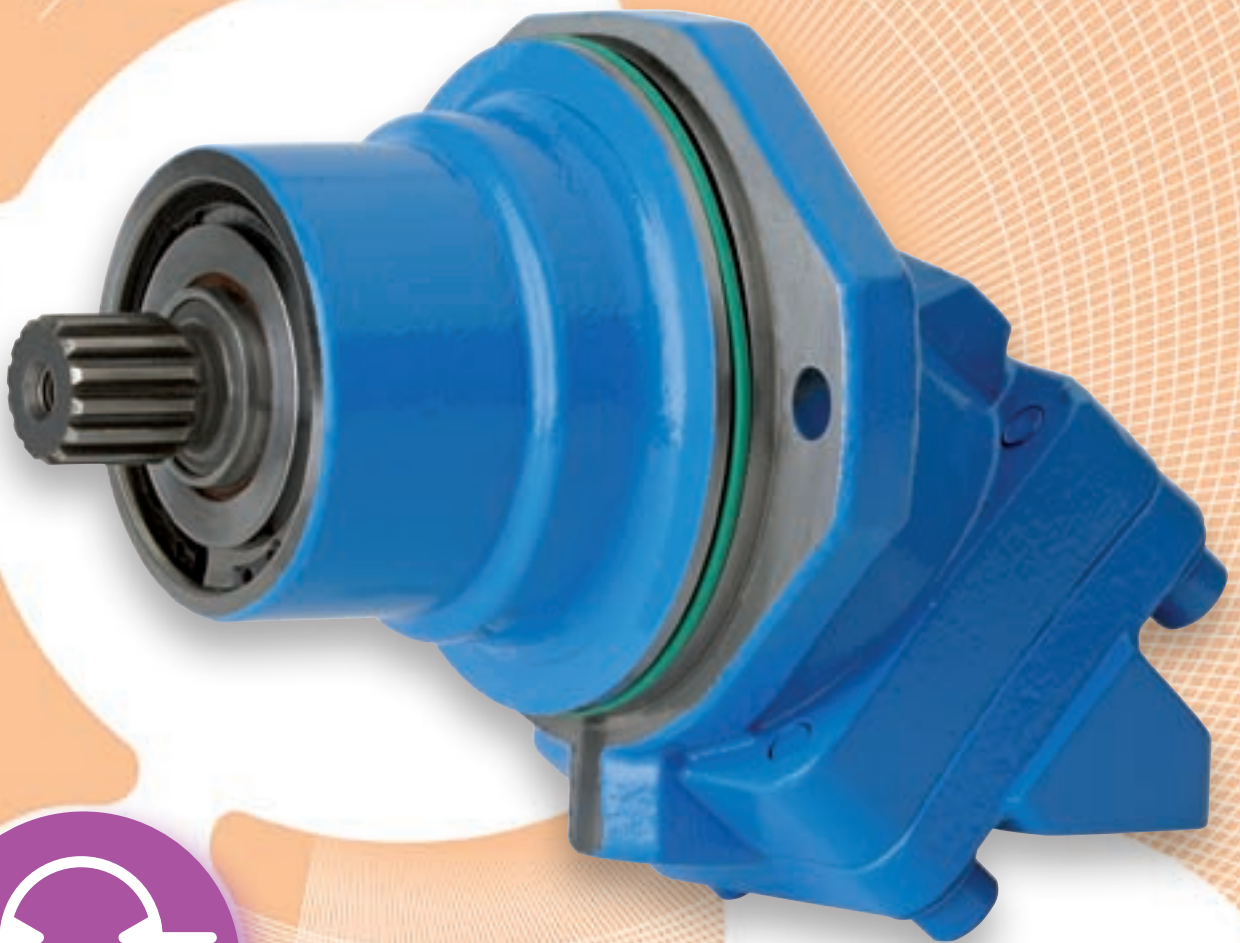


Bent axis hydraulic motors

MSI
Series



 **HYDRO
LEDUC**

Contents

■ Definition and main applications of hydraulic motors, advantages of HYDRO LEDUC motors	1
■ Operating conditions of motors.	2
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MSI series motors

HYDRO LEDUC hydraulic motors of the MSI series are specifically designed for optimum integration into a receiving organ, and in particular a planetary gearbox. This association enables the same torque and speed to be achieved as with a low speed motor, for example. The MSI motors are of bent axis technology, with an angle of 40°.

They combine high performance and reduced size envelope:

- power per kilo: over 10 kW/kg;
- optimized weight and size;
- global efficiency over 90%.

The MSI are an excellent choice for all requirements in displacements from 32cc to 108cc. Suitable for use in either closed or open loop systems, MSI motors are robust and offer long service life. To ensure the best service life from your motors, please take care to follow the installation and start-up recommendations (see pages 2 and 12).



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HYDRO LEDUC also manufactures a range of ISO flange motors: the **M** series.
Literature on request or on our website :
www.hydroleduc.com.

