Inline Piston Motors

Fixed and Variable Displacement
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Introduction

General Data
These motors are of axial piston, fixed or variable displacement, inline design. The units can be operated in either direction of rotation. Flow direction is as indicated.
MFB motors are variable horsepower – horsepower being approximately proportional to rpm with a given constant operating pressure. Service may be continuous, intermittent, continuous reversing, or stalled without damage when properly protected by a relief valve.
Output speeds are dependent on input flow. Speed ranges of at least 36:1 are possible at the maximum torque rating by varying flow to the motor.

Fixed Displacement Inline Piston Motors (MFB)
Vickers fixed displacement inline piston motors offer a choice of five torque ratings, speed from 100 to 3600 r/min and pressures to 210 bar (3000 psi). Reversible shaft rotation and flange or foot mountings are available.

- **High Efficiency**
  Overall operating efficiency can be as high as 93% and volumetric efficiency as high as 97%, depending on motor size, pressure, speed, fluid viscosity, and temperature.

- **Compact, High Performance**
  High speeds, pressures and efficiencies give Vickers inline piston motors power density. The result is high performance in a compact package that requires minimum installation space.

- **Rotation**
  Rotation can be reversed simply by varying the direction of flow through the motor ports.

- **Low Speed Capability**
  Minimum speed can vary between 50 and 100 r/min, depending upon motor size and characteristics of the drive load.

- **Reliability**
  Vickers inline design has seen countless hours of rugged service on a variety of machinery applications. This proven design has provided significant cost and weight savings, while taking full advantage of the high efficiency inherent in piston units.

- **Serviceability**
  The simplicity of Vickers design not only permits easy servicing (often without removing the unit), and also increased reliability. Vickers inline motors have fewer parts compared to competitive units.

Variable Displacement Inline Piston Motors (MVB, MVE)
Vickers variable displacement inline piston motors offer a variety of displacements, speeds, and pressures.

- **Rotation**
  Shaft rotation can be reversed simply by reversing the direction of flow through he motor ports. However, shaft rotation must not be reversed by varying the motor’s displacement control, while the motor is running.

- **Controls**
  A handwheel or lever is used to select displacement. Both controls allow the motor to operate on either side of center, permitting bi-directional shaft rotation. The controls can be assembled on either side of the motor to facilitate motor installation and provide optimum control accessibility.

- **Speed Ranges**
  Output speeds are dependent on input flow and the position of the displacement control. With constant placement to the MVB5 or MVB10 motor, a speed range of 4:1 is possible by varying displacement.

  By varying flow to the MVB5 speed ranges of 12:1 (300 to 3600 r/min) and higher are possible with output torques to approximately 31 Nm (270 lb. in.)

  By varying flow to the MVB10, speed ranges of 11:1 (300 to 3200 r/min) and higher are possible with output torques to approximately 61 Nm (540 lb.in.)

  Both the MVB5 and the MVB10 motor will operate at speeds as low as 50 r/min with appropriate circuit and application considerations.

Application
Vickers piston motors are designed to meet the specifications shown in the “Ratings” section of this catalog. To ensure maximum performance in conjunction with your specific application, consult your Vickers sales representative if your:

- **Pressure requirements are above 100 bar (1500 psi).**
- **Speed is above 1800 r/min rating.**
- **Speed is below minimum recommended speed of 100 r/min.**
- **System requires fire resistant or other fluids.**
- **Operating temperature is not within the range of 38° to 66° C (100° to 150° F).** With proper application and fluid consideration, a greater temperature range is permissible.

- **Oil viscosities at operating conditions is not within 100 to 250 SUS.**
- **Application requires an indirect drive.**
- **Oil viscosity at start-up is in excess of 1000 SUS.**
- **Mounting attitude is other than horizontal.**

Installation Data
Horizontal mounting is recommended to maintain the necessary case fluid level. The case drain line must be full size and unrestricted, and connected from the uppermost drain port directly to the reservoir in such a manner that the housing remains filled with fluid. The piping of the drain line must prevent siphoning. The drain line should be piped so that it terminates below the reservoir fluid level. No other lines are to be connected to the drain line. Caution must be exercised to never exceed 0.35 bar (5 psi) unit case pressure.

