

A close-up photograph of several grey hydraulic components, likely valves or pumps, with various ports and bolts.

EAT•N

Hydraulics

Bent Axis Motors

Variable Displacement
Fixed Displacement



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Bent Axis Motors General Overview



Eaton's family of bent axis motors offer vehicle designers greater flexibility than ever before. Capable of operation in open or closed circuit applications. These units are well suited to a vast array of both industrial-stationary and on-off highway mobile applications and circuit types.

The proven design incorporating convex valve plates, high quality components and manufacturing techniques, results in high performance products capable of up to 350 bar (5075 psi) continuous and 450 bar (6525 psi) peak performance. This high performance, yet compact design allows high power density in small spaces. Fully laboratory tested and field proven, these motors provide maximum efficiency and long life. Heavy duty bearings permit high radial and axial loads.

A full range of options are available to tailor these units to your application needs.

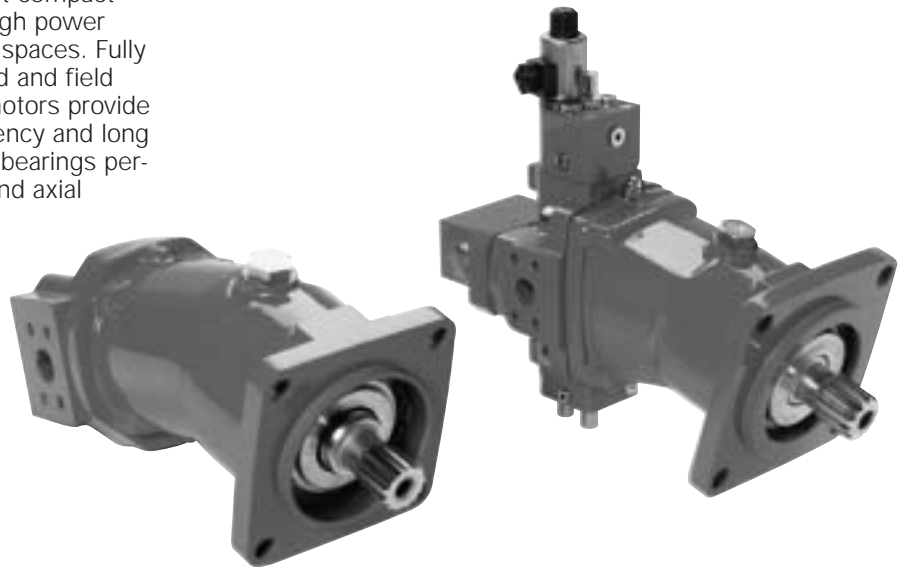
To optimize vehicle operating characteristics, an array of control options are available on variable displacement models; automatic, operator selectable, hydraulic, electric, manual.

Flange or recessed gearbox mounting options allow use with many types of drive systems including compact planetary wheel and track drives.

Flushing valves can be added for integrated closed circuit cooling and flushing.

Typical application:

- Earth moving machines and construction equipment
- Agricultural and forestry vehicles
- Marine and Off-Shore equipment
- Industrial conveying, mixing, and other stationary in-plant uses.



Variable Displacement Specifications and Performance Technical Data

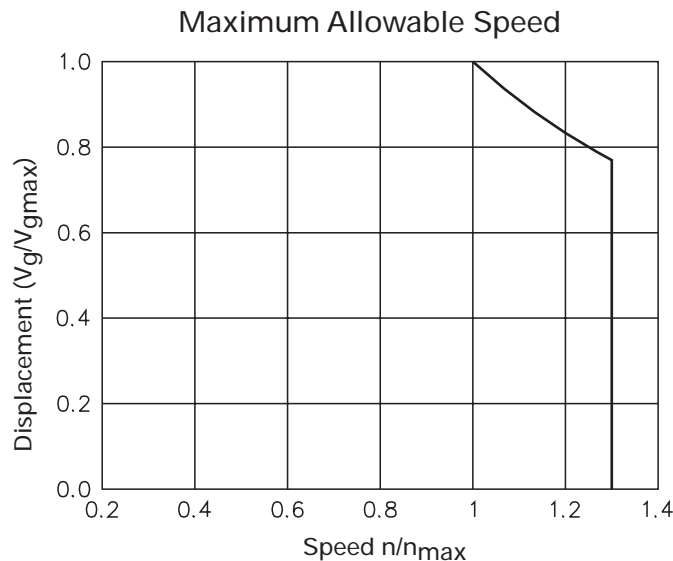
SIZE			55	75	108	161	225
Displacement	$V_{g \max}$	cm ³ /rev (in ³ /rev)	54.8 (3.34)	75.3 (4.60)	107.5 (6.56)	160.8 (9.81)	225.1 (13.73)
Displacement	$V_{g \min}$	cm ³ /rev (in ³ /rev)	15.8 (0.96)	21.7 (1.33)	31.0 (1.89)	46.4 (2.83)	64.9 (3.96)
Max. pressure	cont.	p_{nom}	bar (psi) 350 (5100)				
Max. pressure	peak	p_{max}	bar (psi) 450 (6500)				
Max. flow		q_{max}	l/min (U.S. gpm) 214 (56.5) 263.5 (69.5) 344 (90.5) 450 (118.5) 563 (148.5)				
Max. speed at $V_{g \max}$	$e_{q \max}$	n_{max}	rpm 3900 3500 3200 2800 2500				
Max. speed at $V_{g \max} < e_{q \max}^{(3)}$		$n_{\text{max lim}}$	rpm 5100 4600 4200 3600 3200				
Torque constant $V_{g \max}$		T_k	Nm/bar (lb _f - ft/psi) 0.87 (0.044) 1.20 (0.061) 1.71 (0.087) 2.56 (0.13) 3.58 (0.18)				
Max. power at q_{max} e p_{nom}	motor	p_{max}	kW (hp) 125 (167) 154 (206) 201 (269) 263 (352) 328 (440)				
Max. torque at $V_{g \max}$	cont. (p_{nom})	T_{nom}	Nm (lb _f - ft) 305 (224.5) 420 (310) 599 (442) 896 (661) 1254 (925)				
Max. torque at $V_{g \max}$	peak (p_{max})	T_{max}	Nm (lb _f - ft) 392 (289) 540 (398) 770 (568) 1152 (849) 1613 (1189)				
Moment of inertia (rotating J group)			kg m ² (lb _f - ft ²) 0.004 (0.095) 0.008 (0.189) 0.013 (0.308) 0.025 (0.593) 0.040 (0.948)				
Weight ⁽¹⁾	m		kg (lbs) 29 (64) 41 (90) 54 (119) 76 (168) 106 (234)				
Drainage flow ⁽²⁾		q_d	l/min (U.S. gpm) 1.5 (0.39) 2.0 (0.53) 2.8 (0.74) 3.6 (0.95) 4.9 (1.29)				

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

⁽¹⁾Approximate values.

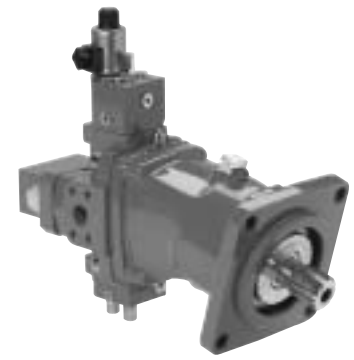
⁽²⁾Average values at 250 bar (3600 psi) with mineral oil at 45 °C (113 °F) and 35 cSt of viscosity.

⁽³⁾Determination of allowable speed n_{max} value can be increased by reducing motor maximum displacement. To determine the relationship between $V_{g \max}$ and n_{max} use the right side chart. Motor maximum allowable speed is $n_{\text{max lim}}$.



Variable Displacement Model Codes

The following 25-digit coding system has been developed to identify standard configuration options for Bent Axis Variable Displacement Motors. Use this model code to specify a motor with the desired features. All 25 digits of the code must be present to release a new product number for ordering.



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
B	A	V												A	0				0	0	0		0	A

CODE POSITION	FEATURE	CODE	DESCRIPTION	CODE POSITION	FEATURE	CODE	DESCRIPTION
1,2,3	Code title	BAV	Variable displacement bent axis piston motor	10	Main ports	E	Opposite side ports - 3/4 code 62 split flange with m10 threads (055 displacement code)
4,5,6	Displacement	055	54.8 cm ³ /r [3.34 in ³ /r]	F	Opposite side ports - 1 code 62 split flange with m12 threads (075 and 108 displacement code)	G	Opposite side ports - 1 1/4 code 62 split flange with m14 threads (161 and 225 displacement code)
		075	75.3 cm ³ /r [4.60 in ³ /r]	L	Opposite side ports - 3/4 code 62 sae split flange (055 displacement code)	M	Opposite side ports - 1 code 62 sae split flange (055, 075 and 108 displacement code)
		108	107.5 cm ³ /r [6.56 in ³ /r]	N	Opposite side ports - 1 1/4 code 62 sae split flange (161 and 225 displacement code)	R	Rear ports - 3/4 code 62 sae split flange (055 displacement code)
		161	160.8 cm ³ /r [9.81 in ³ /r]	S	Rear ports - 1 code 62 sae split flange (055, 075 and 108 displacement code)	T	Rear ports - 1 1/4 code 62 sae split flange (161 and 225 displacement code)
		225	225.1 cm ³ /r [13.73 in ³ /r]	U	Rear ports - 3/4 code 62 split flange with m10 threads (055 displacement code)	V	Rear ports - 1 code 62 split flange with m12 threads (075 and 108 displacement code)
7	Mounting type	3	ISO 125 mm (055 displacement code)	W	Rear ports - 1 1/4 code 62 split flange with m14 threads (161 and 225 displacement code)		
		4	ISO 140 mm (075 displacement code)	11	Valves	0	No optional valves
		5	ISO 160 mm (108 displacement code)	1	Shuttle valve 8.5 l/min [2.25 gal/min] at 21 bar [305 lbf/in ²] with adapter—for use with opposite side ported motors.	2	Shuttle valve 20.0 l/min [5.3 gal/min] at 21 bar [305 lbf/in ²] with adapter—for use with opposite side ported motors.
		6	ISO 180 mm (161 displacement code)	2			
		8	ISO 224 mm (225 displacement code)	12,13	Control	E1	12 volt electrical 2 position control biased to maximum displacement
		C	SAE "C" 4 bolt (055 displacement code)	E3	24 volt electrical 2 position control biased to maximum displacement	E2	12 volt electrical 2 position control biased to minimum displacement
		D	SAE "D" 4 bolt (075, 108 and 161 displacement code)	E4	24 volt electrical 2 position control biased to minimum displacement	E5	12 volt electrical 2 position control with pressure response biased to maximum displacement
		E	SAE "E" 4 bolt (225 displacement code)	E6	24 volt electrical 2 position control with pressure response biased to maximum displacement		
		V	Gearbox 160 mm (055 and 075 displacement code)				
		Y	Gearbox 200 mm (108 displacement code)				
8, 9	Output shaft	03	30mm straight keyed shaft (055 displacement code)				
		04	35mm straight keyed shaft (075 displacement code)				
		05	40mm straight keyed shaft (108 displacement code)				
		06	45mm straight keyed shaft (161 displacement code)				
		07	50mm straight keyed shaft (225 displacement code)				
		09	1 1/4 straight keyed shaft (055 displacement code)				
		11	1 3/4 straight keyed shaft (075, 108, 161 and 225 displacement code)				
		13	13 tooth splined shaft 8/16 dp (075, 108, 161 and 225 displacement code)				
		14	14 tooth splined shaft 12/24 dp (055 displacement code)				
		30	14 tooth w30 splined shaft per din 5480 (055 displacement code)				
		35	16 tooth w35 splined shaft per din 5480 (075 displacement code)				
		40	18 tooth w40 splined shaft per din 5480 (108 displacement code)				
		45	21 tooth w45 splined shaft per din 5480 (161 displacement code)				
		50	24 tooth w50 splined shaft per din 5480 (225 displacement code)				

Variable Displacement Model Codes

CODE POSITION	FEATURE	CODE	DESCRIPTION	CODE POSITION	FEATURE	CODE	DESCRIPTION
12,13	Control			15	Control orifice		
		EA	12 volt electrical proportional control biased to maximum displacement			A	Standard (.8 mm dia.)
		EC	24 volt electrical proportional control biased to maximum displacement			B	No orifice
		EB	12 volt electrical proportional control biased to minimum displacement	16	Control special features	0	None
		ED	24 volt electrical proportional control biased to minimum displacement	17,18	Min/max displacement	02	15.8-54.8 cm ³ /r [.96-3.34 in ³ /r] (055 displacement code)
		H1	Hydraulic 2 position control biased to maximum displacement			03	21.7-75.3 cm ³ /r [1.33-4.60 in ³ /r] (075 displacement code)
		H2	Hydraulic 2 position control biased to minimum displacement			04	31.0-107.5 cm ³ /r [1.89-6.56 in ³ /r] (108 displacement code)
		HA	Hydraulic proportional control 6-8 bar [90-26 lbf/in ²] biased to maximum displacement			05	46.4-160.8 cm ³ /r [2.83-9.81 in ³ /r] (161 displacement code)
		HB	Hydraulic proportional control 6-8 bar [90-26 lbf/in ²] biased to minimum displacement			06	64.9-225.1 cm ³ /r [3.96-13.73 in ³ /r] (225 displacement code)
		M1	Manual (handwheel) control biased to maximum displacement	19	Seals	A	Nitrile (standard)
		M2	Manual (handwheel) control biased to minimum displacement			B	Fluorocarbon
		PA	Pressure response control	20	Additional features	0	No additional features
		PB	Pressure response control with adjustable hydraulic override	21,22	Motor special features	00	None
14	Control pressure			23	Paint	0	No paint
		0	None			A	Primer blue
		A	100 bar [1450 lbf/in ²]	24	Identification	0	Standard eaton identification
		B	120 bar [1740 lbf/in ²]	25	Design code	A	A
		C	140 bar [2030 lbf/in ²]				
		D	160 bar [2320 lbf/in ²]				
		E	180 bar [2610 lbf/in ²]				
		F	200 bar [2900 lbf/in ²]				
		G	220 bar [3190 lbf/in ²]				
		H	240 bar [3480 lbf/in ²]				
		J	260 bar [3770 lbf/in ²]				
		K	280 bar [4060 lbf/in ²]				
		L	300 bar [4350 lbf/in ²]				
		M	320 bar [4640 lbf/in ²]				
		N	340 bar [4930 lbf/in ²]				
		P	350 bar [5075 lbf/in ²]				

Variable Displacement

55cc

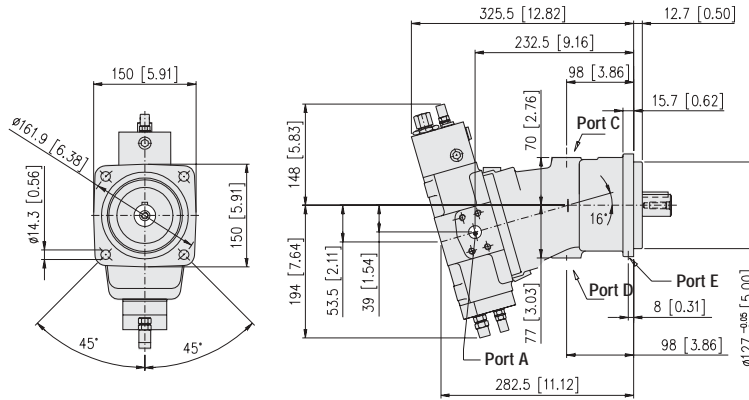
Model Code Pos. 4, 5, 6

Code 055

Mounting Flange Options Model Code Position 7

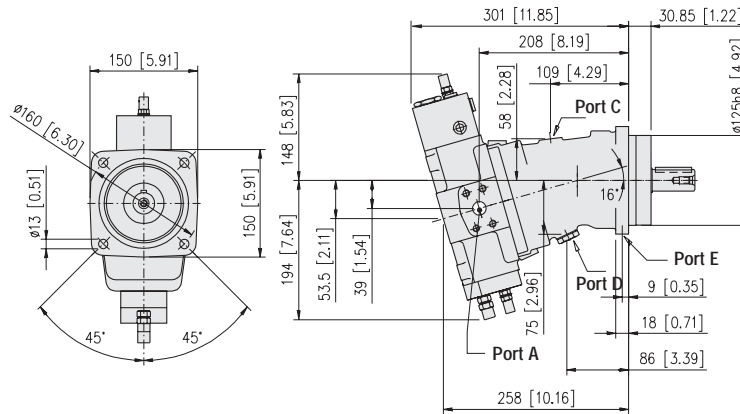
SAE

Code: C



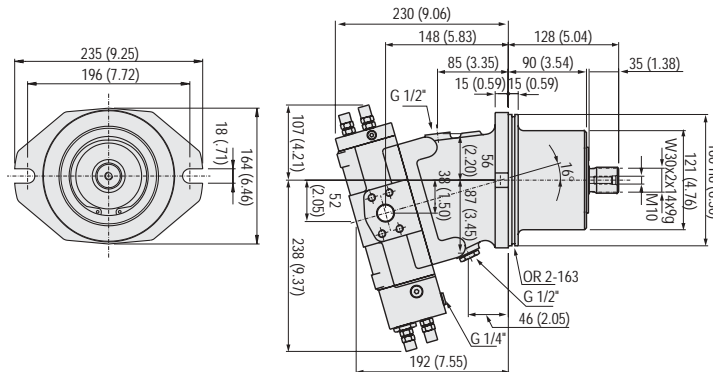
ISO

Code: 3



Gearbox

Code: V



Variable Displacement

55cc

Model Code Pos. 4, 5, 6

Code 055

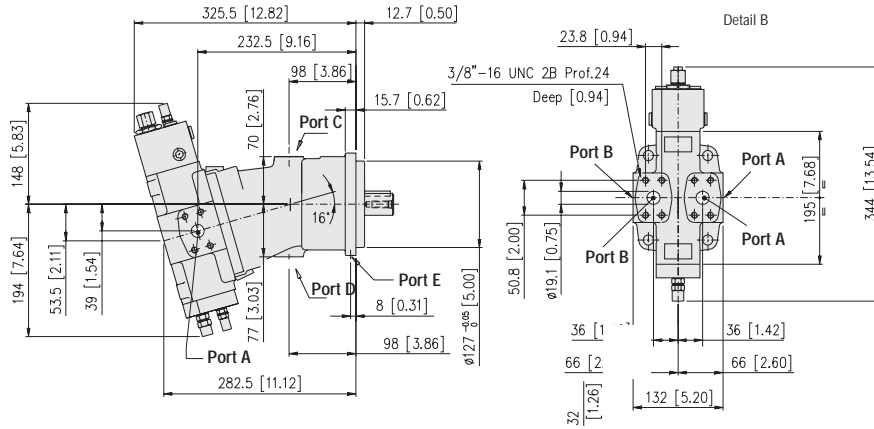
Porting Options

Model Code Position 7

SAE

Opposite Side Code: L

Rear Code: R

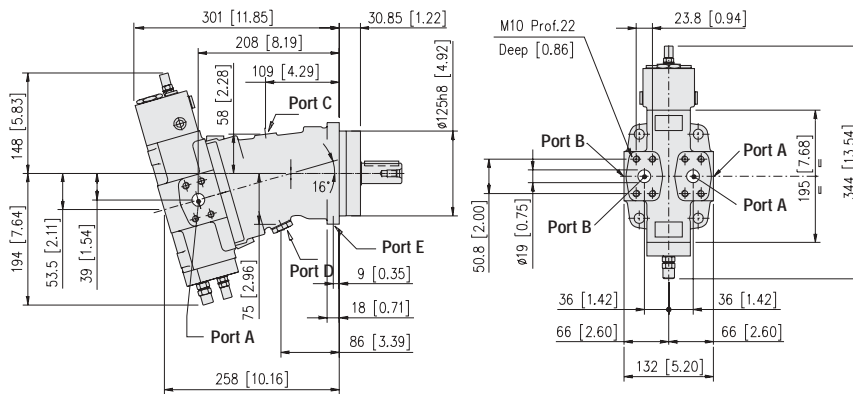


DESCRIPTION	SIZE
A System Port	3/4" SAE Code 62
B System Port	3/4" SAE Code 62
C Case Drain	1" - 14 UNF-2B
D Case Drain	1" - 1/16-12UN2B 1" - 1/16-12UN2B (plugged)
E Flushing Port	G 7/16"-20UNF (plugged)

Metric

Opposite Side Code: E

Rear Code: U

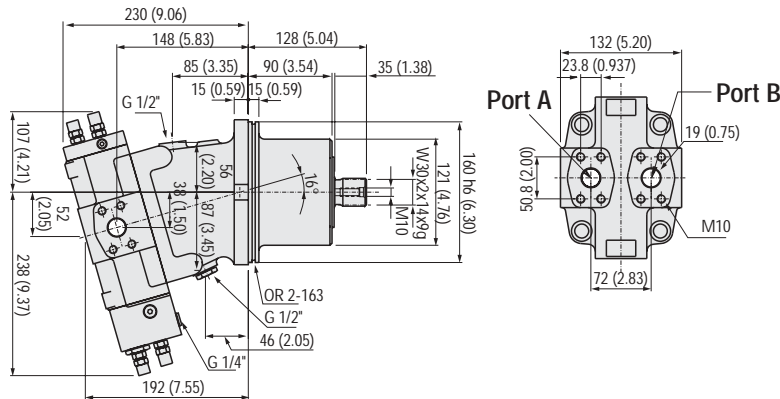


DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)
E Flushing Port	G 1/8" (plugged)

Gearbox

Opposite Side Code: E

Rear Code: U



DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)
E Flushing Port	G 1/8" (plugged)

Variable Displacement

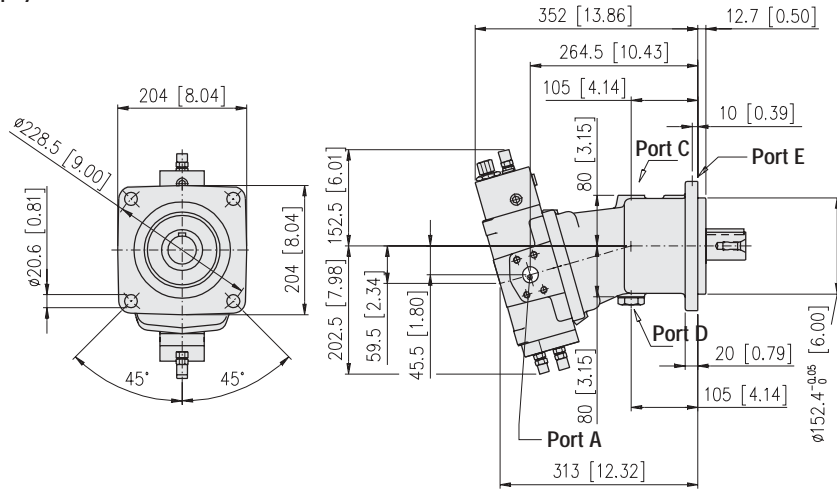
75cc

Model Code Pos. 4, 5, 6

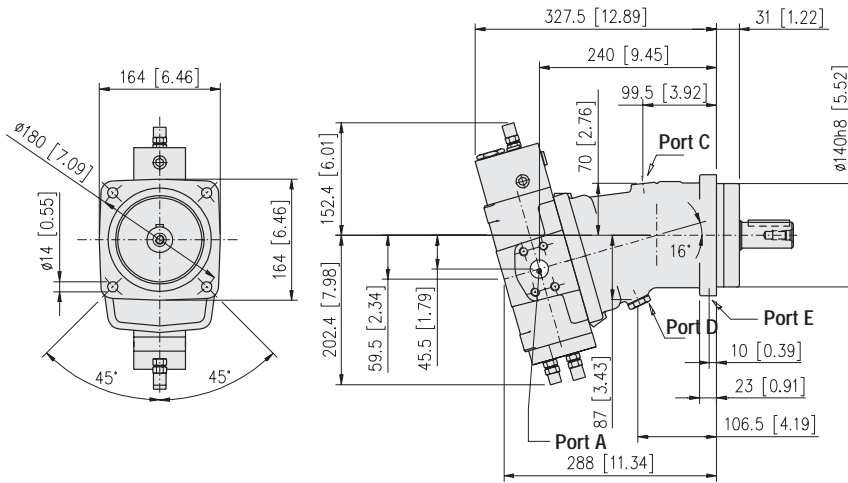
Code 075

Mounting Flange Options Model Code Position 7

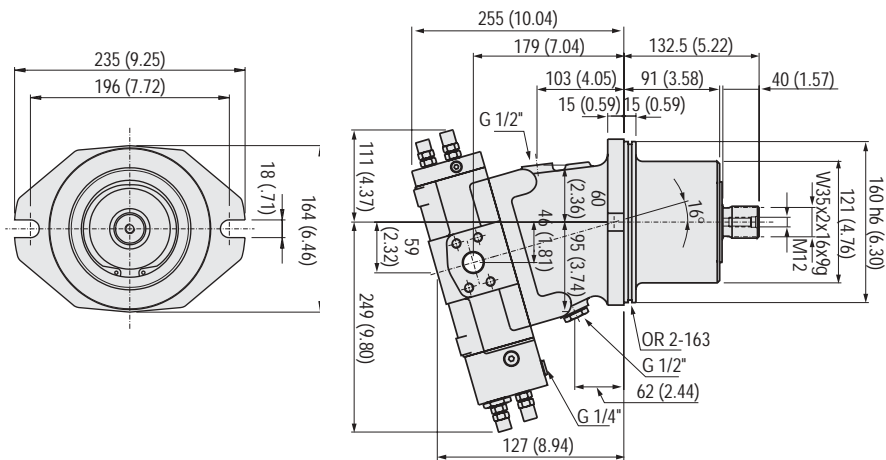
SAE
Code: D



ISO
Code: 4



Gearbox
Code: V



Variable Displacement

75cc

Model Code Pos. 4, 5, 6

Code 075

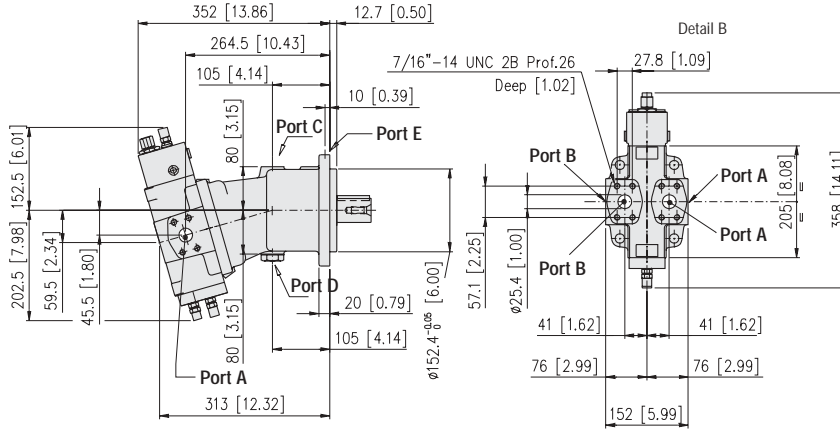
Porting Options

Model Code Position 10

SAE

Opposite Side Code: M

Rear Code: S

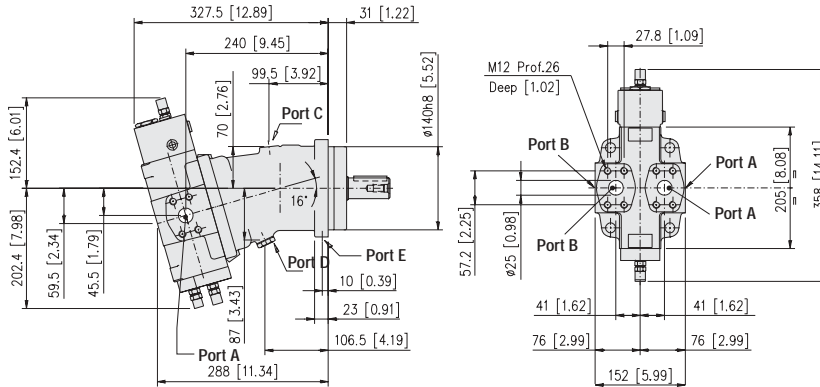


DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16-12 UNF-2B
D Case Drain	1-1/16-12 UNF-2B (plugged)
E Flushing Port	7/16-20UNF (plugged)

