

Bent Axis Piston Motor
Variable Displacement

BAV7

Peak Pressure 480 bar (7000 psi)
Displacement 81-112-160 cm³/r (6.8-10 in³/r)



Danfoss

BC431055166792en-000101

Table of Contents

General Overview BAV7	4
Specifications and Performance Technical Data	5
Model Code	6
Control Options: Model Code 14, 15	
Working Pressure – PA	7
Working Pressure – PB	8
Hydraulic Two Position – HT	9
Hydraulic Two Position with Pressure Override – HV	10
Electric Two Position – ET	11
Electric Two Position with Pressure Override – EV	12
Hydraulic Proportional – HP	13
Hydraulic Proportional with Pressure Override – HR	14
Electric Proportional – EP	15
Electric Proportional with Pressure Override – ER	16
Dimensions – Mounting Flange	
ISO and SAE Mounting Flange 081	17
Dimensions – Mounting Flange	
ISO and SAE Mounting Flange 112	18
Dimensions – Mounting Flange	
ISO and SAE Mounting Flange 160	19
Dimensions – Shafts	
ISO Shaft Options	20
SAE Shaft Options	21
Dimensions – Controls	
ISO Mounting 081	22
SAE Mounting 081	24
Dimensions – Controls	
ISO Mounting 112	27
SAE Mounting 112	29
Dimensions – Controls	
ISO Mounting 160	32
SAE Mounting 160	35
Optional Features	38
Application Information	
Fluid and Filtration Guidelines	40
Installation Guidelines	41

Bent Axis Motor – BAV7



The new BAV7 series bent axis motors are designed for operation in both open and closed circuit. Incorporating the lens shaped proven design valve plate, high quality components and manufacturing techniques allow the BAV7 series motors to operate up at 430 bar (6235 psi) continuous and 480 bar (6960 psi) peak pressures. Fully laboratory tested and field proven, these motors provide maximum efficiency and long life even in the most demanding conditions. Heavy duty bearings permit high radial and axial loads. The versatile design includes a variety of control and mounting options that will adapt the BAV7 series motors to any industrial or mobile application.

A full range of options are available to tailor these units to your application needs. To optimize vehicle operating characteristics, an array of control options are available on variable displacement models; automatic, operator selectable, hydraulic pressure response and proportional, electric proportional, manual.

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

(Theoretical values, without considering η_{hm} , η_v ; approximate values). Peak operations must not exceed 1% of every minute. A simultaneous maximum pressure and maximum speed not recommended.

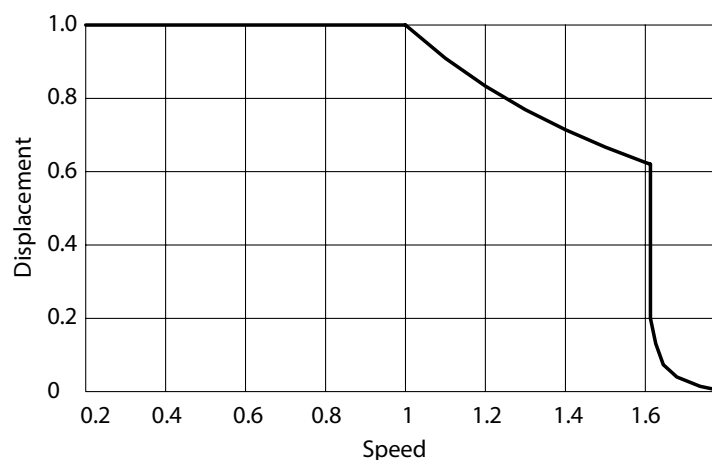
Size (BAV7)			061*	081	112	161
Displacement	Vgmax	cm ³ /rev	61	80.6	112.5	160.8
		(in ³ /rev)	(3.72)	(4.91)	(6.86)	(9.81)
	Standard Vgmin	cm ³ /rev	12.2	16	22	32.2
		(in ³ /rev)	(0.74)	(0.97)	(1.34)	(1.96)
	Optional (5) Vg0	cm ³ /rev			0	
		(in ³ /rev)			(0)	
Maximum Pressure	Continuous Phom	Bar			430	
		(psi)			(6235)	
	Peak Pmax	Bar			480	
		(psi)			(6960)	
Maximum Flow	qmax	l/min	271	322	382	500
		(US gpm)	(71.5)	(85)	(100.8)	(132)
Max speed at Vgmax (2)Vgmax	nmax	rpm	4450	4000	3400	3100
	Vgmin nmax lim	rpm	7000	6150	5600	5000
	Vg0 nmax	rpm	8350	7350	6300	5500
Specific Torque	Tk	Nm/bar	0.97	1.28	1.79	2.56
		(lb-ft/psi)	(0.04)	(0.06)	(0.09)	(0.13)
Max Power	Pmax	kW	194	231	273	330
		(hp)	(260)	(310)	(366)	(442)
Max Torque	Continuous Tnom	Nm	418	552	770	1101
	Pnom	(lb-ft)	(308)	(407)	(568)	(811)
	Peak Tmax	Nm	466	616	859	1230
	Pmax	(lb-ft)	(343)	(454)	(633)	(907)
Moment of Inertia	J	kg-m ²	0.005	0.009	0.0124	0.026
		(lb-ft ²)	(0.12)	(0.22)	(0.31)	(0.616)
Weight (3)	m	kg	28	36	47	63
		(lbs)	(62)	(79)	(104)	(139)
Drain flow (4)	qdl	l/min	3	4	5	5
		(US gpm)	(0.8)	(1.1)	(1.3)	(1.3)

* Under development

Notes

- 1 Maximum and minimum displacement can be changed in the field. When ordering, please state the Vgmax and Vgmin required.
- 2 Maximum speed can be increased by decreasing the displacement. Please use the chart below to determine maximum permissible speed.
- 3 Approximate values.
- 4 Maximum value at 250 bar (3625psi) with mineral oil at 45°C (113°F) and 35cSt viscosity.
- 5 Available with EX, EZ, HY, EP, HP controls with displacement setting 000. To use the motors in this condition, please contact Danfoss.

Maximum Allowable Speed



Model Code

The following 37 digit coding system has been developed to identify preferred feature options for the BAV7 Bent Axis Variable Displacement Axial-Piston Motor. Use this code to specify a motor with the desired features. All 37-digits of the code must be present to release a new product number for ordering.

BAV 7 XXX X X X XX X XX XX X X XX 00 V XXX XXX 00 00 X 1 A

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 31 32 33 34 35 36 37

1 2 3 4 CodeTitle
BAV7 - Variable Displacement Bent Axis Piston Motor

5 6 7 Displacement
061 - 60 cm³/r (3.72 in³/r)*
081 - 80.58 cm³/r (4.91 in³/r)
112 - 112 cm³/r (6.86 in³/r)
160 - 160 cm³/r (9.76 in³/r)

8 MountingType
C - SAE 4 bolt C (081 only)
G - ISO 4 bolt gearbox *
M - ISO 4 bolt
S - SAE D 4 bolt (112 & 160)

9 Output ShaftType
A - SAE13 Tooth splined shaft 8/16 DP (112 & 160)
B - SAE15 Tooth splined shaft 8/16 DP (160 only)
C - SAE27 Tooth splined shaft 16/32 DP (112 & 160)
D - 44.45 (1.75) Parallel keyed (112 & 16)
E - 45 (1.77) Parallel keyed (160 only)
F - W40x2x30x18 DIN5480
G - W45x2x30x21 DIN5480 (112 & 160)
H - W50x2x30x24 DIN5480 (160 only)
K - 40 (1.57) Parallel Keyed (112 only)
L - SAE 14 Tooth 12/24 DP (081 only)
M - W35x2x30x16 DIN5480 (081 only)
N - 35 (1.38) Parallel Keyed (081 only)

10 Ports
1 - Rear SAE Code 62 with M14 Threads
2 - Rear SAE Code 62 with .500 UNCThreads
3 - Side SAE Code 62 with M14 Threads
4 - Side SAE Code 62 with .500 UNCThreads

11 12 Control
EP - Electric Proportional
ER - Electric Proportional with Pressure Override
ET - Electric Two position

EV - Electric Two position with Pressure Override
HP - Hydraulic Proportional
HR - Hydraulic Proportional with Pressure Override
HT - Hydraulic Two Position
HV - Hydraulic Two Position with Pressure Override
PA - Working Pressure
PB - Working Pressure, High pressure

13 Electrical Features
0 - None
1 - 12 VDC (EP, ER, ET, EV Controls only)
2 - 24 VDC (EP, ER, ET, EV Controls only)

14 15 Pilot Pressure Setting
00 - None
05 - 5 bar [73 lbf/in²] (HP, HR Controls only)
10 - 10 bar [145 lbf/in²] (HP, HR Controls only)
15 - 15 bar [217 lbf/in²] (HP, HR Controls only)
20 - 20 bar [290 lbf/in²] (HP, HR Controls only)

16 17 Working Pressure Setting
ER, EV, HR, HV, PA Controls
00 - None
10 - 100 bar (1450 psi)
15 - 150 bar (2175 psi)
20 - 200 bar (2900 psi)
25 - 250 bar (3625 psi)
30 - 300 bar (4350 psi)
35 - 350 bar (5075 psi)
38 - 380 bar (5510 psi)
40 - 400 bar (5800 psi)

18 Displacement Bias
1 - Bias to Maximum (not available for PA & PB control option)
2 - Bias to Minimum (not available for ER, EV, HR & HV control option)

19 Control Orifice size
0 - 0.7 (0.027) (standard)
A - 0.4 (0.015) (not available for ER & HR)

20 21 Flushing Valve
00 - None
06 - 6 l/min (1.6 gpm) - 1.5mm (.05 in) Orifice
09 - 10.5 l/min (2.8 gpm) - 2.0mm (.07 in) Orifice
13 - 15 l/min (4.0 gpm) - 2.5mm (.09 in) Orifice
21 - 20 l/min (5.3 gpm) - 3.0mm (.11 in) Orifice

22 23 Flanged Valve
00 - None
24 Seals
V - Fluorocarbon (Viton * seals)

25 26 27 Maximum Displacement Setting
061 Model:
050 - 50 cm³/r [3.1 in³/r]
055 - 55 cm³/r [3.4 in³/r]
061 - 61 cm³/r [3.7 in³/r] (standard)
081 Model:
065 - 65 cm³/r [4.0 in³/r]
070 - 70 cm³/r [4.3 in³/r]
075 - 75 cm³/r [4.6 in³/r]
081 - 81 cm³/r [4.9 in³/r] (standard)
112 Model:
090 - 90 cm³/r [5.5 in³/r]
100 - 100 cm³/r [6.1 in³/r]
112 - 112 cm³/r [6.8 in³/r] (standard)
160 Model:
130 - 130 cm³/r [7.9 in³/r]
135 - 135 cm³/r [8.2 in³/r]
140 - 140 cm³/r [8.5 in³/r]
145 - 145 cm³/r [8.8 in³/r]
150 - 150 cm³/r [9.2 in³/r]
155 - 155 cm³/r [9.5 in³/r]
160 - 160 cm³/r [9.8 in³/r] (standard)

28 29 30 Minimum Displacement Setting
000 - 0 cm³/r [0 in³/r]
Model 061 only
012 - 12 cm³/r [0.7 in³/r]
015 - 15 cm³/r [0.9 in³/r]
Model 061, 081 only
020 - 20 cm³/r [1.2 in³/r]
Model 061, 081, 112 only

025 - 25 cm³/r [1.5 in³/r]
030 - 30 cm³/r [1.8 in³/r]
Model 061, 081, 112, 160
032 - 32 cm³/r [1.8 in³/r]
Model 081, 112, 160 only
035 - 35 cm³/r [2.1 in³/r]
040 - 40 cm³/r [2.4 in³/r] (standard for 081)
045 - 45 cm³/r [2.7 in³/r]
050 - 50 cm³/r [3.0 in³/r]
Model 112, 160 only
055 - 55 cm³/r [3.3 in³/r] (standard for 112)
Models 112, 160 only
060 - 60 cm³/r [3.7 in³/r]
065 - 65 cm³/r [3.9 in³/r]
070 - 70 cm³/r [4.3 in³/r]
075 - 75 cm³/r [4.6 in³/r]
Model 160
080 - 80 cm³/r [4.9 in³/r] (standard for 160)
085 - 85 cm³/r [5.2 in³/r]
090 - 90 cm³/r [5.5 in³/r]
095 - 95 cm³/r [5.8 in³/r]
100 - 100 cm³/r [6.1 in³/r]
105 - 105 cm³/r [6.4 in³/r]
110 - 110 cm³/r [6.7 in³/r]

31 32 Special Features
00 - No Special Features

33 34 Options
00 - No Motor Options

35 Paint
0 - No Paint
1 - Danfoss Blue Primer

36 Identification
1 - Danfoss

37 Design Code
A - Design Code A

* Under development
On request only

Control Options

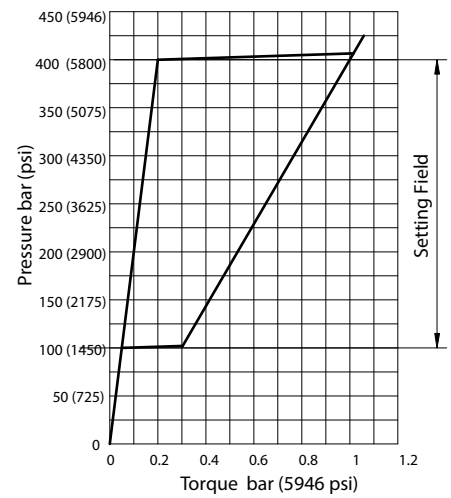
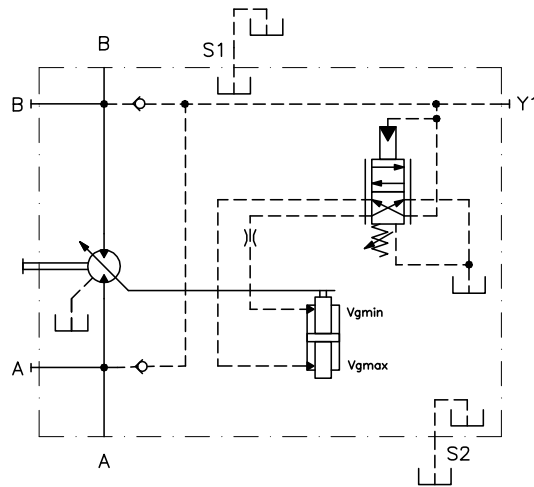
Model Code Position 14,15

Working Pressure – PA

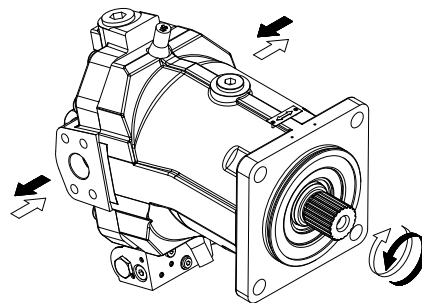
The working pressure control positions the motor displacement from $V_{g \min}$ to $V_{g \max}$ when the operating pressure rises beyond the preset operating pressure, so that the motor is at $V_{g \min}$ when min torque and max speed are required and at $V_{g \max}$ when max torque and

min speed are required. The operating pressure applies a force on the spool which is matched by an adjustable spring. The motor keeps the minimum displacement $V_{g \min}$ until the operating pressure reaches the set value (pressure setting). Once the preset pressure

rises beyond, the motor swivels from $V_{g \min}$ to $V_{g \max}$. The swivel range is from $V_{g \min}$ to $V_{g \max}$ displacement setting type 2 as per model code position 18). Start of control is adjustable between 100 and 400 bar (1450 and 5800 psi).



