

Technical Information

Orbital Motor EMD Speed Sensor



Revision history

Table of revisions

Date	Changed	Rev
June 2021	Changed document number from 'L1017287' to 'BC152886484579' and removed obsolete motors	0501
April 2015	Various minor changes	DB
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	new motor 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 orbital 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.

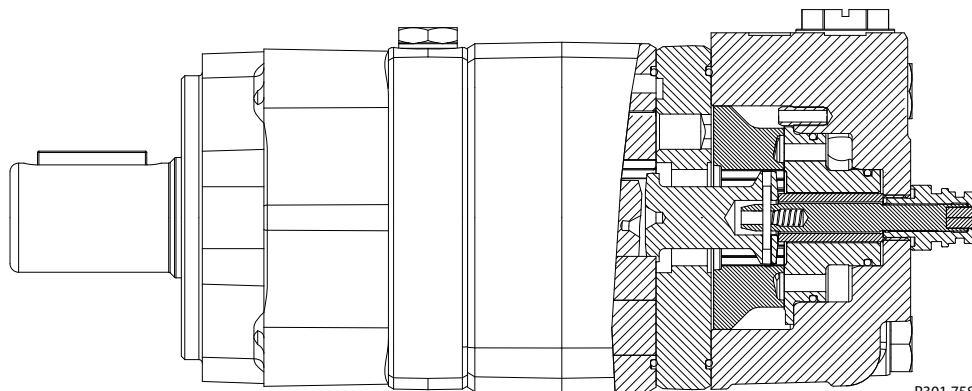
Mounting with a snap/click lock and can be adjusted in 36 different positions.

- Available for following LSHT-motors: 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

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	Pulse/rev (PPR)	180

* Fixed setting. Can not be changed

† Hexadecimal

Special sensor

Part number	Output	Parameter	Default setting
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.

Order information

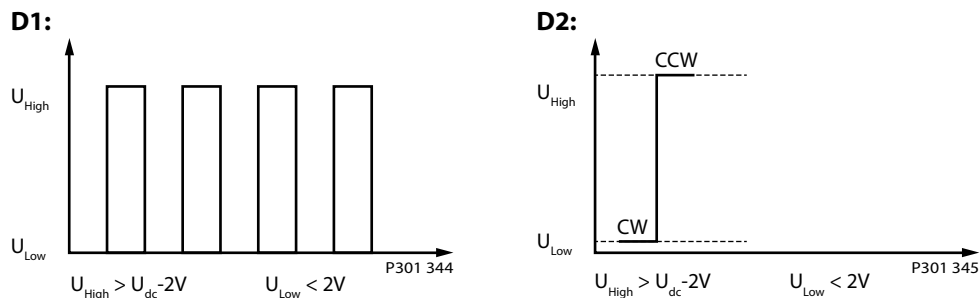
Orbital Motor prepared for EMD speed sensor is to be order separately. See [OMT EMD and OMV EMD versions](#) on page 12.

[If you need TMK, TMT or TMV motors with EMD Speed Sensor, please contact Danfoss](#)

General data

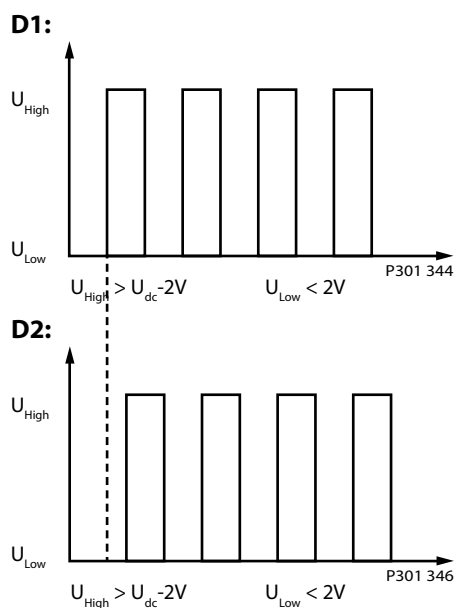
Pulse mode

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 (default), 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	

