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Type	Displacement cm <sup>3</sup> /rev [in <sup>3</sup> /rev]	Max. flow l/min [U.S. gpm]	Max. pressure cont. bar [psi]	Max peak Pressure bar [psi]
SH7VR 055	61 [3.72]	271 [71.5]	430 [6235]	480 [6960]
SH7VR 075	80.58 [4.91]	322 [85]	430 [6235]	480 [6960]
SH7VR 108	112.5 [6.86]	400 [105.6]	430 [6235]	480 [6960]
SH7VR 160	160.8 [9.81]	500 [132]	430 [6235]	480 [6960]

SH7VR series are a family of variable displacement motors, bent axis piston design for operation in both open and closed circuit. SH7VR series motors are mainly intended for installation in mechanical gearboxes such as track drive and winches gear boxes.

The proven design incorporating the lens shape valve plate, the high quality components and manufacturing techniques make able the SH7VR series motors to provide up to 430 bar [6235 psi] continuous and 480 bar [6960 psi] peak performance.

Fully laboratory tested and field proven, these motors assume 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 SH7VR series motors to any application both industrial and mobile.

**Simbology:**

<b>C</b>	N/bar [lbf/psi]	Load
<b>F<sub>ax max</sub></b>	N [lbf]	Axial pushing load
<b>F<sub>ax max</sub></b>	N [lbf]	Axial pulling load
<b>F<sub>q</sub></b>	N [lbf]	Radial load
<b>F<sub>q max</sub></b>	N [lbf]	Maximum permissible radial load
<b>J</b>	kg·m <sup>2</sup> [lbf·ft <sup>2</sup> ]	Moment of inertia
<b>m</b>	kg [lbs]	Weight
<b>n<sub>0 max</sub></b>	rpm	Maximum speed
<b>p<sub>nom</sub></b>	bar [psi]	Maximum cont. pressure
<b>p<sub>max</sub></b>	bar [psi]	Maximum pressure peak

<b>q<sub>max</sub></b>	l/min [U.S. gpm]	Maximum flow
<b>q<sub>d</sub></b>	l/min [U.S. gpm]	External drain flow
<b>T<sub>k</sub></b>	Nm/bar [lbf.ft/psi]	Torque costant
<b>T<sub>nom</sub></b>	Nm [lbf.ft]	Maximum torque at pressure cont.
<b>T<sub>max</sub></b>	Nm [lbf.ft]	Maximum torque at pressure peak
<b>V<sub>g</sub></b>	cm <sup>3</sup> /rev [in <sup>3</sup> /rev]	Displacement
<b>P<sub>max</sub></b>	kW [hp]	Maximum power at p <sub>nom</sub>
<b>η<sub>hm</sub></b>	%	Mech-hyd. efficiency
<b>η<sub>v</sub></b>	%	Volumetric efficiency
<b>I</b>	A	Current

**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 than 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.

**Operating temperature:**

The operating temperature of the oil must be within -25°C ÷ 115°C [-13°F ÷ 239°F]. The running of the unit with oil temperature higher than 115°C [239°F] or lower than -25°C [-13°F] is not allowed. For further information see at Fluids and filtering section

**Filtration:**

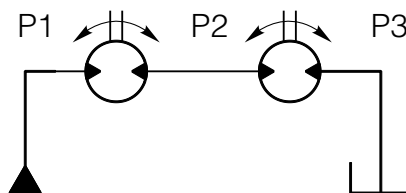
A correct filtering helps to extend the service life of axial piston units. In order to ensure a correct functioning of the unit, the max. permissible contamination class is 21/19/16 according to ISO 4406:1999. For further details see at Fluids and filtration section.

**Operating pressure:**

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

**Case drain pressure:**

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



**Seals:**

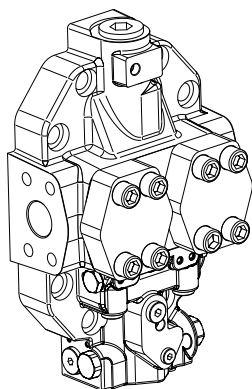
Seals used on standard SH7VR series axial piston motors are of FKM seals (Fluoroelastomer - Viton®). In case of use of special fluids, contact Dana.

**Minimum rotating speed:**

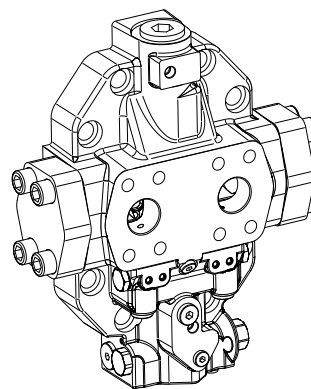
Under “minimum rotating speed” we mean the minimum speed ensuring a smooth running of the piston unit. Operation smoothness at low speeds depends on many factors, as type of load and operating pressure. At a speed higher than 150 rpm, a smooth running is ensured almost in every case. Lower speeds are, usually, possible. For special applications please contact Dana.

**Port plates:**

The SH7VR motor port plate has inlet and outlet ports, both lateral (LM cover) and frontal (FM cover). Unused ports are plugged with blind flanges. The kind of ports to be used must be specified when ordering.



**LM port plate**



**FM port plate**

**Flushing valve:**

The motors can be equipped with built in flushing valve for closed circuit operation.

**Installation:**

SH7VR series motors can be installed in every position or direction. These axial piston units have separate ports and drain chambers and so must be always 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.

			Size			
			055	075	108	160
Displacement	$V_{g \max}$	cm <sup>3</sup> /rev [in <sup>3</sup> /rev]	61 [3.72]	80.58 [4.91]	112.5 [6.86]	160.8 [9.81]
Displacement standard	$V_{g \min}$	cm <sup>3</sup> /rev [in <sup>3</sup> /rev]	30 [1.83]	40 [2.44]	56 [3.416]	80 [4.88]
Displacement min. possible	$V_{g \min}$	cm <sup>3</sup> /rev [in <sup>3</sup> /rev]	12.2 [0.74]	16 [0.97]	22 [1.34]	32.2 [1.96]
Displacement optional	$V_{g0}$	cm <sup>3</sup> /rev [in <sup>3</sup> /rev]	0 [0]	0 [0]	0 [0]	0 [0]
Max. pressure cont.	$p_{\text{nom}}$	bar [psi]	430 [6235]	430 [6235]	430 [6235]	430 [6235]
Max. pressure peak	$p_{\text{max}}$	bar [psi]	480 [6960]	480 [6960]	480 [6960]	480 [6960]
Max flow	$q_{\text{max}}$	l/min [U.S. gpm]	271 [71.5]	322 [85]	400 [105.6]	500 [132]
Max speed at $V_{g \max}$ e $q_{\text{max}}$	$n_{\text{max}}$	rpm	4450	4000	3550	3100
Max speed at $V_g < V_{g \max}^{(2)}$	$n_{\text{max lim}}$	rpm	7000	6150	5600	5000
Max speed at $V_{g0}$	$n_{\text{max } 0 \text{ lim}}$	rpm	8350	7350	6300	5500
Torque constant $V_{g \max}$	$T_k$	Nm [lbf·ft/psi]	0.97 [0.04]	1.28 [0.06]	1.79 [0.09]	2.56 [0.13]
Max power at $q_{\text{max}}$ e $p_{\text{nom}}$	$P_{\text{max}}$	kW [hp]	194 [259.9]	231 [309.5]	273 [365.8]	330 [442.2]
Max torque at $V_{g \max}$ cont. ( $p_{\text{nom}}$ )	$T_{\text{nom}}$	Nm [lbf·ft]	418 [308]	552 [406.8]	770 [567.5]	1101 [811.4]
Max torque at $V_{g \max}$ peak ( $p_{\text{max}}$ )	$T_{\text{max}}$	Nm [lbf·ft]	466 [343.4]	616 [453.9]	859 [633]	1230 [906.5]
Moment of inertia	$J$	kg·m <sup>2</sup> [lbf·ft <sup>2</sup> ]	0.005 [0.12]	0.009 [0.22]	0.0124 [0.31]	0.026 [0.616]
Weight <sup>(3)</sup>	$m$	kg [lbs]	28 [61.7]	36 [79.3]	47 [103.6]	63 [138.8]
Drainage flow <sup>(4)</sup>	$q_d$	l/min [U.S. gpm]	3 [0.79]	4 [1.05]	5 [1.32]	5 [1.32]

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

#### Notes:

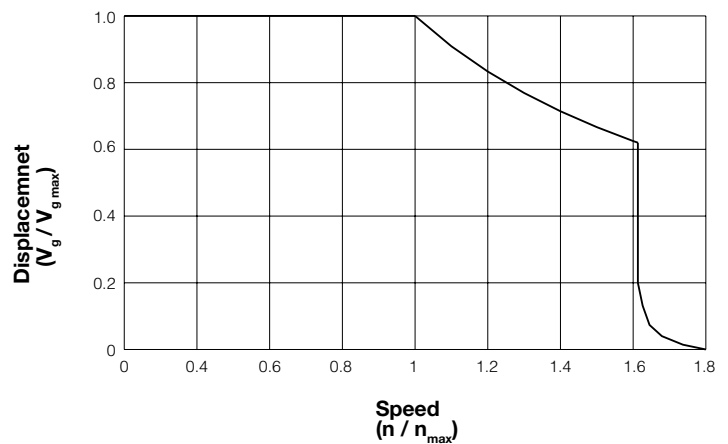
<sup>(1)</sup> Maximum and minimum displacement can be changed with continuity. When ordering state  $V_{g \max}$  and  $V_{g \min}$  required.

<sup>(2)</sup> Determination of admissible speed  $n_{\text{max}}$  value can be increased by reducing motor maximum displacement. To determine the relationship between  $V_{g \max}$  and  $n_{\text{max}}$  use the right side chart. Motor maximum admissible speed is  $n_{\text{max lim}}$ .

<sup>(3)</sup> Approximate values.

<sup>(4)</sup> Maximum value at 250 bar [3625 psi] with mineral oil at 45°C [113°F] and 35 cSt of viscosity.

Permissible speed





The following alphanumeric codes system has been developed to identify all of the configuration options for the SH7VR motors. Use the model code below to specify the desired features. **All alphanumeric digits system of the code must be present when ordering.** We recommend to carefully read the catalogue before filling the ordering code.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Series	Motor	Size	Maximum displacement limitation	Minimum displacement limitation	Mount flange	Shaft end	Port cover	Seal	Control	Control specification	Valves	Valves feature	Flushing valve	Serie feature	Painting
SH7VR	M	055	61	30	OL	SAI	FM	V	RPE	2 100 04	XXXX	000	PR	XX	XX

1

## Series

SH7VR	Plug-in variable displacement motor for gearbox
-------	---

2

## Motor

M	Motor
---	-------

3

## Size

055	61 cm³/rev [3.72 in³/rev]
075	80.58 cm³/rev [4.91 in³/rev]
108	112.5 cm³/rev [6.86 in³/rev]
160	160.8 cm³/rev [9.81 in³/rev]

4

## Maximum displacement limitation

## Displacement

			055	075	108	160
61÷49	From 61 cm³/rev [3.721 in³/rev] to 49 cm³/rev [2.989 in³/rev]	Standard 61 cm³/rev [3.721 in³/rev]	●	–	–	–
80÷64	From 80 cm³/rev [4.880 in³/rev] to 64 cm³/rev [3.904 in³/rev]	Standard 80 cm³/rev [4.880 in³/rev]	–	●	–	–
112÷91	From 112 cm³/rev [6.832 in³/rev] to 91 cm³/rev [5.551 in³/rev]	Standard 112 cm³/rev [6.832 in³/rev]	–	–	●	–
160÷130	From 160 cm³/rev [9.760 in³/rev] to 130 cm³/rev [7.930 in³/rev]	Standard 160 cm³/rev [9.760 in³/rev]	–	–	–	●

● : Required  
– : Not required

[Click i button to return to main index](#)

[Click Dana button to return to Section index](#)



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SH7VR	M	055	61	30	OL	SAI	FM	V	RPE	2 100 04	XXXX	000	PR	XX	XX

5

Minimum displacement limitation			Size			
			055	075	108	160
<b>12÷42</b>	From 12 cm³/rev [0.732 in³/rev] to 42 cm³/rev [2.562 in³/rev]	Standard 30 cm³/rev [1.830 in³/rev]	●	–	–	–
<b>16÷56</b>	From 16 cm³/rev [0.976 in³/rev] to 56 cm³/rev [3.416 in³/rev]	Standard 40 cm³/rev [2.440 in³/rev]	–	●	–	–
<b>22÷80</b>	From 22 cm³/rev [1.342 in³/rev] to 80 cm³/rev [4.880 in³/rev]	Standard 56 cm³/rev [3.416 in³/rev]	–	–	●	–
<b>32÷112</b>	From 32 cm³/rev [1.952 in³/rev] to 112 cm³/rev [6.832 in³/rev]	Standard 80 cm³/rev [4.880 in³/rev]	–	–	–	●
<b>0</b>	0 cm³/rev		●	●	●	●

● : Required  
– : Not required

6

Mount Flange		Size			
		055	075	108	160
<b>OL</b>	2 Bolts Ø 160 mm [Ø 6.299 in]	●	–	–	–
<b>OM</b>	2 Bolts Ø 190 mm [Ø 7.48 in]	–	●	–	–
<b>ON</b>	2 Bolts Ø 200 mm [Ø 7.874 in]	–	–	●	●

● : Available  
– : Not Available

7

Shaft end		Size			
		055	075	108	160
<b>SAI</b>	Splined W30x2x30x14 - DIN 5480	●	–	–	–
<b>SAM</b>	Splined W35x2x30x16 - DIN 5480	●	–	–	–
<b>SAO</b>	Splined W40x2x30x18 - DIN 5480	–	●	●	–
<b>SAR</b>	Splined W50x2x30x24 - DIN 5480	–	–	–	●

● : Available  
– : Not Available

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SH7VR	M	055	61	30	OL	SAI	FM	V	RPE	2 100 04	XXXX	000	PR	XX	XX

8

## Port cover

<b>FM</b>	Metric End Main ports
<b>LM</b>	Metric Main Ports positioned 180° apart
<b>L3</b>	Metric Main Ports positioned 180° apart (no VSC)

9

## Seal

<b>V</b>	FKM
----------	-----

10

## Control

## Port cover

		FM	LM	L3
<b>RPE</b>	Working pressure control	•	•	–
<b>ROE</b>	Working pressure control $\Delta p$ 100	•	•	•
<b>2EE</b>	Electric two positions control with pressure override	•	•	–
<b>2EN</b>	Electric two positions control	•	•	–
<b>2IE</b>	Hydraulic two positions control with pressure override	•	•	–
<b>2IN</b>	Hydraulic two positions control	•	•	–
<b>REE</b>	Electric proportional control with pressure override	•	•	•
<b>RED</b>	Electric proportional control with double step pressure override	•	•	•
<b>REN</b>	Electric proportional control	•	•	•
<b>RIE</b>	Hydraulic proportional control with pressure override	•	•	•
<b>RID</b>	Hydraulic proportional control with double step pressure override	•	•	•
<b>RIN</b>	Hydraulic proportional control	•	•	•
<b>RPI</b>	Working pressure control with hydraulic override.	•	•	•
<b>ROI</b>	Working pressure control $\Delta p$ 100 with hydraulic override.	•	•	•
<b>ROS</b>	Working pressure control $\Delta p$ 100 with electric override.	•	•	•
<b>RPS</b>	Working pressure control with electric override.	•	•	•

• : Available  
– : Not Available

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SH7VR	M	055	61	30	OL	SAI	FM	V	RPE	2 100 04	XXXX	000	PR	XX	XX

11			(Chosen) Control															
Control specification																		
			RPE	ROE	2EE	2EN	2IE	2IN	REE	RED <sup>(1)</sup>	REN	RID <sup>(1)</sup>	RIE	RIN	RPI	ROI	ROS	RPS
Displacement setting	1	From max displacement to min displacement ( $V_{g\ max} \rightarrow V_{g\ min}$ )	–	–	●	●	●	●	●	●	●	●	●	–	–	–	–	
	2	From min displacement to max displacement ( $V_{g\ min} \rightarrow V_{g\ max}$ )	●	●	–	●	–	●	–	–	●	–	–	●	●	●	●	
None	00		–	–	–	–	–	●	–	–	–	–	–	–	–	–	–	
Pressure Setting (*)	XXX	100÷400 bar [1430÷5802 psi]	●	–	●	–	●	–	●	●	–	●	●	–	●	–	–	
	XXX	100÷350 bar [1430÷5076 psi]	–	●	–	–	–	–	–	–	–	–	–	–	●	●	●	
Start of control, Setting range (*)	XX	5-10-15-20 bar [72-145-218-290 psi]	–	–	–	–	–	–	–	–	●	●	●	–	–	–	–	
Δp Displacement change	25	25 bar [363 psi]	–	–	–	–	–	–	–	–	●	●	●	–	–	–	–	
Voltage	12	12 - Connector DIN43650	–	–	●	●	–	–	●	●	●	–	–	–	–	–	●	●
	24	24 - Connector DIN43650	–	–	●	●	–	–	●	●	●	–	–	–	–	–	●	●
	D2	12 - Deutsch DT04	–	–	●	●	–	–	●	–	●	–	●	–	–	–	●	●
	D4	24 - Deutsch DT04	–	–	●	●	–	–	●	–	●	–	●	–	–	–	●	●
Control orifice (**)	04	With Ø0.4 mm [Ø 0.015 in] Control Orifice	●	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
	05	With Ø0.5 [Ø 0.0196 in] Control Orifice	–	●	–	–	–	–	●	●	●	●	●	●	●	●	●	●
	07	With Ø0.7 [Ø 0.027 in] Control Orifice	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

Specify for each control, all the required values for the chosen control.

- Available
- Not available

<sup>(1)</sup> Specify Pressure Setting values for Step 1 and Step 2 (Step1<Step2)

(\*) Supply the setting value

(\*\*) 0.4 mm [Ø 0.015 in] (standard) nozzle, provides a smooth control response (max-to-min and min-to-max), while Ø 0.5-0.7 mm [Ø 0.0196-0.027 in] (optional) nozzle, provides a faster reaction.

