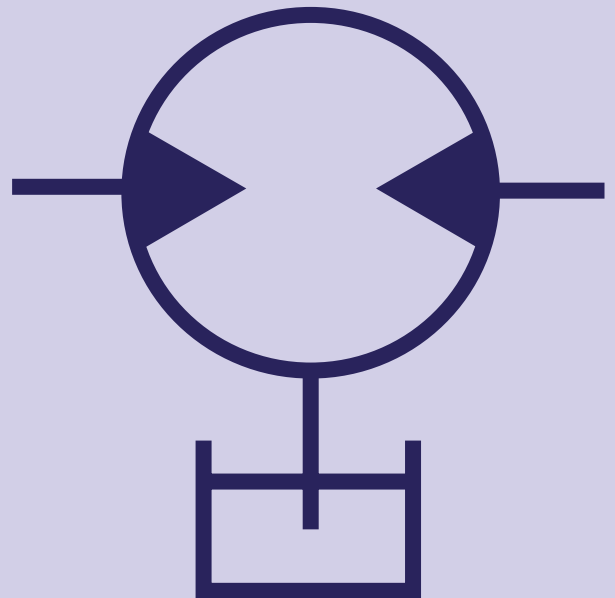
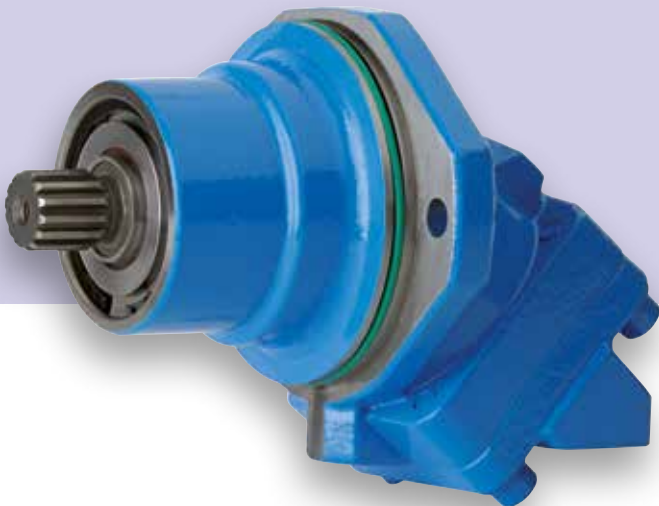
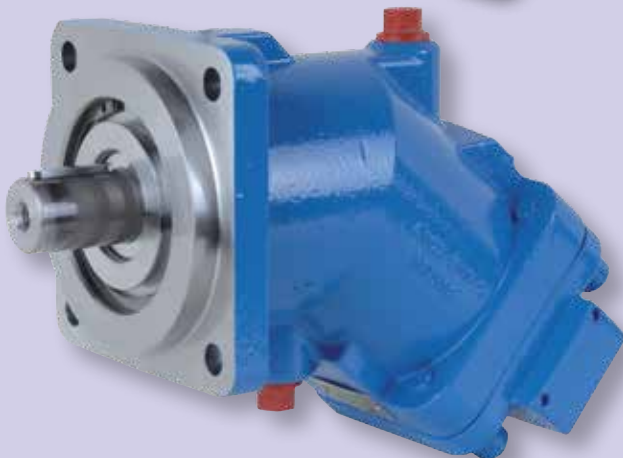
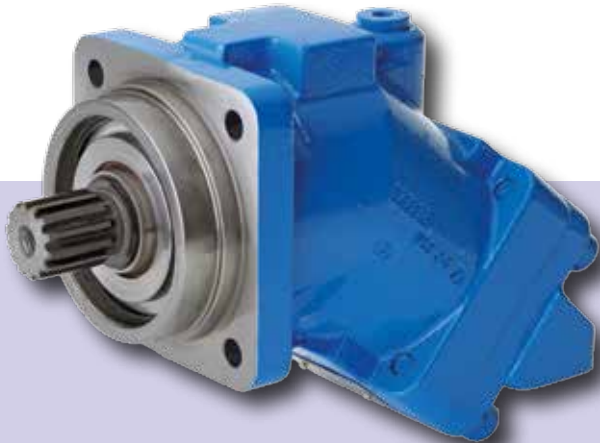


BENT AXIS HYDRAULIC MOTORS

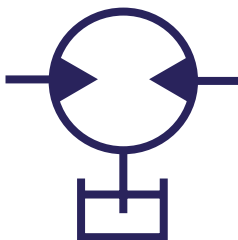
FIXED DISPLACEMENT



make it simple

 **HYDRO
LEDUC**

BENT AXIS

HYDRAULIC MOTORS

Applications and efficiency	4
Definition and advantages	5
Operating conditions	6
Determination / calculating the right motor	8

M series

Range and characteristics of M series motors	10
Order code system of M series motors	11
Dimensions M 5 to M 180	12

MA series

Range and characteristics of MA series motors	26
Order code system of MA series motors	27
Dimensions MA 10 to 180	28

MSI series

Range and characteristics of MSI series motors	42
Order code system of MSI series motors	43
Dimensions MSI 28 to 125	44

Options | Accessories

Speed sensor	49
Flushing valve	50
ATEX certification	51

Installation and start-up recommendations	52
Drainless motor	53
Other product lines	54

M

- Displacement 0.31 cu.in/rev (5 cc/rev) - CETOP
- Displacements from 0.73 cu.in/rev to 11.02 cu.in/rev (12 to 180 cc/rev) - ISO
- For fixed and mobile applications



M series

MA

- SAE
- Displacements from 0.62 cu.in/rev to 11.02 cu.in/rev (10 to 180 cc/rev)
- For fixed and mobile applications



MA series

MSI

- ISO - semi-integrated
- Displacements from 1.69 cu.in/rev to 7.65 cu.in/rev (28 to 125 cc/rev)
- For applications mounted on a planetary gearbox



MSI series

Drainless motor

- Single direction of rotation
- Bi-directional rotation



Options
Accessories

► Main applications

Typical applications are those requiring high torque within a small size.

The hydraulic motor is essential for rotations where:

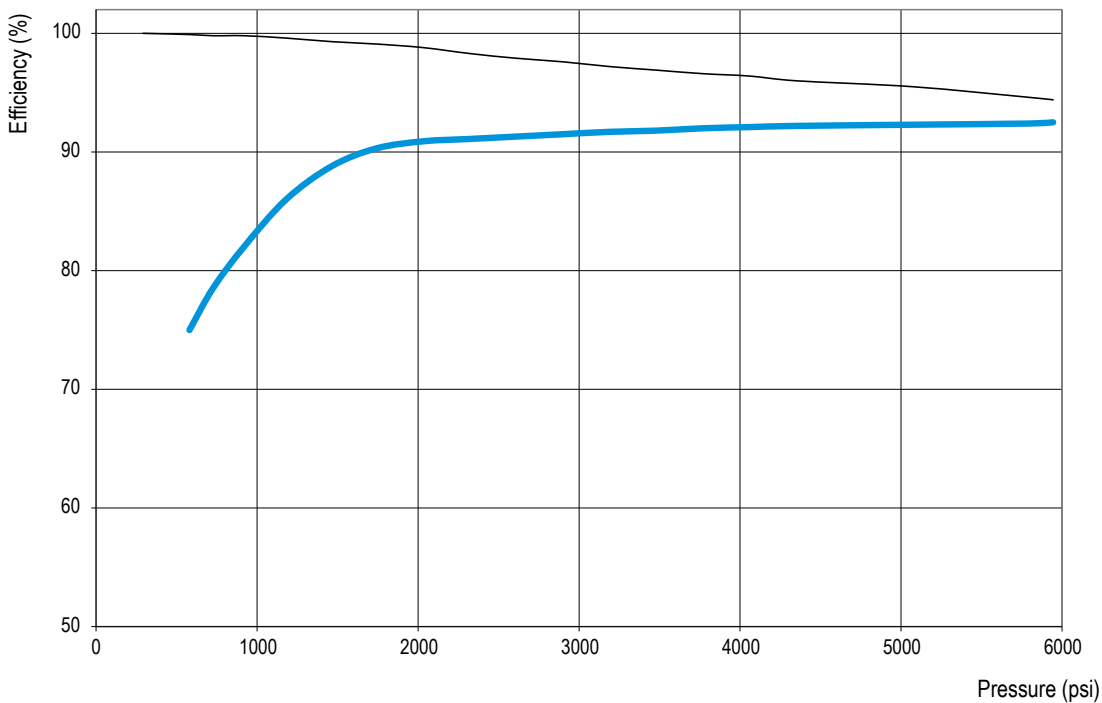
- mechanical solutions are complex or even impossible;
- electrical or pneumatic power sources are not available;
- environments are dangerous (i.e. risk of explosion or extreme temperatures).

► Examples of use

- Mowers: drive of grass cutting blade, where mechanical solution would be too complicated or impossible;
- Blowers: compressor drive;
- Wheel drive of undercarriages for construction equipment (motor installed on planetary gearbox);
- Industrial of marine winch drive;
- Fan drives.

EFFICIENCY OF M / MA / MSI SERIES MOTORS

N motor = 1000 rpm
ISO46 fluid at 77° F (25°C)



— Global efficiency
— Volumetric efficiency

This graph is given as an indication only.
For further information, please contact our Technical Service.

► Definition of function

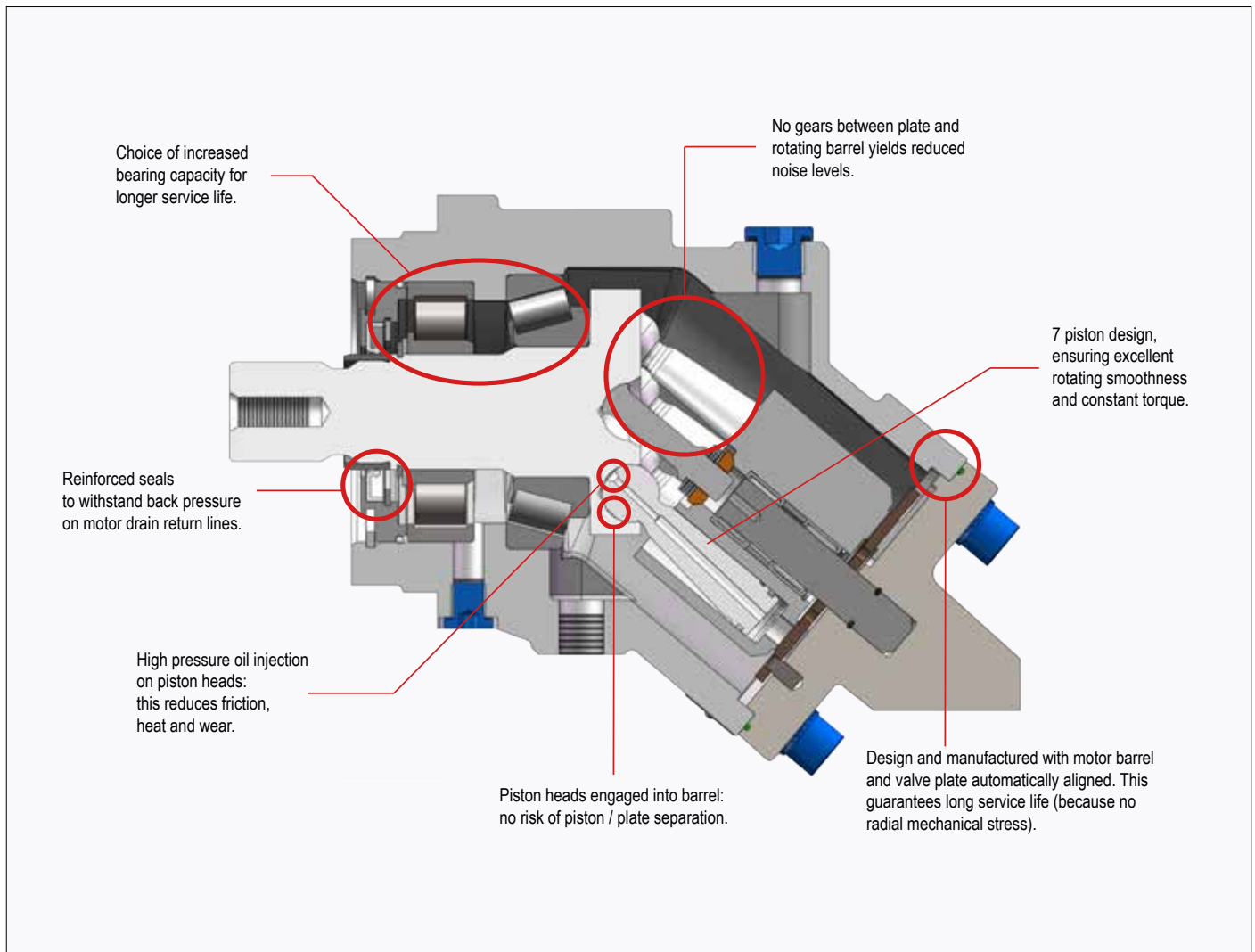
Hydraulic motors transform hydraulic flow into rotating speed and hydraulic pressure into mechanical torque.

Motor rotating speed is proportional to the flow which is supplied to it. Torque produced is proportional to the hydraulic pressure the motor receives.



► Advantages of LEDUC motors

High quality materials and workmanship. The design choices highlighted below ensure the remarkable reliability and long service life of LEDUC motors.



Operating conditions

► Preparation of the motor

Before start-up, the motor must be filled with oil.



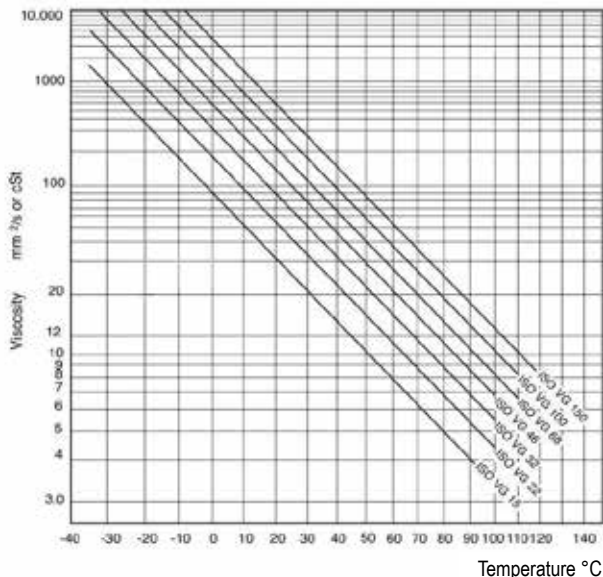
► The fluid

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

Recommended viscosity:

- Ideally: between 15 and 400 cSt;
- Maximum range: between 5 and 1600 cSt.

Fluid viscosities as a function of temperature



► 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 minimum cleanliness as follows:

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

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

► Rotating speeds

Minimum rotating speed to obtain continuous rotation is 200 rpm (however, in certain conditions, the motor can run at speeds as low as 50 rpm). Maximum rotating speed is given for each model of motor.

► Installation positions

LEDUC motors are made to operate in all positions (see details on page 52).

► Operating temperatures

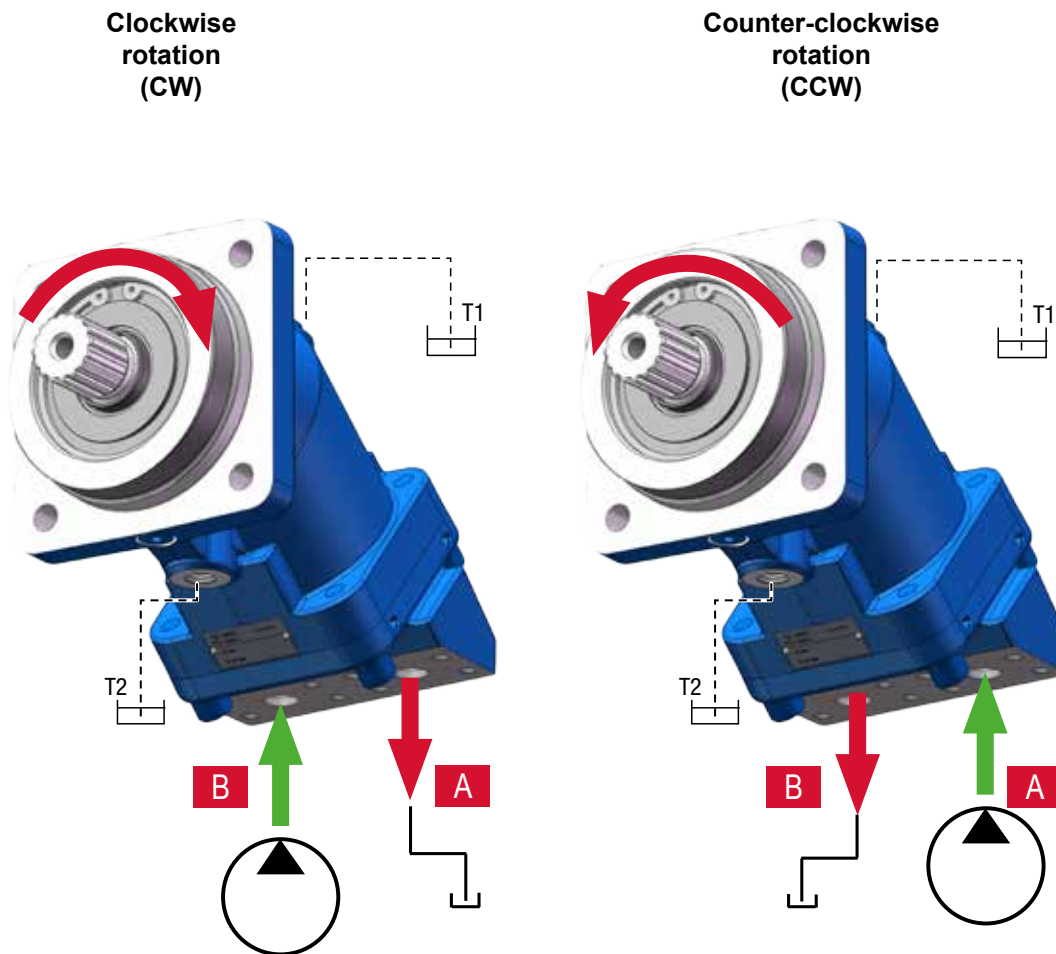
- As standard, LEDUC motors are fitted with FKM seals (Viton®). Operating temperatures: from -13 to 239 °F (-25 to 115 °C).
- As an option, HYDRO LEDUC proposes NBR seals, for operating temperatures from -40 to 176 °F (-40 to 80 °C).

IMPORTANT NOTE:

*Before start up, ensure the motor is filled with hydraulic fluid:
See section on installation and start-up, page 52.*

► Direction of rotation

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

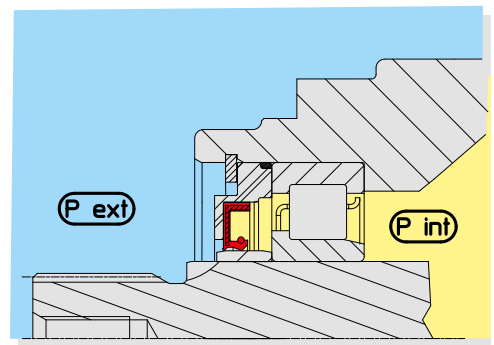


► Drain pressure

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

However, following these guidelines will avoid problems during operation:

- Maximum internal pressure (int P) regardless of rotating speed (continuous): 4 bar (60 psi);
- Maximum internal pressure (int P) regardless of rotating speed (peak): 5.5 bar (80 psi);
- Minimum pressure in the motor housing: must be greater than ambient (external) pressure (ext P).



► How to determine the correct motor for your application

Calculations using usual mechanical units:

N	= rotating speed (rpm)
T	= torque (lfb.ft)
ΔP	= pressure difference between A and B (psi)
Displ.	= displacement (cu.in/rev)
Q	= flow (gpm)
E	= efficiency (%)

1. Torque supplied by the hydraulic motor

$$\text{Theoretical torque} = T_{th} = \frac{\Delta P \times \text{Displ.}}{75.6}$$

$$\text{Torque } T = T_{th} \times E$$

For example: a 3.07 cu.in/rev (50 cc/rev) motor with a ΔP of 3625 psi (250 bar) will supply a theoretical torque of 147 lbf.ft (200 N.m). Average global efficiency of the motor is 90%, actual torque is thus: 132 lbf.ft (180 N.m).

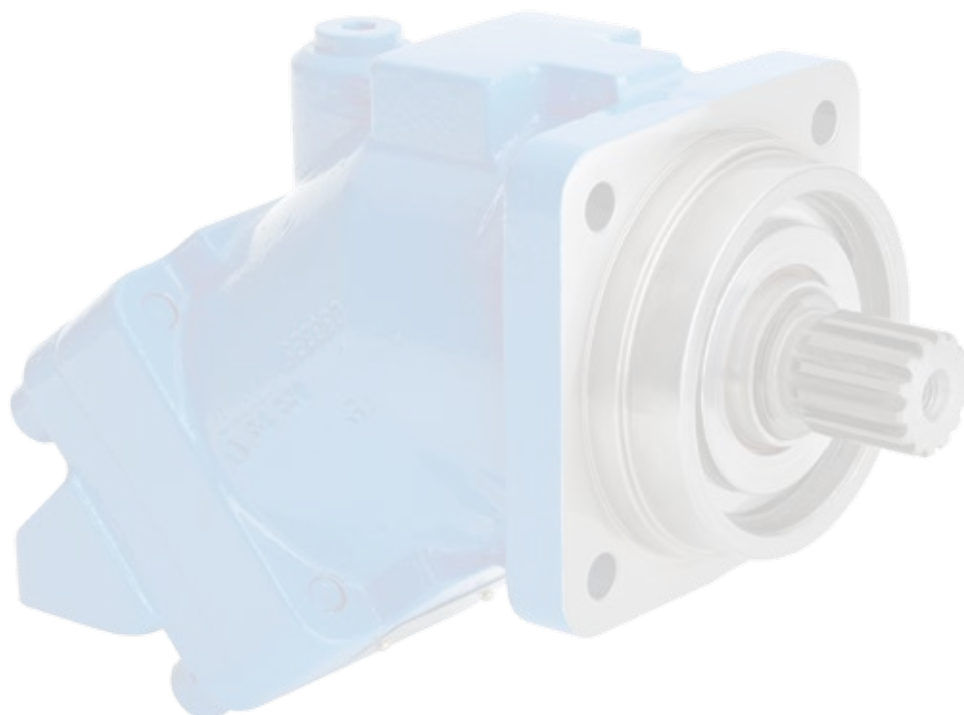
2. Rotating speed of the motor

The rotating speed of the hydraulic motor depends on the flow Q which goes through it, and on the displacement of the motor.

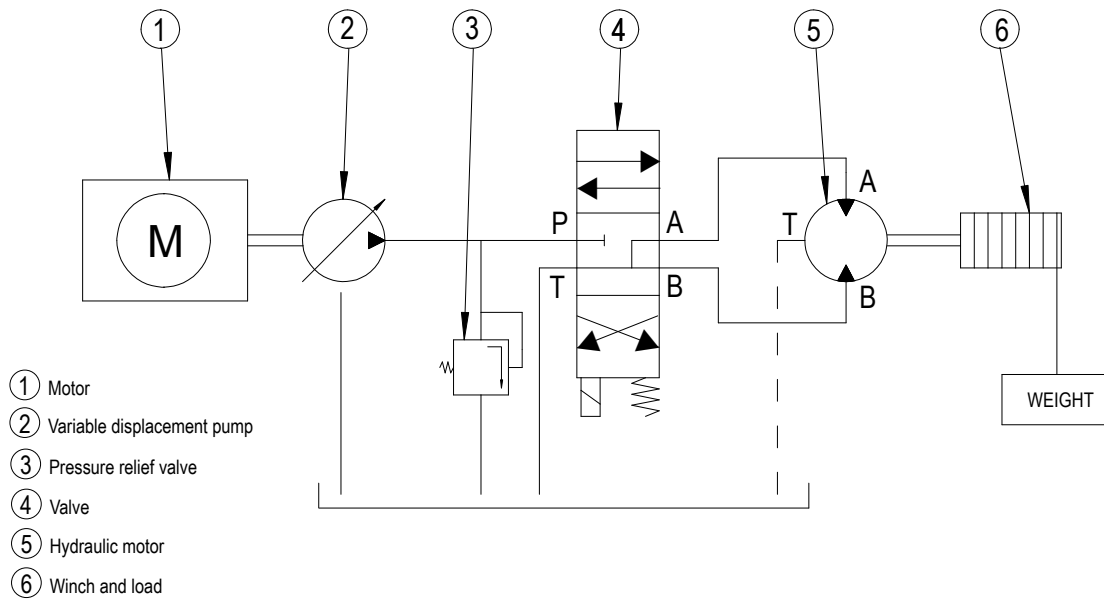
$$N = \frac{Q \times 231}{\text{Displ.}}$$

► Technical assistance

Our Customer Service would be pleased to assist in determining the right motor for your application.



► Example



The receiving organ (winch) ⑥ needs to rotate at $N = 400$ rpm and supply an actual torque of 147 lbf.ft (200 N.m).
The hydraulic pump ② is capable of operating at pressure P up to 5076 psi (350 bar).

1. Calculating the displacement of the hydraulic motor:

$$T_{th} = \frac{\Delta P \times \text{Displ.}}{75.6} \text{ thus Displ.} = 2.19 \text{ cu.in/rev (35.9 cc/rev)}$$

In the LEDUC range, choose a motor with a displacement of 1.96 or 2.50 cu.in/rev (32 cc/rev or 41 cc/rev).

2. Calculating the flow Q which the pump needs to supply:

$$Q = \frac{N \times \text{Displ.}}{231}$$

Corresponding flow:

- For 1.96 cu.in/rev (32 cc/rev) motor, $Q = 3.39$ gpm (12.8 l/min)
- For 2.50 (41 cc/rev) motor, $Q = 4.33$ gpm (16.4 l/min)

CHARACTERISTICS OF THE M SERIES MOTORS

Motor model	Displacement		Continuous max. speed (1)	Intermittent max. speed (1)	Max. flow absorbed		Torque		Torque at 350 bar (5100 psi)		Theoretical maximal power at 5800 psi 400 bar		Max. allowable pressure continuous / peak		Weight (kg)	
	cu.in/rev	cc/rev	rpm	rpm	gpm	l/mn	lbf.ft/psi	N.m/bar	lbf.ft	N.m	HP	kW	psi	bar	lbs	Kg
M 5_093840	0.31	5	8000	8800	10.6	40	0.0040	0.08	21	28	35.7	26.6	5800 / 6525	400 / 450	9.7	4.4
M 12	0.73	12	8000	8800	25.4	96	0.0097	0.19	49	67	85.7	64	5800 / 6525	400 / 450	12.1	5.5
M 18	1.10	18.0	8000	8800	38.0	144	0.0145	0.29	74	100	128.7	96	5800 / 6525	400 / 450	12.1	5.5
M 25	1.52	24.9	6300	6900	41.4	157	0.0201	0.40	102	139	140.1	104.5	5800 / 6525	400 / 450	25	11.5
M 28	1.69	27.7	6300	6900	46.1	175	0.0223	0.44	114	154	155.9	116.3	5800 / 6525	400 / 450	25	11.5
M 32	1.96	32.1	6300	6900	53.4	202	0.0259	0.51	132	179	180.7	134.8	5800 / 6525	400 / 450	25	11.5
M 41	2.51	41.1	5600	6200	60.8	230	0.0331	0.65	169	229	205.6	153.4	5800 / 6525	400 / 450	25	11.5
M 45	2.77	45.4	5000	5500	60.0	227	0.0366	0.72	187	253	202.8	151.3	5800 / 6525	400 / 450	40	18
M 50	3.07	50.3	5000	5500	66.4	252	0.0405	0.80	207	280	224.7	167.6	5800 / 6525	400 / 450	40	18
M 63	3.84	63	5000	5500	83.2	315	0.0508	1.00	259	351	281.5	210	5800 / 6525	400 / 450	40	18
M 80	4.91	80.4	4500	5000	95.6	362	0.0648	1.28	330	448	323.3	241.2	5800 / 6525	400 / 450	51	23
M 90	5.49	90	4500	5000	107.0	405	0.0725	1.43	370	501	361.9	270	5800 / 6525	400 / 450	51	23
M 108	6.61	108.3	4000	4400	114.4	433	0.0872	1.72	445	603	387	288.8	5800 / 6525	400 / 450	51	23
M 108 R (2)	6.61	108.3	3400	4500	97.3	368	0.0872	1.72	445	603	329	245.4	5800 / 6525	400 / 450	66	35
M 125	7.65	125.4	3400	4500	112.6	426	0.1010	2.00	515	699	381	284.2	5800 / 6525	400 / 450	66	36
M 160	9.76	160	3600	4000	152.2	576	0.1289	2.55	657	891	514.7	384	5800 / 6525	400 / 450	107	48.5
M 180	11.02	180.6	3600	4000	171.8	650	0.1455	2.87	742	1006	581	433.4	5800 / 6525	400 / 450	107	48.5

(1) For higher speeds, please contact us.

