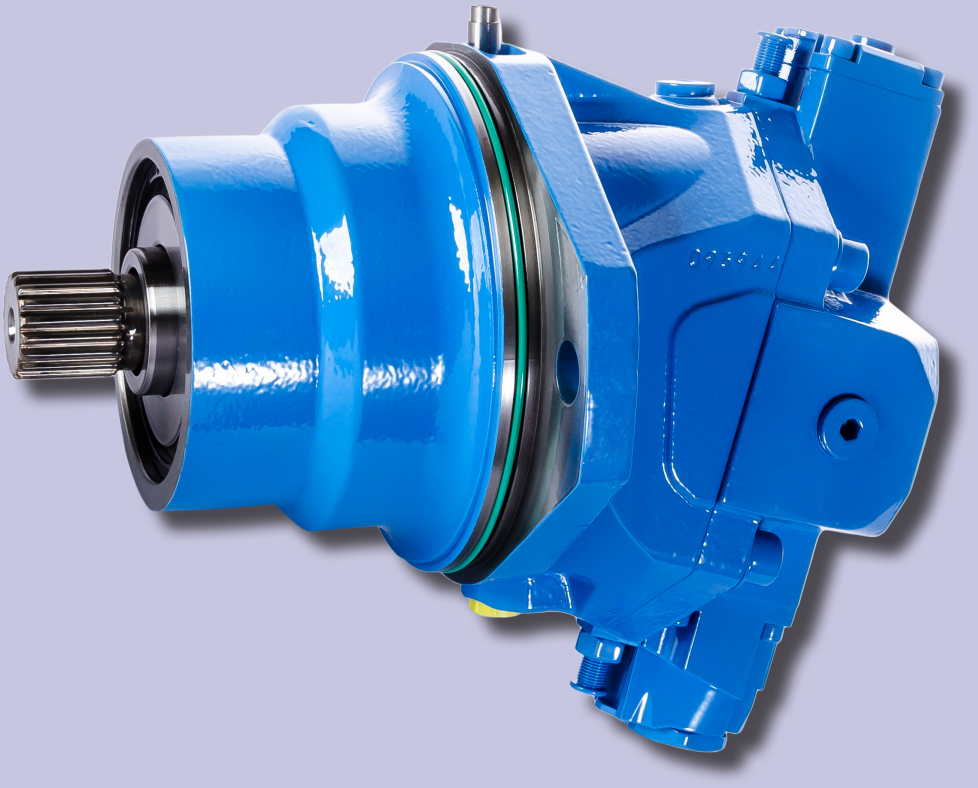
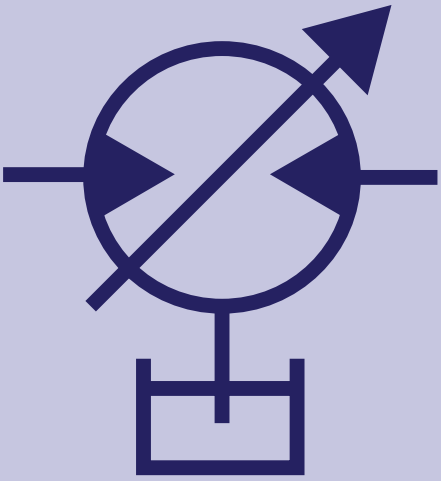
HYDRAULIC MOTORS

VARIABLE DISPLACEMENT





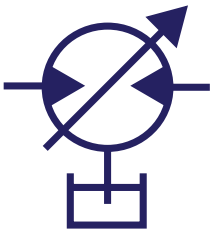
make it simple

HYDRO LEDUC

Contents

HYDRO LEDUC

HYDRAULIC MOTORS
VARIABLE DISPLACEMENT



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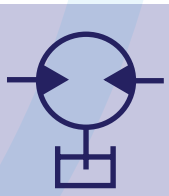
Dimensions MVA series motors 14

Displacement control 16

Options | Accessories 18

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} or from V_{min} to V_{max}
- 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
- 8 types of displacement control - see page 16 (HPA, HPM, HPD, HPT, HYP, H2N, E2N, ELP)

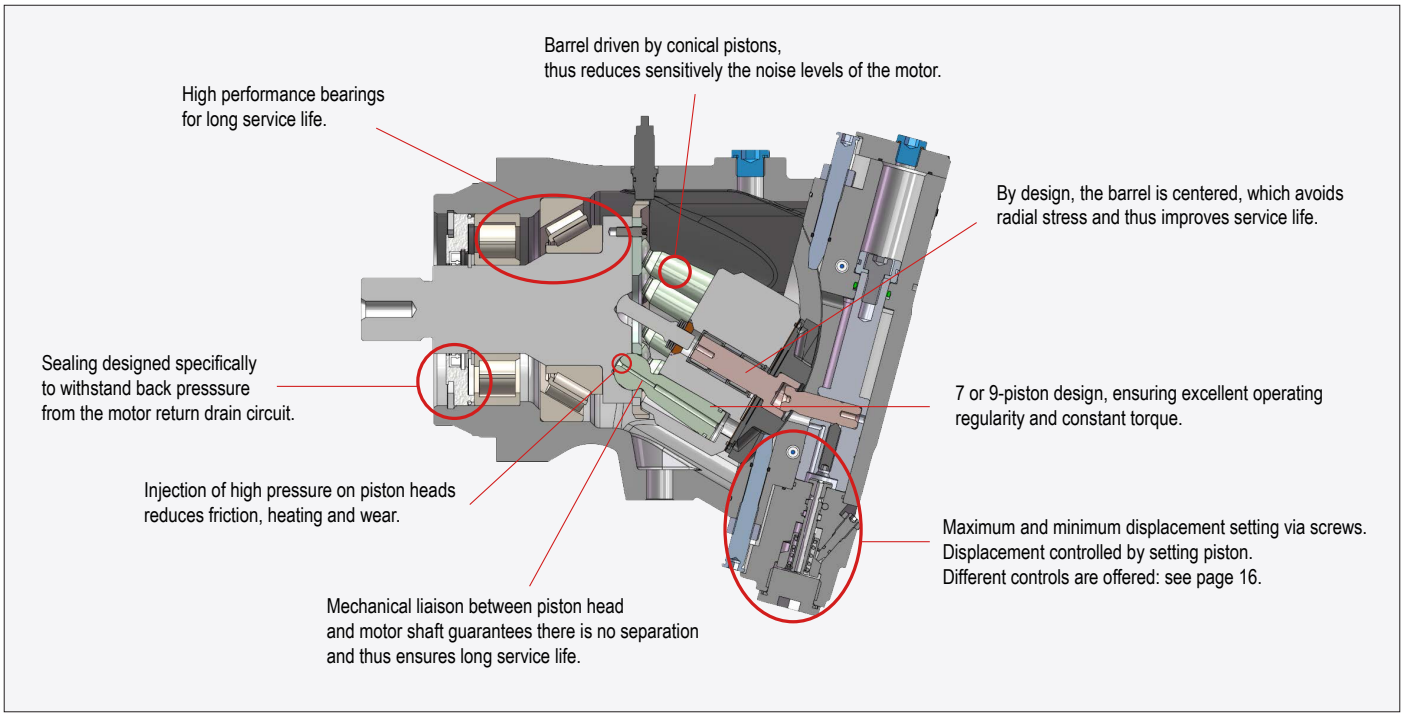
▶ Technical characteristics of LEDUC variable displacement motors

		28	85	115
Max. displacement (cm³/tr)	V_{max}	9,6 ⇨ 28,1	30,6 ⇨ 85,2	41,1 ⇨ 115,6
Min. displacement (cm³/tr)	V_{min}	5,6 ⇨ 19,4	17 ⇨ 57,4	23,1 ⇨ 78,1
Displacement ratio 5	$V_{max\,/\,5}$	5,6 cm³	17 cm³	23,1 cm³
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} à V_{max}	5550 tr/min	3900 tr/min	3550 tr/min
Max. speed at min. displacement	N_{max} 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

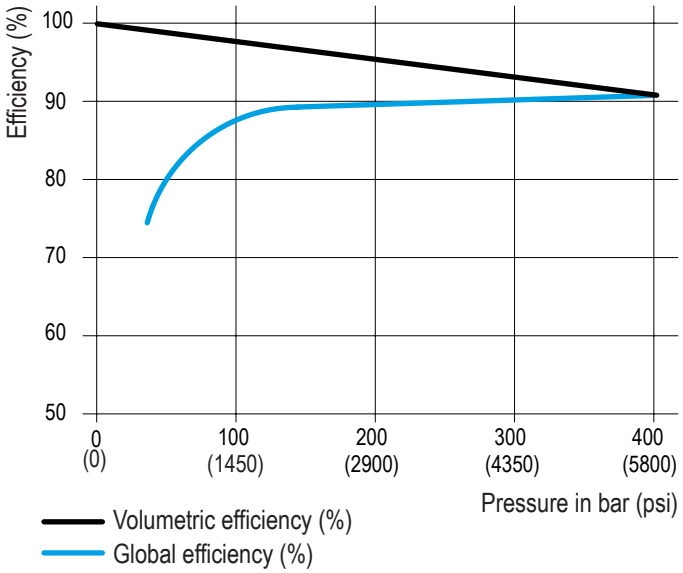
High-quality expertise and materials. The design choices presented below ensure the reliability and long service life of LEDUC motors.



