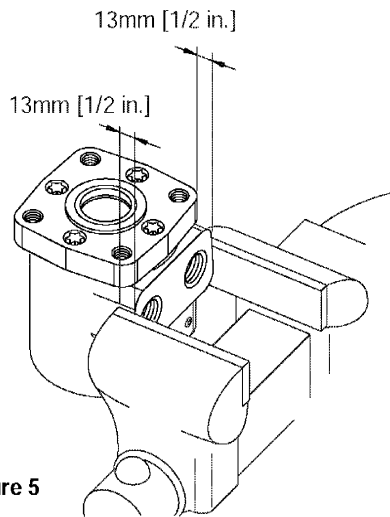


Figure 5

13 Reposition motor in vise. Clamp across ports as shown in Figure 5. Do not clamp on side of housing. Excessive clamping pressure on side of housing causes distortion.

14 Remove cap screws from mounting flange. These screws are assembled with Loctite to hold them in place.

The screws will require 35-45 Nm [300-400 lb-in] of torque to break loose and 11 Nm [100 lb-in] torque to remove. Do not use impact wrench on screws that have been secured with Loctite. This could result in rounded heads or broken sockets.

Note: If torque higher than given above is required to break screws loose, apply heat according to following instructions:

When heated, Loctite partially melts. This reduces torque required to remove screw. Use small flame propane torch to heat small area of housing where screw enters (see Figure 6). Be careful not to overheat housing and damage motor. Gradually apply torque to screw with socket wrench as heat is applied for 8 to 10 seconds. As soon as screw breaks loose, remove heat from housing. Continue turning screw until it is completely removed.

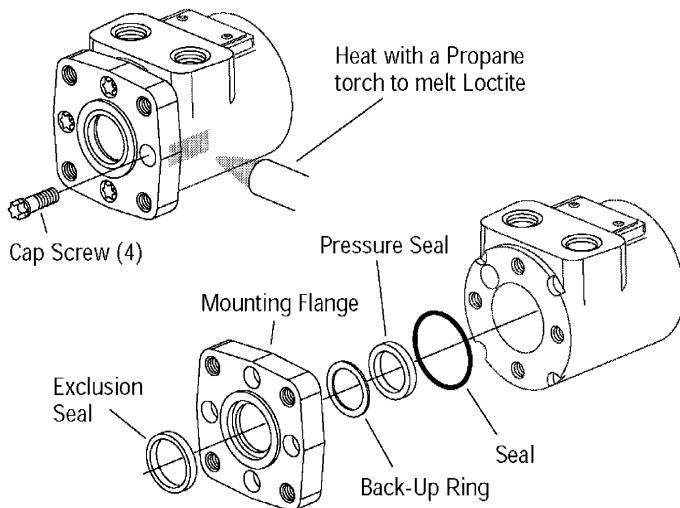


Figure 6

15 Carefully remove flange from housing.

Important: Some motors may have a quad seal and back-up ring in place of the pressure seal. The quad seal and back-up ring are no longer available and are replaced by the pressure seal. They are interchangeable, but some precautions must be taken to insure proper installation. Follow the reassembly instructions.

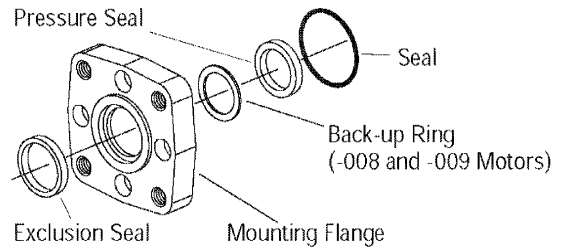


Figure 7

16 Exclusion seal, back-up ring, pressure seal and seal will come off with flange (see Figure 7). Use seal removal tool (shown in Figures 8 and 9) to remove exclusion and pressure seals.

Important: Be careful not to scratch seal cavity O.D. This could create a leak path.

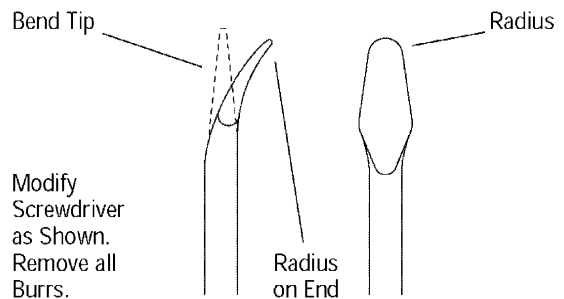
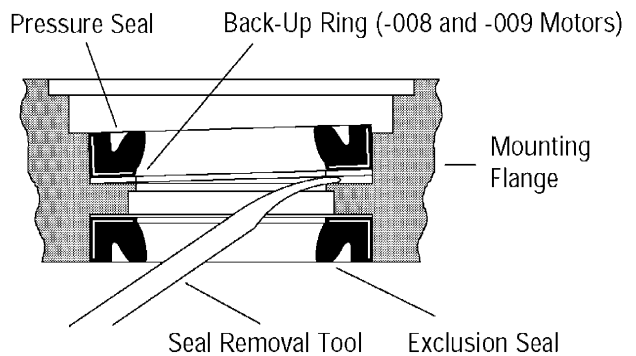


Figure 8



Work from outer side for both (either) Seals.

Figure 9

Reassembly

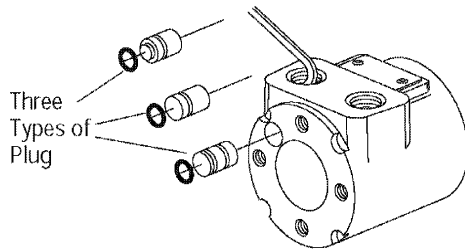


Figure 10

17 A metal plug, with seal, plugs a machining hole in the housing. It is not necessary to remove plug and replace seal unless leakage occurs around plug. To remove plug, insert 5 mm [.187 in.] hex key through port opening and push it out (see Figure 10). The 009 plug is not interchangeable with 007 and 008 plugs.