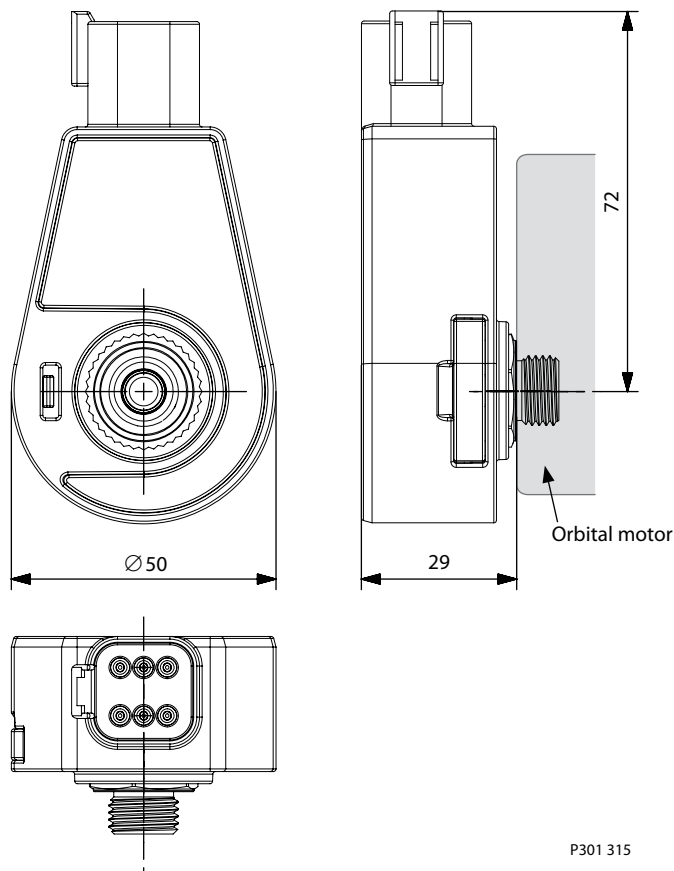
CAN ID: J1939 proprietary B. Programmable 29 bit message id.

General data

	ID = \$18FF20XX (source address XX is programmable, default value is \$51)
Sequence no.:	byte (0-255) 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



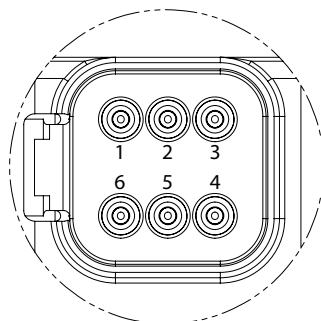
P301 315

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)

Deutsch DT connector – 6 pin



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Product overview

Mating connector

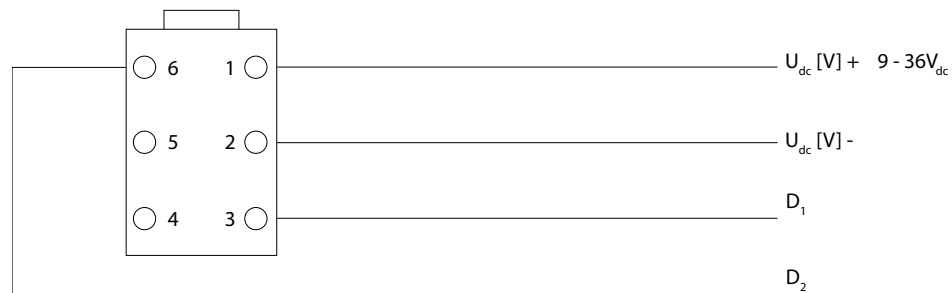
Deutsch DT connector 6 pin Mating connector assembly: (Not offered by Danfoss).

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

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

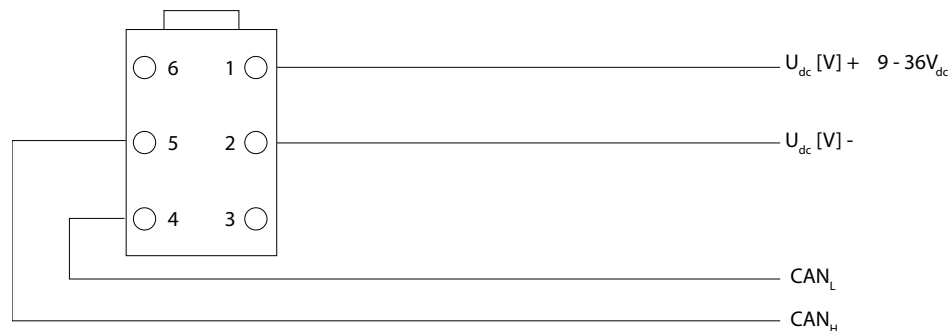
Wiring diagram

Wiring diagram: Pulse and quadrature mode



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Wiring diagram: CAN mode



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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.

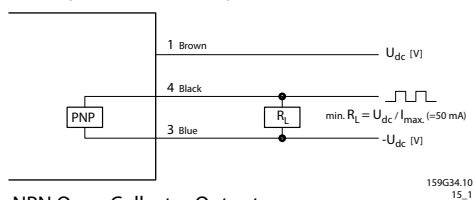
The resistor R_L which is used in the current NPN/PNP diagram is not needed but can under certain conditions remain in the circuit:

- If $R_L < U_{DC}/10 \text{ mA}$ remove or increase the size of the resistor.
- If $R_L > U_{DC}/10 \text{ mA}$ no change needed.

