Staffa Dual Displacement Hydraulic Motor
1. GENERAL DESCRIPTION

Kawasaki “Staffa” high torque, low speed radial piston motors use hydrostatic balancing techniques to achieve high efficiency, combined with good breakout torque and smooth running capability.

The HMC series dual displacement models have two pre-set displacements which can be chosen from a wide range to suit specific application requirements. The displacements are hydraulically selected by a directional control valve which can be remote from, or mounted directly on, the motor. Displacements can be changed when the motor is running.

The range of HMC motors extends from the HMC010 of 202 cm³ (12.3 in³) to the HMC325 of 5330 cm³ (325 in³) displacement.

These motors are also available in a continuously variable version using either hydro-mechanical or electro-hydraulic control methods.

Other mounting options are available on request to match many of the competitor interfaces.

The HMC030 is one of 8 frame sizes and is capable of developing torques up to 1720 Nm (1270 lbf ft) with a continuous output power of 60 kW (80 hp).

The Kawasaki “Staffa” range also includes fixed displacement motors, plus matching brakes and gearboxes to extend the torque range.

2. FUNCTIONAL SYMBOLS

All model types with variants in model code positions 3 & 7.
3. MODEL CODE

Features shown in brackets ( ) may be left blank according to requirements. All other features must be specified.

(F**) - HM(*) - C030.**.***.***-**(T*)-30-(PL**)  

<p>| | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 1 | FLUID TYPE                  | Blank = Petroleum oil  
F3 = Phosphate ester (HFD fluid)  
F11 = Water-based fluids (HFA, HFB and HFC)

2 | MODEL TYPE                  | Blank = Standard (“HMC”)  
M = To NCB (UK) specification 463/1981 (“HMMC”)

3 | SHAFT TYPE                  | P* = Cylindrical shaft with parallel key  
S* = Cylindrical, 17 splines to BS 3550  
Z* = Cylindrical shaft to DIN 5480 (W55 x 3 x 7h)  
  
* For installations where shaft is vertically upwards specify “V” after shaft type letter to ensure that additional high level drain port is provided.

4 | HIGH DISPLACEMENT CODE      | 15 to 30 in³, in 3 in³ steps

5 | LOW DISPLACEMENT CODE       | 21 to 03 in³, in 3 in³ steps

6 | MAIN PORT CONNECTIONS       | Models with 2 1/4” distributor valve  
F2 = SAE 1” 4-bolt (UNC) flange  
FM2 = SAE 1” 4-bolt (metric) flange  
Models with 3” distributor valve  
SO3 = 6-bolt (UNF) flange (Staffa original valve housing)  
F3 = SAE 1 1/4” 4-bolt (UNC) flange  
FM3 = SAE 1 1/4” 4-bolt (metric) flange  
  
◆ Gives minimum overall length of HMC030 motor

7 | DISPLACEMENT CONTROL PORTS  | (AND SHUTTLE VALVE)  
Threaded ports/bi-directional shaft rotation:  
X = X and Y ports G3/4” (BSPF to ISO 228/1)  
ISO 4401 size 03 mounting face/bi-directional shaft rotation:  
C = No shuttle valve  
CS = With shuttle valve  
ISO 4401 size 03 mounting face/uni-directional shaft rotation (viewed on shaft end):  
C1▲ = Control pressure from main port 1 (shaft rotation clockwise with flow into port 1)  
C2▲ = Control pressure from main port 2 (shaft rotation counter-clockwise with flow into port 2)  
  
■ Not available with “SO3” and “F(M)2” type main port connections  
▲ Not available with “F(M)2” type main port connections

8 | TACHO/ENCODER DRIVE         | T = Staffa original tacho drive  
T1 = Suitable for Hohner 3000 series encoders. (Encoder to be ordered separately)  
Omit if not required.

9 | DESIGN NUMBER, 30 SERIES   | Subject to change. Installation and performance details remain unaltered for design numbers 30 to 39 inclusive.

10 | SPECIAL FEATURES            | PL** = non-catalogued features, e.g.:  
High pressure shaft seals  
Alternative port connections  
Stainless steel shaft sleeves  
Alternative encoder and tacho drives  
Motor valve housing orientation  
Shaft variants  
Special paint  
** Number assigned as required to specific customer build.
4. PERFORMANCE DATA

Performance data is valid for Staffa HMC030 motors fully run in and operating with petroleum oil. Leakage values are at fluid viscosity of 50 cSt (232 SUS).