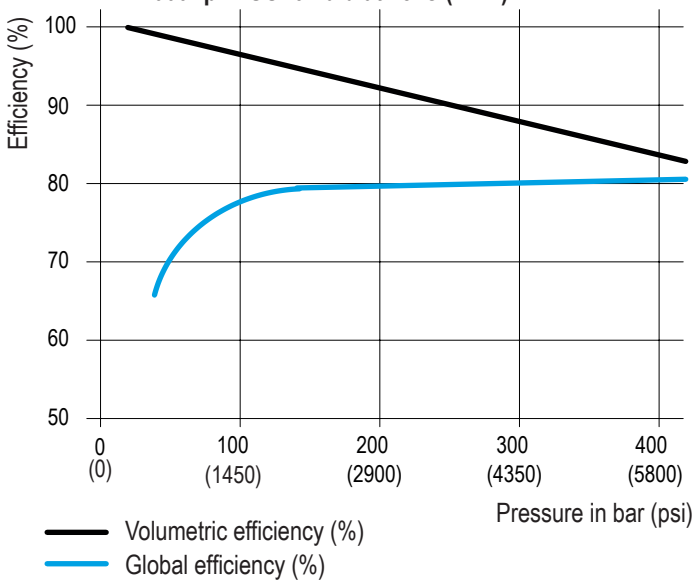
Efficiency and operating conditions

► Efficiency of the MV, MVA and MVSI motors

Efficiency at maximum displacement
N = 1000 rpm ISO46 fluid at 25°C (77°F)



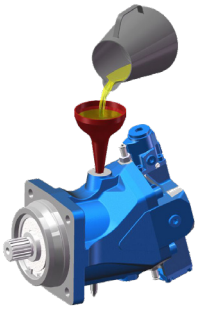
Efficiency at 1/3 displacement
N = 1000 rpm ISO46 fluid at 25°C (77°F)



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.

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.

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

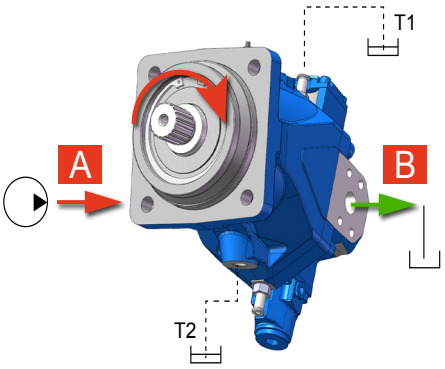
- As standard, LEDUC motors are equipped with FKM (Viton®) seals.

  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)

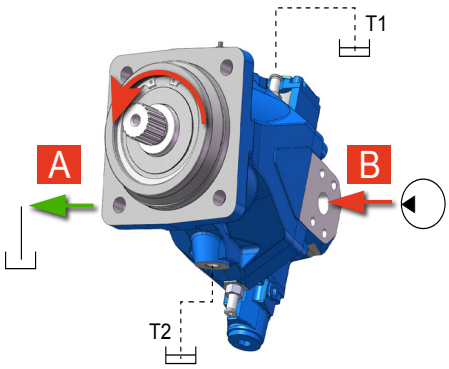
▶ Direction of rotation

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

Clockwise rotation (CW)



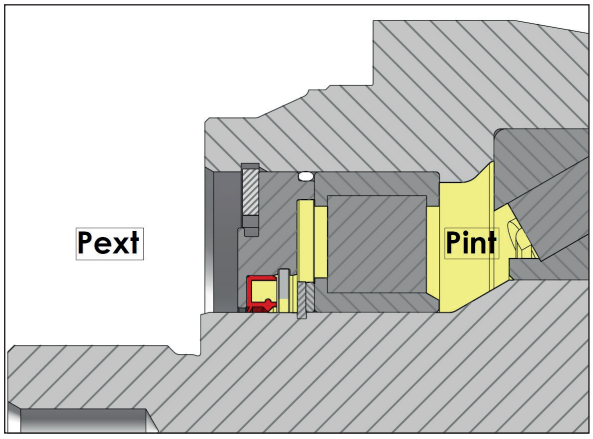
Counter-clockwise rotation (CCW)



▶ Drain pressure

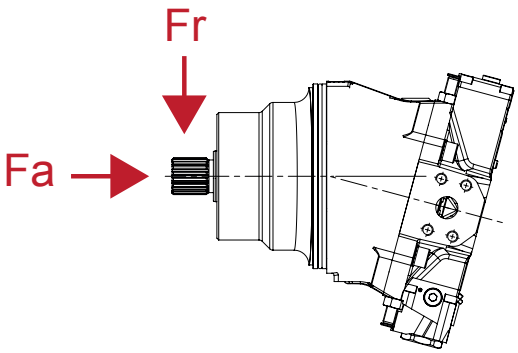
It is essential to drain the motor, through T1 or to T2, to avoid excessive pressures on the shaft seal. Maximum acceptable internal pressure depends on shaft rotation speed.
However, following these guidelines will avoid problems during operation:

- 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 | MVSI | MVA		28	85	115
Fr	daN	430	1300	1500
Fa	N/bar	39	80	60

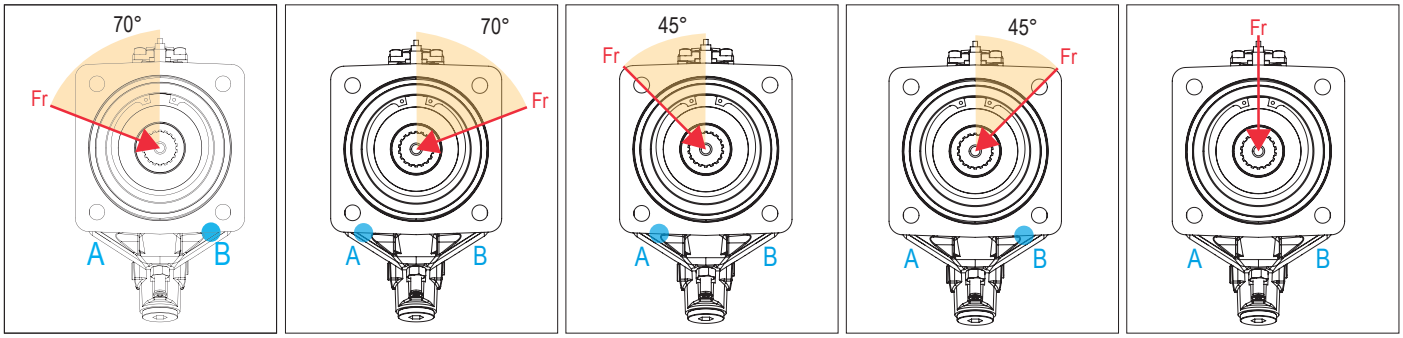


Operating conditions

►Maximizing service life of bearings

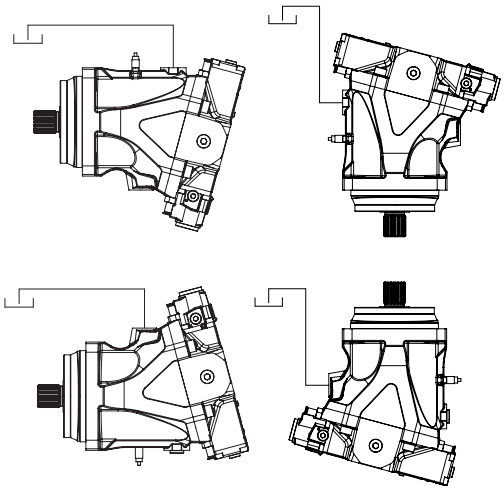
In cases where there is a radial force on motor shaft, keeping the direction of that force within the shaded areas shown below will improve service life of the motor.

Gear hub			Pulley hub	
Motor in rotation CCW pressure in **B**	Motor in rotation CW pressure in **A**	Motor in rotation CW pressure in **A**	Motor in rotation CCW pressure in **B**	Motor capable of rotation CCW and CW

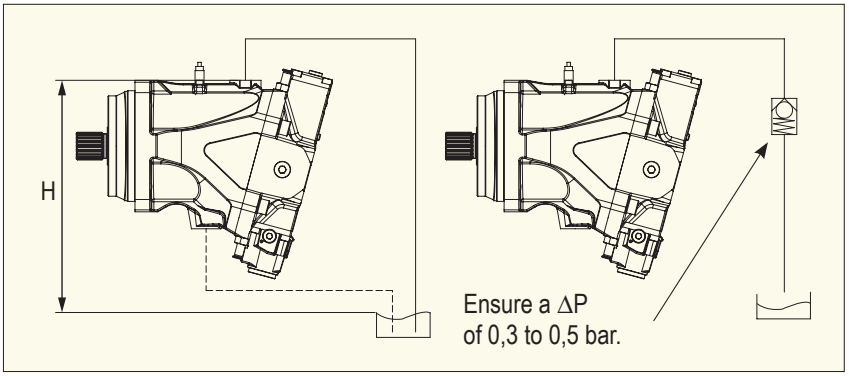


►Mounting position of motors

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**		**MVSI**			**MVA**		**MV**	**MVSI**	**MVA**					
Displacement																	
02			85	115	28	85	115	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**						
Drain																	
06			2	2	2	2	2	2	2	**M2**	**M2**	**U2**					
Displacement control*																	
07	Automatic high pressure	Δp = 10 bar		●	●	●	●	●	●	●	**HPA**						
		Δp = 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	ΔP = 10 bar		●	●	●	●	●	●	●	**HPD**						
		ΔP = 100 bar		●	●	●	●	●	●	●	**HPT**						
	Proportional Hydraulics with External Control	V_{min} to V_{max}	ΔP = 10 bar	●	●	●	●	●	●	●	**HYP1+**						
		V_{min} to V_{max}	ΔP = 25 bar	●	●	●	●	●	●	●	**HYP2+**						
		V_{max} to V_{min}	ΔP = 10 bar	●	●	●	●	●	●	●	**HYP1-**						
		V_{max} to V_{min}	ΔP = 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**						
	Electric proportional control	V_{min} to V_{max}	24V	●	●	●	●	●	●	●	**ELP+ 24**						
		V_{max} to V_{min}	24V	●	●	●	●	●	●	●	**ELP- 24**						
		V_{min} to V_{max}	12V	●	●	●	●	●	●	●	**ELP+ 12**						
		V_{max} to V_{min}	12V	●	●	●	●	●	●	●	**ELP- 12**						

0 = Without suitability for valve
1 = With flushing valve (FV) control, MV115 s available with N1 inlet ports without a valve (WV).