Metric

Opposite Side Code: F

Rear Code: V

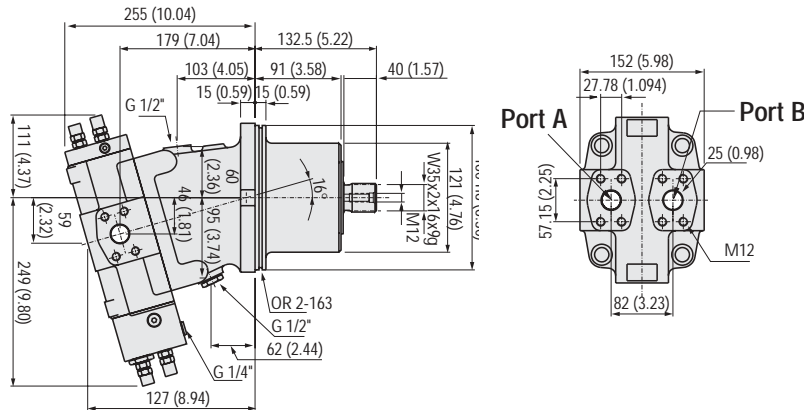


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)
E Flushing Port	G 1/8" (plugged)

Gearbox

Opposite Side Code: F

Rear Code: V



DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)
E Flushing Port	G 1/8" (plugged)

Variable Displacement

108cc

Model Code Pos. 4, 5, 6

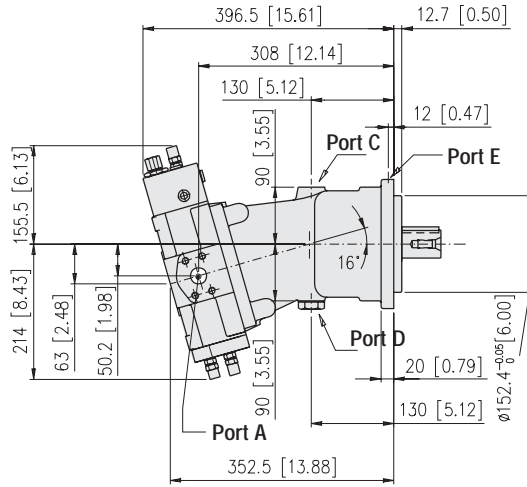
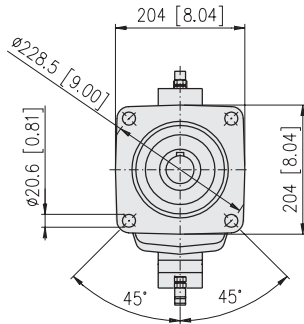
Code 108

Mounting Flange Options

Model Code Position 7

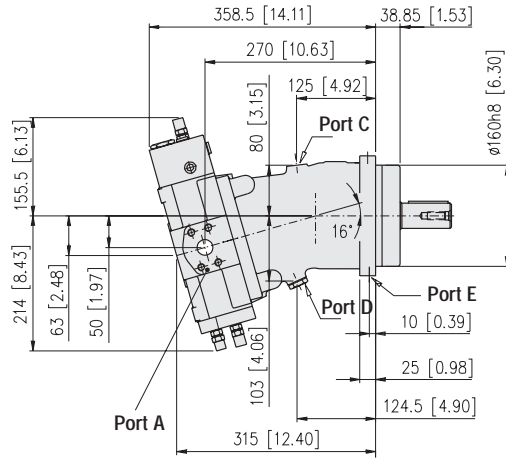
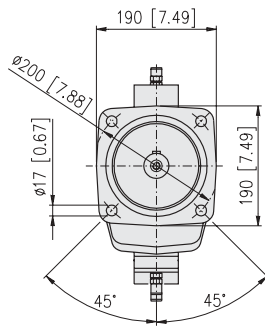
SAE

Code: D



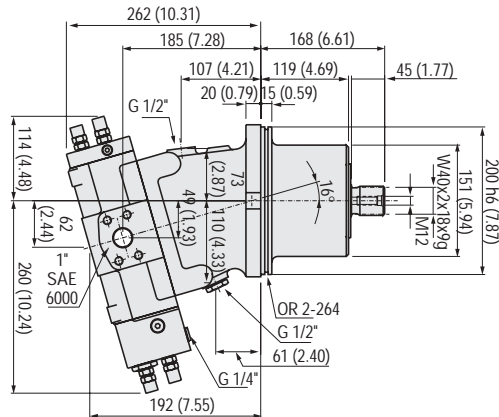
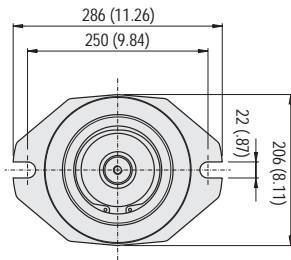
ISO

Code: 5



Gearbox

Code: Y



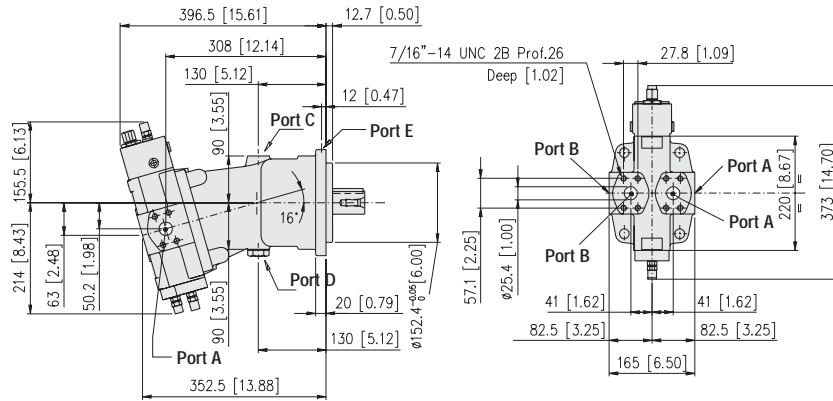
Variable
Displacement
108cc
Model Code Pos. 4, 5, 6
Code 108

Porting Options
Model Code Position 7

SAE

Opposite Side
Code: M

Rear
Code: S

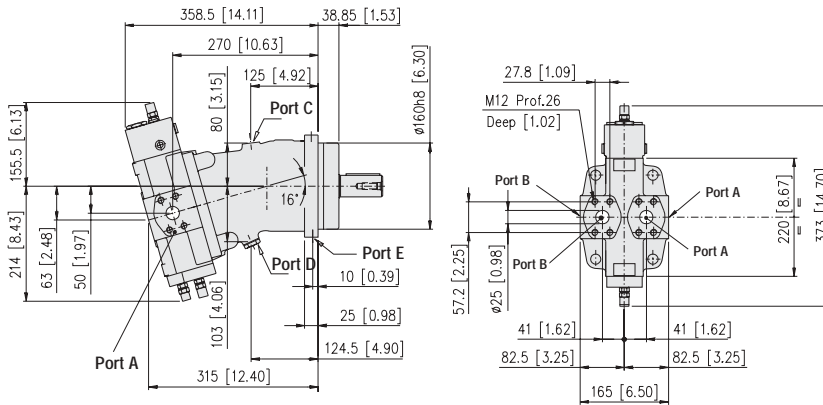


DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16" - 12 UNF-2B
D Case Drain	1-1/16" - 12 UNF-2B (plugged)
E Flushing Port	G 7/16" - 20 UNF (plugged)

Metric

Opposite Side
Code: F

Rear
Code: V

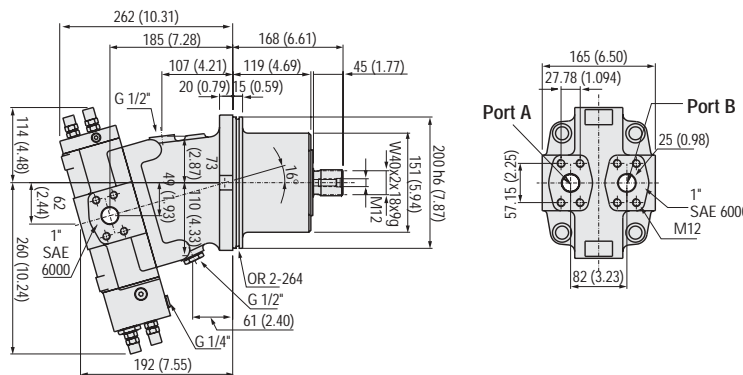


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)
E Flushing Port	G 1/8" (plugged)

Gearbox

Opposite Side
Code: F

Rear
Code: V

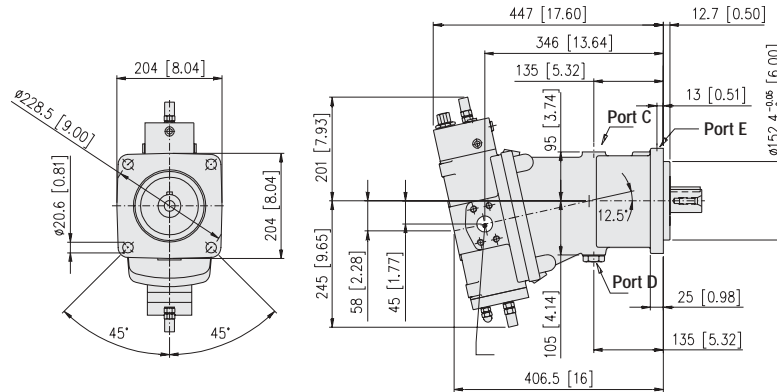


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)
E Flushing Port	G 1/8" (plugged)

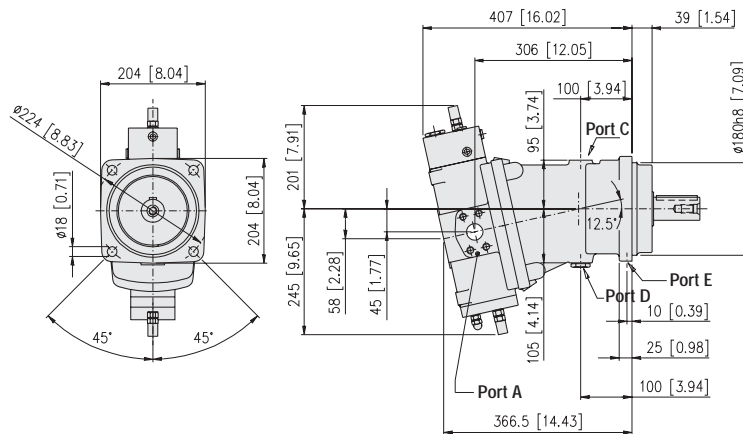
Variable
Displacement
161cc
Model Code Pos. 4, 5, 6
Code 161

Mounting Flange Options
Model Code Position 7

SAE
Code: D



ISO
Code: 6



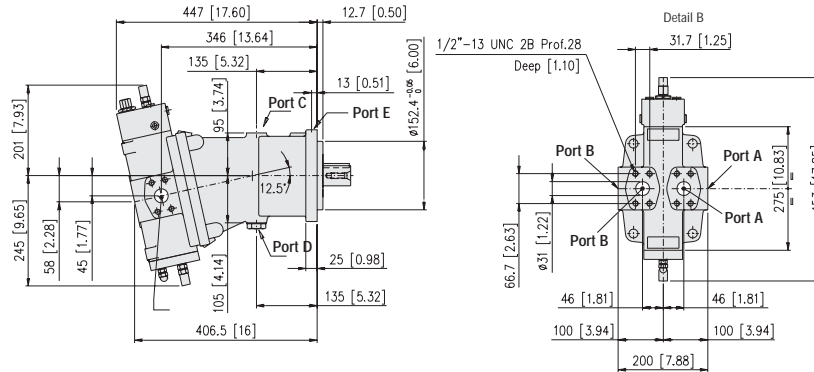
Variable
Displacement
161cc
Model Code Pos. 4, 5, 6
Code 161

Porting Options
Model Code Position 10

SAE

Opposite Side
Code: N

Rear
Code: T

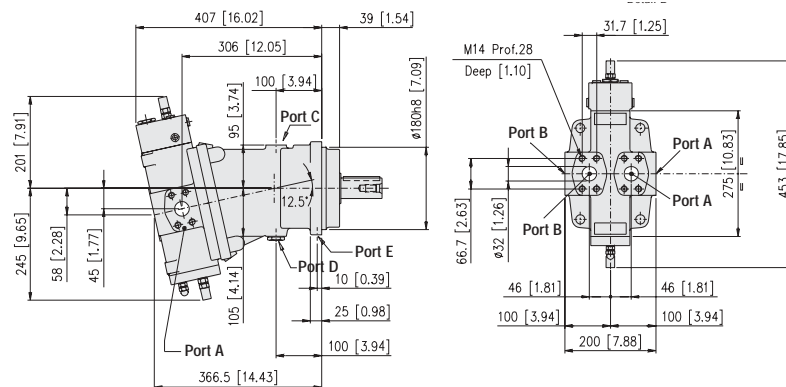


DESCRIPTION	SIZE
A 62 System Port	1-1/4" SAE Code
B 62 System Port	1-1/4" SAE Code
C Case Drain	1-1/16" - 12 UNF-2B
D Case Drain	1-1/16" - 12 UNF-2B (plugged)
E Flushing Port	G 7/16" - 20 UNF (plugged)

Metric

Opposite Side
Code: G

Rear
Code: W



DESCRIPTION	SIZE
A System Port	1-1/4" Metric Code 62
B System Port	1-1/4" Metric Code 62
C Case Drain	G 3/4"
D Case Drain	G 3/4" (plugged)
E Flushing Port	G 1/8" (plugged)

Variable Displacement

225cc

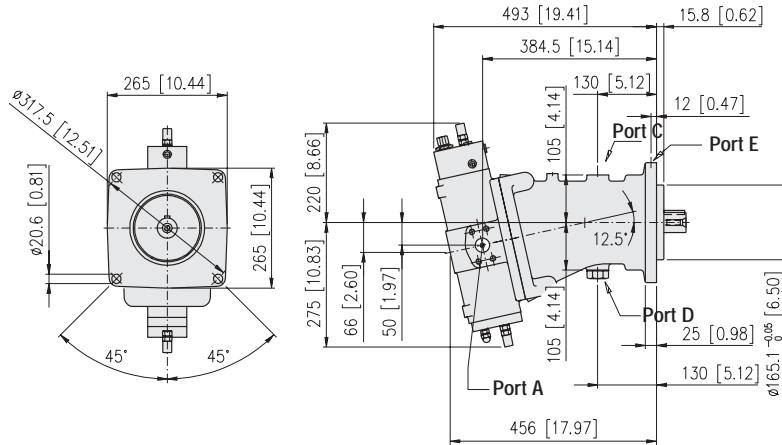
Model Code Pos. 4, 5, 6

Code 225

Mounting Flange Options Model Code Position 7

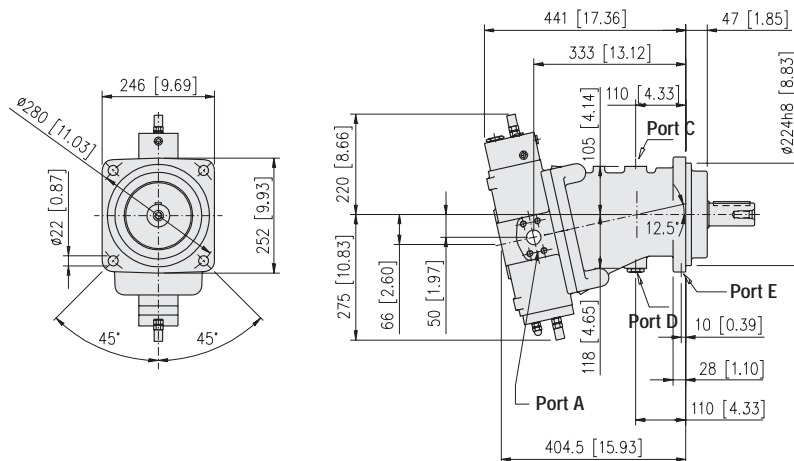
SAE

Code: E



ISO

Code: 8



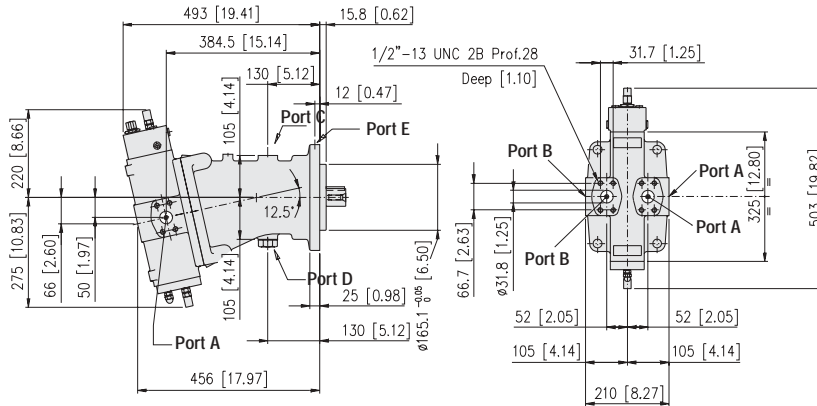
Variable
Displacement
225cc
Model Code Pos. 4, 5, 6
Code 225

Porting Options
Model Code Position 10

SAE

Opposite Side
Code: N

Rear
Code: T

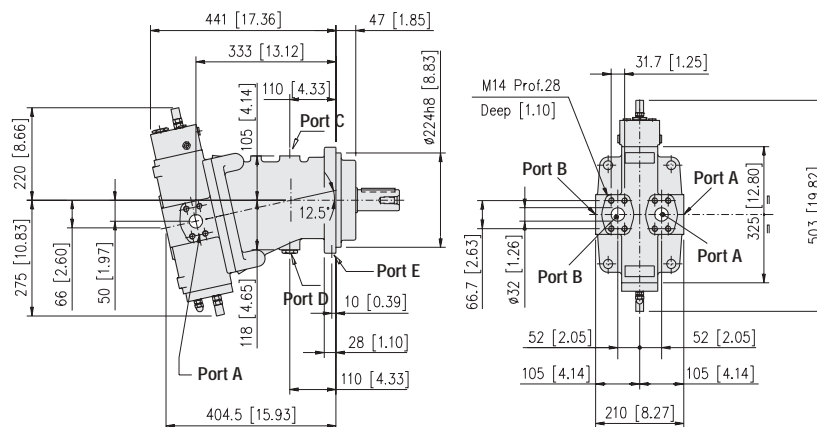


DESCRIPTION	SIZE
A	1-1/4" SAE Code
62	System Port
B	1-1/4" SAE Code
62	System Port
C	1-3/16"-12 UNF-2B
Case Drain	
D	1-3/16"-12 UNF-2B
Case Drain	(plugged)
E	G 7/16" - 20 UNF
Flushing Port	(plugged)

Metric

Opposite Side
Code: G

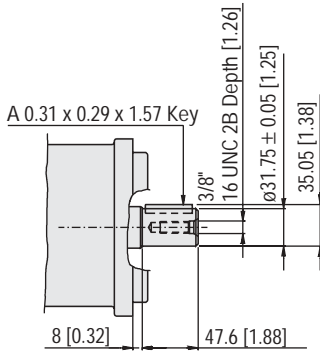
Rear
Code: W



DESCRIPTION	SIZE
A	3/4" Metric Code 62
System Port	
B	3/4" Metric Code 62
System Port	
C	G 3/4"
Case Drain	
D	G 3/4"
Case Drain	(plugged)
E	G 1/8"
Flushing Port	(plugged)

Variable Displacement Output Shaft Options

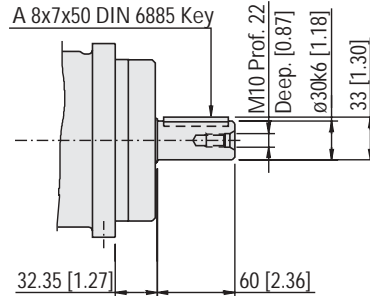
Model Code Positions 8, 9



1-1/4" Straight Keyed Shaft

Available in:
55cc SAE mount unit

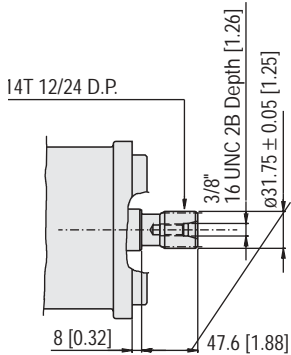
Code: 09



30mm Straight Keyed Shaft

Available in:
55cc ISO mount unit

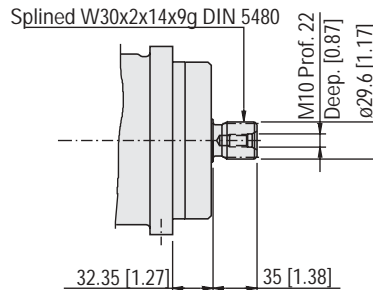
Code: 03



14T Splined Shaft with 3/8"-16 UNC threaded hole in shaft end

Available in:
55cc SAE mount unit

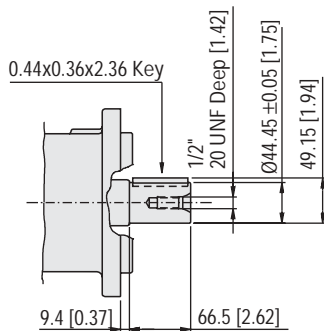
Code: 14



W30-14T DIN Splined Shaft with M10 x 22 threaded hole in shaft end

Available in:
55cc ISO and gearbox
mount units

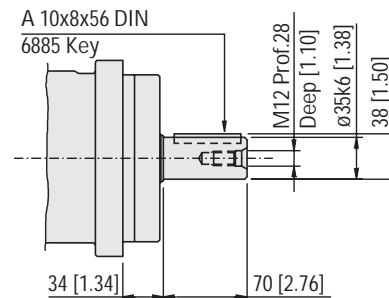
Code: 30



1-3/4" Straight Keyed Shaft

Available in:
75, 108, 161, 225cc
SAE mount units

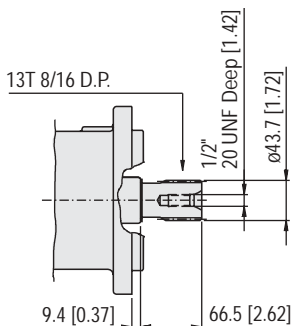
Code: 11



35mm Straight Keyed Shaft

Available in:
75cc ISO mount unit

Code: 04

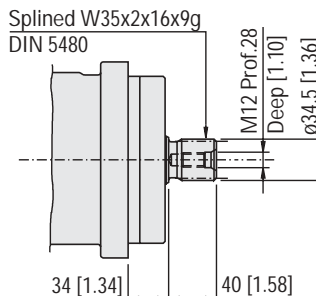


13T 8/16 DP Splined Shaft

with 1/2"-20 UNF threaded hole
in shaft end

Available in:
75, 108, 161, 225cc
SAE mount units

Code: 13



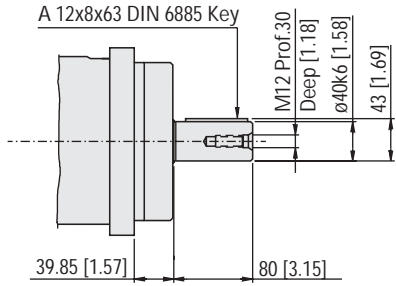
W35-16T DIN Splined Shaft with M12 x 28 threaded hole in shaft end

