MAKING MODERN LIVING POSSIBLE

Technical Information

Orbital Motors

OMSW with brake nose

powersolutions.danfoss.com

Revision history

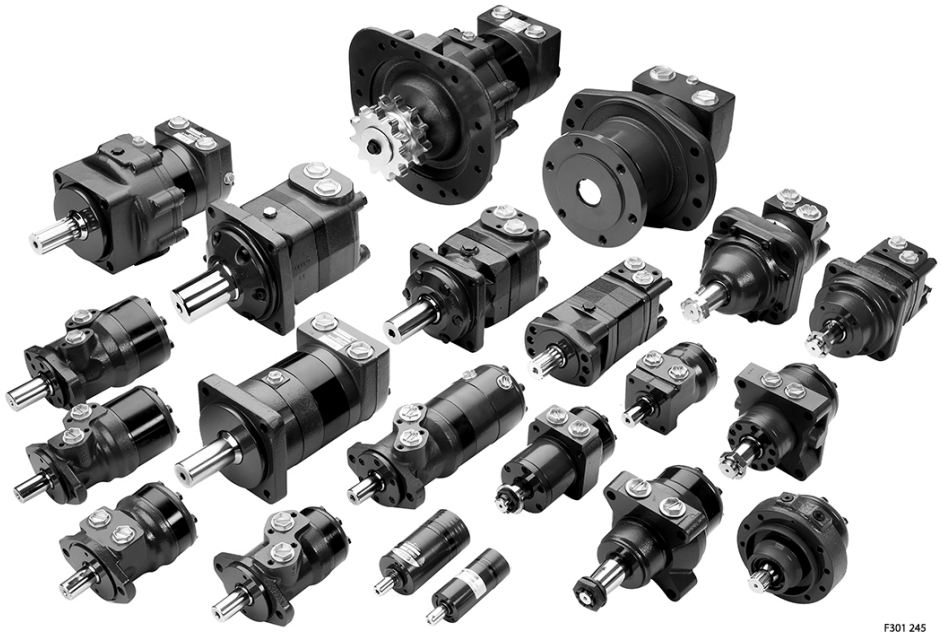
Table of revisions

Date	Changed	Rev
October 2014	Changed to Danfoss layout	DA
November 2012		CD

Contents

A wide range of Orbital Motors

Characteristic, features and application areas of Orbital Motors



Danfoss is a world leader within production of low speed orbital motors with high torque. We can offer more than 3,000 different orbital motors, categorised in types, variants and sizes (including 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 approximate 2,500 min^{-1} (rpm) for the smallest type and up to approximate 600 min^{-1} (rpm) for the largest type.

Maximum operating torques vary from 13 N•m [115 lbf•in] to 2,700 N•m [24,000 lbf•in] (peak) and maximum outputs are from 2.0 kW [2.7 hp] to 70 kW [95 hp].

Characteristic features of Danfoss Orbital Motors

- 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

Technical features of Danfoss Orbital Motor

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:

A wide range of Orbital Motors

- 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 positive holding brake
- Motors with integrated negative holding brake
- Motors with integrated flushing valve
- Motors with speed sensor
- Motors with tacho connection
- All motors are available with black finish paint

Survey of literature with technical data on Danfoss Orbital Motors

Detailed data on all Danfoss Orbital Motors can be found in our motor catalogue, which is divided into more individual subcatalogues:

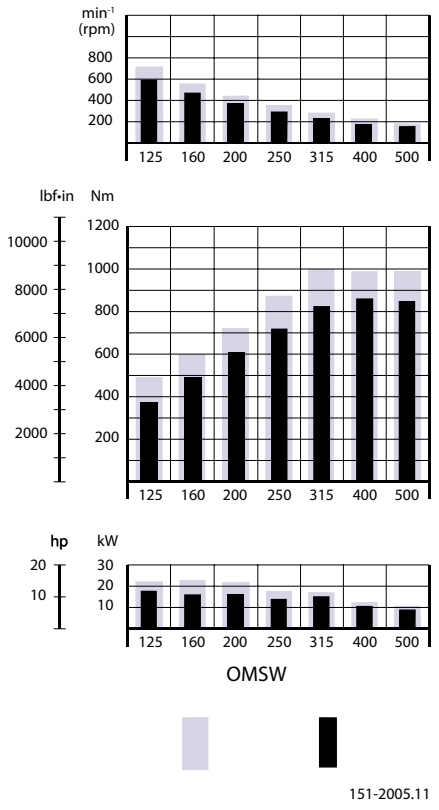
- General information on Danfoss Orbital Motors: function, use, selection of orbital motor, hydraulic systems, etc.
- Technical data on small motors: OML and OMM
- Technical data on medium sized motors: OMP, OMR, OMH
- Technical data on medium sized motors: DH and DS
- Technical data on medium sized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

A general survey brochure on Danfoss Orbital Motors gives a quick motor reference based on power, torque, speed and capabilities.

Data survey

Speed, torque and output

Max. speed / Max. torque / Max. output



[light] Intermittent values

[dark] Continuous values

The bar diagrams above 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 for each motor size.

- OMSW can be found here: *Function diagrams* on page 13.

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.

Versions

OMSW version

Mounting flange	Spigot diameter (front/rear end)	Bolt circle diameter (BC)	Shaft	Port size	European version	US version	Side port version	End port version	Standard shaft seal	Drain connection	Check valve	Main type designation
Wheel	Ø5.0 in / Ø5.0 in	Ø 5.8 in	Tap. 1 1/4"	7/8 - 14 UNF	X	X		X	No	Yes	OMSW	
						X	X		X	Yes	No	OMEW
					X		X	X	No	Yes	OMSW	
					X		X	X	Yes	No	OMSW	

Motors are painted black

Features available (options)

Shaft options:

- 1 3/8" shaft
- Side port G 1/2
- End port G 1/2

High pressure shaft seal

Code numbers

OMSW code numbers

	Displacement						
Code Numbers	**125**	**160**	**200**	**250**	**315**	**400**	**500**
151F	2502	2503	2504	2505	2506	2507	2508
151F	2512	2513	2514	2515	2516	2517	2518
151F	2522	2523	2524	2525	2526	2527	2528
151F	2532	2533	2534	2535	2536	2537	2538

Ordering

Add the four digit prefix "151F" to the four digit numbers from the chart for complete code number.

Example:

151F2514 for an OMSW 200 as sideport version and with drain connection

Orders will not be accepted without the four digit prefix.

