Technical Information
ATEX certified OMR

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Chapter 1

General Information

Topics:

- *ATEX introduction*
- *Explosive atmosphere*

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).

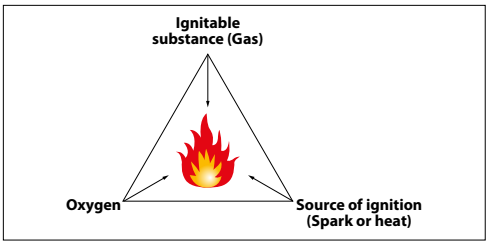
Group II: Equipment intended for use in other places than mines (non-mining equipment).

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

Explosive atmosphere

Explosion triangle

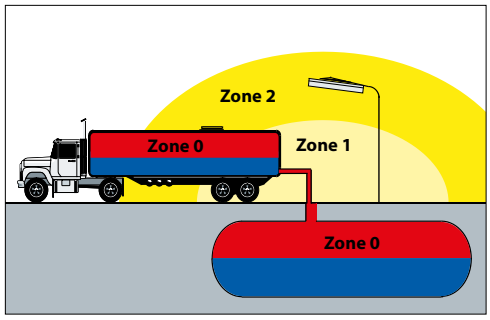
A “hazardous area” is defined as an area in which the atmosphere contains, or may contain in sufficient quantities, flammable or explosive gases, dusts or vapours. In such an atmosphere a fire or explosion is possible when three basic conditions are met. This is often referred to as the “hazardous area”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



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.



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Zones		Presence of potentially explosive atmosphere	Type of risk
Gas (G)	Dust (D)		
0	20	Present continuously or for long periods	Permant
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

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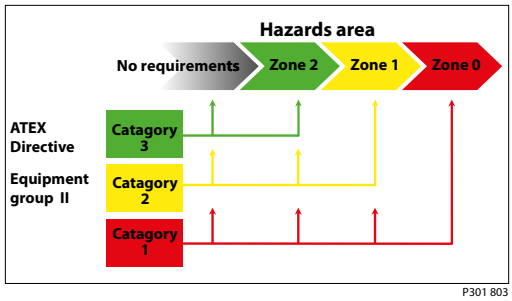
These products have to fulfil all requirements in the ATEX directive, and have to be marked with the required “Ex” marking.

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.



Marking of motors

The OMR motors are marked for application gaseous and dusty environments according to the below:

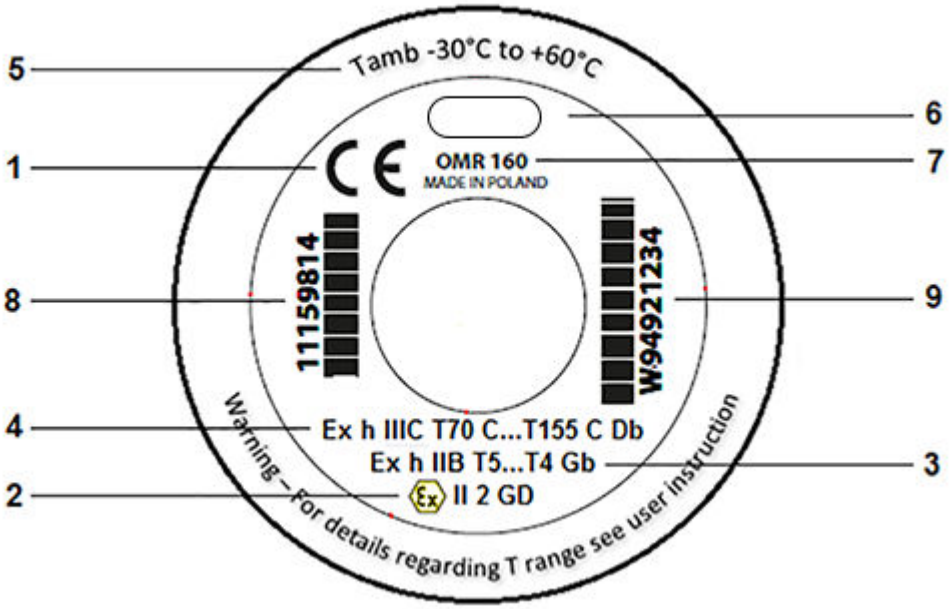


Figure 1: ATEX label layout

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	Ex
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

Description		**EU marking**
Equipment group		II / III
Equipment protection level (EPL)		Gb / Db
T-class	Gas	T5...T4
	Dust	T70°C...T155°C

Table 1: 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 OMR motors* on page 12)
6. Manufacturer
7. Motor type and displacement
8. Code number
9. Production number, date, and series number

Item 9 example: **W94921234**

W	Manufacturing location (W = Wroclaw)
9	Year 2019
49	Week 49
2	Tuesday (1 = Monday)
1234	Consecutive number

Chapter

2

T codes / Maximum surface temperature

Topics:

- *T codes and maximum surface temperature for OMR motors*

T codes and maximum surface temperature for OMR motors

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

Table 2: OMR motors - fluid and ambient temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [64 °F]	≤ 40 °C [104 °F	≤ 60 °C [140 °F]
≤ 20 °C [68 °F]	T5	T5	T5
≤ 40 °C [104 °F]	T5	T5	T4
≤ 60 °C [140 °F]	T5	T4	T4
≤ 80 °C [176 °F]	T4	T4	T4

Table 3: Classification of maximum surface temperatures for Group II equipment:

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

Note:

For Group II with T4 classification it is acceptable that small surface areas (total areas ≥ 20 mm^2 and ≤ 1000 mm^2) can have surface temperature up to 200 °C.

For T5 classification it is acceptable that small surface areas (total areas ≤ 1000 mm^2) can have surface temperature up to 150 °C.

Maximum surface temperature – Dusty environment (Group III)

Table 4: OMR motors - Maximum surface temperature

Maximum oil temperature	Maximum ambient temperature		
	≤ 20 °C [68 °F]	≤ 40 °C [104 °F]	≤ 60 °C [140 °F]
≤ 20 °C [68 °F]	70	90	110
≤ 40 °C [104 °F]	85	105	125
≤ 60 °C [140 °F]	100	120	140
≤ 80 °C [176 °F]	115	135	155

Note: Above maximum surface temperature is without any deposited dust on the motors. The possible insulation effect of a dust layer on the surface temperature has to be taken into account by the safety margin to the minimum ignition temperature of the dust concerned. 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 16.

Chapter 3

Versions and code numbers

Topics:

- *OMR motors*

OMR motors

OMR standard motor

Table 5: Mounting flange: 2 hole flange (A2)

Spigot diameter	**Ø82.5 mm [3.25 in]**						
Bolt circle diameter	**Ø106.4 mm [4.20 in]**						
Shaft	**Main port size**	**Drain port size**	**Check valve**	**Standard shaft seal**	**High pressure shaft seal**	**Main type designation**	**Conf. code**
Cyl. Ø25 mm	G 1/2	G 1/4	Yes	-	Yes	OMR	***A1***
Splined 1in (SAE 6B)	G 1/2	G 1/4	Yes	-	Yes	OMR	***A2***
Cyl. Ø32 mm	G 1/2	G 1/4	Yes	Yes	-	OMR	***A3***

Table 6: Code numbers

Conf. code	**Displacement**								
	50	**80**	**100**	**125**	**160**	**200**	**250**	**315**	**375**
A1	11159797	11159798	11159799	11159801	11159802	11159803	11159804	11159805	11159806
A2	11159809	11159810	11159812	11159813	11159814	11159815	11159816	11159817	11159818
A3	11181934	11181935	11181936	11181937	11181938	11181939	11181940	11181941	11181942

Chapter
4

Technical specification - ATEX OMR motors

Topics:

- *Ambient temperature*
- *Oil types / Operating fluids*

All necessary design information for instance maximum pressure rating, maximum flow, maximum radial load etc. are provided in the relevant Technical Information documents.

For easy collection of the technical specifications see *Cross list* on page 19 which shows a cross list between the code number for the standard motor and the equivalent ATEX certified motor.

The rated data published in the Technical Information are based on the use of premium mineral based hydraulic oil with a viscosity of 35 mm^2/s.

Ambient temperature

Maximum ambient temperature depends on the requested ATEX class needed – please see *T codes / Maximum surface temperature* on page 11.

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 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 11.

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

Table 7: 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 mm^2/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).

Chapter 5

Cross list

Topics:

- *OMR motor 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.

OMR motor cross list

Table 8: Mounting flange: A2 flange

Shaft type	Cylindrical 25 mm (Conf. Code A1)		Splined 1" (SAE 6B) (Conf. Code A2)	
	Standard motor	ATEX certified	Standard motor	ATEX certified
Code number	151-0710	11159797	151-0720	11159809
	151-0711	11159798	151-0721	11159810
	151-0712	11159799	151-0722	11159812
	151-0713	11159801	151-0723	11159813
	151-0714	11159802	151-0724	11159814
	151-0715	11159803	151-0725	11159815
	151-0716	11159804	151-0726	11159816
	151-0717	11159805	151-0727	11159817
	151-0718	11159806	151-0728	11159818

Table 9: Mounting flange: A2 flange

Shaft type	Cylindrical 32 mm (Conf. Code A3)	
	Standard motor	ATEX certified
Code number	151-0248	11181934
	151-0242	11181935
	151-0243	11181936
	151-0208	11181937
	151-0244	11181938
	151-0245	11181939
	151-0247	11181940
	151-0246	11181941
	151-6294	11181942

Chapter 6

Declaration

EU Declaration of Conformity to be added by White.

Notice

Back Cover

Topics:

- *Products we offer*
- *About Danfoss Power Solutions*

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