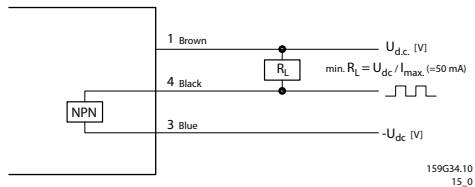
In case the EM-sensor and the controller have different power supply, it is needed to modify the circuit so that the EMD-sensor has the same power supply as the controller.

Product overview

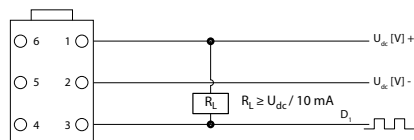
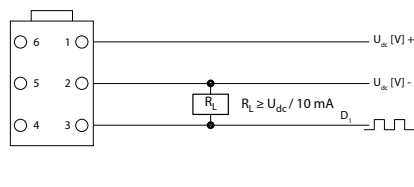
PNP Open Collector Output



NPN Open Collector Output



EMD-Speed Sensor



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Technical Information
Orbital Motor EMD Speed Sensor

Version and code numbers

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						
OMT EMD Motors												
Standard flange	∅125 mm	∅160 mm	Cyl. 40 mm	G 3/4	X		X	X	X	X	OMT EMD	1
	∅5 in	∅6.38	Cyl. 1.5 in	11/16 - 12 UN		X	X	X	X	X	OMT EMD	2
OMV EMD Motors												
Standard flange	∅160 mm	∅200 mm	Cyl. 50 mm	G 1	X		X	X	X	X	OMV EMD	3

Please contact Danfoss if a TMK, TMT, or TMV motor with EMD Speed Sensor is needed.

Code numbers

Displacements	Config. code		
	OMT EMD Motors		OMV EMD Motors
	1	2	3
160	11106121	11113705	
200	11106122	11113706	
250	11106123	11113707	
315	11095277	11113708	11106132
400	11106124	11113709	11106133
500	11106125	11113710	11095278
630			11106134
800			11106135