Available in:
75cc ISO and gearbox
mount units

Code: 35

Variable Displacement Output Shaft Options

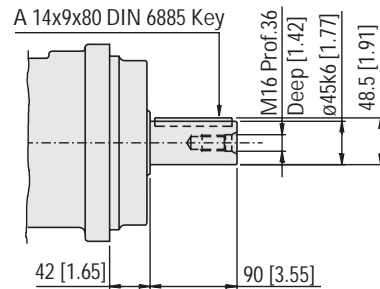
Model Code Position 8, 9



40mm Straight Keyed Shaft

Available in:
108cc ISO mount unit

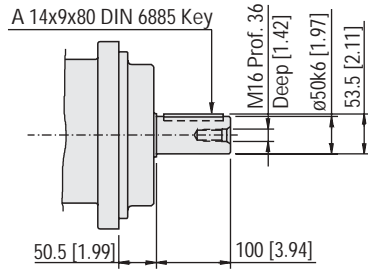
Code: 05



45mm Straight Keyed Shaft

Available in:
160cc ISO and gearbox mount units

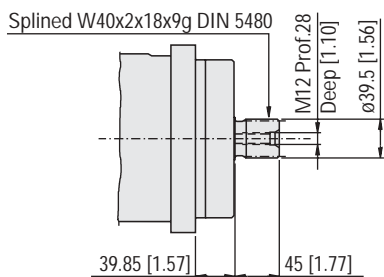
Code: 06



50mm Straight Keyed Shaft

Available in:
226cc ISO mount unit

Code: 07

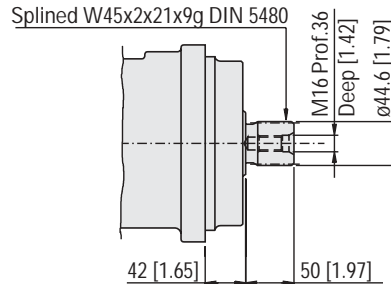


W40-18T DIN Splined Shaft

with M12 x 28 threaded hole in shaft end

Available in:
108cc ISO mount unit

Code: 40

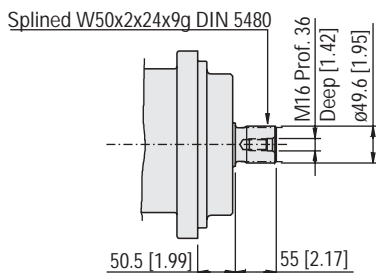


W45-21T DIN Splined Shaft

with M16 x 36 threaded hole in shaft end

Available in:
160cc ISO mount unit

Code: 45



W50-24T DIN Splined Shaft

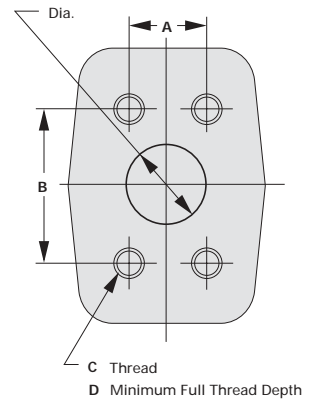
with M16 x 36 threaded hole in shaft end

Available in:
226cc ISO mount unit

Code: 50

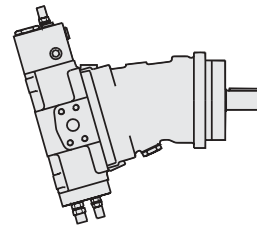
Variable Displacement Port Options

Model Code Pos. 10

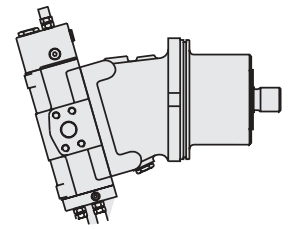


CODE	DESCRIPTION	DIAMETER	A	B	C	D
E	Opposite side ports - 3/4" code 62 - Metric - Split Flange (055 Displacement Code)	19 mm (0.75 in)	23.8 mm (0.94 in)	50.8 mm (2.00 in)	M10	22 mm (0.86 in)
F	Opposite side ports - 1" code 62 - Metric - Split Flange (075 and 108 Displacement Code)	25 mm (0.98 in)	27.8 mm (1.09 in)	57.2 mm (2.25 in)	M12	26 mm (1.02 in)
G	Opposite side ports - 1 1/4" code 62 - Metric - Split Flange (161 and 225 Displacement Code)	32 mm (1.26 in)	31.7 mm (1.25)	66.7 mm (2.63)	M14	28 mm (1.10 in)
L	Opposite side ports - 3/4" code 62 - SAE - Split Flange (055 Displacement Code)	19.1 mm (0.75 in)	23.8 mm (0.94 in)	50.8 (2.00)	3/8" - 16 UNC 2B	22 mm (0.86 in)
M	Opposite side ports - 1" code 62 - SAE - Split Flange (075 and 108 Displacement Code)	25.4 mm (1.00 in)	27.8 mm (1.09 in)	57.2 mm (2.25 in)	7/16" -14 UNC (2B)	26 mm (1.02 in)
N	Opposite side ports - 1 1/4" code 62 - SAE - Split Flange (161 and 225 Displacement Code)	31mm (1.22 in)	31.7mm (1.25 in)	66.7mm (2.63 in)	1/2" -13 UNC 2B	28 mm (1.10 in)
R	Rear ports - 3/4" code 62 - SAE - Split Flange (055 Displacement Code)	19.1mm (0.75 in)	23.8mm (0.94 in)	50.8mm (2.00)	3/8" -16 UNC 2B	22 min (0.86 in)
S	Rear ports - 1" code 62 - SAE - Split Flange (075 and 108 Displacement Code)	25.4 mm (1.00 in)	27.8 mm (1.09 in)	57.2 mm (2.25 in)	7/16" - 14 UNC 2B	26 mm (1.02 in)
T	Rear ports - 1 1/4" code 62 - SAE - Split Flange (106 and 225 Displacement Code)	31 mm (1.22 in)	31.7 mm (1.25 in)	66.7 mm (2.63 in)	1/2" - 13 UNC 2B	28 mm (1.10 in)
U	Rear ports - 3/4" code 62 - Metric - Split Flange (055 Displacement Code)	19 mm (0.75 in)	23.8 mm (0.94 in)	50.8 mm (2.00)	M10	22 mm (0.86 in)
V	Rear ports - 1" code 62 - Metric - Split Flange (075 and 108 Displacement Code)	25 mm (0.98 in)	27.8 mm (1.09 in.)	57.2 mm (2.25 in)	M12	26 mm (1.02 in)
W	Rear ports - 1 1/4" code 62 - Metric - Split Flange (075 and 108 Displacement Code)	32 mm (1.26 in)	31.7 mm (1.25 in)	66.7 mm (2.63 in)	M14	28 mm (1.10 in)

Variable
Displacement
Valve Options
Model Code Pos. 11



Flange



Gearbox

All Eaton variable displacement motors configured with opposite side ports can be specified with optional shuttle valves.

This feature is used to remove hot oil from the low pressure side of a closed circuit. The system charge pump replenishes this oil with cooled, filtered oil from the reservoir. Shuttle valves are recommended in closed circuit applications, especially when operating at high speeds and power levels.

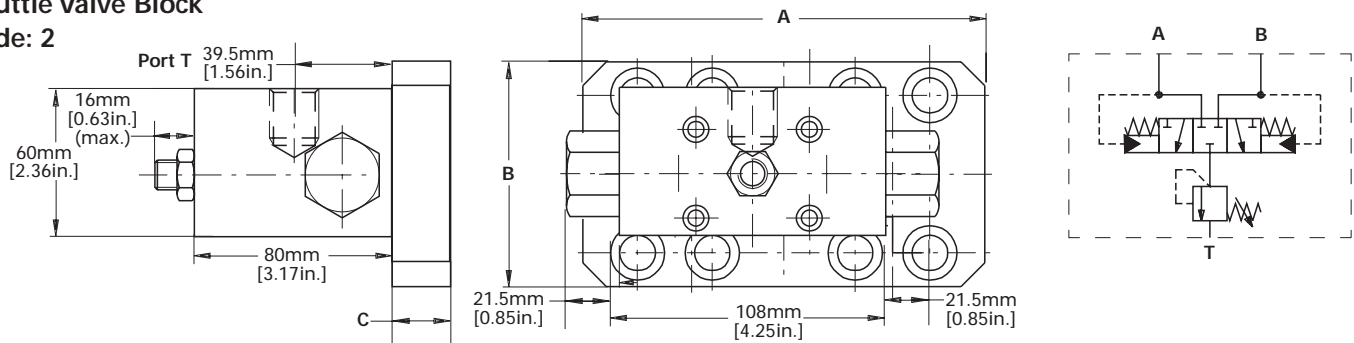
The valve block is mounted to an adapter plate attached to the rear of the motor.

Two versions of the shuttle valve are available. Consult the table below for specifications and ordering codes.

CODE	SHUTTLE VALVE	DISPLACEMENT				
		55	75	108	161	225
1	8.5 lpm (2.25 gpm) @ 305 psi	Requires port option L or E	Requires port option M or F	Requires port option M or F	Requires port option N or G	Requires port option N or G
2	20 lpm (5.3gpm) @ 305 psi	Requires port option L or E	Requires port option M or F	Requires port option M or F	Requires port option N or G	Requires port option N or G
ø	No Shuttle					

**20 lpm (5.3 gpm)
Shuttle Valve Block**

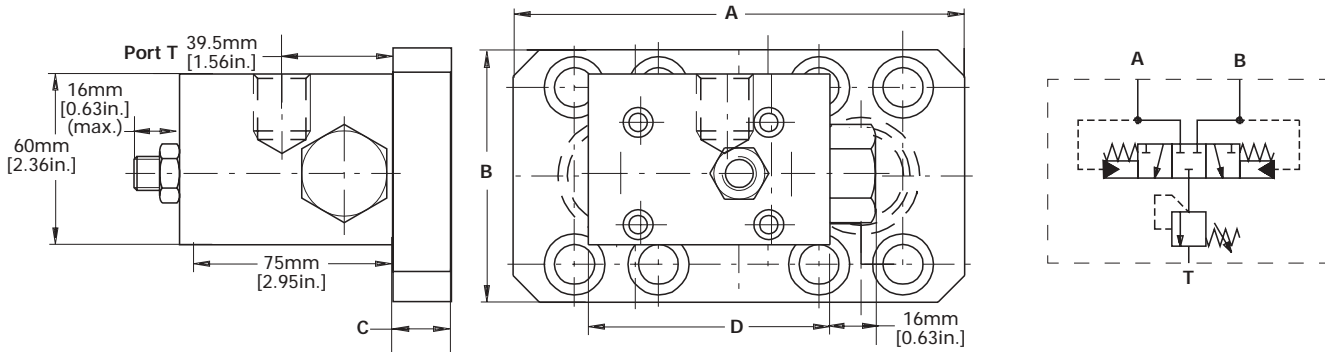
Code: 2



DISPLACEMENT	A	B	C	PORT T	WEIGHT
055	130 [5.12in.]	75 [2.95in.]	25 [0.98in.]	G 1/2"	5.5 kg [12.1lbf]
075	150 [5.91in.]	82 [3.23in.]	25 [0.98in.]	G 1/2"	5.8 kg [12.8lbf]
108	150 [5.91in.]	82 [3.23in.]	25 [0.98in.]	G 1/2"	6.0 kg [13.2lbf]
161	170 [6.69in.]	95 [3.74in.]	28 [1.10in.]	G 1/2"	6.2 kg [13.6lbf]
225	180 [7.09in.]	95 [3.74in.]	40 [1.57in.]	G 1/2"	7.0 kg [15.4lb]

Variable
Displacement
Valve Options
Model Code Pos. 11

8.5 lpm (1.25 gpm)
Shuttle Valve Block
Code: 1



DISPLACEMENT	A	B	C	D	PORT T	WEIGHT (KG)
055	130 [5.12in.]	75 [2.95in.]	25 [0.98in.]	85	G 1/2"	4.3kg [9.5lbf]
075	150 [5.91in.]	82 [3.23in.]	25 [0.98in.]	85	G 1/2"	4.6kg [10.1lbf]
108	150 [5.91in.]	82 [3.23in.]	25 [0.98in.]	90	G 1/2"	4.8kg [10.6lbf]
161	170 [6.69in.]	95 [3.74in.]	28 [1.10in.]	90	G 1/2"	5.0kg [11.0lbf]
225	180 [7.09in.]	95 [3.74in.]	40 [1.57in.]	90	G 1/2"	5.8kg [12.8lbf]

Variable Displacement Control Options

Model Code Pos. 12,13

Pressure Response Control

Code: PA

The pressure response control shifts the variable motor to satisfy system torque requirements.

The motor is biased to minimum displacement and remains at this setting until the motor's torque demand increases system pressure to the preset shift point, causing the motor displacement to increase to the maximum displacement setting.

At maximum displacement, the motor provides maximum torque for a given pressure. When at minimum displacement, the motor provides the maximum output speed for a given flow rate.

Control operation occurs when system pressure creates a force on the spool which exceeds the force of the adjustable control spring.

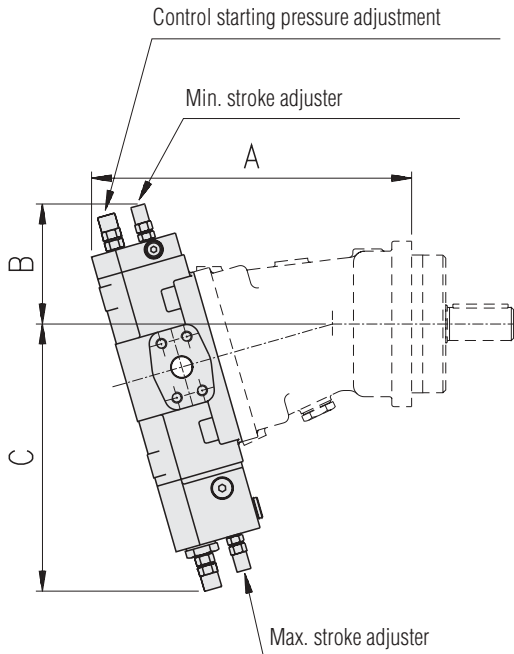
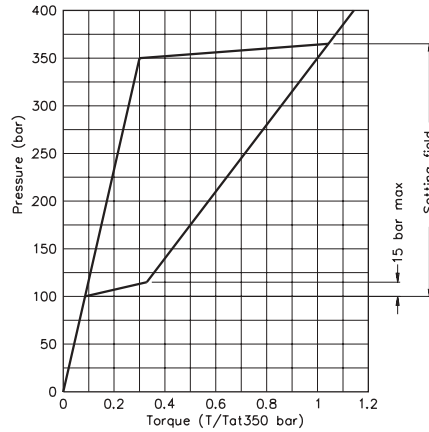
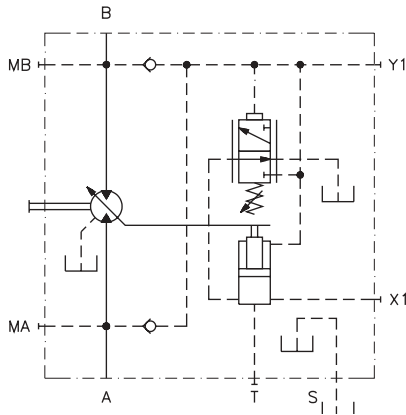
The motor remains at minimum displacement until system pressure creates a force exceeding the preset spring force, opening the spool, shifting the motor to maximum displacement.

A minimum system operating pressure of approximately 40 bar (580 psi) is required to operate the control. Pressure increase during the motor shift from minimum to maximum displacement

is approximately 15 bar (220 psi).

Control shift pressure can be specified in 20 bar [290 psi] increments from 100 to 350 bar (1450 to 5000 psi).

Select desired pressure in model code position 14.



Displacement	Version	A mm (in)	B mm (in)	C mm (in)
55	M	290 (11.41)	109 (4.28)	242 (9.53)
	SAE	315 (12.40)	109 (4.28)	242 (9.53)
75	M	316 (12.45)	112 (4.39)	252 (9.92)
	SAE	342 (13.46)	112 (4.39)	252 (9.92)
108	M	347 (13.65)	115 (4.53)	263 (10.34)
	SAE	385 (15.15)	115 (4.53)	263 (10.34)
161	M	400 (15.73)	160 (6.29)	290 (11.41)
	SAE	438 (17.25)	160 (6.29)	290 (11.41)
225	M	435 (17.11)	178 (7.01)	320 (12.59)
	SAE	486 (19.14)	178 (7.01)	320 (12.59)

Variable Displacement Control Options

Model Code Pos. 12,13

Pressure Response Control with Adjustable Hydraulic Over-ride

Code: PB

The PB control operates in the same manner as the standard Pressure Response control until pilot pressure is applied to port X2.

This pressure over-rides the preset shift pressure, by reducing the system pressure required to shift the motor to maximum displacement.

The motor's shift pressure setting is reduced proportionally to the pilot pressure at port X2 by the ratio of 13:1. (e.g. for each 10 psi of pilot pressure, shift pressure is reduced by 130 psi)

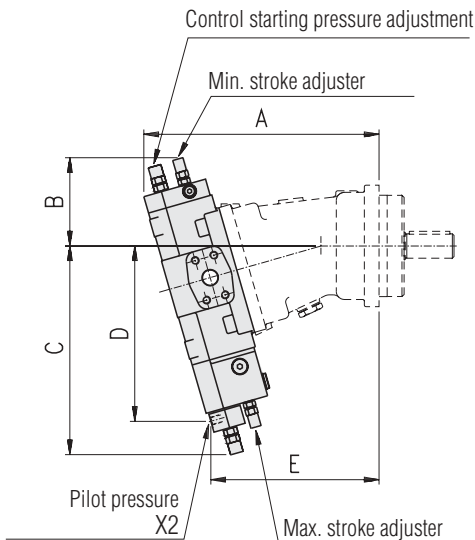
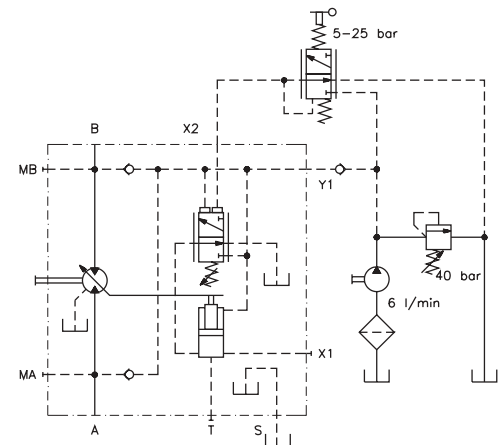
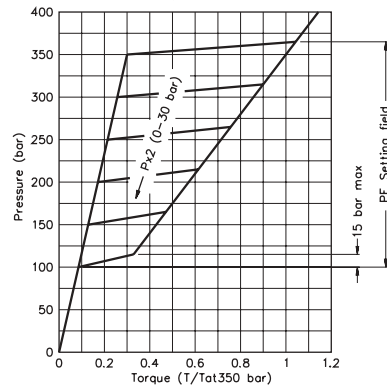
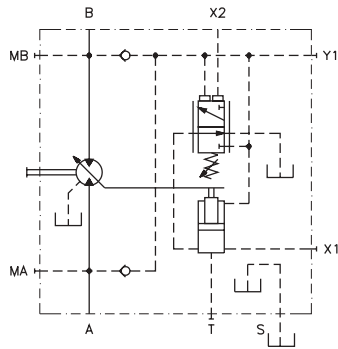
The maximum pressure which can be applied at port X2 = 50 bar (725 psi).

Minimum system pressure of 40 bar [580 psi] bar pressure is required to operate the control. Pressure rise during the motor shift from minimum to maximum displacement is approximately 15 bar (220 psi).

Control shift pressure can be specified in 20 bar [290 psi] increments from 100 to 350 bar (1450 to 5000 psi).

Select desired pressure in model code position 14.

Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example below).



Displacement	Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	X2
55	M	290 (11.41)	109 (4.28)	258 (10.16)	216.5 (8.51)	206.5 (8.12)	1/8" G
	SAE	315 (12.40)	109 (4.28)	258 (10.16)	222.5 (8.75)	253 (9.96)	7/16"-20 UNF
75	M	316 (12.45)	112 (4.39)	267 (10.50)	225.5 (8.88)	230.5 (9.08)	1/8" G
	SAE	342 (13.46)	112 (4.39)	267 (10.50)	231.5 (9.12)	278 (10.93)	7/16"-20 UNF
108	M	347 (13.65)	115 (4.53)	278 (10.94)	237 (9.32)	257 (10.12)	1/8" G
	SAE	385 (15.15)	115 (4.53)	278 (10.94)	243 (9.56)	316 (12.43)	7/16"-20 UNF
161	M	400 (15.73)	160 (6.29)	306 (12.05)	263 (10.35)	316 (12.43)	1/8" G
	SAE	438 (17.25)	160 (6.29)	306 (12.05)	267.5 (10.53)	375.5 (14.79)	7/16"-20 UNF
225	M	435 (17.11)	178 (7.01)	336 (13.23)	293 (11.53)	339.5 (13.37)	1/8" G
	SAE	486 (19.14)	178 (7.01)	336 (13.23)	297.5 (11.71)	412 (16.22)	7/16"-20 UNF

Variable Displacement Control Options

Model Code Pos. 12,13

Hydraulic Proportional Control

Code: HA (bias to max.)
HB (bias to min.)

The hydraulic proportional control allows infinitely variable adjustment of the motor displacement proportional to the pilot pressure applied at port X2.

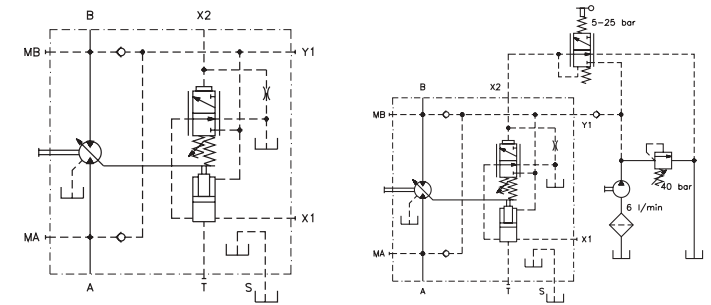
The pilot pressure generates a force on the control spool, shifting the motor displacement until the feedback spring force equals that of the pilot pressure. Motor displacement is adjusted in direct proportion with the pilot pressure.

The standard control configuration is with the control biased to maximum displacement, and pilot pressure shifting the motor to minimum displacement.

Pilot pressure range: 6 bar (87 psi) to 18 bar (260 psi)

The maximum pressure which can be applied at port X2 = 50 bar (725 psi).

Minimum system pressure of 40 bar [580 psi] bar pressure is required to operate the control.



Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example below).

Control operation is the same as for HA, but with logic reversed. Pilot pressure shifts the motor from it's bias position at minimum displacement to maximum.

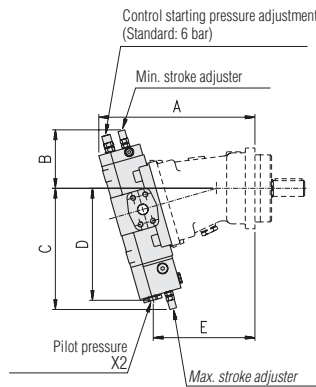
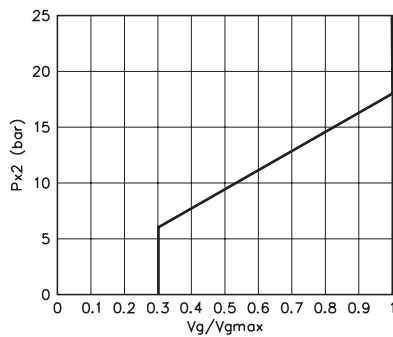
Pilot pressure range from 6 bar (87 psi) to 18 bar (261 psi).

The maximum pressure which can be applied at port X2 = 50 bar (725 psi).

Minimum system pressure of 40 bar [580 psi] bar pressure is required to operate the control.

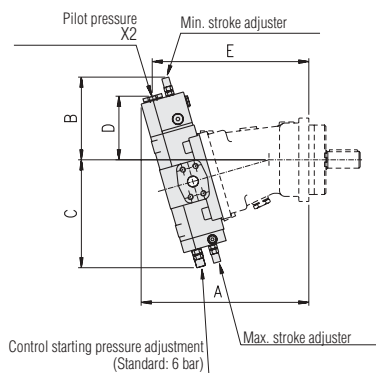
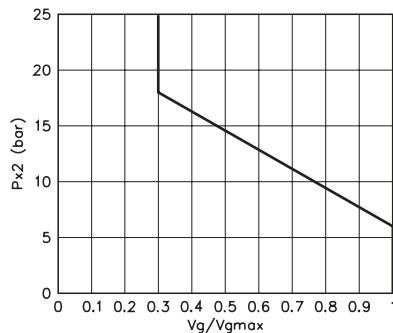
Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example above).

Code: HA



Displacement	Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	X2
55	M	290 (11.41)	109 (4.28)	225 (8.85)	208 (8.18)	189 (7.44)	G ¹ /4
	SAE	315 (12.40)	109 (4.28)	232 (9.11)	228.5 (9.00)	207.5 (8.16)	7/16"-20 UNF
75	M	316 (12.45)	112 (4.39)	237 (9.31)	217 (8.55)	212.5 (8.36)	G ¹ /4
	SAE	342 (13.46)	112 (4.39)	240.5 (9.46)	238 (9.36)	232.5 (9.14)	7/16"-20 UNF
108	M	347 (13.65)	115 (4.53)	248 (9.76)	228.5 (8.99)	238.5 (9.39)	G ¹ /4
	SAE	385 (15.15)	115 (4.53)	252 (9.92)	249 (9.81)	270.5 (10.64)	7/16"-20 UNF
161	M	400 (15.73)	160 (6.29)	287 (11.29)	255.5 (10.06)	297 (11.69)	G ¹ /4
	SAE	438 (17.25)	160 (6.29)	287 (11.29)	276.5 (10.89)	330.5 (13.01)	7/16"-20 UNF
225	M	435 (17.11)	178 (7.01)	317 (12.47)	285.5 (11.24)	321 (12.63)	G ¹ /4
	SAE	486 (19.41)	178 (7.01)	317 (12.47)	306.5 (12.07)	367 (14.45)	7/16"-20 UNF

Code: HB



Displacement	Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	X2
55	M	301 (11.86)	149 (5.85)	194 (7.64)	114 (4.49)	281 (11.07)	G ¹ /4
	SAE	326 (12.81)	149 (5.85)	203 (7.64)	115 (4.51)	311.5 (12.25)	7/16"-20 UNF
75	M	328 (12.90)	153 (6.02)	203 (7.97)	115 (4.51)	307.5 (12.10)	G ¹ /4
	SAE	354 (13.93)	153 (6.02)	203 (7.97)	135.5 (5.32)	339 (13.35)	7/16"-20 UNF
108	M	358 (14.10)	156 (6.12)	214 (8.41)	117.5 (4.63)	338 (13.31)	G ¹ /4
	SAE	396 (15.58)	156 (6.12)	214 (8.41)	150 (5.44)	387 (15.02)	7/16"-20 UNF
161	M	409 (16.08)	201 (7.91)	246 (9.67)	150 (5.91)	387 (15.23)	G ¹ /4
	SAE	447 (17.60)	201 (7.91)	246 (9.67)	171 (6.74)	429.5 (16.91)	7/16"-20 UNF
225	M	443 (17.45)	219 (8.63)	276 (10.86)	168.5 (6.63)	421.5 (16.59)	G ¹ /4
	SAE	494 (19.45)	219 (8.63)	276 (10.86)	189.5 (7.46)	477 (18.78)	7/16"-20 UNF

Variable Displacement Control Options

Model Code Pos. 12,13

Hydraulic Two-Position Control

Code: H1 (bias to max.)
H2 (bias to min.)