Starting
Before starting, fill case with system fluid through the uppermost drain port. Housing must be kept full at all times to provide internal lubrication.
# MFB Model Series

## Model Code

![Model Code](image)

1. **Special Seals**
   - F3 – Seals for use with mineral oil or fire resistant fluids.
   - Blank – Omit if not required

2. **Model Series**
   - M – Motor
   - F – Fixed displacement
   - B – Inline type

3. **GPM Rating @ 1800 rpm**
   - 5 – 19 L/min (5 USgpm)
   - 10 – 37.9 L/min (10 USgpm)
   - 20 – 75.7 L/min (20 USgpm)
   - 29 – 109.8 L/min (29 USgpm)
   - 45 – 170.3 L/min (45 USgpm)

4. **Mounting Type**
   - F – Foot bracket
   - Blank – Omit for flange mounting

5. **Rotation**
   - U – Either direction

6. **Port Connections (MFB 45)**
   - F – SAE 4-bolt Flanged Ports

7. **Design Number**
   - Subject to change
   - 21 – 21 Design (MFB5)
   - 31 – 31 Design (MFB10)
   - 10 – 10 Design (MFB 20, 29, 45)

## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Theoretical Displ. cm³/rev (in³/rev)</th>
<th>Flow L/min (USgpm) @ Rated r/min</th>
<th>Operating Speed r/min</th>
<th>Pressure bar (psi)</th>
<th>Output Torque Nm (lb in)</th>
<th>Dry Weight kg (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rated</td>
<td>Max</td>
<td>Rated</td>
</tr>
<tr>
<td>MFB5</td>
<td>10.5 (0.643)</td>
<td>19.0 (5.0)</td>
<td>1800</td>
<td>3600</td>
<td></td>
<td>100 (1500)</td>
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<tr>
<td></td>
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<td>210 (3000)</td>
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<tr>
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<td>15.25 (135)</td>
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<td>30.5 (270)</td>
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<td>5.0 (11)</td>
</tr>
<tr>
<td>MFB10</td>
<td>21.12 (1.29)</td>
<td>37.9 (10.0)</td>
<td>1800</td>
<td>3200</td>
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<td>100 (1500)</td>
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<td>9.5 (21)</td>
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<tr>
<td>MFB20</td>
<td>42.8 (2.61)</td>
<td>75.7 (20)</td>
<td>1800</td>
<td>2400</td>
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<td>100 (1500)</td>
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<td>175 (2500)</td>
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<td>101.7 (900)</td>
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<td>18.5 (49)</td>
</tr>
<tr>
<td>MFB29</td>
<td>61.6 (3.76)</td>
<td>109.8 (29)</td>
<td>1800</td>
<td>2400</td>
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<td>70 (1000)</td>
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<td>18.5 (49)</td>
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<td>MFB45</td>
<td>94.4 (5.76)</td>
<td>170.3 (45)</td>
<td>1800</td>
<td>2200</td>
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<td>100 (1500)</td>
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<td>210 (3000)</td>
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<td>135.6 (1200)</td>
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<td>271.2 (2400)</td>
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<td>33 (73)</td>
</tr>
</tbody>
</table>
MFB5 Model Series

Performance Characteristics

Based on oil temperature of 49°C (120°F) – Atmospheric Outlet

---

**Speed – r/min**

0  600  1200  1800  2400  3000  3600

**Inlet – 100 bar (1500 psi) Differential**

- Volumetric Efficiency
- Torsional Efficiency
- Overall Efficiency
- Input Flow
- Input Horsepower
- Theoretical Torque
- Actual Torque
- Output Horsepower

**Torque – Nm, lb. in., L/min, USgpm**

- Nm
- lb. in.
- L/min
- USgpm

---

**Kilowatt – Horsepower**

0  0  11,3  22,6  33,9  45  57  41,6  11

0  3,8  7,6  11,4  15,1  18,9  22,7  26,5  30,2  34,1  37,8  41,6

0  3,8  7,6  11,4  15,1  18,9  22,7  26,5  30,2  34,1  37,8  41,6

**Flow – L/min, USgpm**

0  0  1  2  3  4  5  6  7  8  9  10

0  3,8  7,6  11,4  15,1  18,9  22,7  26,5  30,2  34,1  37,8  41,6

**Based on 1800 r/min**

**Differential input pressure**

0  (500)  (1000)  (1500)  (2000)  (2500)  (3000)

0  bar  psi

---

**Theoretical Torque**

11,3 (100)

---

**Running Torque**

33,9 (300)

22,5 (200)

11,3 (100)
Installation Dimensions
Millimeters (inches)

Ø 11.2 (.44). 2 holes for mounting

Ø 95.2 (3.75)

33.6 (1.32)

16.8 (.66)

106.4 (4.188)

Ø 130 (5.12)

44.4 (1.75)

12.7 (.50)

6.3 (.25)

85.9 (3.38)

142.2 (5.60)

53.2 (2.094)

40.6 (1.60)

23.8 (.938)

10.3 (.406)

20 (0.79)

16.8 (0.66)

14.0 (0.55)

12.7 (0.50)

5.7 (.22)

9.5 (0.375)

6.3 (0.25)

4.8 (.19) x 25.4 (1.00) Key

Ø 9.5 (0.375)

25.4 (1.00)

43.7 (1.72)

