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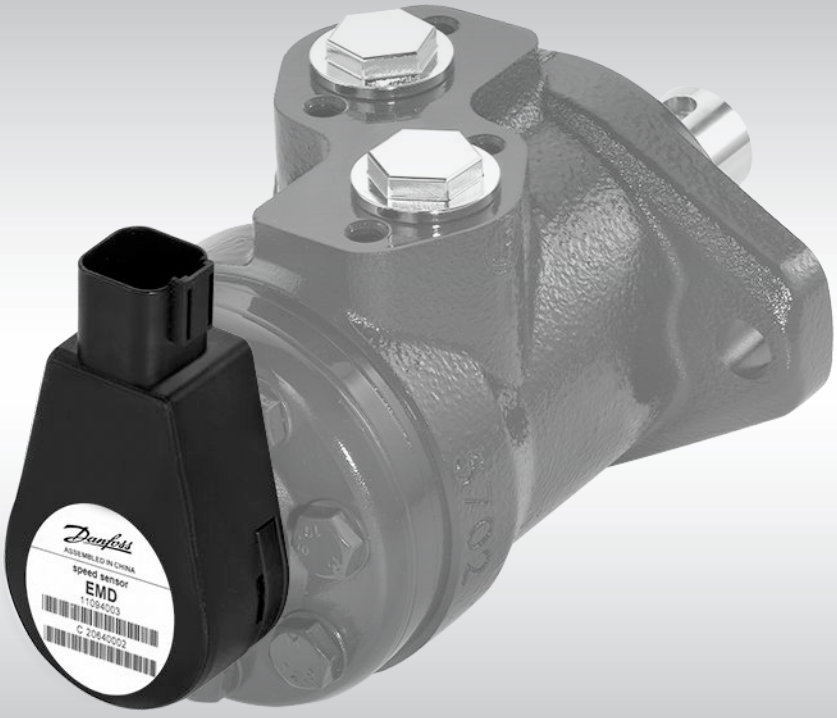
Technical Information

Orbital Motor
EMD Speed Sensor



Revision history

Table of revisions

Date	Changed	Rev
November 2014	Drawings updated	DA
June 2014	Drawings updated	CA
May 2014	Errors corrected	BB
February 2014	Converted to Danfoss layout - DITA CMS	BA
March 2013	OMSS version added	AC
May 2012	Conversion Diagram text updated	AB
May 2012	First edition	AA

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Product overview

Description

Warning

Please note that the EMD speed sensor may fail. Output signals may not represent correct rotation speed or direction.

Any application of the EMD speed sensor should be subjected to appropriate hazard and risk assessment, according to relevant safety standards for the application.

Reliability data MTBF for the EMD speed sensor are available on request from your Danfoss representative.

Function of the speed sensor is to detect the shaft speed and the direction of rotation. The sensor is mounted to the endcover of a Danfoss motor and senses the speed from a magnet that is rotating inside the motor. Because of the digital output signals for speed and direction and a non speed dependent output voltage level, the sensor is ideal for high and low speed measurements.

The speed sensor is designed for rugged outdoor, mobile or heavy industrial speed sensing applications. The detection of the speed is contactless. It is a “plug and perform” device that does not need any calibration or adjustments.

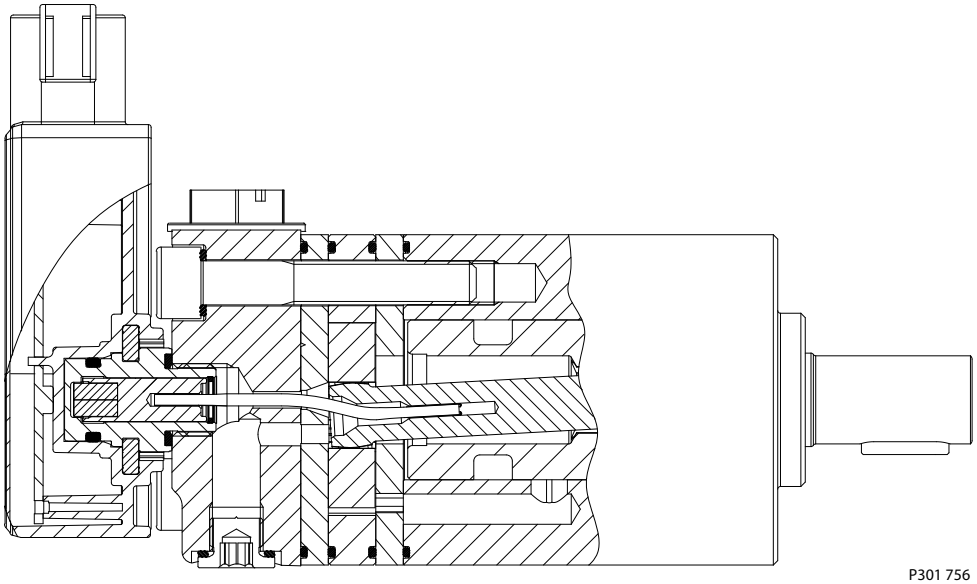
Mounting with a snap/click lock and can be adjusted in 36 different positions.

- Available for following LSHT-motors: OMM, OMP, OMR, OMS, OMT, OMV, TMK, TMT and TMV.
- Speed and Direction output.
- Highest resolution in the market.
- Sensor is not in contact with oil making it robust and exchangeable in the field.
- PLUS+1® Compliant.

Sectional drawings

Sectional drawing

OMM EMD speed sensor



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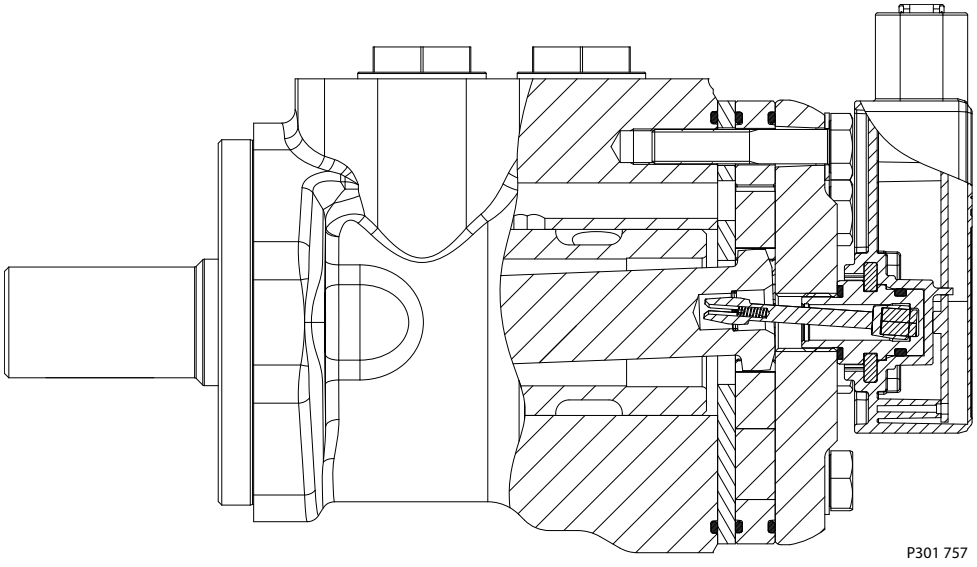
OMP / OMR EMD speed sensor - European version



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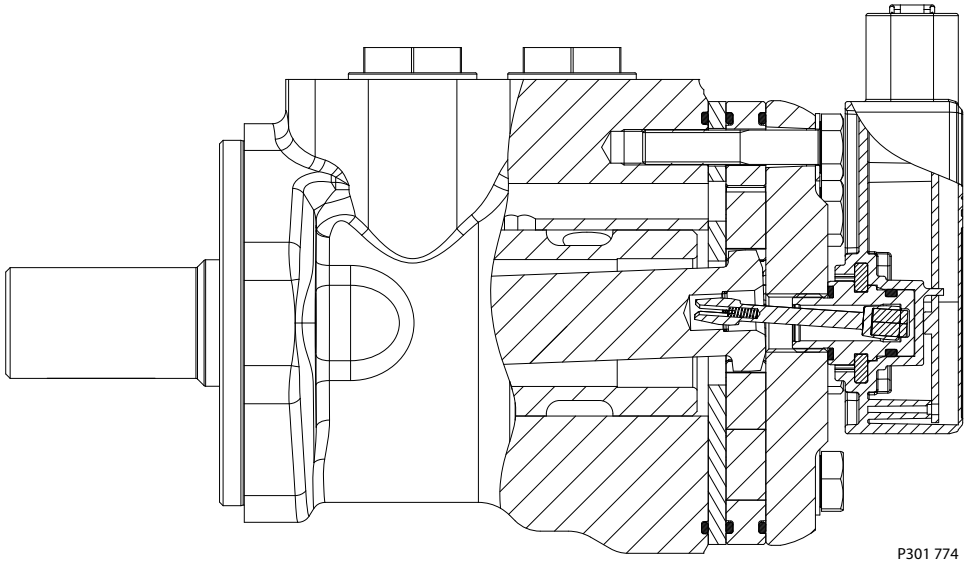
Sectional drawings

