Industrial Products

| Size 50 to 11,600 cc/rev, up to 250 bar, 36,000Nm, 240kW | Fixed Displacement Radial Piston Hydraulic Motor Staffa, Series B | Data Sheet M-1001/03.00 GB |

Features
- Rugged, reliable, proven design.
- Unique Hydrostatic balancing provides minimum wear and extended life.
- High volumetric and mechanical efficiency.
- Capacities range from 50 to 11600 cc per rev.
- Large variety of Shaft and Porting options.
- Output torque up to 36000 Nm.
- Wide range of mounting interfaces available.
- Highly accurate electronic positional and velocity control systems also available.

Description
The Kawasaki “Staffa” range of high torque low speed fixed displacement radial piston hydraulic motors consists of 13 frame sizes ranging from the HMB010 to HMB700. Capacity ranges from 50 to 11,600 cc/rev.

The rugged, well proven design incorporates high efficiency, combined with good breakout torque and smooth running capability.

Various features and options are available including, on request, mountings to match competitors’ interfaces.

The Kawasaki “Staffa” range also includes dual and continuously variable displacement motors. To obtain details of this product range please refer to data sheet M-1002

Model
Staffa B

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Data Sheet
M-1001/03.00

Issue 03/00
### Ordering Code – Staffa Motor Series B

<table>
<thead>
<tr>
<th>Fluid Type</th>
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<td>HD: Heavy duty (HMHDB)</td>
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<table>
<thead>
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<th>Shaft Type</th>
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<tr>
<td>eg: Stainless steel shaft sleeves.</td>
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<tr>
<td>Alternative port connections.</td>
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<td>Shaft varients.</td>
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<td>Tx: Customer specific encoder drive.</td>
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### Motors Industrial Products

Issue 03/00
### Shaft Options

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<th>SHAFT DESCRIPTION</th>
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<tr>
<td>HMB0100</td>
<td>P* = Parallel keyed shaft Ø 40mm</td>
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<tr>
<td>HMB0100</td>
<td>S* = Involute spline 17 teeth to BS3550</td>
</tr>
<tr>
<td>HMB030/045</td>
<td>(H)S* = Involute spline 17 teeth to BS3550</td>
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<tr>
<td>HMB030/045</td>
<td>(H)P = Parallel keyed shaft Ø 55mm</td>
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<tr>
<td>HMB030/045</td>
<td>(H)Z* = Involute spline to DIN5480 (W55x3x17x7h)</td>
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<tr>
<td>HMB045</td>
<td>Q* = Internal involute spline 21 teeth to BS3550</td>
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<td>HMB060/080/100</td>
<td>(H)P* = Parallel keyed shaft Ø 60mm</td>
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<td>(H)S* = Involute spline 14 teeth to BS3550</td>
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<tr>
<td>HMB060/080/100</td>
<td>(H)Z* = Involute spline to DIN5480 (W70x3x22x7h)</td>
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<tr>
<td>HMB060/080/100/125/150/200/270/325</td>
<td>T* = Long tapered keyed shaft</td>
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<td>HMB125/150/200/270/325</td>
<td>X* = Short tapered keyed shaft</td>
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<td>HMB125/150/200/270/325</td>
<td>(H)P2* = Parallel keyed shaft Ø 100mm</td>
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<td>(H)S3* = Involute spline 20 teeth to BS3550</td>
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<td>(H)S4* = Involute spline 16 teeth at 20°</td>
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<td>(H)S5* = Involute spline 34 teeth to BS3550</td>
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<td>(H)Z3* = Involute spline to DIN5480 (W85x3x27x7h)</td>
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<tr>
<td>HMB125/150/200/270/325</td>
<td>(H)Z5* = Involute spline to DIN5480 (W100x4x24x7h)</td>
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<td>(H)Q* = Internal involute spline 34 teeth to BS3550</td>
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<td>HMB125/150/200/270/325</td>
<td>(H)X* = Short taper, keyed shaft</td>
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<td>HMB270/325</td>
<td>(H)Z* = Involute spline to DIN5480 (W100x4x24x7h)</td>
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<td>HMB270/325 + HMHDB270/325</td>
<td>P* = Parallel shaft with two keys Ø 100mm</td>
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<td>S* = Involute spline 23 teeth to BS3550</td>
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<td>Z* = Involute spline to DIN5480 (W100x4x24x7h)</td>
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<tr>
<td>HMB270/325</td>
<td>Q* = Internal involute spline 31 teeth to BS3550</td>
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<tr>
<td>HMB270/325</td>
<td>X* = Tapered keyed shaft</td>
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<tr>
<td>HMB700</td>
<td>Z* = Involute spline to DIN5480 (W120x4x28x7h)</td>
</tr>
<tr>
<td>HMB700</td>
<td>P = Parallel keyed shaft at 120° 120 Ø</td>
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</tbody>
</table>

Notes:

* - For installations where shaft is vertically upwards specify “V” after shaft type letter to ensure that additional high level drain port is provided.

(H) - Use “H” prefix code as noted to specify “hollow” shaft with through hole Ø 26.2. Hollow shafts are available only with type “S04” main port connection.

For all shaft dimensions see the motor installation drawings.
Main Port Connections

Product Type

**HMB010**
Blank = Two, four bolt flange ports of 20mm Ø

**HMB030 Mono bloc**
Blank = Rear entry ports G 3/4" (BSPF)
F = Side port SAE 1"-4 Bolt (UNC) flange
FM = Side port SAE 1"-4 Bolt (Metric) flange

**HMB045 Mono bloc**
Blank = Rear entry ports G 1" (BSPF)
D = Dual entry ports G 1" (BSPF)

**HMB030/045 Two part build (TPB)**
See detail below

**HMB060/080/100**
F2 = SAE 1", 4 Bolt (UNC) flanges
FM2 = SAE 1", 4 Bolt (Metric) flanges
S03 = 6-Bolt (UNF) flange. (Staffa original valve housing)
F3 = SAE 1 1/4 4 Bolt (UNC) flanges
FM3 = SAE 1 1/4" 4 Bolt (Metric) flanges
S04 (1) = 6 Bolt (UNF) flanges. (Staffa original valve housing)

**HMB125/150/200 + Heavy Duty Variants** Details as above, plus the following:
F4 = SAE 1 1/4" 4 Bolt (UNC) flanges
FM4 = SAE 1 1/2" 4 Bolt (Metric) flanges

**HMB270/325 + Heavy Duty Variants**
F4 = SAE 1 1/2" 4 Bolt (UNC) flanges
FM4 = SAE 1 1/2" 4 Bolt (Metric) flanges
S04 (1) = 6 Bolt (UNF) flanges. (Staffa original valve housing)

**HMHDB400**
Blank = Combined 6-Bolt flange and 4 Bolt SAE connection
Ports “B” and “C” 6-Bolt UNF flange
Ports “A” and “C” SAE, 2” 4-Bolt UNF flanges
S045 = 2 x 6 Bolts (UNF) flanges (2 inlet and 2 outlet ports available)

**HMB700**
FM = Standard code 62
SAE 2” 4 Bolt (Metric) flanges

*Note:* (1)

Obligatory for hollow shafts type: HP, HS, HZ or HQ
Industrial Products Motors

**Functional Symbols**

- **HMB010**
- **HMB030 (Mono Block)**

- **HMB045-**

- **HMB045-**
- **HMB030/045 (TPB)**
- **HMB060/080**
- **HMB100/125**
- **HMB150/200**

- **-F(M)3; F(M)4;**
- **HMB030+/045+ (TPB)**
- **HMB060/080**
- **HMB100/125**
- **HMB150/200**

- **-S03; S04-**

- **HMB270**
- **HMB325**

- **-S04-**

- **HMB270**
- **HMB325**

- **HMB700**

- **HMHD400-**

- **HMHD400-**
- **S045-030**

- **Dual ports**

- **Removable plug**

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**Model**

**Staffa**

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**Data Sheet**

**M-1001/03.00**

**Issue 03/00**
Performance Data

Intermittent max pressure
B010 up to 241 bar
B700 up to 250 bar
All other models to 293 bar.
These pressures are allowable on the following basis:
  (a) Up to 50 r/min: 15% duty for periods up to 5 minutes maximum.
  (b) Over 50 r/min: 2% duty for periods up to 30 seconds maximum.

Continuous rating
For continuous duty the motor must be operating within each of the maximum values for speed, pressure and power.

