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- ...to deliver innovative, quality products
- ...to respond fast
- ...to provide dedicated customer service and support around the globe

### Our strength is global reach with local responsiveness and support

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- Diverse channels ensure reliable availability and support
- Design and engineering teams provide support for standard products and custom solutions
- Eaton experts offer efficient product and application training

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### Bent Axis Motor - BAF7

#### **General Information - Features**

BAF7 series units are a family of fixed displacement motors, bent axis piston design for operation in both open and closed circuit. The proven design incorporating the lens shaped valve plate, the high quality components and manufacturing techniques allow the BAF7 series units able to provide up to 430 bar [6235 psi] continuous and 480 bar [6960 psi] peak performance. Fully laboratory tested and field proven, these units provide maximum efficiency and long life. Heavy duty bearings permit high radial and axial loads. Versatile design includes a variety of port plate, shaft end and valve packages that will fit the BAF7 series units to any application, both industrial and mobile. BAF7 series units are available in both ISO and SAE versions.

#### **Typical Applications:**

- Earth moving machines and construction equipment
- Agricultural and forestry vehicles
- Marine and off-shore equipment
- Industrial conveying, mixing & other stationary in-plant uses











### Specifications and Performance Technical Data

#### **Hydraulic Fluids**

See page 34 for fluid related information.

#### **Operating Pressure**

The maximum permissible pressure on pressure ports is 430 bar [6235 psi] continuous and 480 bar [6960 psi] peak. If two motors are connected in series, total working pressure P1+P2 must be limited to 700 bar max. [10150 psi].



#### **Case Drain Pressure**

Maximum permissible case drain pressure is 10 bar [145 psi]. A higher pressure can damage the main shaft seal or reduce its life.



#### **Output Shaft**

The table below is a guide to determine maximum permissible loads. Values are calculated in such a way to assure at least 80% of the bearing operating life where no external load is applied. The published values are related to loads applied in the middle of shaft and in the least favourable direction.

|                          | Displacement                              | 055                | 063*                       | 075                           | 090                              | 108                              | 125                              | 160                            | 180*                             |                                |                                |
|--------------------------|---|--------------------|----------------------------|-------------------------------|----------------------------------|----------------------------------|----------------------------------|--------------------------------|----------------------------------|--------------------------------|--------------------------------|
|                          | Radial load (F <sub>q max</sub> )         | N<br>[lbf]         |                            | 9200 <sup>(*)</sup><br>[2068] | 10300 <sup>(*)</sup><br>[2317.5] | 11500 <sup>(*)</sup><br>[2587.5] | 12900 <sup>(*)</sup><br>[2902.5] | 13600 <sup>(*)</sup><br>[3060] | 15900 <sup>(*)</sup><br>[3577.5] | 18400 <sup>(*)</sup><br>[4140] | 20600 <sup>(*)</sup><br>[4635] |
| Fq<br>±Fax<br>X/2<br>X/2 | Load                                      | N/bar<br>[lbf/psi] |                            | 25<br>[0.375]                 | 30<br>[0.45]                     | 25.7<br>[0.386]                  | 28.5<br>[0.428]                  | 35<br>[0.525]                  | 37<br>[0.555]                    | 41<br>[0.615]                  | 45<br>[0.675]                  |
|                          | Axial pulling load (F <sub>ax max</sub> ) | N                  | 250 bar<br>[3625 psi]      | 1920<br>[432]                 | 2150<br>[484]                    | 2300<br>[517.5]                  | 2800<br>[630]                    | 2900<br>[652.5]                | 3300<br>[742.5]                  | 3800<br>[855]                  | 4050<br>[911.2]                |
|                          |   | [lbf]              | 350 bar<br>[5075 psi]      | 2650<br>[596]                 | 2990<br>[673]                    | 3550<br>[798.75]                 | 3800<br>[855]                    | 4050<br>[911.25]               | 4550<br>[1023.7]                 | 5300<br>[1192.5]               | 5800<br>[1305]                 |
|                          | Avial pushing load (F                     | N<br>[lbf]         | < 100 bar<br>[< 1450 psi]  | 800<br>[180]                  | 800<br>[180]                     | 1000<br>[225]                    | 1000<br>[225]                    | 1250<br>[281.25]               | 1250<br>[281.25]                 | 1600<br>[360]                  | 1600<br>[360]                  |
|                          |   | N/bar<br>[lbf/psi] | > 100 bar<br>[ > 1450 psi] | 9<br>[0.135]                  | 9<br>[0.135]                     | 12<br>[0.18]                     | 12<br>[0.18]                     | 13<br>[0.195]                  | 13<br>[0.195]                    | 17<br>[0.255]                  | 17<br>[0.255]                  |

\* Under Development

#### (\*)

Max permissibile radial force with "30" Output Shaft code (BAF7 055-063):

Fq max = 6500 N [1462.5 lbf]

Max permissibile radial force with "35" Output Shaft Code (BAF7 075-090):

Fq max = 6500 N [1462.5 lbf]

Max permissibile radial force with "40" Output Shaft Code (BAF7 108-125):

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Fq max = 6500 N [1462.5 lbf]

Max permissibile radial force with "45" Output Shaft Code (BAF7 160-180):

Fq max = 6500 N [1462.5 lbf]

### Specifications and Performance Technical Data

When an external side (radial) load is applied to the drive shaft, the bearing life will vary accordingly to the magnitude, location and direction of the load. The diagram shows how the bearing operating life varies versus the direction of the load. In the diagram 100% represents the bearing operating life where no external side load is applied to the drive shaft. The optimum direction is dependent on which port is pressurised.





The bearing operating life increases up to 30% when the load is applied in certain directions and the maximum increase is dependent on the operating pressure and the nominal size of the unit. When considering the permissible axial force, the force - transfer direction must be taken in account:

- Pushing axial loads increase the bearing life.
- Pulling axial loads reduce the bearing life (if possible pulling axial loads should be avoided).

#### Seals

Seals used on BAF7 series are of FKM (Fluoroelastomer). For applications with special fluids, contact Eaton.

#### Minimum rotating speed:

No limit to minimum speed; if uniformity of rotation is required, speed must not be less than 50 rpm. For lower speed operation, contact Eaton.

#### Installation

Mounting attitude for BAF7 units is unrestricted. These Bent Axis piston units have separate ports and drain chambers and so must always be drained.

#### **Flange-mounted valves**

Flange-mounted valves are available for motors both in open and closed loop.

#### Flushing valves

The motors can be equipped with flushing valves. To mount the flushing valve on motors, it is necessary to use a special port cover.

### Relation between direction of rotation and direction of flow

The relation between direction of rotation of shaft and direction of flow in BAF7 piston units is shown in the diagram below.