43.7 (1.72)

103.1 (4.06)

85.9 (3.38)

49.3 (1.94)

4.8 (.19)

25.4 (1.00) Key

14.0 (0.55)

12.7 (0.50)

9.5 (0.375)

6.3 (0.25)

4.8 (.19) x 25.4 (1.00) Key

10.3 (.406)

20 (0.79)

16.8 (0.66)

14.0 (0.55)

6.3 (0.25)

Optional drive shaft.
SAE standard involute spline.
Flat root major diameter fit.
9 teeth 16/32 pitch.
.5625 pitch diameter ref.
.4835/.4725 minor diameter
MFB10 Model Series

Performance Characteristics
Based on oil temperature of 49°C (120°F), 20.6 cSt (100 SUS) and atmospheric outlet
Installation Dimensions
Millimeters (inches)

<table>
<thead>
<tr>
<th>Shaft Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. (Code Y)</td>
<td>58.7 (2.31)</td>
<td>228.1 (8.98)</td>
<td>47.6 (1.874)</td>
</tr>
<tr>
<td>Short</td>
<td>44.4 (1.75)</td>
<td>213.9 (8.42)</td>
<td>33.3 (1.312)</td>
</tr>
</tbody>
</table>

Optional drive shaft
SAE standard involute spline.
Flat root – major diameter fit.
13 teeth – 16/32 pitch.
.8125 pitch diameter (ref.)
.7335/.7225 minor diameter
MFB20 & MFB29 Model Series

**Performance Characteristics**
Based on oil temperature of 49°C (120°F), 20.6 cSt (100 SUS)

- X indicates minimum speed with approx. ± 10% speed variation
- O indicates stall torque

---

**MFB20**

![Graph showing performance characteristics of MFB20](image1)

---

**MFB29**

![Graph showing performance characteristics of MFB29](image2)
Installation Dimensions
Millimeters (inches)

Model number shown here

Case drain connection
.750-16 UNF-2B straight thread

Alternate case drain connection

Shaft Rotation

<table>
<thead>
<tr>
<th>Rotation</th>
<th>Outlet Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right hand</td>
<td>A</td>
</tr>
<tr>
<td>Left hand</td>
<td>B</td>
</tr>
</tbody>
</table>

Optional drive shaft
SAE standard involute spline.
Flat root – major diameter fit.
14 teeth – 12/24 pitch.
1.1667 pitch diameter (ref.)
1.0627/1.0497 minor diameter
Performance Characteristics
Based on oil temperature of 49° C (120° F), 20.6 cSt (100 SUS)

X indicates minimum speed with approximate ± 10 % speed variation
O indicates stall torque
Installation Dimensions
Millimeters (inches)

- Right hand shaft rotation:
  - 181 (7.125)
  - 90.5 (3.562)
  - 39.6 (1.56)
  - 19.8 (.78)
  - ∅ 212.3 (.836)
  - ∅ 147.8 (5.81)

- Alternate drain connection:
  - 214.87 (8.464)

- Case drain connection:
  - 1.062-12 UN-2B SAE straight thread for .750 O.D. tubing. 2 places
  - .500-13 UNC-2B thread 26.9 (1.06) deep 8 places

- Shaft Rotation
  - Right hand “A”
  - Left hand “B”

- Outlet Port
  - Port A
  - Port B

- Model number shown here:
  - 4110 (.437) × 38.1 (1.50)

- Key:
  - 81.8 (3.22)
  - 167.1 (6.58)
  - 16.5 (0.65)
  - 12.7 (0.50)

- Alternate drain plate:
  - 234.7 (9.24)

- 50-13 UNC-2B thread 26.9 (1.06) deep 8 places

- Key:
  - 77.77 (3.062)

- Outlet Port:
  - Port A
  - Port B

- Port A:
  - 48.13/47.85 (1.895/1.884)
  - ∅ 44.45/44.40 (1.750/1.748)
  - 234.7 (9.24)

- Port B:
  - 38.89 (1.531)
  - 42.88 (1.688)
  - 21.44 (.844)

- Rotation plate:
  - ∅ 50 (1.970)

- Right hand shaft rotation:
  - 108.7 (4.28)

- Left hand shaft rotation:
  - 182.4 (7.18)

- Case drain connection:
  - 50.8 (2.0)
  - 25.4 (1.0)
# MFE15 and MFE19 Model Series

## Ratings

<table>
<thead>
<tr>
<th>Theoretical Maximum Displacement</th>
<th>Maximum Rated Input Speed</th>
<th>Maximum Rated Output Speed</th>
<th>Maximum Intermittent Pressure</th>
<th>Maximum Continuous Pressure</th>
<th>Rated Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>MFE15 33 cm³/rev (2 in³/rev)</td>
<td>3600 r/min</td>
<td>3600 r/min</td>
<td>350 bar (5000 psi)</td>
<td>210 bar (3000 psi)</td>
<td>16.8 kW per 1000 r/min (22.5 hp per 1000 r/min)</td>
</tr>
<tr>
<td>MFE19 41 cm³/rev (2.5 in³/rev)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Model Code

