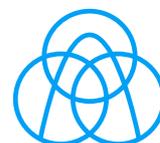
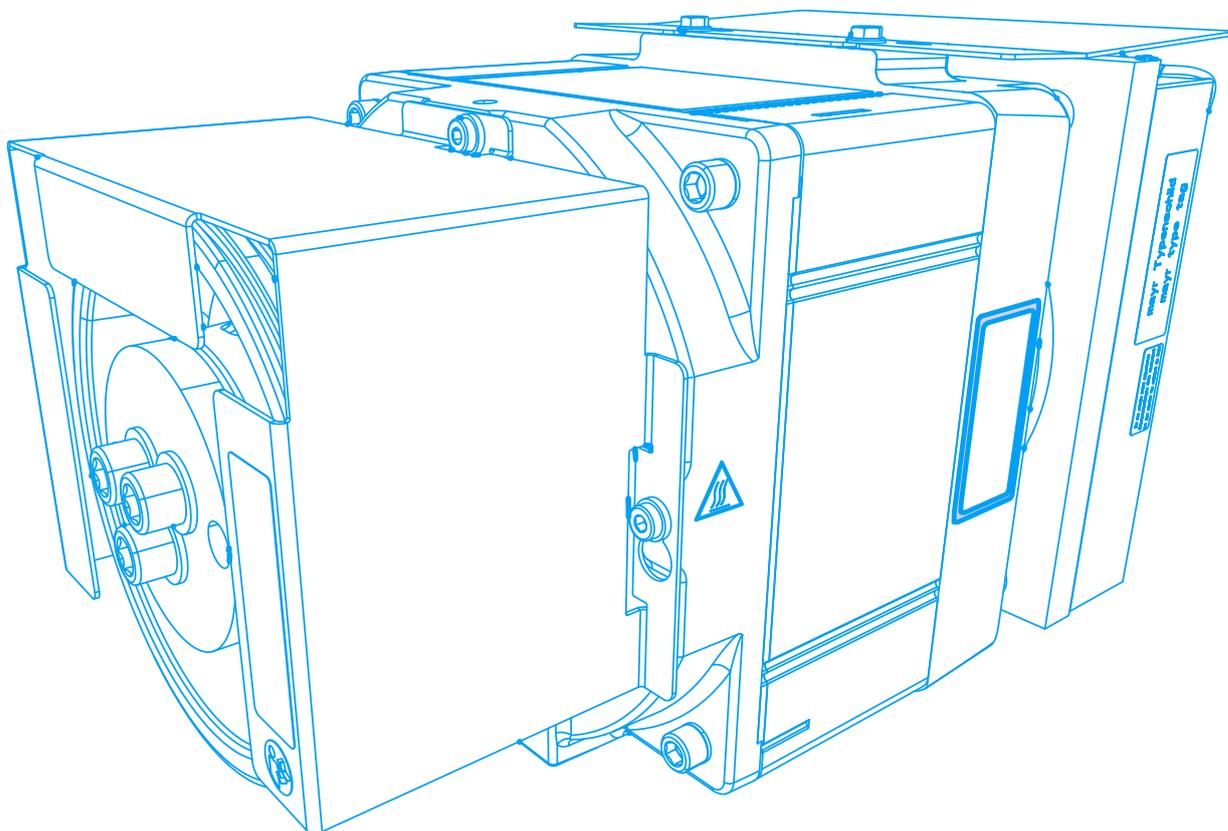


# Product Catalogue

## PMC125

Drive  
04/2018



thyssenkrupp

## Company and contact information

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List of abbreviations..... 85

# 1 Description

## 1.1 Standards and legal requirements

The product complies with the following standards:

- Directive 2014/33/EU
- DIN EN60034/VDE 0530
- DIN EN81-20:2014-11
- DIN EN81-50:2015-02
- DIN EN81-77:2014-02



For operation in line with standards, the elevator installation must comply with each standard.

## 1.2 Product family gearless

thyssenkrupp Aufzugswerke currently offers the following model series of gearless machines:

	Range of performance	Synchronous	Asynchronous	Without machine room	With machine room
<b>Mini gearless®</b>					
PMC125 S/M/L	Lower	x		x	
PMC145 S/XS/M/XM/L/XL	Lower	x		x	x <sup>1)</sup>
PMC170 S	Lower	x		x	x
PMC170 M/L/XL	Middle	x		x	x
DAF210 M/L	Lower	x		x	x <sup>1)</sup>
DAF270 S/M/L	Middle	x		x	x
<b>Compact gearless®</b>					
DAF380 M1xx	Middle		x		x
SC300 S/M	Middle	x			x
SC400 S/M	Middle	x			x
SC500 M	Upper	x			x
<b>External rotor gearless</b>					
DAB450 S	Middle		x		x
DAB450 L	Upper		x		x
DAB530 L/XL	Upper		x		x
<b>SF gearless</b>					
SF600 M	Upper	x			x
SF700 M	High Rise	x			x
SF800 M	High Rise	x			x
SF1000 M	High Rise	x			x

Tab. 1

ATR\_1\_10\_0001\_0

1) Optional version available with brake and manual release for machine room

Information on each of the machines mentioned in the table can be found [in the corresponding product catalogue](#).



The PMC125L machine is likely to be available as of summer 2018.

## 1.3

### Product group Mini gearless

The product group of Mini gearless has the following features:

- Traction sheave supported by bearings on one side

The machine can be deployed with

- Single wrap with rope pulley
- Single wrap without rope pulley (180° wrap)

## 1.4

### Product

The PMC125 is a frequency-controlled (V3F) synchronous machine excited by permanent magnets and belongs to the product group of the thyssenkrupp Mini gearless.

#### Range of application

The range of applications of the machines is listed in the following table. Only guide values are listed to provide an overview.



The PMC125L machine is likely to be available as of summer 2018.

Machine	Suspension	Rated load Q [kg]	Speed v [m/s]	Traction sheave DT [mm]
PMC125 S 001	2:1	450 - 480	1	240
PMC125 M 002		630		
PMC125 L 003		1000		
PMC125 M 002		480		320
PMC125 L 003		750		
PMC125 L 003	1:1	500		240

Tab. 2

ATR\_1\_11\_0001\_5

The PMC125 is conceived for deployment in machine-room-less (MRL) elevators using suspension ropes with diameter 6 mm (e.g. synergy model series).

#### Product key

Example: PMC125 S 001

	Meaning	Explanation
PM	Permanent-magnet-excited synchronous machine	Main designation for the machine
C	Compact	Design

	Meaning	Explanation
125		Designation
S, M, L	Length of the three basic types (1 m/s) S: 450 kg - 1 m/s M: 630 kg - 1 m/s L: 1000 kg - 1 m/s	Length of the machine (assignment for 2:1 application)
0..	1st digit designates the machine generation 0 for tkAW machine	Generation of the machine
01	2nd and 3rd digit for the winding design	Winding category

Tab. 3

ATR\_1\_11\_0035\_0

## PMC125 S

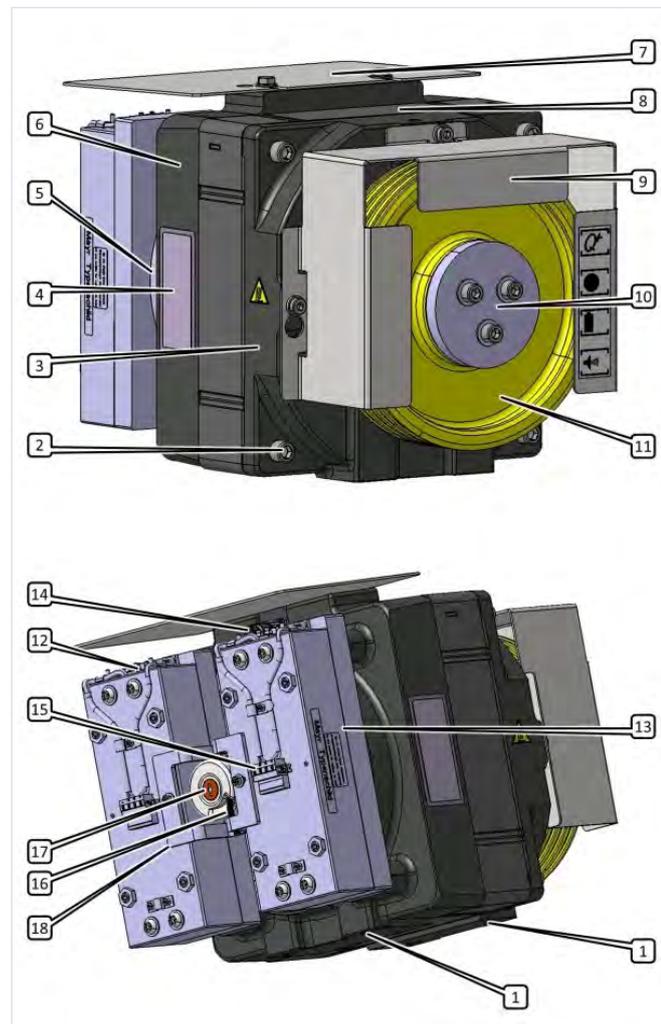


Fig. 1

ATR\_2\_11\_0007\_0

Item	Designation	Item	Designation
1	Mounting surface for connection with machine base frame (2 M16 threads per bearing bracket)	2	Connecting bolts for stator package with bearing brackets
3	Bearing bracket – traction sheave side	4	Motor name plate (on both sides)
5	Brake rotor	6	Bearing bracket – brake side
7	Cover plate for brake and encoder	8	Motor unit (stator package with the rotor inside the stator)

Item	Designation	Item	Designation
9	Rope guard	10	Tension disc with screws for traction sheave mount (conical connection 1:15)
11	Traction sheave	12	Brake monitoring switch
13	Brake (mayr RSR 200)	14	Plug connector for motor cable
15	Plug connector for brake cable	16	Line for encoder
17	Encoder	18	Encoder bracket

## PMC125 M

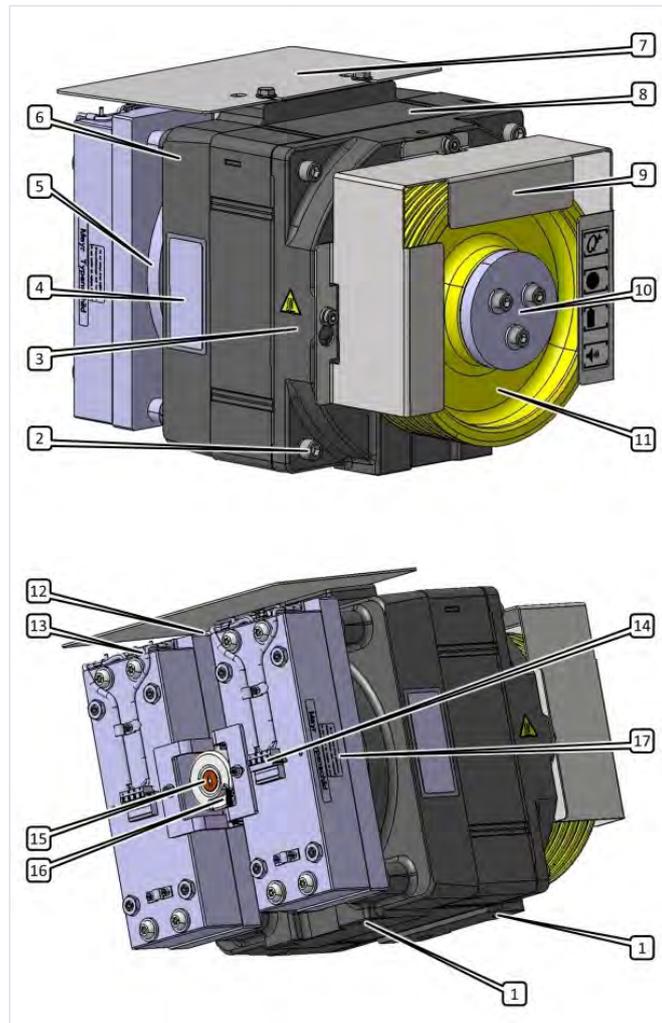


Fig. 2

ATR\_2\_11\_0008\_0

Item	Designation	Item	Designation
1	Mounting surfaces for connection with machine base frame	2	Connecting bolts for stator package with bearing brackets
3	Bearing bracket – traction sheave side	4	Motor name plate (on both sides)
5	Brake rotor	6	Bearing bracket – brake side
7	Cover plate for brake and encoder	8	Motor unit (stator package with the rotor inside the stator)
9	Rope guard	10	Tension disc with screws for traction sheave mount (conical connection 1:15)

Item	Designation	Item	Designation
11	Traction sheave	12	Plug connector for motor cable
13	Brake monitoring switch	14	Plug connector for brake cable
15	Encoder	16	Line for encoder
17	Brake (mayr RSR 400)		

## PMC125 L



The PMC125L machine is likely to be available as of summer 2018.