OMP / OMR EMD speed sensor - US version



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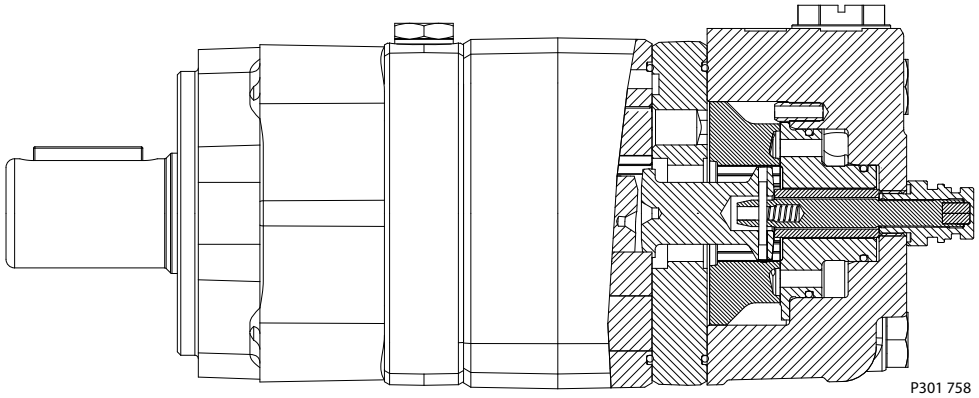
OMS / OMT / OMV / TMK / TMT / TMV EMD speed sensor



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General data

EMD Speed Sensor specifications

Specifications:

Output signal *			**D1**	**D2**
	Pulse mode	Push-pull output. Direction = CCW: high, CW: low Configurable up to 180 pulse/revolutions	Square Wave	Direction
	Quadrature mode	2 channels with 90° phaseshift each with 90 pulses/revolution Push-pull output	Square Wave Phase A	Square Wave Phase B
	CAN mode	Supports CAN 2.0B with SAE J1939 Message Protocol with Proprietary Messages		
		Baudrate: 250 kbaud (fixed)		
		Shaft velocity: ± 2500 rpm		
Speed range		0 - 2500 rpm		
Supply voltage		9 - 36 Vdc		
Maximum power		0.8 W		
Temperature range (ambient)		-30 °C to 60 °C		
EMC-Immunity (EMI):		100 V/m ISO 13766		
Grade of enclosure †		IP 69 K		
Vibration		30 G (294 m/s^2)		
Shock		50 G (490 m/s^2)		

* Configurable with PLUS+1® Service Tool - Please contact Danfoss for further information.

† According to IEC 529.

EMD speed sensor ordering information

Standard sensor

Part number	**Output**	**Parameter**	**Default setting**
11094003	Pulse mode	Pulse/rev (PPR)	180
11101202	Quadrature mode	2 channels 90° phaseshift	90 *
11101205	CAN mode	Node address	0x51 †
		Message transmission rate	50 ms
11114575	OEM configurable sensor	---	---

* Fixed setting. Can not be changed

† Hexadecimal

Special sensor

Part number	**Output**	**Parameter**	**Default setting**
11101182	Compatibility mode OMM	Pulse/rev (PPR)	22
11101186	Compatibility mode OMP/R	Pulse/rev (PPR)	35
11101188	Compatibility mode OMS	Pulse/rev (PPR)	55
11101189	Compatibility mode OMT	Pulse/rev (PPR)	84
11101191	Compatibility mode OMV	Pulse/rev (PPR)	102
11101204	Compatibility mode TMK	Pulse/rev (PPR)	70

If product is not seen in this table refer to Technical Information of the specific product.

General data

Order information

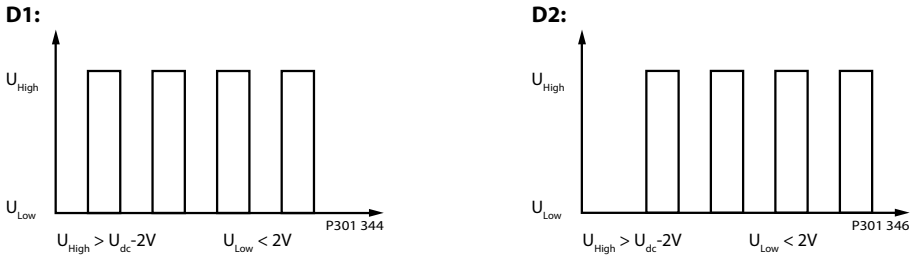
Orbital Motor prepared for EMD speed sensor is to be order seperatly. See *OMM EMD, OMP EMD and OMR EMD versions* on page 14, *OMS EMD, OMT EMD and OMV EMD versions* on page 15.

Pulse mode

The sensor generates a speed dependent pulse on D1 and a direction signal on D2.

Quadrature mode

The sensor generates a speed dependent pulse on D1 and D2 with a 90 degree phaseshift.



CAN mode

Cyclic message specification

Interface:	CAN 2.0 B
Baud rate:	250 kBaud
Transmit rate:	10, 20, 50, 100 or 200 ms (cyclic message transmission)

Proprietary B 29 bit	Data							
	0 (LSB)	1 (MSB)	2	3 (LSB)	4 (MSB)	5	6 (LSB)	7 (MSB)
CAN ID	Reserved		Sequence number	Angular velocity		Reserved	CRC-16	

CAN ID:

J1939 proprietary B. Programmable 29 bit message id.

ID = $18FF20XX (source address XX is programmable, default value is $51)

Sequence no.:

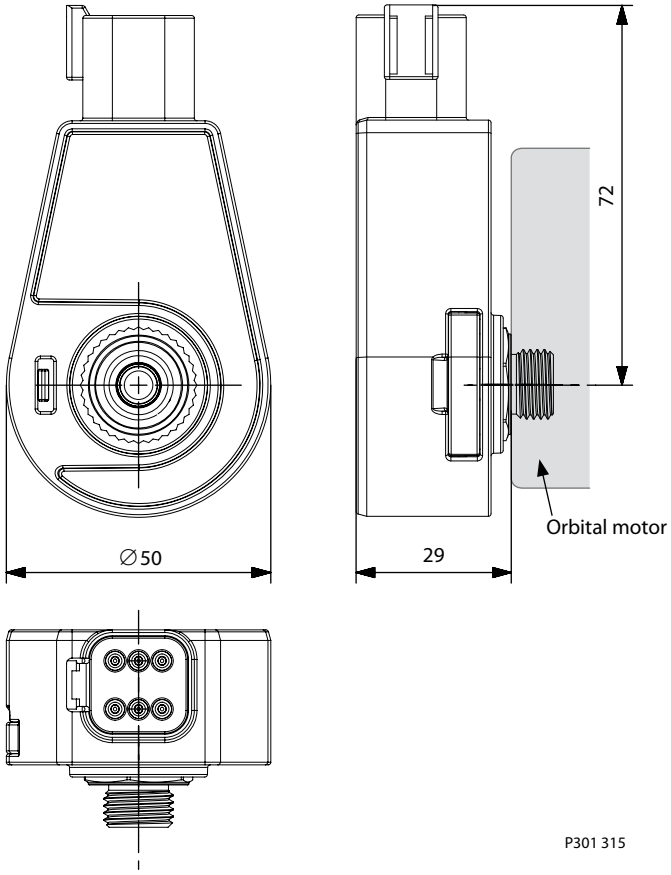
byte (0-255)

General data

	Increments 1 for each message
Angular velocity:	Angular velocity of the shaft. 16 bit integer with 2's complementary encoding for negative values (-25,000 to 25,000). -25,000 = -2,500 RPM (CCW) 0 = 0 RPM 25,000 = 2,500 RPM (CW)
CRC-16:	The standard CRC16 polynomial is used to calculate the checksum for byte 0 – 5. (x^16+x^15+x^2+1)

Product overview

Dimensions



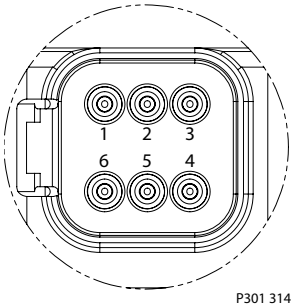
Sensor pinout

Sensor pinout

Pin	Controller function
1	Power supply 9-36 V dc
2	Power ground -
3	D 1 (configurable output)
4	CAN L
5	CAN H
6	D 2 (configurable output)

Product overview

Deutsch DT connector – 6 pin



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Mating connector

Deutsch DT connector 6 pin Mating connector assembly: (Not offered by Danfoss)

Pcs	Description	Deutch part no.	Color
1	Plug	DT06-6S-PO12	(black)
1	Wedgelock	W6S-PO12	(green)
6	Solid Contacts	0462-209-16141	(nickel)
Options			
1	Boot compl.	DT6S-BT-BK	(black)

For correct mounting please see Deutsch homepage: www.deutsch.net

Wiring diagram

Wiring diagram: Pulse and quadrature mode

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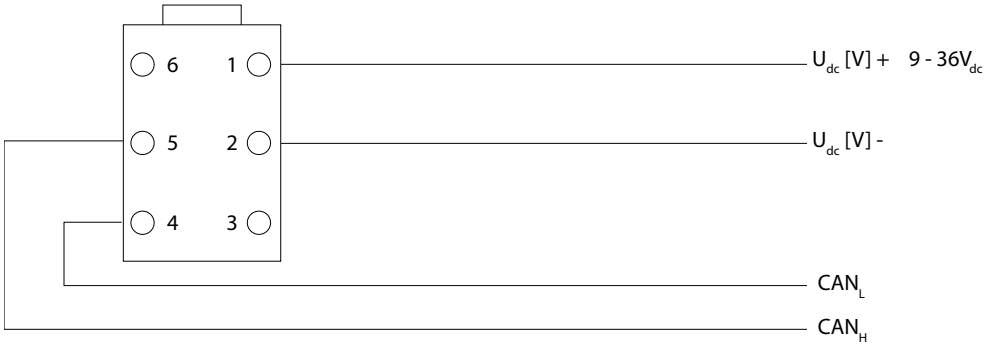
Wiring diagram: CAN mode