Advantages of MSI series motors

■ Definition of function

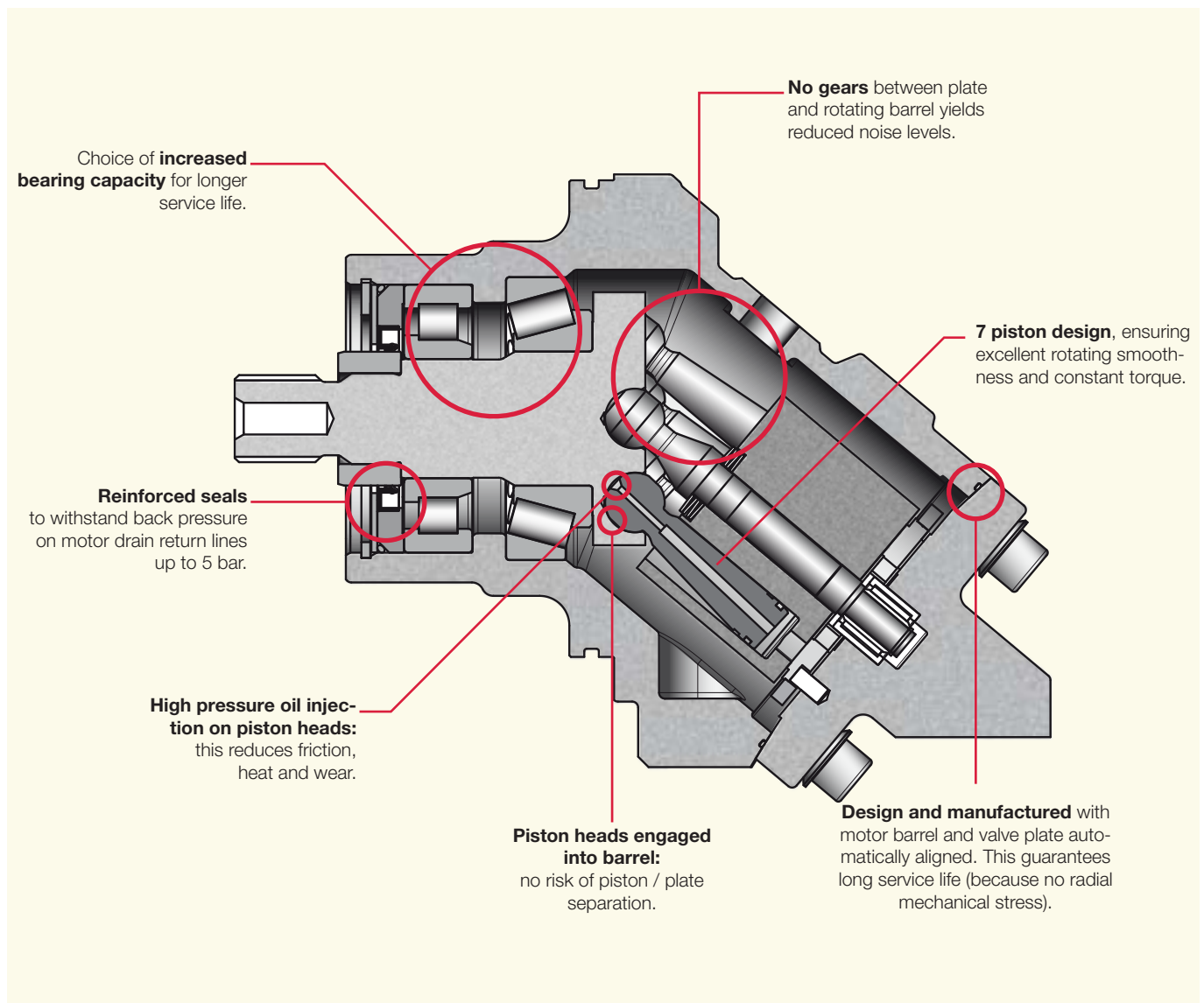
Hydraulic motors transform hydraulic flow into rotating speed and hydraulic pressure into mechanical torque.
Motor rotating speed is proportional to the flow which is supplied to it.
Torque produced is proportional to the hydraulic pressure the motor receives.

■ Main applications of hydraulic motors

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).

■ Advantages of HYDRO LEDUC motors

All structural components are made from similar materials resulting in consistent thermal expansion and exceptional reliability.



Operating conditions of MSI series motors

Hydraulic fluid

HYDRO LEDUC motors are designed to be powered 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 200 cSt;
- Maximum range: between 5 and 1600 cSt.

Filtration of hydraulic fluid

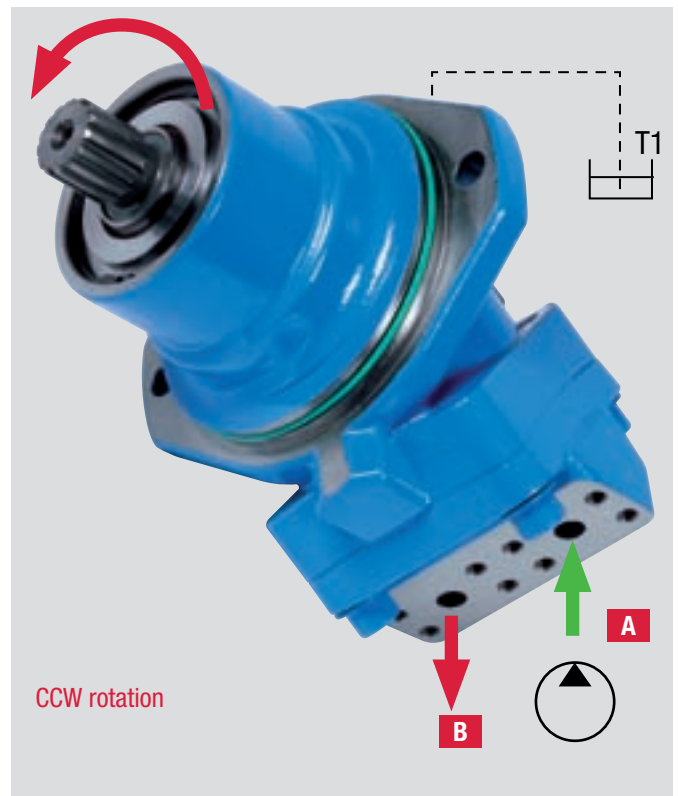
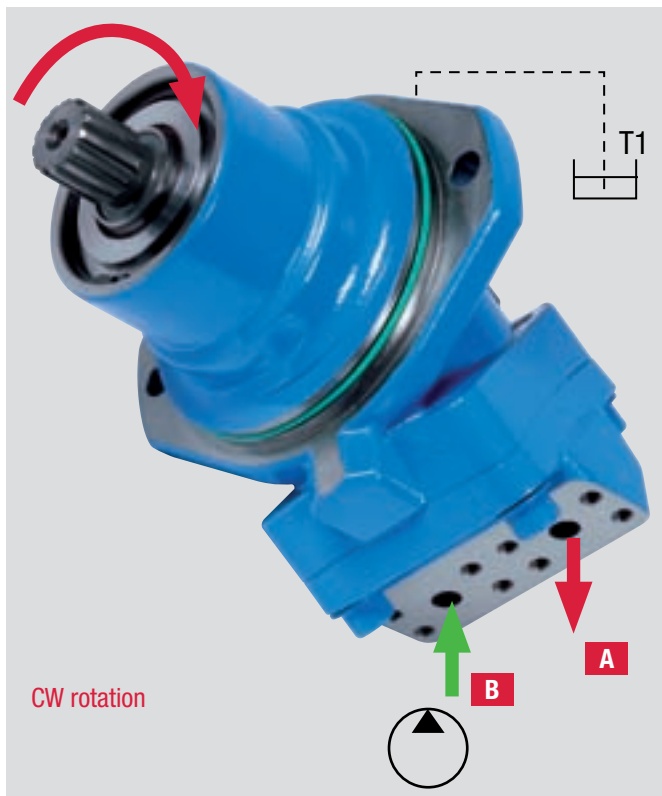
The service life of the motors depends greatly on the quality and the cleanliness of the hydraulic fluid.