Technical data

Technical data for OMSW

Type			OMSW	OMSW	OMSW	OMSW	OMSW	OMSW	OMSW
Motor size			**125**	**160**	**200**	**250**	**315**	**400**	**500**
Geometric displacement	cm^3 [in^3]		125.7 [7.67]	159.7 [9.75]	200.0 [12.20]	250.0 [15.26]	314.9 [19.22]	393.0 [23.98]	488.0 [29.78]
Maximum speed	min^{-1} [rpm]	cont.	600	470	375	300	240	190	155
		int.[1]	720	560	450	360	285	230	185
Maximum torque	N•m [lbf•in]	cont.	375 [3320]	490 [4340]	610 [5400]	720 [6370]	825 [7300]	865 [7660]	850 [7520]
		int.[1]	490 [4340]	600 [5310]	720 [6370]	870 [7700]	1000 [8850]	990 [8760]	990 [8760]
Maximum output	kW [hp]	cont.	18.0 [24.1]	16.5 [22.1]	16.5 [22.1]	14.5 [19.4]	15.0 [20.1]	11.0 [14.8]	9.0 [12.1]
		int.[1]	22.5 [30.2]	22.5 [30.2]	23.0 [30.8]	18.0 [24.1]	17.0 [22.8]	12.5 [16.8]	10.5 [14.1]
Maximum pressure drop	bar [psi]	cont.	210 [3050]	210 [3050]	210 [3050]	200 [2900]	200 [2900]	160 [2320]	120 [1740]
		int.[1]	275 [3990]	260 [3770]	250 [3630]	250 [3630]	240 [3480]	190 [2760]	140 [2030]
		Peak[2]	295 [4280]	280 [4060]	270 [3920]	270 [3920]	260 [3770]	210 [3050]	160 [2320]
Maximum oil flow	l/min [US gal/min]	cont.	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]
		int.[1]	90 [23.8]	90 [23.8]	90 [23.8]	90 [23.8]	90 [23.8]	90 [23.8]	90 [23.8]
Maximum starting pressure with unloaded shaft	bar [psi]		10 [145]	8 [115]	8 [115]	8 [115]	8 [115]	8 [115]	8 [115]
Minimum starting torque	at maximum press drop cont. N•m [lbf•in]		290 [2570]	370 [3270]	470 [4160]	560 [4960]	710 [6280]	710 [6280]	660 [5840]
	at maximum press drop int.[1] N•m [lbf•in]		380 [3360]	460 [4070]	560 [4960]	700 [6200]	850 [7520]	840 [7430]	770 [6820]

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

[2] Peak load: the permissible values may occur for maximum 1% of every minute.

Type			Max inlet pressure	Max return pressure with drain line
OMSW	bar	cont.	230	140
	[psi]		[3340]	[2030]
	bar	int.[1]	290	175
	[psi]		[4280]	[2540]
	bar	peak[2]	300	210
	[psi]		[4350]	[3050]

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

[2] Peak load: the permissible values may occur for max. 1% of every minute.

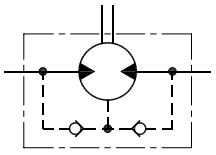
For max. permissible combination of flow and pressure, see function diagram for actual motor.

Technical data

Max. permissible shaft seal pressure

OMSW with check valves

The pressure on the shaft seal never exceeds pressure in the return line



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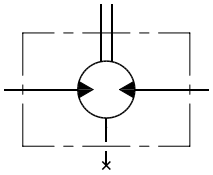
OMSW with drain connection

Use of the drain connection:
The shaft seal pressure equals the pressure in the drain line.

Without use of the drain connection:
The shaft seal pressure equals the average of input pressure and return pressure.



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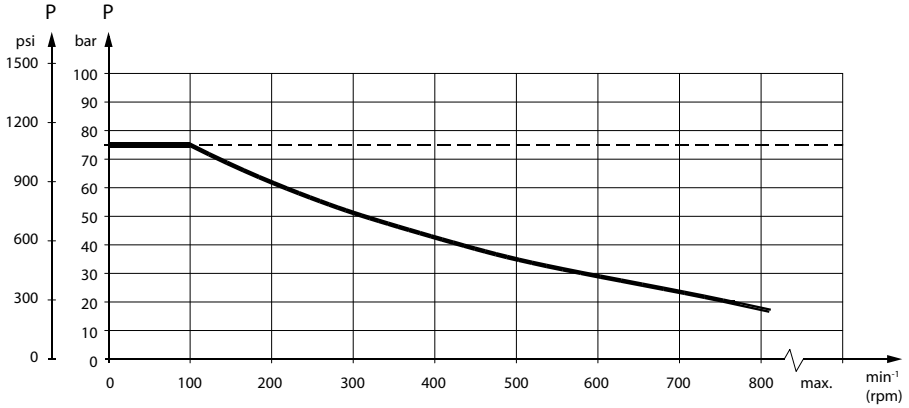
Max. pressure on shaft seal



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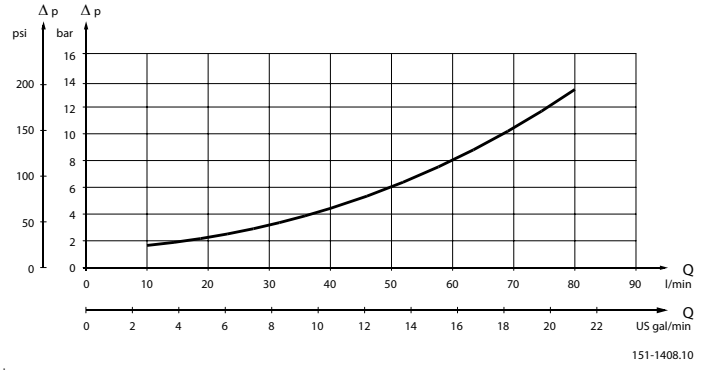
[dotted line] Intermittent operation: the permissible values may occur for max. 10% of every minute

[solid line] Continuous operation

Technical data

Pressure drop in motor



The curve applies to an unloaded motor shaft and an oil viscosity of 35 mm^2/s [165 SUS]

