H1V - Variable displacement axial piston pumps for open circuit





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Type	**Displacement** cm^3/rev [in^3/rev]	**Max. flow** l/min [U.S. gpm]	**Max. pressure cont.** bar [psi]
H1V 055	54.8 [3.34]	143 [37.8]	350 [5100]
H1V 075	75.3 [4.60]	173 [45.6]	350 [5100]
H1V 108	107.5 [6.56]	215 [56.7]	350 [5100]
H1V 160	160.8 [9.81]	289 [76.2]	350 [5100]
H1V 226	225.1 [13.73]	338 [89.1]	350 [5100]

H1V series are a family of variable displacement pumps, bent axis piston design for operation in open circuit. The proven design incorporating the lens shape valve plate, the high quality components and manufacturing tecniques make able the H1V series pumps to provide up to 350 bar [5100 psi] continuous and 450 bar [6500 psi] peak performance. Fully laboratory tested and field proven, these pumps assure maximum efficiency and long life, even at very bad filtering conditions. Heavy duty bearings permit high radial and axial loads.
Versatile design includes a variety of control and shaft ends that will adapt the H1V series pumps to any application both industrial and mobile. H1V series pumps are available in both ISO and SAE version.

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The product images and drawings shown are for illustration purposes only and may not be an exact representation of the product.
We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.
Each product configuration listed below is subject to availability: please contact Sales Dpt. for more commercial detailed info.

General information - Features

Simbology:

C	N/bar [lbf/psi]	Load
$F_{ax\ max}$	N [lbf]	Axial pushing load
$F_{ax\ max}$	N [lbf]	Axial pulling load
F_q	N [lbf]	Radial load
$F_{q\ max}$	N [lbf]	Maximum permissible radial load
J	kg·m^2 [lbf·ft^2]	Moment of inertia
m	kg [lbs]	Weight
$n_{0\ max}$	rpm	Maximum speed
p_{nom}	bar [psi]	Maximum cont. pressure

p_{max}	bar [psi]	Maximum pressure peak
q_{max}	l/min [U.S. gpm]	Maximum flow
q_d	l/min [U.S. gpm]	External drain flow
T_k	Nm/bar [lbf.ft/psi]	Torque costant
T_{nom}	Nm [lbf.ft]	Maximum torque at pressure cont.
T_{max}	Nm [lbf.ft]	Maximum torque at pressure peak
V_g	cm^3/rev [in^3/rev]	Displacement
P_{max}	kW [hp]	Maximum power at p_{nom}
η_{hm}	%	Mech-hyd. efficiency
η_v	%	Volumetric efficiency

Hydraulic fluids:
Use fluids with mineral oil basis and anticorrosive, antioxidant and wear preventing addition agents (HL or HM). 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 then 10 cSt are not allowed. A viscosity range of 10¸15 cSt is allowed for extreme operating conditions and for short periods only. For further information see at Fluids and filtering section.

Temperature ranges:
The operating temperature of the oil must be within -25ºC÷90ºC [-13ºF÷194ºF]. The running of the axial piston unit with oil temperature higher than 90ºC [194°F] or lower than -25ºC [-13°F] is not allowed. For further information see at Fluids and filtering section.

Filtering:
A correct filtering is essential for long and satisfactory life of axial piston units. In order to ensure a correct functioning of the unit, the maximum permissible contamination class is 21/19/16 according to ISO 4406:1999. For further details see at Fluids and filtering section.

Inlet pressure:
(Pumps in open loop) Minimum absolute pressure at suction port is 0.8 bar [11.6 psi]. Case inlet pressure can never be lower.

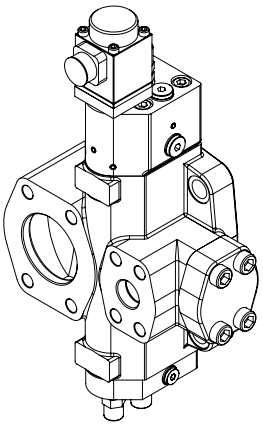
Operating pressure:
The maximum permissible continuous pressure on pressure ports is 350 bar [5100 psi]. The peak pressure is 450 bar [6500 psi].

Case drain pressure:
Maximum permissible case drain pressure is 1.5 bar [22 psi]. A higher pressure can affect the shaft seal or reduce its life.

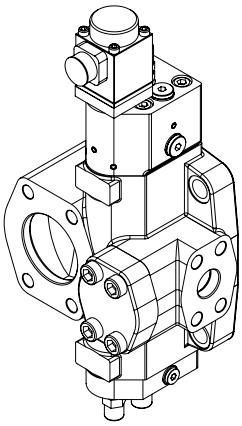
Seals:
Seals used on standard H1V series axial piston pumps are of NBR (Acrylonitrile-Butadiene Elastomer). For special uses (high temperatures or special fluids) it is possible to order the unit with FKM seals (Viton®). In case of use of special fluids, contact Dana.

Output shaft:
Shaft has bearings that can bear both radial and axial loads. As for loads permissible values, see relevant section at Service life of bearings for axial piston units.

Port plates:
The H1V pump port plate has outlet ports, both lateral (L2 cover) and frontal (F2 cover). Unused port is plugged with a blind flange. The kind of port to be used must be specified when ordering. The suction port is always frontal.



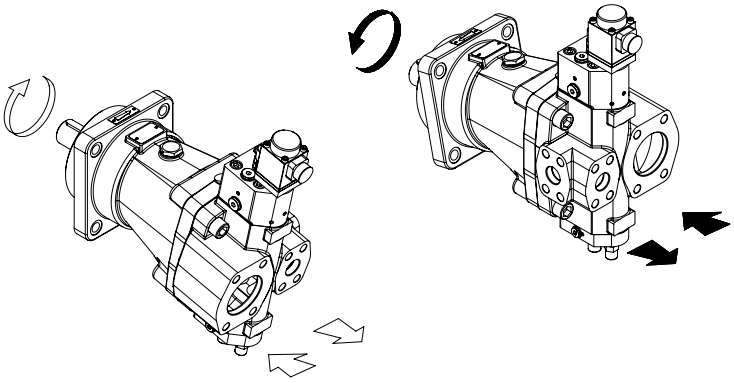
F2 Port plate



L2 Port plate

Installation:
H1V series pumps can be installed in every position or direction. These axial piston units do not have have separate inlet and drain chambers and so must be never drained. Installation of the unit with shaft in vertical position and above the tank involves some limitations. For further details see at General installation guidelines.

Relation between direction of rotation and director of flow:
The relation between direction of rotation of shaft and direction of flow in H1V piston pumps is shown in the picture below.
In order to change direction of rotation, port plate and control have to be removed, and after the valve plate has been replaced, they must be reassembled with the port plate turned of 180°.



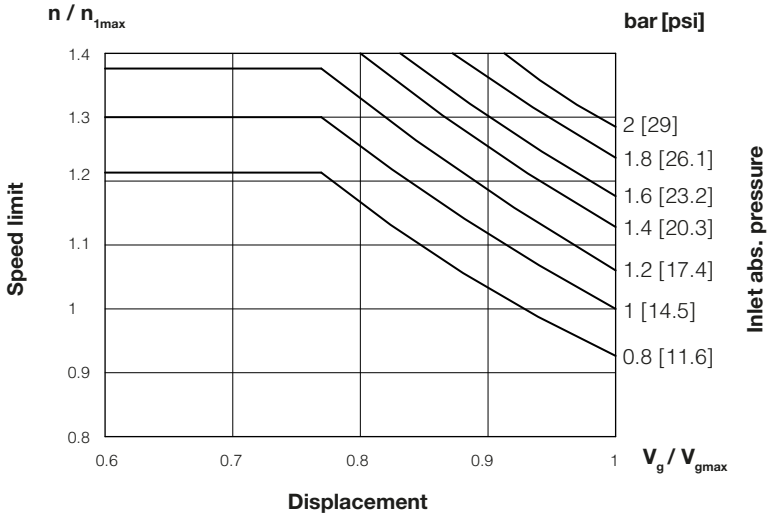
			Size				
			55	75	108	160	226
Max. displacement	V_{gmax}	cm^3/rev [in^3/rev]	54.8 [3.34]	75.3 [4.60]	107.5 [6.56]	160.8 [9.81]	225.1 [13.73]
Min. displacement	V_{gmin}	cm^3/rev [in^3/rev]	0 [0]	0 [0]	0 [0]	0 [0]	0 [0]
Max. Press. cont.	p_{nom}	bar [psi]	350 [5100]				
Max. Press. peak	p_{max}	bar [psi]	450 [6500]				
Max. speed at V_{gmax}	n_{max1} (2)	rpm	2600	2300	2000	1800	1500
Max. speed at $V_g < V_{gmax}$	n_{max2} (2)		3300	2900	2600	2300	1900
Speed limit	n_{lim} (3)	rpm	3700	3200	2800	2500	2100
Max. flow at n_{max1} e V_{gmax}	q_{max}	l/min [U.S.gpm]	143 [37.8]	173 [45.6]	215 [56.7]	289 [76.2]	338 [89.1]
Max. power at n_{max1} e p_{nom}	P_{max}	kW [hp]	83 [111]	101 [135]	125 [168]	168.5 [226]	197 [264]
Torque costant at V_{gmax}	T_k	Nm/bar [lbf.ft/psi]	0.87 [0.044]	1.20 [0.061]	1.71 [0.087]	2.56 [0.13]	3.58 [0.18]
Permissible max. torque at V_{gmax} e p_{nom}	T_{nom}	Nm [lbf.ft]	306 [225]	420 [310]	559 [442]	896 [661]	1254 [925]
Permissible max. torque at V_{gmax} e p_{max}	T_{max}	Nm [lbf.ft]	393 [290]	540 [398]	770 [568]	1152 [849]	1613 [1189]
Moment of inertia	J	$kg \cdot m^2$ [$lbf.ft^2$]	0.0004 [0.095]	0.0008 [0.189]	0.0013 [0.308]	0.025 [0.593]	0.040 [0.948]
Weight	m (4)	kg [lbs]	30 [66]	42 [92]	55 [121]	77 [170]	107 [236]

(Theorical values, without considering η_{hm} e η_v; approximate values). Peak operations must not excede 1% of every minute.
A simultaneus maximum pressure and maximum speed not recomended.

Notes:

1. The minimum and maximum displacements are infinitely adjustable. In the order code please indicate the needed Vg_{max} and V_{gmin}.
2. The values shown are valid for an absolute pressure of 1 bar [14.5 psi] at the suction inlet port an when operated on mineral oil. By decreasing the the displacement the speed may be increased to the max permissible speed, see diagram.
3. By increasing the inlet pressure (pabs > 1 bar [14.5 psi]) the speed my be increased to the max. permissible speed (nlim), see diagram.
4. Approximate values.

Calculation of permissible speed:
The pump rotation speed my be increased by decreasing the displacement or by increasing the suction pressure. The maximum suction pressure must be less then 2.5 bar [36.2 psi] absolute. The max. pump speed must be always less then value shown table (nlim). To calculate the max. permissible speed related to the pump displacement and the suction pressure see the diagram below.



Ordering code

The following alphanumeric codes system has been developed to identify all of the configuration options for the H1V pumps.
Use the model code below to specify the desired features.
All alphanumeric digits system of the code must be present when ordering.
We advise to carefully read the catalogue before filling the ordering code.

1	2	3	4	5	6	6A	6B	6C	6D	7	8	9
Series	Size	Shaft end	Port plate	Direct. of rotat.	Control	Displac. setting	Power at 1500 rpm	Pressure	Solenoid voltage	Displacement min / max	Version	Seals
H1V	075	S	L2	D	NC	1	030	50	03	17/160	ME	NBR

1

Series	
H1V	Variable displacement axial piston pumps for open circuit

2

Size	
055	54.8 cm^3/rev [3.34 in^3/rev]
075	75.3 cm^3/rev [4.60 in^3/rev]
108	107.5 cm^3/rev [6.56 in^3/rev]
160	160.8 cm^3/rev [9.81 in^3/rev]
226	225.1 cm^3/rev [13.73 in^3/rev]

3

Shaft end	
C	Cylindrical keyed
S	Splined

4

Port plate	
L2	At side
F2	At rear

5

Direction of rotation (viewed from shaft side)	
D	CW
S	CCW

Ordering code

1	2	3	4	5	6	6A	6B	6C	6D	7	8	9
H1V	075	S	L2	D	NC	1	030	50	03	17/160	ME	NBR

6

Controls	
NC	Power controls - Constant power control
NC+PC (1)	Constant power control with pressure compensator
NC+PI	Constant power control with hydraulic limiting device
PC	Constant pressure control
CR	Remote constant pressure control
PI	Hydraulic proportional control
EM	Electric proportional control
CLS+TP with drain	Load sensing control with pressure cut-off (with drain)
CLS+TP without drain	Load sensing control with pressure cut-off (without drain)
LC	Manual control

1) The NC+PC control is not available with displacement 55 cm^3/rev [3.34 in^3/rev].

6A

Displacement Setting		Controls								
		NC	NC+PC	NC+PI	PC	CR	PI	EM	CLS+TP	LC
1	(V_{gmax} - V_{gmin})	●	●	●	●	●	●	●	●	●
2	(V_{gmin} - V_{gmax})	–	–	–	–	–	●	●	–	●

● : Available
- : Not Available

6B

Power at 1500 rpm (1)		Size				
		55	75	108	160	226
	kW [hp]	5 ÷ 30 [6.7 ÷ 40.2]	11 ÷ 45 [14.7 ÷ 60.3]	13 ÷ 70 [17.4 ÷ 93.8]	22 ÷ 98 [29.4 ÷ 131.2]	27 ÷ 130 [36.1 ÷ 174.2]

1) Field to be filled only with NC / NC+PC / NC+PI Controls by setting specific value in kW

6C

Pressure (1)	Controls								
	NC	NC+PC	NC+PI	PC	CR	PI	EM	CLS+TP	LC
50 ÷ 350 bar [725 ÷ 5075 psi]	–	●	–	●	●	–	–	–	–
18 ÷ 35 bar (CLS) / 50 ÷ 350 bar (TP) [261 ÷ 507.5 psi] (CLS) / [725 ÷ 5075 psi] (TP)	–	–	–	–	–	–	–	●	–

1) Field to be filled only with NC+PC / PC / CR / CLS+TP Controls by setting specific value in bar

● : Available
- : Not Available

Ordering code

1	2	3	4	5	6	6A	6B	6C	6D	7	8	9
H1V	075	S	L2	D	NC	1	030	50	03	17/160	ME	NBR

6D

Solenoid voltage (1)	Controls								
	NC	NC+PC	NC+PI	PC	CR	PI	EM	CLS+TP	LC
12 Vdc	–	–	–	–	–	–	●	–	–
24 Vdc	–	–	–	–	–	–	●	–	–

1) Field to be filled only with EM Controls
● : Available
- : Not Available

7

V_{gmin} / V_{gmax}	Size				
	55	75	108	160	226
Control NC	6 / 55 cm³/rev [0.37 / 3.36 in³/rev]	10 / 75 cm³/rev [0.61 / 4.58 in³/rev]	13 / 107 cm³/rev [0.79 / 6.54 in³/rev]	17 / 160 cm³/rev [1.04 / 9.77 in³/rev]	20 / 225 cm³/rev [1.22 / 13.74 in³/rev]
Other control	0 / 55 cm³/rev [0 / 3.36 in³/rev]	0 / 75 cm³/rev [0 / 4.58 in³/rev]	0 / 107 cm³/rev [0 / 6.54 in³/rev]	0 / 160 cm³/rev [0 / 9.77 in³/rev]	0 / 225 cm³/rev [0 / 13.74 in³/rev]