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### **Technical Data**

| Size                  |                           |                         |                        | 055              | <b>063</b> *     | 075               | 090               | 108               | 125               | 160               | 180*              |
|-----------------------|---------------------------|-------------------------|------------------------|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Displacement          |                           | Vg                      | cm³/rev<br>[in³/rev]   | 56.35<br>[3.437] | 63.26<br>[3.859] | 77.82<br>[4.747]  | 86.23<br>[5.26]   | 108.4<br>[6.612]  | 124.8<br>[7.613]  | 163.9<br>[9.998]  | 178.1<br>[10.864] |
| Max. pressure         | cont.                     | p <sub>nom</sub>        | bar<br>[psi]           | 430<br>[6235]    | 430<br>[6235]    | 430<br>[6235]     | 430<br>[6235]     | 430<br>[6235]     | 430<br>[6235]     | 430<br>[6235]     | 430<br>[6235]     |
|                       | peak                      | p <sub>max</sub>        | bar<br>[psi]           | 480<br>[6960]    | 480<br>[6960]    | 480<br>[6960]     | 480<br>[6960]     | 480<br>[6960]     | 480<br>[6960]     | 480<br>[6960]     | 480<br>[6960]     |
| Max. speed            | Motor (cont.)             | n <sub>o max</sub>      | rpm                    | 5000             | 5000             | 4500              | 4500              | 4000              | 4000              | 3600              | 3600              |
| Max. flow             | Motor                     | <b>q</b> <sub>max</sub> | L/min<br>[U.S. gpm]    | 282<br>[74.45]   | 316<br>[83.42]   | 350<br>[92.4]     | 388<br>[102.5]    | 433<br>[114.31]   | 500<br>[132]      | 590<br>[155.76]   | 641<br>[169.22]   |
| Max. power<br>at pnom | Motor                     | $P_{max}$               | kW<br>[hp]             | 202<br>[270.68]  | 226<br>[302.84]  | 251<br>[336.34]   | 278<br>[372]      | 310<br>[415.4]    | 358<br>[479.72]   | 423<br>[566.82]   | 459<br>[615.06]   |
| Torque costant        |                           | $T_{k}$                 | Nm/bar<br>[lbf·ft/psi] | 0.9<br>[0.045]   | 1<br>[0.05]      | 1.2<br>[0.06]     | 1.4<br>[0.07]     | 1.7<br>[0.085]    | 2<br>[0.1]        | 2.6<br>[0.13]     | 2.8<br>[0.14]     |
| Max. torque           | cont. (p <sub>nom</sub> ) | T <sub>nom</sub>        | Nm<br>[lbf·ft]         | 386<br>[284.48]  | 433<br>[319.12]  | 533<br>[392.82]   | 590<br>[435.13]   | 742<br>[546.85]   | 855<br>[630.13]   | 1122<br>[826.91]  | 1219<br>[898.40]  |
|                       | peak (p <sub>max</sub> )  | T <sub>max</sub>        | Nm<br>[lbf·ft]         | 431<br>[317.65]  | 484<br>[356.71]  | 595<br>[438.51]   | 659<br>[486.05]   | 829<br>[610.97]   | 954<br>[703.10]   | 1253<br>[923.46]  | 1361<br>[1003.06] |
| Moment of iner        | tia <sup>(3)</sup>        | J                       | kg·m²<br>[lbf∙ft²]     | 0.004<br>[0.094] | 0.004<br>[0.094] | 0.007<br>[0.1645] | 0.007<br>[0.1645] | 0.012<br>[0.2820] | 0.012<br>[0.2820] | 0.022<br>[0.5170] | 0.022<br>[0.5170] |
| Weight (3)            |                           | m                       | kg<br>[lbs]            | 19<br>[41.876]   | 19<br>[41.876]   | 23.7<br>[52.23]   | 23.7<br>[52.23]   | 35<br>[77.14]     | 35<br>[77.14]     | 48<br>[105.79]    | 48<br>[105.79]    |
| External drain flo    | OW <sup>(4)</sup>         | q <sub>d</sub>          | L/min<br>[U.S. gpm]    | 1.2<br>[0.317]   | 1.2<br>[0.317]   | 2.5<br>[0.66]     | 2.5<br>[0.66]     | 3<br>[0.79]       | 3<br>[0.79]       | 3<br>[0.79]       | 3<br>[0.79]       |

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| BAF7    | 055   | 3 | 30   | Ε  | 0  | В  | 0  | 00    | 0  | 0  | 0  | 00    | 0  | 00    | 0 00     | Α  | 0  | Α  |
|---------|-------|---|------|----|----|----|----|-------|----|----|----|-------|----|-------|----------|----|----|----|
|         |       | Ц | Ļ    | Ц  | Ц  | Ц  | Ц  | Ļ     | Ц  | Ц  | Ц  | Ц     | Ц  | Ц     | ЧĻ       | Ц  | Ц  | Ц  |
| 1,2,3,4 | 5,6,7 | 8 | 9,10 | 11 | 12 | 13 | 14 | 15,16 | 17 | 18 | 19 | 20,21 | 22 | 23,24 | 25 26,27 | 28 | 29 | 30 |

#### 1,2,3,4 Code Title

**BAF7** – Fixed displacement bent axis piston motor

5,6,7 Displacement

**055** - 56.35 cm<sup>3</sup>/r [3.437 in<sup>3</sup>/r] **063** - 63.26 cm<sup>3</sup>/r [3.859 in<sup>3</sup>/r]\* **075** - 77.82 cm<sup>3</sup>/r [4.747 in<sup>3</sup>/r] **090** - 86.23 cm<sup>3</sup>/r [5.26 in<sup>3</sup>/r] **108** - 108.4 cm<sup>3</sup>/r [6.612 in<sup>3</sup>/r] **125** - 124.8 cm<sup>3</sup>/r [7.613 in<sup>3</sup>/r] **160** - 163.9 cm<sup>3</sup>/r [9.968 in<sup>3</sup>/r] **180** - 178.1 cm<sup>3</sup>/r [10.864 in<sup>3</sup>/r]\*

#### 8 Mounting Type

3 - ISO 125 mm (055 and 063 Displacement Code)
4 - ISO 140 mm (075 and 090 Displacement Code)
5 - ISO 160 mm (108 and 125 Displacement Code)
6 - ISO 180 mm (160 and 180 Displacement Code)
C - SAE C 4 Bolt (055,063,075, and 090 Displacement Code)
D - SAE D 4 Bolt (108, 125, 160 and 180 Displacement Code)

#### 9,10 Output Shaft

**03** – 30mm straight keyed shaft (055 and 063 displacement code, 3 mount code)

**04** – 31.75mm [1.25 in] straight keyed shaft (055 and 063 displacement code, C mount code) **05** – 40mm straight keyed shaft (075 and 090 displacement code, 4 mount code)

**08** – 40mm straight keyed shaft (108 and 125 displacement code, 5 mount code)

**10** – 44.45mm straight keyed shaft(108,125,160 and 180 displacement code, d mount code) **06** – 45mm straight keyed shaft (108-125 displacement code, 5 mount code)

**11** – 45mm straight keyed shaft (160-180 displacement code, 6 mount code)

**07** – 50mm straight keyed shaft (160-180 displacement code, 6 mount code) **23** – 23 tooth splined shaft 16/32 dp (108, and 125 displacement code, D mount code)

**13** – 13 tooth splined shaft 8/16 dp (108,125, 160 and 180 displacement code, D mount code) **14** – 14 tooth splined shaft 12/24 dp (055, 063,075 and 090 displacement code, C mount code) **30** – 14 tooth W30 splined shaft per DIN 5480 (055 and 063 displacement code, 3 mount code) **35** – 16 tooth W35 splined shaft per DIN 5480 (055,063,075 and 090 displacement code,3 and 4 mount code)