Intermittent rating
Operation within the intermittent power rating (up to the maximum continuous speed) is permitted on a 15% duty basis, for periods up to 5 minutes maximum.

Limits for fire resistant fluids

<table>
<thead>
<tr>
<th>Fluid Type</th>
<th>Pressure, bar</th>
<th>Max Speed r/min</th>
<th>Model type</th>
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<tr>
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<td>103</td>
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<td>50% of limits for Mineral Oil</td>
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<tr>
<td>HFB 60/40 water in oil emulsion</td>
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<td>172</td>
<td>As for Mineral Oil</td>
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<tr>
<td>HFC water glycol</td>
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<td>50% of limits or Mineral Oil</td>
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<tr>
<td>HFD phosphate ester</td>
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### Performance Data Tables

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<th>Average actual running torque (Nm/bar)</th>
<th>Max. continuous speed (rev/min)</th>
<th>Max. continuous output (kW)</th>
<th>Max. continuous pressure (bar)</th>
<th>Max. intermittent pressure (bar)</th>
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## Non-Standard Displacements

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**Note:**

* Reduced pressure and power rating.
Output Torque

These torque curves indicate the maximum output torque and power of a fully run-in motor for a range of pressures and speeds when operating with zero outlet pressure on Mineral Oil of 50 cSt (232 SUS) viscosity. High return line pressures will reduce torque for a given pressure differential. – x – x – x – Upper limit of continuous rating envelope.
Output Torque (continued)

**Model:** Staffa

Output Torque Graphs for Models B20D, B270, B325, B400

<table>
<thead>
<tr>
<th>Model</th>
<th>Page</th>
<th>Data Sheet</th>
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<tbody>
<tr>
<td>Staffa</td>
<td>11.70</td>
<td>M-1001/03.00</td>
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</tbody>
</table>

Issue 03/00
Example 1 (follow chain dotted line):
Side load (W)  
System pressure (P)  
Speed (N)  
Median bearing life  
L10 bearing rating = median x 0.2

Example 2 (follow chain dotted line):
Side load (W)  
Load offset (A) from motor mounting face  
System pressure (P)  
Speed (N)  
Median bearing life  
L10 bearing rating = median x 0.2

W = Side Load
A = Distance from mounting face to load centre
P = Max. pressure on port 1 or port 2
N = Shaft speed, r/min
Bearing Life Graphs (continued)

HMB030 Shaft Types P, S, and Z

HMB045 Shaft Types P, S, and Z

W = Side Load
A = Distance from mounting face to load centre
P = Max. pressure on port 1 or port 2
N = Shaft speed, r/min
Bearing Life Graphs (continued)

HMB 060, HMB080, HMB100 Shaft Types P, S, Z, X

HMB125, HMB 150, HMB200 Shaft Types P1, S3, S4, Z3, T

W = Side Load
A = Distance from mounting face to load centre
P = Max. pressure on port 1 or port 2
N = Shaft speed, r/min

Model  
Staffa

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Bearing Life Graphs (continued)

HMHDB125, 150, 200 Shaft Types S5, Z5 and P2

HMB270, HMB325 Shaft Types P1, S3, Z, T, X

W = Side Load
A = Distance from mounting face to load centre
P = Max. pressure on port 1 or port 2
N = Shaft speed, r/min
Bearing Life Graphs (continued)

HMHDB270, 325 Shaft Type P2, S5, Z and X

HMHDB400 Shaft Types P, S, Z, and X

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Bearing Life Graphs (continued)

HMB700 Shaft Type P and Z

- $W =$ Side Load
- $A =$ Distance from mounting face to load centre
- $P =$ Max. pressure on port 1 or port 2
- $N =$ Shaft speed, r/min

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Volumetric Efficiency

These nomographs enable the average volumetric efficiency, crankcase (drain) leakage and "winch slip"/shaft creep speed to be estimated. The shaft creep occurs when the load attempts to rotate the motor against the closed ports as may occur, for example in winch applications.

Example (follow chain dotted line):
Given:
1. Pressure ......................175 bar
2. Speed ..........................100 r/min
3. Viscosity ............50 cSt (232 SUS)

To obtain:
4. Volumetric efficiency ........94.2%
5. Crankcase leakage .......0.451 l/min
   (27.4 in³/min)
6. Shaft creep speed ..........6.4 r/min
Volumetric Efficiency (continued)

**B030**

![Graph showing volumetric efficiency and shaft speed](image)

**B045**

![Graph showing volumetric efficiency and shaft speed](image)
Volumetric Efficiency (continued)

**B060**

**B080**
Volumetric Efficiency (continued)

**B100**

![Graph showing pressure, shaft speed, and volumetric efficiency for B100 model.]

**B125**

![Graph showing pressure, shaft speed, and volumetric efficiency for B125 model.]

---

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Volumetric Efficiency (continued)

**B150**

![Graph for B150 showing pressure, shaft speed, and volumetric efficiency at 50 cSt (232 SUS).]

**B200**

![Graph for B200 showing pressure, shaft speed, and volumetric efficiency at 50 cSt (232 SUS).]
Volumetric Efficiency (continued)

B270

B325
Volumetric Efficiency (continued)

B400

B700

Kawasaki
Hydraulic Products

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Issue 03/00
Starting Torque
The starting torques shown on the graphs on pages 9 to 12 are average and will vary with system parameters.

Low Speed Operations
Minimum operating speeds are determined by the hydraulic system and load conditions (load inertia, drive elasticity, etc.) Recommended minimum speeds are shown below:

<table>
<thead>
<tr>
<th>Model Type</th>
<th>r/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>B010</td>
<td>20</td>
</tr>
<tr>
<td>B030</td>
<td>5</td>
</tr>
<tr>
<td>B045</td>
<td>6</td>
</tr>
<tr>
<td>B060/80/100/125/150/200</td>
<td>3</td>
</tr>
<tr>
<td>B270/B325/HMB400</td>
<td>2</td>
</tr>
<tr>
<td>B700</td>
<td>1</td>
</tr>
</tbody>
</table>

Note: Speed as low as 0.025 rpm can be accurately achieved using electronic control systems. For operation at speeds below these figures please contact Kawasaki Precision Machinery (UK) Ltd.

High Back Pressure
When both inlet and outlet ports are pressurised continuously, the lower port pressure must not exceed 70 bar at any time.

Note: High back pressure reduces the effective torque output of the motor.

Boost Pressure
When operating as a motor the outlet pressure should equal or exceed the crankcase pressure. If pumping occurs (i.e. overrunning loads) then a positive pressure, “P”, is required at the motor ports. Calculate “P” (bar) from the operating formula:

\[
P = \frac{1 + N^2 \times V^2 + C}{K}
\]

Where P is in Bar, N = motor speed (RPM), V = motor displacement (cc/rev.), C=Crankcase pressure (BAR) and K=a constant from the table below:

<table>
<thead>
<tr>
<th>MOTOR</th>
<th>PORTING</th>
<th>CONSTANT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMB010</td>
<td>Standard</td>
<td>8 x 10^6</td>
</tr>
<tr>
<td>HMB030</td>
<td>Standard, F(M)/3</td>
<td>3.7 x 10^9</td>
</tr>
<tr>
<td></td>
<td>SO3, F(M)/3</td>
<td>7.5 x 10^9</td>
</tr>
<tr>
<td>HMB045</td>
<td>Standard</td>
<td>1.3 x 10^10</td>
</tr>
<tr>
<td></td>
<td>SO3, F(M)/3</td>
<td>1.6 x 10^10</td>
</tr>
<tr>
<td>HMB060/080/100</td>
<td>F(M)/2</td>
<td>2.7 x 10^9</td>
</tr>
<tr>
<td></td>
<td>F(M)/3, S03</td>
<td>1.8 x 10^10</td>
</tr>
<tr>
<td>HMB060/080/100</td>
<td>F(M)/3, S03</td>
<td>4.0 x 10^10</td>
</tr>
<tr>
<td>HMB060/080/100</td>
<td>F(M)/4, S04</td>
<td>8.0 x 10^10</td>
</tr>
<tr>
<td>HM(HD)B125/150/200</td>
<td>F(M)/4, S04</td>
<td>7.2 x 10^10</td>
</tr>
<tr>
<td>HM(HD)B270/325</td>
<td>Standard</td>
<td>6.0 x 10^10</td>
</tr>
<tr>
<td>HM(HD)B270/325</td>
<td>S045</td>
<td>7.2 x 10^10</td>
</tr>
<tr>
<td>HMHDB400</td>
<td>Standard</td>
<td>1.3 x 10^11</td>
</tr>
<tr>
<td>HMB700</td>
<td>Standard</td>
<td>1.3 x 10^11</td>
</tr>
</tbody>
</table>
Circuit and Application Notes (continued)

The flow rate of oil needed for the make-up system can be estimated from the crankcase leakage figure (see Volumetric Efficiency graphs pages 19 to 29). Allowances should be made for other system losses and also for “fair wear and tear” during the life of the motor, pump and system components.

