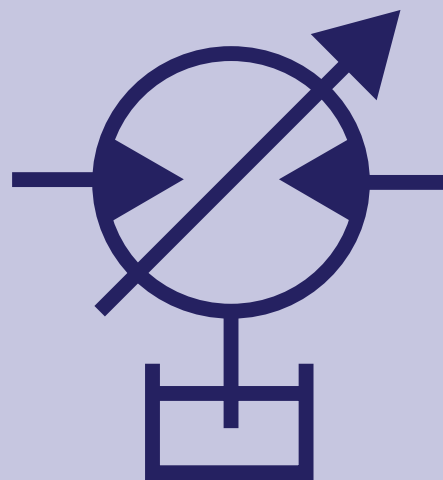
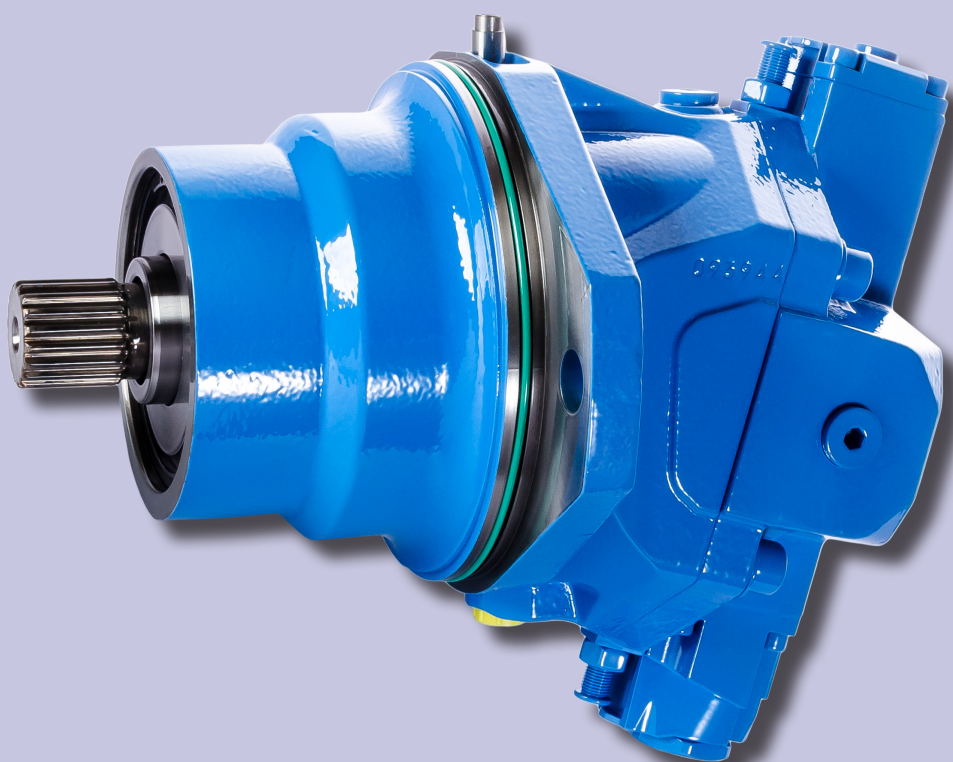


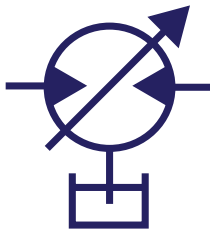
HYDRAULIC MOTORS

VARIABLE DISPLACEMENT



make it simple

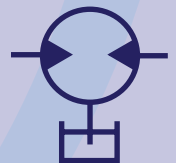


**HYDRAULIC
MOTORS**
 VARIABLE DISPLACEMENT


Design, characteristics and advantages	3
Efficiency and operating conditions	4
Order code	7
Dimensions MV series motors	9
Dimensions MVS1 series motors	11
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Also find the fixed displacement LEDUC motors range in the **BENT AXIS HYDRAULIC MOTORS - FIXED DISPLACEMENT** catalogue downloadable on www.hydroleduc.com

- Models from 5 to 250 cc/rev
- Available in DIN and SAE versions
- In fixed displacement, special drainless motor.



Complete catalogues available at www.hydroleduc.com

► Main applications

- Suitable for use in either open or closed loop circuits
- On-wheel / track propulsion
- Cutting tools
- Winches...

► Advantages of the LEDUC variable displacement motors

- 9-piston design (7-piston for 28 cm³) allowing high starting torque and reduced pulsations at low speed
- Continuous variable displacement from V_{max} to V_{min}
- High operating ratio (5:1)
- Compact size; high weight-power ratio
- High speed and high operating pressure
- Low noise level: barrel driven by conical pistons
- Long service life: high performance bearings
- 7 types of displacement control - see page 16 (HPA, HPM, HPD, HPT, HYP, H2N, E2N)

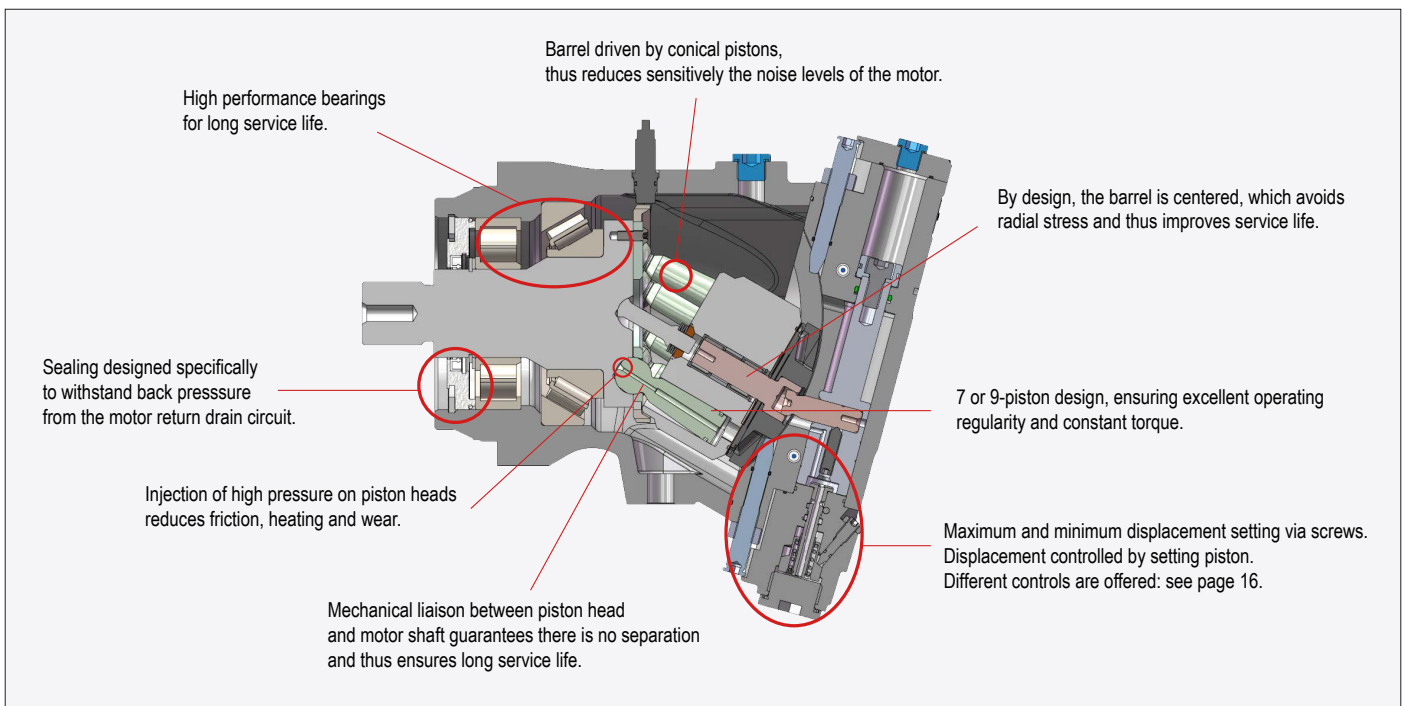
► Technical characteristics of LEDUC variable displacement motors

		28	85	115
Max. displacement (cm ³ /tr)	V_{max}	9,6 ⇔ 28,1	30,6 ⇔ 85,2	41,1 ⇔ 115,6
Min. displacement (cm ³ /tr)	V_{min}	5,6 ⇔ 19,4	17 ⇔ 57,4	23,1 ⇔ 78,1
Displacement ratio 5	$V_{max} / 5$	5,6 cm ³	17 cm ³	23,1 cm ³
Max. continuous operating pressure	P_{max}	400 bar	400 bar	400 bar
Max. peak pressure	P_p	450 bar	450 bar	450 bar
Max. speed at max. displacement	$N_{max} \text{ à } V_{max}$	5550 tr/min	3900 tr/min	3550 tr/min
Max. speed at min. displacement	$N_{max} \text{ à } V_{min}$	8550 tr/min	6800 tr/min	5600 tr/min
Max. absorbed flow	Q_{max}	156 l/min	331 l/min	408 l/min
Max. output power	P_{max}	99 kW	220 kW	271 kW
Max. output torque at P_{max} and V_{max}	C_{max}	17,9 daN.m	54 daN.m	73 daN.m

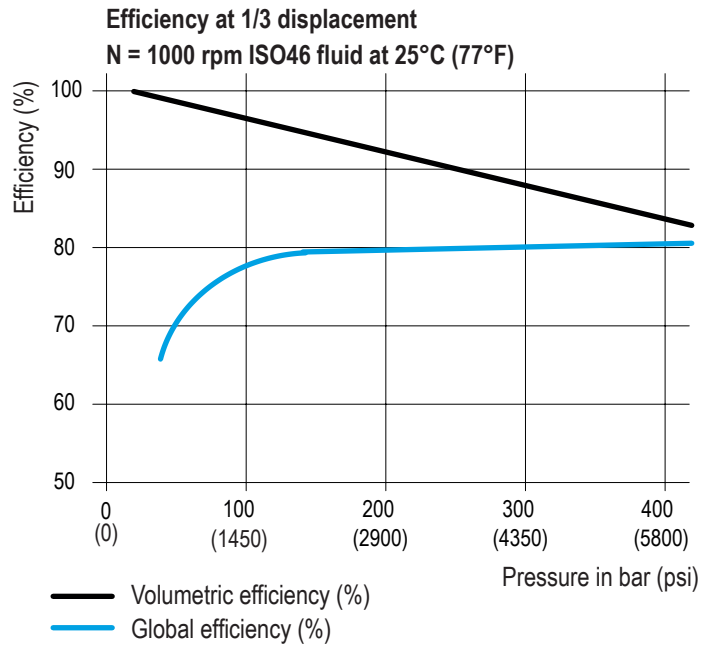
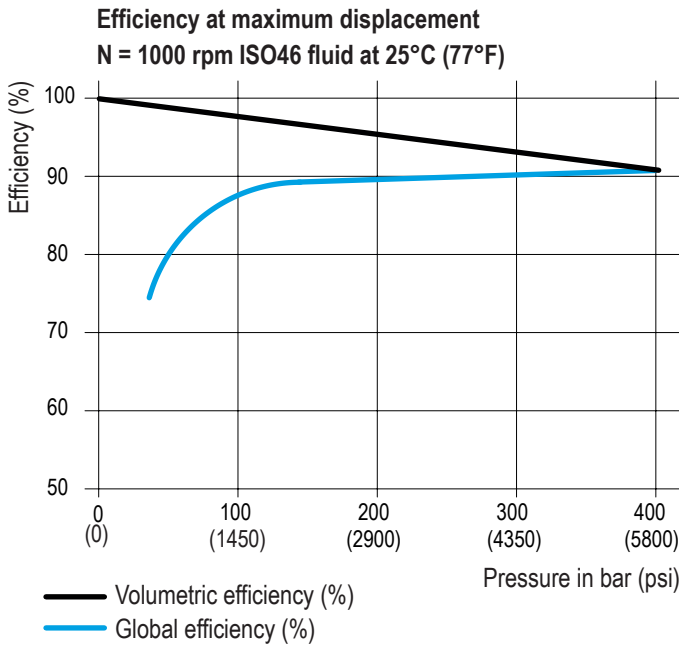
Currently, three displacements are available: 28 cm³/tr, 85 cm³/tr, and 115 cm³/tr. The expansion of the range is underway.