**M F E** **X** – **3** – **0**

- **1** Model Series
  - MFE – Fixed displacement piston motor

- **2** Rated Flow
  - 15 – 57 L/min (15 USgpm)
  - 19 – 72 L/min (19 USgpm)

- **3** Thru Shaft
  - X – Available only on side ported models. Omit if not required

- **4** Output Shaft *
  - 2 – SAE B–B splined

  * Other shafts available. Contact your Vickers sales engineer.

- **5** Design Number
  - 30 – Subject to change. Installation dimensions remain the same for design number 30 through 39

- **6** Special Suffix
  - Blank – Side Ports
  - 030 – End Ports
Installation Dimensions
Millimeters (inches)

SAE B–B Splined Shaft

<table>
<thead>
<tr>
<th>External Involute Spline</th>
<th>* Modified ANS B92.1 – 1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9375 Pitch Dia.</td>
<td>.8119 Base Dia.</td>
</tr>
<tr>
<td>Flat root class 5 side fit</td>
<td></td>
</tr>
<tr>
<td>Major Diameter</td>
<td>Form Dia.</td>
</tr>
<tr>
<td>.9835 Max.</td>
<td>.872 Max.</td>
</tr>
<tr>
<td>.9780 Min.</td>
<td>.840 Min.</td>
</tr>
</tbody>
</table>

15 teeth 16/32 pitch 30° Pr. Angle

Port B
1.3125–12 UN–2B Thd.
SAE o-Ring boss connection
1.000 O.D. Tubing

Drain port D1
0.8750–14 UNF–2B Thd
SAE o-ring boss connection
0.625 O.D. Dia. Tubing

160.3 (6.31)
175 (6.89)
201.2 (7.92)
225.6 (8.88)

Port A
1.3125–12 UN–2B Thd.
SAE o-Ring boss connection
1.000 O.D. Tubing

152.4 (6.00)
69.9 (2.75)
40.6 (1.6)

Optional Thru Shaft

ASA B5.15 – 1960

<table>
<thead>
<tr>
<th>External Involute Spline</th>
<th>.7813 Pitch Dia.</th>
<th>.6766 Pitch Dia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Dia.</td>
<td>Form Dia.</td>
<td>Minor Dia.</td>
</tr>
<tr>
<td>203.4 (.8022) Max.</td>
<td>18.9 (.7460)</td>
<td>18.8 (.7398) Max.</td>
</tr>
<tr>
<td>20.3 (.7992) Min.</td>
<td></td>
<td>18.6 (.7318) Min.</td>
</tr>
</tbody>
</table>

25 teeth 32/64 pitch 30° Pr. Angle

Thru shaft extension is limited to a maximum torque of 327 Nm (2900 in. lbs.) with no overhung load. Applications subjecting shaft extension to both bending and torsional loads are subject to Vickers engineering approval.

Drain port D1. Same size as side-ported model.

Port A. Same size as side-ported model.
Alternate drain port D2. Same size as side-ported model.

Alternate drain port D2

Construction plug.
Do not remove.

END-PORTED MODEL

See side-ported model above for additional dimensions.
## MVB5 and MVB10 Model Series

### Ratings

<table>
<thead>
<tr>
<th>Model</th>
<th>Theoretical Displacement cm³/rev (in³/rev)</th>
<th>Flow L/min (USgpm) @ 1800 r/min</th>
<th>Operating Speed (r/min)</th>
<th>Pressure bar (psi)</th>
<th>Output Torque Nm (lb. in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Rated 3600</td>
<td>Rated Max</td>
<td>Rated Max</td>
<td>Rated Max</td>
</tr>
<tr>
<td>MVB5</td>
<td>10.5 (0.643)</td>
<td>19.0 (5.0)</td>
<td>1800</td>
<td>100 (1500)</td>
<td>15.25 (135)</td>
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<tr>
<td></td>
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<td>38.0 (10)</td>
<td></td>
<td>210 (3000)</td>
<td>30.5 (270)</td>
</tr>
<tr>
<td>MVB10</td>
<td>21.12 (1.29)</td>
<td>37.9 (10.0)</td>
<td>1800</td>
<td>100 (1500)</td>
<td>30.5 (270)</td>
</tr>
<tr>
<td></td>
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<td>68.1 (18.0)</td>
<td></td>
<td>210 (3000)</td>
<td>61.0 (540)</td>
</tr>
</tbody>
</table>