Reassembly

Shaft End

Check all mating surfaces. Replace any parts with scratches or burrs that could cause leakage or damage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe parts with cloth or paper towel because lint or other matter could get into the hydraulic system and cause damage.

Check around key slot and chamfered area of shaft for burrs, nicks or sharp edges that could damage seals during reassembly. Remove nicks or burrs with a hard smooth stone (such as an Arkansas stone). Do not file or grind motor parts.

Note: Lubricate all seals with petroleum jelly. Use new seals when reassembling motor. Refer to parts list 6-121 for proper seal kit numbers.

Important: Do not stretch seals before installing them.

Cleanliness is extremely important in the successful application of Loctite. Before Loctite can be applied, the parts should be cleaned as follows:

Note: Fully cured Loctite resists most solvents, oils, gasoline and kerosene and is not affected by cleaning operations. It is not necessary to remove cured Loctite that is securely bonded in tapped holes; however, any loose particles of cured Loctite should be removed.

- a. Wash the housing with solvent to remove oil, grease and debris. Pay particular attention to four tapped holes on flange end.
- b. Blow dry with compressed air. Clean and dry tapped holes.

c. Wire brush screw threads to remove cured Loctite and other debris. Discard any screws that have damaged threads or rounded heads.

d. Wash screws with non-petroleum base solvent. Blow dry with compressed air.

18 If you remove plug and seal, lubricate new seal and install on plug. Some plugs have two o-ring grooves but require only one o-ring. Install o-ring in groove closest to end of plug. Push plug into housing so plug and housing are flush. Be careful not to damage seal.

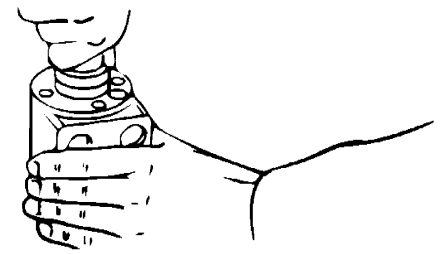
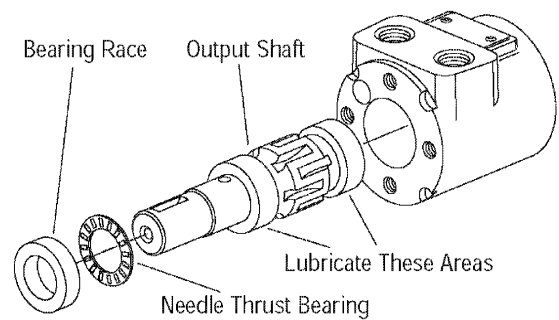


Figure 11

19 Lubricate output shaft with hydraulic oil, then install shaft in housing (see Figure 11).

Important: Do not permit oil to get into the four tapped holes.

20 Install needle thrust bearing, then bearing race on shaft. Pull shaft partially out of housing. Push all three parts in housing together (see Figure 11). The bearing race must rotate freely when in position.

Reassembly

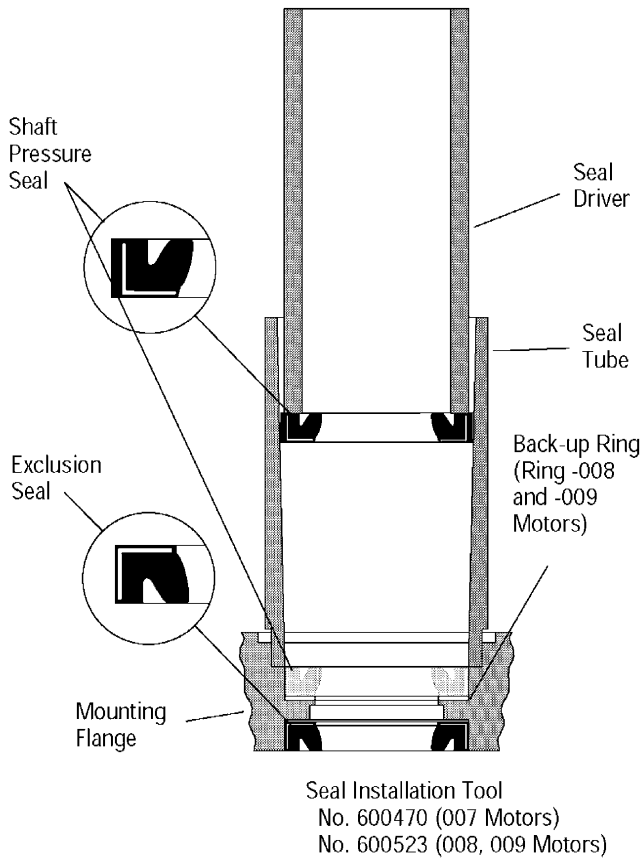


Figure 12

- 21** Install exclusion seal in flange (see Figure 12). Carefully press exclusion seal into place.
- 22** Visually check seal seat in mounting flange for scratches or other marks that might damage the pressure seal. Check for cracks in flange that could cause leakage.
- 23** Lubricate I.D. of seal tube and O.D. of shaft pressure seal with light film of clean petroleum jelly. Align small I.D. end of seal tube with seal seat in mounting flange. Install back-up ring and pressure seal in tube with lips of seal face up (see Figure 12). Insert seal driver in tube and firmly push seal seat with a rotating action.

Important: After installing seal in flange, examine seal condition. If damaged or improperly installed, you must replace it before continuing with reassembly.

- 24** Install 49 mm [1.937 in.] I.D. seal in flange.
 - 25** It is recommended to apply a light coat of Loctite Primer NF in tapped holes of housing. Allow primer to air dry for at least 1 minute. Do not force dry with air jet; the primer will blow away.
- Use of primer is optional. With primer, Loctite curing time is approximately 15 minutes. Without primer curing time is approximately 6 hours.