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Product overview

Conversion diagram

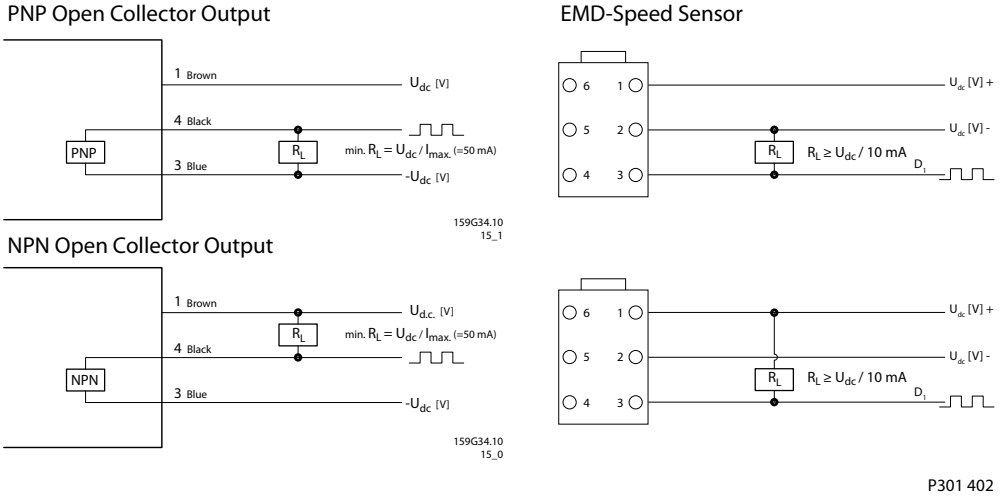
It is possible to replace an Orbital Motor with EM-sensor with PNP or NPN open collector output with an Orbital Motor with EMD-sensor. Conversion diagrams show how it is possible to replace present sensor with EMD-sensor.

The resistor R_L which is used in the current NPN/PNP diagram is not needed but can under certain conditions remain in the circuit:

- If $R_L < U_{DC}/10$ mA remove or increase the size of the resistor.
- If $R_L > U_{DC}/10$ mA it can be removed.

In case the EM-sensor and the controller have different power supply, it is needed to modify the circuit so that the EMD-sensor has the same power supply as the controller.

Please see *EMD speed sensor ordering information* on page 8 for EMD sensor with compatibility mode OMM, OMP/OMR, OMS, OMT, OMV and TMK.



Version

OMM EMD, OMP EMD and OMR EMD versions

Versions

Mounting flange	Spigot diam.	Bolt circle diameter (BC)	Shaft	Port size	Version		Side port version	Standard shaft seal	HPS	Drain connection	Check valve	Main type designation	Conf. code
					EU	US							
OMM EMD Motors													
Front 4 • M5	∅60 mm	∅45 mm	Cyl. 16 mm	G 3/8	X		X	X		X	X	OMM EMD	*1*
OMP EMD Motors													
2 hole oval flange (A2-flange)	∅82.5 mm	∅106.4 mm	Cyl. 25 mm	G 1/2	X		X		X		X	OMP EMD	*2*
	[3.25 in]	[4.19 in]	Cyl. 1 in	7/8 - 14 UNF		X	X		X		X	OMP EMD	*3*
OMR EMD Motors													
2 hole oval flange (A2-flange)	∅82.5 mm	∅106.4 mm	Cyl. 25 mm	G 1/2	X		X		X		X	OMR EMD	*4*
	[3.25 in]	[4.19 in]	Cyl. 1 in	7/8 - 14 UNF		X	X		X		X	OMR EMD	*5*

Features available (options): OMP/OMR motors with drain.

Code numbers

Displacement	Config. code				
	OMM EMD Motors	OMP EMD Motors		OMR EMD Motors	
	Code *1*	Code *2*	Code *3*	Code *4*	Code *5*
8	11105513				
12.5	11105514				
20	11095214				
25		11128818			
32	11105515	11113815			
40	11105516	11118872			
50	11105517	11095306	11110374	11095307	11110489
80		11105957	11110375	11106113	11110490
100		11105958	11110376	11106114	11110491
125		11105959	11110377	11106115	11110492
160		11105960	11110378	11106116	11110493
200		11105961	11110379	11106117	11110494
250		11105972	11110380	11106118	11110495
315		11105973	11110406	11106119	11110496
375				11106120	11110497
400					

Order information

Orbital Motor prepared for EMD Speed Sensor is to be order seperatly. See *EMD speed sensor ordering information* on page 8

Version

OMS EMD, OMT EMD and OMV EMD versions

Versions

Mounting flange	Spigot diameter	Bolt circle diam. (BC)	Shaft	Port size	Version		Side port version	Standard shaft seal	Drain connection	Check valve	Main type designation	Conf. code
					EU	US						
OMS EMD Motors												
Standard flange	∅82.5 mm	∅106.4 mm	Cyl. 32 mm	G 1/2	X		X	X	X	X	OMS EMD	*1*
A2-flange	∅3.25 in	∅4.19 in	Cyl. 1.25 in	7/8 - 14 UNF		X	X	X	X	X	OMS EMD	*2*
Short			No output shaft	G 1/2	X		X		X	X	OMSS EMD	*3*
OMT EMD Motors												
Standard flange	∅125 mm	∅160 mm	Cyl. 40 mm	G 3/4	X		X	X	X	X	OMT EMD	*4*
	∅5 in	∅6.38	Cyl. 1.5 in	11/16 - 12 UN		X	X	X	X	X	OMT EMD	*5*
OMV EMD Motors												
Standard flange	∅160 mm	∅200 mm	Cyl. 50 mm	G 1	X		X	X	X	X	OMV EMD	*6*

If you need TMK, TMT or TMV motors with EMD Speed Sensor, please contact Danfoss

Code numbers

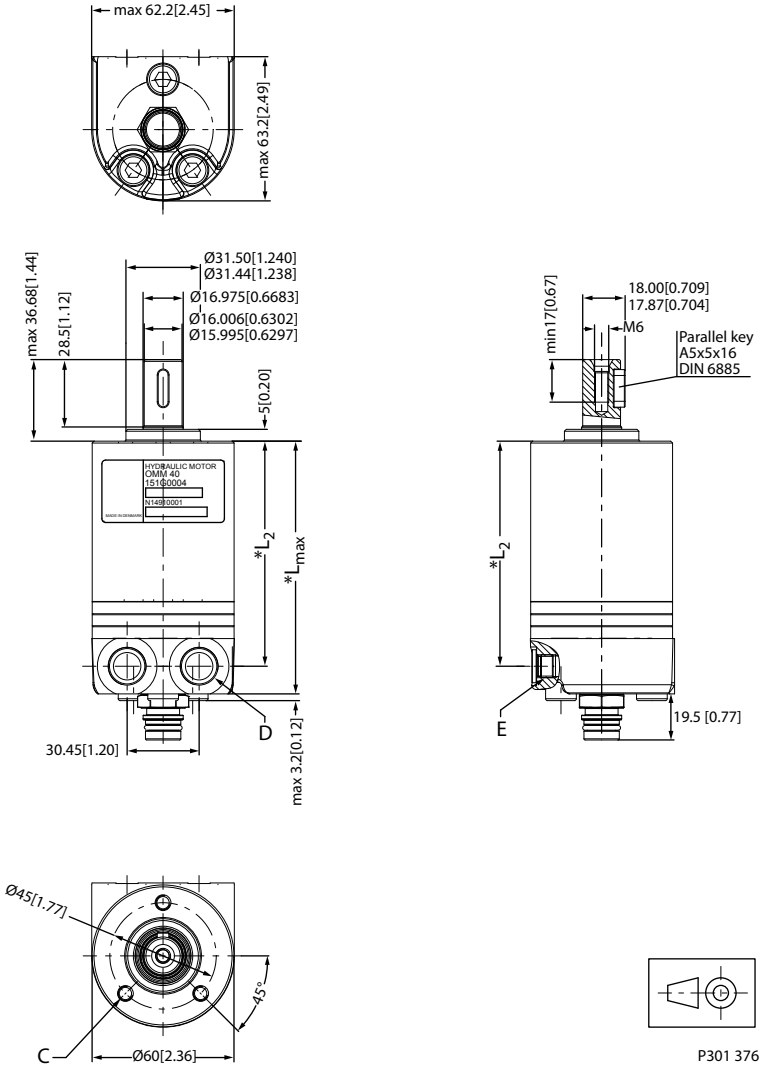
Displacements	Config. code					
	OMS EMD Motors			OMT EMD Motors		OMV EMD Motors
	1	*2*	*3*	*4*	*5*	*6*
80	11095111	11110509	11113880			
100	11105153	11110510	11113882			
125	11105162	11110511	11113883			
160	11105163	11110512	11113884	11106121	11113705	
200	11105165	11110513	11113885	11106122	11113706	
250	11105166	11110514	11113886	11106123	11113707	
315	11105168	11110515	11113887	11095277	11113708	11106132
400	11105169	11110516		11106124	11113709	11106133
500	11105170	11110517		11106125	11113710	11095278
630						11106134
800						11106135

Order information

Orbital Motor prepared for EMD Speed Sensor is to be order seperatly. See *EMD speed sensor ordering information* on page 8