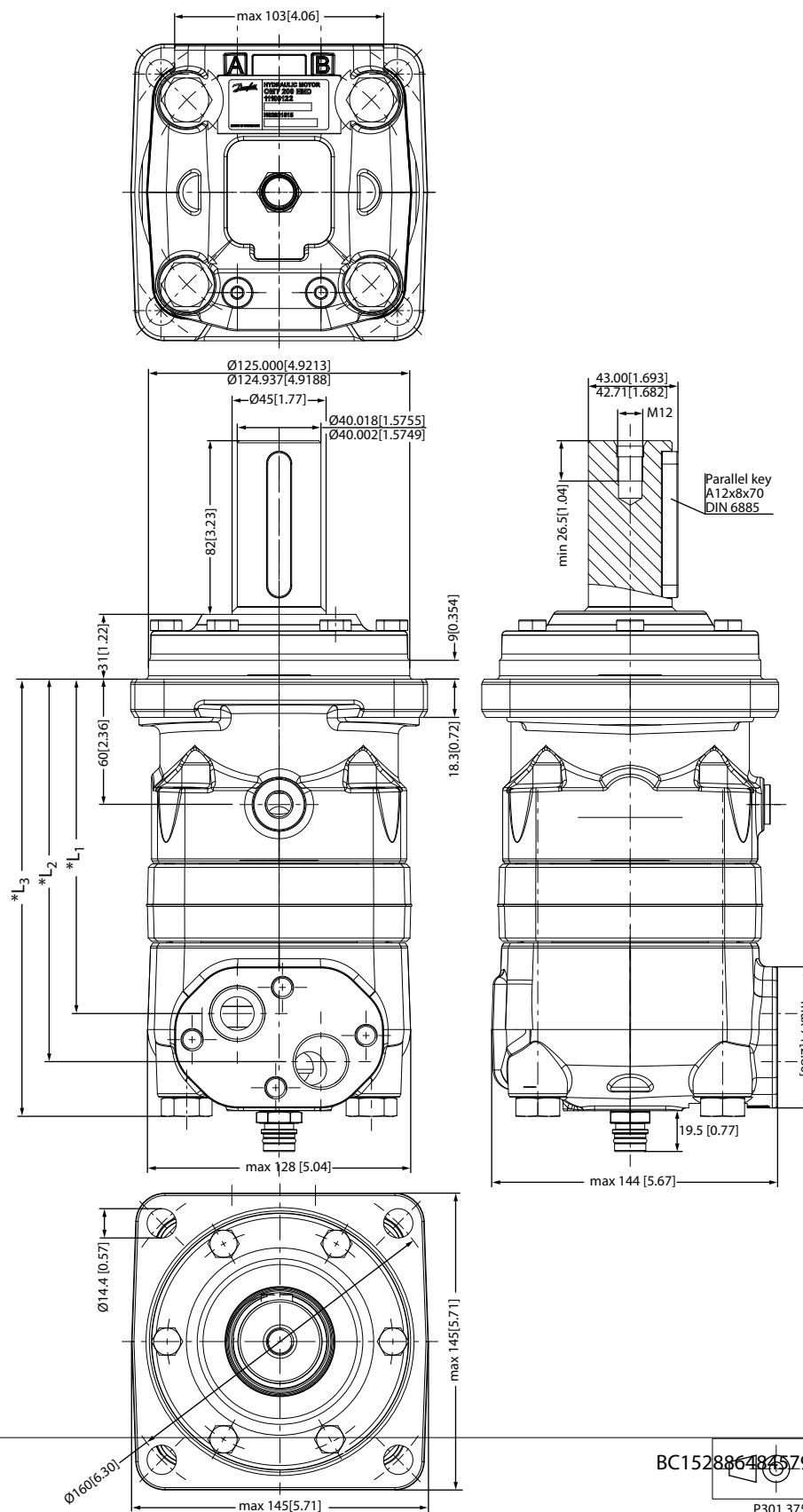
Order information

Orbital Motor prepared for EMD Speed Sensor is to be order separately. See [EMD speed sensor ordering information](#) on page 6.