**40** – 18 tooth W40 splined shaft per DIN 5480 (075,090, 108 and 125 displacement code, 4 and 5 mount code)

**45** – 21 tooth W45 splined shaft per DIN 5480 (108 and125 displacement code, 5 and 6 mount code)

**50** – 24 tooth W50 splined shaft per DIN 5480 (160-180 displacement code, 6 mount code)

#### 11 Main Ports

D – Rear ports - G 1 1/2 BSPP Oring port (108 and 125 displacement code, 5 mount code)
E – Opposite side ports - 3/4 code 62 split flange with M10 threads (055 and 063 displacement code, 3 mount code)
A – Opposite side and rear ports

G 1" BSPP (055-063 displace-

ment code, 3 mount code) **B** – Rear ports G 1" BSPP (055-

063 displacement code, 3 mount code)

**C** – Opposite side G 1" BSPP (055-063 displacement code, 3 mount code)

**F** – Opposite side ports - 1 code 62 SAE split flange with M12 bolts ( 075, and 090 displacement code, 4 mount code )

**G** – Opposite side ports - 1 1/4 code 62 split flange with M14 threads (108,125, 160 and 180 displacement code,5 and 6 mount code) J – Same side ports bottom - 3/4 code 62 with M10 threads (055 and 063 displacement code, 3 mount code)

**H** – Same side ports bottom -3/4 code 62 with 7/16-14 unc thds (055 and 063 displacement code, C mount code)

 $\mathbf{P}$  – Rear ports-3/4 code 62 with M10 threads (055 and 063 displacement code, 3 mount code)  $\mathbf{R}$  – Rear ports-3/4 code 62 with 7/16-14 UNC threads (055 and 063 displacement code, C mount code)

**K** – Same side ports bottom - 1 code 62 with M12 threads (075 and 090 displacement code,4 mount code)

**S** – Same side ports bottom - 1 code 62 with 7/16-14 threads (075 and 090 displacement code,C mount code)

L – Opposite side ports - 3/4 code 62 SAE split flange with 7/16-14 UNC thds (055 and 063 displacement code,C mount code)

**M** – Opposite side ports - 1 code 62 SAE split flange with 7/16-14 UNC thds bolts (075, and 090 displacement code,C mount code)

T – Rear ports- 1 code 62 with M12 threads (075 and 090 displacement code, 4 mount code)
U – Rear ports- 1 code 62 with 7/16-14 threads (075 and 090 displacement code, C mount code)

**N** – Opposite side ports - 1 1/4 code 62 SAE split flange 1/2-13 UNC thds(108,125,160 and 180 displacement code, D mount code)

V − Rear ports - 1 1/4 code 62 split flange with M14 threads (108,125, 160 and 180 displacement code,5 and 6 mount code)
W − Rear ports - 1 1/4 code 62 sae split flange 1/2-13 UNC thds(108,125,160 and 180 displacement code, D mount code) **1** – Same side ports bottom - 1 1/4 code 62 split flange with M14 threads (108,125, 160 and 180 displacement code,5 and 6 mount code)

**2** – Same side ports bottom - 1 1/4 code 62 SAE split flange 1/2-13 UNC thds(108,125,160 and 180 displacement code, D mount code)

12 **Direction of Rotation 0** – Reversible

<sup>13</sup> Seals

V - Fluorocarbon

#### <sup>14</sup> Valves

0 – No optional valving
3 – VCD/M pilot assisted overcentre valve 055, 063, 075 and 090 displacement code, available with same side bottom ports and rear ports, 3 and 4 mount code
1 – VCD/1 pilot assisted overcentre valve 055, 063, 075, 090, 108, 125, 160 and 180 displacement code, available with opposite side ports, 3, 4, 5, 6 mount code

**2** – VCD/2 pilot assisted overcentre valve 075, 090,108,125,160 and 180 displacement code, available with opposite side ports

**4** – VCR1 D/AF double acting overcentre valve 055, 063, 075 and 090 displacement code, available with same side bottom ports and rear ports code

#### 15,16 Control

**00** – No control - fixed displacement

#### **17** Control Pressure

0 – None - fixed displacement

18 **Control Orifice 0** – None



19 Control Special Features0 - None

#### 20,21 Min/Max Displacement

**00** – Fixed displacement per model code positions 4,5,6

#### 22 Valve Features

0 – Feature not necessary
1 – Setting range 30 to 350 bar
[435 to 5075 psi] [piloting ratio
6.2:1] "VCR1" valve code, valve not set, user to set valve per requirement

**2** – Setting range 0 to 350 bar [0 to 5075 psi] [piloting ratio 2.9:1] Control of rotation CW "VCD1" valve code, valve not set, user to set valve per requirement

**6** – Setting range 0 to 350 bar [0 to 5075 psi] [piloting ratio 2.9:1] Control of rotation CCW "VCD1" valve code, valve not set, user to set valve per requirement

**4** – Setting range 30 to 350 bar [435 to 5075 psi] [piloting ratio 6.2:1] Control of rotation CW "VCDM" valve code, valve not set, user to set valve per requirement

**5** – Setting range 30 to 350 bar [435 to 5075 psi] [piloting ratio 6.2:1] Control of rotation CCW "VCDM" valve code, valve not set, user to set valve per requirement

**3** – Setting range 250 to 500 bar [3625 to 7250 psi][piloting ratio 13:1] control of rotation CW "VCD2" valve code,valve not set, user to set valve per requirement

7 – Setting range 30 to 350 bar [435 to 5075 psi][piloting ratio 6.2:1] Control of rotation CCW"VCD2" valve code,valve not set, user to set valve per requirement

#### 23,24 Flushing Valves

**00** – None

**06** – VSC/F flushing valve -6 L/ min [1.58 U.S gpm] only available with opposite side ports and same side ports bottom configurations

**09** – VSC/F flushing valve -10.5 L/min [2.77 U.S gpm] only available with opposite side ports and same side ports bottom configurations

**15** – VSC/F flushing valve -15 L/ min [3.96 U.S gpm] only available with opposite side ports and same side ports bottom configurations

**21** – VSC/F flushing valve -20 L/ min [5.28 U.S gpm only available with opposite side ports and same side ports bottom configurations

#### **25** Additional Features

0 – No additional features

#### **26,27** Motor Special Features

#### **00** – None

- 01 SAE version with ISO ports
- **05** High pressure shaft seal
- 06 Motor with speed sensor

#### 28 Paint

0 – No paint

A – Primer blue

#### 29 Identification

0 – Eaton standard identification

#### 30 Design Code

**A**-A

### Dimensions ISO 4-Bolt Flange BAF7 055-063 "3" Mount Code

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[3,48]

₩ 3/4" SAE 6000

8

ø19

M10 Depth [0.708]

Detail C

147 [5,79]

3/4" SAE 6000

ø19 [ø0,748]

S1, S2: Drain ports (1 plugged) - G 1/2 (BSPP) A, B: Service line ports R: Air bleed (plugged) - G 1/8 (BSPP) "E" Port Code

215,3 [8,48]

50,012,0

168,8 [6,65]



"A" Port Code



137,8 [5,43]





#### "J" Port Code



#### "35" Output Shaft Code Splined Shaft



"03" Output Shaft Code Parallel Keyed Shaft







### **Dimensions ISO 4-Bolt Flange** BAF7 075-090 "4" Mount Code

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S1, S2: Drain ports (1 plugged) - G 1/2 (BSPP) A, B: Service line ports R: Air bleed (plugged) - G 1/8 (BSPP)