► Advantages of LEDUC variables motors

High-quality expertise and materials. The design choices presented below ensure the reliability and long service life of LEDUC motors.



► Efficiency of the MV, MVA and MVSI motors



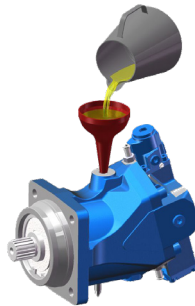
These graphs are given as an indication only; for further information, please contact our Technical Service.

► Preparation of the motor

Before starting, the hydraulic motors must be oiled. Bleeding of control device is done automatically during initial commissioning.

► The fluid

LEDUC motors are designed for use with mineral-origin hydraulic fluids. Using other fluids is possible but may require a modified motor; please contact us with details of fluid.



For fluids at very high temperatures (from 90 to 115 °C / 194 to 239°F), we recommend a minimum cleanliness level of 19/17/14 according to ISO 4406.

► Rotating speeds

The minimum rotation speed required for continuous operation is 200 rpm. However, under certain conditions, the motor can be used at lower speeds (please consult us).

The maximum rotation speed is determined based on the motor sizes.

► Installation positions

LEDUC motors are designed to operate in all positions (see details on page 6).

► Operating Temperatures

- As standard, LEDUC motors are equipped with FKM (Viton®) seals.

Permissible temperatures: from -25 to 115 °C (-13 to 239°F)

- As an option, HYDRO LEDUC proposes NBR seals, for operating temperatures from -40 to 80°C (-40 to 176°F)

Recommended viscosity:

- Ideally: between 15 to 400 cSt,
- Maximum range: between 5 to 1600 cSt.

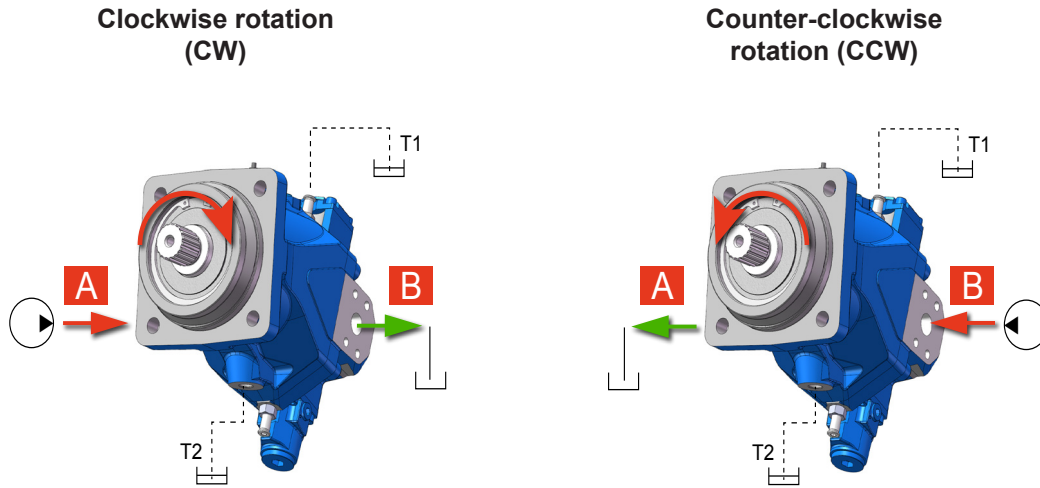
► Filtration of the hydraulic fluid

The service life of the motors depends greatly on the quality and the cleanliness of the hydraulic fluid. We recommend the following minimum cleanliness levels:

- 9 according to NAS 1638,
- 6 according to SAE,
- 20/18/15 according to ISO/DIS 4406.

► Direction of rotation

LEDUC motors rotate clockwise or counter-clockwise depending on the direction of hydraulic flow entering the motor.

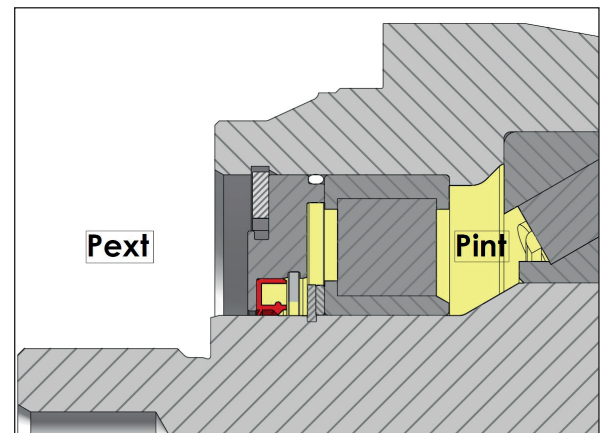


► Drain pressure

It is essential to drain the motor, through T1 or to T2, to avoid excessive pressures on the shaft seal. Maximum acceptable internal pressure depends on shaft rotation speed.

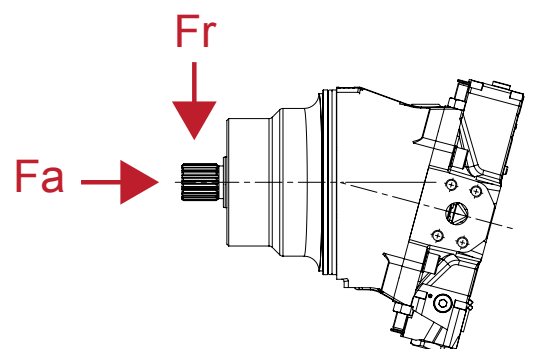
However, following these guidelines will avoid problems during operation:

- Maximum internal pressure (Int P) regardless of rotating speed (continuous): 4 bar.
- Maximum pressure regardless of rotating speed: 5.5 bar.
- The maximum pressure in the motor housing must be greater than the external pressure (ext P).



► Acceptable forces applied to motor shaft

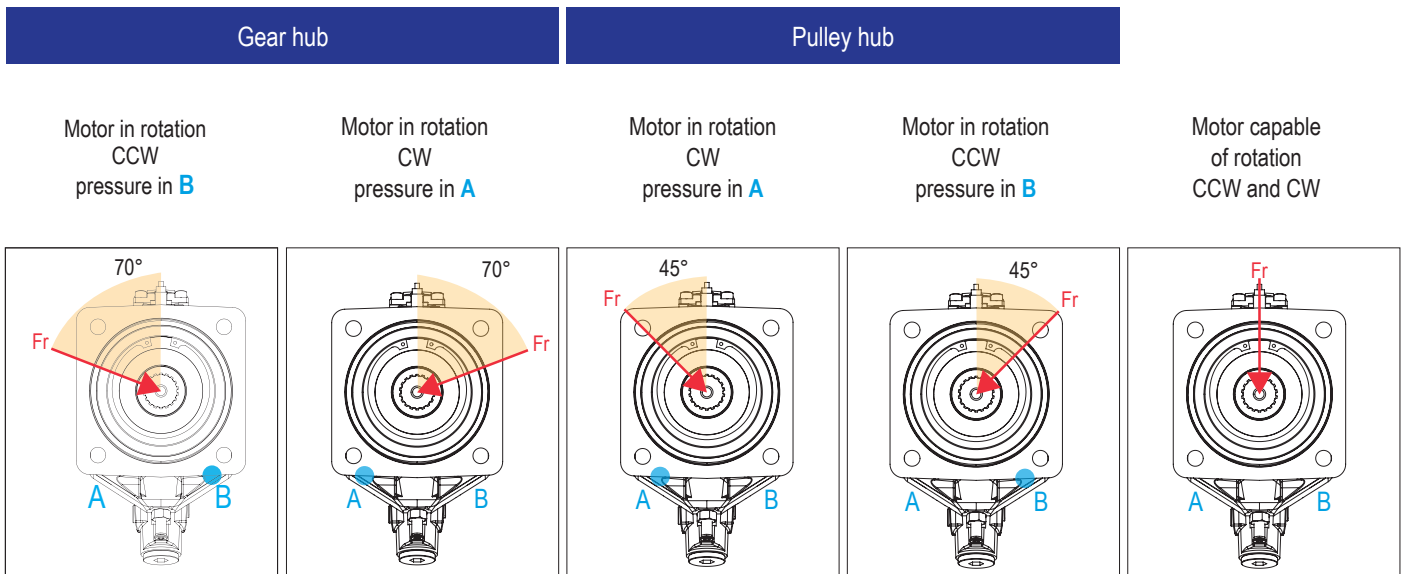
Variable motors MV | MVS1 | MVA		28	85	115
Fr	daN	430	1300	1500
Fa	N/bar	39	80	60



Operating conditions

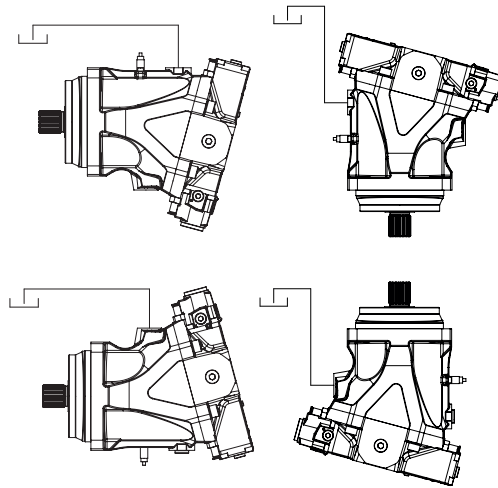
► Maximizing service life of bearings

In cases where there is a radial force on motor shaft, keeping the direction of that force within the shaded areas shown below will improve service life of the motor.

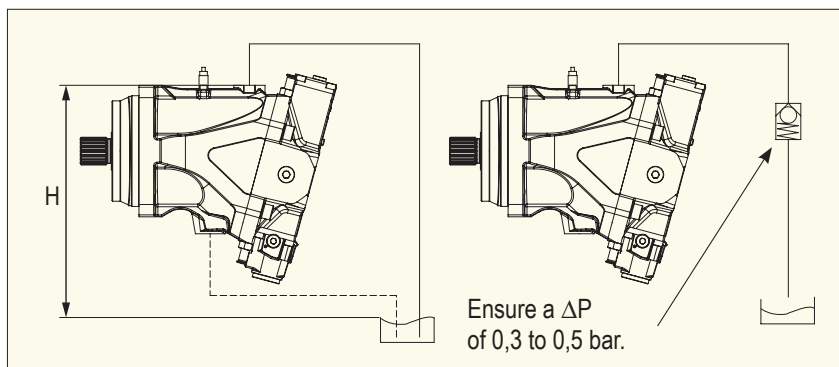


► Mounting position of motors

LEDUC motors can be used in only mounting position. In "shaft upwards" position, make sure that the motor housing is completely filled with fluid.