Cooling Flow

Operating within the continuous rating does not require any additional cooling. For operating conditions above “continuous”, up to the “intermittent” rating, additional cooling oil may be required. This can be introduced through the spare crankcase drain holes, or in special cases through the valve spool end cap. Consult Kawasaki about such applications.

Motor Casing Pressure

With the standard shaft seal fitted, the motor casing pressure should not exceed 3.5 bar.

Notes:
1. The casing pressure at all times must not exceed either the motor inlet or outlet pressure.
2. High pressure shaft seals are available for casing pressures of:
   - 6 Bar for HMB700
   - 9 Bar for HMB 010
   - 10 Bar for all remaining frame sizes.
3. Check installation dimensions for maximum crankcase drain fitting depth.

Hydraulic Fluids

Dependent on motor (see Ordering Code.) suitable fluids include:
(a) Antiwear hydraulic oils.
(b) Phosphate ester (HFD fluids)
(c) Water glycols (HFC fluids)
(d) 60/40% water-in-oil emulsions (HFB fluids).
(e) 5/95% oil-in-water emulsions (HFA fluids)

Reduce pressure and speed limits, see page 6.

Viscosity limits when using any fluid except oil-in-water (5/95) emulsions are:
Max. off load 2000cSt (9270 SUS)
Max. on load 150 cSt (695 SUS)
Optimum 50 cSt (232 SUS)
Minimum 25cSt (119 SUS)
Circuit and Application Notes (continued)

Mineral Oil recommendations
The fluid should be a good hydraulic grade, non-detergent Mineral Oil. It should contain anti-oxidant, anti-foam and demulsifying additives. It should contain antiwear or EP additives. Automatic transmission fluids and motor oils are not recommended.

Temperature limits
Ambient min. -30°C (-22°F)
Ambient max. + 70°C (158°F)
Max. operating temperature range.
Mineral Oil Water- containing
Min -20°C (-4°F) +10°C (50°F)
Max. + 80°C (175°F) +54°C (130°F)

Note: To obtain optimum service life from both fluid and hydraulic systems components, a fluid operating temperature of 40°C is recommended.

Filtration
Full flow filtration (open circuit), or full boost flow filtration (close circuit) to ensure system cleanliness to ISO4406/1986 code 18/14 or cleaner.

Noise levels
The airborne noise level is less than 66.7 dB(A) DIN (&) dB (A) NFPA) through the “continuous” operating envelope. Where noise is a critical factor, installation resonances can be reduced by isolating the motor by elastomeric means from the structure and the return line installation. Potential return line resonances originating from liquid borne noise can be further attenuated by providing a return line back pressure of 2 to 5 bar.

Polar Moment of Inertia & Mass:

<table>
<thead>
<tr>
<th>Model Type</th>
<th>Polar moment of Inertia (kg.m²) (Typical data)</th>
<th>Mass (kg) (Approx. all models)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMB010</td>
<td>0.0076</td>
<td>40</td>
</tr>
<tr>
<td>HMB030</td>
<td>0.015</td>
<td>73</td>
</tr>
<tr>
<td>HMB045</td>
<td>0.047</td>
<td>120</td>
</tr>
<tr>
<td>HMB060</td>
<td>0.055</td>
<td>144</td>
</tr>
<tr>
<td>HMB080</td>
<td>0.060</td>
<td>144</td>
</tr>
<tr>
<td>HMB100</td>
<td>0.076</td>
<td>144</td>
</tr>
<tr>
<td>HMB125</td>
<td>0.22</td>
<td>217</td>
</tr>
<tr>
<td>HMB150</td>
<td>0.25</td>
<td>265</td>
</tr>
<tr>
<td>HMB200</td>
<td>0.27</td>
<td>265</td>
</tr>
<tr>
<td>HMB270</td>
<td>0.91</td>
<td>420</td>
</tr>
<tr>
<td>HMB325</td>
<td>0.95</td>
<td>429</td>
</tr>
<tr>
<td>HMHDB400 (With 4” valve)</td>
<td>0.54</td>
<td>481</td>
</tr>
<tr>
<td>HMHDB400 (With 4.5” valve)</td>
<td>0.54</td>
<td>510</td>
</tr>
<tr>
<td>HMB700</td>
<td>2.38</td>
<td>1050</td>
</tr>
</tbody>
</table>
Crankcase Drain

Motor axis horizontal.

The crankcase drain must be taken from a position above the horizontal centre line of the motor to ensure lubrication of the shaft bearing.

Axis vertical, shaft down.

Use either drain position. The drain line should be run above the level of the uppermost bearing. If there is a risk of syphoning then a syphon breaker should be fitted.

Axis vertical, shaft up.

An additional G 1/4" (BSPF) drain port is provided when "V" (shaft vertically upwards) designator is given after the shaft type (see Ordering Code). This additional drain should be connected into the main motor casing drain line downstream of a 0.35 bar check valve to ensure lubrication of the upper bearing, see diagram.

Installation Data

GENERAL

Spigot:

The motor should be located by the mounting spigot on a flat, robust surface using correctly sized bolts. The diametrical clearance between the motor spigot and the mounting must not exceed 0.15mm. If the application incurs shock loading, frequent reversing or high speed running, then high tensile bolts should be used, including one fitted bolt.

Bolt Torque:

The recommended torque wrench setting for bolts are as follows:

<table>
<thead>
<tr>
<th>Size</th>
<th>Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12</td>
<td>97 +/- 7</td>
</tr>
<tr>
<td>M14</td>
<td>160 +/- 21</td>
</tr>
<tr>
<td>M18</td>
<td>312 +/- 14</td>
</tr>
<tr>
<td>M20</td>
<td>407 +/- 14</td>
</tr>
<tr>
<td>M24</td>
<td>690 +/- 27</td>
</tr>
<tr>
<td>1/2&quot;  UNF</td>
<td>97 +/- 7</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>265 +/- 14</td>
</tr>
<tr>
<td>3/4&quot; bolts</td>
<td>393 +/- 14</td>
</tr>
<tr>
<td>1&quot;</td>
<td>810 +/- 27</td>
</tr>
</tbody>
</table>

Shaft Coupling:

Where the motor is solidly coupled to a shaft having independent bearings the shaft must be aligned to within 0.13mm TIR.
Installation Drawings HMB010 Motor

(See additional views for shaft types)

- 2 PORTS Ø20
- 8 HOLES TAPPED M10-1.5 PITCH X 23 THREAD DEPTH.
- Ø130
- Ø262 MAX
- 2 HOLES Ø20
- 8 HOLES TAPPED M10-1.5 PITCH X 20 THREAD DEPTH.
- MOUNTING FACE
- FLOW DIRECTION
- REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION
- C/L OF DRAINS Ø203.950
- Ø203.904
- 8 HOLES Ø14 EQU-SPACED AS SHOWN ON A P.C.D.
- 5 HOLES Ø14 EQU-SPACED AS SHOWN ON A 230.0 P.C.D.
- SPOTFACED TO Ø28. Ø0.15
- VIEW ON ARROW 'A'
- 3/8-BSP DRAIN (CHOICE OF 3 POSITIONS)
- 2 NORMALLY PLUGGED
- NOTE: ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR
- DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT
- 17 11.4 33 MAX
- Ø92
- 5 HOLES Ø14 EQUI-SPACED AS SHOWN ON A 230.0 P.C.D.
- SPOTFACED TO Ø28. Ø0.15
- VIEW ON ARROW 'A'

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Shaft Specification HMB010

SHAFT TYPE 'S'
13 SPLINES TO BS 3550-

SHAFT TYPE 'P'
CYLINDRICAL SHAFT WITH KEY

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Installation Drawings

HMB030 motor with rear entry ports (Mono block)
See additional views for side entry model and for shaft types

- Maximum dimensions:
  - Width: 276
  - Height: 260
  - Depth: 135
- Flow direction:
  - 83 A/F
- Mounting face:
  - ‘A’
- Reverse port connections:
  - For opposite direction of shaft rotation
- Drain connection:
  - 3/8 BSP x 19 deep, on installation ensure drain is connected to port above motor
- Additional views:
  - Side entry model
  - Shaft types

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HMB030 Motor
HMB030 motor with side entry ports (Mono block)
See view of rear entry motor for additional shaft types.