The relation between direction of rotation of shaft and direction of flow in the BAV7 motor is shown in the picture below.



Control Options

Model Code Position 14,15

Working Pressure – PB

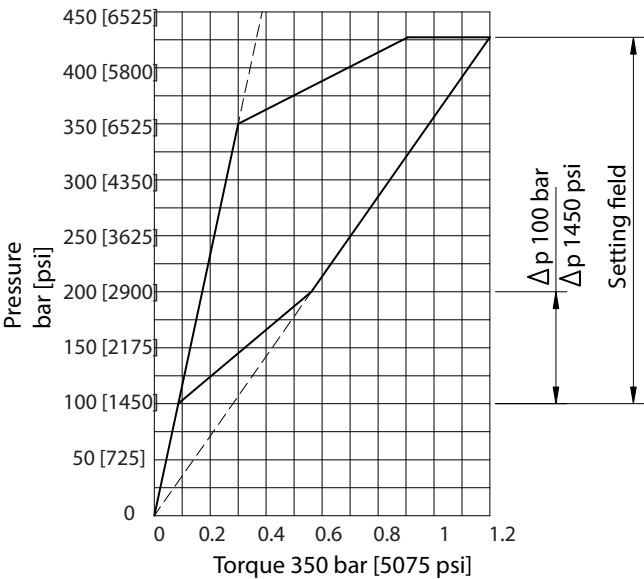
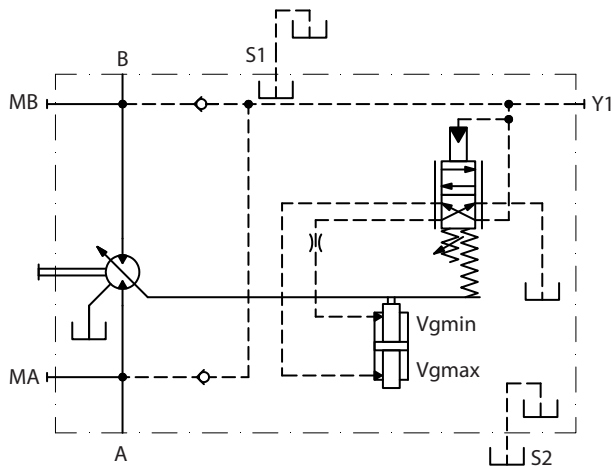
The PB control allows a larger pressure range for displacement variation in comparison to PA control. The increase of pressure range for variation from $V_{g\min}$ to $V_{g\max}$ allows a

smoother working of the motor during displacement variation. The PB allows the displacement variation with the pressure range shown in the table.

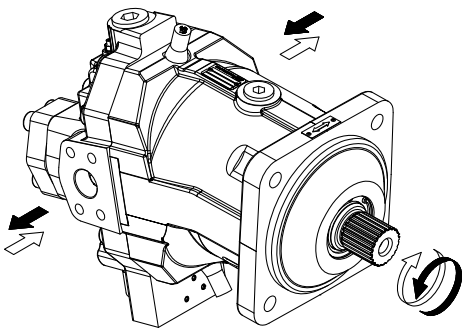
Δp bar [psi]	$P_{\min}$ bar [psi]	$P_{\max}$ bar [psi]
100 [1450]	100 [1450]	350 [5075]

Where:

- Δp is the working pressure range that allows the displacement variation.
- $P_{\min}$ is the minimum pressure at which displacement variation starting can be set.
- $P_{\max}$ is the maximum pressure at which displacement variation starting can be set.



The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



Warning: in case of displacement limitation, the control shall vary of a reduced Δp with respect to its standard one. Please contact Danfoss for more information.

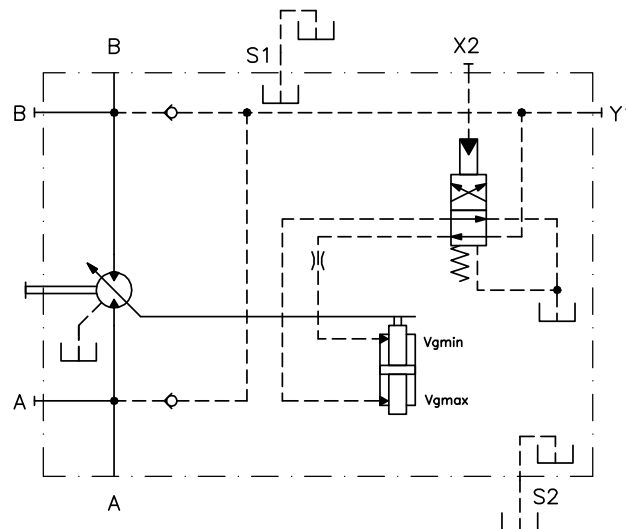
Control Options

Model Code Position 14,15

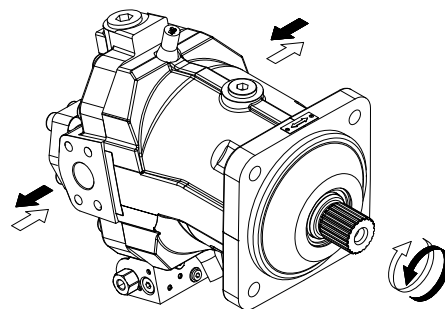
Hydraulic Two Position – HT

The hydraulic two positions control allows the displacement of the motor to be set to $V_{g \max}$ or $V_{g \min}$ by applying or not a pilot pressure at port X2. The feedback spring is missing so $V_{g \max}$ or $V_{g \min}$ only can be set. Minimum

required pilot pressure = 10 bar (145 psi) and maximum permissible pressure at port X2=100 bar (1450 psi). The swivel range is 1 or 2 (model code position 18).



The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



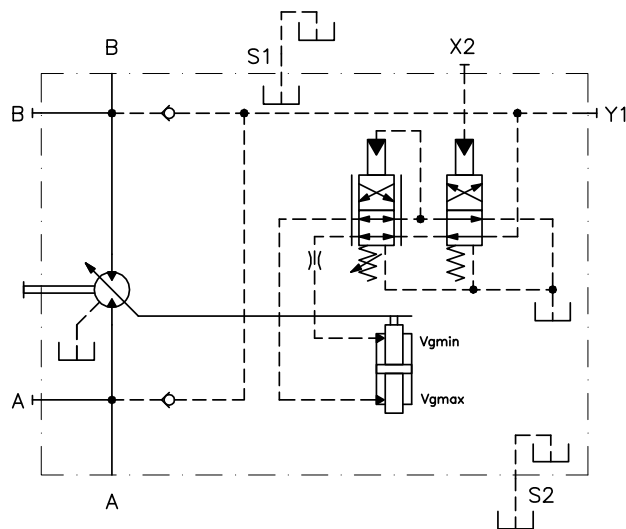
Control Options

Model Code Position 14,15

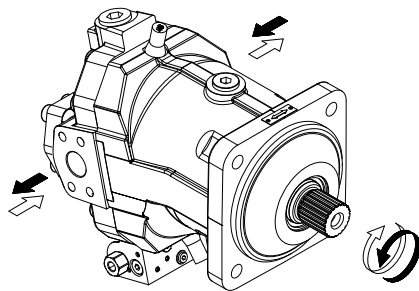
Hydraulic Two Position with Pressure Override – HV

The HV control version with the pressure override allows the motor to swivel to Vg_{max} when the pressure setting is reached. Same as 'HT' control, the motor displacement is adjusted to Vg_{min} when the pilot pressure applied at port X2. If the operating pressure

rises beyond the pressure setting, the pressure limiting device the motor swivels out to Vg_{max} . Swivel range is from Vg_{max} to Vg_{min} (model code position 18).



The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



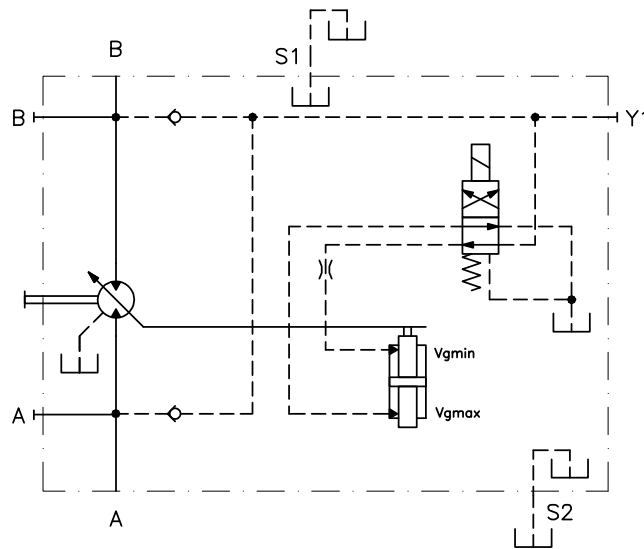
Control Options

Model Code Position 14,15

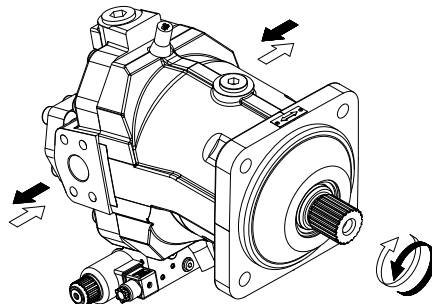
Electric Two Position – ET

The electric two position control allows the displacement of the motor to be set to $V_{g\max}$ or $V_{g\min}$ by switching an ON/OFF solenoid valve. The feedback spring is missing so $V_{g\max}$ or $V_{g\min}$ only can be set. 12V DC and

24V DC ON/OFF solenoid are available. The swivel range is 1 (from $V_{g\max}$ to $V_{g\min}$) or 2 (swivel range from $V_{g\min}$ to $V_{g\max}$) (model code position 18).



The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



Control Options

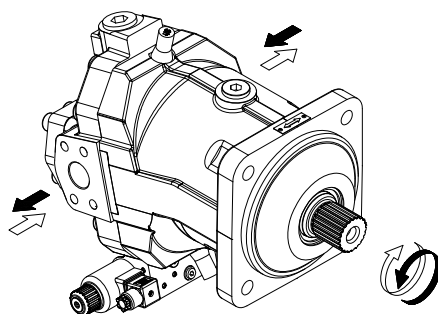
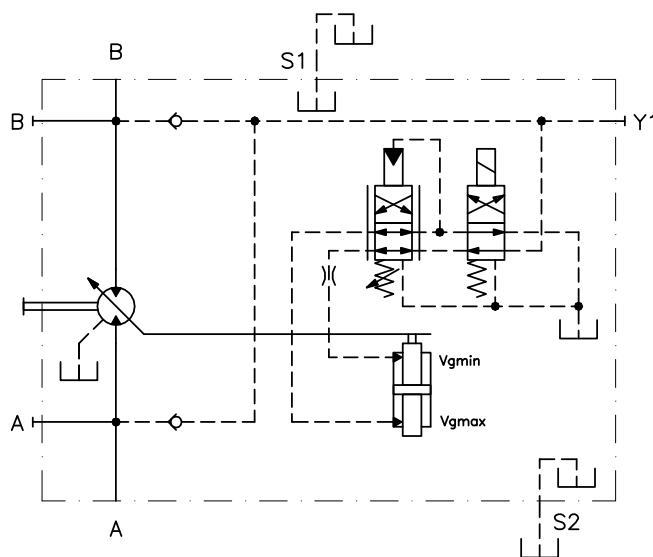
Model Code Position 14,15

Electric Two Position with Pressure Overrides – EV

The EV control versions with the pressure override allows the motor to swivel to Vg_{max} when the pressure setting is reached. Same as 'ET' control, when solenoid valve is switched off the motor is at Vg_{max} . The motor displacement is adjusted to Vg_{min} when the solenoid

valve is switched on and if the operating pressure rises beyond the pressure setting, the pressure limiting device overrides the electric two positions control and the motor swivels out to Vg_{max} . Swivel range is from Vg_{max} to Vg_{min} (displacement setting 1, model code

position 18). Select voltage of solenoid in model code position 13.



Control Options

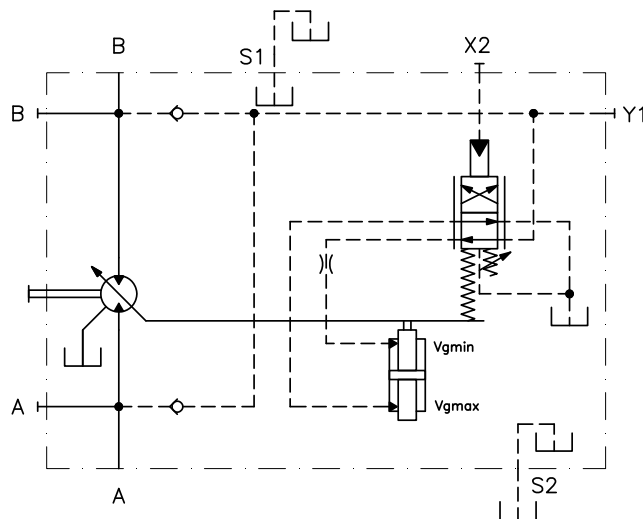
Model Code Position 14,15

Hydraulic Proportional – HP

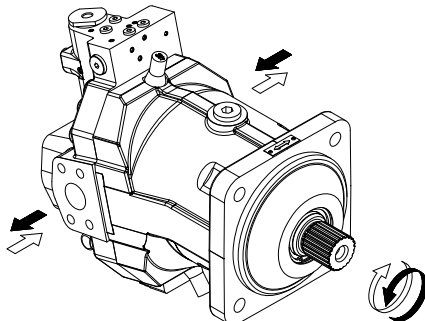
The hydraulic proportional control allows a stepless adjustment of the motor displacement proportionally to the pilot pressure applied at port X2. The pilot pressure applies a force on the spool and the motor swivels until a force balance on the arm is stored by feed back spring. Therefore

the motor displacement is adjusted in direct proportion with the pilot pressure. Usually the swivel range is from $V_{g \max}$ to $V_{g \min}$, displacement setting 1 (model code position 18) so that increasing the pilot pressure the motor swivels towards $V_{g \min}$, however, displacement setting type

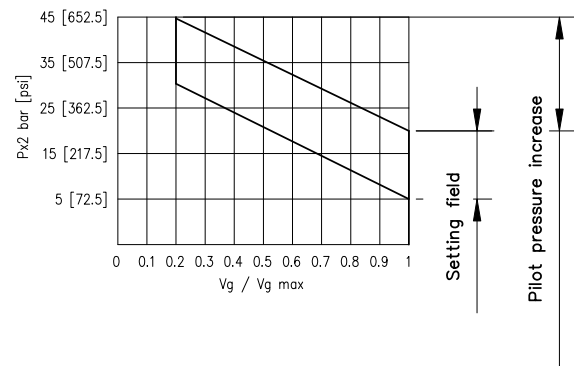
2 (swivel range from $V_{g \min}$ to $V_{g \max}$) is also available. Setting pressure range from 5 bar [72.5 psi] to 20 bar [290 psi] around. Pilot pressure range 25 bar [362.5 psi]. Max permissible pilot pressure at port X2 = 100 bar [1450 psi].