MOTOR SELECTION

Use table 1 to select appropriate displacements for each application. Refer to table 2 for pressure and speed limits when using fire-resistant fluids.

TABLE 1

<table>
<thead>
<tr>
<th>Displacement code*</th>
<th>30</th>
<th>27</th>
<th>24</th>
<th>21</th>
<th>18</th>
<th>15</th>
<th>12</th>
<th>09</th>
<th>06</th>
<th>03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement cm³</td>
<td>492</td>
<td>442</td>
<td>393</td>
<td>344</td>
<td>295</td>
<td>246</td>
<td>197</td>
<td>147</td>
<td>98</td>
<td>49</td>
</tr>
<tr>
<td>Displacement in³</td>
<td>30</td>
<td>27</td>
<td>24</td>
<td>21</td>
<td>18</td>
<td>15</td>
<td>12</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Average actual</td>
<td>Nm/bar</td>
<td>6.86</td>
<td>6.08</td>
<td>5.30</td>
<td>4.59</td>
<td>3.88</td>
<td>3.20</td>
<td>2.51</td>
<td>1.83</td>
<td>1.15</td>
</tr>
<tr>
<td>running torque</td>
<td>lbf ft/psi</td>
<td>0.349</td>
<td>0.309</td>
<td>0.269</td>
<td>0.233</td>
<td>0.197</td>
<td>0.163</td>
<td>0.128</td>
<td>0.093</td>
<td>0.058</td>
</tr>
<tr>
<td>Max. continuous</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>speed r/min</td>
<td>450</td>
<td>500</td>
<td>525</td>
<td>550</td>
<td>575</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>1000</td>
</tr>
<tr>
<td>Max. continuous</td>
<td>kW</td>
<td>60</td>
<td>60</td>
<td>55</td>
<td>49</td>
<td>42</td>
<td>35</td>
<td>27</td>
<td>20</td>
<td>10</td>
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<tr>
<td>output</td>
<td>hp</td>
<td>80</td>
<td>80</td>
<td>74</td>
<td>66</td>
<td>56</td>
<td>47</td>
<td>37</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>Max. intermittent</td>
<td>kW</td>
<td>66</td>
<td>66</td>
<td>61</td>
<td>55</td>
<td>48</td>
<td>41</td>
<td>32</td>
<td>24</td>
<td>13</td>
</tr>
<tr>
<td>output</td>
<td>hp</td>
<td>88</td>
<td>88</td>
<td>82</td>
<td>74</td>
<td>64</td>
<td>55</td>
<td>43</td>
<td>32</td>
<td>17</td>
</tr>
<tr>
<td>Max. continuous</td>
<td>bar</td>
<td>207</td>
<td>207</td>
<td>207</td>
<td>207</td>
<td>207</td>
<td>207</td>
<td>207</td>
<td>207</td>
<td>17</td>
</tr>
<tr>
<td>pressure psi</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>250</td>
</tr>
<tr>
<td>Max. intermittent</td>
<td>bar</td>
<td>241</td>
<td>241</td>
<td>241</td>
<td>241</td>
<td>241</td>
<td>241</td>
<td>241</td>
<td>241</td>
<td>241</td>
</tr>
<tr>
<td>pressure psi</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>250</td>
</tr>
</tbody>
</table>

* Intermediate displacements are made available to special order.

See “Small displacements” page 7 for information about higher pressure applications.

TABLE 2

<table>
<thead>
<tr>
<th>Fluid type</th>
<th>Pressure, bar (psi)</th>
<th>Max. speed r/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>Intermittent</td>
<td></td>
</tr>
<tr>
<td>HFA, 5/95% oil-in-water emulsion</td>
<td>103 (1500)</td>
<td>138 (2000)</td>
</tr>
<tr>
<td>HFB, 60/40% water-in-oil emulsion</td>
<td>138 (2000)</td>
<td>172 (2500)</td>
</tr>
<tr>
<td>HFC, water glycol</td>
<td>103 (1500)</td>
<td>138 (2000)</td>
</tr>
<tr>
<td>HFD, phosphate ester</td>
<td>207 (3000)</td>
<td>241 (3500)</td>
</tr>
</tbody>
</table>

RATING DEFINITIONS

● CONTINUOUS RATING
For continuous duty the motor must be operating within each of the maximum values for speed, pressure and power as specified for each displacement code.

● 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.