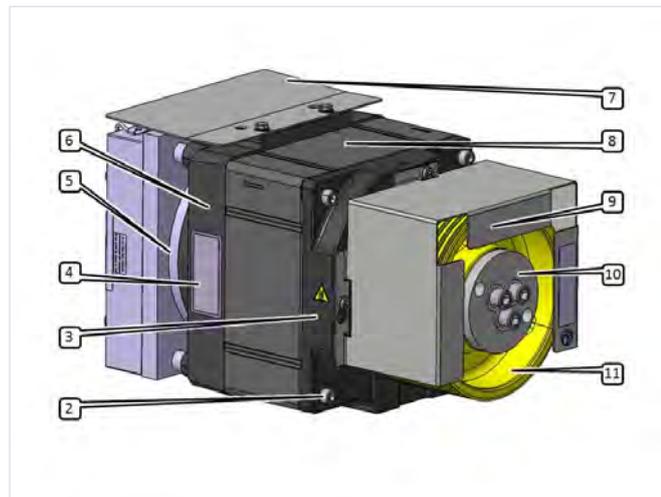


Fig. 3

ATR\_2\_11\_0009\_0

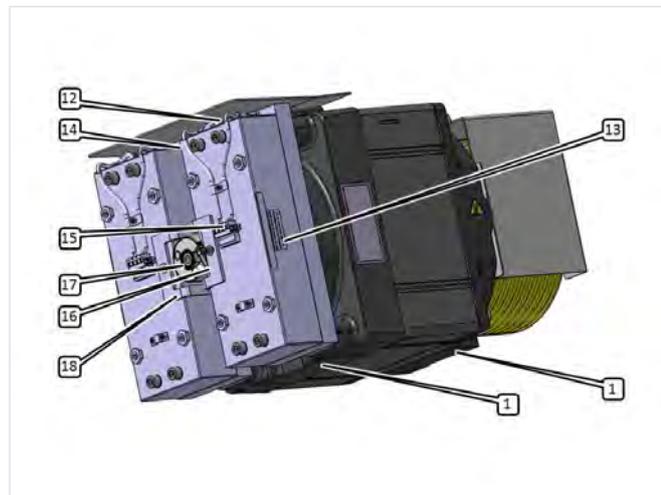


Fig. 4

ATR\_2\_11\_0010\_0

Item	Designation	Item	Designation
1	Mounting surfaces for connection with machine base frame	2	Connecting bolts for stator package with bearing brackets
3	Bearing bracket – traction sheave side	4	Motor name plate (on both sides)
5	Brake rotor	6	Bearing bracket – brake side
7	Cover plate for brake and encoder	8	Motor unit (stator package with the rotor inside the stator)

Item	Designation	Item	Designation
9	Rope guard	10	Tension disc with screws for traction sheave mount (conical connection 1:15)
11	Traction sheave	12	Brake monitoring switch
13	Brake (mayr RSR 400)	14	Plug connector for motor cable
15	Plug connector for brake cable	16	Line for encoder
17	Encoder	18	Encoder bracket

### 1.4.1

## Engineering design

The motor design corresponds to design IM B3.

The drives of the PMC125 model series are designed as machines without a housing.

They comprise a stator package with bearing brackets on each side. The assemblies are connected via 4 screwed connections to form a stable unit.

The brake is attached to one of the bearing brackets. The connection box for the motor line is integrated in the bearing bracket on the brake side.

The one-piece traction sheave (rim and hub) is mounted in a floating arrangement (overhung) via a conical connection on the drive shaft. For safety reasons, microencapsulated screws and locking washers are used to mount the disc.

The PMC125 is conceived for deployment in installations with single wrap and resulting rope pull direction plumb (90°) on the mounting surfaces.

The rope guard is available for a wrap angle of 180°.

The machine is mounted via the two bearing brackets with 2 screws (M16) each on a machine base frame.

The PMC125 is designed with concentrated windings.

### 1.4.2

## Brake



The brakes of the PMC125 are intended as a stop brake for static application and perform the additional function of a braking device for protection of the upward-moving elevator car against overspeed and against unintentional movement of the elevator car Chap. 3.2, P. 28. Dynamic braking is restricted to emergency and inspection braking.

There are various versions of brakes depending on the machine size, the electrical operating conditions and the required braking torque.

The redundant brakes of the machine each consist of two disc brakes with a shared brake rotor that directly affect the traction sheave shaft.

A cover plate is fitted over the brake to provide protection against contamination.

The brake is opened electromagnetically during operation to ensure failure safety.

The PMC125 is designed without manual brake release.

In the tkAW standard version, both brake circuits are operated in a series connection, which means that a joint signal is generated.

It is not possible to set the braking torque or air gap.

## 1.4.3 Brake monitoring



The customer must evaluate the monitoring signals.

A microswitch is fitted to monitor the brake function of each brake circuit and detect redundancy loss. This reports the current position of the brake (opened/closed) by means of a corresponding signal. In the event of a false signal, the installation is to be shut down immediately.

The switches are fitted, adjusted and provided with safety coating varnish at the plant.

## 1.4.4 Encoder

The PMC125 is fitted with a sine-cosine encoder for recording the speed and angular position.

It is mounted on the end of the motor shaft and on the brake.

## 1.4.5 Electrical connection

The optional connection lines for motor, temperature monitoring and brake have a length of 5 m, 6 m or 10 m. The connection line of the encoder has a length of 5 or 10 m.

The optional lines of the brakes (coils and microswitches) are supplied loose. The connectors on both sides of the connecting lines enable simple connection of the brakes to the brake control system and/or frequency inverter.

## 1.4.6 Cooling

The PMC125 has no fan. The machine is cooled by means of free convection.

## 1.4.7 Protection devices for earthquake regions

The rope guard available as standard (non-adjustable) meets the requirements in accordance with DIN EN81-77 for all construction sizes of the PMC125 series up to and including earthquake category 3.

## 1.4.8 Maintenance instructions

The rolling bearings of the traction sheave shaft have lifetime lubrication, making the PMC125, including the brake, maintenance free.

Following replacement of the encoder or a change in position in relation to the rotor, the encoder must be readjusted in the case of synchronous machines.

## 2 Technology

### 2.1 Mechanical data



The PMC125L machine is likely to be available as of summer 2018.

#### 2.1.1 General data of the machine

Version		S	M	L	
Diameter $D_T$	[mm]	240		320	240   320
Permitted radial shaft load $F_{t_{zul}}$ <sup>1)</sup>	[kN]	13	14		25
Weight (including traction sheave)	[kg]	127	137	150	193   204
Mass moment of inertia (including traction sheave)	[kgm <sup>2</sup> ]	0.17	0.18	0.343	0.29   0.495
Max. sound pressure level	[dB(A)]	< 60			
Momentum grade		G 2.5			
Protection class		IP21			

Tab. 4

ATR\_1\_11\_0005\_5

1) Resulting rope pull direction plumb (90°) onto the mounting surface of the machine.

#### 2.1.2 Brake

Additional data for the brake: [Chap. 3.2, P. 28.](#)

Version		S	M	L
Manufacturer		Chr. Mayr GmbH & Co. KG		
Designation		ROBA-Duplostop RSR...		
		200	400k	400l
Design		2-surface disc brake in double configuration (2 brake circuits)		
Braking torque	[Nm]	2 x 210	2 x 300	2 x 550
Weight	[kg]	2 x 13	2 x 18	2 x 22
Braking torque setting		not possible		
Diameter of brake disc	[mm]	235		253
Air gap	[mm]	0.45		
Air gap setting		not possible		
Manual brake release		none		
Protection class		IP21		
Type test certificate		EU-BD 766 <sup>1)</sup>		
Times $t_{10}/t_{50}/t_{90}$	[ms]	35/85/140	45/105/160	40/75/120
Certificate for traction sheave shaft		PMC125S0/M0/L0		

Tab. 5

ATR\_1\_11\_0013\_5

1) complying with EN81-20/50:2014

## 2.1.3 Traction sheave

### Overview of versions

Version		S	M	L		
Diameter $D_T$	[mm]	240		320	240	320
Rim width $B_T$	[mm]	51	75	62	122	92
Weight	[kg]	9	11	20	17.5	24
max. number of grooves x rope diameter z x dia. <sup>1)</sup>	[mm]	4 x 6 4 x 6.5	6 x 6 6 x 6.5	5 x 6 5 x 6.5 4 x 8	10 x 6 10 x 6.5	7 x 6 7 x 6.5 6 x 8
max. number of grooves x rope diameter z x dia. <sup>2)</sup>	[mm]	4 x 6 4 x 6.5	7 x 6 7 x 6.5	5 x 6 5 x 6.5 4 x 8	11 x 6 10 x 6.5	8 x 6 8 x 6.5 6 x 8
Groove clearance RA	[mm]	12 Standard 10 minimum		14	12/10	14
Groove shape <sup>3) 4)</sup>		Seat/V-groove				
Vee groove angle $\beta$ <sup>4)</sup>	[°]	Order-dependent				
Material		EN-GJS 600-3	EN-GJL -250 5)	EN-GJS 600-3	EN-GJL -250 5)	

Tab. 6

ATR\_1\_11\_0009\_5

1) With standardised groove clearance RA = 12 mm for diameter = 6/6.5 and 14 mm for diameter = 8 mm

2) With minimum permitted groove clearance RA = 10 mm for diameter = 6.5 and 14 mm for diameter = 8 mm

3) Depending on order

4) Version in accordance with product description "groove profiles" with hardened groove flanks (min. 50 HRc)

5) Specially alloyed

### Standardised version for tkE applications

Version		S	M	L	
Load	[kg]	450	480	630	1000
Speed	[m/s]	1			
Number of grooves x rope diameter z x diameter	[mm]	4 x 6	6 x 6	8 x 6 10 x 6	
Vee groove angle	[β]	S80°	S100° S80°	S100°	
Groove clearance RA	[mm]	12			

Tab. 7

ATR\_1\_11\_0009\_6

## 2.2 Electrical data

### 2.2.1 Version data



The tables contain guide values that can change depending on the machine version and project planning conditions. A layout with e.g. TLD is required in all cases.

#### PMC125 S

Electrical version		S001	
Suspension r		2:1	
Rated speed v	[m/s]	1	
Max. rated load Q	[kg]	450	480
Diameter of traction sheave $D_T$	[mm]	240	
Rated power $P_{\text{rated}}^{1)}$	[kW]	2.8	
Rated torque $M_N$	[Nm]	170	
Rated speed $n_{\text{Rot}}$	[rpm]	159	
Rated current $I_N$	[A]	7.9	
Effective voltage $U_{\sim, \text{eff}}$	[V]	323	
Stator frequency $f_{\text{Stator}}$	[Hz]	26.5	
Efficiency (at rated load) $\eta^{2)}$	[%]	71.9	
Power factor $\cos \varphi^{2)}$		0.89	
Approach moment $M_A$	[Nm]	300	
Starting current $I_A$	[A]	15.5	
Max. permitted current $I_{\text{max.}}$	[A]	18	
Inverter type <sup>3)</sup>		RPI5.5/MFR5.5 CPI09 FS	

Tab. 8

ATR\_1\_11\_0032\_0

- 1) S5 (120 c/h, 40% duty cycle), for Korea application S5 (180 c/h, 50% duty cycle) permitted
- 2) Machine warm at 20°C ambient temperature
- 3) Allocation frequency inverter via calculation program (e.g. TLD)

#### PMC125 M

Electrical version		M002	
Suspension r		2:1	
Rated speed v	[m/s]	1	
Max. rated load Q	[kg]	480	630
Traction sheave diameter $D_T$	[mm]	320	240
Rated power $P_{\text{rated}}^{1)}$	[kW]	2.9	3.8
Rated torque $M_N$	[Nm]	230	
Rated speed $n_{\text{Rot}}$	[rpm]	119	159
Rated current $I_N$	[A]	10.2	
Effective voltage $U_{\sim, \text{eff}}$	[V]	252	336
Stator frequency $f_{\text{Stator}}$	[Hz]	19.9	26.5
Efficiency (at rated load) $\eta^{2)}$	[%]	68.3	73.8
Power factor $\cos \varphi^{2)}$		0.89	

Electrical version		M002
Approach moment $M_A$	[Nm]	400
Starting current $I_A$	[A]	18.8
Max. permitted current $I_{max.}$	[A]	22
Inverter type <sup>3)</sup>		RPI5.5/MFR5.5 CPI09/15 FS MFC21-09/15

Tab. 9

ATR\_1\_11\_0033\_0

- 1) S5 (120 c/h, 40% duty cycle), for Korea application S5 (180 c/h, 50% duty cycle) permitted  
 2) Machine warm at 20°C ambient temperature  
 3) Allocation frequency inverter via calculation program (e.g. TLD)

## PMC125 L



The PMC125L machine is likely to be available as of summer 2018.