"F" Port Code

"T" Port Code





#### "K" Port Code



#### "35" Output Shaft Code **Splined Shaft**



"05" Output Shaft Code **Parallel Keyed Shaft** 



"40" Output Shaft Code Splined Shaft



### **Dimensions ISO 4-Bolt Flange** BAF7 108-125 "5" Mount Code

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S1, S2: Drain ports (1 plugged) - G 1/2 (BSPP) A, B: Service line ports R: Air bleed (plugged) - G 1/8 (BSPP)



#### "G" Port Code

"D" Port Code



#### "V" Port Code

"1" Port Code



#### "08" Output Shaft Code **Parallel Keyed Shaft**

Key 0.47x0.31x2.48

120 [4,73]

[**ø1,574**‡8,8887

**\$40**10.002

28 [1,10]

43 [1,69] M12

"06" Output Shaft Code **Parallel Keyed Shaft** 

Key 0.55x0.35x2.48 **a1,771** #88887 48,5 [1,91] M16 Ø45+0.008 36 [1,42] 120 [4,73]

#### "40" Output Shaft Code **Splined Shaft**



#### "45" Output Shaft Code **Splined Shaft**



### Dimensions ISO 4-Bolt Flange BAF7 160-180 "6" Mount Code

# Available from Cross Company | Hydraulics Group 336.856.6985

S1, S2: Drain ports (1 plugged) - G 3/4 (BSPP) A, B: Service line ports R: Air bleed (plugged) - G 1/8 (BSPP)



"G" Port Code

"V" Port Code



#### "1" Port Code



"11" Output Shaft Code Parallel Keyed Shaft



"07" Output Shaft Code Parallel Keyed Shaft



"45" Output Shaft Code Splined Shaft



#### **"50" Oustput Shaft Code** Splined Shaft



### Dimensions SAE C 4-Bolt Flange Available from Cross Company | Hydraulics Group BAF7 055-063 "C" Mount Code <sup>336.856.6985</sup>

S1, S2: Drain ports (1 plugged) - 1" 1/16-12 UN 2B A, B: Service line ports

R: Air bleed (plugged) - 7/16"-20 UNF



#### "L" Port Code

"R" Port Code



#### "H" Port Code



#### "04" Output Shaft Code Parallel Keyed Shaft



"14" Output Shaft Code Splined Shaft



### Dimensions SAE C 4-Bolt Flange BAF7 075-090 "C" Mount Code

# Available from Cross Company | Hydraulics Group 336.856.6985

S1, S2: Drain ports (1 plugged) - 1" 1/16-12 UN 2B A, B: Service line ports R: Air bleed (plugged) - 7/16"-20 UNF



"M" Port Code

"U" Port Code



#### "S" Port Code



#### "14" Output Shaft Code Splined Shaft



# Dimensions SAE D 4-Bolt Flange Available from Cross Company | Hydraulics Group 108-125 "D" Mount Code 336.856.6985

S1, S2: Drain ports (1 plugged) - 1" 1/16-12 UN 2B A, B: Service line ports

R: Air bleed (plugged) - 7/16"-20 UNF



"N" Port Code



"2" Port Code



"10" Output Shaft Code



"23" Output Shaft Code



D.P. 8/16 Z13 ANSI B92.1 a 1976



### Dimensions SAE C 4-Bolt Flange BAF7 160-180 "D" Mount Code

Available from Cross Company | Hydraulics Group 336.856.6985

S1, S2: Drain ports (1 plugged) - 1" 3/16-12 UN 2B A, B: Service line ports R: Air bleed (plugged) - 7/16"-20 UNF



"N" Port Code

"W" Port Code



"2" Port Code



"10" Output Shaft Code Parallel Keyed Shaft



"13" Output Shaft Code Splined Shaft





|         | 055-063   | 075-090   | 108-125   | 160-180   | 055-063   | 075-090   | 108-125   | 160-180   |
|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|         | "3″ Mount | "4" Mount | "5″ Mount | "6″ mount | "C″ Mount | "C″ Mount | "D" Mount | "D″ Mount |
| A       | 41.7      | 37.5      | 41.9      | 42.5      | 41.7      | 37        | 42.9      | 42.5      |
| mm [in] | [1.64]    | [1.47]    | [1.65]    | [1.67]    | [1.64]    | [1.45]    | [1.69]    | [1.67]    |
| B       | 161.2     | 177       | 207.4     | 222.8     | 184.8     | 200.8     | 240.8     | 254.9     |
| mm [in] | [6.35]    | [6.99]    | [8.16]    | [8.77]    | [7.27]    | [7.87]    | [9.48]    | [10.03]   |

Output signal electronic tacho



Number of pulses per revolution = 14 Inductive principle Output current PNP Voltage 10-65 V d.c. Max load 300 mA Max frequency 10000 Hz Temperature range -25°C +85°C Enclosure IP 67 Available versions: • Sensor with 2 metres three wires cable (cod. 424.0050.0000)

The sensor can be assembled only at S1 drain port

#### **Opposite Side Ports**



Same Side Bottom Ports



|         |                | 055-063<br>"3″ Mount | 075-090<br>"4" Mount | 108-125<br>"5″ Mount | 160-180<br>"6″ mount | 055-063<br>"C" Mount | 075-090<br>"C" Mount | 108-125<br>"D" Mount | 160-180<br>"D″ Mount |
|---------|----------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| A       | Opp Side ports | 245.7                | 259.4                | 294.3                | 319.6                | 269.8                | 283.5                | 326.4                | 351.7                |
| mm [in] |                | [9.67]               | [10.21]              | [11.58]              | [12.58]              | [10.62]              | [11.16]              | [12.85]              | [13.85]              |
| B       | Opp side Ports | 152.8                | 159.1                | 179.9                | 199.1                | 152.8                | 159.1                | 179.8                | 199.1                |
| mm [in] |                | [6.01]               | [6.26]               | [7.08]               | [7.84]               | [6.01]               | [6.26]               | [7.08]               | [7.84]               |
| A       | Same Side      | 239.2                | 258.8                | 298.8                | 313.2                | 263.3                | 282.9                | 330.8                | 345.3                |
| mm [in] | Bottom Ports   | [9.41]               | [10.18]              | [11.76]              | [12.33]              | [10.36]              | [11.13]              | [13.02]              | [13.59]              |
| B       | Same Side      | 193.6                | 205.2                | 218.2                | 231.7                | 193.6                | 205.2                | 218.2                | 231.7                |
| mm [in] | Bottom Ports   | 193.6                | [8.08]               | [8.59]               | [9.12]               | [7.62]               | [8.08]               | [8.59]               | [9.12]               |

### BAF7 (Gearbox Version)

Available from Cross Company | Hydraulics Group 336.856.6985

#### **General Information - Features**

BAF7 (Gearbox Version) series are a family of fixed displacement motors, bent axis piston design for operation in both open and closed circuit. BAF7 (Gearbox Version) series motors are mainly intended for installation in mechanical gearboxes such as track drive and winches gear boxes. The proven design incorporating the lens shaped valve plate, the high quality components and manufacturing tecniques make the BAF7 (Gearbox Version) series motors able to provide up to 430 bar [6235 psi] continuous and 480 bar [6960 psi] peak performance. Laboratory tested and field proven, these motors provide maximum efficiency and long life. Heavy duty bearings permit high radial and axial loads. Flange-mounted valves, both for open and closed circuit, enable BAF7 (Gearbox Version) series motors to meet the requirements of various types of applications.