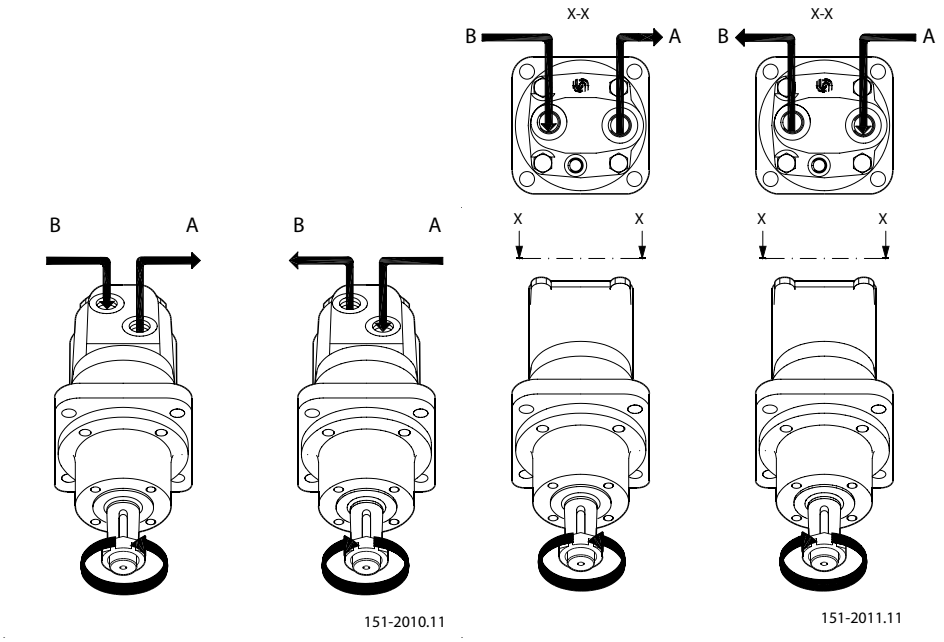
Oil flow in drain line

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

Pressure Viscosity Oil flow in drop drain line bar mm^2/s l/min [psi] [SUS] [US gal/min]

Pressure drop bar [psi]	Viscosity mm^2/s [SUS]	Oil flow in drain line l/min [US gal/min]
140 [2030]	20 [100]	1.5 [0.40]
	35 [165]	1.0 [0.26]
210 [3050]	20 [100]	3.0 [0.79]
	35 [165]	2.0 [0.53]

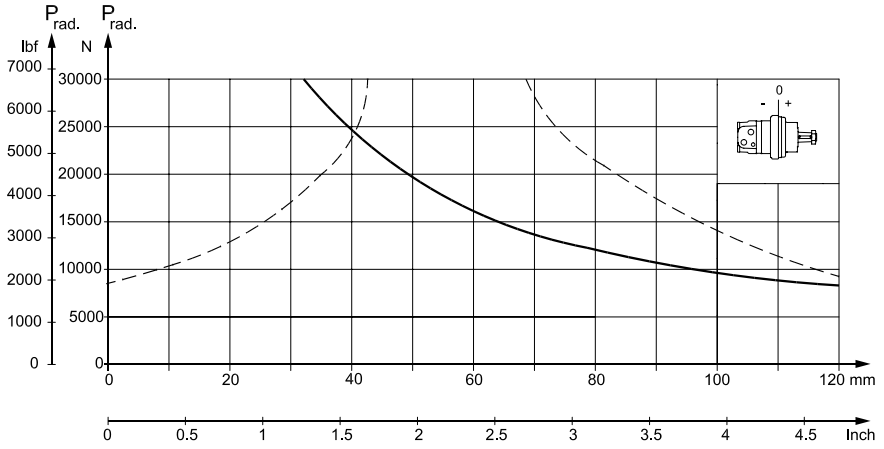
Direction of shaft rotation



Technical data

Permissible shaft load for OMSW

Mounting flange: Wheel / Shaft: All shaft types



Permissible radial shaft load

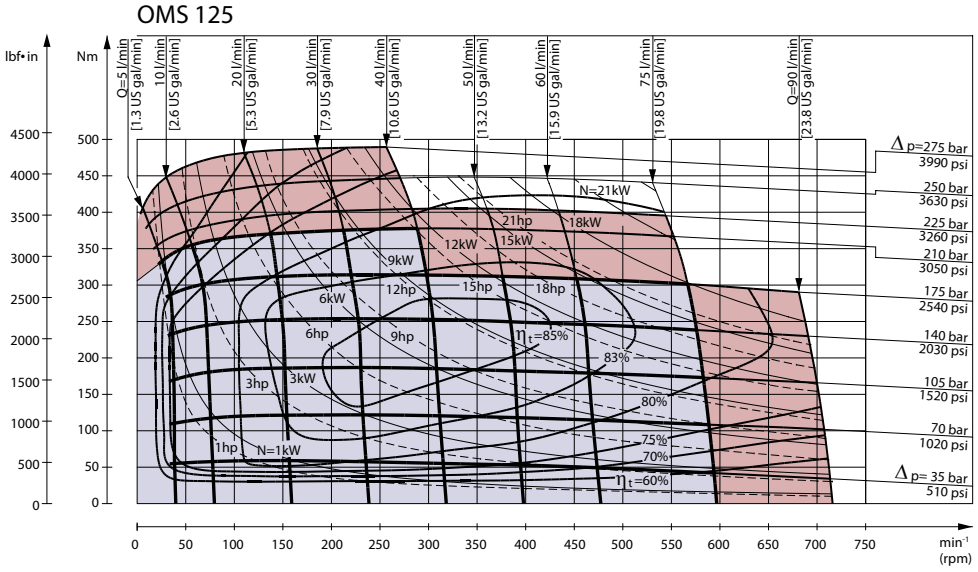
The output shaft runs in tapered roller bearings that permit high axial and radial forses.

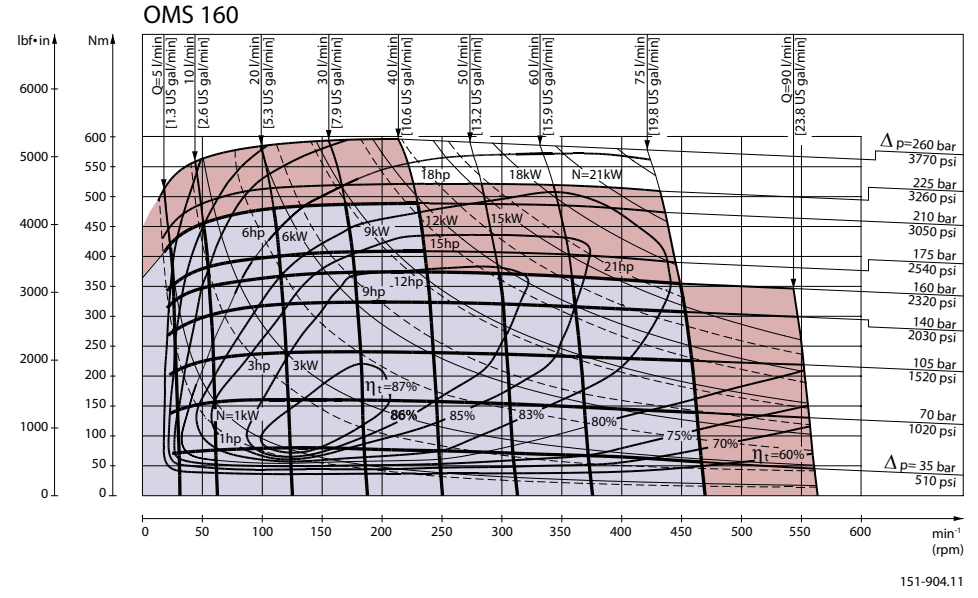
The permissible radial load on the shaft is shown for an axial load of 0 N as a function of the distance from the mounting flange to the point of load application.