2 GROUPS OF 4 HOLES, SEE TABLE FOR THREAD SIZES

2 PORTS 055 TO SUIT SAE CODE 61, 1" NXM. SPLIT FLANGE.

PORT FLANGE BOLT TAPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>3/8&quot;-16 UNC-2B X 16 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM</td>
<td>M10 X P1.5 X 16 FULL THREAD DEPTH</td>
</tr>
</tbody>
</table>

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

2 PORTS Ø25 TO SUIT SAE CODE 61, 1" NXM. SPLIT FLANGE.

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

PORT FLANGE BOLT TAPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>3/8&quot;-16 UNC-2B X 16 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM</td>
<td>M10 X P1.5 X 16 FULL THREAD DEPTH</td>
</tr>
</tbody>
</table>

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

PORT FLANGE BOLT TAPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>3/8&quot;-16 UNC-2B X 16 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM</td>
<td>M10 X P1.5 X 16 FULL THREAD DEPTH</td>
</tr>
</tbody>
</table>

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

PORT FLANGE BOLT TAPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>3/8&quot;-16 UNC-2B X 16 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM</td>
<td>M10 X P1.5 X 16 FULL THREAD DEPTH</td>
</tr>
</tbody>
</table>

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

DRAIN CONNECTION 3/8 BSP X 19 DEEP, ON INSTALLATION ENSURE DRAIN IS CONNECTED TO PORT ABOVE MOTOR CENTRE LINE.

VIEW ON ARROW 'A'

5 HOLES Ø18 EQUI-Spaced AS SHOWN ON A 260.1 P.C.D. WITH Ø35 SPOTFACE.

VIEW ON ARROW 'A'

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PORT FLANGE BOLT TAPPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
<th>GAUGE CONNECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>7/16&quot;-14 UNC-2B X 27 FULL THREAD DEPTH</td>
<td>1/8&quot;-18 UNF-2B, SAE J475</td>
</tr>
<tr>
<td>FM3</td>
<td>M12 X P1.75 X 27 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
</tr>
</tbody>
</table>

PRESSURE GAUGE CONNECTION INTO EACH PORT SUPPLIED PLUGGED (SEE TABLE)

FLOW DIRECTION

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

MOUNTING FACE

Ø305 MAX

5 HOLES Ø18 EQUI-SPACED AS SHOWN ON A

P.C.D. SPOTFACED Ø35

NOTE: ENSURE INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR CENTRE LINE.

3/8" BSP X 17 FULL THREAD DRAIN (CHOICE OF 3 POSITIONS) [2 NORMALLY PLUGGED]
HMB30 Shaft Specification

Shaft Type "P" Parallel keyed shaft
Shaft Type "S" Involute spline, 17 teeth to BS3550
Shaft Type "Z" Involute spline, 17 teeth to DIN 5480

SHAFT TYPE 'S'
17 SPLINES TO BS 3550-1963

SHAFT TYPE 'Z'
17 SPLINES TO DIN 5480
FOR SHAFT TYPE 'Z'
DIN 5480, W55 X 3 X 17 X 7h

SHAFT TYPE 'P'
CYLINDRICAL SHAFT WITH KEY

SPLINE DATA
FOR SHAFT TYPE 'S'
TO BS 3550-1963 (ANSI B92.1,1970 CLASS 5)
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30°
NUMBER OF TEETH 17
PITCH 8/16
MAJOR DIAMETER 56.41/56.28
FORM DIAMETER 50.703
MINOR DIAMETER 50.07/49.60
PIN DIAMETER 6.096
DIAMETER OVER PINS 62.985/62.931

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Installation Drawings
HMB045-**-3* Motor with rear entry ports
HMB045-**-D-3* Motor with dual entry ports

SEE VIEWS FOR ADDITIONAL SHAFT TYPES

FLOW DIRECTION

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

DUAL ENTRY MODELS:
2 SIDE PORTS 1" BSP
x 25 DEEP: SPOTFACED
TO Ø63.

DRAIN CONNECTION 3/8 BSP x 19 DEEP
SPOTFACED TO Ø28. CHOICE OF TWO
POSITIONS.ONE NORMALLY PLUGGED.
ON INSTALLATION ENSURE DRAIN IS
CONNECTED TO PORT ABOVE MOTOR C/L

VIEW ON ARROW 'A'

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PORT FLANGE BOLT TAPPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
<th>GAUGE CONNECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>7/16&quot;-14 UNC-2B X 27 FULL THREAD DEPTH</td>
<td>9/16&quot;-18 UNF-2B, SAE J475</td>
</tr>
<tr>
<td>FM3</td>
<td>M12 X P1.75 X 27 FULL THREAD DEPTH</td>
<td>G1/4 (BSPF)</td>
</tr>
</tbody>
</table>

PRESSURE GAUGE CONNECTION INTO EACH PORT SUPPLIED PLUGGED (SEE TABLE)

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

3/4" UNF-2B DRAIN (CHOICE OF 3 POSITIONS) (2 NORMALLY PLUGGED)

NOTE:
ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR, C/L
DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT

5 HOLES Ø18 EQUIS-SPACED AS SHOWN ON A 804.8
P.C.D. SPOTFACED Ø38

VIEW ON ARROW 'A'
Motors Industrial Products

B045 Shaft Specification

Shaft type “P”, Parallel keyed shaft
Shaft type “S”, Involute spline, 17 teeth to BS3550
Shaft type “Z”, Involute spline to DIN 5480
Shaft type “Q”, Internal Involute spline, 21 teeth to BS 3550

B045 SHAFT VARIATIONS

SHAFT TYPE ‘P’
Cylindrical shaft with key

SHAFT TYPE ‘S’
17 splines to BS 3550-1963

SHAFT TYPE ‘Z’
17 splines to DIN 5480

SHAFT TYPE ‘Q’
Female shaft with 21 splines to BS 3550

SPLINE DATA

For shaft type ‘S’

BS 3550-1963 & ANSI B92.1,1970
Flat root side fit, Class 1
Pressure angle, 30°
Number of teeth, 17
Pitch, 8/16
Major diameter, 56.41/56.28
Form diameter, 50.703
Minor diameter, 50.07/49.60
Pin diameter, 6.096
Diameter over pins, 62.985/62.931

For shaft type ‘Z’

DIN 5480, W55 X 3 X 17 X 7h

Form diameter, 50.703

SPLINE DATA

INTERNAL SPLINE TO BS 3550-1963
Flat root side fit
Pressure angle, 30°
Number of teeth, 21
Pitch, 12/24
Major diameter, 46.566/46.896
Form diameter, 46.144
Minor diameter, 42.334/42.461
Pin diameter, 3.658
Pin flattened to, 3.556
Dimension between pins, 39.169/39.103

Key (supplied):
14.046/14.028 wide
9.04/8.99 1 inch

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HMB030/HMB045 Valve Housings

3" VALVE HOUSING WITH 6-BOLT FLANGE, 'S03'
SUPPLIED WITH 2 'O' RING SEALS

2 PORTS Ø28
PORT 1
= =
PORT 2
= =
6 HOLES 3/8"-24
UNF-2B 16 DEEP.

256 (285 ON HMB045)

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION
FLOW DIRECTION

331 (360 ON HMB045)

Model
Staffa

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Issue 03/00
HMB030/HMB045 Valve Housings (continued)

1" SAE 4-BOLT FLANGE, 'F2'/FM2'

Ø1" CODE 61 SAE PORTS (2 POSITIONS)

4 HOLES (2 POSITIONS) SEE TABLE FOR BOLT TAPPINGS

PORT FLANGE BOLT TAPPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2</td>
<td>3/8&quot;-16 UNC-2B X 22 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM2</td>
<td>M10 X P1.5 X 22 FULL THREAD DEPTH</td>
</tr>
</tbody>
</table>

FLOW DIRECTIONS FOR SHAFT ROTATION SHOWN, REVERSE FLOW DIRECTIONS FOR OPPOSITE ROTATION

26.2

254 (284 ON HMB045)

294 (323 ON HMB045)

294

MOUNTING FACE

Model
Staffa

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40.70

Data Sheet
M-1001/03.00
Installation Drawings

HMB060/80 motors with type "F3"/"FM3" (1\1/4" SAE) port connection

See additional views for shaft types and for types "S03" and "S04" port connection. See drawing of dual-mount model for details of types "F2" and FM2" port connection.