The hydraulic two-position control allows the displacement of the motor to be shifted by applying pilot pressure to port X2.

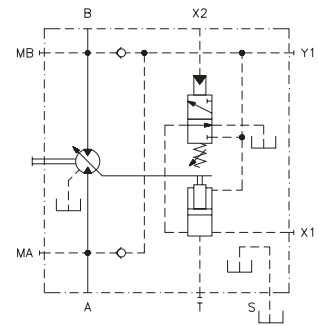
Control operation is similar to Hydraulic Proportional control, except there is no feedback mechanism, therefore only maximum and minimum displacements can be set.

Minimum required pilot pressure = 15 bar (220 psi). The maximum pressure which can be applied at port X2 = 50 bar (725 psi).

Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example below).

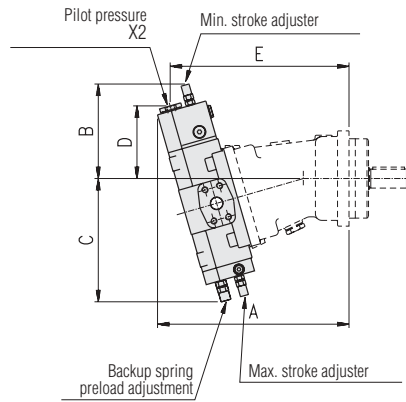
Control operation is the same as for H1, but with logic reversed. Pilot pressure shifts the motor from it's bias position at minimum displacement to maximum.

Minimum required pilot pressure = 15 bar (220 psi). The maximum pressure which can be applied at port X2 = 50 bar (725 psi).



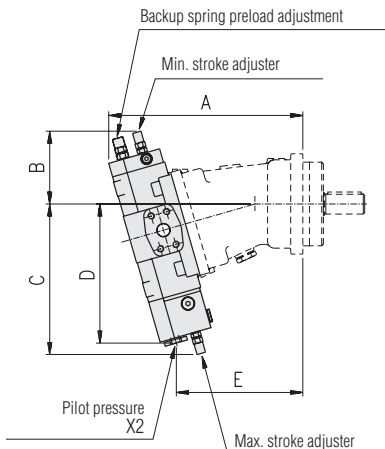
Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example above).

H1 (bias to max.)



Displacement	Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	X2
55	M	301 (11.86)	149 (5.85)	194 (7.64)	114 (4.49)	281 (11.07)	G ¹ / ₄
	SAE	326 (12.81)	149 (5.85)	194 (7.64)	135 (5.31)	311.5 (12.25)	7/16 ⁻²⁰ UNF
75	M	328 (12.90)	153 (6.02)	203 (7.97)	115 (4.51)	307.5 (12.10)	G ¹ / ₄
	SAE	354 (13.93)	153 (6.02)	203 (7.97)	135.5 (5.32)	339 (13.35)	7/16 ⁻²⁰ UNF
108	M	358 (14.10)	156 (6.12)	214 (8.41)	117.5 (4.63)	338 (13.31)	G ¹ / ₄
	SAE	396 (15.58)	156 (6.12)	214 (8.41)	138.5 (5.44)	381.5 (15.02)	7/16 ⁻²⁰ UNF
161	M	409 (16.08)	201 (7.91)	246 (9.67)	150 (5.91)	387 (15.23)	G ¹ / ₄
	SAE	447 (17.60)	201 (7.91)	246 (9.67)	171 (6.74)	429.5 (16.91)	7/16 ⁻²⁰ UNF
225	M	443 (17.45)	219 (8.63)	276 (10.86)	168.5 (6.63)	421.5 (16.59)	G ¹ / ₄
	SAE	494 (19.45)	219 (8.63)	276 (10.86)	189.5 (7.46)	477 (18.78)	7/16 ⁻²⁰ UNF

H2 (bias to min.)



Displacement	V Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	X2
55	M	290 (11.41)	109 (4.28)	225 (8.85)	208 (8.18)	189 (7.44)	G ¹ / ₄
	SAE	315 (12.40)	109 (4.28)	232 (9.11)	228.5 (9.00)	207.5 (8.16)	7/16 ⁻²⁰ UNF
75	M	316 (12.45)	112 (4.39)	237 (9.31)	217 (8.55)	212.5 (8.36)	G ¹ / ₄
	SAE	342 (13.46)	112 (4.39)	240.5 (9.46)	238 (9.36)	232.5 (9.14)	7/16 ⁻²⁰ UNF
108	M	347 (13.65)	115 (4.53)	248 (9.76)	228.5 (8.99)	238.5 (9.39)	G ¹ / ₄
	SAE	385 (15.15)	115 (4.53)	252 (9.92)	249 (9.81)	270.5 (10.64)	7/16 ⁻²⁰ UNF
161	M	400 (15.73)	160 (6.29)	287 (11.29)	255.5 (10.06)	297 (11.69)	G ¹ / ₄
	SAE	438 (17.25)	160 (6.29)	287 (11.29)	276.5 (10.89)	330.5 (13.01)	7/16 ⁻²⁰ UNF
225	M	435 (17.11)	178 (7.01)	317 (12.47)	285.5 (11.24)	321 (12.63)	G ¹ / ₄
	SAE	486 (19.41)	178 (7.01)	317 (12.47)	306.5 (12.07)	367 (14.45)	7/16 ⁻²⁰ UNF

Variable Displacement Control Options

Model Code Pos. 12,13

Electric Two Position Control

Code: E1 (bias to max.) 12V
E2 (bias to min.) 12V

The electric two-position control allows the displacement of the motor to be shifted by switching an ON/OFF solenoid valve. Control operation is similar to Electrical Proportional control, except there is no feedback mechanism, therefore only maximum and minimum displacements can be set.

Code: E3 (bias to max.) 24V
E4 (bias to min.) 24V

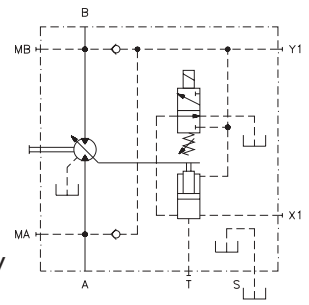
12V DC and 24V DC ON/OFF solenoid are available. (Note model codes/descriptions above)

E1 and E3 options are normally at maximum displacement, and shift motor to minimum displacement when the solenoid is turned on.

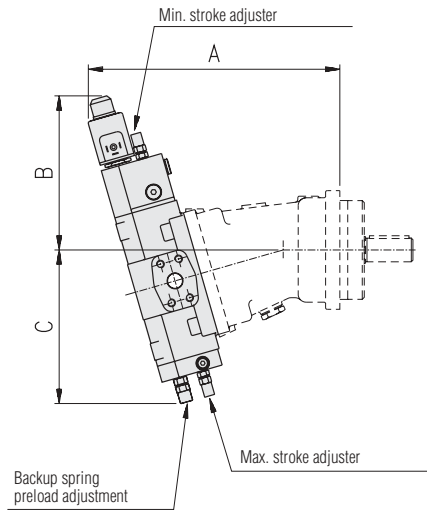
E2 and E4 options function similarly, but with reverse logic. Control is biased to

minimum displacement and shift to maximum displacement when the solenoid is turned on.

Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example above).

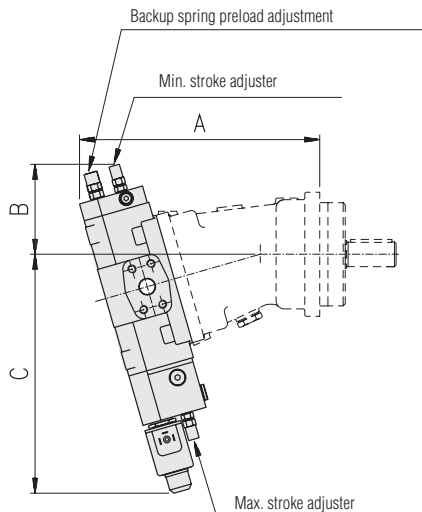


E1 (bias to max.)
E3 (bias to max.)



Displacement	Version	A mm (in)	B mm (in)	C mm (in)
55	M	318 (12.51)	195 (7.67)	194 (7.64)
	SAE	342 (13.46)	195 (7.67)	194 (7.64)
75	M	344 (13.53)	195 (7.67)	203 (7.97)
	SAE	370 (14.57)	195 (7.67)	203 (7.97)
108	M	375 (14.76)	198 (7.80)	214 (8.42)
	SAE	413 (16.25)	198 (7.80)	214 (8.42)
161	M	421 (16.57)	232 (9.13)	246 (9.68)
	SAE	459 (18.07)	232 (9.13)	246 (9.68)
225	M	455 (17.91)	250 (9.84)	276 (10.86)
	SAE	506 (19.92)	250 (9.84)	276 (10.86)

E2 (bias to min.)
E4 (bias to min.)



Displacement	Version	A mm (in)	B mm (in)	C mm (in)
55	M	290 (11.41)	109 (4.29)	289 (11.38)
	SAE	315 (12.40)	109 (4.29)	289 (11.38)
75	M	316 (12.45)	112 (4.39)	298 (11.73)
	SAE	342 (13.46)	112 (4.39)	298 (11.73)
108	M	347 (13.65)	115 (4.53)	309 (12.16)
	SAE	385 (15.15)	115 (4.53)	309 (12.16)
161	M	400 (15.73)	160 (6.29)	337 (13.25)
	SAE	438 (17.25)	160 (6.29)	337 (13.25)
225	M	435 (17.11)	178 (7.01)	367 (14.44)
	SAE	486 (19.14)	178 (7.01)	367 (14.44)

Variable Displacement Control Options

Model Code Pos. 12,13

Electric Proportional Control

Code: EA (bias to max.) 12V
EB (bias to min.) 12V

The electrical proportional control allows infinitely variable, programmable adjustment of the motor displacement proportional to current applied to the solenoid coil.

The proportional solenoid applies force on the control spool, shifting the motor displacement until the feedback spring force equals that of the solenoid force. Motor displacement is adjusted in direct proportion with the electrical current.

Code: EC (bias to max.) 24V
ED (bias to min.) 24V

Controls are offered with either 12V or 24V solenoids. In the standard configuration (Codes EA and EC) the motor is biased to maximum displacement, and solenoid force shifts the motor to minimum displacement.

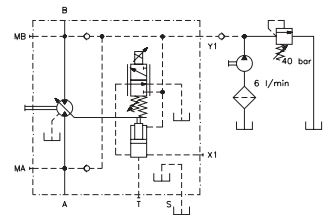
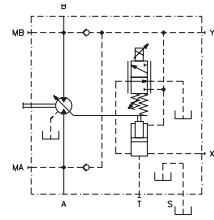
Solenoids are controlled by 24 V (12 V) DC supply with current levels between approximately 250 (500) and 700 (1400) mA.

Max current which can be applied to the solenoid is 800 (1600) mA.

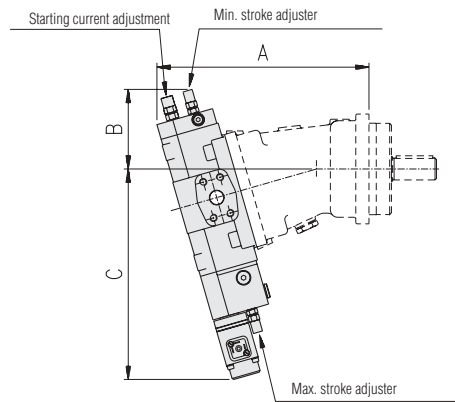
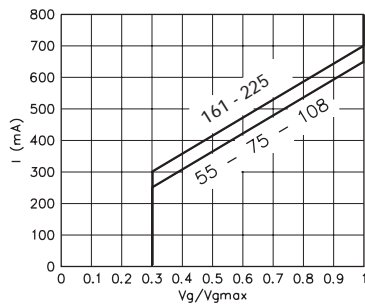
Recommended PWM frequency of 110 Hz.

Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example above).

Contact Eaton for optional solenoid driver information.

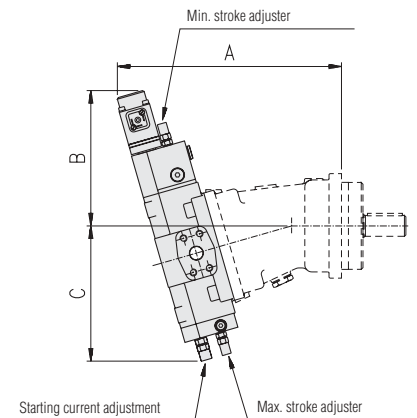
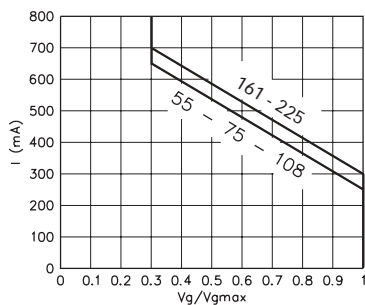


Code: EA (bias to max.) 12V



Displacement	Version	A mm (in)	B mm (in)	C mm (in)
55	M	290 (11.41)	109 (4.29)	288 (11.33)
	SAE	315 (12.40)	109 (4.29)	288 (11.33)
75	M	316 (12.45)	112 (4.39)	297 (11.69)
	SAE	342 (13.45)	112 (4.39)	297 (11.69)
108	M	347 (13.65)	115 (4.53)	309 (12.14)
	SAE	384 (15.11)	115 (4.53)	309 (12.16)
161	M	400 (15.73)	160 (6.29)	336 (12.16)
	SAE	438 (17.25)	160 (6.29)	336 (13.21)
225	M	435 (17.11)	178 (7.01)	366 (14.39)
	SAE	486 (19.14)	178 (7.01)	366 (14.39)

Code: EB (bias to min.) 12V



Displacement	V Version	A mm (in)	B mm (in)	C mm (in)
55	M	322 (12.68)	194 (7.64)	194 (7.64)
	SAE	346 (13.63)	194 (7.64)	194 (7.64)
75	M	348 (13.68)	195 (7.66)	203 (7.97)
	SAE	373 (14.71)	195 (7.66)	203 (7.97)
108	M	378 (14.88)	198 (7.78)	214 (8.41)
	SAE	416 (16.37)	198 (7.78)	214 (8.41)
161	M	423 (16.65)	231 (9.09)	246 (9.68)
	SAE	461 (18.15)	231 (9.09)	246 (9.68)
225	M	458 (18.01)	249 (9.80)	276 (10.86)
	SAE	509 (20.04)	249 (9.80)	276 (10.86)

Variable Displacement Control Options

Model Code Pos. 12,13

Electric Two Position Control with Pressure Response

Code: E5 (bias to max.) 12V
E6 (bias to max.) 24V

The control operates similar to Code options E1 and E3, when the solenoid is turned off the motor is biased to maximum displacement.

When the solenoid is turned on, the motor shifts to minimum displacement and remains at that setting unless system pressure rises beyond the pre-set shift pressure setting. The control then over-rides the electrical setting, by shifting the motor to maximum displacement.

Minimum system pressure of 40 bar [580 psi] bar pressure is required to operate the control. Pressure rise during the motor shift from minimum to maximum displacement is approximately 15 bar (220 psi).

Control shift pressure can be specified in 20 bar [290

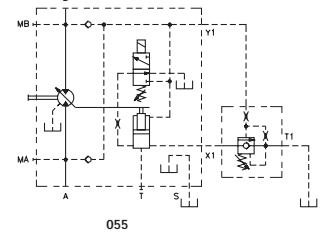
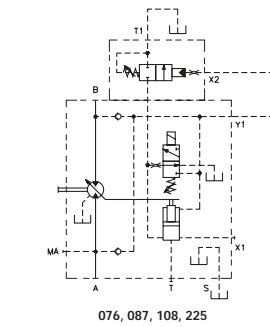
psi] increments from 100 to 350 bar (1450 to 5000 psi).

Select desired pressure in model code position 14.

Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example below).

The control operates similar to Code options E1 and E3, when the solenoid is turned off the motor is biased to maximum displacement.

When the solenoid (24 V two-position) is turned on, the motor shifts to minimum displacement and remains at that setting unless system pressure rises beyond the pre-set shift pressure setting. The control then over-rides the



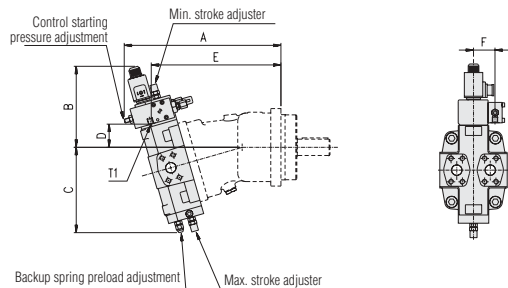
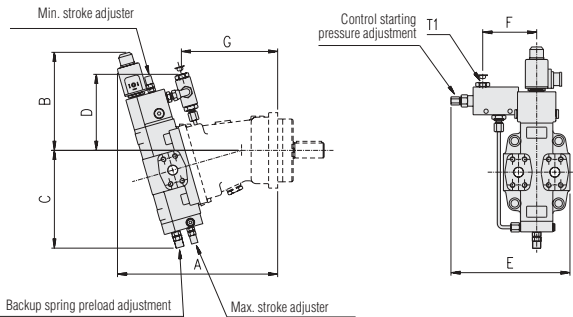
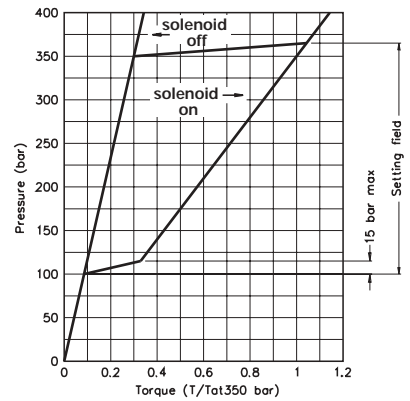
electrical setting, by shifting the motor to maximum displacement.

Minimum system pressure of 40 bar [580 psi] bar pressure is required to operate the control. Pressure rise during the motor shift from minimum to maximum displacement is approximately 15 bar (220 psi).

Control shift pressure can be specified in 20 bar [290 psi] increments from 100 to 350 bar (1450 to 5000 psi).

Select desired pressure in model code position 14.

Control boosting: If it is necessary to shift the motor displacement when system pressure is less than 40 bar (580 psi), an auxiliary boost circuit must be supplied (see example above).



Displacement	Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	F mm (in)	G mm (in)	T1
55	M	318 (12.51)	195 (7.66)	194 (7.64)	151 (5.94)	236 (9.29)	107 (4.21)	191 (7.52)	1/4" G
	SAE	342 (13.46)	195 (7.66)	194 (7.64)	171.5 (6.75)	236 (9.29)	107 (4.21)	221.5 (8.71)	7/16"-20 UNF

Displacement	Version	A mm (in)	B mm (in)	C mm (in)	D mm (in)	E mm (in)	F mm (in)	T1
75	M	354 (13.92)	196 (7.71)	198 (7.79)	53.5 (2.12)	287.5 (11.31)	52.5 (2.07)	1/4" G
	SAE	380 (14.95)	196 (7.71)	198 (7.79)	33 (1.3)	307 (12.07)	52.5 (2.07)	7/16"-20 UNF
108	M	384 (15.12)	199 (7.81)	209 (8.23)	57 (2.24)	318 (12.51)	52.5 (2.07)	1/4" G
	SAE	422 (16.60)	199 (7.81)	209 (8.23)	36 (1.4)	350 (13.77)	52.5 (2.07)	7/16"-20 UNF
161	M	435 (17.13)	232 (9.13)	246 (9.69)	88.5 (3.48)	369.5 (14.55)	64.5 (2.54)	1/4" G
	SAE	473 (18.62)	232 (9.13)	246 (9.69)	67.5 (2.66)	403.5 (15.89)	64.5 (2.54)	7/16"-20 UNF
225	M	470 (18.50)	250 (9.84)	276 (10.87)	106.5 (4.19)	404.5 (15.93)	64.5 (2.54)	1/4" G
	SAE	521 (20.51)	250 (9.84)	276 (10.87)	85.5 (3.37)	451.5 (17.78)	64.5 (2.54)	7/16"-20 UNF

Variable Displacement Control Options

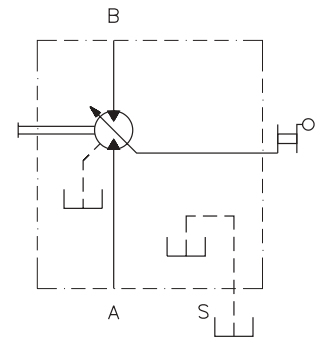
Model Code Pos. 12,13

Manual Control

Code: M1 (bias to max.)
M2 (bias to min.)

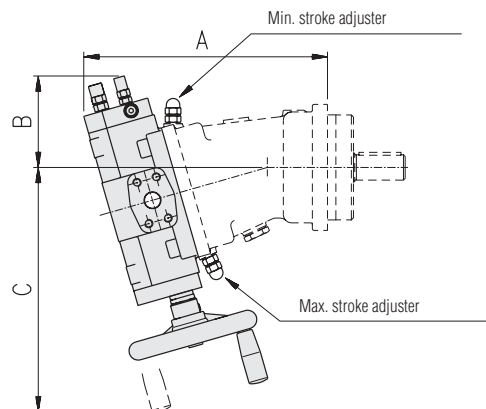
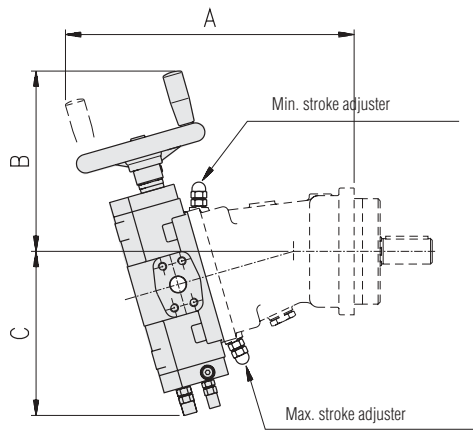
The motor displacement is adjusted from maximum displacement to minimum displacement by manually operating the hand-wheel.

The motor displacement is adjusted from minimum displacement to maximum displacement by manually operating the hand-wheel.



The following table shows number of hand wheel turns required to shift the motor from minimum displacement to maximum displacement or viceversa:

Dimensions	55	75	108	160	226
Handwheel Turns	21	23	25	26	29



Displacement	Version	A mm (in)	B mm (in)	C mm (in)
55	M	341 (13.43)	213 (8.39)	194 (7.64)
	SAE	366 (14.41)	213 (8.39)	194 (7.64)
75	M	367 (14.45)	216 (8.50)	203 (7.99)
	SAE	393 (15.46)	216 (8.50)	203 (7.99)
108	M	397 (15.63)	219 (8.62)	214 (8.43)
	SAE	435 (17.11)	219 (8.62)	214 (8.43)
161	M	429 (16.88)	250 (9.83)	246 (9.69)
	SAE	467 (18.39)	250 (9.83)	246 (9.69)
225	M	461 (18.15)	269 (10.57)	276 (10.87)
	SAE	512 (20.15)	269 (10.57)	276 (10.87)

Displacement	Version	A mm (in)	B mm (in)	C mm (in)
55	M	290 (11.41)	109 (4.28)	290 (11.41)
	SAE	315 (12.40)	109 (4.28)	290 (11.41)
75	M	316 (12.45)	112 (4.39)	301 (11.86)
	SAE	342 (13.45)	112 (4.39)	301 (11.86)
108	M	347 (13.65)	115 (4.33)	313 (12.32)
	SAE	385 (15.15)	115 (4.33)	313 (12.32)
161	M	400 (15.73)	160 (6.29)	336 (13.21)
	SAE	438 (17.25)	160 (6.29)	336 (13.21)
225	M	435 (17.11)	178 (7.01)	365 (14.37)
	SAE	486 (19.14)	178 (7.01)	365 (14.37)

Variable Displacement Additional Options

Control Pressure
Model Code Pos.: 14

For control options: PA, PB, E5, E6 a pressure setting must be selected from the options shown. This setting is the pressure at which pressure response or pressure over-ride controls will begin to shift the motor displacement. All other control options use ∅.

CODE	PRESSURE
∅	none
A	100 bar (1450 psi)
B	120 bar (1740 psi)
C	140 bar (2030 psi)
D	160 bar (2320 psi)
E	180 bar (2610 psi)
F	200 bar (2900 psi)
G	220 bar (3190 psi)
H	240 bar (3480 psi)
J	260 bar (3770 psi)
K	280 bar (4060 psi)
L	300 bar (4350 psi)
M	320 bar (4640 psi)
N	340 bar (4930 psi)
P	350 bar (5075 psi)

Control Orifice
Model Code Pos.: 15

Select A for Standard Orifice

Control Special Features
Model Code Pos.: 16

Select 0 for None

Min./Max. Displacement
Model Code Pos.: 17, 18

All variable motors have independent displacement limiters for both max. and Min. displacement.

Standard factory settings are at max. and min. limits the motor.