8

Version	
ME	ISO
SE	SAE

9

Seals	
NBR	Nitrile STD
FKM	Viton ®

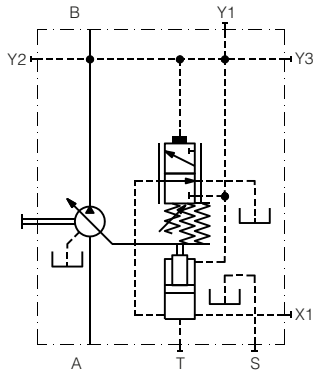
The constant power control makes it possible to control the output flow of the pump in relation to the operating pressure so to keep the pre-set drive power constant at a constant speed:

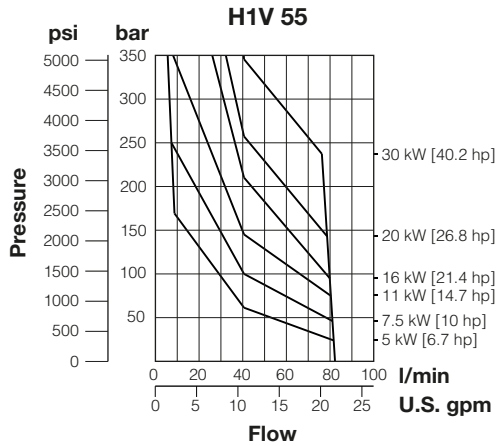
$$N = \frac{p \cdot Q}{600} = cost$$

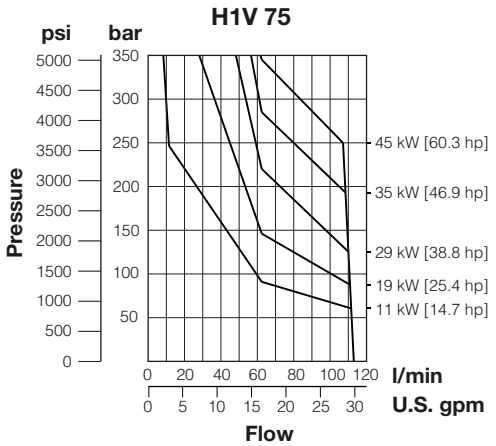
N = Power (kW)
p = pressure (bar)
Q = flow (l/min)

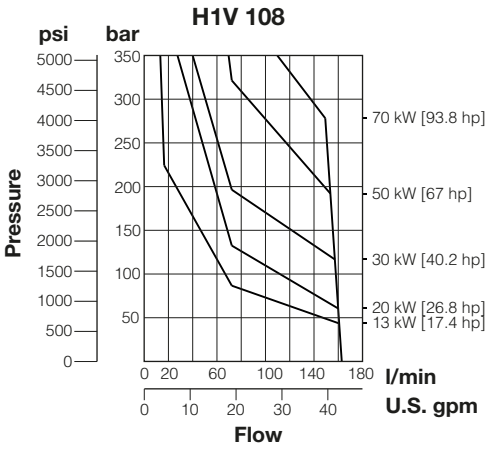
The operating pressure applies a force on the pilot which is matched by an adjustable spring so that the pump keeps Vg max until the operating pressure overtakes the pre-set spring force. When the operating pressure rises beyond the pre-set spring force, the spool valve opens and the positioning piston moves allowing the pump to swivel toward Vg min until a force balance on the control rod is restored by feed back springs so that the output flow reduces in the same ratio by which the operating pressure has risen. Therefore at constant drive speed the drive power keeps constant. The displacement setting is (1) (MAX-MIN) with two feed back springs. Calibration starts from 50 bar [725 psi].

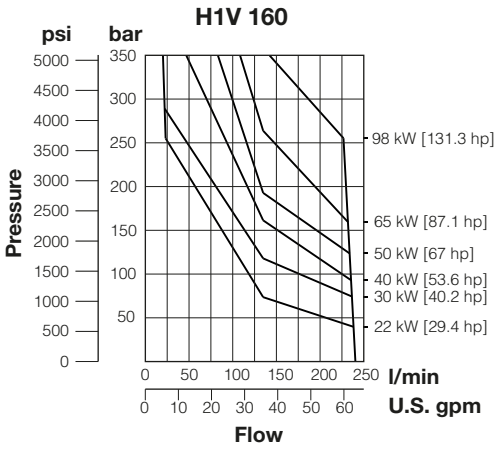
When ordering, please clearly state:
- Input power (kW) at 1500 rpm.

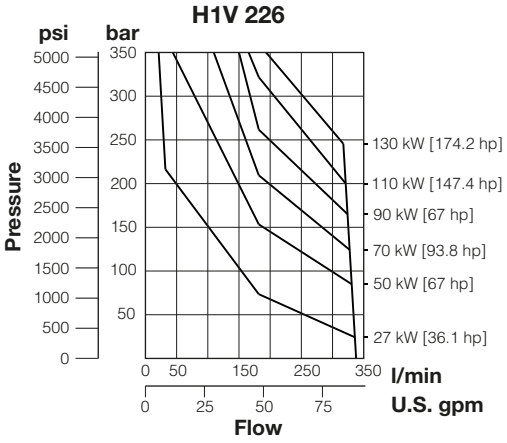






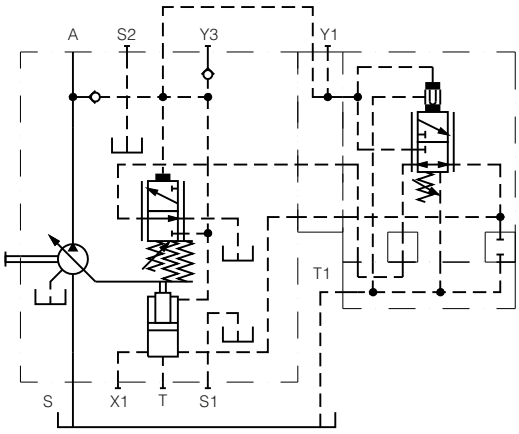

H1V 108
psi
bar
Pressure
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
350
300
250
200
150
100
50
70 kW [93.8 hp]
50 kW [67 hp]
30 kW [40.2 hp]
20 kW [26.8 hp]
13 kW [17.4 hp]
0 20 60 100 140 180 l/min
0 10 20 30 40 U.S. gpm
Flow

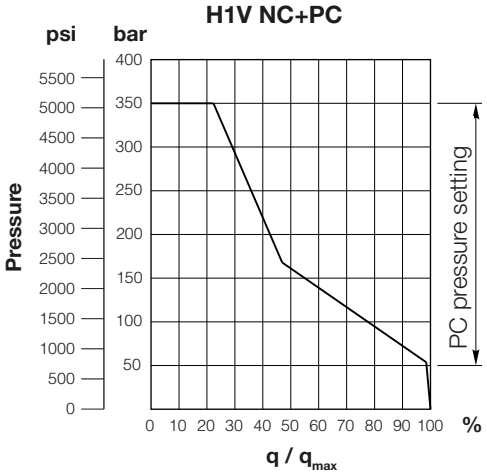

H1V 160
psi
bar
Pressure
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
350
300
250
200
150
100
50
98 kW [131.3 hp]
65 kW [87.1 hp]
50 kW [67 hp]
40 kW [53.6 hp]
30 kW [40.2 hp]
22 kW [29.4 hp]
0 50 100 150 200 250 l/min
0 10 20 30 40 50 60 U.S. gpm
Flow


H1V 226
psi
bar
Pressure
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
350
300
250
200
150
100
50
130 kW [174.2 hp]
110 kW [147.4 hp]
90 kW [67 hp]
70 kW [93.8 hp]
50 kW [67 hp]
27 kW [36.1 hp]
0 50 150 250 350 l/min
0 25 50 75 U.S. gpm
Flow

The NC+PC control operates as the NC constant power control with the addition of a max pressure cut-off so that, if the operating pressure exceeds the setting value, the pump automatically detrokes to Vg_{min} maintaning the pressure.
The pressure limiting device is made by the adjustable sequence valve mounted on the pump. The valve is adjustable up to 350 bar [5000 psi]. The pressure limiting device overrides the constant power control, i.e. below the pre-set operating pressure the displacement is adjusted according to the pre-set drive power curve and if the operating pressure rises such as to exceed the pre-set operating pressure, the pressure limiting device overrides the constant power control. It should be required for the pump to operate long term at zero stroke, more then 200 bar [2900 psi] for more than 5 min., pump flushing is necessary through the S port and flushing flow must be 7-10% approx. of the nominal pump flow. The VSI T1 port must be connected to the tank directly. Any relief included in the circuit must be set at least at 30 bar [435 psi] above the pressure limiting device setting. Displacement setting is (1) (MAX-MIN).

When order, please clearly state:
- Input power (kW) at 1500 rpm
- Pressure limiting device setting.

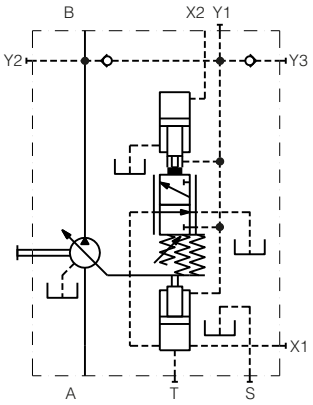


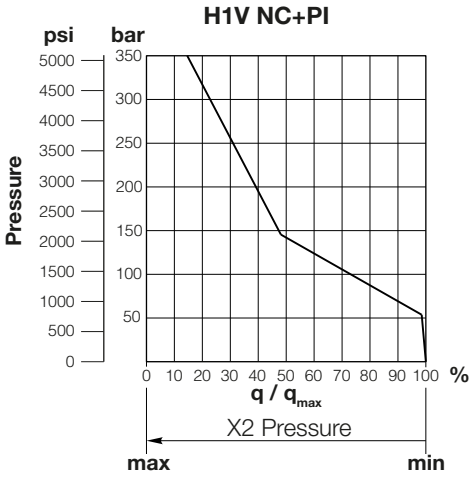


Constant power control with hydraulic limiting device NC+PI

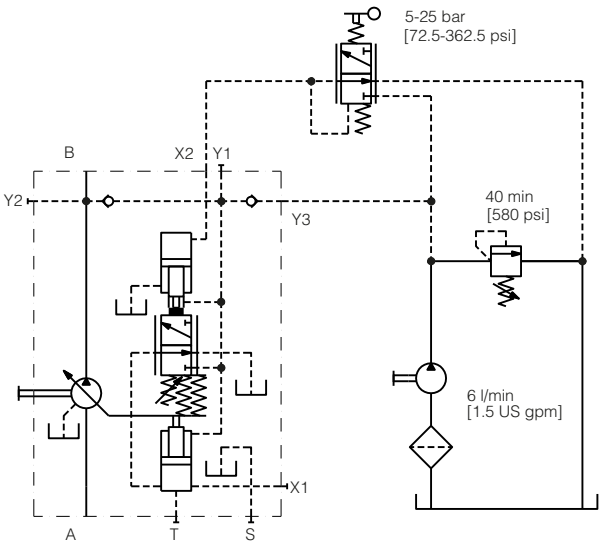
The NC+PI control operates as the NC constant power control, with the additional option of being able to limit the flow in proportion of the pilot pressure applied on port X2. The hydraulic limiting device is overridden by the constant power control, i.e. below the pre-set drive power curve the displacement is adjusted in relation to the pilot pressure and if operating pressure rises such as to exceed the power curve, the constant power control overrides the hydraulic limiting device and reduces the displacement according to the power curve. To zero the displacement a piloting pressure of about 10% of working pressure (10 to 35 bar depending on spool diameter) [145-508 psi] is required at port X2; maximum pressure on X2 port 250 bar [3625 psi].
Displacement setting is (1) (MAX to MIN).

When ordering, please clearly state:
- Input power (kW) at 1500 (rpm).





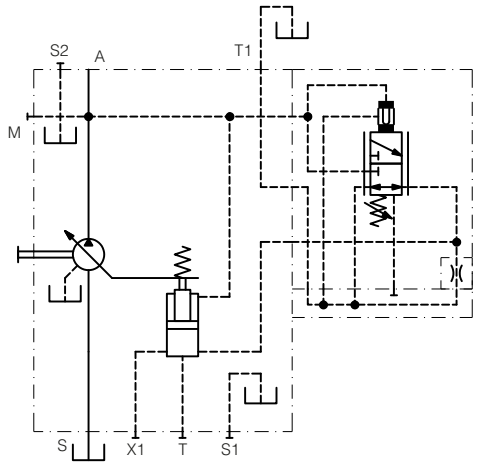
Control boosting:
When it is necessary to change the displacement of the pump with a working pressure lower than 40 bar [580 psi], the control must be boosted by means of an auxiliary circuit connected at Y3 port.

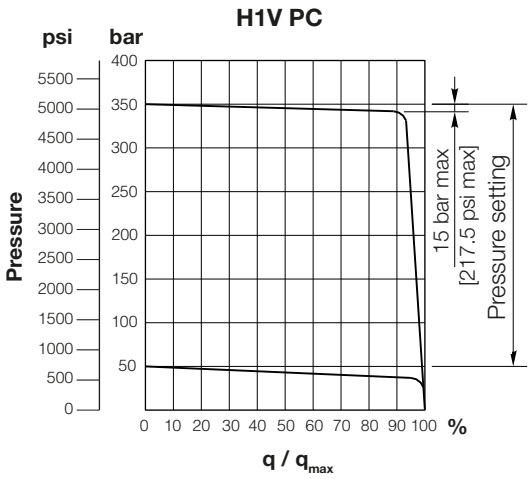


Note:
The above illustrated circuit has the only aim to show the connection required to construct a boosting circuit.

The constant pressure control controls the pump displacement in relation to flow requirements in such a way to maintain the pressure in the hydraulic circuit constant.
The operating pressure applies a force on the pilot which is matched by an adjustable spring. There is no feed back. Should the flow requirements reduce, the operative pressure rises and exceed the pre-set pressure, consequently the spool opens and the pump swivels back until the pre-set pressure is restored. The swivel back time to zero stroke is about 0.2 sec. while the time to restore the output flow is about 0.8 sec. The setting range of the control is 50 bar [725 psi] to 350 bar [5000 psi]. Should it be requested the pump to operate for long time, i.e. more then 200 bar [2900 psi] for more than 5 min, at zero stroke, pump flushing is necessary through the port S and flushing must be 7% approx. of the nominal pump flow. The relief valve included in the circuit should be set at least at 30 bar [435 psi] above the constant pressure control setting and the T1 port of the control must be connected directly to the tank. Displacement settng is (1) (MAX- MIN).

When order, please clearly state:
- Valve calibration pressure.