Electrical version		L003			
Suspension r		1:1	2:1		
Rated speed v	[m/s]	1			
Max. rated load Q	[kg]	500	750	800	1000
Traction sheave diameter $D_T$	[mm]	240	320	240	
Nominal power $P_N$	[kW]	2.9 <sup>1)</sup>	4.4 <sup>1)</sup>	4.7 <sup>2)</sup>	5.9 <sup>1)</sup>
Rated torque $M_N$	[Nm]	350		280	350
Rated speed $n_{Rot}$	[rpm]	80	119	159	
Rated current $I_N$	[A]	14.6	14.9	11.9	14.9
Effective voltage $U_{\sim, eff}$	[V]	200	249	309	333
Stator frequency $f_{Stator}$	[Hz]	13.3	19.9	26.5	
Efficiency (at rated load) $\eta$ <sup>3)</sup>	[%]	64.5	69	79	75
Power factor $\cos \varphi$ <sup>3)</sup>		0.91		0.93	0.91
Approach moment $M_A$	[Nm]	600		500	600
Starting current $I_A$	[A]	25.2	27.7	22.8	27.4
Max. permitted current $I_{max.}$	[A]	30			
Inverter type <sup>4)</sup>		RPI7.5/MFR7.5 CPI15 FS			

Tab. 10

ATR\_1\_11\_0034\_0

- 1) S5 (180 c/h, 40% duty cycle)  
 2) S5 (180 c/h, 50% duty cycle)  
 3) Machine warm at 20°C ambient temperature  
 3) Allocation frequency inverter via calculation program (e.g. TLD)

## 2.2.2

### Pole pairs

The machine has 10 magnetic pole pairs (20 poles).

## 2.2.3 Brake



The PMC125L machine is likely to be available as of summer 2018.

Additional data for the brake: [Chap. 3.2, P. 28.](#)

Version		S	M	L
Manufacturer		Chr. Mayr GmbH & Co. KG		
Designation		ROBA-Duplostop RSR...		
		200	400k	400l
Electrical brake release		1 solenoid per brake circuit (series connection)		
Holding voltage <sup>1)</sup>	[VDC]	2 x 72 = 144		
Pull-in voltage <sup>1)</sup>	[VDC]	2 x 103.5 = 207		
Holding power <sup>1)</sup>	[W]	2 x 70	2 x 76	2 x 88
Inrush current <sup>1)</sup>	[W]	2 x 146	2 x 158	2 x 184
Number of switch operations (S5)	[c/h]	120/180 <sup>1)</sup>		180
Duty cycle	[%]	40/50 <sup>1)</sup>		50
Monitoring devices		1 microswitch per brake circuit (monitoring of brake release)		

Tab. 11

ATR\_1\_11\_0013\_6

1) 180 c/h 50% duty cycle for Korea application

## 2.2.4 Encoder

Additional encoder data: [Chap. 3.2, P. 28.](#)

Manufacturer		Kübler	Baumer <sup>1)</sup>	Heidenhain
Designation		Sendix absolute, type 5873	EAL580-B55	ECN 413
Data interface		BISS-C <sup>1)</sup> , SSI <sup>2)</sup>		EnDat01
Code		binary <sup>1)</sup> , grey <sup>2)</sup>		binary
Positions per revolution		8192 (13 bit)		
System accuracy			+0.025°	+20"
Incremental signals (sine/cosine)		2 x 2048; 1 Vpp		
Limit frequency (-3 dB)	[kHz]	400	200	400
Supply voltage	[VDC]	4.5 ... 5.5		3.6 ... 14
Current consumption	[mA]	max. 70 [5VDC]	max. 50	max. 160
Protection class		IP65	IP64	
Vibration 50 to 2000 Hz in accordance with EN 60 068-2-6	[m/s <sup>2</sup> ]	max. 100		max. 300
Shock according to EN 60 068-2-27		max. 2500 m/s <sup>2</sup> 6 ms	max. 2000 m/s <sup>2</sup> 3 ms	max. 1000 m/s <sup>2</sup> , 6 ms max. 2000 m/s <sup>2</sup> , 2 ms
Operating temperature	[°C]	-40 ... +105	-20 ... +105	-40 ... +100
Mechanical structure		Conical shaft 1 : 10		
Electrical connection		15-pin D-Sub plug connector (2-row) <sup>1)</sup>		

Manufacturer		Kübler	Baumer <sup>1)</sup>	Heidenhain
		15-pin D-Sub plug connector (3-row) <sup>2)</sup>		
Cable length	[m]	5 or 10 <sup>3)</sup>		

Tab. 12

ATR\_1\_11\_0017\_0

1) Standard version, encoders made by Kübler and Baumer are compatible

2) For deployment in North America

3) 10 m only in conjunction with standard version

## 2.2.5

## Temperature monitoring

### NOTICE



#### Overheating of the motor

Motor can be damaged.

→ In the case of overtemperature, the elevator installation must be shut down.

For temperature monitoring, a thermistor is embedded in the stator winding; this outputs a switching signal in the case of overtemperature.

The temperature monitoring must be connected to an evaluation unit that complies with the standard DIN VDE V 0898-1-401 and must be monitored by the elevator control system.

Type		PTC triplex PTC thermistor
Tripping temperature	[°C]	110 (± 5)
Measurement voltage	[V]	2.5
Max. operating voltage	[V]	30

Tab. 13

ATR\_1\_10\_0004\_1

## 2.3

## Limit values

The maximum temperature on the surface of the PMC125 is 105°C at 40°C ambient temperature.

The specified electrical data apply to the ambient conditions described in [Chap. 2.3.1, P. 17](#).

Max. permitted voltage (earth cable, measured at the terminal blocks)	[V]	1200
Voltage at the motor terminals (wire-wire)	[V]	1200
Rise time of measured voltage (10- 90%) at the motor terminal	[ns]	100
Layout of insulation material according to insulating material class		B
Utilization according to insulating material class		A

Tab. 14

ATR\_1\_11\_0036\_0

### 2.3.1

## Ambient conditions

The machine is designed for operation under the following ambient conditions:

- Relative air humidity up to 95% (no dewfall)
- Ambient temperature between +5 °C and +40 °C
- Site altitude without derating up to 1000 m amsl

- A minor dust and/or salt content in the air is permitted (harbour towns)

With the following conditions, the brake is able to hold the stationary elevator securely:

- Air humidity up to 99% (no dewfall)
- Temperature between -30°C and +70°C

## 2.3.2

### Service life

The machine is configured for a service life of:

	120 c/h	180 c/h
Years	15	10
Hours of operation	15,000	10,000
Elevator runs	1.8 million	

Tab. 15

ATR\_1\_11\_0042\_0

## 2.4

### Derating



Besides the electric motor, the brake is also affected by derating. Additional information: Chap. 3.2, P. 28

If the conditions stated in [Chap. 2.3.1, P. 17](#) are exceeded, the deratings in accordance with DIN EN60034 and/or VDE0530 apply. A power increase for reduced requirements is not possible.