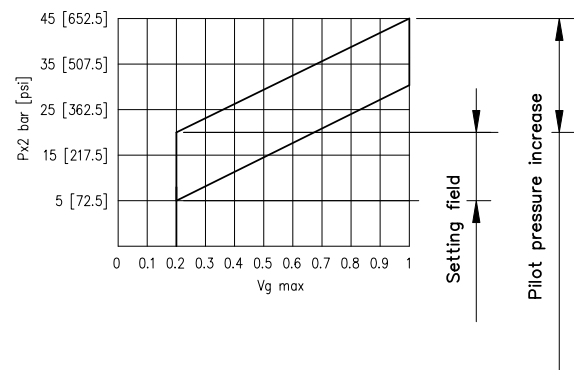
The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



BAV7 HP (1)



BAV7 HP (2)



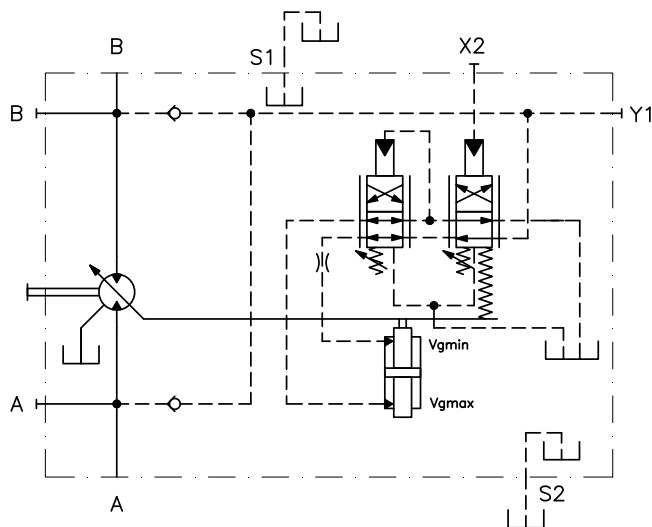
Control Options

Model Code Position 14,15

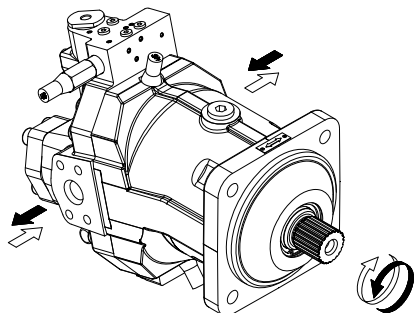
Hydraulic Proportional with Pressure Override – HR

The HR control version with the pressure override allows the motor to swivel to $V_{g \max}$ when the pressure setting is reached. Same as 'HP' control, the motor displacement is adjusted to $V_{g \min}$ when the pilot pressure applied at port X2.

If the operating pressure rises beyond the pressure setting, the pressure limiting device the motor swivels out to $V_{g \max}$. Swivel range is from $V_{g \max}$ to $V_{g \min}$, displacement setting 1 (model code position 18).



The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



Control Options

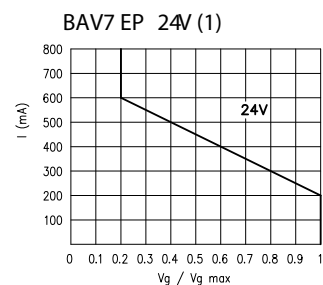
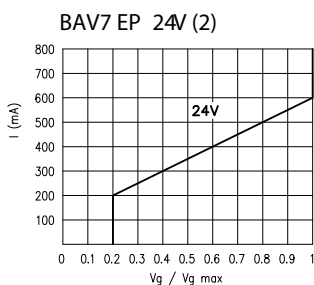
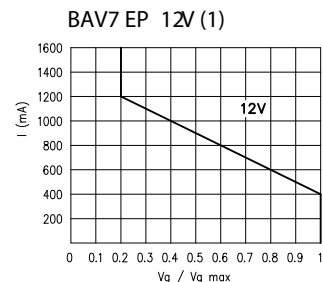
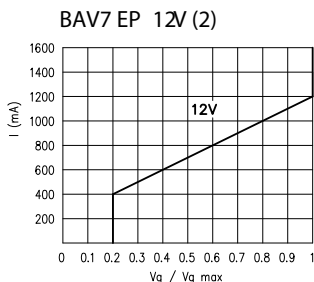
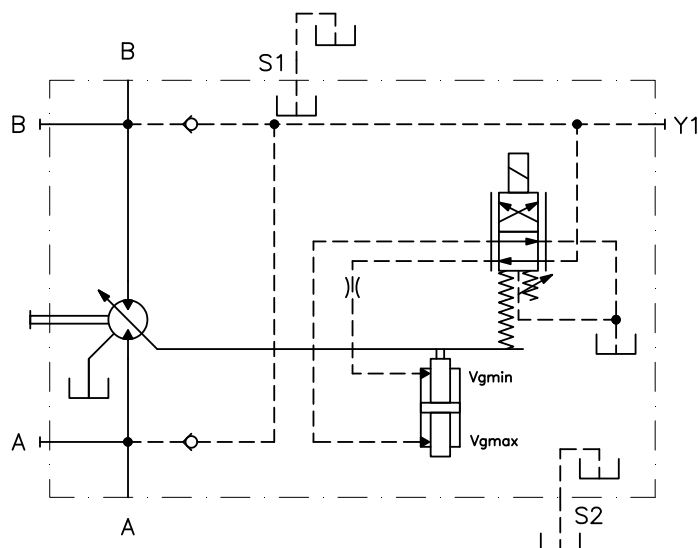
Model Code Position 14,15

Electric Proportional – EP

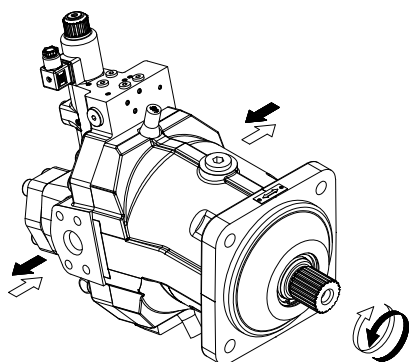
The electrical proportional control allows stepless and programmable adjustment of the motor displacement proportionally to the current strength supplied to a proportional solenoid valve available in 12V DC and 24V DC version. The proportional solenoid valve applies a force on the spool proportionally to the current strength and the motor swivels until a force

balance is restored by a feed-back spring. To control the proportional solenoid valve a 24V DC (12V DC) supply is required. Current range between 200 (400) and 600 (1200) mA approx. (with standard setting of Max and Min displacement). Max permissible current = 800 (1600) mA. Usually the swivel range is from Vg_{max} to Vg_{min} (displacement setting type 1 as per model

code position 18) so that increasing the current strength the motor swivels towards Vg_{min} , however displacement setting type 2 (swivels range from Vg_{min} to Vg_{max}) is also available. The electronic devices are available to control the solenoid (they must be ordered separately).



The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.



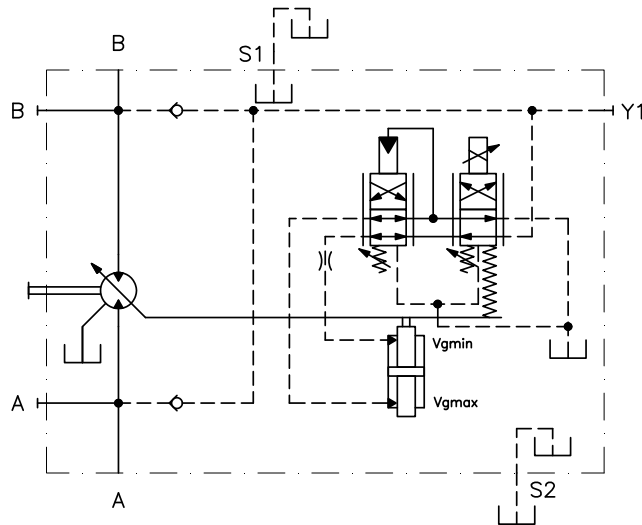
Control Options

Model Code Position 14,15

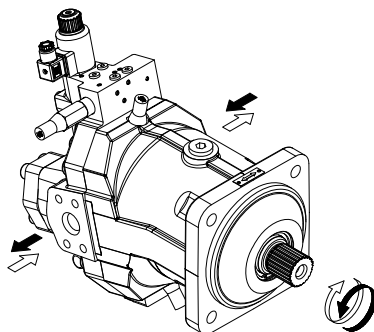
Electric Proportional with Pressure Override – ER

The ER control version with the pressure override allows the motor to swivel to Vg_{max} when the pressure setting is reached. Same as 'EP' control, when solenoid valve is switched off the motor is at Vg_{max} . The motor displacement is adjusted to Vg_{min} when the solenoid valve is switched on and if

the operating pressure rises beyond the pressure setting, the pressure limiting device overrides the electric two positions control and the motor swivels out to Vg_{max} . Swivel range is from Vg_{min} to Vg_{max} , displacement setting 1 (model code position 18).

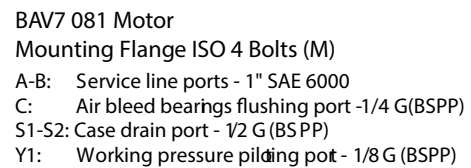


The relation between direction of rotation of shaft and direction of flow in BAV7 motor is shown in the picture below.

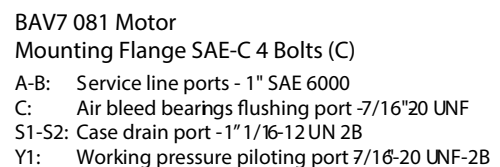


ISO and SAE Mounting Flange – BAV7 081

4 Bolt



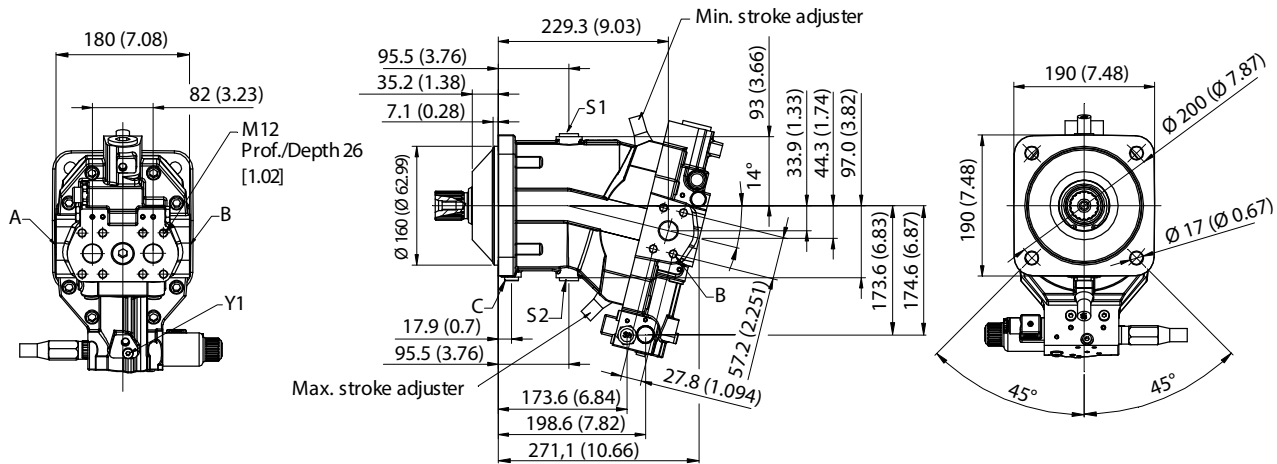
4 Bolt



Dimensions– Mounting Flange

ISO and SAE Mounting Flange – BAV7 112

ISO Mounting Flange



BAV7 112 Motor

Mounting Flange ISO 4 Bolts (M)

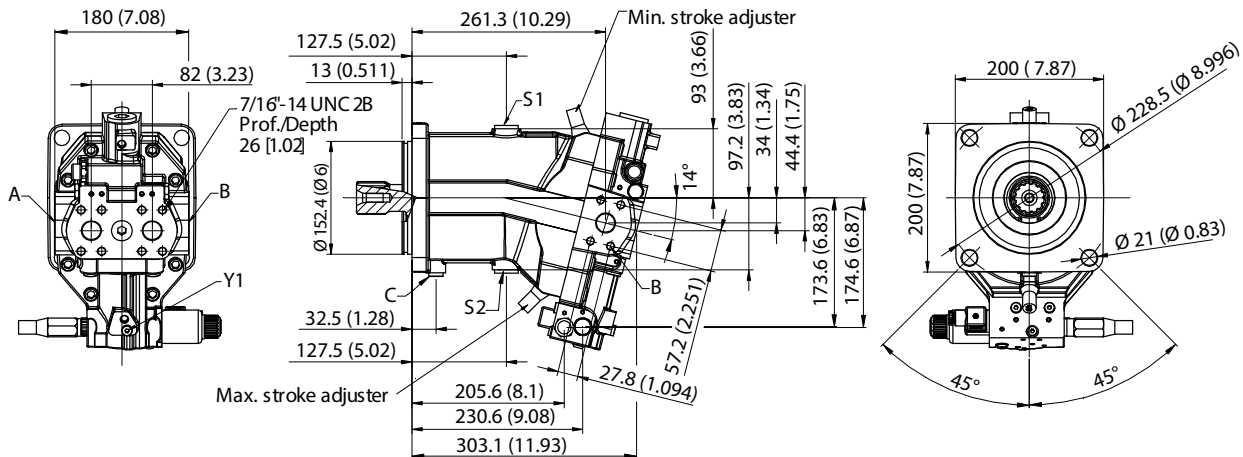
A-B: Service line ports - 1" SAE 6000

C: Air bleed bearings flushing port -1/4 G (BSPP)

S1-S2: Case drain port - 1/2 G (BSPP)

Y1: Working pressure piloting port - 1/8 G (BSPP)

SAE Mounting Flange



BAV7 112 Motor

Mounting Flange SAE-D 4 Bolts (S)

A-B: Service line ports - 1" SAE 6000

C: Air bleed bearings flushing port -7/16"20 UNF

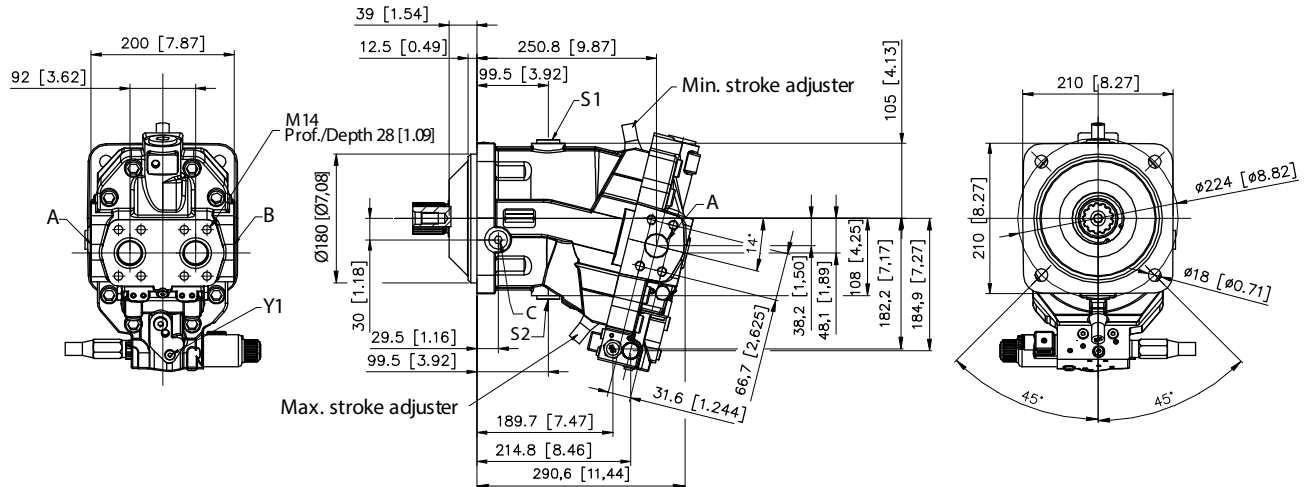
S1-S2: Case drain port -1"1/16-12 UN 2B

Y1: Working pressure piloting port 7/16-20 UNF-2B

Dimensions– Mounting Flange

ISO and SAE Mounting Flange – BAV7 160

ISO Mounting Flange

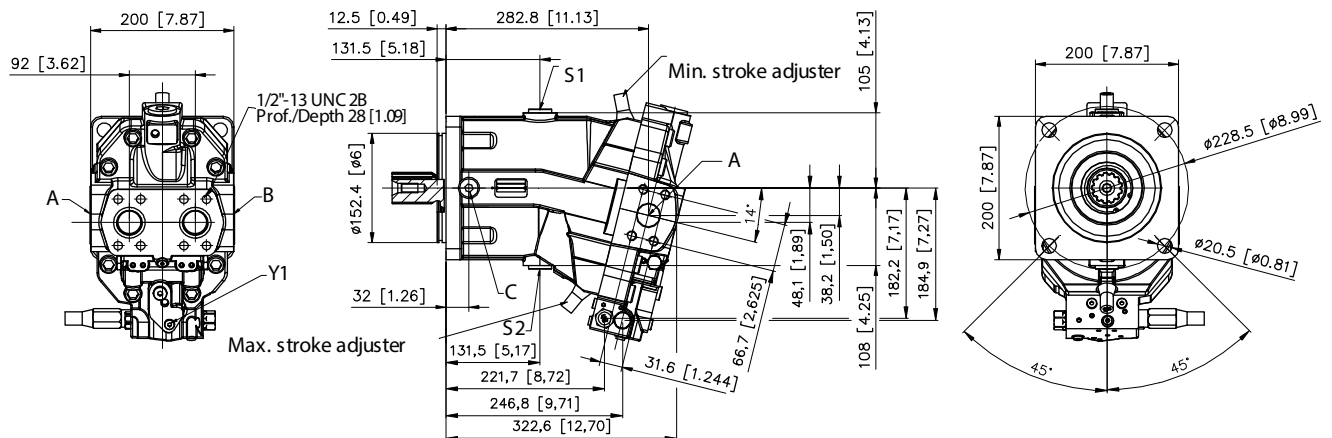


BAV7 160 Motor

Mounting Flange ISO 4 Bolts (M)

