

ENGINEERING
TOMORROW



Technical Information

ATEX certified OMT and OMV Orbital Motor



Revision history

Table of revisions

Date	Changed	Rev
June 2021	Removed obsolete products	0301
February 2020	Major revision	0105
August 2016	update code numbers	0104
March 2016	minor updates	0103
June 2015	Tapered shaft updated for wheel motor	AB
March 2015	First edition	AA

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Declaration

General Information

ATEX introduction

Hydraulic Orbital Motors are designed for mobile and stationary applications. Some motors are used in related applications, where locations are classified as hazardous areas.

The ATEX Directive 2014/34/EU specifies the minimum safety requirements for equipment intended for use in potentially explosive atmospheres in European Union member states. ATEX is derived from the French term “ATmosphères EXplosives”.

The equipment intended for use in hazardous areas are divided into two groups:

Group I: Equipment intended for use in underground parts of mines (mining equipment).

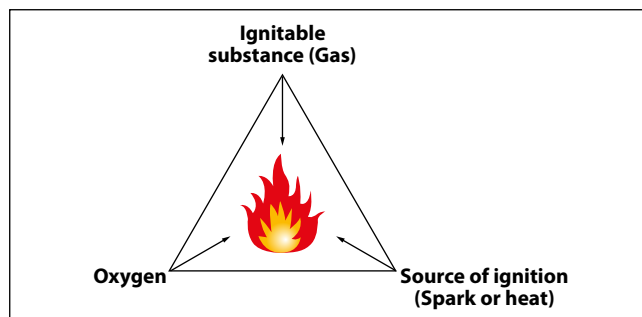
Group II: Equipment intended for use in other places than mines (non-mining equipment).

The hydraulic orbital motors are intended for use in Group II applications.

Explosive atmosphere

Explosion triangle

A “hazardous area” is defined as an area in which the atmosphere contains, or may contain in sufficient quantities, flammable or explosive gases, dusts or vapours. In such an atmosphere a fire or explosion is possible when three basic conditions are met. This is often referred to as the “hazardous area” or “explosion” triangle.



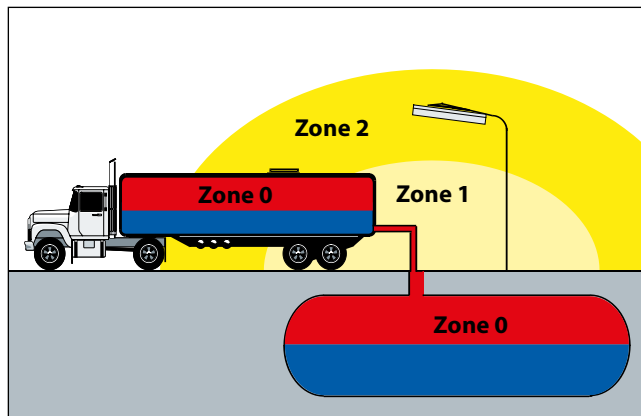
P301 800

An atmosphere with the potential to become an explosive atmosphere during operating conditions and/or under the influence of the surroundings is defined as a potentially explosive atmosphere. Products covered by directive 2014/34/EU are defined as intended for use in potentially explosive atmospheres. Removing one of the elements eliminates all risk of explosion.

General zone classification

Directive 99/92/EC divides the Hazardous areas into zones and defines criteria by which products are categorized within these zones; Zone 0 / 20 is the most restrictive and Zones 1 / 21 and 2 / 22 are less restrictive. The following table describes the zones in an installation where there is a potential for explosive atmospheres. The owner of the installation must analyze and assess the area in which the explosive gas/dust mixture may occur, and if necessary must divide it into zones. This process of zoning then allows the correct plant and equipment to be selected for use in the area.

General Information



F301 801

Zones		Presence of potentially explosive atmosphere	Type of risk
Gas (G)	Dust (D)		
0	20	Present continuously or for long periods	Permanent
1	21	Likely to occur in normal operation occasionally	Potential
2	22	Not likely to occur in normal operation but. If it does occur, will persist for a short period of time	Minimal

Equipment category and zones

Mechanical components with potential ignition sources e.g. components containing non-conductive materials or layers or components with hot surface are covered by the ATEX-directive.

Non-mining equipment for potentially explosive atmosphere is classified as:

Equipment Group II – this group comprises three categories according to the level of safety provided:

- Category 1
- Category 2
- Category 3

Category 1 equipment has the highest degree of protection – see the following below.