## 2.5

## Dimensions

### 2.5.1

### PMC125 S machine for diameter of traction sheave 240 mm

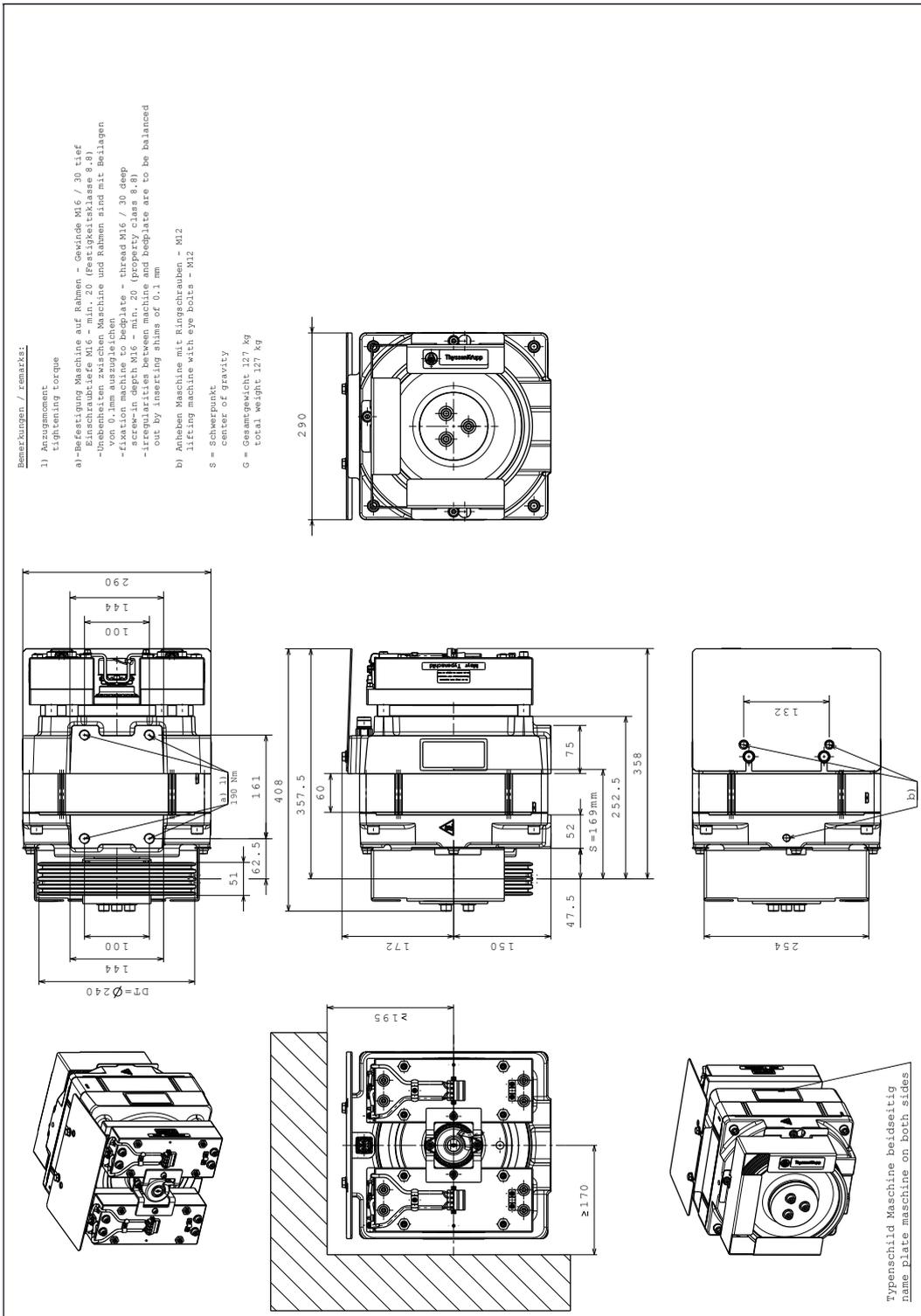


Fig. 5

ATR\_2\_11\_0011\_0

2.5.2

PMC125 M machine for diameter of traction sheave 240 mm

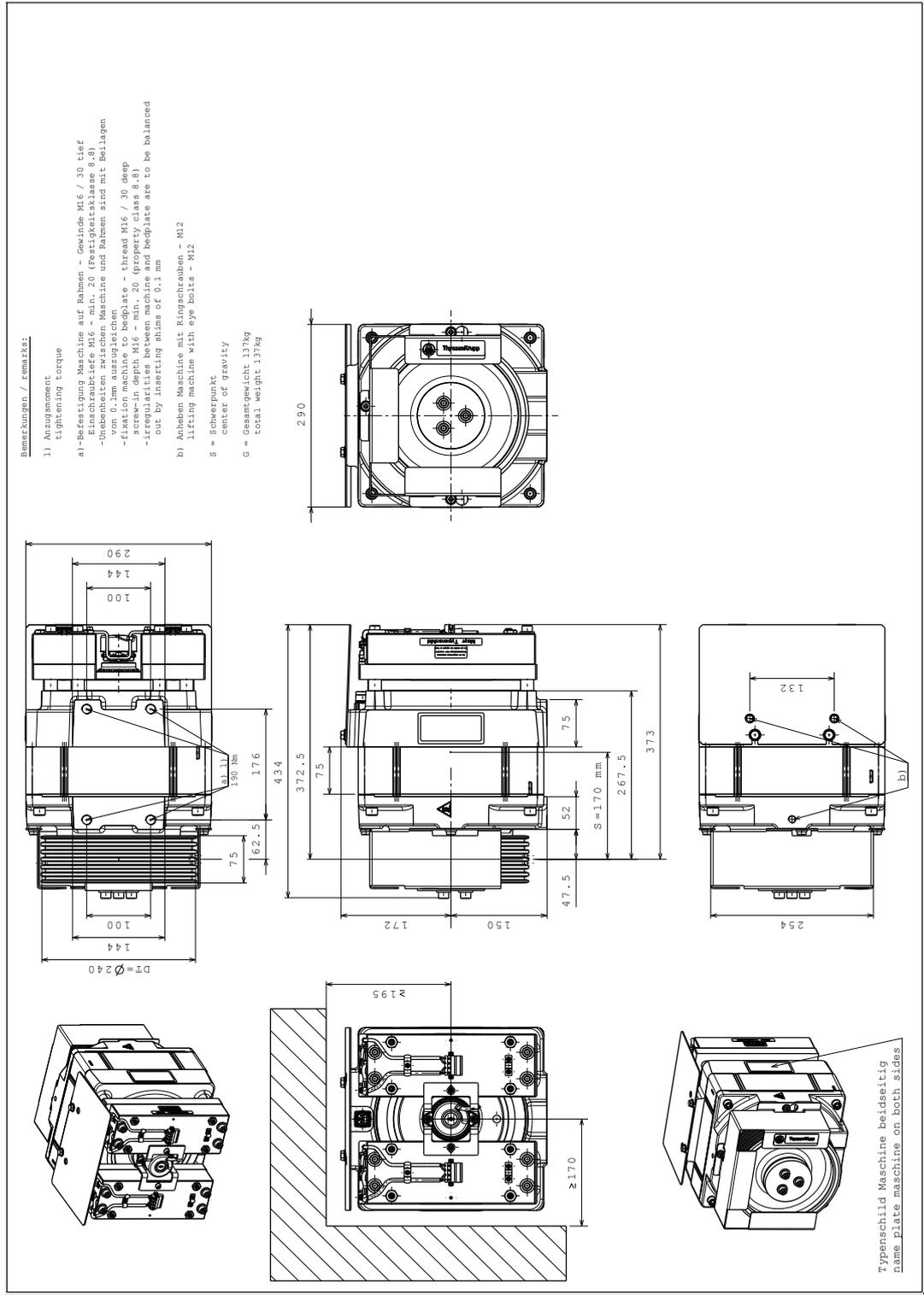


Fig. 6

ATR\_2\_11\_0012\_0

2.5.3

PMC125 L machine for diameter of traction sheave 240 mm



The PMC125L machine is likely to be available as of summer 2018.

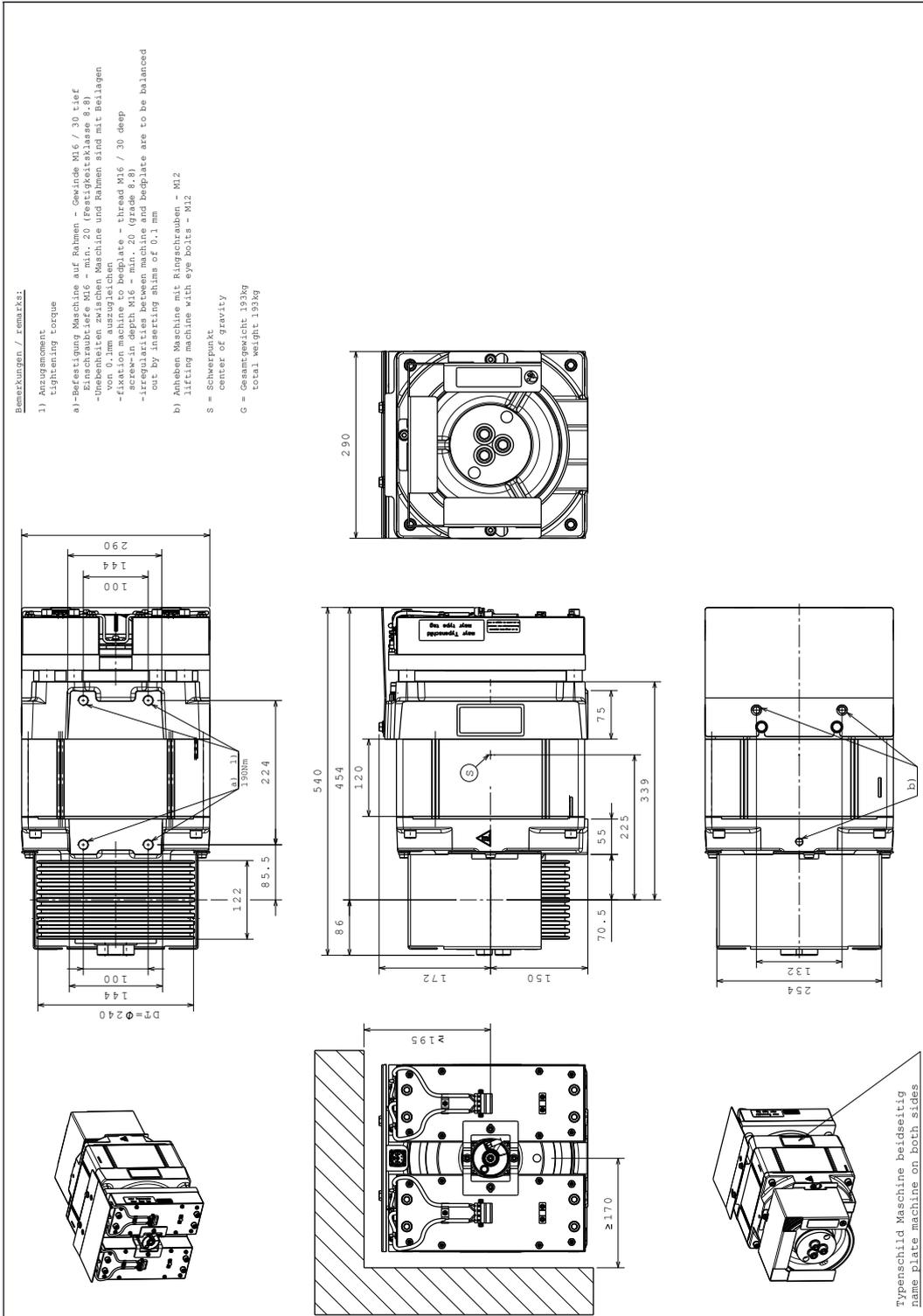


Fig. 7

ATR\_2\_11\_0013\_0

2.5.4

Traction sheave side for diameter of traction sheave 320 mm

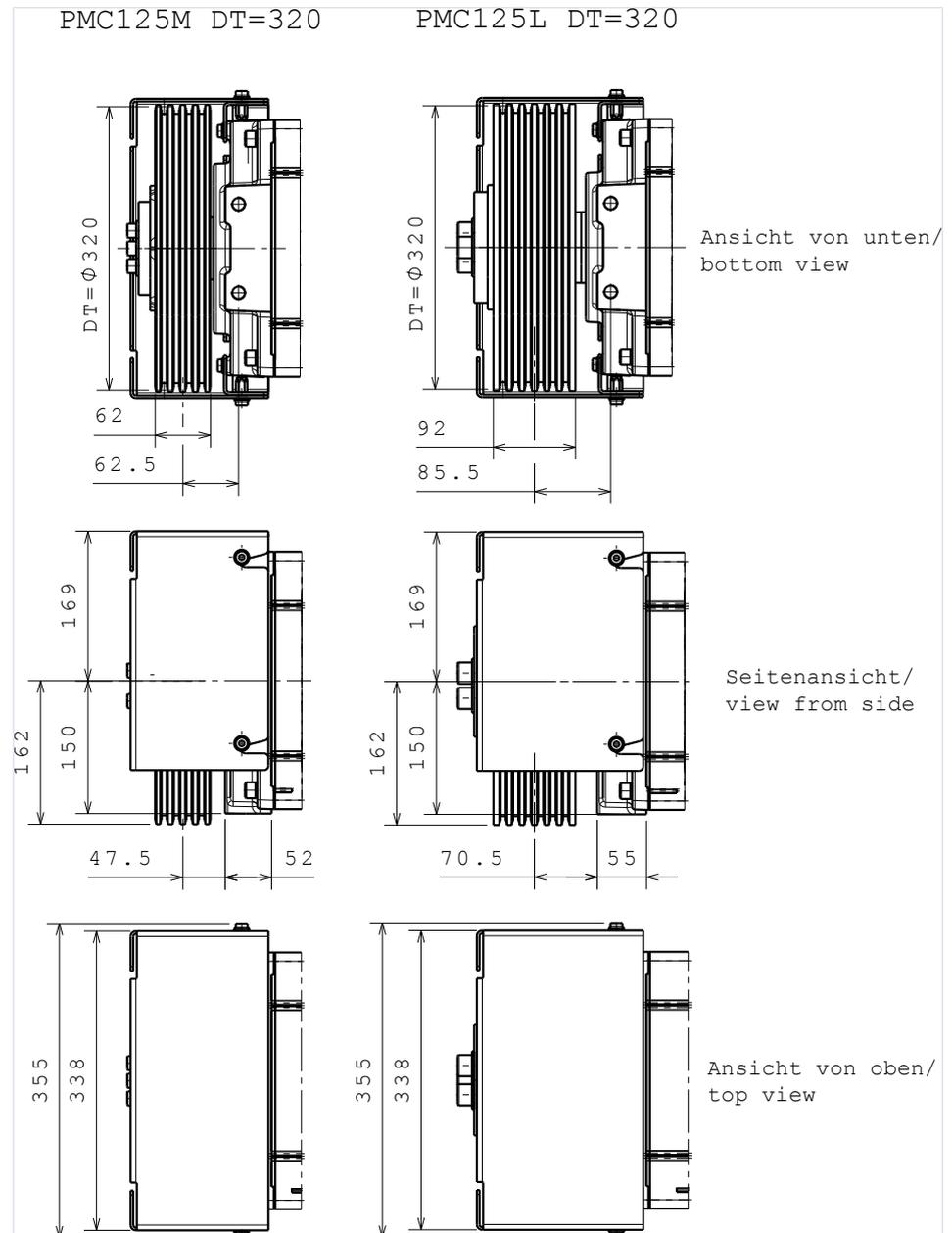


Fig. 8

ATR\_2\_11\_0014\_0

## 2.6 Wiring diagram

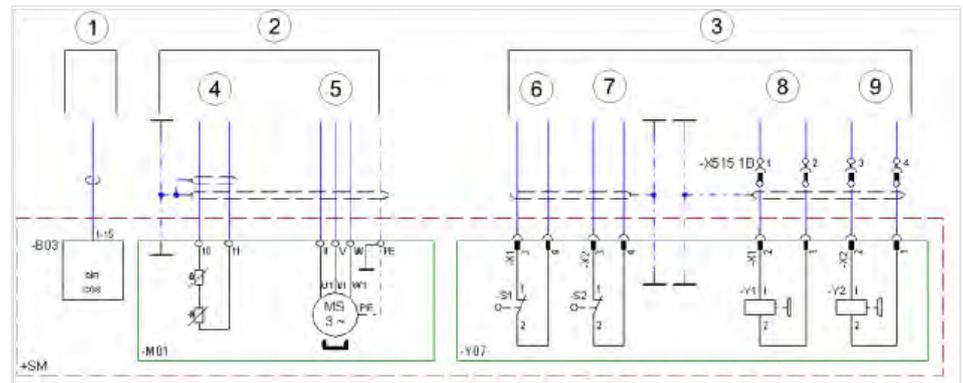


Fig. 9

ATR\_2\_11\_0028\_0

Item	Designation	Item	Designation
1	Encoder	2	Motor
3	Brake	4	Thermistor
5	Motor winding	6	Brake opening monitoring - brake 1
7	Brake opening monitoring - brake 2	8	Coil – brake 1
9	Coil – brake 2		

## 2.7

### Electrical connection

The machine has 3 different connection lines. All lines are provided with shielding to prevent disruptive influences.