Dimensions, European version, OMT EMD

OMT - European version

OMT EMD



Dimensions, European version, OMT EMD

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

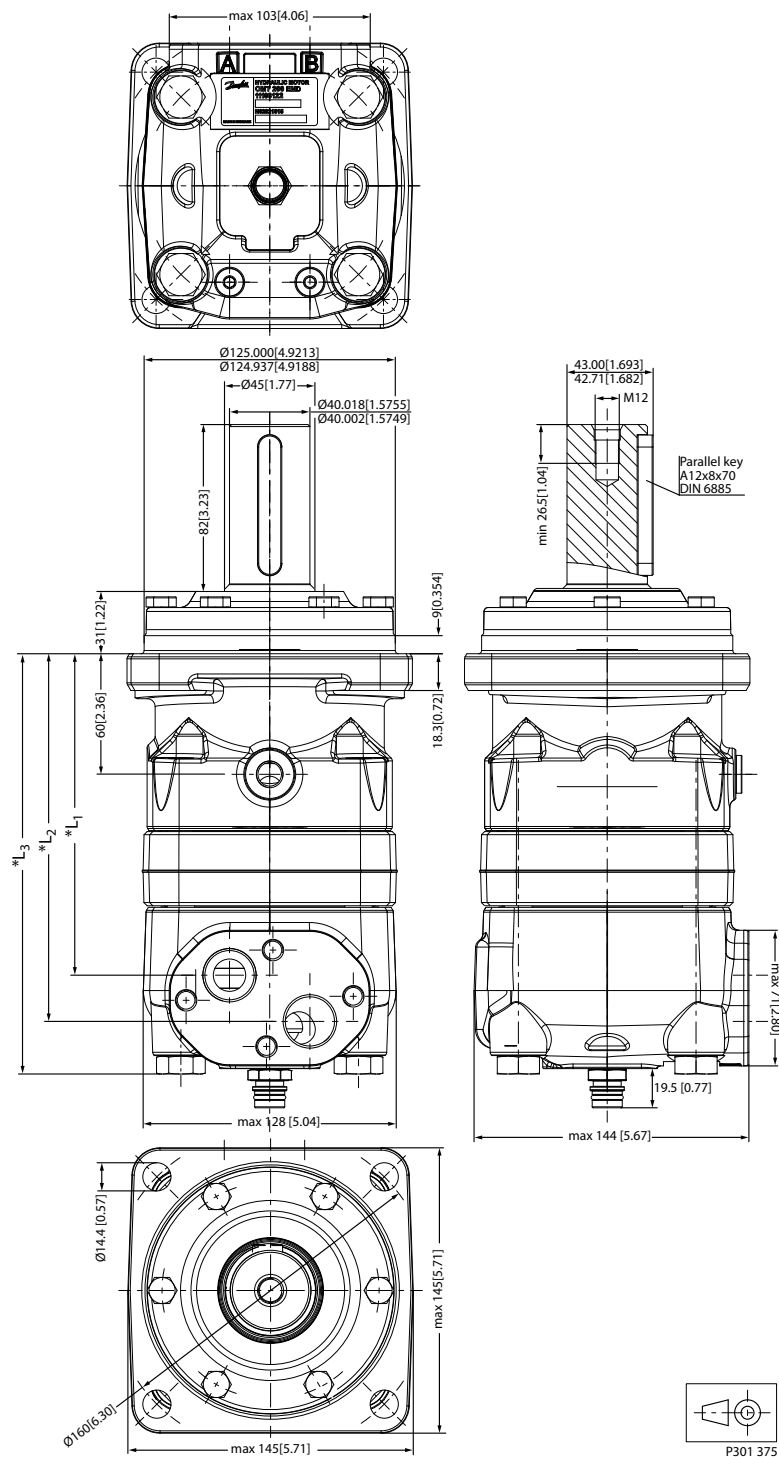
D: M10; 10 mm [0.39 in] deep

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

Type		OMT 160 EMD	OMT 200 EMD	OMT 250 EMD	OMT 315 EMD	OMT 400 EMD	OMT 500 EMD
*L ₁	mm [in]	140.0 [5.51]	145.0 [5.70]	151.3 [5.96]	160.5 [6.32]	171.0 [6.73]	185.0 [7.28]
*L ₂	mm [in]	163.0 [6.42]	168.0 [6.61]	174.3 [6.86]	183.5 [7.22]	194.0 [7.64]	208.0 [8.19]
*L ₃	mm [in]	192.2 [7.57]	197.2 [7.76]	203.5 [8.01]	212.7 [8.37]	223.2 [8.79]	237.2 [9.34]

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

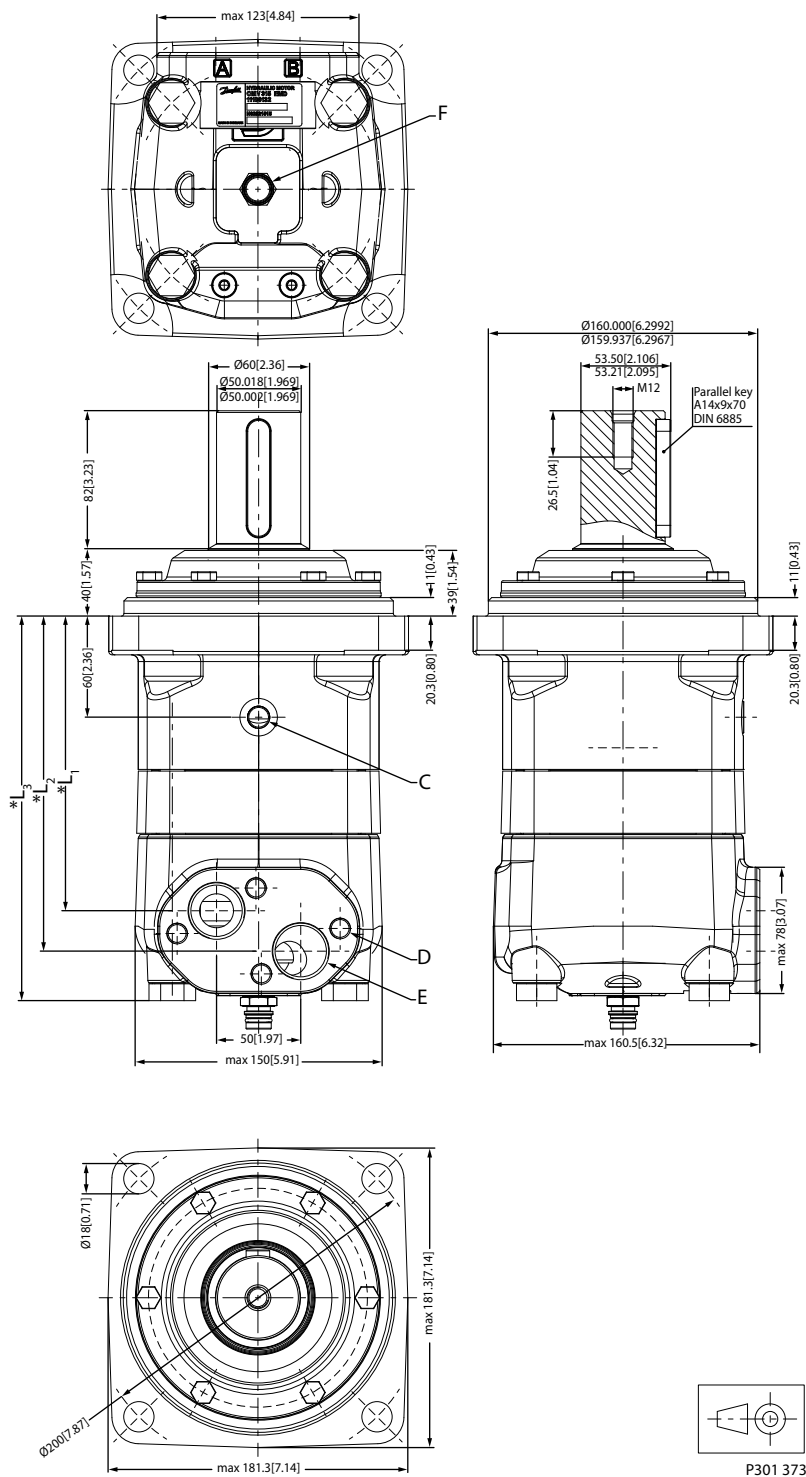
Dimensions, European version, OMT EMD***Dimensions***