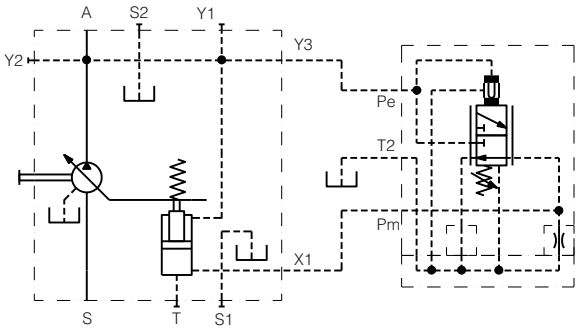
Remote constant pressure control

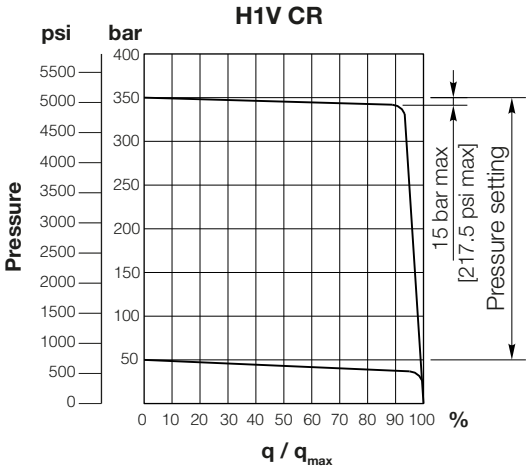
CR

The constant pressure control of the pump can be remotely piloted by means of the internal piloting sequence valve VSI (see valves and accessories section). VSI valve is directly assembled on pump, but it also can be ordered separately. Setting adjustment is 50 bar [725 psi] to 350 bar [5075 psi]; the piping length should not exceed 5 mt [16ft]. Port T2 (fixed restrictor) must be directly connected to the tank and circuit relief valve must be 30 bar [435 psi] higher than the PCR control.
Other features of PCR controls are similar to PC ones.
Displacement setting is 1 (MAX to MIN).

Note:
Please contact our technical department when 2 or more pressure settings are required.

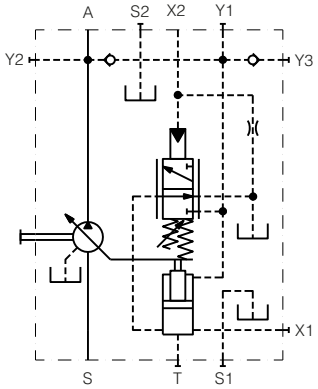
When ordering, please clearly state:
- Control pressure setting.

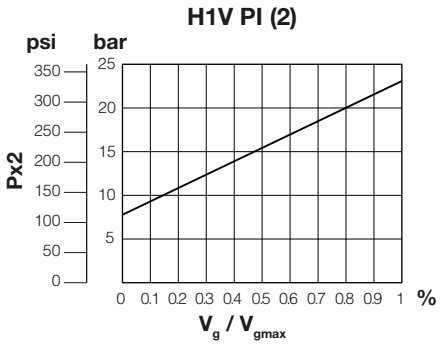


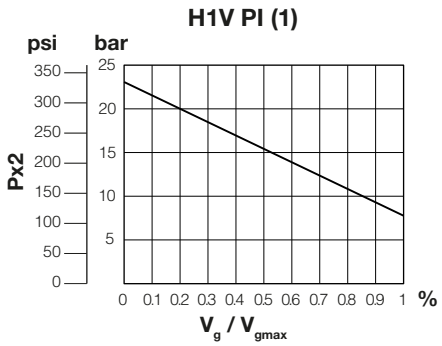


The hydraulic proportional control allows a stepless adjustment of the pump displacement proportionally to the pilot pressure applied to port X2. The pilot pressure applies a force on the spool and the pump swivels until a force balance on the arm is restored by feed back spring. Therefore the pump displacement is adjusted in direct proportion with the pilot pressure. Standard displacement setting is 2 (Min → Max), however displacement setting 1 (Min → Max) is also available. The required flow can be obtained by setting the pressure relief valve at X2 port: 8 - 23 bar [115 - 335 psi]. Maximum permissible pilot pressure at port X2 is 50 bar [725 psi] A min. 40 bar [580 psi] approx. operating pressure is required to operate the control. In case of operating pressure lower than 40 bar [580 psi], a boost pressure must be applied at port Y3 to control the pump.

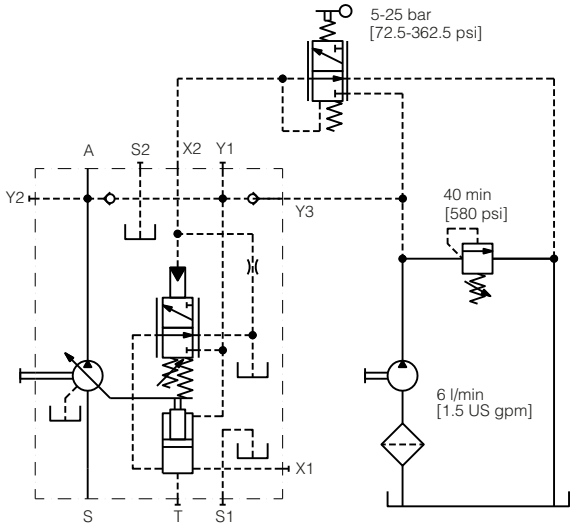
When ordering please state clearly:
- Displacement setting.







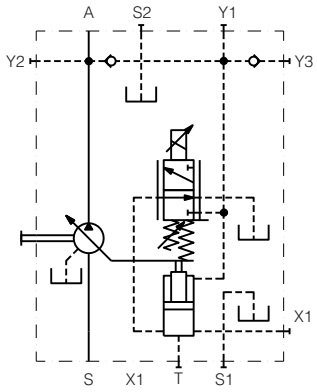
Control boosting:
When it is required to change the displacmeent of the pump with working pressure lower than 40 bar [580 psi], the control must be boosted by means of an auxiliary circuit connected at port Y3.

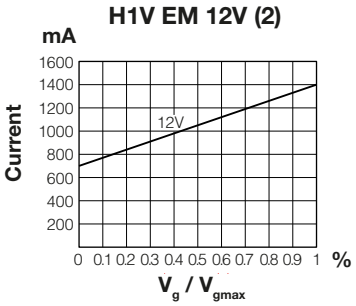


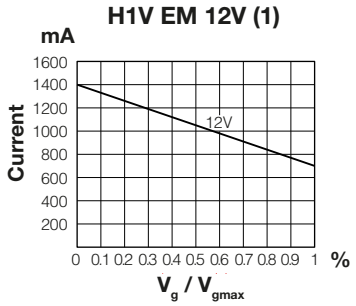
Note:
The above illustrated circuit has the only aim to show the connection required to construct a boosting circuit.

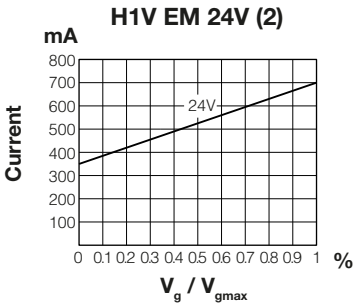
The electrical proportional control allows stepless and programmable adjustment of the pump displacement proportionally to the current strength supplied to a proportional solenoid valve, available in 12V DC and 24V DC versions. The proportional solenoid valve applies a force on the spool proportional to the current strength and the pump swivels until a force balance is restored by a feed-back spring. To control the proportional solenoid valve a 24V DC (12V DC) supply is required. Current range between 350 (700) and 700 (1400) mA approx. (with standard setting of Max and Min displacement). Max permissible current = 800 (1600) mA. Usually the swivel range is from Vgmin to Vgmax (displacement setting 2) so that increasing the current strength the pump swivels towards Vgmax, however displacement setting 1 (swivels range from Vgmax to Vgmin) is also available. A min. 40 bar [580 psi] approx. operating pressure is required to operate the control. Two electronic devices are available to control the solenoid (they must be ordered separately): VPD/AD (two channel) - VPC/AP (one channel).

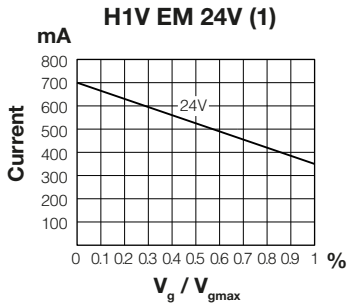
When ordering please state clearly:
- Displacement setting
- Solenoid voltage.



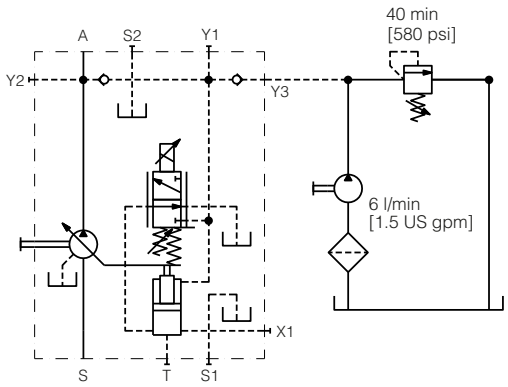








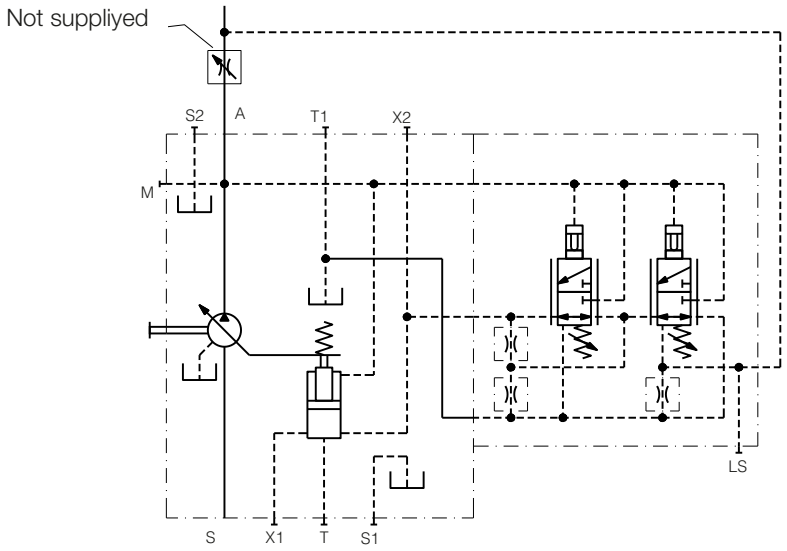
Control boosting:
When it is required to change the displacement of the pump with working pressure lower than 40 bar [580 psi], the control must be boosted by means of an auxiliary circuit connected at port Y3.

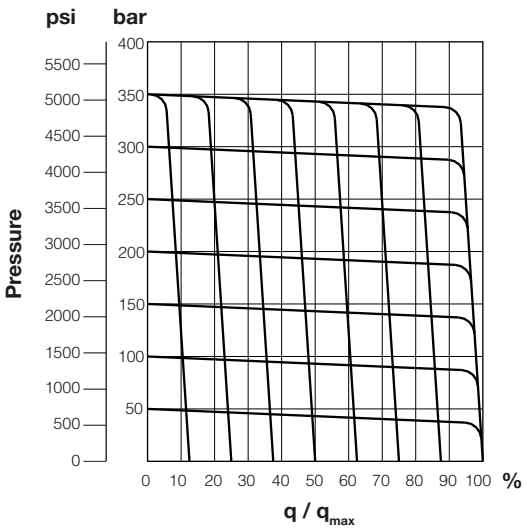


Note:
The above illustrated circuit has the only aim to show the connection required to construct a boosting circuit.

The Load Sensing control device is a regulating valve that controls the pump displacement in function of the working pressure so as to satisfy the demands for the various users. The pump flow is influenced from an external restrictor (the variable restrictor or proportional compensated flow control valve) placed between the user and the pump.
The Load Sensing control compares the pressure before and after the restrictor and varies the pump displacement so as to maintain a constant the pressure drop through the restrictor (Δp). In this way, the flow of the pump depends exclusively on the section of passage of the variable restrictor. The field of calibration of the Δp is contained between 18 bars [261 psi] end 35 bars [507 psi]. The standard calibration is 20 bars [290 psi]. The variable restrictor not supplied with the pump.
The control has a pressure cut-off built-in valve (with drain) with setting from 50 to 350 bar [725 ÷ 5075 psi].
The pressure of calibration of the control however, can not exceed the value of nominal pressure (pnom) of the pump. The pressure relief valve in the circuit has to be set at a pressure level of at least 20 bar [290 psi] higher than the setting pressure of the TP control.

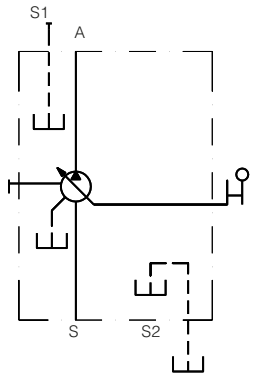
When ordering. Please state clearly:
- CLS Δp pressure setting
- TP pressure setting [psi]





The pump displacement is adjusted by manually operating the handwheel. The standard swivel range is from Vg_{max} to Vg_{min} (displacement setting 1 as per our ordering code), however displacement setting 2 (swivel range from Vg_{min} to Vg_{max}) can be supplied.

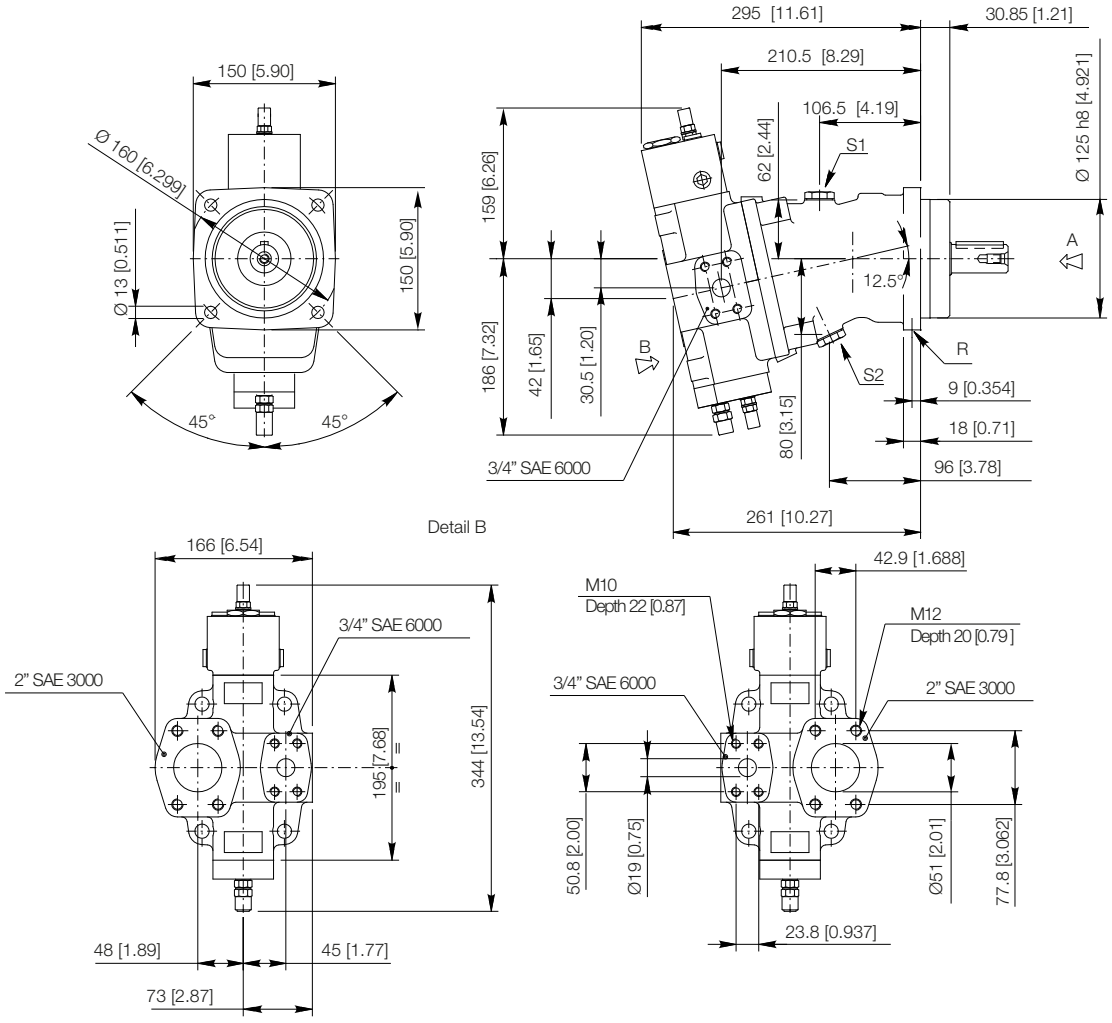
When ordering please state clearly:
- Displacent setting



The table shows number of handwheel turns required to swivel the pump from zero displacement to maximum displacement or vice versa.