(2) The M 108 R motor is in the frame size of the M 125.

► Acceptable forces applied to motor shaft

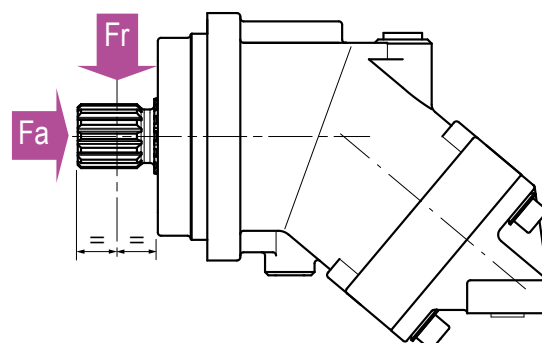
Motor model		5	12	18	25	28	32	41	45	50	63	80	90	108	108 R	125	160	180
Fr	lbf	160	630	900	1350	1394	1462.5	1574	1462.5	1686	2023	2360	2473	2585	2812	3262	4050	4500
	N	710	2800	4000	6000	6200	6500	7000	6500	7500	9000	10500	11000	11500	12500	14500	18000	20000
Fa	lbf/psi	0.15	0.23	0.31	0.42	0.44	0.46	0.62	0.62	0.62	0.77	0.93	1.03	1.24	1.24	1.33	1.32	1.47
	N/psi (N/bar) *	0.70 (10)	1.03 (15)	1.37 (20)	1.86 (27)	1.93 (28)	2.06 (30)	2.75 (40)	2.75 (40)	2.75 (40)	3.44 (50)	4.14 (60)	4.62 (67)	5.52 (80)	5.52 (80)	5.93 (86)	5.86 (85)	6.55 (95)

Fr: radial force measured at mid point of length of shaft.

Fa: axial force which tends to push the shaft inwards.

* Differential pressure between A and B.

For other forces, please contact us.



Order code system of M series motors

11

M series

M	...	A	..	..	M2	.	.	..	..
01	02	03	04	05	06	07	08	09	10

To obtain the code for your motor, complete the different parameters 02, 04, 05, 07, 08, 09 and 10 in the table on the left according to the options you require (see table below).

Motor																			
01	Motor																		M

Displacement																			
02		5	12	18	25	28	32	41	45	50	63	80	90	108	108R	125	160	180	

Mounting flange																			
03		CETOP 2 bolts																	A
																			4 bolts ISO 3019-2

Shaft end																			
04	DIN 5480 splined	–	W25	W25	W25	W30	W30	W30	W30	W30	W30	W40	W40	W40	W45	W45	W50	W50	W1
		–	–	–	W30	W25	W25	–	W35	W35	W35	W35	–	–	W40	W40	–	–	W2
	DIN 6885 keyed	Ø 18	Ø 25	Ø 25	Ø 25	Ø 30	Ø 30	Ø 30	Ø 30	Ø 30	Ø 30	Ø 40	Ø 40	Ø 40	Ø 45	Ø 45	Ø 50	Ø 50	D1
		–	Ø 20	–	Ø 30	Ø 25	Ø 25	–	Ø 35	Ø 35	Ø 35	–	–	–	Ø 40	–	–	–	D2

Inlet ports A and B																			
05	SAE flange ports	Bottom	0	–	–	–	–	•	•	•	•	•	•	•	•	•	•	•	L0
		Rear	0	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	M0
		Side	0	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	N0
	Threaded	Side	1	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	N1
		Side	0	–	•	•	•	•	•	•	•	•	•	•	•	–	–	–	Q0
		Rear	1	–	–	–	•	•	•	•	•	•	•	•	•	–	–	–	Q1
		Rear	0	•	•	•	•	•	•	•	•	•	•	•	•	–	–	–	P0

0 = Without suitability for valves
1 = Compatible with flushing valve

Drain ports T1 and T2																			
06		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	M2

Suitable for use of speed sensor																			
07	Yes	–	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
	No	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0

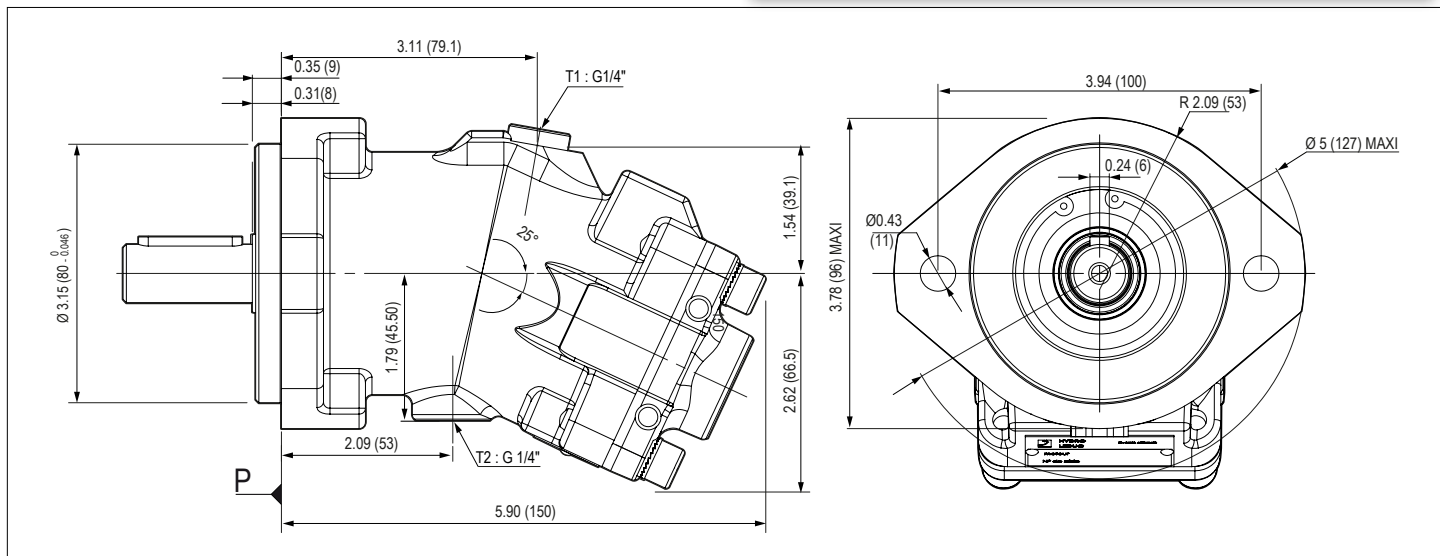
Speed sensor																			
08	Yes	–	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
	No	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0

Valves																			
09	Without	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	SV
	with flushing valve	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	•	•	VB

Low temperature option																			
10	Yes (NBR)	–	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	N
	No (FKM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	F

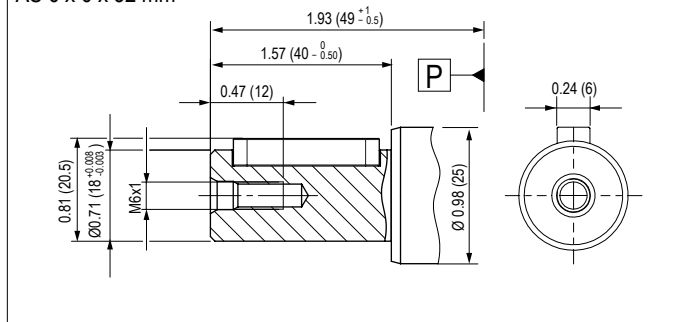
PLEASE NOTE: The M5 motor, reference 093840, only exists in one version (see next page).

CETOP flange, 2 bolts



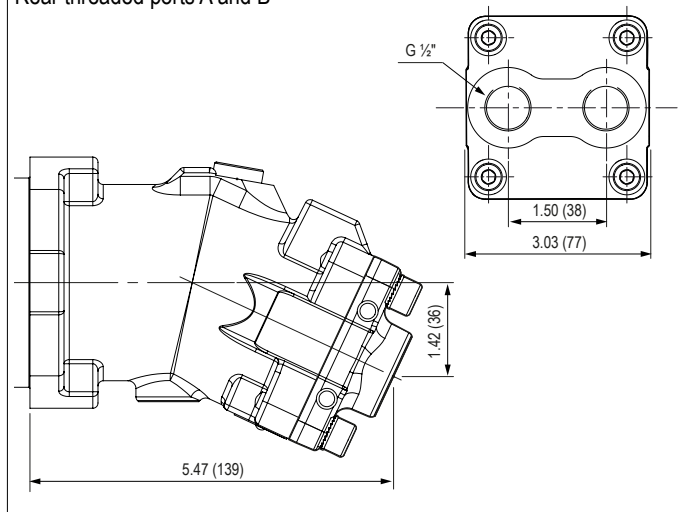
► **Shaft end**

Cylindrical keyed shaft Ø 18 mm
AS 6 x 6 x 32 mm

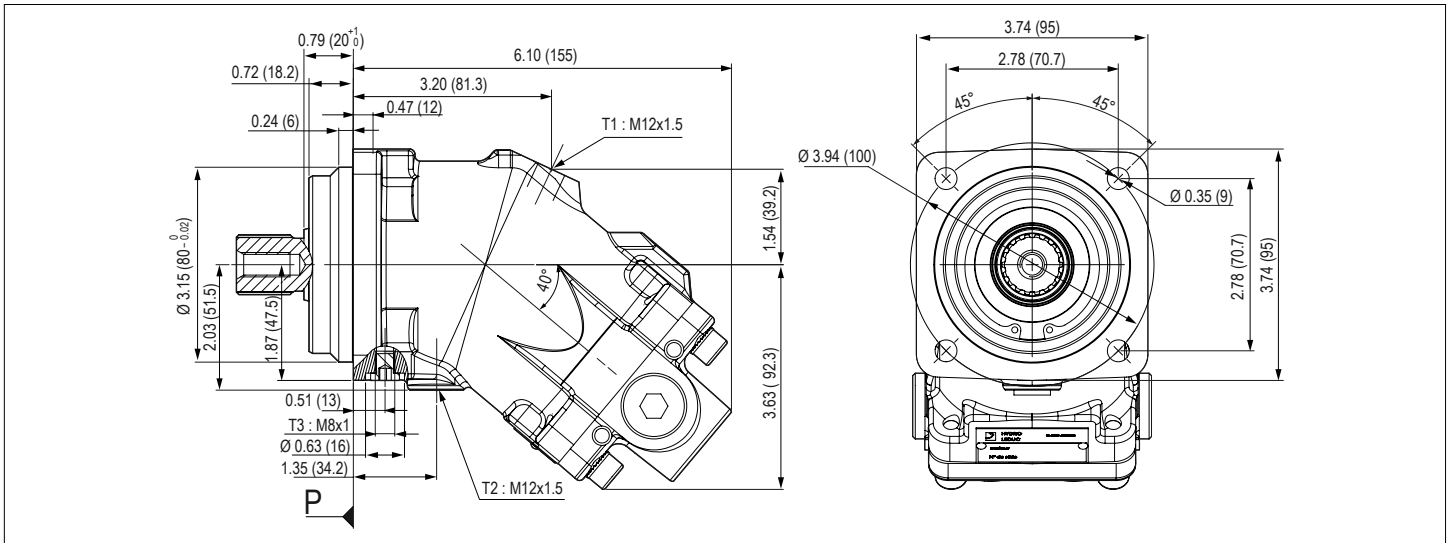


► Inlet ports

Rear threaded ports A and B

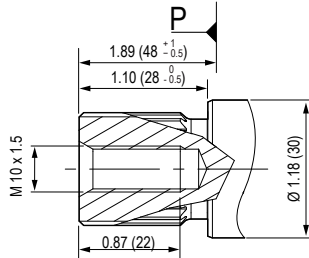


Dimensions in inches (mm) are given only as an indication.

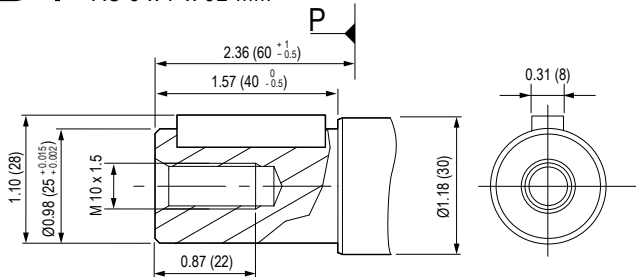


► Shaft end

W1 Splined shaft DIN 5480
W 25 x 1.25 x 30 x 18 x 9 g

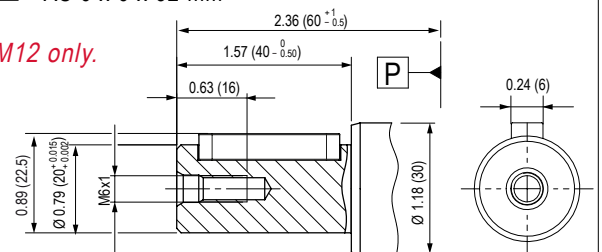


D1 Cylindrical keyed shaft Ø 25 mm DIN 6885
AS 8 x 7 x 32 mm



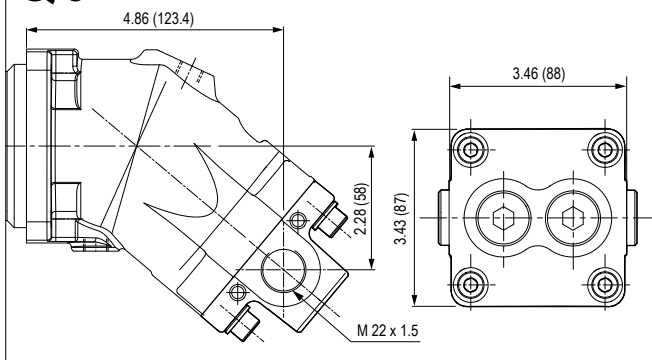
D2 Cylindrical keyed shaft Ø 20 mm DIN 6885
AS 6 x 6 x 32 mm

For M12 only.

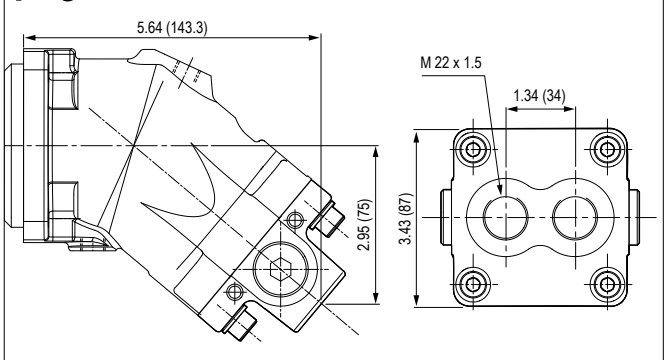


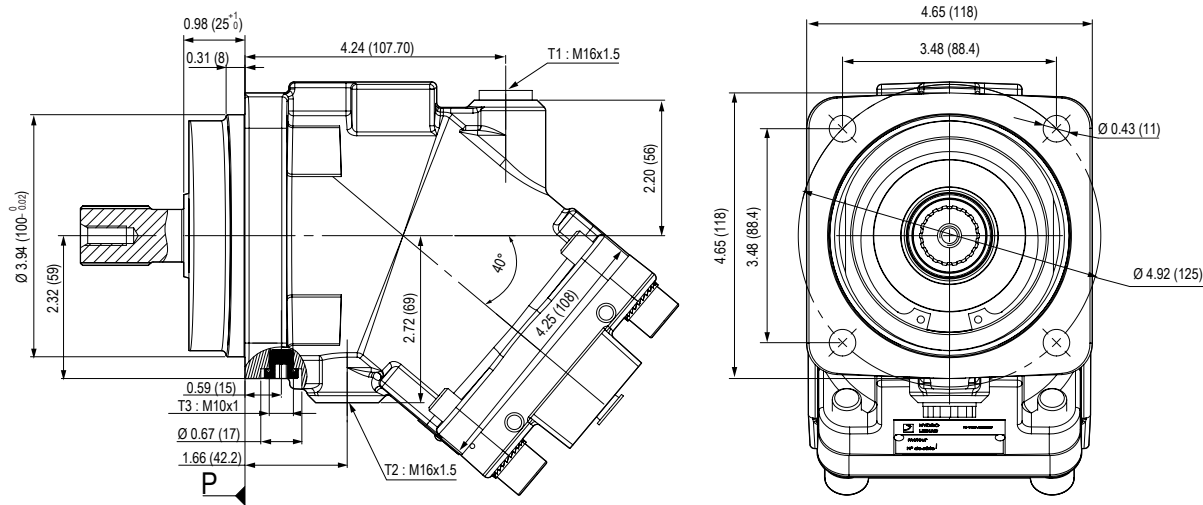
► Inlet ports

Q0 Side threaded ports A and B



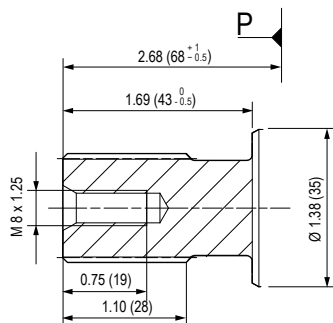
P0 Rear threaded ports A and B



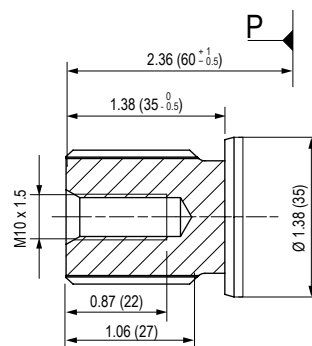


► Shaft end

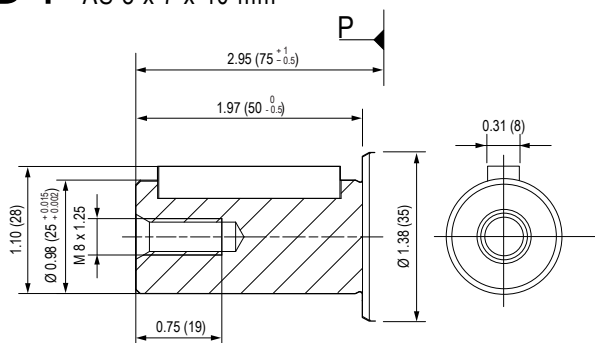
W1 Splined shaft DIN 5480 W 25 x 1.25 x 30 x 18 x 9 g



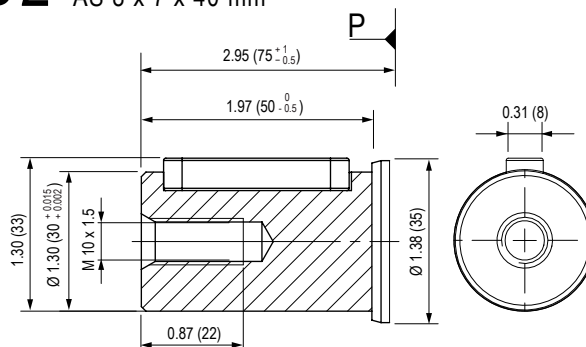
W2 Splined shaft DIN 5480 W 30 x 2 x 30 x 14 x 9 g



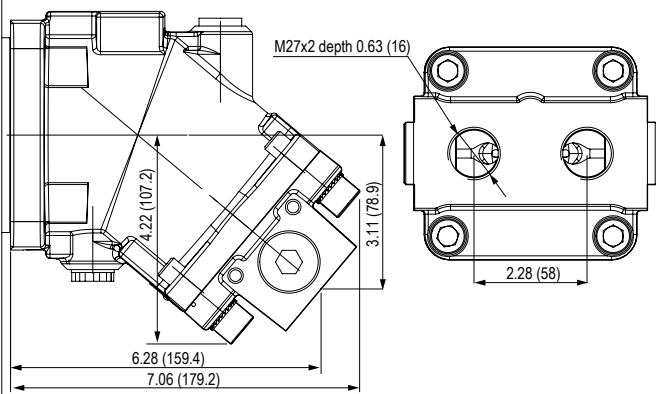
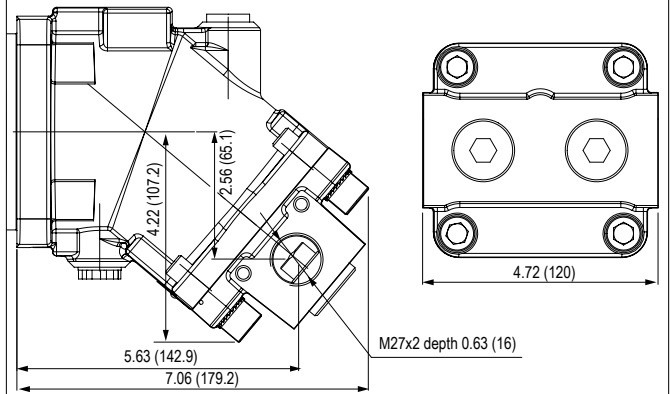
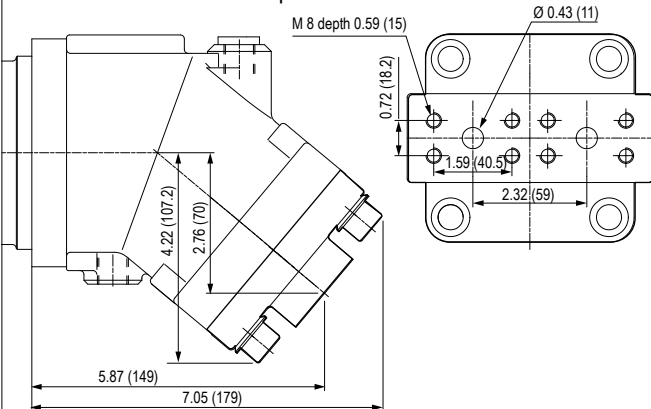
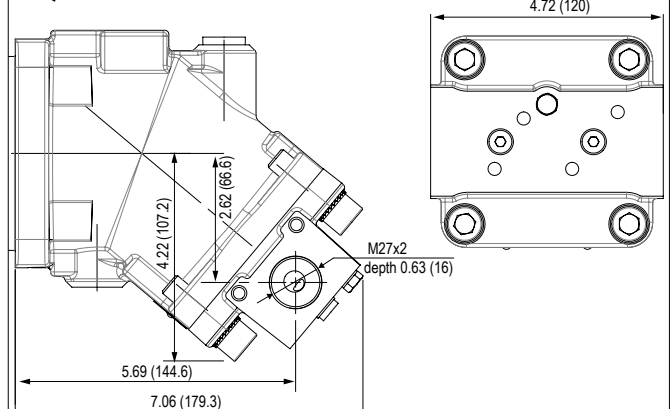
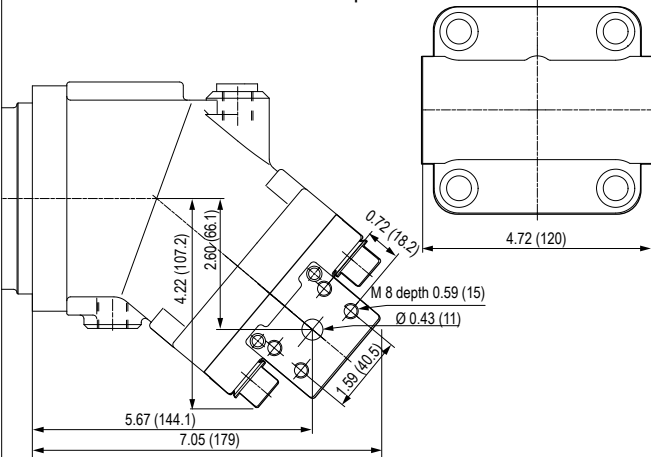
D1 Cylindrical keyed shaft Ø 25 mm DIN 6885 AS 8 x 7 x 40 mm

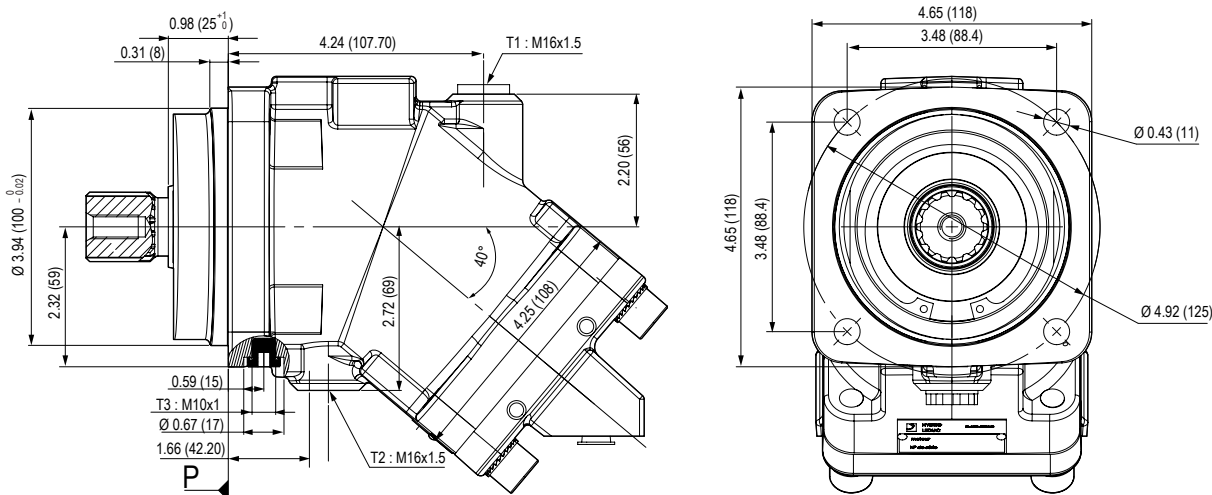


D2 Cylindrical keyed shaft Ø 30 mm DIN 6885 AS 8 x 7 x 40 mm



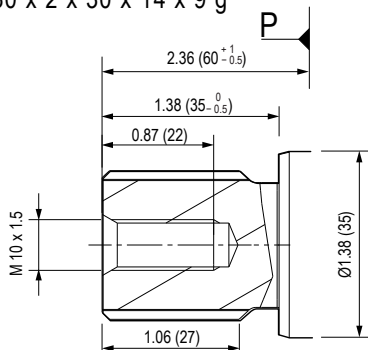
► Inlet ports

P0 Rear threaded ports A and B**Q0** Side threaded ports**M0** Rear flange ports A and B
SAE 1/2" 6000 psi**Q1** Side threaded ports**N0 or N1** Side flange ports A and B
SAE 1/2" 6000 psi