<table>
<thead>
<tr>
<th>MODEL CODE</th>
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<tbody>
<tr>
<td>F3</td>
<td>7/16&quot;-14 UNC-2B X 27 FULL THREAD DEPTH</td>
<td>9/16&quot;-18 UNF-2B, SAE J475</td>
</tr>
<tr>
<td>FM3</td>
<td>M12 X P1.75 X 27 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
</tr>
</tbody>
</table>

3/4"-16UNF-2B DRAIN (CHOICE OF 3 POSITIONS)
(2 NORMALLY PLUGGED)

NOTE:
ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR C/L
DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT

5 HOLES Ø30 EQUI-SPACED AS SHOWN ON A [327.03] P.C.D.
SPOTFACED TO EFFECTIVE Ø40.

Model
Staffa

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41.70

Data Sheet
M-1001/03.00
HMB060/080/100 Shaft Specification

**SHAFT TYPES 'P' & 'HP'**

**CYLINDRICAL SHAFT WITH KEY**

**KEY (SUPPLIED):**
- 18.037/18.019 WIDE
- 11.99/11.94 THICK

**SHAFT TYPE 'P'**
- 1/2"-20 UNF-2B X 32 FULL THREAD DEPTH

**SHAFT TYPE 'HP'**
- Ø26.2 HOLE THROUGH MOTOR

**SHAFT TYPE 'X'**

**SHORT TAPER WITH KEY**

**KEYWAY SIZE:** 19.05/19.02 WIDE X 10.92/10.77 DEEP

**KEY SIZE (KEY SUPPLIED):** 19.10/19.05 SQ

**CLAMP PLATE & 3 BOLTS**
- SUPPLIED M12 X P1.75P X 30 LONG HEX.
- 19 A/F
- (3 HOLES IN SHAFT END EQUIL. SPACED ON A 30.0 P.C.D. TAPPED TO 23 MIN FULL THREAD DEPTH

**SHAFT TYPE 'T'**

**LONG TAPER WITH KEY**

**KEY SIZE (KEY SUPPLIED):** 19.10/19.05 SQ

**BASIC TAPER, ON DIAMETER**
- 0.100/0.0999 PER mm
HMB060/080/100 Shaft Specification (continued)

SHAFT TYPES 'S' & 'HS'
14 SPLINES TO BS 3550-1963

SHAFT TYPES 'Z' & 'HZ'
22 SPLINES TO DIN 5480

SHAFT TYPES 'S' & 'Z'
1/2"-20 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPES 'HS' & 'HZ'
Ø26.2 HOLE THROUGH MOTOR

SHAFT TYPE 'Q' & 'HQ'
FEMALE SHAFT WITH 24 SPLINES TO BS 3550

SPLINE DATA

FOR SHAFT TYPES 'S' & 'HS'
TO BS 3550/ANSI B92.1 1970 CLASS 5
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE
30°
NUMBER OF TEETH
14
PITCH
6/12
MAJOR DIAMETER
62.553/62.425
FORM DIAMETER
55.052
MINOR DIAMETER
54.084/53.525
PIN DIAMETER
8.128
DIAMETER OVER PINS
71.593/71.544

FOR SHAFT TYPES 'Z' & 'HZ'
DIN 5480 W70 X 3 X 30 X 22 X 7h

SPLINE DATA

FOR SHAFT TYPES 'S' & 'HS'
TO BS 3550/ANSI B92.1 1970 CLASS 5
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE
30°
NUMBER OF TEETH
14
PITCH
6/12
MAJOR DIAMETER
62.553/62.425
FORM DIAMETER
55.052
MINOR DIAMETER
54.084/53.525
PIN DIAMETER
8.128
DIAMETER OVER PINS
71.593/71.544

FOR SHAFT TYPES 'Z' & 'HZ'
DIN 5480 W70 X 3 X 30 X 22 X 7h

SPLINE DATA

FOR SHAFT TYPES 'S' & 'HS'
TO BS 3550/ANSI B92.1 1970 CLASS 5
FLAT ROOT SIDE FIT, MODIFIED
PRESSURE ANGLE
30°
NUMBER OF TEETH
24
PITCH
12/24
MAJOR DIAMETER
53.246/52.916
MINOR DIAMETER
48.811/48.684
PIN DIAMETER
3.658
PIN FLATTED TO
3.560
DIAMETER BETWEEN PINS
45.626/45.550
Installation Drawings
HMB125 Motor with type "F3"/FM3 (1 1/4" SAE) Port Connection

SEE VIEWS FOR SHAFT TYPES & "F2","FM2","S03","S04","F4" & "FM4" PORT CONNECTION.

PORT FLANGE BOLT TAPINGS

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<tr>
<td>FM3</td>
<td>M12 X P1.75 X 27 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
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</table>

PRESSURE GAUGE CONNECTION INTO EACH PORT SUPPLIED PLUGGED (SEE TABLE)

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

FLOW DIRECTION

5 HOLES Ø20 EQUISPACED AS SHOWN ON A P.C.D. SPOTFACED TO GIVE AN EFFECTIVE Ø40.

NOTE:-
ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR C/L DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT

Model       Page      Data Sheet
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Issue 03/00
## Installation Drawings

**HDB125 Motor with type "F3"/FM3 (1 1/4" SAE) Port Connection**

SEE VIEWS FOR SHAFT TYPES & 'F2','FM2','S03','S04' & 'FM4' PORT CONNECTION.

### PORT FLANGE BOLT TAPPINGS

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<td>M12 X P1.75 X 27 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
</tr>
</tbody>
</table>

### MOUNTING FACE

- Ø473 MAX
- Ø380.95
- Ø380.87

### FLOW DIRECTION

- VIEW ON ARROW 'A'
- 30.2° = 58.7° = 58.7° = 58.7° = 58.7° = 58.7° = 58.7° = 58.7°
- 46.5° = 37° = 37° = 37°
- 69° = 32° = 32° = 32°
- 3/4"-16UNF-2B DRAIN (CHOICE OF 3 POSITIONS) (2 NORMALLY PLUGGED)

### PRESSURE GAUGE CONNECTIONS

- INTO EACH PORT SUPPLIED PLUGGED (SEE TABLE)

### REVERSE PORT CONNECTIONS

FOR OPPOSITE DIRECTION OF SHAFT ROTATION

- 8 HOLES, SEE TABLE FOR THREAD SIZES

### 5 HOLES Ø20 EQUI-SPACED AS SHOWN ON A 419.1 P.C.D.

### NOTE:

ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR C/L.
DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT.
Motor HMB125 Shaft Specification

**SHAFT TYPES 'S3' & 'HS3'**
20 SPLINES TO BS 3550-1963

**SHAFT TYPES 'S4' & 'HS4'**
16 INVOLUTE FORM SPLINES

**SHAFT TYPES 'Z3' & 'HZ3'**
27 SPLINES TO DIN 5480

SHAFT TYPES 'S3','S4' & 'Z3'
3/4"-16 UNF-2B X 32 FULL THREAD DEPTH

SHAFT TYPES 'HS3','HS4' & 'HZ3'
Ø26.2 HOLE THROUGH MOTOR

### SPLINE DATA

**FOR SHAFT TYPES 'S3' & 'HS3'**
TO BS 3550-1963 & ANSI B92.1, 1970
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30°
NUMBER OF TEETH 20
MAJOR DIAMETER 87.953/87.825
FORM DIAMETER 80.264
MINOR DIAMETER 79.485/79.925
PIN DIAMETER 8.128
DIAMETER OVER PINS 97.084/97.030

**FOR SHAFT TYPES 'Z3' & 'HZ3'**
DIN 5480 W85 X 3 X 27 X 7H

### SPLINE DATA

**FOR SHAFT TYPES 'S4' & 'HS4'**
INVOLUTE GEAR TOOTH FORM
PRESSURE ANGLE 20°
NUMBER OF TEETH 16
MAJOR DIAMETER 86.360/86.233
FORM DIAMETER 76.124
MINOR DIAMETER 74.93/72.39
PIN DIAMETER 8.636
DIAMETER OVER PINS 92.710/92.581

