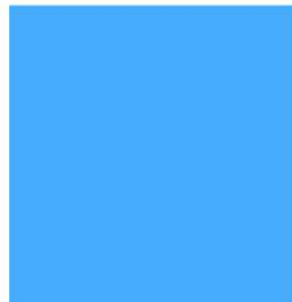
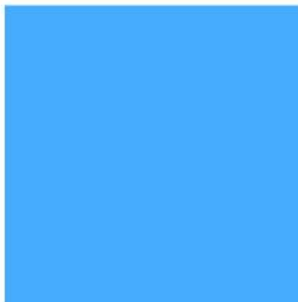
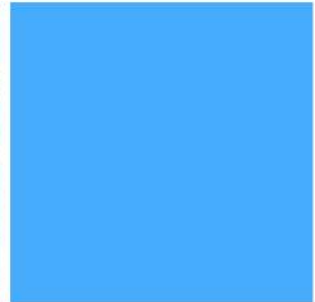
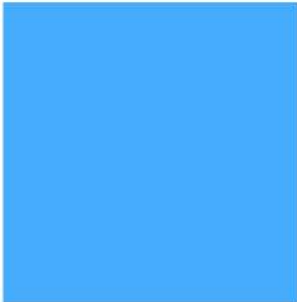
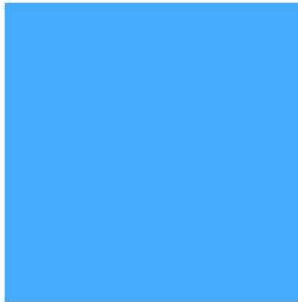


Mac.N.Hom Systems

Hydraulic Rudder Control System



Model: BHIMA User Manual

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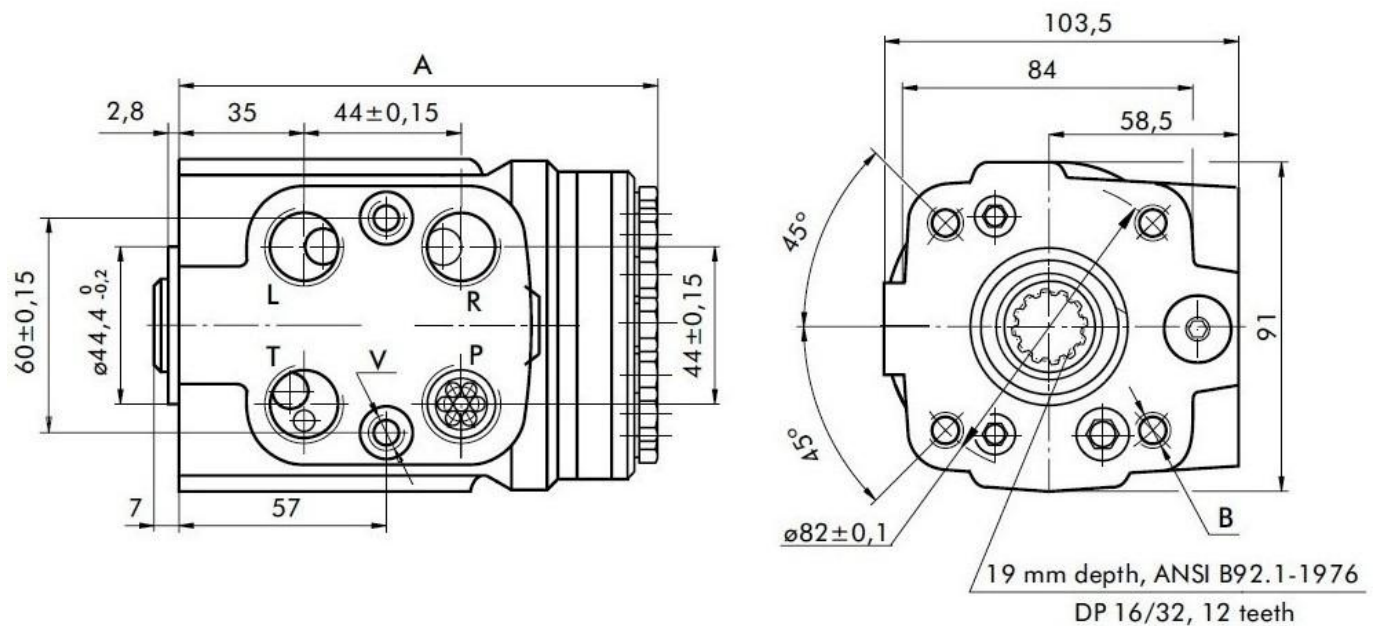
1. Helm Pump