Dimensions, European version, OMM EMD side port version

OMM EMD side port, European version



C : M6 10 mm [0.39] deep

D : G3/8; 12 mm [0.47] deep

E : Drain connection G1/8; 8 mm [0.32] deep

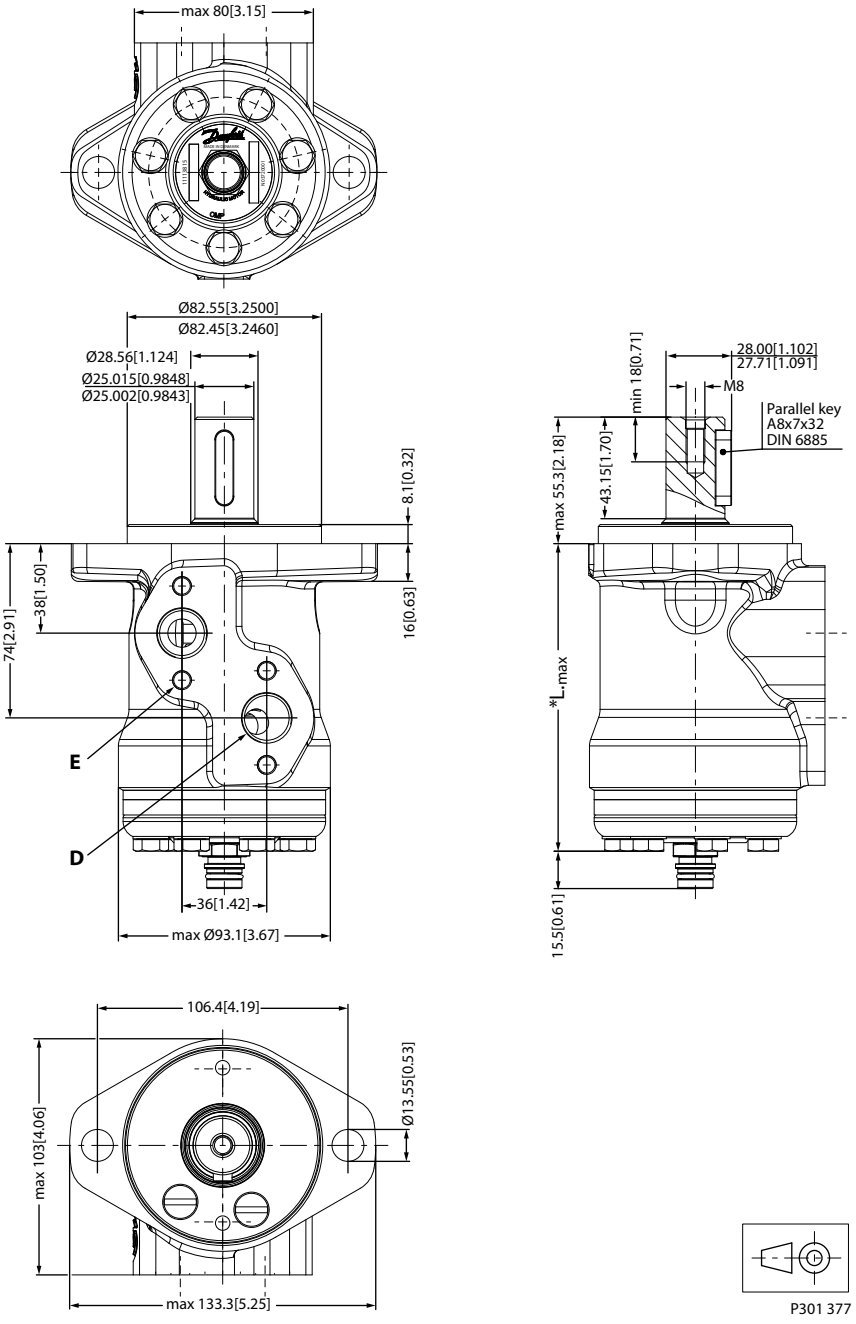
Dimensions, European version, OMM EMD side port version

Dimensions

Type	*L_{max} mm [in]	*L_2 mm [in]
OMM 8 EMD	107.7 [4.24]	93.2 [3.67]
OMM 12.5 EMD	109.7 [4.32]	95.2 [3.75]
OMM 20 EMD	112.7 [4.44]	98.2 [3.87]
OMM 32 EMD	117.7 [4.64]	103.2 [4.07]
OMM 40 EMD	121.2 [4.78]	106.7 [4.20]
OMM 50 EMD	125.7 [4.95]	111.2 [4.38]

Dimension, European version, OMP EMD side port version

OMP EMD side port version with 2 hole oval mounting flange (A2-flange), European version



D : G1/2; 15 mm [0.59 in] deep

E : M8; 13 mm [0.51 in] deep

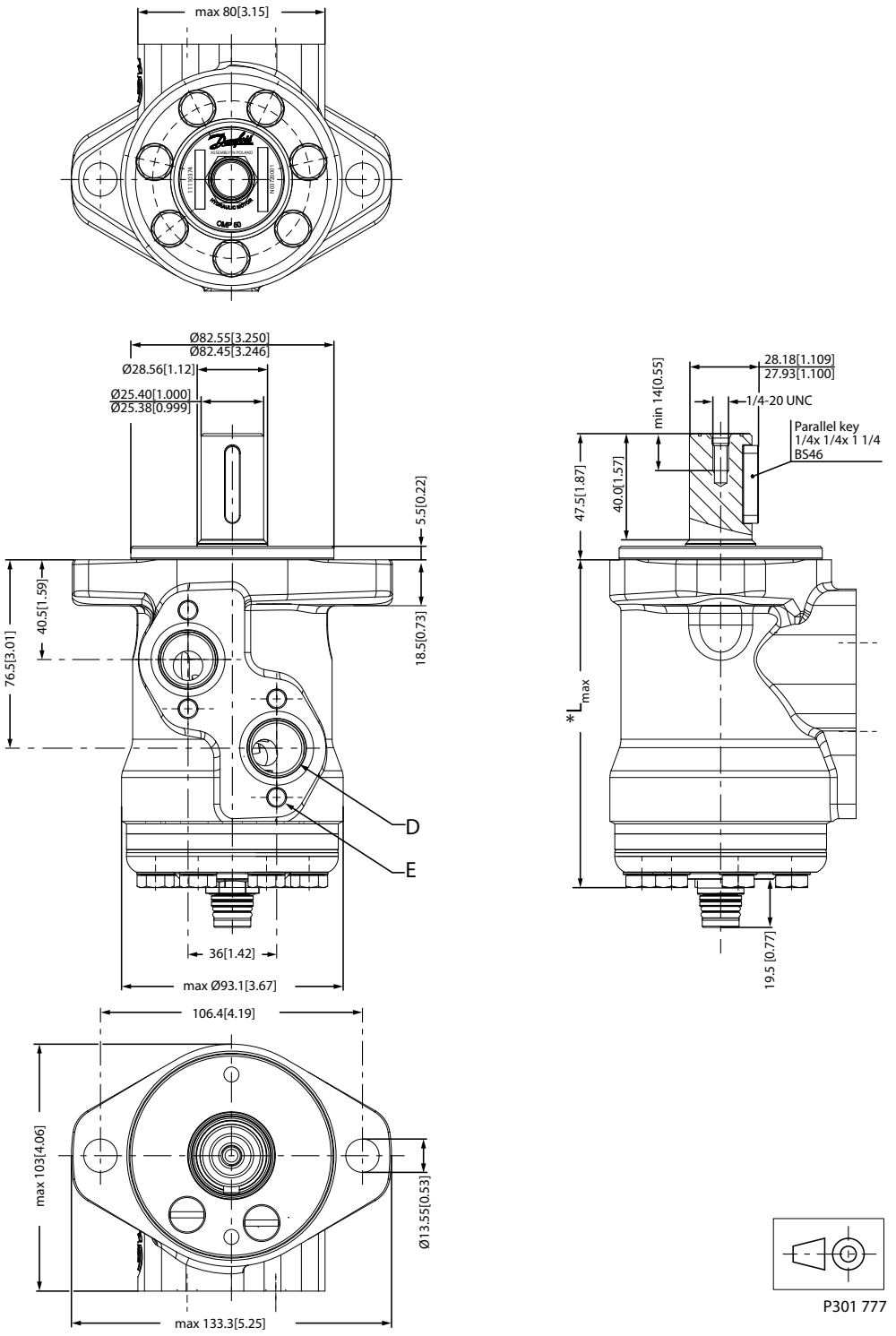
Dimension, European version, OMP EMD side port version

Dimensions

Type	*L_{max} mm [in]
OMP 25 EMD	131.0 [5.16]
OMP 32 EMD	131.9 [5.19]
OMP 40 EMD	133.2 [5.24]
OMP 50 EMD	133.2 [5.24]
OMP 80 EMD	137.2 [5.40]
OMP 100 EMD	139.7 [5.50]
OMP 125 EMD	143.5 [5.65]
OMP 160 EMD	147.5 [5.81]
OMP 200 EMD	152.7 [6.01]
OMP 250 EMD	159.2 [6.27]
OMP 315 EMD	167.6 [6.60]

Dimension, US version, OMP EMD side port version

OMP EMD side port version with 2 hole oval mounting flange (A2-flange), US version



