ExRDM3913/50N

防爆步进电机

EEx d IIC T4
EN60079-0、EN60079-1
zones 1、zones 2，2G

北京润诚时代科技有限公司

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Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) # EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 02 ATEX 1134

(4) Equipment: Three-phase synchronous and three-phase stepping motor, types Ex RDM 3910, Ex RDM 3913 and Ex RSM 3913

(5) Manufacturer: Berger Lahr GmbH & Co. KG

(6) Address: Breslauer Straße 7, 77933 Lahr, Germany

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 02-12210.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50 014:1997 + A1 + A2 **EN 50 018:2000**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.

(12) The marking of the equipment shall include the following:

II 2G EEx d IIC T4

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, 31 January 2003

Dr.-Ing. U. Klausmeyer
Regierungsdirektor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT

sheet 1/2

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt.
In case of dispute, the German text shall prevail.

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(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 02 ATEX 1134

(15) Description of equipment

Three-phase synchronous and three-phase stepping motors of types 3910 and 3913, respectively, are employed for positioning and infeed adjustment purposes at machining and processing equipment. They are designed to Flameproof Enclosure "d" type of protection. To ensure compliance with the temperature class, the three-phase stepping motor is provided with three temperature sensors embedded in the winding as well as a suitable electronic tripping system. The three-phase synchronous motor is protected by three matched fuses.

The housing is made from steel. The unit is cooled by heat exchange for the open cooling circuit by means of thermal radiation and convection between housing and the surrounding cooling medium.

(16) Test report PTB Ex 02-12210

(17) Special conditions for safe use

None

Notes for manufacturing and operation

Due care must be taken that the temperatures that are admitted for the elements used are not exceeded.

The housings may be exempted from routine testing as required in EN 50018, section 16, because the static overpressure test was passed at 4 times the reference pressure.

The electrical motor data, incl. specifications for compliance with the temperature class, are defined on a data sheet attached to the EC type-examination certificate.

The motor shall be designed for ambient temperatures of –20 °C to 40 °C as a minimum.

For delimitation of the flameproof enclosure, screws shall be used that satisfy strength class 8.8 as a minimum.

(18) Essential health and safety requirements

Met by compliance with the aforementioned Standards-

Zertifizierungsstelle Explosionsschutz

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Explosion-protected 3-phase stepping motor ExRDM 3913

ATTENTION

Please read the following description and connection instructions before installing this motor!

WARNING

To prevent ignition of hazardous atmosphere do not operate the motor in hazardous location with any securing srews or covers removed and do not remove any srews or cover wile motor is in a hazardous location!

WARNING

The conduit seal must be listed for Class I, Zone 1, AExd IIC or Class I, Div. 1, Groups A, B, C, and D hazardous location!

ATTENTION

For supply connections, use cable rated for at least 90°C.

ATTENTION

The fuses and the stepping motor power drive must be installed outside of the explosion hazard area!

ATTENTION

The setted ratings of the power driver must not exceed the specified values for phase current, phase frequency and chopper voltage!

The new explosion-protected 3-phase stepping motor ExRDM 3913 excels with a robust design, high torque and small dimensions.
The motor is conform to protection type AEx d IIC T4.

The torque of the 3-phase stepping motor ExRDM 3913 is 5.8 Nm.

Power drives

The ExRDM 3913 3-phase stepping motor can be driven via a 325 V power drive for 3-phase stepping motors such as the WD3-004.