We recommend minimum cleanliness as follows:

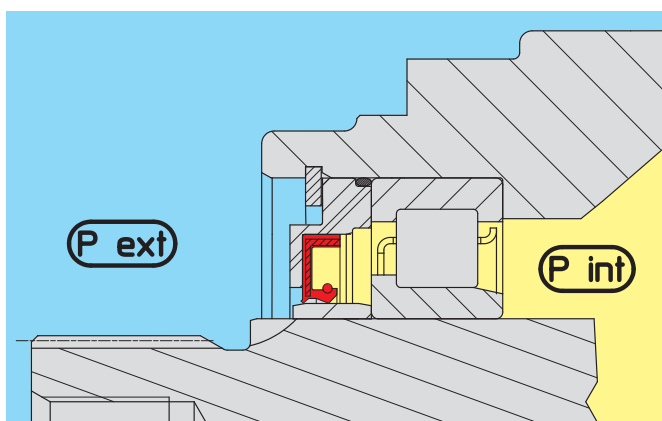
- NAS 1638 class 9
- SAE class 6
- ISO/DIS 4406 class 18/15

Direction of rotation

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



Drain pressure



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

HYDRO LEDUC motors are made to operate in all positions.

Important note : before start up, ensure the motor is filled with hydraulic fluid. (See section on installation and start-up, page 20).

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

How to determine the correct motor for your application

Calculations using usual mechanical units:

- N = rotating speed in rpm
- C = torque in N.m
- P = pressure supplied by the generator (hydraulic pump), in bar
- ΔP = pressure difference between A and B, in bar
- Disp. = displacement in cc
- Q = flow in litres per minute
- η = efficiency (%)

1. Torque supplied by the hydraulic motore

$$\text{Theoretical torque} = \frac{\text{Disp.} \times \Delta P}{20 \pi} = C_{th}$$

$$\text{Torque } C = C_{th} \times \eta_{\text{motor}}$$

For example: a 50cc motor with a ΔP of 250 bar will supply a theoretical torque of : 200 N.m.
Average global efficiency of the motor is 90%, actual torque is thus: 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.

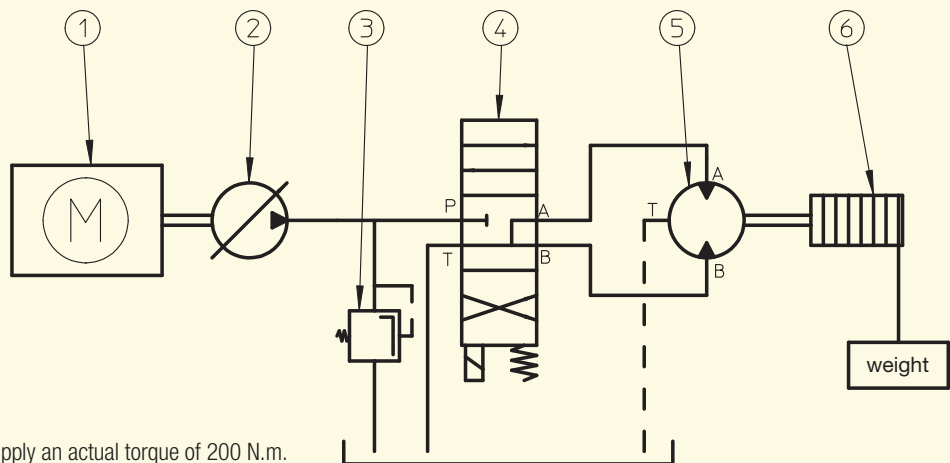
$$N = \frac{Q}{\text{Disp.}} \times 1000$$



test bench for motors

Example

- ① Motor
- ② Variable displacement pump
- ③ Pressure relief valve
- ④ Valve
- ⑤ Hydraulic motor
- ⑥ Winch and load



The receiving organ (winch) ⑥ needs to rotate at $N = 400$ rpm and supply an actual torque of 200 N.m.

The hydraulic pump ① is capable of operating at pressure P up to 350 bar.

1. Calculating the displacement of the hydraulic motor:

$$C_{th} = \frac{\text{Disp.} \times \Delta P}{20 \pi} \text{ thus Disp. } \mathbf{Cy = 35.9 \text{ cc}}$$

..... → In the YDRO LEDUC range, choose a motor with a displacement of **32 cc** or **41 cc**.

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

$$N = \frac{Q}{\text{Disp.}} \times 1000 \text{ thus } \mathbf{Q = 14.36 \text{ l/min}}$$

Corresponding flow :
- for **32 cc** motor, $Q = 12.8 \text{ l/min}$
- for **41 cc** motor, $Q = 16.4 \text{ l/min}$



■ Characteristics of the MSI series motors

MSI series motors are suitable for intensive long duty requirements. Designed for both mobile and industrial installations.

Typical applications are:

- vehicle transmissions;
- high power crushers;
- forestry equipment;
- heavy duty winches.
- high power planetary gearboxes...

These motors are built to suit all applications to ISO standard 3019/2.

Displacement (cc)	continuous max. speed ⁽¹⁾ (rpm)	Intermittent max. speed ⁽¹⁾ (rpm)	Max. flow absorbed (l/mn)	Torque bar (m.N/bar)	Torque at 350 bar (m.N)	Motor max./min. temperature* (°C)	Max. allowable pressure continuous / peak (bar)	weight (kg)
32	6300	6900	202	0.5	175	-25 / 110	400 / 450	11.5
41	5600	6200	230	0.65	227	-25 / 110	400 / 450	11.5
50.3	5000	5500	252	0.8	280	-25 / 110	400 / 450	19
63	5000	5500	315	1	350	-25 / 110	400 / 450	19
80.4	4500	5000	362	1.27	445	-25 / 110	400 / 450	26
90	4500	5000	405	1.42	499	-25 / 110	400 / 450	26
108.3	4000	4400	435	1.7	595	-25 / 110	400 / 450	26

* for wider extreme temperatures, please contact us.

(1) for higher speeds, please contact us.

For special fluids, please contact us.

■ Acceptable forces applied to motor shaft

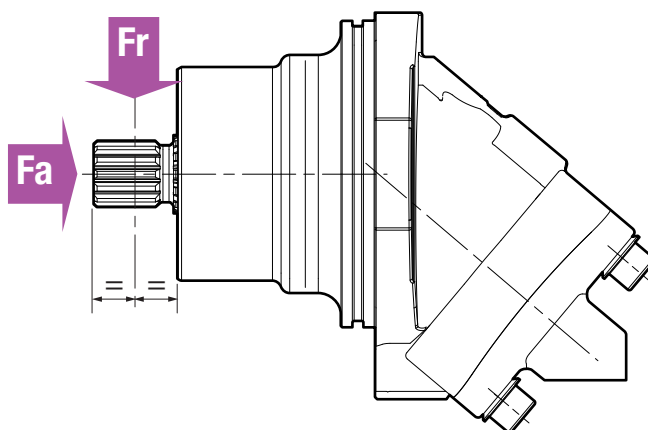
Fr : radial force measured at mid point of length of shaft.