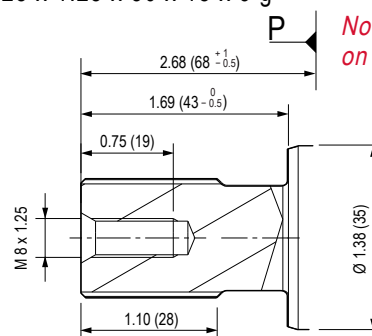


► Shaft end

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

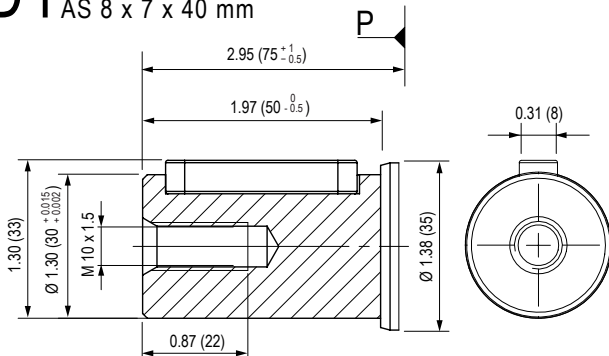


W2 Splined shaft DIN 5480 W 25 x 1.25 x 30 x 18 x 9 g

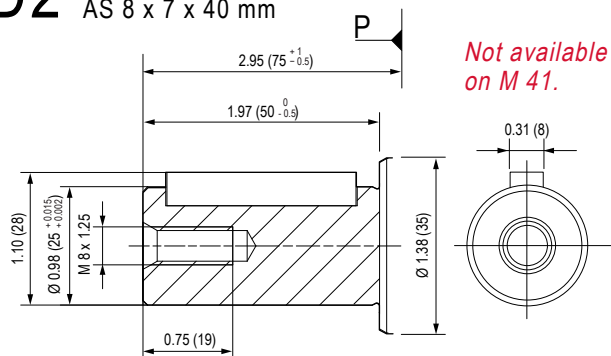


*Not available
on M 41.*

D1 Cylindrical keyed shaft Ø 30 mm DIN 6885 AS 8 x 7 x 40 mm

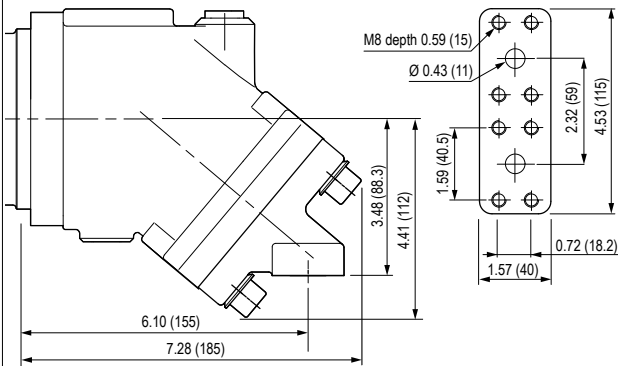
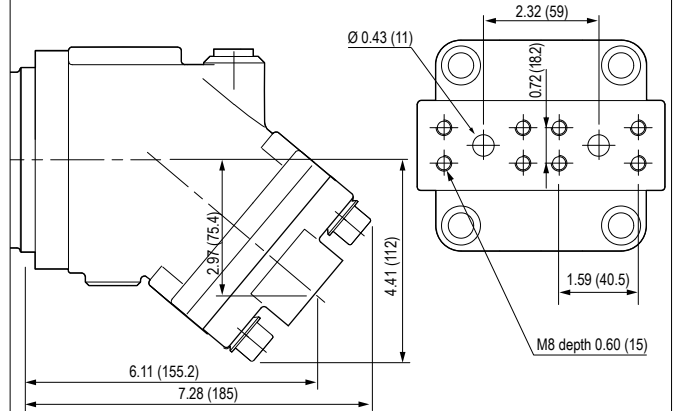
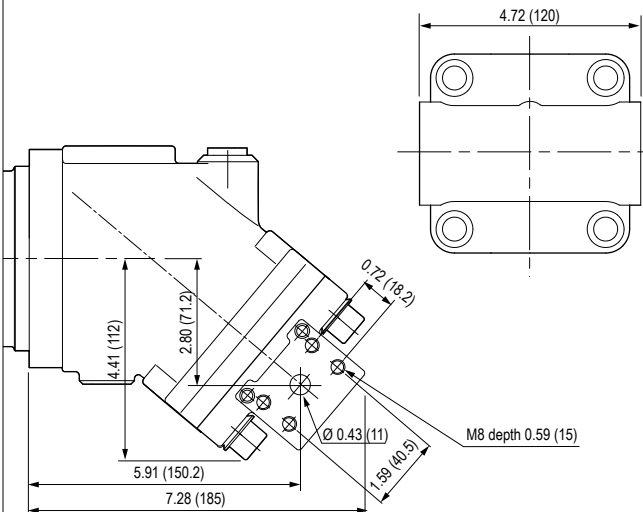
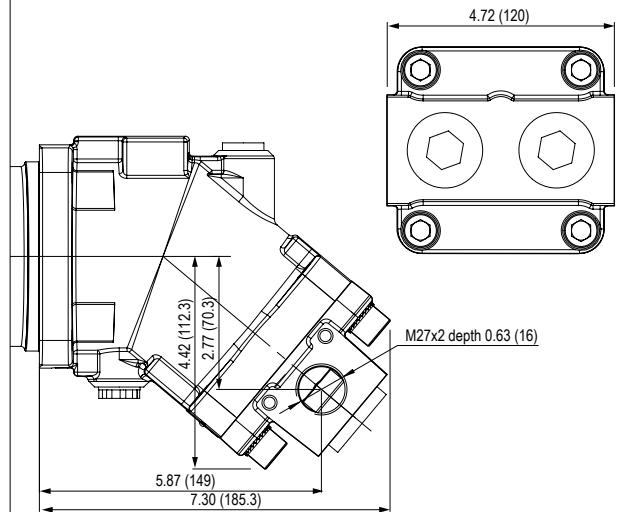
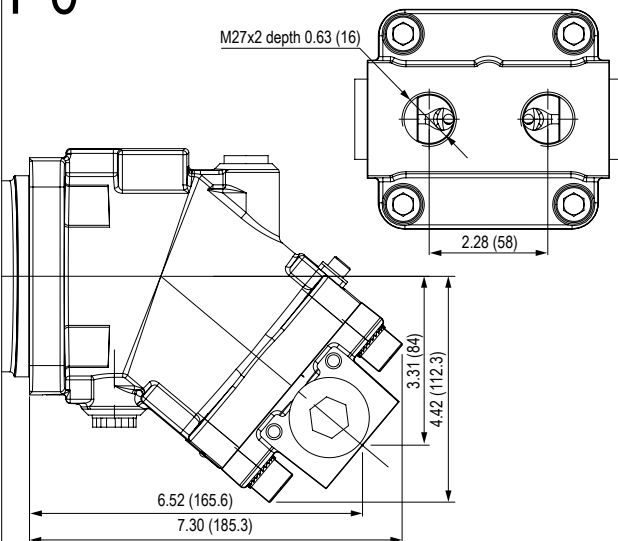
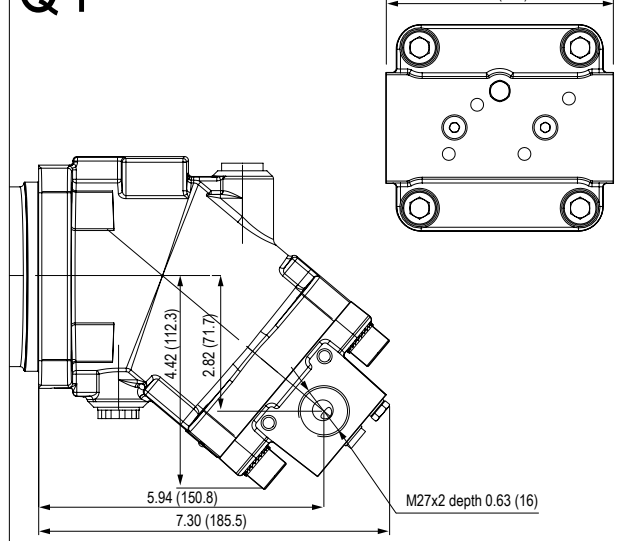


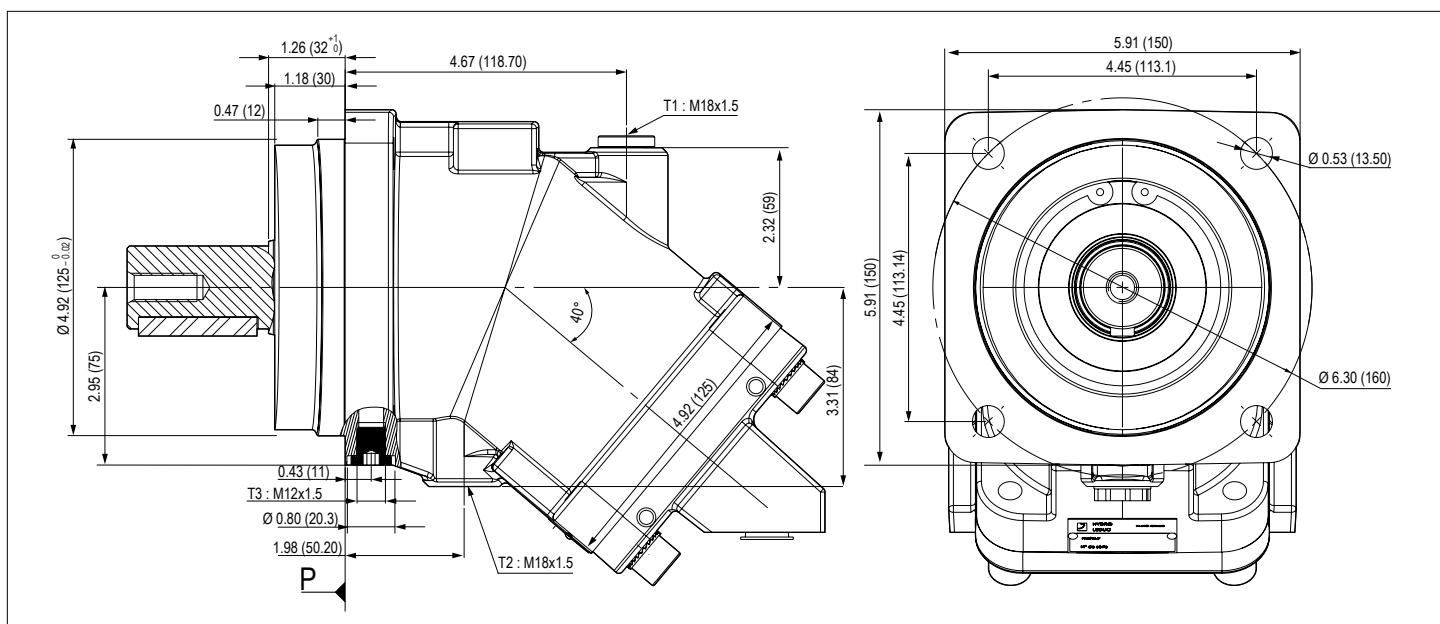
D2 Cylindrical keyed shaft Ø 25 mm DIN 6885 AS 8 x 7 x 40 mm



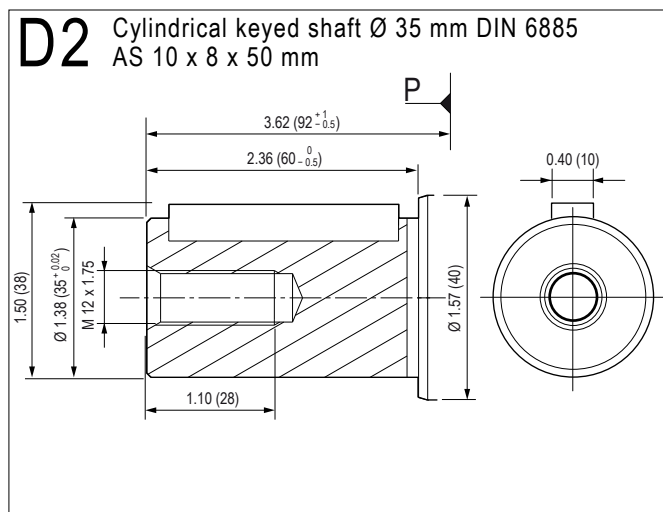
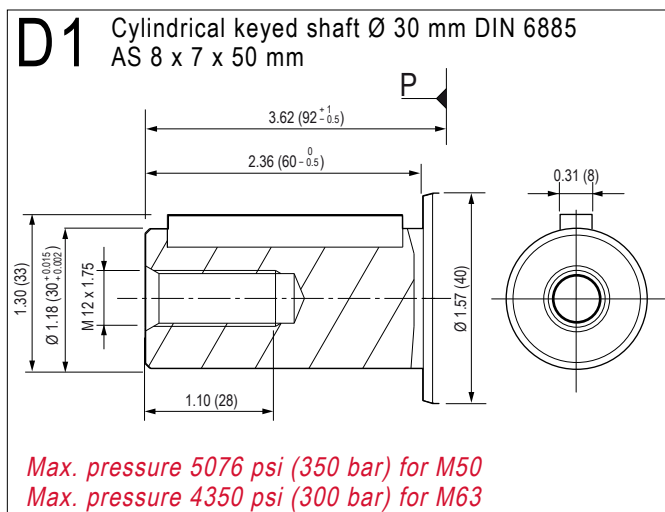
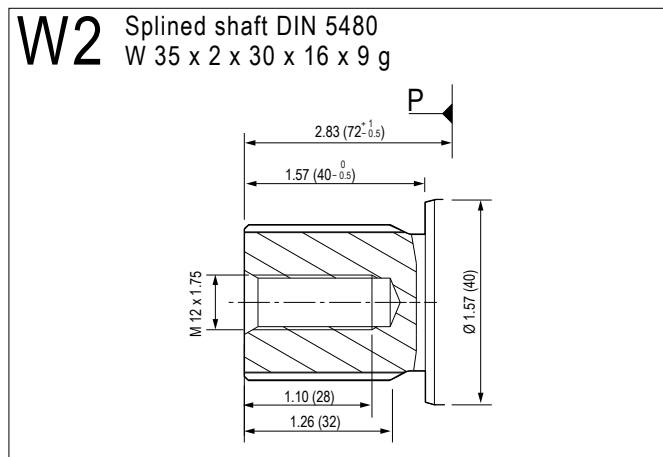
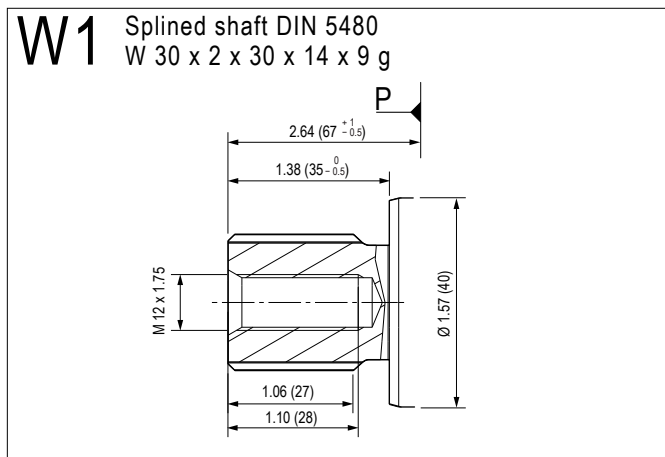
*Not available
on M 41.*

► Inlet ports

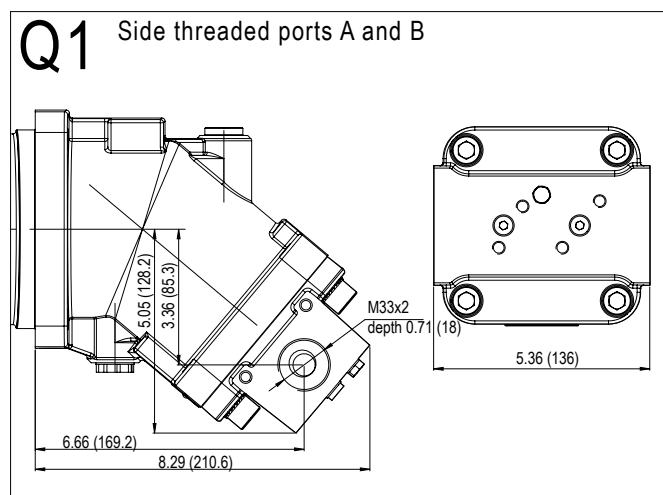
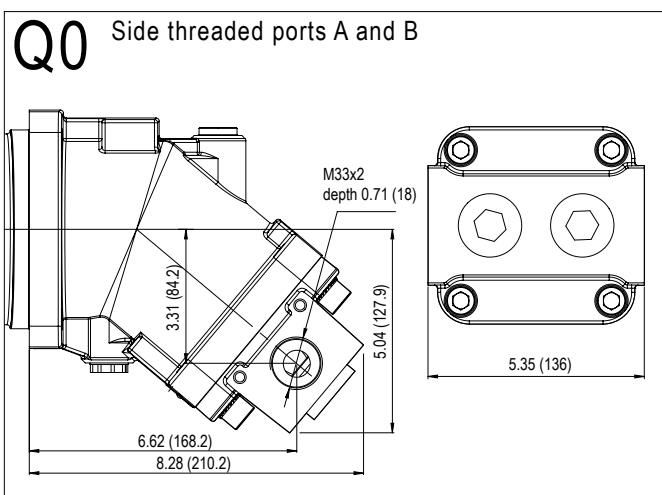
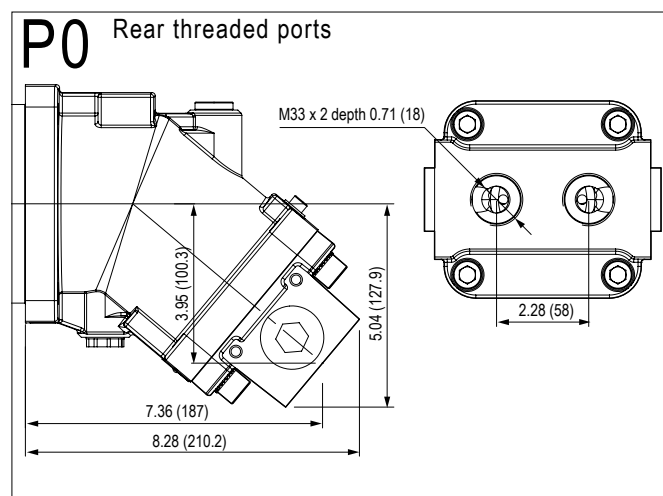
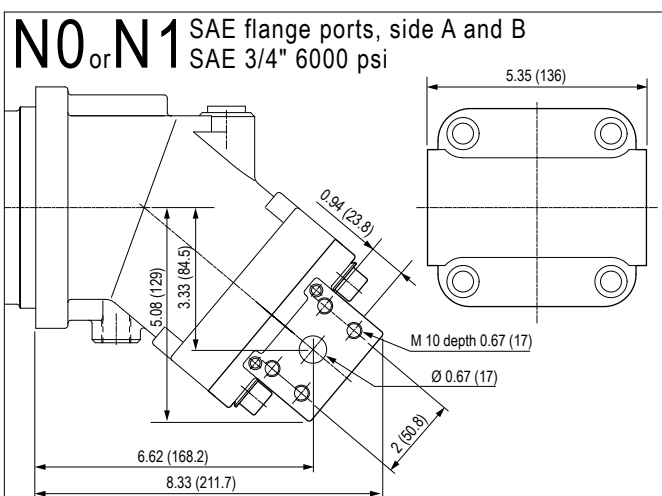
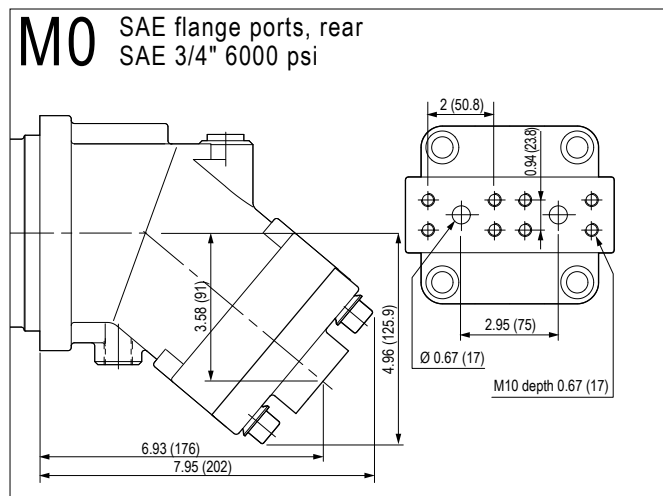
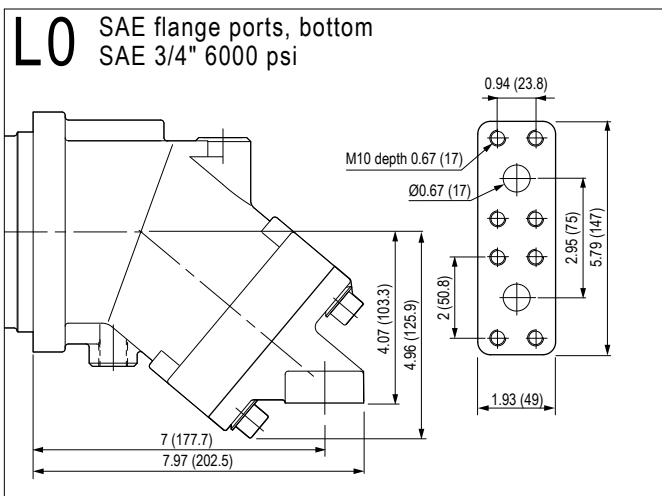
L0 SAE flange ports, bottom
SAE 1/2" 6000 psi**M0** Rear flange ports
SAE 1/2" 6000 psi**N0 or N1** Side flange ports A and B
SAE 1/2" 6000 psi**Q0** Side threaded ports A and B**P0** Rear threaded ports**Q1** Side threaded ports A and B

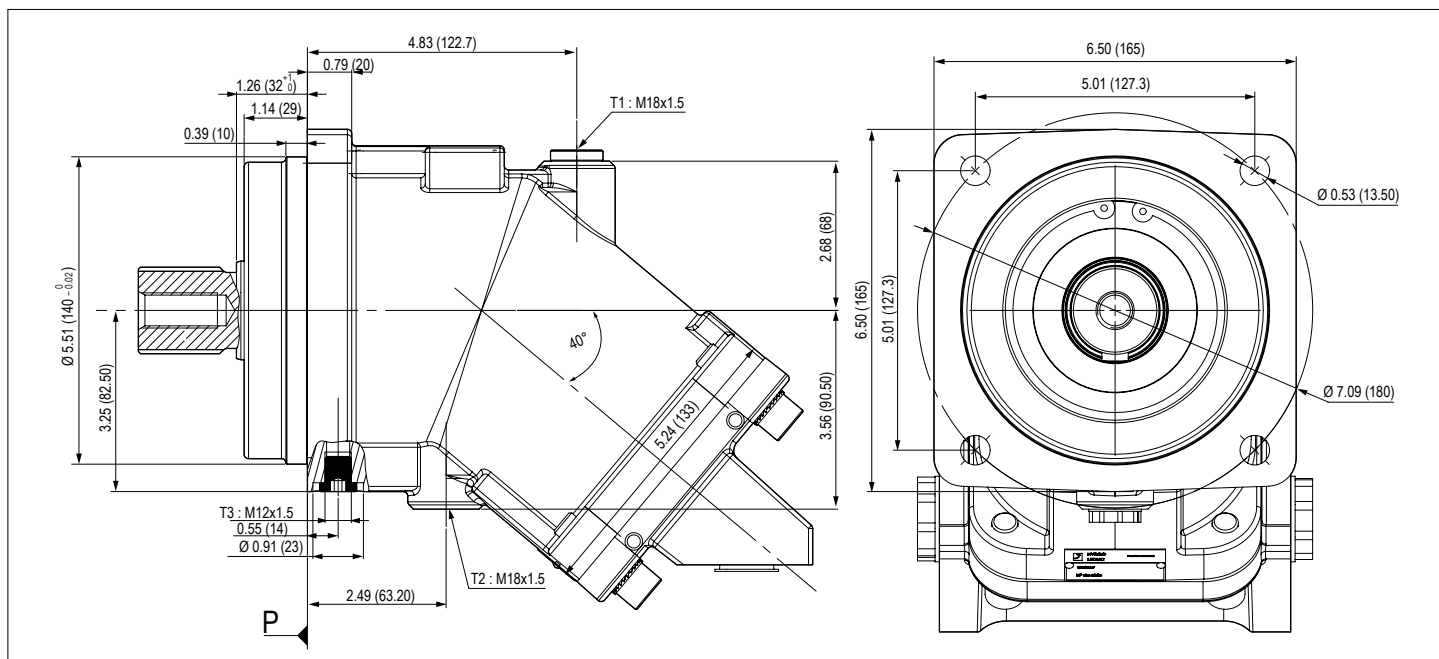


► Shaft end

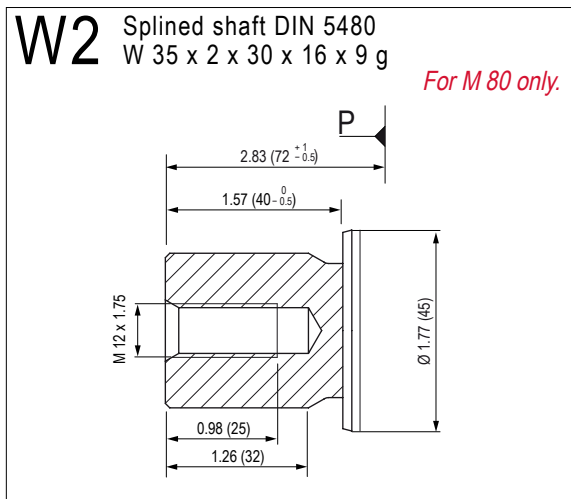
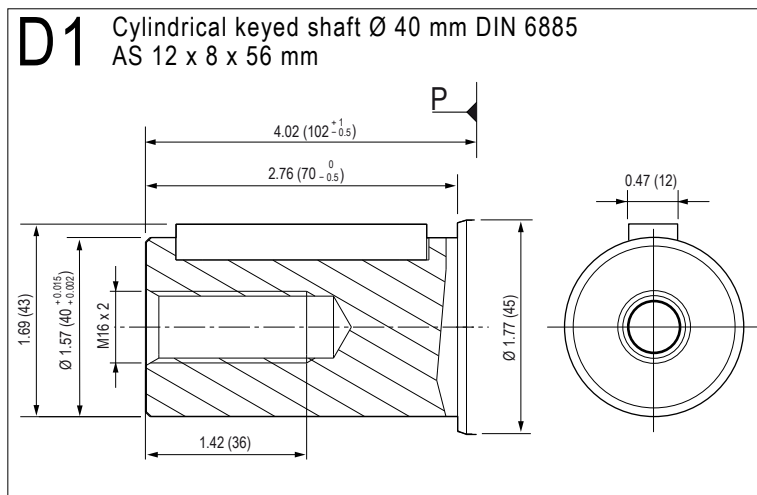
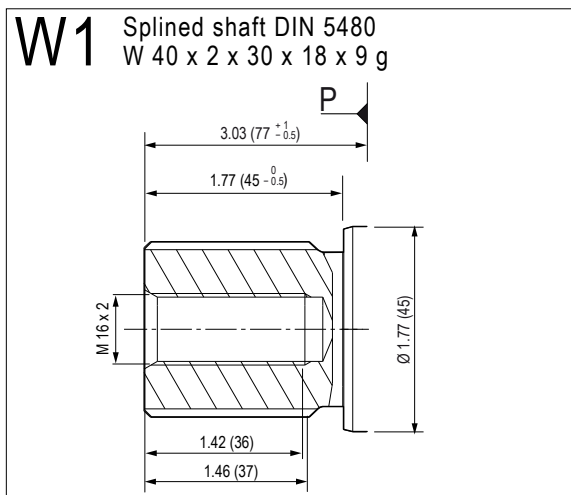