- A-B: Service line ports - 1" 1/4 SAE 6000
- C: Air bleed bearings flushing port - 1/2 G (BSPP)
- S1-S2: Case drain port - 3/4 G (BSPP)
- Y1: Working pressure piloting port - 1/8 G (BSPP)

SAE Mounting Flange



BAV7 160 Motor

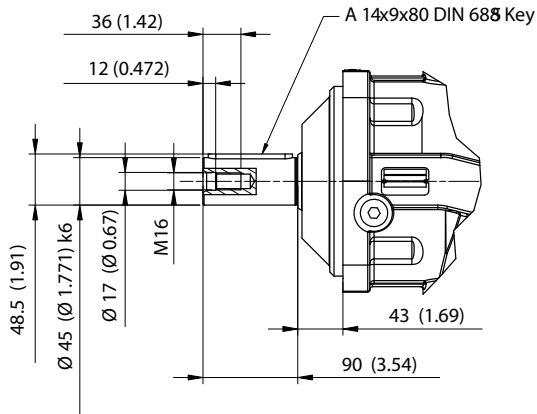
Mounting Flange SAE-D 4 Bolts (S)

- A-B: Service line ports - 1" 1/4 SAE 6000
- C: Air bleed bearings flushing port - 3/4- 16 UNF-2B
- S1-S2: Case drain port - 1"1/16-12 UN 2B
- Y1: Working pressure piloting port - 7/16"-20 UNF-2B

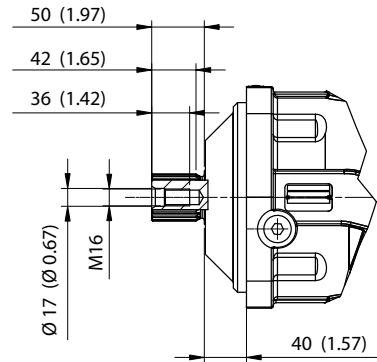
Dimensions– Shafts

ISO Shaft Options

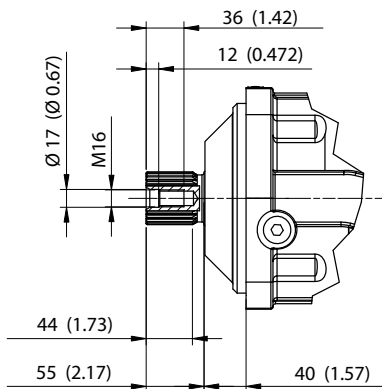
E
Parallel Keyed (160 only)
Ø45mm[1.772in]



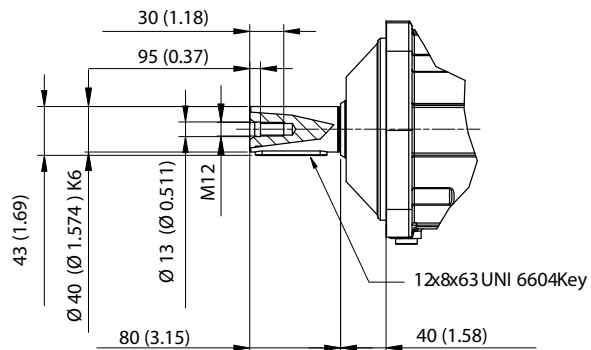
G
Splined
W45x2x30x21 - DIN 5480



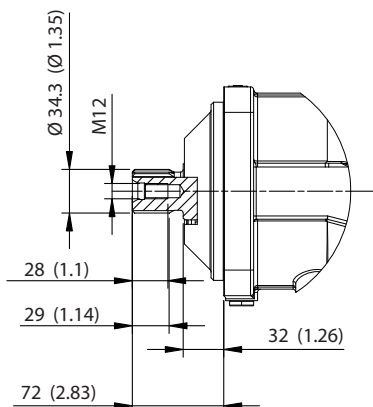
H
Splined (160 only)
W50x2x30x24 - DIN 5480



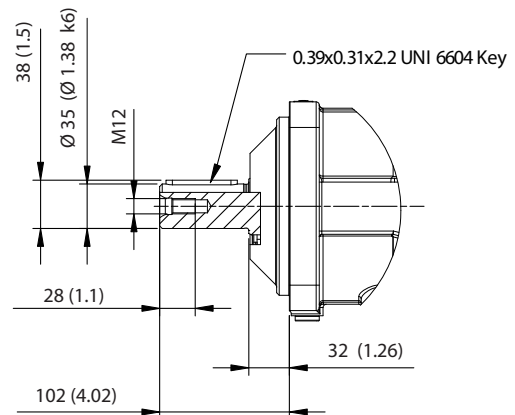
K
Parallel Keyed (112 only)
Ø40mm[1.56in]



M
Splined
W35x2x30x16 - DIN 5480 (081 Only)



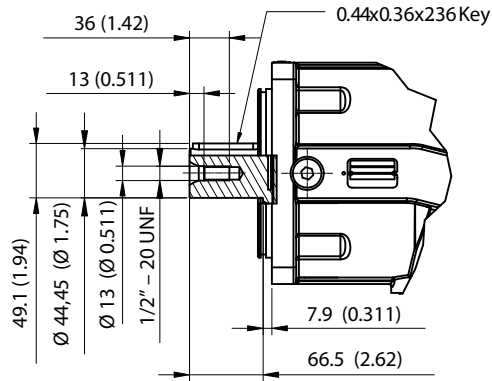
N
Parallel Keyed
Ø35 mm[1.377in] (081 Only)



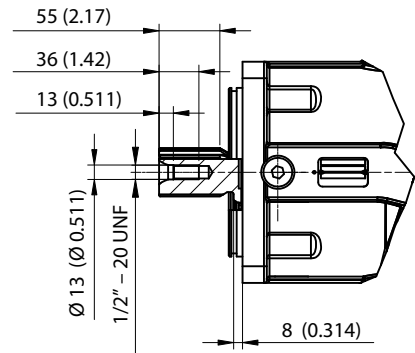
Dimensions– Shafts

SAE Shaft Options

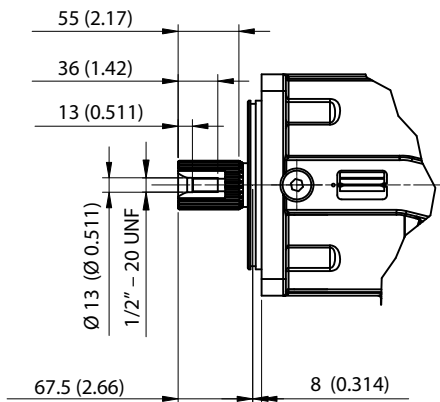
D
Parallel Keyed
Ø44.45mm[1.75in]



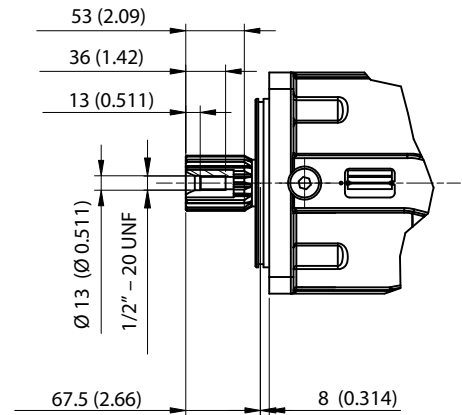
A
Splined
13T 8/16DP



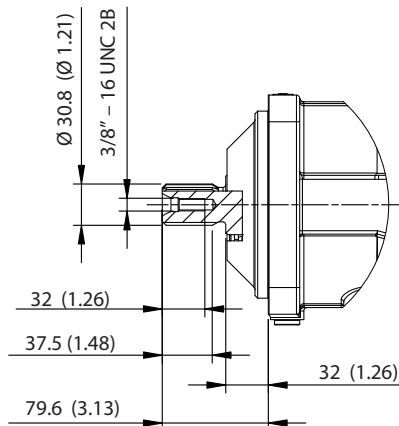
C
Splined
27T 16/32DP



B
Splined
15T 8/16DP



L
Splined
14T 12/24DP

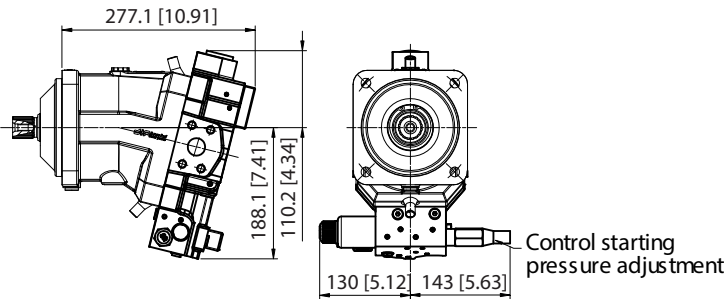


Dimensions– Controls

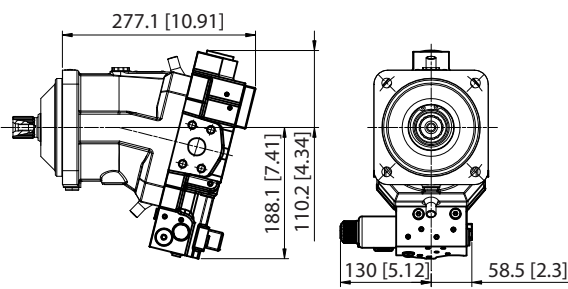
Displacement shift from
Maximum to Minimum (1)

ISO Mounting – BAV7 081

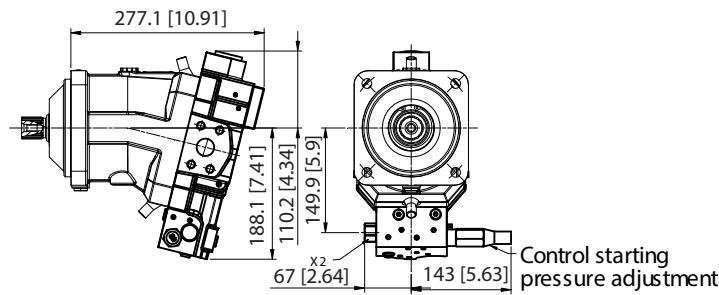
EV Control



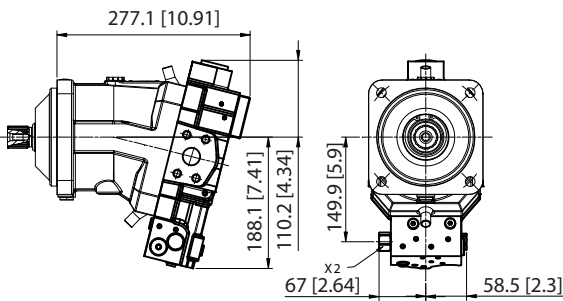
ET Control



HV Control



HT Control

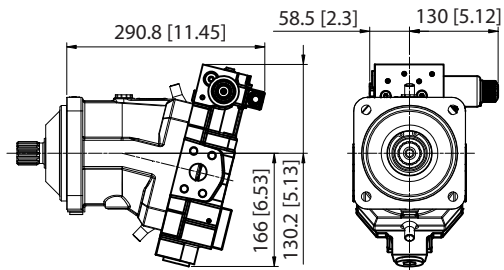


X2: 2 positionhydraulic piloting port -1/4G (BSPP)

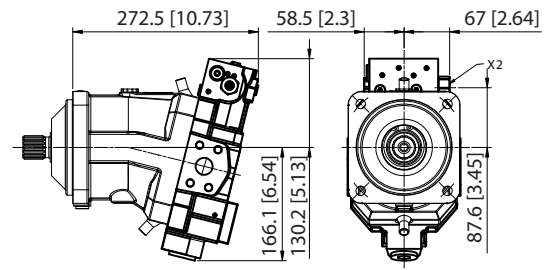
X2: 2 positionhydraulic piloting port -1/4G (BSPP)

ISO Mounting – BAV7 081

ET C ontrol

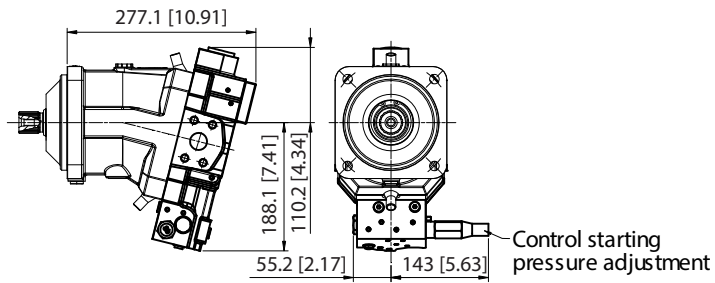


HT C ontrol



X2: 2 positionhydraulic piloting port -1/4G (BSPP)

PA Control

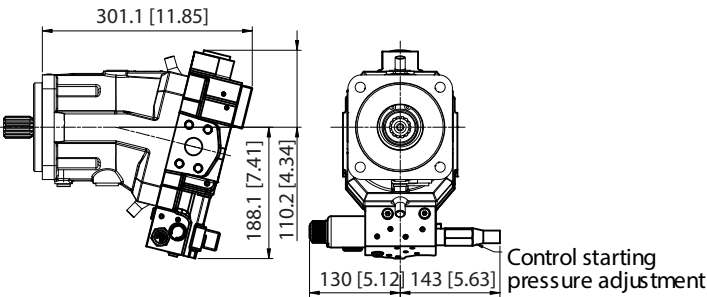


Dimensions– Controls

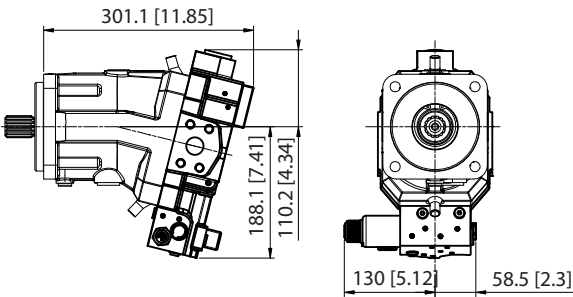
Displacement shift from
Maximum to Minimum (1)

