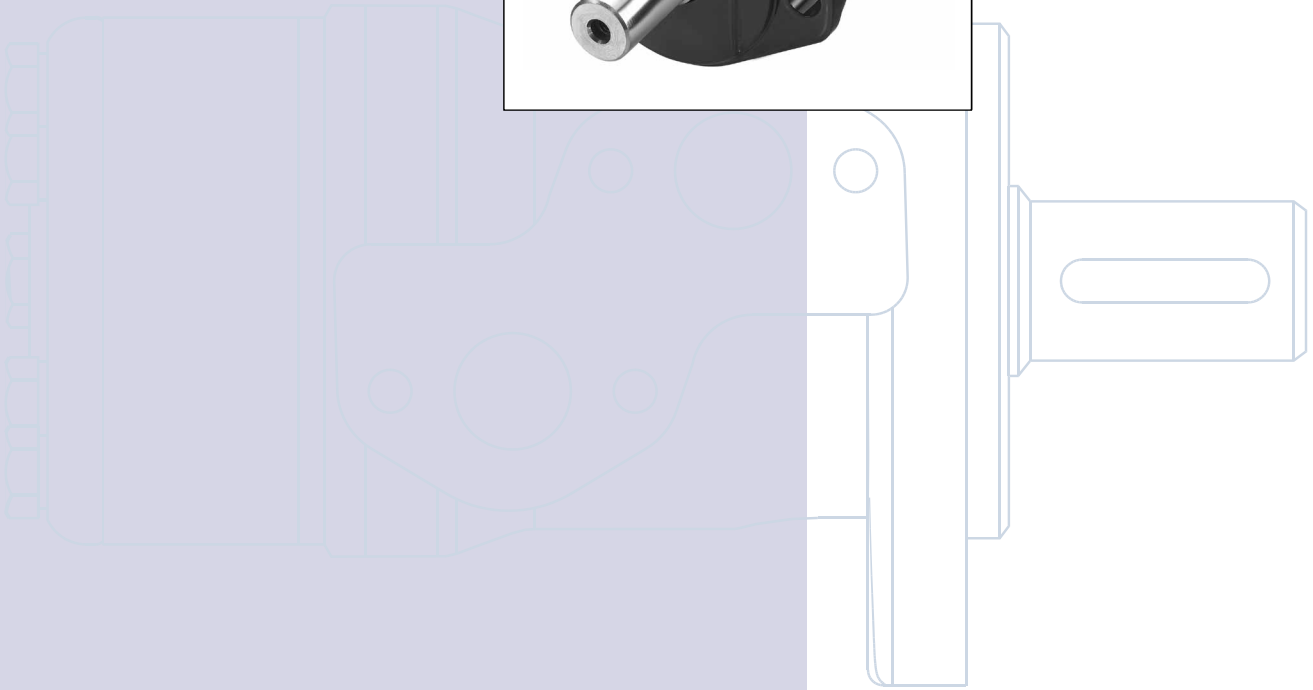
SAUER DANFOSS

Orbital Motors
Type VMP

Technical Information



VMP Orbital Motor
Technical Information
A Wide Range of Orbital Motors

Revision View

Date	Page	Changed	Revision
May 2013	All	First edition	AA

F301 245

A Wide Range of Orbital Motors

Sauer-Danfoss is a world leader within production of low speed orbital motors with high torque. We can offer more than 3000 different orbital motors, categorised in types, variants and sizes (incl. different shaft versions).

The motors vary in size (rated displacement) from 8 cm^3 (0.50 in^3] to 800 cm^3 (48.9 in^3] per revolution.

Speeds range up to approx. 2500 min^{-1} (rpm) for the smallest type and up to approx 600 min^{-1} (rpm) for the largest type.

Maximum operating torques vary from 13 Nm (115 lbf·in] to 2700 Nm (24.000 lbf·in] (peak) and maximum outputs are from 2.0 kW (2.7 hp] to 70 kW (95 hp].

Characteristic features:
- Smooth running over the entire speed range
- Constant operating torque over a wide speed range
- High starting torque
- High return pressure without the use of drain line (High pressure shaft seal)
- High efficiency
- Long life under extreme operating conditions
- Robust and compact design
- High radial and axial bearing capacity
- For applications in both open and closed loop hydraulic systems
- Suitable for a wide variety of hydraulics fluids

Front cover illustrations: F500 216, Drawing:

A Wide Range of Orbital Motors (continued)

The programme is characterised by technical features appealing to a large number of applications and a part of the programme is characterised by motors that can be adapted to a given application. Adaptions comprise the following variants among others:

- Motors with corrosion resistant parts
- Wheel motors with recessed mounting flange
- OMP, OMR- motors with needle bearing
- OMR motor in low leakage version
- OMR motors in a super low leakage version
- Short motors without bearings
- Ultra short motors
- Motors with integrated negative holding brake
- Motors with integrated flushing valve
- Motors with speed sensor
- All motors are available with black finish paint

The Sauer–Danfoss LSHT motors are used in the following application areas:

- Construction equipment
- Agricultural equipment
- Material handling & Lifting equipment
- Forestry equipment
- Lawn and turf equipment
- Special purpose
- Machine tools and stationary equipment
- Marine equipment

Survey of Literature with Technical Data on Sauer-Danfoss Orbital Motors

Detailed data on all Sauer-Danfoss orbital motors can be found in our motor catalogue, which is divided into more individual subcatalogues:

- General information on Sauer-Danfoss orbital motors: function, use, selection of orbital motor, hydraulic systems, etc.
- Technical data on small motors: OML and OMM
- Technical data on medium sized motors: OMP, OMR, OMH and OMEW
- Technical data on medium sized motors: DH and DS
- Technical data on medium sized motors: VMP and VMR
- Technical data on large motors: OMS, OMT and OMV
- Technical data on large motors: TMT

A general survey brochure on Sauer-Danfoss orbital motors gives a quick motor reference based on power, torque, speed and capabilities.

VMP Orbital Motor
Technical Information
Contents and Data Survey

Contents

Introduction

By introducing the VMP, Sauer- Danfoss is introducing the first Orbital Motor of a new Series. In order to meet the demands for motors that have the right duty cycle and efficiency capabilities for a given function, Sauer-Danfoss now has 3 Orbital Motor Series:

T-Series – The Highest Torque

Leading performance with a long lifetime makes light work of the heaviest duties. Offering pressure capability up to 350 bar [5076 psi]and high starting torque, the T-Series is the energy-efficient choice for the toughest working environments.