► Inlet ports



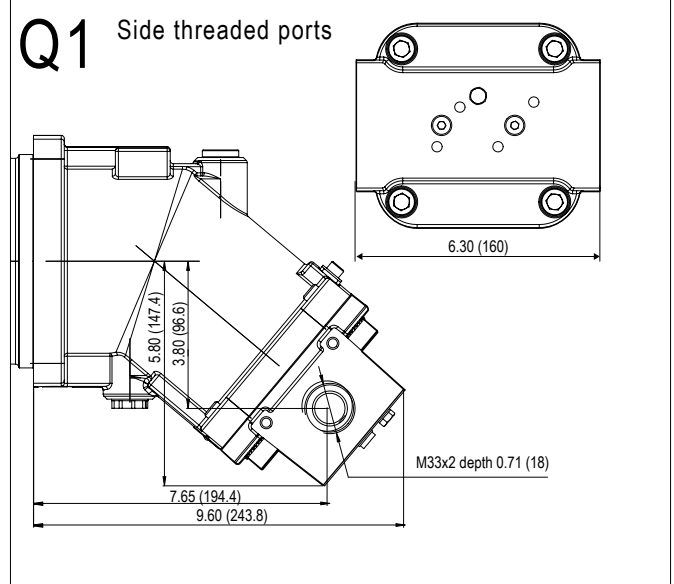
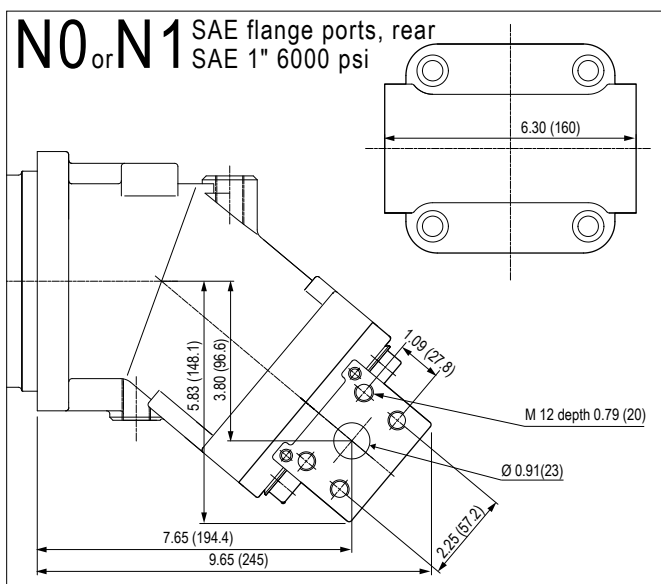
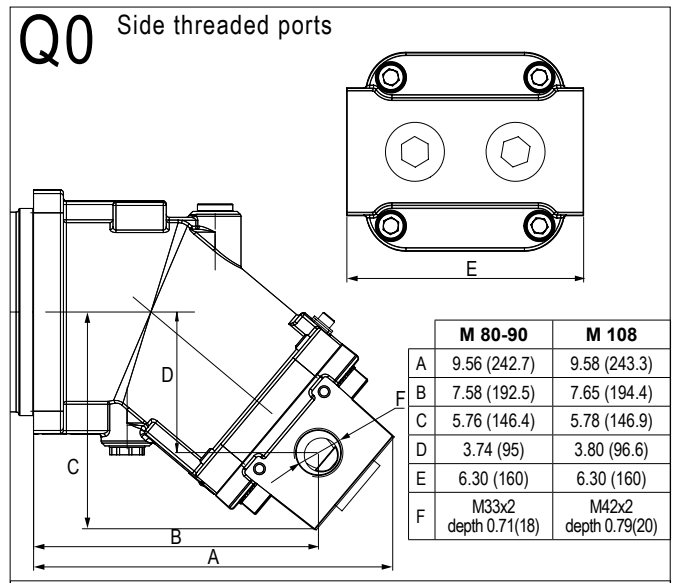
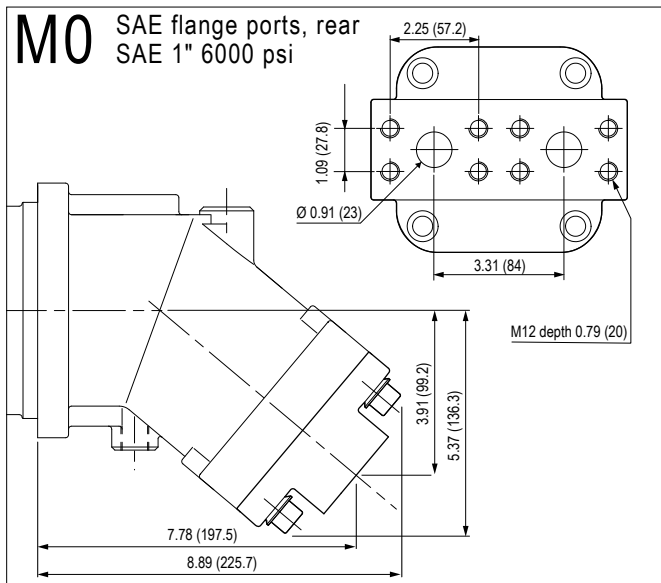
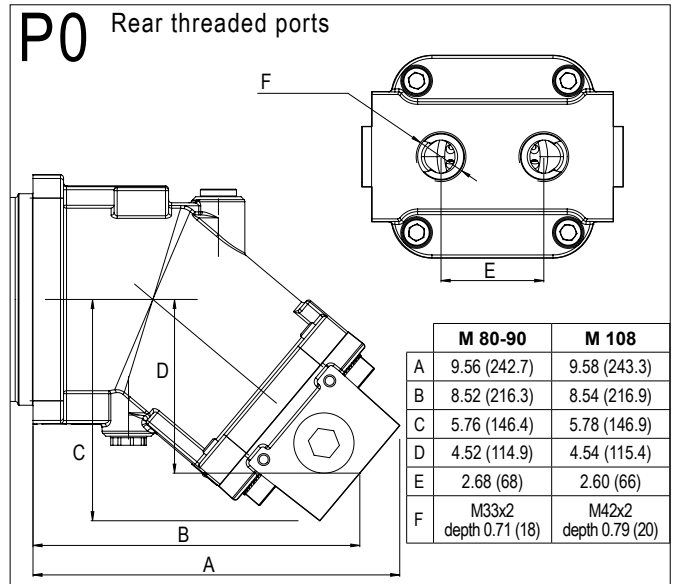
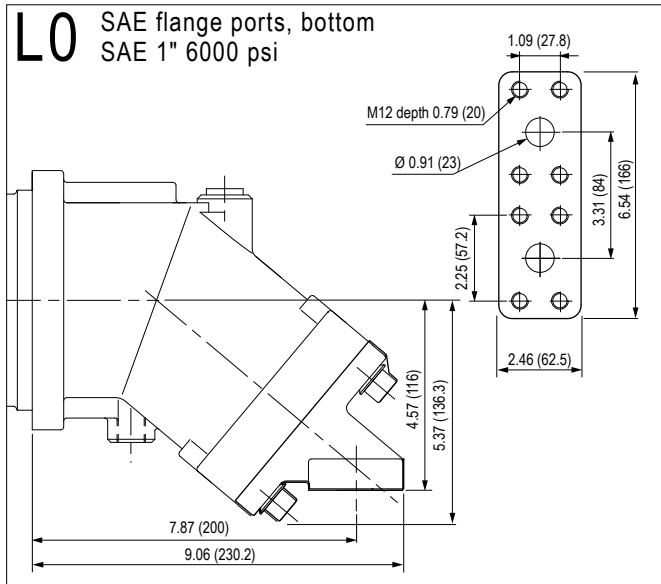


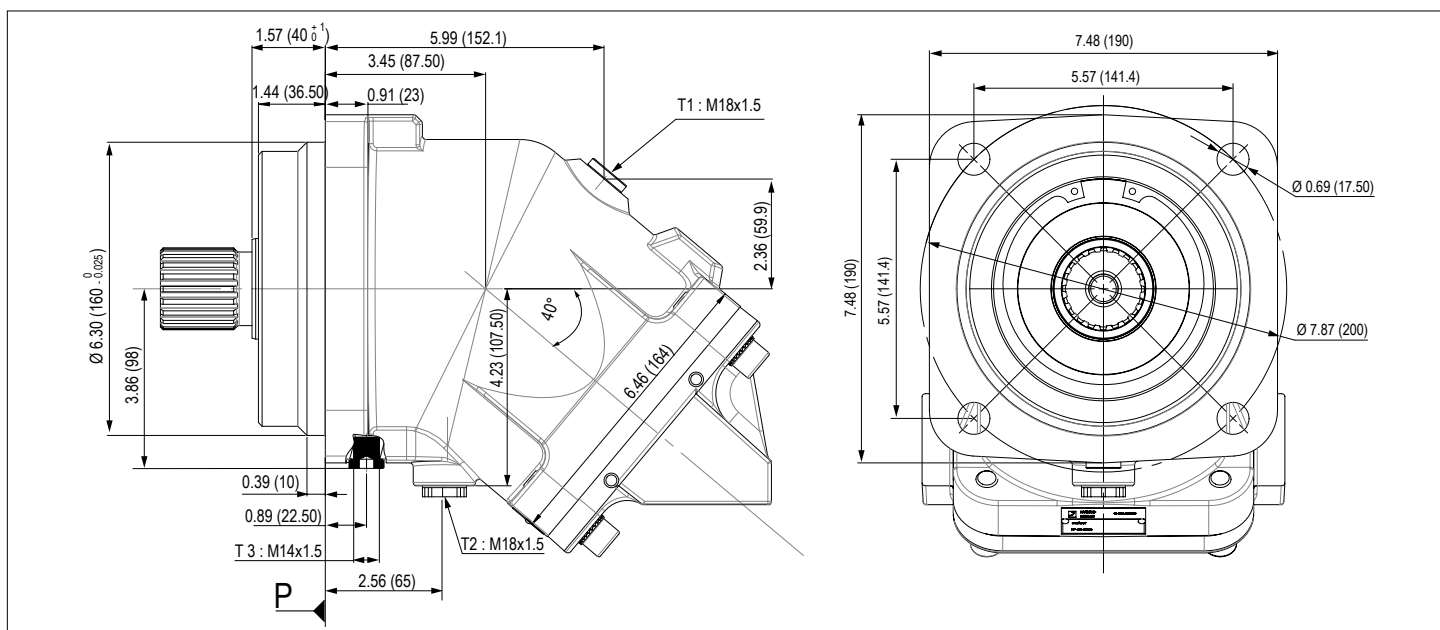
► **Shaft end**



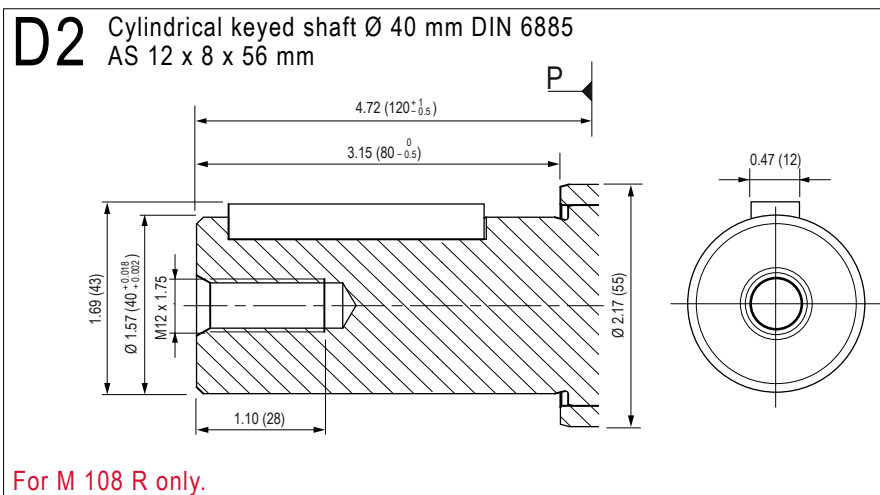
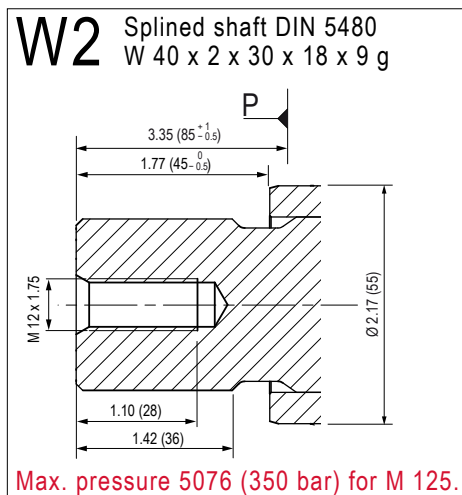
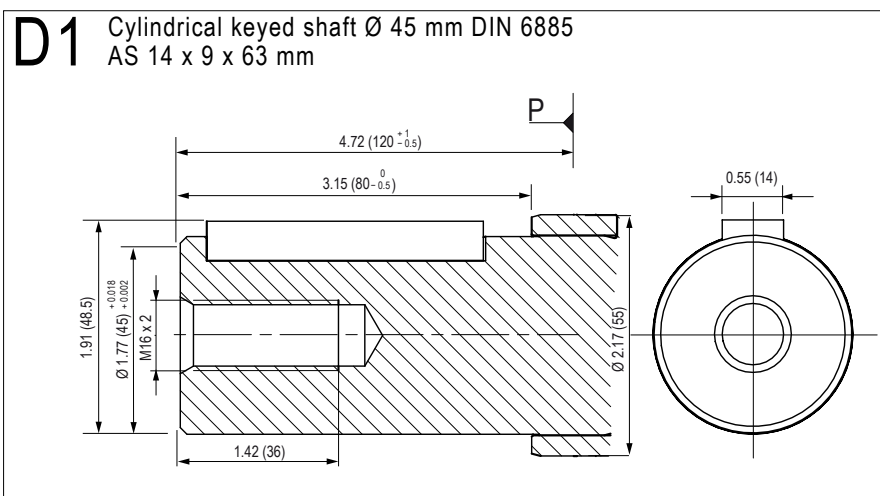
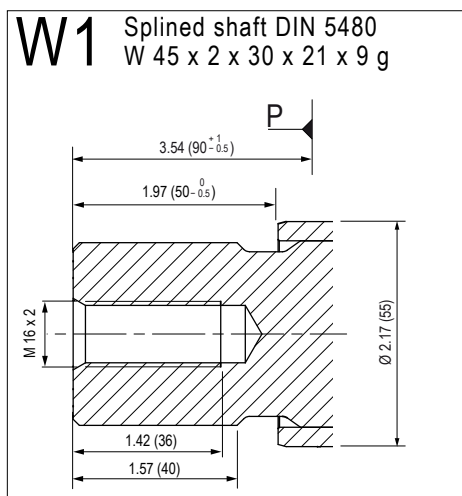
Dimensions in inches (mm) are given only as an indication.

Inlet ports

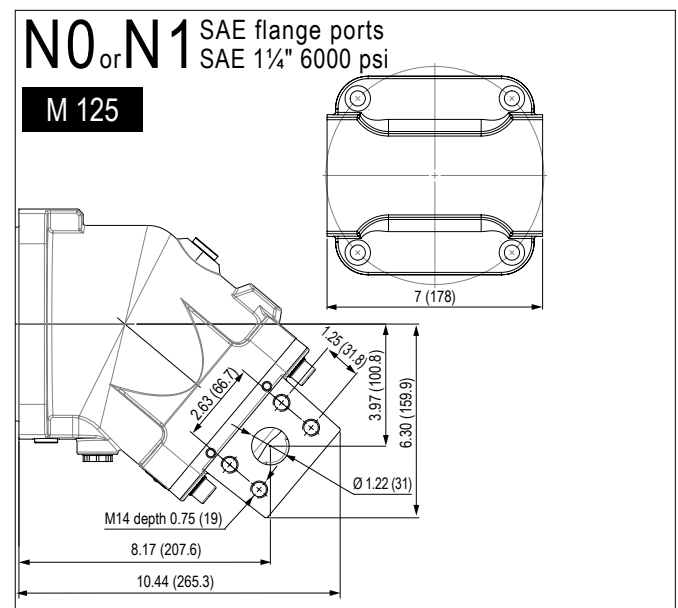
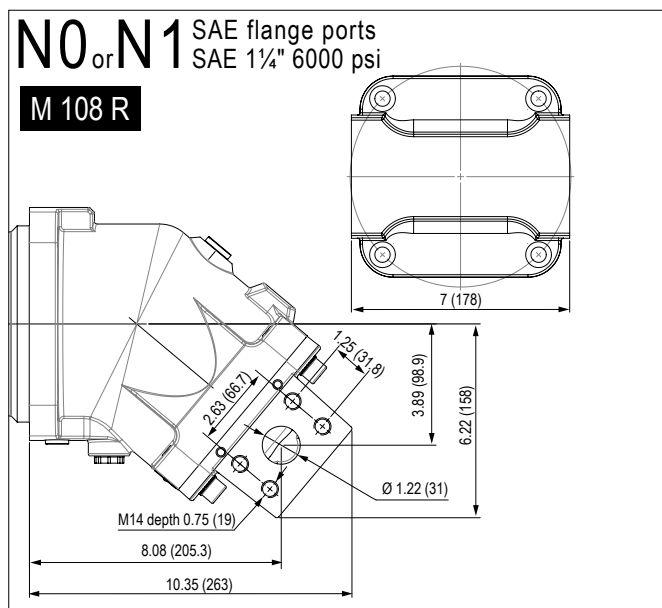
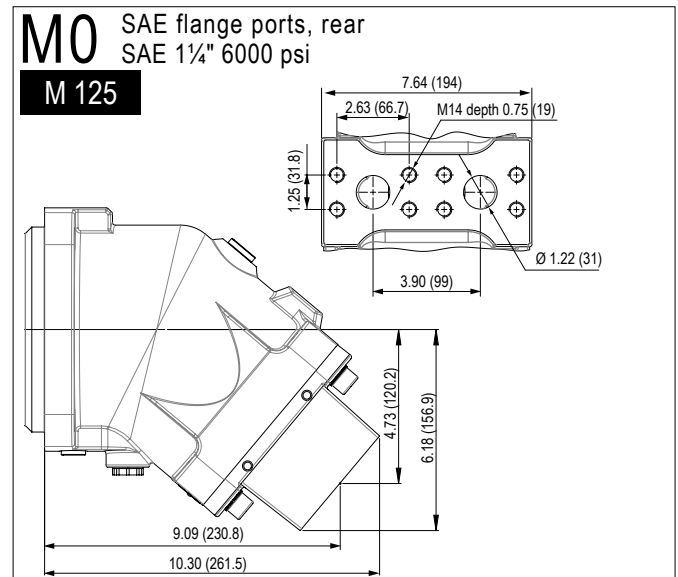
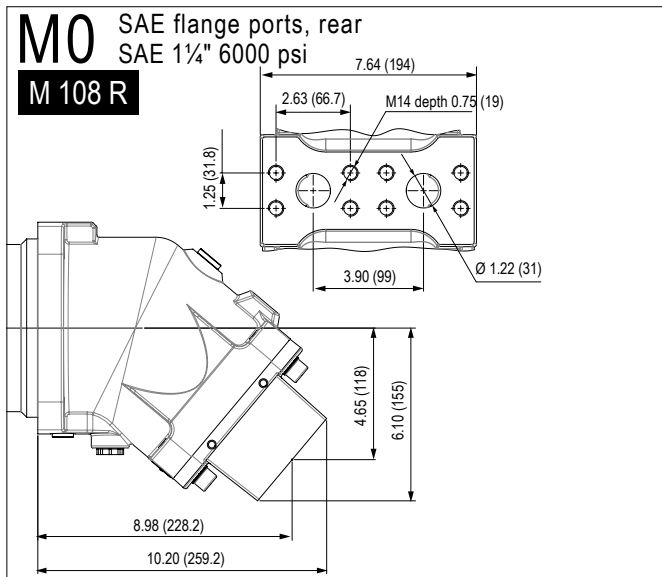
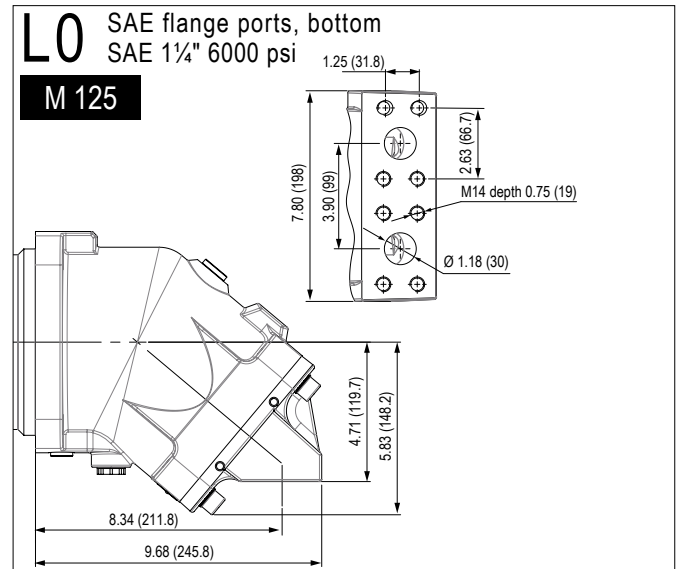
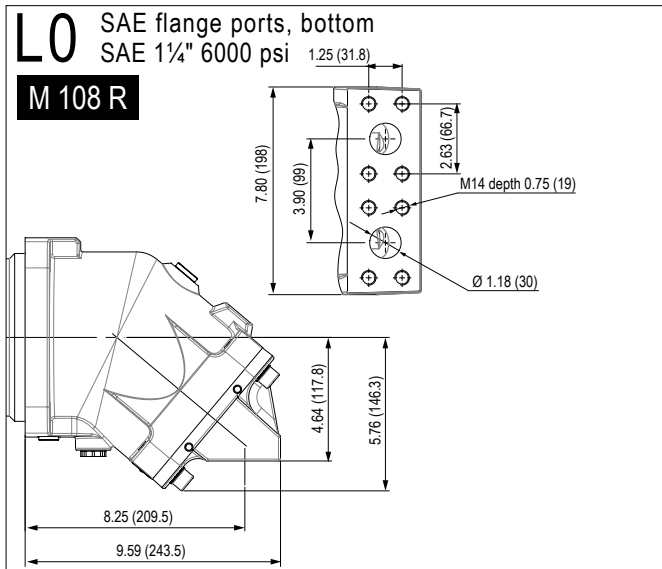


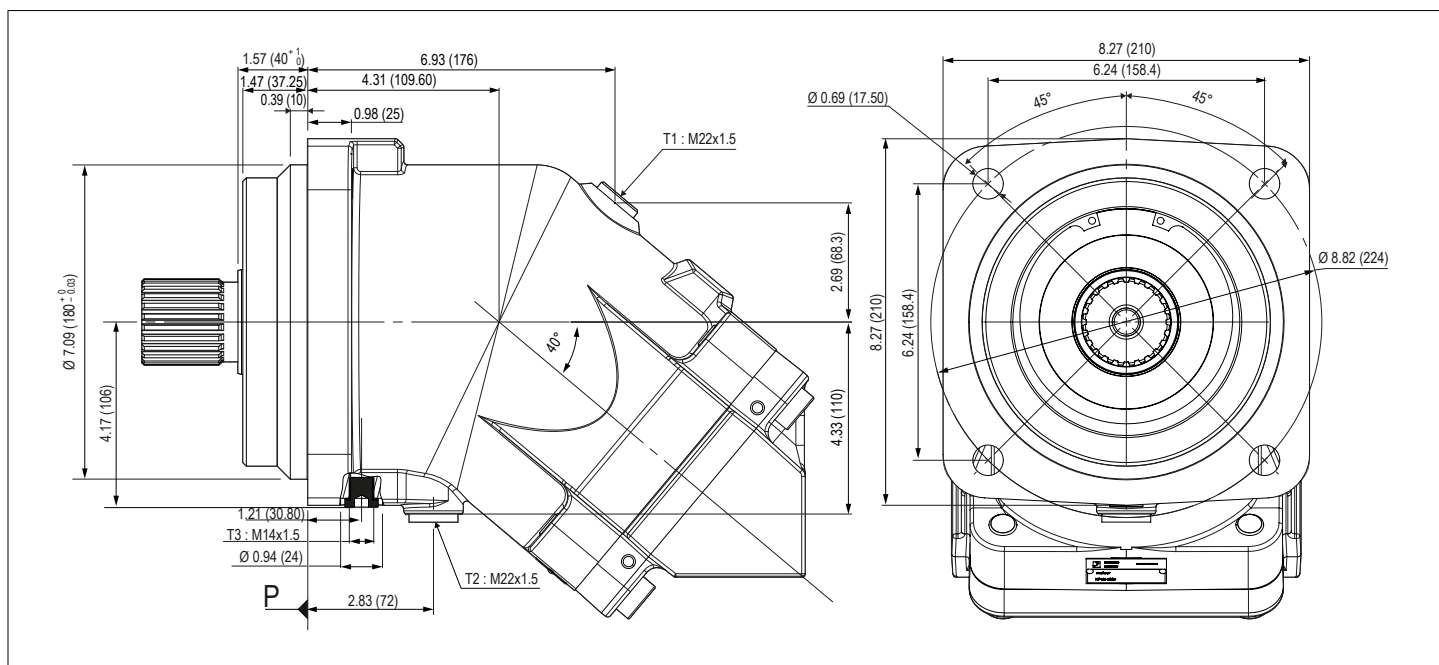


► Shaft end

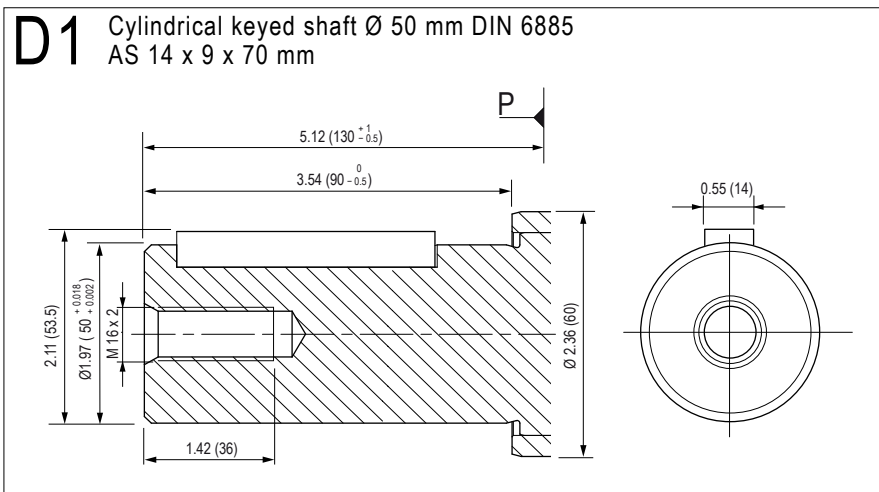
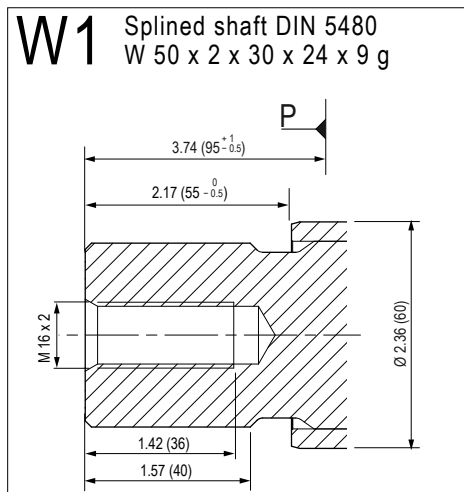


Inlet ports

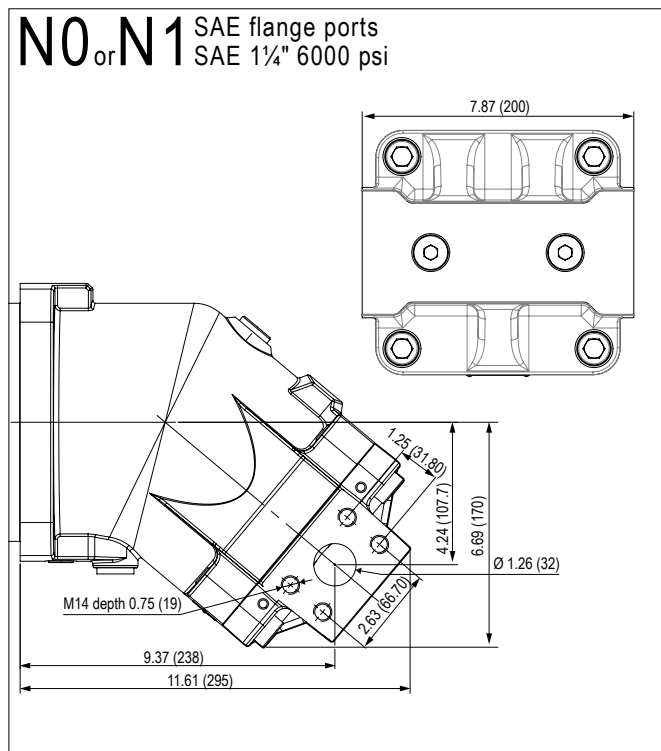
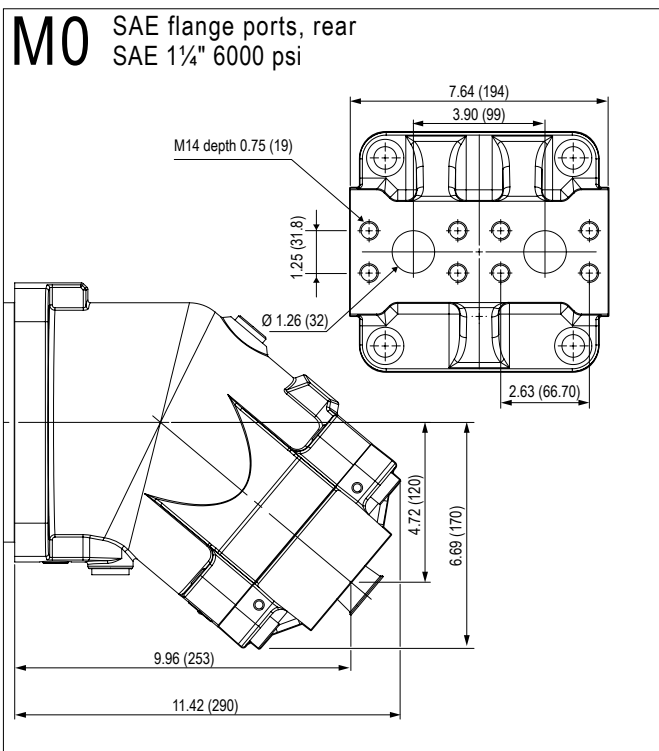
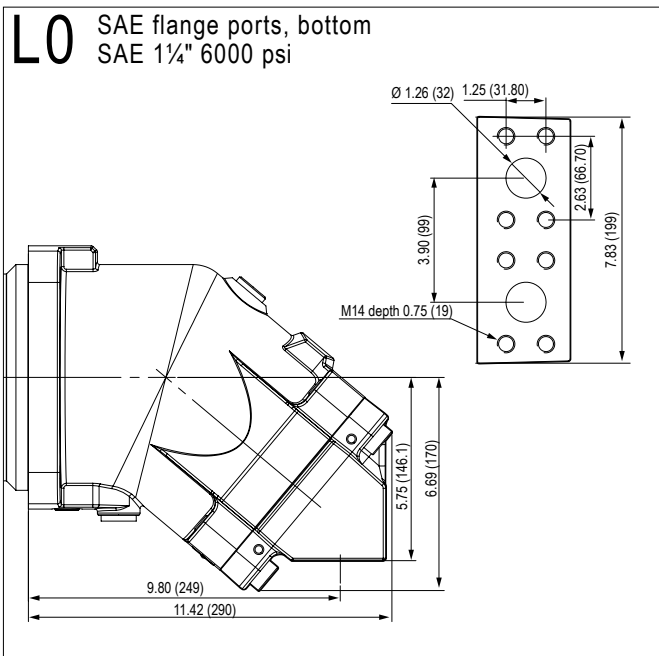




► Shaft end



► Inlet ports



CHARACTERISTICS OF THE MA SERIES MOTORS (SAE)

Motor model	Displacement		Continuous max. speed (1)	Intermittent max. speed (1)	Max. flow absorbed		Torque		Torque at 350 bar (5100 psi)		Theoretical maximal power at 5800 psi 400 bar		Max. allowable pressure continuous / peak		Weight (kg)	
	cu.in/rev	cc/rev	rpm	rpm	gpm	l/mn	lbf.ft/psi	N.m/bar	lbf ft	N.m	HP	kW	psi	bar	lbs	Kg
MA 10	0.62	10.2	8000	8800	21.6	82	0.0082	0.16	42	57	72.9	54.4	5800 / 6525	400 / 450	14.3	6.5
MA 12	0.73	12.0	8000	8800	25.4	96	0.0097	0.19	49	67	85.7	64	5800 / 6525	400 / 450	14.3	6.5
MA 18	1.10	18.0	8000	8800	38.0	144	0.0145	0.29	74	100	128.7	96	5800 / 6525	400 / 450	14.3	6.5
MA 25	1.52	24.9	6300	6900	41.4	157	0.0201	0.40	102	139	140.1	104.5	5800 / 6525	400 / 450	25	11.5
MA 32	1.96	32.1	6300	6900	53.4	202	0.0259	0.51	132	179	180.7	134.8	5800 / 6525	400 / 450	25	11.5
MA 41	2.51	41.1	5600	6200	60.8	230	0.0331	0.65	169	229	205.6	153.4	5800 / 6525	400 / 450	25	11.5
MA 45	2.77	45.4	5000	5500	60.0	227	0.0366	0.72	187	253	202.8	151.3	5800 / 6525	400 / 450	40	18
MA 50	3.07	50.3	5000	5500	66.4	252	0.0405	0.80	207	280	224.7	167.6	5800 / 6525	400 / 450	40	18
MA 63	3.84	63.0	5000	5500	83.2	315	0.0508	1.00	259	351	281.5	210	5800 / 6525	400 / 450	40	18
MA 80	4.91	80.4	4500	5000	95.6	362	0.0648	1.28	330	448	323.3	241.2	5800 / 6525	400 / 450	51	23
MA 90	5.49	90.0	4500	5000	107.0	405	0.0725	1.43	370	501	361.9	270	5800 / 6525	400 / 450	51	23
MA 108R	6.61	108.3	3400	4500	97.3	368	0.0872	1.72	445	603	329	245.4	5800 / 6525	400 / 450	77	35
MA 125	7.65	125.4	3400	4500	112.6	426	0.1010	2.00	515	699	381	284.2	5800 / 6525	400 / 450	77	35
MA 160	9.76	160.0	3600	4000	152.2	576	0.1289	2.55	657	891	514.7	384	5800 / 6525	400 / 450	107	48.5
MA 180	11.02	180.6	3600	4000	171.8	650	0.1455	2.87	742	1006	581	433.4	5800 / 6525	400 / 450	107	48.5

(1) For higher speeds, please contact us.