SAE Mounting – BAV7 081

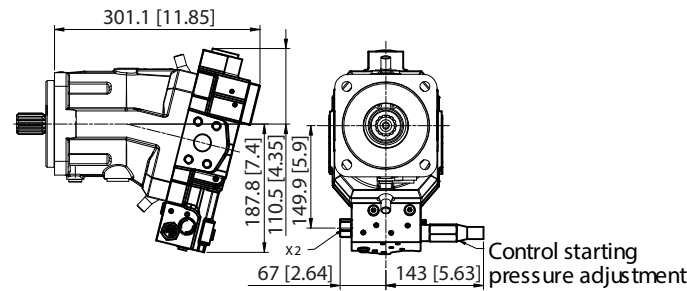
EV Control



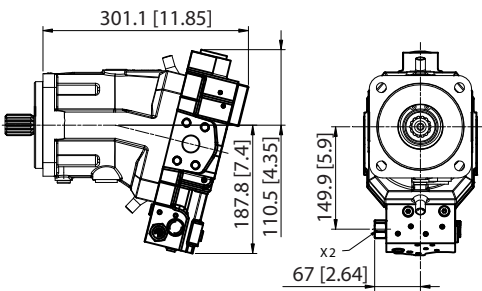
ET Control



HV Control



HT Control



X2: 2 positionhydraulic piloting port -7/16"20 UNF

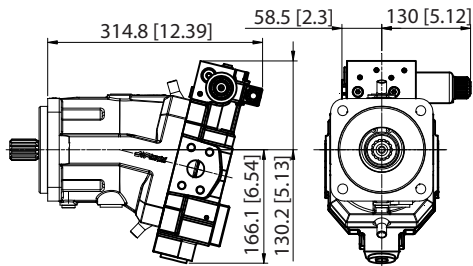
X2: 2 positionhydraulic piloting port -7/16"20 UNF

Dimensions– Controls

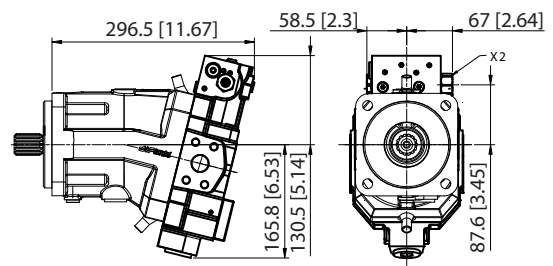
SAE Mounting – BAV7 081

Displacement shift from
Minimum to Maximum (2)

ET Control

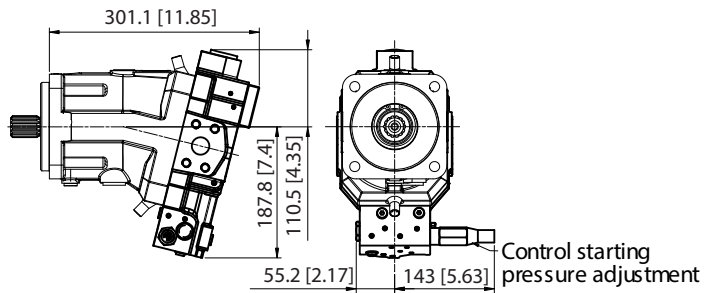


HT Control



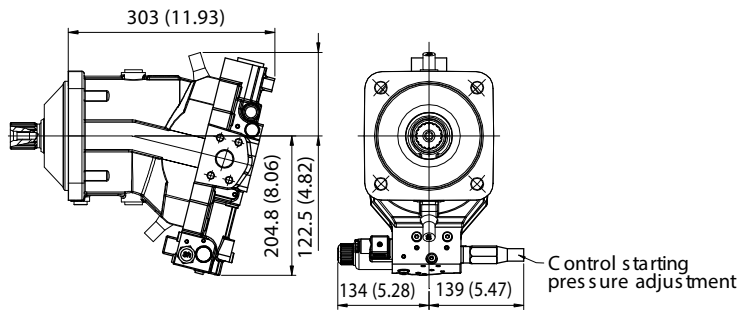
X2: 2 position hydraulic piloting port -7/16"20 UNF

PA Control

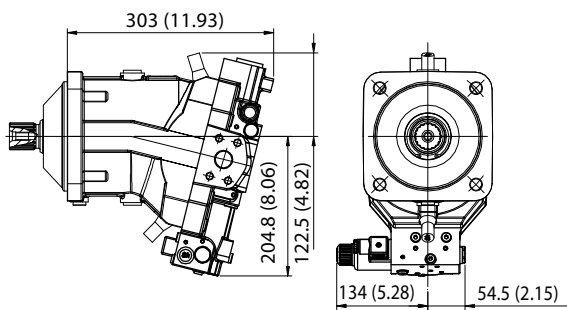


ISO Mounting – BAV7 112

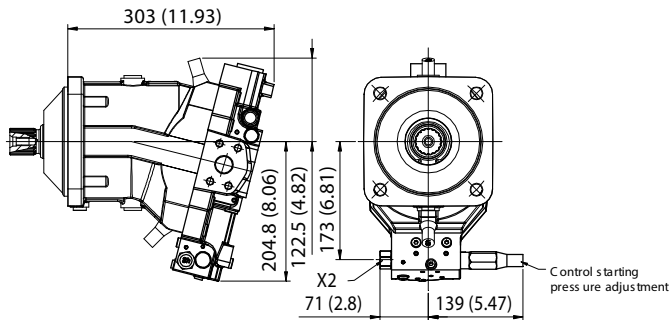
EV Control



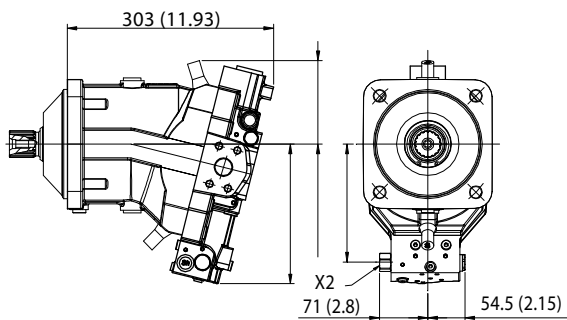
ET C control



HV Co ntrol



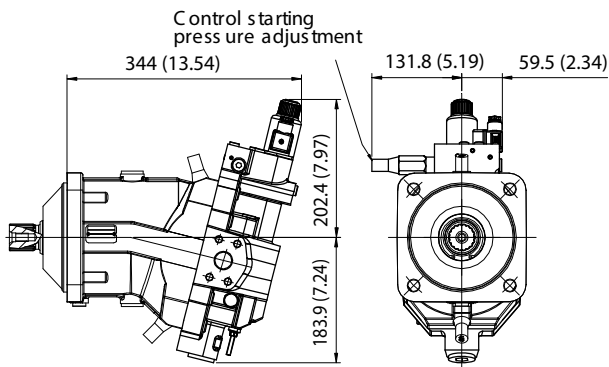
HT C control



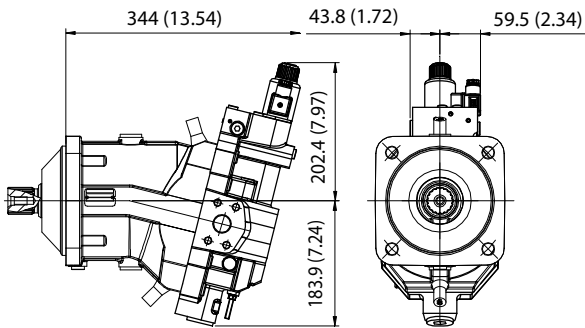
X2: 2 position hydraulic piloting port - 1/4 G (BSPP)

X2: 2 position hydraulic piloting port - 1/4 G (BSPP)

ER Control



EP C control

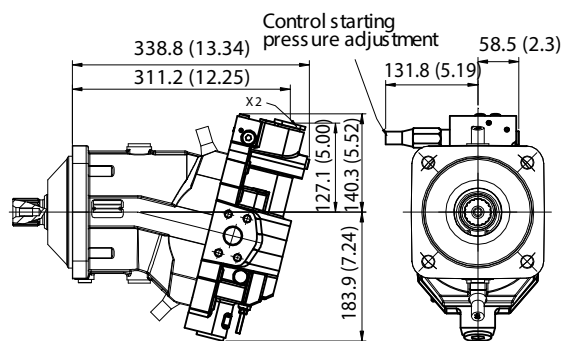


Dimensions – Controls

ISO Mounting – BAV7 112

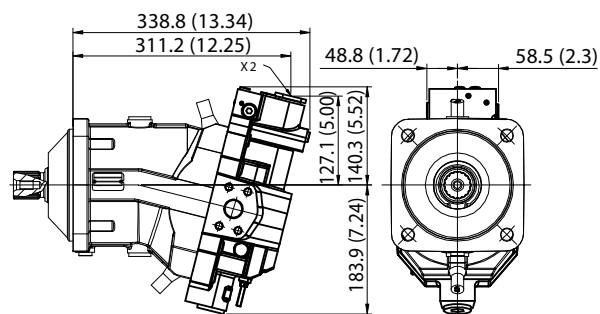
Displacement shift from
Maximum to Minimum (1)

HR Co ntrol



X2: Proportional hydraulic piloting port - 1/4 G (BSPP)

HP C ntrol



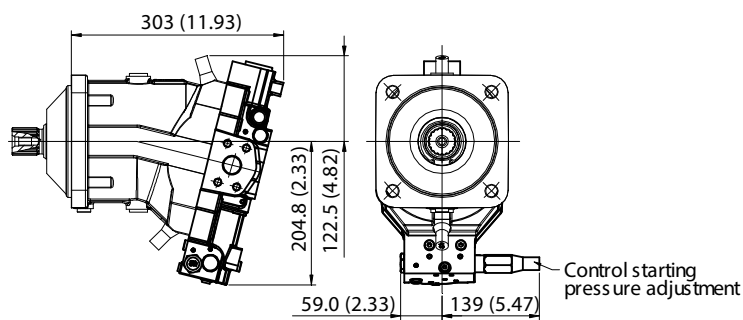
X2: Proportional hydraulic piloting port - 1/4 G (BSPP)

Dimensions – Controls

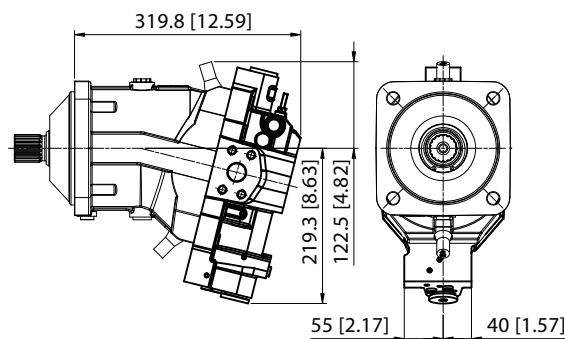
ISO Mounting – BAV7 112

Displacement shift from
Minimum to Maximum (2)

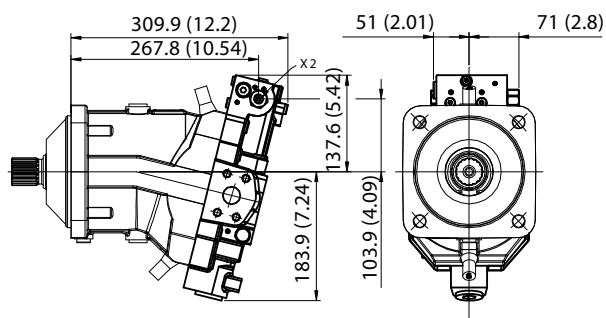
PA Control



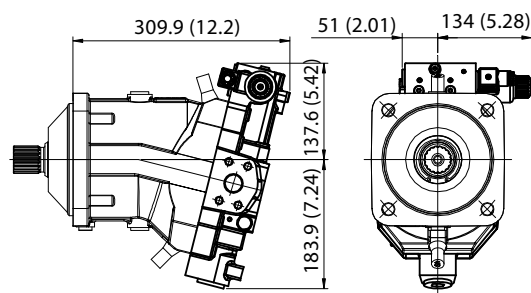
PB C ontrol



HT C ontrol



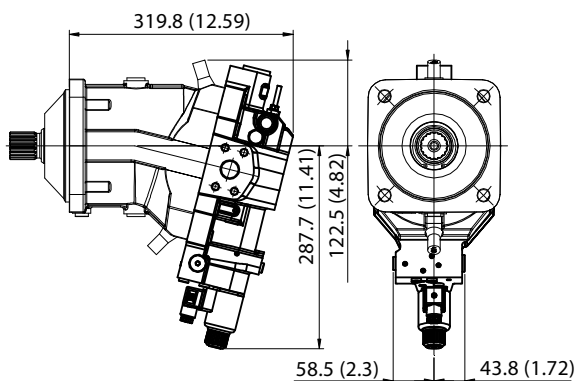
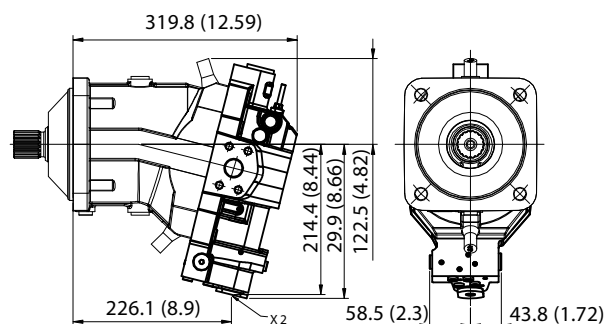
ET C ontrol



X2: 2 position hydraulic piloting port -1/4G (BSPP)

EP C ontrol

HP C ontrol



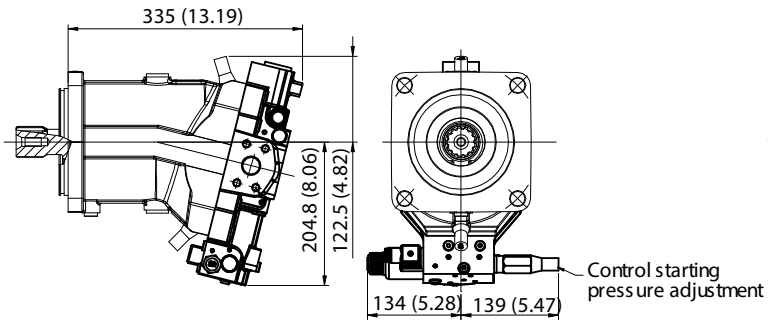
X2: Proportional hydraulic piloting port - 1/4G (BSPP)

Dimensions – Controls

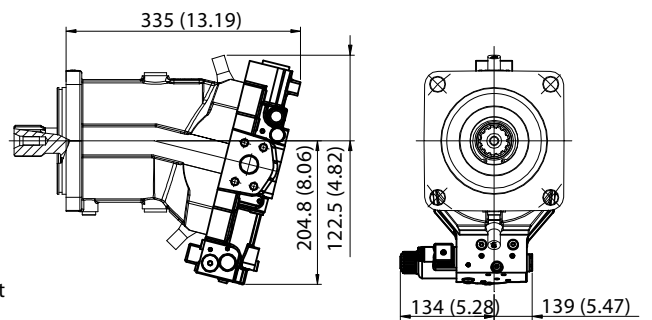
SAE Mounting – BAV7 112

Displacement shift from
Maximum to Minimum (1)