#### Warning:

The values showed are only valid in maximum and minimum displacement conditions of the respective displacement.  
For different values, verify the possibility with the control diagrams present on the catalogue.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SH7VR	M	055	61	30	OL	SAI	FM	V	RPE	2 100 04	XXXX	000	PR	XX	XX

## 12

Valves		Size			
		055	075	108	160
XXXX	NONE	●	●	●	●
VCD1	VCD/1 Pilot assisted overcentre valve	LM	LM	LM	LM
VCD2	VCD/2 Pilot assisted overcentre valve	–	LM	LM	LM
VCR2	VCR2 D/AF Double acting ove centre valve	FM	–	–	–
VCR4	VCR4 double acting overcentre valve	–	FM	FM	FM

● : Available  
– : Not Available

The valves are available with ISO port cover only, please contact Technical department for SAE version.

(1) The LM - FM digit means that the valve is only available with LM - FM port cover.

## 13

Valves feature		Valve				
		XXXX	VCD1	VCD2	VCR2	VCR4
000	Feature not necessary	●	–	–	–	–
002	Not Set 0÷350 bar [0 to 5075 psi] [Piloting ratio 2.9:1] Control of rotation CW	–	●	–	–	–
006	Not Set 0÷350 bar [0 to 5075 psi] [Piloting ratio 2.9:1] Control of rotation CCW	–	●	–	–	–
003	Not Set 250÷500 bar [3625 to 7250 psi] [Piloting ratio 13:1] Control of rotation CW	–	–	●	–	–
007	Not Set 250÷500 bar [3625 to 7250 psi] [Piloting ratio 13:1] Control of rotation CCW	–	–	●	–	–
010	Not Set - Aluminum [60÷350 bar [870 to 5075 psi] [Piloting ratio 6.2:1]	–	–	–	●	–
013	Not Set 140÷350 bar [2030 to 5075 psi] [Piloting ratio 4.5:1]	–	–	–	–	●

● : Available  
– : Not Available

Note:  
Please contact Technical department for valve which requie specific setting.  
For the feature see catalogue valves.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SH7VR	M	055	61	30	OL	SAI	FM	V	RPE	2 100 04	XXXX	000	PR	XX	XX

## 14

Flushing valve		Port Cover		
		FM	LM	L3
<b>XX</b>	No Flushing Valve	–	–	•
<b>PR</b>	Arranged for Flushing Valve	•	•	•
<b>06</b>	VSC/F Flushing valve - 6 l/min [1.58 U.S. gpm]	•	•	•
<b>09</b>	VSC/F Flushing valve - 10.5 l/min [2.77 U.S. gpm]	•	•	•
<b>15</b>	VSC/F Flushing valve - 15 l/min [3.96 U.S. gpm]	•	•	•
<b>21(*)</b>	VSC/F Flushing valve - 20 l/min [5.28 U.S. gpm]	•	•	–

• : Available

– : Not Available

(\*) : Not available with 055-075 displacements

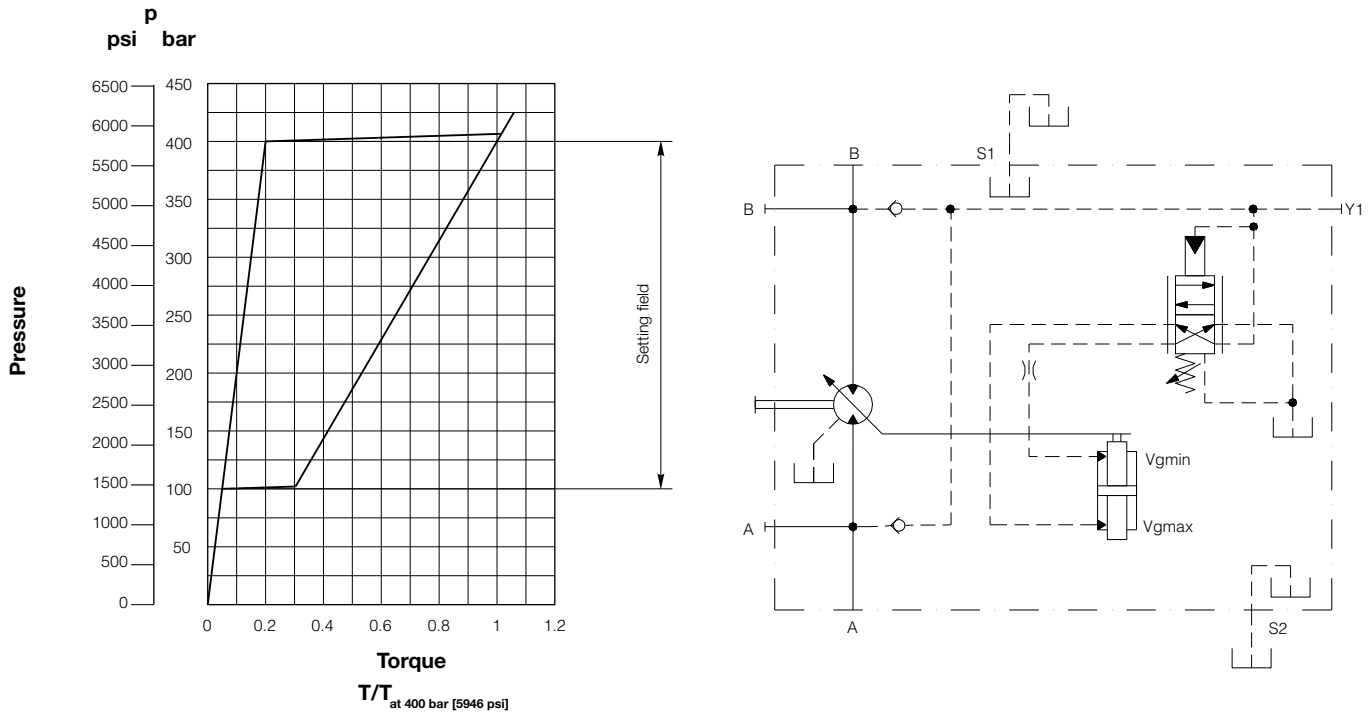
## 15

Serie feature	
<b>XX</b>	None
<b>TS</b>	Prepared for tachometer sensor
<b>TW</b>	Tachometer + sensor 2-channel-Hall effect PNP - 5V
<b>TZ</b>	Tachometer + sensor 2-channel-Hall effect

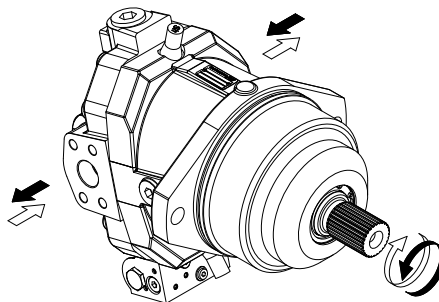
## 16

Painting	
<b>XX</b>	Not Required
<b>01</b>	Painted RAL 9005
<b>02</b>	Painted RAL 5015

The working pressure control allows to swivel the motor displacement from  $V_{g\ min}$  to  $V_{g\ max}$  when the operating pressure rises beyond the preset operating pressure, so that the motor is at  $V_{g\ min}$  when min torque and max speed are required and at  $V_{g\ max}$  when max torque and min speed are required. The operating pressure applies a force on the spool which is matched by an adjustable spring. The motor keeps the  $V_{g\ min}$  until the operating pressure reaches the setting value (pressure setting). Once the preset pressure rises beyond, the motor swivels from  $V_{g\ min}$  to  $V_{g\ max}$ . The swivel range is from  $V_{g\ min}$  to  $V_{g\ max}$  (displacement setting type 2 as per our ordering code). Start of control adjustable between 100 and 400 bar [1450 and 5800 psi].



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.

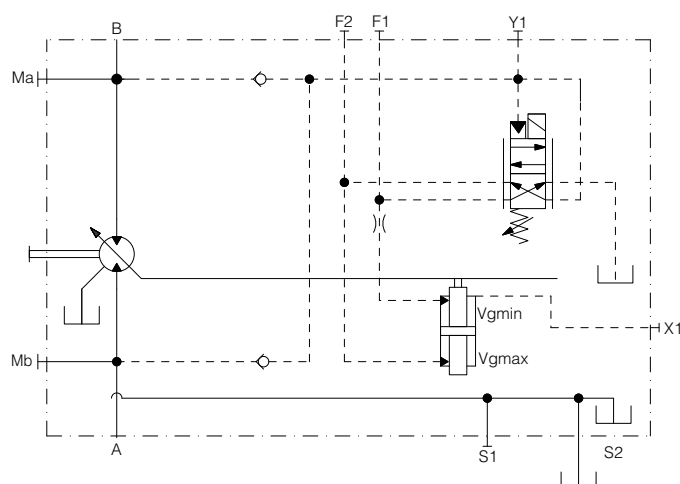


RPS control is a pressure related control which permits the changing of displacement  $V_{g\ min}$  to  $V_{g\ max}$  when working pressure exceeds setting threshold, so that the motor works at  $V_{g\ min}$  when low torque and high speed are required and at  $V_{g\ max}$  when high torque and low speed are required. The motor stands at  $V_{g\ min}$  till working pressure reaches setting threshold.  $\Delta p$  of working pressure that allows the changing of displacement from minimum to maximum is around 10 bar (such as RPE control).

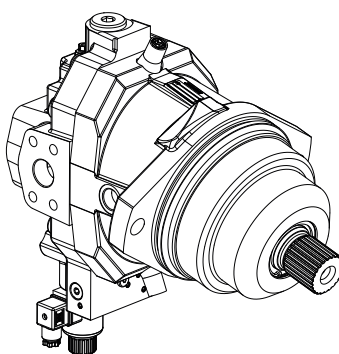
This pressure related control can be overridden by an electrical signal; when solenoid is energized, the motor reaches maximum displacement without stopping in an intermediate position.

Swivel range from  $V_{g\ min}$  to  $V_{g\ max}$  (assembly type 2 as per our ordering code).

Setting pressure range is 100-300 bar.



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.

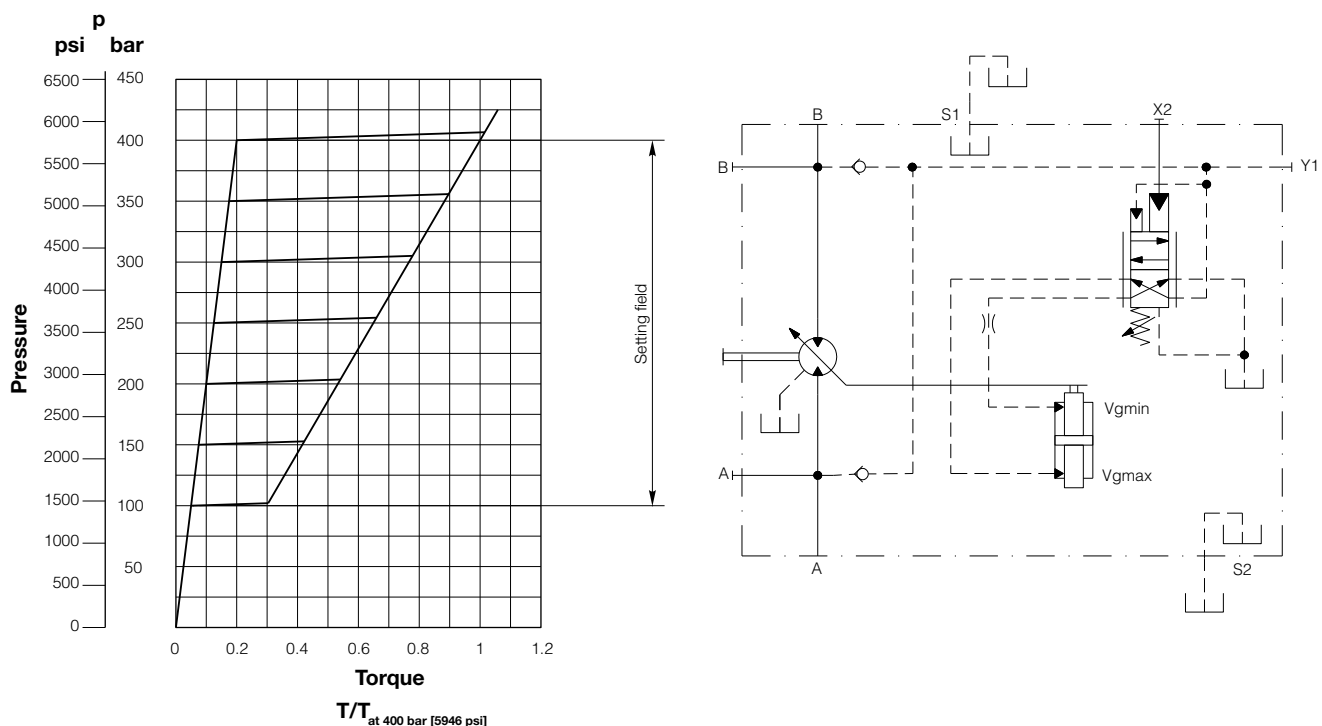




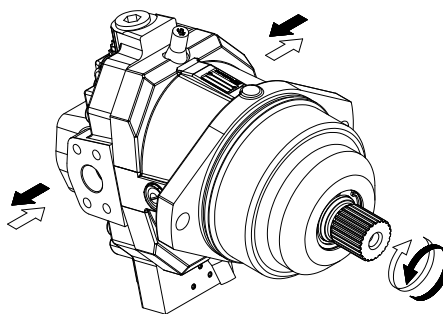
The hydraulic limiting device makes possible to reduce the pressure setting of RPE control by means of an external pilot pressure applied at port X2. The RPE control pressure setting is reduced proportionally to the pilot pressure in the ratio of 1/17 (for each pilot pressure bar, the preset operating pressure is reduced of 17 bar) [170 psi each 10 psi of pilot pressure]. Max permissible pilot pressure at port X2 = 100 bar [1450 psi]. Example: preset operating pressure of RPE control = 300 bar [4350 psi]. By applying at port X2 a pilot pressure of 10 bar [145 psi], the pressure setting comes to 130 bar [1885 psi] ( $300 - (10 \times 17) = 130$ ) ( $4350 - (145 \times 17) = 1885$ ). Should it be required to swivel the motor to  $V_{g \max}$  independently from the operating pressure, a pilot pressure of 20 bar [290 psi] should be applied at port X2. Swivel range from  $V_{g \min}$  to  $V_{g \max}$  (assembly type 2 as per our ordering code). Start of control adjustable between 100 and 400 bar [1450 and 5800 psi].

#### When ordering please clearly state:

Control pressure setting.



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.

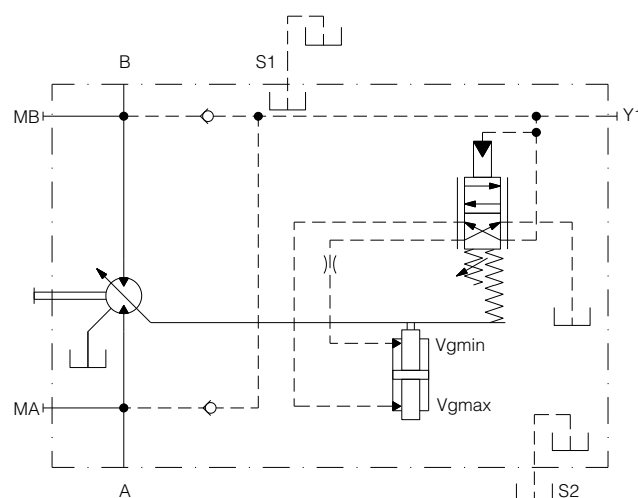
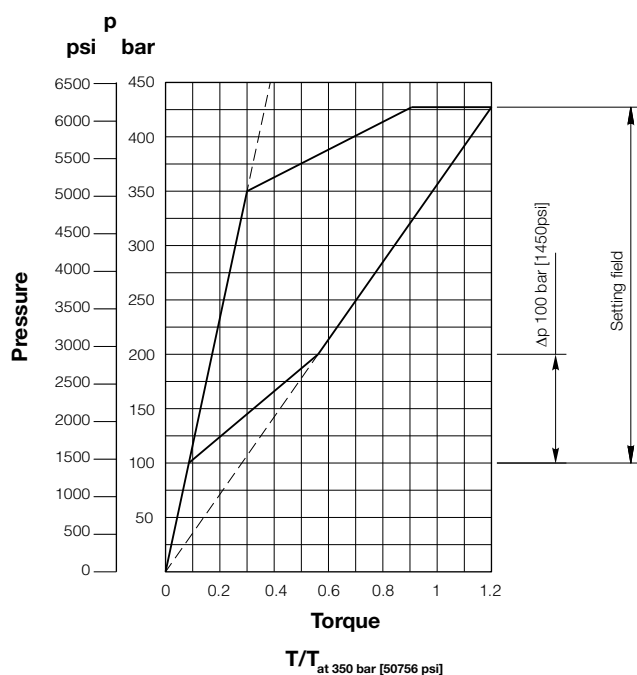


The “ROE” control allows a larger pressure range for displacement variation in comparison to “RPE” control. The increase of pressure range for variation from  $V_{g\min}$  to  $V_{g\max}$  allows a smoother working of the motor during displacement variation. The “ROE” allows the displacement variation with the pressure range show in the table.

Where:

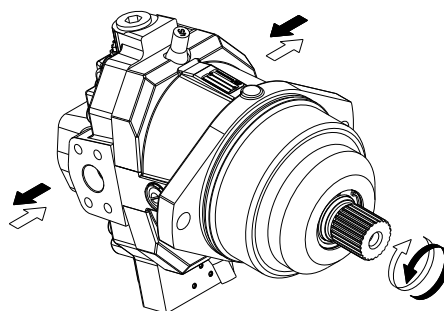
- $\Delta p$  is the working pressure range that allows the displacement variation.
- $P_{\min}$  is the minimum pressure at which displacement variation starting can be set.
- $P_{\max}$  is the maximum pressure at which displacement variation starting can be set.

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



Warning: in case of displacement limitation, the control shall vary of a reduced  $\Delta p$  with respect to its standard one. Please contact Dana for more info.