► Acceptable forces applied to motor shaft

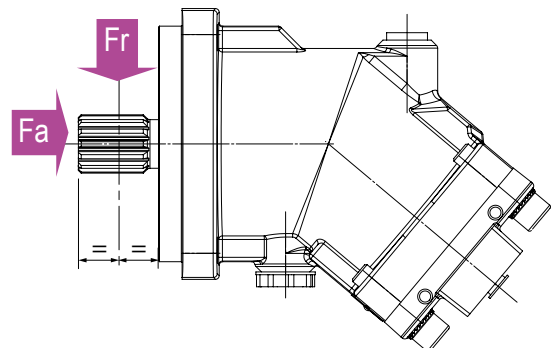
Motor model		10	12	18	25	32	41	45	50	63	80	90	108 R	125	160	180
Fr	lbf	528	630	900	1350	1462.5	1574	1462.5	1686	2023	2360	2473	2812	3262	4050	4500
	N	2350	2800	4000	6000	6500	7000	6500	7500	9000	10500	11000	12500	14500	18000	20000
Fa	lbf/psi	0.19	0.23	0.31	0.42	0.46	0.62	0.62	0.62	0.77	0.93	1.03	1.24	1.33	1.32	1.47
	N/psi (N/bar) *	0.83 (12)	1.03 (15)	1.37 (20)	1.86 (27)	2.06 (30)	2.75 (40)	2.75 (40)	2.75 (40)	3.44 (50)	4.14 (60)	4.62 (67)	5.52 (80)	5.93 (86)	5.86 (85)	6.55 (95)

Fr: radial force measured at mid point of length of shaft.

Fa: axial force which tends to push the shaft inwards.

* Differential pressure between A and B.

For other forces, please contact us.



Order code system of MA series motors

27

MA	...	C	..	..	U2	.	.	..	..
01	02	03	04	05	06	07	08	09	10

To obtain the code for your motor, complete the different parameters 02, 04, 05, 07, 08, 09 and 10 in the table on the left according to the options you require (see table below).

Motor																	
01	Motor																MA

Displacement																	
02		10	12	18	25	32	41	45	50	63	80	90	108R	125	160	180	

Mounting flange					
03		SAE B 2 bolts	SAE C 4 bolts	SAE D 4 bolts	C

Shaft end																	
04	Splined SAE J498b	13 T 16/32 DP SAE B	13 T 16/32 DP SAE B	13 T 16/32 DP SAE B	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	14 T 12/24 DP SAE C	13 T 8/16 DP SAE D	13 T 8/16 DP SAE D	13 T 8/16 DP SAE D	13 T 8/16 DP SAE D	S1
			–	–	–	–	–	–	–	–	–	–	–	–	–	–	S2
		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	S3
	DIN 6885	–	–	–	–	–	–	–	–	–	–	–	–	–	Ø 1.97 inches (50 mm)	Ø 1.97 inches (50 mm)	D1
	Keyed SAE J744	Ø1"	Ø1"	Ø1"	Ø1 1/4"	Ø1 1/4"	Ø1 1/4"	Ø1 1/4"	Ø1 1/4"	Ø1 1/4"	Ø1 1/2"	Ø1 1/2"	Ø1 3/4"	Ø1 3/4"	–	–	K1
		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	K2

Inlet ports A and B																	
05	SAE flange ports	Bottom	0	–	–	–	–	•	•	•	•	•	•	•	•	•	L0
		Rear	0	–	–	–	•	•	•	•	•	•	•	•	•	•	M0
		Side	0	–	–	–	•	•	•	•	•	•	•	•	•	•	N0
			1	–	–	–	•	•	•	•	•	•	•	•	•	•	N1
	Threaded	Side	0	•	•	•	•	•	•	–	–	–	–	–	–	–	Q0
			1	–	–	–	•	•	•	–	–	–	–	–	–	–	Q1
		Rear	0	•	•	•	•	•	•	–	–	–	–	–	–	–	P0

0 = Without suitability for valves
1 = Compatible with flushing valve

Drain ports T1 and T2																	
06		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	U2

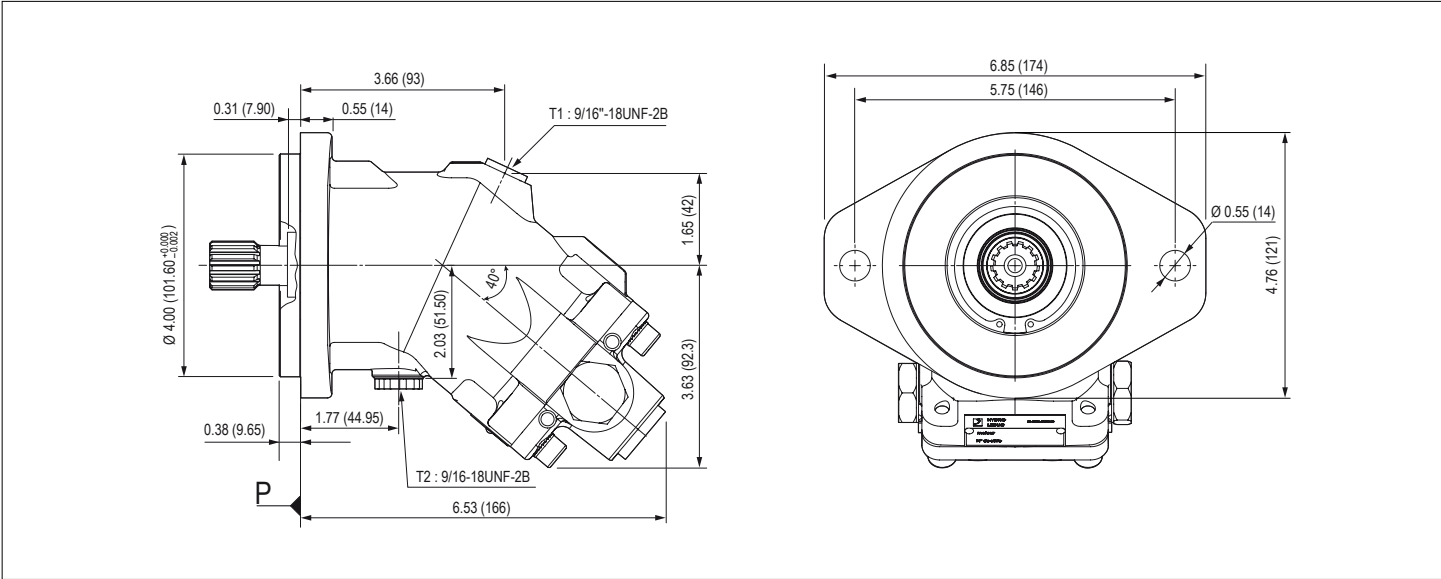
Suitable for use of speed sensor																	
07	Yes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
	No	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0

Speed sensor																	
08	Yes	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	1
	No	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	0

Valves																	
09	Without	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	SV
	With flushing valve	–	–	–	•	•	•	•	•	•	•	•	•	•	•	•	VB

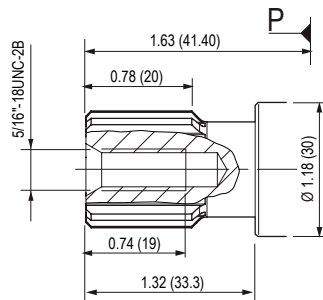
Low temperature option																	
10	Yes (NBR)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	N
	No (FKM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	F

MA series

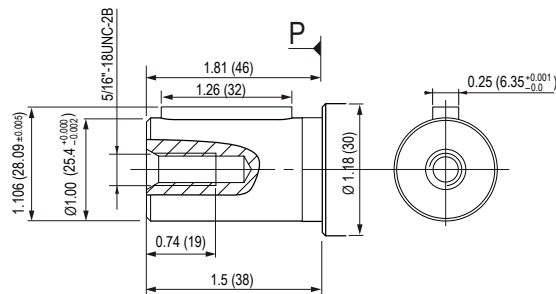


► Shaft end

S1 Splined shaft 13T 16/32DP 7/8"



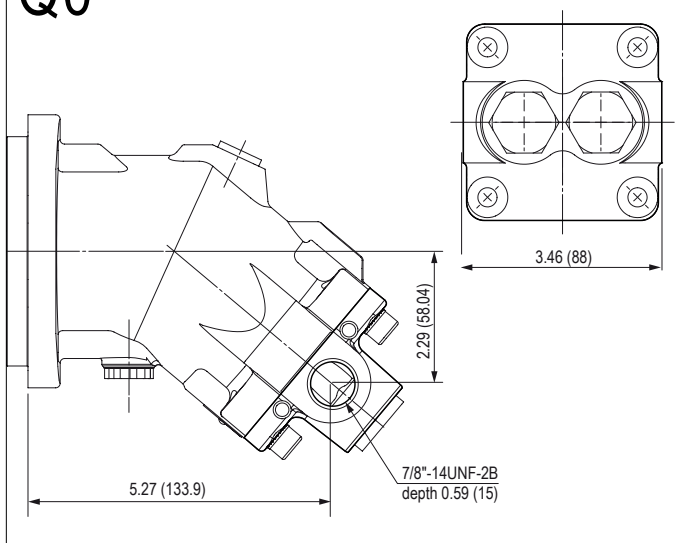
K1 Cylindrical keyed shaft Ø 1"



► Inlet ports

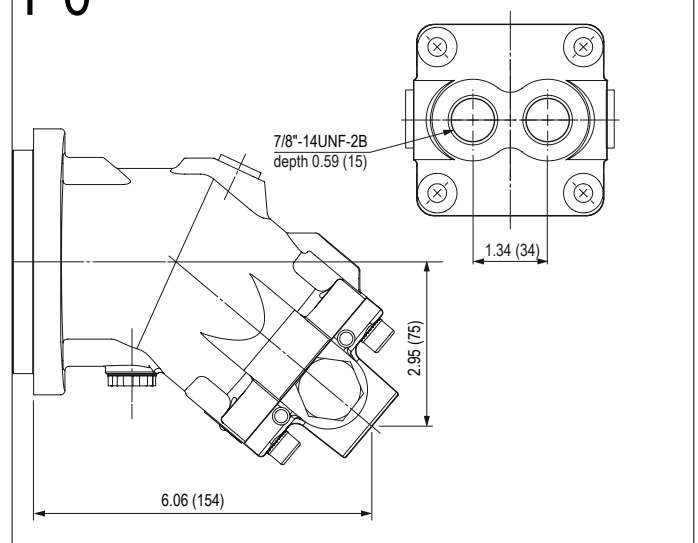
Q0

Side threaded ports A and B

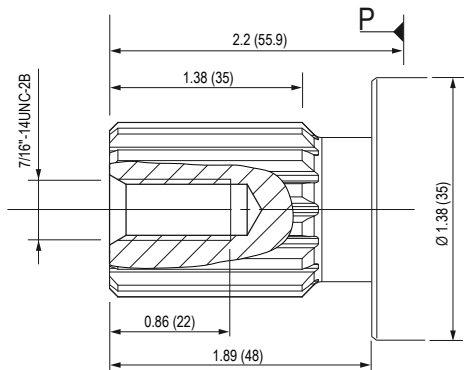


P0

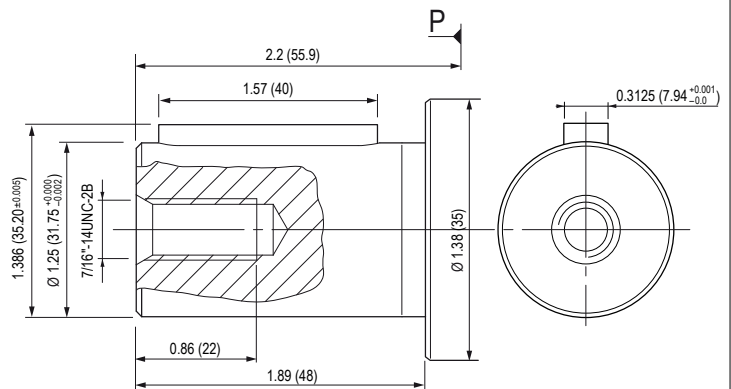
Rear threaded ports A and B



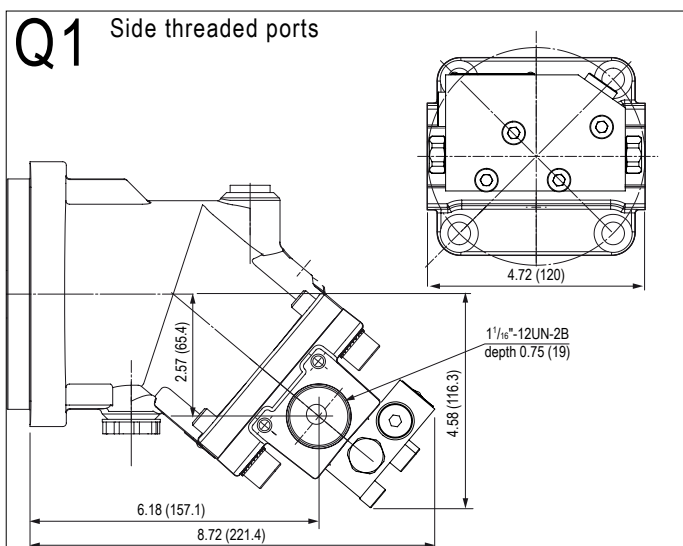
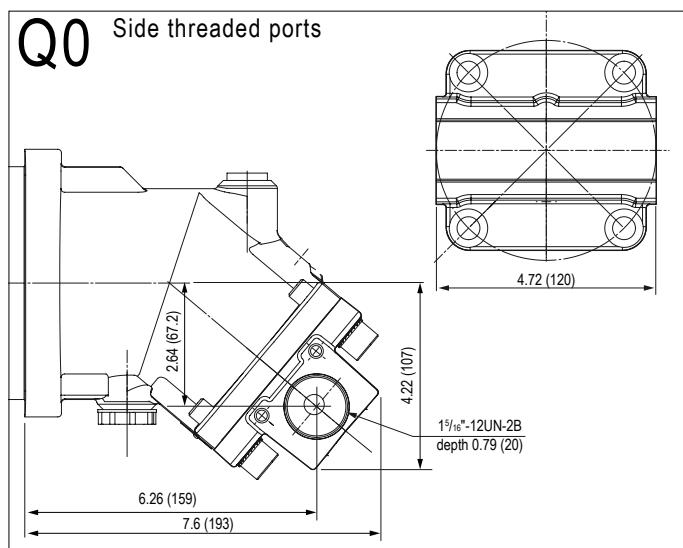
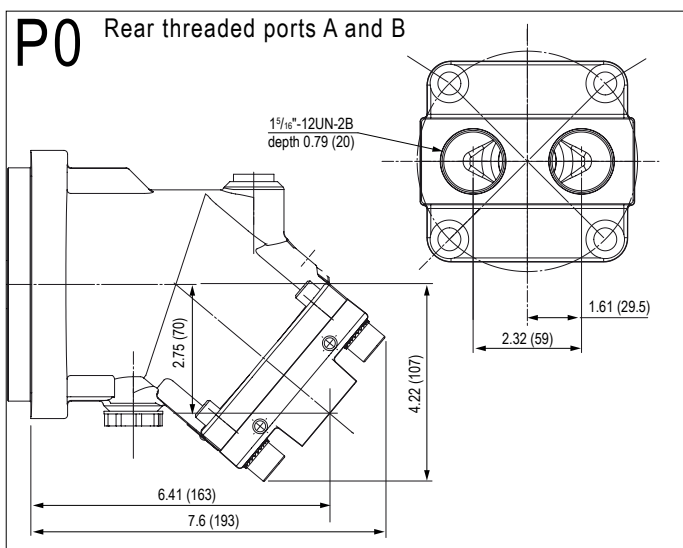
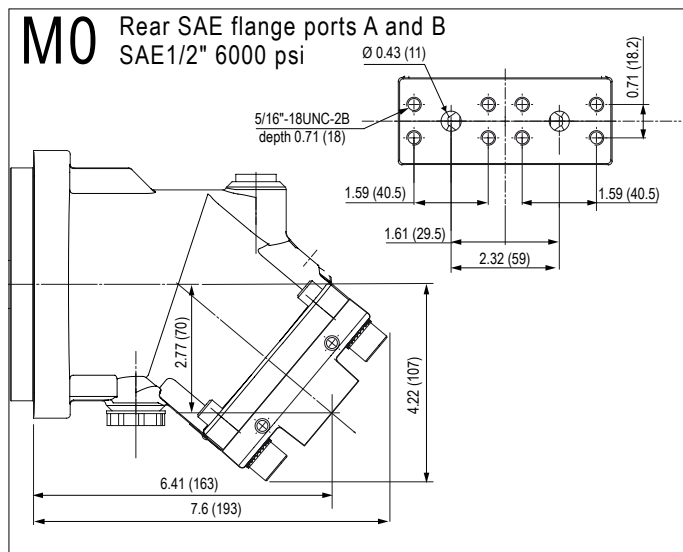
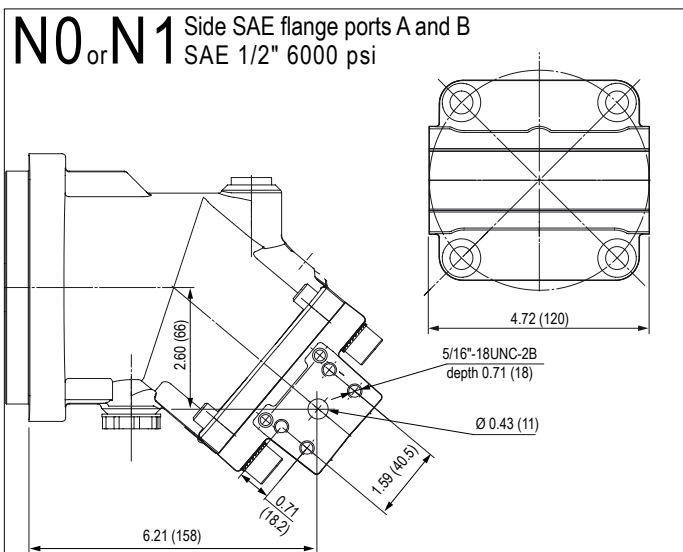
S1 Splined shaft 14T 12/24DP 1¼"



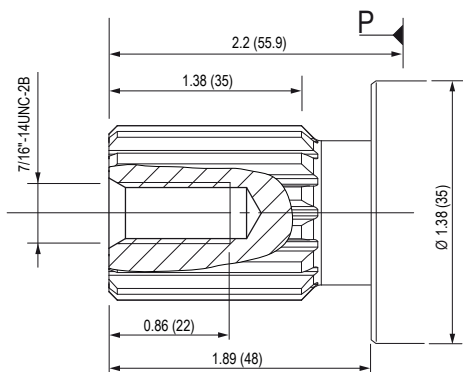
K1 Cylindrical keyed shaft Ø 1¼"



► Shaft end



S1 Splined shaft 14T 12/24DP 1¼"



Technical drawing of a 1/2-14UNC-2B hex bolt and hex nut. The drawing includes a side view and a top view. Dimensions are given in inches and millimeters.

Bolt Dimensions:

- Head Diameter: 1.386 (35.20^{+0.005})
- Head Height: 0.157 (4.0)
- Thread Length: 1.89 (48)
- Thread Specification: 1/2-14UNC-2B
- Thread Diameter: Ø 1.25 (31.75^{+0.002} -0.002)

Nut Dimensions:

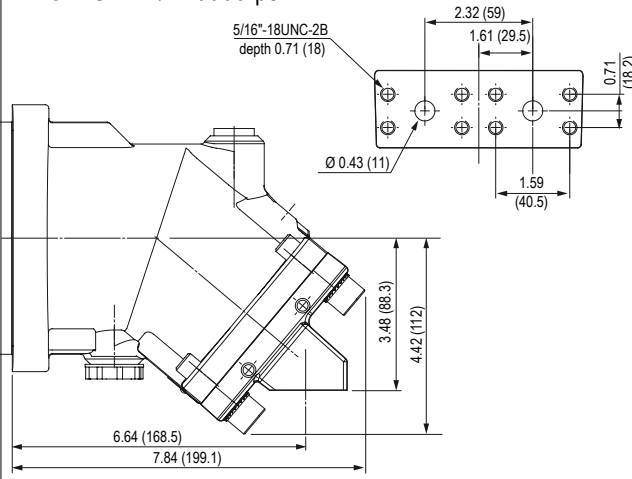
- Nut Height: 0.3125 (7.94^{+0.001} -0.0)

Other Dimensions:

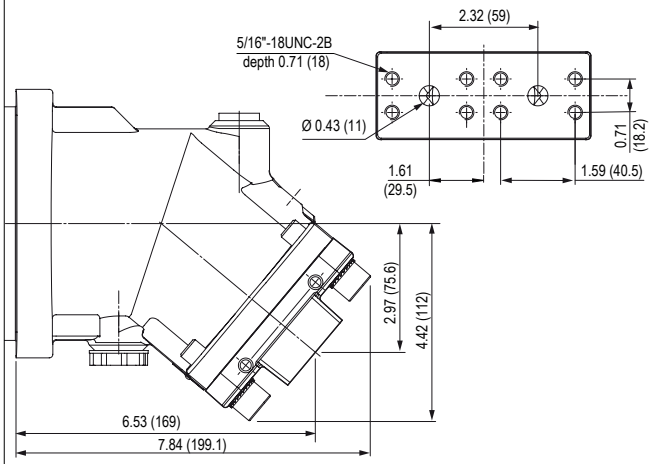
- Distance from Head to End of Thread: 0.86 (22)
- Distance from Head to End of Nut: 2.2 (55.9)
- Nut Inner Diameter: Ø 1.38 (35)

Inlet ports

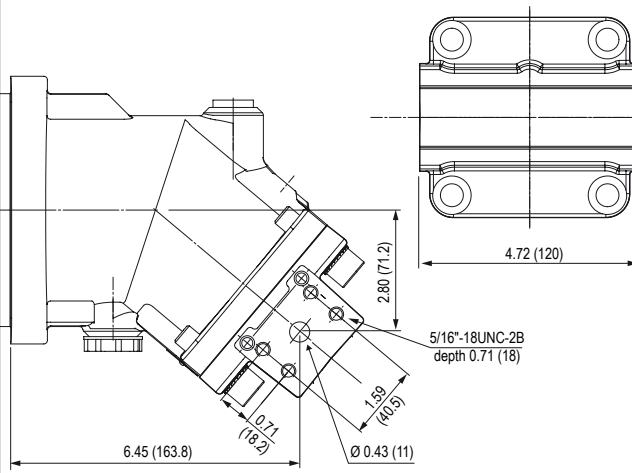
L0 SAE flange ports, bottom SAE 1/2" 6000 psi



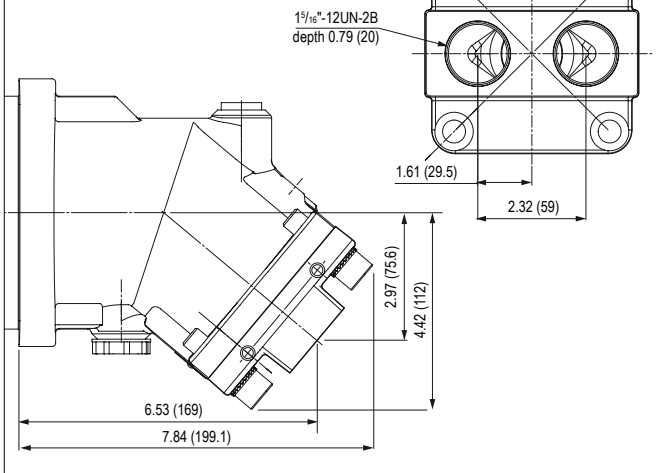
M0 Rear flange ports SAE 1/2" 6000 psi



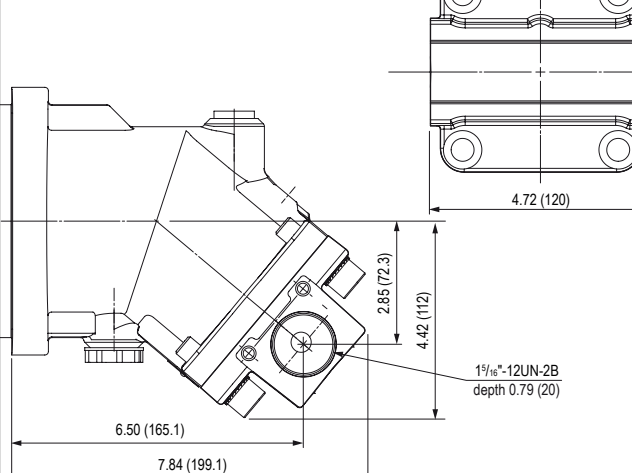
N0 or N1 Side flange ports A and B SAE 1/2" 6000 psi