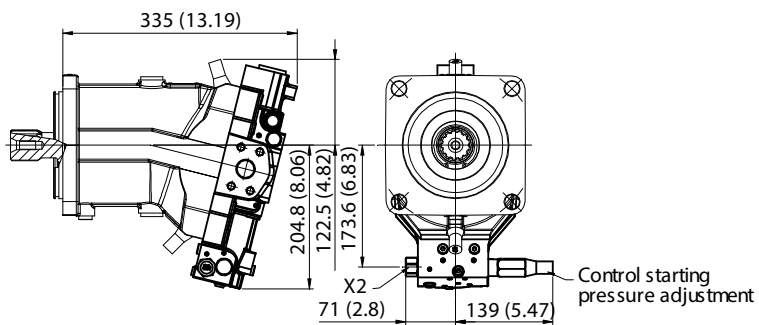
EV Control



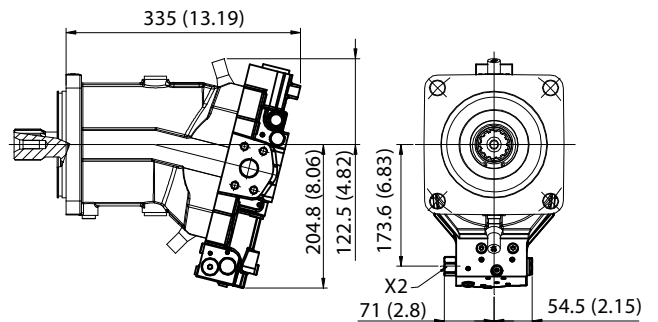
ET C control



HV Co ntrol



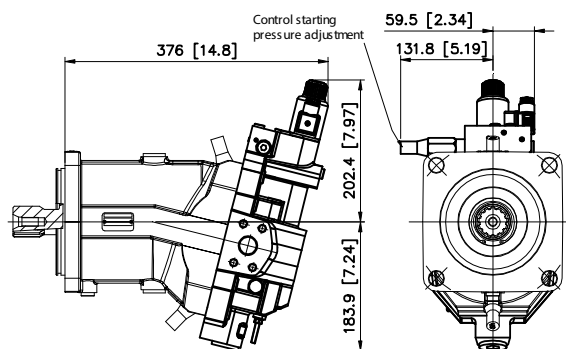
HT C control



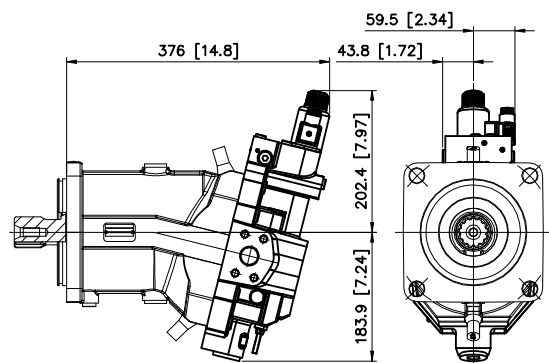
X2: 2 positionhydraulic piloting port -7/16"20 UNF

X2: 2 positionhydraulic piloting port -7/16"20 UNF

ER Control



EP C control

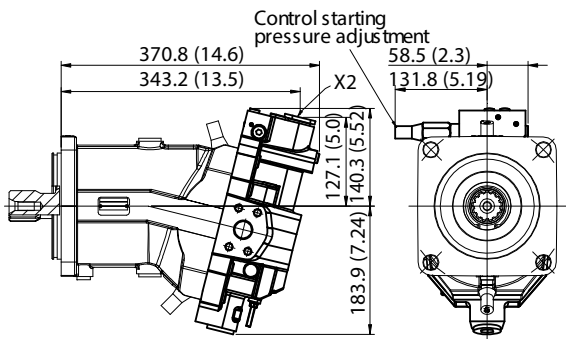


Dimensions – Controls

Displacement shift from
Maximum to Minimum (1)

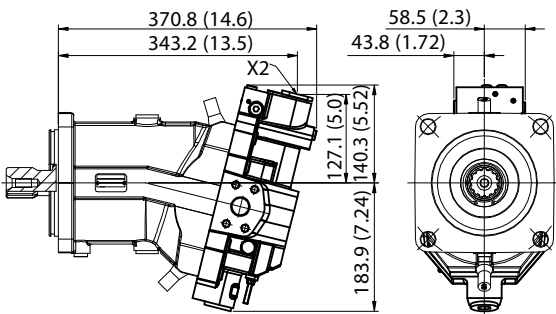
SAE Mounting – BAV7 112

HR Control



X2: Proportionalhydraulic piloting pot - 7/16"-20 UNF

HP Control



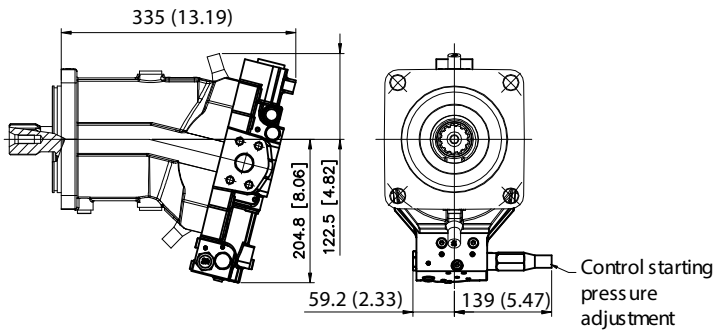
X2: Proportionalhydraulic piloting pot - 7/16"-20 UNF

Dimensions – Controls

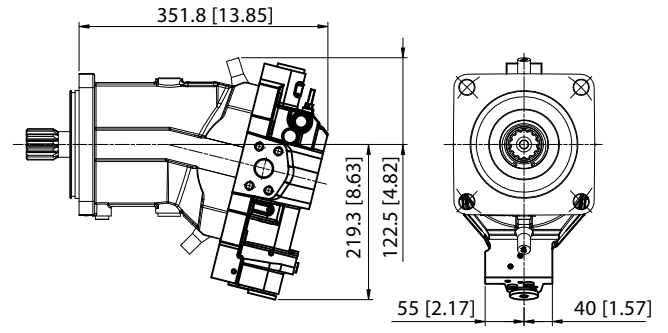
SAE Mounting – BAV7 112

Displacement shift from
Minimum to Maximum (2)

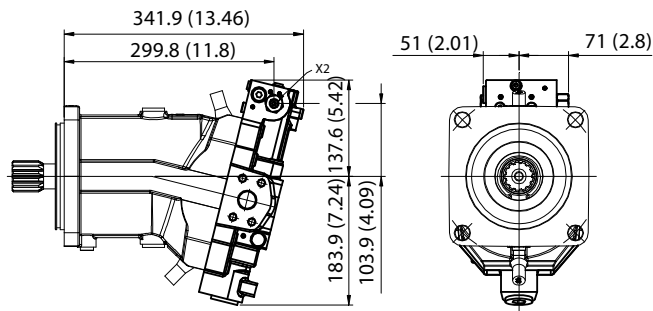
PA Control



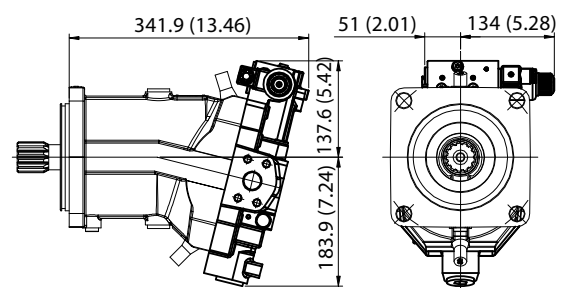
PB C ontrol



HVC ontrol

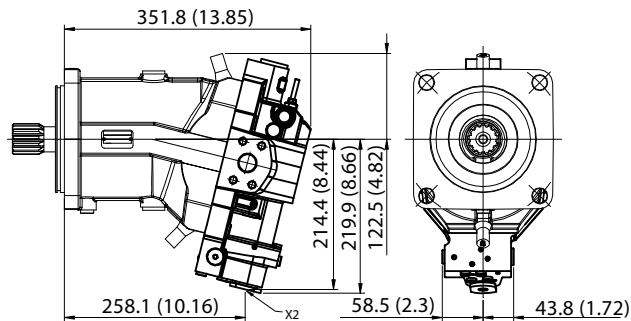


ET C ontrol

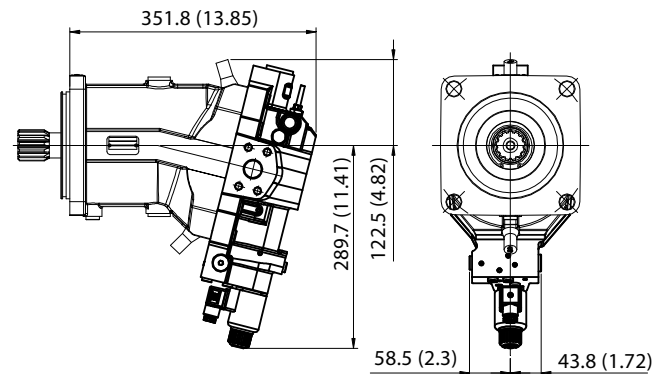


X2: 2 positionhydraulic piloting port 7/16"20 UNF

HP C ontrol



EP C ontrol



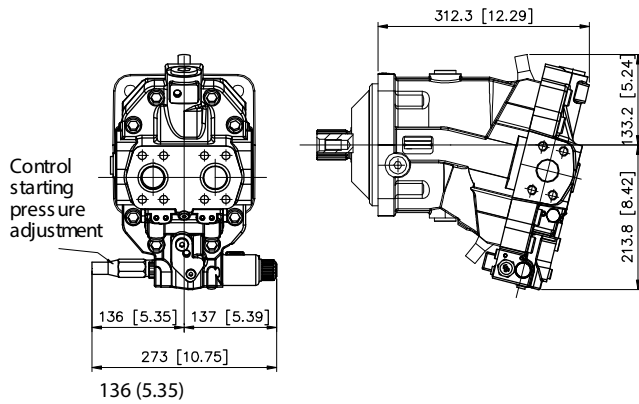
X2: Proportionalhydraulic piloting port - 7/16"-20 UNF

Dimensions – Controls

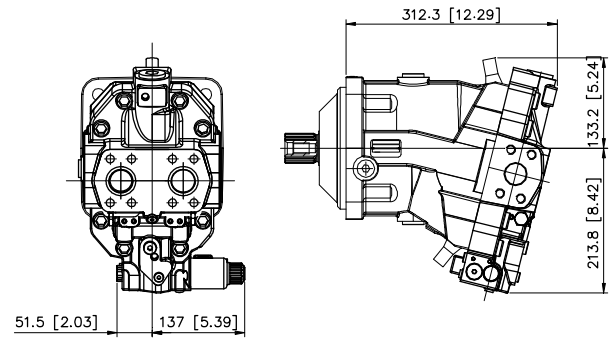
ISO Mounting – BAV7 160

Displacement shift from
Maximum to Minimum (1)

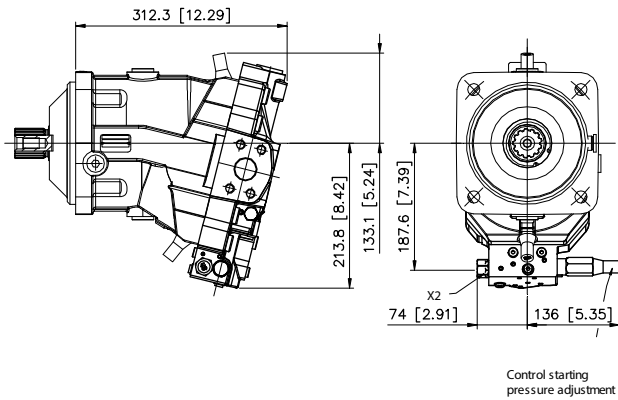
EV Control



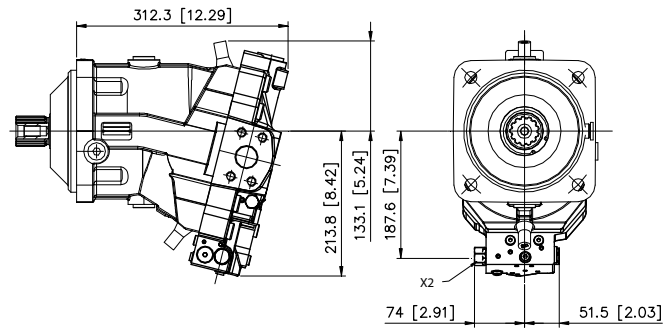
ET C ontrol



HVCo ntrol



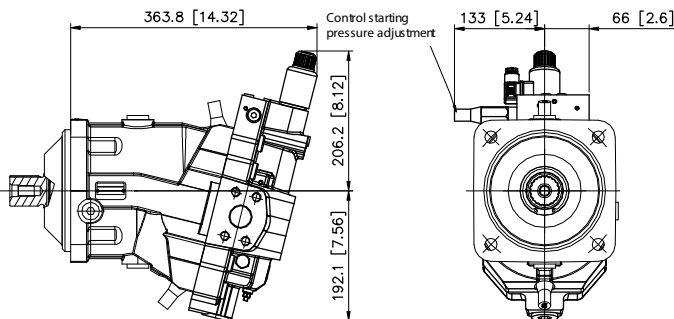
HT C ontrol



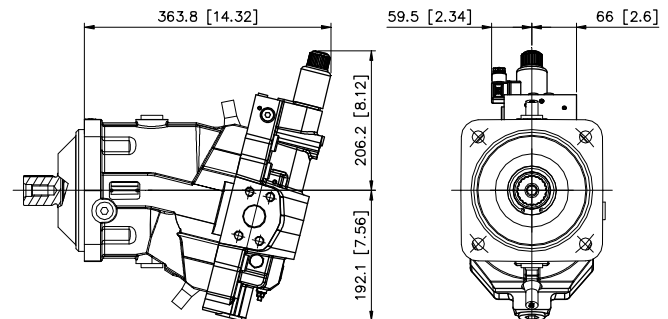
X2: 2 positionhydraulic piloting port -1/4G (BSPP)

X2: 2 positionhydraulic piloting port -1/4G (BSPP)

ER Control



EP C ontrol

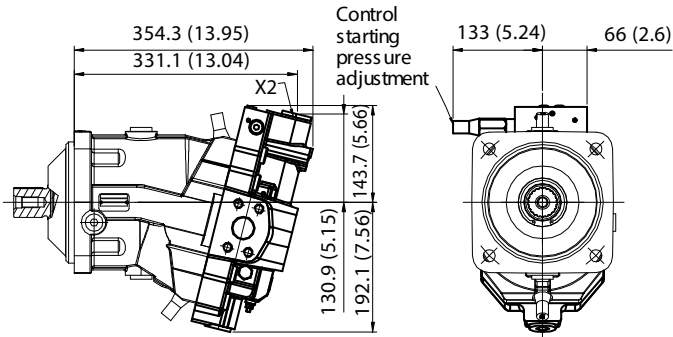


Dimensions – Controls

ISO Mounting – BAV7 160

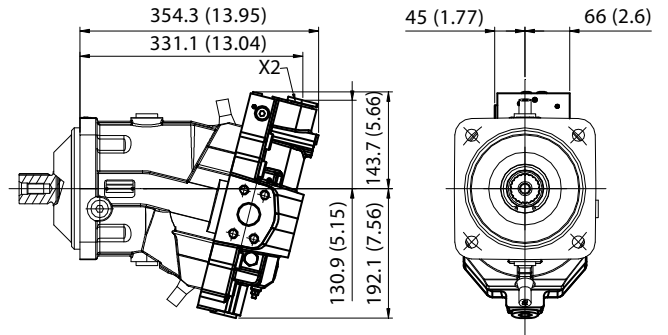
Displacement shift from
Maximum to Minimum (1)