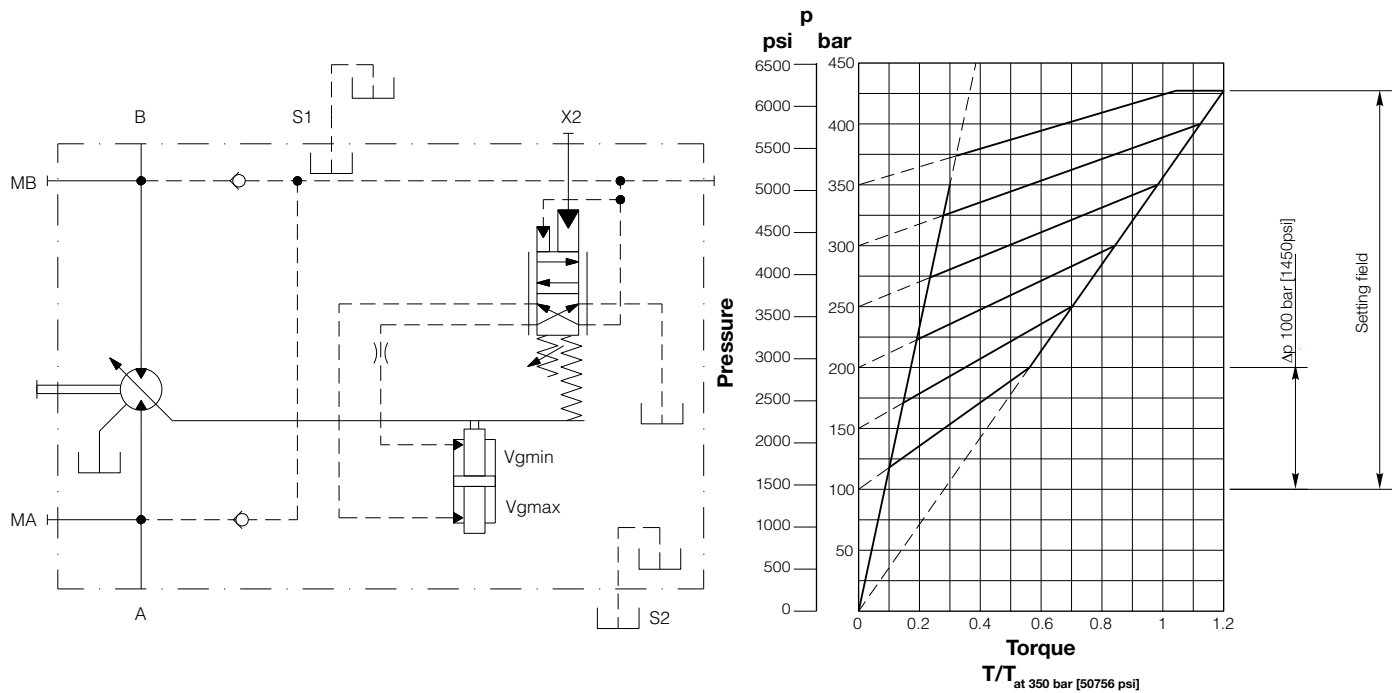
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



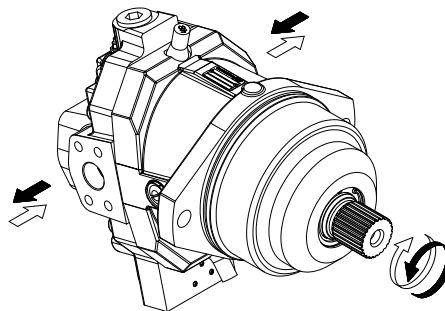
The hydraulic limiting device makes possible to reduce the pressure setting of ROE control by means of an external pilot pressure applied at port X2. The ROE control pressure setting is reduced proportionally to the pilot pressure in the ratio of 1/17 (for each pilot pressure bar, the preset operating pressure is reduced of 17 bar) [170 psi each 10 psi of pilot pressure]. Max permissible pilot pressure at port X2 = 100 bar [1450 psi]. Example: preset operating pressure of ROE control = 300 bar [4350 psi]. By applying at port X2 a pilot pressure of 10 bar [145 psi], the pressure setting comes to 130 bar [1885 psi] ( $300 - (10 \times 17) = 130$ ) ( $4350 - (145 \times 17) = 1885$ ). Should it be required to swivel the motor to  $V_{g \max}$  independently from the operating pressure, a pilot pressure of 20 bar [290 psi] should be applied at port X2. Swivel range from  $V_{g \min}$  to  $V_{g \max}$  (assembly type 2 as per our ordering code). Start of control adjustable between 100 and 350 bar [1450 and 5000 psi].

**When ordering please clearly state:**

Control pressure setting.



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.

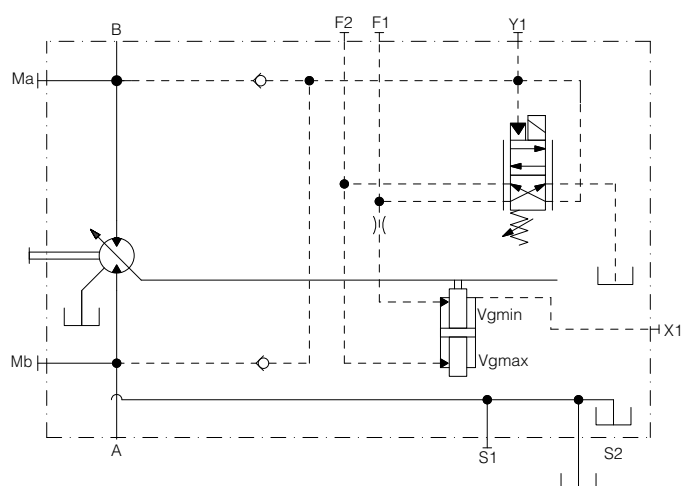


ROS control is a pressure related control which permits the changing of displacement  $V_{g\ min}$  to  $V_{g\ max}$  when working pressure exceeds setting threshold, so that the motor works at  $V_{g\ min}$  when low torque and high speed are required and at  $V_{g\ max}$  when high torque and low speed are required. The motor stands at  $V_{g\ min}$  till working pressure reaches setting threshold.  $\Delta p$  of working pressure that allows the changing of displacement from minimum to maximum is 100 bar (such as ROE control).

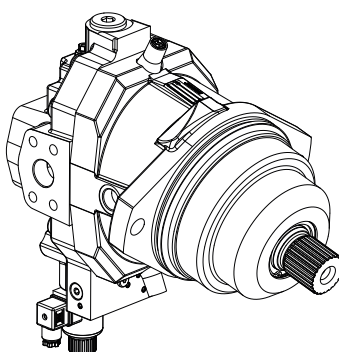
This pressure related control can be overridden by an electrical signal; when solenoid is energized, the motor reaches maximum displacement without stopping in an intermediate position.

Swivel range from  $V_{g\ min}$  to  $V_{g\ max}$  (assembly type 2 as per our ordering code).

Setting pressure range is 100-300 bar.



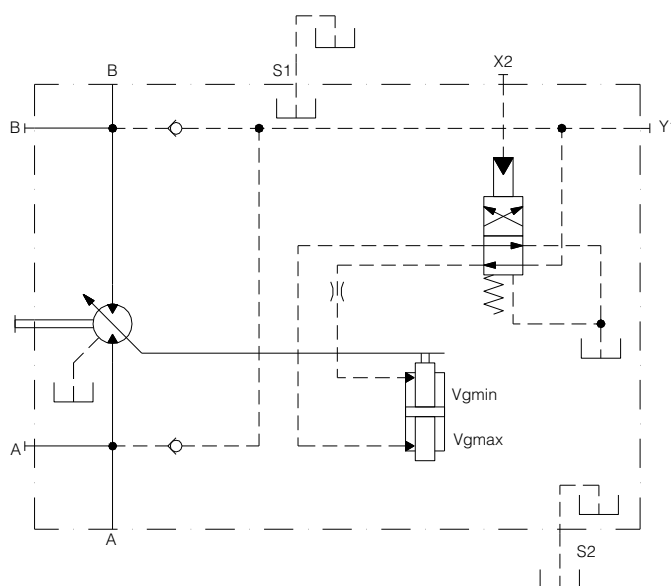
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



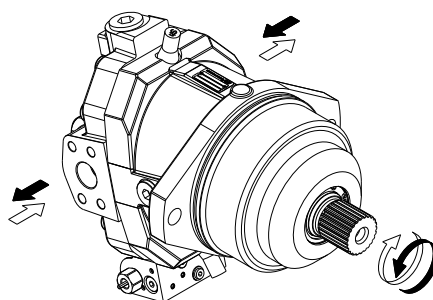
The hydraulic two positions control allows the displacement of the motor to be set to  $V_{g\ max}$  or  $V_{g\ min}$  by applying or not a pilot pressure at port X2. The feed back spring is missing so  $V_{g\ max}$  or  $V_{g\ min}$  only can be set. Minimum required pilot pressure = 10 bar [145 psi] and maximum permissible pressure at port X2=100 bar [1450 psi]. The swivel range is 1 (from  $V_{g\ max}$  to  $V_{g\ min}$ ) or 2 (swivel range from  $V_{g\ min}$  to  $V_{g\ max}$ ).

**Note:**

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



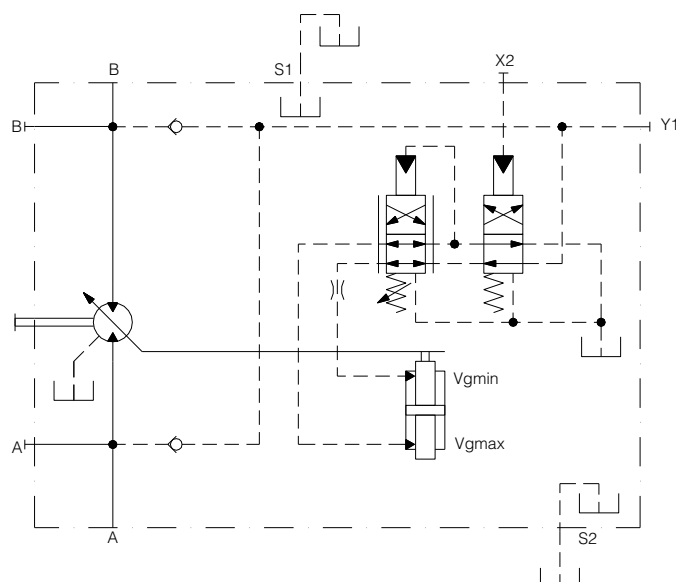
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



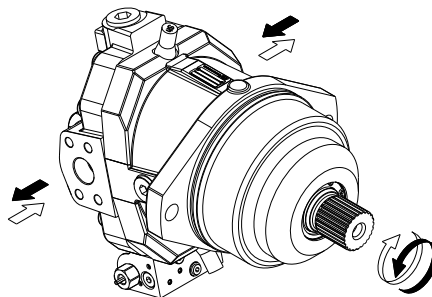
The 2IE control version with the pressure override allows the motor to swivel to  $V_{g\max}$  when the pressure setting is reached. Same as 2IN control, the motor displacement is adjusted to  $V_{g\min}$  when the pilot pressure applied at port X2. Minimum required pilot pressure = 10 bar [145 psi] and maximum permissible pressure at port X2=100 bar [1450 psi]. If the operating pressure rises beyond the pressure setting, the pressure limiting device the motor swivels out to  $V_{g\max}$ . Swivel range is from  $V_{g\max}$  to  $V_{g\min}$  (displacement setting 1 per our ordering code).

**Note:**

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



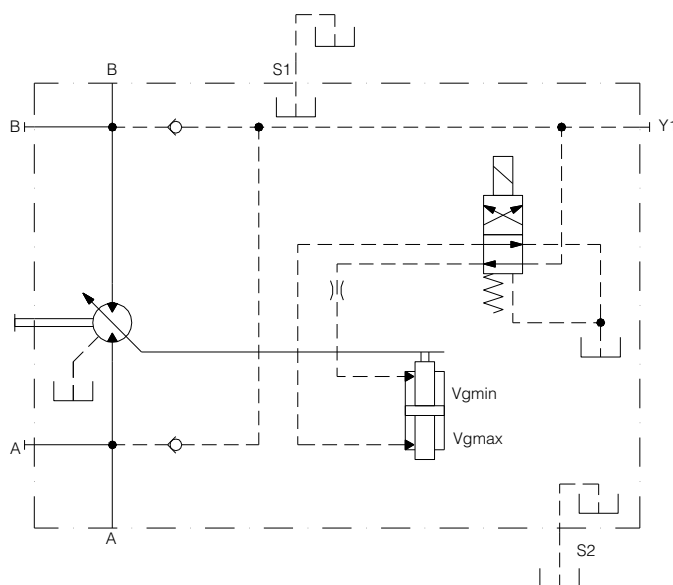
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



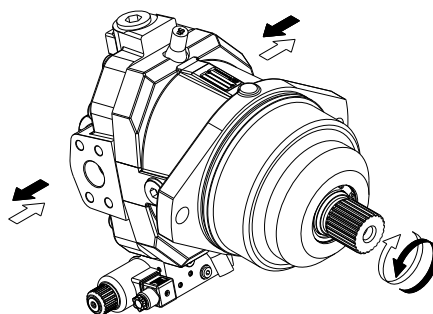
The electric two positions control allows the displacement of the motor to be set to  $V_{g\max}$  or  $V_{g\min}$  by switching an ON/OFF solenoid valve. The feed back spring is missing so  $V_{g\max}$  or  $V_{g\min}$  only can be set. 12V DC and 24V DC ON/OFF solenoid are available. The swivel range is 1 (from  $V_{g\max}$  to  $V_{g\min}$ ) or 2 (swivel range from  $V_{g\min}$  to  $V_{g\max}$ ).

**Note:**

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



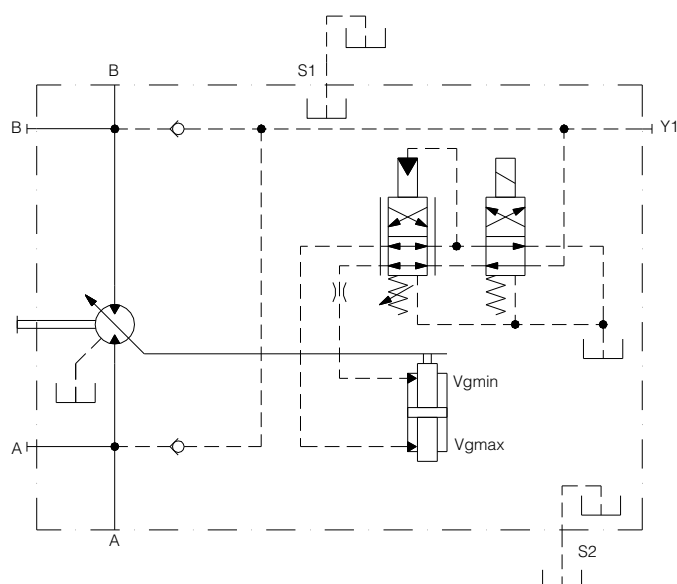
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



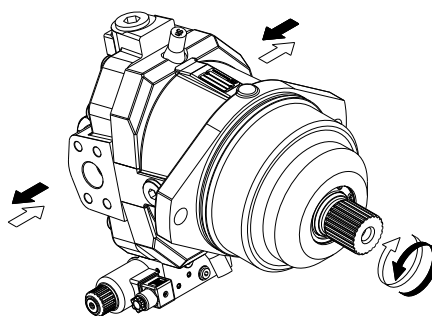
The 2EE control version with the pressure override allows the motor to swivel to  $V_{g\max}$  when the pressure setting is reached. Same as '2EN' control, when solenoid valve is switched off the motor is at  $V_{g\max}$ . The motor displacement is adjusted to  $V_{g\min}$  when the solenoid valve is switched on and if the operating pressure rises beyond the pressure setting, the pressure limiting device overrides the electric two positions control and the motor swivels out to  $V_{g\max}$ . Swivel range is from  $V_{g\max}$  to  $V_{g\min}$  (displacement setting 1 per our ordering code).

**Note:**

For reliable control, an operating pressure of at least 20 bar [290 psij], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psij] is to be applied at port Y1.



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.

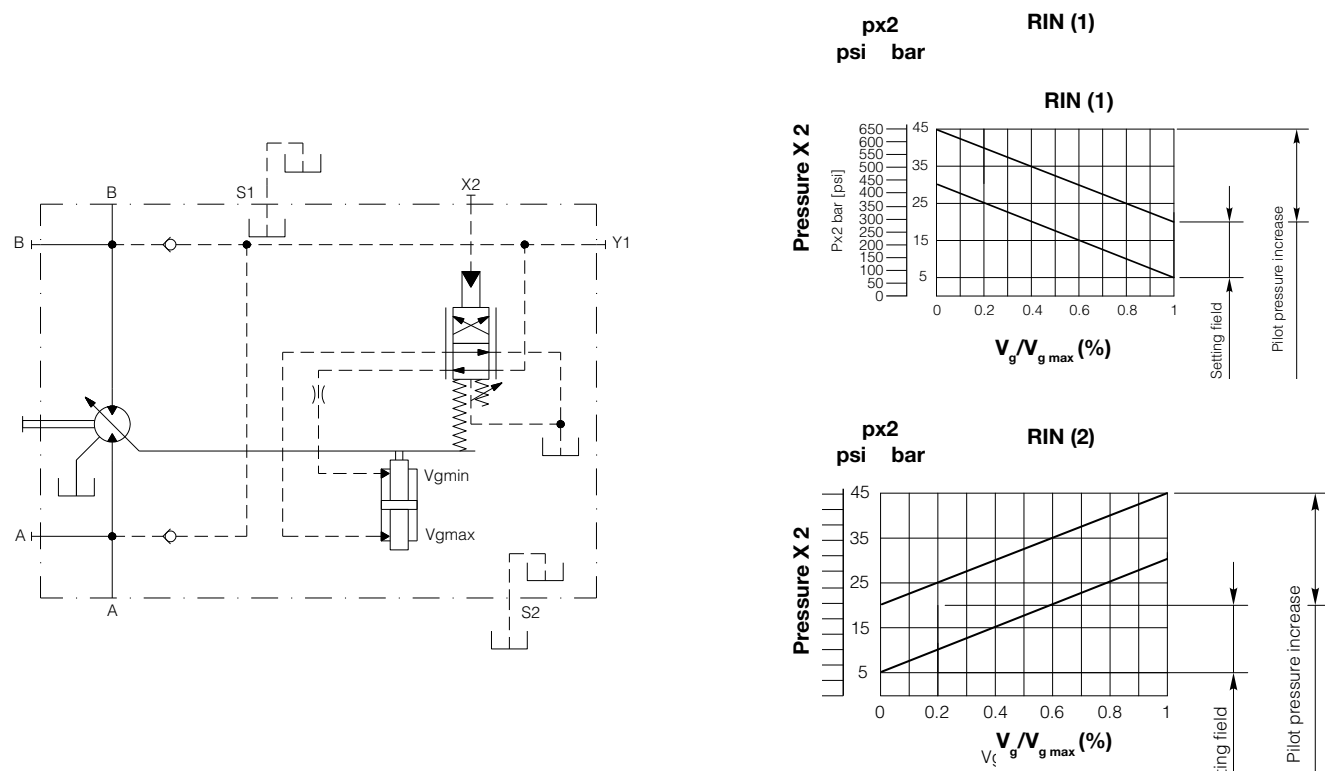




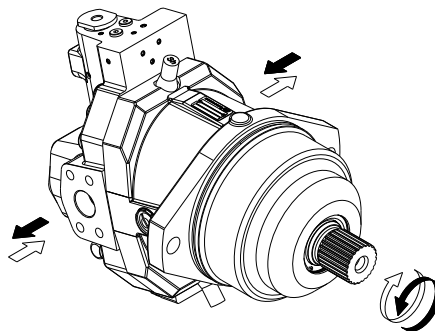
The hydraulic proportional control allows a stepless adjustment of the motor displacement proportionally to the pilot pressure applied at port X2. The pilot pressure applies a force on the spool and the motor swivels until a force balance on the arm is stored by feed back spring. Therefore the motor displacement is adjusted in direct proportion with the pilot pressure. Usually the swivel range is from  $V_{g \max}$  to  $V_{g \min}$  (displacement setting type 1 as per our ordering code) so that increasing the pilot pressure the motor swivels towards  $V_{g \min}$ , however, displacement setting type 2 (swivel range from  $V_{g \min}$  to  $V_{g \max}$ ) is also available. Start of control, Setting range from 5 bar [72.5 psi] to 20 bar [290 psi] around. Pilot pressure range 25 bar [362.5 psi]. Max permissible pilot pressure at port X2 = 100 bar [1450 psi].