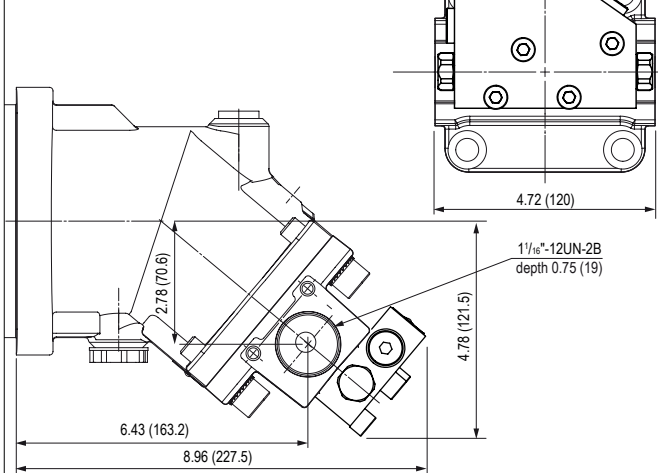
P0 Rear threaded ports

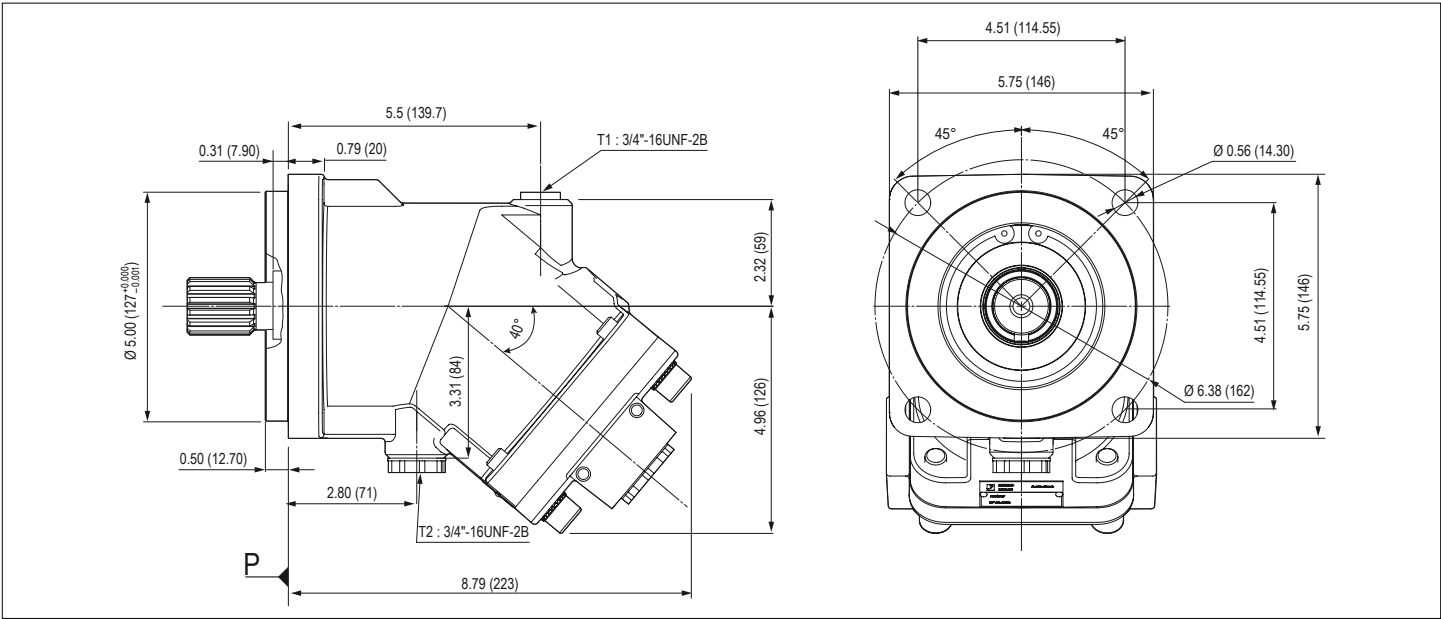


Q0 Side threaded ports A and B

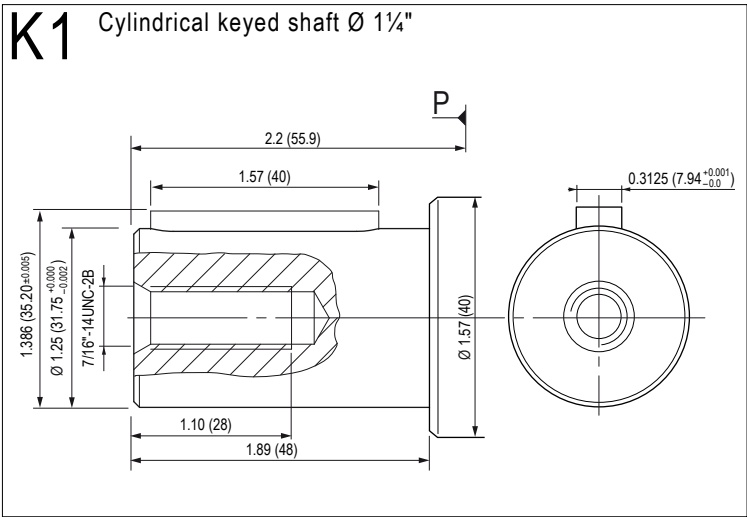
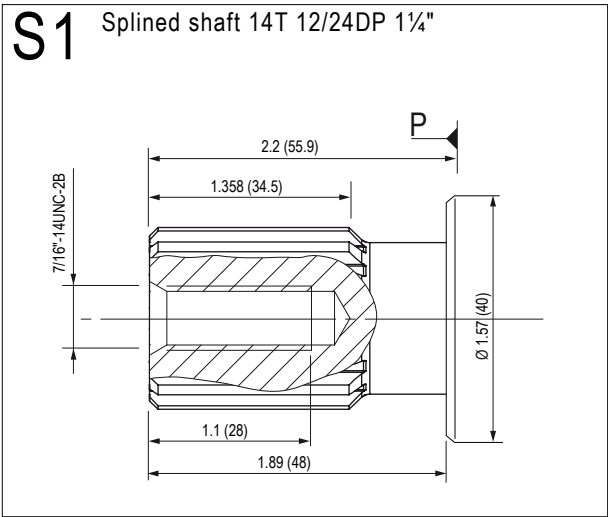


Q1 Side threaded ports A and B + Valve

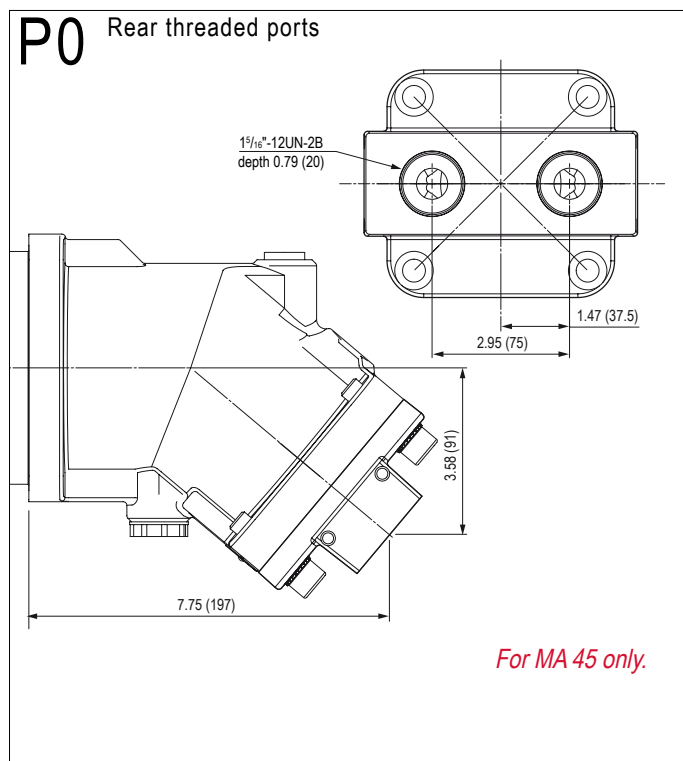
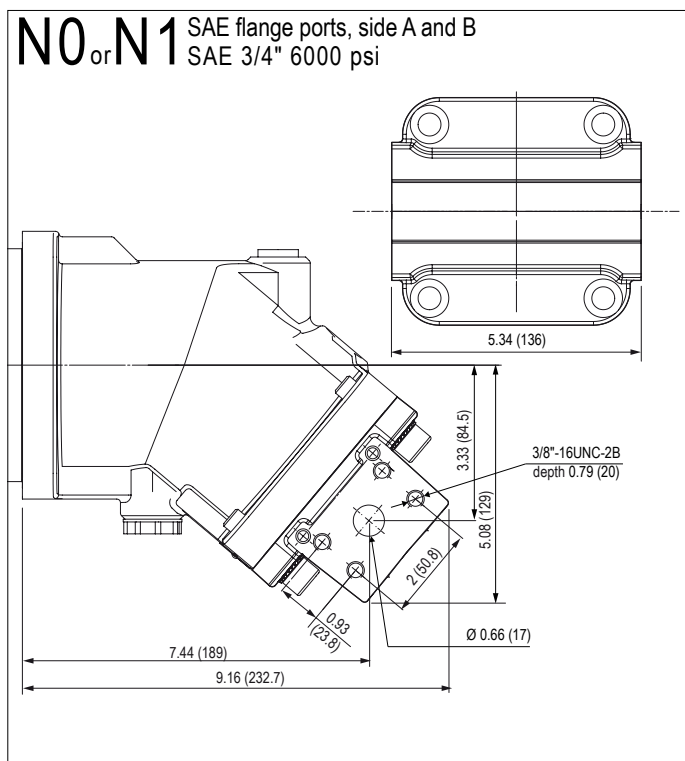
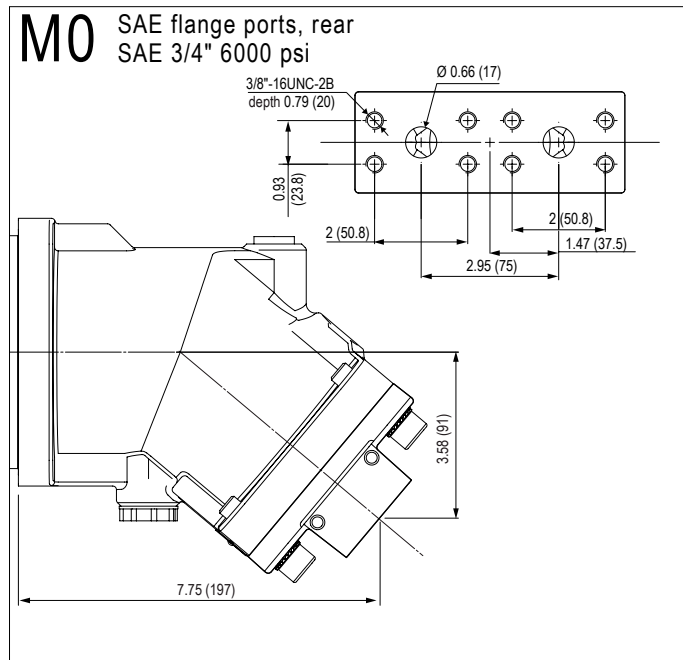
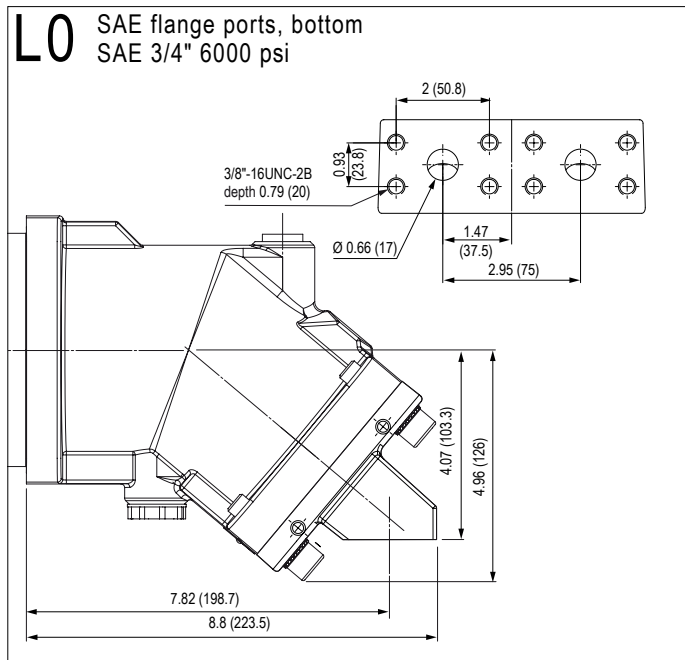


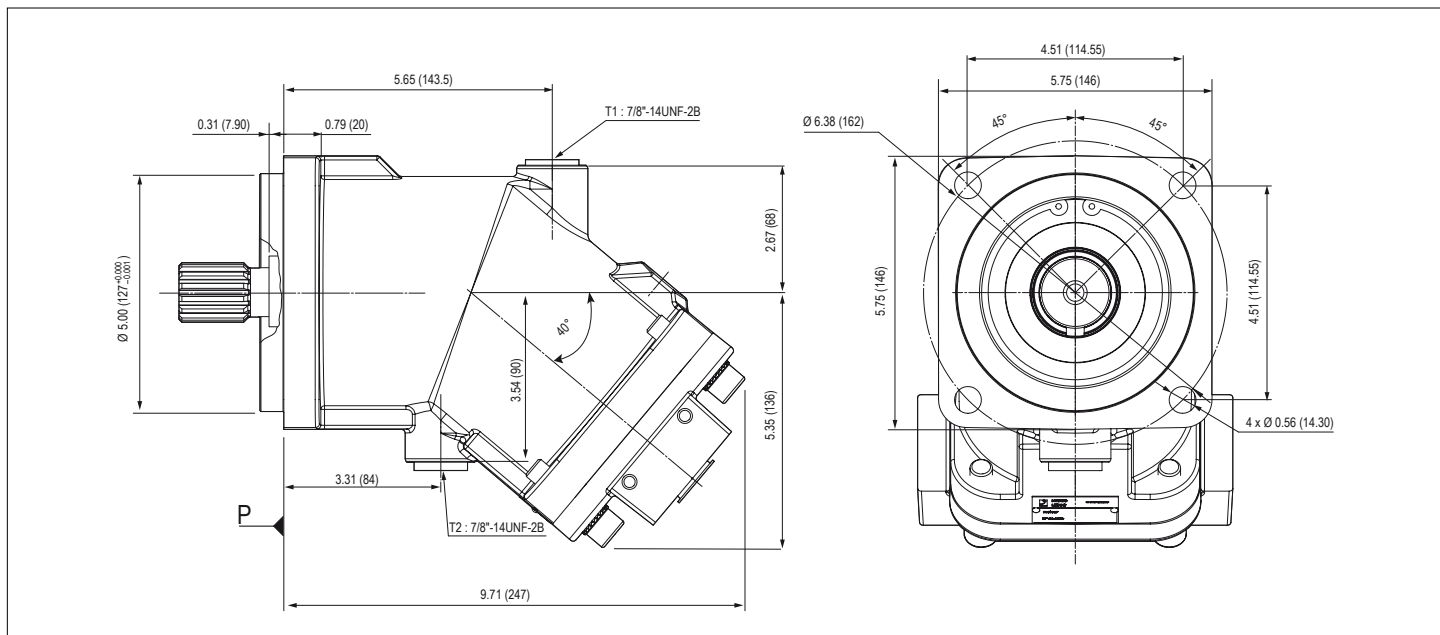


► Shaft end



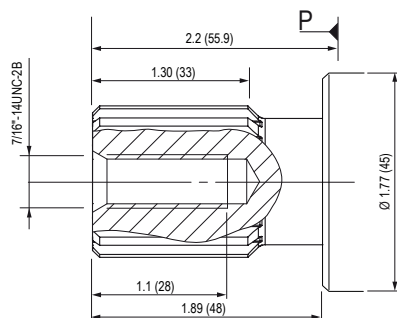
Inlet ports





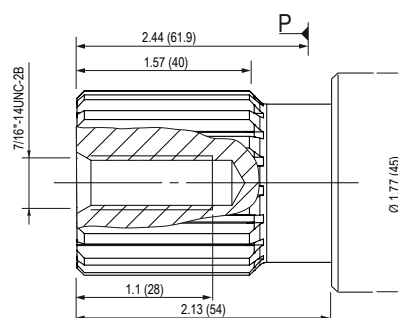
► **Shaft end**

S1 Splined shaft 14T 12/24DP 1¼"

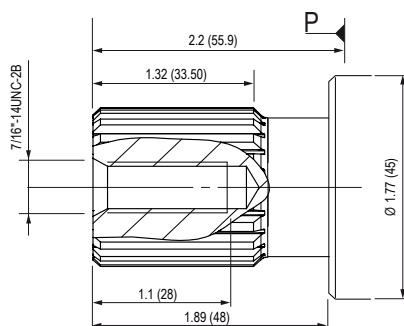


Max. pressure 350 bar (5076 psi) for MA 80.
Max. pressure 320 bar (4495 psi) for MA 90.

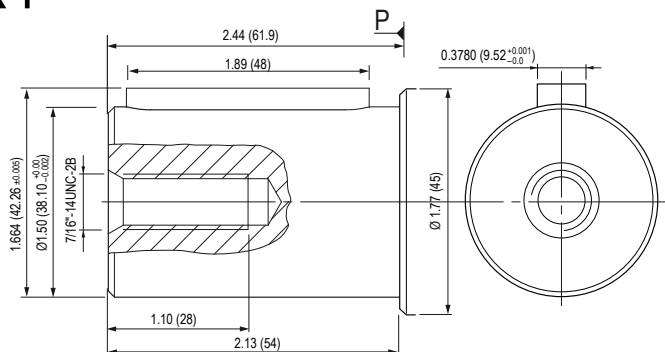
S2 Splined shaft 17T 12/24DP 1½"



S3 Splined shaft 21T 16/32DP 1 $\frac{3}{8}$ "



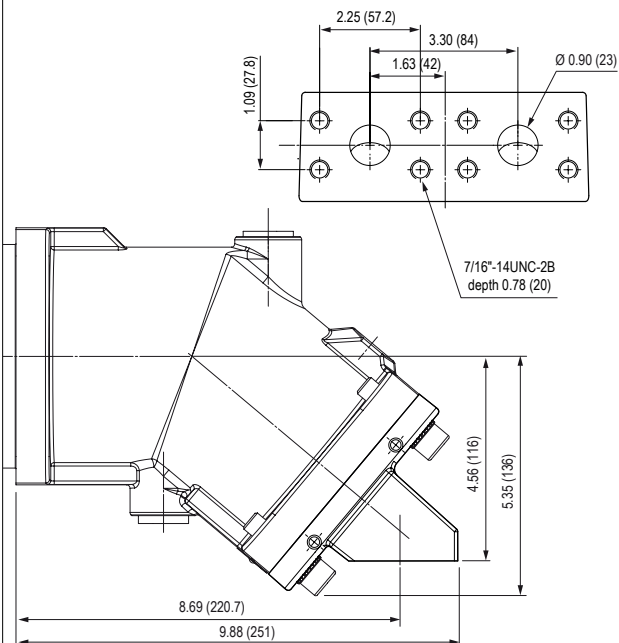
K1 Cylindrical keyed shaft Ø 1½"



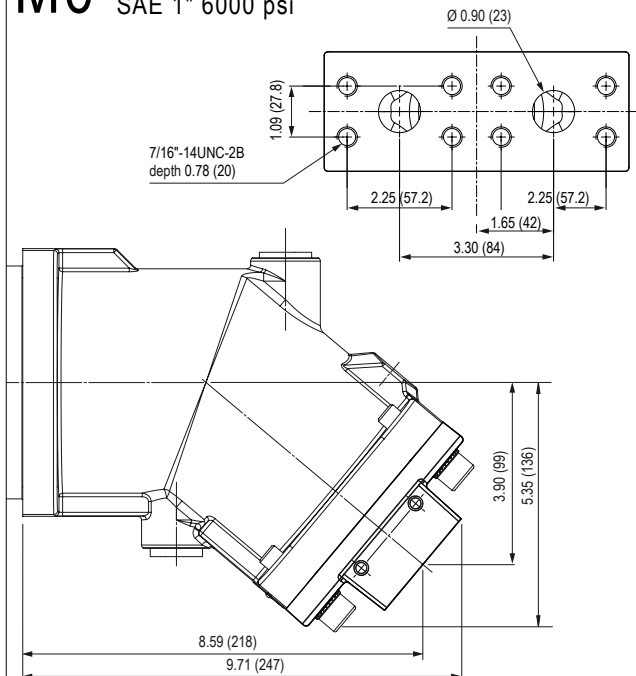
Dimensions in inches (mm) are given only as an indication.

Inlet ports

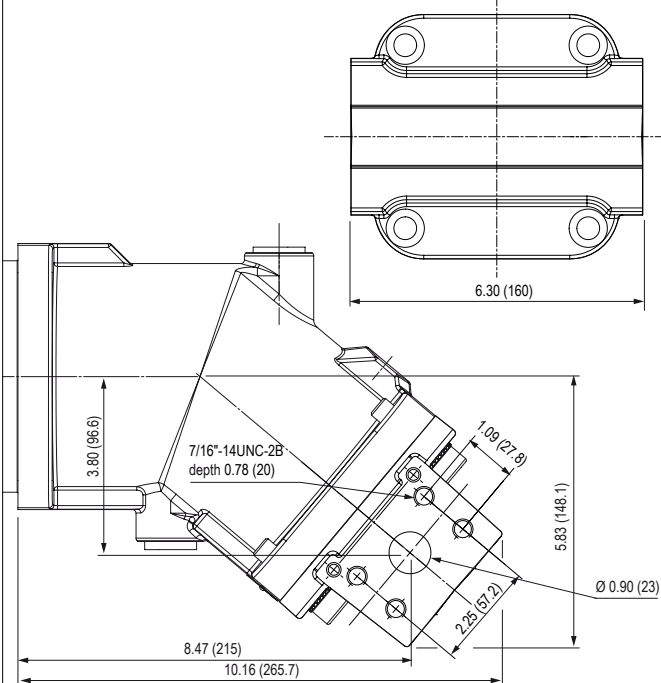
L0 SAE flange ports, bottom SAE 1" 6000 psi

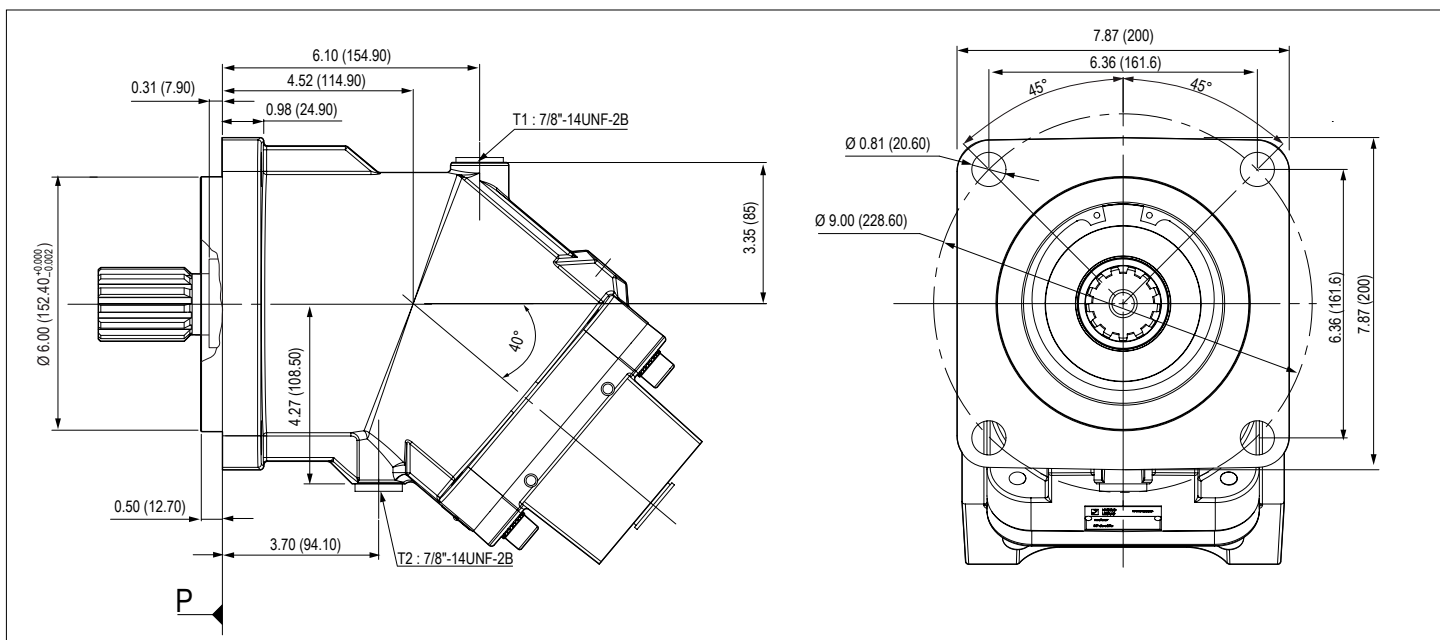


M0 SAE flange ports, rear SAE 1" 6000 psi

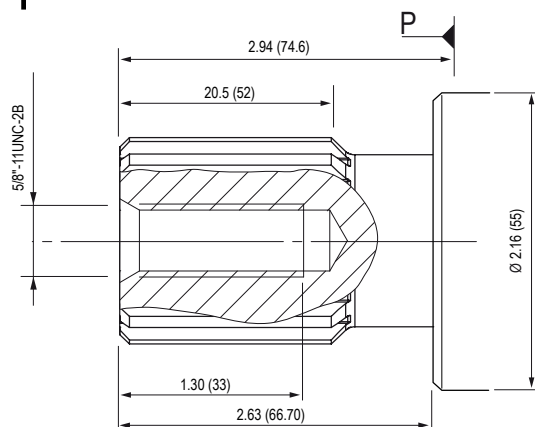
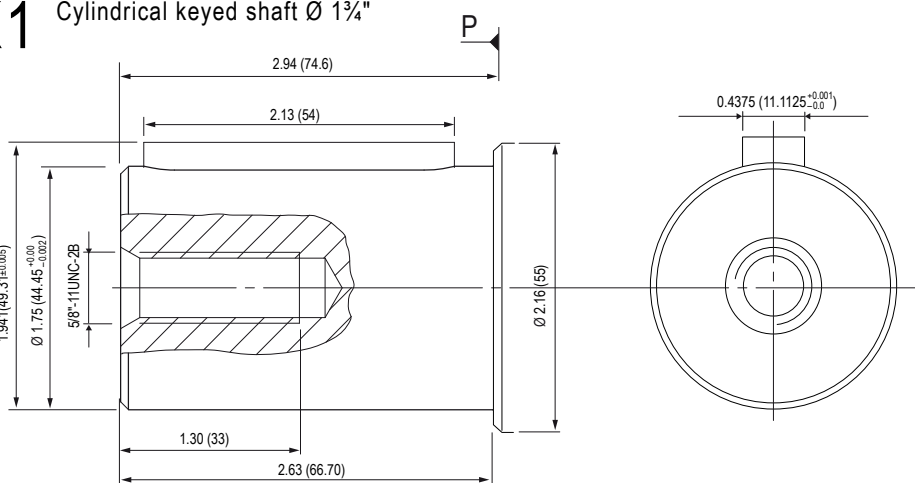


N0 or N1 SAE flange ports, side A and B SAE 1" 6000 psi





► Shaft end

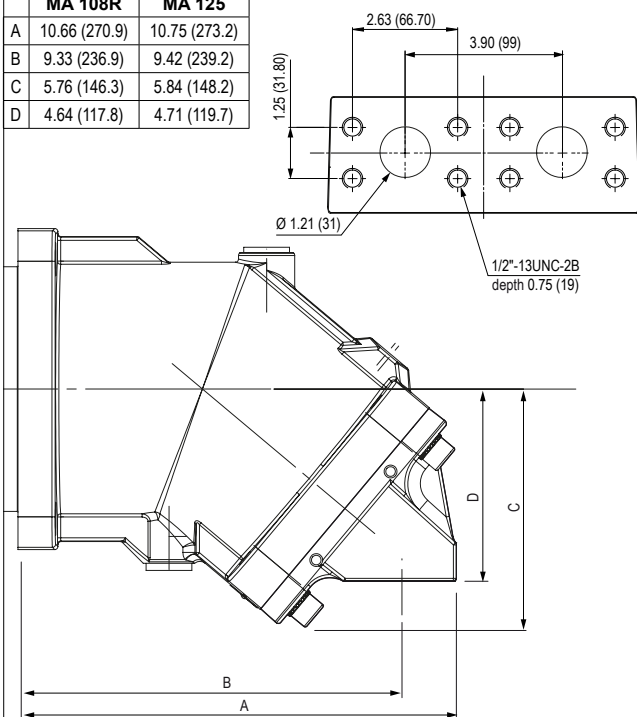
S1 Splined shaft 13T 8/16DP 1 $\frac{3}{4}$ "**K1** Cylindrical keyed shaft $\varnothing$ 1 $\frac{3}{4}$ "

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

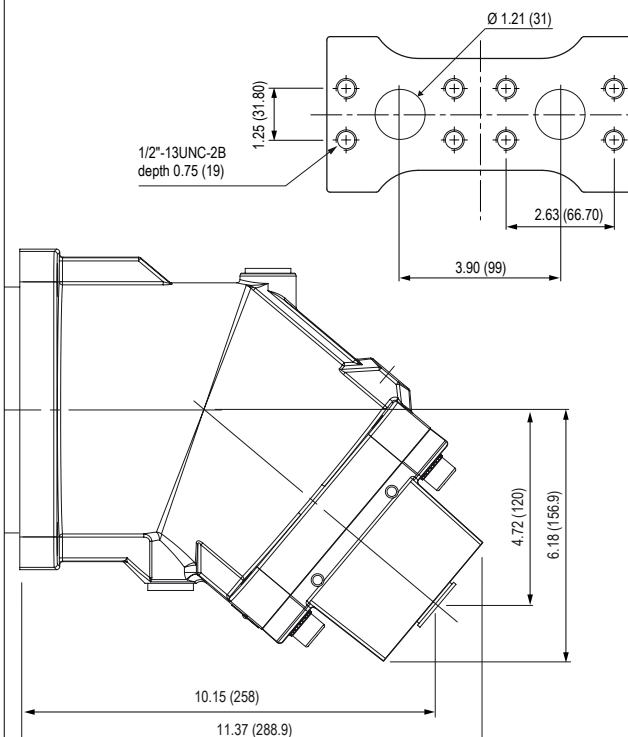
Inlet ports

L0 SAE flange ports, rear SAE 1 1/4" 6000 psi

	MA 108R	MA 125
A	10.66 (270.9)	10.75 (273.2)
B	9.33 (236.9)	9.42 (239.2)
C	5.76 (146.3)	5.84 (148.2)
D	4.64 (117.8)	4.71 (119.7)