In installations where the position of the motor (H) is above the tank for the drain return, be sure the drain line is always submerged in fluid. If this is not the case, it is necessary to add a check valve on the drain line as shown the figure on right.



MV	...	...	...	...	...	...	...	...	...	F	...	...
01	02	03	04	05	06	07	08	09	10	11	12	13

To obtain the code for your motor, complete the different parameters 01 to 11 in the table on the left according to the options you require (see table below).

Motor															
01	MV					MVS1			MVA		MV	MVS1	MVA		
Displacement															
02	85		115		28		85		115						
Mounting flange															
03	ISO 3019-2, 4 bolts				ISO 3019-2, 2 bolts			SAE C 2 bolts		SAE D 4 bolts		A	B	C	
Shaft															
04	DIN 5480 splined		W40	W40	W30	W40	W40	-		-		W1			
			-	W45	-	-	W45	-		-		W2			
	SAE J744 splined		-	-	-	-	-	1-1/2" 17T 12/24 DP		1-3/4" 13T 8/16 DP		S1			
			-	-	-	-	-	1-1/4" 14T 12/24 DP		1-1/2" 17T 12/24 DP		S2			
Inlet ports															
05	Flange	Rear	0	•	•	•	•	•	•		•		M0		
		Side	0	•	•	•	•	•	•		•		N0		
			1	•	•	•	•	•	•		•		N1		
<div style="border: 1px solid red; padding: 5px; background-color: #ffffcc;"> 0 = Without suitability for valve 1 = With flushing valve (FV) control, MV115 s available with N1 inlet ports without a valve (WV). </div>															
Drain															
06	2		2		2		2		2		2		M2	M2	U2
Displacement control*															
07	Automatic high pressure	$\Delta p = 10$ bar		•	•	•	•	•	•		•		HPA		
		$\Delta p = 100$ bar		•	•	•	•	•	•		•		HPM		
	Hydraulic 2 speeds	V_{min} to V_{max}		•	•	•	•	•	•		•		H2N+		
		V_{max} to V_{min}		•	•	•	•	•	•		•		H2N-		
	Automatic Proportional Hydraulics + 2 speeds controlled externally	$\Delta P = 10$ bar		•	•	•	•	•	•		•		HPD		
		$\Delta P = 100$ bar		•	•	•	•	•	•		•		HPT		
	Proportional Hydraulics with External Control	V_{min} to V_{max}	$\Delta P = 10$ bar	•	•	•	•	•	•		•		HYP1+		
		V_{min} to V_{max}	$\Delta P = 25$ bar	•	•	•	•	•	•		•		HYP2+		
		V_{max} to V_{min}	$\Delta P = 10$ bar	•	•	•	•	•	•		•		HYP1-		
		V_{max} to V_{min}	$\Delta P = 25$ bar	•	•	•	•	•	•		•		HYP2-		
	Electric 2 speeds	V_{min} to V_{max}	24V	•	•	•	•	•	•		•		E2N+ 24		
		V_{max} to V_{min}	24V	•	•	•	•	•	•		•		E2N- 24		
V_{min} to V_{max}		12V	•	•	•	•	•	•		•		E2N+ 12			
V_{max} to V_{min}		12V	•	•	•	•	•	•		•		E2N- 12			
Suitable for use of speed sensor															
08	Yes		•	•	•	•	•	•		•		1			
	No		•	•	•	•	•	•		•		0			

*see page 16-17

Speed sensor

09	1 frequency signal	•	•	•	•	•	•	•	1
	1 signal with connector	•	•	•	•	•	•	•	1P
	2 signals	•	•	•	•	•	•	•	2P
	Without	•	•	•	•	•	•	•	0

Flushing valve (FV)

10	Without	•	•	•	•	•	•	•	SV	
	Flow rate	4,25 l/min ($\Delta p = 25$ bar)	•	•	•	•	•	•	•	VB04
		10 l/min ($\Delta p = 25$ bar)	•	•	•	•	•	•	•	VB10
		14 l/min ($\Delta p = 25$ bar)	•	•	•	•	•	•	•	VB14

Requires a N1 flange.

Seal

11	FKM	•	•	•	•	•	•	•	F
----	-----	---	---	---	---	---	---	---	---

Displacement setting

12	Max. displacement (cm ³ /tr) (1)	30,6↔85,2	41,4↔115,6	9,6↔85,2	30,6↔85,2	41,4↔115,6	30,6↔85,2	41,4↔115,6	...
13	Min. displacement* (cm ³ /tr) (2)	17↔57,4	23,1↔78,1	5,6↔19,4	17↔57,4	23,1↔78,1	17↔57,4	23,1↔78,1	...

Legend :

• Existing model

– Not yet existing

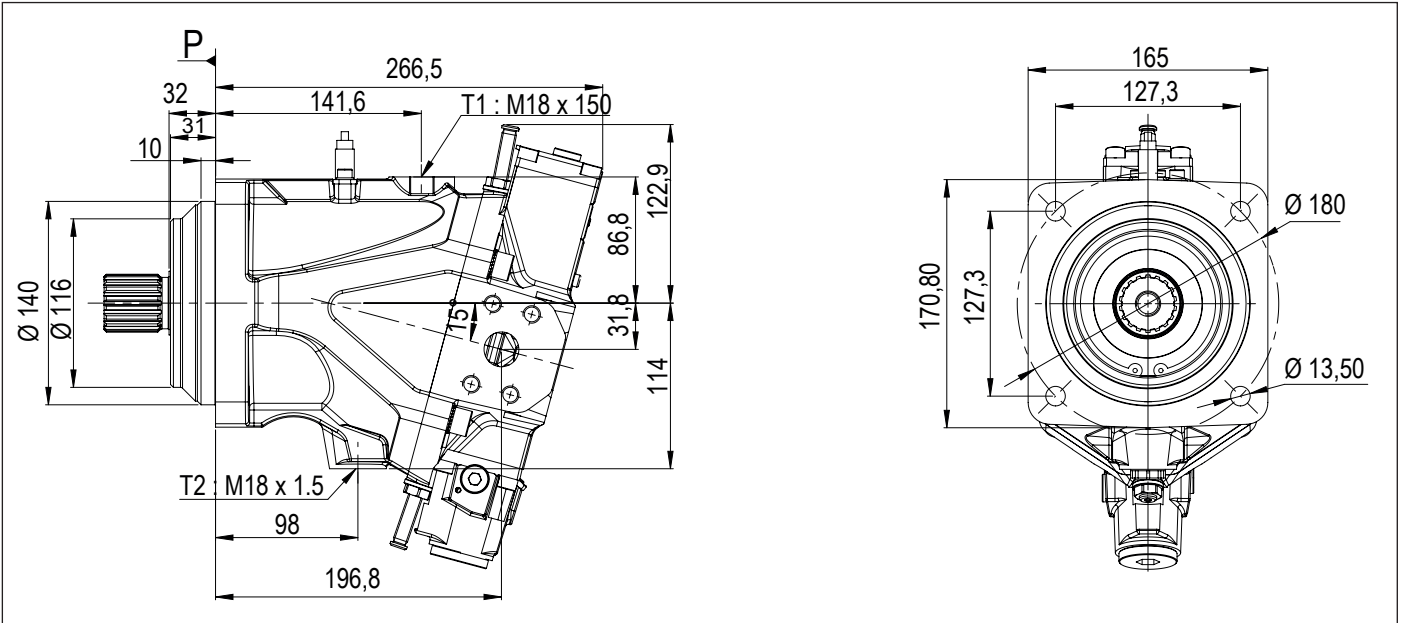
(1) By default: maximum displacement.

(2) By default: 1/3 of maximum displacement.

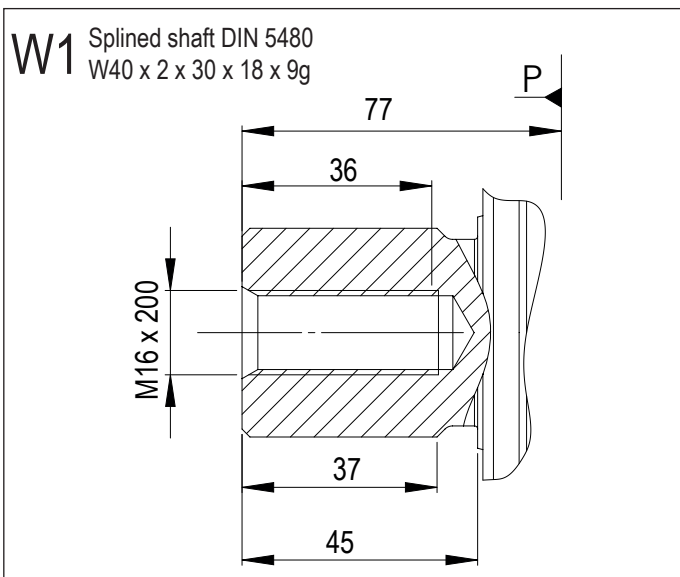
*Minimum displacement of 0cm³ possible only upon request.

Depending on the control selected in part 7, please specify the additional setting on your order:

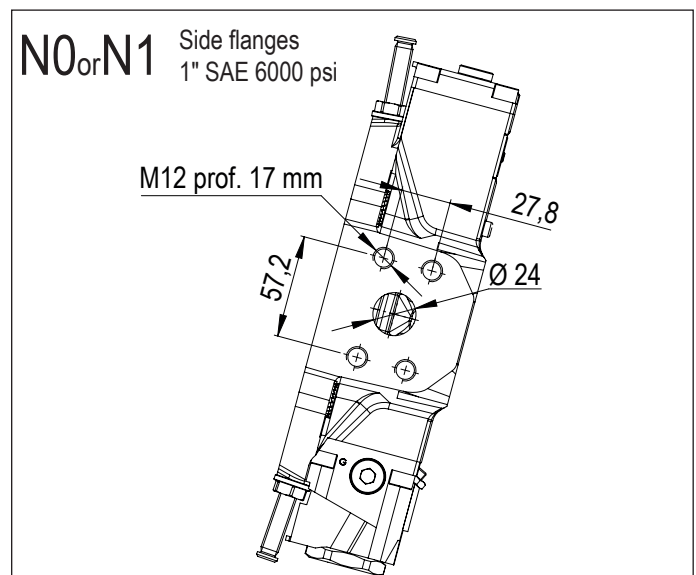
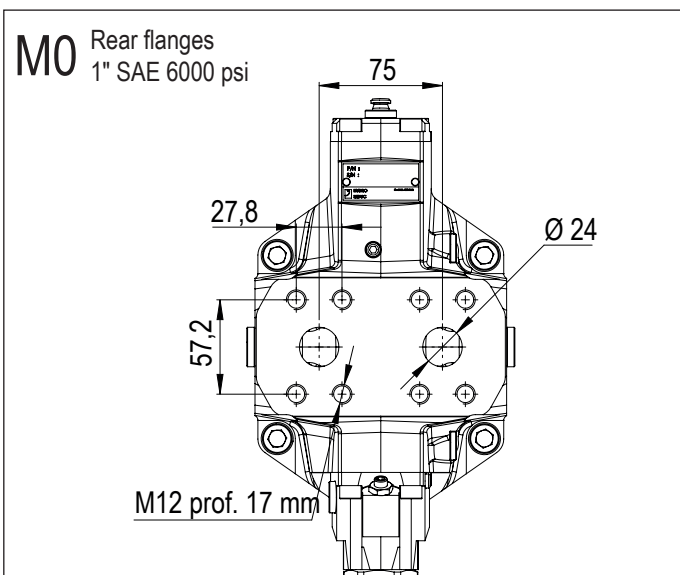
- HPA / HPM / HPD / HPT: Regulation pressure to be specified between 80 and 350 bar.
- H2N: Displacement change pressure between 5 and 25 bar.
- HYP: Regulation flow pressure between 5 and 25 bar.