**FOR SHAFT TYPES 'T'**
LONG TAPER WITH KEY
KEY (SUPPLIED)
22.27/22.22 WIDE
15.92/15.87 THICK

**FOR SHAFT TYPES 'P1' & 'HP1'**
CYLINDRICAL SHAFT WITH KEY
KEY (SUPPLIED)
24.066/24.000 WIDE
15.92/15.87 THICK

**BASIC TAPER, ON DIAMETER**
0.1001/0.0999 PER mm

---

Model  | Page  | Data Sheet
--- | --- | ---
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Motor HDB125 Shaft Specification

SHAFT TYPES 'S5' & 'HS5'
23 SPLINES TO BS 3550-1963

SHAFT TYPE 'S5'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HS5'
Ø26.2 HOLE THROUGH MOTOR

SHAFT TYPES 'S3' & 'HS3'
20 SPLINES TO BS 3550-1963

SHAFT TYPE 'S3'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HS3'
Ø26.2 HOLE THROUGH MOTOR

SHAFT TYPES 'Z5' & 'HZ5'
24 SPLINES TO DIN 5480

SHAFT TYPE 'Z5'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HZ5'
Ø26.2 HOLE THROUGH MOTOR

Model
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Data Sheet
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Motor HDB125 Shaft Specification (continued)

SHAFT TYPES 'P1' & 'HP1'
CYLINDRICAL SHAFT WITH KEY

KEY (SUPPLIED):
24.966/24.000 WIDE
16.05/16.00 THICK

SHAFT TYPE 'P1'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

MOUNTING FACE
130.2
3

SHAFT TYPE 'HP1'
Ø26.2 HOLE THROUGH MOTOR

SPLINE DATA
TO BS 3550-1963 & ASA.B5.15-1960
FLAT ROOT SIDE FIT,
PRESSURE ANGLE 30°
NUMBER OF TEETH 34
PITCH 12.0/24
MAJOR DIAMETER 74.414/74.084
MINOR DIAMETER 69.977/69.850
PIN DIAMETER 3.658
PIN FLATTED TO 3.556
DIAMETER BETWEEN PINS 66.815/66.744

SHAFT TYPES 'P2' & 'HP2'
CYLINDRICAL SHAFT WITH KEY

KEY (SUPPLIED):
24.966/24.000 WIDE
16.05/16.00 THICK

SHAFT TYPE 'P2'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

MOUNTING FACE
196.4
194.8

SHAFT TYPE 'P1'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

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Staffa
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Motor HDB125 Shaft Specification (continued)

### SHAFT TYPE 'X' & 'HX'

#### SHORT TAPER WITH KEY

- **KEY SIZE (KEY SUPPLIED)**
  - 25.48/26.43 WIDE
  - 17.539/17.462 THICK

- **NUT 29 THICK 98.4 A/F**

- **SHAFT TYPE 'HX'**
  - Ø26.2 HOLE THROUGH MOTOR
  - BASIC TAPER, ON DIAMETER
  - 0.1001/0.0999 PER mm

### SHAFT TYPE 'T'

#### LONG TAPER WITH KEY

- **KEY SIZE (KEY SUPPLIED)**
  - 22.27/22.22 WIDE
  - 15.92/15.87 THICK

- **SLOTTED NUT 45.2 THICK, 57.15 A/F**

- **1 1/2"-12 UNF THREAD**

- **BASIC TAPER, ON DIAMETER**
  - 0.1001/0.0999 PER mm
Motor HMB125/HDB125 Valve Housings

3" VALVE HOUSING WITH 6-BOLT FLANGE, 'S03' SUPPLIED WITH 2 'O' RING SEALS

4" VALVE HOUSING WITH 1 1/2" SAE 4-BOLT FLANGES, 'F4'/FM4' IN MODEL CODE POSITION

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

FLOW DIRECTION

PORT FLANGE BOLT TAPPINGS

<table>
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<tr>
<th>MODEL CODE</th>
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<tbody>
<tr>
<td>F4</td>
<td>5/8&quot;-11 UNC-2B X 35 FULL THREAD DEPTH</td>
<td>9/16&quot;-18 UNF-2B, SAE J475</td>
</tr>
<tr>
<td>FM4</td>
<td>M16 X P2 X 35 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPP)</td>
</tr>
</tbody>
</table>

Kawasaki
Hydraulic Products

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Motor HMB125/HDB125 Valve Housings (continued)

4" VALVE HOUSING WITH 6-BOLT FLANGE, 'S04'
SUPPLIED WITH 2 "O" RING SEALS

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

FLOW DIRECTION

PORT FLANGE BOLT TAPPINGS

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<td>F2</td>
<td>3/8&quot;-16 UNC.2B X 22 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM2</td>
<td>M10 X P1.5 X 22 FULL THREAD DEPTH</td>
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</tbody>
</table>

2 1/4" VALVE HOUSING WITH 1" SAE 4-BOLT FLANGES,
F2/FM2

FLOW DIRECTIONS
FOR SHAFT ROTATION
SHOWN. REVERSE FLOW
DIRECTIONS FOR
OPPOSITE ROTATION

MOUNTING FACE

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Issue 03/00
HMB150/200 Motors with type "F4"/"FM4" (1 1/2" SAE) port connection

See additional views for shaft types and for types "S04", "F3", "FM3" and "S03" port connection

PORT FLANGE BOLT TAPPINGS

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<td>M16 X P2.0 X 35 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
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</table>

PORT规格和螺栓规格

01 1/2" SAE (CODE 62) PORTS (600 SERIES)

FLOW DIRECTION

MOUNTING FACE

Ø473 MAX

Ø380.95

78.0

70.0

36.5

79.4

25

32 MAX

442 D/A

65.0 D/A

100

216.4

96 O/DIA

79.4

Ø254

3/4"-16 UNF-2B DRAIN

(CHOICE OF 3 POSITIONS)

(2 NORMALLY PLUGGED)

NOTE:
ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR C/L
DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT

5 HOLES Ø20 EQUI-SPACED AS SHOWN ON A P.C.D. SPOTFACED TO GIVE AN EFFECTIVE Ø40.

VIEW ON ARROW 'A'

5 HOLES Ø20 EQUI-SPACED AS SHOWN ON A P.C.D. SPOTFACED TO GIVE AN EFFECTIVE Ø40.

5 HOLES Ø20 EQUI-SPACED AS SHOWN ON A P.C.D. SPOTFACED TO GIVE AN EFFECTIVE Ø40.

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Installation Drawings
HMHDB 150/200 Motors with type "F4"/...(1 1/2" SAE) Port Connection

PORT FLANGE BOLT TAPINGS

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PORT FLANGE BOLT TAPINGS

PRESSURE GAUGE CONNECTION INTO EACH PORT SUPPLIED PLUGGED (SEE TABLE)

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

FLOW DIRECTION

VIEW ON ARROW 'A'

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Kawasaki
Hydraulic Products
HMB150 Shaft Specification

SHAFT TYPES 'S3' & 'HS3'
20 SPLINES TO BS 3550-1963

SHAFT TYPES 'S4' & 'HS4'
16 INVOLUTE FORM SPLINES

SHAFT TYPES 'Z3' & 'HZ3'
27 SPLINES TO DIN 5480

SHAFT TYPES 'S3', 'S4' & 'Z3'
3/4"-16 UNF-2B X 32 FULL THREAD DEPTH

SHAFT TYPES 'HS3', 'HS4' & 'HZ3'
Ø26.2 HOLE THROUGH MOTOR

SPLINE DATA
FOR SHAFT TYPES 'S3' & 'HS3'
TO BS 3550-1963 & ANSI B92.1, 1970
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30°
NUMBER OF TEETH 20
PITCH 6.12
MAJOR DIAMETER 87.953/87.825
FORM DIAMETER 80.264
MINOR DIAMETER 79.485/79.925
PIN DIAMETER 8.128
DIAMETER OVER PINS 97.084/97.030

FOR SHAFT TYPES 'Z3' & 'HZ3'
DIN 5480 W85 X 3 X 27 X 7H

PRESSURE ANGLE 20°
NUMBER OF TEETH 16
PITCH 5.10
MAJOR DIAMETER 86.360/86.233
FORM DIAMETER 76.124
MINOR DIAMETER 74.93/72.39
PIN DIAMETER 8.636
DIAMETER OVER PINS 92.710/92.581