O-Series – The Flexible Choice

The O-Series is flexible beyond compare. Delivering premium power across the board, these motors cover small to large, medium to heavy-duty needs with pressure capability up to 275 bar [3990 psi]. Robust, reliable and designed to fulfill the latest emissions standards.

V-Series – The Core Solution

The V-Series is your quality benchmark in the medium duty market. Based on proven technology, these reliable motors will reduce your overall system costs while adding value to your machine. Perfect for many tasks.

VMP-Features

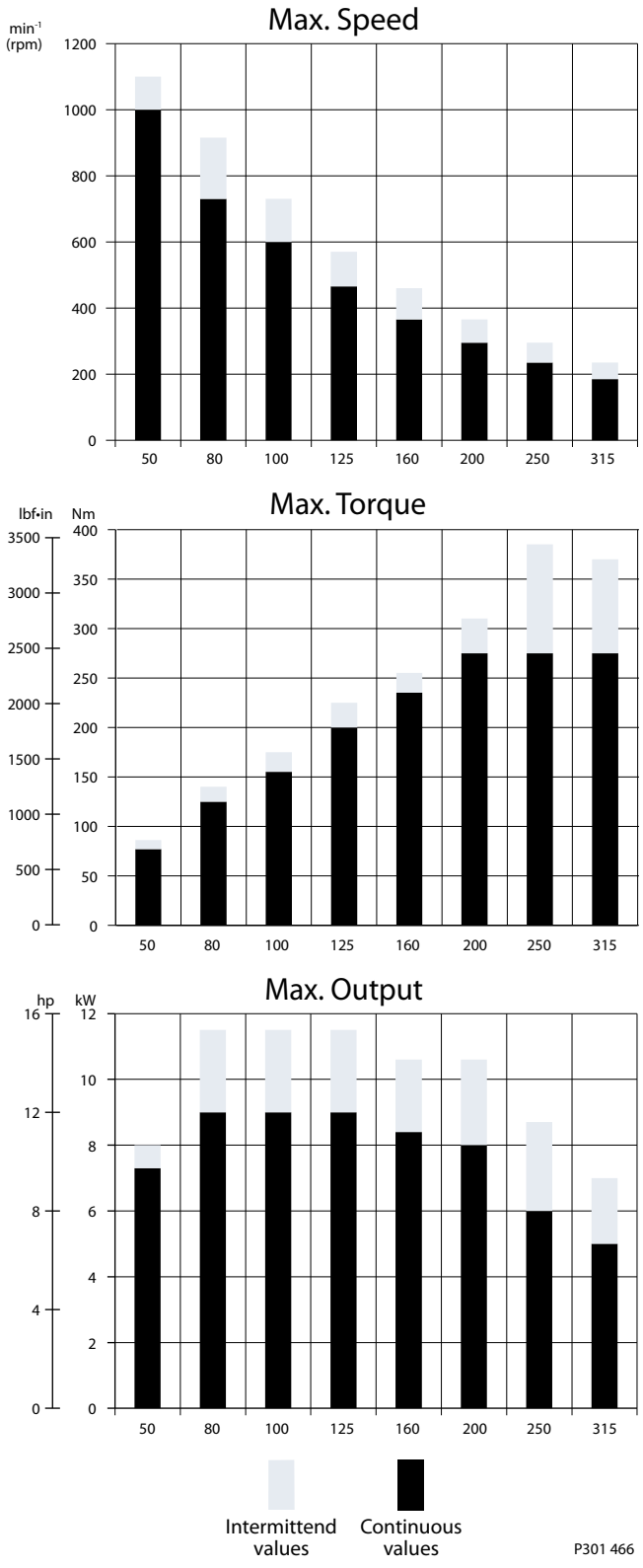
- High pressure shaft seal
- Proven orbital motor design
- 3-chamber motor design
- Suitable for medium and low duty

Speed, Torque and Output

The bar diagrams, see page 5, are useful for a quick selection of relevant motor size for the application. The final motor size can be determined by using the function diagram on page 12-15.

The function diagrams are based on actual tests on a representative number of motors from our production. The diagrams apply to a return pressure between 5 and 10 bar [75 and 150 psi] when using mineral based hydraulic oil with a viscosity of 35 mm^2/s [165 SUS] and a temperature of 50°C [120°F]. For further explanation concerning how to read and use the function diagrams, please consult the paragraph "Selection of motor size" in the technical information "General" 520L0232.

Speed, Torque and Output



Versions

Mounting flange	Spigot diameter	Bolt circle diameter (BC)	Shaft	Drain connection	Port size	Metric version	1" version	Painted Black
2 hole oval flange (A2 - flange)	Ø 82.5 mm [3.25 in]	Ø 106.4 [4.20 in]	Cyl. 25 mm	Yes	G1/2	x		
				Yes	G1/2	x		x
			Cyl. 1 in	Yes	7/8-14 UNF		x	
				Yes	7/8-14 UNF		x	x

Code Numbers

DISPLACEMENT (cm^3)									
50	80	100	125	160	200	250	315	Technical data – Page	Dimensions – Page
11118244	11118245	11118246	11118247	11118248	11118249	11118250	11118251	8-11	17-19
11118253	11118254	11118255	11118256	11115010	11118257	11118258	11118259	8-11	17-19
11129680	11129681	11129683	11129692	11129693	11129716	11129717	11129718	8-11	17-19
11129860	11129861	11129872	11129873	11129874	11129875	1112976	11129877	8-11	17-19