The Helm Pump Assembly has built-in relief and check valves. Along with Pressure developing mechanism, a direction control valve also incorporated. Thus it is very compact steering unit which reduces the need for additional hydraulic components in the system. Discharge 80 cc per revolution.



Figure 1.1: Helm Pump Assembly

DIMENSIONS AND MOUNTING DATA

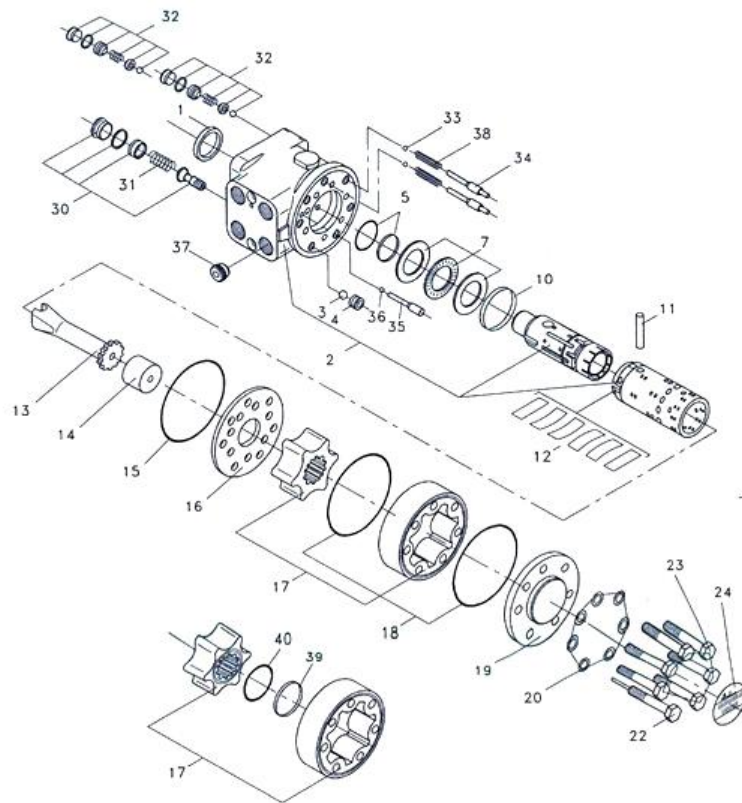


THREADED PORTS

code	Ports - P, T, R, L Thread	Column Mounting Thread - B	Valve Mounting Thread - V
-	G1/2 17 mm depth	4 x M10 18 mm depth	2 x M10x1 16 mm depth

Figure 1.2: Overall Dimensions:Helm Pump

Exploded View and Seal Kit



150-454.10

Callout	Description	Callout	Description
1	Dust seal ring	19	End cover
2	Housing, spool and sleeve. Check valve and the seats for relief and shock valves are locktited.	20	Washer
3	Ball 8.5 mm [0.33 in]	22	Special screw
4	Thread bushing	23	Screw
5	O-ring used with kin-ring (item 6)	24	Name plate
6	Kin-ring	30	Complete relief valve
7	Bearing assembly	31	Spring wire
10	Ring	32	Complete shock valve
11	Cross pin	33	Ball 3/16 in
14	Spacer	38	Spring
13	Cardan shaft	34	Rolled pin