### Specifications and Performance Technical Data

# Available from Cross Company | Hydraulics Group 336.856.6985

#### **Hydraulic fluids**

See page 34 for fluid related information

#### **Operating pressure**

The maximum permissible pressure on pressure ports is 430 bar [6235 psi] continuous and 480 bar [6960 psi] peak. If two motors are connected in series, total working pressure P1+P2 must be limited to 700 bar max. [10150 psi].



#### **Case drain pressure**

The service life of the shaft seal is influenced by the speed of rotation of the motor and by case pressure. It's recommended not to exceed the value of 10 bar [145 psi], at reduced speed please see the diagram. Instantaneous pressure spikes (t<0.1 sec) up to 15 bar [217.5 psi] are permitted.



#### **Output shaft**

Main shaft has bearings that can bear both radial and axial loads. For permissible load values, see page 6.

#### Seals

Seals used on standard BAF7 (GB) series axial piston motors are made by FKM seals (Fluoroelastomer). For Applications with special fluids, contact Eaton.

#### Minimum rotating speed

No limit to minimum speed; if uniformity of rotation is required, speed must not be less than 50 rpm. For lower speed operation, contact Eaton.

#### Installation

BAF7 (Gearbox) motors can be installed in various position and directions; however, installation in vertical position with shaft towards upper is not allowed. These axial piston units have separated ports and drain chambers and so must be always drained. For further detail see at General installation guidelines.

#### Flange-mounted valves:

Flange-mounted valves are available for motors both in open and closed loop. For more information see the catalogue Axial Valves.

#### **Flushing valves**

The motors can be equipped with flushing valves. The mount the flushing valve on motors, it is necessary to use a special port cover. For more information see the catalogue Axial Valves.

### Relation between direction of rotation and direction of flow

The relation between direction of rotation of shaft and direction of flow in BAF7 (Gearbox) piston units is shown in the picture below.



| Size                             |                              |                  |  | 055              | 063*             | 075               | 090               | 108               | 125               | 160*              | 180*              |  |
|----------------------------------|------------------------------|------------------|--|------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--|
| Displacement                     |                              | Vg               | cm <sup>3</sup> /rev<br>[in <sup>3</sup> /rev] | 56.35<br>[3.437] | 63.26<br>[3.859] | 77.82<br>[4.747]  | 86.23<br>[5.26]   | 108.4<br>[6.612]  | 124.8<br>[7.613]  | 163.9<br>[9.998]  | 178.1<br>[10.864] |  |
| May pressure                     | cont.                        | p <sub>nom</sub> | bar<br>[psi]                                   | 430<br>[6235]    |                  |                   |                   |                   |                   |                   |                   |  |
| Max. pressure                    | peak                         | p <sub>max</sub> | bar<br>[psi]                                   |                  |                  |                   | 48<br>[69         | 80<br>60]         |                   |                   |                   |  |
| Max. speed                       |                              | n <sub>max</sub> | rpm  | 5000             | 5000             | 4500              | 4500              | 4000              | 4000              | 3600              | 3600              |  |
| Max. flow                        |                              | q <sub>max</sub> | L/min<br>[U.S. gpm]                            | 282<br>[74.45]   | 316<br>[83.42]   | 350<br>[92.4]     | 388<br>[102.5]    | 433<br>[114.31]   | 500<br>[132]      | 590<br>[155.76]   | 641<br>[169.22]   |  |
| Max. power at p <sub>nom</sub>   |                              | P <sub>max</sub> | kW<br>[hp]                                     | 202<br>[270.68]  | 226<br>[302.84]  | 251<br>[336.34]   | 278<br>[372]      | 310<br>[415.4]    | 358<br>[479.72]   | 423<br>[566.82]   | 459<br>[615.06]   |  |
| Torque constant                  |                              | Τĸ               | Nm/bar<br>[lbf·ft/psi]                         | 0.9<br>[0.045]   | 1<br>[0.05]      | 1.2<br>[0.06]     | 1.4<br>[0.07]     | 1.7<br>[0.085]    | 2<br>[0.1]        | 2.6<br>[0.13]     | 2.8<br>[0.14]     |  |
| May targua                       | cont.<br>(p <sub>nom</sub> ) | T <sub>nom</sub> | Nm<br>[lbf·ft]                                 | 386<br>[284.48]  | 433<br>[319.12]  | 533<br>[392.82]   | 590<br>[435.16]   | 742<br>[546.85]   | 855<br>[630.13]   | 1122<br>[826.91]  | 1291<br>[898.40]  |  |
| Max. torque                      | peak<br>(p <sub>max</sub> )  | T <sub>max</sub> | Nm<br>[lbf·ft]                                 | 431<br>[317.65]  | 484<br>[356.71]  | 595<br>[438.51]   | 659<br>[486.05]   | 829<br>[610.97]   | 954<br>[703.10]   | 1253<br>[923.46]  | 1361<br>[1003.1]  |  |
| Moment of inertia <sup>(1)</sup> |                              | J                | kg·m²<br>[lbf·ft²]                             | 0.004<br>[0.094] | 0.004<br>[0.094] | 0.007<br>[0.1645] | 0.007<br>[0.1645] | 0.012<br>[0.2820] | 0.012<br>[0.2820] | 0.022<br>[0.5170] | 0.022<br>[0.5170] |  |
| Weight <sup>(1)</sup>            |                              | m                | kg<br>[lbs]                                    | 19<br>[41.876]   | 19<br>[41.876]   | 23.7<br>[52.23]   | 23.7<br>[52.23]   | 35<br>[77.14]     | 35<br>[77.14]     | 48<br>[105.79]    | 48<br>[105.79]    |  |
| Drainage flow <sup>(2)</sup>     |                              | q <sub>d</sub>   | L/min<br>[U.S. gpm]                            | 1.2<br>[0.317]   | 1.2<br>[0.317]   | 2.5<br>[0.66]     | 2.5<br>[0.66]     | 3<br>[0.79]       | 3<br>[0.79]       | 3<br>[0.79]       | 3<br>[0.79]       |  |

\* Under Development

(Theoretical values, without considering n<sub>hm</sub> e n<sub>v</sub>; approximate values). Peak operation must not exceed 1% of every minute. A simultaneous maximum pressure and maximum speed not recommended.

#### Notes:

<sup>(1)</sup> Approximate values.