D : G1/2; 15 mm [0.59 in] deep

E : M8; 13 mm [0.51 in] deep

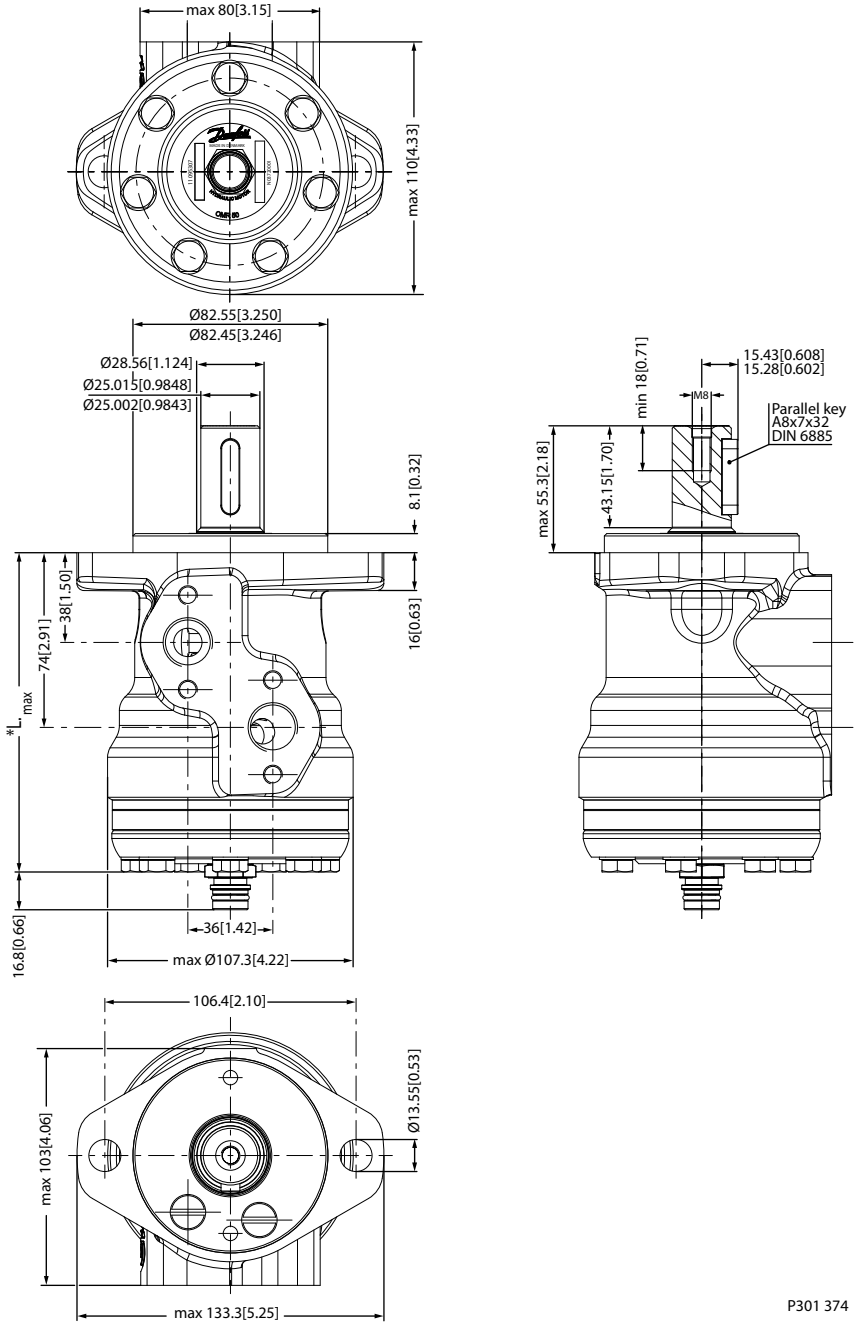
Dimension, US version, OMP EMD side port version

Dimensions

Type	*L_{max} mm [in]
OMP 25 EMD	134.3 [5.29]
OMP 50 EMD	136.7 [5.38]
OMP 80 EMD	140.6 [5.53]
OMP 100 EMD	143.2 [5.64]
OMP 125 EMD	146.9 [5.78]
OMP 160 EMD	151.0 [5.94]
OMP 200 EMD	156.2 [6.15]
OMP 250 EMD	162.7 [6.41]
OMP 315 EMD	171.1 [6.74]

Dimensions, European version, OMR EMD side port version

OMR EMD side port version with 2 hole oval mounting flange (A2-flange)



D : G1/2; 15 mm [0.59 in] deep

E : M8; 13 mm [0.51 in] deep

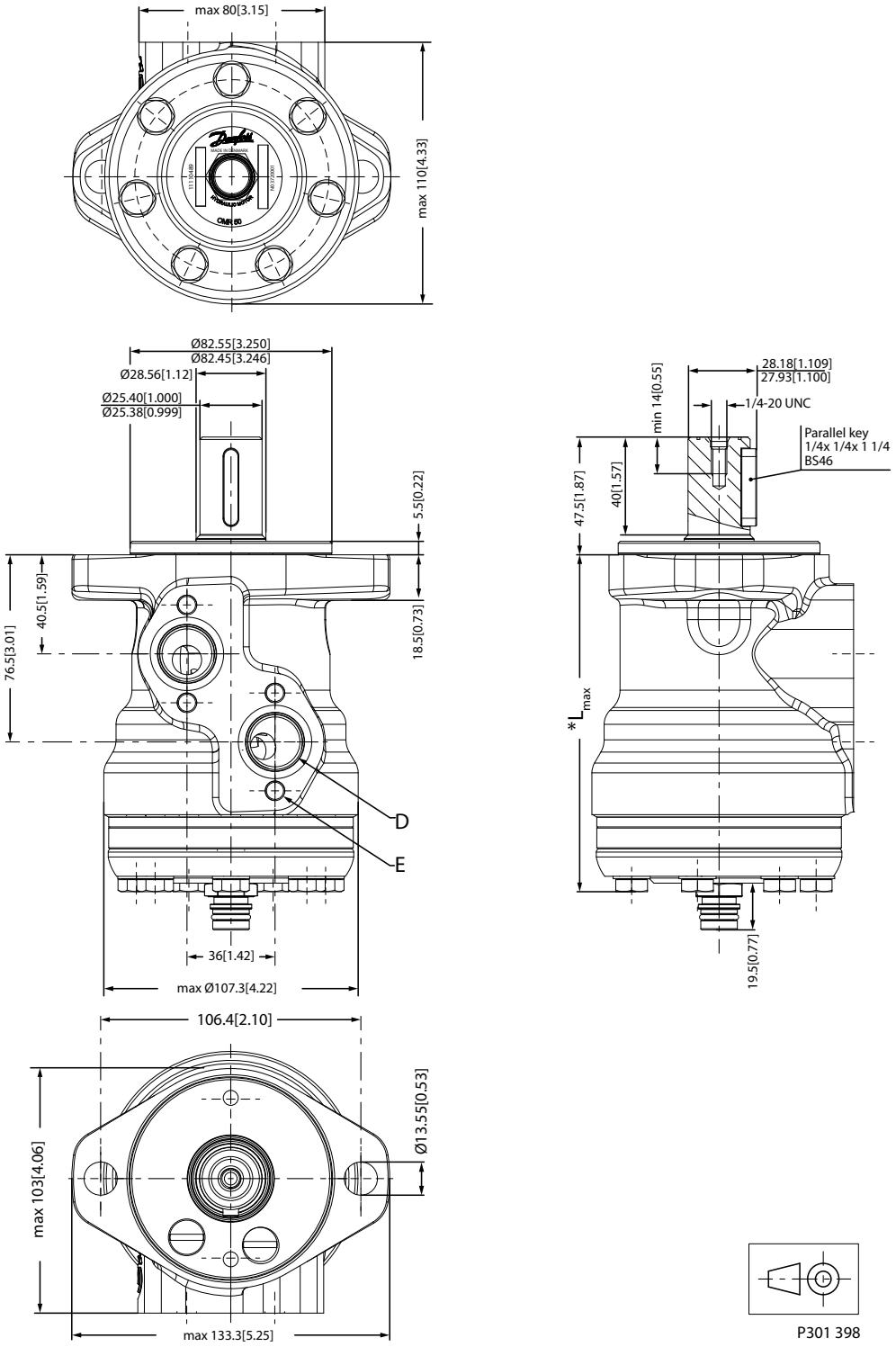
Dimensions, European version, OMR EMD side port version

Dimensions

Type	*L_{max} mm [in]
OMR 50 EMD	137.8 [5.43]
OMR 80 EMD	142.8 [5.62]
OMR 100 EMD	146.2 [5.76]
OMR 125 EMD	150.6 [5.93]
OMR 160 EMD	156.6 [6.17]
OMR 200 EMD	163.6 [6.44]
OMR 250 EMD	172.3 [6.78]
OMR 315 EMD	183.6 [7.23]
OMR 375 EMD	193.8 [7.63]

Dimensions, US version, OMR EMD side port version

OMR EMD side port version with 2 hole oval mounting flange (A2-flange)