*see page 16-17

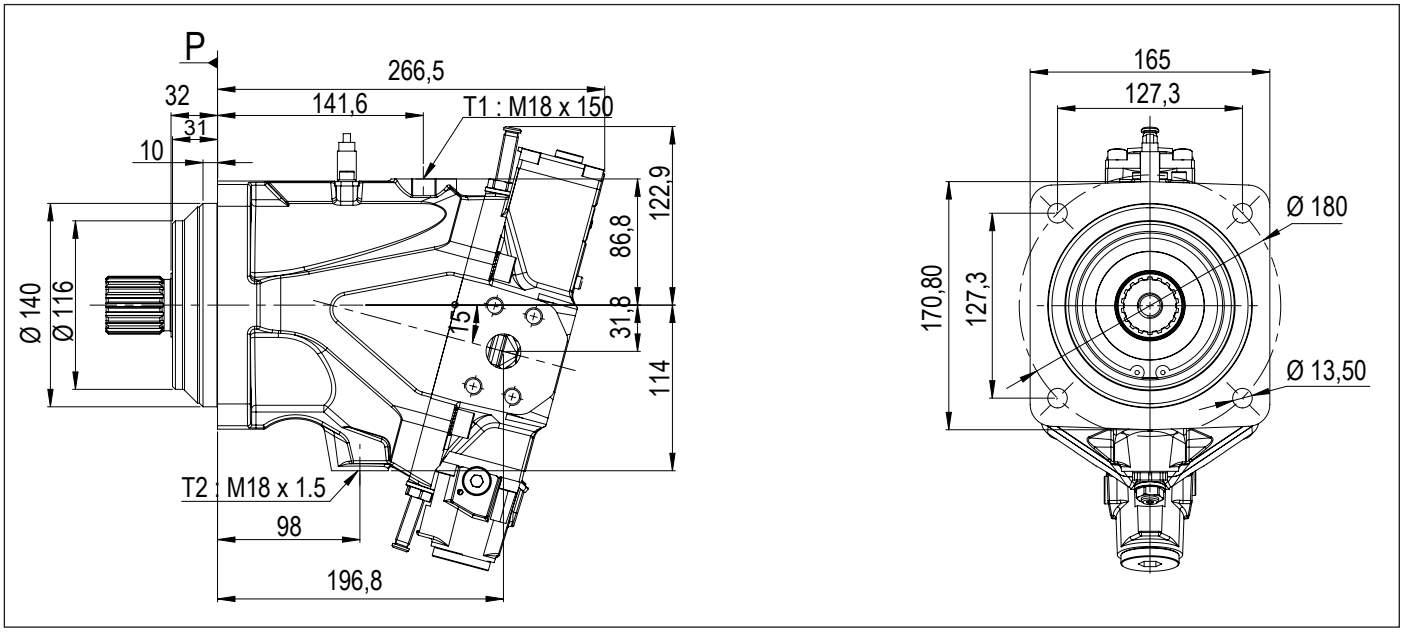
Order code

Suitable for use of speed sensor										
08	Yes		●	●	●	●	●	●	●	**1**
	No		●	●	●	●	●	●	●	**0**
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 (Δp = 25 bar)	●	●	●	●	●	●	●	**VB04**
		10 l/min (Δp = 25 bar)	●	●	●	●	●	●	●	**VB10**
		14 l/min (Δp = 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	**...**

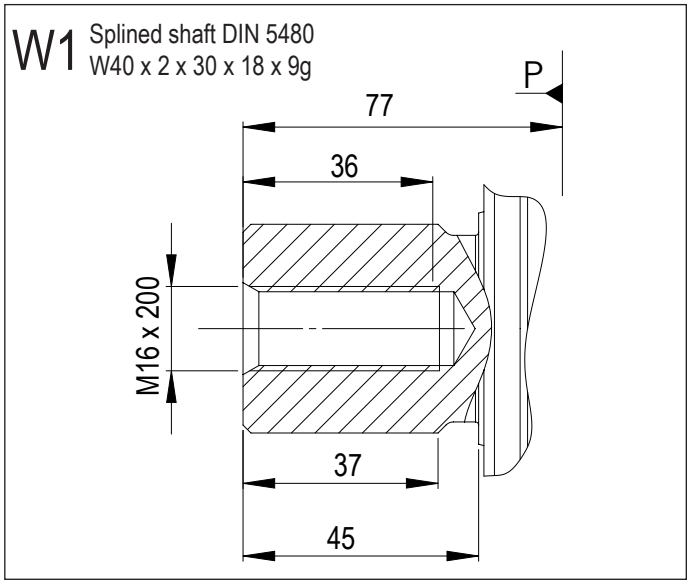
Legend :
● Existing model
– Not yet existing
(1) By default: maximum displacement.
(2) By default: 1/3 of maximum displacement.
*Minimum displacement below the adjustable range is available on request..

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

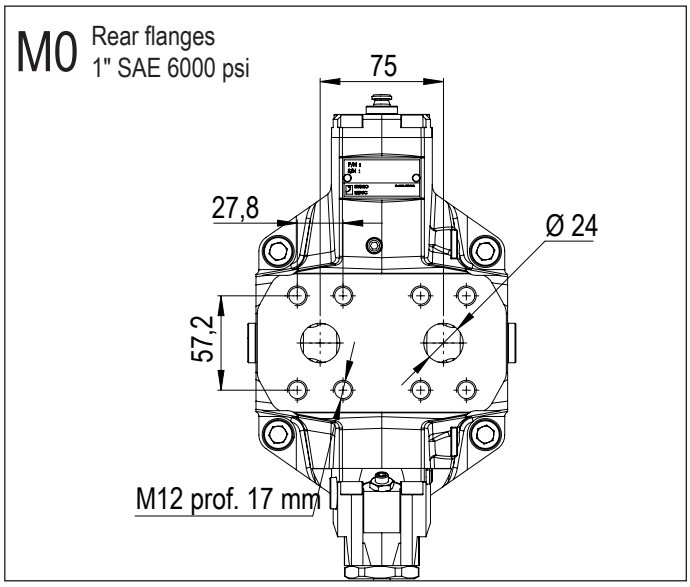
- HPA / HPM / HPD / HPT: Regulation flow pressure to be specified between 80 and 350. Default: 190 bar.
- H2N: Displacement change pressure between 5 and 25 bar.
- HYP: Regulation flow pressure between 5 and 25 bar. Default: 11±3 bar.