 $^{\scriptscriptstyle (2)}$  Average values at 250 bar [3600 psi] with mineral oil at 45°C [113°F] and 35 cSt of viscosity.

| BAF7    | 055   | U | 30   | Ε ( | ) B  | 0  | 00    | 0                | 0  | 0            | 00    | 0  | 00    | 0 00     | Α  | 0  | A  |
|---------|-------|---|------|-----|------|----|-------|------------------|----|--------------|-------|----|-------|----------|----|----|----|
| 1,2,3,4 | 5,6,7 | 8 | 9,10 |     | 2 13 | 14 | 15,16 | <br> <br> <br>17 | 18 | <br> <br> 19 | 20,21 | 22 | 23,24 | 25 26,27 | 28 | 29 | 30 |

#### 1,2,3,4 Code Title

BAF7 – Fixed displacement bent axis piston motor

#### 5,6,7 Displacement

| <b>055</b> – 56.35 cm <sup>3</sup> /r [3.437 in <sup>3</sup> /r] |   |
|--|---|
| <b>063</b> – 63.26 cm <sup>3</sup> /r [3.859 in <sup>3</sup> /r] | * |
| <b>075</b> – 77.82 cm <sup>3</sup> /r [4.747 in <sup>3</sup> /r] |   |
| <b>090</b> – 86.23 cm <sup>3</sup> /r [5.26 in <sup>3</sup> /r]  |   |
| <b>108</b> – 108.4 cm <sup>3</sup> /r [6.612 in <sup>3</sup> /r] |   |
| <b>125</b> – 124.8 cm <sup>3</sup> /r [7.613 in <sup>3</sup> /r] |   |
| <b>160</b> – 163.9 cm <sup>3</sup> /r [9.968 in <sup>3</sup> /r] | * |
| 180 - 178.1 cm <sup>3</sup> /r [10.864 in <sup>3</sup> /r]       | 1 |
| * Under Development  |   |

#### 8 Mounting Type

U – Gearbox 2-Bolt hub dia 160mm (055 and 063 displacement code)

V – Gearbox 2-Bolt hub dia 190mm (075 and 090 displacement code)

W – Gearbox 2-Bolt hub dia 200mm (108,125,160 and 180 displacement code)

#### 9,10 Output Shaft

30 - 14 tooth W30 splined shaft per DIN 5480 (055 and 063 displacement code, U mount code) 35 – 16 tooth W35 splined shaft per DIN 5480 (055,063,075 and 090 displacement code, U and V mount code)

40 – 18 tooth W40 splined shaft per DIN 5480 (075,090, 108 and 125 displacement code, V and W mount code)

45 – 21 tooth W45 splined shaft per DIN 5480 (108 and 125 displacement code, W mount code) 50 - 24 tooth W50 splined shaft per DIN 5480 (160-180 displacement code, W mount code)\*

#### 11 Main Ports

E – Opposite side ports - 3/4 code 62 split flange with M10 threads (055 and 063 displacement code, U mount code) **F** – Opposite side ports - 1 code 62 SAE split flange with M12

bolts (075, and 090 displacement code, V mount code ) G – Opposite side ports - 1 1/4 code 62 split flange with M14 threads (108,125, 160 and 180 displacement code, W mount code)

J – Same side ports bottom - 3/4 code 62 with M10 threads (055 and 063 displacement code, U mount code)

K – Same side ports bottom - 1 code 62 with M12 threads (075 and 090 displacement code, V mount code)

1 - Same side ports bottom-1 1/4 code 62 split flange with M14 threads (108,125, 160 and 180 displacement code,W mount code)

#### 12 Direction of Rotation 0 - Reversible

13 Seals

#### V – Fluorocarbon

#### 14 Valves

0 – No optional valving

3 - VCD/M pilot assisted overcentre valve 055, 063, 075 and 090 displacement code, available with same side bottom ports and rear ports , U and V mount code 1 - VCD/1 pilot assisted overcentre valve 055, 063, 075, 090,108,125,160 and 180 displacement code, available with opposite side ports, U, V, W mount code

2 - VCD/2 pilot assisted overcentre valve 075, 090, 108, 125, 160 and 180 displacement code, available with opposite side ports U, V, W mount code **4** – VCR1 D/AF double acting overcentre valve 055, 063, 075 and 090 displacement code, available with same side bottom ports and U and V mount code

#### 15,16 Control

00 - No control - fixed displacement

#### **17** Control Pressure

0 - None - fixed displacement

**18** Control Orfice 0 - None

19 Control Special Features 0 – None

#### 20,21 Min/Max Displacement

00 - Fixed displacement per model code positions 4,5,6

#### 22 Valves Feature

0 – Feature not necessary 1 - Setting range 30 to 350 bar [435 to 5075 psi][piloting ratio 6.2:1] "VCR1" valve code, valve not set, user to set valve per requirement

2 – Setting range 0 to 350 bar [0 to 5075 psi][piloting ratio 2.9:1] Control of rotation CW "VCD1' valve code, valve not set, user to set valve per requirement

6 - Setting range 0 to 350 bar [0 to 5075 psi][piloting ratio 2.9:1] Control of rotation CCW "VCD1" valve code, valve not set, user to set valve per requirement 4 - Setting range 30 to 350 bar [435 to 5075 psi][piloting ratio 6.2:1] Control of rotation CW

"VCDM" valve code, valve not set, user to set valve per requirement

5 – Setting range 30 to 350 bar [435 to 5075 psi][piloting ratio 6.2:1] Control of rotation CCW "VCDM" valve code, valve not set, user to set valve per requirement

**3** – Setting range 250 to 500 bar [3625 to 7250 psi][piloting ratio 13:1] control of rotation CW "VCD2" valve code,valve not set, user to set valve per

requirement

7 - Setting range 30 to 350 bar [435 to 5075 psi][piloting ratio 6.2:1] Control of rotation CCW"VCD2" valve code,valve not set, user to set valve per requirement

#### 23,24 Flushing Valves 00 - None

06 - VSC/F flushing valve -6 L/ min [1.58 U.S gpm] only available with opposite side ports and same side ports bottom configurations

09 – VSC/F flushing valve -10.5 L/min [2.77 U.S gpm] only available with opposite side ports and same side ports bottom configurations

15 - VSC/F flushing valve -15 L/ min [3.96 U.S gpm] only available with opposite side ports and same side ports bottom configurations

21 - VSC/F flushing valve -20 L/ min [5.28 U.S gpm only available with opposite side ports and same side ports bottom configurations

#### **25** Additional Features 0 – No additional features

#### **26,27** Motor Special Features

- 00 None
- 04 Drain plugs reversed
- 06 Motor with speed sensor

#### 28 Paint

- 0 No paint
- A Primer blue

#### <sup>29</sup> Identification

0 - Eaton standard identification

30 Design Code **A** – A

# Dimensions 2-Bolt FlangeAvailable from Cross Company | Hydraulics Group<br/>336.856.6985BAF7(GB) 055-063 "U" Mount Code

S1, S2: Drain ports - G 1/2 (BSPP) A, B: Service line ports





#### "J" Port Code





#### "30" Output Shaft Code Splined Shaft



"35" Output Shaft Code Splined Shaft



Maximum working pressure for 063 displacement: 300 bar [4350 psi]

# Available from Cross Company | Hydraulics GroupDimensions 2-Bolt Flange336.856.6985BAF7(GB) 075-090 "V" Mount Code

## S1, S2: Drain ports - G 1/2 (BSPP)







#### "K" Port Code

"F" Port Code





#### "35" Output Shaft Code Splined Shaft



#### "40" Output Shaft Code Splined Shaft



#### Maximum working pressure for 090 displacement: 300 bar [4350 psi]

# Available from Cross Company | Hydraulics Group 336.856.6985

### Dimensions 2-Bolt Flange 3 BAF7(GB) 108-125 "W" Mount Code

S1, S2: Drain ports - G 1/2 (BSPP) A, B: Service line ports







#### "40" Output Shaft Code Splined Shaft



Maximum working pressure for 125 displacement: 300 bar [4350 psi]

"45" Output Shaft Code Splined Shaft



### Available from Cross Company | Hydraulics Group 336.856.6985

### Dimensions 2-Bolt Flange BAF7(GB) 160-180 "W" Mount Code





Maximum working pressure for 180 displacement: 300 bar [4350 psi]

172,8 [6,80]

36 [1.41] 42 [1.65] M16 \$49,8

44 [1,73]

177,8 [7,00]

### Motor Special Features Speed Sensor



|         | BAF7(GB) 055-063 | BAF7(GB) 075-090 | BAF7(GB) 108-125 | BAF7(GB) 160-180 |
|---------|------------------|------------------|------------------|------------------|
| A       | 103              | 104              | 124              | 141              |
| mm [in] | [4.05]           | [4.09]           | [4.88]           | [5.55]           |
| В       | 44.5             | 40               | 42               | 41.7             |
| mm [in] | [1.75]           | [1.57]           | [1.65]           | [1.64]           |





Number of pulses per revolution = 14 Inductive principle Ouput current PNP Voltage 10-65 V d.c. Max load 300 mA Max frequency 10000 Hz Temperature range -25°C +85°C Enclosure IP 67 Available versions: • Sensor with 2 metres three wires cable (cod. 424.0050.0000)

The sensor can be assembled at S1 drain location.