### Model Code

- **Model Series**
  
  M – Motor  
  V – Variable displacement  
  B – Inline type

- **USgpm Rating @ 1800 rpm**
  
  5 – 5 USgpm

- **Mounting Type**
  
  F – Foot bracket  
  (For separate foot bracket kit, order model model FB–A–10)  
  Blank – Omit for flange mounting

- **Rotation**
  
  U – Either direction

- **Displacement**
  
  D – Both sides of center

- **Shaft Type**
  
  Y – Keyed, standard 1.75 extension, 0.759 diameter

- **Motor Design Number**
  
  Subject to change

- **Control Type**
  
  H – Handwheel  
  M – Lever

- **Control Position**
  
  L – Left hand  
  Blank – Right hand

- **Control Design Number**
  
  Subject to change
MVB5 Model Series

Performance Characteristics
Based on oil temperature of 49° C (120° F), 20.6 cSt (100 SUS) and atmospheric outlet

NOTE: Initial pressure for starting a load is approximately 30% higher than the values shown
### Installation Dimensions

**Millimeters (inches)**

#### Handwheel Control

Provides manual selection of motor displacement. Handwheel controlled units may be operated on either side of center permitting bi-directional output rotation.

#### Lever Control

Provides mechanical or manual selection of motor displacement. Lever controlled units may be operated on either side of center permitting bi-directional output rotational characteristics. Lever controls must be secured by a suitable linkage arrangement to maintain desired setting. The control pintle may be rotated 446 mm (17.5 in.) on each side of center position to permit full reversal of output shaft. Pintle travel is limited to 35° by internal stops. Torque required to rotate control pintle is approximately 6.7 Nm (60 in. lbs.) at rated speed and pressure.

### Shaft Rotation

<table>
<thead>
<tr>
<th>Shaft Rotation</th>
<th>Pointer Position</th>
<th>Handwheel Rotation from Zero</th>
<th>Inlet Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.H.</td>
<td>1</td>
<td>Clockwise</td>
<td>B</td>
</tr>
<tr>
<td>R.H.</td>
<td>2</td>
<td>Counter-clockwise</td>
<td>A</td>
</tr>
<tr>
<td>L.H.</td>
<td>1</td>
<td>Clockwise</td>
<td>A</td>
</tr>
<tr>
<td>L.H.</td>
<td>2</td>
<td>Counter-clockwise</td>
<td>B</td>
</tr>
</tbody>
</table>

### Drain connection

7/16–20 UNF–2B Straight thd. 2 places

### Lever control assembly

(Lever may be located at any position in 360° circle)

---

**CAUTION:** Loosen lock screw before turning handwheel

---

**Lever control assembly (Lever may be located at any position in 360° circle)**
MVB10 Model Series

Performance Characteristics
Based on oil temperature of 49°C (120°F), 20.6 cSt (100 SUS)

### Input Flow
<table>
<thead>
<tr>
<th>USgpm</th>
<th>L/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>7,6</td>
</tr>
<tr>
<td>4</td>
<td>15,1</td>
</tr>
<tr>
<td>6</td>
<td>22,7</td>
</tr>
<tr>
<td>8</td>
<td>30,3</td>
</tr>
<tr>
<td>10</td>
<td>38</td>
</tr>
<tr>
<td>12</td>
<td>45,4</td>
</tr>
<tr>
<td>14</td>
<td>53</td>
</tr>
<tr>
<td>16</td>
<td>60,5</td>
</tr>
<tr>
<td>18</td>
<td>68,1</td>
</tr>
<tr>
<td>20</td>
<td>75,7</td>
</tr>
<tr>
<td>22</td>
<td>83,3</td>
</tr>
</tbody>
</table>

### Output Speed
- 0 r/min
- 400 r/min
- 800 r/min
- 1200 r/min
- 1600 r/min
- 2000 r/min
- 2400 r/min
- 2800 r/min
- 3200 r/min

### Input Pressure
<table>
<thead>
<tr>
<th>bar</th>
<th>psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>500</td>
</tr>
<tr>
<td>70</td>
<td>1000</td>
</tr>
<tr>
<td>140</td>
<td>2000</td>
</tr>
<tr>
<td>175</td>
<td>2500</td>
</tr>
<tr>
<td>210</td>
<td>3000</td>
</tr>
<tr>
<td>240</td>
<td>3500</td>
</tr>
</tbody>
</table>

### Running Torque
<table>
<thead>
<tr>
<th>Nm</th>
<th>Lb. In.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>11,3</td>
<td>100</td>
</tr>
<tr>
<td>22,6</td>
<td>200</td>
</tr>
<tr>
<td>33,9</td>
<td>300</td>
</tr>
<tr>
<td>45,2</td>
<td>400</td>
</tr>
<tr>
<td>56,5</td>
<td>500</td>
</tr>
<tr>
<td>67,8</td>
<td>600</td>
</tr>
</tbody>
</table>

**NOTE:** Initial pressure for starting a load is approximately 30% higher than the values shown.
Installation Dimensions
Millimeters (inches)

**Handwheel Control**
Provides manual selection of motor displacement. Handwheel controlled units may be operated on either side of center permitting bi-directional output rotation.