SPLINE DATA
FOR SHAFT TYPES 'S4' & 'HS4'
INVOLUTE GEAR TOOTH FORM

SHAFT TYPES 'P1' & 'HP1'
CYLINDRICAL SHAFT WITH KEY

SHAFT TYPE 'P1'
3/4"-16 UNF-2B X 32 FULL THREAD DEPTH

SHAFT TYPE 'HP1'
Ø26.2 HOLE THROUGH MOTOR

KEY (SUPPLIED)
24.051/24.000 WIDE
16.05/16.00 THICK

SPLINE DATA
FOR SHAFT TYPES 'S4' & 'HS4'
INVOLUTE GEAR TOOTH FORM

Kawasaki
Hydraulic Products

Model
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HDB 150/200 Shaft Specifications

SHAFT TYPES 'S5' & 'HS5'
23 SPLINES TO BS 3550-1963

- SHAFT TYPE 'S5'
  3/4"-16 UNF-2B X 32
  FULL THREAD DEPTH

- SHAFT TYPE 'HS5'
  Ø26.2 HOLE THROUGH MOTOR

SHAFT TYPES 'S3' & 'HS3'
20 SPLINES TO BS 3550-1963

- SHAFT TYPE 'S3'
  3/4"-16 UNF-2B X 32
  FULL THREAD DEPTH

- SHAFT TYPE 'HS3'
  Ø26.2 HOLE THROUGH MOTOR

SHAFT TYPES 'Z5' & 'HZ5'
24 SPLINES TO DIN 5480

- SHAFT TYPE 'Z5'
  3/4"-16 UNF-2B X 32
  FULL THREAD DEPTH

- SHAFT TYPE 'HZ5'
  Ø26.2 HOLE THROUGH MOTOR

SPLINE DATA
FOR SHAFT TYPES 'S5' & 'HS5'
TO BS 3550-1963 & ASA,B5.15-1960
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30°
NUMBER OF TEETH 23
PITCH 6/12
MAJOR DIAMETER 100.652/100.526
FORM DIAMETER 92.939
MINOR DIAMETER 92.184/91.626
PIN DIAMETER 8.128
DIAMETER OVER PINS 109.573/109.517

SPLINE DATA
FOR SHAFT TYPES 'S3' & 'HS3'
TO BS 3550-1963 & ASA,B5.15-1960
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30°
NUMBER OF TEETH 20
PITCH 6/12
MAJOR DIAMETER 87.953/87.825
FORM DIAMETER 80.264
MINOR DIAMETER 79.485/78.925
PIN DIAMETER 8.128
DIAMETER OVER PINS 97.084/97.030

SPLINE DATA
FOR SHAFT TYPES 'Z5' & 'HZ5'
TO BS 5480
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30°
NUMBER OF TEETH 24
PITCH 6/12
MAJOR DIAMETER 100.652/100.526
FORM DIAMETER 92.939
MINOR DIAMETER 92.184/91.626
PIN DIAMETER 8.128
DIAMETER OVER PINS 109.573/109.517

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Issue 03/00
HDB 150/200 Shaft Specifications (continued)

SHAFT TYPE ‘Q’ & ‘HQ’
FEMALE SHAFT WITH 34 SPLINES TO BS 3550

SPLINE DATA

TO BS 3550-1963 & ASA,B5.15-1960
FLAT ROOT SIDE FIT,
PRESSURE ANGLE
NUMBER OF TEETH 34
PITCH 12/24
MAJOR DIAMETER 74.414/74.084
MINOR DIAMETER 69.977/69.850
PIN DIAMETER 3.658
PIN FLATTED TO 3.556
DIAMETER BETWEEN PINS 66.815/66.744

SHAFT TYPE ‘P2’ & ‘HP2’
CYLINDRICAL SHAFT WITH KEY

KEY (SUPPLIED):
24.066/24.000 WIDE
16.05/16.00 THICK

SHAFT TYPE ‘P2’
3/4”-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE ‘HP2’
Ø26.2 HOLE THROUGH MOTOR
Ø76.7876.66
92.0291.95

MOUNTING FACE
7.1 41 118.6

SHOFT TYPE HQ
HOLE THROUGH MOTOR Ø26.2
Ø76.78 76.66
65.0 63.5

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Kawasaki
Hydraulic Products

Issue 03/00
HDB 150/200 Shaft Specifications (continued)

SHAFT TYPE ‘X’ & ‘HX’
SHORT TAPER WITH KEY

KEY SIZE (KEY SUPPLIED)
25.48/26.43 WIDE
17.539/17.462 THICK

SHAFT TYPE ‘HX’
Ø26.2 HOLE THROUGH MOTOR
BASIC TAPER, ON DIAMETER
0.1001/0.0999 PER mm

NUT 29 THICK 98.4 A/F

DATUM
Ø98.044

MOUNTING FACE
73.00
71.88
124
35
2 1/2"-16 UN

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HMB150/200 Valve Housings

3" Valve Housing with 6-Bolt Flange, "S03"

3" VALVE HOUSING WITH 6-BOLT FLANGE, 'S03'
SUPPLIED WITH 2 '0' RING SEALS

3" VALVE HOUSING WITH 1 1/4" SAE 4-BOLT FLANGES, 'F3'/FM3'
IN MODEL CODE POSITION 4

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION OF SHAFT ROTATION

PORT FLANGE BOLT TAPPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
<th>GAUGE CONNECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>7/16&quot;-14 UNC-2B X 27 FULL THREAD DEPTH</td>
<td>9/16&quot;-18 UNF-2B, SAE J475</td>
</tr>
<tr>
<td>FM3</td>
<td>M12 X R1.75 X 27 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
</tr>
</tbody>
</table>

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION OF SHAFT ROTATION
HMB150/HMB200 Valve Housings (continued)

4" Valve Housing with 6-Bolt Flange, "S04"

4" VALVE HOUSING WITH 6-BOLT FLANGE, 'S04'
SUPPLIED WITH 2 'O' RING SEALS

2 PORTS Ø32

6 HOLES 3/8"-24
UNF-2B X 16 DEEP

REVERSE PORT CONNECTIONS
FOR OPPOSITE DIRECTION
OF SHAFT ROTATION

FLOW DIRECTION

MOUNTING FACE

Ø254

2 1/4" VALVE HOUSING WITH 1" SAE 4-BOLT FLANGES,
F2/FM2

Ø1" CODE 61 SAE PORTS
(2 POSITIONS)

4 HOLES (2 POSITIONS) SEE
TABLE FOR BOLT TAPPINGS

FLOW DIRECTIONS
FOR SHAFT ROTATION
SHOWN. REVERSE FLOW
DIRECTIONS FOR
OPPOSITE ROTATION

PORT FLANGE BOLT TAPPINGS

<table>
<thead>
<tr>
<th>MODEL CODE</th>
<th>TAPPING SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2</td>
<td>3/8&quot;-16 UNC-2B X 22 FULL THREAD DEPTH</td>
</tr>
<tr>
<td>FM2</td>
<td>M10 X P1.5 X 22 FULL THREAD DEPTH</td>
</tr>
</tbody>
</table>

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Installation Drawings

HMB270 Motor with Type F4/FM4 (1 1/2 SAE) Port Connection (HMHDB270 Dimensions in brackets)

NOTE: -
ENSURE INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR C/L
DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT OF DRAINS

8 HOLES, SEE TABLE FOR THREAD SIZES

PRESSURE GAUGE CONNECTION INTO EACH PORT, SUPPLIED PLUGGED (SEE TABLE)

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

VIEW ON ARROW 'A'

7 HOLES Ø20mm EQUI-SPACED AS SHOWN ON 'A' P.C.DIA.
SPOTFACED TO GIVE EFFECTIVE Ø40

SEE ADDITIONAL VIEWS FOR SHAFT TYPES & 'SO4' PORT CONNECTION.