#### Same Side Bottom Ports Port Cover



**Opposite Side Ports Port Cover** 



|         |                     | BAF7(GB) 055-063 | BAF7(GB) 075-090 | BAF7 (GB) 108-125 | BAF7(GB) 160-180 |
|---------|---------------------|------------------|------------------|-------------------|------------------|
| A       | Opposite Side Ports | 185.8            | 182.2            | 211.8             | 236.8            |
| mm [in] |                     | [7.31]           | [7.17]           | [8.33]            | [9.32]           |
| B       | Opposite Side Ports | 152.8            | 159.3            | 179.9             | 199.9            |
| mm [in] |                     | [6.01]           | [6.27]           | [7.08]            | [7.87]           |
| A       | Same Side Ports     | 178              | 181              | 216.5             | 223.4            |
| mm [in] |                     | [7.01]           | [7.12]           | [8.52]            | [8.79]           |
| B       | Same Side Ports     | 194              | 205              | 218               | 231.7            |
| mm [in] |                     | [7.64]           | [8.07]           | [8.58]            | [9.12]           |

### Motor Special Features Drain Plugs Reversed

# Available from Cross Company | Hydraulics Group 336.856.6985

For the BAF7(GB) motors it is possible to request the drain plug reversed compared to standard. For the reverse configuration specify '04' in positions 26 and 27 of the model code.



S1 - Metallic plug. S2 - Plastic plug.



S1 - Plastic plug. S2 - Metallic plug.

Drain plugs reversed "04" Version

### Flushing Valve Model Code Pos. 23-24

# Available from Cross Company | Hydraulics Group 336.856.6985

The VSC flushing valve allows an oil cooling action, which is recommended when operating at high speed and power. The unit consists of a 3-way spool valve which allows a small oil flow from the low pressure side of the circuit into the case of the motor via an internal connection. For correct operation it is necessary to connect the drain port of the motor to tank.

| Description   | Theoritical Flow (391 psi) | Orifice Diameter |
|---------------|----------------------------|------------------|
| VSC-06F Valve | 6 L/min [1.5 US gpm]       | 1.5 mm [0.05 in] |
| VSC-09F Valve | 10.5 L/min [2.7 US gpm]    | 2 mm [0.07 in]   |
| VSC-15F Valve | 15 L/min [3.9 US gpm]      | 2.5 mm [0.09 in] |
| VSC-21F Valve | 20 L/min [5.2 US gpm]      | 3.3 mm [0.12 in] |
|               |                            |                  |



\*Dimensions shown above are only for VSC-06F valve and may vary based on the flow required.

### Pilot Assisted Overcentre Valves Model Code Pos. 14

The pilot assisted overcentre valves prevent the motor from "running ahead" pulled by a driving load and allow cavitation free operation. The relief section limits the pressure shocks. These valves incorporate also a shuttle valve to release the fail safe brake. The setting pressure value must be approx. 1.3 times the load induced pressure. To allow the descent of the load, a minimum pilot pressure must be supplied to the control valve. This is usually determined with the following formula:

$$\mathsf{PP} = \frac{\mathsf{PS} - \mathsf{PL}}{\mathsf{R} + 1}$$

Where:

PP = pilot pressure

- PS = pressure setting of relief valve section
- PL = load induced pressure
- R = piloting ratio





# Available from Cross Company | Hydraulics Group 336.856.6985

### Pilot Assisted Overcentre Valves Model Code Pos. 14

Alluminium Alloy Casing





**Corrosion Protected** 



| BAF7    | A mm   | B mm   | C mm   | D mm   | E mm   | F mm   | G mm   | H mm    | l mm    | J mm   | K mm   | L mm   | M mm   | N mm    | O mm    | P mm   |
|---------|--------|--------|--------|--------|--------|--------|--------|---------|---------|--------|--------|--------|--------|---------|---------|--------|
|         | [in]    | [in]    | [in]   | [in]   | [in]   | [in]   | [in]    | [in]    | [in]   |
| 055/063 | 183    | 90     | 47     | 26     | 95     | 36     | 65     | 11      | 50.8    | 23.8   | G 3/4  | 45     | 69     | 24.2    | 13      | 3.5    |
|         | [7.20] | [3.54] | [1.85] | [1.02] | [3.74] | [1.41] | [2.55] | [0.433] | [2.000] | [0.93] | (BSPP) | [1.77] | [2.71] | [0.952] | [0.511] | [7.71] |
| 075/090 | 198    | 100    | 47     | 26     | 110    | 36     | 75     | 13.4    | 57.2    | 27.8   | G 1"   | 45     | 69     | 26.8    | 12      | 4.2    |
|         | [7.79] | [3.93] | [1.85] | [1.02] | [4.33] | [1.41] | [2.95] | [0.527] | [2.251] | [1.09] | (BSPP) | [1.77] | [2.71] | [1.055] | [0.472] | [9.26] |

### Pilot Assisted Overcentre Valves Dimensions Model Code Pos. 14 Available

# Available from Cross Company | Hydraulics Group 336.856.6985

Steel Casing

Valve is supplied with screws, o-rings and flange



### Pilot Assisted Overcentre Valves Dimensions Model Code Pos. 14

Steel Casing

Valve is supplied with screws and O-rings.



### Double Acting Overcentre Valve Model Code Pos 14

# Available from Cross Company | Hydraulics Group 336.856.6985





VCR1 D/AF

Aluminium alloy casing Corrosion protected

 Piloting ratio
 6.2:1

 Setting range
 30 to 350 bar [435 to 5075 psi]

 Standard setting (Q=5 L/min[1.32 U.S. gpm])
 150 to170 bar [2175 to 2465 psi]

|         | Α            | В             | С             | D               | E               | F             | G              |              |        |                |
|---------|--------------|---------------|---------------|-----------------|-----------------|---------------|----------------|--------------|--------|----------------|
| BAF7    | mm [in]      | mm [in]       | mm [in]       | mm [in]         | mm [in]         | mm [in]       | mm [in]        | V1-V2        | O-RING | Weight kg [lb] |
| 055/063 | 59<br>[2.32] | 13<br>[0.511] | 19<br>[3.54]  | 23.8<br>[0.937] | 50.8<br>[2.000] | 75<br>[2.952] | 42.1<br>[1.65] | G 3/4 (BSPP) | 2-119  | 4.7<br>[10.4]  |
| 075/090 | 69<br>[2.71] | 12<br>[0.472] | 100<br>[3.93] | 27.8<br>[1.094] | 57.2<br>[2.251] | 84<br>[3.307] | 34.4<br>[1.35] | G 1" (BSPP)  | 2-123  | 4<br>[8.81]    |

### Application Information Fluid and Filtration Guidelines

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#### **Types of Fluid**

The table below shows the main categories of hydraulic fluid as referenced in ISO 6743-4. Under normal operating conditions, Eaton Hydraulics recommends mineral oil-based fluids with anticorrosive and anti-wear additives (HM or HV) for its bent-axis piston units. Flame resistant fluids (HF grade) and organic fluids (HE grade) may not be fully compatible with materials and may therefore reduce the maximum pressure and speed specification of Bent Axis piston units. Customers are advised to contact Eaton Hydraulics before using flameresistant or organic fluids.