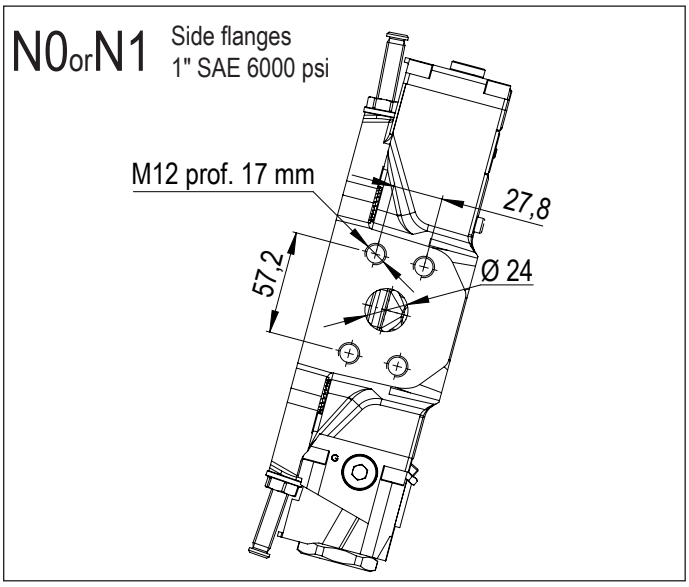


▶ Shaft - code 04

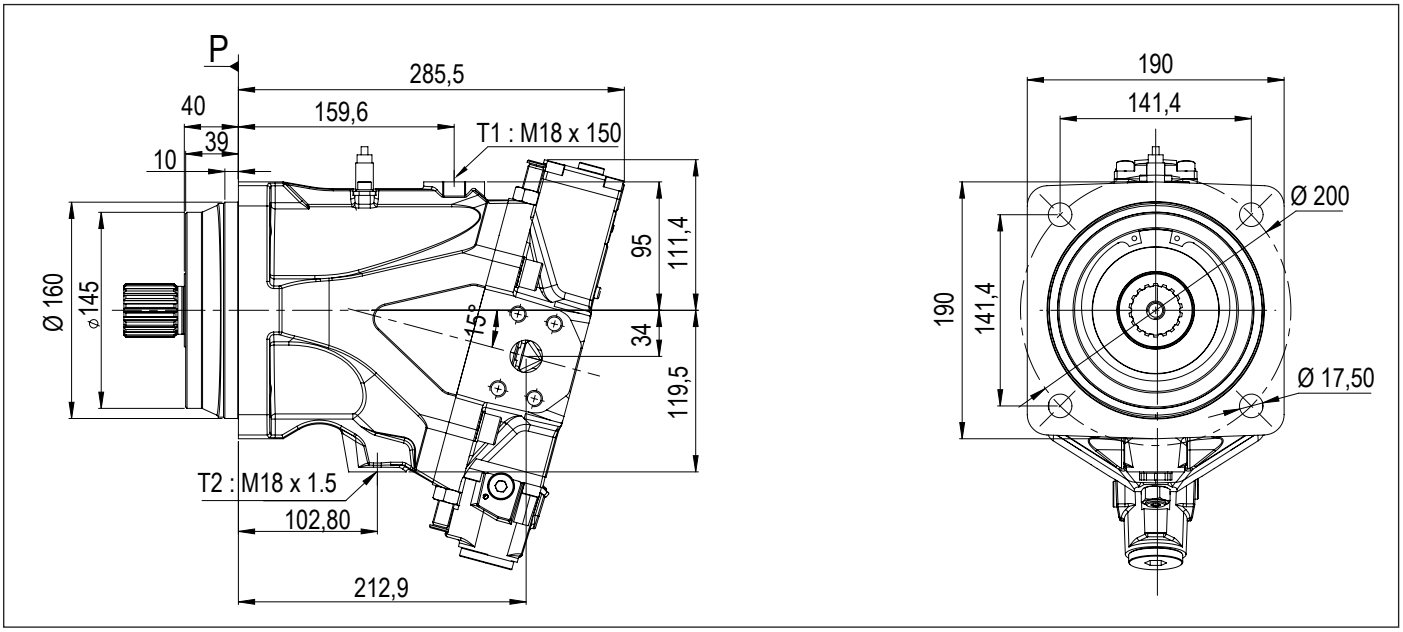


▶ Inlet ports - code 05

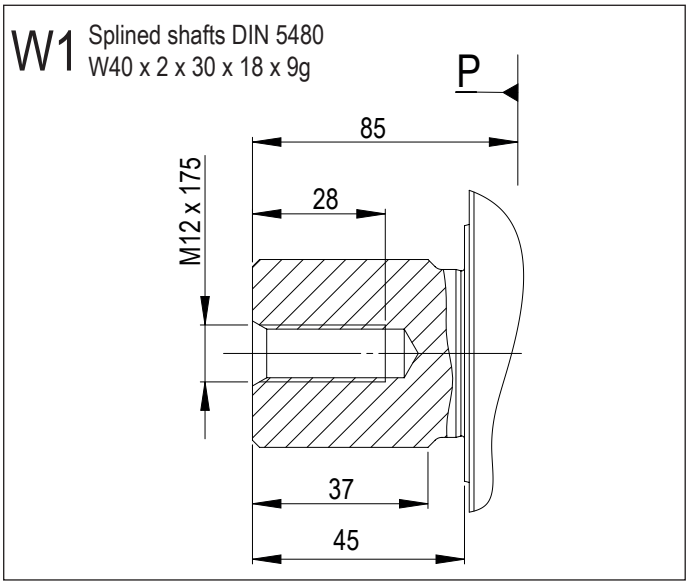


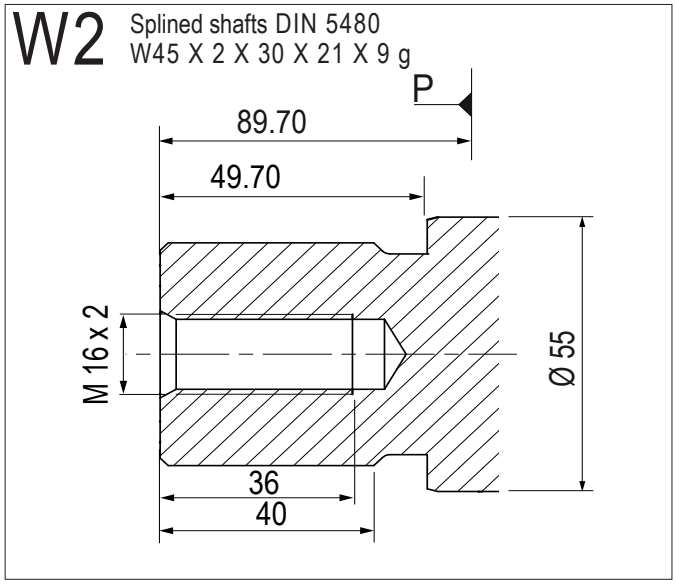


Dimensions (in mm) are given only as an indication.

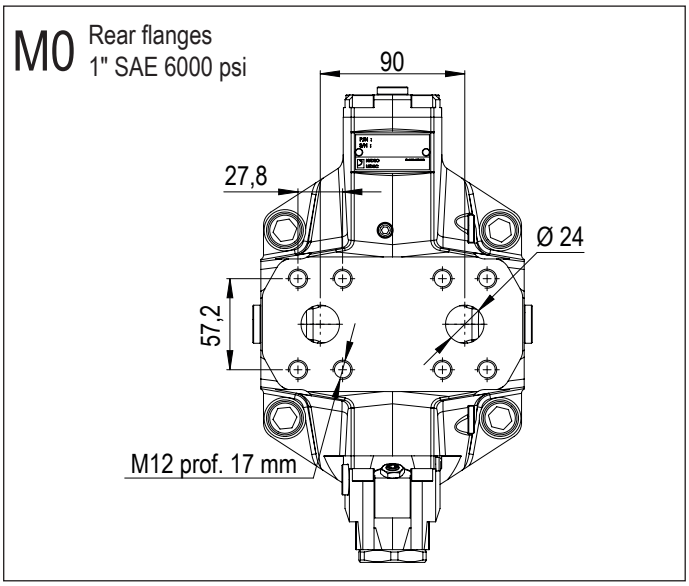


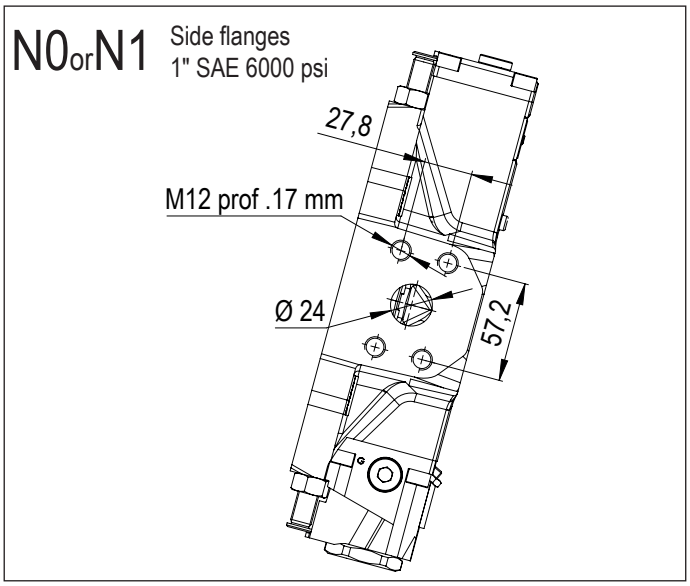
▶ Shaft - code 04



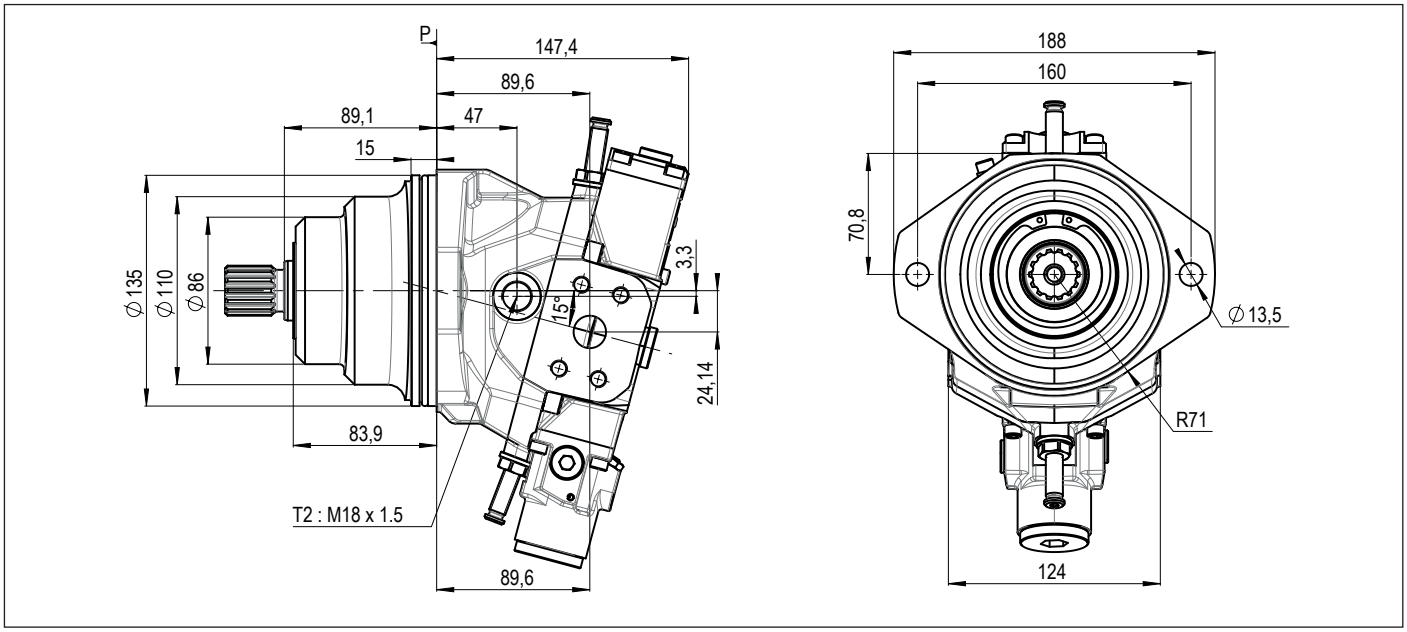


▶ Inlet ports - code 05



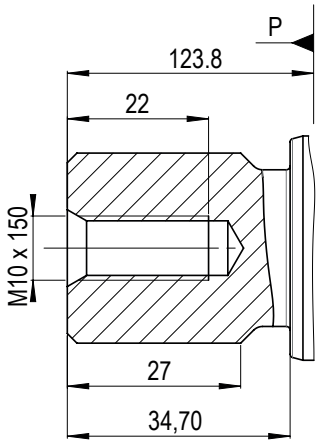


Dimensions (in mm) are given only as an indication.