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Specifications of the motor

ExRDM 3913 stepping motor

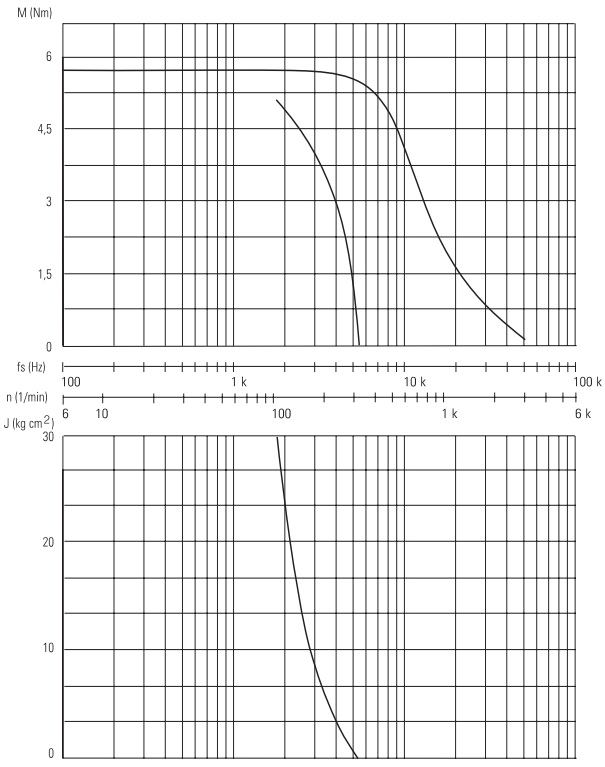
Number of steps z		200 to 10000
Step angle α		1.8° to 0.036°
Step accuracy non-cumulative[1] $\Delta\alpha_S$		± 6´
Max. torque M_m		5.80 Nm
Holding torque M_H		6.55 Nm
Moment of inertia of rotor J_R		3.3 kgcm2
Max. starting frequency[1] f_{Aom}		5.3 kHz
Nominal current/winding I_W		1.6 A
Resistance/winding R_W		9.3 W
Time constant of current rise τ		~11 ms
Max. dynamic shaft load	axial[2]	~60 N
	radial	~110 N
Weight		9.5 kg
Max. chopper voltage		325 V
Protection type		AEx d IIC T4
Ambient temperature		-20°C to 50°C

[1] measured at 1,000 steps/revolution
[2] at half shaft length (from mounting flange), please inquire for different shaft loads

Characteristics for ExRDM3913 stepping motor

The following characteristics are shown:
- maximum operating torque
- start-stop characteristic
- moment of inertia of the load (start/stop operation)

For determining the characteristics, the motors were driven with the WD3-004. The phase current was set to 1.6 A, the number of steps to 1,000 steps/revolution.



Motor ExRDM 3913 with PL 50/100 gearbox

The ExRDM 3-phase stepping motor can be equipped with the PL 50 gearbox.
The torque available during operation depends on the reduction ratio and on the efficiency of the gearbox. The table below shows the maximum torque and the moments of inertia of the gearbox.

Reduction	3:1	5:1	10:1
Max. torque ExRDM 3913 in Nm	14.8	24.6	41.9
Moment of inertia of gearbox in kgcm^2	0.33	0.21	0.16

The actual torque of the ExRDM 3913 3-phase stepping motor at a given driving frequency f_S must be determined on the basis of the torque characteristic. The moment of inertia of the gearbox must be added to the moment of inertia of the rotor and the external moment of inertia in order to determine the maximum start/stop frequencies on the basis of the start/stop characteristic.

Specifications of PL 50 / 100 gearbox

Gearbox type	planetary gearbox single-stage 3:1, 5:1 double-stage 10:1
Max. continuous load	50 Nm
Max. radial load	500 N
Max. axial load	250 N
Standard circumferential backlash	motor shaft / gearbox shaft < 15'
Standard reduction ratios	3:1, 5:1, 10:1
Efficiency	~ 0.85/stage
Housing material	aluminum
Surface	black eloxed
Shaft material	C 45
Bearing	roller bearings
Sealing at shaft	shaft sealing ring
Lubrication	life-time lubrication
Weight	3.3 kg