- Motor/thermistor on both sides with plug connectors, connected on machine side
- Brake supplied loose, with plug connectors on both sides
- Encoder installed on encoder, on inverter side with plug connector

### Cable lengths and areas of application

The above-mentioned connection lines are available with the following lengths:

- 5 m: preferably in installations without machine room (MRL, for example synergy)
- 10 m: if 5 m is not sufficient
- 6 m: Korea

### 2.7.1

#### Motor

##### Different versions of the motor cables

The motor cable is available in the following versions:

- On the motor side, always with round plug.
- On the inverter side, there are the following versions:
  - With connector for connection to the RPI/MFR inverter
  - Without connector, i. e. with end sleeves for connection to the CPI/MFC inverter or third-party inverters.

The motor cable contains four conductors for the power supply and two conductors for temperature monitoring.

Machine size	Motor cable size [mm <sup>2</sup> ]
PMC125 S, M	2.50
PMC125 L	4.00

Tab. 16

ATR\_1\_11\_0018\_5



The PMC125L machine is likely to be available as of summer 2018.

### Motor cable connection to CPI/MFC devices

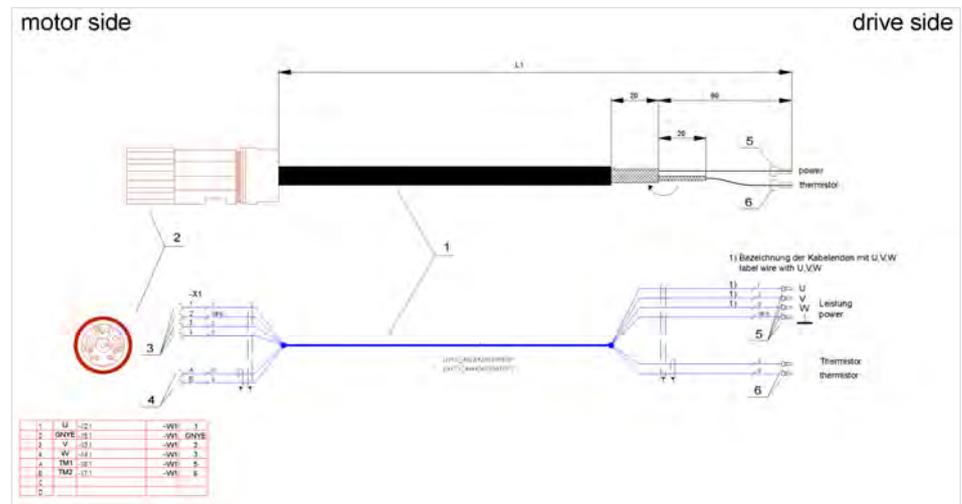


Fig. 10

ATR\_2\_11\_0025\_0

### Motor cable connection to RPI/MFR devices

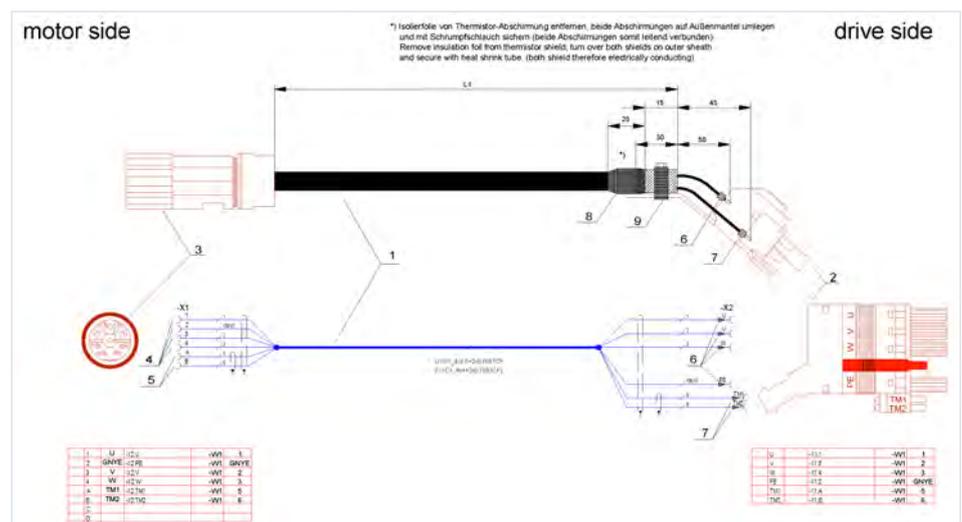


Fig. 11

ATR\_2\_11\_0026\_0

## Motor cable connection for Korea

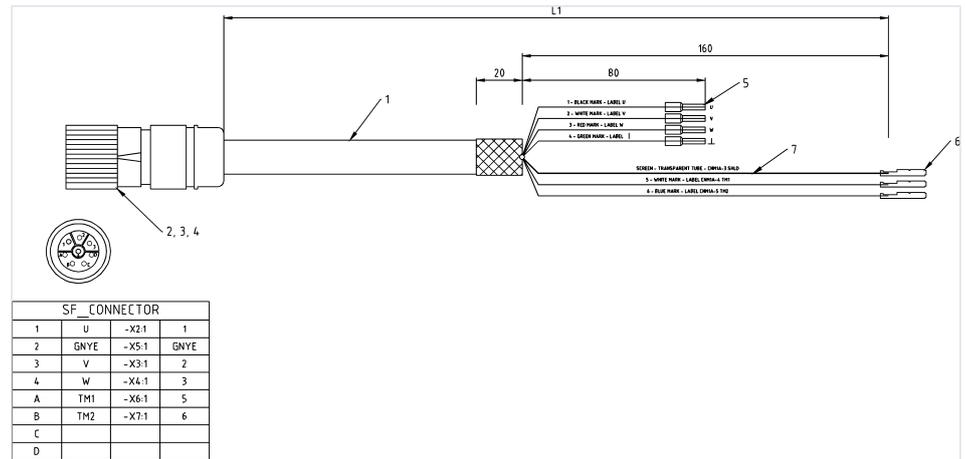


Fig. 12

ATR\_2\_11\_0027\_0

## 2.7.2

## Brake



On connecting the brakes, the manufacturer of the elevator installation must implement suitable measures that enable testing of the brake (separately for each brake circuit) and rescue operation (also in the event of a power failure).

## Brake-side connection of the brake line

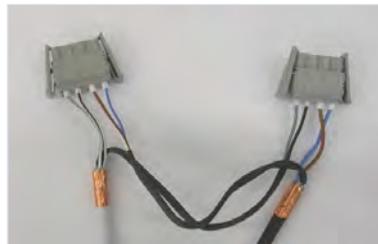


Fig. 13

ATR\_2\_11\_0022\_0

## Inverter-side connection of the brake line

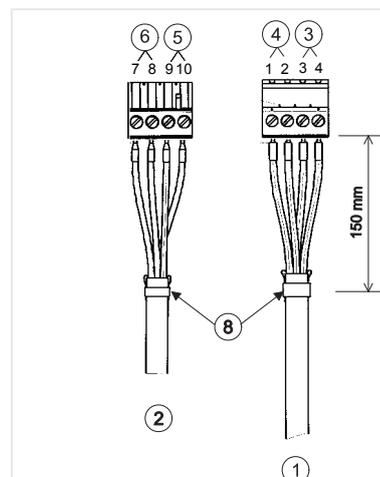


Fig. 14

ATR\_2\_11\_0023\_0

Item	Designation	Item	Designation
1	Cable for magnet coils with Phoenix Contact connector type GIC2.5/4-ST-7.62	2	Cable for monitoring devices with Phoenix connector FKC 2.5/4-ST-5.08
3	Coil – brake 1	4	Coil – brake 1
5	Brake release control microswitch – brake 2	6	Brake release control microswitch – brake 1
		8	Exposed shielding

### Connection of the brake line for Korea

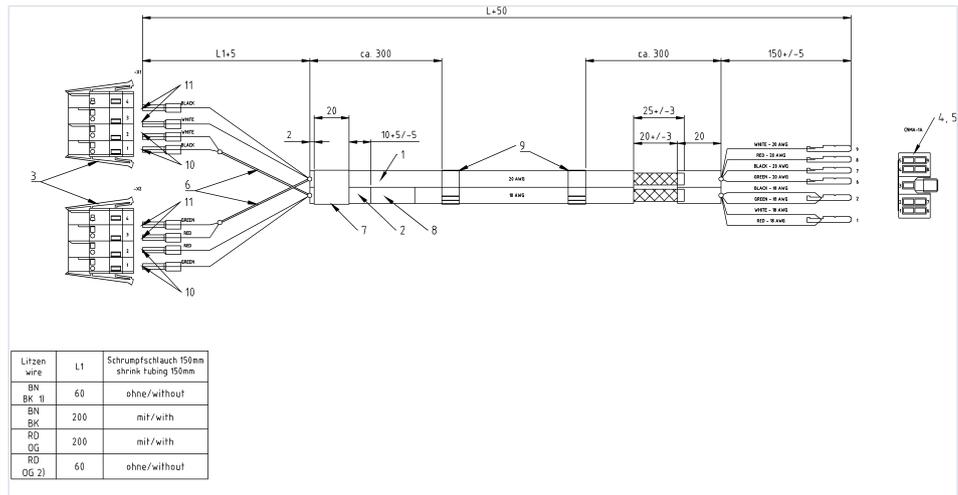


Fig. 15

ATR\_2\_11\_0024\_0

## 2.7.3

## Encoder

### NOTICE



**The encoder connection cable makes contact with hot machine surface**  
Cable is damaged.

→ The connection cable must not make contact with the machine surface.

### Terminal connecting plan for encoder with 2-row plug connector

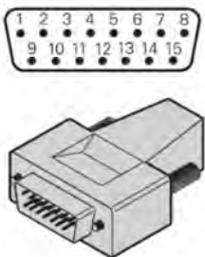


Fig. 16

ATR\_2\_12\_0053\_2

4	12	2	10	1	9	3	11	5	13	8	15	6
5V U <sub>p</sub>	5V sensor	0V U <sub>N</sub>	0V sensor	A+	A-	B+	B-	DATA	DATA	CLOCK	CLOCK	Innenschirm Internal shield (0V)
br/gn BN/GN	bl BL	ws/gn WH/GN	ws WH	gn/sw GN/BK	ge/sw YL/BK	bl/sw BL/BK	rt/sw RD/BK	gr GY	rs PK	vio VI	ge YL	

Fig. 17

ATR\_2\_12\_0053\_1

An external screen is fitted at the housing. The sensor line is connected internally to the power supply. **Connections 7 and 14 are not used and must not be used.**

Additional information: [Chap. 3.2, P. 28](#)

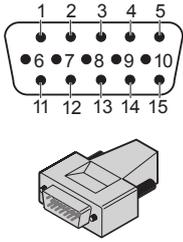


Fig. 18

ATR\_2\_11\_0016\_0

### Terminal connecting plan for encoder with 3-row plug connector

13	14	1	2	3	4	5	6	11	12	14
+V (U <sub>P</sub> )	0V (U <sub>N</sub> )	A+	A-	B+	B-	DATA	$\overline{\text{DATA}}$	CLOCK	$\overline{\text{CLOCK}}$	Innenschirm Internal shield (0V)
br/gn BN/GN	ws/gn WH/GN	gn/sw GN/BK	ge/sw YL/BK	bl/sw BL/BK	rt/sw RD/BK	gr GY	rs PK	vio VI	ge YL	

Fig. 19

ATR\_2\_11\_0017\_0

An external screen is fitted at the housing.

**Connections 7, 9, 10 and 15 are not used and must not be used!**

Connection 8 with Kübler encoder with SSI: set input for zeroing.