Figure 1.3: Exploded View: Helm Pump

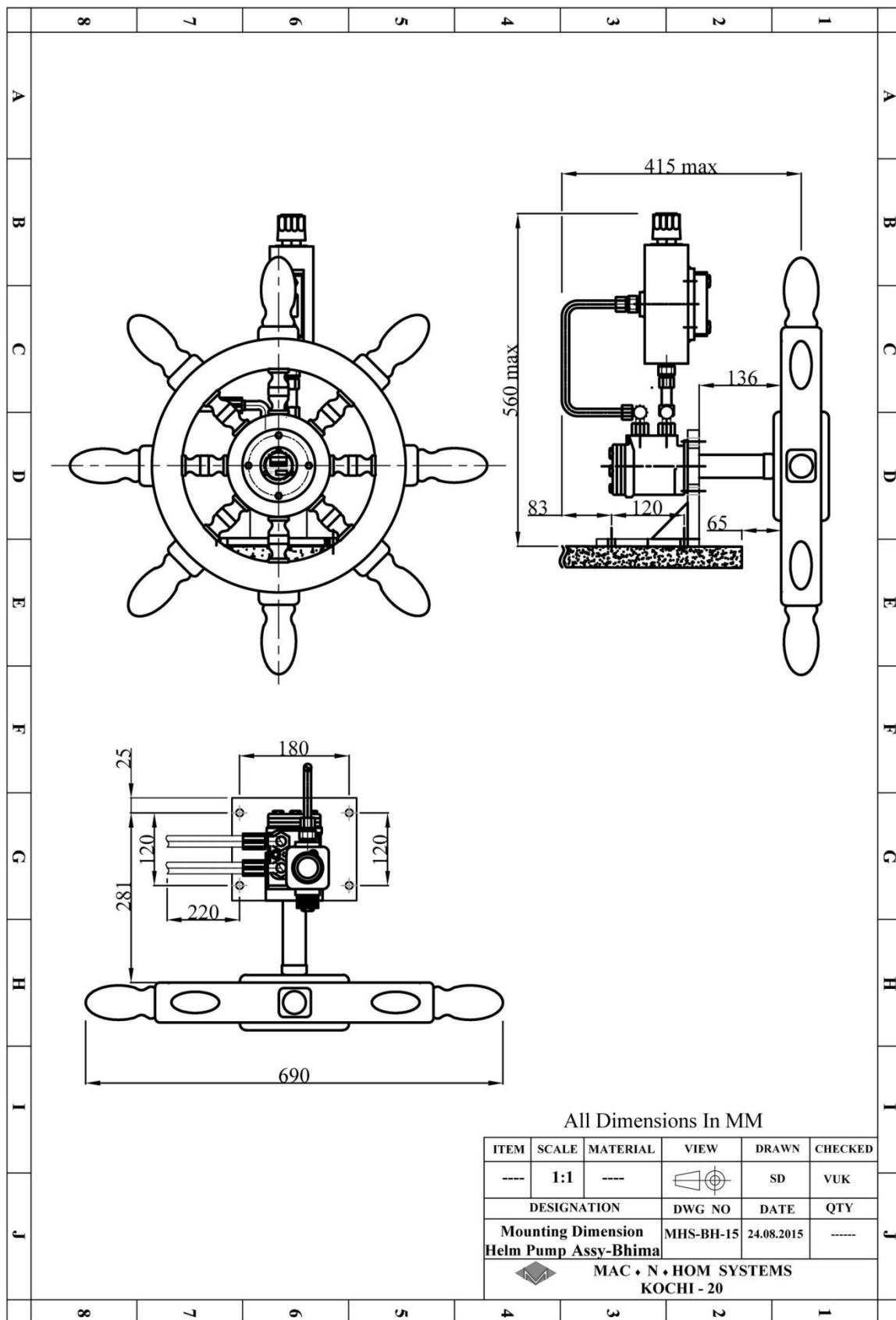


Figure 1.4: Mounting Dimensions: Helm Pump

2. Hydraulic Actuator

The balanced hydraulic actuator is planned to turn the tiller arm to both sides of the vessel, smoothly and precisely. Oil supply ports are provided on both sides of this actuator through which, oil can be supplied to the piston of the actuator. As pressurised oil is supplied from the Helm pump to the Linear actuator, the piston-rod will move forward or backward, depending on, to which supply port, oil is provided. The Piston rod-end / Ram-end of this actuator has a flexible connector, which can be coupled to the Tiller arm.

On other end of the piston rod, we have provided same thread of other end, so that, in case the thread with Swivel rod eye develops any damage, the actuator can be diametrically rotated and the second end can be engaged with tiller arm. An Aluminum Dummy is provided on this thread for protection.