Technical data for VMP with 25 mm and 1 in cylindrical shaft

Type			VMP	VMP	VMP	VMP	VMP	VMP	VMP	VMP
Motor size			**50**	**80**	**100**	**125**	**160**	**200**	**250**	**315**
Geometric displacement	cm^3 [in^3]		48.6 [2.97]	77.8 [4.76]	97.3 [5.95]	125.0 [7.65]	155.7 [9.53]	194.6 [11.91]	242.3 [14.83]	306.1 [18.73]
Max. speed	min^{-1} [rpm]	cont.	1000	730	600	465	365	295	235	185
		int[1)]	1100	915	730	570	460	365	295	235
Max. torque	N•m [lbf•in]	cont.	77 [680]	125 [1105]	155 [1330]	200 [1770]	235 [2090]	275 [2435]	275 [2435]	275 [2435]
		int.[1)]	86 [760]	140 [1240]	175 [1550]	225 [1990]	255 [2255]	310 [2745]	385 [3410]	370 [3275]
Max. output	kW [hp]	cont.	7.3 [9.8]	9 [12.1]	9 [12.1]	9 [12.1]	8.4 [11.3]	8 [10.7]	6 [8.0]	5 [6.7]
		int.[1)]	8.0 [10.7]	11.5 [15.4]	11.5 [15.4]	11.5 [15.4]	10.6 [14.2]	10.6 [14.2]	8.7 [11.7]	7 [9.4]
Max. pressure drop	bar [psi]	cont.	125 [1815]	125 [1815]	125 [1815]	125 [1815]	120 [1740]	115 [1670]	90 [1305]	75 [1090]
		int[1)]	140 [2030]	140 [2030]	140 [2030]	140 [2030]	130 [1885]	130 [1885]	125 [1815]	100 [1450]
Max. oil flow	l/min [US gal/min]	cont.	50 [13.2]	60 [15.9]	60 [15.9]	60 [15.9]	60 [15.9]	60 [15.9]	60 [15.9]	60 [15.9]
		int.[1)]	55 [14.5]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]
Max. starting pressure with unloaded shaft	bar [psi]		10 [145]	10 [145]	10 [145]	10 [145]	10 [145]	7 [100]	7 [100]	7 [100]
Min starting torque	at max. press drop cont. N•m [lbf•in]		68 [600]	110 [975]	135 [1195]	175 [1550]	210 [1860]	250 [2215]	245 [2170]	255 [2255]
	at max. press.drop int.[1)] N•m [lbf•in]		76 [675]	120 [1060]	150 [1330]	195 [1725]	225 [1990]	280 [2480]	340 [3010]	340 [3010]

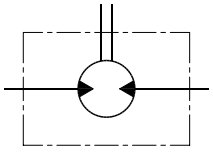
Type			Max. inlet pressure	Max.return pressure with drain line
VMP 50 - 315	bar [psi]	cont	140 [2030]	140 [2030]
	bar [psi]	int.[1)]	160 [2320]	160 [2320]

[1)] Intermittent operation: the permissible values may occur for max. 10% of every minute.

VMP with High Pressure Shaft Seal (HPS)

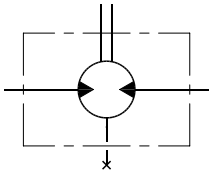
VMP with HPS and without drain connection:
The shaft seal pressure equals the average of input pressure and return pressure.

$$P_{seal} = \frac{P_{in} + P_{return}}{2}$$



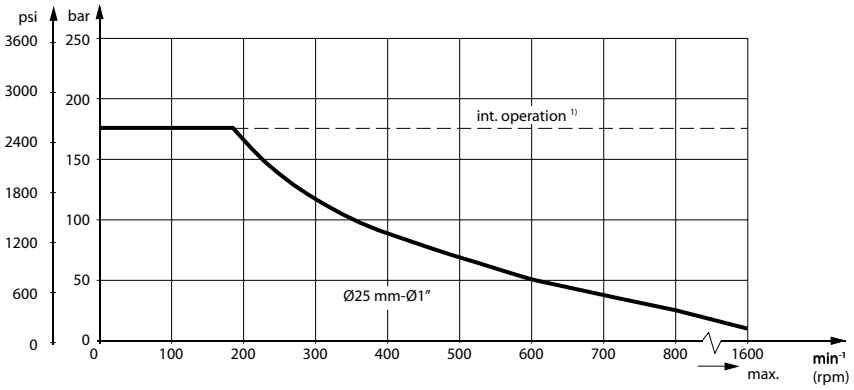
151-1743.10

VMP with HPS and drain connection:
The shaft seal pressure equals the pressure in the drain line.



151-1855.10

Max. permissible shaft seal pressure



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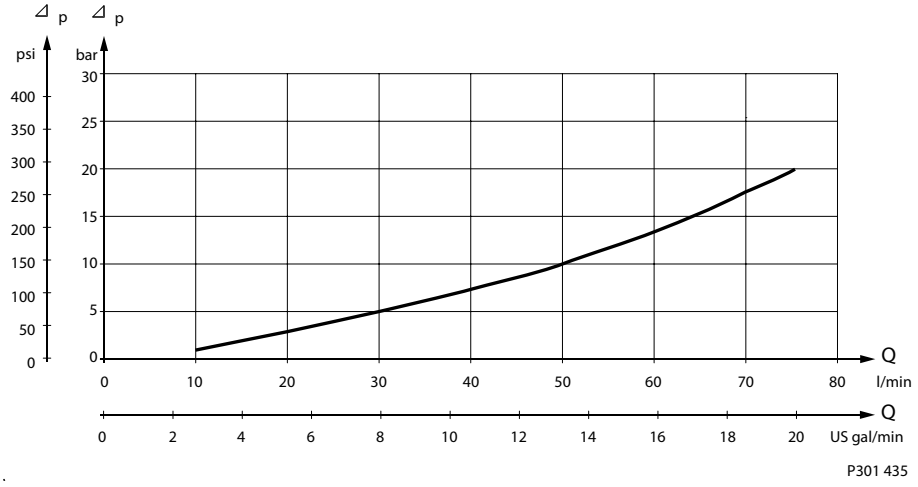
Please check motor pressure according to data on page 8.

Pressure Drop in Motor



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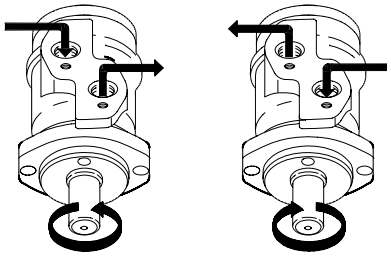
The curve applies to an unloaded motor shaft and an oil viscosity of 35 mm²/s [165 SUS]

Oil Flow in Drain Line

The table shows the max. oil flow in the drain line at a return pressure less than 5-10 bar [75-150 psi].