● INTERMITTENT MAX. PRESSURE
Up to 241 bar (3500 psi) is allowable on the following basis:
(a) Up to 100 r/min: 15% duty for periods up to 5 minutes maximum.
(b) Over 100 r/min: 2% duty for periods up to 30 seconds maximum.
The torque curves indicate, for each displacement, the maximum output torque of the motor with an inlet pressure of 207 bar (3000 psi) and zero output pressure. High return line pressures will reduce the torque for any given pressure differential.

The solid line portion of each curve indicates the levels of maximum torque and speed that are permitted on a "continuous" basis.

The dotted portion of each curve indicates the levels of torque and speed at which the motor can operate at an "intermittent" rating.

The starting torques shown on the graph are average and will vary with crankshaft angle.
The nomograph allows the median bearing life to be determined for conditions of:

1. No side load and no axial thrust
2. Side load and no axial thrust

To determine L10 life predictions per ISO 281-1-1977 multiply the median figure by 0.2.

For more precise life prediction, or where axial thrusts are incurred, a computer analysis can be provided by Kawasaki on receipt of machine duty cycle.

### VOLUMETRIC EFFICIENCY

The nomograph on page 7 enables the average volumetric efficiency, crankcase (drain) leakage and “winch slip”/shaft creep speed to be estimated.

#### Example 1 (follow chain dotted line):
- Side load (W) a) 0
- System pressure (P) b) 207 bar (3000 psi)
- Speed (N) c) 100 r/min
- Median bearing life d) 136 000 hrs
- L10 bearing rating = median x 0.2 27 200 hrs

#### Example 2 (follow chain dotted line):
- Side load (W) e) 25 kN (5620 lbf)
- Load offset (A) from motor mounting face f) 50 mm (2.0 in)
- System pressure (P) g) 207 bar (3000 psi)
- Speed (N) h) 100 r/min
- Median bearing life i) 45 500 hrs
- L10 bearing rating = median x 0.2 9100 hrs

The shaft creep occurs when the load attempts to rotate the motor against closed ports as may occur, for example, in winch applications.
5. CIRCUIT AND APPLICATION NOTES

DISPLACEMENT SELECTION
To select either displacement, a pressure at least equal to 2/3 of the motor inlet/outlet pressure (whichever is higher) is required. In most applications the motor inlet pressure will be used.

For inlet/outlet pressures below 3,5 bar (50 psi) a minimum control pressure of 3,5 bar (50 psi) is required. In the event of loss of control pressure the motor will shift to its highest displacement.

For rapid reversing applications it is recommended to externally source the control oil supply direct from the system pump (use displacement control type “X” or “C” - not “CS”, “C1” or “C2” - in model code position).

STARTING TORQUES
The starting torques shown on the graph on page 5 are average and will vary with system parameters. For motors with low displacement below 12 in³ and starting under load it is recommended to select high displacement for start-up.

LOW SPEED OPERATION
(High displacement mode)
Minimum operating speeds are determined by load conditions (load inertia, drive elasticity, etc.) For operation at speeds below 3 r/min consult Kawasaki.

SMALL DISPLACEMENTS
(3 in³ and below)
The pressures given in the table on page 4 for displacement code “03” (and below) are based on 1000 r/min output shaft speed. These pressures can be increased for shaft speeds less than 1000 r/min; consult Kawasaki for details.

In addition to 3 in³, a zero swept volume displacement (for free wheeling requirements) is available on request, subject to Kawasaki approving the application.

HIGH BACK PRESSURE
When both inlet and outlet ports are pressurized continuously, the lower pressure in one port must not exceed 70 bar (1000 psi). Consult Kawasaki on applications beyond this limit. Note that high back pressures reduce 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/psi) from the appropriate formula:

\[
P \text{ (bar)} = 14.5 + \frac{N^2 \times V^2}{D_{\text{bar}}} + C \\
P \text{ (psi)} = 14.5 + \frac{N^2 \times V^2}{D_{\text{psi}}} + C
\]

Where:
- \(C\) = crankcase pressure, bar
- \(D\) = see table
- \(N\) = speed, r/min
- \(V\) = displacement, cm³/r

<table>
<thead>
<tr>
<th>Port connection type</th>
<th>D value</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3 FM3, SO3</td>
<td>(D_{\text{bar}} = 7.5 \times 10^9)</td>
</tr>
<tr>
<td></td>
<td>(D_{\text{bar}} = 2.0 \times 10^7)</td>
</tr>
<tr>
<td>F2, FM2</td>
<td>(D_{\text{bar}} = 3.7 \times 10^9)</td>
</tr>
<tr>
<td></td>
<td>(D_{\text{bar}} = 9.5 \times 10^5)</td>
</tr>
</tbody>
</table>

The flow rate of oil needed for the make-up system can be estimated from the crankcase leakage figure (see Volumetric Efficiency graph above) plus an allowance for changing displacement; e.g. to change high to low in 0,2 sec requires 11 l/min (2.0 USgpm).