<table>
<thead>
<tr>
<th>Shaft Rotation</th>
<th>Pointer Position</th>
<th>Handwheel Rotation from Zero</th>
<th>Inlet Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.H.</td>
<td>1</td>
<td>Clockwise</td>
<td>B</td>
</tr>
<tr>
<td>R.H.</td>
<td>2</td>
<td>Counter-clockwise</td>
<td>A</td>
</tr>
<tr>
<td>L.H.</td>
<td>1</td>
<td>Clockwise</td>
<td>A</td>
</tr>
<tr>
<td>L.H.</td>
<td>2</td>
<td>Counter-clockwise</td>
<td>B</td>
</tr>
</tbody>
</table>

**Lever Control**
Provides mechanical or manual selection of motor displacement. Lever controlled units may be operated on either side of center permitting bi-directional output rotational characteristics. Lever controls must be secured by a suitable linkage arrangement to maintain desired setting. The control pintle may be rotated 446mm (17.5 in.) on each side of center position to permit full reversal of output shaft. Pintle travel is limited to 35° by internal stops. Torque required to rotate control pintle is approximately 6.7 Nm (60 in. lbs.) at rated speed and pressure.
MVE19 Model Series

Circuit Diagram

![Circuit Diagram]

Ratings

<table>
<thead>
<tr>
<th>Model &amp; Theoretical Maximum Displacement cm³/rev (in³/rev)</th>
<th>Maximum Rated Input Speed</th>
<th>Maximum Rated Output Speed</th>
<th>Maximum Intermittent Pressure</th>
<th>Maximum Continuous Pressure</th>
<th>Rated Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>MVE19 40.9 (2.5)</td>
<td>3600 r/min</td>
<td>3600 r/min</td>
<td>350 bar (5000 psi)</td>
<td>210 bar (3000 psi)</td>
<td>16.8 kW per 1000 r/min (22.5 hp per 1000 r/min)</td>
</tr>
</tbody>
</table>

Model Code

|----------|-------------------------------|

1 Model Series
MVE – Variable displacement piston motor

2 Rated Flow
19 – 72 L/min (19 USgpm)

3 Thru Shaft
Blank – No thru shaft
X – Available only on side ported models. Use for static brake only.

4 Output Shaft
2 – SAE B–B splined
9 – SAE B splined*

* #9 shaft is limited to max pressure of 210 bar (3000 psi)

5 Motor Design Number
Subject to change. Installation dimensions remain as shown for designs 30 through 39.

6 Control & Location
A – Right hand pintle location viewed from shaft end with drain port up
B – Left hand pintle location viewed from shaft end with drain port up
M – External pilot control (“Vented” equals minimum stroke/maximum speed) †
P – External pilot control. See above pressure restrictions under “Ratings”. (“Vented” equals maximum stroke/minimum speed) †

† External pilot pressure must be equal to the system pressure to ensure yoke position.

7 Minimum Displacement Angle
Any angle from 7° to 15° in 2° increments

8 Control Design Number
10 – Subject to change

9 Special Suffix
Blank – No special features
030 – End ports
MVE19 Model Series with Control Pintle & Side Ports

Installation Dimensions
Millimeters (inches)

Pintle Detail

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.1/19.5</td>
<td>0.750/0.768</td>
<td>D.</td>
</tr>
<tr>
<td>25.4/25.3</td>
<td>1.000/0.995</td>
<td>D.</td>
</tr>
<tr>
<td>2.2/2.3</td>
<td>0.086/0.091</td>
<td></td>
</tr>
<tr>
<td>23.5/23.3</td>
<td>0.926/0.916</td>
<td>D.</td>
</tr>
<tr>
<td>4.1</td>
<td>0.160</td>
<td></td>
</tr>
<tr>
<td>20.3/20.2</td>
<td>0.801/0.796</td>
<td></td>
</tr>
</tbody>
</table>

Alternate Drain Port D2
.8750–14 UNF–2B thd. SAE O-ring boss connection .625 O.D. Tubing

R.H. Rotation
R.H. Pintle

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.14/14.52</td>
<td>0.557/0.572</td>
<td>Dia</td>
</tr>
<tr>
<td>240.1</td>
<td>0.950</td>
<td>Dia</td>
</tr>
<tr>
<td>146.05</td>
<td>0.575</td>
<td>Dia</td>
</tr>
</tbody>
</table>

ASA B5.15 – 1960
.7813 pitch dia., .6766 base dia.
Flat root class 1 side fit
25 teeth 32/64 pitch 30° Pr. angle
Major dia. .8022 max. .7952 min.
Form dia. .7460
Minor dia. .7398 max. .7318 min.