D : 7/8-14 UNF; 16.7 mm [0.66 in] deep

E : M8; 13 mm [0.51 in] deep

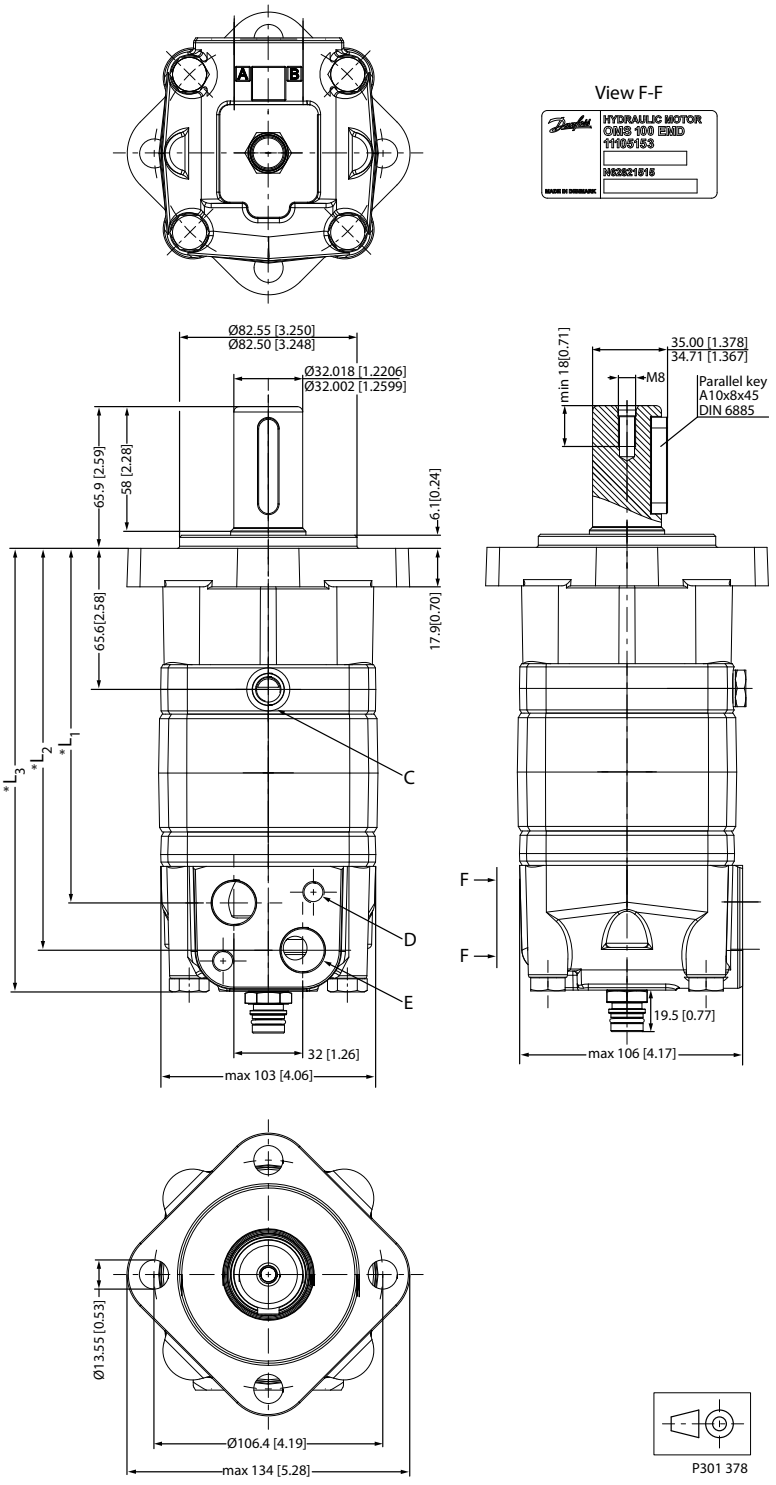
Dimensions, US version, OMR EMD side port version

Dimensions

Type	*L_{max} mm [in]
OMR 50 EMD	140.2 [5.52]
OMR 80 EMD	145.2 [5.72]
OMR 100 EMD	148.6 [5.85]
OMR 125 EMD	153.0 [6.02]
OMR 160 EMD	159.0 [6.26]
OMR 200 EMD	166.0 [6.54]
OMR 250 EMD	174.7 [6.88]
OMR 315 EMD	186.0 [7.32]
OMR 375 EMD	196.2 [7.72]

Dimensions, European version, OMS EMD

OMS EMD



C: Drain connection G 1/4; 12 mm [0.47 in] deep

D: M10; 13 mm [0.51 in] deep

E: G 1/2; 15 mm [0.59 in] deep

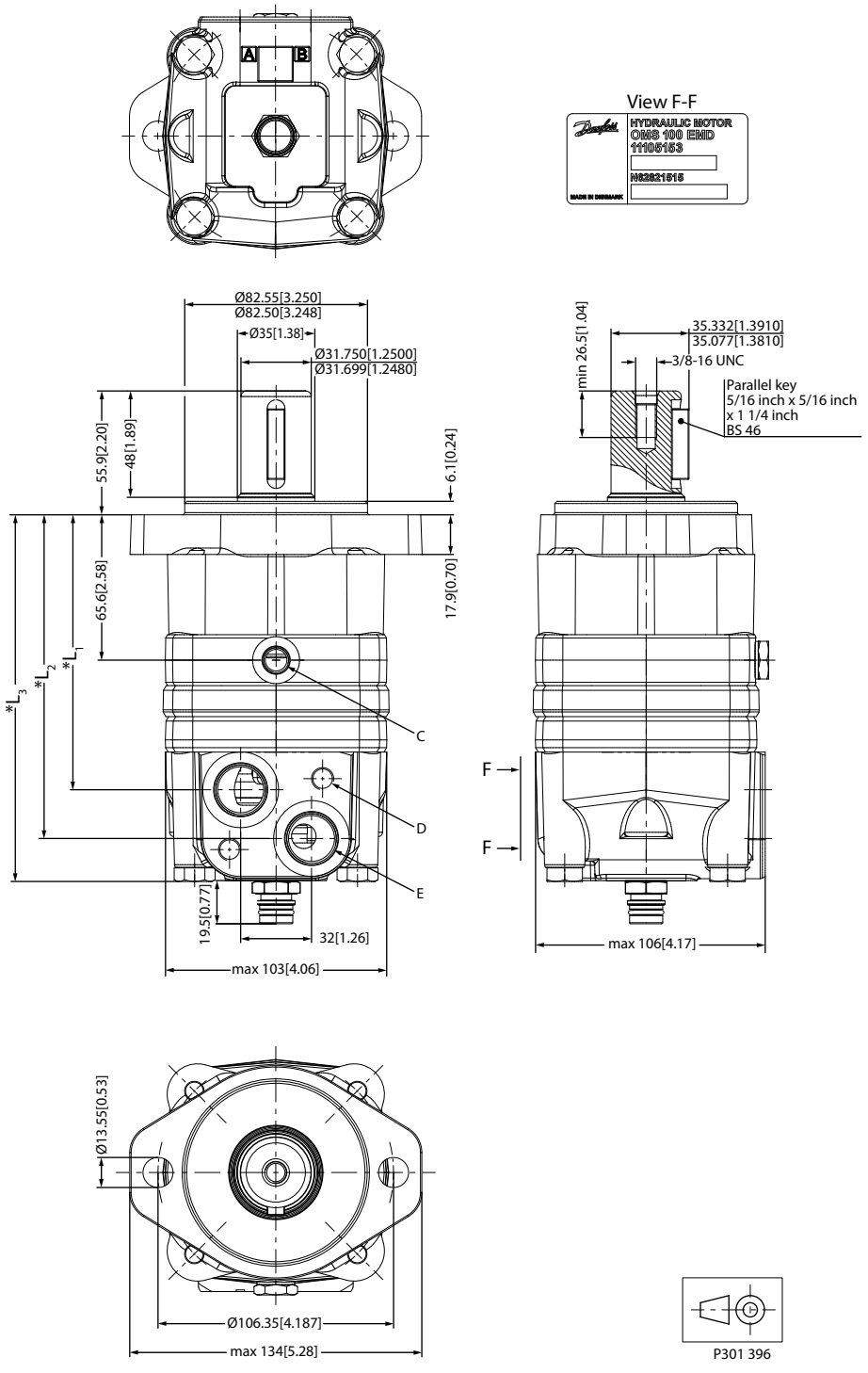
Dimensions, European version, OMS EMD

Dimensions

Type	*L_1 mm [in]	*L_2 mm [in]	*L_3 mm [in]
OMS 80 EMD	124.1 [4.89]	146.1 [5.75]	168.4 [6.63]
OMS 100 EMD	127.5 [5.02]	149.5 [5.89]	171.8 [6.76]
OMS 125 EMD	131.9 [5.20]	153.9 [6.06]	176.2 [6.93]
OMS 160 EMD	137.9 [5.43]	159.9 [6.30]	182.2 [7.17]
OMS 200 EMD	144.9 [5.70]	166.9 [6.57]	189.2 [7.45]
OMS 250 EMD	153.6 [6.05]	175.6 [6.91]	197.9 [7.80]
OMS 315 EMD	164.9 [6.49]	186.9 [7.36]	209.2 [8.24]
OMS 400 EMD	178.5 [7.03]	200.5 [7.89]	222.8 [8.77]
OMS 500 EMD	178.5 [7.03]	200.5 [7.89]	222.8 [8.77]