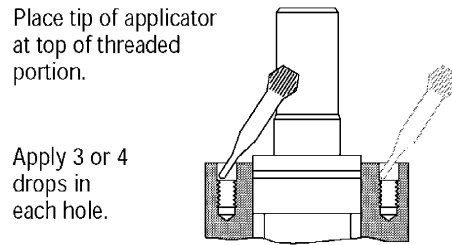


Figure 13

26 Apply 3 or 4 drops of Loctite sealant at top of thread for each of four holes in housing (see Figure 13). Do not allow parts with Loctite applied to come in contact with any metal parts other than those for assembly. Wipe off excess Loctite from housing face, using a non-petroleum base solvent.

Do not apply Loctite to threads more than 15 minutes before installing screws. If housing stands for more than 15 minutes, repeat application. No additional cleaning or removal of previously applied Loctite is

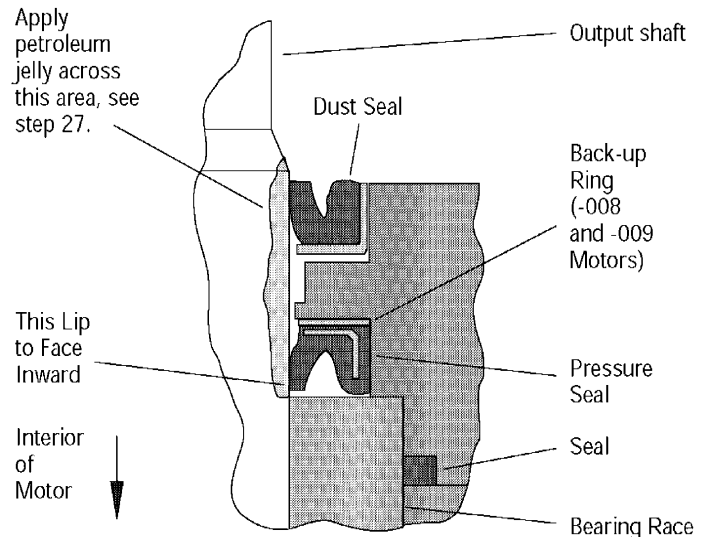


Figure 14

necessary.

27 Before installing flange and seal assembly over shaft, place protective sleeve or bullet over shaft. Then lubricate space between exclusion seal and pressure seal, as well as lips of both seals (see Figure 14).

Install flange. Rotate flange slowly while pushing down over shaft. Be careful not to invert or damage seals.

Reassembly

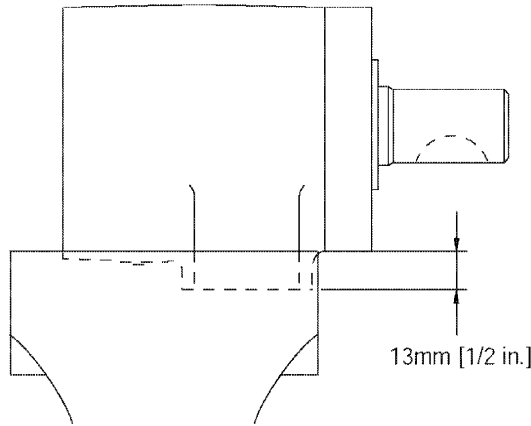


Figure 15

28 After removing bullet, clamp motor in vise as shown in Figure 15. Make sure shaft cannot fall out. Install dry screws and alternately torque them immediately to 250 lb-in [28 Nm]. If you use primer, allow to cure for 10 to 15 minutes. Without primer, allow 6 hours curing time before subjecting motor to high torque reversals. On all other applications, you can run motor immediately.

If you use new screws, make sure they are the correct length: 22 mm [.875 in.] under head length. See parts list for correct part number.

Gerotor End

29 Reposition motor with gerotor end up, then clamp across ports. Do not clamp on side of housing.

Important: To aid installation of seals, apply light coat of clean petroleum jelly to seals. Do not stretch seals before installing them in groove.

30 Pour approximately 35 cc of clean hydraulic oil in output shaft cavity.

31 Install 73 mm [2.875 in.] I.D. seal in housing seal groove. Avoid twisting seal.

Timing Procedure

a. Install drive. Use felt tip marker to mark one drive tooth. Align this tooth with timing dot on shaft.

Note: If drive is not symmetrical, install larger splined end into shaft.

b. Install spacer plate.

c. Install 73 mm [2.875 in.] I.D. seal in gerotor seal groove. Carefully place gerotor on spacer plate, seal side toward spacer plate.

Standard Rotation Align any star point with tooth marked on drive (see Figure 16).

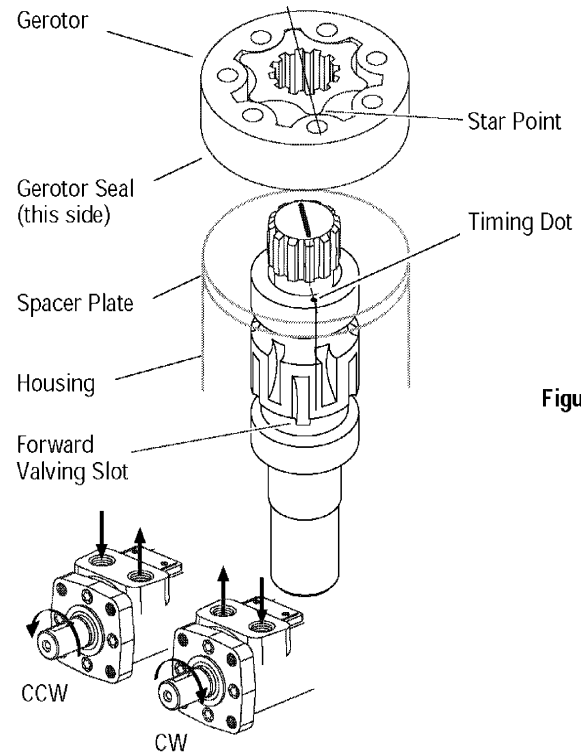


Figure 16

Reverse Rotation Align any star valley with marked tooth (see Figure 17).