Optional Thru Shaft
External Involute Spline

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>63.5</td>
<td>2.50</td>
<td>D.</td>
</tr>
<tr>
<td>98.3</td>
<td>3.87</td>
<td></td>
</tr>
<tr>
<td>196.6</td>
<td>7.74</td>
<td></td>
</tr>
<tr>
<td>375–16 UNC–2B Thd. .62 deep 3 holes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAE B–B Splined Shaft (No.2 shaft)

External Involute Spline

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>.9375 pitch dia.</td>
<td>15 teeth 16/32 pitch 30° Pr. angle</td>
<td></td>
</tr>
<tr>
<td>.8119 base dia.</td>
<td>.785 max. .9780 min.</td>
<td></td>
</tr>
<tr>
<td>Flat root class 5 side fit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAE B Splined Shaft (No. 9 shaft)

External Involute Spline

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>.8125 pitch dia.</td>
<td>13 teeth 16/32 pitch 30° Pr. angle</td>
<td></td>
</tr>
<tr>
<td>.7036 base dia.</td>
<td>.8585 max. .8530 min.</td>
<td></td>
</tr>
<tr>
<td>Flat root class 5 side fit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Thru shaft extension is limited to a maximum torque of 328 Nm (2900 in. lb.) with no overheng load. Applications subjecting shaft extension to both bending and torsional loads are subject to engineering approval.
MVE19 Model Series with Pilot Control & Side Ports

Installation Dimensions
Millimeters (inches)

<table>
<thead>
<tr>
<th>Shaft Rotation</th>
<th>Pressure Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.H.</td>
<td>&quot;B&quot;</td>
</tr>
<tr>
<td>L.H.</td>
<td>&quot;A&quot;</td>
</tr>
</tbody>
</table>

Thru shaft extension is limited to a maximum torque of 328 Nm (2900 in. lb.) with no overhung load. Applications subjecting shaft extension to both bending and torsional loads are subject to engineering approval.

SAE B–B Splined Shaft (No.2 shaft)

*Modified ANSI B92.1 – 1970
.9375 pitch dia. .8119 base dia.
Flat root class 5 inside fit
15 teeth 16/32 pitch 30° Pr. angle
Major dia. .9835 max. .9780 min.
Form dia. .872
Minor dia. .840 min

External Involute Spline

SAE B Splined Shaft (No. 9 shaft)

ANS B92.1 – 1970
.8125 pitch dia. .7036 base dia.
Flat root class 5 inside fit
13 teeth 16/32 pitch 30° Pr. angle
Major dia. .8585 max. .8530 min.
Form dia. .749
Minor dia. .715 min

41,1 (1.62)
18,9 (.745)
33,27 (1.310)
MVE19 Model Series with Control Pintle & End Ports

Installation Dimensions
Millimeters (inches)

<table>
<thead>
<tr>
<th>Pintle Detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>19.1/19.5 (.750/7.68) D.</td>
</tr>
<tr>
<td>25.4/25.3 (1.000/.995) D.</td>
</tr>
<tr>
<td>2.2/2.3 (.086/.091)</td>
</tr>
<tr>
<td>23.5/23.3 (.926/.916) D.</td>
</tr>
<tr>
<td>.8125 pitch dia.</td>
</tr>
<tr>
<td>.8219 base dia.</td>
</tr>
<tr>
<td>15 teeth 16/32 pitch 30° Pr. angle</td>
</tr>
<tr>
<td>Major dia. .9835 max. .9780 min.</td>
</tr>
<tr>
<td>Form dia. .872</td>
</tr>
<tr>
<td>Minor dia. .840 Min</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternate Drain Port D2</th>
</tr>
</thead>
<tbody>
<tr>
<td>.8750–14 UNF–2B thread</td>
</tr>
<tr>
<td>SAE O-ring boss connection</td>
</tr>
<tr>
<td>.625 O.D. dia. tubing</td>
</tr>
</tbody>
</table>

| Port B. 1.3125–12 UN–2B thd. |
| SAE O-ring boss conn. |
| 1.000 O.D. Tubing |

| SAE O-ring boss conn. |
| 1.000 O.D. Tubing |

<table>
<thead>
<tr>
<th>Shaft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation</td>
</tr>
<tr>
<td>Pressure Port</td>
</tr>
<tr>
<td>R.H.</td>
</tr>
<tr>
<td>L.H.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SAE B Splined Shaft (No. 9 shaft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Involute Spline</td>
</tr>
<tr>
<td>*Modified ANSI B92.1 – 1970</td>
</tr>
<tr>
<td>.8125 pitch dia. .7036 base dia.</td>
</tr>
<tr>
<td>Flat root class 5 side fit</td>
</tr>
<tr>
<td>13 teeth 16/32 pitch 30° Pr. angle</td>
</tr>
<tr>
<td>Major dia. .8585 max. .8530 min.</td>
</tr>
<tr>
<td>Form dia. .749</td>
</tr>
<tr>
<td>Minor dia. .715 min</td>
</tr>
</tbody>
</table>
Installation Dimensions
Millimeters (inches)