The curve is based on B_{10} Bearing life (2000 hours or 12 000 000 shaft revolutions at 100 min^{-1}) at rated output torque, when mineral-based hydraulic oil with a sufficient content of anti-wear additives, is used.

Technical data

Function diagrams





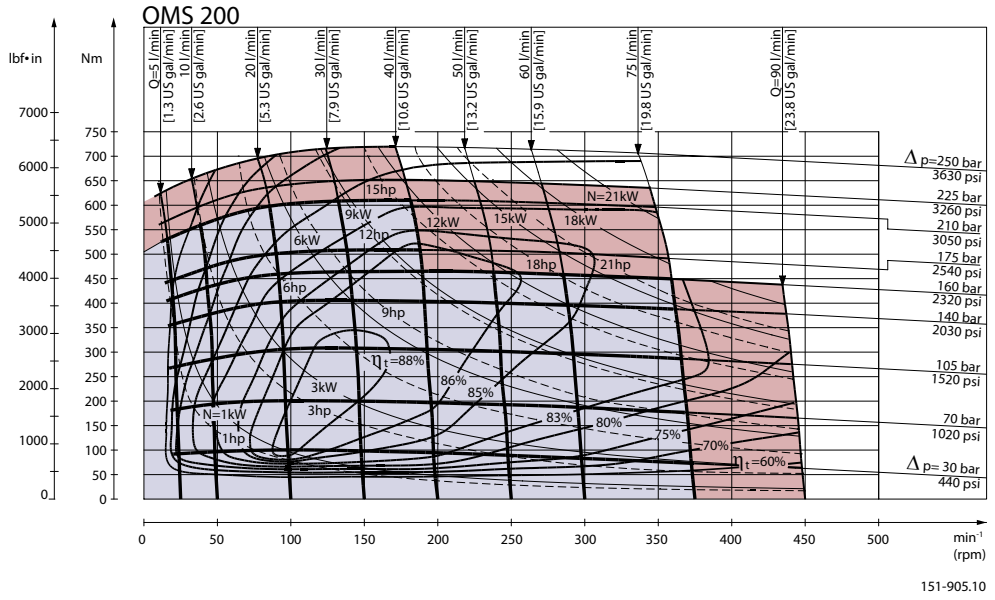
Explanation of function diagram use, basis and conditions can be found on page 5.

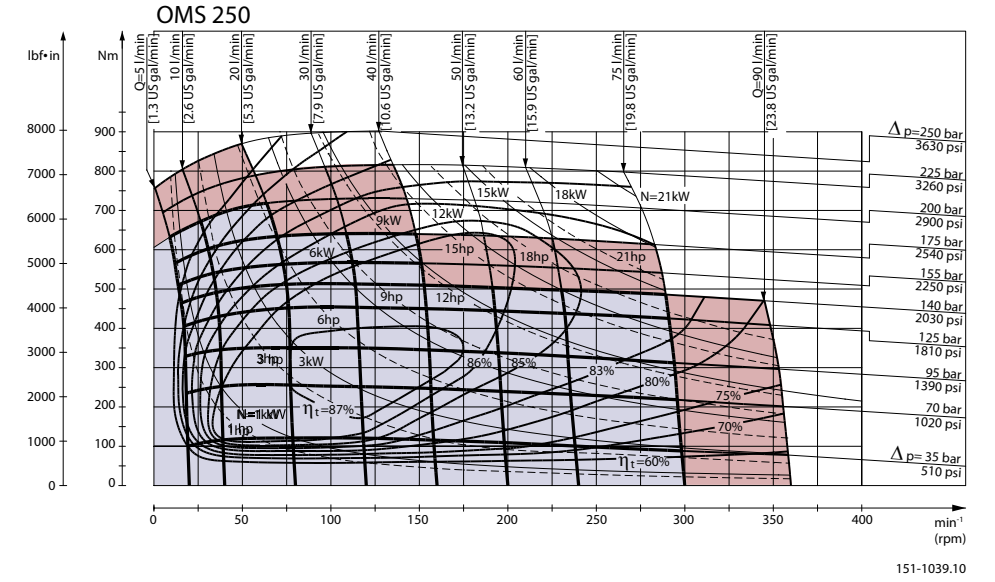
[blue] Continuous range

[pink] Intermittent range (max. 10% operation every minute)

Intermittent pressure drop and oil flow must not occur simultaneously.

Technical data





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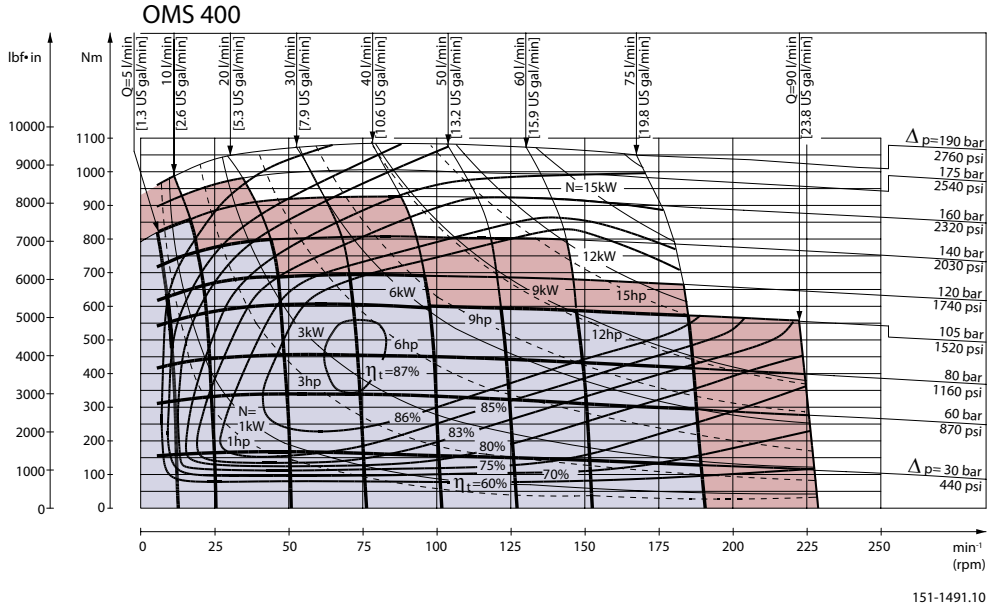