HR Co ntrol



X2: Proportionalhydraulic pilding pot - 1/4G (BSPP)

HP C control



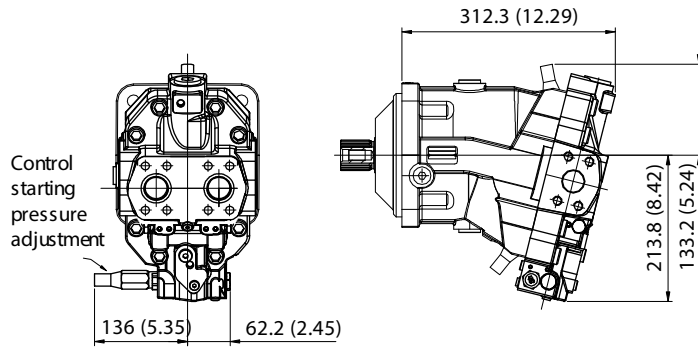
X2: Proportionalhydraulic pilding pot - 1/4G (BSPP)

Dimensions – Controls

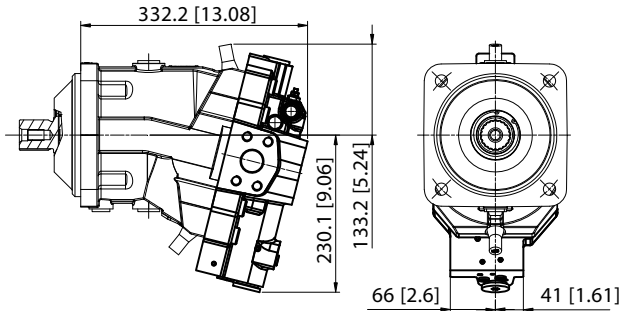
ISO Mounting – BAV7 160

Displacement shift from
Minimum to Maximum (2)

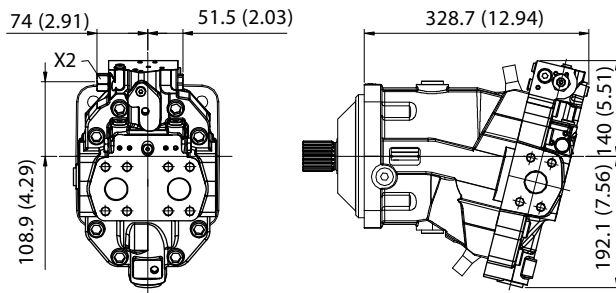
PA Control



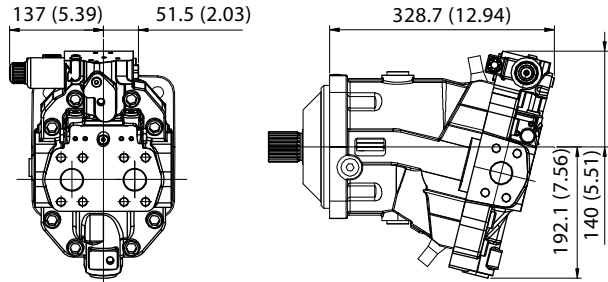
PBC control



HTC control

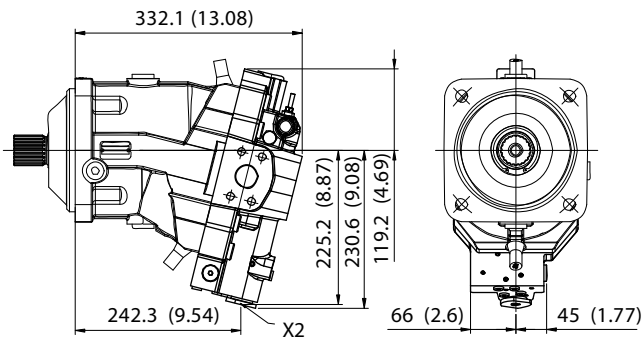


ETC control



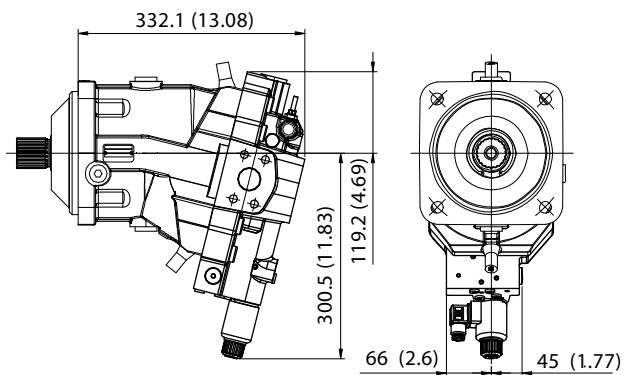
X2: 2 position hydraulic piloting port -1/4G (BSPP)

HPC control



X2: Proportional hydraulic piloting port - 1/4G (BSPP)

EP C ontrol

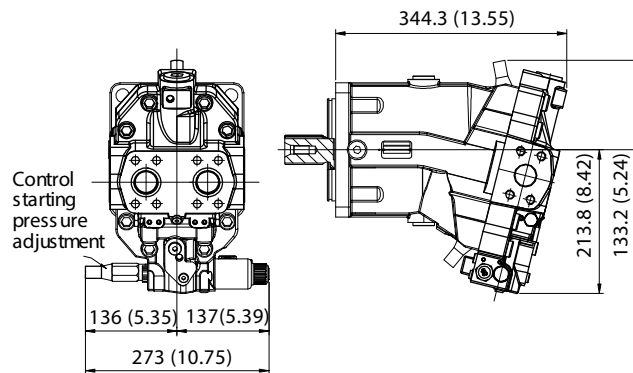


Dimensions – Controls

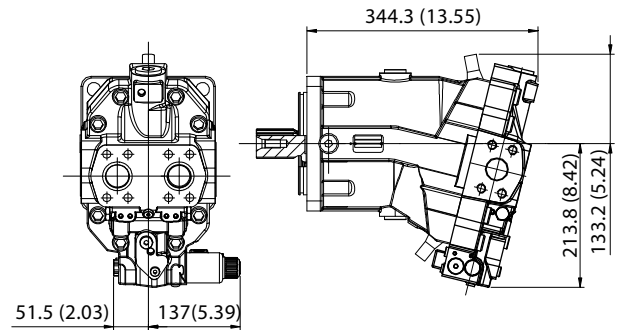
SAE Mounting – BAV7 160

Displacement shift from
Maximum to Minimum (1)

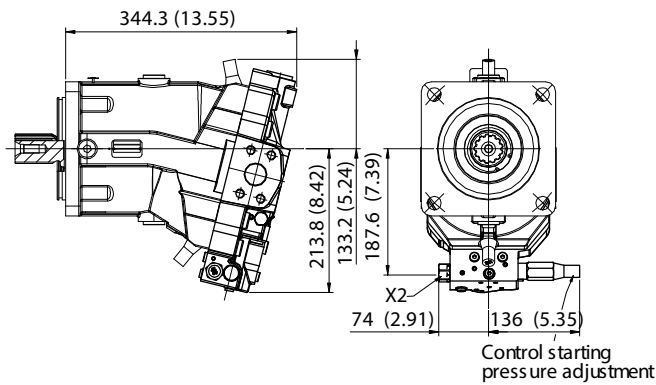
EV Control



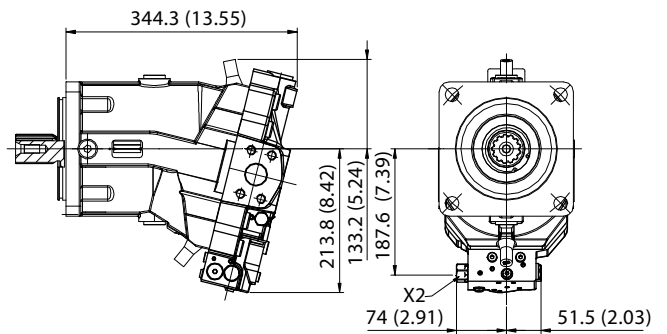
ET C ontrol



HV Co ntrol



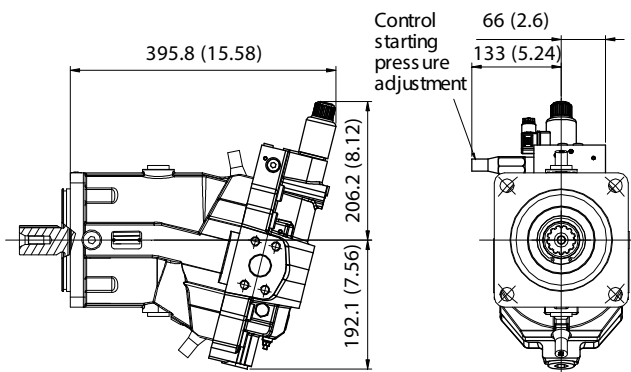
HT C ontrol



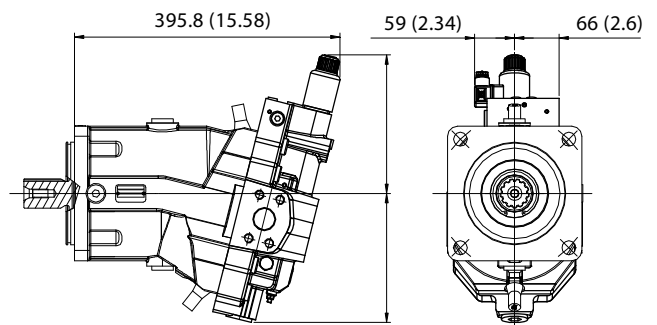
X2: 2 positionhydraulic piloting port 7/16"20 UNF-2B

X2: 2 positionhydraulic piloting port 7/16"20 UNF-2B

ER Control



EP C ontrol

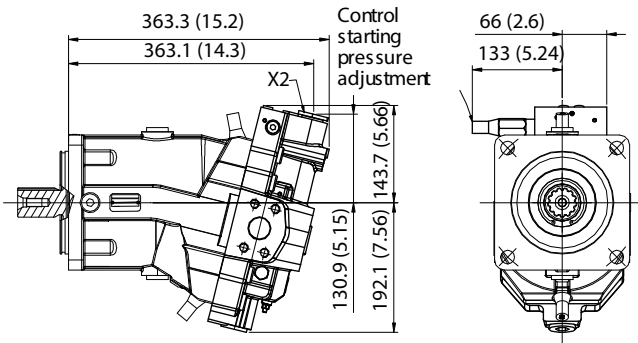


Dimensions – Controls

Displacement shift from
Maximum to Minimum (1)

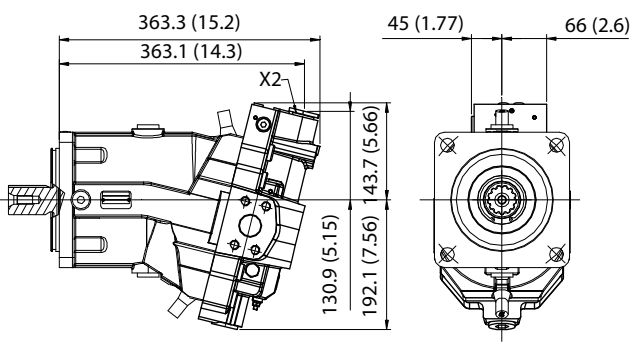
SAE Mounting – BAV7 160

HR Co ntrol



X2: Proportionalhydraulic piloting port - 7/16-20 UNF-2B

HP C ntrol



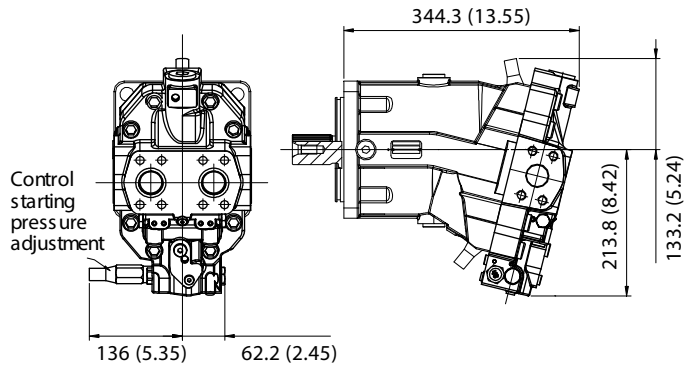
X2: Proportionalhydraulic piloting port - 7/16-20 UNF-2B

Dimensions – Controls

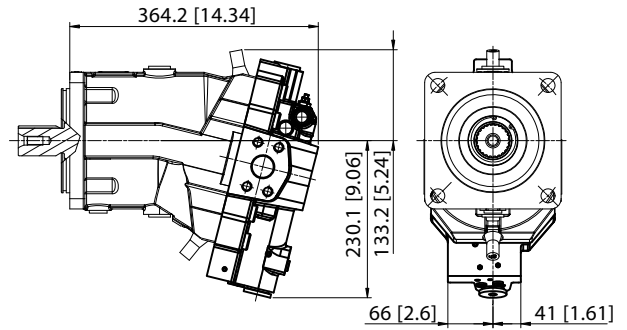
SAE Mounting – BAV7 160

Displacement shift from
Minimum to Maximum (2)