## Note:

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.

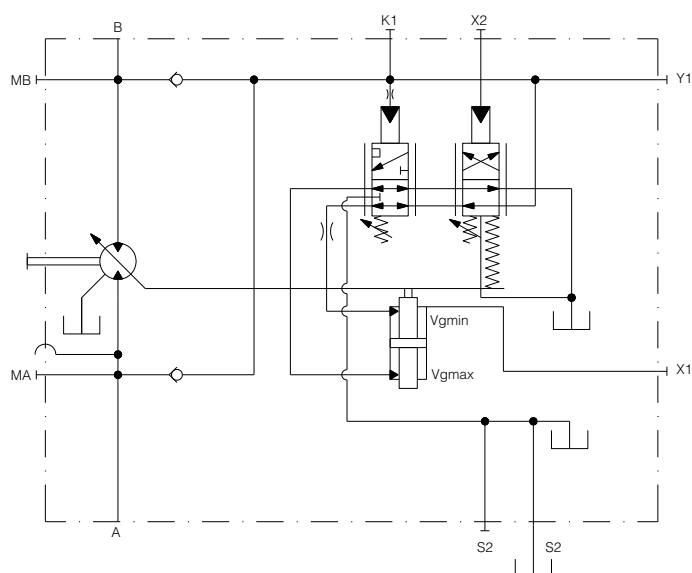


The RIE control version with the pressure override allows the motor to swivel to  $V_{g \max}$  when the pressure setting is reached. Same as RIN control, the motor displacement is adjusted to  $V_{g \min}$  when the pilot pressure applied at port X2. If the operating pressure rises beyond the pressure setting, the pressure limiting device the motor swivels out to  $V_{g \max}$ . Swivel range is from  $V_{g \max}$  to  $V_{g \min}$  (displacement setting 1 per our ordering code).

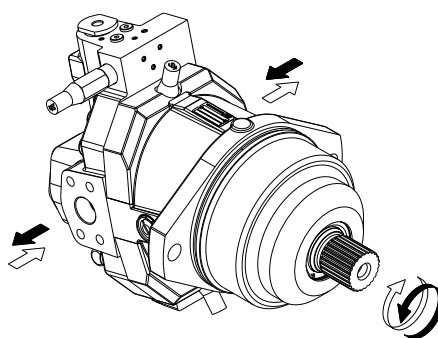
Start of control, Setting range from 5 bar [72.5 psi] to 20 bar [290 psi] around. Pilot pressure range 25 bar [362.5 psi]. Max permissible pilot pressure at port X2 = 100 bar [1450 psi].

#### Note:

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



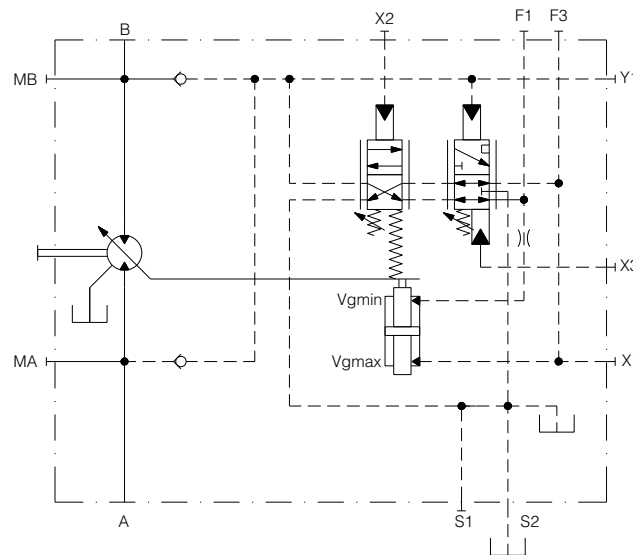
The RID control version with the pressure override allows the motor to swivel to  $V_{g \max}$  when the pressure setting is reached. Same as RIN control, the motor displacement is adjusted to  $V_{g \min}$  when the pilot pressure applied at port X2. If the operating pressure rises beyond the pressure setting, the pressure limiting device the motor swivels out to  $V_{g \max}$ . Swivel range is from  $V_{g \max}$  to  $V_{g \min}$  (displacement setting 1 per our ordering code).

Applying a pressure to port X3, the setting of PE control can be overridden by a different value of pressure.

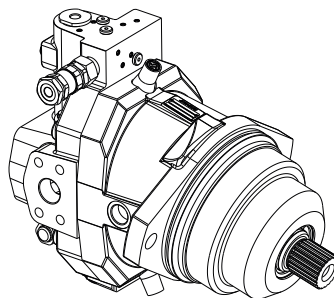
Setting range from 16 bar [232 psi] to 64 bar [928 psi] around. Start of control, Setting range from 5 bar [72.5 psi] to 20 bar [290 psi] around. Pilot pressure range 25 bar [362.5 psi]. Max permissible pilot pressure at port X2 = 100 bar [1450 psi].

## Note:

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



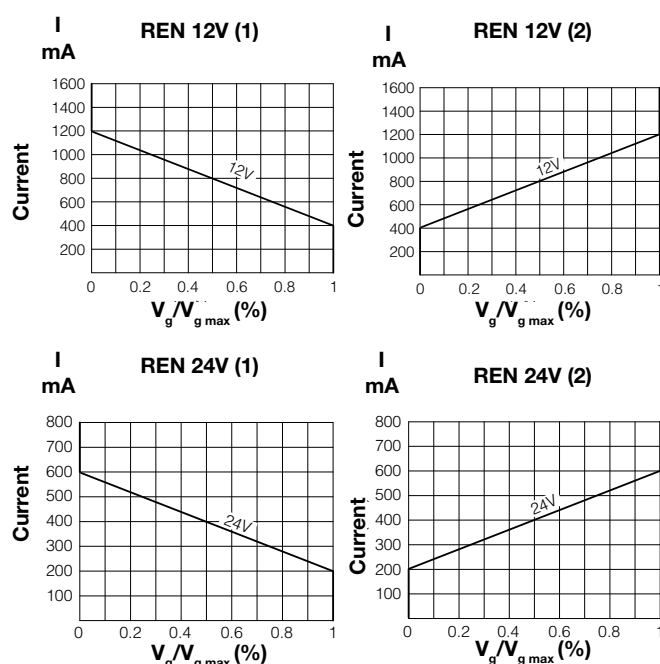
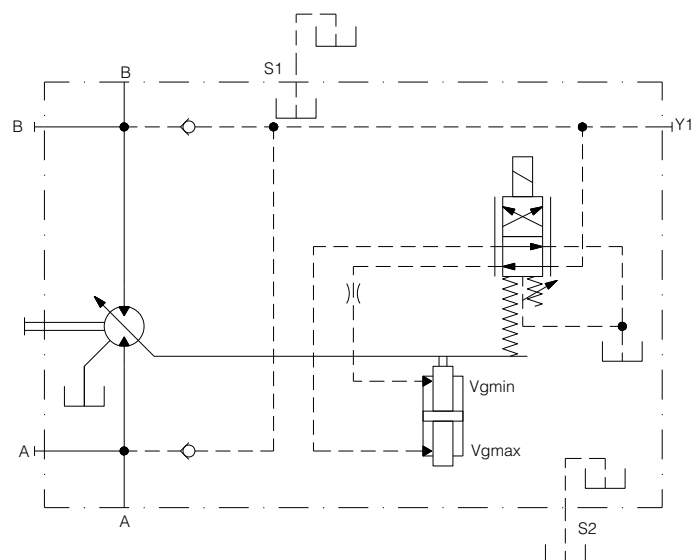
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



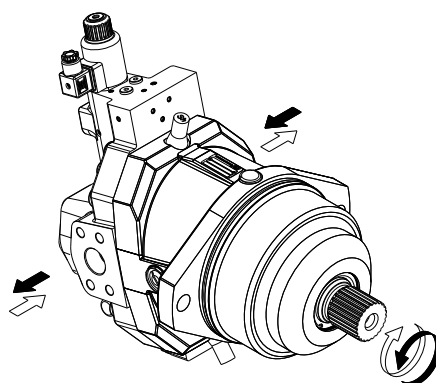
The electrical proportional control allows stepless and programmable adjustment of the motor displacement proportionally to the current strength supplied to a proportional solenoid valve available in 12V DC and 24V DC version and with connector DIN 43650 or DEUTSCH. The proportional solenoid valve applies a force on the spool proportional to the current strength and the motor swivels until a force balance is restored by a feed-back spring. To control the proportional solenoid valve a 24V DC (12V DC) supply is required. Current range between 200 (400) and 600 (1200) mA approx. (with standard setting of Max and Min displacement). Max permissible current = 800 (1600) mA. Usually the swivel range is from  $V_{g \max}$  to  $V_{g \min}$  (displacement setting type 1 as per our ordering code) so that increasing the current strength the motor swivels towards  $V_{g \min}$ , however displacement setting type 2 (swivels range from  $V_{g \min}$  to  $V_{g \max}$ ) is also available. The electronic devices are available to control the solenoid (they must be ordered separately).

### Note:

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



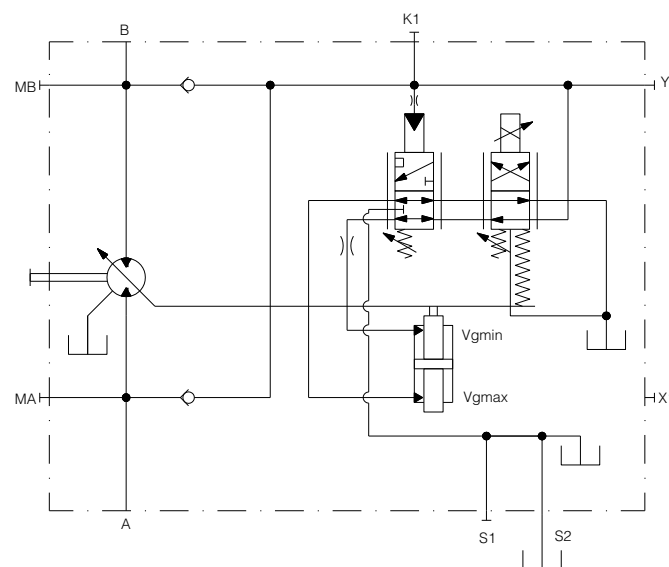
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



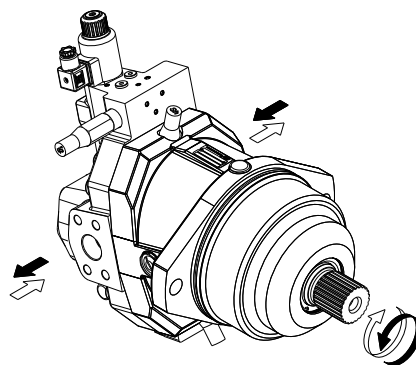
The REE control version with the pressure override allows the motor to swivel to  $V_{g\max}$  when the pressure setting is reached. Same as REN control, when solenoid valve is switched off the motor is at  $V_{g\max}$ . The proportional solenoid valve is available in 12V DC and 24V DC version and with connector DIN 43650 or DEUTSCH. The motor displacement is adjusted to  $V_{g\min}$  when the solenoid valve is switched on and if the operating pressure rises beyond the pressure setting, the pressure limiting device overrides the electric two positions control and the motor swivels out to  $V_{g\max}$ . Swivel range is from  $V_{g\max}$  to  $V_{g\min}$  (displacement setting 1 per our ordering code).

**Note:**

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.



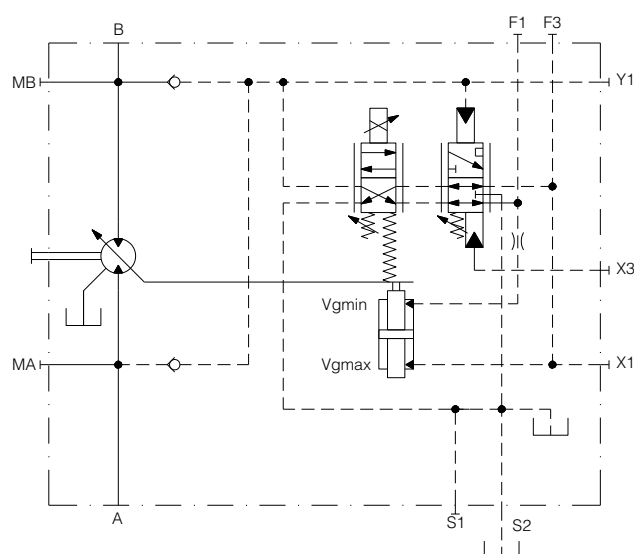
The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



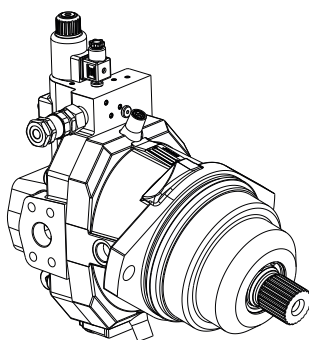
The RED control version with the pressure override allows the motor to swivel to  $V_{g\max}$  when the pressure setting is reached. Same as REN control, when solenoid valve is switched off the motor is at  $V_{g\max}$ . The proportional solenoid valve is available in 12V DC and 24V DC version and with connector DIN 43650 or DEUTSCH. The motor displacement is adjusted to  $V_{g\min}$  when the solenoid valve is switched on and if the operating pressure rises beyond the pressure setting, the pressure limiting device overrides the electric two positions control and the motor swivels out to  $V_{g\max}$ . Swivel range is from  $V_{g\max}$  to  $V_{g\min}$  (displacement setting 1 per our ordering code). Applying a pressure to port X3, the setting of PE control can be overridden by a different value of pressure. Setting range from 16 bar [232 psi] to 64 bar [928 psi] around.

**Note:**

For reliable control, an operating pressure of at least 20 bar [290 psi], is necessary at port A (B). If in the application this pressure is not guaranteed, an auxiliary pressure of 20 bar [290 psi] is to be applied at port Y1.

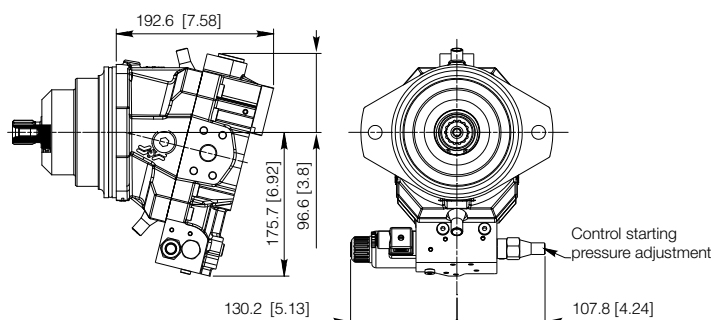


The relation between direction of rotation of shaft and direction of flow in SH7VR motor is shown in the picture below.