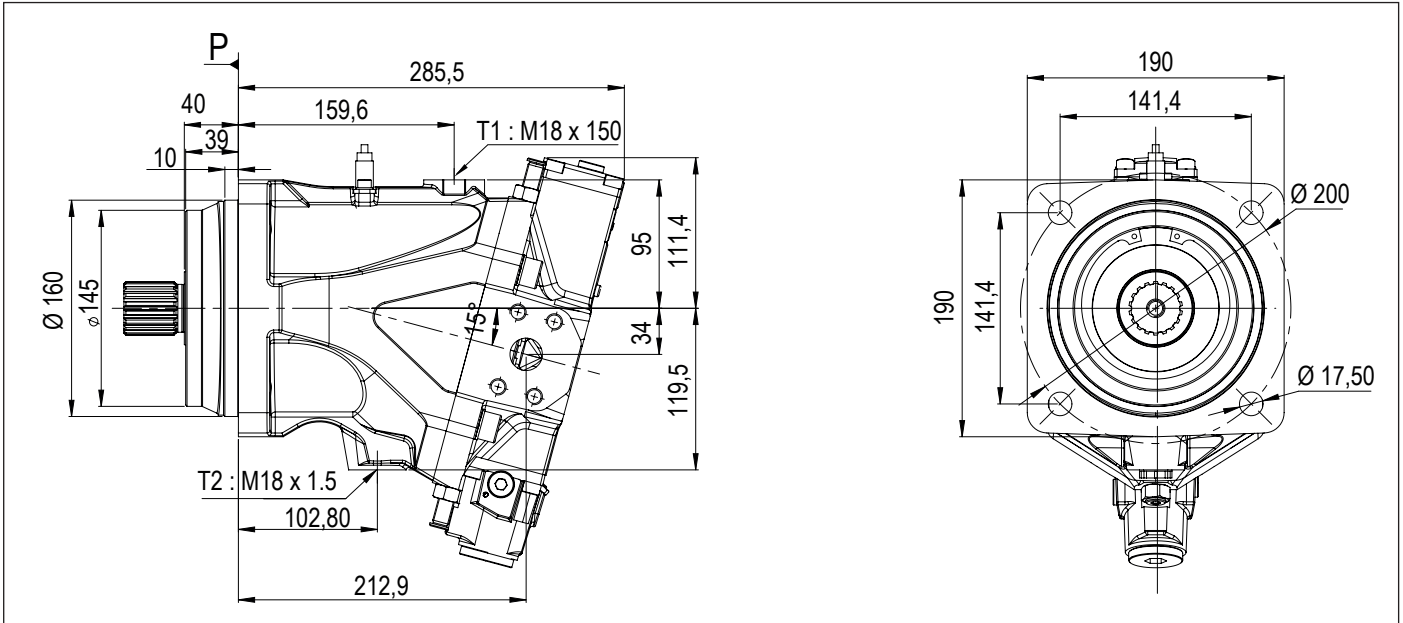
► Shaft - code 04



► Inlet ports - code 05

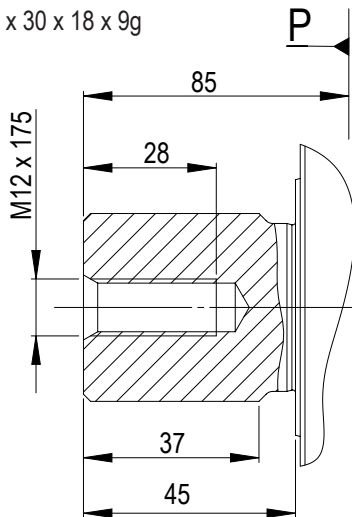


Dimensions (in mm) are given only as an indication.