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Installation Drawings

HMDB 325 Motor with Type F4/FM4 (1½" SAE) Port Connection HM325 (Dimensions in Brackets)

8 HOLES, SEE TABLE FOR THREAD SIZES

PORT FLANGE BOLT TAPPINGS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>TAPPING SIZE</th>
<th>GAUGE CONNECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>F4</td>
<td>5/8&quot;-11 UNC-2B X 35 FULL THREAD DEPTH</td>
<td>9/16&quot;-18 UNF-2B, SAE J475</td>
</tr>
<tr>
<td>FM4</td>
<td>M16 X P2.0 X 35 FULL THREAD DEPTH</td>
<td>G1/4&quot; (BSPF)</td>
</tr>
</tbody>
</table>

PRESSURE GAUGE CONNECTION INTO EACH PORT, SUPPLIED PLUGGED (SEE TABLE)

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

SEE ADDITIONAL VIEWS FOR SHAFT TYPES & 'SO4' PORT CONNECTION.

FLOW DIRECTON

3/4"-16 UNF-2B DRAIN (CHOICE OF 3 POSITIONS)

NOTE: ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR C/L. DO NOT EXCEED 12 DEPTH OF COUPLING INTO DRAIN PORT.

7 HOLES Ø20mm EQUISPCED AS SHOWN ON A P.C.DIA. SPOTFACED TO GIVE EFFECTIVE Ø40

MOUNTING FACE

OF DRAINS

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Issue 03/00
HMB270/325 Shaft Specification

SHAFT TYPES 'S3' & 'HS3'
20 SPLINES TO BS 3550-1963

SHAFT TYPES 'Z' & 'HZ'
24 SPLINES TO DIN 5480

SPLINE DATA
FOR SHAFT TYPES 'S3' & 'HS3'
TO BS 3550-1963 (ANSI B92.1,1970 CLASS 5)
FLAT ROOT SIDE FIT, CLASS 1
PRESSURE ANGLE 30 °
NUMBER OF TEETH 20
PITCH 6/12
MAJOR DIAMETER 87.953/87.825
FORM DIAMETER 80.264
MINOR DIAMETER 79.485/78.925
PIN DIAMETER 8.128
DIAMETER OVER PINS 97.064/97.030

FOR SHAFT TYPES 'Z' & 'HZ'
DIN 5480, W100 X 4 X 24 X 7h

SHAFT TYPE 'Q' & 'HQ'
FEMALE SHAFT WITH 34 SPLINES TO BS 3550

SPLINE DATA
TO BS 3550-1963
FLAT ROOT SIDE FIT
PRESSURE ANGLE 30 °
NUMBER OF TEETH 34
PITCH 12/24
MAJOR DIAMETER 74.414/74.084
MINOR DIAMETER 69.977/69.850
PIN DIAMETER 3.556
PIN FLATTED TO 3.556
DIMENSION BETWEEN PINS 66.815/66.744
HMB270/325 Shaft Specification (continued)

SHAFT TYPES 'P1' & 'HP1'
CYLINDRICAL SHAFT WITH KEY

KEY (SUPPLIED):
24.066/24.000 WIDE
16.05/16.00 THICK

SHAFT TYPE 'P1'
3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HP1'
Ø26.2 HOLE THROUGH MOTOR

KEY (SUPPLIED):
24.066/24.000 WIDE
16.05/16.00 THICK

SHAFT TYPE 'T'
LONG TAPER WITH KEY

KEY (SUPPLIED):
25.45/25.40 WIDE
17.539/17.463 THICK

BASIC TAPER, ON DIAMETER
0.1001/0.0999 PER mm

SHAFT TYPE 'X'
SHORT TAPER WITH 2 KEYS

KEY SIZE (2 KEYS SUPPLIED):
25.48/25.43 WIDE
17.539/17.462 THICK

BASIC TAPER, ON DIAMETER
0.1001/0.0999 PER mm
SHAFT TYPES 'Z' & 'HZ'

24 SPLINES TO DIN 5480

SHAFT TYPE 'Z'

3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HZ'

Ø26.2 HOLE THROUGH MOTOR

SPLINE DATA

SPLINES TO DIN 5480
W100 X 4 X 24 X 7h

FOR SHAFT TYPES 'S5' & 'HS5'

TO BS 3550-1963 (ANSI B92.1, 1970 CLASS 5)

FLAT ROOT SIDE FIT, CLASS 1

PRESSURE ANGLE
30°

NUMBER OF TEETH
23

PITCH
6/12

MAJOR DIAMETER
100.653/100.526

FORM DIAMETER
92.939

MINOR DIAMETER
92.184/91.625

PIN DIAMETER
8.126

DIAMETER OVER PINS
109.573/109.517

SHAFT TYPES 'S5' & 'HS5'

23 SPLINES TO BS 3550-1963

SHAFT TYPE 'S5'

3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HS5'

Ø26.2 HOLE THROUGH MOTOR

SHAFT TYPES 'P2' & 'HP2'

CYLINDRICAL SHAFT WITH KEY

SHAFT TYPE 'P2'

3/4"-16 UNF-2B X 32
FULL THREAD DEPTH

SHAFT TYPE 'HP2'

Ø26.2 HOLE THROUGH MOTOR

SPLINE DATA

SPLINES TO BS 5769, PART 1
W20 X 4 X 24 X 7h

KEY SIZE (2 KEYS SUPPLIED):
25.48/25.43 WIDE
17.539/17.462 THICK

KEY (SUPPLIED):
24.066/24.000 WIDE
16.05/16.00 THICK

BASIC TAPER, ON DIAMETER
0.1001/0.0999 PER mm

NUT 29 THICK 98.4 A/F

2 1/2"-16 UN

204.1

205.7
**HMHDB270/325 Valve Housings**

4" Valve Housing with 6-Bolt Flange, "S04"

SUPPLIED WITH 2 'O' RING SEALS

FLOW DIRECTION

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION
HMHDB400 Motor with 6-Bolt (UNF) Flange or SAE 2", 4-Bolt (UNF) Flanges

See Views for Shaft Types & "SO45" Port Connection.

Port A & C will accept SAE Code 61 2" Split Flanges

6 Holes 1/2"-20 UNF-2B x 28 Full Thread Depth

1 1/4" BSPT, Internally Connected to Port B and Supplied Plugged

2 Drain Ports (1 Normally Plugged) 3/4"-16 UNF-2B Spotfaced to Ø38

5 Holes Ø20 Equi-Spaced as Shown on A 419.1 PCD and Spotfaced to Ø38

Reverse Port Connections for Opposite Direction of Shaft Rotation

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Kawasaki Hydraulic Products
HMHDB400 Shaft Specification

SHAFT TYPE 'P'
CYLINDRICAL SHAFT WITH 2 KEYS

SHAFT TYPE 'Q'
FEMALE SHAFT WITH 31 SPLINES TO BS 3550

SHAFT TYPE 'S'
23 SPLINES TO BS 3550-1963 (ANSI B92.1, 1970 CLASS 5)
FLAT ROOT SIDE FIT CLASS 1,
PRESSURE ANGLE
NUMBER OF TEETH
PITCH
MAJOR DIAMETER
FORM DIAMETER
MINOR DIAMETER
PIN DIAMETER
DIAMETER OVER PINS

SHAFT TYPE 'Z'
24 SPLINES TO DIN 5480

SHAFT TYPE 'X'
SHORT TAPER WITH KEY

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HMHDB400 Valve Housings
Dual Port, 6-Bolt HDB400 Valve Housing

DUAL PORT, 6-BOLT FLANGE CONNECTION, 'SO45'

2 CONNECTION FACES, EACH WITH 6 HOLES 1/2"-20 UNF-2B X 32 FULL THREAD DEPTH

4 PORTS Ø38

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION
Installation Drawings
HMB700 Motor with 2 SAE (Code 62) Port Flanges

SEE VIEWS FOR ADDITIONAL SHAFT TYPES.

REVERSE PORT CONNECTIONS FOR OPPOSITE DIRECTION OF SHAFT ROTATION

1/4" BSP PRESSURE TAPPING ONE EACH SIDE (SUPPLIED PLUGGED)

3/4" BSP DRAIN, Ø45 SPOTFACE (CHOICE OF 3 POSITIONS) (2 NORMALLY PLUGGED) ENSURE ON INSTALLATION DRAIN IS TAKEN FROM ABOVE MOTOR CENTRE LINE

VIEW ON ARROW 'A'

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HMB700 Shaft Specification

SHAFT TYPE 'Z'
28 SPLINES TO DIN 5480.

SHAFT TYPE 'P'
CYLINDRICAL SHAFT WITH 2 KEYS.

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Web site: http://www.kpm-uk.co.uk

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