Degree of protection	Protection	Category
Very high	Two independent protection measures or safe if two errors occur independently	Category 1
High	Safe in normal operation and in anticipated case of commonly occurring errors	Category 2
Normal	Safe in normal operation	Category 3

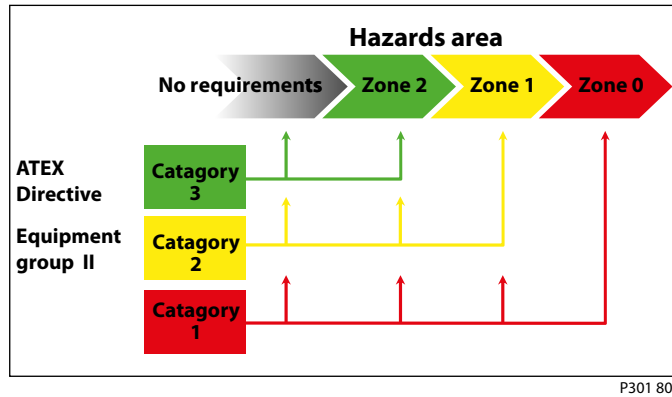
P301 802

These products have to fulfil all requirements in the ATEX directive, and have to be marked with the required "Ex" marking.

Equipment located in zone specified areas must fulfil the following requirements (see also the following figure):

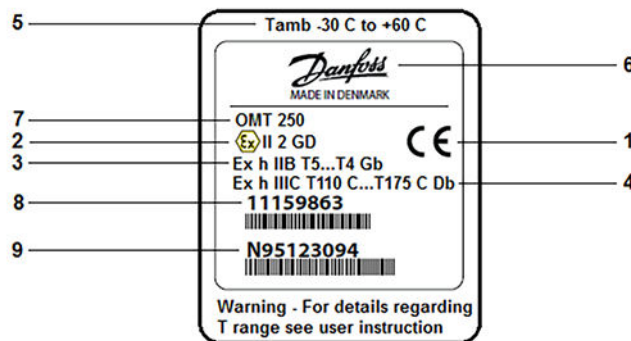
- Category 3 – approved equipment can be installed in hazardous areas zone 2 / 22 and outside zone categorized areas.
- Category 2 – approved equipment can be installed in hazardous areas zone 1 / 21, zone 2 / 22 and outside zone categorized areas.
- Category 1 – approved equipment can be installed in hazardous areas zone 0 / 20, zone 1 / 21, zone 2 / 22 and outside zone categorized areas.

General Information



Marking of Danfoss motors

The Danfoss OMT/V motors are marked for application in gaseous and dusty environments according to the below:



Key to label image:

1. CE Conformity marking
2. EU marking (per 2014/34/EU) - Directive part

Description	EU Marking
CE conformity marking	CE
Explosion protection marking	
Equipment group	II
Equipment Category	2G / 2D

3. EU marking (per EN ISO 80078-36.2016 Standard part)

Description	EU Marking
Protection principle	h
Explosion protection marking	Ex
Equipment group	II / III
Equipment protection level (EPL)	Gb / Db

General Information

Description			EU Marking
T-class	OMT	Gas	T5...T4
		Dust	T110°C...T175°C
	OMTS	Gas	T5...T4
		Dust	T75°C...T125°C
	OMV	Gas	T5...T4
		Dust	T120°C...T190°C
	OMVS	Gas	T5...T4
		Dust	T75°C...T125°C

EPL/Equipment category

Definition	Level of protection	Typical zone of application	EN ISO		EU	
			EPL	Group	Category	Group
Gas atmosphere	Very high	0	Ga	II	1G	II
	High	1	Gb		2G	
	Enhanced	2	Gc		3G	
Dust atmosphere	Very high	20	Da	III	1D	II
	High	21	Db		2D	
	Enhanced	22	Dc		3D	

4. See item 3
5. Min and max ambient temperature (See *T codes and maximum surface temperature for OMT and OMV motors* on page 8).
6. Manufacturer
7. Motor type and displacement
8. Code number
9. Production number, date, and series number

Example of item 9: **N95123094**

N Manufacturing location (N = Nordborg)
9 Year 2019
51 Week 51
2 Tuesday (1 = Monday)
3094 Consecutive number

T codes / Maximum surface temperature

T codes and maximum surface temperature for OMT and OMV motors

T codes for OMT motors – Gaseous environment (Group II)