Dimensions, US version, OMS EMD

OMS EMD



C: Drain connection 7/16-20 UNF; 12 mm [0.47 in] deep

D: M10; 13 mm [0.51 in] deep

E: 7/8-14 UNF; 16.7 mm [0.66 in] deep O-ring boss port

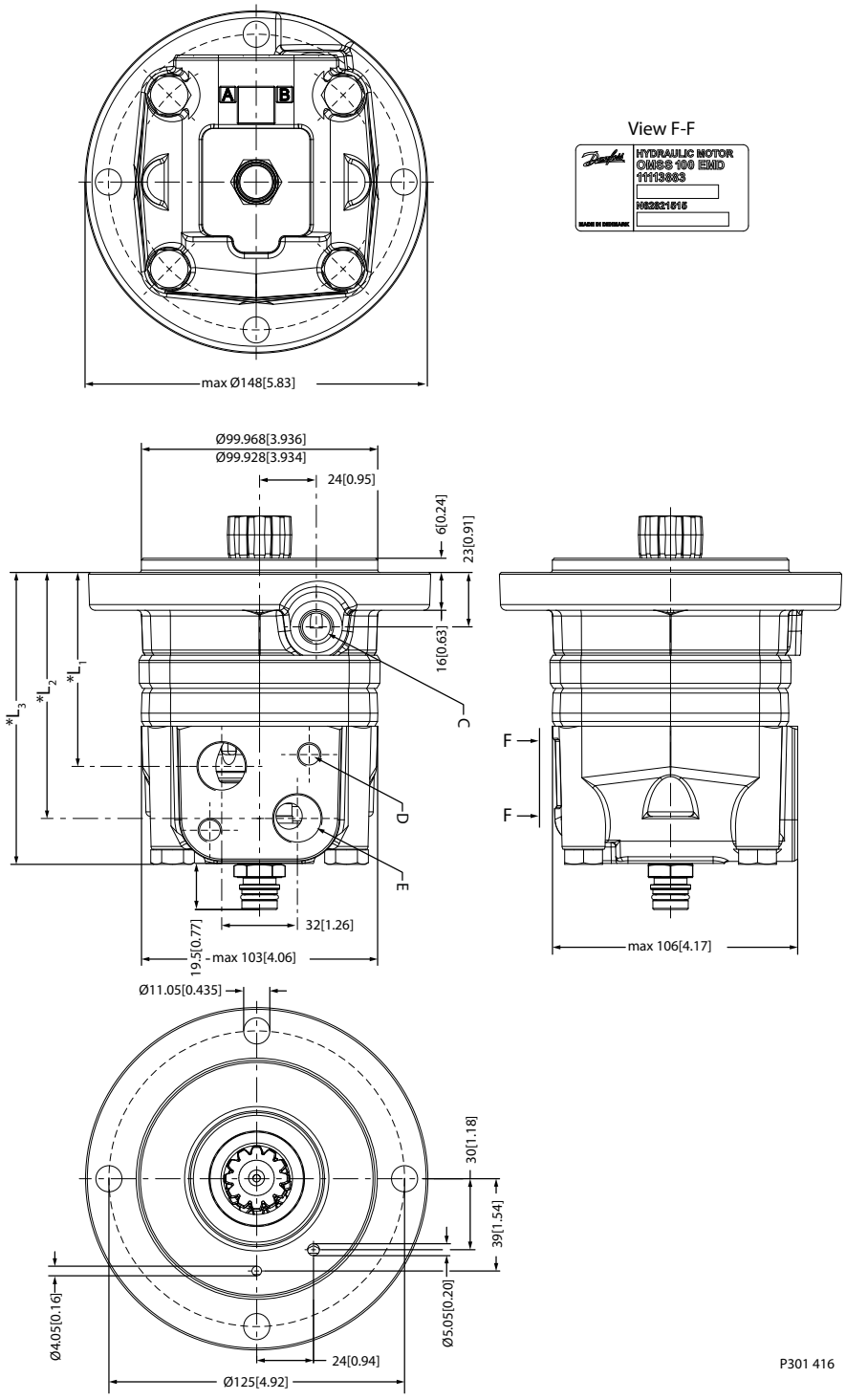
Dimensions, US version, OMS EMD

Dimensions

Type	*L_1 mm [in]	*L_2 mm [in]	*L_3 mm [in]
OMS 80 EMD	124.1 [4.89]	146.1 [5.75]	168.4 [6.63]
OMS 100 EMD	127.5 [5.02]	149.5 [5.89]	171.8 [6.76]
OMS 125 EMD	131.9 [5.20]	153.9 [6.06]	176.2 [6.93]
OMS 160 EMD	137.9 [5.43]	159.9 [6.30]	182.2 [7.17]
OMS 200 EMD	144.9 [5.70]	166.9 [6.57]	189.2 [7.45]
OMS 250 EMD	153.6 [6.05]	175.6 [6.91]	197.9 [7.80]
OMS 315 EMD	164.9 [6.49]	186.9 [7.36]	209.2 [8.24]
OMS 400 EMD	178.5 [7.03]	200.5 [7.89]	222.8 [8.77]
OMS 500 EMD	178.5 [7.03]	200.5 [7.89]	222.8 [8.77]

Dimensions, European version, OMSS EMD

OMSS EMD



C: Drain connection G 1/4; 12 mm [0.47 in] deep

D: M10; 13 mm [0.51 in] deep

E: G 1/2; 16 mm [0.63 in] deep

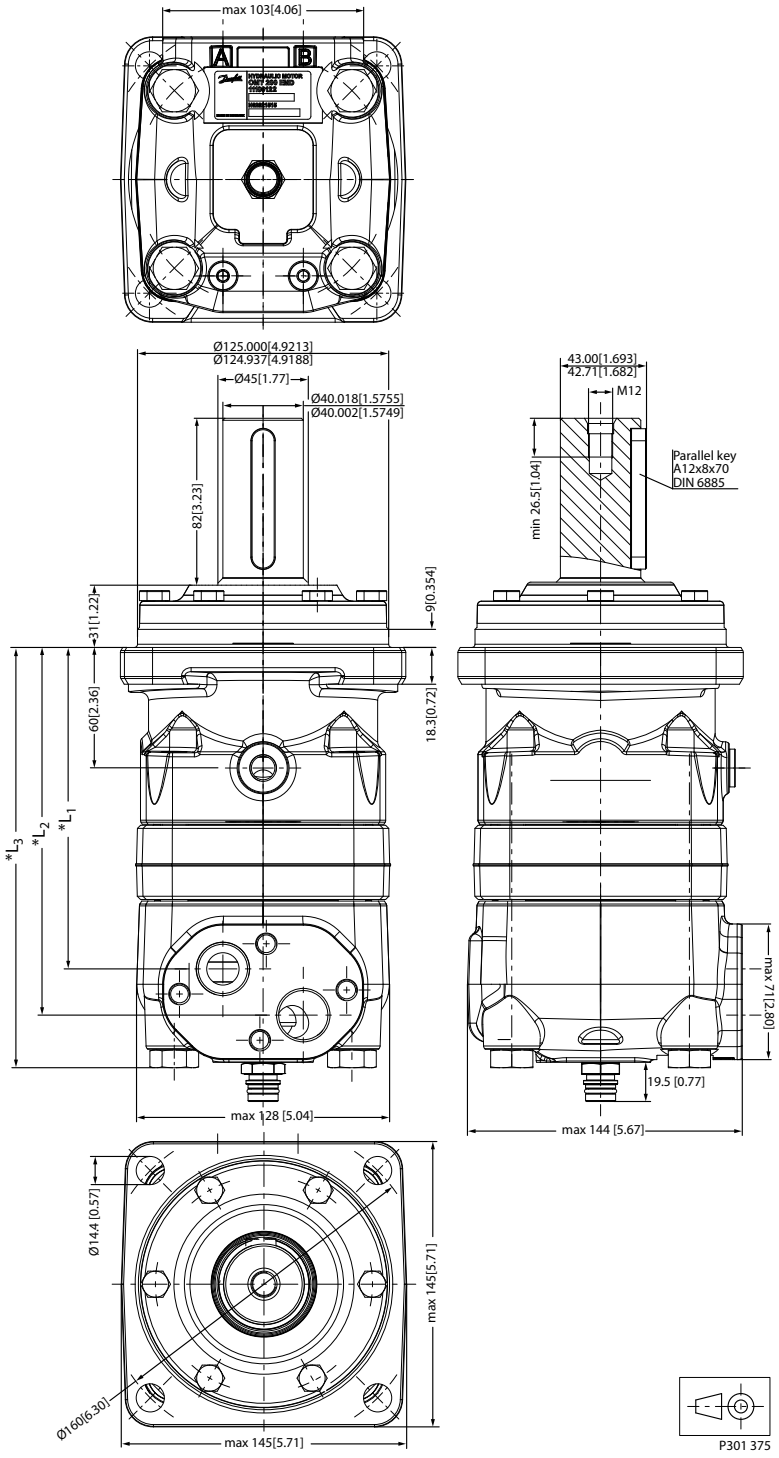
Dimensions, European version, OMSS EMD

Dimensions

Type	*L_1 mm [in]	*L_2 mm [in]	*L_3 mm [in]
OMSS 80 EMD	82.0 [3.28]	104.0 [4.09]	126.0 [4.96]
OMSS 100 EMD	85.4 [3.36]	107.4 [4.23]	129.4 [5.09]
OMSS 125 EMD	89.8 [3.53]	111.8 [4.40]	133.8 [5.27]
OMSS 160 EMD	95.8 [3.77]	117.8 [4.64]	139.8 [5.50]
OMSS 200 EMD	102.8 [4.08]	124.8 [4.91]	146.8 [5.78]
OMSS 250 EMD	111.5 [4.39]	133.5 [5.26]	155.5 [6.12]
OMSS 315 EMD	122.8 [4.83]	144.8 [5.71]	166.8 [6.57]