Type	*L₁ mm [in]	*L₂ mm [in]	*L₃ 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, European version, OMT EMD

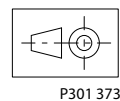
OMV - European version

OMV EMD



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

D: M12; 12 mm [0.47 in] deep



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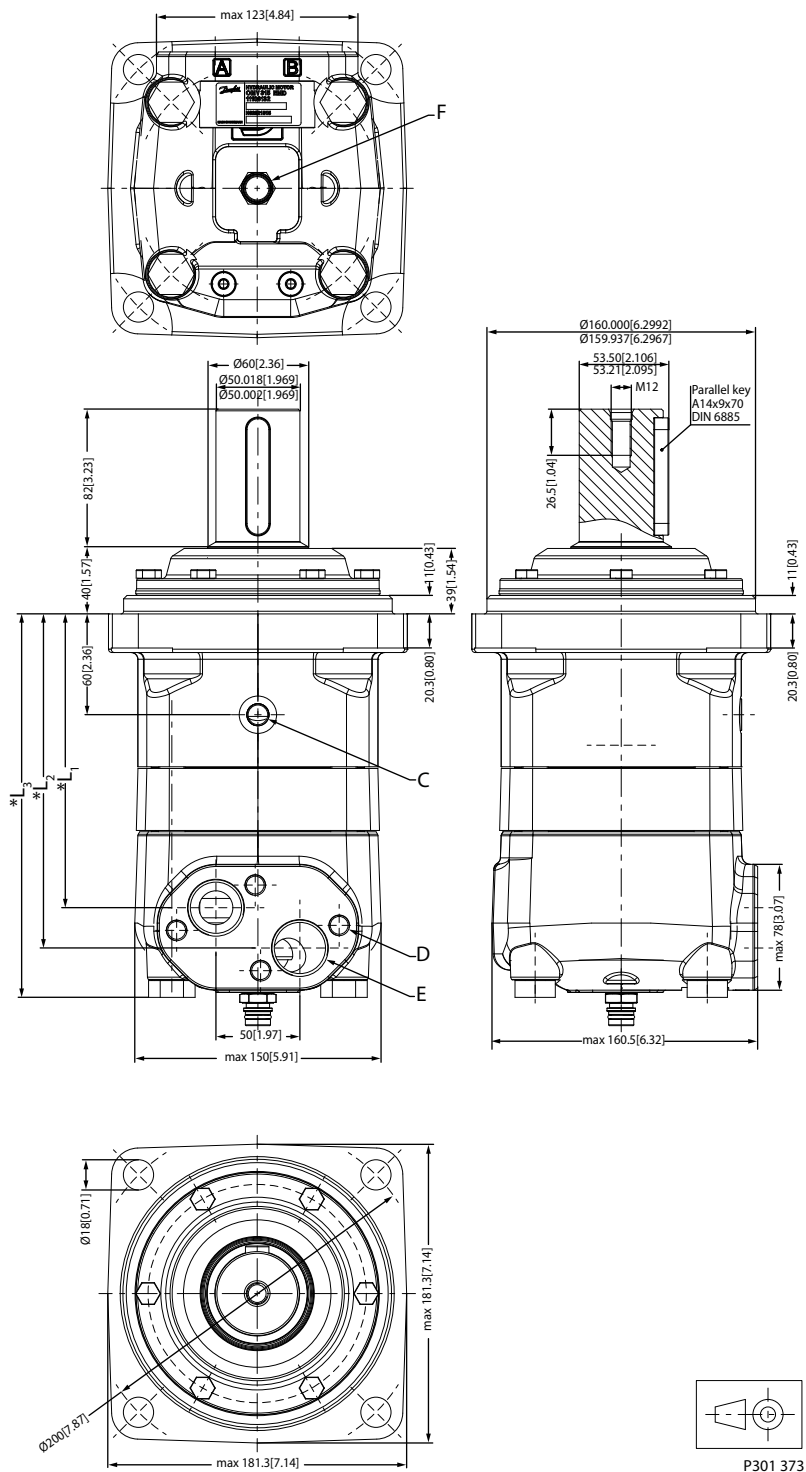
Dimensions, European version, OMT EMD

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

Type		OMV 315 EMD	OMV 400 EMD	OMV 500 EMD	OMV 630 EMD	OMV 800 EMD
*L ₁	mm [in]	160.0 [6.30]	167.0 [6.57]	175.0 [6.89]	185.5 [7.30]	199.5 [7.85]
*L ₂	mm [in]	184.0 [7.24]	191.0 [7.51]	199.0 [7.83]	209.5 [8.25]	223.5 [8.80]
*L ₃	mm [in]	216.4 [8.52]	223.5 [8.80]	231.5 [9.11]	242.0 [9.53]	256.0 [10.08]

