

Information in the Ex Directive ATEX 100a (95) for gear units and gear units with three-phase A.C. motors (EC Directive 94/9/EC)



ID 441677.16



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1. General

The Directive 94/9/EC regulates the circulation of electrical and non-electrical equipment in Ex endangered areas.

The regulation applies to Ex areas in atmospheres and conditions up to 60°C.

STÖBER ANTRIEBSTECHNIK GmbH + Co. KG supplies Gear Units and Gear Units with directly attached three-phase A.C. motors compliant with this directive in the ranges listed below:

- Helical Gear Units **C**
- Shaft-Mounted Helical Gear Units **F, FS**
- Helical Bevel Gear Units **K**
- Helical Worm Gear Units **S**
- Worm Gear Units **W0**
- Planetary Gear Units **P, PA, PKX, PH, PHA, PHKX, PHQ, PHQA, PHV, PHVA**
- Right-Angle Servo Gear Units **KS**
- Adjustable Gear Units **R**
- Adjustable Gear Units **RD11***
- Combinations of these Gear Unit ranges.

2. Standards

The EC Directive 94/9/EC is since 1st July 2003 national law. The following standards are applied:

Electrical equipment:

- EN 50014 General specifications
- EN 50015 Oil encapsulation "o"
- EN 50016 High pressure encapsulation "p"
- EN 50017 Sand encapsulation "q"
- EN 50018 Pressure-resistant encapsulation "d"
- EN 50019 Improved safety "e"
- EN 50020 Intrinsic safety "i"
- EN 50028 Cast encapsulation "m"
- EN 50033 Miners lamps for mining in a firedamp hazard
- EN 50039 Intrinsically safe systems "i"

Non-electrical equipment:

- EN 13463-1 Principles and requirements
- EN 13463-2 Protection by vapour inhibiting encapsulation "fr"
- EN 13463-3 Protection by pressure resistant encapsulation "d"
- EN 13463-4 Protection by intrinsic safety "g"
- EN 13463-5 Protection by design safety "c"
- EN 13463-6 Protection by ignition cause monitoring "b"
- EN 13463-7 Protection by high pressure encapsulation "p"
- EN 13463-8 Protection by liquid encapsulation "k"

The following standards are applied for the assessment and classification of the ignition hazards:

EN 13463-1, EN 13463-5, EN 13463-6, EN 13463-8.

3. Assessment and classification of ignition hazards

In Appendix II, the directive 94/9/EC (ATEX 100a / 95) demands the fulfilment of fundamental safety and health requirements for a device to be regarded as explosion protected. Potential causes of ignition such as hot surfaces, impact or friction sparks or electrostatic charges must not become effectual causes of ignition. Depending on the possible ignition hazards and fault conditions, suitable explosion protection measures must be specified. An important condition for the fulfilment of the fundamental safety and health requirements is therefore an assessment of the ignition hazards as required by EN 13463-1 to 8.

Potential causes of ignition can generally occur by:

- mechanically produced sparks
- electrostatic discharge
- hot surfaces
- chemical reactions

Mechanical sparks and hot surfaces are significant for the assessment of the ignition hazards in gear units.

Mechanical sparks are avoided by design safety and liquid encapsulation as well as by temperature monitoring of the gear unit / geared motor.

The ignition hazard assessment can be classified by the following overview:

An ignition hazard assessment has been conducted for the STÖBER gear units list-

ed in Item 1 and the following classifications were made.

Specified categories and temperature ranges of STÖBER gear units:

MGS and P:

- II 3 G c/k T3; II 3 D c/k 120°C
- II 3 G c/k T4; II 3 D c/k 120°C
- II 2 G c/k T4; II 2 D c/k 120°C
- II 2 G c/k T3; II 2 D c/k 120°C
- (see Item 6 Project planning)

MGS with RD11*:

- II 3 G c/k T3; II 3 D c/k 120°C

MGS with R:

- II 2 G b/c/k T3; II 2 D b/c/k 120°C, with GTW (only available as spare)
- II 2 G b/c/k T4; II 2 D b/c/k 120°C, with GTW (only available as spare)
- II 3 G c/k T3; II 3 D c/k 120°C

R:

- II 2 G b/c/k T3; II 2 D b/c/k 120°C, with GTW (only available as spare)
- II 2 G b/c/k T4; II 2 D b/c/k 120°C, with GTW (only available as spare)
- II 3 G c/k T3; II 3 D c/k 120°C

RD11* (adjustment range 10:1 only):

- II 3 G c/k T3; II 3 D c/k 120°C

*only available as spare

Group II (Explosive atmosphere composed of gas/air or dust/air mixtures, aerosols or vapours)					
Category 1		Category 2		Category 3	
G (Gas) (Zone 0)	D (Dust) (Zone 20)	G (Gas) (Zone 1)	D (Dust) (Zone 21)	G (Gas) (Zone 2)	D (Dust) (Zone 22)
For equipment which ensures a very high degree of safety. Intended for cases in which a frequent or permanent explosive atmosphere must be expected.		For equipment which ensures a high degree of safety. Intended for cases in which an explosive atmosphere must be expected.		For equipment which ensures a normal degree of safety. Intended for cases in which an infrequent and only brief explosive atmosphere must be expected.	