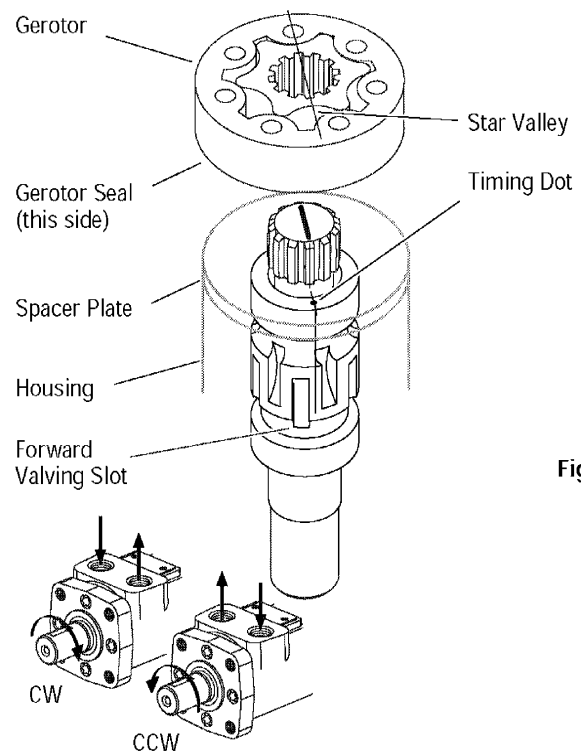
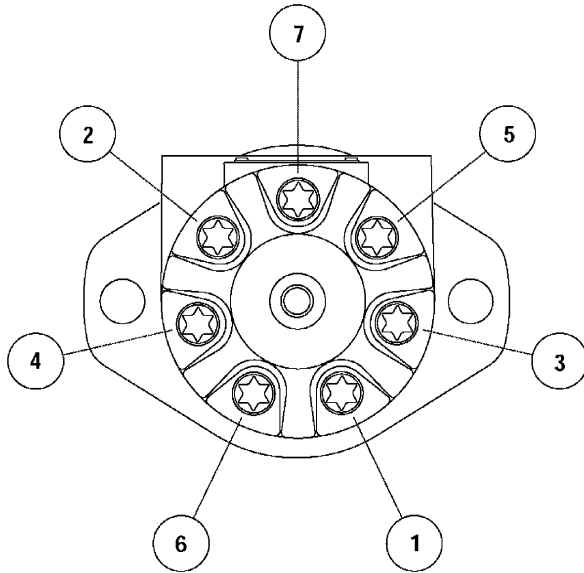


Figure 17

Reassembly

- 32 Rotate gerotor to line up with bolt holes. Be careful not to disengage star from drive or disturb gerotor seal.
- 33 Install drive spacer if applicable.
- 34 Install 73 mm [2.875 in.] seal in end cap. Carefully place end cap on gerotor.



Bolt Torquing Sequence

Figure 18

- 35 Install cap screws and seal washers (if applicable) in end cap. Pretighten screws to 7,4 Nm [40 lb-in]. Make sure seal washers are properly seated. Then torque screws 27-28 Nm [235-250 lb-in] in sequence, as shown in figure 18.

Reassembly — Speed Sensor

1 Rotate the motor shaft until a (gear/target) tooth is centered in the speed sensor port. If this is not done, the sensor may be damaged during the operation of the motor.

2 Make sure the lock nut and its threads are clean and dry for the proper torque. Position the lock nut against the alignment nut as shown in Figure 19.

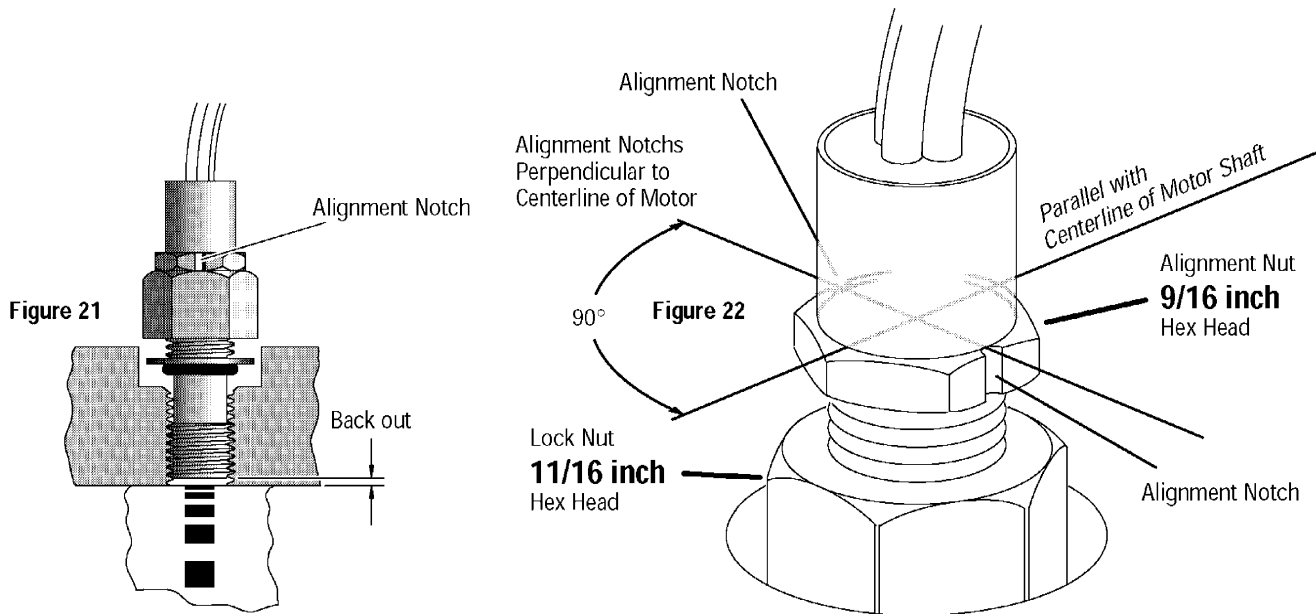
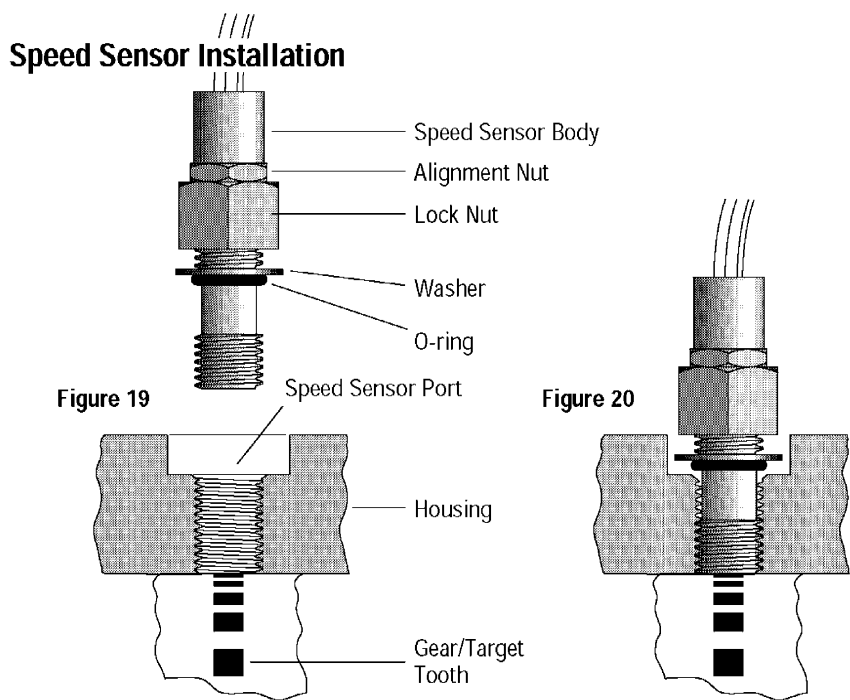
3 Move the washer and the o-ring up against the speed sensor body threads as shown in Figure 19.