#### Viscosity

The optimum viscosity of the hydraulic fluid at normal system operating temperature (temperature of the tank for open circuits or temperature of the circuit for closed circuits) must fall between the minimum and maximum values shown below. The minimum viscosity shown is permitted in extreme conditions and for short intervals. The maximum viscosity for short intervals and during cold starts is shown below. The temperature of the fluid should not exceed a maximum of +90°C or minimum of -25°C.

### Viscosity Recommendation for Variable and Fixed Displacement Motors

| Optimum | 15-40 (cSt) |
|---------|-------------|
| Minimum | 10 (cSt)    |
| Maximum | 800 (cSt)   |

#### Viscosity grades

Under the ISO standard, hydraulic fluids are divided into 8 grades of viscosity. In order to choose the correct type of fluid, it is essential to know the operating temperature of the fluid (temperature of the tank for open circuits or temperature of the circuit for closed circuits). At normal system operating temperature, the viscosity of the fluid must fall within the optimum viscosity range above.

#### **Contamination Grades**

Efficient filtering is essential for hydraulic systems to operate properly. A good quality fluid extends the working life of hydraulic parts and makes the system more reliable.

#### **Filtering Grade**

ISO 4572 states that the filtering ratio  $\beta x$  is the ratio of the number of particles greater than given size upstream of test filter divided by number of particles of same size downstream. The grade  $\beta x$  therefore gives a good indication of the quality of the filter.

**Example:** A filter with a filtering ratio of  $\beta 20 \ge 100$  is able to capture 99% of particles greater than or equal to 20  $\mu$ m. Eaton Hydraulics recommends filters with the following Bx ratios for its Bent Axis piston motors:

#### Maximum Contamination

| Grades        |                         | <b>ISO</b><br>21/19/16                                   |  |  |  |  |  |
|---------------|-------------------------|--|--|--|--|--|--|
| Fixed Bent Ax | is Motors               |  |  |  |  |  |  |
| Ratio ßX      | Filtering<br>Efficiency | Notes  |  |  |  |  |  |
| 2             | 50%                     | Average size of filter pores equal to smallest particles |  |  |  |  |  |
| 20            | 95%                     | Normal retention   |  |  |  |  |  |
| 100           | 99%                     | Absolute retention                                       |  |  |  |  |  |

#### Bent Axis Design Motors: Flushing the Bearings

The operating temperature influences the operating life of the bearings to a significant degree. As a result it is essential to maintain oil temperature at the bearings at acceptable levels. These units are designed to allow flushing the shaft bearings by utilizing the optional flushing valve. Flushing is recommended where motors are installed vertically and where operating cycles display long periods at high pressure (> 250 bar).

### Application Information Installation Guidelines

#### Installation Guidelines

The following installation guidelines for Eaton Bent Axis piston motors are designed for standard components applied within catalog ratings. Observing these guidelines below will help ensure acceptable life of the motors.

#### 1. Filling the Case

The case of bent axis piston motors must be pre-filled with hydraulic oil before the system is started for the first time.

Use the case drain connection at the highest point to ensure the case remains full at all times. See figure below.

**Caution:** Starting the motor with little or no oil in the case causes immediate and permanent damage to the piston unit.

#### 2. Connections

To reduce noise levels, flexible hoses are recommended (Main system pressure lines as well as case drain lines).

Case drain hoses should be as short as possible.

Minimize pressure drops due to couplings, elbows and differences in diameter.

Where non-flexible tubes are used, ensure that the pipes do not pull on the cover of the motor.

All hoses connected to tank (case drain lines) should be immersed at least 200 mm [8 in.] below the minimum oil level and at least 150 mm [6 in.] from the bottom of the tank.

#### **Drive Shaft**

Take special care to ensure that mechanical parts of the motor are coupled correctly. Ensure that the shaft and flange are lined up accurately to prevent additional loads on the shaft bearings. Flexible couplings should be used.

**Caution:** incorrectly aligned parts significantly reduce the service life of the bearings.











### Application Information Installation Guidelines (Cont...)

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#### **Installation Position**

Motors may be installed both above and below the level of the fluid in the tank. (lowest level of the oil when the system is operating). When motors are used in open circuit applications, the oil level is affected by the number and size of any hydraulic cylinders used in the system. For mobile installations it is important to take into account the slope of the ground and the effect of centrifugal forces on the oil level.

#### Installation Above the Tank

Particular care should be taken when installing units above the tank. Special case drain hoses must always be used to prevent the case from being siphoned out.

Always use the highest case drain port available and ensure that the line is designed such that the motor case remains full at all times.

It is recommended to position a pre-loaded check valve in the cased drain line (maximum pressure when open: 0.5 bar [8 psi]) to prevent oil from draining from the motor case when the system is not in use. The oil level of the units should be checked at regular intervals. It is essential to check the level if the system is out of service for extended periods of time, since the force of gravity causes oil to drain from the case.

#### Installation Below the Tank

Installation below the minimum level of the fluid (or immersed in fluid) does not create particular problems. Gearbox mount motors should not be installed vertically with the shaft turned upwards.

#### Flushing

If Bent Axis piston motors are to be installed with shaft turned upwards, or run at high oil temperature inside the tank (>50° C), or if units are used for a long operation time at high pressures(>250 bar), it is recommended to flush the motor with the optional flushing valve (model code position 23,24) and selecting the desired flow rate.







### Application Information Installation Guidelines (Cont...)

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#### System Start-up

Before starting system for the first time, fill system components with new and filtered oil. In addition, clean the reservoir and fill with the same type of oil. We recommend flushing the circuit. Verify that charge pressure is correct (closed circuits). Check reservoir level and top-off if necessary.

#### **Closed Circuit Cleaning Procedure**

Hydrostatic transmission circuits must be cleaned without load for a period of one hour. Afterwards, remove system pressure hoses from port connections A and B on the motor and connect them together so as to short circuit the pump. Insert a filter in series (working pressure: 50 bar [750 psi]) on the connection A of the pump. Make sure the direction of rotation of the pump ensures the flow as shown by the arrows. If necessary insert a nonreturn valve. A 10  $\mu$ m filter in series is recommended.

#### Maintenance

Replace system filters after the first 50 hours of operation, and then every 500 hours. Change oil after first 500 hours of operation. Subsequently change oil every 2,000 hours. Maintenance intervals should be reduced when the filter indicator shows that the filter is dirty or when the system is operated in an especially dusty environment.



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