Figure 2.1: Hydraulic Actuator

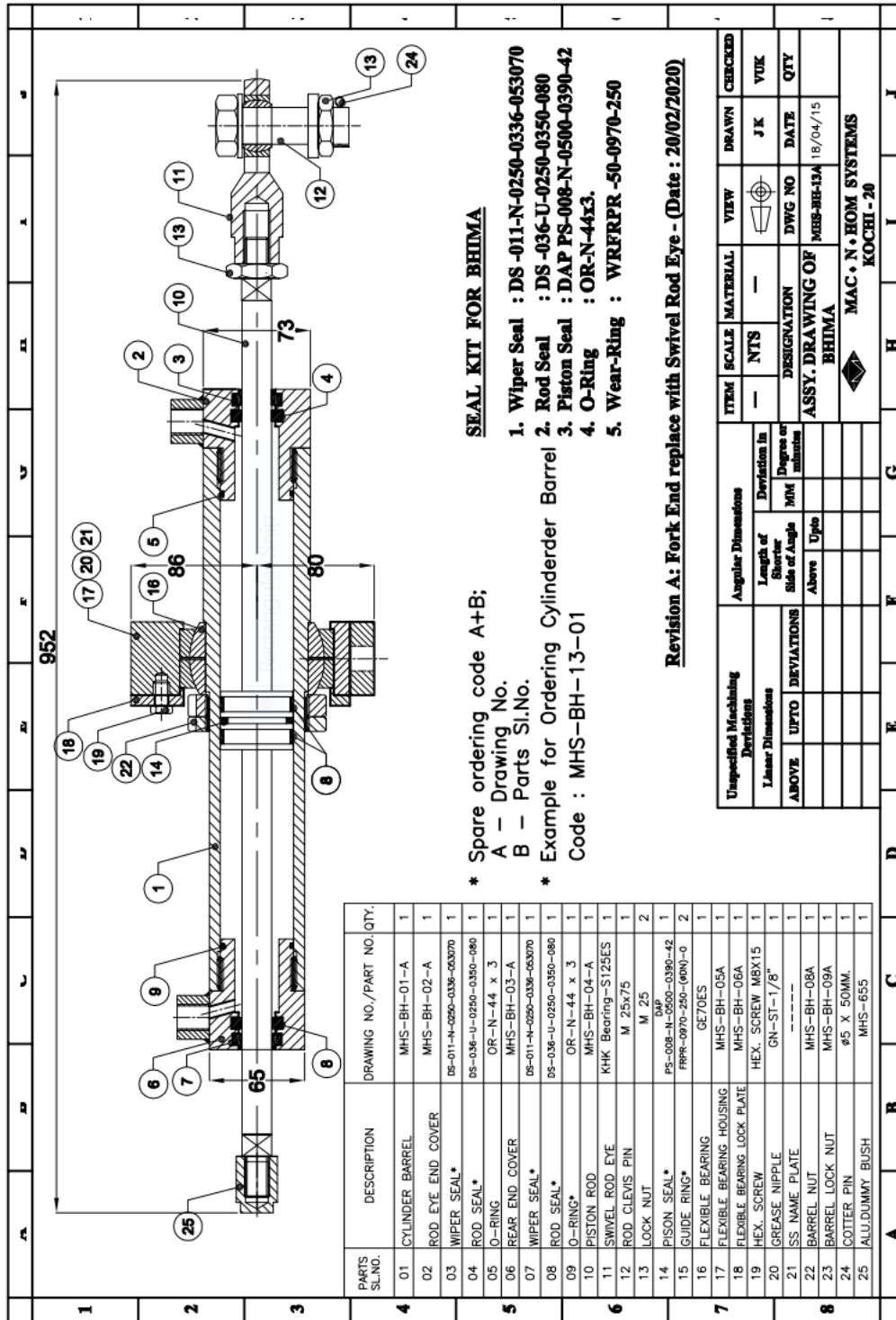


Figure 2.2: Section Drawing: Hydraulic Actuator



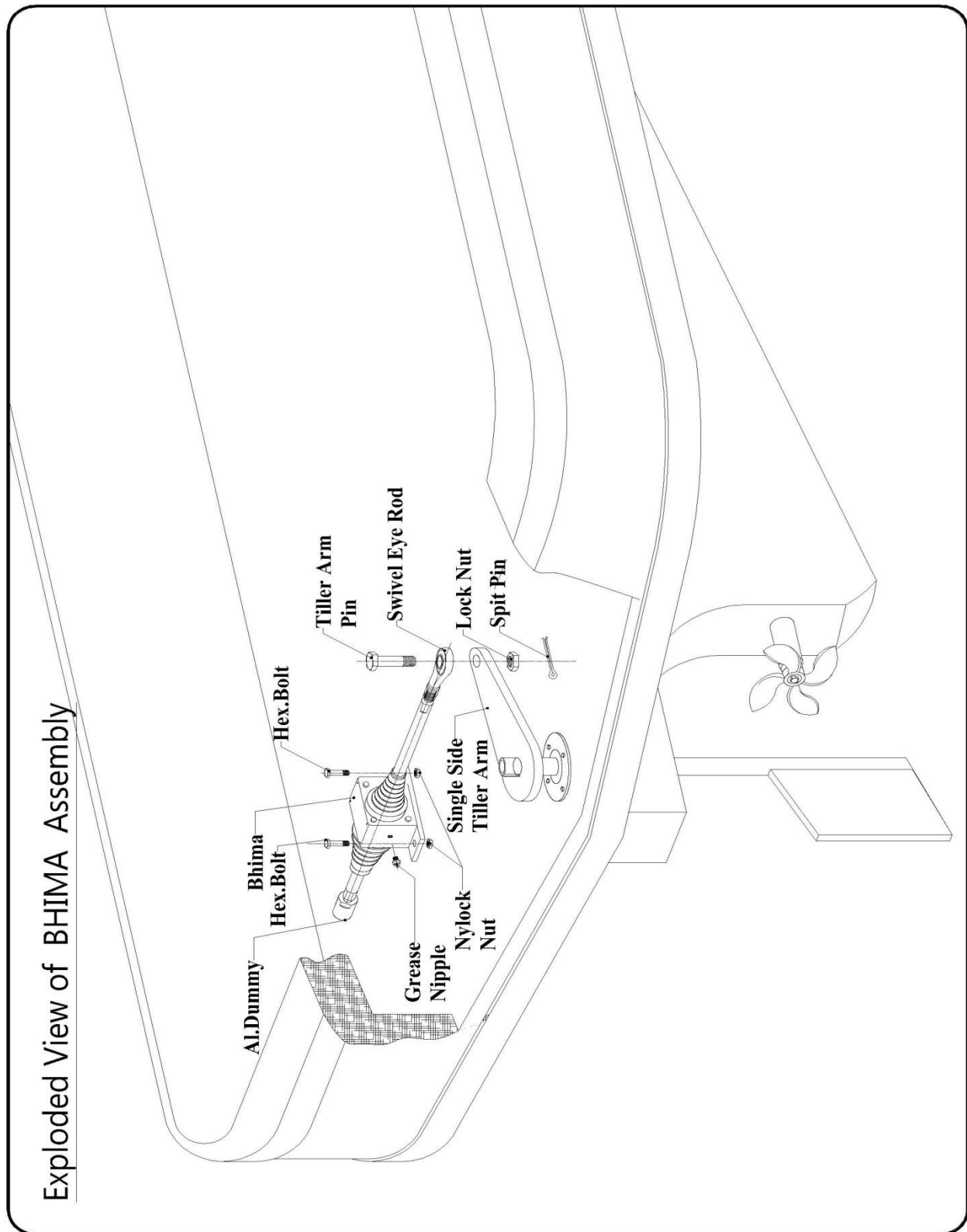


Figure 2.4: Exploded View of Bhima Assembly

3. Hydraulic Connectors

Four Types of Hydraulic Connectors Used in our Hydraulic Piping Circuits

1. Banjo Connection with one end thread and other end for pipe connection on any perpendicular direction
2. Straight Connectors with One end thread and other end for Pipe Connection
3. Straight coupling for pipe to pipe connection
4. Elbow Coupling for pipe to pipe connection perpendicular to each other.

3.1. Banjo Connectors