OMT motors - Maximum fluid and ambient temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	T5	T5	T4
≤ 60 °C [140 °F]	T5	T4	T4
≤ 80 °C [176 °F]	T4	T4	T4

OMTS motors (short motor) - Maximum fluid and ambient temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	T5	T5	T5
≤ 60 °C [140 °F]	T5	T4	T4
≤ 80 °C [176 °F]	T4	T4	T4

T codes for OMV motors – Gaseous environment (Group II)

OMV motors - Maximum fluid and ambient temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	T5	T5	T4
≤ 60 °C [140 °F]	T4	T4	T4
≤ 80 °C [176 °F]	T4	T4	T4

OMVS motors (short motor) - Maximum fluid and ambient temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	T5	T5	T5
≤ 60 °C [140 °F]	T5	T4	T4
≤ 80 °C [176 °F]	T4	T4	T4

Classification of maximum surface temperatures for Group II equipment

Temperature class	Maximum surface temperature	
	°C	[°F]
T3	200	[392]
T4	135	[275]
T5	100	[212]

For Group II with T4 classification it is acceptable that small surface areas (total areas ≥ 20 mm² and ≤ 1000 mm²) can have surface temperature up to 200 °C.

For T5 classification it is acceptable that small surface areas (total areas ≤ 1000 mm²) can have surface temperature up to 150 °C.

T codes / Maximum surface temperature

Maximum surface temperature – Dusty environment (Group III)

OMT motors - Maximum surface temperatures

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	110 [230]	130 [266]	150 [302]
≤ 60 °C [140 °F]	120 [248]	140 [284]	160 [320]
≤ 80 °C [176 °F]	135 [275]	155 [311]	175 [347]

OMTS motors (short motor) - Maximum surface temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	75 [167]	85 [185]	95 [203]
≤ 60 °C [140 °F]	90 [194]	100 [212]	110 [230]
≤ 80 °C [176 °F]	105 [221]	115 [239]	125 [257]

OMV motors - Maximum surface temperatures

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	120 [248]	140 [284]	160 [320]
≤ 60 °C [140 °F]	135 [275]	155 [311]	175 [347]
≤ 80 °C [176 °F]	150 [302]	170 [338]	190 [374]

OMVS motors (short motor) - Maximum surface temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 40 °C [104 °F]	75 [167]	85 [185]	95 [203]
≤ 60 °C [140 °F]	90 [194]	100 [212]	110 [230]
≤ 80 °C [176 °F]	105 [221]	115 [239]	125 [257]

Above maximum surface temperatures are without any deposited dust on the motors. The possible insulation effect of a dust layer on the surface has to be taken into account by the safety margin to the minimum ignition temperature of the dust concerned. For up to 5 mm [1.97 in] layer thickness the safety margin is 75 °C [167 °F]. For further information please see IEC 60079-14.

Warning

The above operating temperatures (ambient and oil) of the motor must be guaranteed by the end user.

Warning

It is compulsory to use oils whose inflammable degree is at least 50K above the maximum surface temperature of the motor. See also *Oil types / Operating fluids* on page 12

Versions and code numbers

OMT motors

OMT standard motor

Mounting flange: standard 4 hole flange

Spigot diameter	Ø125 mm [4.92 in]				
Bolt circle diameter	Ø160 mm [6.30 in]				
Shaft	Main port size	Drain port size	Check valve	Main type designation	Configuration code
Cyl. Ø40 mm	G 3/4	G 1/4	X	OMT	A1
Splined 1.50 in	G 3/4	G 1/4	X	OMT	A2

Code numbers

Conf. code	Displacement					
	160	200	250	315	400	500
A1	11159855	11159856	11159857	11159858	11159859	11159860
A2	11159861	11159862	11159863	11159864	11159865	11159866

OMT short motor

Mounting flange: Short

Spigot diameter	Ø100 mm [3.94 in]				
Bolt circle diameter	Ø125 mm [4.92 in]				
Shaft	Main port size	Drain port size	Check valve	Main type designation	Configuration code
No output shaft	G 3/4	G 1/4	X	OMTS	C1

Code numbers

Conf. code	Displacement					
	160	200	250	315	400	500
C1	11159867	11159868	11159869	11159871	11159872	11159873