Seals
Model Code Pos.: 19

Select A for Nitrile (standard)
Select B for Fluorocarbon

Additional Features
Model Code Pos.: 20

Select 0 for None

Motor Special Features
Model Code Pos.: 21, 22

Select 00 for None

Paint
Model Code Pos.: 23

Standard motors are shipped unpainted.
Select 0 for No paint
Optional "Eaton blue" primer can also be specified.
Select A for Eaton blue

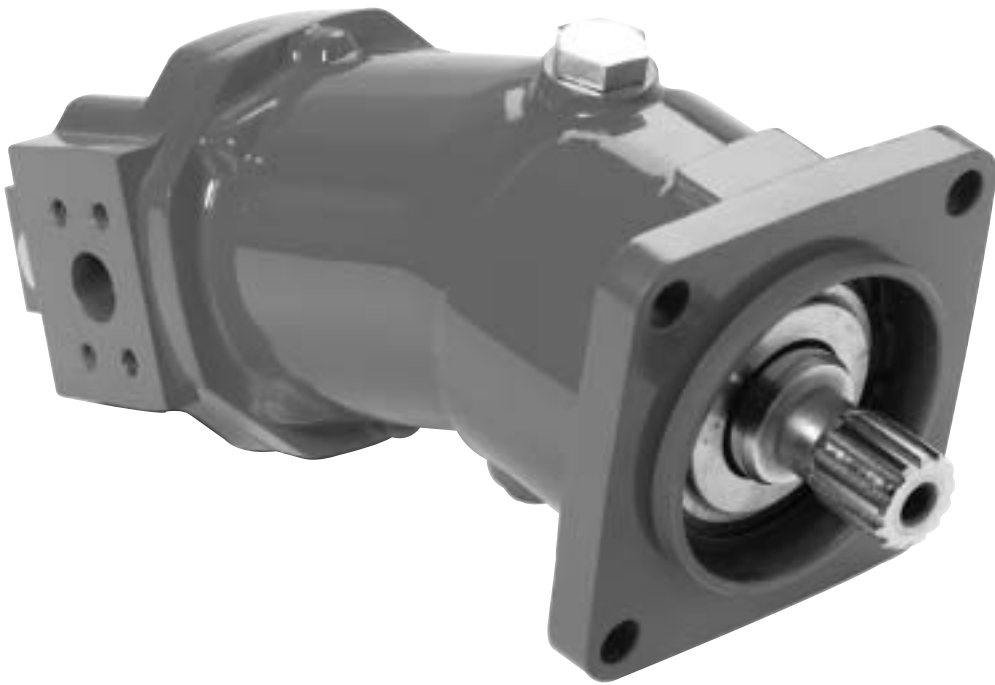
Product Identification
Model Code Pos.: 24

Select 0 for Standard Eaton Identification.

Design Code
Model Code Pos.: 25

Select A for Design Code A

Fixed
Displacement

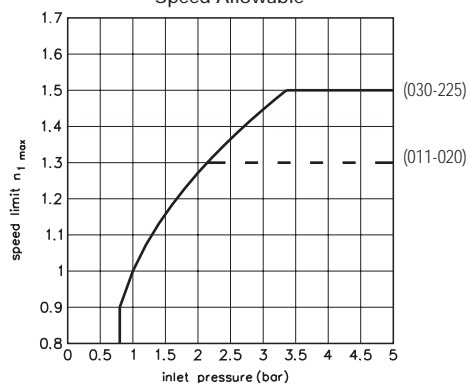


Fixed Displacement Specifications and Performance Technical Data

SIZE			11	20	30	40	44	55	
Displacement	V_g	cm ³ /rev (in ³ /rev)	10.9 (0.66)	19.6 (1.20)	30.0 (1.83)	40.1 (2.45)	44.3 (2.67)	54.8 (3.34)	
Max. speed	motor	n_{0max}	rpm	5590	5590	4500	4950	4200	3900
Max. pressure (5100)	cont.	P_{nom}	bar (psi)	350 (5100)	350 (5100)	350 (5100)	350 (5100)	350 (5100)	350
Max. pressure (6500)	peak	P_{max}	bar (psi)	450 (6500)	450 (6500)	450 (6500)	450 (6500)	450 (6500)	450
Max. flow/motor		q_{max}	l/min (U.S. gpm)	61 (16.1)	109 (28.7)	135 (35.6)	198 (52.2)	486 (55)	214 (56.4)
Max. power at P_{nom}	motor	P_{max}	kW (hp)	35.5 (47.5)	64 (85.5)	79 (106)	115.5 (154.5)	108 (145)	125 (167.5)
Max. torque	cont. (P_{nom})	T_{nom}	Nm (lbf ft)	60.5 (44.5)	109 (80)	167 (123)	223 (164)	247 (182)	306 (225)
Max. torque	peak (P_{max})	T_{max}	Nm (lbf ft)	76 (56)	139 (102)	216 (159)	288 (212)	217 (234)	391 (288)
Moment of Inertia ⁽¹⁾		J	kg m ² (lbf ft ²)	0.0007 (0.016)	0.0002 (0.047)	0.0002 (0.047)	0.004 (0.094)	0.004 (0.094)	0.004 (0.094)
Weight ⁽¹⁾		m	kg (lbs)	5.5 (12.1)	13 (28.7)	13 (28.7)	22 (48.5)	20 (44.1)	22 (48.5)
External drain flow ⁽²⁾		q_d	l/min (U.S. gpm)	0.4 (0.10)	0.4 (0.10)	0.6 (0.16)	0.7 (0.18)	0.7 (0.18)	0.8 (0.21)

SIZE			75	87	108	161	225	
Displacement	V_g	cm ³ /rev in ³ /rev	75.3 (4.60)	87.0 (5.30)	107.5 (6.56)	160.8 (9.81)	225.1 (13.73)	
Max. speed	motor	N_{0max}	rpm	3450	3750	3000	2700	2400
Max. pressure	cont.	P_{nom}	bar (psi)	350 (5100)	350 (5100)	350 (5100)	350 (5100)	350 (5100)
Max. pressure	peak	P_{max}	bar (psi)	450 (6500)	450 (6500)	450 (6500)	450 (6500)	450 (6500)
Max. flow	motor	q_{max}	l/min (U.S. gpm)	259 (68.3)	325 (85.7)	322 (85)	434 (114.5)	540 (142.5)
Max. power at P_{nom}	motor	P_{max}	kW (hp)	151 (202.5)	190.5 (255.5)	188 (252)	253 (339)	315 (422)
Max. torque	cont. P_{nom}	T_{nom}	Nm (lbf ft)	420 (310)	485 (357)	599 (442)	896 (661)	1254 (925)
Max. torque	peak P_{max}	T_{max}	Nm (lbf ft)	540 (398)	623 (460)	770 (568)	1152 (849)	1613 (1189)
Moment of Inertia ⁽¹⁾		J	kg m ² (lbf ft ²)	0.0008 (0.190)	0.0013 (0.308)	0.0013 (0.308)	0.025 (0.593)	0.040 (0.949)
Weight ⁽¹⁾		m	kg (lbs)	30 (66.1)	45 (99.2)	45 (99.2)	61 (134.5)	86 (189.6)
External drain flow ⁽²⁾		q_d	l/min (U.S. gpm)	0.9 (0.23)	1.0 (0.26)	1.2 (0.31)	1.8 (0.47)	2.5 (0.66)

Calculation of Maximum Speed Allowable



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

⁽¹⁾Approximate values.

⁽²⁾Average values at 250 bar (3600 psi) with mineral oil at 45 °C (113 °F) and 35 cSt of viscosity.

Fixed Displacement Model Codes

The following 25-digit coding system has been developed to identify standard configuration options for Bent Axis Fixed Displacement Motors. Use this model code to specify a motor with the desired features. All 25 digits of the code must be present to release a new product number for ordering.



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
B	A	F									0	0	0	A	0	0	0		0	0	0		0	A

CODE POSITION	FEATURE	CODE	FEATURE DESCRIPTION	CODE POSITION	FEATURE	CODE	FEATURE DESCRIPTION
1,2,3	Code title	BAF	Fixed displacement bent axis piston motor	8,9	Output shaft	01	20mm Straight Keyed Shaft (011 displacement code)
4,5,6	Displacement	011	10.9 cm ³ /r [.66 in ³ /r]			02	25mm Straight Keyed Shaft (020 and 030 displacement code)
		020	19.6 cm ³ /r [1.20 in ³ /r]			03	30mm Straight Keyed Shaft (040 and 055 displacement code)
		030	30.0 cm ³ /r [1.83 in ³ /r]			04	35mm Straight Keyed Shaft (075 displacement code)
		040	40.1 cm ³ /r [2.45 in ³ /r]			05	40mm Straight Keyed Shaft (087 and 108 displacement code)
		044	44.3 cm ³ /r [2.67 in ³ /r]			06	45mm Straight Keyed Shaft (161 displacement code)
		055	54.8 cm ³ /r [3.34 in ³ /r]			07	50mm Straight Keyed Shaft (225 displacement code)
		075	75.3 cm ³ /r [4.60 in ³ /r]			08	7/8 straight keyed shaft (020 and 030 displacement code)
		087	87.0 cm ³ /r [5.30 in ³ /r]			09	1 1/4 straight keyed shaft (040 and 055 displacement code)
		108	107.5 cm ³ /r [6.56 in ³ /r]			11	1 3/4 straight keyed shaft (075, 087, 108, 160 and 226 displacement code)
		161	160.8 cm ³ /r [9.81 in ³ /r]			12	13 tooth splined shaft 16/32 dp (020 and 030 displacement code)
		225	225.1 cm ³ /r [13.73 in ³ /r]			13	13 tooth splined shaft 8/16 dp (075, 087, 108, 161 and 225 displacement code)
7	Mounting type					14	14 tooth splined shaft 12/24 dp (040 and 055 displacement code)
		1	ISO 80 mm (011 displacement code)			20	14 tooth w20 splined shaft per DIN 5480 (011 displacement code)
		2	ISO 100 mm (020 and 030 displacement code)			25	18 tooth w25 splined shaft per DIN 5480 (020 and 030 displacement code)
		3	ISO 125 mm (040 and 055 displacement code)			30	14 tooth w30 splined shaft per DIN 5480 (040, 044 and 055 displacement code)
		4	ISO 140 mm (075 displacement code)			35	16 tooth w35 splined shaft per DIN 5480 (075 displacement code)
		5	ISO 160 mm (087 and 108 displacement code)			40	18 tooth w40 splined shaft per DIN 5480 (087 and 108 displacement code)
		6	ISO 180 mm (161 displacement code)			45	21 tooth w45 splined shaft per DIN 5480 (161 displacement code)
		7	ISO 200 mm displacement code			50	24 tooth w50 splined shaft per DIN 5480 (225 displacement code)
		B	SAE "B" 2 bolt (020 and 030 displacement code)				
		C	SAE "C" 4 bolt (040 and 055 displacement code)				
		D	SAE "D" 4 bolt (075, 087, 108 and 161 displacement code)				
		E	SAE "E" 4 bolt (225 displacement code)				
		U	Gearbox 135 mm (030 displacement code)				
		V	Gearbox 160 mm (044, 055 AND 075 displacement code)				
		W	Gearbox 190 mm (087 displacement code)				
		Y	Gearbox 200 mm (108 displacement code)				

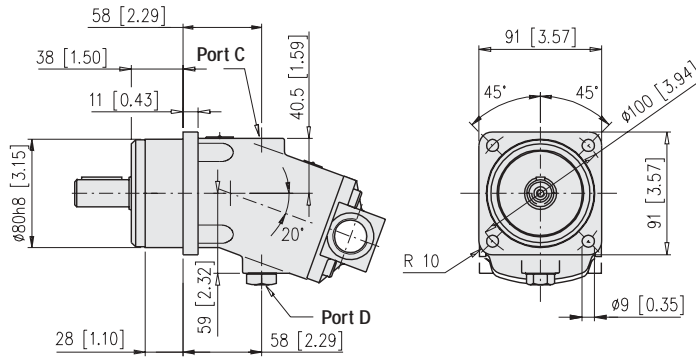
Fixed Displacement Model Codes

CODE POSITION	FEATURE	CODE	FEATURE DESCRIPTION	CODE POSITION	FEATURE	CODE	FEATURE DESCRIPTION
10	Main ports			12,13	Control		
		A	Opposite side ports - G 3/4 o-ring port (011 displacement code)			00	No control - fixed displacement
		B	Rear ports - G 1 o-ring port (020 and 030 displacement code)	14	Control pressure	0	None - fixed displacement
		C	Rear ports - G 1 1/4 o-ring port (040 and 055 displacement code)	15	Control orifice	0	None
		D	Rear ports - G 1 1/2 o-ring port (075, 087 and 108 displacement code)	16	Control special features	0	None
		E	Opposite side ports - 3/4 code 62 split flange with M10 threads (020, 030, 040 and 055 displacement code)	17,18	Min/max displacement	00	Fixed displacement per model code positions 4,5,6
		F	Opposite side ports - 1 code 62 split flange with M12 threads (075, 087 and 108 displacement code)	19	Seals	A	Nitrile (standard)
		G	Opposite side ports - 1 1/4 code 62 split flange with M14 threads (161 and 225 displacement code)			B	Fluorocarbon
		H	Same side ports bottom - 1/2 code 62 split flange with M8 threads (020 and 030 displacement code)	20	Additional features	0	No additional features
		J	Same side ports bottom - 3/4 code 62 split flange with M10 threads (040, 044, 055 and 075 displacement code)	21,22	Motor special features	00	None
		K	Same side ports bottom - 1 code 62 split flange with M12 threads (087 and 108 displacement code)	23	Paint	0	No paint
		L	Opposite side ports - 3/4 code 62 SAE split flange (020 and 030 displacement code)			A	Primer blue
		M	Opposite side ports - 1 code 62 SAE split flange (040, 055, 075, 087 and 108)	24	Identification	0	Standard Eaton identification
		N	Opposite side ports - 1 1/4 code 62 SAE split flange (161 and 225 displacement code)	25	Design code	A	A
		P	Opposite side ports - 1 1/2 code 62 SAE split flange (225 displacement code)				
		0	No optional valving				
11	Valves						
		3	Shuttle valve 8.5 l/min [2.25 gal/min] at 21 bar [305 lbf/in ²] – for use with opposite side split flange ports.				
		4	Shuttle valve 20.0 l/min [5.3 gal/min] at 21 bar [305 lbf/in ²]– for use with opposite side split flange ports.				
		5	Shuttle valve 8.5 l/min [2.25 gal/min] at 21 bar [305 lbf/in ²] with adapter flange – for use with same side ports bottom.				
		6	Shuttle valve 20.0 l/min [5.3 gal/min] at 21 bar [305 lbf/in ²] with adapter flange – for use with same side ports bottom.				

Fixed
Displacement
11cc
Model Code Pos. 4, 5, 6
Code 011

Mounting Flange Options
Model Code Position 7

ISO
Code: 1

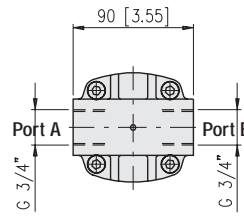
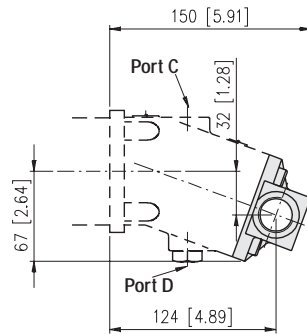


Fixed
Displacement
11cc
Model Code Pos. 4, 5, 6
Code 011

Porting Options
Model Code Position 10

Metric

**Opposite Side
O-Ring**
Code: A

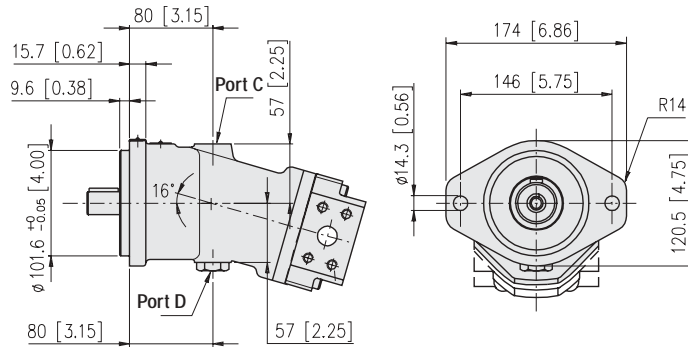


DESCRIPTION	SIZE
A System Port	G - 3/4"
B System Port	G - 3/4"
C Case Drain	G - 3/8"
D Case Drain	G - 3/8"
E Flushing Port	G 1"

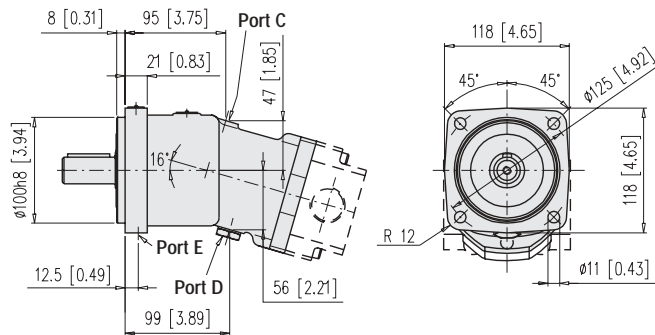
Fixed
Displacement
20cc
Model Code Pos. 4, 5, 6
Code 020

Mounting Flange Options
Model Code Position 7

SAE
Code: B



ISO
Code: 2

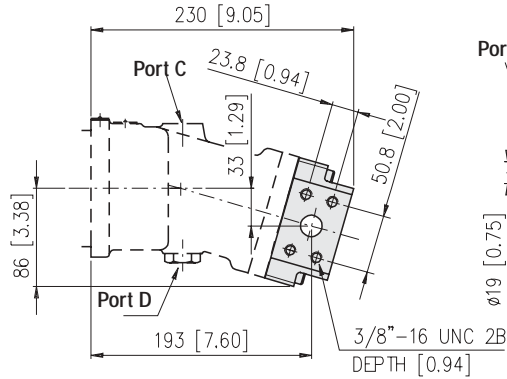


Fixed
Displacement
20cc
Model Code Pos. 4, 5, 6
Code 020

Porting Options
Model Code Position 10

SAE

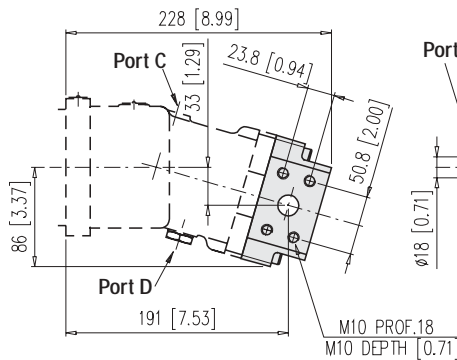
Opposite Side
Code: L



DESCRIPTION	SIZE
A System Port	3/4" SAE Code 62
B System Port	3/4" SAE Code 62
C Case Drain	7/8" - 14 UNF-2B
D Case Drain	7/8" - 14 UNF-2B (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

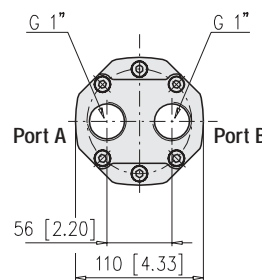
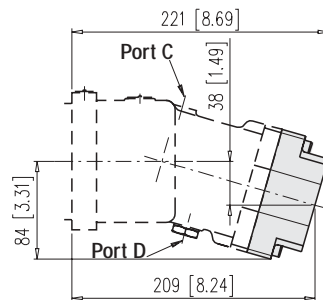
Opposite Side
Code: E



DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8"

Metric

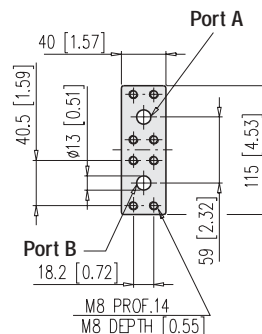
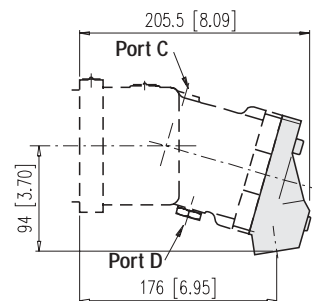
Rear O-Ring
Code: B



DESCRIPTION	SIZE
A System Port	G 1"
B System Port	G 1"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom
Code: H



DESCRIPTION	SIZE
A System Port	1/2" Metric Code 62
B System Port	1/2" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Fixed
Displacement

30cc

Model Code Pos. 4, 5, 6

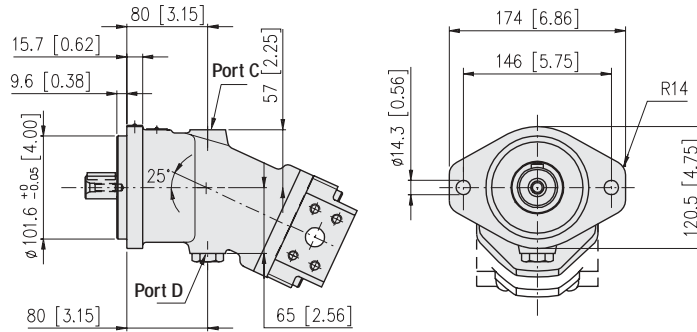
Code 030

Mounting Flange Options

Model Code Position 7

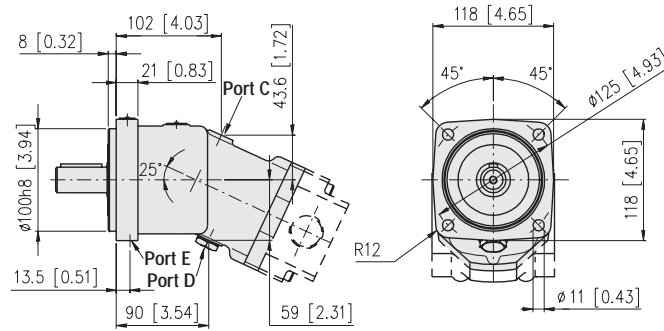
SAE

Code: B



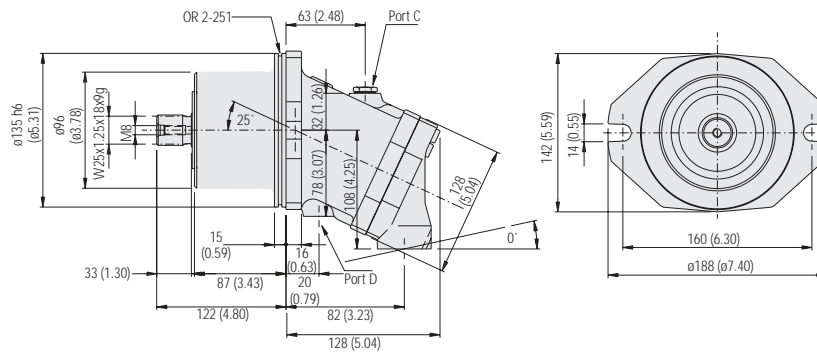
ISO

Code: 2



Gearbox

Code: U



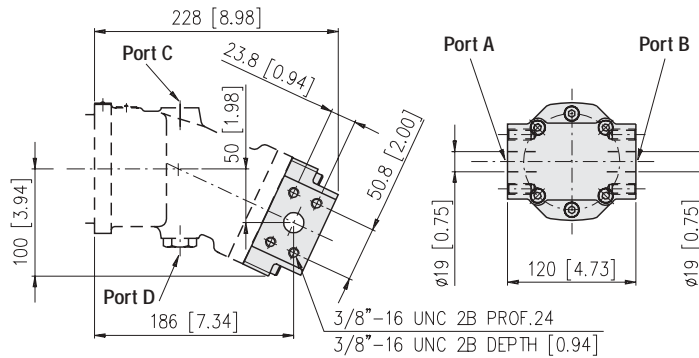
Fixed
Displacement
30cc
Model Code Pos. 4, 5, 6
Code 030

Porting Options
Model Code Position 10

SAE

Opposite Side

Code: L

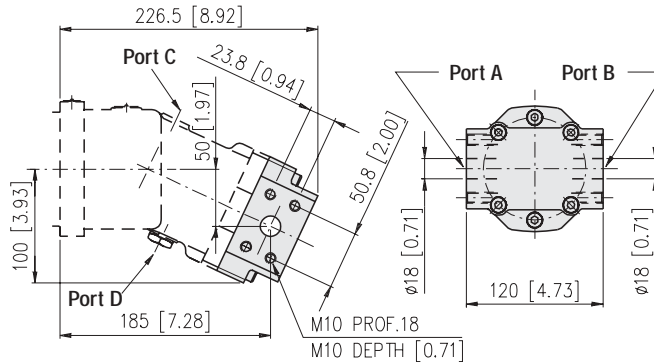


DESCRIPTION	SIZE
A System Port	3/4" SAE Code 62
B System Port	3/4" SAE Code 62
C Case Drain	7/8" - 14 UNF-2B
D Case Drain	7/8" - 14 UNF-2B (plugged)
E Flushing Port	G 1/8"

Metric

Opposite Side

Code: E

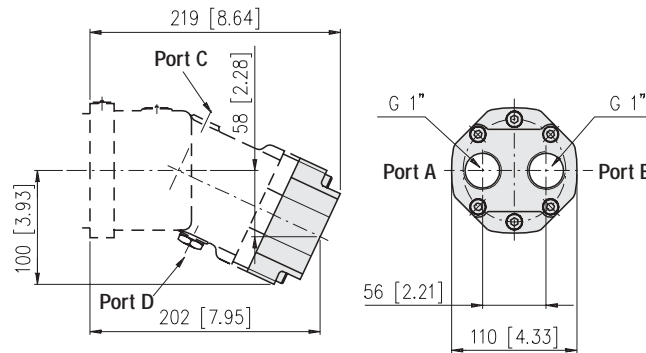


DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Rear O-Ring

Code: B

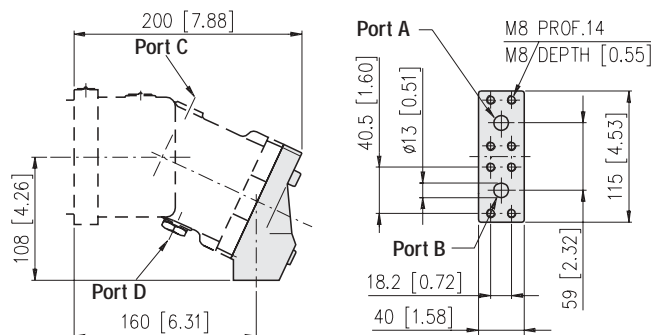


DESCRIPTION	SIZE
A System Port	G 1"
B System Port	G 1"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom

Code: H



DESCRIPTION	SIZE
A System Port	1/2" Metric Code 62
B System Port	1/2" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Fixed Displacement