**Connection 8 with Heidenhain encoder is not used and must not be used!**

Additional information: [Chap. 3.2, P. 28](#)

## 3 Appendix

### 3.2 Manufacturer information

#### Also see about this

[Verification of traction sheave calculation P. 29](#)

[Baumer BISS-C encoder - operating and installation instructions P. 30](#)

[Baumer SSI encoder - operating and installation instructions P. 31](#)

[Baumer encoder - declaration of conformity P. 32](#)

[Kübler Sendix 5873 encoder - installation instructions P. 33](#)

[Kübler Sendix absolut 5873 encoder - instructions for installation/removal P. 35](#)

[Kübler Sendix 5873 encoder - data sheet A1796\\_9950 001 0874 P. 37](#)

[Kübler Sendix 5873 encoder - data sheet A1796\\_9950 001 0877 P. 38](#)

[Kübler Sendix absolut 5873 encoder - declaration of conformity P. 39](#)

[Heidenhain ECN 413 encoder - installation instructions P. 40](#)

[Heidenhain ECN 413 encoder - data sheet P. 42](#)

[Heidenhain ECN 413 encoder - declaration of conformity P. 44](#)

[mayr ROBA-duplostop RSR8010\\_0013 brake - installation and operating manual P. 45](#)

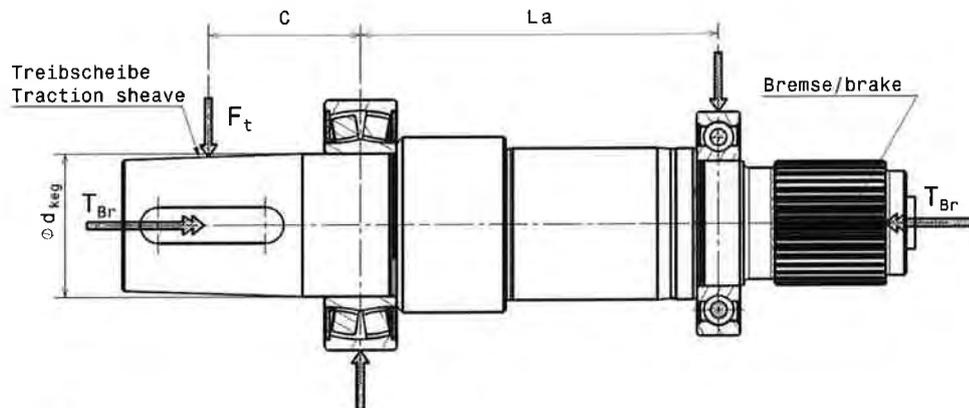
[mayr ROBA-duplostop RSR8010\\_2013 brake - installation and operating manual P. 61](#)

[mayr ROBA-duplostop RSR8010\\_0013 brake , EU type test certificate EU-BD 766 P. 77](#)

Certificate concerning the examination of traction sheave shaft calculation including shaft to collar connections

Neuhausen / May 31th, 2017

**Lift machine, type:** PMC125S0/M0/LO  
**Brake type:** RSR 200/8010.00013 S or RSR200/8010.12013 S for PMC125S0  
 RSR 400/8010.20013 S or RSR 400/8010.22013 S for PMC125M0  
 RSR 400/8010.10013 S or RSR 400/8010.12013 S for PMC125LO  
 according EC-Type – Examination ABV 766/X respectively  
 EC-Type – Examination EU-BD 766  
**Manufacturer:** thyssenkrupp Aufzugswerke GmbH  
 Bernhäuser Str.45, 73765 Neuhausen a.d.F.  
**Object examined:** Calculation of traction sheave shaft including shaft to collar connections  
**Examination basis:** DIN743, Roloff / Matek 1994 (DIN254)



**Design drawing:** 6251 000 0560  
 6251 000 0550  
 6251 000 0574  
**Material:** C45R +N (1.1201)

**Load data:**

Machine	Max. Shaft load $F_t$	Nominal brake torque $T_{Br}$	Max. brake torque $2,0 \times T_{Br}$	Taper diameter $d_{keg}$	Distance traction sheave C	Bearing distance $La$
	(kN)	(Nm)	(Nm)	(mm)	(mm)	(mm)
PMC125S0	13	2 x 250 (2 x 210)	1000	70	60.5	143
PMC125M0	14	2 x 350 (2 x 300)	1400	70	60.5	158
PMC125LO	25	2 x 550 (2 x 500)	2200	80	85	200

**Examination result:**

For the examination calculations were carried out based on the examination basis. The result was that the traction sheave shaft and the shaft to collar connections were designed according the maximum load data. The remarks in the maintenance instructions are to be observed.

The conditions mentioned in annex 2.4 of the EC-Type-Examination Certificate no. ABV766/X respectively EC-Type-Examination Certificate EU-BD 766 are herewith fulfilled.



(Executive board)



(Head of TKEI TD)

**EN Translation of the original operating and mounting instructions**

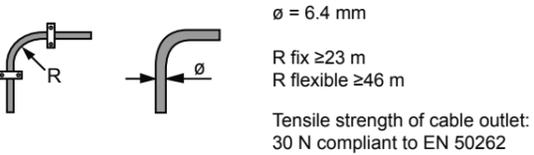
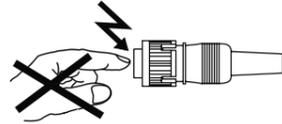
**EAL580-B55.T\$6B.13009.2/**

Absolute encoder – BISS-C

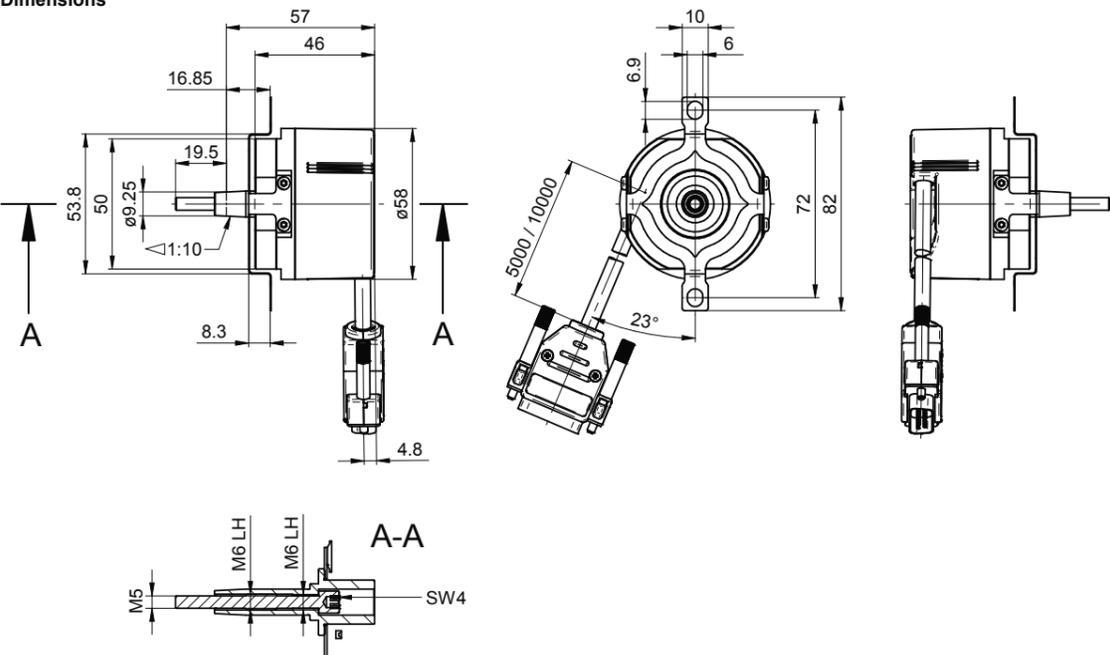


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Errors and omissions excepted.



**Dimensions**



**Safety instructions**

Observe the applicable law, directives and standards for use respectively intended use.

Do not put encoder into service if there is any visible evidence of damage. Please refer to and observe the operating instructions of the machine manufacturer.

Do not operate the system outside the specifications. Prior to commissioning the system, check every electrical connection. Installation, electrical commissioning or any other work at encoder or system is to be performed by appropriately qualified staff only. Appropriate safety precautions must eliminate any risk of personal injury, damage to property or installations which may result from encoder failure or malfunction.

**Mounting and installation**

Encoder mounting and installation are to be performed by appropriately qualified electronic experts only.

**Intended use of the device**

The encoder is a precision instrument for the acquisition of angular positions, their electronic evaluation and provision in the form of electronic output signals for the downstream device. The encoder must not be used for any other purpose.

**Transport, storage and disposal**

Only ever store and transport the encoder in its original packaging. Do not drop the encoder; otherwise it must no longer be deployed. Dispose of components according to the country-specific applicable law.

**Maintenance**

The encoder is maintenance-free and must not be opened or mechanically/electrically modified in any way.

**Mounting instructions**

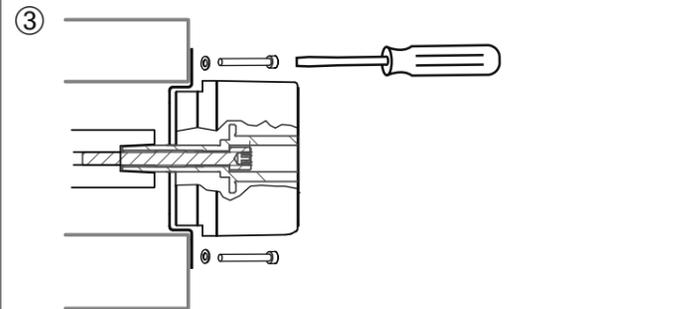
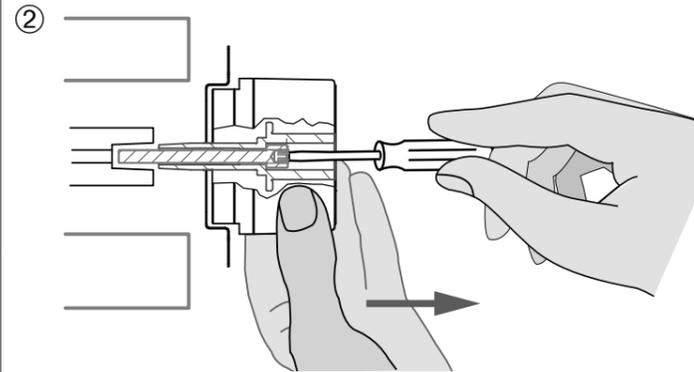
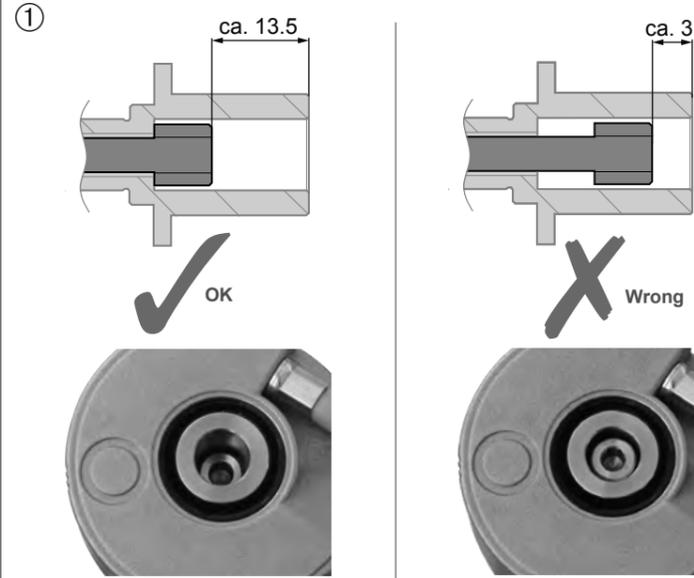
Avoid any shocks or mechanical impact on housing or shaft.

**Mounting the encoder:**

- Countersink center screw M5 (SW4) to have it fully rest on the inside shoulder of the encoder shaft (see drawing ①).
  - Fasten center screw onto motor shaft (tightening torque 3 Nm  $\pm$ 0.05 Nm).
  - Slightly pull back the encoder while screwing (see drawing ②). This way it is ensured the center screw will fully rest on the inside shoulder of the encoder shaft!
  - Attach stator coupling to the contact surface using two screws (not included)
- Make sure the spring arms remain free to move (see drawing ③).



The fastening screw provides microencapsulation and requires the motor shaft being absolutely free from oil and grease! Due to microencapsulation, the center screw can be used only once. Observe at least 6 h hardening time.



Fastening screws for stator coupling are not included!



Failure to observe will result in impaired operational safety.

**Electrical commissioning**



Do not modify the encoder electrically nor perform any wiring work while the encoder is live. Any output which is left unassigned must not be wired. Make sure the entire system installation is EMC compliant. Installation environment and wiring affect the encoder EMC. Encoder and supply lines must be spatially separated or routed at a great distance from cables with high interference level (frequency converters, contactors, etc.). Provide separate encoder supply where consumers with high interference levels are present. Encoder housing and connecting cable must be fully shielded. Grounding at both ends is recommended. Connector attachment at a temperature below -10 °C requires re-tightening the fastening screws as soon as the surroundings are warming up.

**Terminal assignment**

Connector	Assignment
Pin 1	A
Pin 2	GND
Pin 3	B
Pin 4	UB
Pin 5	Data+
Pin 6	-
Pin 7	-
Pin 8	Clock+
Pin 9	A inv.
Pin 10	GND-Sense
Pin 11	B inv.
Pin 12	UB-Sense
Pin 13	Data-
Pin 14	-
Pin 15	Clock-

**Encoder deinstallation**

1. Unscrew the encoder stator coupling from the contact surface.
2. Fully loosen the center screw and remove encoder from drive shaft.