	Size				
	55	**75**	**108**	**160**	**226**
Handwhell rounds	28	29	24	36	40

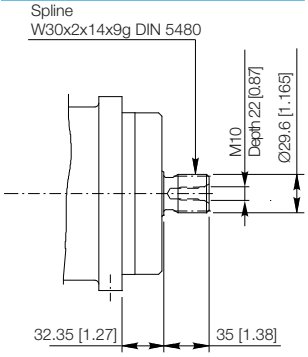
S1, S2: Flushing ports (plugged) - 1/8” G (BSPP)
R: Air bleed (plugged) - 1/8” G (BSPP)



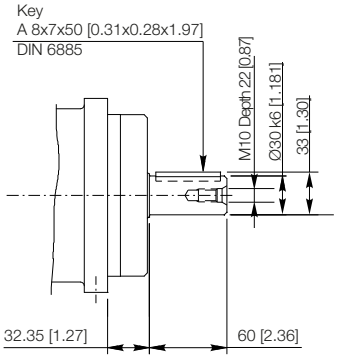
Anti-clockwise rotation **Clockwise rotation**

3 Shaft end

S Splined shaft



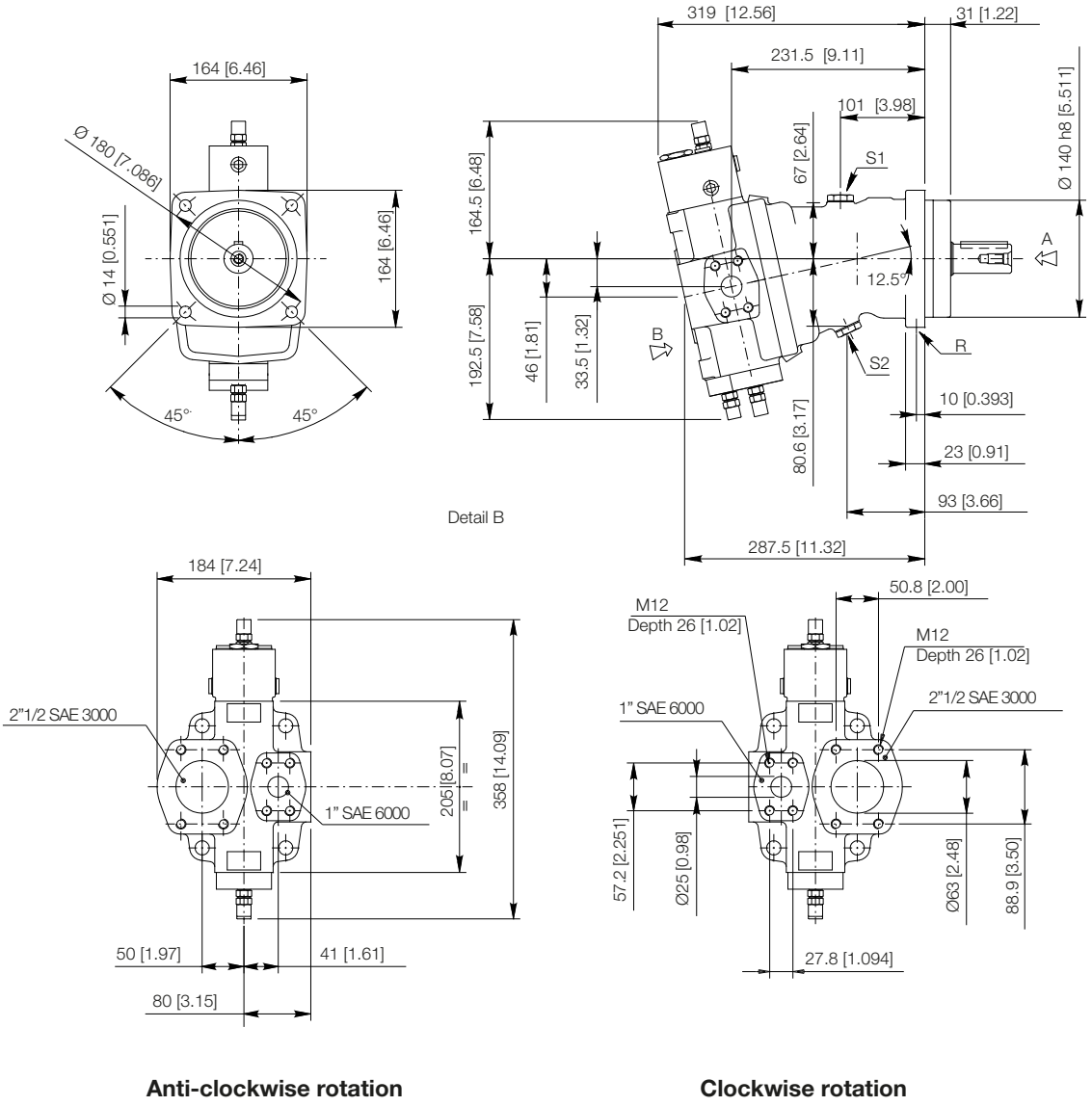
C Parallel keyed shaft



Dimensions ISO 4 Bolts flange

H1V 75 M

S1, S2: Flushing ports (plugged) - 1/2" G (BSPP)
R: Air bleed (plugged) - 1/8" G (BSPP)

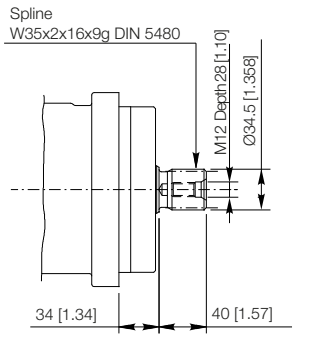


Anti-clockwise rotation

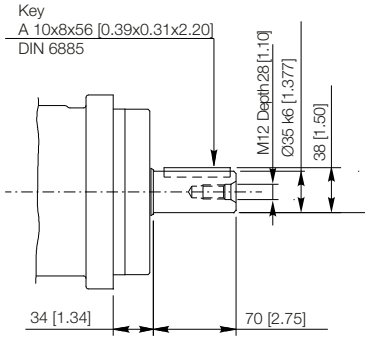
Clockwise rotation

3 Shaft end

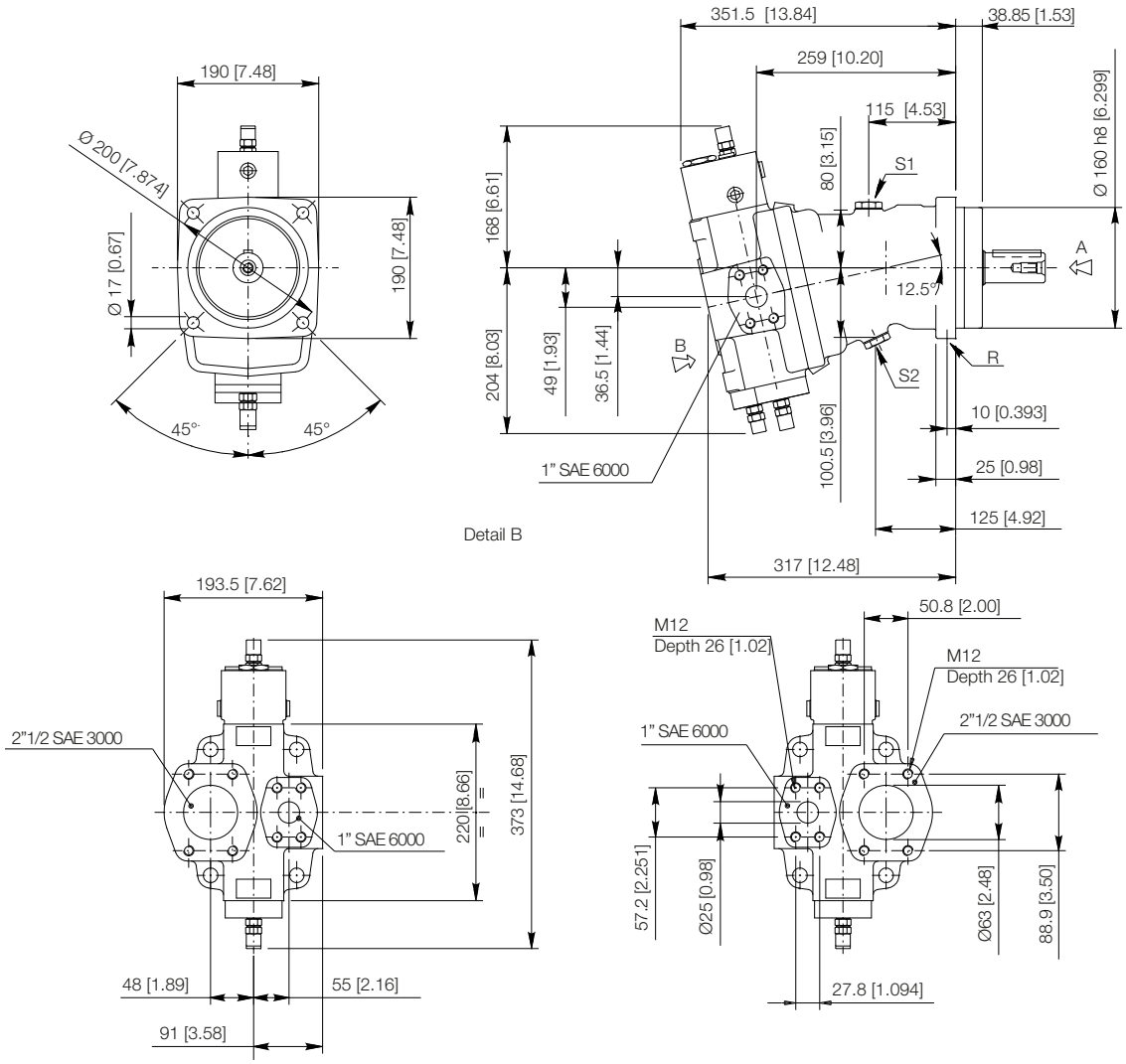
S Splined shaft



C Parallel keyed shaft



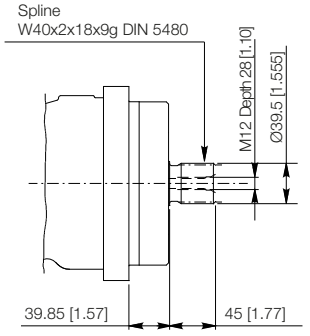
S1, S2: Flushing ports (plugged) - 1/2" G (BSPP)
R: Air bleed (plugged) - 1/8" G (BSPP)



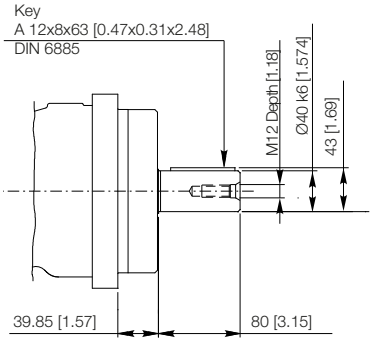
Anti-clockwise rotation **Clockwise rotation**

3 Shaft end

S Splined shaft



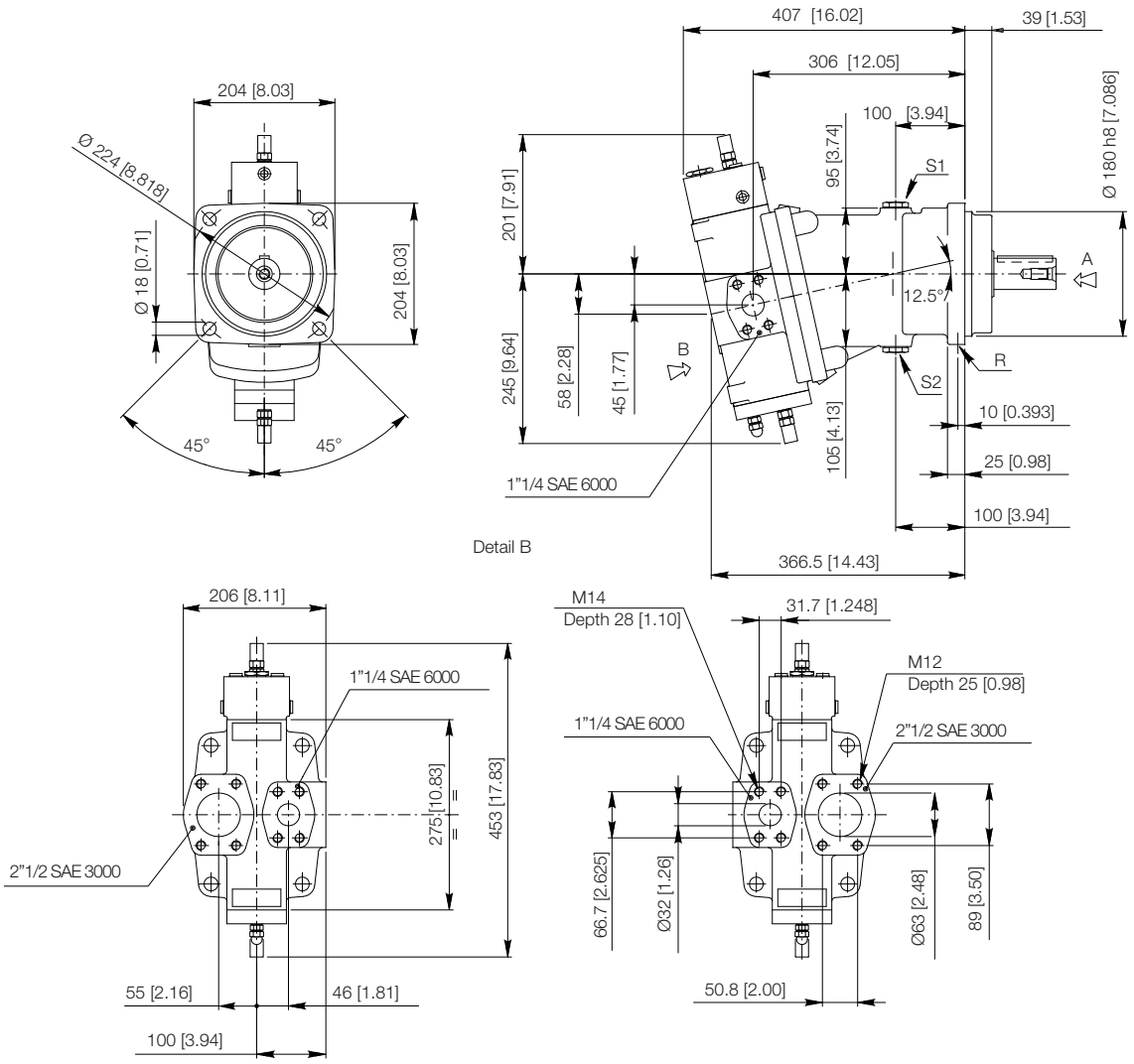
C Parallel keyed shaft



Dimensions ISO 4 Bolts flange

H1V 160 M

S1, S2: Flushing ports (plugged) - 3/4" G (BSPP)
R: Air bleed (plugged) - 1/8" G (BSPP)



