HYDRAULIC MOTORS

VARIABLE DISPLACEMENT

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VARIABLE DISPLACEMENT

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Also find the fixed displacement LEDUC motors range in the BENT AXIS HYDRAULIC MOTORS - FIXED DISPLACEMENT catalogue downloadable on www.hydroleduc.com

Complete catalogues available at www.hydroleduc.com
Definition & advantages

► Main applications

- Suitable for use in either open or closed loop circuits
- Wheel drives
- Track drives
- Winches

► Advantages of the LEDUC variable displacement motors

- 9 pistons designed for high starting torque and reduced pulsations at low speed
- Continuous variation in displacement from $V_{\text{max}}$ to $V_{\text{min}} (=0)$
- High operating ratio (5 :1)
- Compact size, high weight-power ratio
- High speed and high operating pressure
- Low noise level
- Long service life
- 3 choices of displacement control: see page 9 (HPA, H2N, E2N)

► Technical characteristics of LEDUC variable displacement motors

<table>
<thead>
<tr>
<th></th>
<th>85</th>
<th>115</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. displacement</td>
<td>$V_{\text{max}}$</td>
<td>28.1 → 85.2</td>
</tr>
<tr>
<td>Min. displacement</td>
<td>$V_{\text{min}}$</td>
<td>0 → 59.7</td>
</tr>
<tr>
<td>Displacement ratio 5</td>
<td>$\frac{V_{\text{max}}}{5}$</td>
<td>17 cc</td>
</tr>
<tr>
<td>Max. continuous operating pressure</td>
<td>$P_{\text{max}}$</td>
<td>400 bar</td>
</tr>
<tr>
<td>Max. peak pressure</td>
<td>$P_{p}$</td>
<td>450 bar</td>
</tr>
<tr>
<td>Max. speed at max. displacement</td>
<td>$N_{\text{max}}$ at $V_{\text{max}}$</td>
<td>3900 rpm</td>
</tr>
<tr>
<td>Max. speed at min. displacement</td>
<td>$N_{\text{max}}$ at $V_{\text{min}}$</td>
<td>6800 rpm</td>
</tr>
<tr>
<td>Max. flow absorbed</td>
<td>$Q_{\text{max}}$</td>
<td>331 l/min</td>
</tr>
<tr>
<td>Max. output power</td>
<td>$P_{\text{max}}$</td>
<td>220 kW</td>
</tr>
<tr>
<td>Max. output torque at $P_{\text{max}}$ and $V_{\text{max}}$</td>
<td>$C_{\text{max}}$</td>
<td>54 daN.m</td>
</tr>
</tbody>
</table>

Currently two models of motor are offered: 85 cc/rev and 115 cc/rev. Models to extend the range are currently being developed.

► Advantages of LEDUC variable motors

High quality know-how and materials. The design choices below ensure the reliability and long service life of LEDUC motors.
**Preparation of the motor**

Bleeding of control device is done automatically during initial commissioning.

**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.

**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 15).

**Operating temperatures**

- As standard, LEDUC motors are fitted with FKM seals (Viton®). Operating temperatures: from -13 to 239 °F (-25 à 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 15.*
Efficiency and operating conditions

► Direction of rotation

The 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, T1 and T2, to avoid excessive pressures on the shaft seal. Maximum acceptable internal pressure depends on motor 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

<table>
<thead>
<tr>
<th>Variable motors</th>
<th>MV</th>
<th>MVS1</th>
<th>MVA</th>
</tr>
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<tbody>
<tr>
<td>Fr</td>
<td>daN</td>
<td>1300</td>
<td>1500</td>
</tr>
<tr>
<td>Fa</td>
<td>N/bar</td>
<td>80</td>
<td>60</td>
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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).