Dimensions, European version, OMT 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, OMT EMD

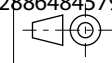
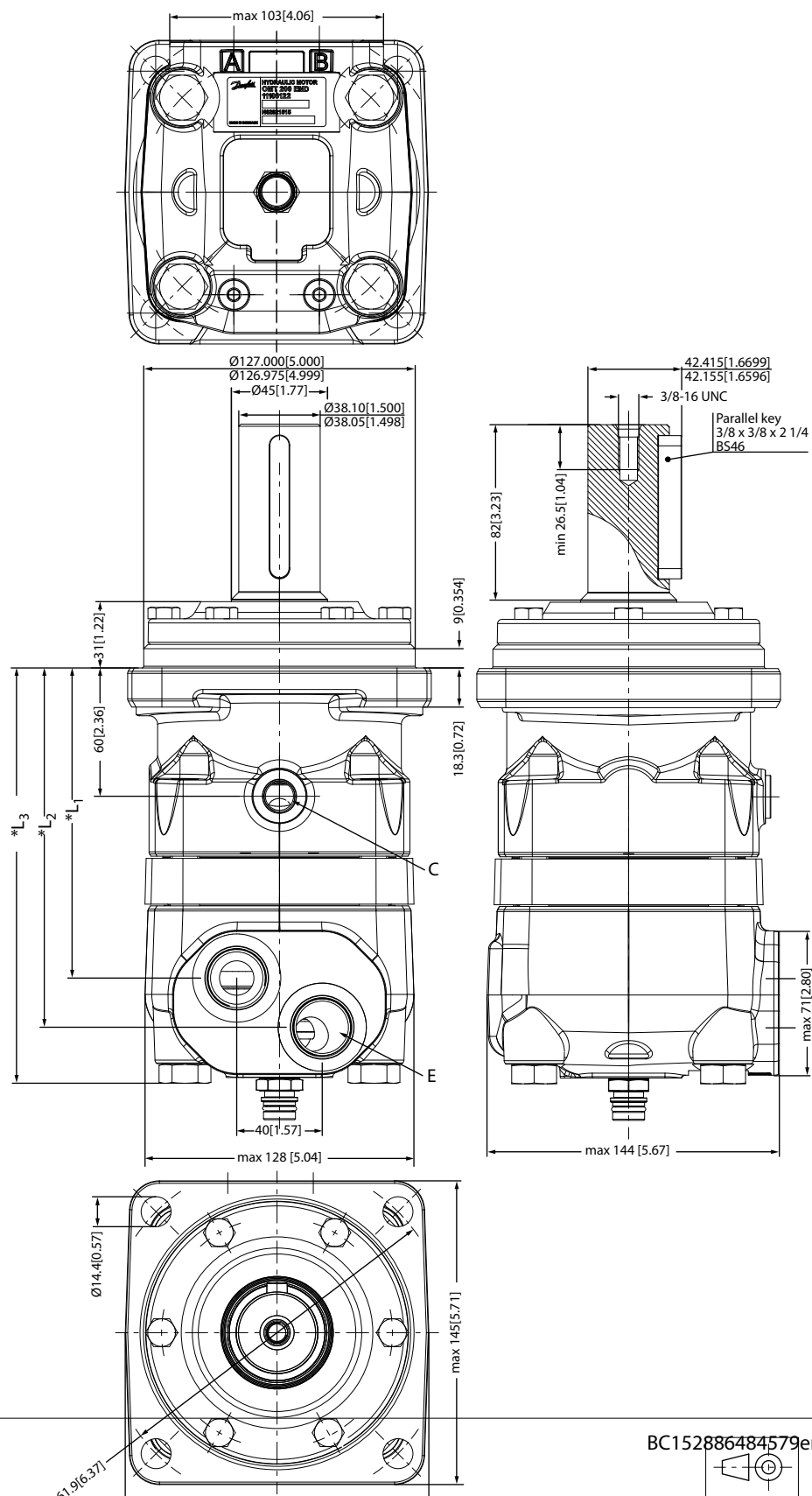
Dimensions

Type	*L₁ mm [in]	*L₂ mm [in]	*L₃ 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]