40cc

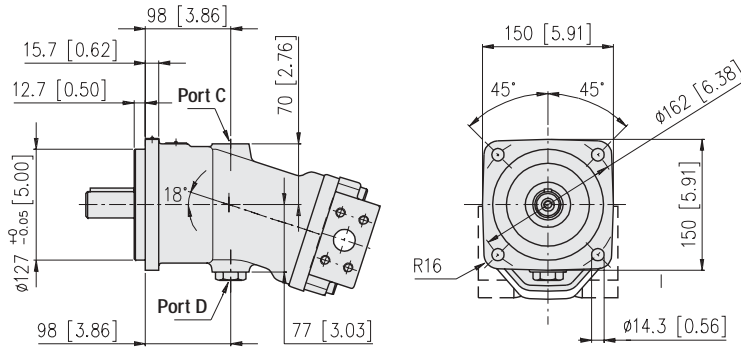
Model Code Pos. 4, 5, 6

Code 040

Mounting Flange Options Model Code Position 7

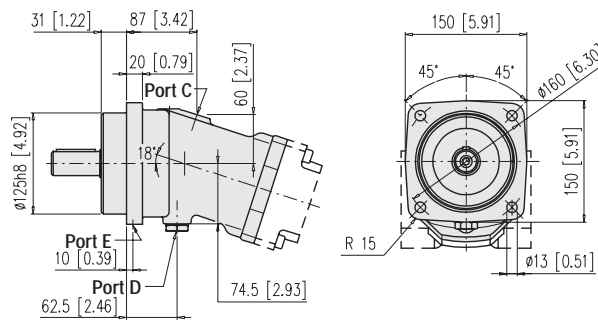
SAE

Code: C



ISO

Code: 3

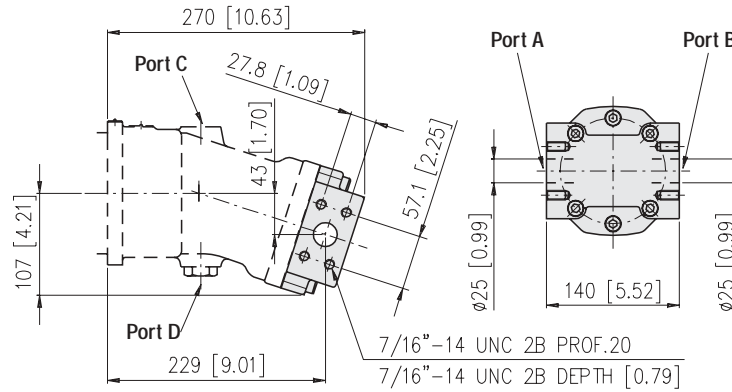


Fixed Displacement
40cc
Model Code Pos. 4, 5, 6
Code 040

Porting Options
Model Code Position 10

SAE

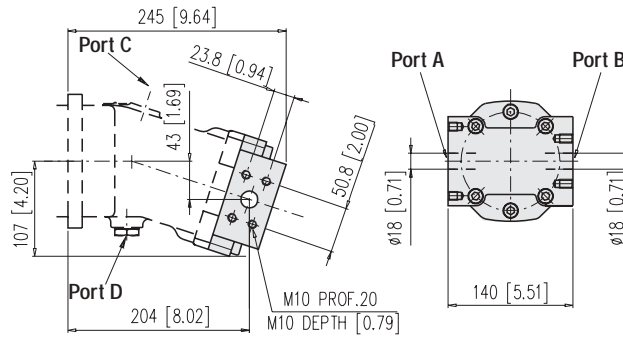
Opposite Side
Code: M



DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16"-14 UNF-2B
D Case Drain	1-1/16"-14 UNF-2B (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

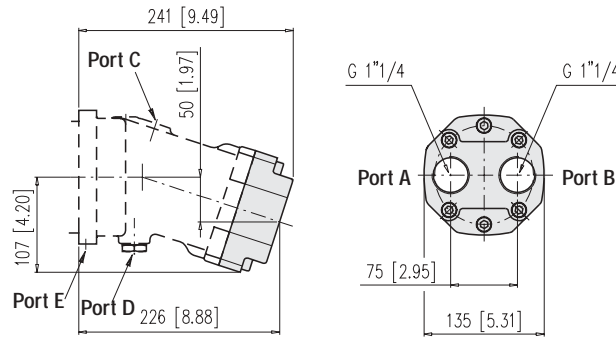
Opposite Side
Code: E



DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

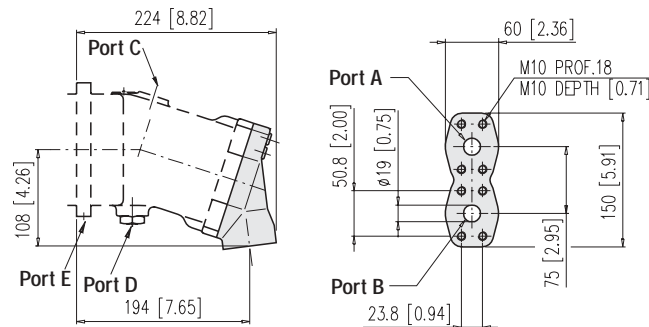
Rear O-Ring
Code: C



DESCRIPTION	SIZE
A System Port	G 1-1/4"
B System Port	G 1-1/4"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom
Code: J

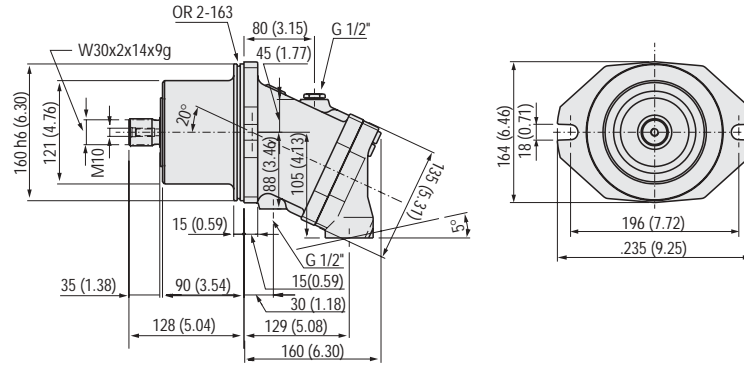


DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Fixed
Displacement
44cc
Model Code Pos. 4, 5, 6
Code 044

Mounting Options
Model Code Position 7

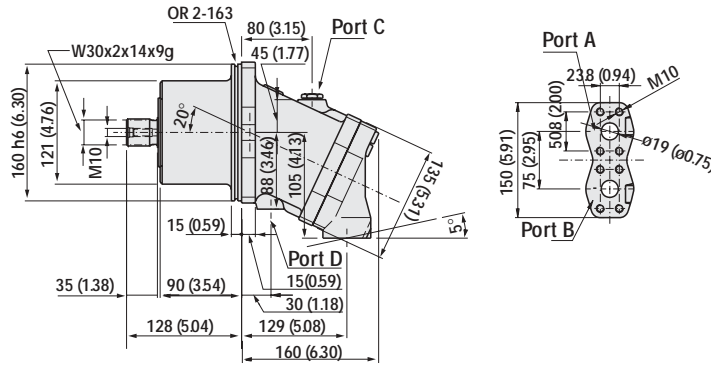
Gearbox
Code: V



Fixed
Displacement
44cc
Model Code Pos. 4, 5, 6
Code 044

Porting Options
Model Code Position 10

Gearbox
Code: J



DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	G 1/2"
D Case Drain	G 1/2" (plugged)

Fixed Displacement

55cc

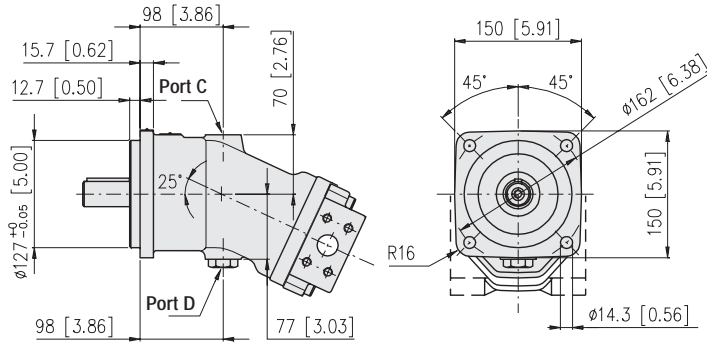
Model Code Pos. 4, 5, 6

Code 055

Mounting Flange Options Model Code Position 7

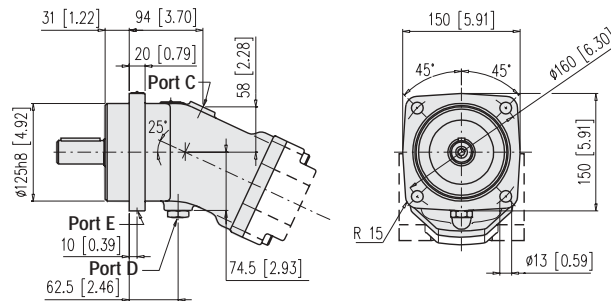
SAE

Code: C



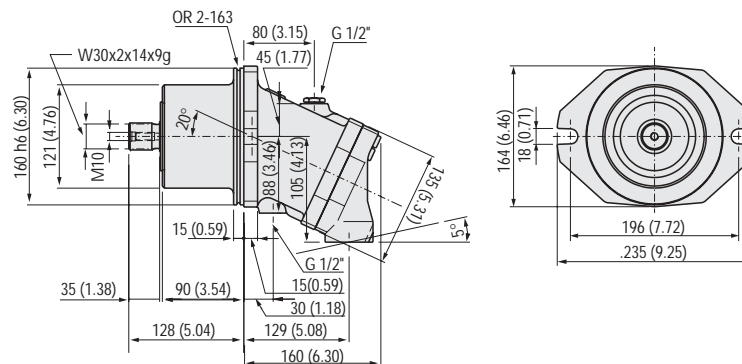
ISO

Code: 3



Gearbox

Code: V



Fixed Displacement

55cc

Model Code Pos. 4, 5, 6

Code 055

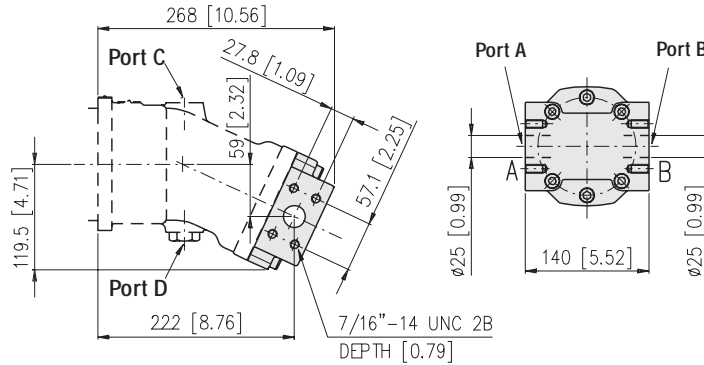
Porting Options

Model Code Position 10

SAE

Opposite Side

Code: M

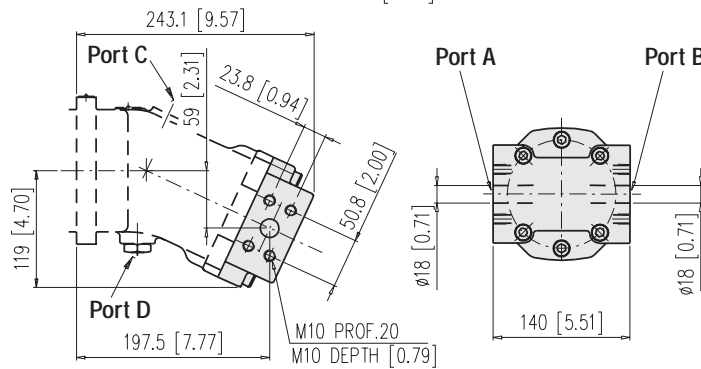


DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16"-12 UNF-2B
D Case Drain	1-1/16"-12 UNF-2B (plugged)
E Flushing Port	G 1/8"

Metric

Opposite Side

Code: E

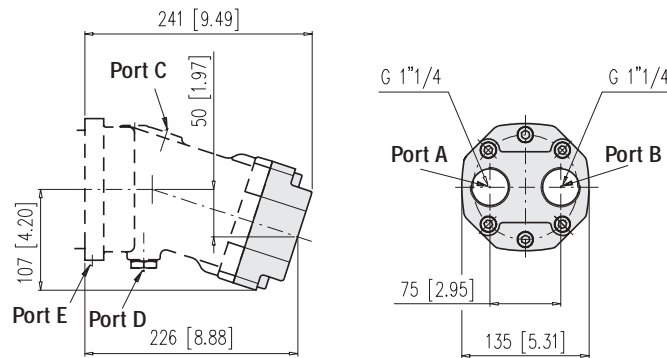


DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Rear O-Ring

Code: C

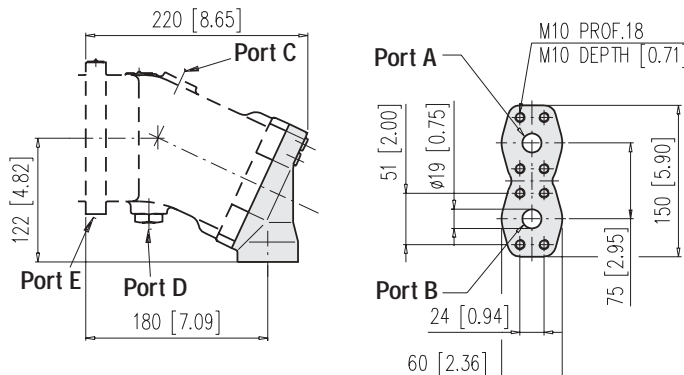


DESCRIPTION	SIZE
A System Port	G 1-1/4"
B System Port	G 1-1/4"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom

Code: J



DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Fixed
Displacement

75cc

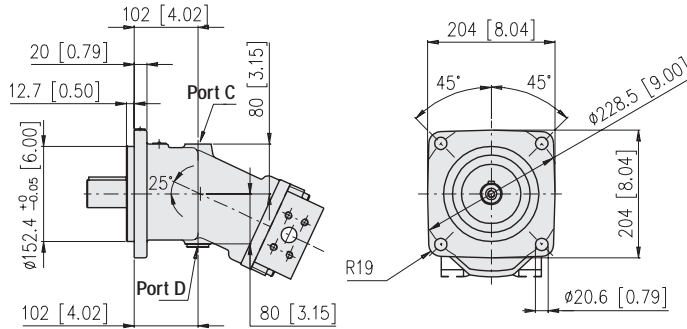
Model Code Pos. 4, 5, 6

Code 075

Mounting Flange Options
Model Code Position 7

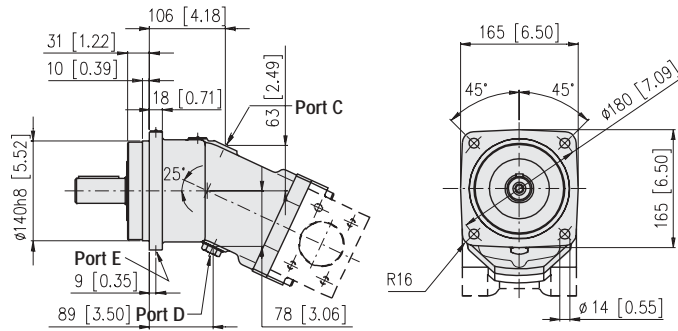
SAE

Code: D



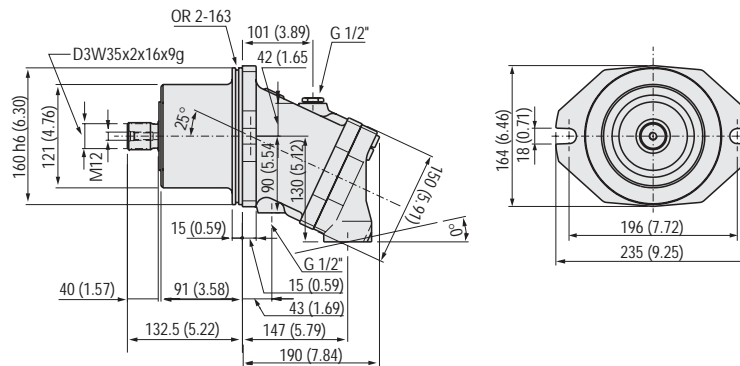
ISO

Code: 4



Gearbox

Code: V



Fixed Displacement

75cc

Model Code Pos. 4, 5, 6

Code 075

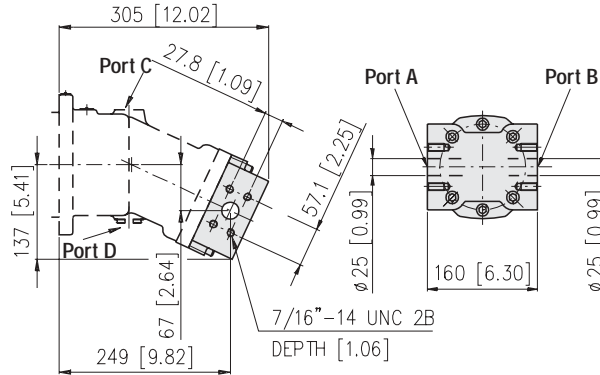
Porting Options

Model Code Position 10

SAE

Opposite Side

Code: M

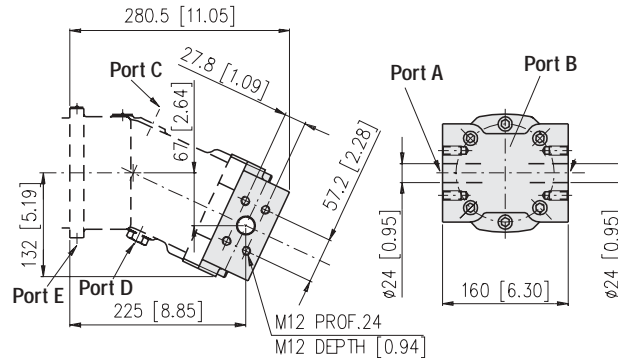


DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16"-12 UNF-2B
D Case Drain	1-1/16"-12 UNF-2B (plugged)
E Flushing Port	G 1/8"

Metric

Opposite Side

Code: F

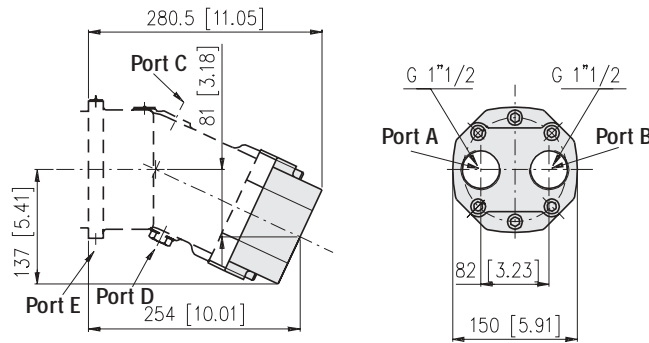


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8"

Metric

Rear O-Ring

Code: D

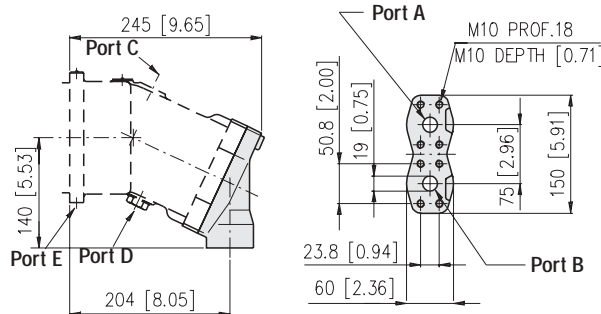


DESCRIPTION	SIZE
A System Port	G 1-1/2"
B System Port	G 1-1/2"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom

Code: J



DESCRIPTION	SIZE
A System Port	3/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8"

Fixed Displacement

87cc

Model Code Pos. 4, 5, 6

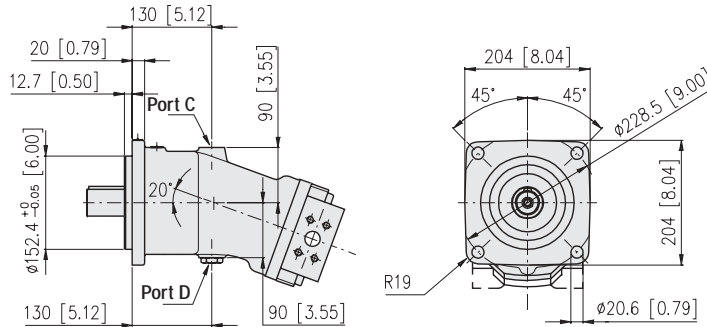
Code 087

Mounting Flange Options

Model Code Position 7

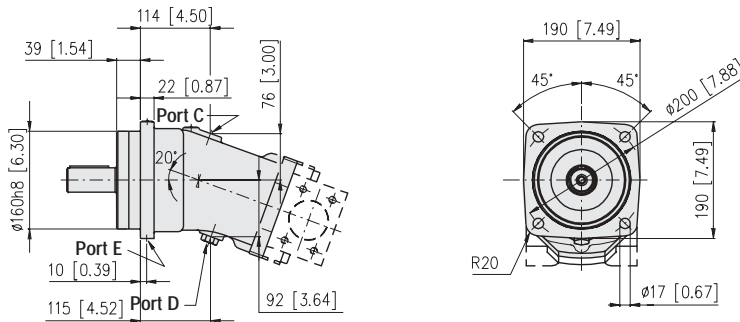
SAE

Code: D



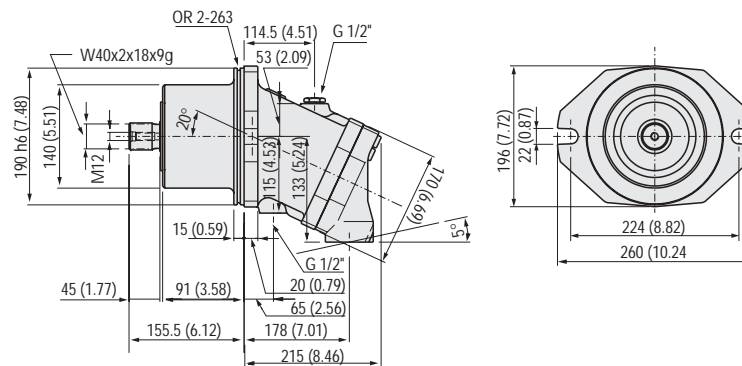
ISO

Code: 5



Gearbox

Code: W



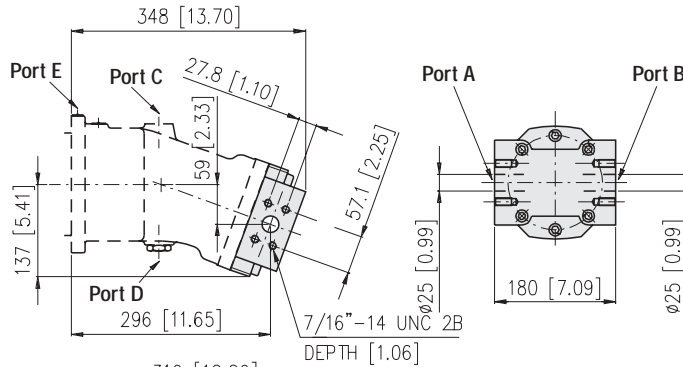
Fixed Displacement
87cc
Model Code Pos. 4, 5, 6
Code 087

Porting Options
Model Code Position 10

SAE

Opposite Side

Code: M

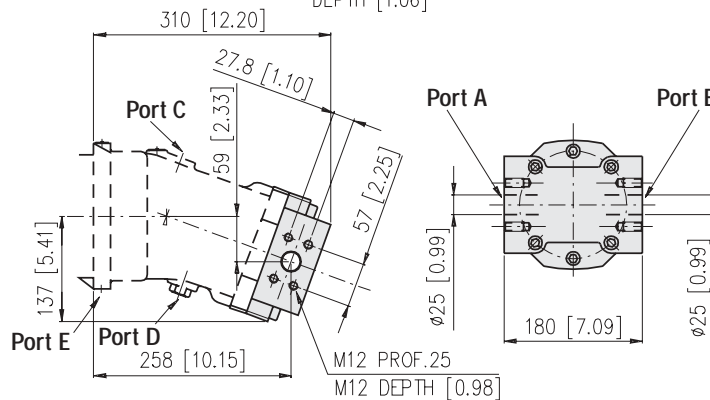


DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16"-12 UNF-2B
D Case Drain	1-1/16"-12 UNF-2B (plugged)
E Flushing Port	G 1/8"

Metric

Opposite Side

Code: F

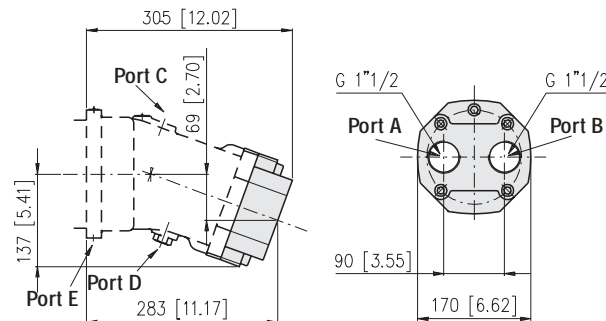


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Rear O-Ring

Code: D

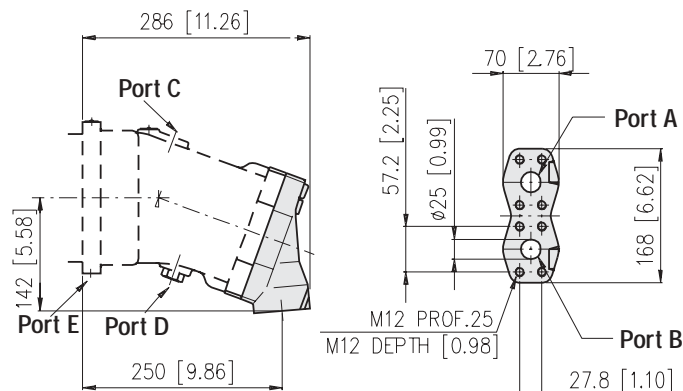


DESCRIPTION	SIZE
A System Port	G 1-1/2"
B System Port	G 1-1/2"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom

Code: K

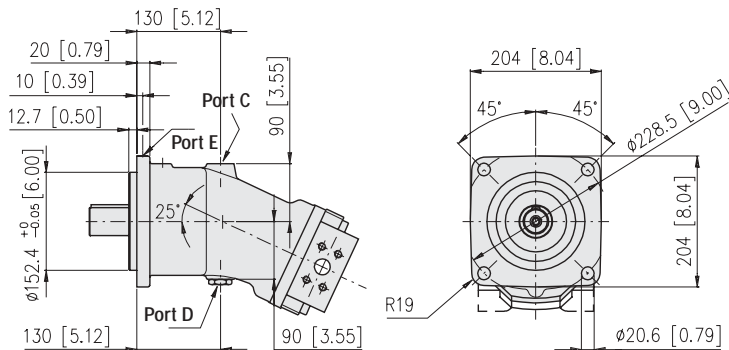


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

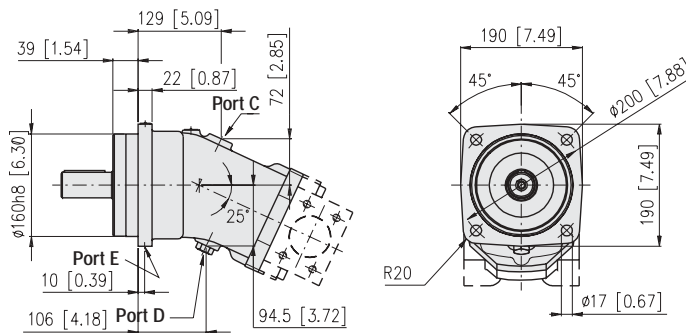
Fixed
Displacement
108cc
Model Code Pos. 4, 5, 6
Code 108

Mounting Flange Options
Model Code Position 7

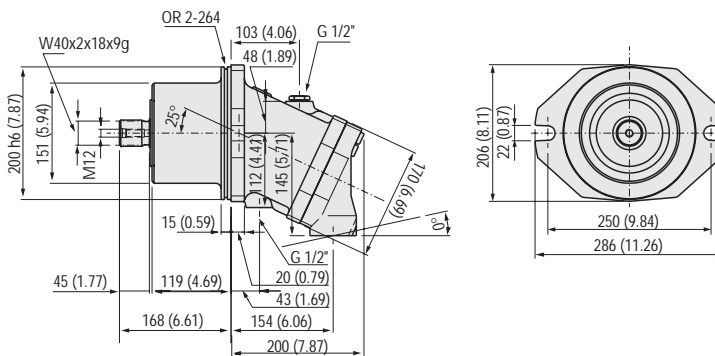
SAE
Code: D



ISO
Code: 5



Gearbox
Code: Y



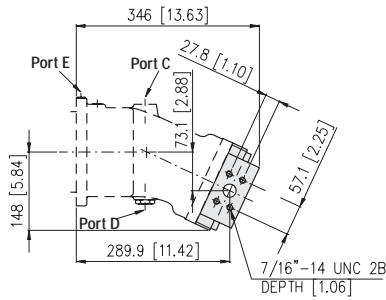
Fixed
Displacement
108cc
Model Code Pos. 4, 5, 6
Code 108

Porting Options
Model Code Position 10

SAE

Opposite Side

Code: M

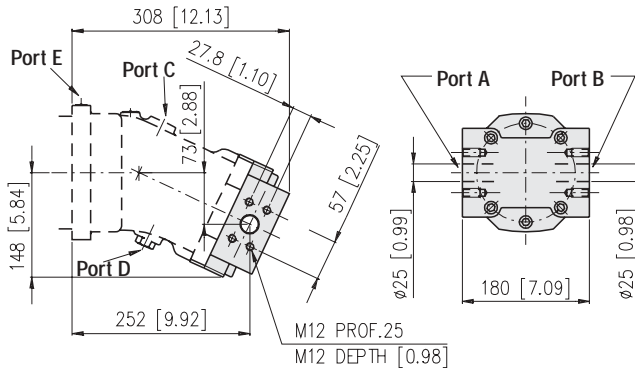


DESCRIPTION	SIZE
A System Port	1" SAE Code 62
B System Port	1" SAE Code 62
C Case Drain	1-1/16"-12 UNF-2B
D Case Drain	1-1/16"-12 UNF-2B (plugged)
E Flushing Port	7/16" - 20 UNF

Metric

Opposite Side

Code: F

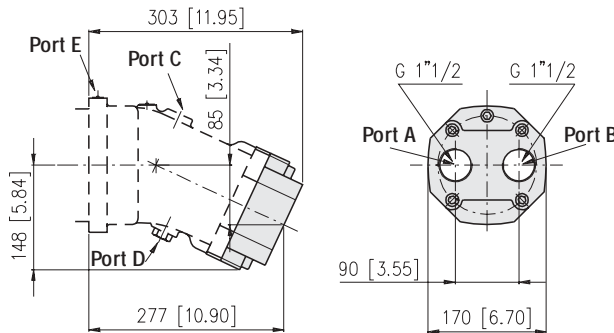


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Rear O-Ring

Code: D

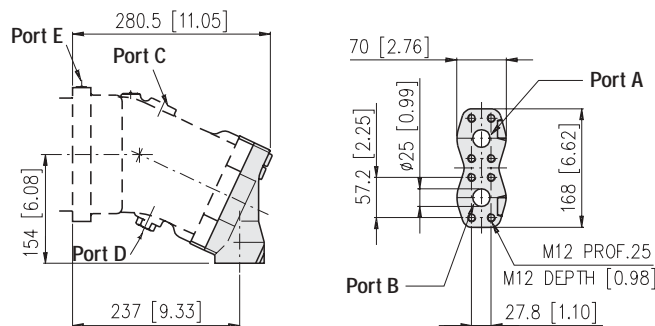


DESCRIPTION	SIZE
A System Port	G 1-1/2"
B System Port	G 1-1/2"
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

Metric

Same Side Bottom

Code: K

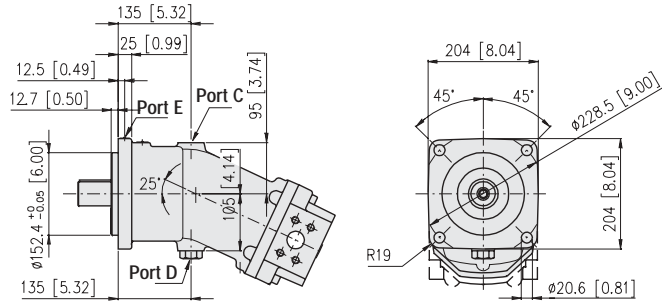


DESCRIPTION	SIZE
A System Port	1" Metric Code 62
B System Port	1" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8" (plugged)

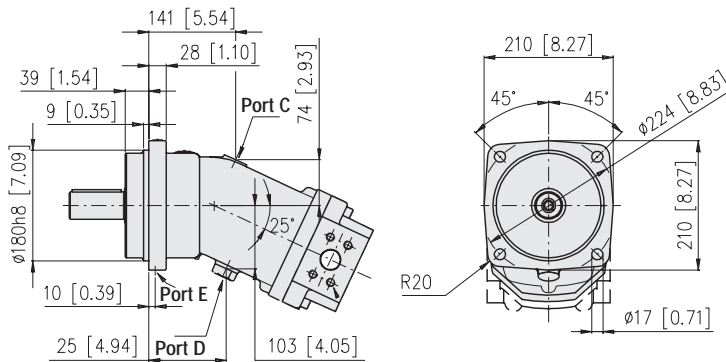
Fixed
Displacement
161cc
Model Code Pos. 4, 5, 6
Code 161

Mounting Flange Options
Model Code Position 7

SAE
Code: D



ISO
Code: 6



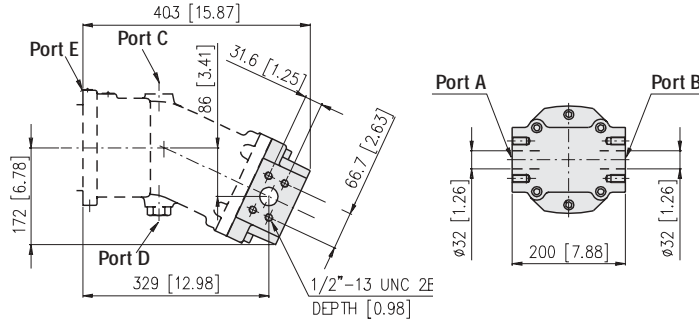
Fixed
Displacement
161cc
Model Code Pos. 4, 5, 6
Code 161

Porting Options
Model Code Position 10

SAE

Opposite Side

Code: N

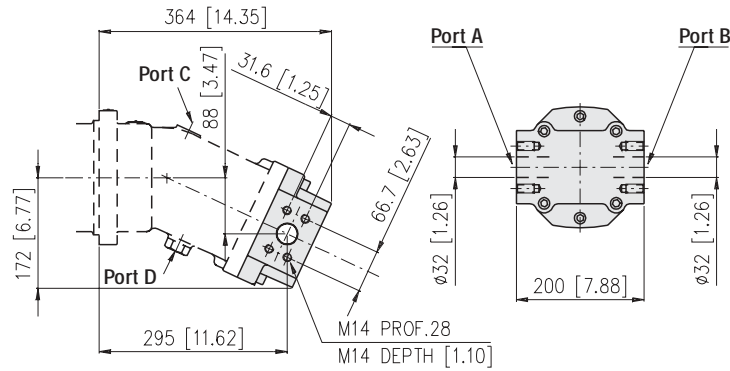


DESCRIPTION	SIZE
A System Port	1-1/4" SAE Code62
B 62System Port	1-1/4" SAE Code
C Case Drain	1-1/16"-12 UNF-2B
D Case Drain	1-1/16"-12 UNF-2B (plugged)
E Flushing Port	7/16" - 20 UNF (plugged)

Metric

Opposite Side

Code: G

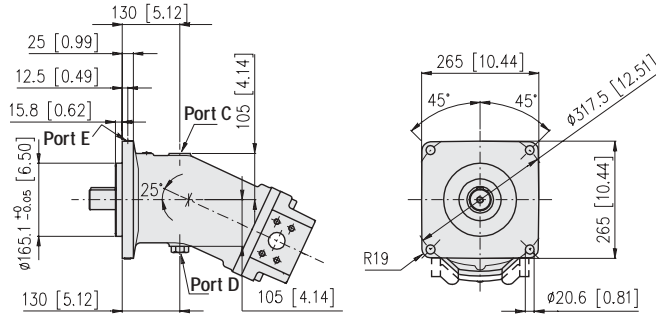


DESCRIPTION	SIZE
A System Port	1-1/4" Metric Code 62
B System Port	1-1/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8"

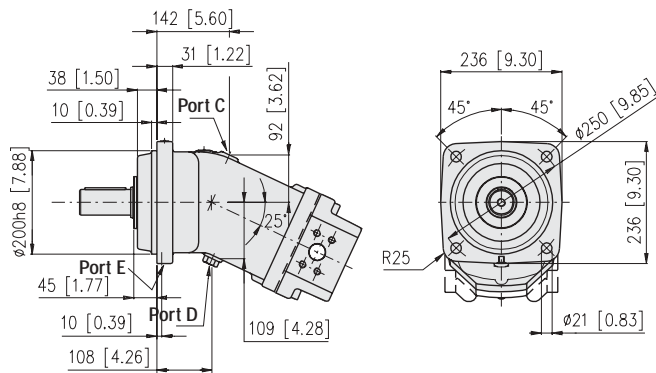
Fixed
Displacement
225cc
Model Code Pos. 4, 5, 6
Code 225

Mounting Flange Options
Model Code Position 7

SAE
Code: E



ISO
Code: 7



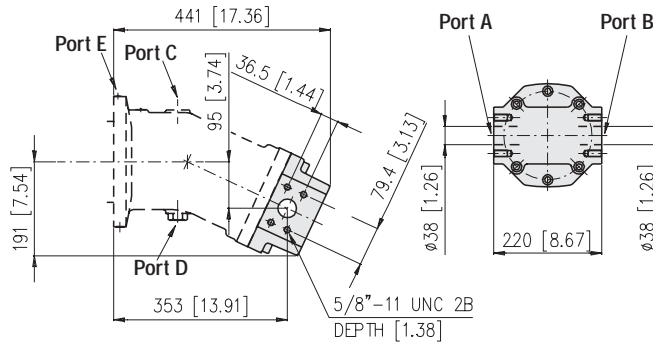
Fixed
Displacement
225cc
Model Code Pos. 4, 5, 6
Code 225

Porting Options
Model Code Position 10

SAE

Opposite Side

Code: P

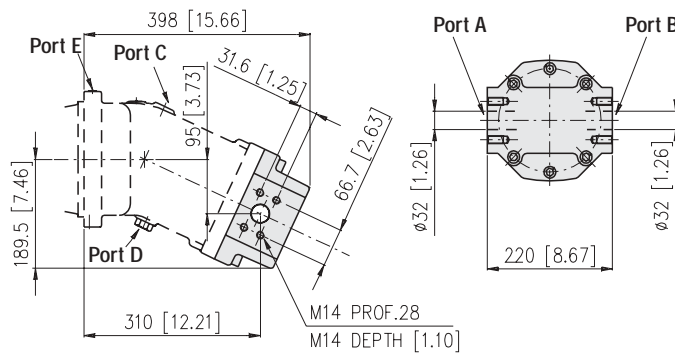


DESCRIPTION	SIZE
A System Port	1-1/2" SAE Code62
B System Port	1-1/2" SAE Code62
C Case Drain	1-3/16"-12 UNF-2B
D Case Drain	1-3/16"-12 UNF-2B (plugged)
E Flushing Port	7/16" - 20 UNF

Metric

Opposite Side

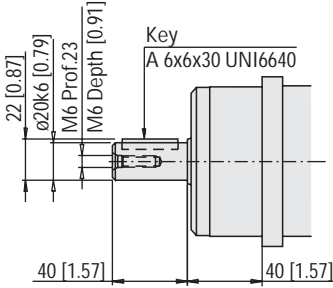
Code: G



DESCRIPTION	SIZE
A System Port	1-1/4" Metric Code 62
B System Port	3/4" Metric Code 62
C Case Drain	G 3/8"
D Case Drain	G 3/8" (plugged)
E Flushing Port	G 1/8"

Fixed Displacement Shaft Options

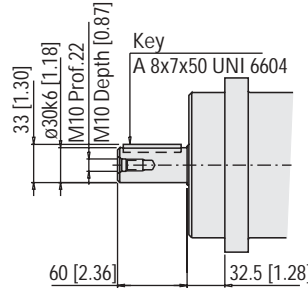
Model Code Position 8, 9



20mm Straight Keyed Shaft

Available in:
11cc ISO mount unit

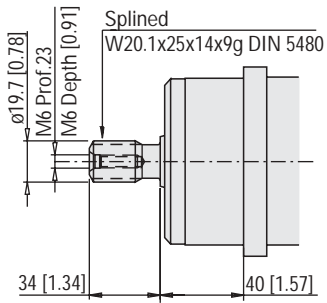
Code: 01



30mm Straight Keyed Shaft

Available in: 40cc and 55cc ISO mount units

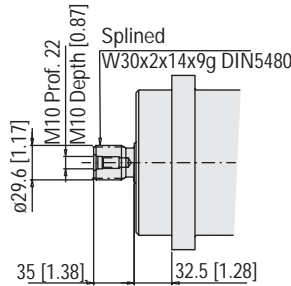
Code: 03



W20-14T DIN Splined Shaft

Available in:
11cc ISO mount unit

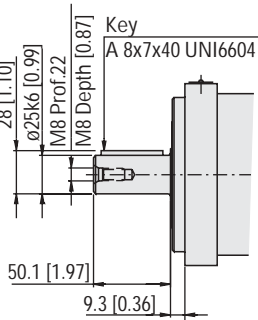
Code: 20



W30-14T DIN Splined Shaft

Available in: 40cc, 44cc and 55cc ISO mount units

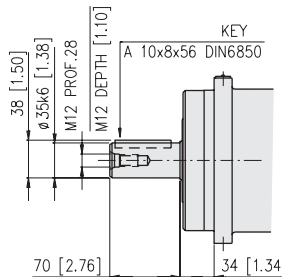
Code: 30



25mm Straight Keyed Shaft

Available in:
20cc and 30cc ISO mount unit

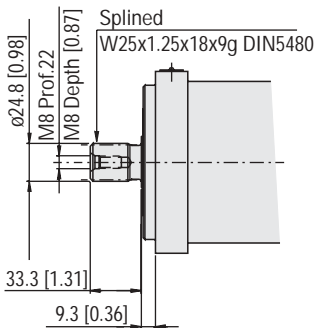
Code: 02



35mm Straight Key Shaft

Available in: 75cc ISO mount units

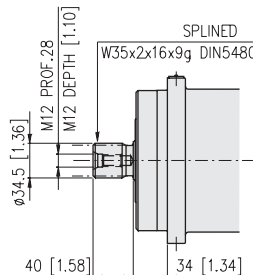
Code: 04



W25-18T DIN Splined Shaft

Available in:
20cc and 30cc ISO mount units

Code: 25



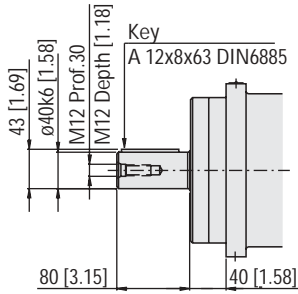
W35-16T DIN Splined Shaft

Available in: 75cc ISO mount units

Code: 35

Fixed Displacement Shaft Options

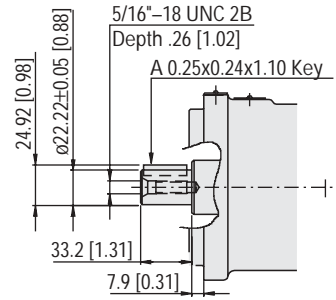
Model Code Position 8, 9



40mm Straight Keyed Shaft

Available in: 87cc and 108cc ISO mount units

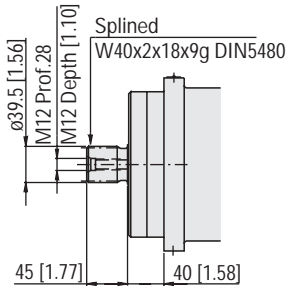
Code: 05



7/8" Straight Keyed Shaft

Available in: 20cc and 30 SAE mount units

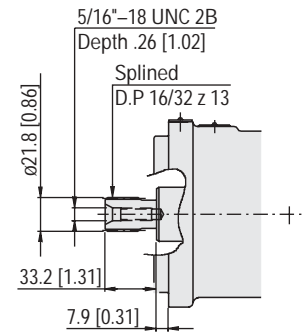
Code: 08



W40-18T DIN Splined Shaft

Available in: 87cc and 108cc ISO mount units

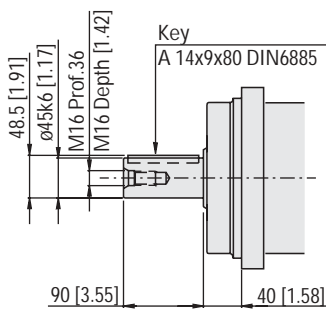
Code: 40



13T-16/32 DP Splined Shaft

Available in: 20cc and 30cc SAE mount units

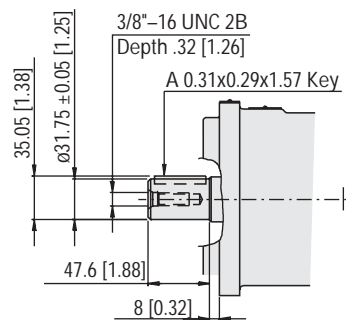
Code: 12



45mm Straight Keyed Shaft

Available in: 161cc ISO mount unit

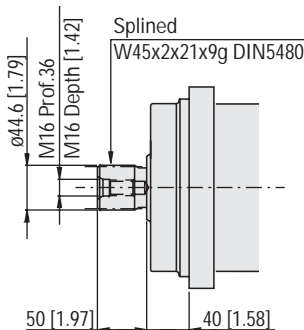
Code: 06



1-1/4" Straight Keyed Shaft

Available in: 40cc and 55cc SAE mount units

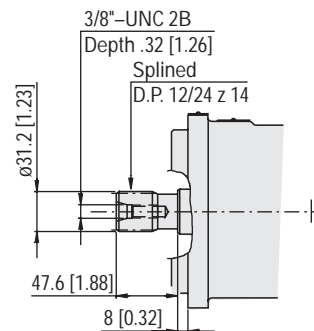
Code: 09



W45-21T DIN Splined Shaft

Available in: 161cc ISO mount unit

Code: 45



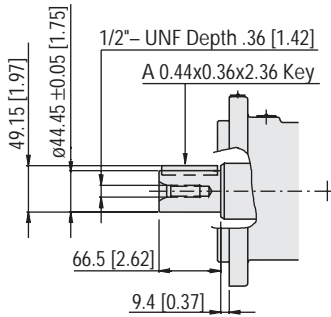
14T-12/24 DP Splined Shaft

Available in: 40cc and 55cc SAE mount units

Code: 14

Fixed Displacement Shaft Options

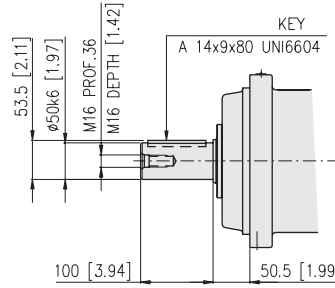
Model Code Position 8, 9



1-3/4" Straight Keyed Shaft

Available in: 75cc, 87cc, 108cc, 161cc and 225cc SAE mount units

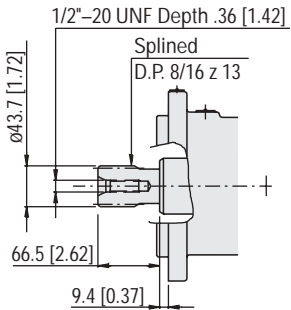
Code: 11



50mm Straight Key Shaft

Available in: 225cc ISO mounting units

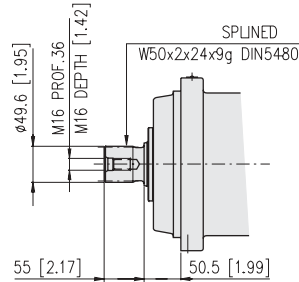
Code: 07



13T-8/16 DP Splined Shaft

Available in: 75cc, 87cc, 108cc, 161cc and 225cc SAE mount units

Code: 13

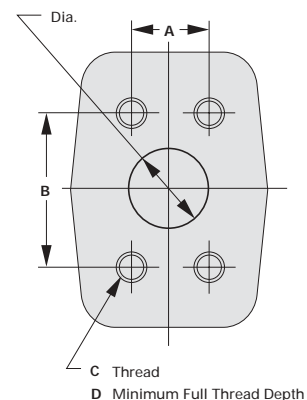


W50-24T DIN Splined Shaft

Available in: 225cc ISO mounting units

Code: 50

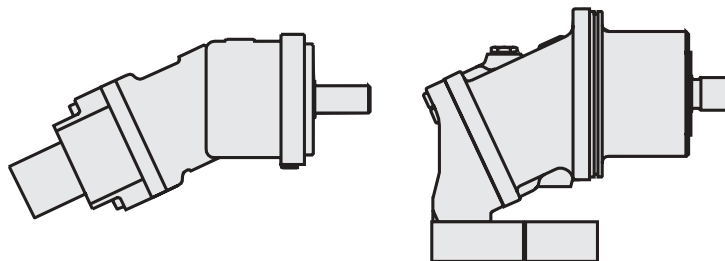
Fixed
Displacement
Port Options
Model Code Pos. 10



CODE	DESCRIPTION	DIAMETER	A	B	C	D
A	Opposite side ports - G 3/4" O-Ring Port (011 Displacement Code)					
B	Rear Ports - G 1" O-Ring Port (020 and 030 Displacement Code)					
C	Rear Ports - G 1 1/4" O-Ring Port (040 and 055 Displacement Code)					
D	Rear Ports - G 1 1/2" O-Ring Port (075, 087 and 108 Displacement Code)					
E	Opposite side ports - 3/4" code 62 - Metric - Split Flange (020, 030, 040 and 055 Displacement Code)	18 mm (0.71 in)	23.8 mm (0.94 in)	50.8 mm (2.00 in)	M10	20 mm (0.79 in)
F	Opposite side ports - 1" code 62 - Metric - Split Flange (075 Displacement Code)	24 mm (0.95 in)	27.8 mm (1.09 in)	57.2 mm (2.25 in)	M12	24 mm (0.94 in)
F	Opposite side ports - 1" code 62 - Metric - Split Flange (075, 087 and 108 Displacement Code)	25 mm (0.99 in)	27.8 mm (1.10 in)	57.0 mm (2.25 in)	M12	25 mm (0.98 in)
G	Opposite side ports - 1 1/4" code 62 - Metric - Split Flange (161 and 225 Displacement Code)	32 mm (1.26 in)	31.7 mm (1.25 in)	66.7 mm (2.63 in)	M14	28 mm (1.10 in)
H	Same side ports bottom - 1/2" code 62 with M8 threads (020 and 030 displacement code)	13 mm (0.51 in)	18.2 mm (0.72 in)	40.5 mm (1.59 in)	M8	14 mm (0.55 in)
J	Same side ports bottom - 3/4" code 62 with M10 threads (040, 044, 055 and 075 displacement code)	19 mm (0.75 in)	23.8 mm (0.94 in)	50.8 mm (2.00 in)	M10	18 mm (0.71 in)
K	Same side ports bottom - 1" code 62 with M12 threads (087 and 108 displacement code)	25 mm (0.99 in)	27.8 mm (1.10 in)	57.0 mm (2.25 in)	M12	25 mm (0.98 in)
L	Opposite side ports - 3/4" code 62 - SAE - Split Flange (020 and 030 Displacement Code)	19 mm (0.75 in)	23.8 mm (0.94 in)	50.8 mm (2.00 in)	3/8" - 16 UNC 2B	24 mm (0.94 in)
M	Opposite side ports - 1" code 62 - SAE - Split Flange (040 and 055 Displacement Code)	25 mm (0.99 in)	27.8 mm (1.09 in)	57.2 mm (2.25 in)	7/16" - 14 UNC 2B	20 mm (0.79 in)
M	Opposite side ports - 1" code 62 - SAE - Split Flange (075, 087 and 108 Displacement Code)	25 mm (0.99 in)	27.8 mm (1.09 in)	57.2 mm (2.25 in)	7/16" - 14 UNC 2B	27 mm (1.06 in)
N	Opposite side ports - 1 1/4" code 62 - SAE - Split Flange (161 and 225 Displacement Code)	32 mm (1.26 in)	31.6 mm (1.25 in)	66.7 mm (2.63 in)	1/2" - 13 UNC 2B	25 mm (0.98 in)
P	Opposite side ports - 1 1/2" code 62 - SAE - Split Flange (225 Displacement code)	38 mm (1.50 in)	36.5 mm (1.44 in)	79.4 mm (3.13)	5/8" - 11 UNC 2B	35 mm (1.38 in)

Fixed Displacement Valve Options

Model Code Pos. 11



Eaton fixed displacement motors, with opposite side, or same side-bottom ports can be specified with optional shuttle valves.