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

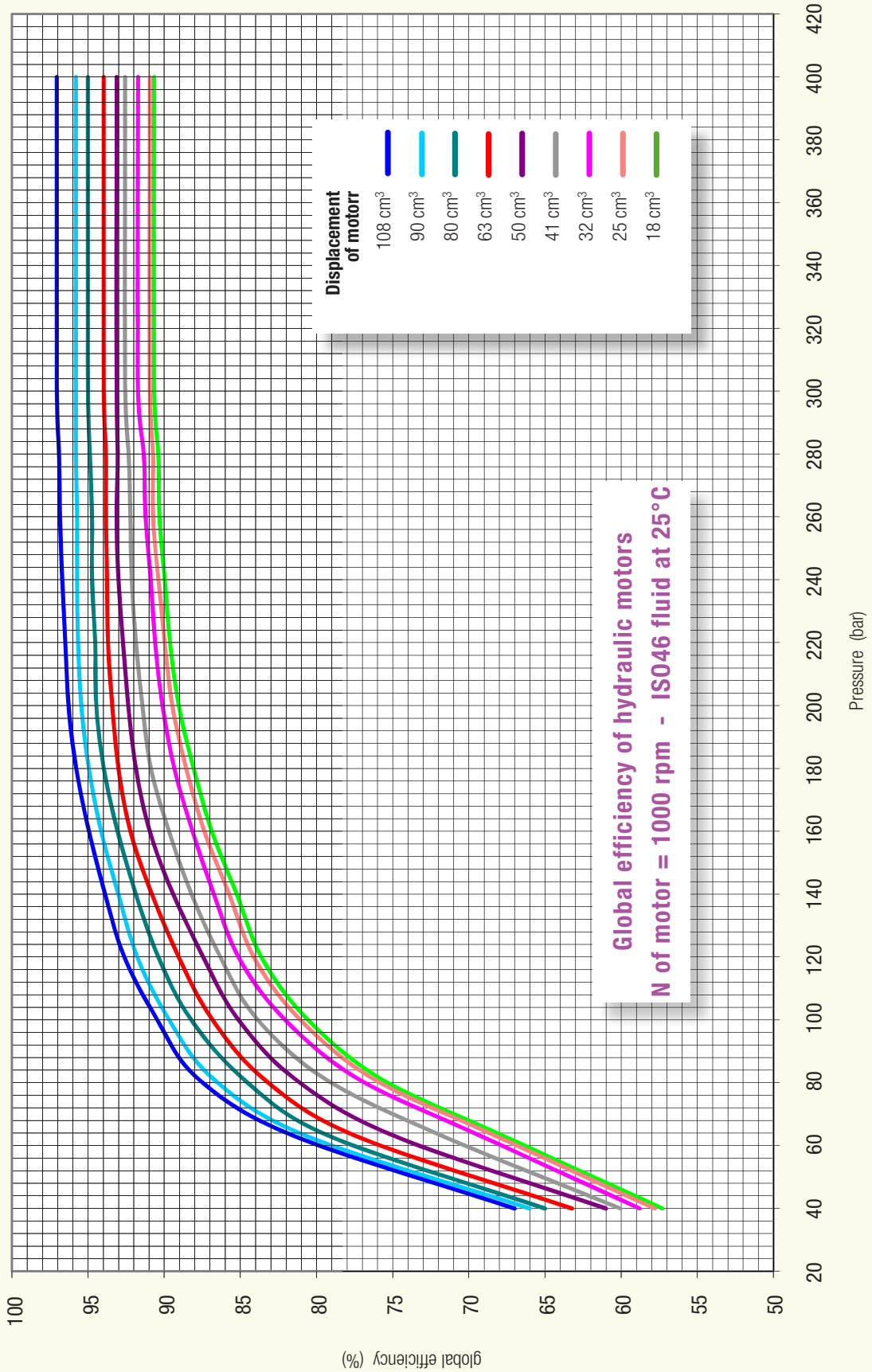
Displacement	cc	32	41	50.3	63	80.4	90	108.3
Fr	N	6500	7000	4000	5000	6500	6700	7000
Fa	N/bar*	30	40	40	50	60	67	80

* differential pressure between A and B.

For other forces, please contact us.



■ Efficiency of motors f(displacement)