Allowance should be made for other system losses and also for “fair wear and tear” during the life of the motor, pump and other system components.
COOLING FLOW
Operation within the continuous ratings does not require any additional cooling.

For operating conditions above “continuous”, up to the “intermittent” ratings, 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 (50 psi). On installations with long drain lines a relief valve is recommended to prevent over-pressurizing the seal.

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 to special order for casing pressures of:
   - Continuous: 10 bar (150 psi)
   - Intermittent: 15 bar (225 psi)
3. Check installation dimensions (page 9) for maximum crankcase drain fitting depth.

6. HYDRAULIC FLUIDS
Dependent on motor (see Model Code position 1) suitable fluids include:
- Antiwear hydraulic oils.
- Phosphate esters (HFD fluids)
- Water glycols (HFC fluids)
- 60/40% water-in-oil emulsions (HFB fluids)
- 5/95% oil-in-water emulsions (HFA fluids)
- Reduced pressure and speed limits, see page 4.

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

PETROLEUM OIL RECOMMENDATIONS
The fluid should be a good hydraulic grade, non-detergent petroleum oil. It should contain anti-oxidant, anti-foam and demulsifying additives. It must contain antiwear or EP additives. Automatic transmission fluids and motor oils are not recommended.

7. TEMPERATURE LIMITS
Ambient min. ..............-30°C (-22°F)
Ambient max. ............+70°C (158°F)
Max. operating temperature range
<table>
<thead>
<tr>
<th>Petroleum oil</th>
<th>Water-containing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. ..........-20°C (-4°F)</td>
<td>+10°C (50°F)</td>
</tr>
<tr>
<td>Max.* ..........+80°C (175°F)</td>
<td>+54°C (130°F)</td>
</tr>
</tbody>
</table>
* To obtain optimum service life from both fluid and hydraulic system components, 65°C (150°F) normally is the maximum temperature except for water-containing fluids.

8. FILTRATION
Full flow filtration (open circuit), or full boost flow filtration (closed circuit) to ensure system cleanliness to ISO 4406/1986 code 18/14 or cleaner.

9. NOISE LEVELS
The airborne noise level is less than 66.7 dB(A) DIN (70 dB(A) NFPA) throughout 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 (30 to 70 psi).

10. POLAR MOMENT OF INERTIA
Typical data

<table>
<thead>
<tr>
<th>Displacement code</th>
<th>kg m²</th>
<th>lb in²</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>0,012</td>
<td>40</td>
</tr>
<tr>
<td>15</td>
<td>0,0094</td>
<td>32</td>
</tr>
</tbody>
</table>

11. MASS
Approx. all models: 100 kg (220 lb)

12. INSTALLATION DATA
GENERAL
- Spigot
  The motor should be located by the mounting spigot on a flat, robust surface using correctly sized bolts. The diametral clearance between the motor spigot and the mounting must not exceed 0,15 mm (0.006”). 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 the M18 bolts is: 312±7Nm (230±5 lbf ft)
- Shaft coupling
  Where the motor is solidly coupled to a shaft having independent bearings the shafts must be aligned to within 0.13 mm (0.005”) TIR.

CRANKCASE DRAIN

Motor axis horizontal
The crankcase drain must be taken from a position above the horizontal centre line of the motor.

- Additional drain port G1/4” (BSPF)

- Standard drain port 3/4” - 16 UNF

An additional G1/4” (BSPF) drain port in the front mounting flange is provided when the “V” (shaft vertically upwards) designator is given after the shaft type letter in position 3 of the model code. This additional drain should be connected into the main motor casing drain line downstream of a 0,35 bar (5 psi) check valve to ensure lubrication of the upper bearing. See above diagram.

Use any drain position. The drain line should be run above the level of the uppermost bearing; if there is risk of syphoning then a syphon breaker should be fitted.
START-UP
Fill the crankcase with system fluid.
Where practical, a short period (30 minutes) of “running in” should be carried out with the motor set to its high displacement (pressure to port Y, or to port B of the size 03 pilot valve).

13. INSTALLATION DIMENSIONS IN MM (INCHES)

HMC030 MOTOR WITH TYPE “F3”/“FM3” (SAE 1\(\frac{1}{4}\)" 4-BOLT FLANGE) MAIN PORTS CONNECTION
See additional views for:
Displacement control connections, all shaft types and alternative main ports connection

- Suitable for M18 or \(\frac{7}{8}\)" dia bolts. Maximum reaming diameter, one hole, 18.5 (0.728) (for fitted bolt); see “Installation Data”.
- Port connection details.