Dimensions, European version, OMT EMD

OMT EMD



C: Drain connection G 1/4; 12 mm [0.47 in] deep

D: M10; 10 mm [0.39 in] deep

E: G 3/4; 17 mm [0.67 in] deep

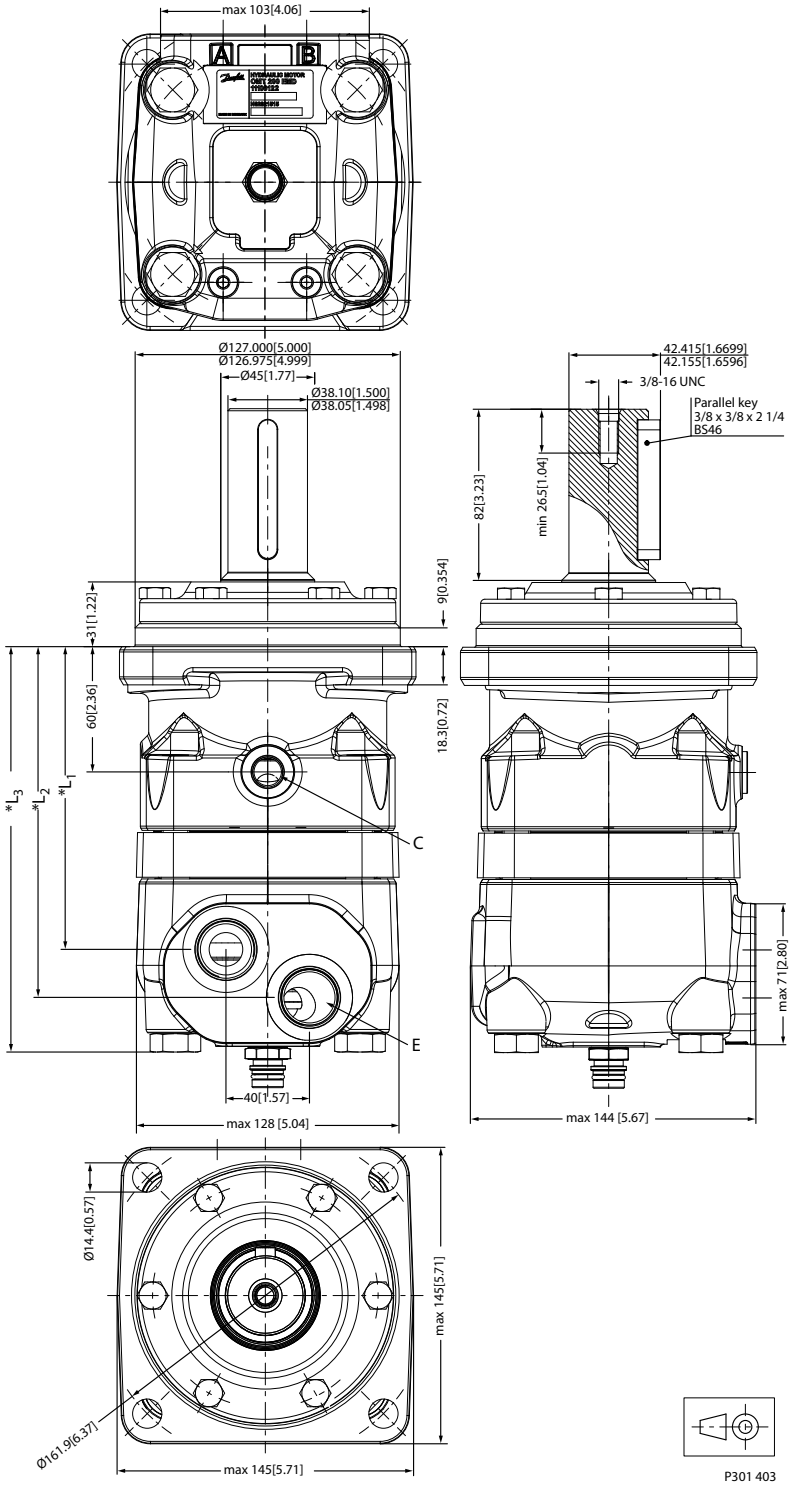
Dimensions, European version, OMT EMD

Dimensions

Type	*L_1 mm [in]	*L_2 mm [in]	*L_3 mm [in]
OMT 160 EMD	140.0 [5.51]	163.0 [6.42]	192.2 [7.57]
OMT 200 EMD	145.0 [5.70]	168.0 [6.61]	197.2 [7.76]
OMT 250 EMD	151.3 [5.96]	174.3 [6.86]	203.5 [8.01]
OMT 315 EMD	160.5 [6.32]	183.5 [7.22]	212.7 [8.37]
OMT 400 EMD	171.0 [6.73]	194.0 [7.64]	223.2 [8.79]
OMT 500 EMD	185.0 [7.28]	208.0 [8.19]	237.2 [9.34]

Dimensions, US version, OMT EMD

OMT EMD



C: Drain connection, 9/16-18 UNF; 13 mm [0.51 in] deep

E: 1 1/16 UN; 19 mm [0.75 in] deep

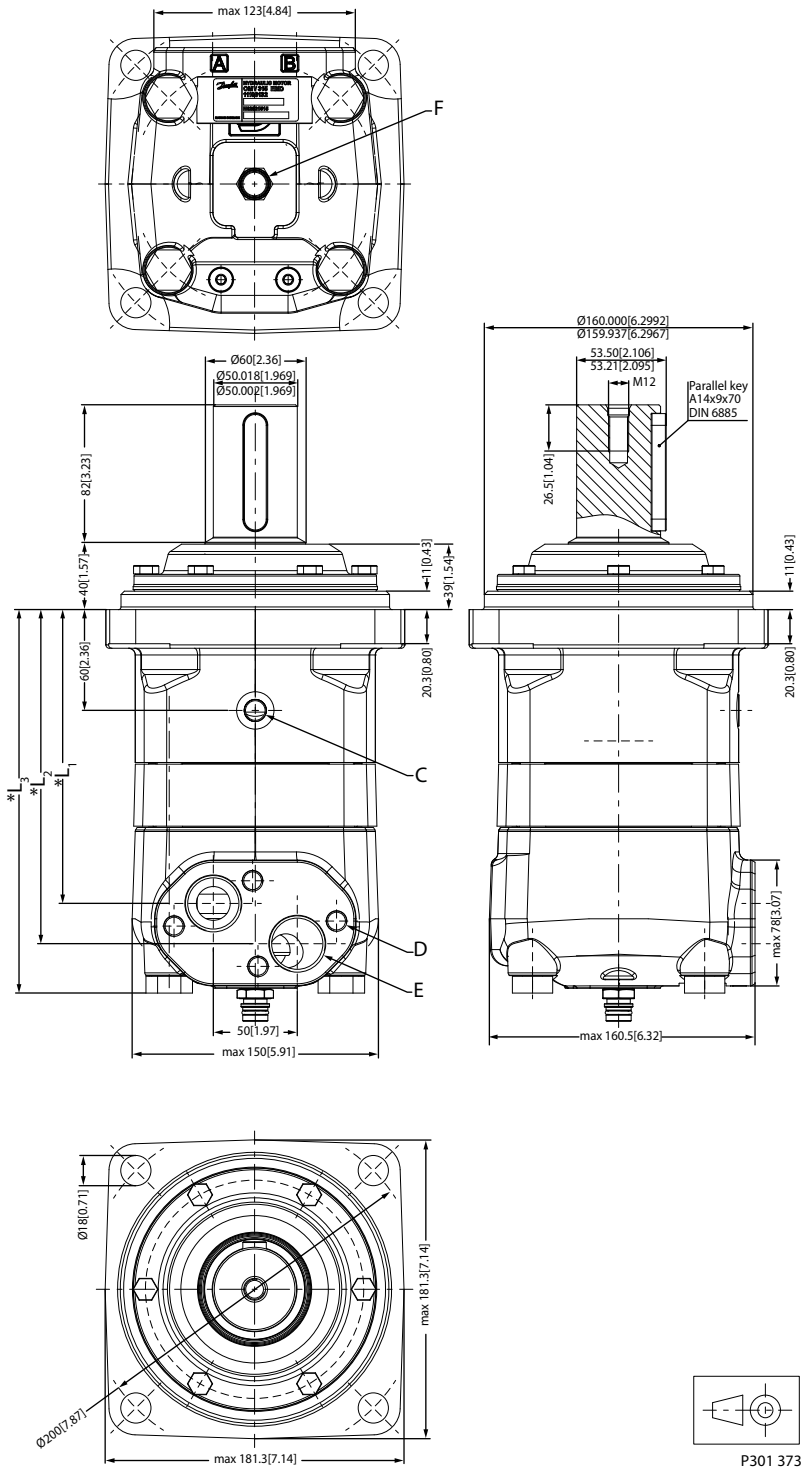
Dimensions, US version, OMT EMD

Dimensions

Type	*L_1 mm [in]	*L_2 mm [in]	*L_3 mm [in]
OMT 160 EMD	140.0 [5.51]	163.0 [6.42]	192.2 [7.57]
OMT 200 EMD	145.0 [5.71]	168.0 [6.61]	197.2 [7.76]
OMT 250 EMD	151.3 [5.96]	174.3 [6.86]	203.5 [8.01]
OMT 315 EMD	160.5 [6.32]	183.5 [7.22]	212.7 [8.37]
OMT 400 EMD	171.0 [6.73]	194.0 [7.64]	223.2 [8.79]
OMT 500 EMD	185.0 [7.28]	208.0 [8.19]	237.2 [9.34]

Dimensions, European version, OMV EMD

OMV EMD



C: Drain connection G 1/4; 12 mm [0.47 in] deep

D: M12; 12 mm [0.47 in] deep

E: G 1; 18 mm [0.71 in] deep

Dimensions, European version, OMV EMD

Dimensions

Type	*L_1 mm [in]	*L_2 mm [in]	*L_3 mm [in]
OMV 315 EMD	160.0 [6.30]	184.0 [7.24]	216.4 [8.52]
OMV 400 EMD	167.0 [6.57]	191.0 [7.51]	223.5 [8.80]
OMV 500 EMD	175.0 [6.89]	199.0 [7.83]	231.5 [9.11]
OMV 630 EMD	185.5 [7.30]	209.5 [8.25]	242.0 [9.53]
OMV 800 EMD	199.5 [7.85]	223.5 [8.80]	256.0 [10.08]

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