Dimensions, US version, OMT EMD

OMT - US version

OMT EMD



Dimensions, US version, OMT EMD

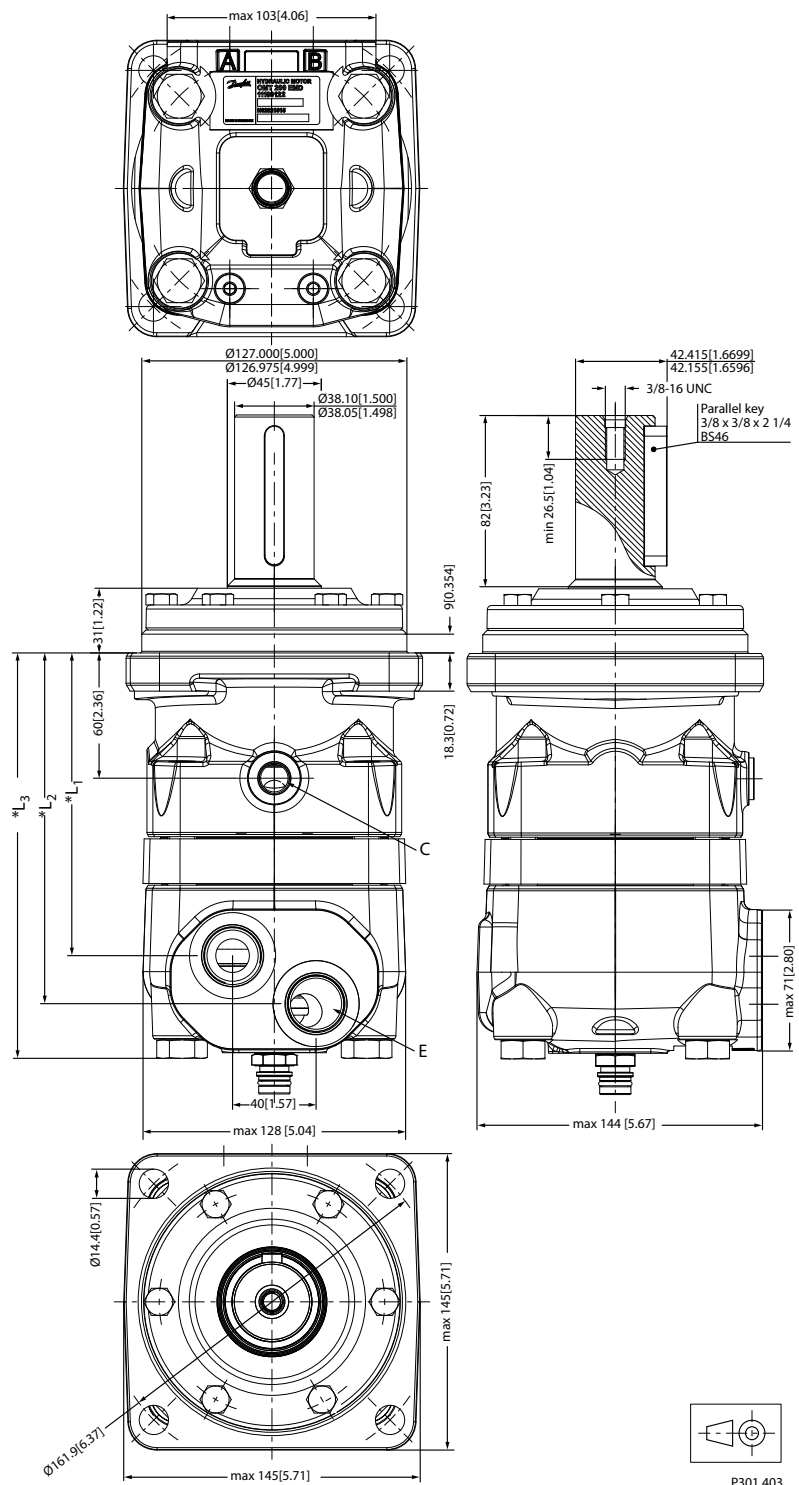
C: Drain connection, 9/16-18 UNF; 13 mm [0.51 in] deep

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

Type		OMT 160 EMD	OMT 200 EMD	OMT 250 EMD	OMT 315 EMD	OMT 400 EMD	OMT 500 EMD
*L ₁	mm [in]	140.0 [5.51]	145.0 [5.71]	151.3 [5.96]	160.5 [6.32]	171.0 [6.73]	185.0 [7.28]
*L ₂	mm [in]	163.0 [6.42]	168.0 [6.61]	174.3 [6.86]	183.5 [7.22]	194.0 [7.64]	208.0 [8.19]
*L ₃	mm [in]	192.2 [7.57]	197.2 [7.76]	203.5 [8.01]	212.7 [8.37]	223.2 [8.79]	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	*L₁ mm [in]	*L₂ mm [in]	*L₃ mm [in]
OMT 160 EMD	140.0 [5.51]	163.0 [6.42]	192.2 [7.57]
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OMT 500 EMD	185.0 [7.28]	208.0 [8.19]	237.2 [9.34]

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