Versions and code numbers

OMV motors

OMV standard motors

Mounting flange: Standard 4 hole flange

Spigot diameter	Ø160 mm [6.30 in]				
Bolt circle diameter	Ø200 mm [7.87 in]				
Shaft	Main port size	Drain port size	Check valve	Main type designation	Configuration code
Cyl. Ø50 mm	G 1	G 1/4	X	OMV	A1
Splined 2.125 in	G 1	G 1/4	X	OMV	A2
Tapered 60 mm	G 1	G 1/4	X	OMV	A3

Code numbers

Conf. code	Displacement				
	315	400	500	630	800
A1	11159874	11159875	11159876	11159877	11159878
A2	11159879	11159880	11159881	11159882	11159883
A3	11159884	11159885	11159886	11159887	11159888

OMV short motor

Mounting flange: Short

Spigot diameter	Ø100 mm [3.94 in]				
Bolt circle diameter	Ø125 mm [4.92 in]				
Shaft	Main port size	Drain port size	Check valve	Main type designation	Configuration code
No output shaft	G 1	G 1/4	X	OMVS	C1

Code numbers

Conf. code	Displacement				
	315	400	500	630	800
C1	11159889	11159890	11159891	11159892	11159893

Technical specification - ATEX OMT and OMV motors

All necessary design information for instance maximum pressure rating, maximum flow, maximum radial load etc. is provided in the Technical Information catalogs - please see *OMT and OMV Orbital motors, Technical Information* with literature number BC152886483862.

For easy collection of the technical specifications see [Cross list](#) on page 14 which shows a cross list between the code number for the standard motor and the equivalent ATEX certified motor.

The rated data which we publish in our Technical Information are based on the use of premium mineral based hydraulic oil with a viscosity of 35 mm²/s.

Danfoss declines any responsibility in case of use of the motor in operating conditions not allowed according to the information shown in the ATEX User Manual and above Technical Information.

Ambient temperature

Maximum ambient temperature depends on the requested ATEX class needed – please see [T codes / Maximum surface temperature](#) on page 8.

In general the ambient temperature should lie between -30 °C [-22 °F] and +60 °C [+140 °F].

Oil types / Operating fluids

In a hydraulic system the most important task of the oil is to transfer energy. At the same time the oil must lubricate moving parts in hydraulic components, protect them from corrosion, and transport dirt particles and heat out of the system. To ensure that hydraulic components operate without problems and have long operating life it is therefore vital to select the correct oil type with the necessary additives.

Ratings and performance data are based on operating with hydraulic fluids containing oxidation, rust and foam inhibitors. These fluids must possess good thermal and hydrolytic stability to prevent wear, erosion and corrosion of motor components.

Mineral oils

For systems containing hydraulic motors, mineral hydraulic oil with anti-wear additives type HLP [DIN 51524] or HM (ISO 11158) **must be used**. Mineral oils without anti-wear additives or engine oils can also be used, provided operating conditions are suitable.

Warning

It is compulsory to use oils whose inflammable degree is at least 50K above the maximum surface temperature of the motor. Maximum surface temperature for Group II and III can be found under: [T codes / Maximum surface temperature](#) on page 8.

Oil temperature

Maximum oil temperature depends on the requested ATEX class needed. See .

Under normal operating conditions it is recommended to keep the temperature in the range of 30 °C [86 °F] to 60 °C [140 °F].

Fluid temperature affects the viscosity of the fluid and resulting lubricity and film thickness. High temperatures can also limit seal life, at most nonmetallic materials are adversely affected by use at elevated temperatures.

Fluids may break down or oxidize at high temperature, reducing their lubricity and resulting in reduced life of the unit. Oil life is greatly reduced if its temperature exceeds +60 °C [+140 °F]. As a general rule, oil life is halved for each 8 °C [46 °F] its temperature exceeds +60 °C [+140 °F].

Viscosity

Maintain fluid viscosity within the recommended range for maximum efficiency and bearing life. Minimum viscosity should only occur during brief occasions of maximum ambient temperature and

Technical specification - ATEX OMT and OMV motors

severe duty cycle operation. Maximum viscosity should only occur at cold start. Limit speeds until the system warms up.

Fluid viscosity limits

Conditions	mm ² /s (cSt)	SUS
Minimum	12	66
Continuous	20 - 80	98 - 370
Maximum	1500	6950

We recommend the use of an oil type having a viscosity of 35 mm²/s at the actual operating temperature.

Filtering

It is necessary to keep the level of oil contamination at an acceptable level to ensure problem-free operation. The recommended maximum level of contamination in systems with hydraulic orbital motors is 22/20/16 (ISO 4406-1999).