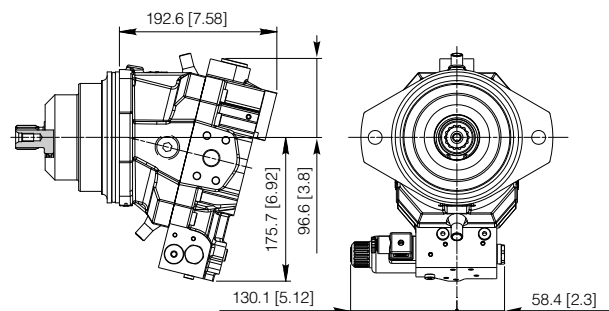
[illegible]

## 2EE



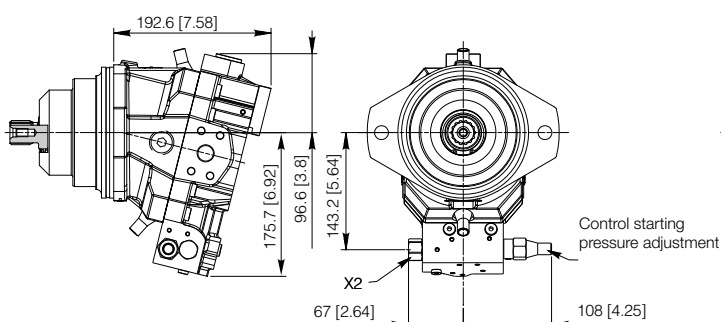
X2: Piloting port - 1/4 G (BSPP)

## 2EN



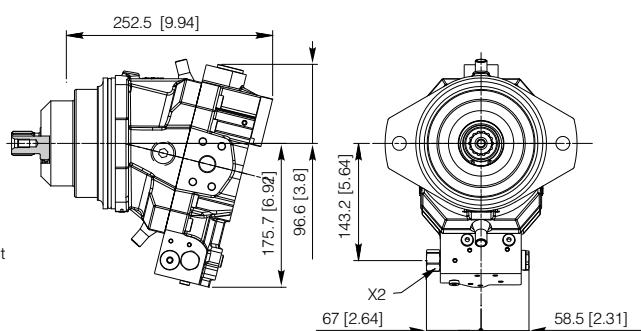
X2: Piloting port - 1/4 G (BSPP)

## 2IE



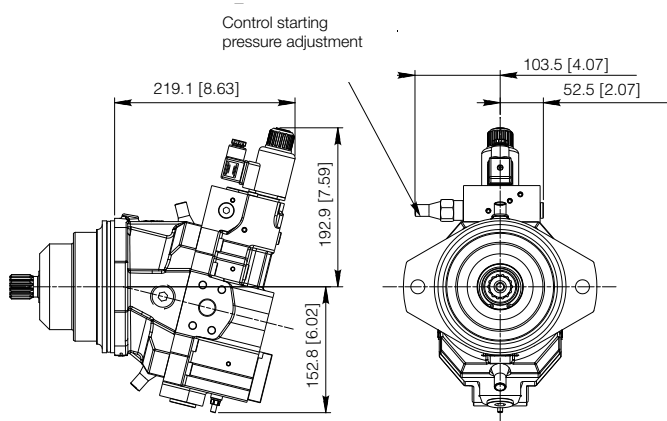
X2: Piloting port - 1/4 G (BSPP)

## 2IN

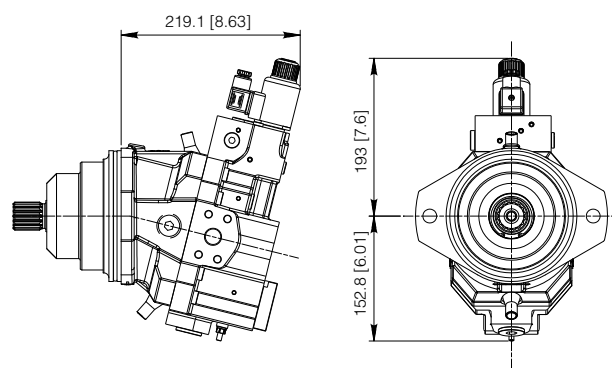


X2: Piloting port - 1/4 G (BSPP)

## REE

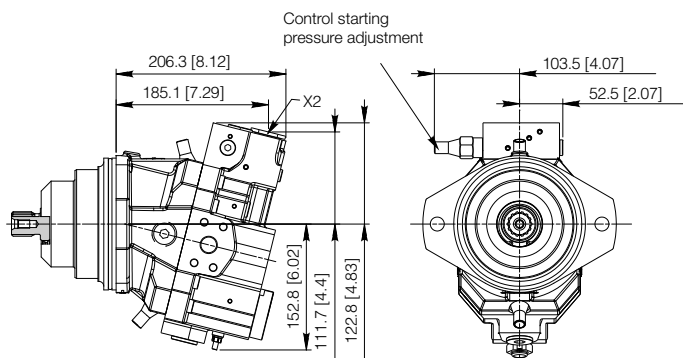


## REN



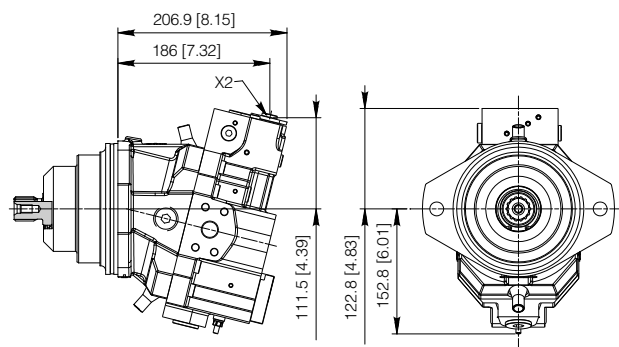


## RIE



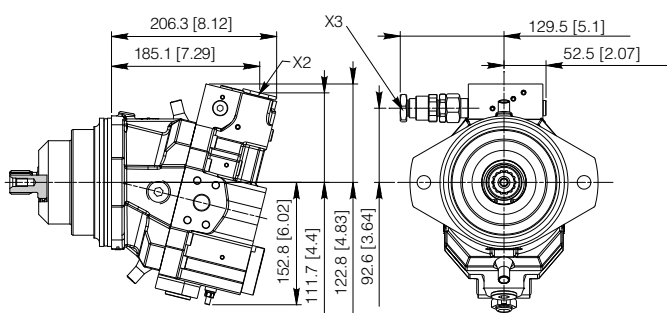
X2: Piloting port - 1/4 G (BSPP)

## RIN



X2: Piloting port - 1/4 G (BSPP)

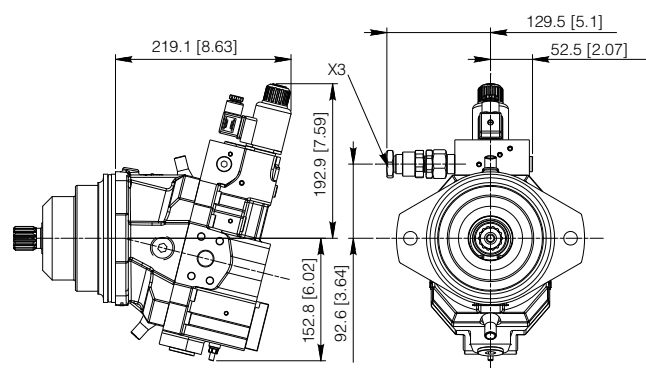
## RID



X2: Piloting port - 1/4 G (BSPP)

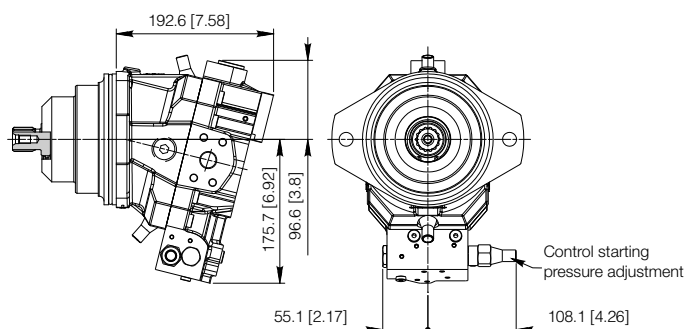
X3: Double step piloting port - 1/4 G (BSPP)

## RED

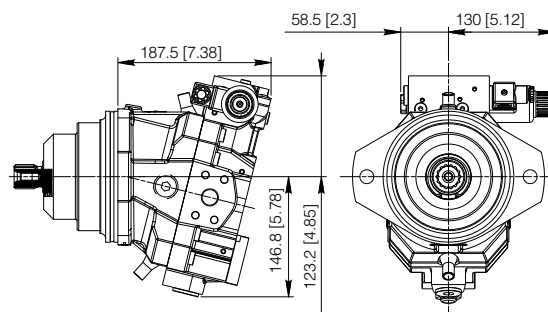


X3: Double step piloting port - 1/4 G (BSPP)

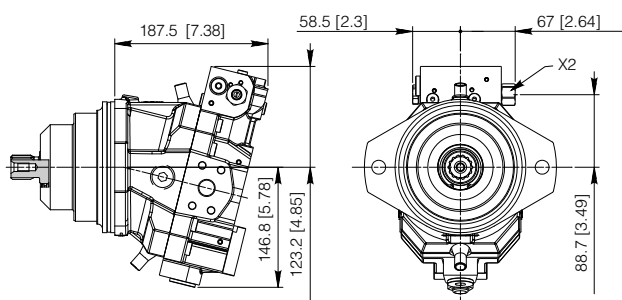
## RPE



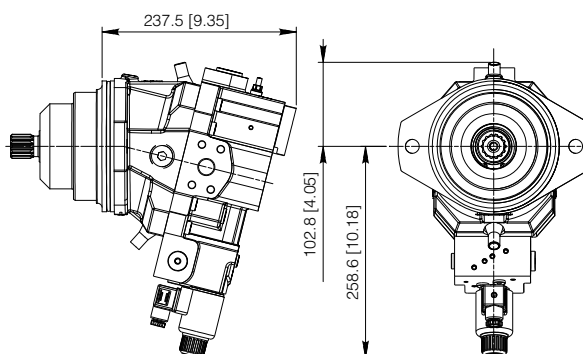
## 2EN



## 2IN

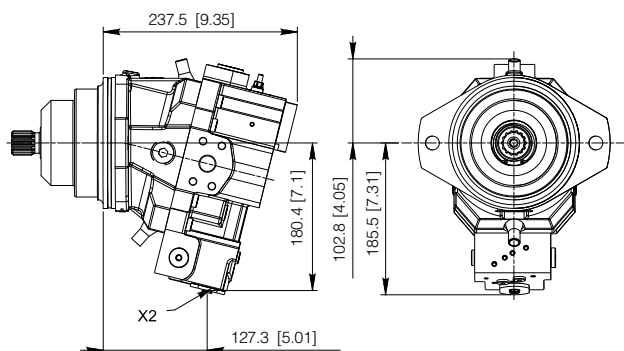


## REN

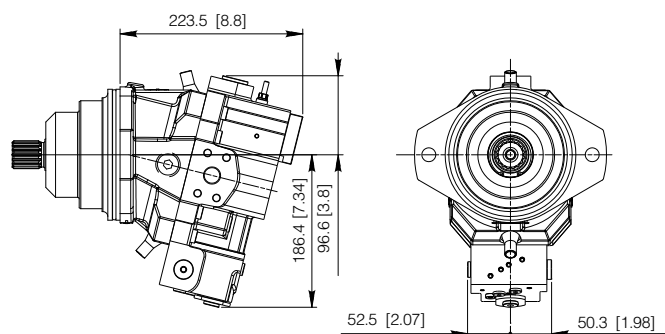


X2: Piloting port - 1/4 G (BSPP)

## RIN



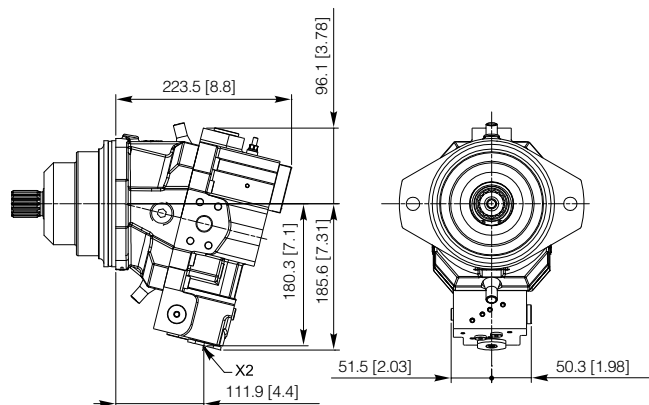
## ROE



X2: Piloting port - 1/4 G (BSPP)

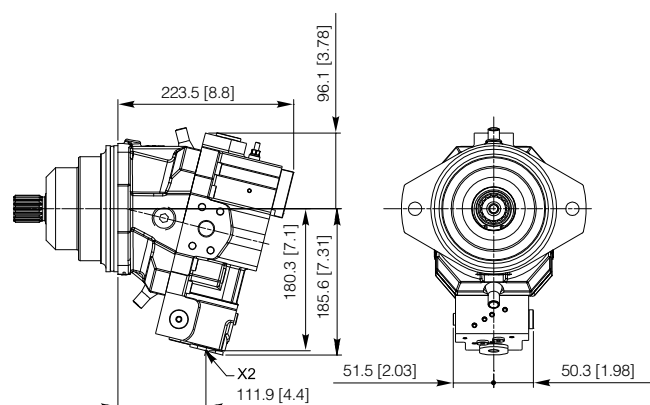
[Click DANA button to return to Section Index](#)[Click i button to return to main index](#)

## RPI



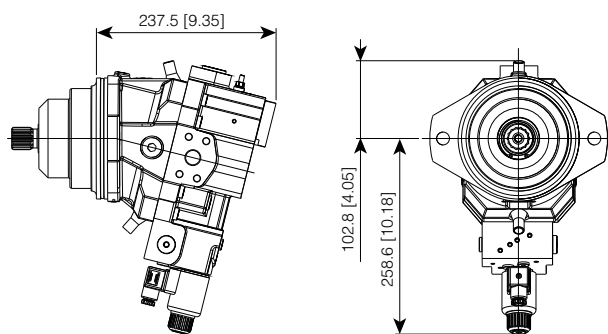
X2: Piloting port - 1/4 G (BSPP)

## ROI

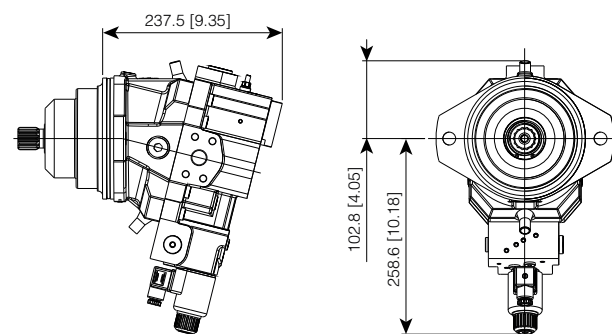


X2: Piloting port - 1/4 G (BSPP)

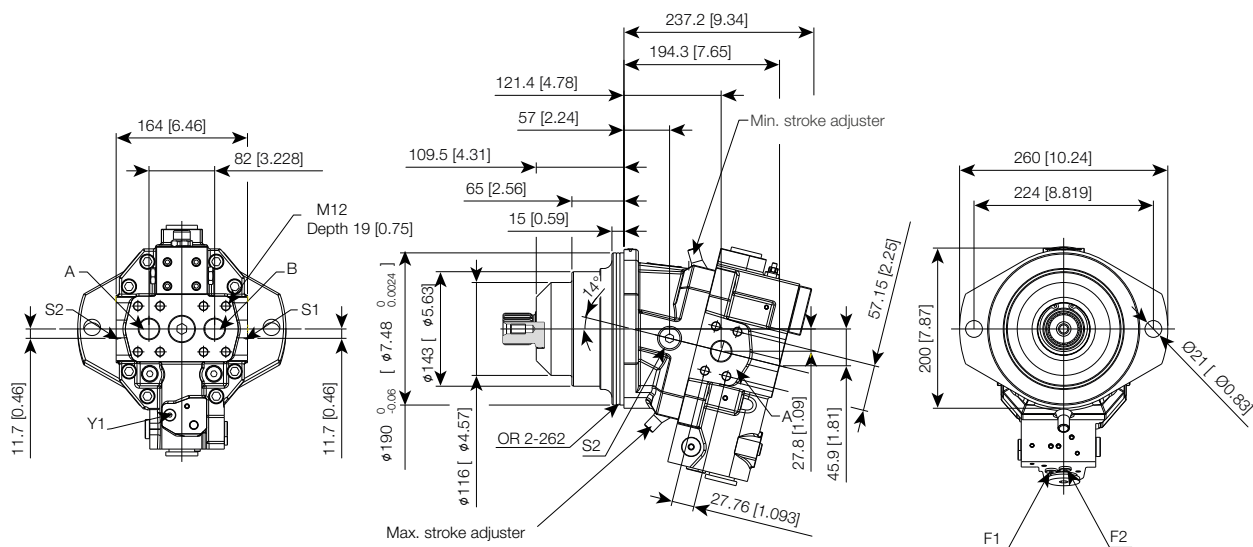
## ROS



## RPS



## SH7VR 075 Motor - Mounting flange 2 Bolts (OM)



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

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

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

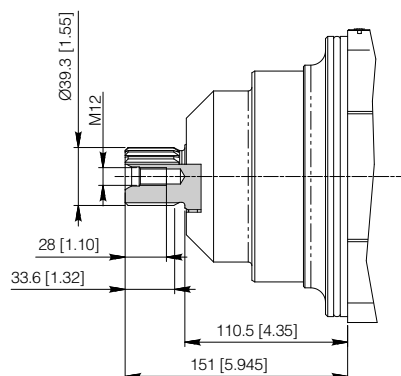
F1-F2: Pressure port - 1/8 G (BSPP)

## 8

## Shaft end

## SAO Splined shaft

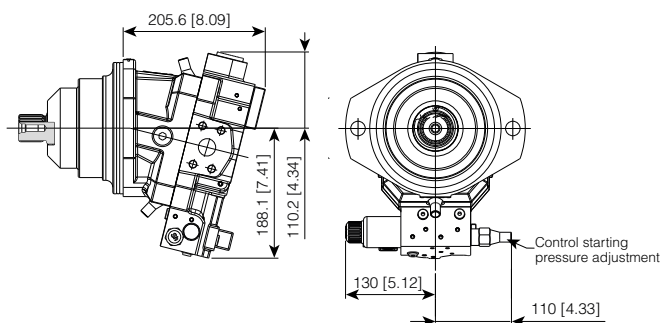
W40x2x30x18 - DIN 5480



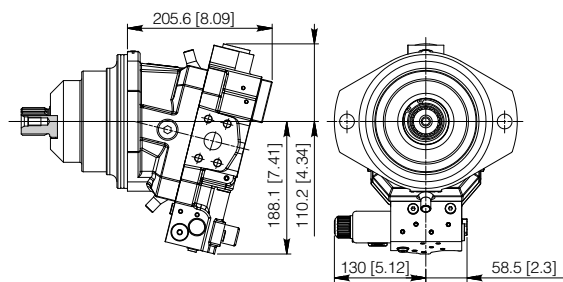
10

Control

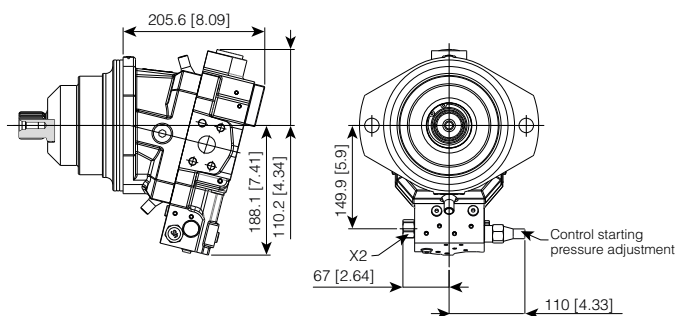
## 2EE



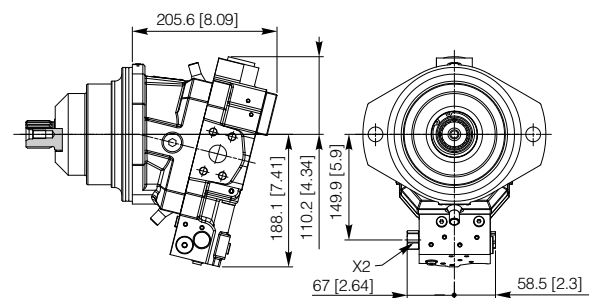
## 2EN



## 2IE



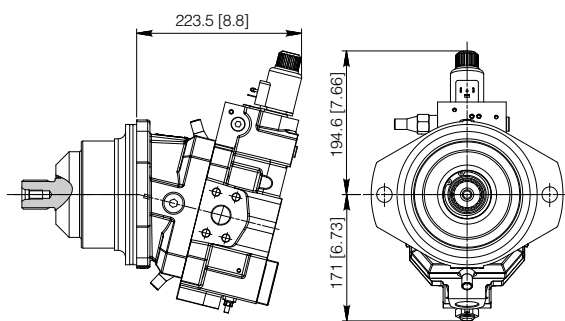
## 2IN



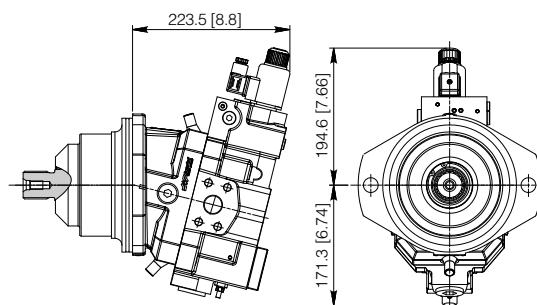
X2: Piloting port - 1/4 G (BSPP)