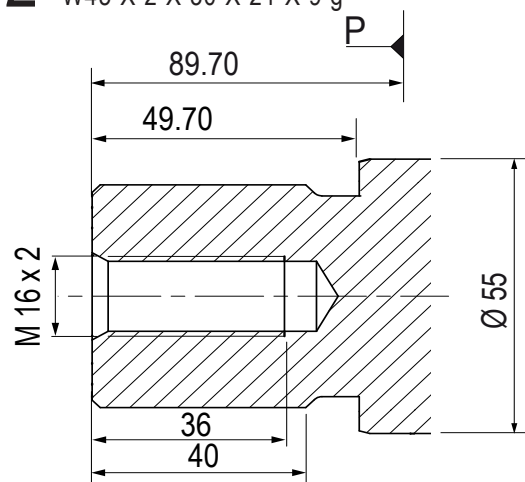


► Shaft - code **04**

W1 Splined shafts DIN 5480
W40 x 2 x 30 x 18 x 9g

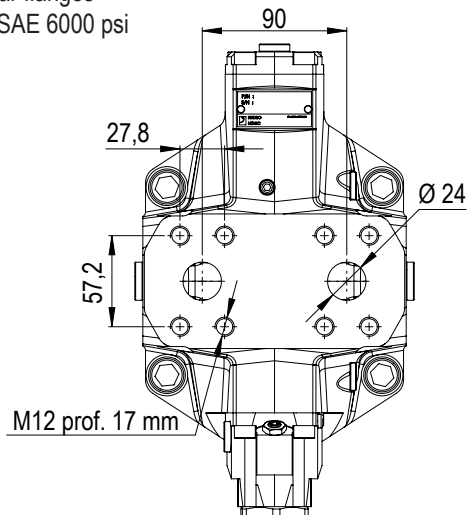


W2 Splined shafts DIN 5480
W45 X 2 X 30 X 21 X 9 g

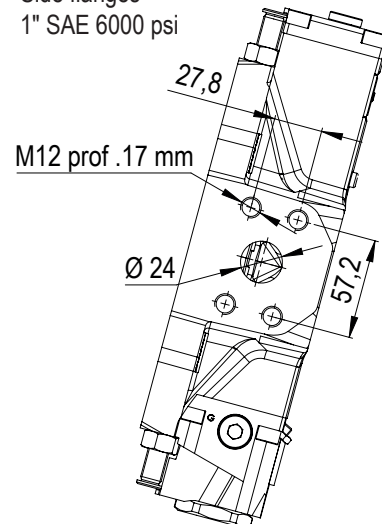


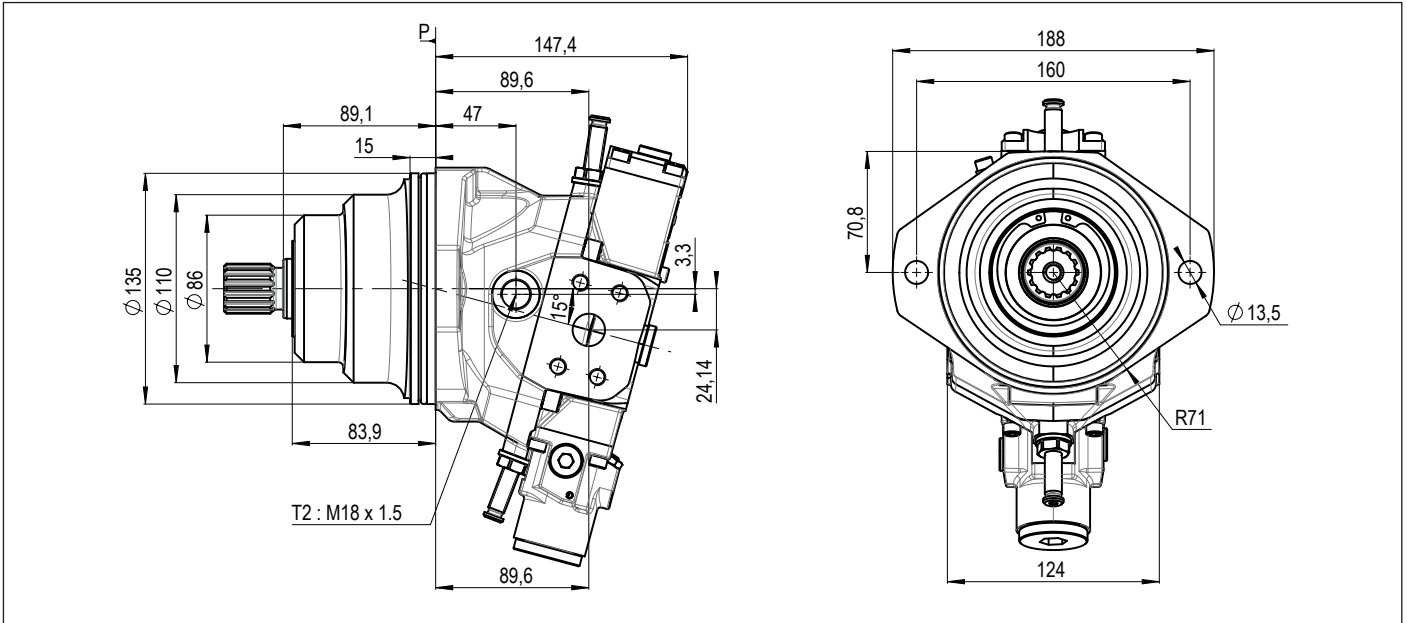
► Inlet ports - code **05**

M0 Rear flanges
1" SAE 6000 psi

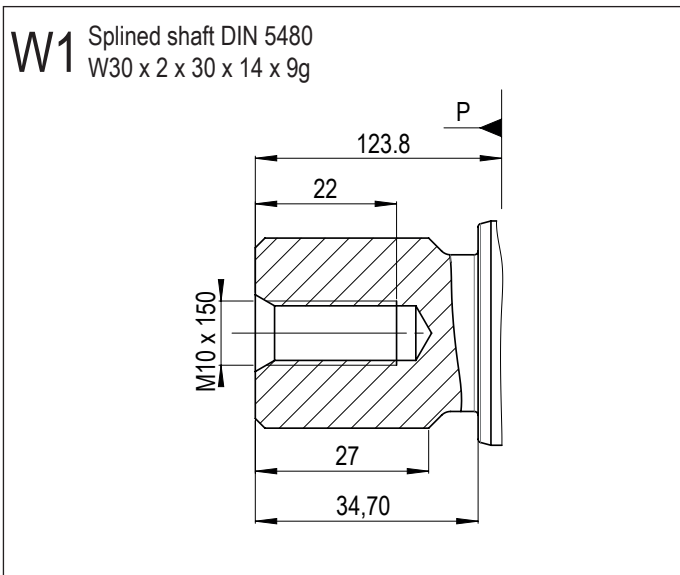


N0 or N1 Side flanges
1" SAE 6000 psi

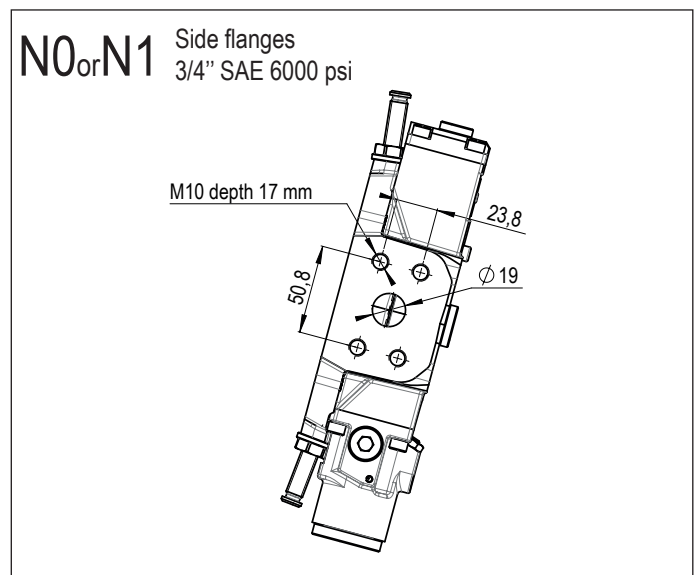
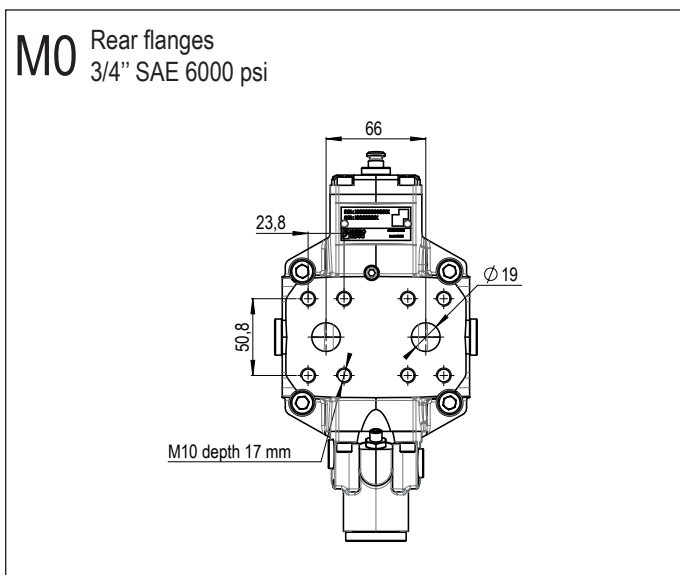


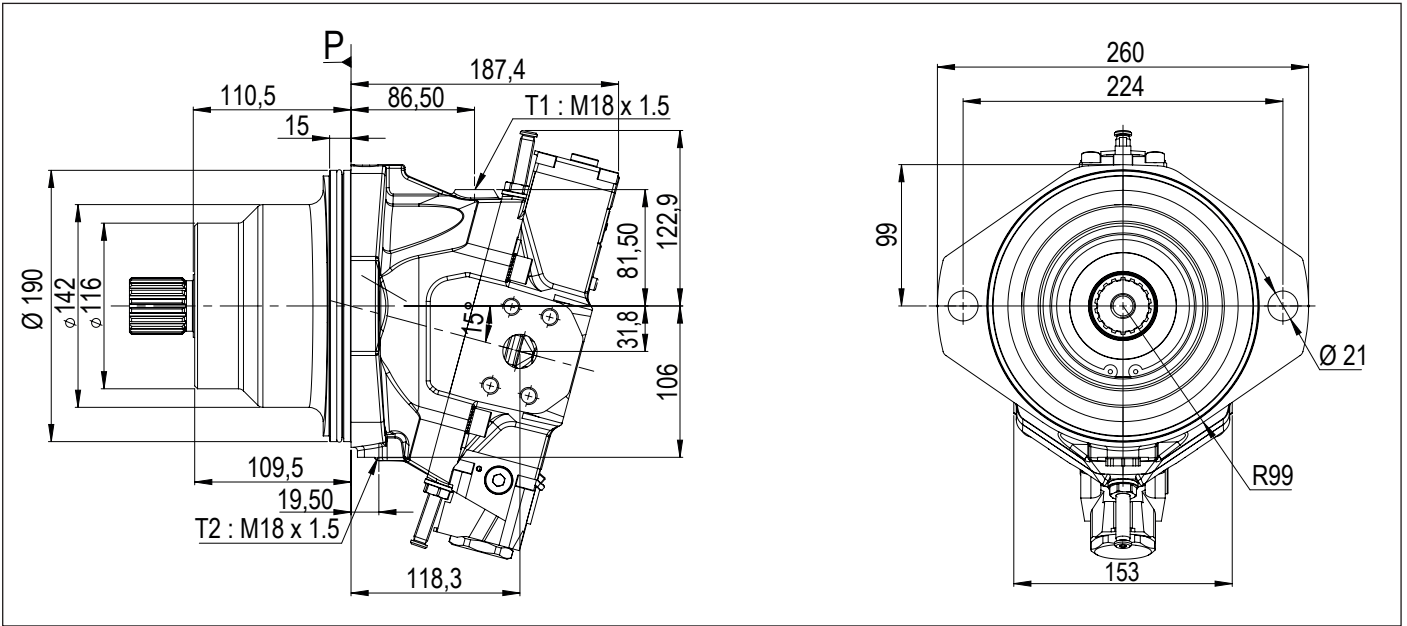


► Shaft - code 04

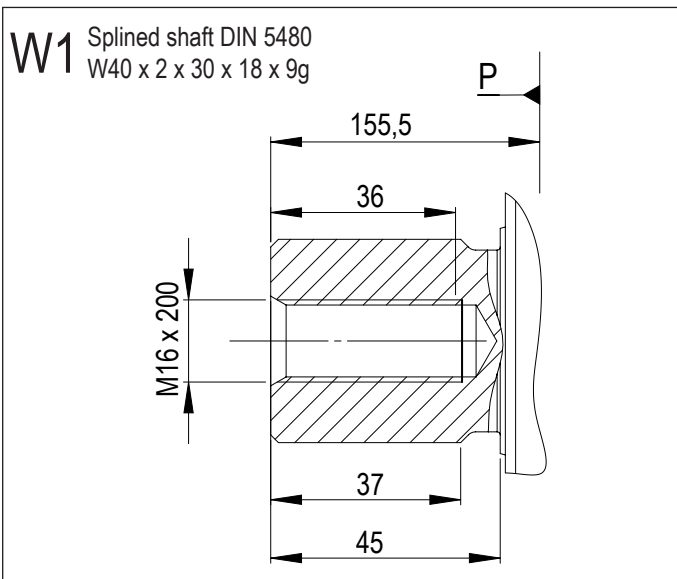


► Inlet ports - code 05

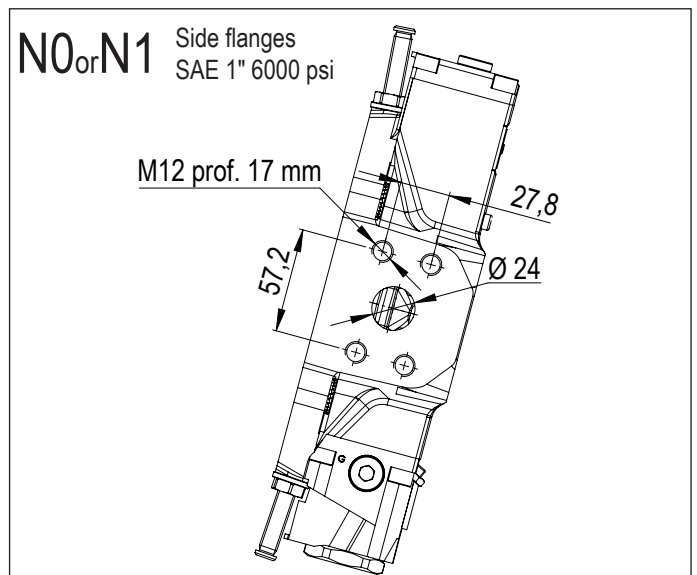
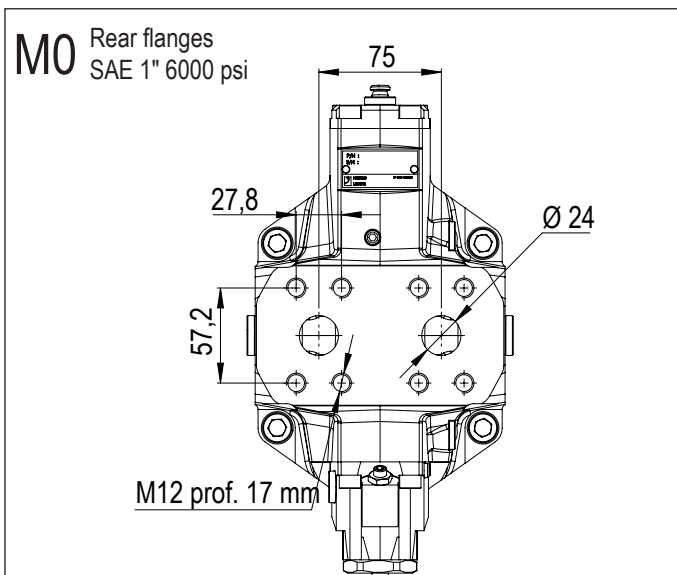