Cross list

For easy collection of the technical specifications are the following lists shown a cross list between the code number for the standard motor and the equivalent ATEX certified motor.

OMT motor cross list

Mounting flange: Standard flange

Shaft type	Cylindrical 40 mm (Conf. Code A1)		Splined 1.50 inch (Conf. Code A2)	
	Standard motor	ATEX certified	Standard motor	ATEX certified
Code number	151B3000	11159855	151B3006	11159861
	151B3001	11159856	151B3007	11159862
	151B3002	11159857	151B3008	11159863
	151B3003	11159858	151B3009	11159864
	151B3004	11159859	151B3010	11159865
	151B3005	11159860	151B3011	11159866

Mounting flange: Short

Shaft type	No output shaft (Conf. Code C1)	
	Standard motor	ATEX certified
Code number	151B3036	11159867
	151B3037	11159868
	151B3038	11159869
	151B3039	11159871
	151B3040	11159872
	151B3041	11159873

OMV motor cross list

Mounting flange: Standard flange

Shaft type	Cylindrical 50 mm (Conf. Code A1)		Splined 2.125 inch (Conf. Code A2)		Tapered 60 mm (Conf. Code A3)	
	Standard motor	ATEX certified	Standard motor	ATEX certified	Standard motor	ATEX certified
Code number	151B3100	11159874	151B3105	11159879	151B3110	11159884
	151B3101	11159875	151B3106	11159880	151B3111	11159885
	151B3102	11159876	151B3107	11159881	151B3112	11159886
	151B3103	11159877	151B3108	11159882	151B3113	11159887
	151B3104	11159878	151B3109	11159883	151B3114	11159888

Mounting flange: Short

Shaft type	No output shaft (Conf. Code C1)	
	Standard motor	ATEX certified
Code number	151B3125	11159889
	151B3126	11159890
	151B3127	11159891
	151B3128	11159892
	151B3129	11159893

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EU DECLARATION OF CONFORMITY**Danfoss A/S****Danfoss Power Solutions ApS**

declares under our sole responsibility that the

Product category:

Orbital Hydraulic Motors

Type designation(s):

OMT 160 – 500 and OMTS 160 – 500

OMV 315 – 800 and OMVS 315 - 800

Part number(s) / Serial number / date of manufactured:

Specifically identified on label affixed to product

Covered by this declaration is in conformity with the following directive(s), standard(s) or other normative document(s), provided that the product is used in accordance with our instructions.

European Directive: ATEX 2014/34/EU

International Standards: EN ISO 80079-36 : 2016, EN ISO 80079-37 : 2016

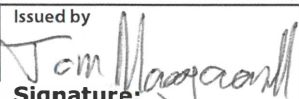
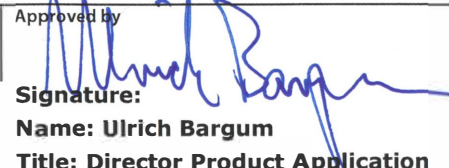
Danfoss declares that the machine has been designed, constructed and tested to fully comply with the health and safety requirements of the Directive, as mentioned above. Any modification to the machine without our prior permission renders this declaration null and void.

ATEX marking: See tabel 1

Technical dossier and archive:

No: 0396 Archive No: DTI 2014-1-0171A

Technological Institute, Kongsvang Allé 29, DK-8000 Aarhus C

Date: 2021.06.18 Place of issue: Nordborg	Issued by  Signature: Name: Tom Maagaard Title: Manager Engineering	Date: 2021.06.18 Place of issue: Nordborg	Approved by  Signature: Name: Ulrich Bargum Title: Director Product Application
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Danfoss only vouches for the correctness of the English version of this declaration. In the event of the declaration being translated into any other language, the translator concerned shall be liable for the correctness of the translation

Tabel 1ATEX marking:

Motor type	Gas environment	Dust environment
OMT 160 – 500 OMTS 160 – 500	Ex h IIB T5...T4 Gb Ex h IIB T5...T4 Gb	Ex h IIIC T110 °C...T175 °C Db Ex h IIIC T75 °C...T125 °C Db
OMV 315 – 800 OMVS 315 – 800	Ex h IIB T5...T4 Gb Ex h IIB T5...T4 Gb	Ex h IIIC T120 °C...T190 °C Db Ex h IIIC T75 °C...T125 °C Db

Products we offer:

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- Gear pumps
- Hydraulic integrated circuits (HICs)
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- Hydrostatic pumps
- Orbital motors
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