X2: Piloting port - 1/4 G (BSPP)

## REE



## REN

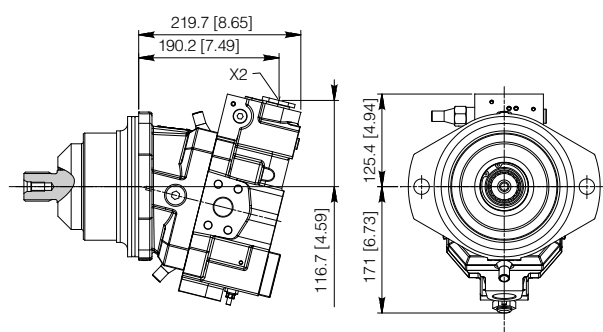


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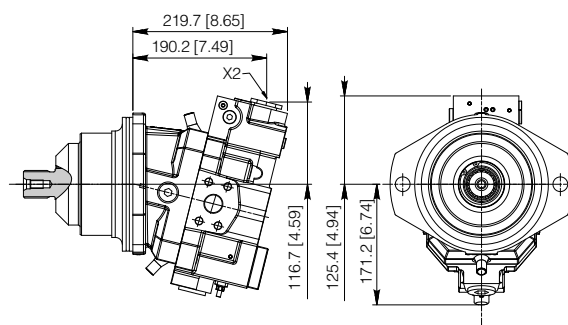


## RIE



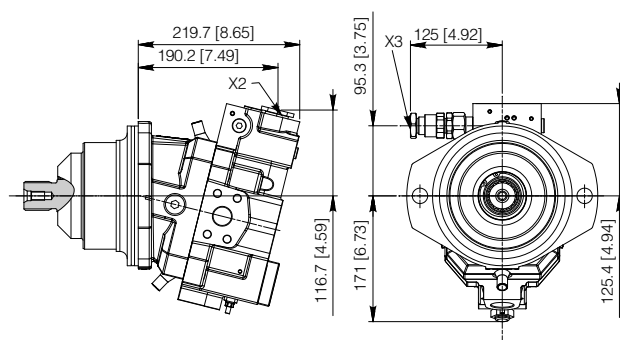
X2: Piloting port - 1/4 G (BSPP)

## RIN



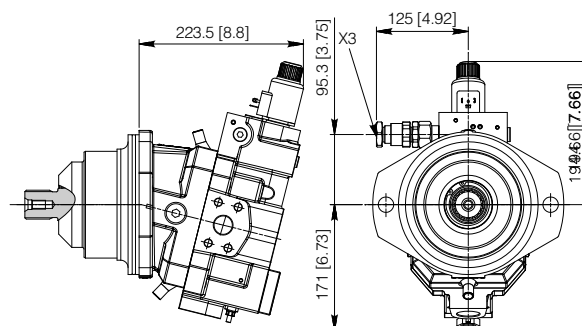
X2: Piloting port - 1/4 G (BSPP)

## RID



X2: Piloting port - 1/4 G (BSPP)  
X3: Double step piloting port - 1/4 G (BSPP)

## RED

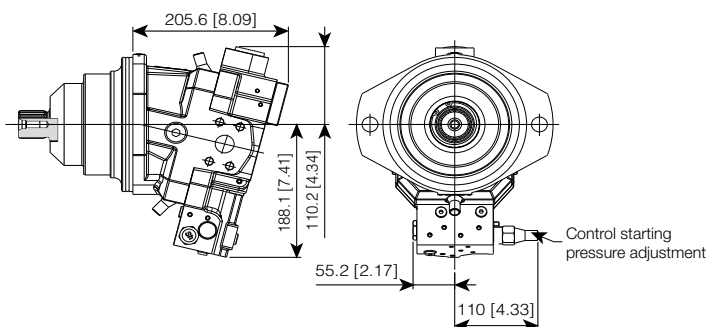


X3: Double step piloting port - 1/4 G (BSPP)

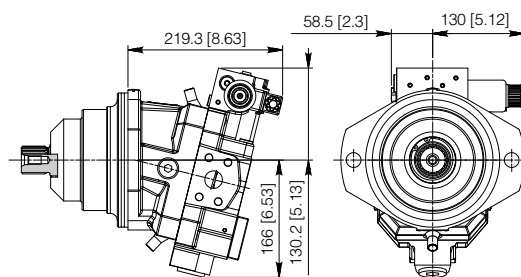
10

Control

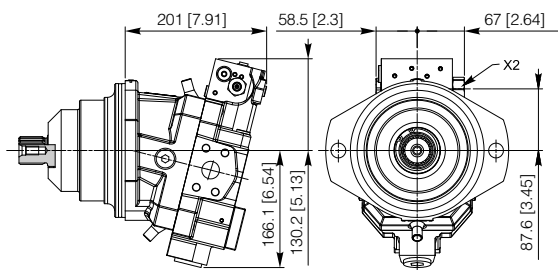
## RPE



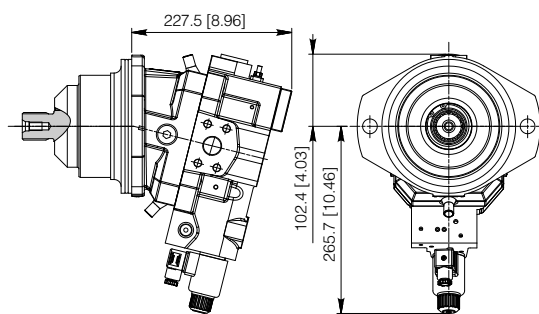
## 2EN



## 2IN

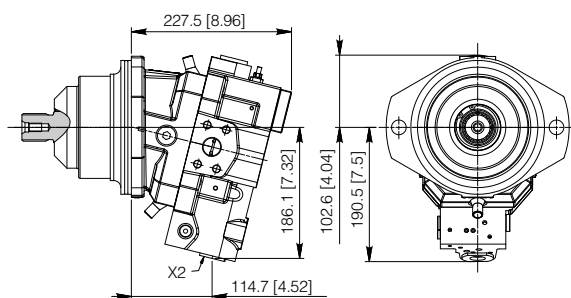


## REN

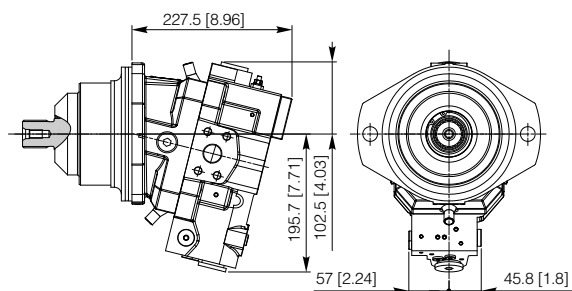


X2: Piloting port - 1/4 G (BSPP)

## RIN



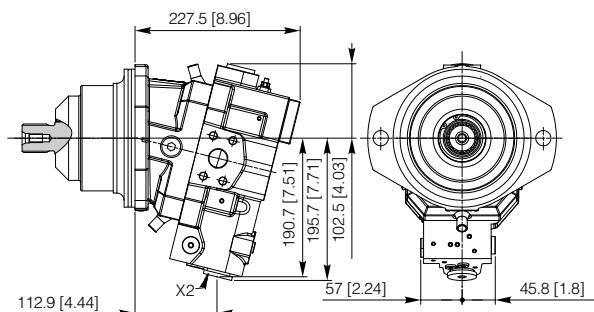
## ROE



X2: Piloting port - 1/4 G (BSPP)

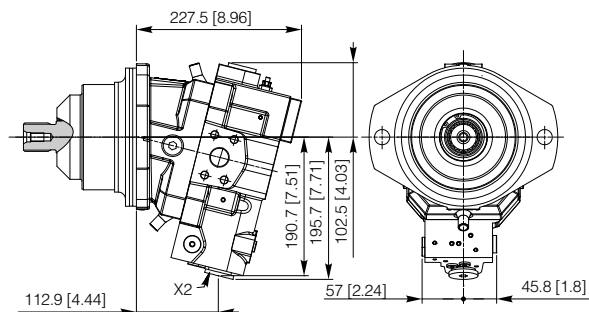
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## RPI



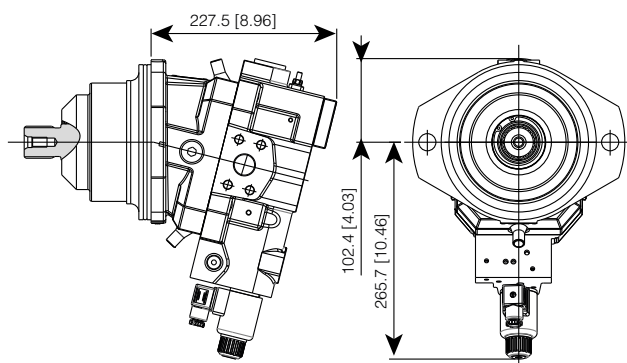
X2: Piloting port - 1/4 G (BSPP)

## ROI

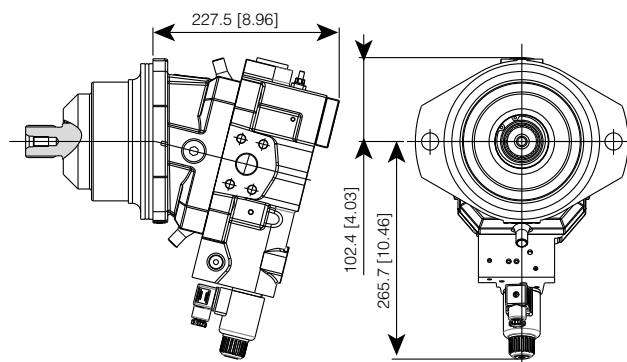


X2: Piloting port - 1/4 G (BSPP)

## ROS

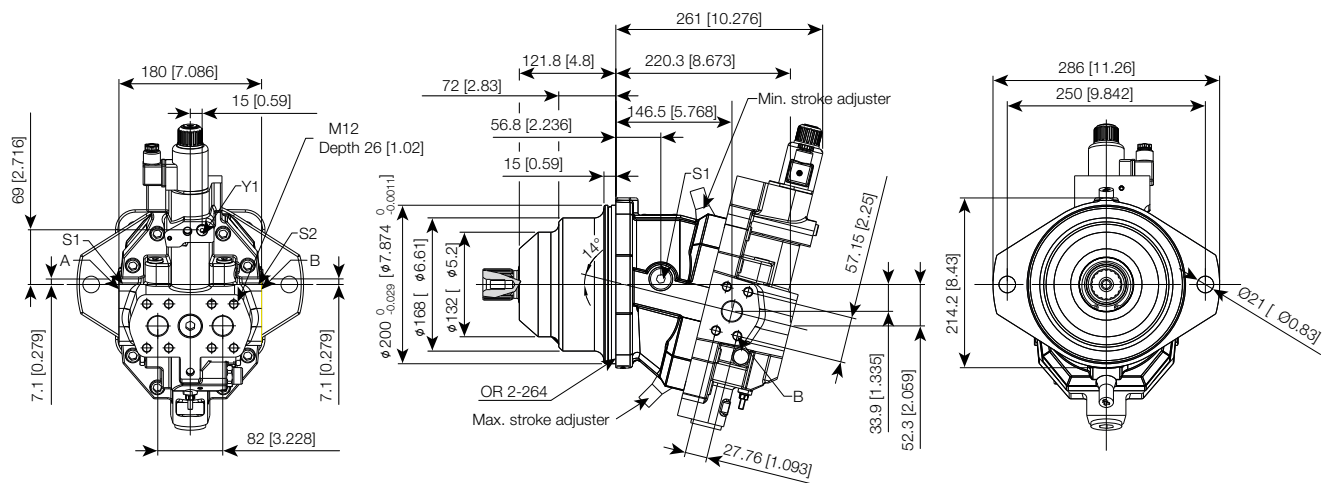


## RPS





## SH7VR 108 Motor - Mounting flange 2 Bolts (ON)



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

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

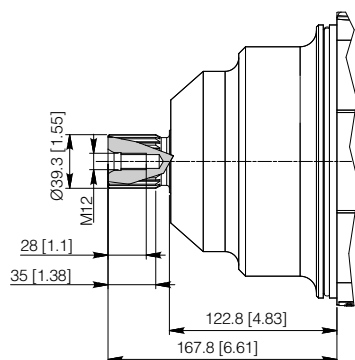
Y1: Working pressure piloting port - 1/8 G (BSPP)

## 8

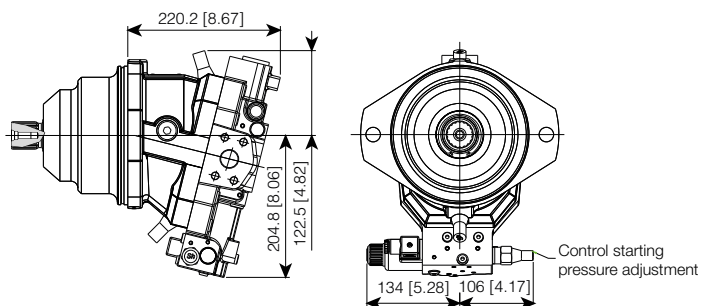
## Shaft end

## SAO Splined shaft

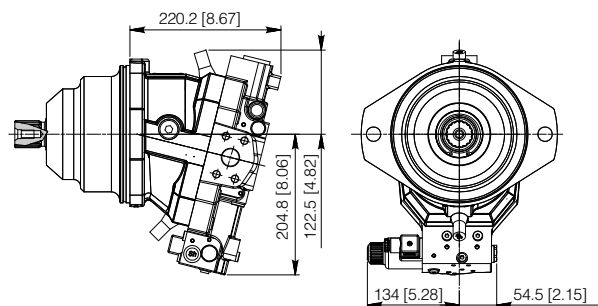
W40x2x30x18 - DIN 5480



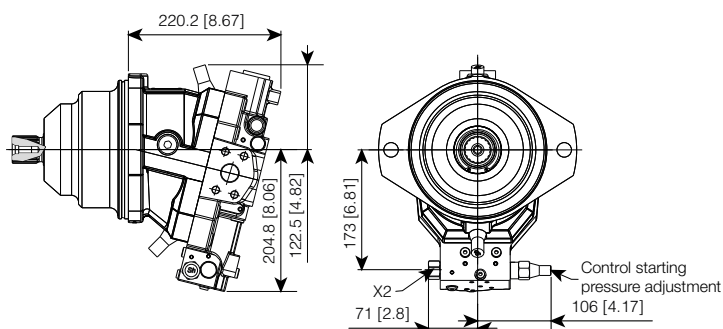
## 2EE



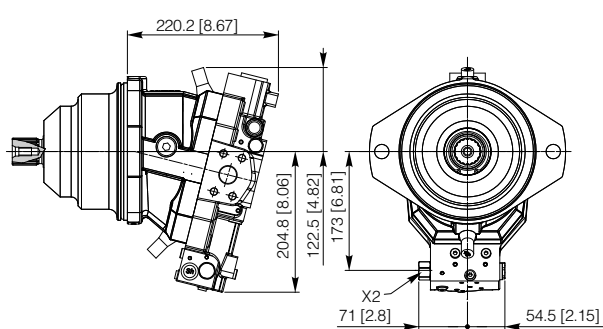
## 2EN



## 2IE



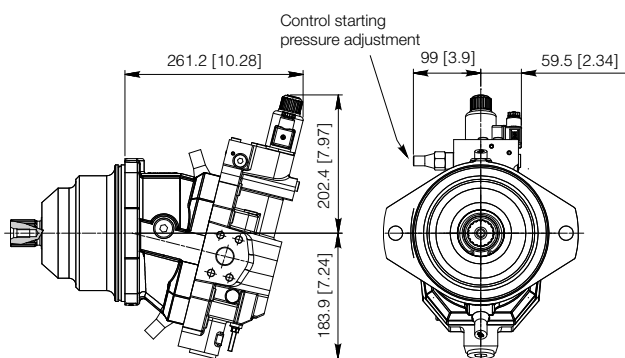
## 2IN



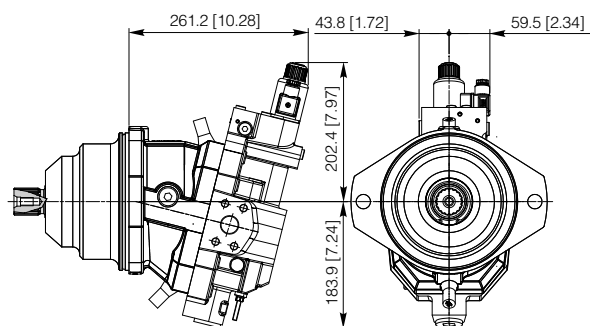
X2: Piloting port - 1/4 G (BSPP)

X2: Piloting port - 1/4 G (BSPP)