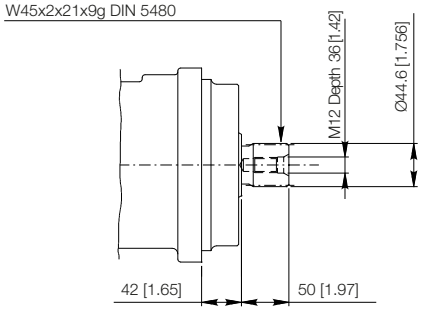
Anti-clockwise rotation

Clockwise rotation

3 Shaft end

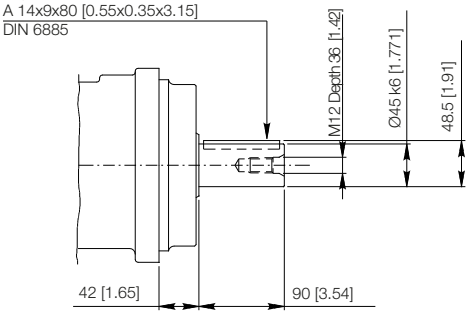
S Splined shaft

Spline
W45x2x21x9g DIN 5480

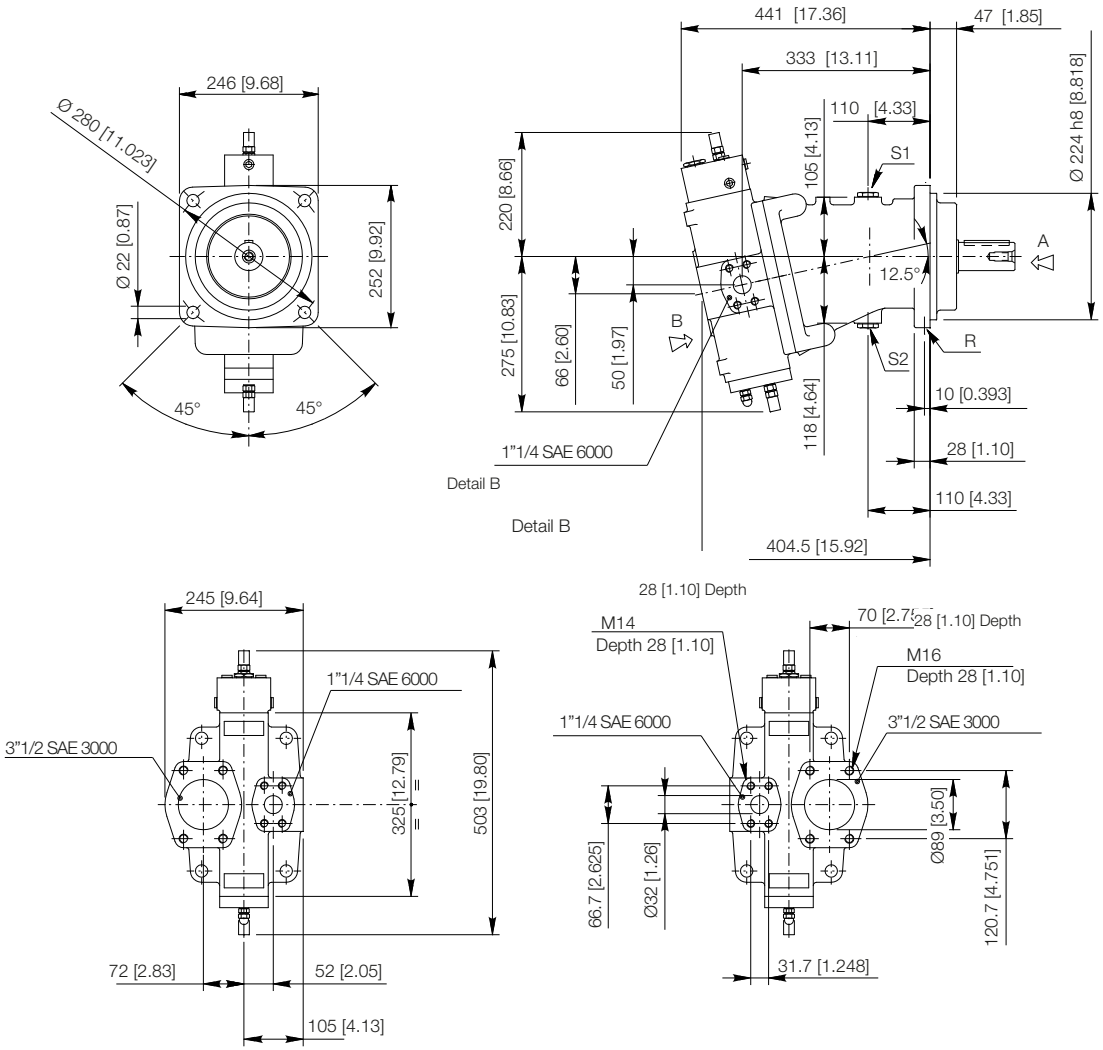


C Parallel keyed shaft

Key
A 14x9x80 [0.55x0.35x3.15]
DIN 6885



S1, S2: Flushing ports (plugged) - 3/4" G (BSPP)
R: Air bleed (plugged) - 1/8" G (BSPP)

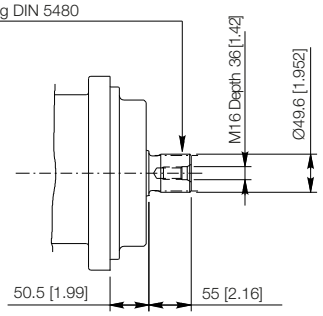


Anti-clockwise rotation **Clockwise rotation**

3 Shaft end

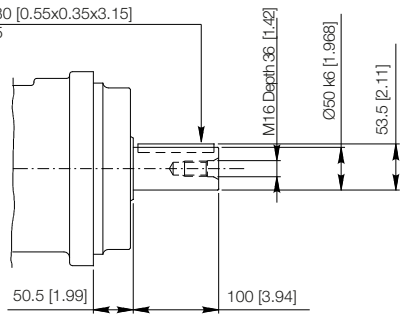
S Splined shaft

Spline
W50x2x24x9g DIN 5480



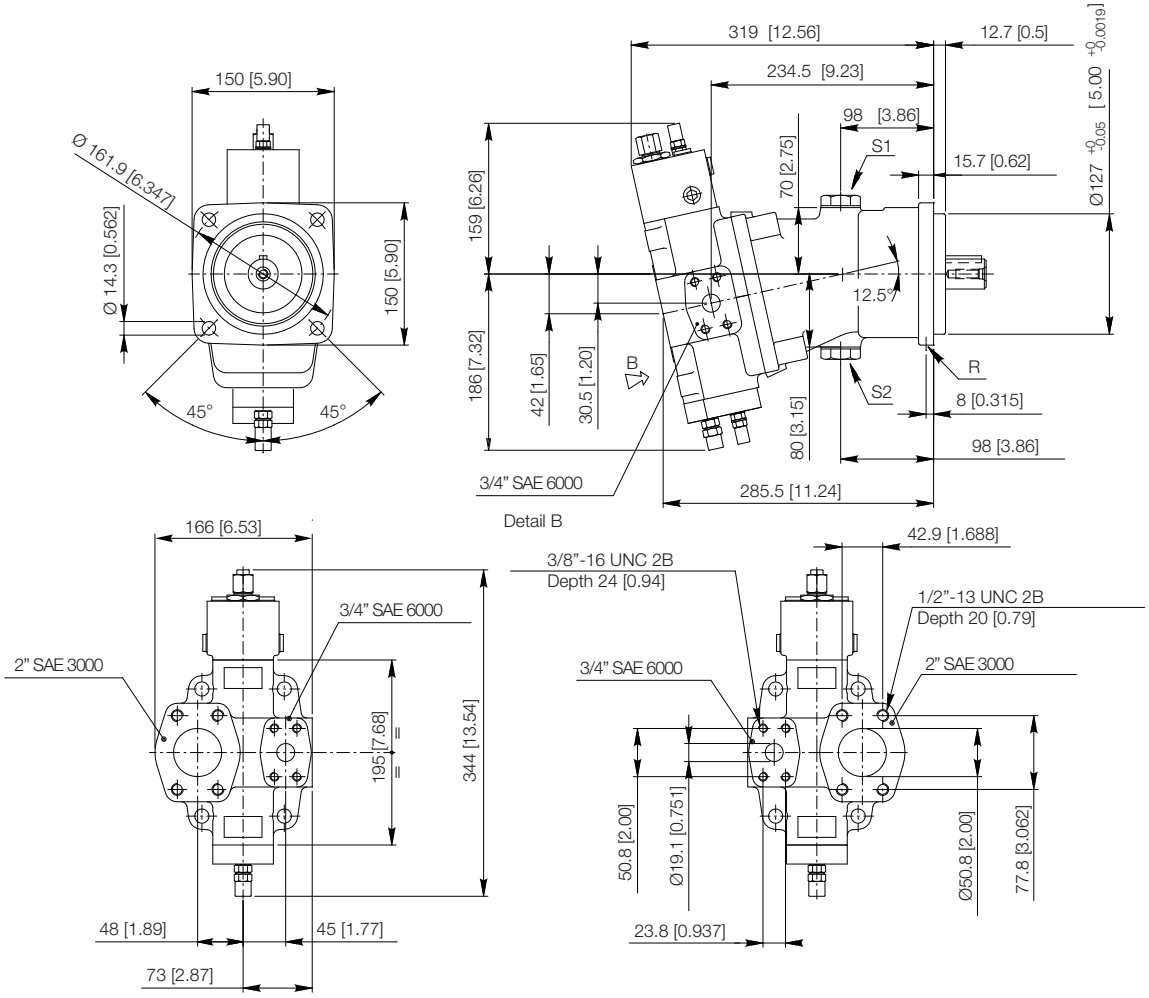
C Parallel keyed shaft

Key
A 14x9x80 [0.55x0.35x3.15]
DIN 6885



Dimensions SAE C 4 Bolts flange

S1, S2: Flushing ports (plugged) - 1” 1/16-12 UN 2B
R: Air bleed (plugged) - 7/16” -20 UNF

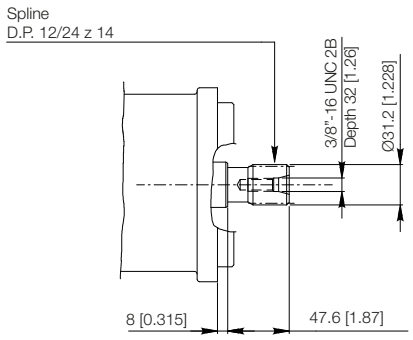


Anti-clockwise rotation

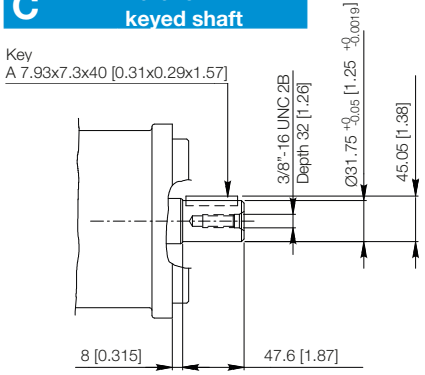
Clockwise rotation

3 Shaft end

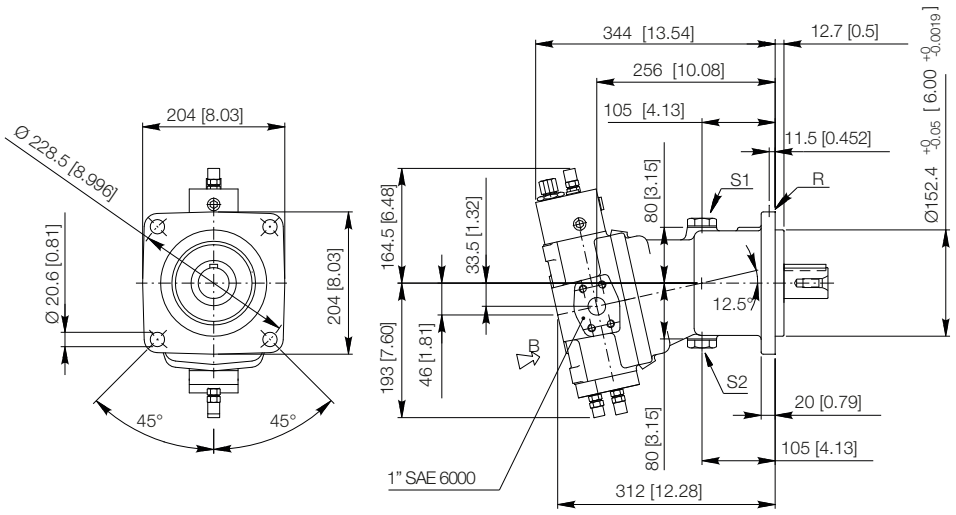
S Splined shaft

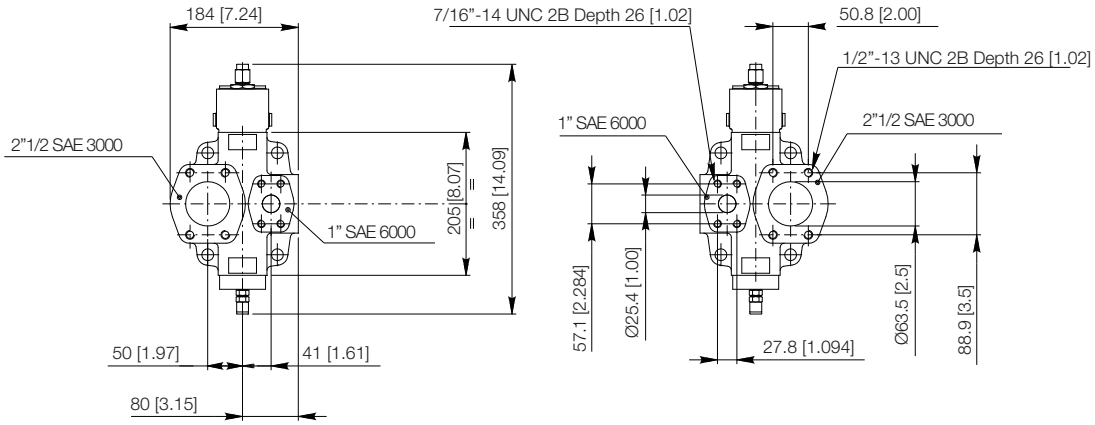


C Parallel keyed shaft



S1, S2: Flushing ports (plugged) - 1” 1/16-12 UN 2B
R: Air bleed (plugged) - 7/16”-20 UNF