<table>
<thead>
<tr>
<th>Model</th>
<th>Flange</th>
<th>Bolt</th>
<th>Tapping</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td>1(\frac{1}{4})&quot; SAE 4-bolt flange</td>
<td>(\frac{7}{8})-14 UNC x 27.0 (1.06)</td>
<td>deep</td>
</tr>
<tr>
<td>FM3</td>
<td>1(\frac{1}{4})&quot; SAE 4-bolt flange</td>
<td>M12 x P1.75 x 27.0 (1.06)</td>
<td>deep</td>
</tr>
<tr>
<td>SO3</td>
<td>Staffa 3&quot; 6-bolt flange, see separate view on page 10.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2/FM2</td>
<td>1&quot; SAE 4-bolt flange, see separate view on page 10.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3" VALVE HOUSING WITH 6-BOLT FLANGE, “SO3” IN MODEL CODE POSITION 6

Flow direction for shaft rotation shown on main drawing on page 9. Reverse flow for opposite direction of shaft rotation.

1" SAE 4-BOLT FLANGE, “F2”/“FM2” IN MODEL CODE POSITION 6

Flange bolt tappings

<table>
<thead>
<tr>
<th>Model code</th>
<th>Bolt tappings</th>
</tr>
</thead>
<tbody>
<tr>
<td>F2</td>
<td>7/16&quot;-16 UNC-2B x 22.0 (0.875) deep</td>
</tr>
<tr>
<td>FM2</td>
<td>M10 x P1.5 x 22.0 (0.875) deep</td>
</tr>
</tbody>
</table>

Flow direction for shaft rotation shown on main drawing on page 9. Reverse flow for opposite direction of shaft rotation.

Displacement selector valve is not supplied with the motor; specify and order separately.

DISPLACEMENT CONTROL CONNECTIONS, MODEL CODE POSITION 7

Type X

G1/4" (BSPF) tapped ports X and Y
Displacement selection (via remotely located valve ◆):
High displacement: P to Y; X to T
Low displacement: P to X; Y to T

Types C, CS, C1 and C2

Mounting interface for directional control valve ◆ to: ISO 4401 size 03 ANSI/B93. 7M size D03
Displacement selection:
High displacement: P to B; A to T
Low displacement: P to A; B to T

Flow direction for shaft rotation shown on main drawing on page 9. Reverse flow for opposite direction of shaft rotation.

◆ Displacement selector valve is not supplied with the motor; specify and order separately.
**SHAFT TYPE “P”, MODEL CODE POSITION** 3
Cylindrical shaft with rectangular key

Key supplied:
14.046/14.028 (0.5533/0.5523) wide
x 9.037/9.961 (0.3558/0.3529) thick

**SHAFT TYPE “S”, MODEL CODE POSITION** 3
Cylindrical shaft with 17 splines to BS 3550

**SHAFT TYPE “Z”, MODEL CODE POSITION** 3
Cylindrical shaft with splines to DIN 5480

---

**Mounting face**

Key supplied:
14.053/14.011 (0.5533/0.5515)

---

**Spline data**

For type S shaft
To BS 3550/SAE J498c (ANSI B92.1-1970, class 5)
Flat root, side fit, class 1
Pressure angle 30°
Number of teeth 17
Pitch 8/16
Major diameter 56.41/56.29 (2.221/2.216)
Form diameter 50.703/1.9962
Minor diameter 50.06/49.80 (1.971/1.953)
Pin diameter 6.096 (0.2400)
Diameter over pins 62.984/62.931 (2.4797/2.4776)

For type Z shaft
DIN 5480, W55 x 3 x 17 x 7h

---

**Mounting face**

Spline data

For type S shaft
To BS 3550/SAE J498c (ANSI B92.1-1970, class 5)
Flat root, side fit, class 1
Pressure angle 30°
Number of teeth 17
Pitch 8/16
Major diameter 56.41/56.29 (2.221/2.216)
Form diameter 50.703/1.9962
Minor diameter 50.06/49.80 (1.971/1.953)
Pin diameter 6.096 (0.2400)
Diameter over pins 62.984/62.931 (2.4797/2.4776)
Staffa hydraulic motors are manufactured to the highest quality standards in a Kawasaki ISO 9001 certified facility. Certification No. 891150