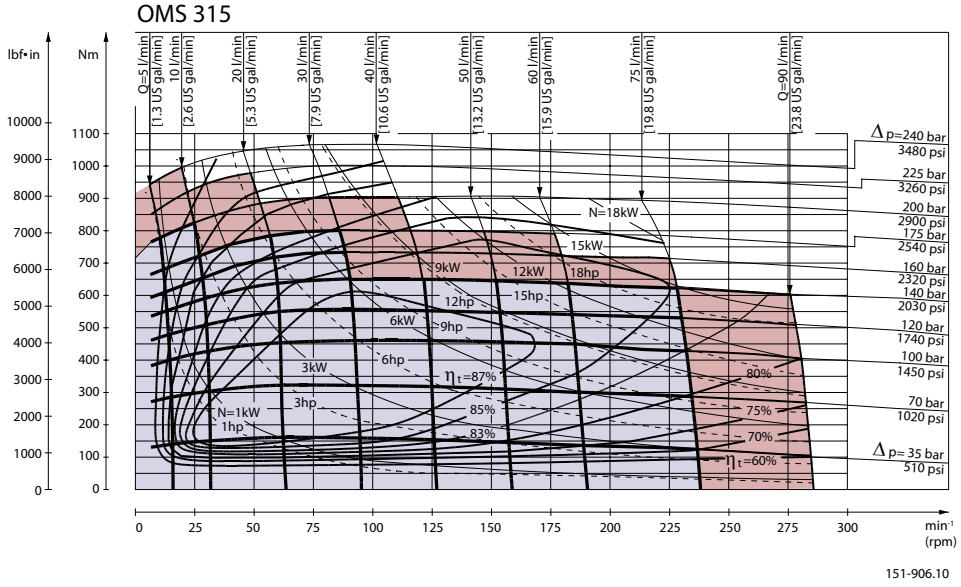

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Intermittent pressure drop and oil flow must not occur simultaneously.

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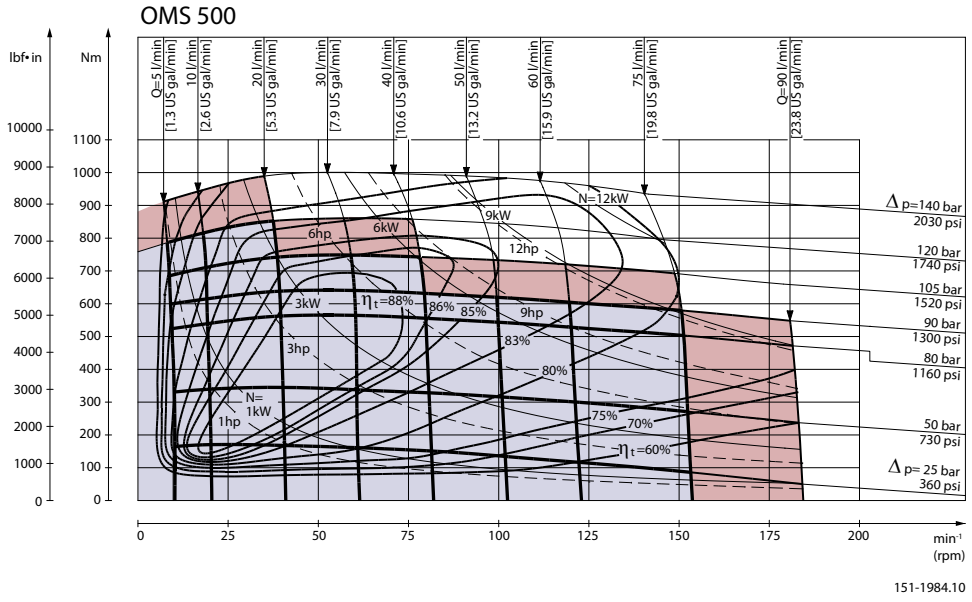

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[blue] Continuous range

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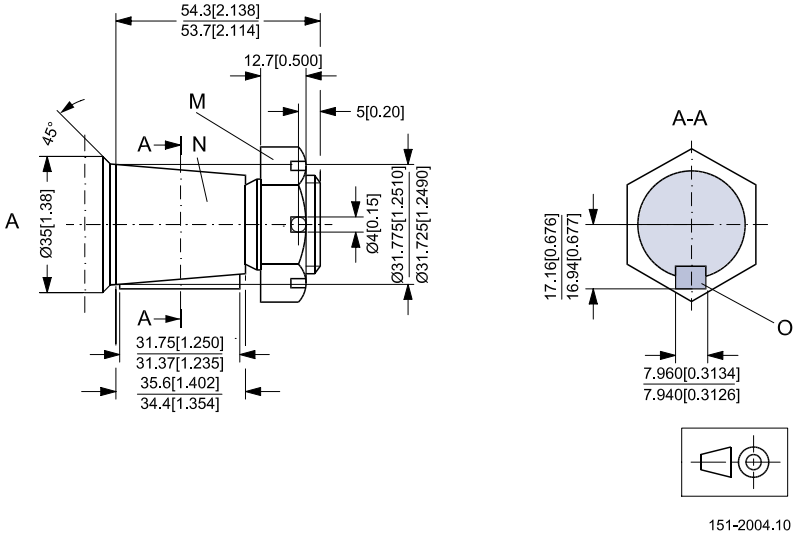
Intermittent pressure drop and oil flow must not occur simultaneously.

Technical data

Shaft version



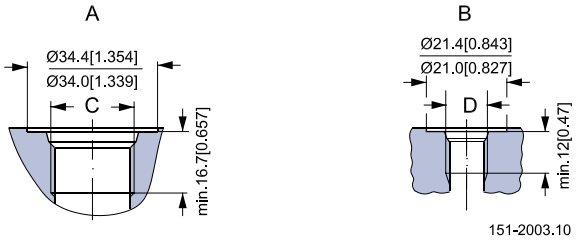
A: Tapered 1 1/4 in shaft

N: Cone 1:8 SAE J501

M: 1 - 20 UNEF across flats 1 7/16 in Tightening torque: 200 ± 10 Nm [1770 ± 85 lbf-in]