<table>
<thead>
<tr>
<th></th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
<th>06</th>
<th>07</th>
<th>08</th>
<th>09</th>
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<th>11</th>
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<tbody>
<tr>
<td>Motor</td>
<td>MV</td>
<td>MVSI</td>
<td>MVA</td>
<td>MV</td>
<td>MVSI</td>
<td>MVA</td>
<td>MV</td>
<td>MVSI</td>
<td>MVA</td>
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<td>115</td>
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<td>115</td>
<td>85</td>
<td>115</td>
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<tr>
<td>Mounting flange</td>
<td>ISO 3019-2, 4 bolts</td>
<td>ISO 3019-2, 2 bolts</td>
<td>SAE C 4 bolts</td>
<td>SAE D 4 bolts</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td></td>
<td></td>
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<tr>
<td>Shaft</td>
<td>DIN 5480 splined</td>
<td>W40</td>
<td>W40</td>
<td>W40</td>
<td>–</td>
<td>–</td>
<td>W1</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SAE J744 splined</td>
<td>1½” 17T 12/24 DP</td>
<td>1½” 17T 12/24 DP</td>
<td>1½” 17T 12/24 DP</td>
<td>1½” 17T 8/16 DP</td>
<td>S1</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Inlet ports</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>M0</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Side</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>N0</td>
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<td></td>
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<td>2</td>
<td>M2</td>
<td>M2</td>
<td>U2</td>
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<td>Regulation</td>
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<td>●</td>
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<td>●</td>
<td>E2N</td>
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<tr>
<td>Suitable for use of speed sensor</td>
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<tr>
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<td>●</td>
<td>SV</td>
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<td>(-)</td>
<td>(-)</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>F</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- ● Existing model
- – Not yet existing
- (-) Possible on request.

Requires a N1 flange.
---

**Shaft - code 04**

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

- **S1** Splined shaft SAE J744
  - 17T 12/24DP 1½"

**Inlet ports - code 05**

- **M0** Rear flanges
  - SAE 1" 6000 psi

- **N0** Side flanges
  - SAE 1" 6000 psi

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

Inlet ports - code 05

M0 Rear flanges
SAE 1" 6000 psi

N0 Side flanges
SAE 1" 6000 psi

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

**Inlet ports - code 05**

M0  Rear flanges  SAE 1" 6000 psi

N0  Side flanges  SAE 1" 6000 psi

Dimensions (in mm) are given only as an indication.
**Shaft - code 04**

**S1**
Splined shaft SAE J744
17T 12/24DP 1½" 

**Inlet ports - code 05**

**M0**
Rear flanges
SAE 1" 6000 psi

**N0**
Side flanges
SAE 1" 6000 psi

Dimensions in inches (mm) are given only as an indication.
MVA 115 (SAE version)

► Shaft - code 04

S1
Splined shaft SAE J744
13T 8/16DP 1/4"  

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

► Inlet ports - code 05

M0
Rear flanges
SAE 1" 6000 psi

N0
Side flanges
SAE 1" 6000 psi

Dimensions in inches (mm) are given only as an indication.
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 Vmin to Vmax. Pressure remains stable, torque increases and speed decreases until Vmax is reached.

Once Vmax has been reached, motor pressure can exceed set pressure if required.

Setting Vmin or Vmax 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 Vmin to Vmax (standard configuration). From Vmax to Vmin on request.

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

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

Standard voltage of the coil is 24V (12V on request).

When the coil is activated, the motor starts changing displacement from Vmin to Vmax (standard configuration). From Vmax to Vmin on request.
Options | Accessories

SPEED SENSOR & INDICATOR OF DIRECTION OF ROTATION
LEDUC CODE: 093327

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).

►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**: –104°F…+ 257°F (–40°C…+ 125°C)
- **Weight**: around 65 g
- **Cable length**: 50 cm

FLUSHING VALVE | LEDUC CODE: VBS 091180

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.

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

►Schematic drawing of the flushing valve

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

<table>
<thead>
<tr>
<th>Gear hub</th>
<th>Pulley hub</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor in rotation CCW pressure in A</td>
<td>Motor in rotation CW pressure in B</td>
</tr>
<tr>
<td>Motor in rotation CW pressure in B</td>
<td>Motor in rotation CCW pressure in A</td>
</tr>
<tr>
<td>Motor capable of rotation CCW and CW</td>
<td></td>
</tr>
</tbody>
</table>

**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.