4 By hand, lightly thread the speed sensor body into the housing until the sensor touches against the motor (gear/target) tooth. **Do not force the sensor against the (gear/target) tooth, damage may occur.** Make sure the o-ring or the washer do not touch the housing — see Figure 20.

5 Turn the speed sensor body out one quarter turn (CCW) plus the additional amount (CCW) needed to make the alignment notches perpendicular to the motor shaft centerline (90° +/- 5 degrees from the motor shaft centerline — Figure 21 and 22).

6 Maintain the speed sensor body alignment (Figure 22), and tighten the lock nut to 8,5-14 Nm [75-125 lb-in.] (torque values are for clean dry threads).

7 Check the speed sensor body for correct alignment (Figure 22), reinstall the sensor if it is not correct.



Common Product Numbers

Product Numbers—H Series

Add three digit prefix —**101**—to four digit number from chart for complete product number—Example 101-1868.
Orders will not be accepted without three digit prefix.

Mounting	Shaft	Ports	Displ. cm ³ /r [in ³ /r] Product Number 101-xxxx												
			36 [2.2]	46 [2.8]	59 [3.6]	74 [4.5]	97 [5.9]	120 [7.3]	146 [8.9]	159 [9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	740 [45.0]
2 Bolt Flange	1 in. Straight w/Woodruff Key	7/8-14 O-ring	101-1700	-1033	-1701	-1034	-1035	-1702	-1703	-1036	-1037	-1038	-1039	-1040	—
		1/2 NPTF	101-1704	-1025	-1705	-1026	-1027	-1706	-1707	-1028	-1029	-1030	-1031	-1032	—
		Manifold*	101-1708	-1041	-1709	-1042	-1043	-1710	-1711	-1044	-1045	-1046	-1047	-1048	—
	1 in. SAE 6B Splined	7/8-14 O-ring	101-1721	-1081	-1722	-1082	-1083	-1723	-1724	-1084	-1085	-1086	-1087	-1088	—
		1/2 NPTF	101-1725	-1073	-1726	-1074	-1075	-1727	-1728	-1076	-1077	-1078	-1079	-1080	—
		Manifold*	101-1729	-1089	-1730	-1090	-1091	-1731	-1732	-1092	-1093	-1094	-1095	-1096	—
	1 in. Straight w/.31 Dia. Crosshole	7/8-14 O-ring	101-1796	-1797	-1798	-1799	-1800	-1801	-1802	-1803	—	—	—	—	—
		1/2 NPTF	101-1804	-1805	-1806	-1807	-1808	-1809	-1810	—	—	—	—	—	—
		Manifold*	101-1811	-1812	-1813	-1814	-1815	-1816	-1817	-1818	—	—	—	—	—
	1 in. Straight w/.40 Dia. Crosshole	7/8-14 O-ring	101-1819	-1323	-1820	-1324	-1325	-1821	-1822	-1326	—	—	—	—	—
		1/2 NPTF	101-1823	-1319	-1824	-1320	-1825	-1826	-1827	-1828	—	—	—	—	—
		Manifold*	101-1829	-1463	-1830	-1831	-1832	-1833	-1834	-1871	—	—	—	—	—
4 Bolt Flange	1 in. Straight w/Woodruff Key	7/8-14 O-ring	101-1749	-1009	-1750	-1010	-1011	-1751	-1752	-1012	-1013	-1014	-1015	-1016	—
		1/2 NPTF	101-1753	-1001	-1754	-1002	-1003	-1755	-1756	-1004	-1005	-1006	-1007	-1008	—
		Manifold*	101-1757	-1017	-1758	-1018	-1019	-1759	-1760	-1020	-1021	-1022	-1023	-1024	—
	1 in. SAE 6B Splined	7/8-14 O-ring	101-1761	-1057	-1762	-1058	-1059	-1763	-1764	-1060	-1061	-1062	-1063	-1064	—
		1/2 NPTF	101-1764	-1049	-1765	-1050	-1051	-1766	-1767	-1052	-1053	-1054	-1055	-1056	—
		Manifold*	101-1768	-1065	-1769	-1066	-1067	-1770	-1771	-1068	-1069	-1070	-1071	-1072	—
	1 in. Straight w/.31 Dia. Crosshole	7/8-14 O-ring	101-1835	-1836	-1837	-1838	-1839	-1840	-1841	-1842	—	—	—	—	—
		1/2 NPTF	101-1843	-1497	-1844	-1449	-1352	-1845	-1846	-1847	—	—	—	—	—
		Manifold*	101-1848	-1466	-1849	-1459	-1850	-1851	-1852	-1853	—	—	—	—	—
	1 in. Straight w/.40 Dia. Crosshole	7/8-14 O-ring	101-1854	-1311	-1855	-1856	-1857	-1858	-1859	-1860	—	—	—	—	—
		1/2 NPTF	101-1861	-1313	-1862	-1312	-1314	-1863	-1864	-1315	—	—	—	—	—
		Manifold*	101-1865	-1305	-1866	-1306	-1307	-1867	-1868	-1869	—	—	—	—	—