**EN Translation of the original operating and mounting instructions**

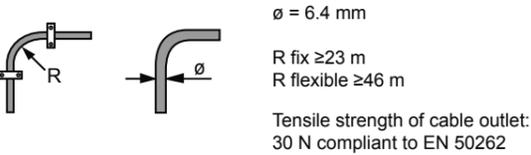
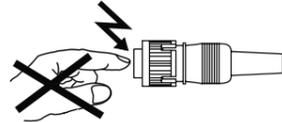
**EAL580-B55.T\$5B.13009.2/**

Absolute encoder – SSI

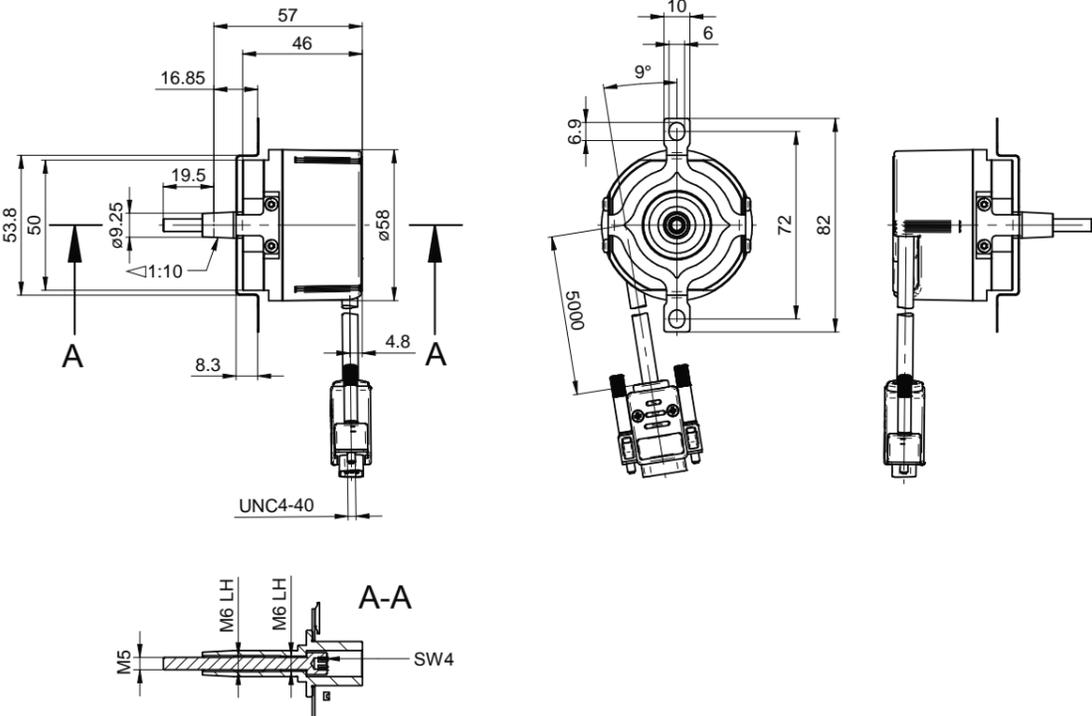


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Do not operate the system outside the specifications.  
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**Transport, storage and disposal**

Only ever store and transport the encoder in its original packaging. Do not drop the encoder; otherwise it must no longer be deployed. Dispose of components according to the country-specific applicable law.

**Maintenance**

The encoder is maintenance-free and must not be opened or mechanically/electrically modified in any way.

**Mounting instructions**

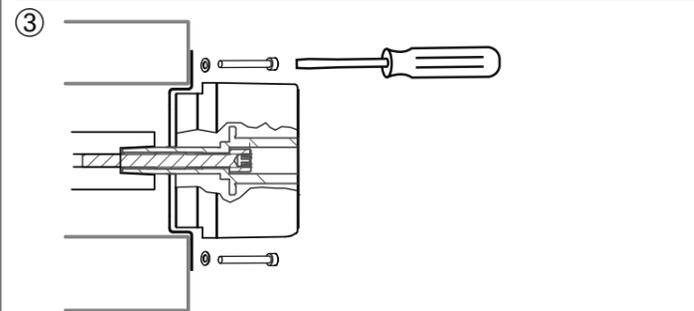
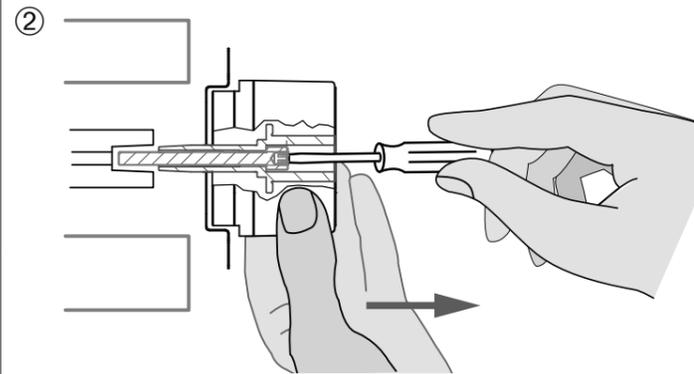
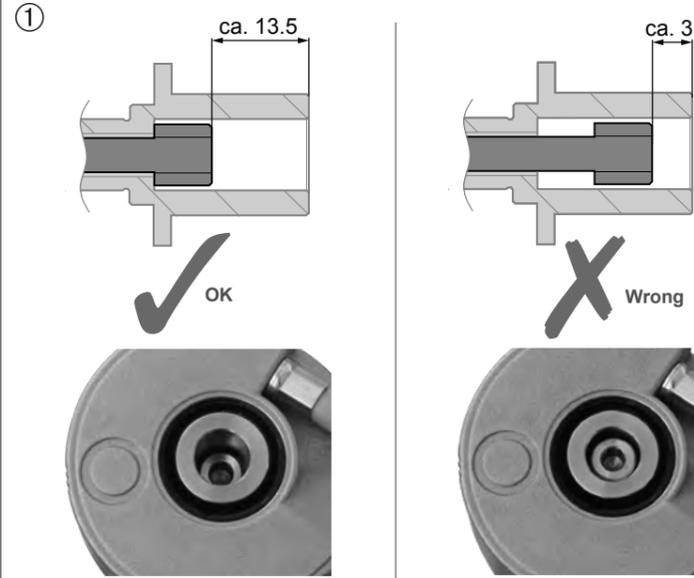
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- Slightly pull back the encoder while screwing (see drawing ②). This way it is ensured the center screw will fully rest on the inside shoulder of the encoder shaft!
- Attach stator coupling to the contact surface using two screws (not included)
- Make sure the spring arms remain free to move (see drawing ③).



The fastening screw provides microencapsulation and requires the motor shaft being absolutely free from oil and grease! Due to microencapsulation, the center screw can be used only once. Observe at least 6 h hardening time.



Fastening screws for stator coupling are not included!



Failure to observe will result in impaired operational safety.

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Do not modify the encoder electrically nor perform any wiring work while the encoder is live. Any output which is left unassigned must not be wired. Make sure the entire system installation is EMC compliant. Installation environment and wiring affect the encoder EMC. Encoder and supply lines must be spatially separated or routed at a great distance from cables with high interference level (frequency converters, contactors, etc.). Provide separate encoder supply where consumers with high interference levels are present. Encoder housing and connecting cable must be fully shielded. Grounding at both ends is recommended. Connector attachment at a temperature below -10 °C requires re-tightening the fastening screws as soon as the surroundings are warming up.

**Terminal assignment**

Connector	Assignment
Pin 1	A
Pin 2	A inv.
Pin 3	B
Pin 4	B inv.
Pin 5	Data+
Pin 6	Data-
Pin 7	–
Pin 8	Zero setting
Pin 9	–
Pin 10	–
Pin 11	Clock+
Pin 12	Clock-
Pin 13	UB
Pin 14	GND
Pin 15	–

**Encoder deinstallation**

1. Unscrew the encoder stator coupling from the contact surface.
2. Fully loosen the center screw and remove encoder from drive shaft.

# EU-Konformitätserklärung

## EU Declaration of Conformity

### Déclaration UE de Conformité

Wir erklären in alleiniger Verantwortung, dass die Produkte, auf die sich diese Erklärung bezieht, die grundlegenden Anforderungen der angegebenen Richtlinie(n) erfüllen und basierend auf den aufgeführten Norm(en) bewertet wurden.

We declare under our sole responsibility that the products to which the present declaration relates comply with the essential requirements of the given directive(s) and have been evaluated on the basis of the listed standard(s).

Nous déclarons sous notre seule responsabilité que les produits auxquels se réfère la présente déclaration sont conformes aux exigences essentielles de la directive/ des directives mentionnée(s) et ont été évalués sur la base de la norme/ des normes listée(s).

**Hersteller**

Manufacturer                      Baumer IVO GmbH & Co. KG  
Fabricant

**Bezeichnung**

Description                        Drehgeber  
Description                        Encoder  
Codeurs

**Typ(en) / Type(s) /Type(s)**

EAL580-BS5.T\$5B  
EAL580-BS5.T\$6B

nicht vorgesehen für örtliche(s) DC-Elektrizitätsversorgungsnetz / Batterie mit Verbindungskabel  $\geq$  30m.  
not intended for local DC electricity grid / battery with connecting cable  $\geq$  30m.  
pas prévu(s) au réseau électrique local à courant continu DC / Batterie avec câble de raccordement  $\geq$  30m

**Richtlinie(n)**                      2014/30/EU, 2011/65/EU

Directive(s)  
Directive(s)

**Norm(en)**                            EN 61000-6-2:2005, EN 61000-6-4:2007+A1:2011, EN 50581:2012, EN 12015:2004  
Standard(s)                        EN 12016:2013

Norme(s)

**Ort und Datum**                    Villingen-Schwenningen,  
Place and date                      25.05.2016  
Lieu et date

**Unterschrift/Name/Funktion**  
Signature/name/function  
Signature/nom/fonction

Daniel Kleiner  
Head of R&D Motion Control  
Baumer Group

## Deutsch

## Installationsanleitung Drehgeber

### Wichtig!

#### Vor Inbetriebnahme des Gebers unbedingt lesen.

Mit diesem Geber haben Sie ein Präzisionsmessgerät erworben. Beachten Sie stets die Angaben und Hinweise des Datenblattes, um eine problemlose Funktion des Gebers zu gewährleisten und um die Garantieleistung aufrecht zu erhalten. Falls im Datenblatt nichts anderes angegeben ist, bitte folgendes unbedingt beachten:

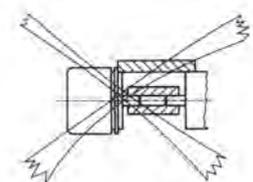
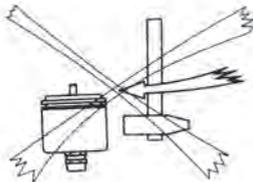
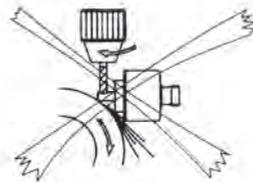
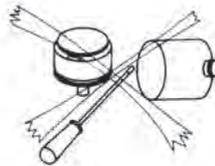
### Mechanisch:

– Der Drehgeber darf weder teilweise noch ganz zerlegt oder modifiziert werden.

– Die Welle nicht nachträglich bearbeiten (schleifen, sägen, bohren, usw.). Die Genauigkeit des Gebers und die Zuverlässigkeit von Lager und Dichtung nehmen sonst Schaden. Wir sind gerne bereit, auf Ihre Kundenwünsche einzugehen.

– Das Gerät niemals mit dem Hammer ausrichten.  
– Schlagbelastungen unbedingt vermeiden.  
– Drehgeberwelle nicht über die im Datenblatt angegebenen Werte belasten (weder axial noch radial).

– Drehgeber und Antriebsgerät nicht an Wellen und Flanschen starr miteinander verbinden. Benutzen Sie grundsätzlich eine Kupplung (zwischen Antriebswelle und Geberwelle, bzw. zwischen Hohlwellen-Geber-Flansch und Antriebsflansch).



Für die Gebermontage empfehlen wir Ihnen den Einsatz unserer Montagehilfen und Kupplungen (siehe Zubehör-Datenblätter).

**Bitte beachten Sie die umseitig stehenden Montagehinweise!**

## English

## Installing instructions for rotary encoders

### Important!

#### It is imperative to read these instructions before setting the encoder in operation.

This encoder is a precision measuring instrument.