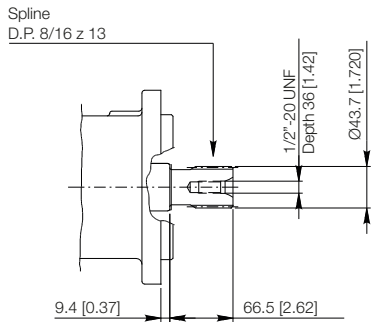




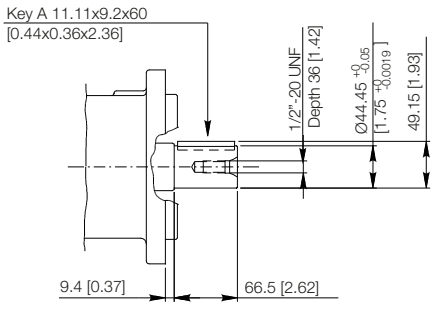
Anti-clockwise rotation **Clockwise rotation**

3 Shaft end

S Splined shaft



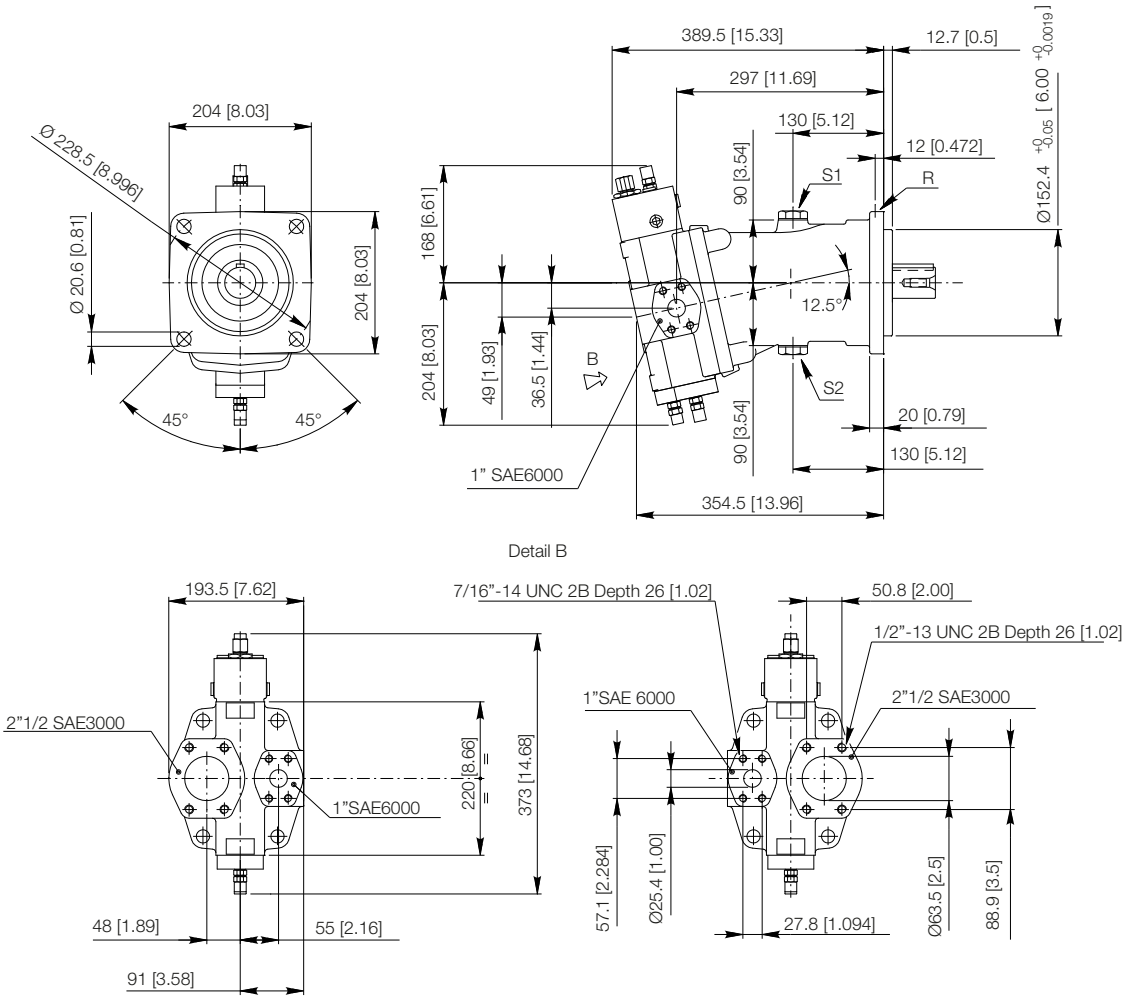
C Parallel keyed shaft



Dimensions SAE D 4 Bolts flange

H1V 108 SAE

S1, S2: Flushing ports (plugged) - 1” 1/16-12 UN 2B
R: Air bleed (plugged) - 7/16”-20 UNF

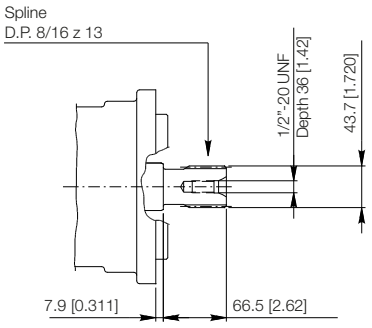


Anti-clockwise rotation

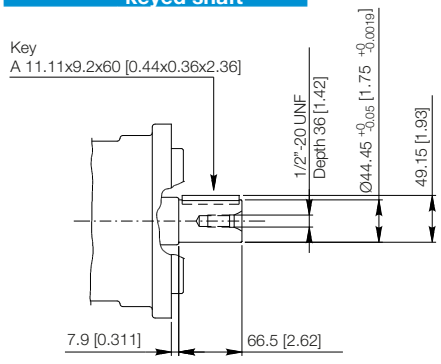
Clockwise rotation

3 Shaft end

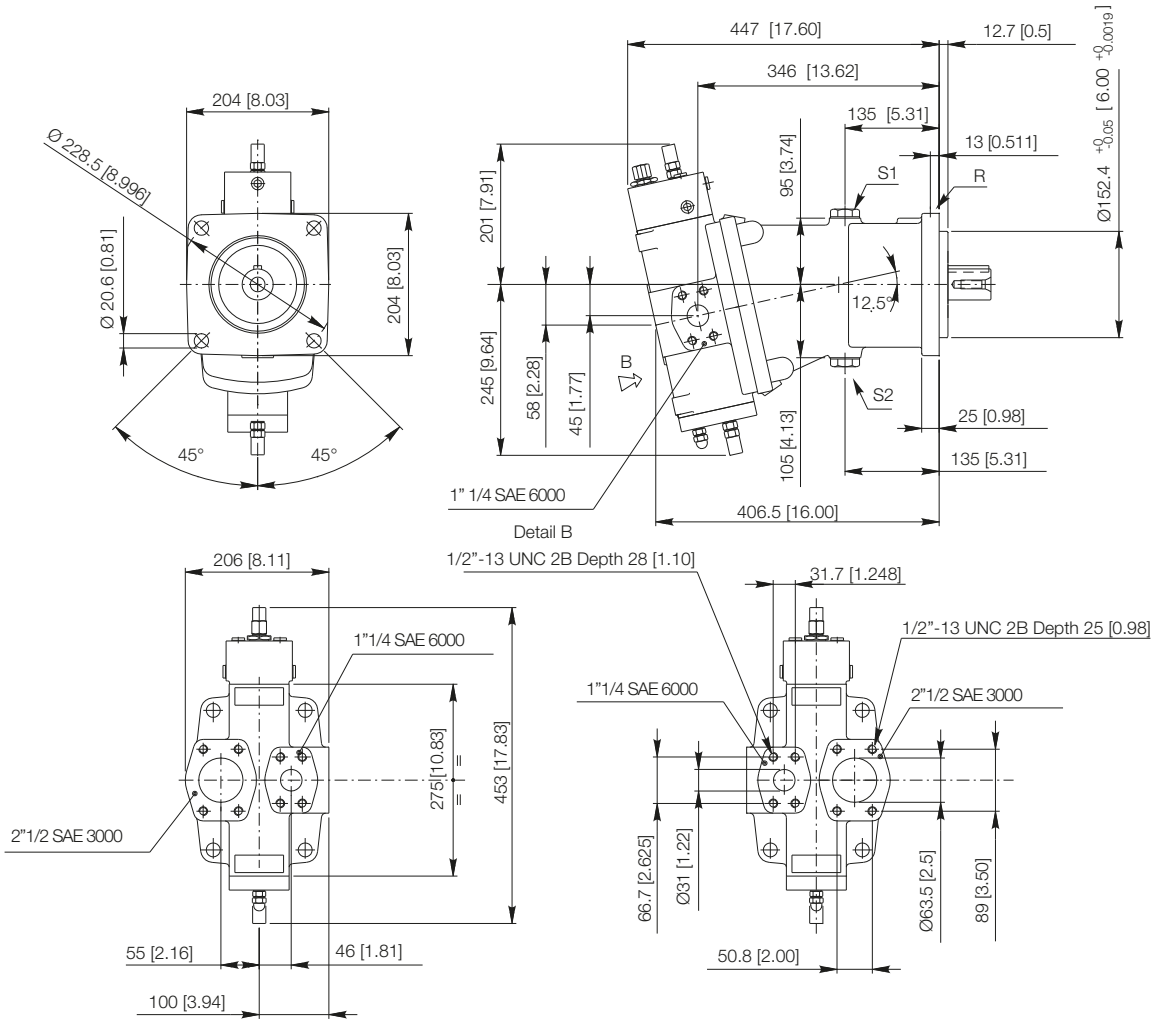
S Splined shaft



C Parallel keyed shaft



S1, S2: Flushing ports (plugged) - 1” 1/16-12 UN 2B
R: Air bleed (plugged) - 7/16”-20 UNF

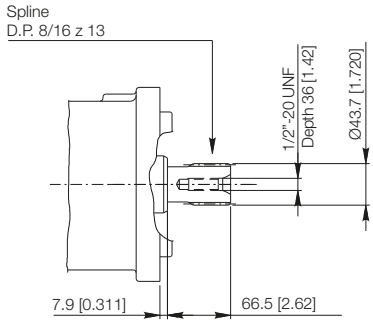


Anti-clockwise rotation

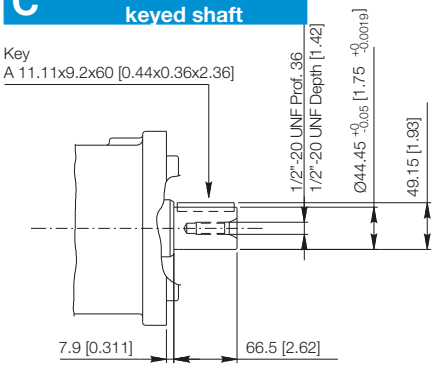
Clockwise rotation

3 Shaft end

S Splined shaft



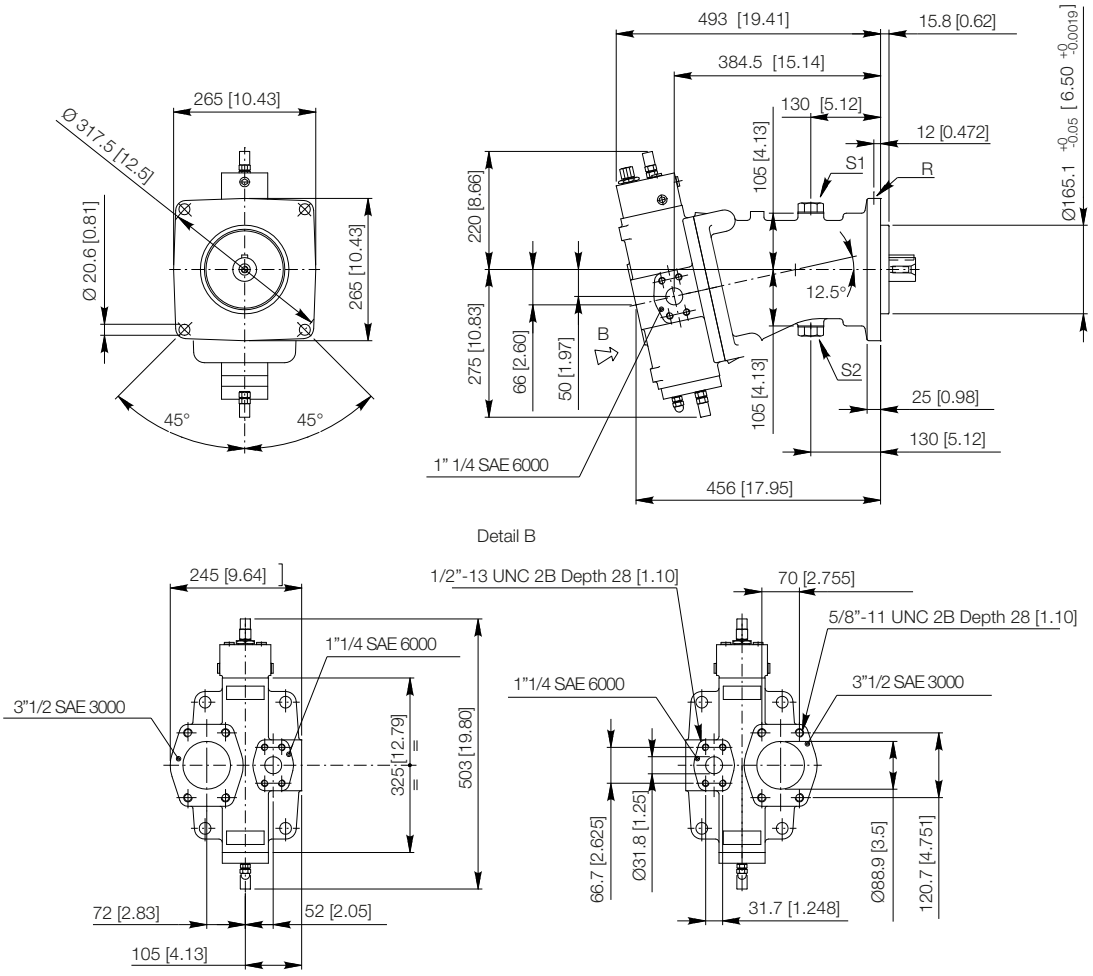
C Parallel keyed shaft



Dimensions SAE E 4 Bolts flange

H1V 226 SAE

S1, S2: Flushing ports (plugged) - 1” 3/16-12 UN 2B
R: Air bleed (plugged) - 7/16”-20 UNF