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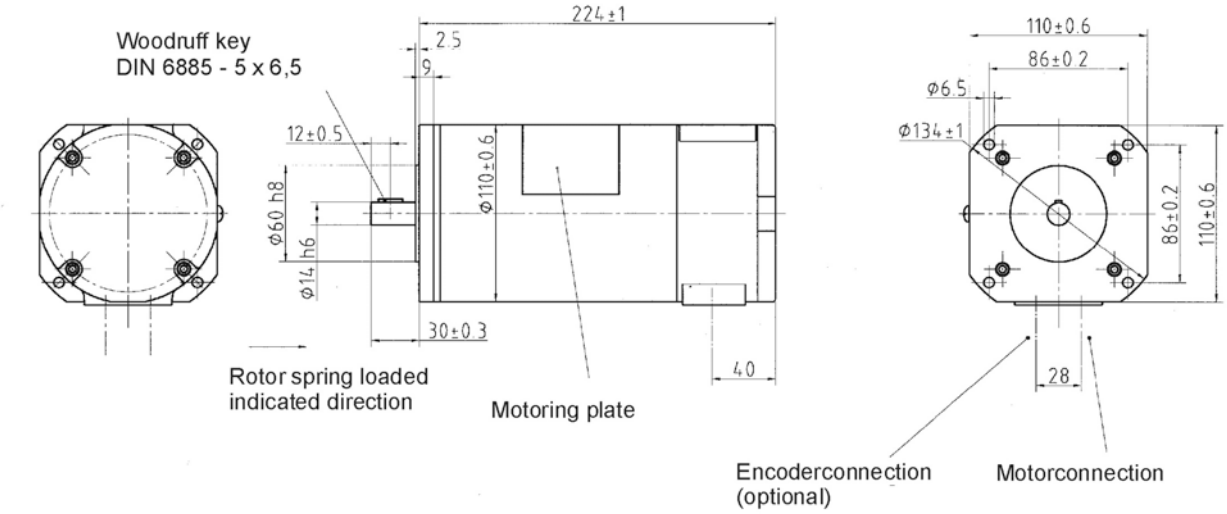
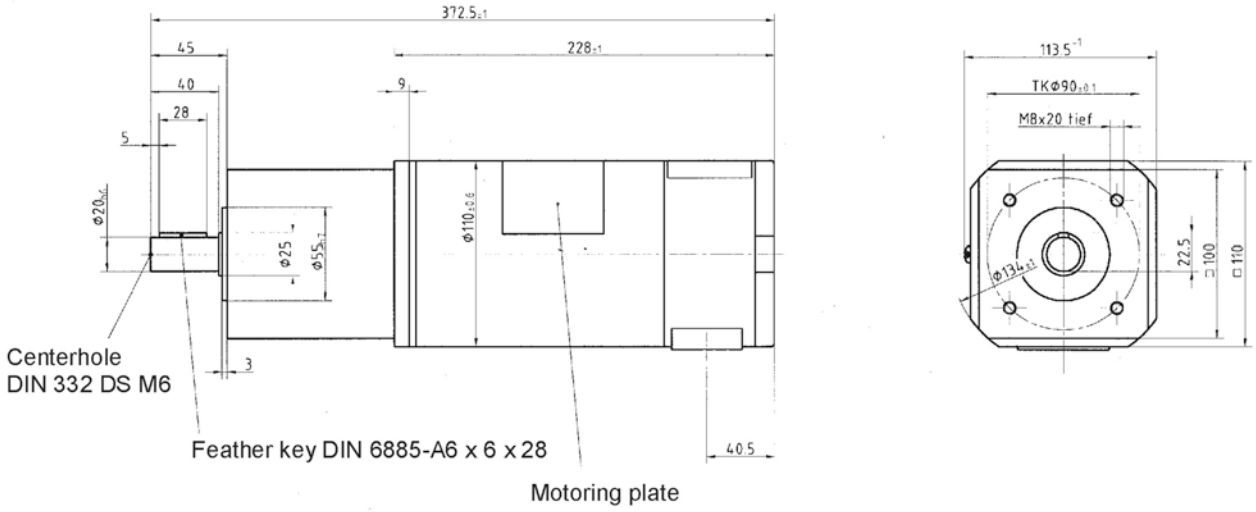
Specifications of the motor



Dimensions of ExRDM 3931 3-phase stepping motor



Dimensions of ExRDM 3931 3-phase stepping motor with Gearbox

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Installation of the motor

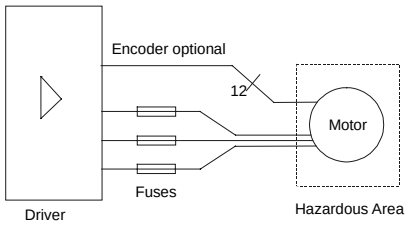
ATTENTION

Please read the following instructions before installing this motor.

General safety instructions

- Do not disassemble the 3-phase stepping motor!
- A protective conductor with AWG 12 max. can be connected to the exterior terminal on the terminal box. The use of this terminal must be permitted by the local authority.
- Stepping motors heat up during operation. Provide for efficient heat dissipation. Caution when touching the motor!
- When pressing on a pinion, pulley or similar onto the motor shaft, pad the shaft from behind!
- The motor shall be connected through a conduit seal within 18 inches distance. Box and fittings shall be threaded for conntection to conduit or cable termination and shall be explosionproof, listed for Class I, Division 1, Groups A, B, C, and D; or Class I, Zone 1, AEx d IIC. Threaded joint shall be made up with at least five threads fully engaged.

Wiring diagram



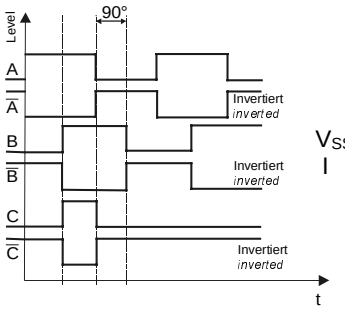
External fuses for the motors

Three fuses, 2.5 A, 250 V, breaking capacity H (=1500 A), must be inserted in the power supply cable to the explosion proof stepping motor ExRDM 3913.