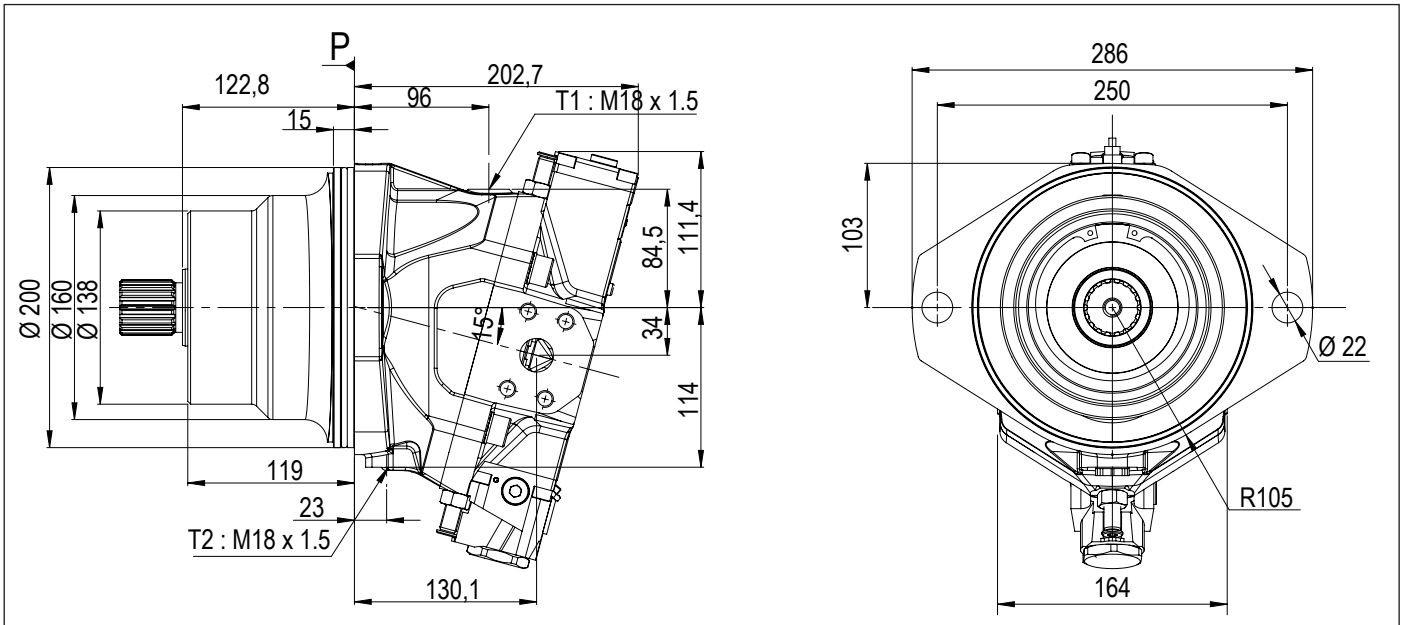


► Shaft - code **04**

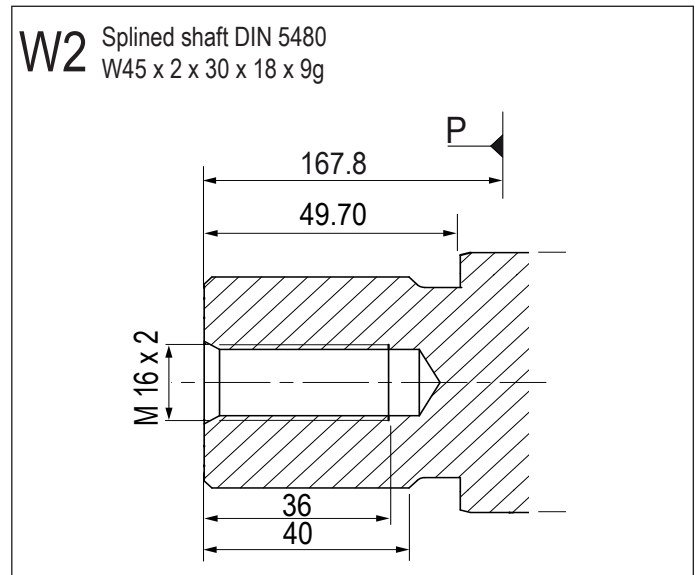
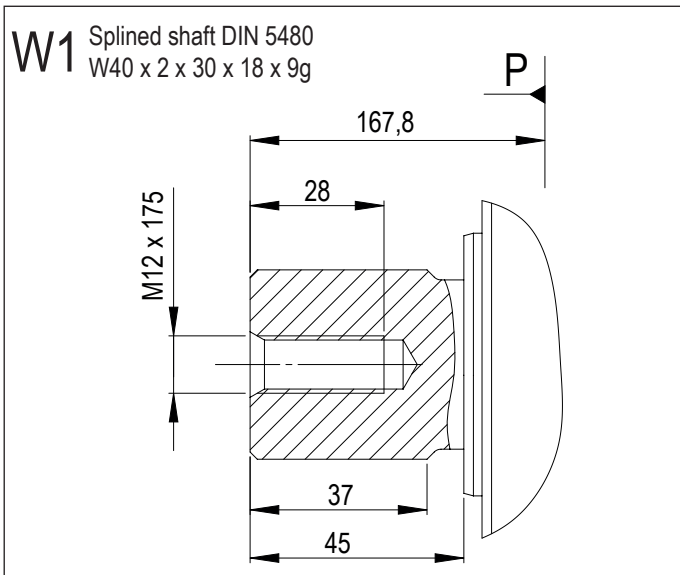


► Inlet ports - code **05**

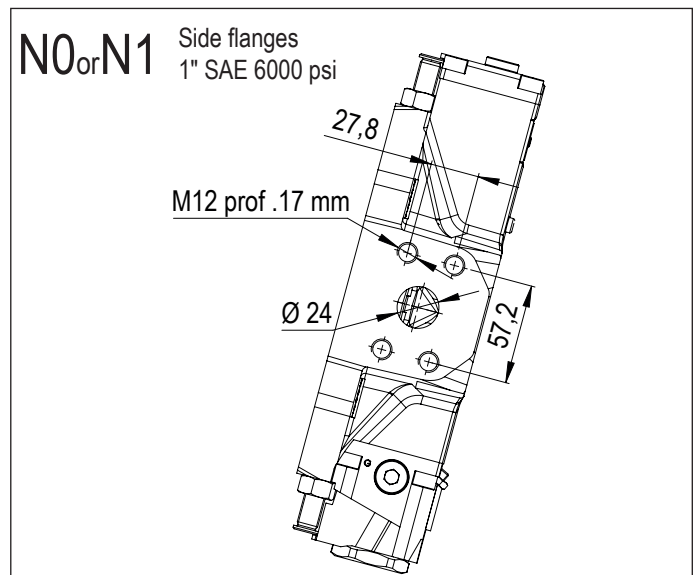
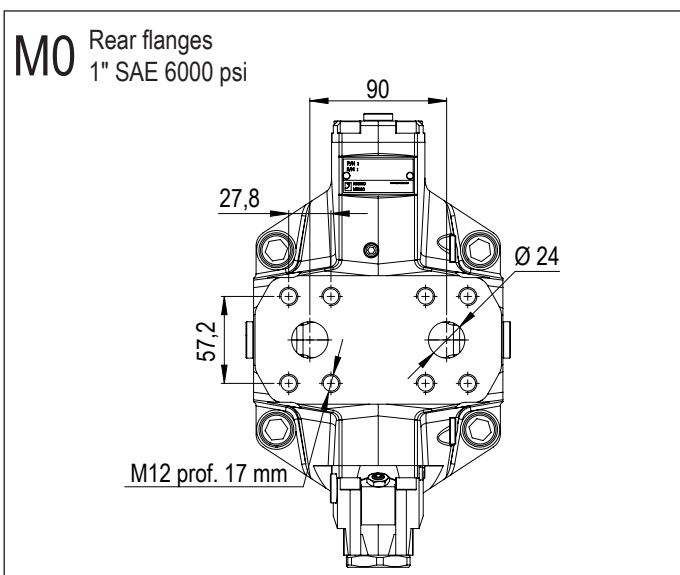




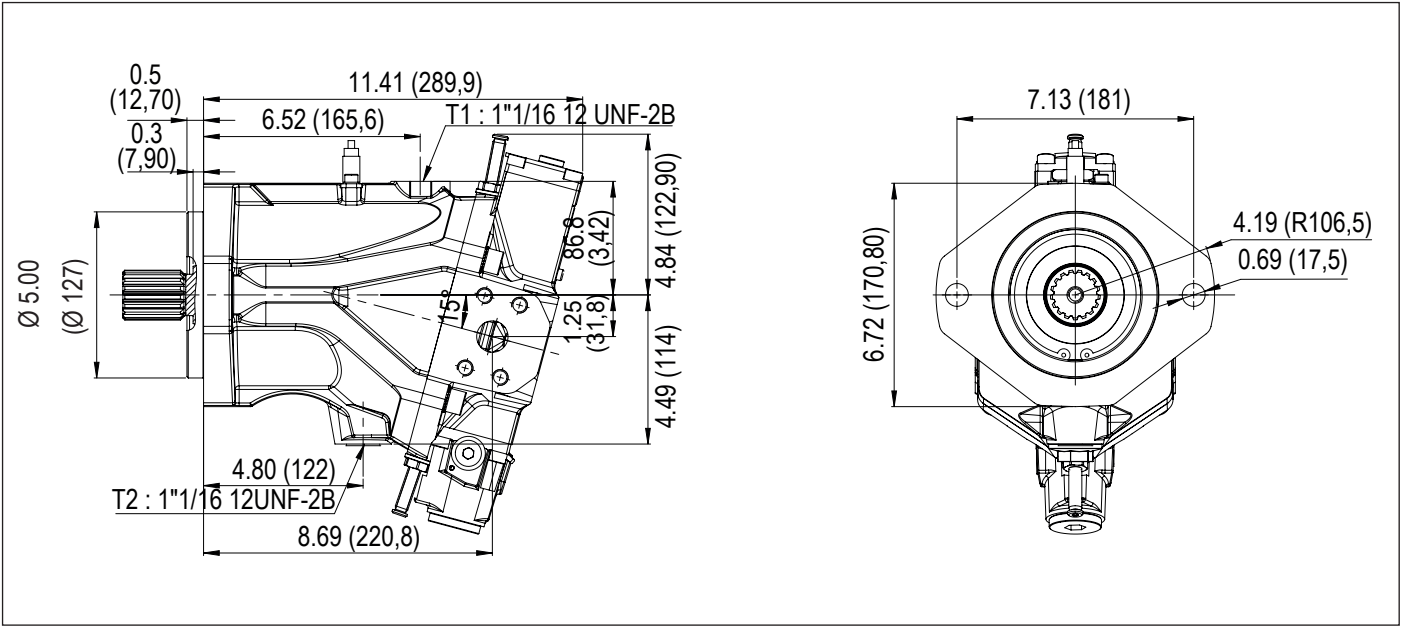
► Shaft - code 04



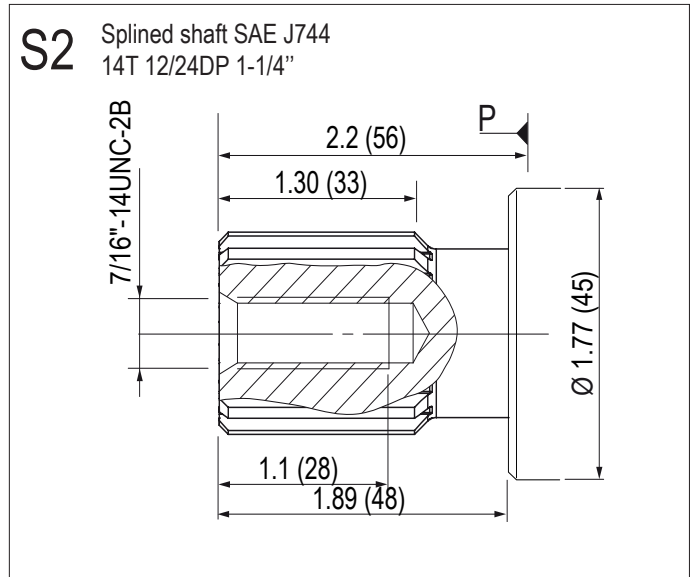
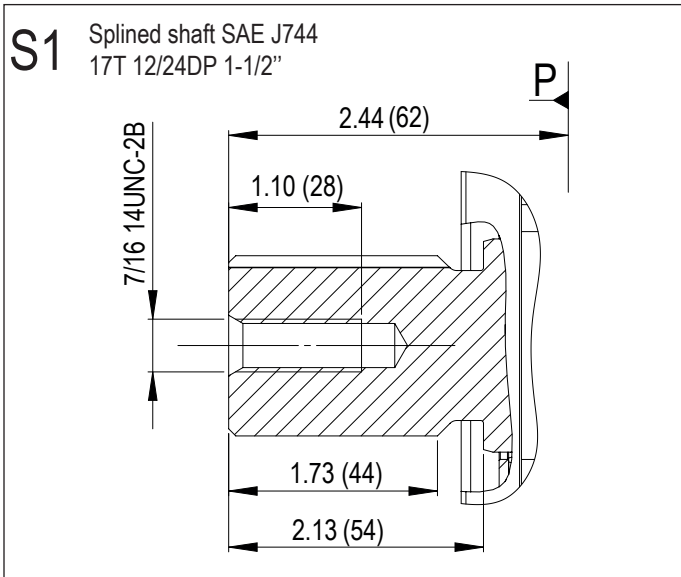
► Inlet ports - code 05