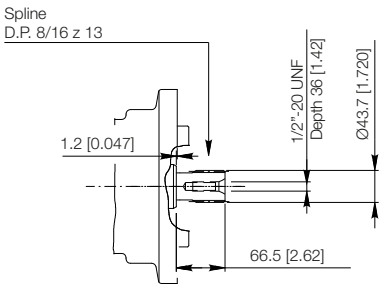


Anti-clockwise rotation

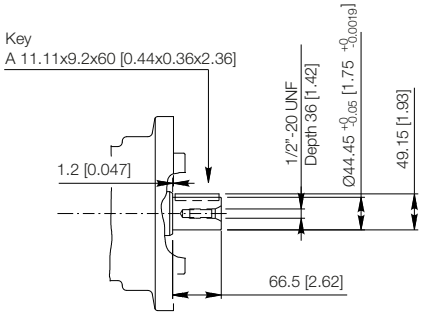
Clockwise rotation

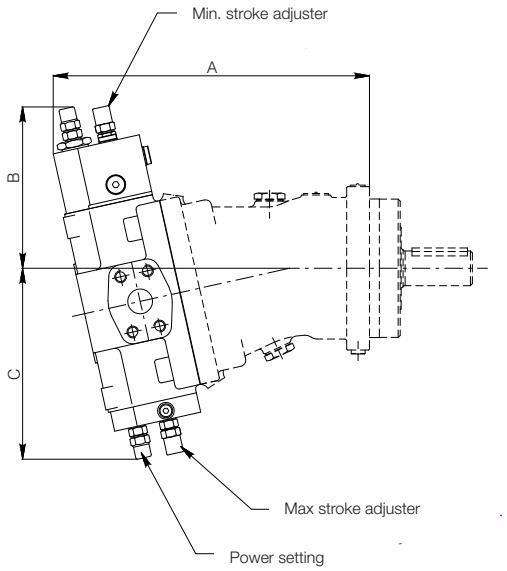
3 Shaft end

S Splined shaft

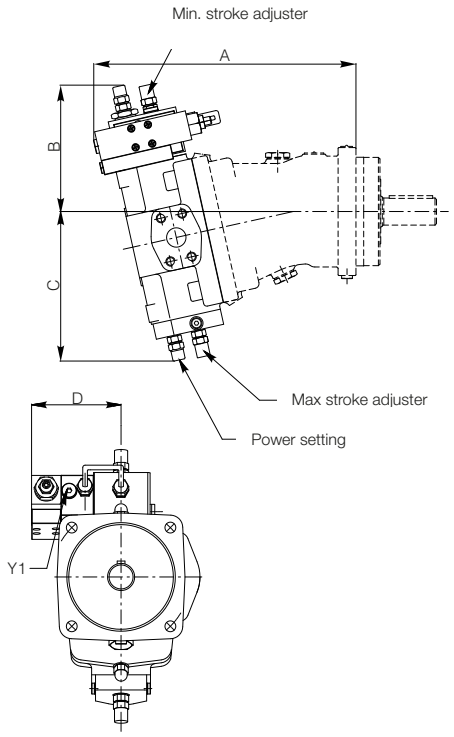


C Parallel keyed shaft

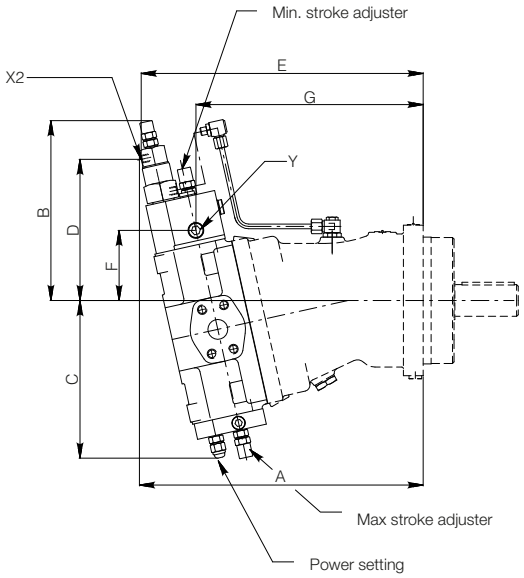




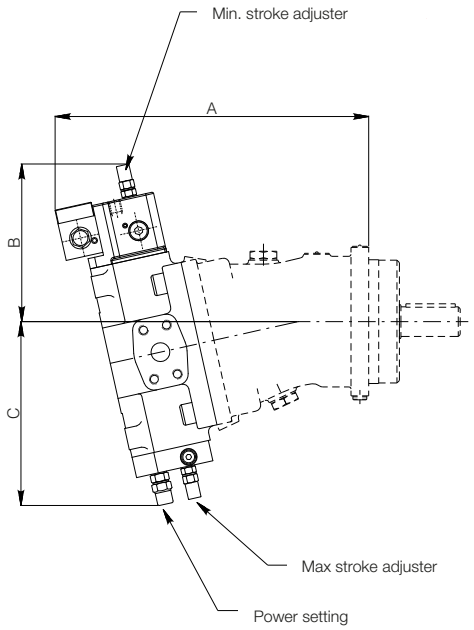
Size	Version	A mm [in]	B mm [in]	C mm [in]
55	M	295 [11.61]	161 [6.33]	186 [7.32]
	SAE	319 [12.55]	161 [6.33]	186 [7.32]
75	M	320 [12.59]	164 [6.45]	193 [7.59]
	SAE	344 [13.54]	164 [6.45]	193 [7.59]
108	M	350 [13.77]	169 [6.65]	203 [7.99]
	SAE	388 [15.27]	169 [6.65]	203 [7.99]
160	M	408 [16.06]	199 [7.83]	247 [9.72]
	SAE	447 [17.59]	199 [7.83]	247 [9.72]
226	M	441 [17.36]	218 [8.58]	276 [10.86]
	SAE	492 [19.37]	218 [8.58]	276 [10.86]



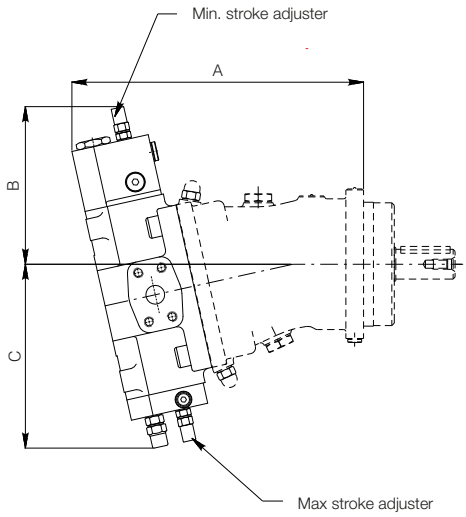
Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	Y1
75	M	339 [13.34]	164 [6.45]	193 [7.59]	115.5 [4.54]	1/4 G (BSPP)
	SAE	364 [14.33]	164 [6.45]	193 [7.59]	115.5 [4.54]	7/16” - 20 UNF
108	M	369.5 [14.54]	117.5 [4.62]	203 [7.99]	115.5 [4.54]	1/4 G (BSPP)
	SAE	407.5 [16.04]	117.5 [4.62]	203 [7.99]	115.5 [4.54]	7/16” - 20 UNF
160	M	420 [16.53]	199 [7.83]	247 [9.72]	126.5 [4.98]	1/4 G (BSPP)
	SAE	460 [18.11]	199 [7.83]	247 [9.72]	126.5 [4.98]	7/16” - 20 UNF
226	M	452 [17.79]	218 [8.58]	276 [10.86]	126.5 [4.98]	1/4 G (BSPP)
	SAE	504 [19.84]	218 [8.58]	276 [10.86]	126.5 [4.98]	7/16” - 20 UNF



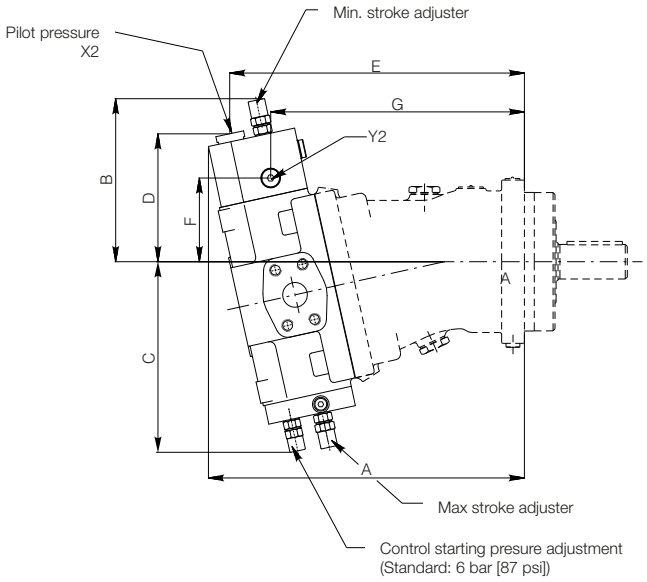
Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	F mm [in]	G mm [in]	Y	X2
55	M	303 [11.92]	222 [8.74]	186 [7.32]	172.5 [6.79]	301 [11.85]	83 [3.26]	231 [9.09]	1/4 G (BSPP)	1/8 G (BSPP)
	SAE	349 [13.74]	222 [8.74]	186 [7.32]	167.5 [6.59]	346 [13.62]	83 [3.26]	255 [10.03]	7/16” - 20 UNF	7/16” - 20 UNF
75	M	328 [12.91]	223 [8.77]	193 [7.59]	174 [6.85]	325.5 [12.81]	84.5 [3.32]	256.5 [10.09]	1/4 G (BSPP)	1/8 G (BSPP)
	SAE	374 [14.72]	223 [8.77]	193 [7.59]	169.5 [6.67]	371 [14.60]	84.5 [3.32]	280.5 [11.04]	7/16” - 20 UNF	7/16” - 20 UNF
108	M	359 [14.13]	227 [8.93]	204 [8.03]	178 [7.01]	356 [14.01]	88.5 [3.48]	287 [11.29]	1/4 G (BSPP)	1/8 G (BSPP)
	SAE	417.5 [16.43]	227 [8.93]	204 [8.03]	173.5 [6.83]	415 [16.33]	88.5 [3.48]	324.5 [12.77]	7/16” - 20 UNF	7/16” - 20 UNF
160	M	415 [16.33]	245 [9.64]	246 [9.68]	196 [7.71]	413 [16.25]	111 [4.37]	323.5 [12.73]	1/4 G (BSPP)	1/8 G (BSPP)
	SAE	476 [18.74]	245 [9.64]	246 [9.68]	191.5 [7.53]	473.5 [18.64]	111 [4.37]	362.5 [14.27]	7/16” - 20 UNF	7/16” - 20 UNF
226	M	448 [17.63]	264 [10.39]	275 [10.82]	215 [8.46]	445.5 [17.53]	129.5 [5.09]	356 [14.01]	1/4 G (BSPP)	1/8 G (BSPP)
	SAE	520 [20.47]	264 [10.39]	275 [10.82]	210 [8.26]	518 [20.39]	129.5 [5.09]	407 [16.02]	7/16” - 20 UNF	7/16” - 20 UNF



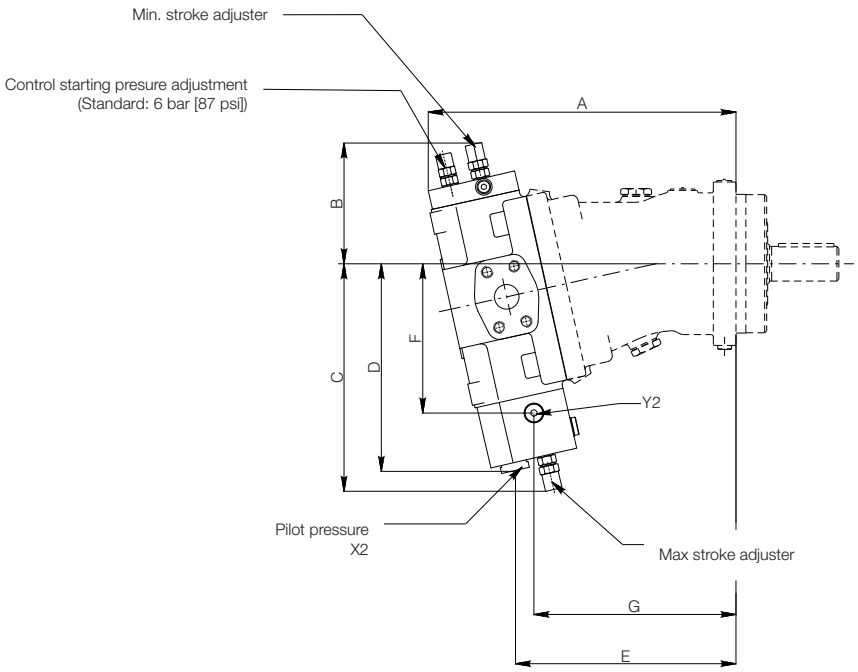
Size	Version	A mm [in]	B mm [in]	C mm [in]
55	M	317 [12.48]	159.5 [6.27]	186 [7.32]
	SAE	341 [13.42]	159.5 [6.27]	186 [7.32]
75	M	342.5 [13.48]	164 [6.45]	193 [7.59]
	SAE	367.5 [14.46]	164 [6.45]	193 [7.59]
108	M	373 [14.68]	168.5 [6.63]	203 [7.99]
	SAE	411 [16.18]	168.5 [6.63]	203 [7.99]
160	M	425.5 [16.75]	201 [7.91]	247 [9.72]
	SAE	465.5 [18.32]	201 [7.91]	247 [9.72]
226	M	457.5 [18.01]	220 [8.66]	276 [10.86]
	SAE	509.5 [20.05]	220 [8.66]	276 [10.86]



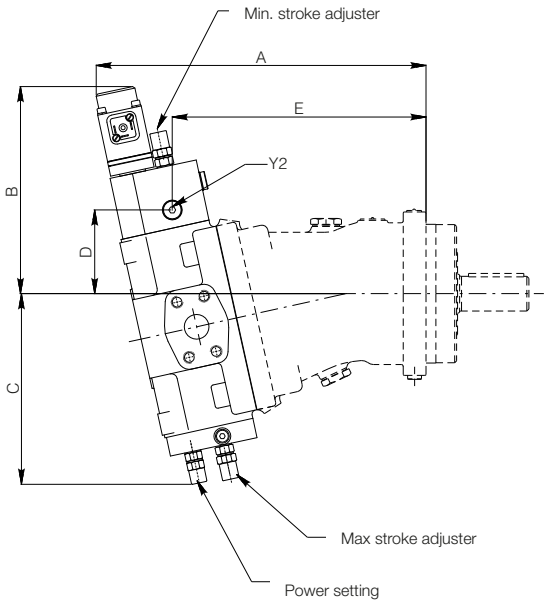
Size	Version	A mm [in]	B mm [in]	C mm [in]
55	M	295 [11.61]	161 [6.33]	189 [7.44]
	SAE	319 [12.55]	161 [6.33]	189 [7.44]
75	M	320 [12.59]	164 [6.45]	193 [7.59]
	SAE	344 [13.54]	164 [6.45]	193 [7.59]
108	M	350 [13.77]	169 [6.65]	203 [7.99]
	SAE	388 [15.27]	169 [6.65]	203 [7.99]
160	M	408 [16.06]	199 [7.83]	247 [9.72]
	SAE	447 [17.59]	199 [7.83]	247 [9.72]
226	M	441 [17.36]	218 [8.58]	276 [10.86]
	SAE	492 [19.37]	218 [8.58]	276 [10.86]