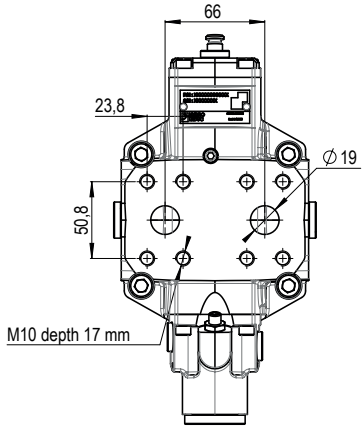
▶ Shaft - code 04

W1 Splined shaft DIN 5480
W30 x 2 x 30 x 14 x 9g

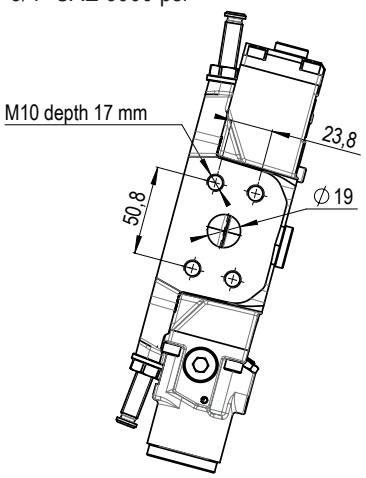


▶ Inlet ports - code 05

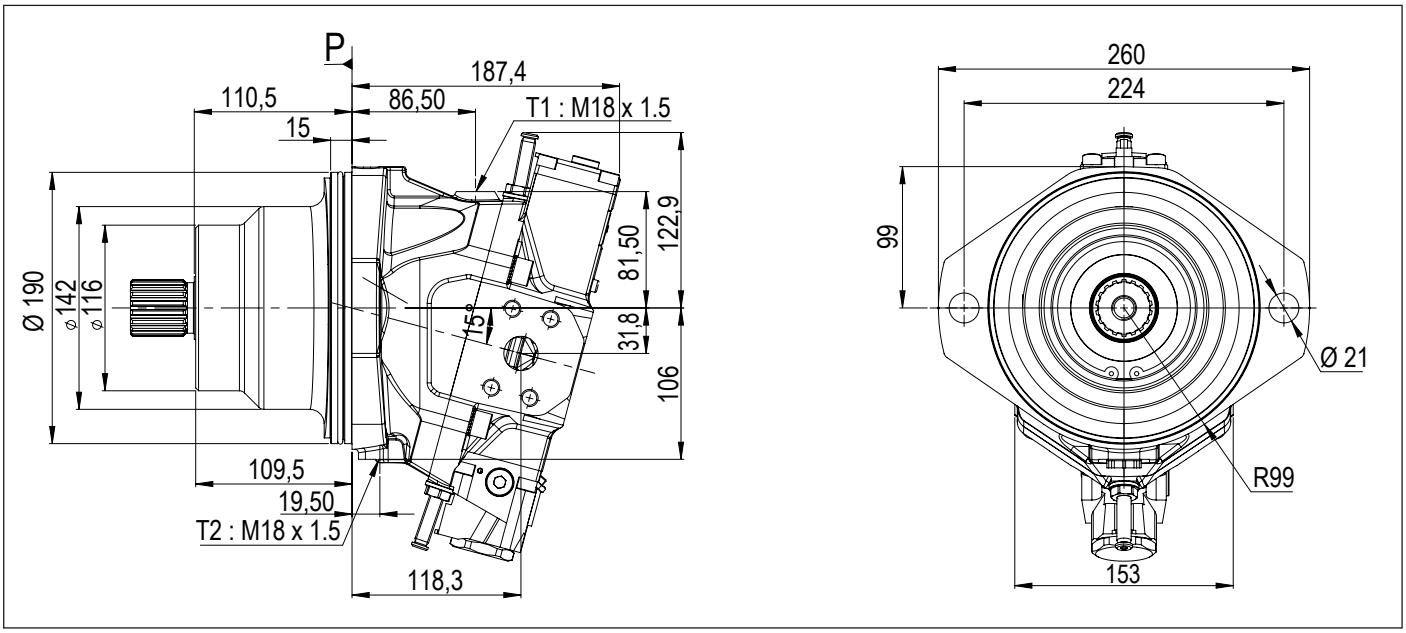
M0 Rear flanges
3/4" SAE 6000 psi



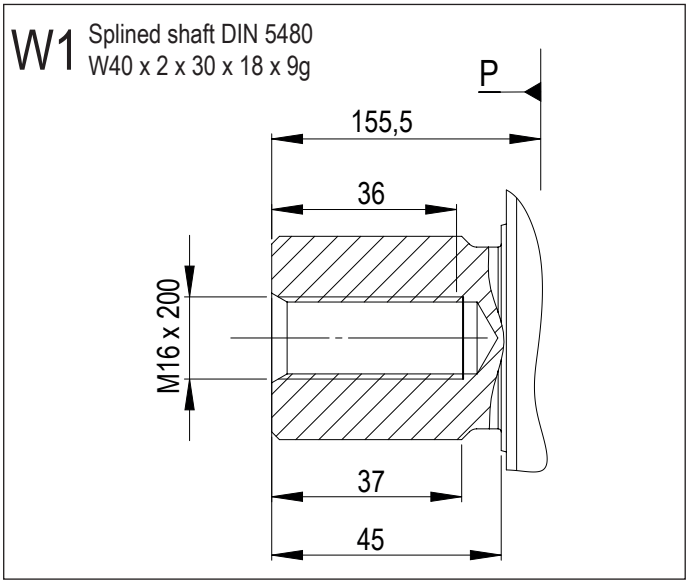
N0 or N1 Side flanges
3/4" SAE 6000 psi



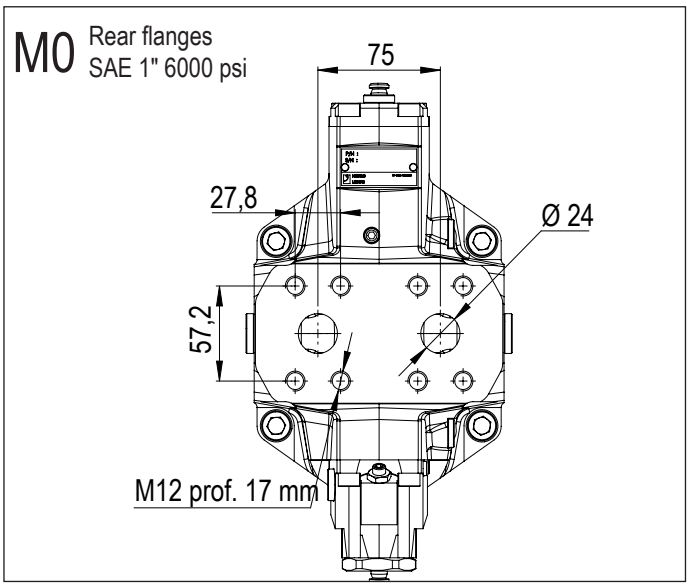
Dimensions (in mm) are given only as an indication.