Under preparation

Direction of Shaft Rotation



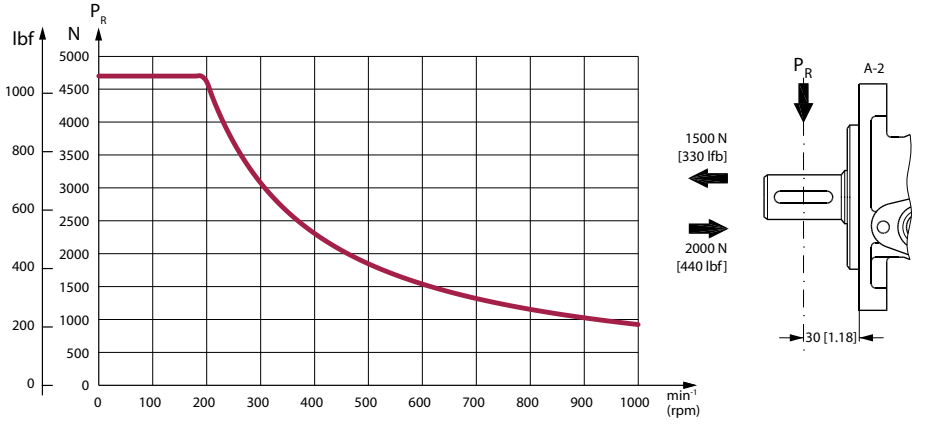
Technical Data

The permissible radial shaft load (P_R) depends on

- n = Speed (min^{-1})
- L = Distance from the point of load to the mounting flange (mm, in)

Permissible shaft load (P_R) - l in mm	$\frac{800}{n} \cdot \frac{150000\ N^*}{100 + L}$
Permissible shaft load (P_R) - l in inch	$\frac{800}{n} \cdot \frac{1330\ lbf^*}{3.94 + L}$

* $n \geq 200\ min^{-1}$ [rpm]; ≤ 55 mm [2.2 in]
$n < 200\ min^{-1}$ [rpm]; = > P_{Rmax} = 4615 N [1037 lbf]



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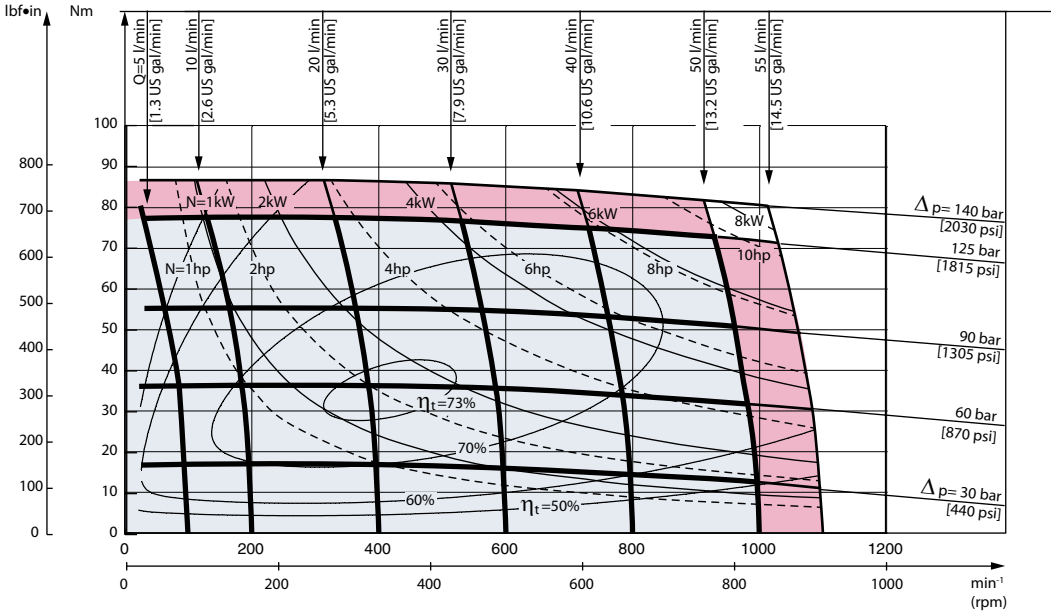
Function Diagrams

VMP 50



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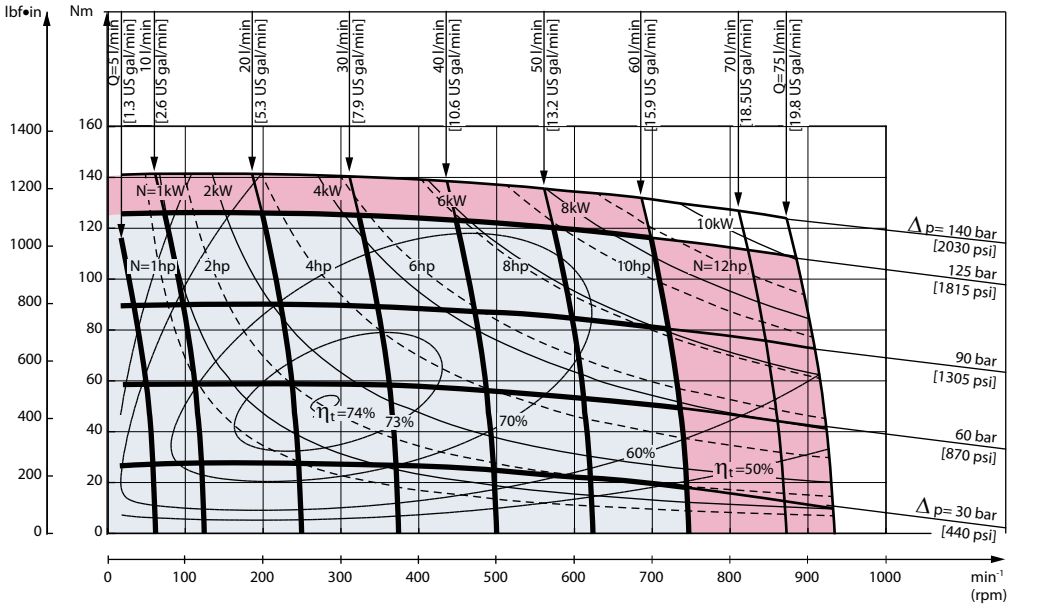
VMP 80



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Explanation of function diagram use, basis and conditions can be found on page 4.