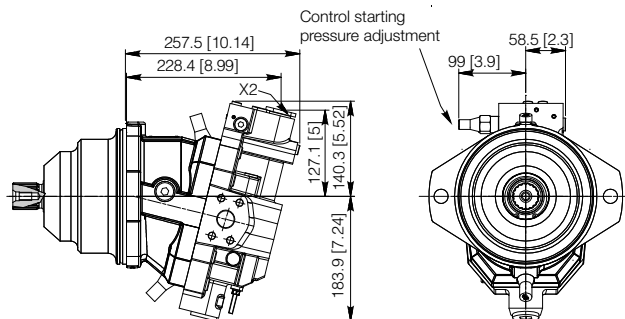
## REE



## REN

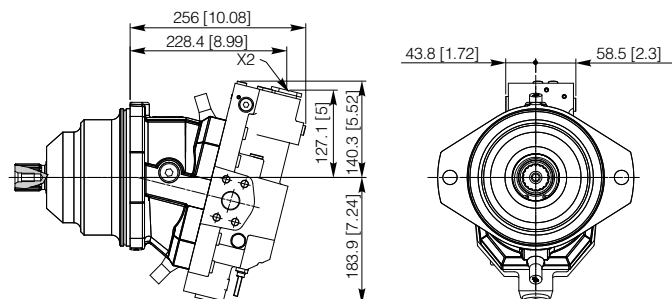


## RIE



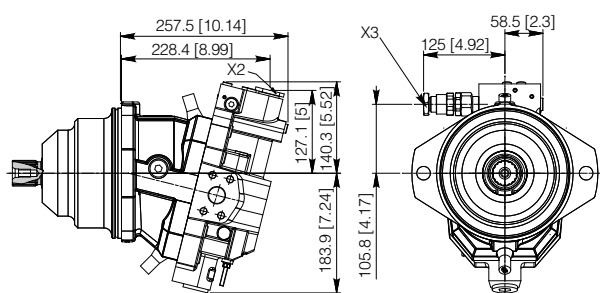
X2: Piloting port - 1/4 G (BSPP)

## RIN



X2: Piloting port - 1/4 G (BSPP)

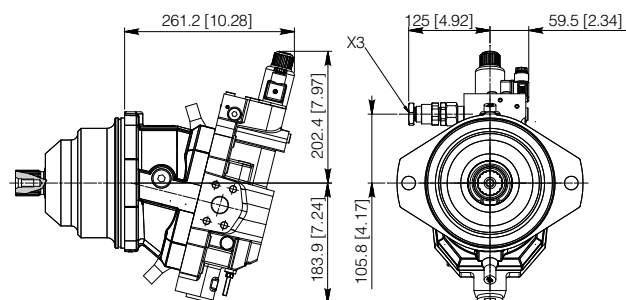
## RID



X2: Piloting port - 1/4 G (BSPP)

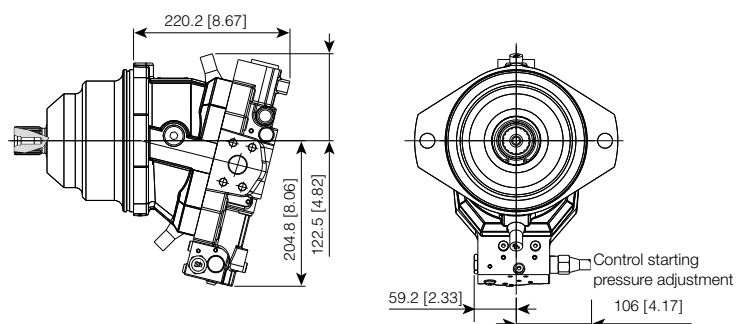
X3: Double step piloting port - 1/4 G (BSPP)

## RED

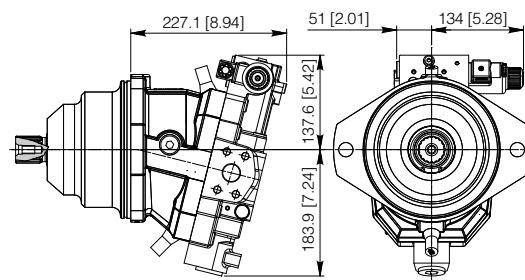


X3: Double step piloting port - 1/4 G (BSPP)

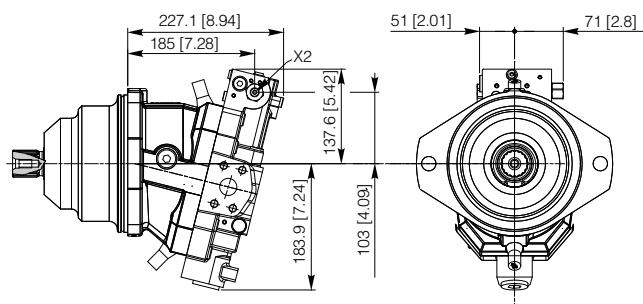
## RPE



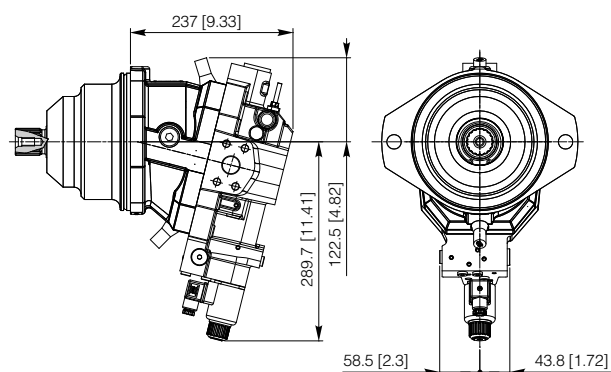
## 2EN



## 2IN

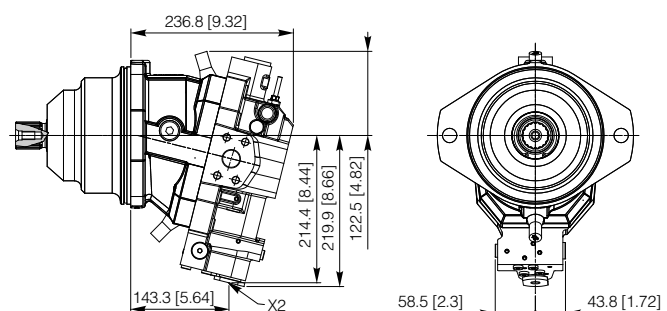


## REN

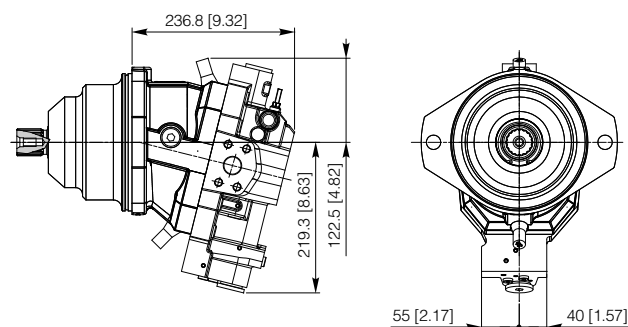


X2: Piloting port - 1/4 G (BSPP)

## RIN



## ROE



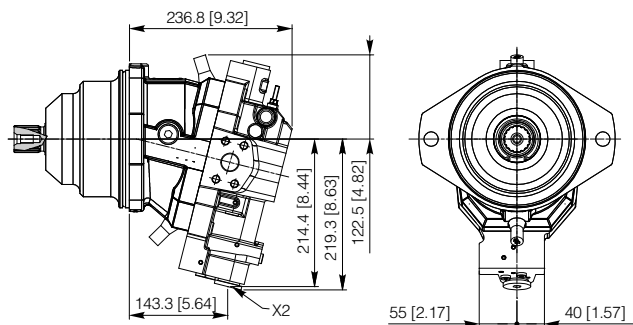
X2: Piloting port - 1/4 G (BSPP)

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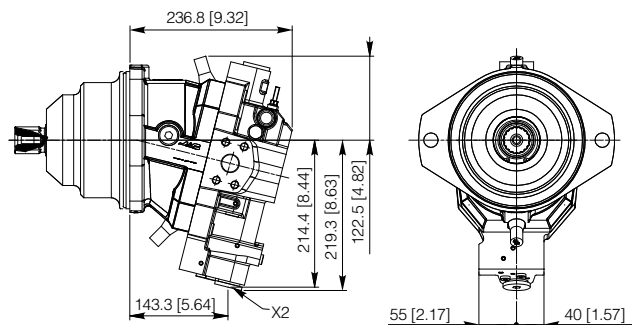


## RPI



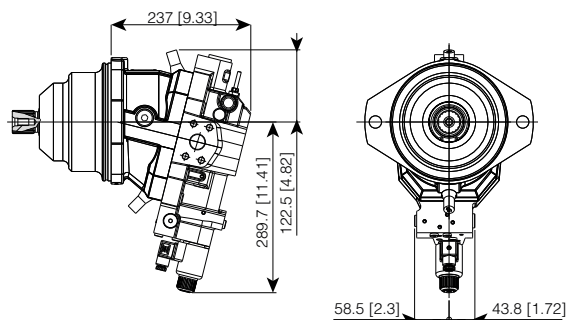
X2: Piloting port - 1/4 G (BSPP)

## ROI

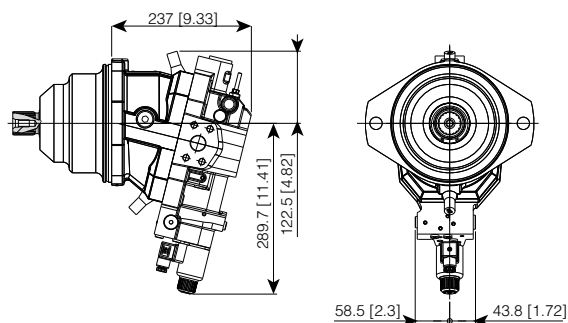


X2: Piloting port - 1/4 G (BSPP)

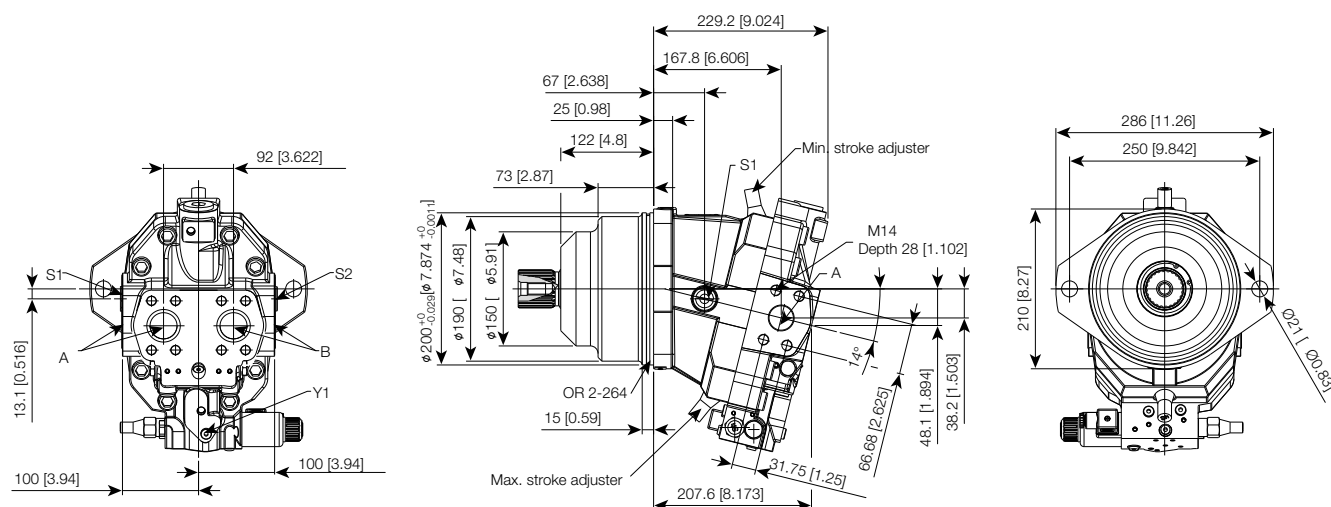
## ROS



## RPS



## SH7VR 160 Motor - Mounting flange 2 bolts (ON)



S1, S2: Case drain port - 3/4 G (BSPP)

A, B: Service line ports - 1" 1/4 SAE 6000

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

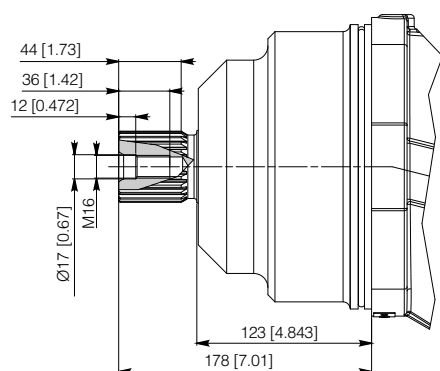
## 8

## Shaft end

## SAR

## Splined shaft

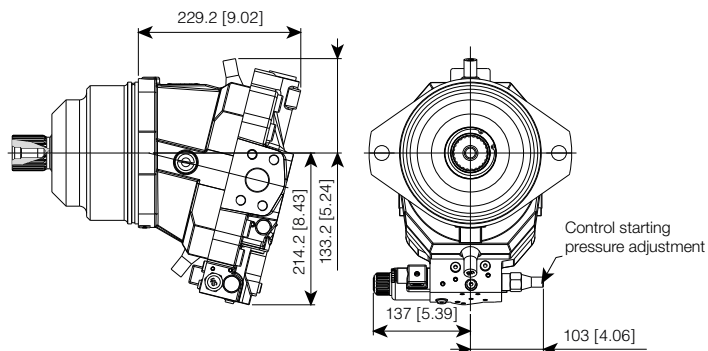
W50x2x30x24 - DIN 5480



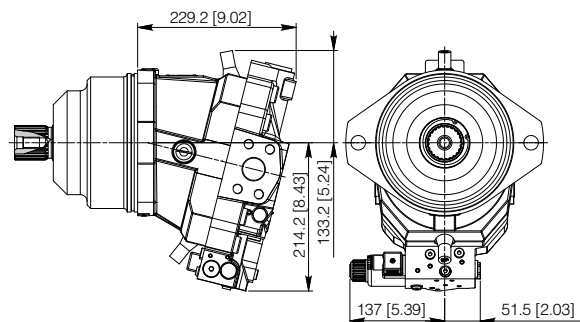
10

Control

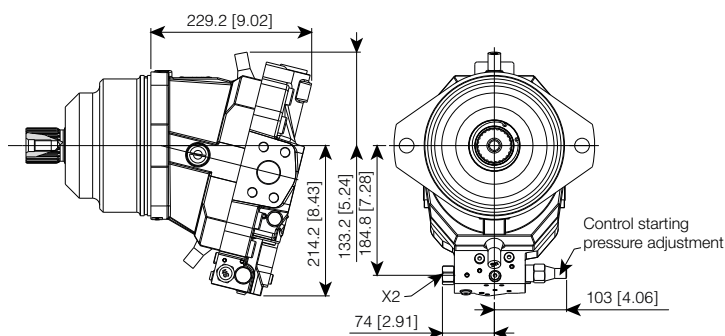
## 2EE



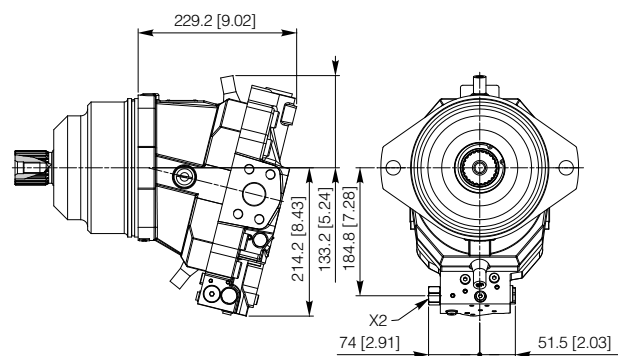
## 2EN



## 2IE



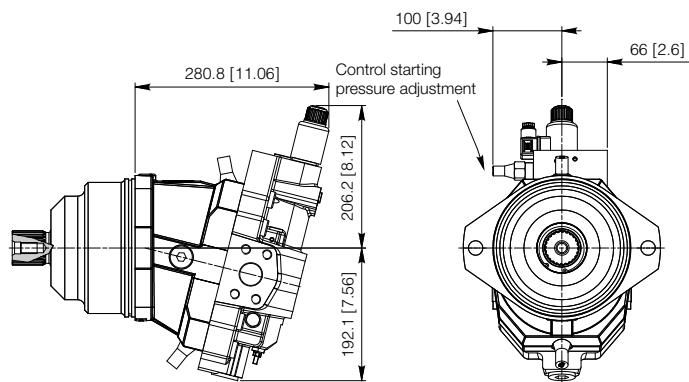
## 2IN



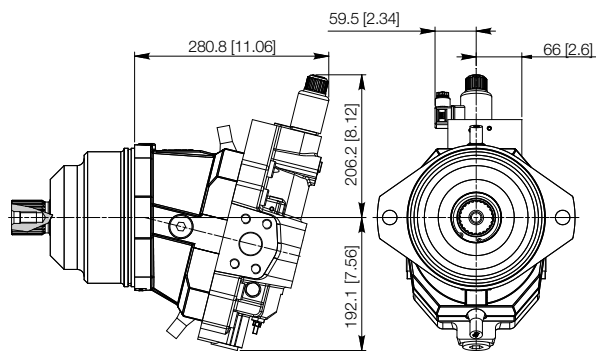
X2: Piloting port - 1/4 G (BSPP)

X2: Piloting port - 1/4 G (BSPP)

## REE



## REN

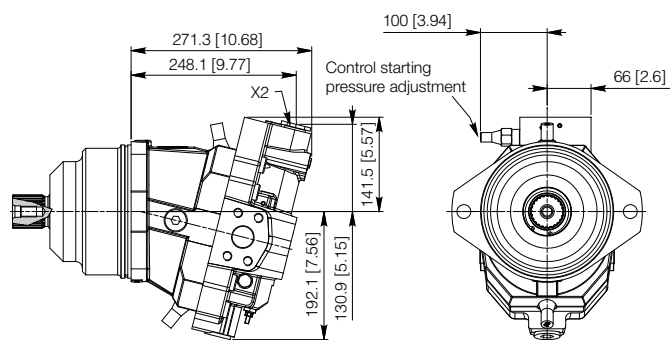


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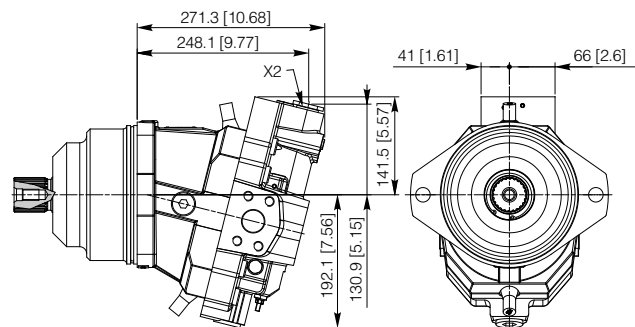