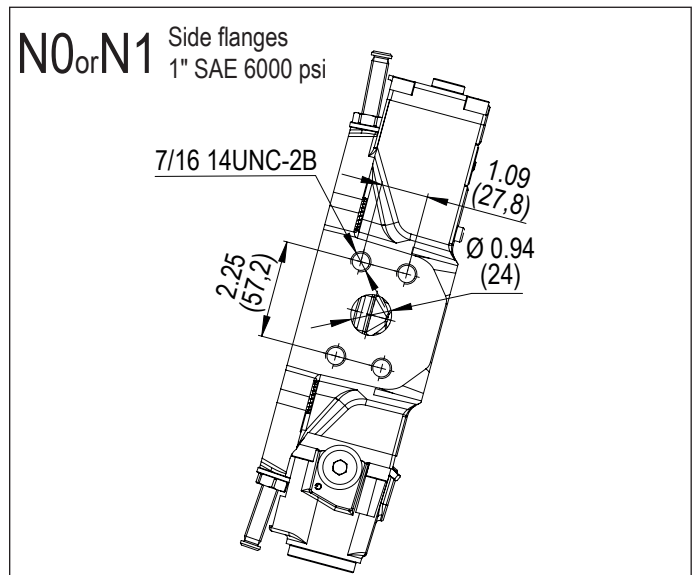
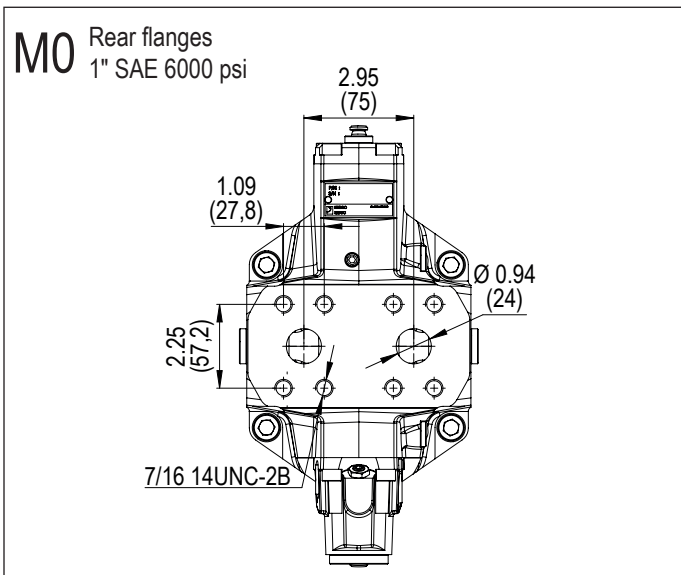
MVA 85 (SAE version)

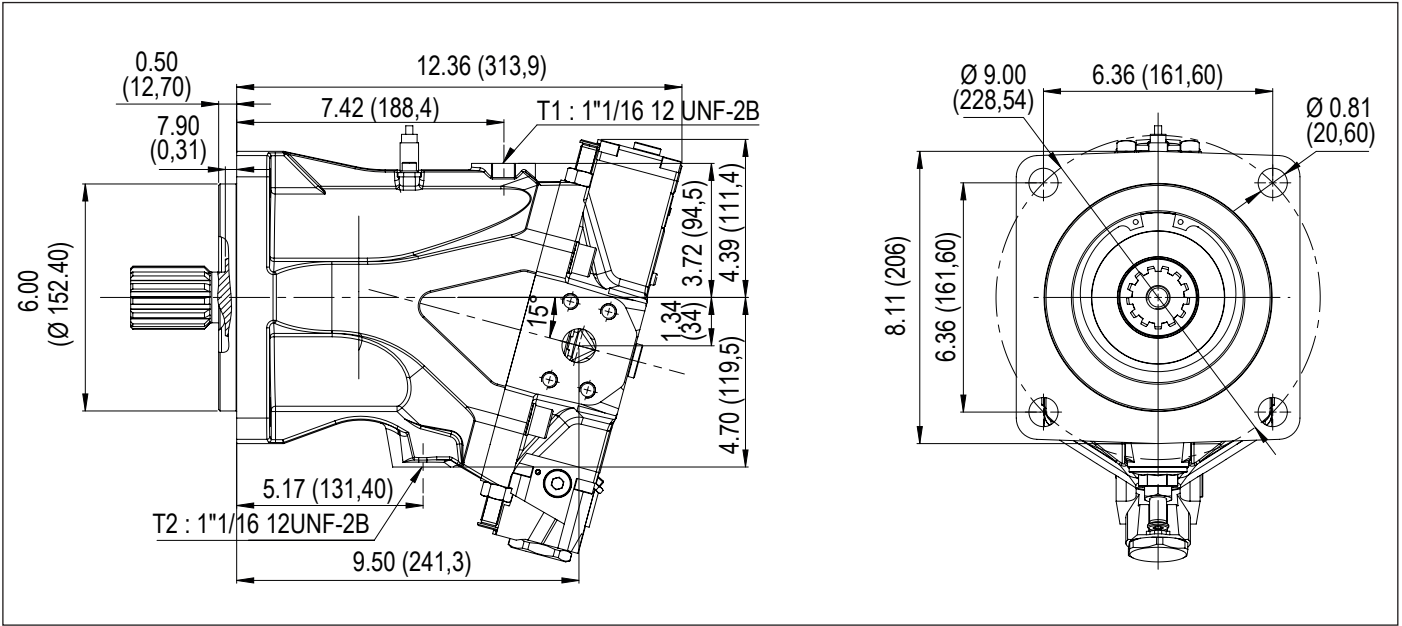


► Shaft - code **04**

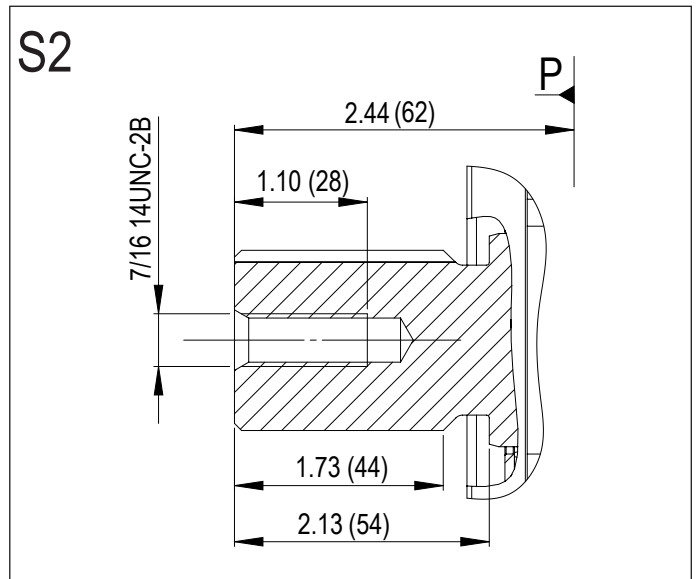
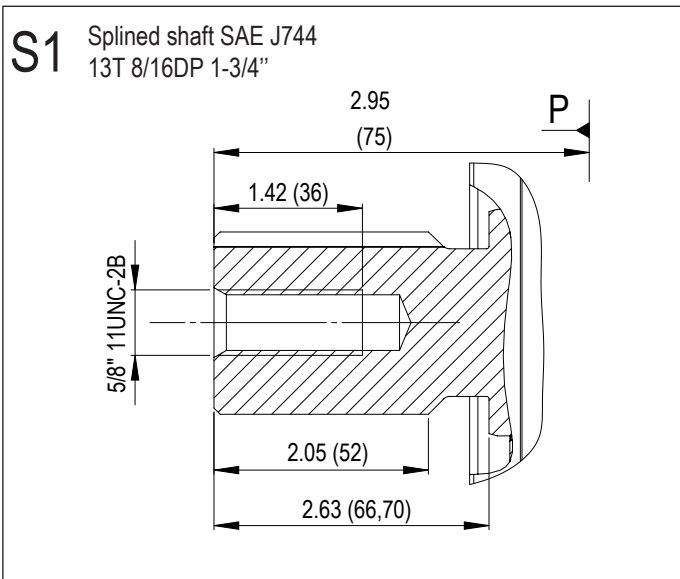


► Inlet ports - code **05**

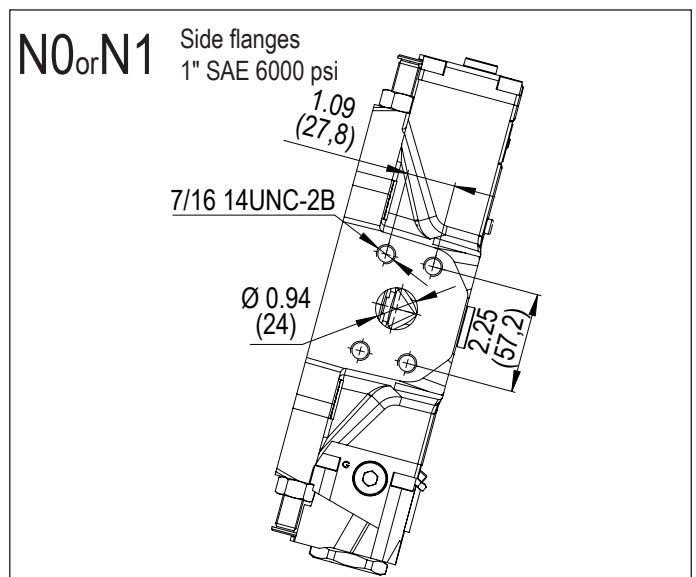
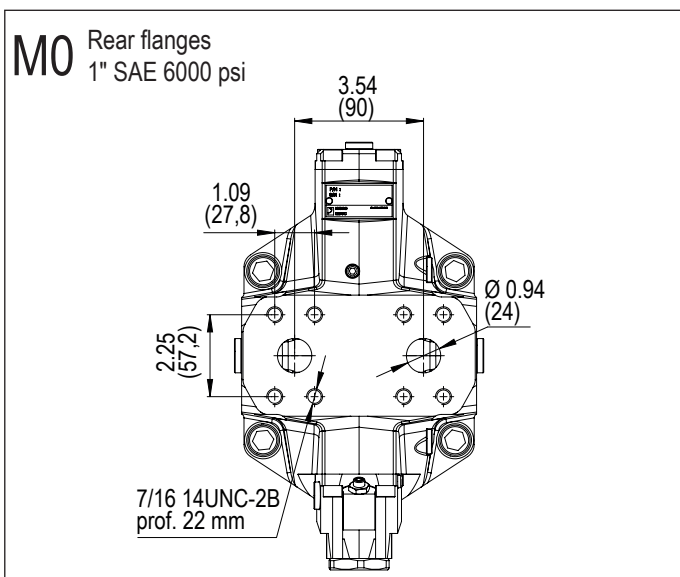




► Shaft - code **04**



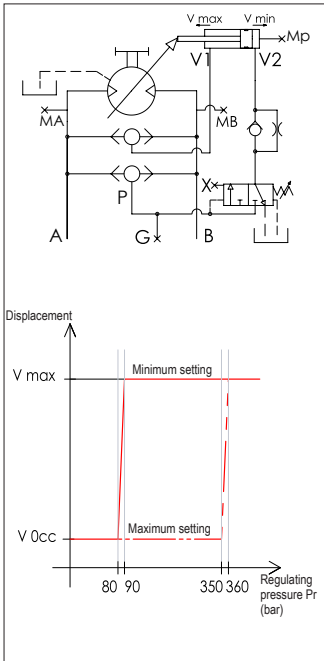
► Inlet ports - code **05**



► Displacement control - code **07**

Automatic displacement control, high pressure:

HPA



The automatic displacement control, high pressure, automatically adjusts displacement as a function of the set pressure level.