This feature is used to remove hot oil from the low pressure side of a closed circuit. The charge pump replenishes this oil with cooled, filtered oil from the reservoir.

Shuttle valves are recommended in closed circuit applications, especially when operating at high speeds and power levels.

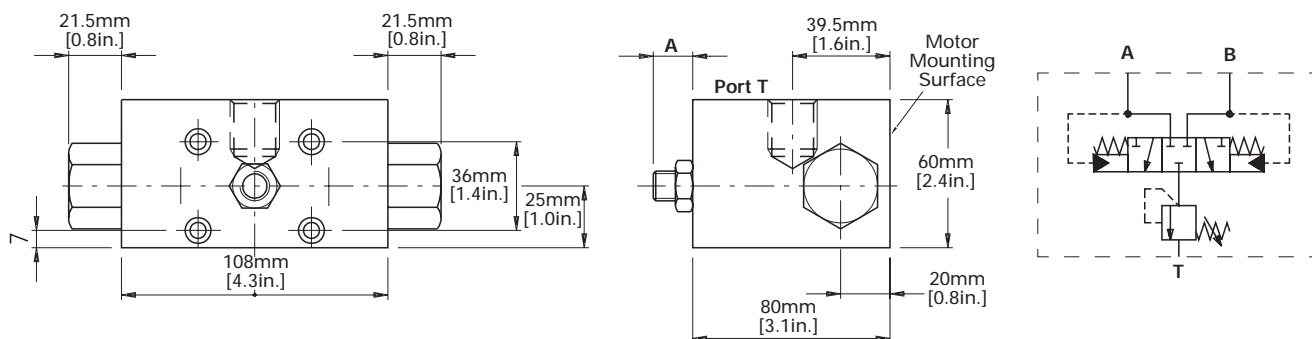
For units with opposite side ports, the valve block is mounted directly to the motor endcover. Motors with same side-bottom ports require an adapter block to mount the shuttle valve block.

Two versions of the shuttle valve are available. Consult the table below for specifications and ordering codes.

CODE	SHUTTLE VALVE	DISPLACEMENT									
		020	030	040	044	055	075	087	108	161	225
3	8.5 lpm (2.25 gpm) @ 21 bar 305 psi for use with opposite side ported motors	Requires port option E or L	Requires port option E or L	Requires port option E or M	N/A	Requires port option E or M	Requires port option F or M	Requires port option F or M	Requires port option F or M	Requires port option G or N	Requires port option G or P
4	20 lpm (5.3 gpm) @ 21 bar 305 psi for use with opposite side ported motors	N/A	N/A	Requires port option E or M	N/A	Requires port option E or M	Requires port option F or M	Requires port option F or M	Requires port option F or M	Requires port option G or N	Requires port option G or P
5	8.5 lpm (2.25 gpm) @ 21 bar 305 psi with adapter flange for use with same-side bottom ported motors	Requires port option H	Requires port option H	Requires port option J	Requires port option J	Requires port option J	Requires port option J	Requires port option K	Requires port option K	N/A	N/A
6	20 lpm (5.3 gpm) @ 21 bar 305 psi with adapter flange for use with same-side bottom ported motors	N/A	N/A	Requires port option J	Requires port option J	Requires port option J	Requires port option J	Requires port option K	Requires port option K	N/A	N/A
ø	No Shuttle										

20 lpm (5.3 gpm) Shuttle Valve Block for direct mounting on motors with opposite side ports.

Code: 4



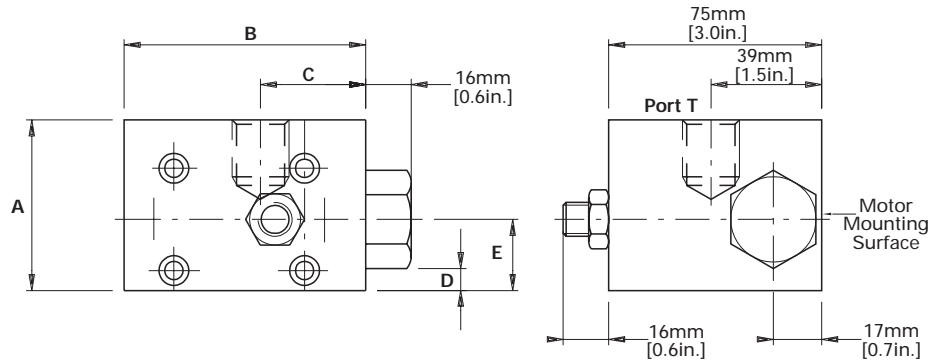
DISPLACEMENT	A	PORT T	WEIGHT
040, 055, 075	Max 16	G 1/2"	4.0 [8.8lbf]
087, 108, 161, 225	Max 16	G 1/2"	4.2 [9.2lbf]

Fixed Displacement Valve Options

Model Code Pos. 11

8.5 lpm (2.25 gpm)
Shuttle Valve Block
for direct mounting on motors
with opposite side ports.

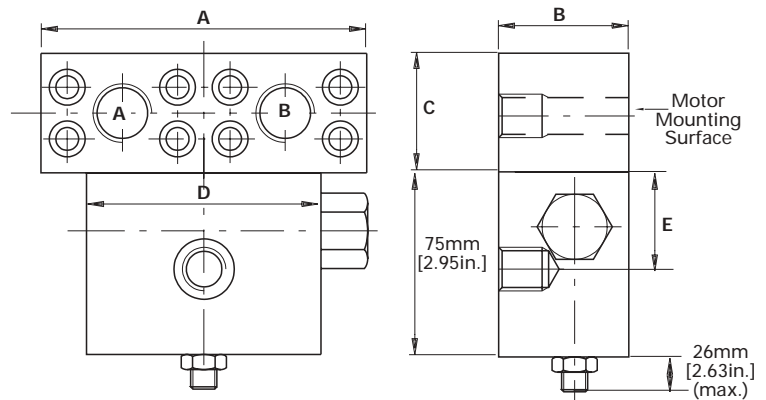
Code: 3



DISPLACEMENT	A	C	D	E	PORT T	WEIGHT
020, 030	50mm [1.97in.]	75mm [2.95in.]	4mm [0.16in.]	20mm [0.79in.]	G 1/2"	2.6kg [5.7lbf]
040, 055, 075	60mm [2.36in.]	85mm [3.35in.]	7mm [0.28in.]	25mm [0.98in.]	G 1/2"	2.8kg [6.2lbf]
087, 108, 161, 225	60mm [2.36in.]	90mm [3.54in.]	7mm [0.28in.]	25mm [0.98in.]	G 1/2"	3.0kg [6.6lbf]

8.5 lpm (1.25 gpm)
Shuttle Valve Block
for use with same-side
ported motors

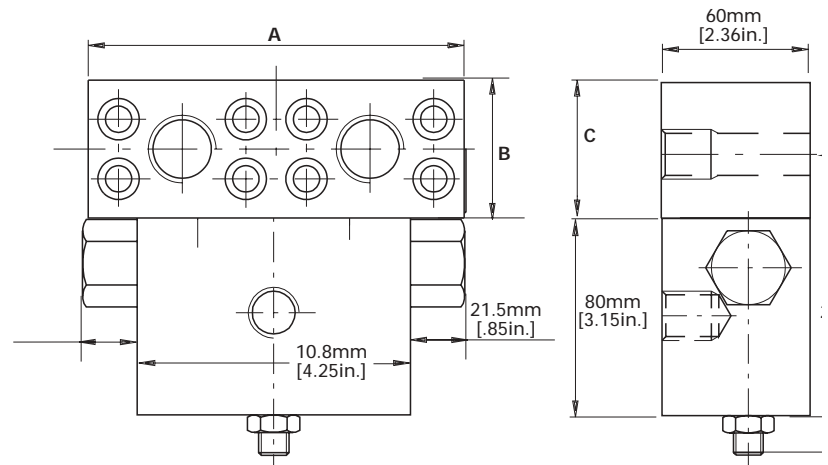
Code: 5



DISPLACEMENT	FLANGE A	B	C	D	PORTS A+B	WEIGHT
020, 030	115mm [4.53in.]	50mm [1.97in.]	40mm [1.57in.]	75mm [2.95in.]	G 1/2"	5.3kg [11.7lbf]
040, 044, 055, 075	150mm [5.91in.]	60mm [2.36in.]	55mm [2.17in.]	85mm [3.35in.]	G 1/2"	5.8kg [12.8lbf]
087, 108	168mm [6.61in.]	60mm [2.36in.]	60mm [2.36in.]	90mm [3.54in.]	G 1/2"	6.6kg [14.5lbf]

20 lpm (5.3 gpm)
Shuttle Valve Block
for use with same side bottom
ported motors

Code: 6



DISPLACEMENT	FLANGE A	B	C	PORTS A+B	PORT T	WEIGHT
040, 044, 055, 075	150mm [5.91in.]	60mm [2.36in.]	55mm [2.17in.]	G 3/4"	G 1/2"	7.0kg [15.4lbf]
087, 108	168mm [6.61in.]	60mm [2.36in.]	60mm [2.36in.]	G 1"	G 1/2"	7.5kg [16.5lbf]

Fixed Displacement Additional Options

Control Model Code Pos.: 12,13	Select 00 for No Control - Fixed Displacement	Motor Special Features Model Code Pos.: 20,21	Select 00 for None
Control Pressure Model Code Pos.: 14	Select 00 for None - Fixed Displacement	Paint Model Code Pos.: 23	Standard motors are shipped unpainted. - Select Code 0 Optional "Eaton blue" primer can be specified - Select Code A
Control Orifice Model Code Pos.: 15	Select 0 for None		
Control Special Features Model Code Pos.: 16	Select 0 for None	Product Identification Model Code Pos.: 24	Select 0 for Standard Eaton Identification.
Min./Max. Displacement Model Code Pos.: 17, 18	Select 00 - Fixed Displacement Per Model Code Pos. 4,5,6	Design Code Model Code Pos.: 25	Select A for Design Code A
Seals Model Code Pos.: 19	Standard Motors are shipped with Nitrile Seals -Select Code A For high temperature operation or for use with special fluids, optional Fluorocarbon seals can be selected -Select Code B		
Additional Features Model Code Pos.: 20	Select 0 for No Additional Features		

Fixed Displacement Application Information

Hydraulic fluids:

Premium grade petroleum based hydraulic fluids will provide the best performance in Eaton hydraulic components. These fluids typically contain additives that are beneficial to hydraulic systems. Eaton recommends fluids that contain anti-wear agents, rust inhibitors, anti-foaming agents, and oxidation inhibitors. Premium grade petroleum based hydraulic fluids carry an ISO VG rating.

Viscosity range at operating temperature must be of 15 - 40 cSt. For short periods and upon cold start, a max. viscosity of 800 cSt is allowed. Viscosities less than 10 cSt are not recommended. A viscosity range of 10 -15 cSt is allowed for extreme operating conditions and for short periods only. For further information see the Fluids and Filtration Guidelines section (pages 66-68) or Eaton Hydraulic Fluids Recommendations (3-401).

Temperature ranges:

The operating temperature of the oil must be between -25°C and 90°C (-13°F to 194°F).

Operation at temperatures above 90°C (194°F) or lower than -25°C (-13°F) is not recommended.

For further information see the Fluids and Filtration Guidelines section (pages 66-68) or Eaton Hydraulic Fluids Recommendations (3-401).

Filtering:

Proper filtration and oil cleanliness are essential for long life and satisfactory performance of bent

axis piston units. Maximum allowable contamination class is 19/16 in accordance with ISO 4406 (6 per SAE).

For further information see the Fluids and Filtration Guidelines section (pages 66-68) or Eaton Hydraulic Fluids Recommendations (3-401).

Operating pressure:

Maximum operating pressure on main system ports of Eaton bent axis motors is 350 bar (5000 psi) continuous, and 450 bar (6500 psi) peak. If two motors are connected in series, working pressure has to be limited to following values:

$$(P_{inlet} + P_{outlet}) < 350 \text{ bar} \\ (5000 \text{ psi}) \text{ continuous}$$

$$(P_{inlet} + P_{outlet}) < 400 \text{ bar} \\ (6500 \text{ psi}) \text{ peak.}$$

Case drain pressure:

Maximum recommended motor case pressure is 3.0 bar (44 psi) and 5.0 bar (73 psi) peak. Excessive case pressure will reduce the life of the main shaft seal.

Seals:

Eaton bent axis motors are equipped with standard NBR (Acrylonitrile-Butadiene Elastomer) for temperatures up to 90°C. For special uses (high temperatures or special fluids) optional Fluorocarbon seals can be specified up to temperatures of 120°C. If using special fluids, contact Eaton Hydraulics.

Output shaft:

Main shaft bearings can bear both radial and axial loads. For details of allowable loading, contact your Eaton representative.

Minimum rotating speed:

Minimum operating speed is the minimum motor rpm at which smooth rotation is assured. Smooth operation at low speeds depends on many factors, such as the type of load and operating pressure.

At speeds of 150 rpm and higher, the motor output shaft will rotate smoothly under most operating conditions. Operation at speeds below 150 is usually acceptable. Please contact Eaton Hydraulics.

Installation:

Eaton bent axis motors can be installed in most orientations. Units have two case drain ports and care must be taken to ensure that motor cases remain full at all times. Always use the case drain port on the highest point on the motor. Gearbox mount motors may not be installed in a vertical orientation with the shaft pointing upwards.

For further details see at General installation guidelines

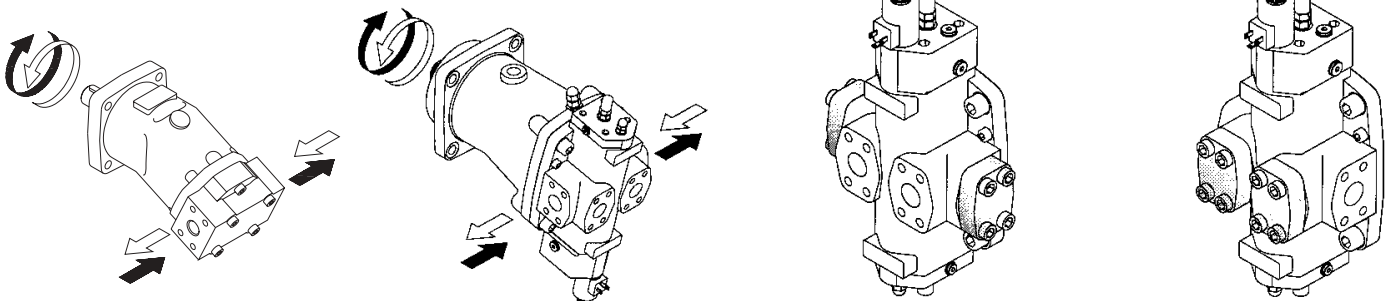
Valves:

Flange mounted shuttle valves are available for flushing and cooling of closed circuit systems. Two different flow rate options can be selected depending on duty cycle requirements..

Variable Motor System Ports:

Variable motor end-covers have both Opposite side and Rear ports. Unused ports are plugged with blind flanges. Port selection is made in model code position 10 of the variable motor model code found on page 6

Relationship between direction of rotation and direction of flow:



Bent Axis Motors

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, Eaton Hydraulics recommends mineral oil-based fluids with anti-corrosive 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 Eaton 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 +90°C or minimum of -25°C.

VARIABLE AND FIXED DISPLACENIC FLUIDS

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

Bent Axis Motors

Application Information

Fluid and Filtration Guidelines (cont.)

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.

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

MAXIMUM CONTAMINATION GRADES	ISO	NAS 1638
Fixed and Variable Bent Axis Motors	19/16	10

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

CONTAMINATION GRADE ISO 4406	RATIO β_x
19/16	$\beta_{20} \geq 100$
18/15	$\beta_{10} \geq 100$

6. ISO 4406 table

The two figures in the code show the number of solid particles per fluid volume unit greater than 5 and 15 microns respectively. Grade 18, for example, indicates that the number of particles per ml is between 1300 and 2500. The table below shows recommended contamination grades set out in ISO 4406.

NUMBER OF PARTICLES PER ML	GREATER THAN $5 \mu\text{m}$	GREATER THAN $15 \mu\text{m}$
Code	From-to	From-to
20/17	5.000-10.000	640-1.300
20/16	5.000-10.000	320-640
20/15	5.000-10.000	160-320
20/14	5.000-10.000	80-160
19/16	2.500-5.000	320-640
19/15	2.500-5.000	160-320
19/14	2.500-5.000	80-160
19/13	2.500-5.000	40-80
18/15	1.300-2.500	160-320
18/14	1.300-2.500	80-160
18/13	1.300-2.500	40-80
18/12	1.300-2.500	20-40
17/14	640-1.300	80-160
17/13	640-1.300	40-80
17/12	640-1.300	20-40
17/11	640-1.300	10-20
16/13	320-640	40-80
16/12	320-640	20-40
16/11	320-640	10-20
16/10	320-640	5-10
15/12	160-320	20-40
15/11	160-320	10-20
15/10	160-320	5-10
15/9	160-320	2,5-5
14/11	80-160	10-20
14/10	80-160	5-10
14/9	80-160	2,5-5
14/8	80-160	1,3-2,5
13/10	40-80	5-10
13/10	40-80	2,5-5
13/10	40-80	1,3-2,5
12/9	20-40	2,5-5
12/8	20-40	1,3-2,5
11/8	10-20	1,3-2,5

Bent Axis Motors

Application Information

Fluid and Filtration Guidelines (cont.)

7. Comparison between ISO 4406, NAS 1638 and SAE

The table below is a comparison between standards ISO 4406 (Cetop RP 70 H), NAS 1638 (1964) and SAE (1963).

ISO 4406 (CETOP RP 70 H)	NAS 1638 (1964)	SAE (1963)
21/18	12	-
21/17	11	-
19/16	10	-
18/15	9	6
17/14	8	5
16/13	7	4
15/12	6	3
14/11	5	2
13/10	4	1
19/9	3	0
18/8	2	-
10/7	1	-
9/6	0	-

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.

Fixed and Variable displacement units are designed to allow flushing the shaft bearings with fresh oil. Flushing is recommended where pumps/motors are installed vertically and where operating cycles display long periods at high pressure (> 250 bar).

Recommended flushing flow rates for each nominal size.

DISPLACEMENT	FLUSHING FLOW RATES
20	3lpm [0.8gpm]
30	4lpm [1.1gpm]
40	4lpm [1.1gpm]
55	4lpm [1.1gpm]
75	5lpm [1.3gpm]
87	8lpm [2.1gpm]
108	8lpm [2.1gpm]
161	10lpm [2.6gpm]
225	10lpm [2.6gpm]

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.

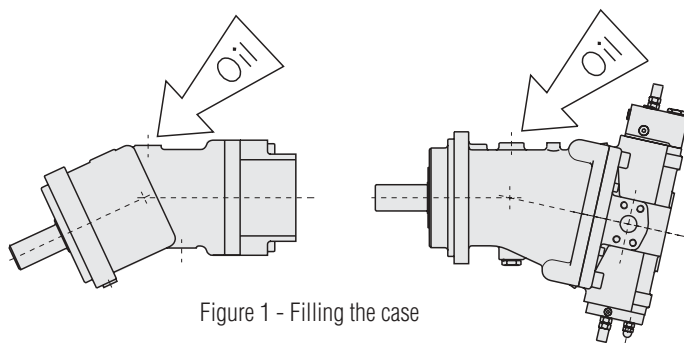


Figure 1 - Filling the case

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.

Bent Axis Motors

Application Information

Installation Guidelines (cont.)

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.

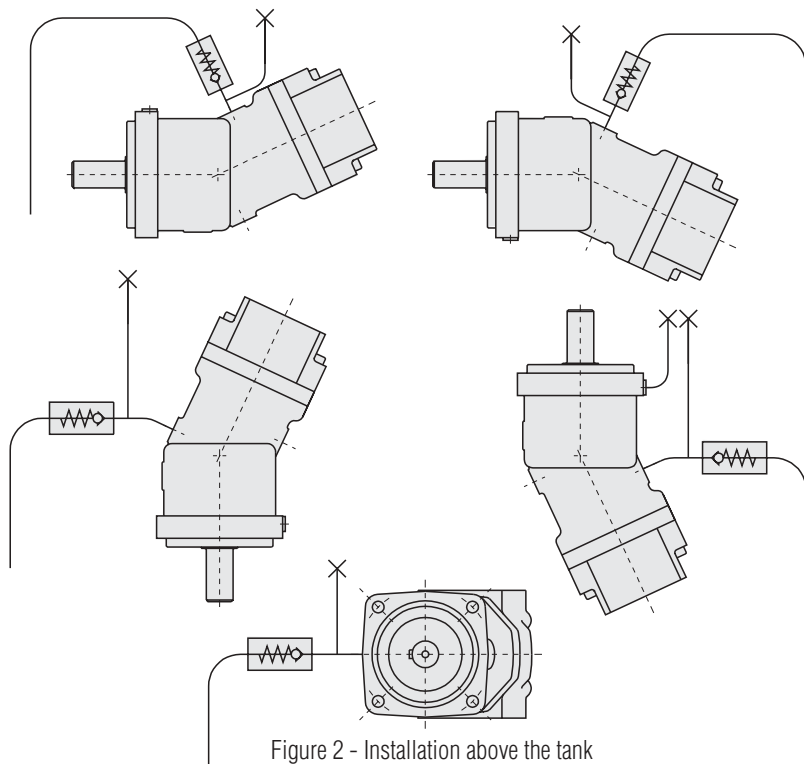


Figure 2 - Installation above the tank

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 motor/pump bearings, by using oil at equal or lower temperature than the tank. Flush the bearings through the Port E

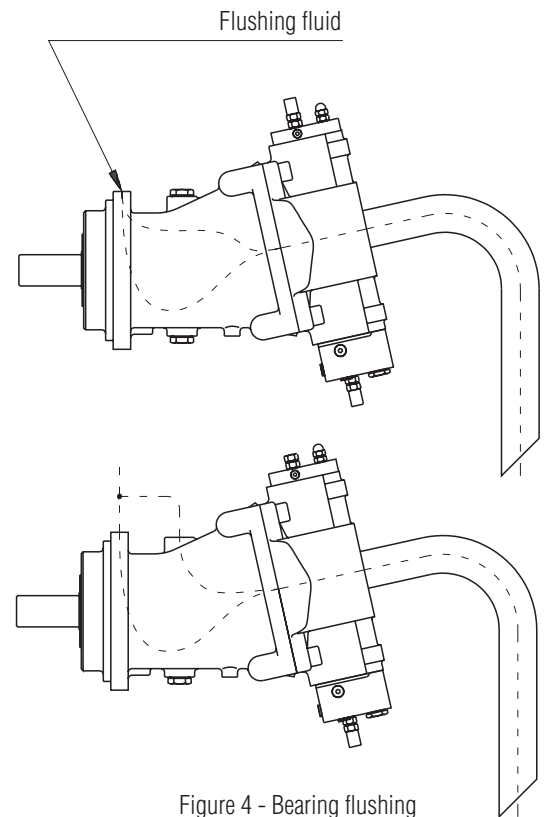


Figure 4 - Bearing flushing

Bent Axis Motors

Application Information

Installation Guidelines (cont.)

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 2000 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.

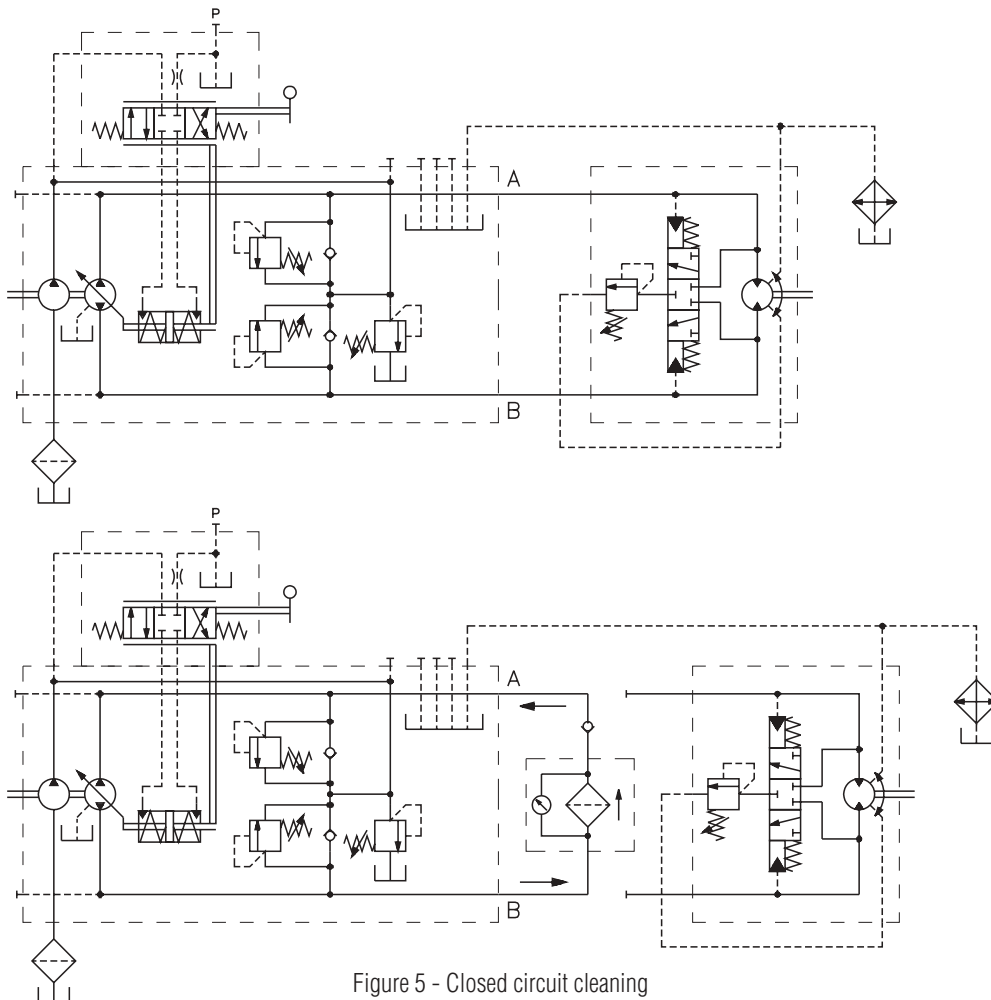


Figure 5 - Closed circuit cleaning

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Hydraulics

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