## RIE



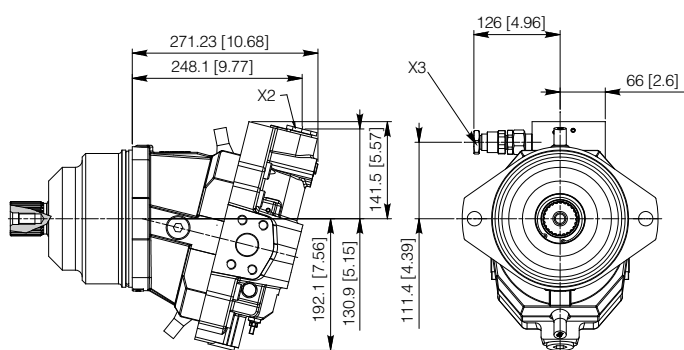
X2: Piloting port - 1/4 G (BSPP)

## RIN



X2: Piloting port - 1/4 G (BSPP)

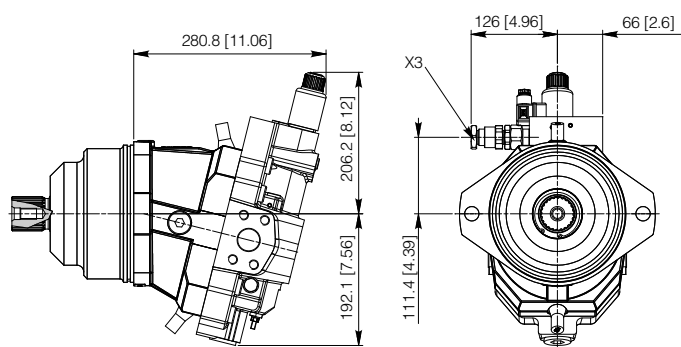
## RID



X2: Piloting port - 1/4 G (BSPP)

X3: Double step piloting port - 1/4 G (BSPP)

## RED



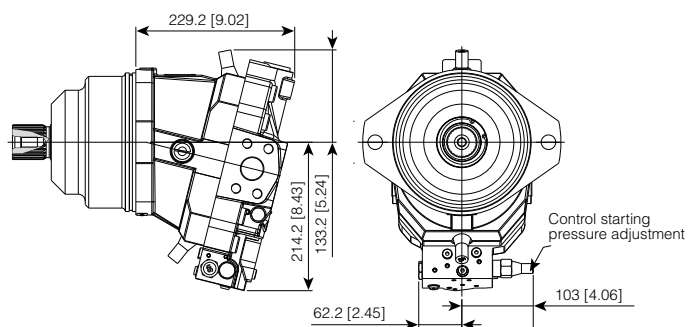
X3: Double step piloting port - 1/4 G (BSPP)



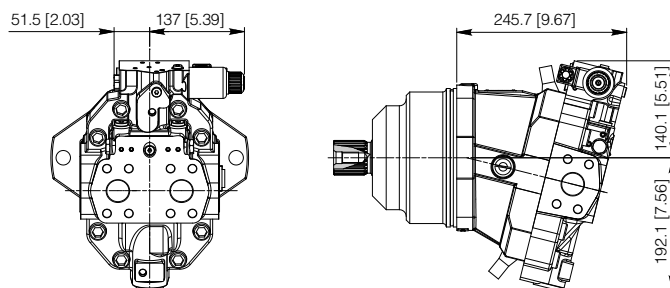
10

Control

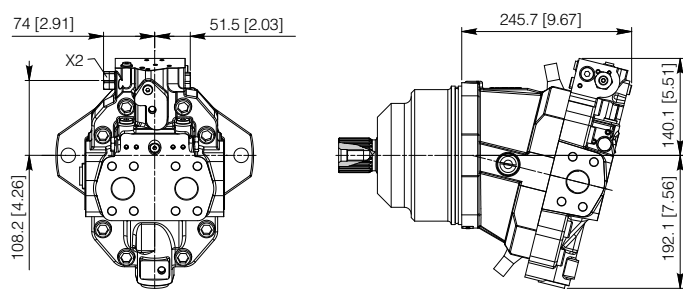
## RPE



## 2EN

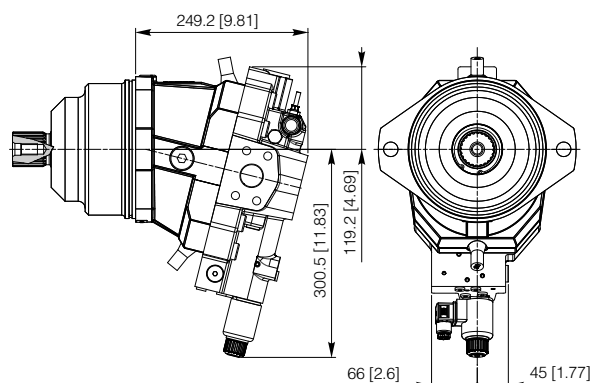


## 2IN

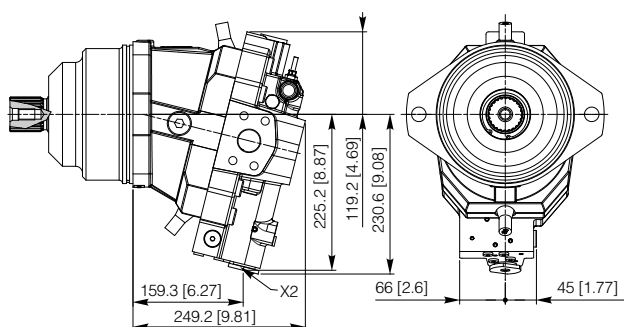


X2: Piloting port - 1/4 G (BSPP)

## REN

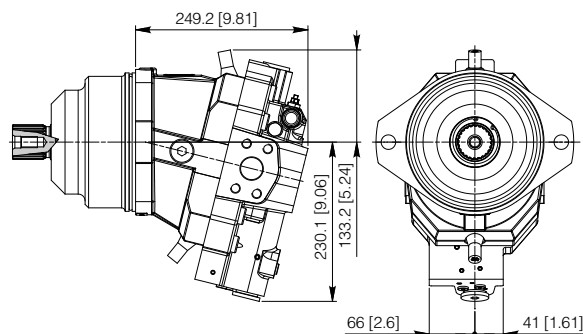


## RIN

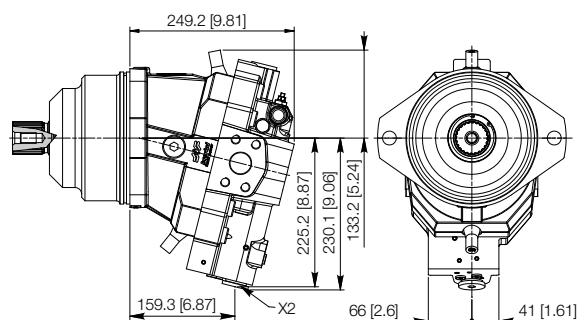


X2: Piloting port - 1/4 G (BSPP)

## ROE

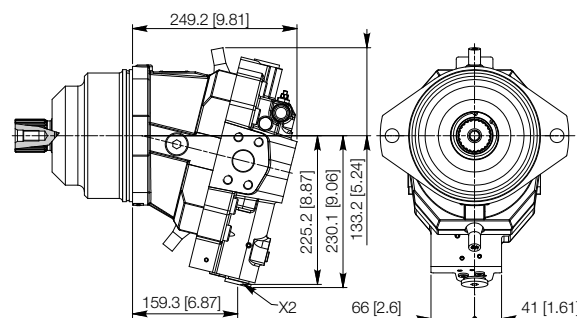
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## RPI



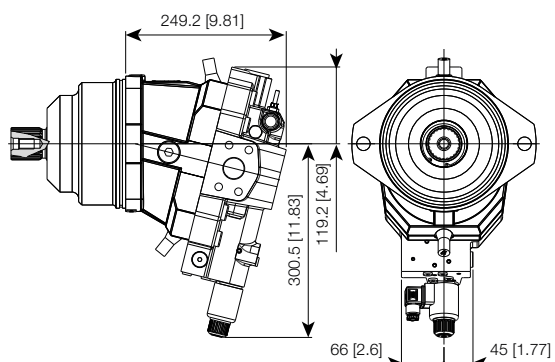
X2: Piloting port - 1/4 G (BSPP)

## ROI

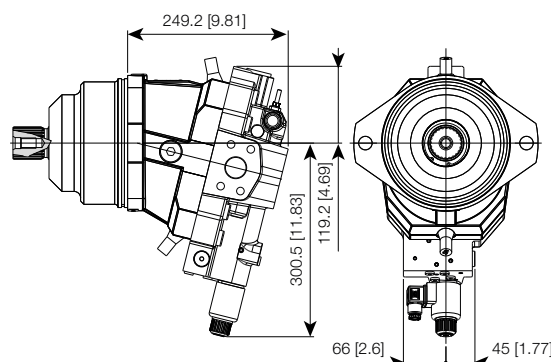


X2: Piloting port - 1/4 G (BSPP)

## ROS

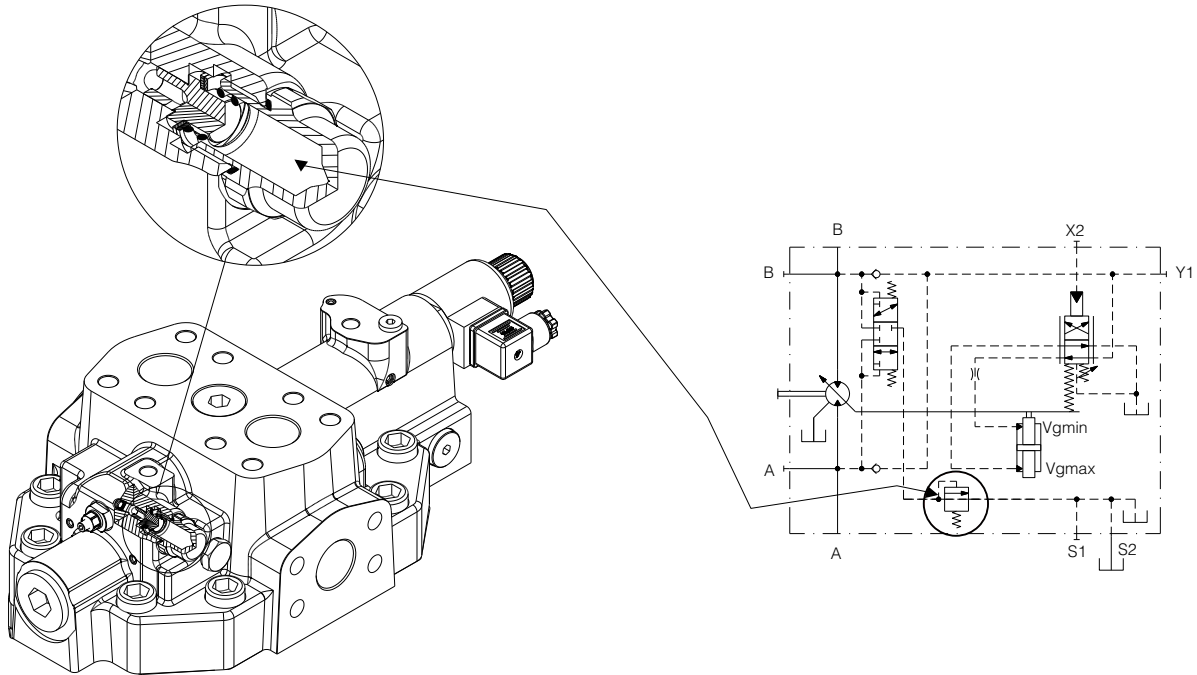


## RPS

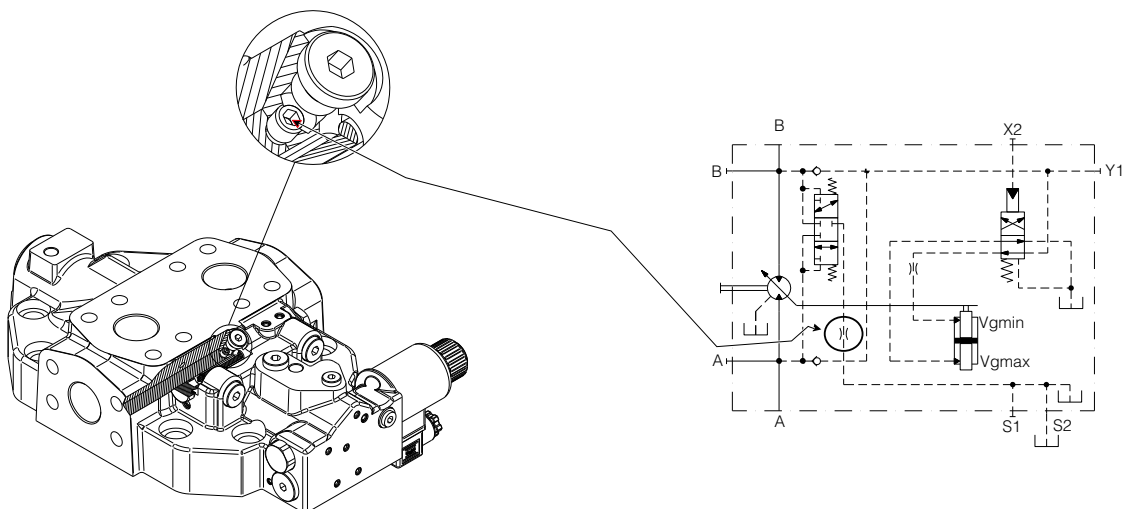


For closed circuit operation, the motors can be equipped with built in flushing valve.

**Only for SH7VR 108-160**



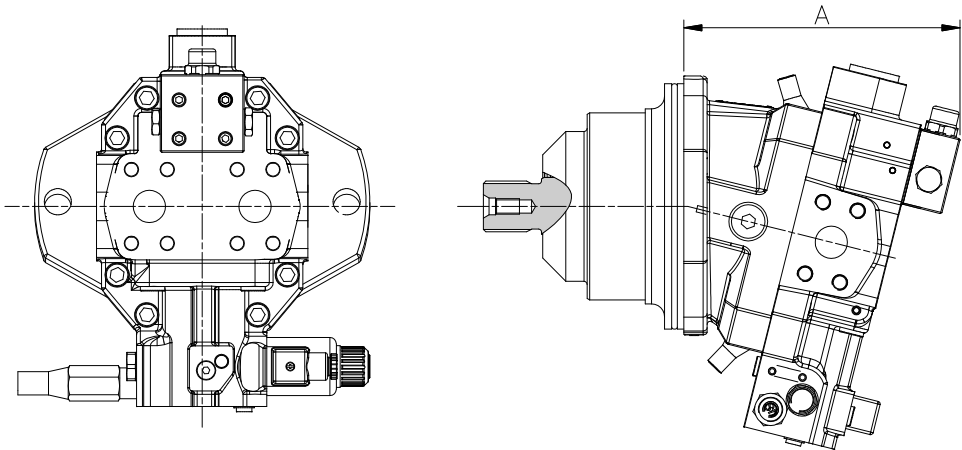
**Only for SH7VR 160 with two positions controls**



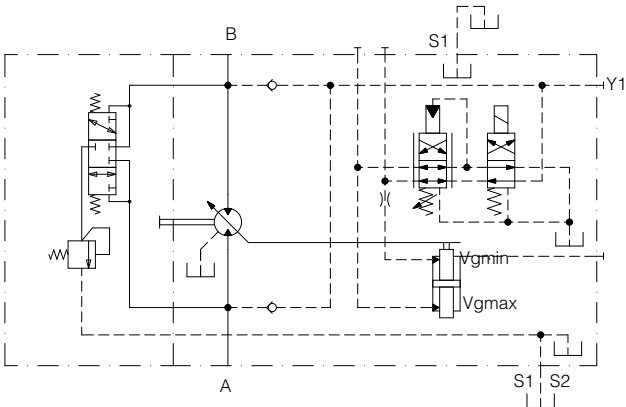
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Flushing valve

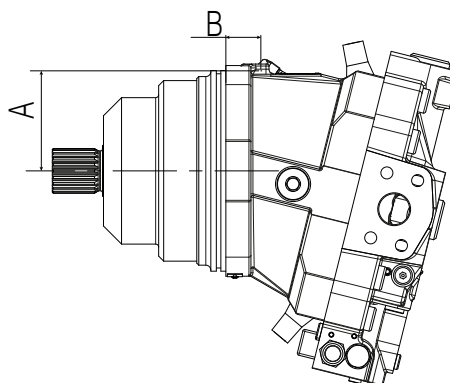
Only for SH7VR 055-075



		SH7VR 055	SH7VR 075
A	mm [in]	214 [8.42]	250 [9.84]



## TS - TW - TZ



		Size			
		SH7VR 055	SH7VR 075	SH7VR 108	SH7VR 160
A	mm [inch]	84.2 [3.3]	88 [3.46]	96.2 [3.787]	103.8 [4.086]
B	mm [inch]	23.5 [0.925]	23 [0.906]	25 [0.984]	29.4 [1.157]

**TW**

2-Channel differential-hall effect operating principle (1 square wave -1 digital for direction of rotation) Output signal PNP  
 Power supply 4.5-16 VDC  
 Frequency 0 - 20.000 Hz  
 Operating temperature -40°C - +110°C  
 Degree of protection IP67  
 Sensor connector Deutsch DT04-4P  
 Electromagnetic compatibility according to EN 60947-5-2  
 Resistance to shock and vibration in accordance with IEC 68-2-17 IEC 68-2-6

**TZ**

2-Channel differential-hall effect operating principle Sensor with dual-channel output (90°)  
 Power supply 8-32 VDC  
 Frequency 0-20.000 Hz  
 Operating temperature -40°C +125°C  
 Degree of protection IP67  
 Sensor connector Deutsch DT04-4P  
 Electromagnetic compatibility according to EN 60947-5-2  
 Resistance to shock and vibration in accordance with IEC 68-2-17 IEC 68-2-6

Size				
	SH7VR 055	SH7VR 075	SH7VR 108	SH7VR 160
Number of pulses per revolution	54	58	67	80



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*Motion Systems*