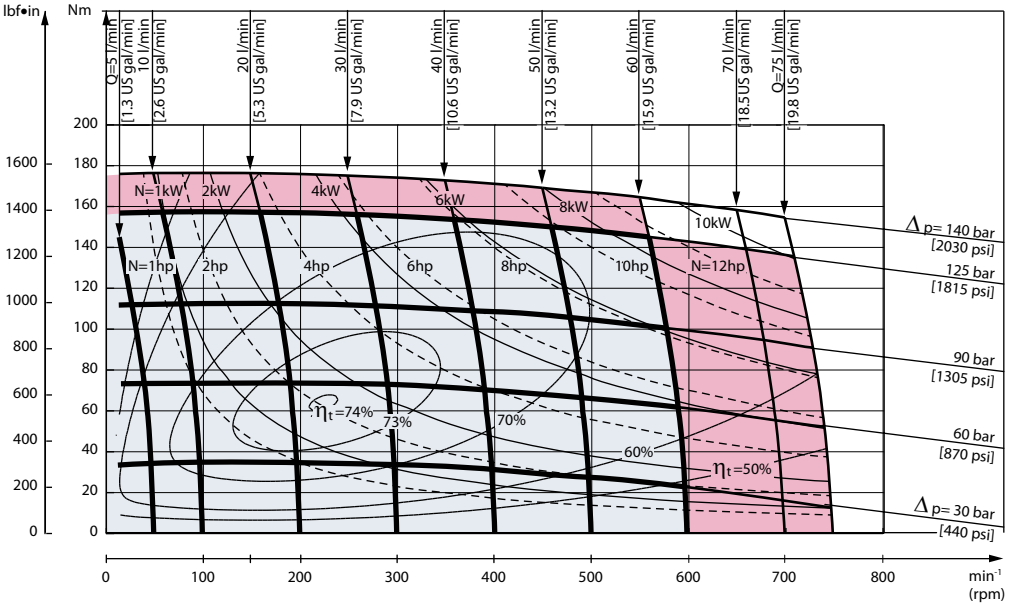
Continuous range

Intermittent range (max. 10% operation every minute)

Intermittent pressure drop and oil flow must not occur simultaneously.

Function Diagrams

VMP 100



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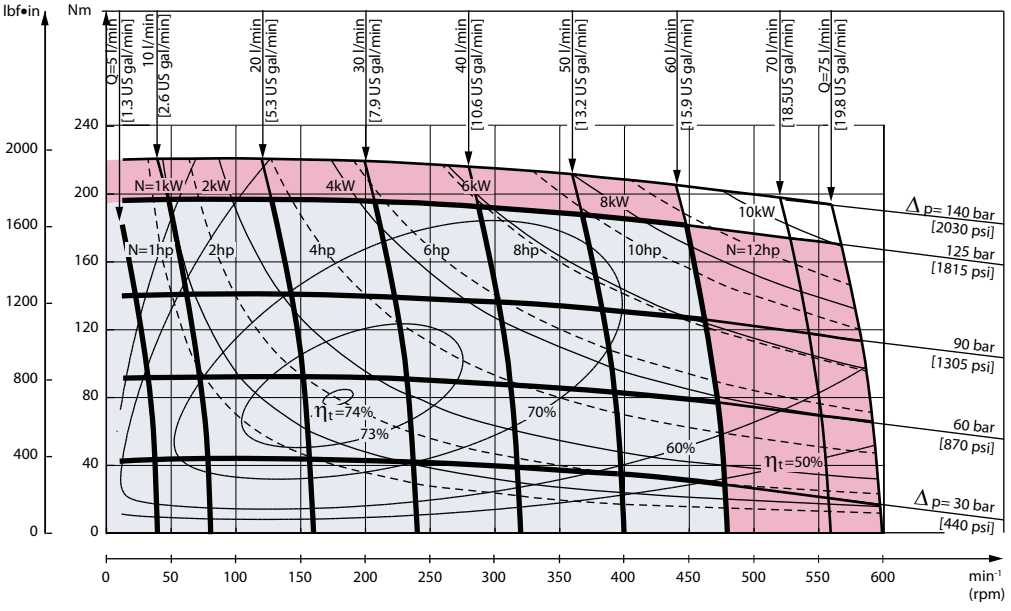
VMP 125



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Explanation of function diagram use, basis and conditions can be found on page 4.

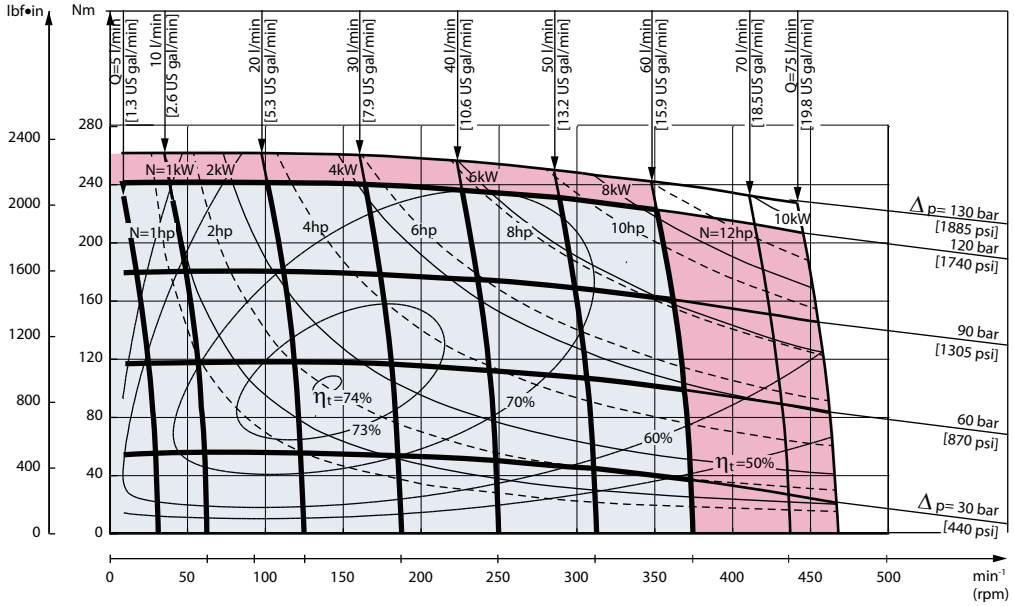
Continuous range

Intermittent range (max. 10% operation every minute)

Intermittent pressure drop and oil flow must not occur simultaneously.