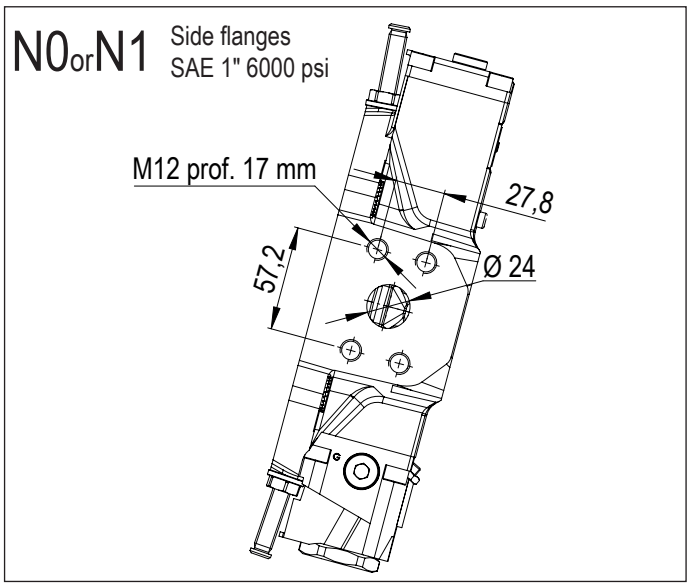


▶ Shaft - code 04

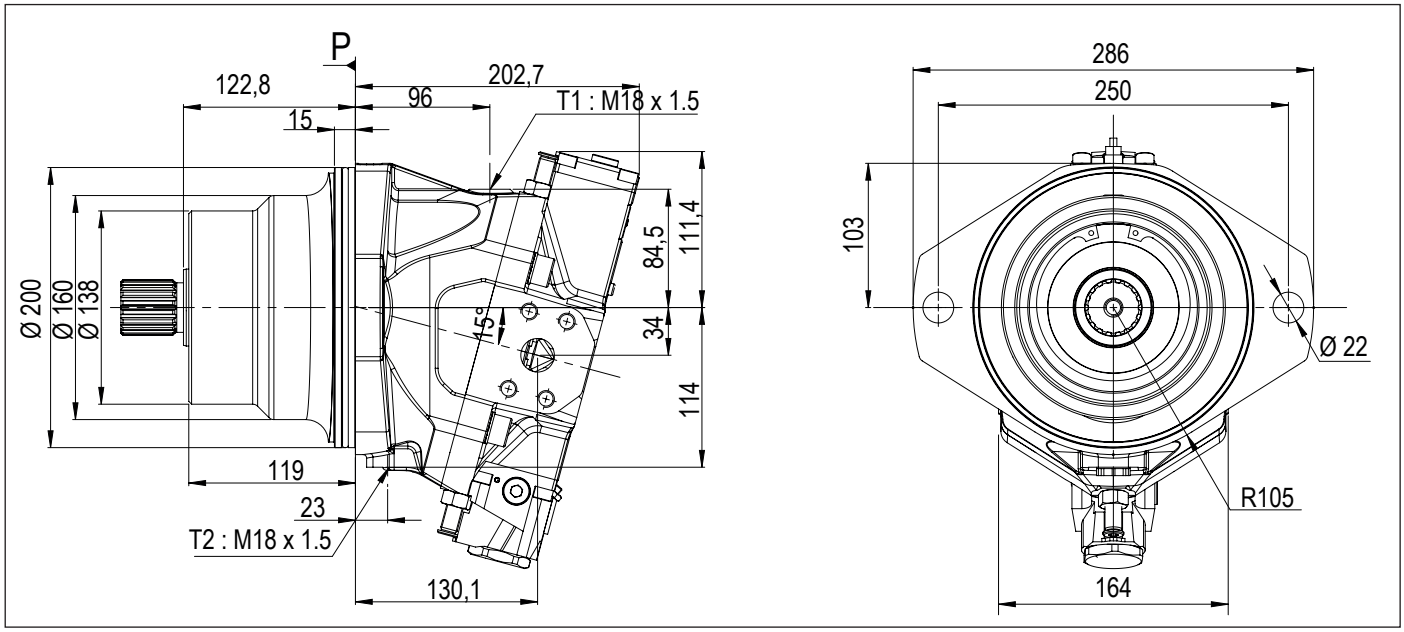


▶ Inlet ports - code 05



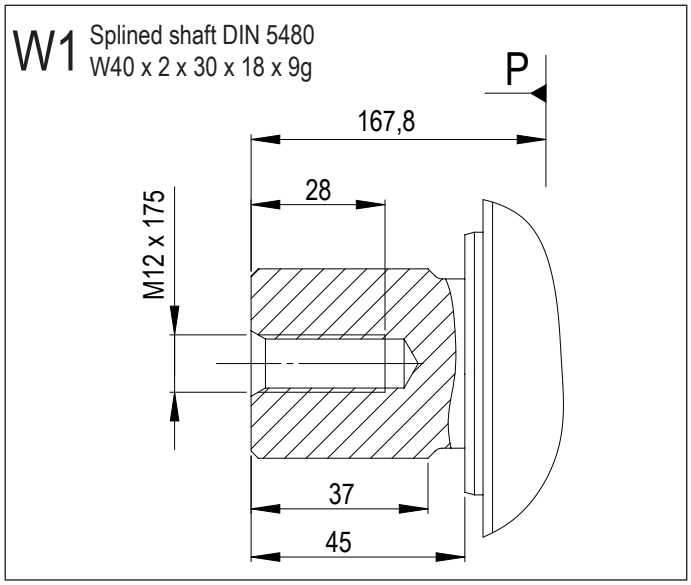


Dimensions (in mm) are given only as an indication.

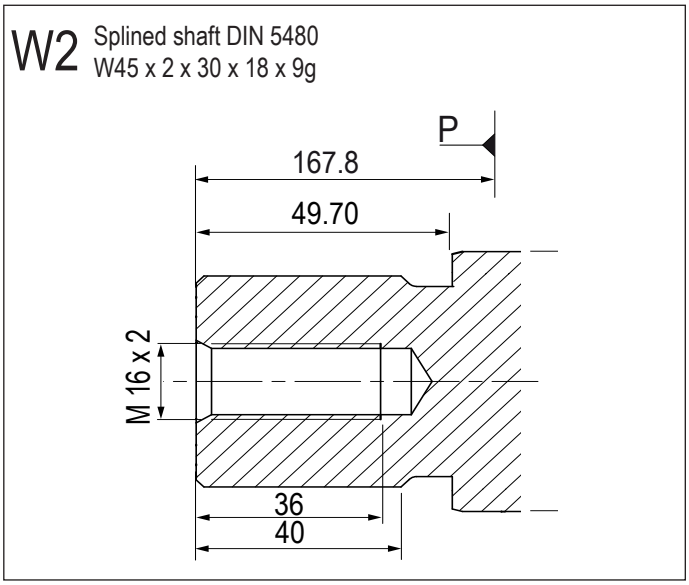


▶ Shaft - code 04

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

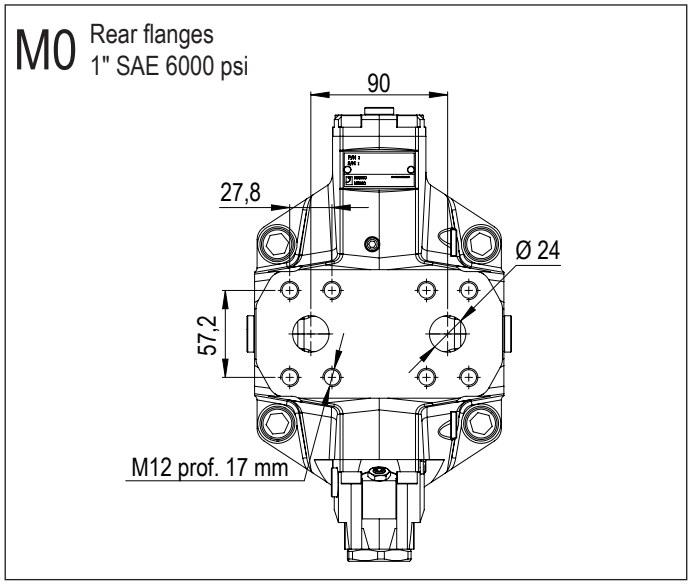


W2 Splined shaft DIN 5480
W45 x 2 x 30 x 18 x 9g

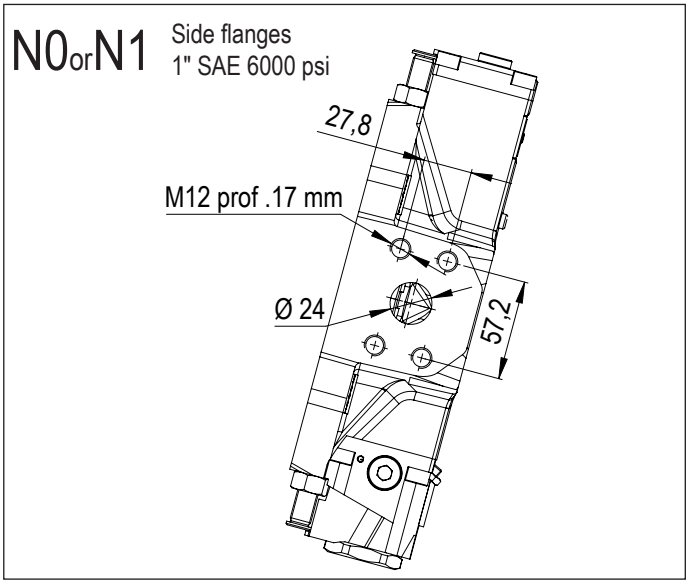


▶ Inlet ports - code 05

M0 Rear flanges
1" SAE 6000 psi

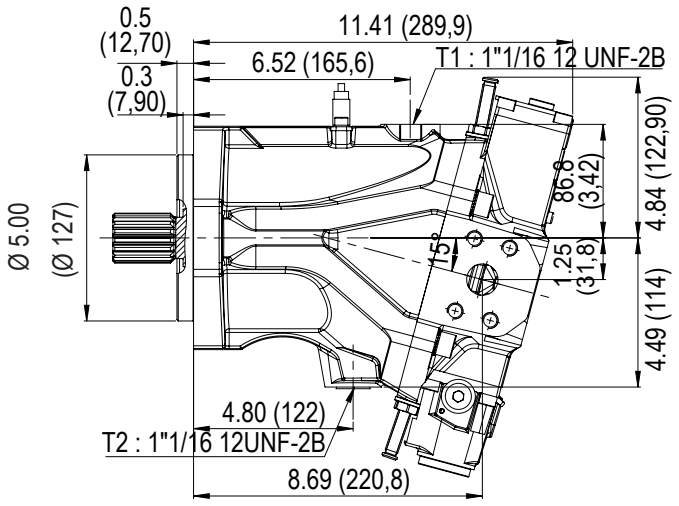


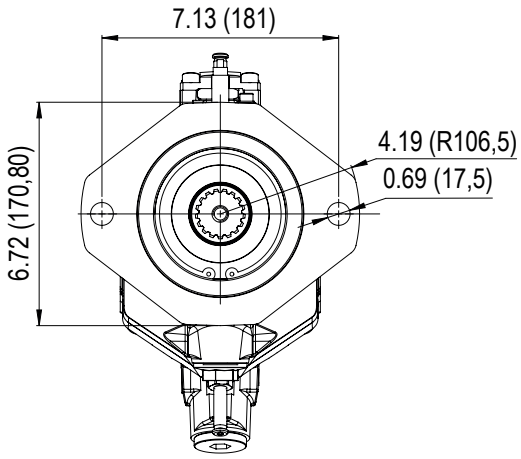
N0 or N1 Side flanges
1" SAE 6000 psi



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

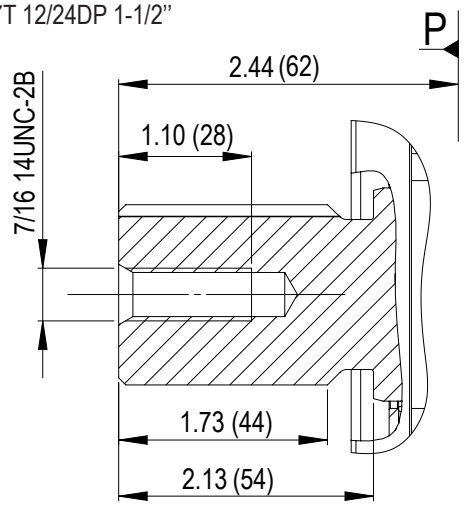
MVA 85 (SAE version)



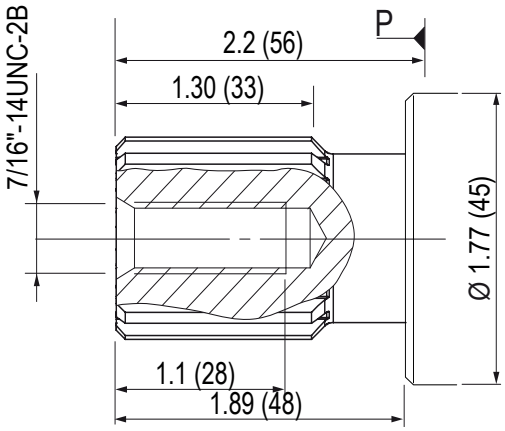


▶ Shaft - code 04

S1 Splined shaft SAE J744
17T 12/24DP 1-1/2"