<table>
<thead>
<tr>
<th>Shaft Rotation</th>
<th>Pressure Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>R.H.</td>
<td>&quot;B&quot;</td>
</tr>
<tr>
<td>L.H.</td>
<td>&quot;A&quot;</td>
</tr>
</tbody>
</table>

SAE B–B Splined Shaft (No. 2 shaft)

External Involute Spline
*Modified ANSI B92.1 – 1970
.9375 pitch dia. .8119 base dia.
Flat root class 5 side fit
15 teeth 16/32 pitch 30° Pr. angle
Major dia. .9835 max. .9780 min.
Form dia. .872
Minor dia. .840 Min

SAE O-ring boss connection
1.000 O.D. Tubing

Port B 1.3125–12 UN–2B thd.
SAE O-ring boss connection
.250 O.D. dia tubing

D1
.875–14 UNF–2B thd.
SAE O-ring boss conn. .625 O.D. Tubing

Pressure
No. 9 shaft

SAE B Splined Shaft (No. 9 shaft)

External Involute Spline
ANSI B92.1 – 1970
.8125 pitch dia. .7036 base dia.
Flat root class 5 side fit
13 teeth 16/32 pitch 30° Pr. angle
Major dia. .8585 max. .8530 min.
Form dia. .749
Minor dia. .715 Min

30°

33.27 (1.310)
The foot bracket kits tabulated below can be used to mount motors having standard SAE-J 744 2-bolt A, B, or C mounting flanges. These designations correspond to -A-, -B-, and -C- letters in the foot bracket kit model number. Each kit includes a bracket and screws for mounting to the motor. Kits are not included with motors and must be ordered separately by model number.

Also available are a bracket (part number 279625) and mounting screws (part number 214794, 2 required) to fit the SAE D mounting flange.
Hydraulic fluids
Vickers motors can be used with anti-wear hydraulic oil, or automotive type crankcase oil (designations SC, SD, SE, SF, or SG) per SAE J183 JUN89. Fire-resistant fluids can also be used, but may require the use of special seals as explained in the following “Seals” section.

The fluid viscosity range with the pump running should be 13-54 cSt (70-250 SUS). An operating temperature of 49°C (120°F) is recommended. For additional fluid and temperature information, refer to 694.

Seals
Nitrile seals are standard in Vickers inline motors. These seals are suitable for use with petroleum, water-glycol, water-in-oil emulsion, polyol ester, and high-water-base fluids. Phosphate ester fluids require the use of fluorocarbon seals, which are identified in applicable model codes by an “F3” prefix.

Installation and Startup
Horizontal mounting is recommended to maintain the necessary case fluid level.
Before starting, fill the case with system fluid through the uppermost drain port. The housing must be kept full at all times to provide internal lubrication.

Cleanliness codes for petroleum oil usage

<table>
<thead>
<tr>
<th>Product</th>
<th>System Pressure Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 140 bar ( &lt; 2000 psi)</td>
</tr>
<tr>
<td>Swash plate design motors</td>
<td>18/16/14</td>
</tr>
</tbody>
</table>

Recommended cleanliness levels, using petroleum oil under common conditions, are based on the highest fluid pressure levels in the system and are coded in the chart below. Fluids other than petroleum, severe service cycles, or personnel safety considerations are cause for adjustment of these cleanliness codes. See Vickers publication 561 for exact details.

Vickers products, as any components, will operate with apparent satisfaction in fluids with higher cleanliness codes than those described. Other manufacturers will often recommend levels above those specified. Experience has shown, however, that life of any hydraulic components is shortened in fluids with higher cleanliness codes than those listed below. These codes have been proven to provide a long trouble-free service life for the products shown, regardless of the manufacturer.

Fluid cleanliness
Proper fluid condition is essential for long and satisfactory life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness, materials and additives for protection against wear of components, elevated viscosity and inclusion of air.

Essential information on the correct methods for treating hydraulic fluid is included in Vickers publication 561; “Vickers Guide to Systemic Contamination Control,” available from your local Vickers distributor or by contacting Vickers, Incorporated. Recommendations on filtration and the selection of products to control fluid condition are included in 561.