101-1868

Product Numbers—H Series Motors with Corrosion Protection

Mounting	Shaft	Ports	Displ. cm ³ /r [in ³ /r] Product Number 101-xxxx												
			36 [2.2]	46 [2.8]	59 [3.6]	74 [4.5]	97 [5.9]	120 [7.3]	146 [8.9]	159 [9.7]	185 [11.3]	231 [14.1]	293 [17.9]	370 [22.6]	740 [45.0]
4 Bolt Flange	1 in. Straight w/Woodruff Key	1/2 NPTF	101-2032	-2014	-2093	-2027	-2013	-2094	-2095	-2015	-2028	-2029	-2030	-2031	—
		Manifold*		-2067							-2068	-2069			

*Manifold product numbers shown are for motors with four 5/16-18 port face mounting threads. Manifold, manifold mounting o-rings and bolts are NOT included (for M8 x 1.5 port face mounting threads see note below).

H Series Spool Valve Motors

For Additional Literature Contact Eaton Corp. Hydraulics Division 15151 Highway 5 Eden Prairie, MN 55344.

- Specifications and performance data, Catalog No. 11-885
- Replacement part numbers and kit information — Parts Information No. 6-121

How to Order Replacement Parts

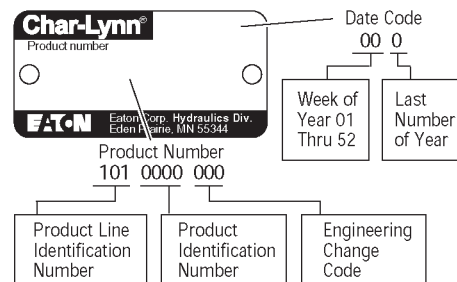
Each Order Must Include the Following:

- | | |
|-------------------|----------------------|
| 1. Product Number | 4. Part Number |
| 2. Date Code | 5. Quantity of Parts |
| 3. Part Name | |

How to Order Replacement Parts

Each Order Must Include the Following:

- | | |
|-------------------|----------------------|
| 1. Product Number | 4. Part Number |
| 2. Date Code | 5. Quantity of Parts |
| 3. Part Name | |



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Tel: 86-21-6387-9988
Fax: 86-21-6335-3912