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Explanation:

MGS – Modular Gear System (consisting of C, F, FS, K, P and S gear units - see also Item 1).

GTW – Temperature limit monitor*

II2GD – Designation according to Group II, Category 2, gas and dust.

II3GD – Designation according to Group II, Category 3, gas and dust.

b/c/k – Monitored design safety and liquid encapsulation.

T3, T4 – Temperature class.

120°C – Maximum surface temperature.

Gear units to ATEX 100a (95) receive a separate specification plate indicating the selected classification.

3-phase AC motors are offered as stand-alone motors or mounted to a gear unit in accordance with EN 50019 – high safety models II2G EExe II T3 (in accordance with EN50018 – pressure-resistant encapsulation – only as spare). Mounting position IMV1 requires protective cowling. Other designs on request.

4. Models

The STÖBER drives intended for application to ATEX 100a (95) are supplied as follows.

Gear units:

- double FKM seal (wherever the design allows)
- synthetic oil, optional also food compatible oil or siliconfree
- Gear units with hollow shafts always come with a hollow shaft cover. Series F and FS shaft-mounted gear units with an "S" type hollow shaft cannot be used in the standard version (no suitable hollow shaft cover).

Motors:

- FKM seal
- synthetic ball bearing grease

5. Service and maintenance

Separate operating instructions are provided for the application and operation of STÖBER gear units to ATEX 100a (95), which require additional attention (see also Item 7, Documentation).

6. Project planning

Category 2:

The gear units are suitable for the following applications:

- Ambient temperature $0^{\circ}C \leq T_a \leq 40^{\circ}C$
- Input speeds $n_1 \leq 1800$ rpm
- Exception: R-0000 variable speed drives with GTW*

For applications with $n_1 > 1800$ min⁻¹ consultation with STÖBER ANTRIEBS-

TECHNIK required.

- Service factor $f_{Ex} \geq 1.5$, based on permissible torque as per catalogue in addition to the further service factors of the respective catalogues. (not applicable to R-0000 gears), caution: catalogue data for maximum permissible accelerating and EMERGENCY STOP torques do not apply to gear unit operation in potentially explosive atmospheres as per EU Directive 94/9/EC
- Service factor $f_{Ex} = 1.5$, referred to permissible forces and breakdown torques as per catalogue.
- Not exceed the thermal breakeven performance $P \leq P_{th}$ [kW]
- Possible ratio $i \geq i_{min}$
- Installation of line- and inverter-operated three-phase AC motors, provided the motors come with the required Ex-protection.

Caution: Please observe maximum permissible speeds.

- Inverter operation: Only motors with type "d" protection (flameproof enclosure)* permitted.
- Brake motors: Dynamic braking is only permissible for a load factor as $S \geq 1.5$. Otherwise the brakes can only be used as holding brakes.

Category 3:

Gear units can be operated under the following conditions:

- Ambient temperature $0^{\circ}C \leq T_a \leq 40^{\circ}C$
- Please observe maximum permissible input speed restrictions as per catalogue.

- Service factor $f_{Ex} = 1$, referred to permissible torques, forces and breakdown torques as per catalogue.
- Installation of line- and inverter-operated three-phase AC motors provided the motors come with the required Ex-protection.

Caution: Please observe maximum permissible speeds.

- Inverter operation: Only motors with type "d" protection (flameproof enclosure)* permitted.
- Brake motors: Dynamic braking is only permissible for a load factor as $S \geq 1$. Otherwise the brakes can only be used as holding brakes.

7. Documentation

Operating instructions:

- **442591** – Operating instructions for gear units C, F, FS, K, KS, KL, S and W0 (ATEX 100a)
- **442599** – Operating instructions for MGS adjustable gear units C, F, K, S (ATEX 100a)
- **442603** – Operating instructions for adjustable gear units series R and RD11 (ATEX 100a)
- **442595** – Operating instructions for planetary gear units (ATEX 100a)

Sales/customer information:

- Conformity declarations **441658, 441674, 441675, 441676**
- ATEX information **441677**

*only available as spare

ATEX:Category 2 -thermal breakeven performance at $i n_1 \leq 1800$ 1/ min and minimum ratio i min																					
unit size	design gear unit																				
	C		F		FS		K		S		P		PH		KX		KS		KL		
	kW	i min	kW	i min	kW	i min	kW	i min	kW	i min	kW	i min	kW	i min	kW	i min	kW	i min	kW	i min	
0	2.5	1.8							1	13											
1	4	1.8	4	4	2.5	14	2.5	4	1.5	13									0.75	4	
2	5	1.8	5	4	4	14	4	4	2.2	13	0.5	5							1.5	4	
3	7.5	1.8	7.5	4	5	14	5	4	3	13	1	5			1	2					
4	10	1.8	10	4	7.5	14	7.5	4	4	20	2	5	1.7	5	1.5	2	1	10			
5	15	1.8					10	15			4	5	3.5	5	3	2	2	10			
6	18.5	4	15	4	10	14	15	15													
7	22	4					18.5	18			7.5	5	6	5	0		4	10			
8	30	4					22	18			15	5	12	5	0						
9	37	4					30	25			20	5	15	20							
10	37	25					37	25					16	30							
11							37	25					30	30							

power = thermal breakeven performance ==> load factor = 1,5