O: Parallel key 5/16 x 5/16 x 1 1/4 SAE

Port thread versions



A: UNF main port

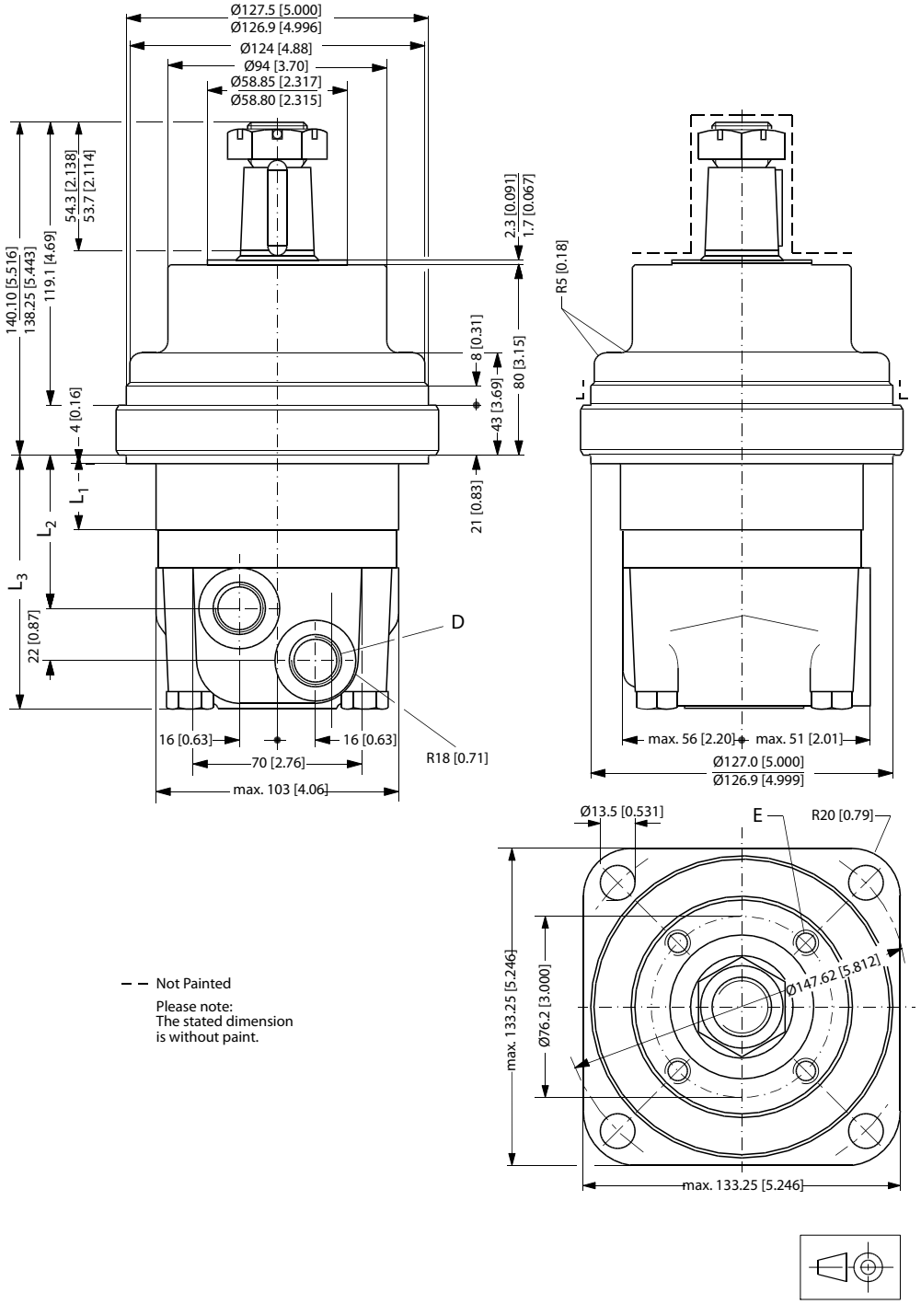
C: 7/8 - 14 UNF o-ring boss port

B: UNF drain port 7/16 - 20 UNF o-ring boss port

Dimensions

OMSW with side port and check valve

OMSW with side port and check valve



D: 7/8 - 14 UNF; 16.76 mm [0. 66 in] deep

E: Thread for external brake 4 x 5/16 - 18 UNF; 13 mm [0.51 in] deep

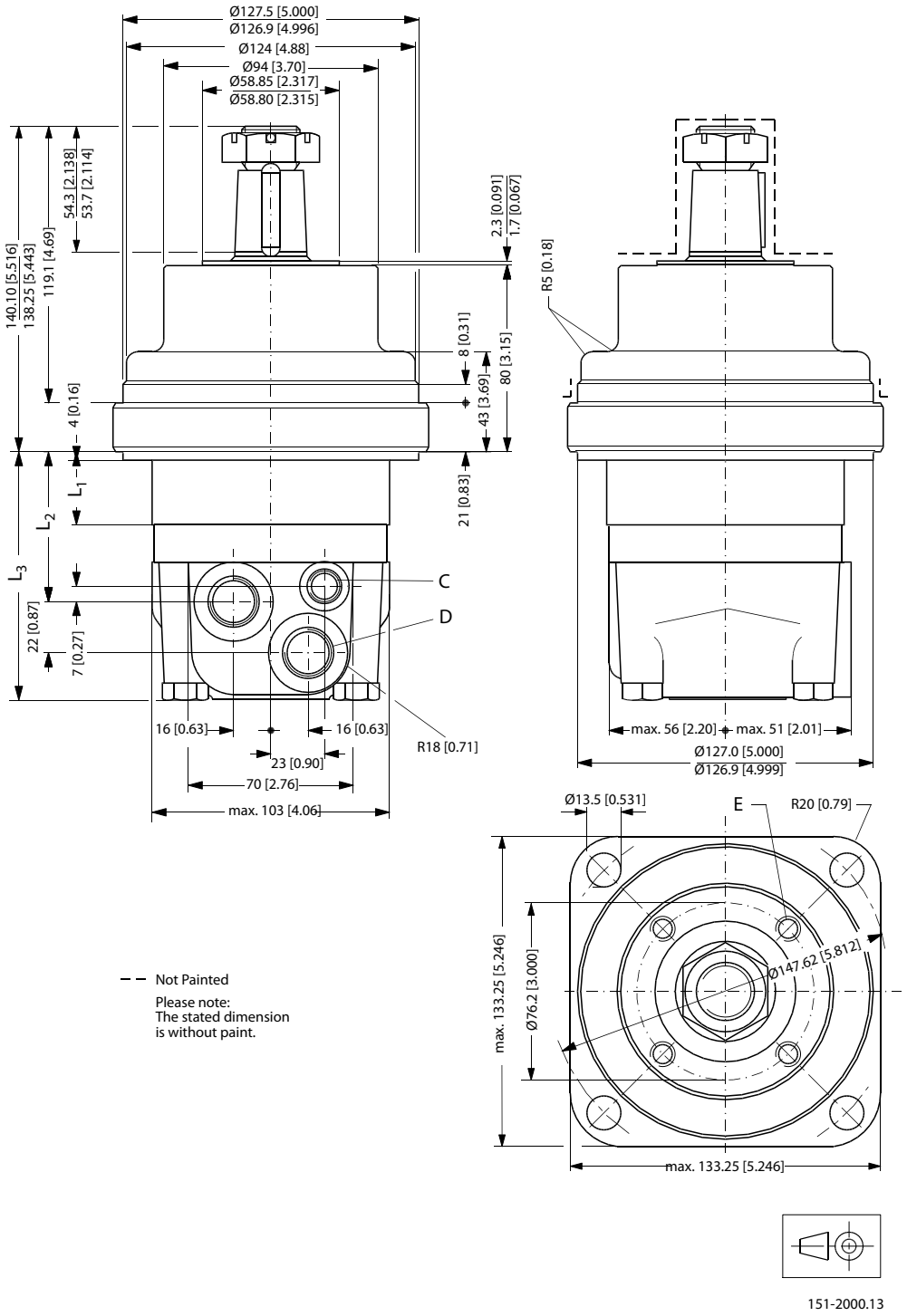
Dimensions

Type	L_1 mm [in]	L_2 mm [in]	L_3 mm [in]
OMSW 125	21.8 [0.86]	58.8 [2.31]	100.2 [3.94]
OMSW 160	27.8 [1.09]	64.8 [2.55]	106.2 [4.18]
OMSW 200	34.8 [1.37]	71.8 [2.83]	113.2 [4.46]
OMSW 250	43.5 [1.71]	80.5 [3.17]	121.9 [4.80]