ATTENTION

The fuses and the stepping motor power drive must be installed outside of the explosion hazard area.

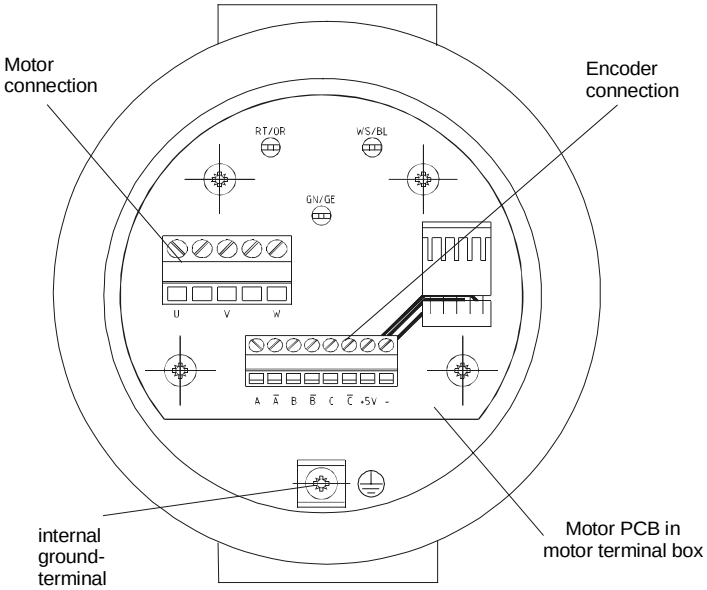
Encoder signals



V_{SS} = 5 V ±10%
I = 150 mA

Wiring

1. Release the four Allen screws on the back of the motor and remove the cover of the terminal box.
2. Mount a conduit seal directly at the cable entry points.
3. Install the conduit system according the documentation of the manufacturer and screw the wires to the terminals on the motor PCB (see figure).



BERGERLAHR motor cable	
U	brown
V	blue
W	black
⏚	protective ground

BERGERLAHR encoder cable	
A	white
Ā	brown
B	green
B̄	yellow
C	grey
C̄	pink
+5V	red
5VGND	blue

The symbol ⏚ IEC earthground terminal marks terminal for equipment grounding.

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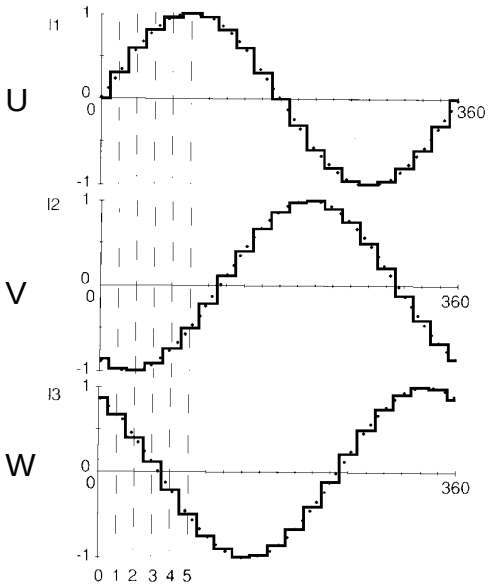
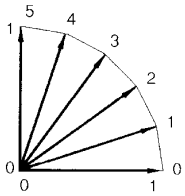
Current-time diagram





Ordering numbers

Stepping motor	Ordering number
without encoder, without gearbox	
ExRDM 3913/50 N UL 1,6A	520 510 460 00
with encoder, without gearbox	
ExRDM 3913/50 N Ei UL 1,6A	529 510 461 00
with gearbox, without encoder	
ExRDM 3913/50 N UL 1,6A PL50/100 3:1	530 510 460 02
ExRDM 3913/50 N UL 1,6A PL50/100 5:1	530 510 460 03
ExRDM 3913/50 N UL 1,6A PL50/100 10:1	530 510 460 09
with gearbox, with encoder	
ExRDM 3913/50 N Ei UL 1,6A PL50/100 3:1	539 510 461 02
ExRDM 3913/50 N Ei UL 1,6A PL50/100 5:1	539 510 461 03
ExRDM 3913/50 N Ei UL 1,6A PL50/100 10:1	539 510 461 09

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