Integrity Machining, Inc. Terms and Conditions

1. **CONDITIONS OF SALE:** These Terms and Conditions ("Terms and Conditions") hereby set forth all terms and conditions pertaining to any transaction whereby a person or entity ("Purchaser") purchases, buys or otherwise obtains any good or item from Integrity Machining, Inc. ("Seller"). Purchaser hereby acknowledges that these Terms and Conditions constitute part of any and all transactions between Purchaser and Seller, and Purchaser further agrees that these Terms and Conditions govern all transactions between Purchaser and Seller, to the extent not otherwise inconsistent with law. Seller is not always the manufacturer of goods purchased from it by a Purchaser. In some instances Seller does not even handle the goods as they are shipped by the manufacturer directly to the Purchaser. In those instances where the goods received by Seller are redelivered to the Purchaser, the goods remain in the original container for delivery to the Purchaser. In some instances the goods are removed from the container and subjected to minor modifications by Seller or installed on another product to satisfy the Purchaser's requirements. Because of this position in the resale of goods of a manufacturer, Seller is unable and unwilling to assume the legal burdens placed upon it by language in a Purchaser's purchase order or other order form. Seller specifically objects to and rejects any additional terms and rejects any terms and conditions in conflict with these terms and conditions, and such additional or conflicting terms shall not become a part of the contract.
2. **TERMS:** All prices, whether herein named or heretofore quoted or contained in a manufacturer's price list shall, at Seller's option, be adjusted to Seller's price in effect at the time of shipment. Purchaser shall pay Seller for goods in full, within thirty (30) days of the date of invoice; however, notwithstanding the foregoing, Seller, at its sole option, may require payment in advance of all or any part of the purchase price for any product or service. An interest charge of 1.5% per month (18% per annum) or the maximum interest charge permitted by applicable law, whichever charge is less, will be assessed against all delinquent payments. Accounts not kept current are subject to being placed on C.O.D. status.
3. **TAXES:** All sales taxes applicable to this order and required to be collected by Seller shall be added to the invoice and paid by the Purchaser unless an appropriate exemption certificate is received from Purchaser in advance of delivering goods to the Purchaser. All other taxes, including but not limited to use and excise taxes, shall be the responsibility of and paid for by the Purchaser.
4. **ORDER ENTRY:** Orders entered by telephone are accepted at the risk of the Purchaser because shipments made before confirmation is received by Purchaser are solely for the benefit of and service to the Purchaser. Confirming orders shall be marked "Confirmation" and such orders not so marked may be treated as an original order. Seller will not be responsible for expenses and inconveniences incurred thereby.
5. **DELIVERY, SHIPMENT, RISK OF LOSS:** Unless otherwise explicitly agreed to by Seller in writing, all shipments of goods shall be F.O.B. manufacturer's factory. In the absence of instructions supplied by Purchaser, Seller will select what is, in its option, the most satisfactory routing. Seller shall not be liable for either delays in deliveries or total failure to deliver due to any cause or event beyond Seller's reasonable control, including, but not limited to strikes, labor difficulties, weather, delays or defaults of common carriers, failure or curtailment in Seller's source of supply or failure of a manufacturer to timely deliver goods to Seller or Purchaser. Seller will give reasonable notice to Purchaser if it appears to Seller that delay in delivery will arise for any reason, and upon the giving of such notice, all specified delivery dates may, at the election of Seller, be extended from time to time for an additional period or periods as may be reasonable. Seller will use its reasonable efforts in the ordinary course of its business to effect deliveries as specified, but in no event, shall Seller be liable for any damage, consequential or otherwise, arising from any failure of Seller to meet any delivery date. Title to, and risk of loss for, products passes to Purchaser upon delivery to carrier.
6. **ACCEPTANCE BY PURCHASER:** The goods shall be deemed accepted by Purchaser as of the date of receipt of the goods by Purchaser unless within fifteen (15) days after such date Purchaser gives Seller written notice that the goods are not accepted and specifies in detail the reasons therefor. Seller may then, at its sole discretion, proceed to make any corrections, in which case such corrective action by Seller shall be Purchaser's sole remedy for non-acceptance of such goods. Upon completion and acceptance of such corrections, the goods will be deemed accepted by Purchaser. Under no circumstances shall Purchaser be entitled to revoke acceptance of any goods subsequent to acceptance thereof.
7. **PARTIAL SHIPMENTS:** Seller reserves the right to make and to invoice for partial shipments.
8. **RETURN OF GOODS:** Purchaser agrees not to return goods for any reason except upon the written consent of Seller obtained in advance of such return, which consent, if given, shall specify the terms and conditions and charges upon which any such return may be made. In the event that any product returned by Purchaser to Seller for warranty service is determined by Seller not to be covered by Seller's warranty set forth in paragraph 10 hereof, Purchaser shall reimburse Seller for all related shipping and other costs incurred by Seller, and shall pay to Seller an amount equal to Seller's standard service charge in effect at the time of the erroneous warranty claim. Any returns, other than for warranty claims, are subject to a 40% restocking fee payable immediately upon receipt by Seller.
9. **CANCELLATION; MODIFICATION:** Purchaser agrees that an order shall in no event be subject to cancellation or reduction or modification except by prior written consent of Seller and then only when Seller is fully reimbursed for its costs (including overhead, restocking, and other indirect costs) for work performed, goods purchased by it or goods ordered by it to satisfy the Purchaser's order.
10. **WARRANTY:** To the extent that any manufacturer's warranty applies to any transaction, such manufacturer's warranty shall be used in lieu of, and replace, any warranty offered by Seller. If not covered by a manufacturer's warranty, Seller warrants to Purchaser that products manufactured by Seller shall be free of defects in material and workmanship for one year from the date of delivery. Most parts, materials, products and equipment Seller provides are warranted to the Purchaser by the manufacturer of the products. Copies of such warranties are supplied with the product or are available from the manufacturer. Seller shall not be responsible for any defects in Purchaser's equipment undiscovered by Seller during diagnoses or troubleshooting, any non-conformities or damage caused by other than normal and proper usage, or contributed to by improper maintenance, incorrect installation, misuse or abuse, alterations made without the written consent of Seller, faulty repairs made by any person other than Seller, or any defects arising from materials supplied or designs stipulated by Purchaser.
11. **DISCLAIMER:** EXCEPT AS PROVIDED IN THESE TERMS AND CONDITIONS, SELLER HEREBY DISCLAIMS AND PURCHASER HEREBY WAIVES ANY REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, AS TO ANY MATTER WHATSOEVER, INCLUDING WITHOUT LIMITATION WORKMANLIKE SERVICE, THE DESIGN OR CONDITION OF THE WORK, ITS MERCHANTABILITY OR ITS FITNESS FOR ANY PARTICULAR PURPOSE. SELLER SHALL NOT BE LIABLE, IN CONNECTION WITH PRODUCTS OR SERVICES PROVIDED BY SELLER FOR NEGLIGENCE OR OTHER TORT (INCLUDING STRICT, STATUTORY, OR PRODUCT LIABILITY), OR FOR DEFECTS IN PURCHASER'S EQUIPMENT UNDISCOVERED BY SELLER DURING DIAGNOSES OR TROUBLESHOOTING.

EXCEPT AS PROVIDED HEREIN FOR REPAIRED GOODS, SELLER MAKES NO EXPRESS WARRANTIES REGARDING THE GOODS SOLD TO PURCHASER, NOR DOES IT MAKE ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY WARRANTIES OF SELLER IMPLIED FROM COURSE OF DEALING OR USAGE OF TRADE ARE SPECIFICALLY EXCLUDED. Seller does, as its sole express warranty, warrant parts and labor with respect to repaired goods, ordinary wear and tear excepted, for ninety (90) days from the date of delivery, as set forth in Paragraph 10 herein. Notwithstanding the foregoing, rubber products are never covered by any warranty. Regardless of the disclaimer of warranties herein, if Seller is for any reason held liable for any warranty, express or implied, such liability shall be limited solely to the replacement and repair of the goods and no more. THE PURCHASER'S REMEDIES IN THIS REGARD ARE ITS EXCLUSIVE AND SOLE REMEDIES AVAILABLE. THE PURCHASER SPECIFICALLY AGREES THAT SELLER SHALL HAVE NO LIABILITY WHETHER ARISING IN CONTRACT, TORT, OR OTHERWISE, FOR LOSS OF CAPITAL, LOSS OF PRODUCT, LOSS OF PROFIT, LOSS OF USE, LOSS OF POWER, POWER OUTAGES, COST OF REPLACEMENT POWER, OR ANY INDIRECT, SPECIAL INCIDENTAL, OR CONSEQUENTIAL DAMAGES. Purchaser waives the benefit of any rule that disclaimers of warranty shall be construed against Seller, and expressly agrees that all warranty disclaimers herein shall be construed liberally in favor of Seller.