OMSW 315	54.8 [2.16]	91.8 [3.61]	133.2 [5.24]
OMSW 400	68.4 [2.69]	105.4 [4.15]	146.8 [5.78]
OMSW 500	68.4 [2.69]	105.4 [4.15]	146.8 [5.78]

Dimensions

OMSW with side port and drain connection

OMSW with side port and drain connection



151-2000.13

C: 7/16 - 20 UNF; 11.43 mm [0. 45 in] deep

D: 7/8 - 14 UNF; 16.76 mm [0. 66 in] deep O-ring boss port

E: Thread for external brake 4 x 5/16 - 18 UNC; 13 mm [0.51 in] deep

Dimensions

Type	L_1 mm [in]	L_2 mm [in]	L_3 mm [in]
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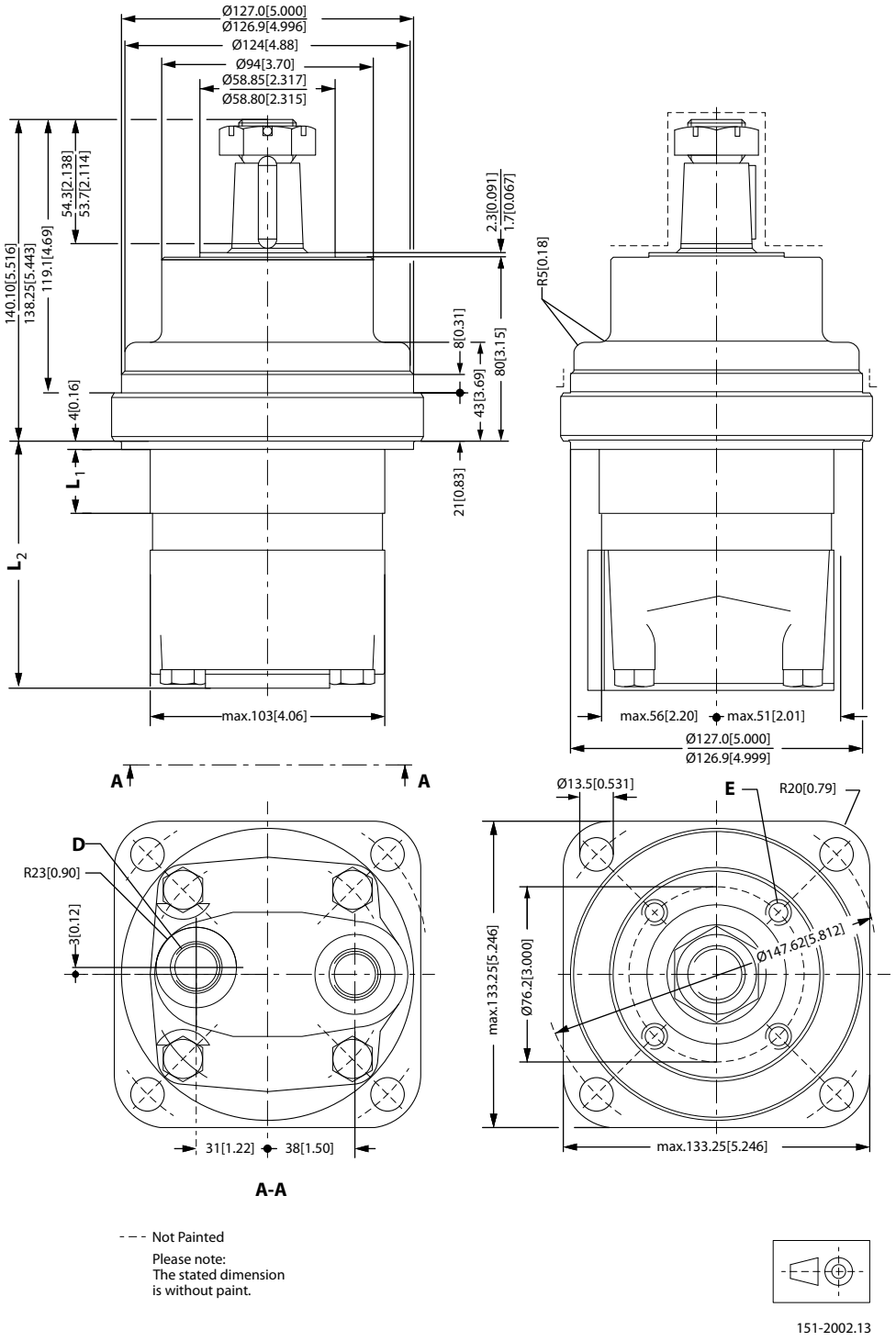
OMSW 315	54.8 [2.16]	91.8 [3.61]	133.2 [5.24]
OMSW 400	68.4 [2.69]	105.4 [4.15]	146.8 [5.78]
OMSW 500	68.4 [2.69]	105.4 [4.15]	146.8 [5.78]