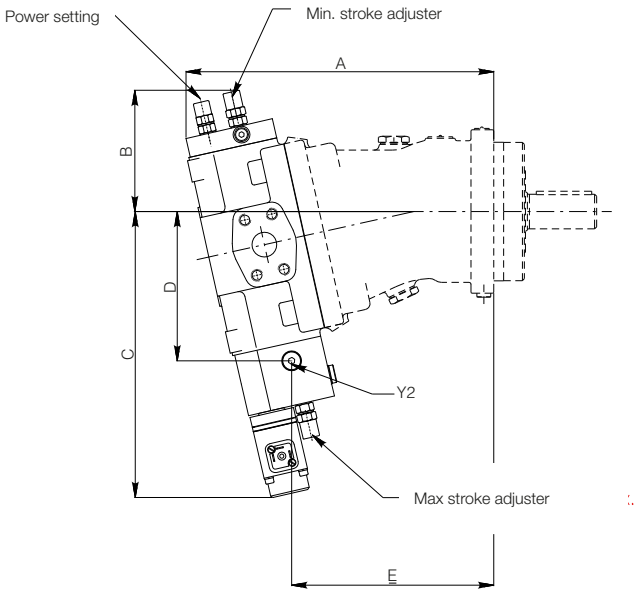
Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	F mm [in]	G mm [in]	X2	Y2
55	M	295 [11.61]	159 [6.25]	186 [7.32]	126.5 [4.98]	274 [10.78]	83 [3.26]	231 [9.09]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	319 [12.55]	159 [6.25]	186 [7.32]	147 [5.78]	302.5 [11.90]	83 [3.26]	255 [10.04]	7/16” - 20 UNF	7/16” - 20 UNF
75	M	320 [12.59]	165 [6.49]	193 [7.59]	128.5 [5.06]	299 [11.77]	84.5 [3.32]	256.5 [10.09]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	344 [13.54]	165 [6.49]	193 [7.59]	149 [5.86]	327.5 [12.89]	84.5 [3.32]	280.5 [11.04]	7/16” - 20 UNF	7/16” - 20 UNF
108	M	351 [13.81]	168 [6.61]	204 [8.03]	132.5 [5.21]	329.5 [12.97]	88.5 [3.48]	287 [11.29]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	388 [15.27]	168 [6.61]	204 [8.03]	153 [6.02]	371.5 [14.62]	88.5 [3.48]	324.5 [12.77]	7/16” - 20 UNF	7/16” - 20 UNF
160	M	408 [16.06]	201 [7.91]	246 [9.68]	150 [5.90]	386.5 [15.21]	111 [4.37]	323.5 [12.73]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	447 [17.59]	201 [7.91]	246 [9.68]	170.5 [6.71]	430 [16.92]	111 [4.37]	362.5 [14.27]	7/16” - 20 UNF	7/16” - 20 UNF
226	M	441 [17.36]	220 [8.66]	275 [10.82]	169 [6.65]	419 [16.49]	129.5 [5.09]	356 [14.01]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	492 [19.37]	220 [8.66]	275 [10.82]	189.5 [7.46]	474.5 [18.68]	129.5 [5.09]	407 [16.02]	7/16” - 20 UNF	7/16” - 20 UNF



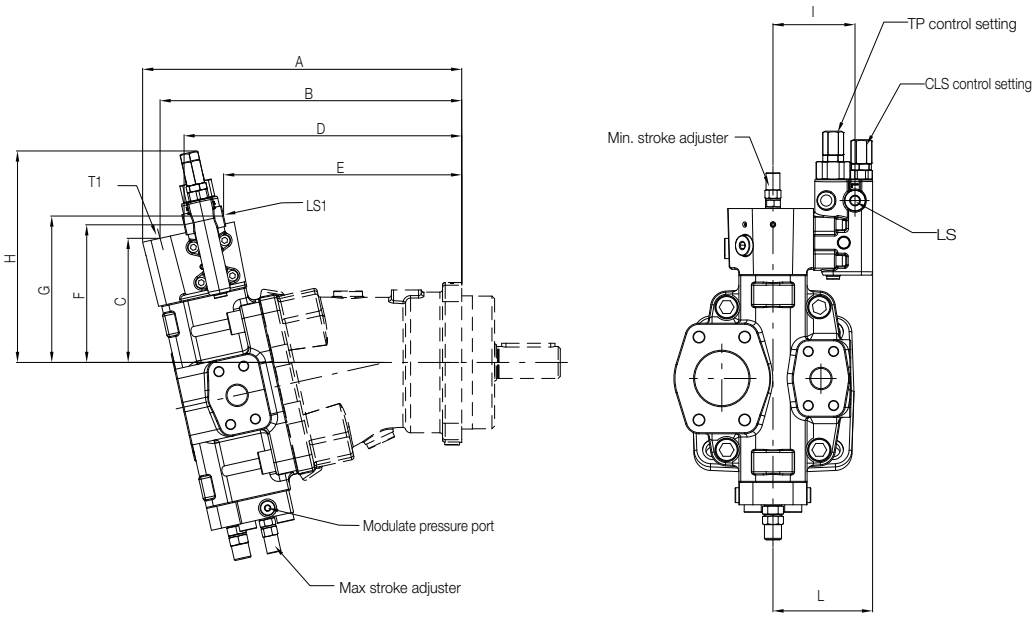
Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	F mm [in]	G mm [in]	X2	Y2
55	M	286 [11.25]	119 [4.68]	220 [8.66]	200.5 [7.89]	201.5 [7.93]	142.5 [5.61]	180.5 [7.10]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	310 [12.20]	119 [4.68]	223 [8.77]	221 [8.70]	221 [8.70]	142.5 [5.61]	204.5 [8.05]	7/16” - 20 UNF	7/16” - 20 UNF
75	M	311 [12.24]	123 [4.84]	230 [9.05]	208.5 [8.20]	244 [9.60]	151 [5.94]	204.5 [8.05]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	335 [13.18]	123 [4.84]	231 [9.09]	229 [9.01]	219.5 [8.64]	151 [5.94]	227 [8.93]	7/16” - 20 UNF	7/16” - 20 UNF
108	M	342 [13.46]	127 [5.00]	241 [9.48]	219 [8.62]	252 [9.92]	161.5 [6.35]	232 [9.13]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	380 [14.96]	127 [5.00]	242 [9.52]	239.5 [9.42]	284.5 [11.20]	161.5 [6.35]	269.5 [10.61]	7/16” - 20 UNF	7/16” - 20 UNF
160	M	399 [15.70]	160 [6.29]	287 [11.29]	255.5 [10.05]	296.5 [11.67]	193 [7.59]	256 [10.07]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	438 [17.24]	160 [6.29]	287 [11.29]	276 [10.86]	331 [13.03]	193 [7.59]	295 [11.61]	7/16” - 20 UNF	7/16” - 20 UNF
226	M	433 [17.04]	178 [7.01]	316 [12.44]	285 [11.22]	318.5 [12.53]	223 [8.77]	278 [10.94]	1/4 G (BSPP)	1/4 G (BSPP)
	SAE	484 [19.05]	178 [7.01]	316 [12.44]	305.5 [12.02]	365 [14.37]	223 [8.77]	329 [12.95]	7/16” - 20 UNF	7/16” - 20 UNF



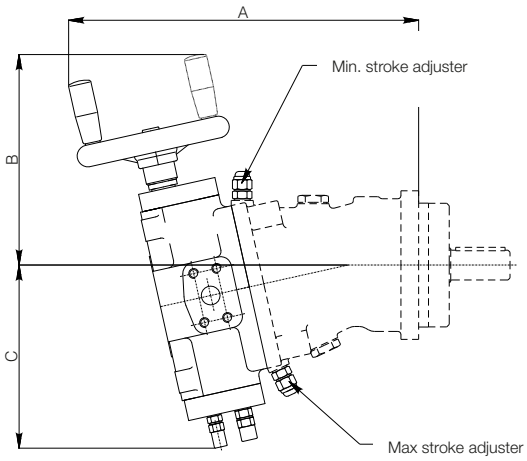
Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	Y2
55	M	310 [12.20]	207 [8.14]	186 [7.32]	83 [3.26]	231 [9.09]	1/4 G (BSPP)
	SAE	334 [13.14]	207 [8.14]	186 [7.32]	83 [3.26]	255 [10.4]	7/16” - 20 UNF
75	M	335 [13.18]	209 [8.22]	193 [7.59]	84.5 [3.32]	256.5 [10.09]	1/4 G (BSPP)
	SAE	359 [14.13]	209 [8.22]	193 [7.59]	84.5 [3.32]	280.5 [11.04]	7/16” - 20 UNF
108	M	366 [14.40]	213 [8.38]	204 [8.03]	88.5 [3.48]	287 [11.29]	1/4 G (BSPP)
	SAE	404 [15.90]	213 [8.38]	204 [8.03]	88.5 [3.48]	324.5 [12.75]	7/16” - 20 UNF
160	M	423 [16.65]	230 [9.05]	246 [9.68]	111 [4.37]	323.5 [12.73]	1/4 G (BSPP)
	SAE	462 [18.18]	230 [9.05]	246 [9.68]	111 [4.37]	362.5 [14.27]	7/16” - 20 UNF
226	M	455 [17.91]	249 [9.80]	275 [10.82]	129.5 [5.09]	356 [14.01]	1/4 G (BSPP)
	SAE	506 [19.92]	249 [9.80]	275 [10.82]	129.5 [5.09]	407 [16.02]	7/16” - 20 UNF



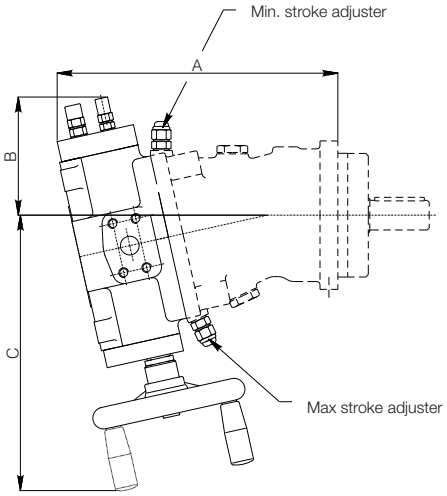
Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	Y2
55	M	286 [11.25]	119 [4.68]	281 [11.06]	142.5 [5.61]	180.5 [7.10]	1/4 G (BSPP)
	SAE	310 [12.20]	119 [4.68]	281 [11.06]	142.5 [5.61]	204.5 [8.05]	7/16" - 20 UNF
75	M	311 [12.24]	123 [4.84]	289 [11.37]	151 [5.94]	204.5 [8.05]	1/4 G (BSPP)
	SAE	335 [13.18]	123 [4.84]	289 [11.37]	151 [5.94]	227 [8.93]	7/16" - 20 UNF
108	M	342 [13.46]	127 [5.00]	299 [11.77]	161.5 [6.35]	232 [9.13]	1/4 G (BSPP)
	SAE	380 [14.96]	127 [5.00]	299 [11.77]	161.5 [6.35]	269.5 [10.61]	7/16" - 20 UNF
160	M	399 [15.70]	160 [6.29]	336 [13.22]	193 [7.59]	256 [10.07]	1/4 G (BSPP)
	SAE	438 [17.24]	160 [6.29]	336 [13.22]	193 [7.59]	295 [11.61]	7/16" - 20 UNF
226	M	433 [17.04]	178 [7.01]	365 [14.37]	223 [8.77]	278 [10.94]	1/4 G (BSPP)
	SAE	484 [19.05]	178 [7.01]	365 [14.37]	223 [8.77]	329 [12.95]	7/16" - 20 UNF



Size	Version	A mm [in]	B mm [in]	C mm [in]	D mm [in]	E mm [in]	F mm [in]	G mm [in]	H mm [in]	I mm [in]	L mm [in]	LS / LS1	T1
55	M	299.5 [11.79]	282.6 [11.12]	116.6 [4.59]	260.6 [10.26]	223.5 [8.79]	129.2 [5.08]	137.4 [5.41]	198.5 [7.81]	77 [3.03]	93.5 [3.68]	1/8 G (BSPP)	1/4 G (BSPP)
75	M	329.7 [12.98]	313.1 [12.33]	117.5 [4.62]	291.7 [11.48]	254.6 [10.02]	130.4 [5.13]	138.7 [5.46]	199.7 [7.86]	76.5 [3.01]	93 [3.66]	1/8 G (BSPP)	1/4 G (BSPP)
108	M	356.6 [14.04]	340 [13.38]	121.9 [4.79]	318.6 [12.54]	281.5 [11.08]	134.5 [5.29]	142.1 [5.59]	204.1 [8.03]	76.5 [3.01]	93 [3.66]	1/8 G (BSPP)	1/4 G (BSPP)
160	M	411.8 [16.21]	395.9 [15.58]	139.6 [5.49]	360.6 [14.19]	323.5 [12.73]	155.1 [6.10]	163.3 [6.43]	224.4 [8.83]	87 [3.42]	103.5 [4.07]	1/8 G (BSPP)	1/4 G (BSPP)
226	M	445.1 [17.52]	429.3 [16.90]	158.5 [6.24]	394 [15.51]	356.9 [14.05]	174 [6.85]	182.2 [7.17]	243.3 [9.57]	87 [3.42]	103.5 [4.07]	1/8 G (BSPP)	1/4 G (BSPP)



Size	Version	A mm [in]	B mm [in]	C mm [in]
55	M	354 [13.93]	213 [8.38]	185 [7.28]
	SAE	378 [14.88]	213 [8.38]	185 [7.28]
75	M	354 [13.93]	225 [8.85]	193 [7.59]
	SAE	378 [14.88]	225 [8.85]	193 [7.59]
108	M	386 [15.19]	229 [9.01]	204 [8.03]
	SAE	423 [16.65]	229 [9.01]	204 [8.03]
160	M	428 [16.85]	250 [9.84]	246 [9.68]
	SAE	467 [18.38]	250 [9.84]	246 [9.68]
226	M	461 [18.14]	269 [10.59]	275 [10.82]
	SAE	512 [20.15]	269 [10.59]	275 [10.82]



Size	Version	A mm [in]	B mm [in]	C mm [in]
55	M	284 [11.18]	119.5 [4.70]	278.5 [10.96]
	SAE	308 [12.12]	119.5 [4.70]	278.5 [10.96]
75	M	311 [12.24]	123 [4.84]	291 [11.45]
	SAE	335 [13.18]	123 [4.84]	29 [11.45]
108	M	342 [13.46]	127 [5.00]	302 [11.88]
	SAE	380 [14.96]	127 [5.00]	302 [11.88]
160	M	399 [15.70]	160 [6.29]	336 [13.22]
	SAE	438 [17.24]	160 [6.29]	336 [13.22]
226	M	433 [17.04]	178 [7.01]	365 [14.37]
	SAE	484 [19.05]	178 [7.01]	365 [14.37]

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