Order code system MSI series motors

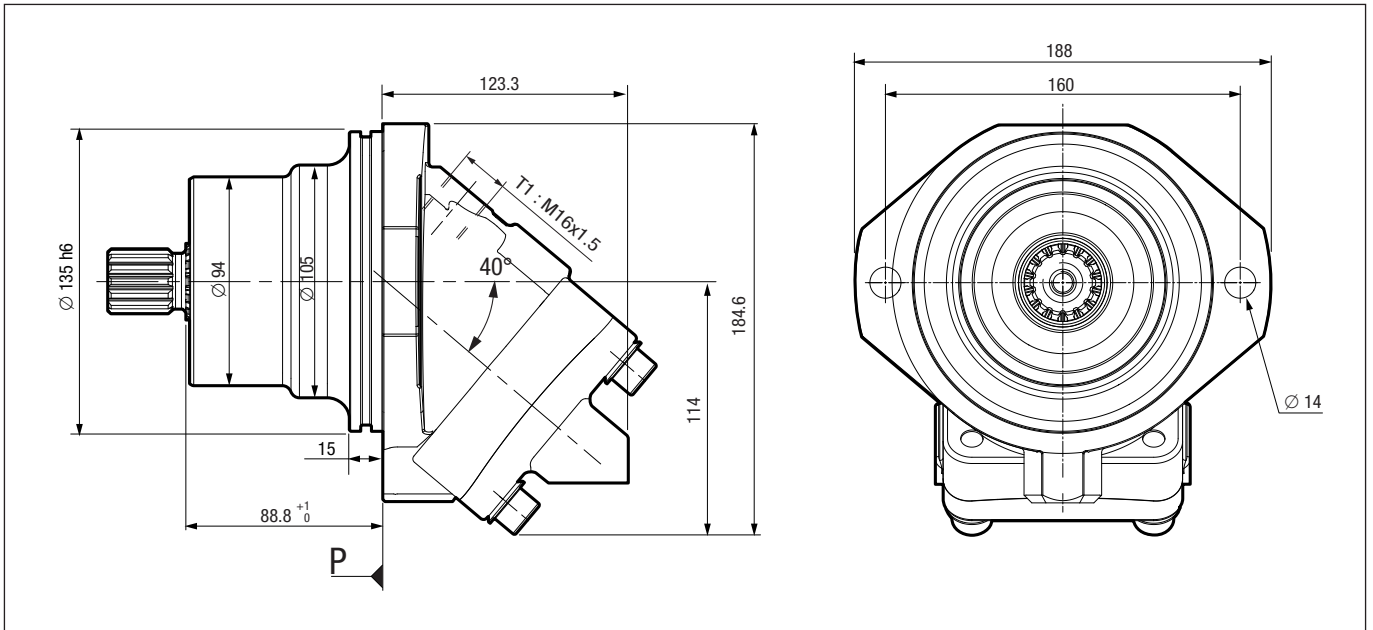
Order code system for MSI type motor

MSI	...	B	W1	L0	M1	.	.	SV
01	02	03	04	05	06	07	08	09

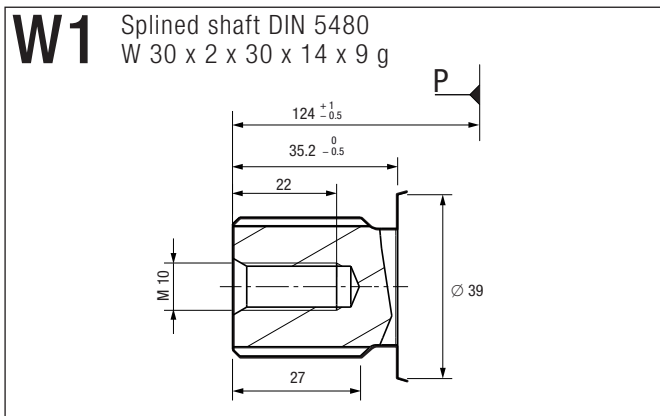
To obtain the code for your motor, complete the different parameters 02, 07 and 08 in the table on the left, according to the options you require (see table below).

01	Motor	semi-integrated motor								MSI
02	Displacement		32	41	50	63	80	90	108	
03	Mounting flange	ISO 3019-2 2 bolt								B
04	Shaft end	DIN 5480 splined	w30	w30	w30	w30	w40	w40	w40	W1
05	Inlet ports A and B	SAE flange ports, bottom								L0
06	Drain ports T1 and T2	-	1	1	1	1	1	1	1	M1
07	Suitable for use of speed sensor	yes								0
		no								1
08	Speed sensor	yes								1
		no								0
09	Valves	without								SV