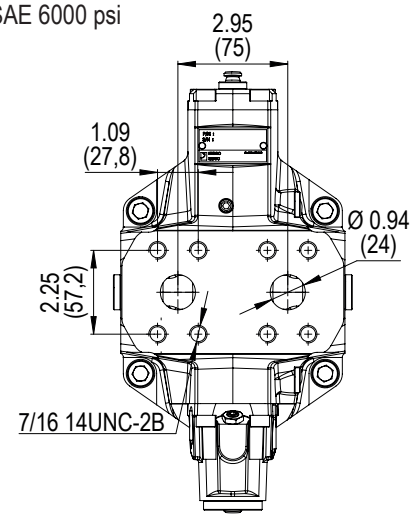


S2 Splined shaft SAE J744
14T 12/24DP 1-1/4"

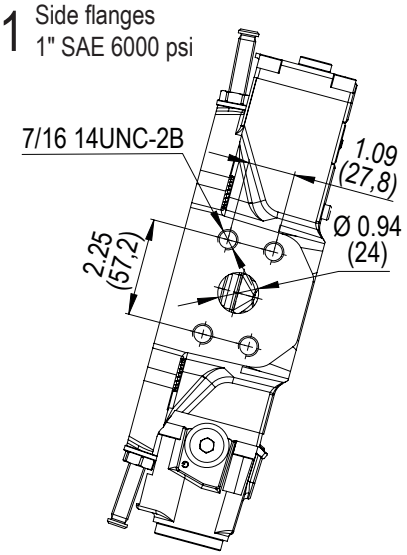


▶ Inlet ports - code 05

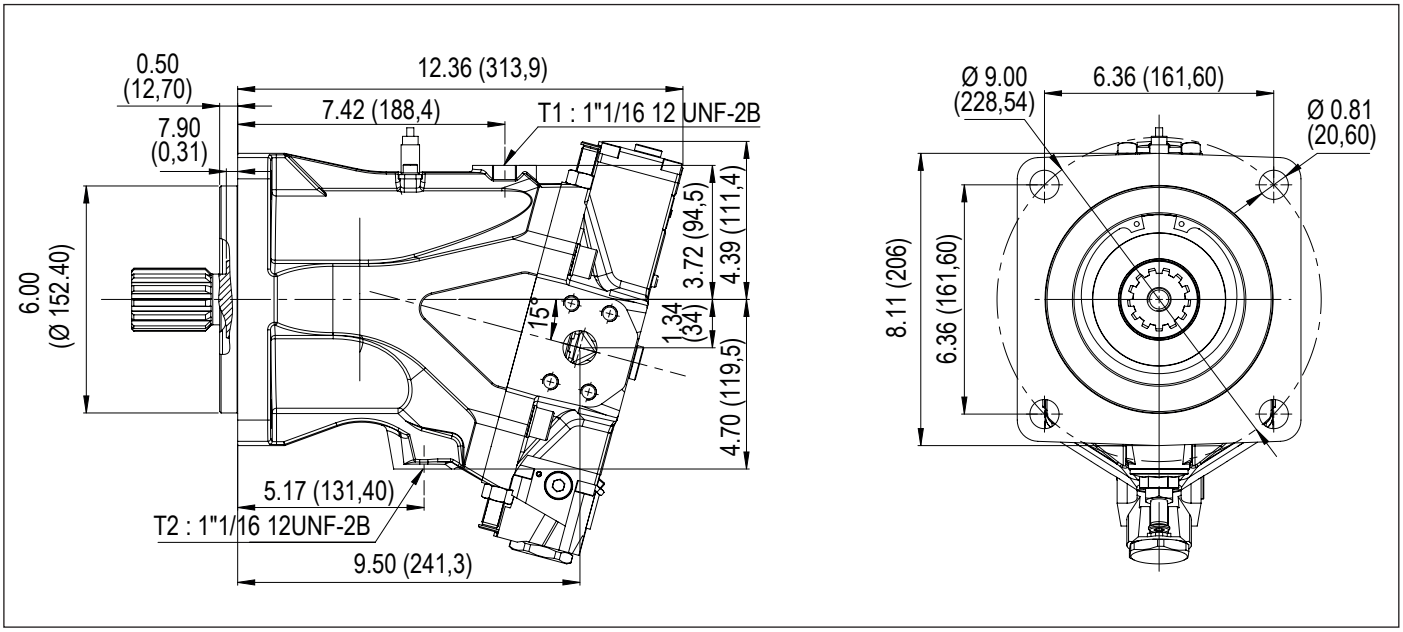
M0 Rear flanges
1" SAE 6000 psi



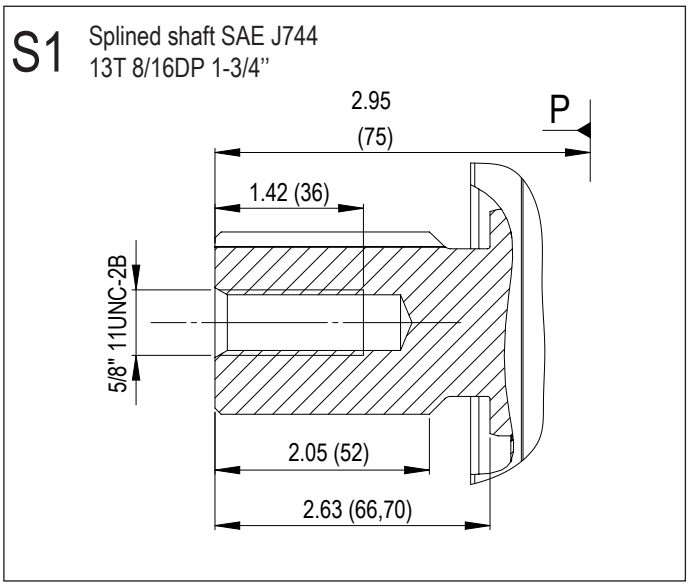
N0 or N1 Side flanges
1" SAE 6000 psi

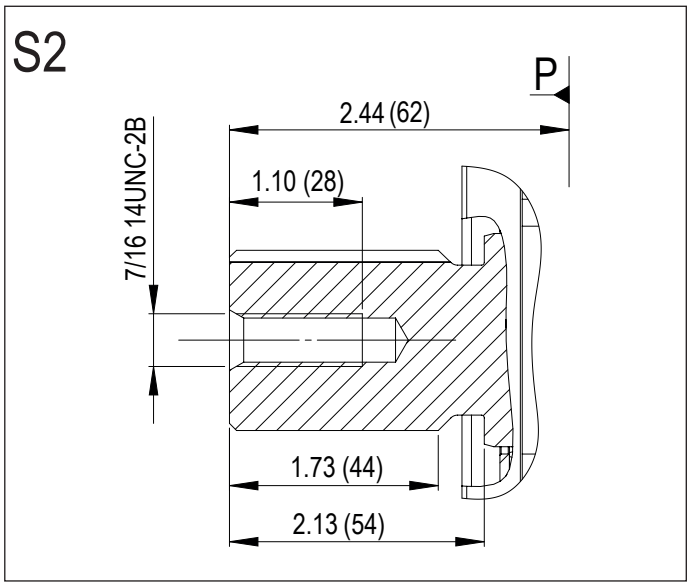


Dimensions (in mm) are given only as an indication.

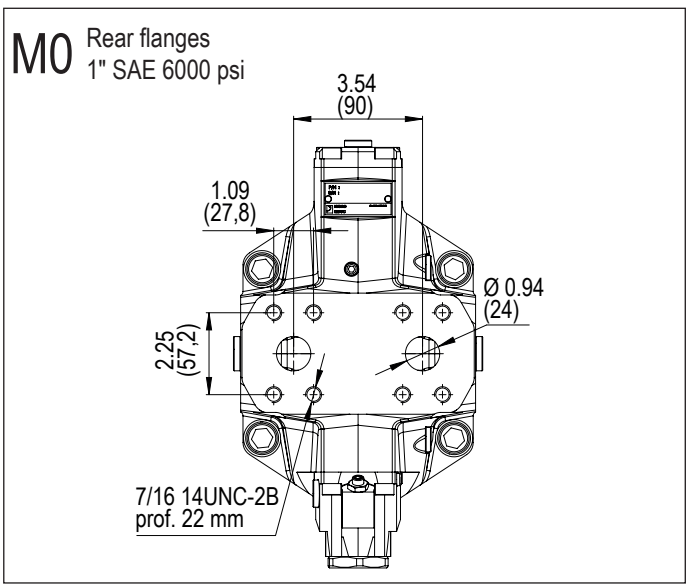


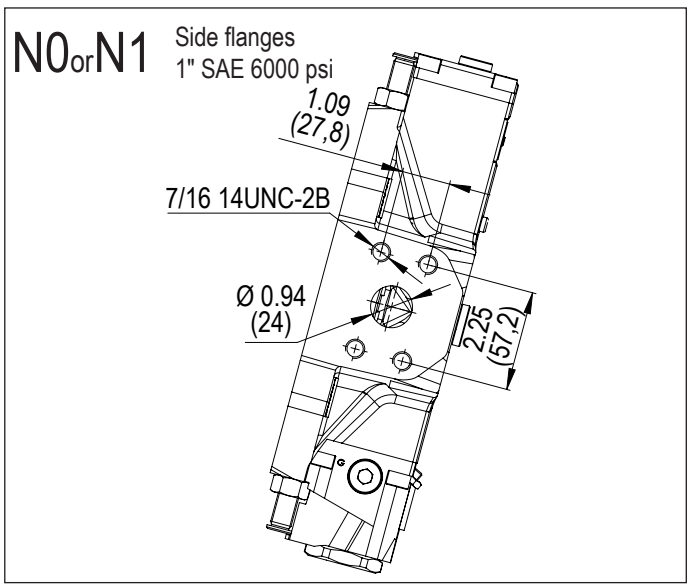
▶ Shaft - code 04





▶ Inlet ports - code 05

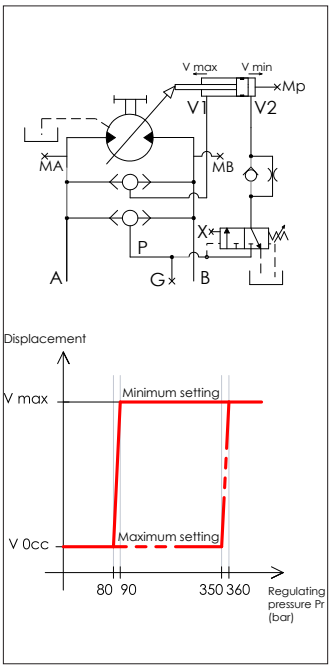




Dimensions (in mm) are given only as an indication.