12. LIMITATIONS OF LIABILITY: UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE TO PURCHASER OR THIRD PARTIES FOR ANY LOSS OF PROFITS OR ANY DELAY, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR RELATING TO ANY PRODUCTS OR SERVICES PROVIDED BY SELLER TO PURCHASER.

13. INDEMNITY: Purchaser agrees to indemnify, hold harmless and defend Seller against any and all liabilities, claims, demands, suits, losses, costs, damages and expenses (including reasonable attorney's fees) which Seller may sustain or incur arising out of any claim based on breach of warranty, negligence, or product liability, including strict liability, and whether due to negligence of Seller or otherwise for injury to or death of persons or damage to property arising out of or in any way connected with the sale or use of the products or incorporation of the products into any structure or vessel, or the sale or use of such structure or vessel.

14. INFORMATION DISCLOSED: No information or knowledge heretofore or hereafter disclosed to Seller in the performance of or in connection with the terms hereof, shall be deemed to be confidential or proprietary, unless otherwise expressly agreed to in writing by Seller and any such information or knowledge shall be free from restrictions.

15. PATENTS AND OTHER PROPRIETARY RIGHTS: In the event any goods to be furnished under an order are to be made in accordance with drawings, samples, or manufacturing specifications designated by or on behalf of Purchaser, Purchaser agrees to indemnify and hold Seller and manufacturer harmless from any and all damages, costs and expenses, including legal fees and court costs, arising from a claim that any of the goods furnished to Purchaser by manufacturer or the use thereof infringes any letters, patents or patent applications, foreign or domestic, trade names, trademarks, service marks, copyrights, both domestic and foreign, trade secrets, or any other proprietary or confidential right or interest; and Purchaser agrees at its own expense to undertake the defense of any suit against Seller and manufacturer brought upon any such claim. In the event any goods to be furnished to Purchaser are not made in accordance with drawings, samples or manufacturing specifications designated by or on behalf of Purchaser, but rather in accordance with the design of manufacturer, Purchaser agrees to look solely to the manufacturer (and not to Seller) to indemnify and hold harmless Purchaser and its customers against any damages awarded by a court of final jurisdiction by reason of the sale or use of the goods furnished by manufacturer and purchased by Purchaser in any suit or suits for the infringement of any letters patent or patent applications, foreign or domestic, trade names, trademarks, service marks, copyrights, both domestic and foreign, trade secrets, or any other proprietary or confidential right or interest. With regard to the foregoing, Purchaser shall inform Seller and manufacturer as soon as practical of the claim or suit alleging such infringement and shall give the manufacturer an opportunity to take over the defense thereof.

16. WAIVERS: No waiver of any provision of this Terms and Conditions or any rights or obligations of either party hereunder shall be effective, except pursuant to a written instrument signed by the party or parties waiving compliance. Any such waiver shall be effective only in the specific instance and for the specific purpose stated in the writing.

17. SEVERABILITY OF PROVISIONS: In case any one or more of the provisions contained in this Terms and Conditions shall for any reason be held to be invalid, illegal or unenforceable in any respect, then such invalidity, illegality or unenforceability shall not affect any other provision of this Terms and Conditions, and this Terms and Conditions shall be construed as if such invalid or illegal or unenforceable provision had never been contained herein. The parties hereto hereby declare that they would have entered into this Terms and Conditions and each and every other paragraph, sentence, clause or phrase hereof irrespective of the fact that any one or more paragraphs, sentences, clauses or phrases of this Terms and Conditions may be held illegal, invalid or unenforceable.

18. SECURITY INTEREST: Purchaser hereby grants Seller a security interest and lien in any goods purchased hereunder or delivered to Seller by or on behalf of Purchaser and in the products into which such goods are incorporated. Such security interest shall secure all sums due Seller.

19. SUCCESSORS OR ASSIGNS. This Terms and Conditions shall be binding upon and inure to the benefit of the parties and their respective successors and assigns, including, but not limited to, any third party which obtains, leases or otherwise uses any item or good purchased from Seller.

20. ATTORNEY'S FEES. In the event that either party hereto shall institute any action or proceeding relating to the provisions of this Settlement Agreement, the party not prevailing in such action or proceeding shall reimburse the prevailing party for their reasonable attorney's fees and expert witness fees, and all fees, costs and expenses incurred in connection with such action or proceedings including, without limitation, any post-judgment fees, costs and/or expenses incurred on any appeal or in collection of any judgment.

21. ENTIRE AGREEMENT. This Terms and Conditions contain the entire agreement of the parties with respect to the subject matter of this Terms and Conditions, and supersede all prior negotiations, agreements and understandings with respect thereto. This Terms and Conditions may only be amended by a written document duly executed by both Purchaser and Seller.

22. GOVERNING LAW. This Terms and Conditions shall be construed and governed in accordance with the laws of the State of Washington. "Any dispute, action or proceeding, legal or otherwise, which challenges the validity, applicability, interpretation, or construction of these Terms and Conditions, or any issues related thereto, or any transaction governed or contemplated to be governed by these Terms and Conditions, must be brought in the District Court of King County, State of Washington, if the amount in dispute is less than \$50,000, and in the Superior Court of King County, State of Washington, if the amount in dispute is \$50,000 or more."