Function Diagrams

VMP 160



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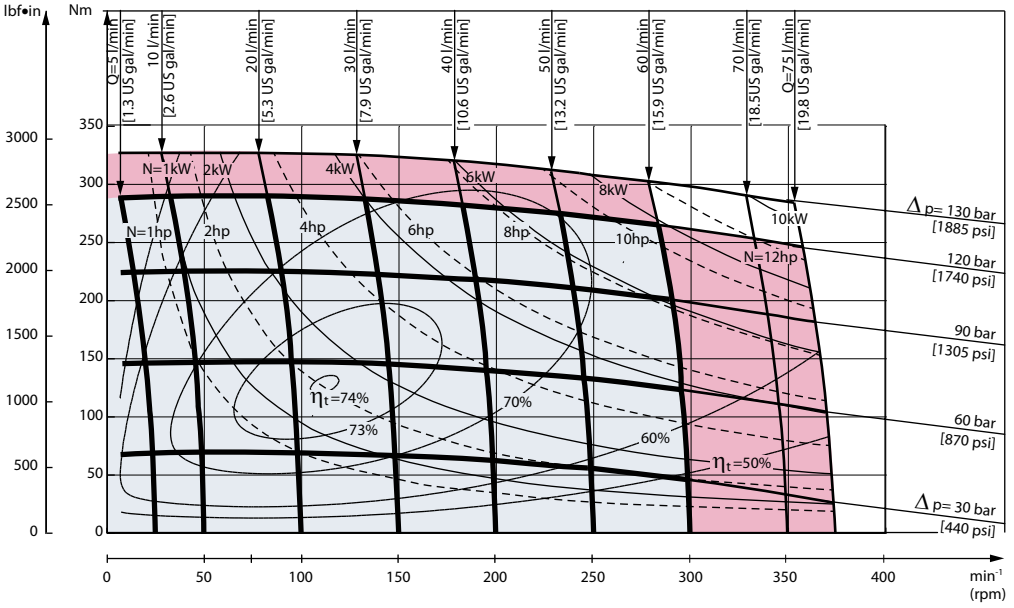
VMP 200



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Explanation of function diagram use, basis and conditions can be found on page 4.

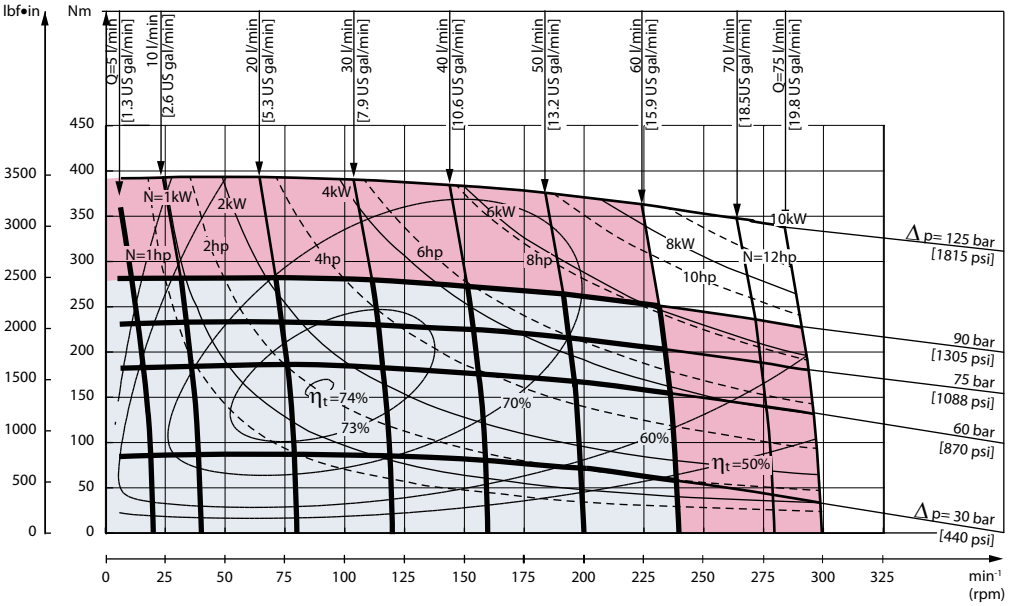
Continuous range

Intermittent range (max. 10% operation every minute)

Intermittent pressure drop and oil flow must not occur simultaneously.

Function Diagrams

VMP 250



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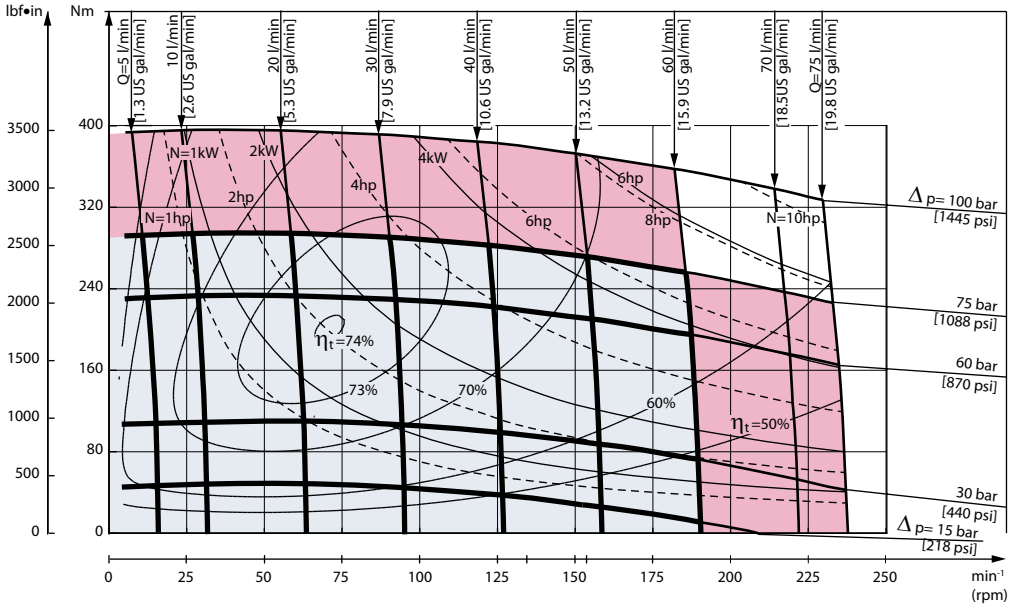
VMP 315



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Explanation of function diagram use, basis and conditions can be found on page 4.