▶ Displacement control - code 07

Automatic displacement control, high pressure: **HPA**	Automatic displacement control with high-pressure piloting and pressure increase: **HPM** *(HPA + control cylinder spring)*	Automatic displacement control with high-pressure piloting and proportional hydraulic shift (Override): **HPD** *(same as HPA + H2N)*	Automatic displacement control with high-pressure piloting, pressure increase, and proportional hydraulic shift (Override): **HPT** *(HPM + HPD)*

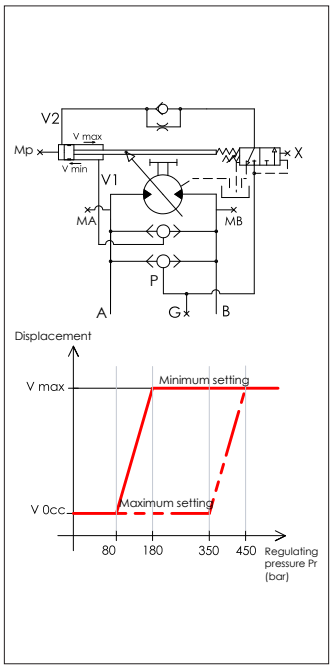


The automatic displacement control, high pressure, automatically adjusts displacement as a function of the set pressure level.

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.

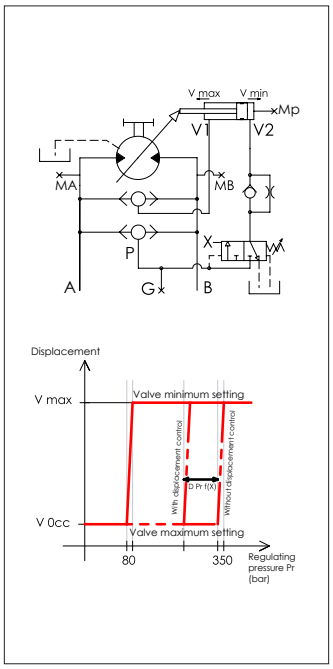
Once V_{max} has been reached, motor pressure can exceed set pressure if required.



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

⇨ ΔP = 100 bar.

(e.g., for V_{min} = $V_{max/2}$ ⇨ ΔP = 100/2 = 50 bar)



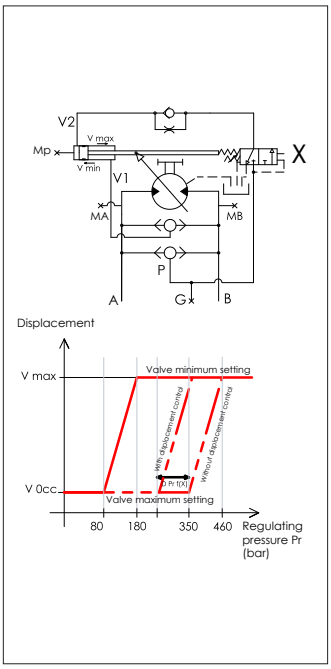
Similar operation as HPA

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

⇨ Shift Dpr = 14.3.Px.

Caution:

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



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

⇨ ΔP = 100 bar.

(e.g., for V_{min} = $V_{max/2}$ ⇨ ΔP = 100/2 = 50 bar)

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

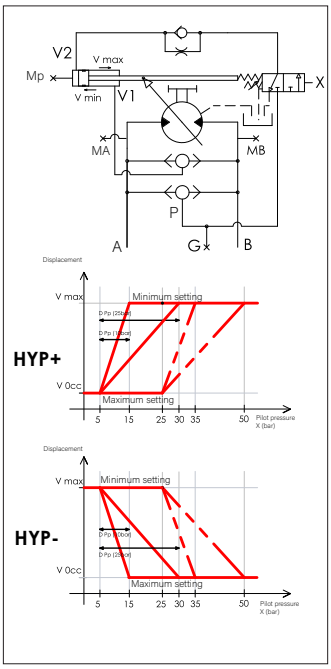
⇨ Shift Dpr = 14.3.Px.

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-**	Two speed hydraulic adjustment of displacement: **H2N+ / H2N-**	Two speed electric adjustment of displacement: **E2N+ / E2N-**	Pilotage électrique de cylindrée 2 vitesses : **eLP+ / eLP-**



The adjustment of the displacement, is done proportionally to the external pilot pressure (Px).

HYP+ ⇨ V_{min} to V_{max}

HYP- ⇨ V_{max} to V_{min}

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

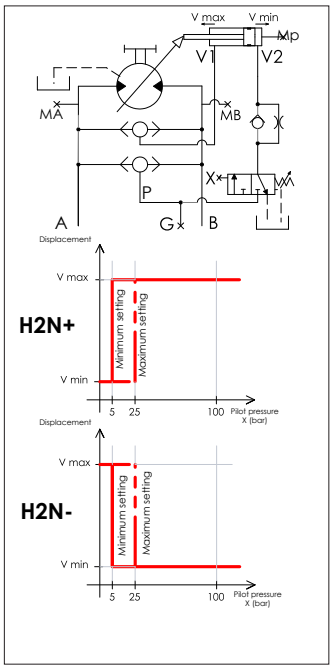
HYP1 ⇨ ΔPx = 10 bar between V 0_{cc} and V_{max} (or V_{max} to V 0_{cc}).

(e.g., for V_{min} = $V_{max/2}$ ⇨ΔP = 10/2 = 5 bar)

HYP2 ⇨ ΔPx = 25 bar between V 0_{cc} and V_{max} (or V_{max} to V 0_{cc}).

(e.g., for V_{min} = $V_{max/2}$ ⇨ΔP = 25/2 = 12.5 bar)

Px_{max} = 100 bar.



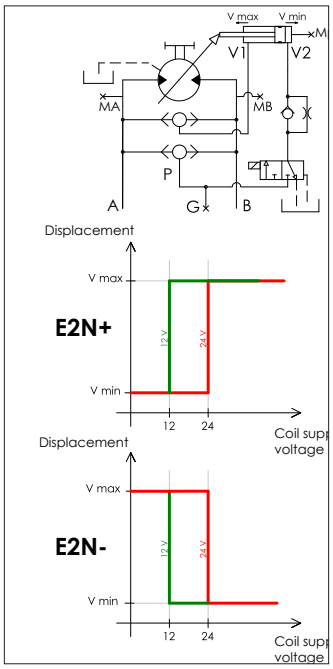
Setting displacement is done by applying an external pilot pressure, or not.

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+, from 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).

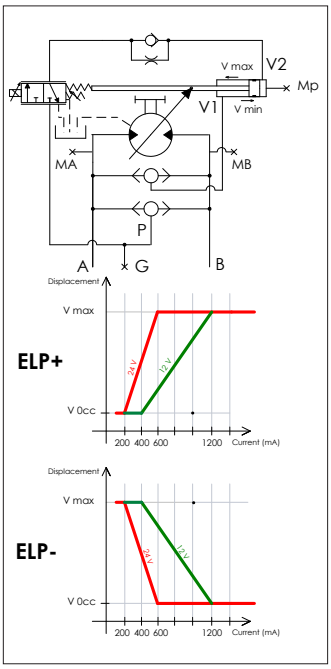


Setting displacement is done by applying an external electrical current via a solenoid, or not.

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.

Connector: EN 175301-803-A



The displacement control is achieved by applying or interrupting an external electric current at the solenoid level.

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

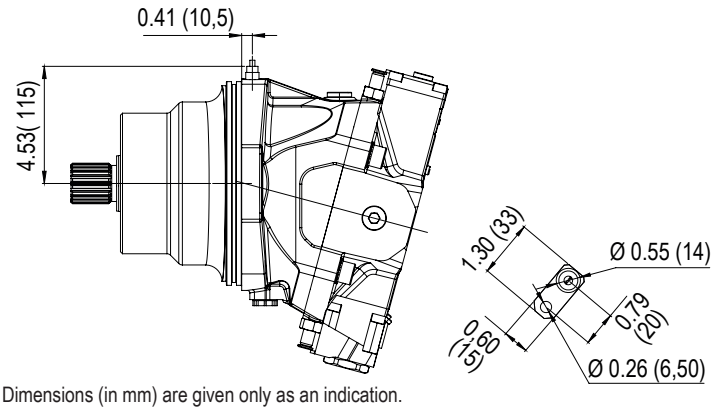
When the coil is energized, the motor initiates the displacement change from Vmin to Vmax in the eLP+ version, and from Vmax to Vmin in the eLP- version.

Connector: DEUTSCH DT04-2P

SPEED SENSOR & INDICATOR OF DIRECTION OF ROTATION

Codes 08 and 09

MV, MVA, MVSI 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

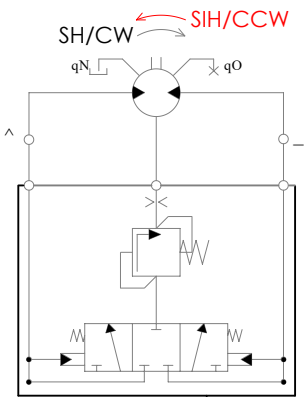
Code 10

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 Δp = 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



NOTES

A passion for hydraulics

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