This can be set between 80 and 350 bar.

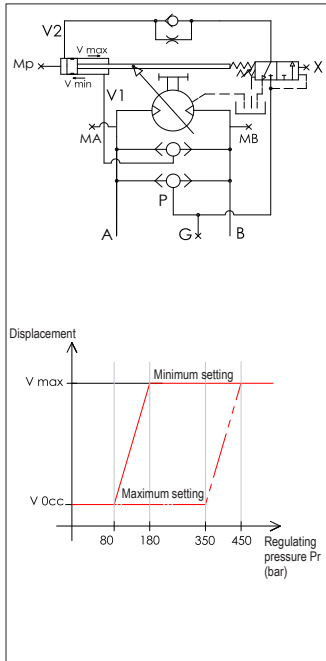
Once set pressure has been reached, the motor starts changing displacement from V_{min} to V_{max} . Pressure remains stable, torque increases and speed decreases until V_{max} is reached.

Once V_{max} has been reached, motor pressure can exceed set pressure if required.

Automatic displacement control with high-pressure piloting and pressure increase:

HPM

(HPA + control cylinder spring)



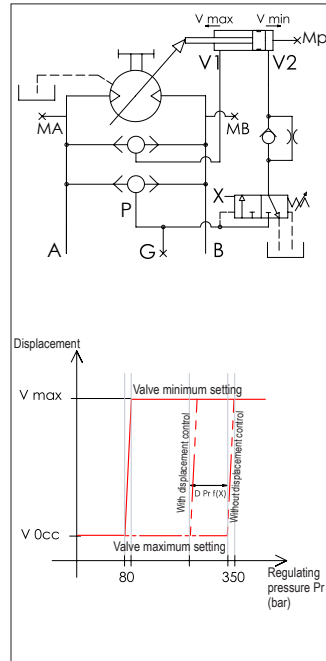
Similar operation as HPA with ΔP between V_{0cc} and V_{max} .

$\Rightarrow \Delta P = 100 \text{ bar.}$

(e.g., for $V_{min} = V_{max/2} \Rightarrow \Delta P = 100/2 = 50 \text{ bar}$)

Automatic displacement control with high-pressure piloting and proportional hydraulic shift:

HPD (same as HPA + H2N)



Similar operation as HPA

Application of an external pilot pressure (Px) to shift the regulation pressure.

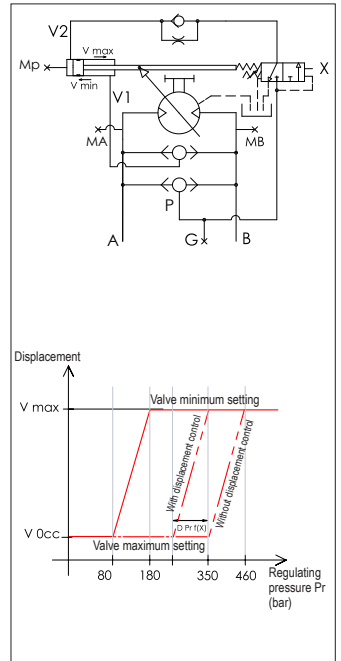
$\Rightarrow \text{Shift } D_{pr} = 14.3 \cdot P_x.$

Caution:

The pilot pressure line X must be drained when it is not under pressure (to ensure evacuation of leakage flow).

Automatic displacement control with high-pressure piloting, pressure increase, and proportional hydraulic shift:

HPT (HPM + HPD)



Similar operation as HPA with ΔP between V_{0cc} and V_{max} .

$\Rightarrow \Delta P = 100 \text{ bar.}$

(e.g., for $V_{min} = V_{max/2} \Rightarrow \Delta P = 100/2 = 50 \text{ bar}$)

Application of an external pilot pressure (Px) to shift the regulation pressure.

$\Rightarrow \text{Shift } D_{pr} = 14.3 \cdot P_x.$

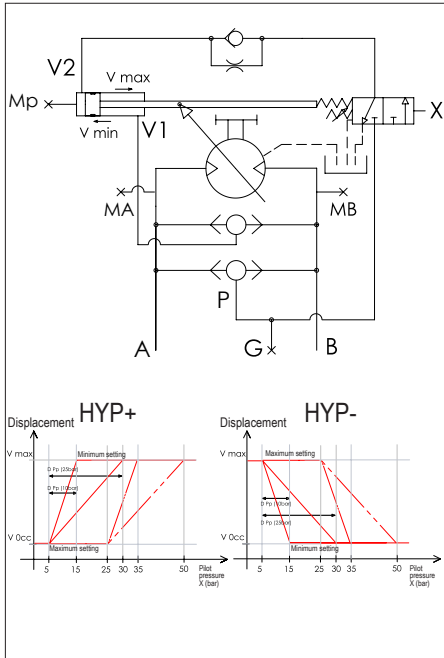
Caution:

The pilot pressure line X must be drained when it is not under pressure (to ensure evacuation of leakage flow).

► Displacement control - code 07

Proportional displacement adjustment through external hydraulic control:

HYP+ / HYP-



The adjustment of the displacement, either V_{min} or V_{max} , is done proportionally to the external pilot pressure (P_x).

HYP+ $\Rightarrow V_{min}$ to V_{max}

HYP- $\Rightarrow V_{max}$ to V_{min}

The start of the displacement change is adjustable from 5 to 25 bar.

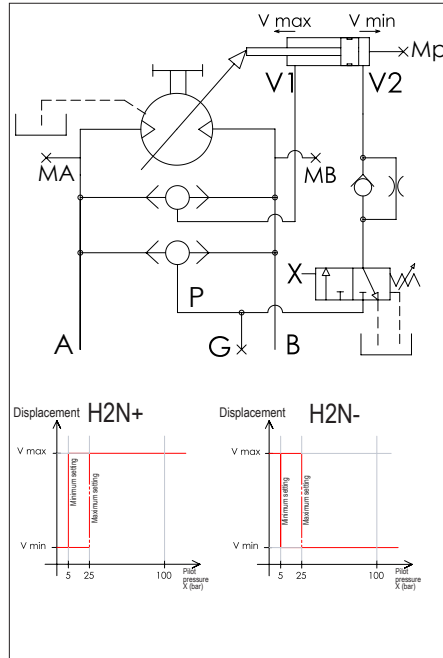
HYP1 $\Rightarrow \Delta P_x = 10$ bar between V_{Occ} and V_{max} (or V_{min} to V_{Occ}).

HYP2 $\Rightarrow \Delta P_x = 25$ bar between V_{Occ} and V_{max} (or V_{min} to V_{Occ}).

$P_{x_{max}} = 100$ bar.

Two speed hydraulic adjustment of displacement:

H2N+ / H2N-



Setting V_{min} or V_{max} displacement is done by applying an external pilot pressure, or not.

Pilot pressure can be set by a screw from 5 to 25 bar.

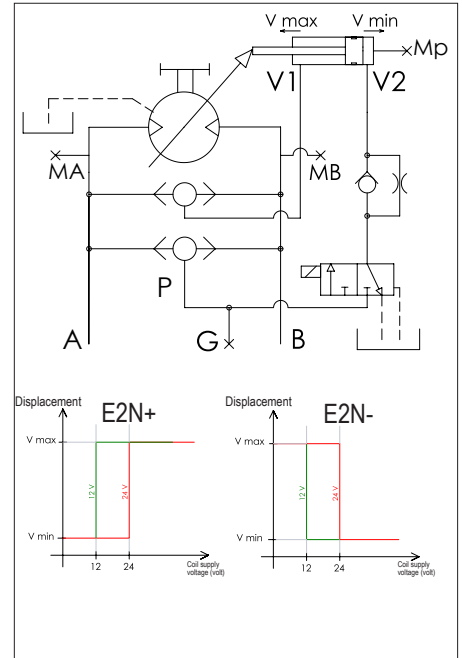
Once pilot pressure has been reached, the motor starts changing displacement from V_{min} to V_{max} in version H2N+ V_{max} to V_{min} in version H2N-.

Caution:

The pilot pressure line X must be drained when it is not under pressure (to ensure evacuation of leakage flow).

Two speed electric adjustment of displacement:

E2N+ / E2N-



Setting V_{min} or V_{max} displacement is done by applying an external electrical current via a solenoid, or not.

The coil voltage is available in 12V or 24V.

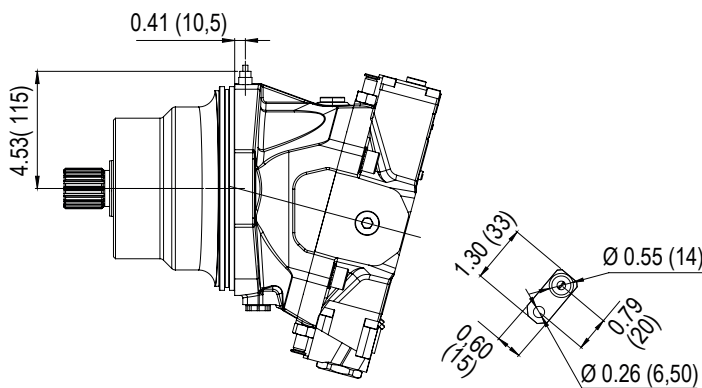
When the coil is powered, the motor initiates the change of displacement from V_{min} to V_{max} in E2N+ version, and from V_{max} to V_{min} in E2N- version.

SPEED SENSOR & INDICATOR OF DIRECTION OF ROTATION

Codes **08** and **09**

MV, MVA, MVSII series motors can be fitted with an induction type speed sensor, to measure rotating speed and also direction of rotation.

This accessory may only be used on motors which are suitably adapted to take it (see the order code system).



Dimensions (in mm) are given only as an indication.

► Technical data for the sensor

Supply voltage	8...32 V DC
Current consumption	maximum 6 mA without load
Output frequency	0 Hz...20 kHz
Protection type	IP 69 k
Operating temperature	- 104°F...+ 257°F (- 40°C...+ 125°C)
Weight	around 65 g
Cable length	1500 mm

FLUSHING VALVE

Code **10**

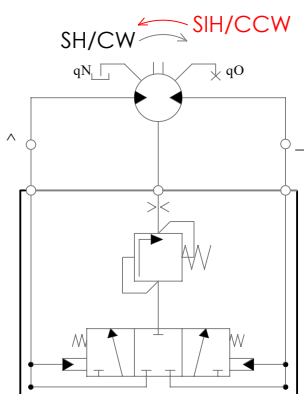
Used to create flow to cool the motor. This valve is essential for all intensive uses of motors and contributes to long service life. The valve takes some hydraulic fluid from the return connection port (low pressure) and reinjects it into the motor housing. This is then evacuated via the motor drain line.

3 flow rates available at $\Delta p = 25$ bar:

- 4.25 l/min for VB04
- 10 l/min for VB10
- 14 l/min for VB14

Flushing valves are only available for use with motors with side ports (N1).

► Schematic drawing of the flushing valve



A passion for hydraulics



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