Dimensions

OMSW with end port and check valve

OMSW with end port and check valve



D: 7/8 - 14 UNF; 16.76 mm [0. 66 in] deep O-ring boss port

E: Thread for external brake 4 x 5/16 - 18 UNC; 13 mm [0.51 in] deep

Dimensions

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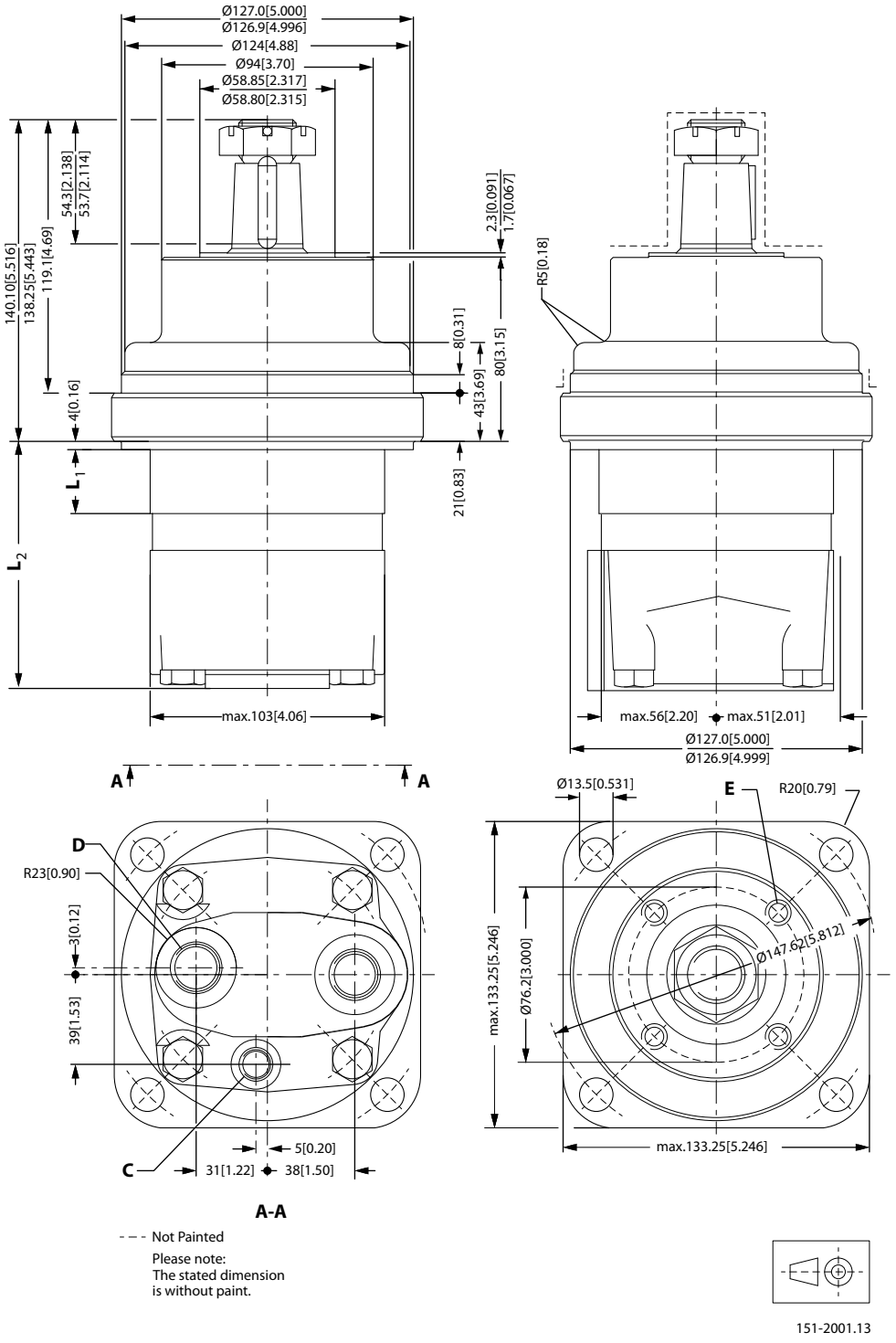
OMSW 200	34.8 [1.37]	114.8 [4.52]
OMSW 250	43.5 [1.71]	123.5 [4.86]
OMSW 315	54.8 [2.16]	134.8 [5.31]
OMSW 400	68.4 [2.69]	148.4 [5.84]
OMSW 500	68.4 [2.69]	148.4 [5.84]

Dimensions

OMSW with end port and drain connection

OMSW with end port and drain connection



C: 7/16 - 20 UNF; 11.43 mm [0. 45 in] deep

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E: Thread for external brake 4 x 5/16 - 18 UNC; 13 mm [0.51 in] deep

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OMSW 400	68.4 [2.69]	148.4 [5.84]
OMSW 500	68.4 [2.69]	148.4 [5.84]

Weight of motors

Code no	Weight kg [lb]
151F2502	10.8 [23.8]
151F2503	11.2 [24.7]
151F2504	11.6 [25.6]
151F2505	12.1 [26.7]
151F2506	12.8 [28.2]
151F2507	13.6 [30.0]
151F2508	13.6 [30.0]
151F2512	10.8 [23.8]
151F2513	11.2 [24.7]
151F2514	11.6 [25.6]
151F2515	12.1 [26.7]
151F2516	12.8 [28.2]
151F2517	13.6 [30.0]
151F2518	13.6 [30.0]
151F2522	10.8 [23.8]
151F2523	11.2 [24.7]
151F2524	11.6 [25.6]
151F2525	12.1 [26.7]
151F2526	12.8 [28.2]
151F2527	13.6 [30.0]
151F2528	13.6 [30.0]
151F2532	10.8 [23.8]
151F2533	11.2 [24.7]
151F2534	11.6 [25.6]
151F2535	12.1 [26.7]
151F2536	12.8 [28.2]
151F2537	13.6 [30.0]
151F2538	13.6 [30.0]

Products we offer:

- Bent Axis Motors
- Closed Circuit Axial Piston Pumps and Motors
- Displays
- Electrohydraulic Power Steering
- Electrohydraulics
- Hydraulic Power Steering
- Integrated Systems
- Joysticks and Control Handles
- Microcontrollers and Software
- Open Circuit Axial Piston Pumps
- Orbital Motors
- PLUS+1® GUIDE
- Proportional Valves
- Sensors
- Steering
- Transit Mixer Drives

Danfoss Power Solutions is a global manufacturer and supplier of high-quality hydraulic and electronic components. We specialize in providing state-of-the-art technology and solutions that excel in the harsh operating conditions of the mobile off-highway market. Building on our extensive applications expertise, we work closely with our customers to ensure exceptional performance for a broad range of off-highway vehicles.

We help OEMs around the world speed up system development, reduce costs and bring vehicles to market faster.

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