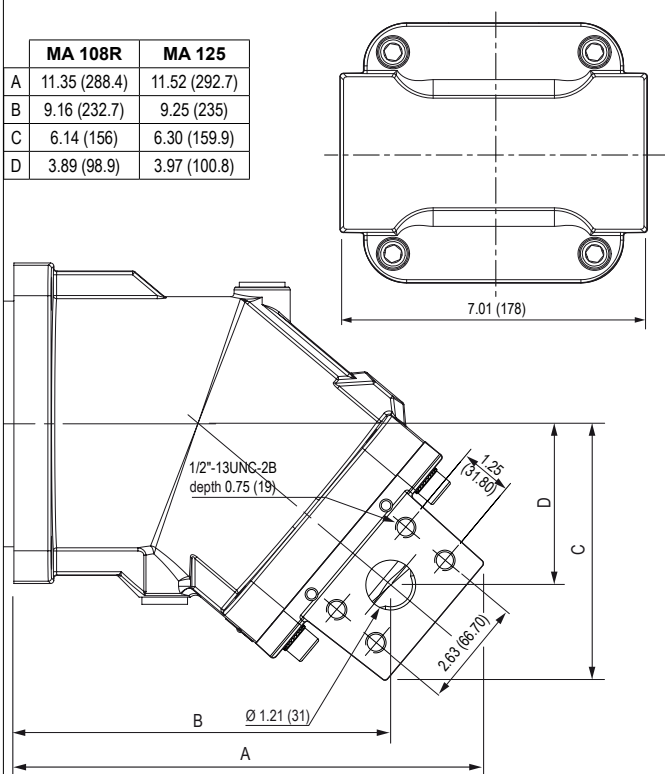


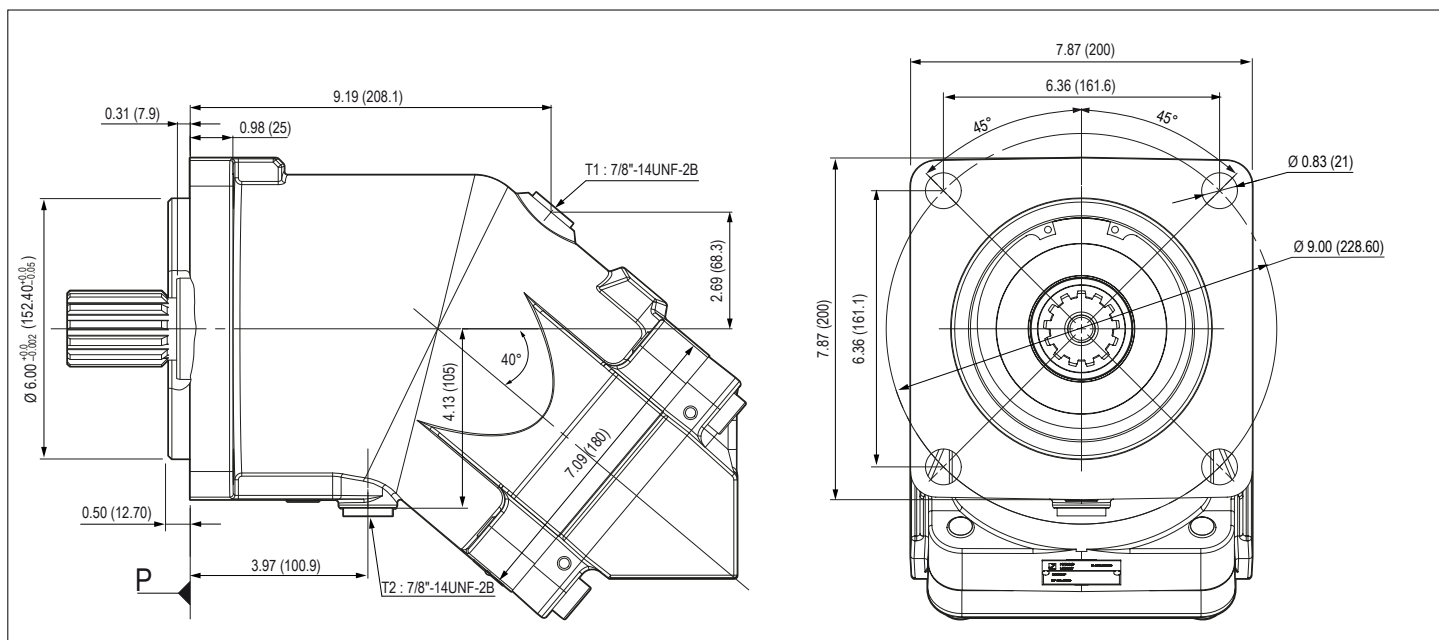
M0 SAE flange ports, bottom SAE 1 1/4" 6000 psi



N0 or N1 SAE flange ports, side A and B SAE 1 1/4" 6000 psi

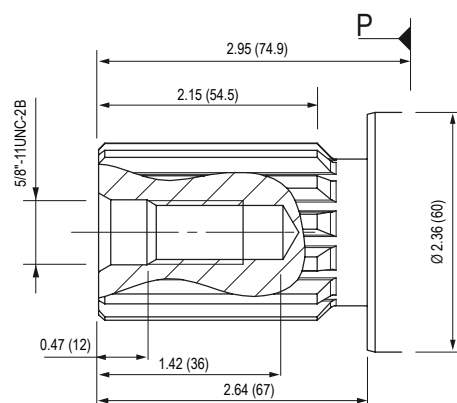
	MA 108R	MA 125
A	11.35 (288.4)	11.52 (292.7)
B	9.16 (232.7)	9.25 (235)
C	6.14 (156)	6.30 (159.9)
D	3.89 (98.9)	3.97 (100.8)



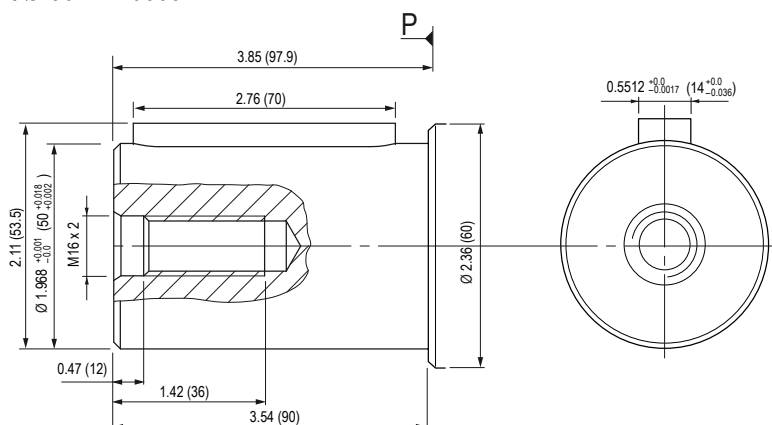


► Shaft end

S1 Splined shaft 13T 8/16DP 1¼"

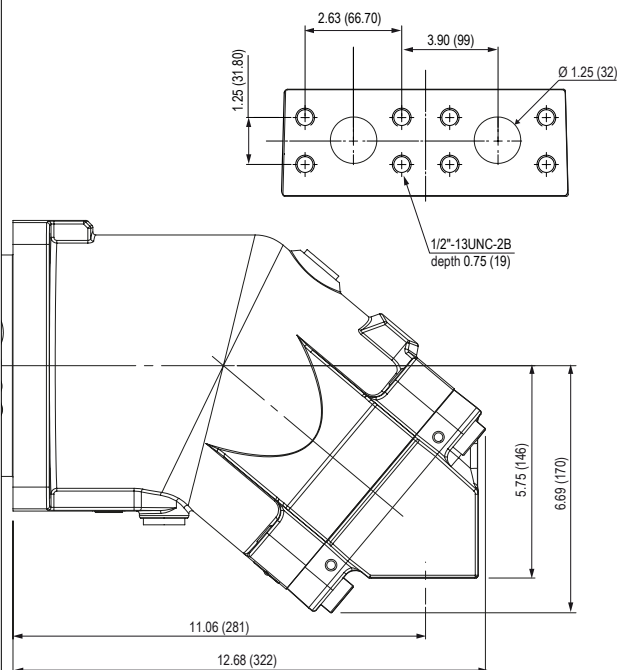


D1 Cylindrical keyed shaft Ø 50 DIN 6885 AS 14 x 9 x 70 mm

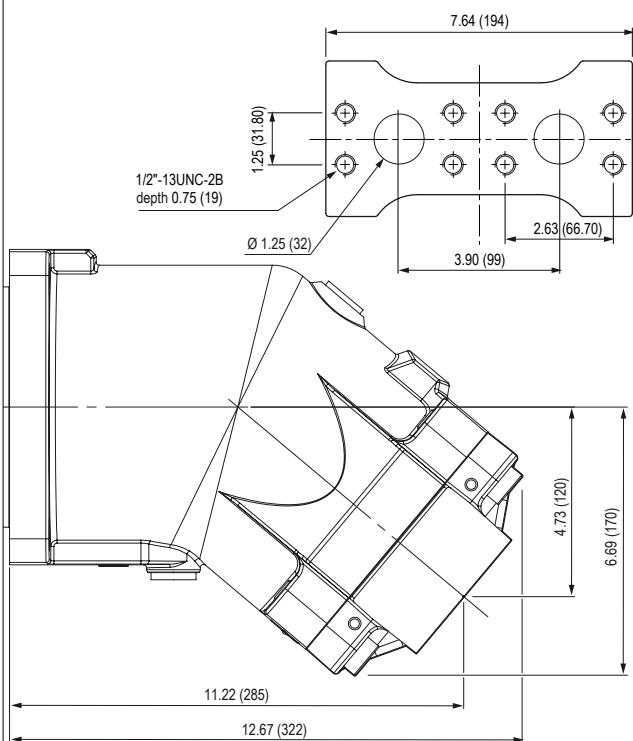


Inlet ports

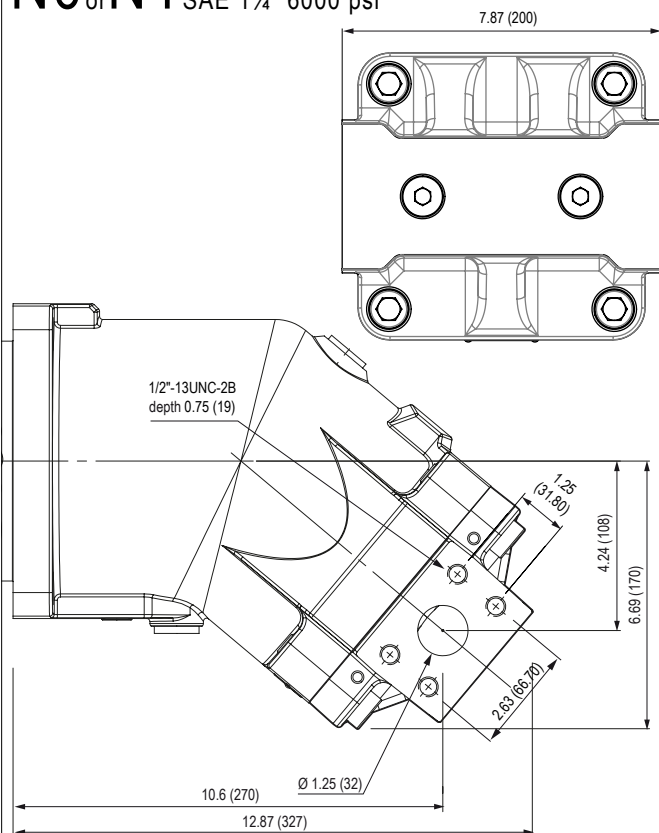
L0 SAE flange ports, bottom
SAE 1 1/4" 6000 psi



M0 SAE flange ports, rear
SAE 1 1/4" 6000 psi



N0 or N1 SAE flange ports, side A and B
SAE 1 1/4" 6000 psi



CHARACTERISTICS OF THE MSI SERIES MOTORS

Motor model	Displacement		Continuous max. speed (1)	Intermittent max. speed (1)	Max. flow absorbed		Torque		Torque at 350 bar (5100 psi)		Max. allowable pressure continuous / peak		Weight (kg)	
	cu.in/rev	cc/rev			gpm	l/mn	lbf.ft/psi	N.m/bar	lbf.ft	N.m	psi	bar	lbs	Kg
MSI 28 (2)	1.69	27.7	6300	6900	46.1	175	0.0223	0.44	114	154	5800 / 6525	400 / 450	25	11.5
MSI 32	1.96	32.1	6300	6900	53.4	202	0.0259	0.51	132	179	5800 / 6525	400 / 450	25	11.5
MSI 41	2.51	41.1	5600	6200	60.8	230	0.0331	0.65	169	229	5800 / 6525	400 / 450	25	11.5
MSI 50	3.07	50.3	5000	5500	66.4	252	0.0405	0.80	207	280	5800 / 6525	400 / 450	42	19
MSI 63	3.84	63	5000	5500	83.2	315	0.0508	1.00	259	351	5800 / 6525	400 / 450	42	19
MSI 80	4.91	80.4	4500	5000	95.6	362	0.0648	1.28	330	448	5800 / 6525	400 / 450	57	26
MSI 90	5.49	90	4500	5000	107	405	0.0725	1.43	370	501	5800 / 6525	400 / 450	57	26
MSI 108	6.61	108.3	4000	4400	114.4	433	0.0872	1.72	445	603	5800 / 6525	400 / 450	57	26
MSI 108 R (2)	6.61	108.3	3400	4500	97.3	368	0.0872	1.72	445	603	5800 / 6525	400 / 450	72	33
MSI 125	7.65	125.4	3400	4500	112.6	426	0.1010	2.00	515	699	5800 / 6525	400 / 450	72	33

(1) For higher speeds, please contact us.

(2) The MSI 108 R is in the frame size of the MA 125.

► Acceptable forces applied to motor shaft

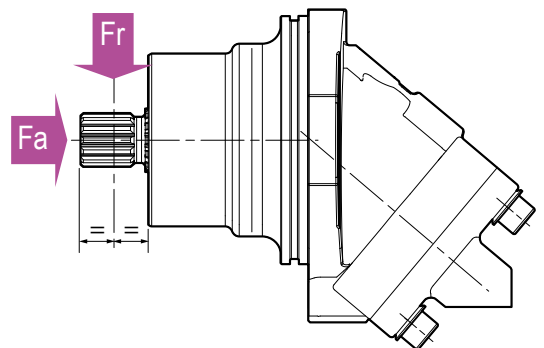
Motor model		28	32	41	50	63	80	90	108	108 R	125
Fr	lbf	1394	1462.5	1574	1686	2023	2360	2473	2585	2812	3262
	N	6200	6500	7000	7500	9000	10500	11000	11500	12500	14500
Fa	lbf/psi	0.44	0.46	0.62	0.62	0.77	0.93	1.03	1.24	1.24	1.33
	N/psi (N/bar) *	1.93 (28)	2.06 (30)	2.75 (40)	2.75 (40)	3.44 (50)	4.14 (60)	4.62 (67)	5.52 (80)	5.52 (80)	5.93 (86)

Fr: radial force measured at mid point of length of shaft.

Fa: axial force which tends to push the shaft inwards.

* Differential pressure between A and B.

For other forces, please contact us.



Order code system of MSI series motors

43

MSI	...	B	...	L0	M1	.	.	SV
01	02	03	04	05	06	07	08	09

To obtain the code for your motor, complete the different parameters 02, 04, 07 and 08, in the table on the left according to the options you require (see table below).

Motor												
01	Semi-integrated motor											MSI

Displacement												
02		28	32	41	50	63	80	90	108	108 R	125	

Mounting flange												
03	2 bolts ISO 3019-2											B

Shaft												
04	DIN 5480 splined	W30	W30	W30	W30	W30	W40	W40	W40	W40	W45	W1
		-	-	-	-	W35	W35	W35	-	-	W40	W2

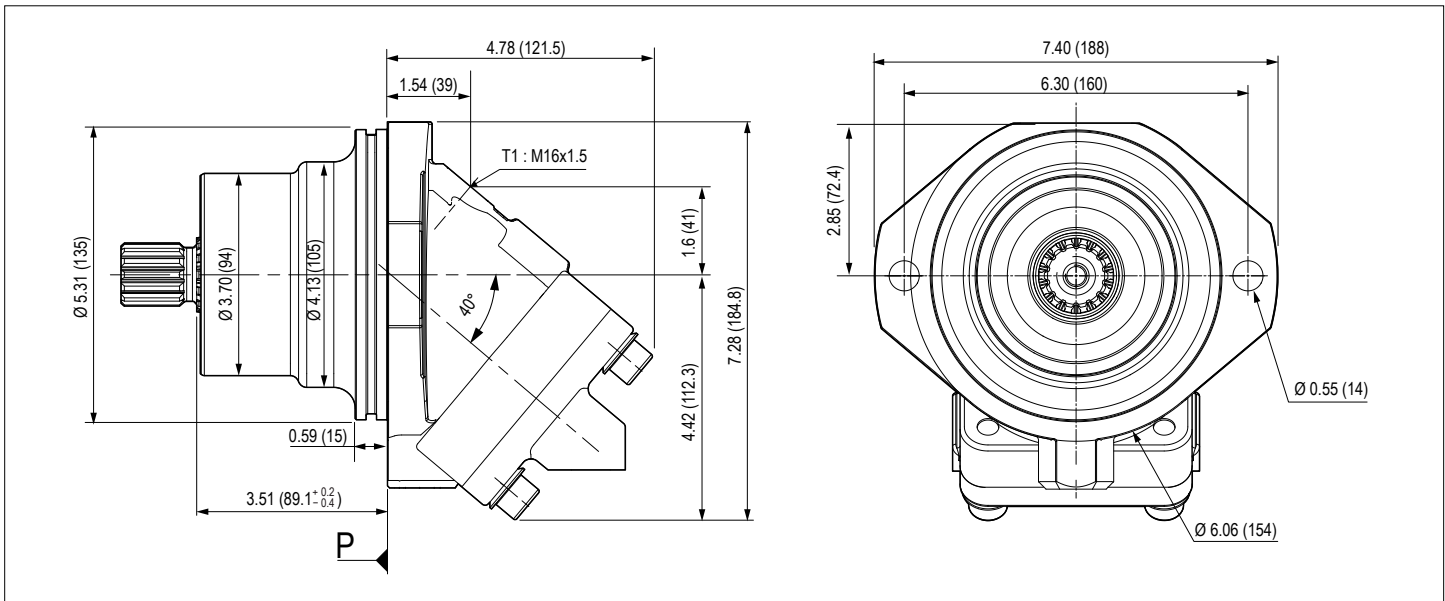
Inlet ports												
05	SAE flange ports, bottom	•	•	•	•	•	•	•	•	•	•	L0

Drain												
06		1	1	1	1	1	1	1	1	1	1	M1

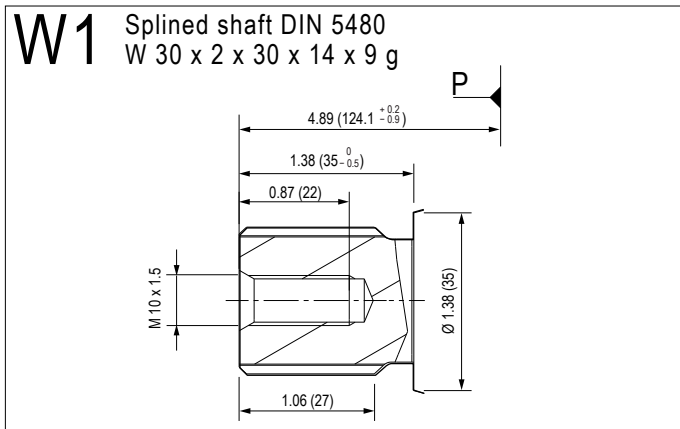
Suitable for use of speed sensor												
07	Yes	•	•	•	•	•	•	•	•	•	•	1
	No	•	•	•	•	•	•	•	•	•	•	0

Speed sensor												
08	Yes	•	•	•	•	•	•	•	•	•	•	1
	No	•	•	•	•	•	•	•	•	•	•	0

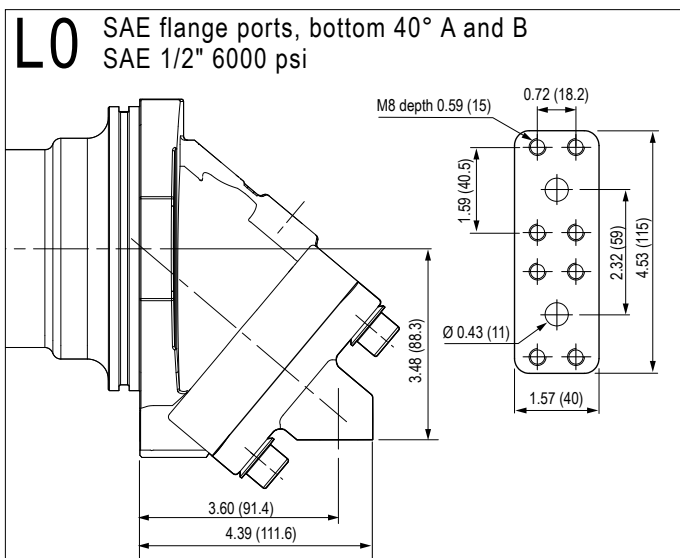
Valves												
09	Without	•	•	•	•	•	•	•	•	•	•	SV



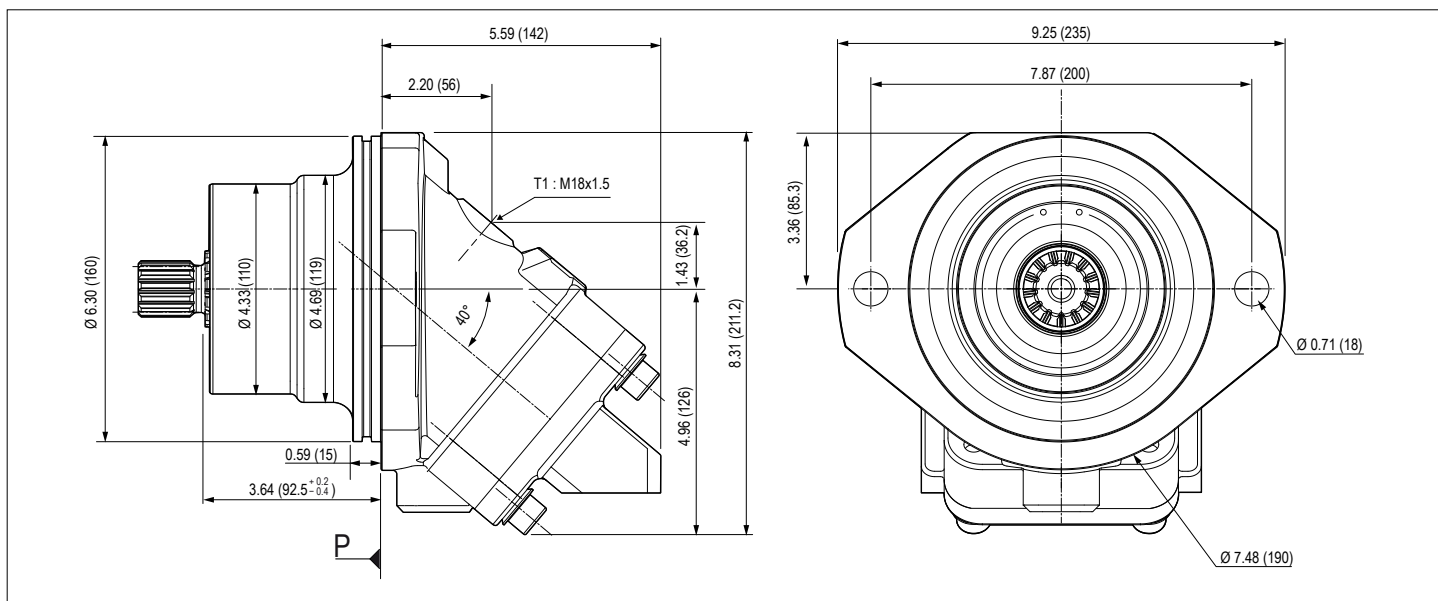
► Shaft



► Inlet ports

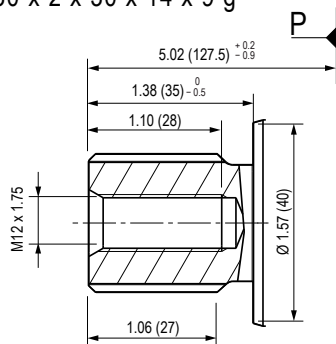


Dimensions in inches (mm) are given only as an indication.

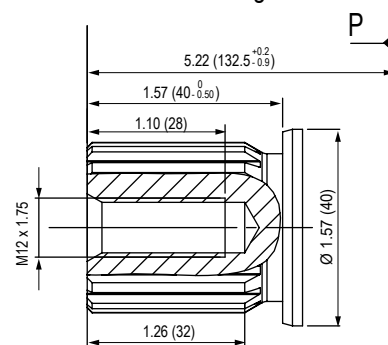


► Shaft end

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



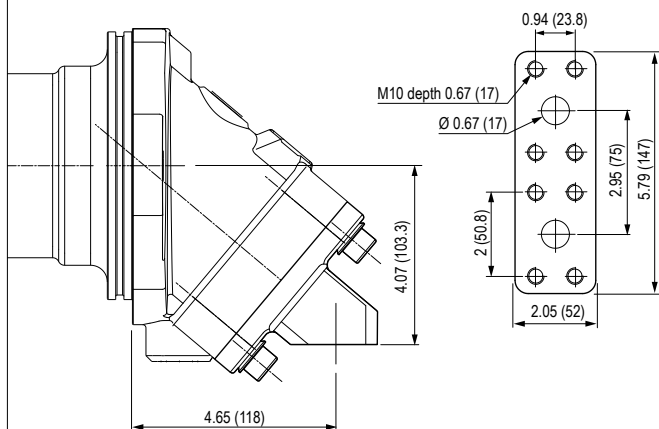
W2 Splined shaft DIN 5480
W 35 x 2 x 30 x 16 x 9 g

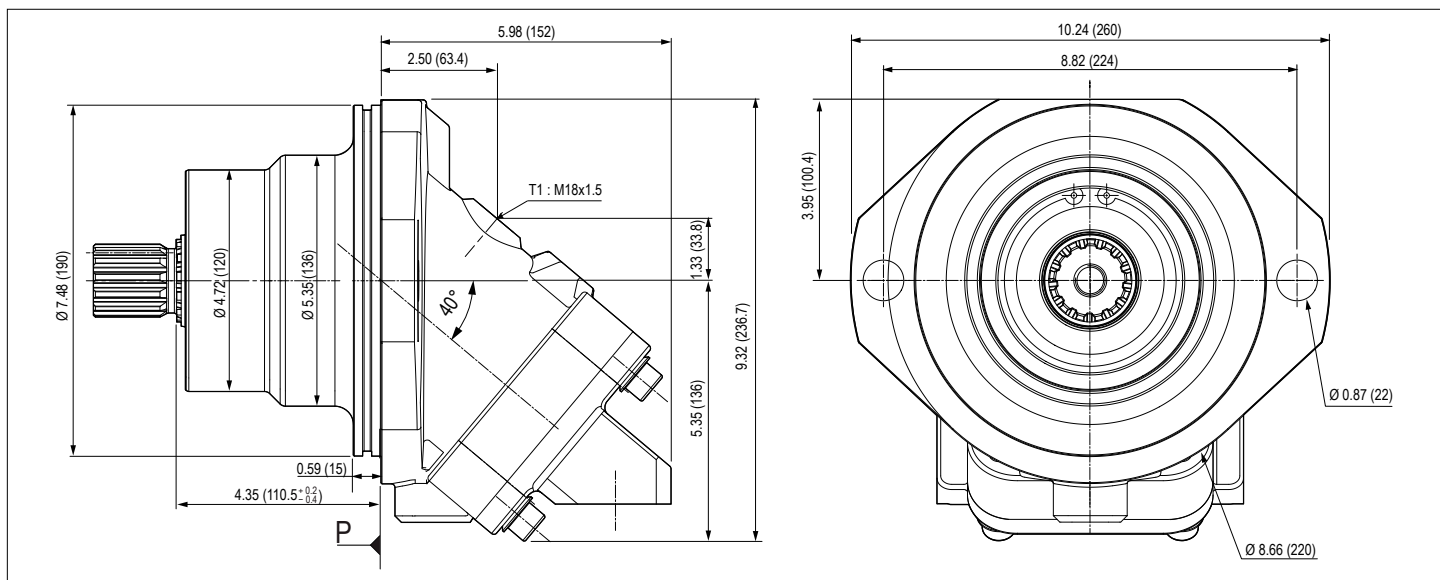


For MSI 63
only.