A banjo fitting (also called an internally relieved bolt) comprises a perforated hollow bolt and spherical union for fluid transfer. Compared to pipe fittings that are themselves threaded, banjo fittings have the advantage that they do not have to be rotated relative to the host fitting. This avoids risk of damage by twisting the hose when screwing the fitting into place. It also allows the pipe exit direction to be adjusted relative to the fitting, then the bolt tightened independently.

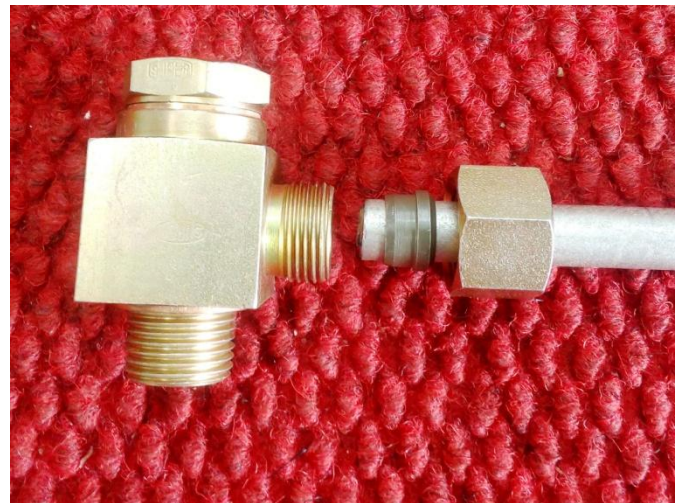


Figure 3.1: Banjo Connectors.

3.2. Male Stud Connectors

A Male Stud Connector comprises of 1/2" BSP Thread at one end and Nut and ferrule connector to suit Seamless steel pipes at other end.



Figure 3.2: Male Stud Connectors.

3.3. Coupling Connectors

A Coupling Connectors comprises of Nut and ferrule connector at both ends to suit Seamless steel pipes.



Figure 3.3: Coupling Connectors.

4. Self-Priming Unit with Oil Reservoir Tank

This Assembly serves two functions

- It Recharge oil to the circuit in case of any small leakage. Thus preventing the hydraulic from immediate stoppage.
- As a Priming unit to the release the trapped air inside the hydraulic circuit. After filling oil in the reservoir if the pump is rotated in one direction. Oil will flow to that side of the circuit and the air trapped in the other side of the circuit is released through the filler breather provided at top of the reservoir.