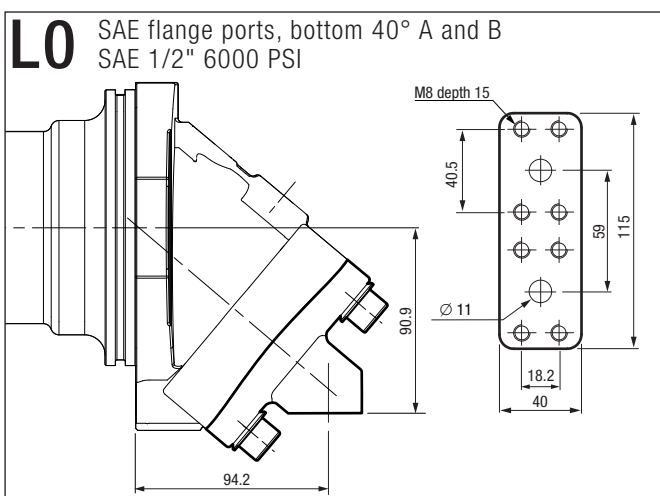
Dimensions



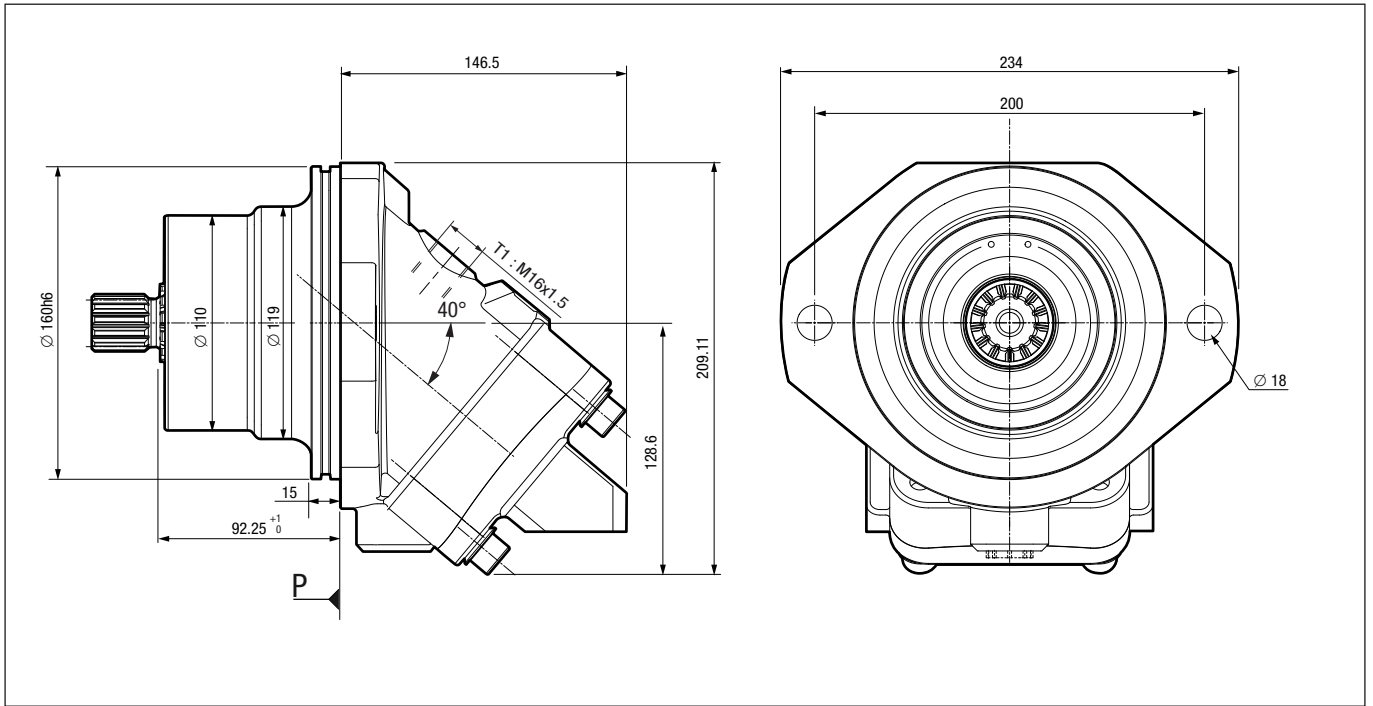
Shaft end



Inlet ports

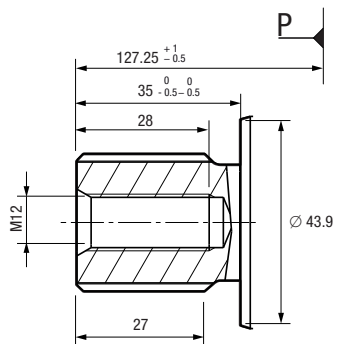


Dimensions



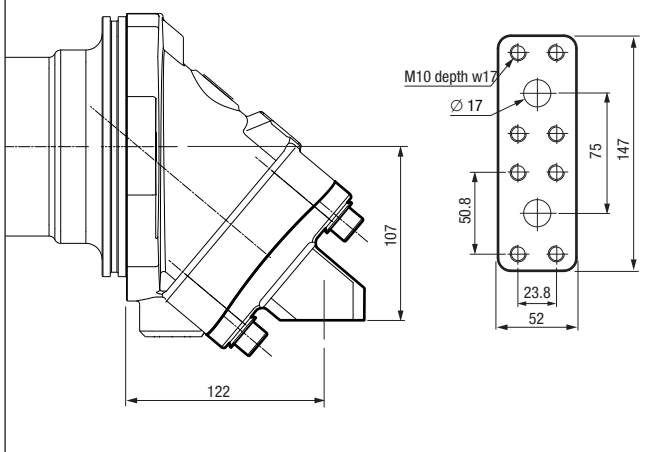
Shaft end

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

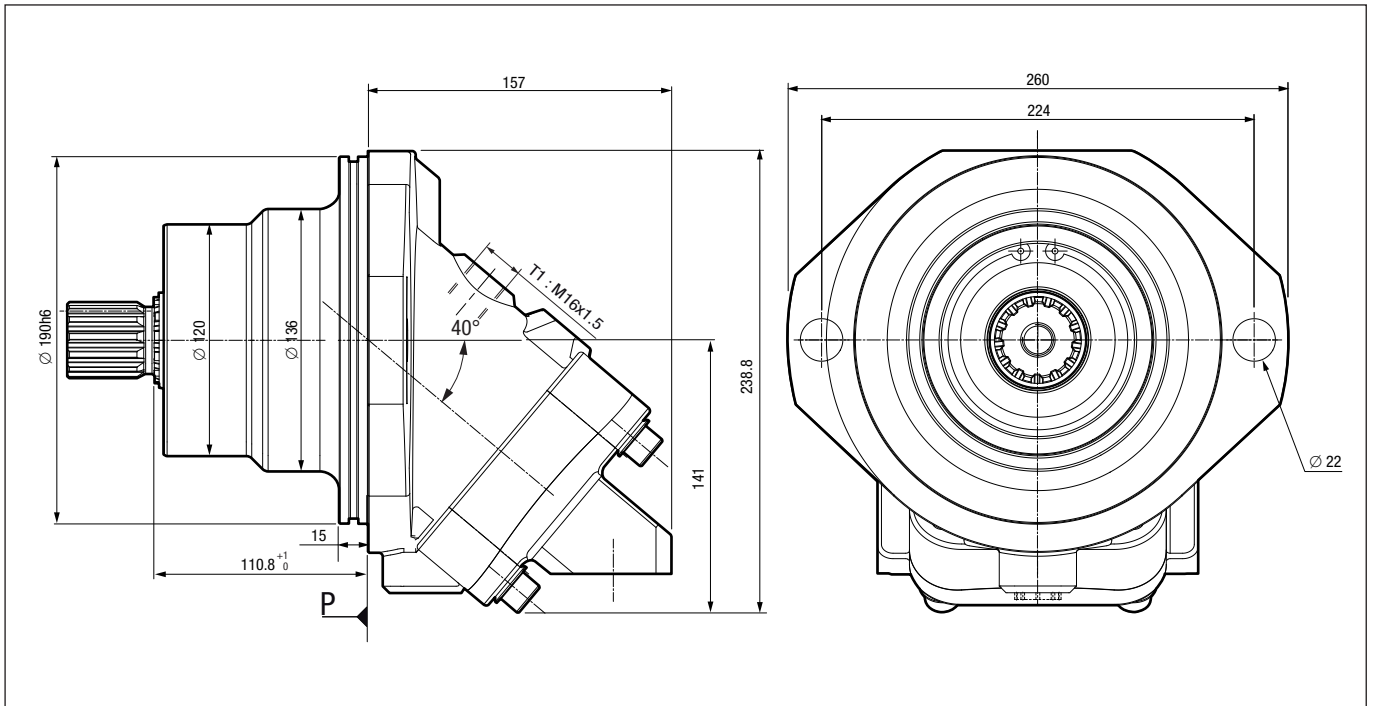


Inlet ports

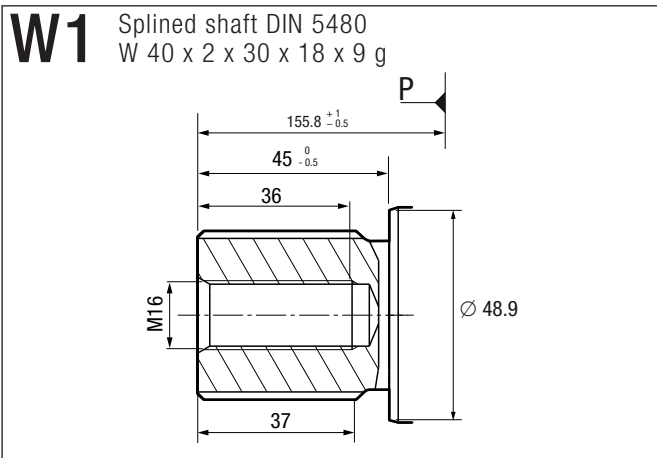
LO SAE flange ports, bottom 40° A and B
SAE 3/4" 6000 PSI