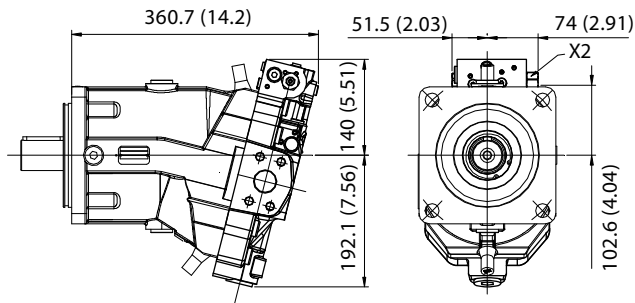
PA C ontrol



PB C ontrol

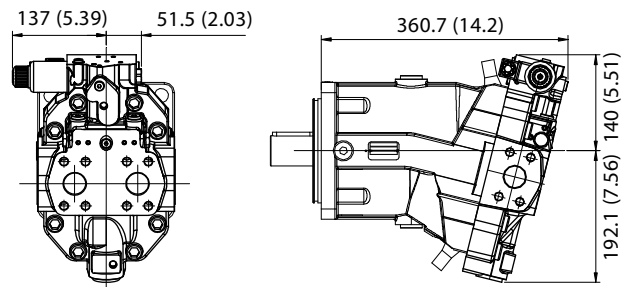


HT C ontrol

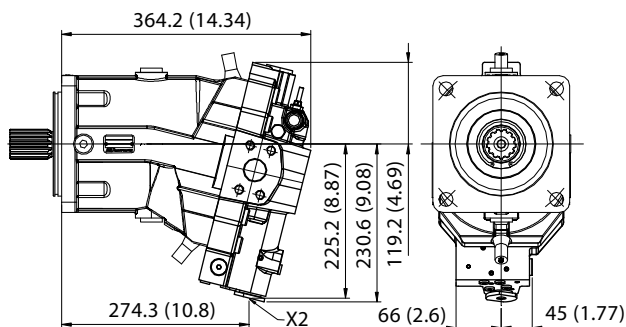


X2: 2 positionhydraulic piloting port

ET C ontrol

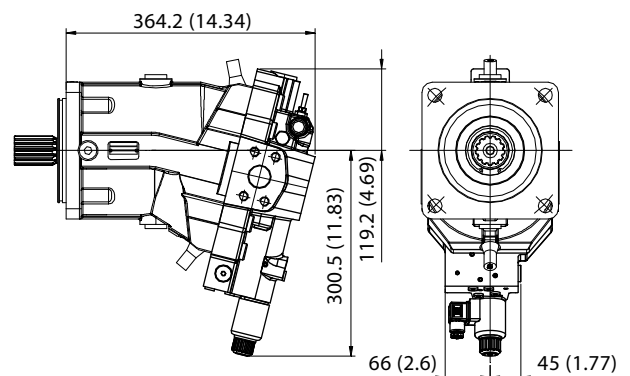


HPC ontrol



X2: Proportionalhydraulic piloting port - 7/16"-20 UNF-2B

EP C ontrol

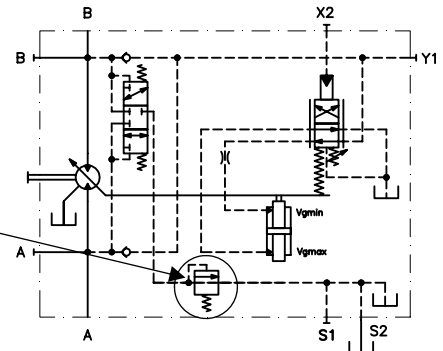
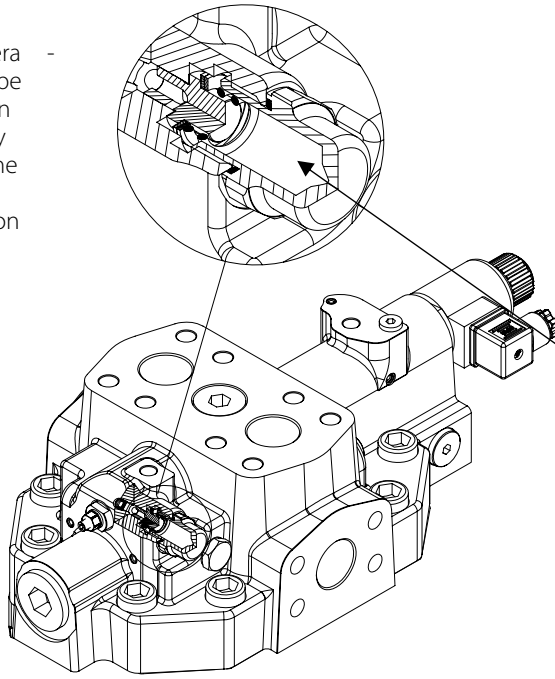


Optional Features

Flushing Valve

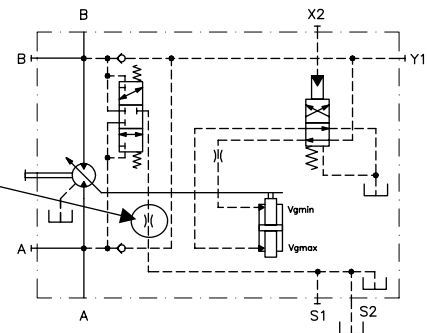
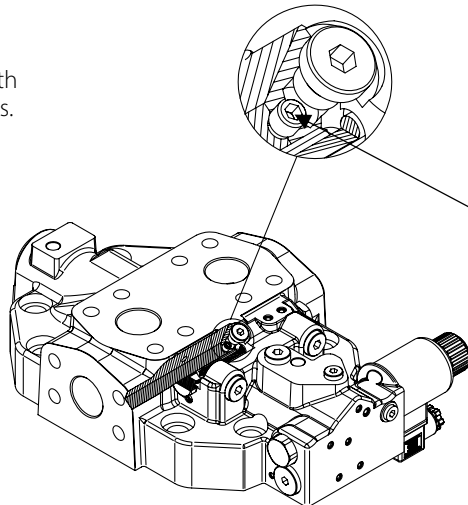
Flushing Valve

For closed circuit operation, the motors can be equipped with built in flushing valve. Specify by selecting one of the optional 4 flow rates in model code position 23,24.



Flushing Valve

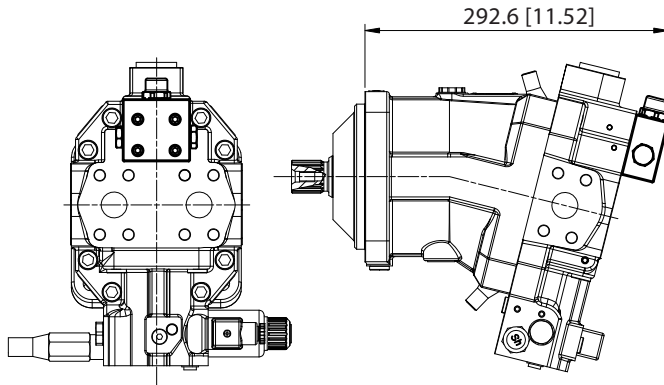
Only for BAV7 160 with two positions controls.



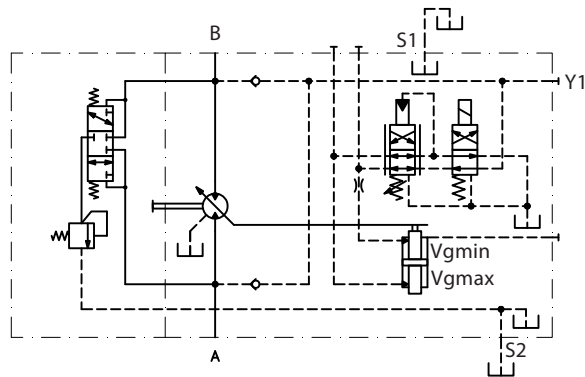
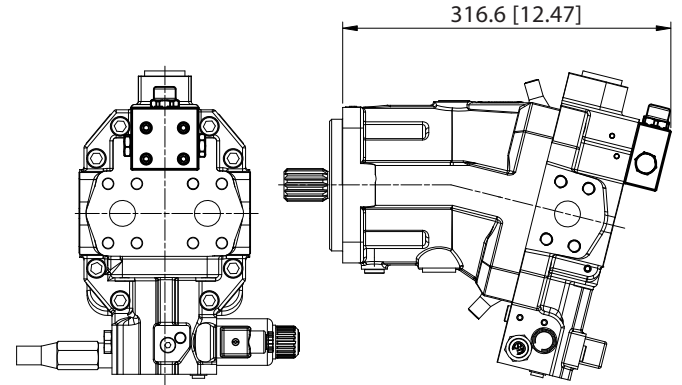
Optional Features

Flushing Valve
(only for BAV7 081)

ISO Mounting



SAE Mounting



Application information

Fluid and Filtration Guidelines

1. Types of fluid

The table below shows the main categories of hydraulic fluid as referenced in ISO 6743-4. Under normal operating conditions, Danfoss Hydraulics recommends mineral oil-based fluids with anticorrosive and anti-wear additives (HL or HM grade) 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 Danfoss Hydraulics before using flame-resistant or organic fluids.

Mineral Oil-Based Fluids

HH	Additive-free
HL	Anticorrosive, antioxidant
HM	HL and anti-wear additives
HV	HM additives and viscosity controls

2. Viscosity index

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. This value refers to a maximum fluid temperature of 90°C (temperature at case drain).

The maximum viscosity for short intervals and during cold starts is shown below.

The temperature of the fluid should not exceed a maximum of +115°C or minimum of -25°C.

Variable and Fixed Displacement Fluids

Optimum	15-40 (cSt)
Minimum	10 (cSt)
Maximum	1000 (cSt)

3. Viscosity grades

Under the ISO standard, hydraulic fluids are divided into 6 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.

4. 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.

5. Filtering Grade

ISO 4572 states that the filtering grade β_x is the ratio between the number of particles of contaminant (per unit volume) of a size greater than or equal to x mm entering the filter and the number of particles of the same size leaving the filter. The grade β_x therefore gives a good indication of the quality of the filter.

Bent Axis Design Motors And Pumps: 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 pumps/motors are installed vertically and where operating cycles display long periods at high pressure (> 250 bar).

Example: A filter with a filtering ratio of $\beta_{20} \geq 100$ is able to capture all particles greater than or equal to 20 μm . Danfoss Power Solutions recommends filters with the following β_x ratios for its Bent Axis piston motors:

Maximum Contamination Grades	ISO
Variable Bent Axis Motors	19/16

Ratio β_x	Filtering Efficiency	Notes
2	50%	Average size of filter pores equal to smallest particles
20	95%	Normal retention
100	99%	Absolute retention

Application information

Installation Guidelines

Installation Guidelines

The following installation guidelines for Danfoss 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.

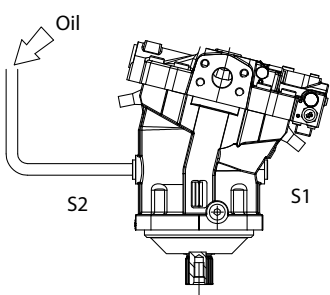
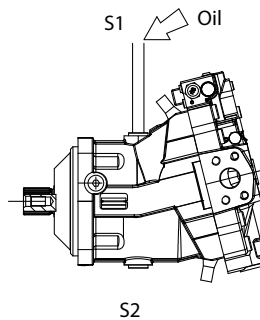
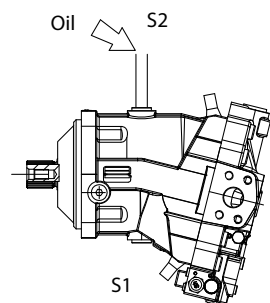
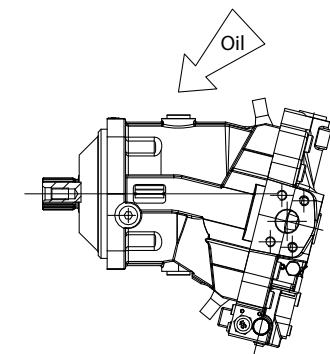
Where non-flexible tubes are used, ensure that the pipes do not pull on the cover of the motor.

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.

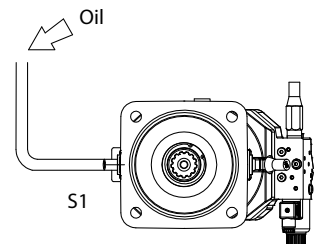
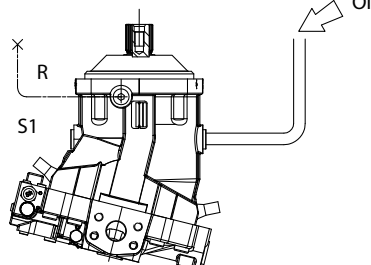
Drive Shaft

- 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.



Air Bleed



Application information

Installation Guidelines (Continued)

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.

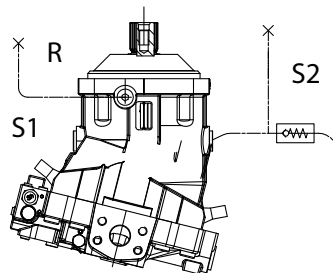
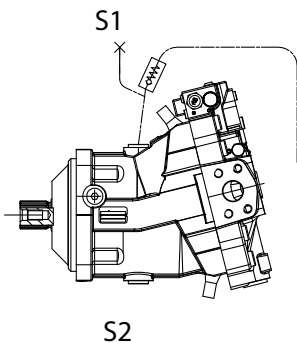
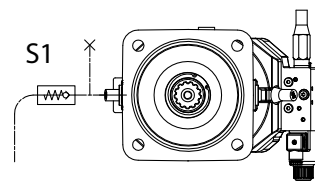
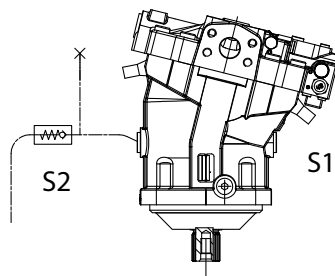
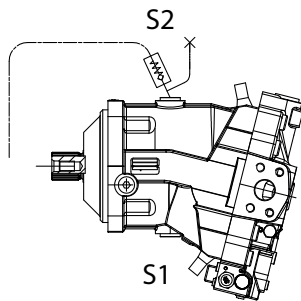
The oil level of the units should be checked at regular intervals. It is essential to check the level if the system is out of service for extended periods of time, since the force of gravity causes oil to drain from the case.

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 ($>50^{\circ}\text{C}$), 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 (Continued)

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 non-return valve. A 10 mm filter in series is recommended.

Maintenance

Replace filter after 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.

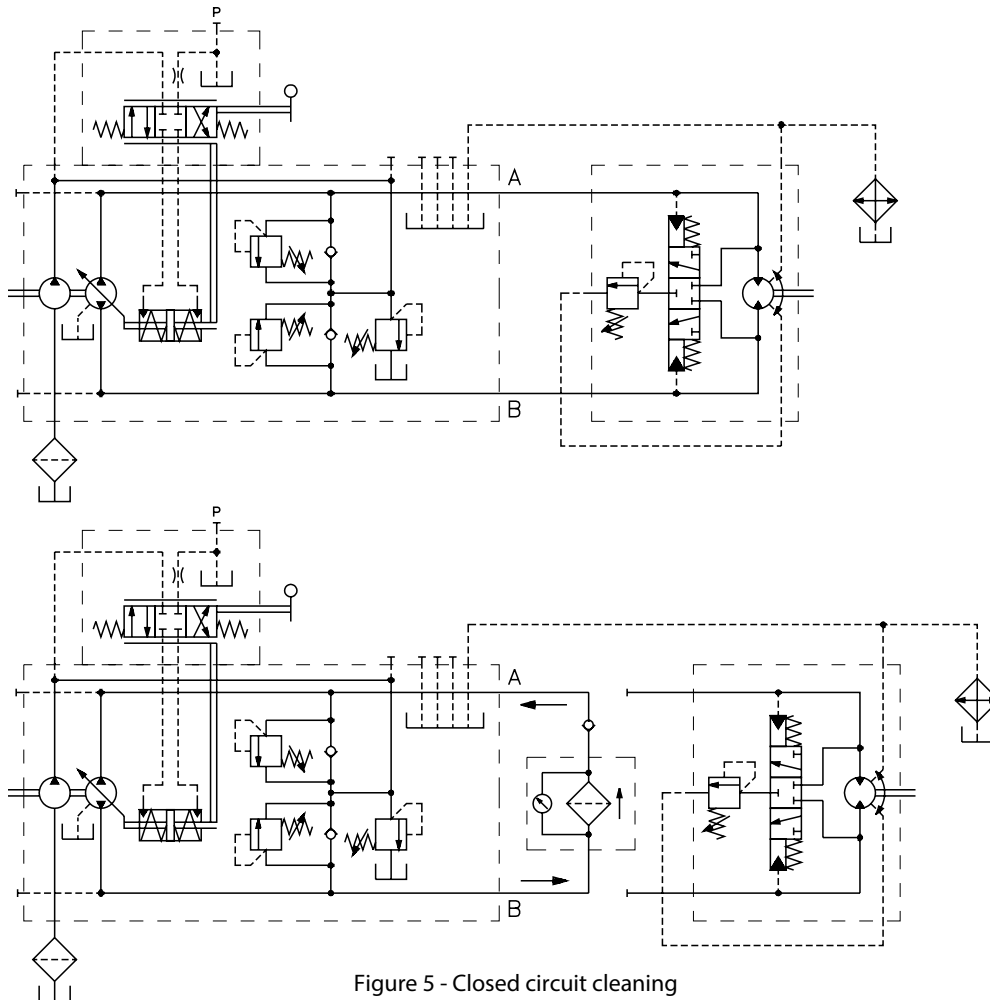


Figure 5 - Closed circuit cleaning

Notes

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook or legal stationery. There are no margins, text, or other markings on the page.

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