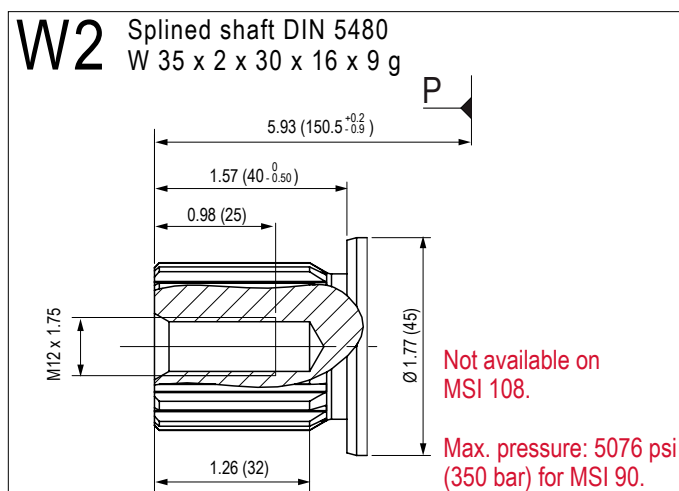
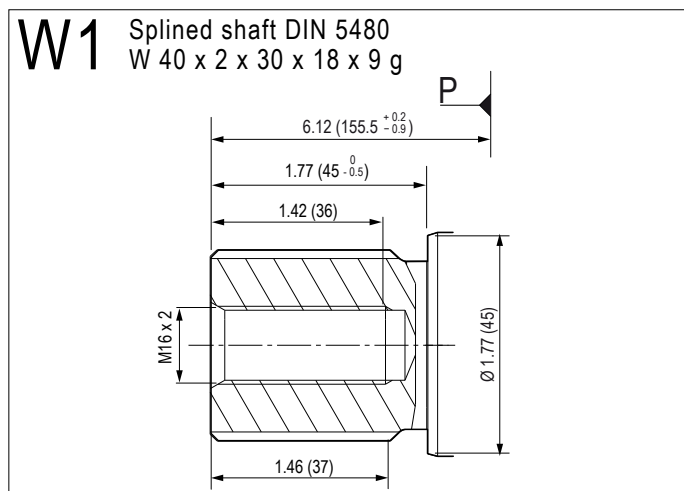
► Inlet ports

L0 SAE flange ports, bottom 40° A and B
SAE 3/4" 6000 psi

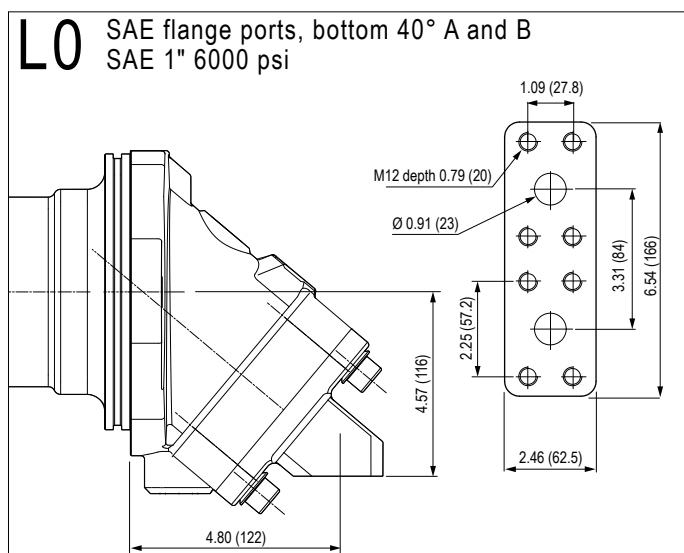




► Shaft end



► Inlet ports



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



Technical drawing of a bolt and nut assembly. The bolt is labeled M12 x 1.75. The nut is labeled Ø 2.17 (55). The dimensions are as follows:

- Total length: 6.61 (167.8^{+0.2}_{-0.9})
- Distance from head to first thread: 1.77 (45⁰_{-0.50})
- Distance from head to second thread: 0.98 (25)
- Distance from head to third thread: 1.42 (36)

Technical drawing of the SAE 1 1/4" 6000 psi pressure washer lance. The drawing includes a side view of the lance assembly and a detailed view of the lance head.

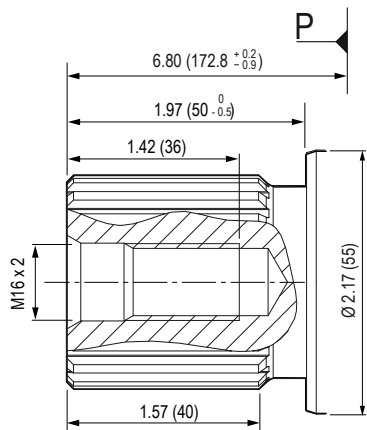
Side View Dimensions:

- Trigger gun length: 4.64 (117.8)
- Trigger gun diameter: 1.25 (31.8)
- Lance head length: 2.63 (66.7)
- Lance head width: 7.80 (198)
- Total length: 4.99 (126.7)

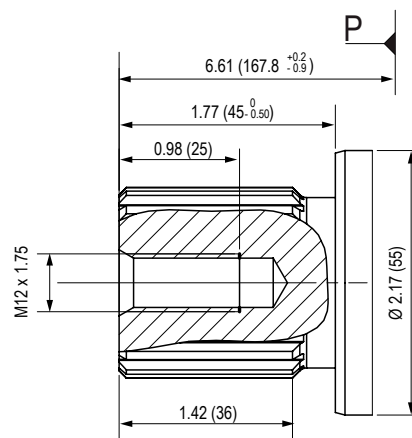
Lance Head Detail Dimensions:

- Mounting holes: 4 holes, diameter $\varnothing 1.18$ (30), depth 0.75 (19) for M14 bolts.
- Distance between mounting holes: 3.90 (99)

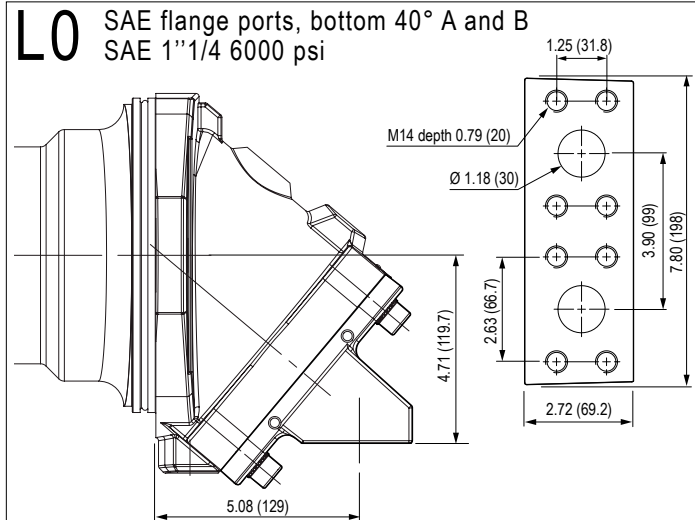
W1	Splined shaft DIN 5480 W 45 x 2 x 30 x 21 x 9 g
-----------	--



W2 Splined shaft DIN 5480
W 40 X 2 X 30 X 18 X 9 g



L0 SAE flange ports, bottom 40° A and B
SAE 1"1/4 6000 psi

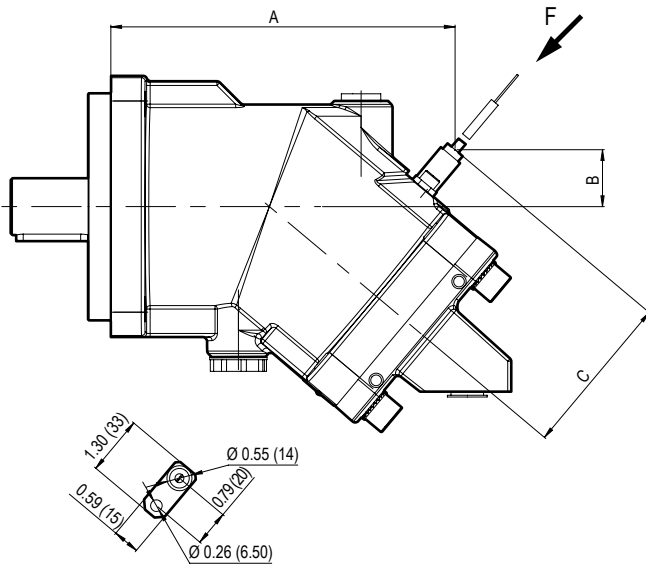


Dimensions in inches (mm) are given only as an indication.

SPEED SENSOR & INDICATOR OF DIRECTION OF ROTATION

LEDUC CODE: 093327

M, MA, MSI 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).



► Technical data for the sensor

Supply voltage	5...32 V DC
Current consumption	maximum 6 mA without load
Output frequency	0 Hz...20 kHz
Protection type	IP 69 k
Operating temperature	- 40°F...+ 257°F (- 40°C...+ 125°C)
Weight	around 0.14 lbs (65 g)
Cable length	20 inches (50 cm)

Series	Motor models	A inches (mm)	B inches (mm)	C inches (mm)	Number of teeth *
M	M 12 - 18	5.98 (152)	1.30 (33)	3.46 (88)	30
	M 25	6.65 (169)	1.26 (32)	3.58 (91)	33
	M 28 - 32 - 41	6.85 (174)	1.10 (28)	3.58 (91)	33
	M 45 - 50 - 63	7.56 (192)	0.94 (24)	3.86 (98)	39
	M 80 - 90 - 108	8.58 (218)	0.71 (18)	4.06 (103)	44
	M 108R - 125	8.86 (225)	1.81 (46)	4.76 (121)	64
	M 160 - 180	9.84 (250)	1.85 (47)	4.96 (126)	68
MA	MA 10 - 12 - 18	6.38 (162)	1.26 (32)	3.43 (87)	30
	MA 25	6.81 (173)	1.61 (41)	3.62 (92)	35
	MA 32 - 41	6.81 (173)	1.61 (41)	3.62 (92)	35
	MA 45 - 50 - 63	7.60 (193)	1.38 (35)	3.78 (96)	39
	MA 80 - 90	8.78 (223)	1.18 (30)	3.98 (101)	44
	MA 108R - 125	9.88 (251)	1.77 (45)	4.80 (122)	64
	MA 160 - 180	11.10 (282)	1.85 (47)	4.96 (126)	68
MSI	MSI 28 - 32 - 41	3.82 (97)	1.69 (43)	3.58 (91)	35
	MSI 50 - 63	4.61 (117)	1.42 (36)	3.78 (96)	39
	MSI 80 - 90 - 108	4.92 (125)	1.22 (31)	3.98 (101)	44
	MSI108 R - MSI 125	5.59 (142)	1.77 (45)	4.80 (122)	64

* The motors suitable for use with a speed sensor are fitted with a gear wheel on the barrel.
 When this barrel rotates, it produces a signal proportional to rotating speed, and which is picked up by the sensor.

NOTE: maximum tightening torque = 7 lbf ft (10 N.m).
 For further information, please contact us.

FLUSHING VALVE | LEDUC CODE: VBS 091180

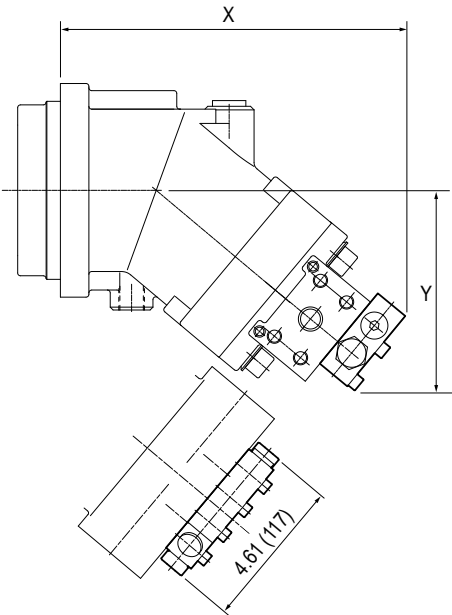
Used to create flow to cool the motor. This valve is essential for all intensive uses of motors and contributes to long service life.

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.

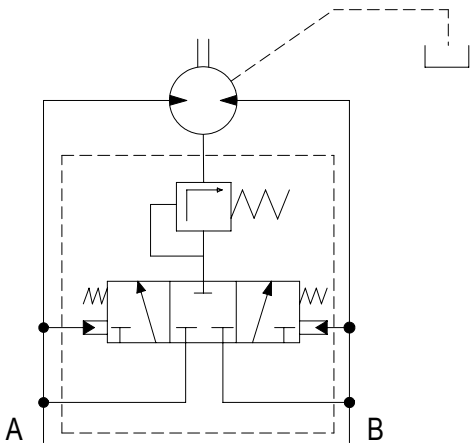
Flushing valves are only available for use with motors with side ports (N1 or Q1).

► Dimensions

Series	Motor models	X inches (mm)	Y inches (mm)
M	M 25	8.15 (207)	4.57 (116)
	M 28 - 32 - 41	8.39 (213)	4.76 (121)
	M 45 - 50 - 63	9.25 (235)	5.39 (137)
	M 80 - 90 - 108	10.43 (265)	6.02 (153)
	M 108R	10.75 (273)	6.02 (153)
	M 125	10.83 (275)	6.10 (155)
	M 160 - 180	12.32 (313)	6.77 (172)
MA	MA 25	8.72 (221.4)	4.58 (116.3)
	MA 32 - 41	8.96 (227.5)	4.78 (121.5)
	MA 45 - 50 - 63	10.07 (255.8)	5.41 (137.4)
	MA 80 - 90	11.26 (286)	6.02 (153)
	MA 108 R	12.01 (305)	6.17 (156.6)
	MA 125	12.10 (307.3)	6.24 (158.5)
	MA 160 - 180	13.58 (345)	6.69 (170)

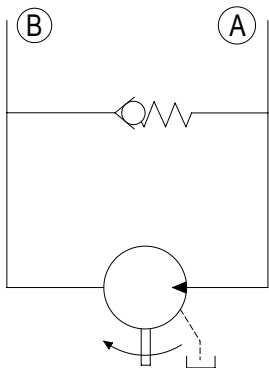


► Schematic drawing of flushing valve

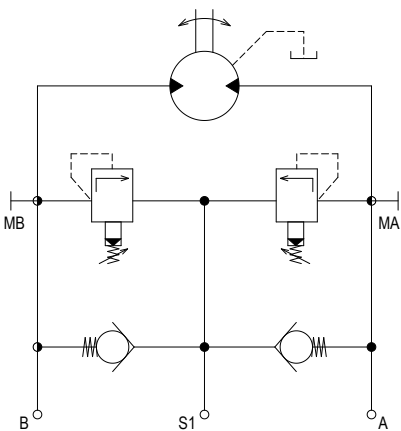


Examples of other valves on request (please consult us):

Anti-cavitation valve



Double pressure relief valve



ATEX CERTIFICATION

► LEDUC motors are certified ATEX

As standard, all LEDUC motors are classed in Group II category 2 D TX.

On request, motors may be supplied for Group II category 2G and Group II category D T4.

As all the motors must be delivered unpainted (risks due to static electricity), it is necessary to pay attention to the risks of corrosion.

► Explanation

Group II category 2 means it is possible to operate in an ATEX 1 zone (probable gas atmosphere) or ATEX 21 zone (probable dusty atmosphere).

G = May operate in a gas zone.

D = May operate in a dusty atmosphere.

TX = Maximum surface temperature.

► Precautions regarding ATEX

It is necessary to check the following recommendations:

- The operating temperatures of the motors must be guaranteed by the end user.
- The machines on which our products are assembled should be ground-connected (static electricity).
- Check all parts connected to the motor for conformity with ATEX.

► Markings on motors

The marking of our product will be: Group II category 2GD c TX (where TX replaces T3 and T4).

Our products are TX registered (based on product surface temperature) and can therefore be certified T4 or T3 according to the following recommendations (hot area).

► Surface temperature

- T4 275°F (135°C) for fluid temperature < 158 °F (70°C).
- T3 392 °F (200°C) for fluid temperature < 230 °F (110°C).

► Example of ATEX marking on motors

CE  II 2 GD c TX HL1

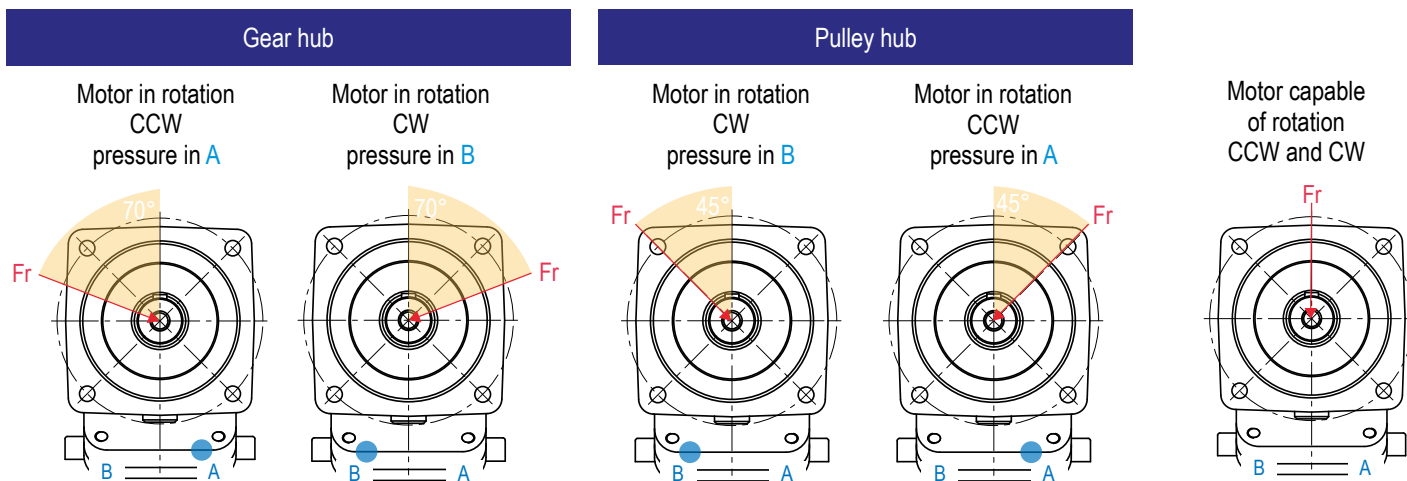
If you have different requirements, please contact us.

IMPORTANT NOTE: ATEX certification does not apply to motors fitted with speed sensor, nor to the “drainless” motors.



► Maximizing service life of bearings

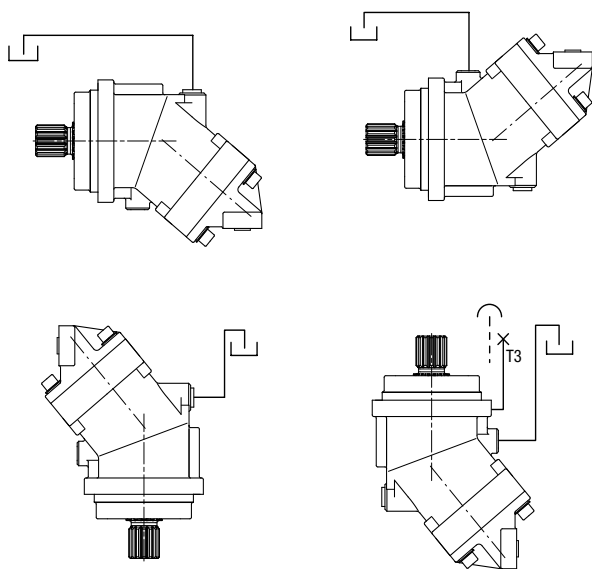
In cases where there is a radial force on motor shaft, keeping the direction of that force within the shaded areas shown below will improve service life of the motor.



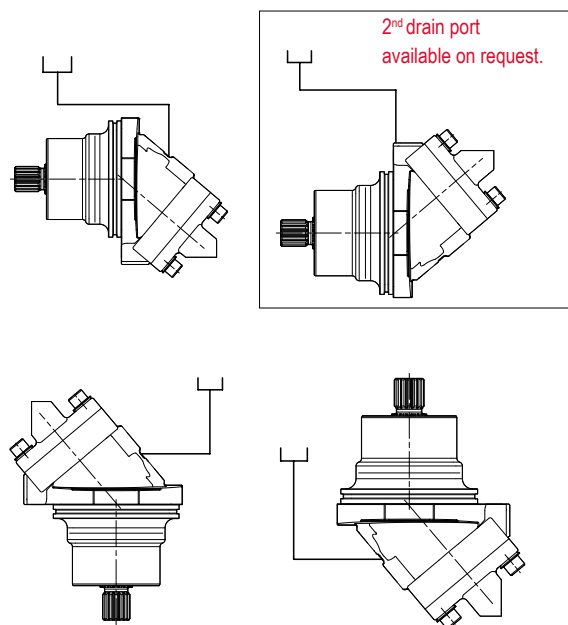
► Mounting position of motors

LEDUC motors can be used in only mounting position. In "shaft upwards" position, make sure that the motor housing is completely filled with fluid (for M motors, bleed the air by the T3 connection). The T3 connection is only available for M series motors.

M | MA

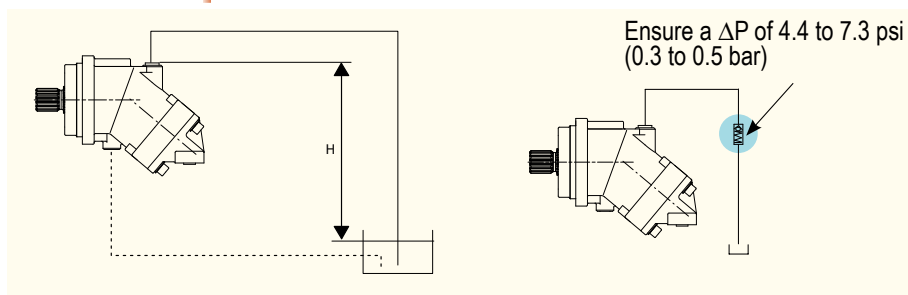


MSI



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.



Drainless motor

bent axis hydraulic motor

HYDRO LEDUC is now able to offer drainless motors for either **single direction of rotation** or **bi-directional use**, under certain conditions and on request (giving details of your application).

ADVANTAGES

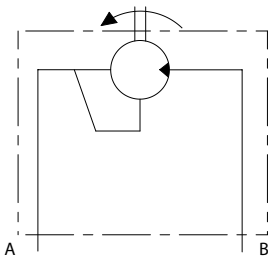
No drainline needed

- ▶ Only two hose lines are required: supply line and output.
 - ▶ The motor is drained through the return line.
- It is fitted with a high pressure lip seal.

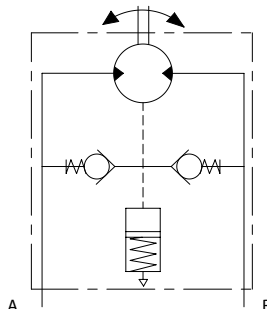
CHARACTERISTICS

- Working speed:
Please consult our Technical Department with details of your applications.
- Max. pressure on the return line: 363 psi (25 bar).

▶ Schematic drawing for use in single direction of rotation

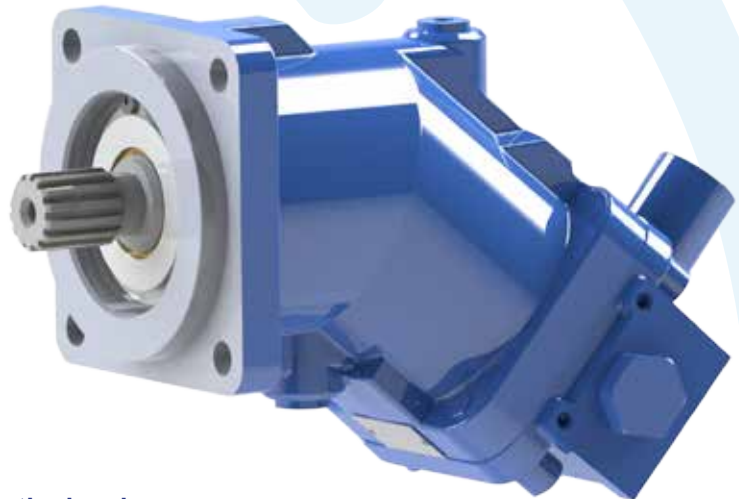
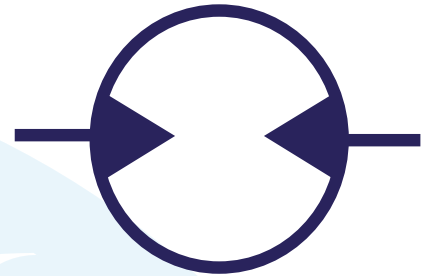


▶ Schematic drawing for bi-directional use



For **bi-directional** applications, the motor is fitted with an accumulator integrated in the back piece, to compensate possible pressure peaks in the housing (for example from rapid change in direction).

Please contact our Customer Service Department with details of your application.



PISTON PUMPS FOR TRUCKS

HYDRO LEDUC offers 3 types of piston pumps perfectly suited to all truck and PTO-mount applications.

- Fixed displac. from 0.73 to 7.93 cu.in/rev (12 to 130 cc/rev)
- Variable displac. from 2.44 to 9.15 cu.in/rev (40 to 150 cc/rev)

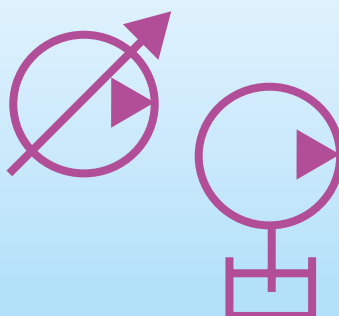


MOBILE & INDUSTRIAL PUMPS

The W range is composed of fixed displacement pumps, and the DELTA range, of variable displacement pumps. These pumps can operate at high pressures within minimal size.

- ▶ W and WA (SAE)* pumps:
 - Fixed displac. from 0.73 to 7.65 cu.in/rev (12 to 125 cc/rev)
 - ISO 3019/2 or SAE flanges
 - DIN 5480 or SAE shafts
- ▶ DELTA pumps:
 - Variable displac. from 2.44 to 5.61 cu.in/rev (40 to 92 cc/rev)
 - SAE shafts and flanges

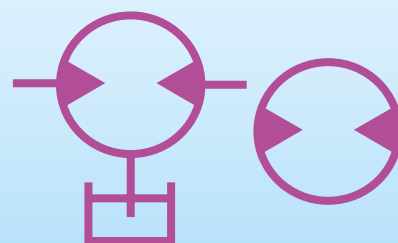
* For SAE version, please ask.



HYDRAULIC MOTORS

Fixed displacement piston motors.

- Models from 0.31 to 11.02 cu.in/rev (5 to 180 cc/rev).
- Available in ISO, SAE and semi-integrated versions.



HYDROPNEUMATIC ACCUMULATORS

Bladder, diaphragm, piston accumulators.
Spherical and cylindrical accumulators.

- Capacity from 0.005 to 13.21 gallons (0.02 to 50 liters).
- Working pressure up to 7252 psi (500 bar).
- Accessories for use with hydraulic accumulators.



MICRO HYDRAULICS

This is a field of exceptional HYDRO LEDUC know-how:

- Axial and radial piston pumps, of fixed and variable displacement
- Axial piston micro-hydraulic motors
- Micro-hydraulic units incorporating pump electric motors, valving, controls, etc.

HYDRO LEDUC offers complete, original and reliable solutions for even the most difficult environments, and within the smallest size envelopes.



A dedicated R&D team means HYDRO LEDUC is able to adapt or create products to meet specific customer requirements.

Working in close cooperation with the decision-making teams of its customers, HYDRO LEDUC optimizes proposals based on the specifications submitted.

Complete catalogues available at
www.hydroleduc.com



A passion for hydraulics

HYDRO LEDUC SAS
Head office and Factory
BP 9 - F-54122 AZERAILLES - FRANCE
Tél. +33 (0)3 83 76 77 40 - Fax +33 (0)3 83 75 21 58

HYDRO LEDUC GmbH
Haselwander Str. 5
D-77746 SCHUTTERWALD - GERMANY
Tel. +49 (0) 781-9482590 - Fax + 49 (0) 781-9482592

HYDRO LEDUC AB
Batterivägen 5
461 38 TROLLHÄTTAN - SWEDEN
Tel. 46 (0) 520 10 820

HYDRO LEDUC N.A. Inc.
19416 Park Row - Suite 170
HOUSTON, TEXAS 77084 - USA
Tel. +1 281 679 9654 - Fax +1 832 321 3553



www.hydroleduc.com



HYDRO LEDUC
SAS with capital of 4 065 000 €
EORI FR31902742100019
RC Nancy B 319 027 421
contact@hydroleduc.com

US_201602_Motors_CB