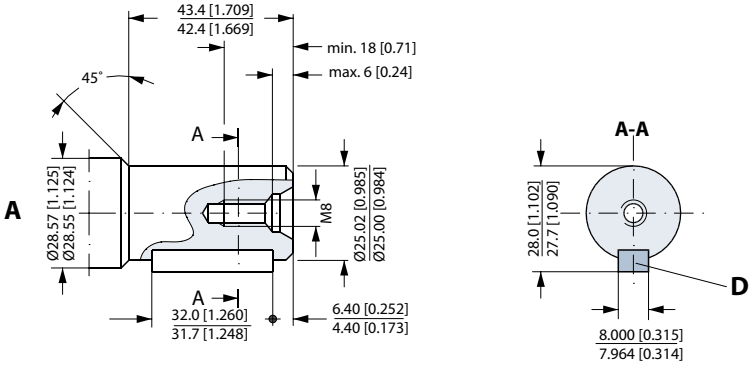
Continuous range

Intermittent range (max. 10% operation every minute)

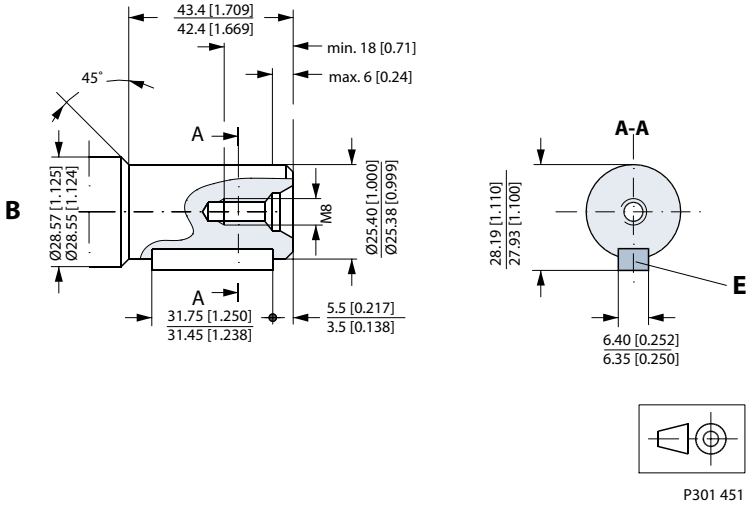
Intermittent pressure drop and oil flow must not occur simultaneously.

Shaft Version

A: Cylindrical shaft
25 mm
D: Parallel key
A 8 x 7 x 32
DIN 6885



B: Cylindrical shaft
1 in
E: Parallel key
1/4 x 1/4 x 11/4 in
B.S. 46



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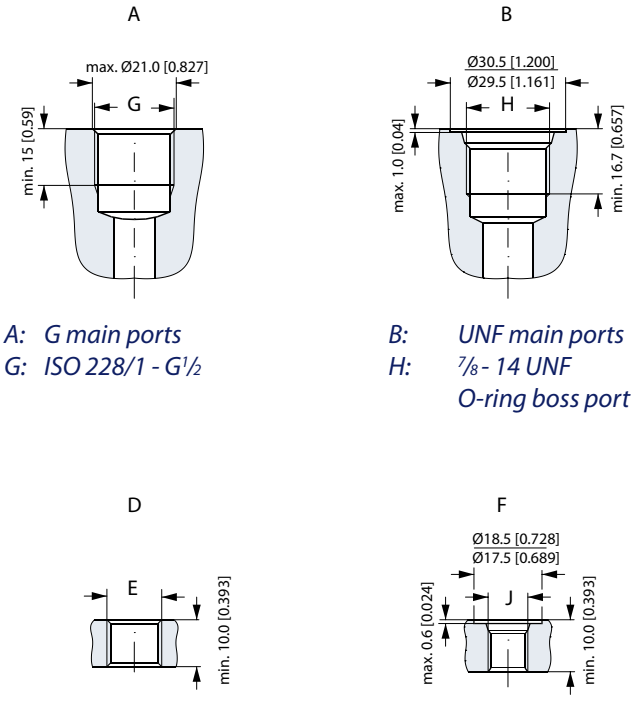
Port Thread Versions



A: G main ports
G: ISO 228/1 - G½

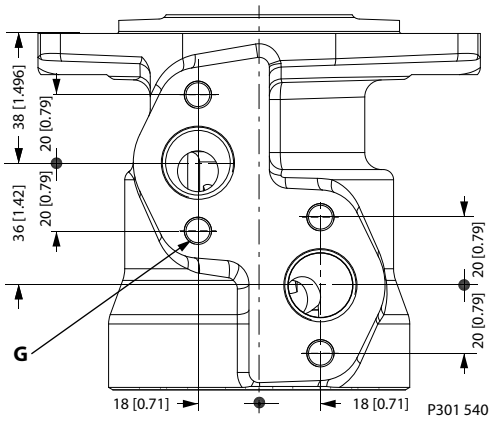
B: UNF main ports
H: ⅞ - 14 UNF
O-ring boss port

D: G drain port
E: ISO 228/1 - G¼

F: UNF drain port
J: 7/16 - 20 UNF
O-ring boss port

Manifold Mount

European version



G: M8. 13 [0.512] deep. (4 pcs.)