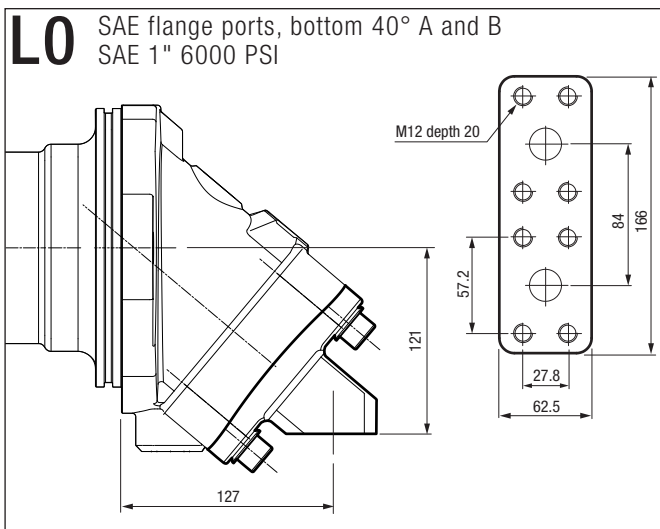
Dimensions



Shaft end



Inlet ports

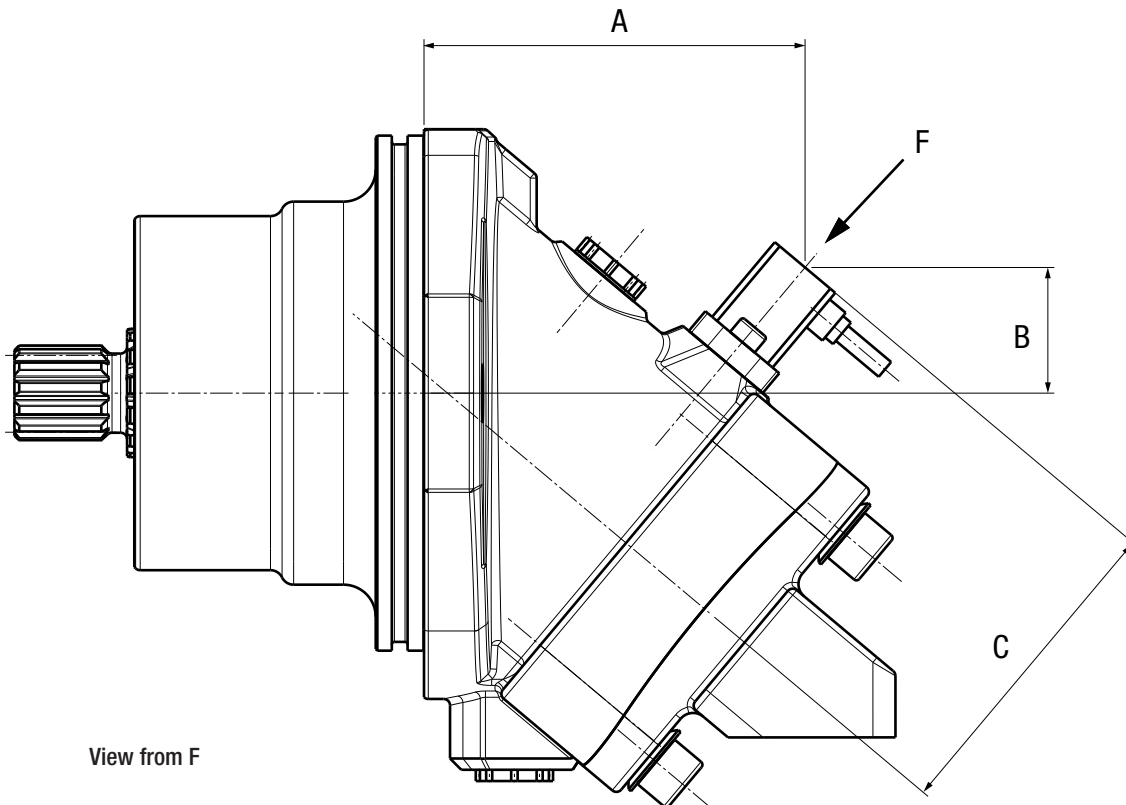


Speed sensor

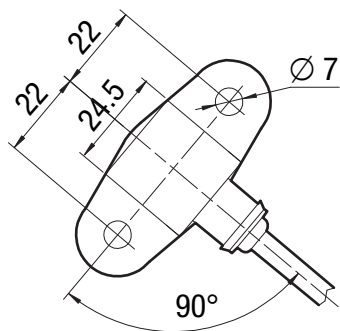
The M series motors can be fitted with an induction type speed sensor, to measure rotating speed and also direction of rotation.

This accessory may only be used on motors which are suitably adapted to take it (see order code system on page 6, parameter no. 7).

HYDRO LEDUC reference: 09244.



View from F



Motor displacement (cc)	A (mm)	B (mm)	C (mm)
32 - 41	95.9	33.15	93.8
50 - 63	118.4	39	101.3
80 - 90 - 108	126.2	42.9	106.3

Technical data for the sensor:

Rated voltage	12 and 24 V DC
Residual ondulation	max \pm 2 V DC
Supply current	8...32 V DC
Current consumption	maximum 33mA at 24 V DC
Output frequency	2 Hz...6kHz
Protection type	IP 67 and IP 69 k
Operating temperature	- 40°C...+ 125°C
Storage temperature	- 55°C...+ 125°C
Weight	around 95 g

Note: maximum tightening torque = 50 Nm
For further information, please contact us.

■ HYDRO LEDUC motors are certified ATEX.

As standard, all HYDRO LEDUC motors are classed in Group II category 2 **D T4**.

On request, motors may be supplied for:

- Group II category **2G**;
- Group II category **D T4**.

In these cases, the motors are not painted and are open to risk of corrosion.

Explanation of the different groups:

- **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.
- **T4** : maximum surface temperature of 135°C.

■ Precautions regarding ATEX

The operating temperatures of the motors must be guaranteed by the end user.

Check all parts connected to the motor for conformity with ATEX.

■ Markings on motors

Example of ATEX marking on motors:

CE  **II 2 D c T4 (135°C) HL 1**

If you have different requirements, please contact us.