Figure 4.1: Self Priming Unit with Oil Reservoir Tank

5. Filler Breather

To strain fluids being added to tanks and to filter entering air. These units are offered for top or side mounting, with choice of neck height, basket depth, inner guards, dipsticks and magnets. In all-metal, all-stainless, or all-nylon construction. This is a combination unit for filtering air displacement from the reservoir and for straining oil while filling. Mounting options include Tank Top and Side Mounting. The displacement capacity is 250 LPM and 700 LPM and filtration is up to 40 microns. The air displacement from underneath the cap assembly improves performance. Power coated cap and nylon or nickel-chrome plated strainer body ensures corrosion resistance. The unit comes completely assembled with internal safety chain and fasteners. The mounting surface should be free of burrs, flat and clean to provide a good sealing surface for the flange. It is for use with Hydraulic/Lubrication oil reservoir applications, including machine tools, mobile equipment, industrial machinery, etc.



Figure 5.1: Filler Breather

6. Oil Level Indicator

Level Gauge can be used on any reservoir containing mineral and petroleum-based hydraulic fluids to indicate oil level. Level gauges are available with or without temperature gauges and are available in two sizes - 3" and 5" between bolt centers. They are easily readable through a magnifying sight glass. These level gauges offer complete protection to any reservoir. The Level Gauges are available ready to assemble. Only two holes are to be drilled onto the tank to fix the level gauge.



Figure 6.1: Oil Level Indicator

7. High Pressure Hydraulic Hose

Thermo Plastic hose is graded by pressure, temperature, and fluid compatibility. Hoses are used when pipes or tubes cannot be used, usually to provide flexibility for machine operation or maintenance. The hose is built up with Processed Rubber and steel layers. A Processed Rubber interior is surrounded by multiple layers of woven steel/polymer wire and rubber. The exterior is designed for abrasion resistance. The bend radius of hydraulic hose is carefully designed into the machine, since hose failures can be deadly, and violating the hose's minimum bend radius will cause failure. Hydraulic hoses generally have steel fittings Crimped on the ends.

Standard is SAE 100 R1, Hose I.D is 1/2", Hose O.D is 19.3 mm, Max Working Pressure is 2050 psi/140 bar, Min Burst Pressure 560 bar.



Figure 7.1: High Pressure Hydraulic Hose

8. Maintenance Instructions

8.1. Daily

- Check oil level in Level gauge. Maintain oil in middle level. Do not fill oil more than the maximum limit. Do not let oil fall below the minimum level.
- Check for leakage from joints. Tight the Swivel nut at the joint to stop the leakage. Top up oil if necessary.



--- MAX. LEVEL

--- IDEAL LEVEL

---MIN. LEVEL

Figure 8.1: Oil Level Indication

8.2. Monthly

- Greasing of Swivel Rod Eye Grease nipple.
- Greasing of Hydraulic Actuator Grease Nipples

8.3. Yearly

- Changing the Hydraulic system oil. Remove oil completely from system by removing one of the High Pressure Hydraulic hoses at the cylinder side then turn the steering to left /right till complete oil inside the system goes out. Refit the hose back to the cylinder port. And add pour new oil into the system by pouring oil into the oil reservoir and turn steering to one direction till it reaches one end. Air from other side escapes through the reservoir. Now turn steering wheel to other side. After repeating this turning 2 to 3 times, system will be air free and fully operational. Preferred Oil SERVO System 32 (IOC) , Enklo 32(HP), Hydrol 32(BPCL).

8.4. After 2 Years

- . If the System is in continuous usage, we recommend to change the high pressure hoses After two years of working.

8.5. After 3 Years.

After 3 years, we recommend Seals of the actuator to be changed.

Test Chart