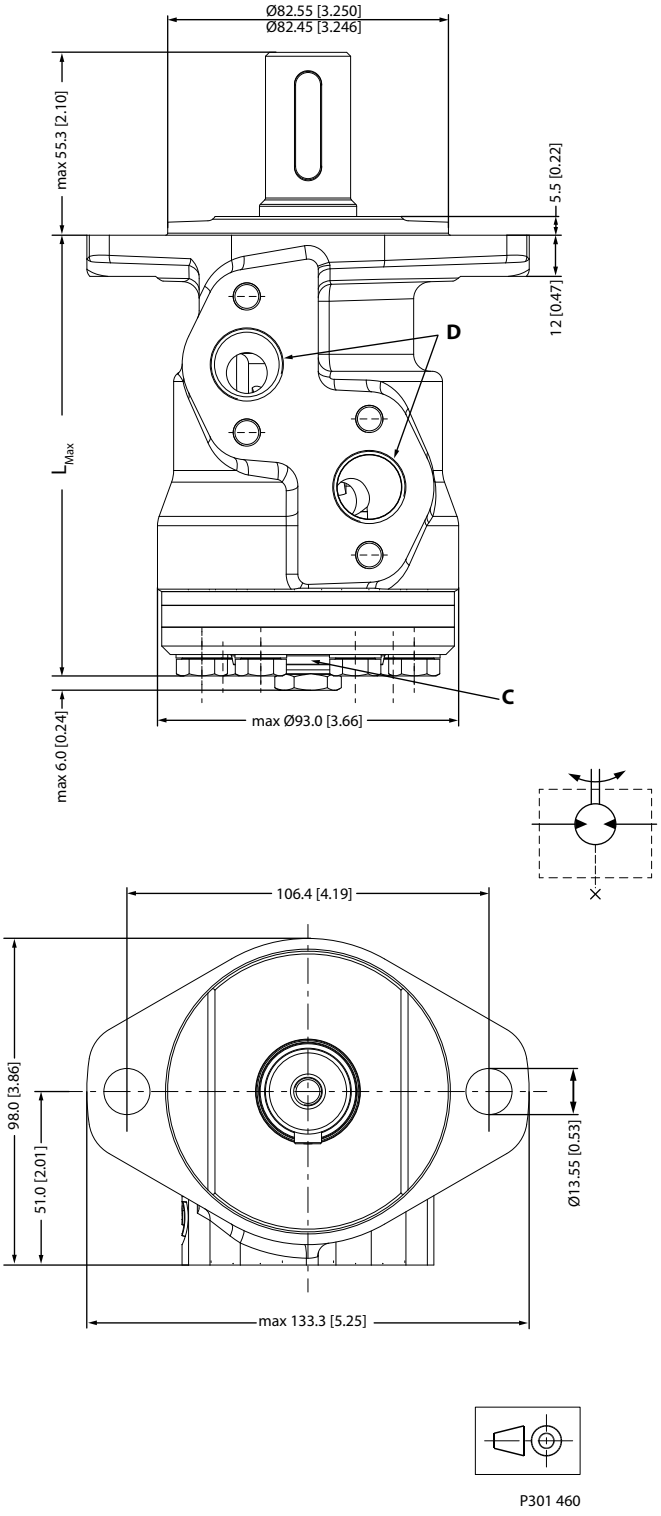
Dimensions

Side port version with 2 hole oval mounting flange (A2-flange).

Type	L_{MAX} mm [in]	Weight kg [lb]
VMP 50	132.0 [5.20]	4.9 [10.8]
VMP 80	136.0 [5.35]	5.0 [11.0]
VMP 100	138.5 [5.45]	5.2 [11.5]
VMP 125	142.2 [5.60]	5.3 [11.7]
VMP 160	146.3 [5.76]	5.5 [12.1]
VMP 200	151.5 [5.96]	5.7 [12.6]
VMP 250	158.0 [6.22]	5.9 [13.0]
VMP 315	166.5 [6.56]	6.2 [13.7]

C: Drain port
ISO 228/1 - G 1/4

D: Port connection
ISO 228/1 - G 1/2



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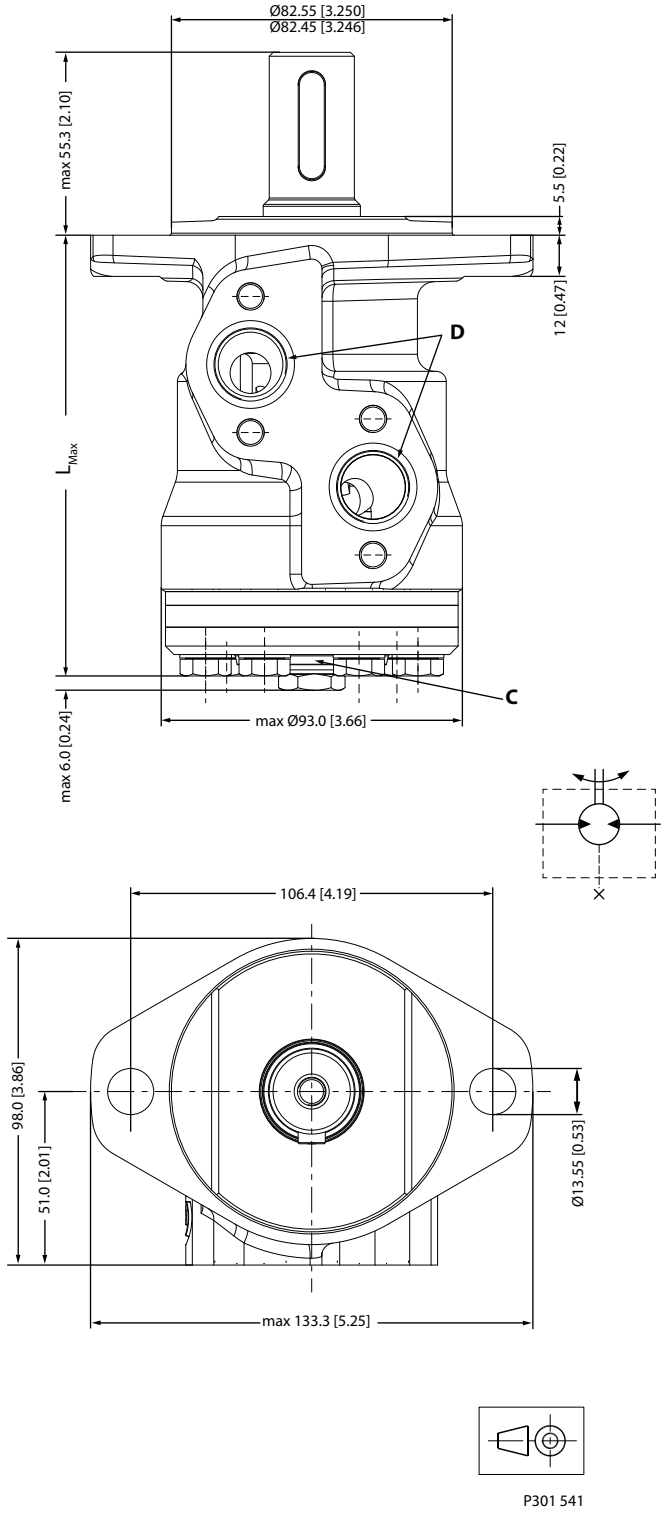
VMP 250	158.0 [6.22]	5.9 [13.0]
VMP 315	166.5 [6.56]	6.2 [13.7]

C: Drain port
7/16-20 UNF
O-ring boss port

D: Port connection
7/8-14 UNF
O-ring boss port



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