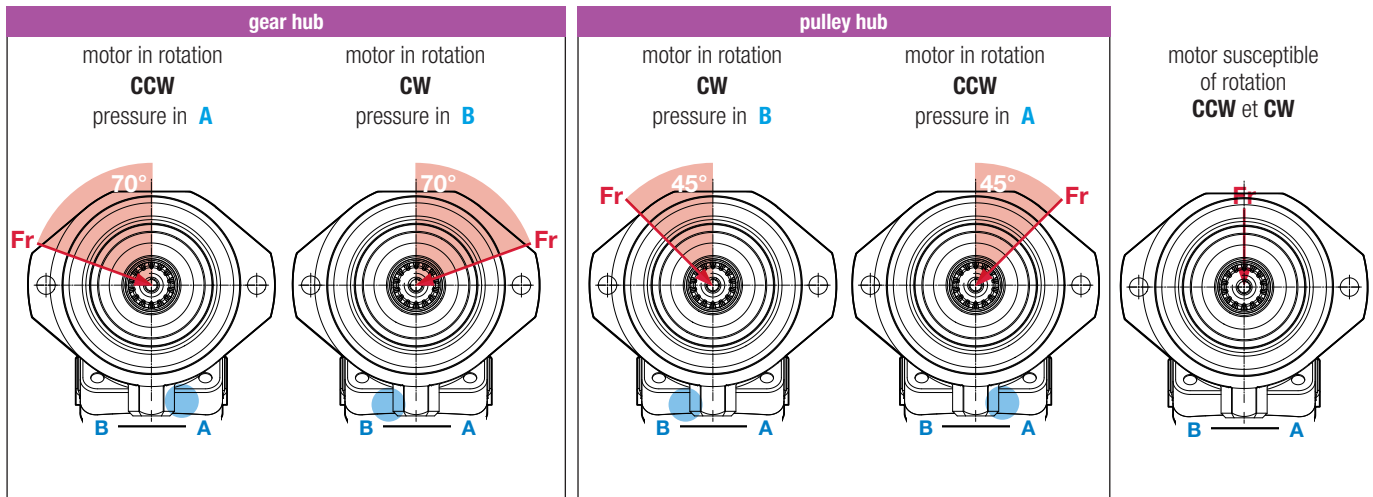
- 1
- 2
- 3
- 4

- 1 Dimensional control of M motor housing
- 2 Assembly of M motor
- 3 Spline cutting (shaft)
- 4 MSI motors

Maximizing service life of bearings

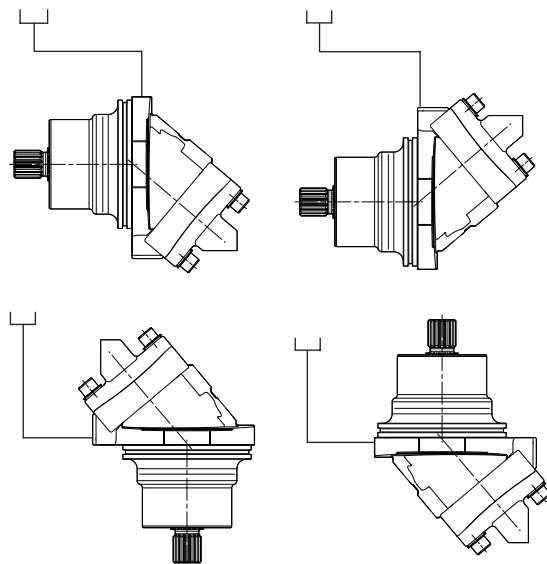
In cases where there is a radial force on motor shaft, keeping the direction of that force within the shaded areas shown below will improve service life of the motor.

For acceptable radial and axial forces, see page 4.

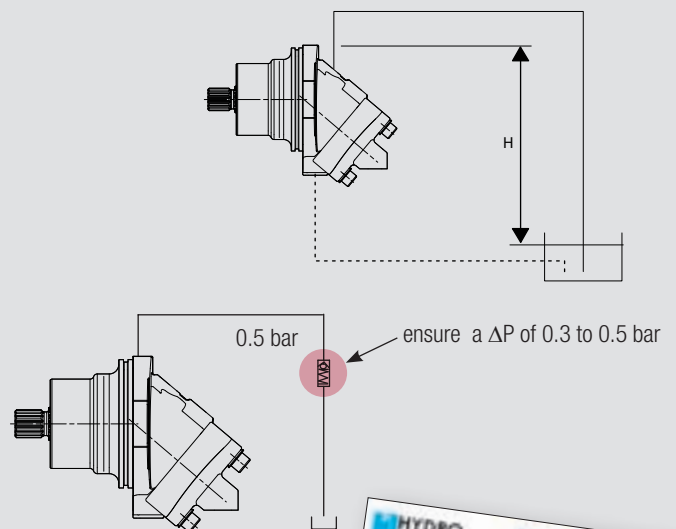


Mounting position of motors

HYDRO LEDUC motors can be used in any position.



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 following the figure below.



Operating conditions

See page 2.

Instructions for use

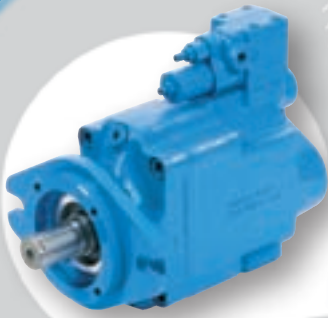
Each motor is supplied with an instruction leaflet, also available via e-mail on request mail@hydroleduc.com.



other product lines

piston pumps for trucks

HYDRO LEDUC offers 3 ranges of piston pumps perfectly suited to all truck, construction equipment, and PTO-mount applications.

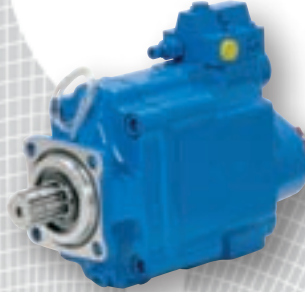


**DELTA
SAE**

Industrial applications

Variable displacement pumps with Load Sensing control, pressure compensation or other control device. Capable of operating at high pressure, in a small space envelope. SAE shafts and flanges.

TXV



**PA
PAC**

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.

To users of hydraulic components which have to be housed in extremely small spaces, HYDRO LEDUC offers complete, original and reliable solutions for even the most difficult environments.



hydro-pneumatical accumulators

Bladder, diaphragm and piston accumulators. Spherical and cylindrical accumulators. Volume capacities from 20 cl to 50 litres. Pressures up to 500 bar. Accessories for use with hydraulic accumulators.

**we are passionate
about hydraulics...**

**HYDRO
LEDUC**

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 optimises proposals based on the specifications submitted.

A passion for hydraulics

HYDRO LEDUC

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Complets catalogues available at:
www.hydroleduc.com



HYDRO LEDUC

SAS with capital of 4 065 000 euros

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