Always observe the information and instructions of the data sheet to ensure trouble-free function and to maintain warranty claims. Unless otherwise stated in the data sheet, the following has to be absolutely observed:

### Mechanical:

– It is not permissible to dismantle the encoder entirely or in part or to modify it.

– Do not alter the shaft (by grinding, sawing, drilling, etc.), otherwise the accuracy of the encoder and the dependability of bearing and gasket will suffer. We are prepared to discuss special designs.

– Never align the instrument with a hammer.  
– It is imperative to avoid impact loads.  
– Radial and axial load capacity as stated in the data sheet have to be observed under any circumstances.

– Do not connect encoder and drive rigidly to one another at shafts and flanges. Always use a coupling (between drive shaft and encoder shaft, or between hollow-shaft encoder flange and drive flange).

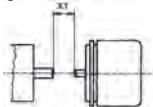
We recommend that you use our assembly aids and couplings to install the encoder (see accessory data sheets).

**Please observe the installation instructions on the back page, too.**

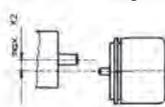
## Deutsch

### Montagehinweis für Geber mit Welle:

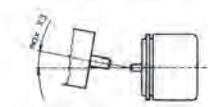
- 1 Wellen auf Versatz überprüfen.



Axialversatz / Axial offset



Radialversatz / Radial offset



Winkelfehler / Angle error

Entnehmen Sie die Werte X1, X2 und X3 dem Datenblatt der Kupplung.

- 2 Kupplung während der Montage vor zu starker Biegung sowie Beschädigung schützen.
- 3 Kupplung auf den Wellen ausrichten.
- 4 Spann- oder Klemmschrauben vorsichtig anziehen.

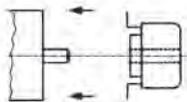
### Installation instructions for encoders with shaft:

- 1 Check shafts for offset.

Refer to the coupling data sheet for the values X1, X2, and X3.

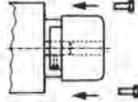
- 2 During assembly, protect coupling against excessive bending or damage.
- 3 Align coupling on the shafts.
- 4 Carefully tighten pulling or clamping bolts.

### Montagehinweise für Hohlwellengeber mit Kupplung:



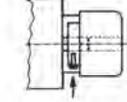
Geber mit Kupplung auf Welle montieren.

Mount encoder with coupling on shaft.



Kupplung mit Antriebsflansch verschrauben

Bolt coupling to drive flange.



Klemmnabe vorsichtig anziehen

Carefully tighten clamping hub

### Installation instructions for hollow-shaft encoders with coupling:

#### Elektrisch:

1. Geltende Sicherheitsnormen
  - Vor Inbetriebnahme sind alle benötigten Kabeladern laut Datenblatt anzuschließen. Isolieren Sie alle nicht benötigten Enden sauber, um Kurzschlüsse zu vermeiden.
  - Bei der Konfektionierung des Gegensteckers ist eine, evtl. dem Stecker beigelegte, Anleitung zu beachten.
  - An Leitungslängen empfehlen wir:
    - bei asymmetrischer Übertragung, i.H. invertierte Signale werden nicht verwendet, max. 10 m Leitungslänge.
    - bei symmetrischer Übertragung (z.B. nach RS 422) max. 50 m Leitungslänge (Leitungslänge mit verdrehten Aderpaaren)
  - Gegenstecken am Geber nur im spannungslosen Zustand ziehen oder stecken.
  - Die richtige Betriebsspannung und den maximal zulässigen Ausgangsstrom berücksichtigen (siehe Datenblatt!)
  - Ein- bzw. Ausschalten der Betriebsspannung für den Geber und das Folgegerät muss gemeinsam erfolgen.
2. Um CE-Konformität zu erreichen, ist eine EMV-gerechte Installation Voraussetzung:
  - Als Steuerleitungen sind durchgehend geschirmte Kabel zu verwenden. Bei symmetrischer Übertragung (z.B. RS 422) muss ein Kabel mit verdrehten Aderpaaren verwendet werden. Der Kabelschirm wird idealerweise rundum (360°) über schirmbare Stecker oder kabeldurchführungen an den Geber und die Auswertung angelegt.
  - Die Schutzzerde (PE) ist bevorzugt beidseitig, am Geber und an der Auswertung, impedanzarm aufzulegen.
  - Bei Problemen durch Erdschleifen ist die Schutzzerde (PE) auf der Geberseite aufzutrennen. Der Geber sollte hierbei gegenüber dem Antrieb elektrisch isoliert angebaut werden.
  - Die Geberleitungen sind getrennt von Leitungen mit hohem Störpegel zu verlegen.
  - An der Spannungsversorgung des Gebers sollten keine Verbraucher mit hohem Störpegel, wie z.B. Frequenzumrichter, Magnetventile, Schütze etc. angeschlossen werden. Andernfalls ist für eine geeignete Spannungsfilterung zu sorgen.

#### Sicherheitshinweise:

1. Wenn anzunehmen ist, dass ein gefahrloser Betrieb nicht mehr gewährleistet ist, muss das Gerät außer Betrieb gesetzt und gegen unbeabsichtigtes Einschalten gesichert werden.
2. Wenn durch den Ausfall oder eine Fehlfunktion des Gebers eine Gefährdung von Menschen oder eine Beschädigung von Betriebsanlagen nicht auszuschließen ist, so muss dies durch geeignete Sicherheitsmaßnahmen wie Schutzvorrichtungen oder Endschalter usw. verhindert werden.

Bei Missachtung der obigen Richtlinien können wir keine Garantie gewähren. Wir bitten um Verständnis.

## English

### Installation instructions for encoders with shaft:

- 1 Check shafts for offset.

Refer to the coupling data sheet for the values X1, X2, and X3.

- 2 During assembly, protect coupling against excessive bending or damage.
- 3 Align coupling on the shafts.
- 4 Carefully tighten pulling or clamping bolts.

### Installation instructions for hollow-shaft encoders with coupling:

#### Electrical:

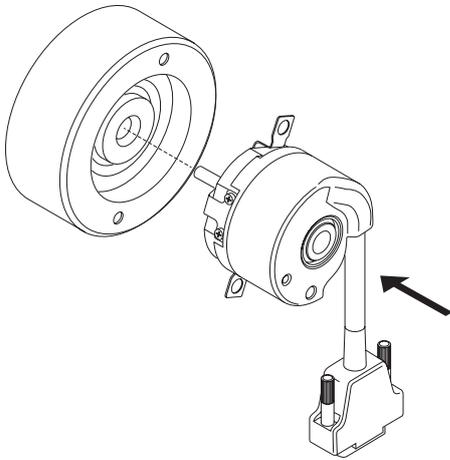
1. The existing safety devices for electrical installations have to be observed.
  - Before setting in operation, connect all required strands as per data sheet. To prevent short-circuits, neatly insulate the ends of all strands which are not required
  - When preassembling the mating connector, comply with any instructions accompanying the connector.
  - Our recommendations regarding cable lengths:
    - in case of asymmetrical transmission, i.e. inverted signals are not used, cable length max. 10 m.
    - in case of symmetrical transmission (e.g. to RS 422), cable length max. 50 m (cable with twisted pairs of wires).
  - Plug in or pull out mating connector at the encoder only when encoder is de-energized.
  - Make certain that the operating voltage is correct and the max. permissible output current is not exceeded (see data sheet).
  - The operating voltage for encoder and succeeding device must be turned on and off together.
2. In order to obtain CE-Conformity, EMC installation conformity should be observed.
  - Shielded cables should be used or control lines.
    - In case of symmetrical transmission (e.g. R422) a cable with twisted pairs of wire has to be used.
    - The cable shield should if possible be connected fully enclosed (360°) by shielded connectors or cable bushings. This has to be done at the encoder and transmission end.
  - The protection earth should be put with low impedance on both face and back of the encoder and the transmission end.
  - In case of earth loop problems, the protection earth of the encoder side has to be removed. On this occasion, the encoder should be placed electrically isolated opposite the actuation.
  - The encoder lines should run separately to cables with high noise levels.
  - Consumer with high disturbance level, e.g. frequency converters, solenoid valves, contactors etc. should not be connected to the same voltage supply. Otherwise, a suitable voltage filtering has to be installed.

#### Safety precautions:

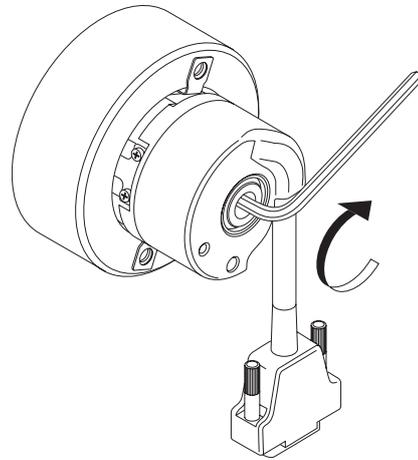
1. If operation without danger can no longer be assured of some point, the unit must be shut down and secured against accidental activation.
2. If personal injury or damage to equipment is possible should the encoder fail or malfunction, this must be prevented by suitable safety precautions such as protective devices or limit switches, etc.

We can assume no warranty if the above directives are disregarded. We ask for your understanding.

## Montageanweisung – Drehgeber Typ 5873 mit Konuswelle *Assembly instructions – encoder type 5873 with tapered shaft*



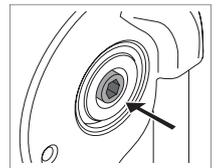
1. Befestigungsschraube in die Motorwelle schrauben. Dabei wird der Drehgeber in den Konus gezogen.  
*Screw the fixing bolt into the motor shaft. This causes the encoder to be drawn into the cone.*



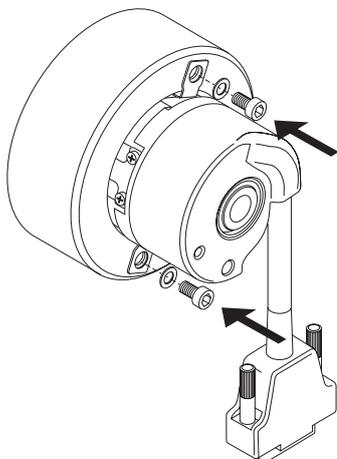
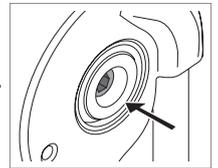
2. Befestigungsschraube mit  $3^{+0,5}$  Nm anziehen.  
*Tighten the fixing bolt with  $3^{+0,5}$  Nm.*  
 Überprüfung der korrekten Montage.  
*Check of correct mounting.*



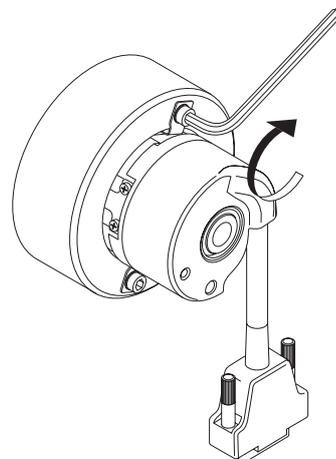
**Falsch**, Schraube nicht versenkt.  
*Wrong*, screw not inside.



**Richtig**, Schraube in Welle versenkt.  
*Right*, screw inside the shaft.

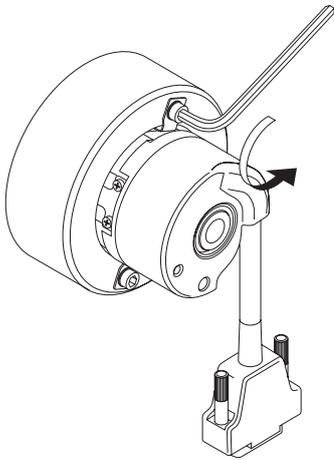


3. Drehgeber mit 2x Schrauben und Unterlegscheiben befestigen.  
*Attach the encoder with 2 x bolts and washers.*

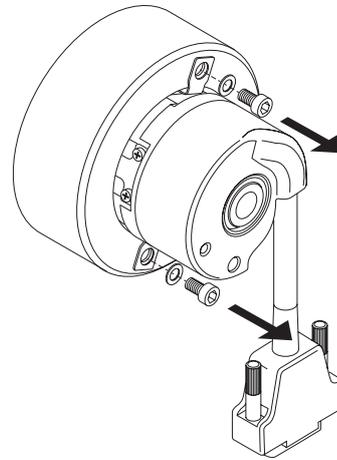


4. 2x Schrauben anziehen.  
*Tighten the 2 x bolts.*

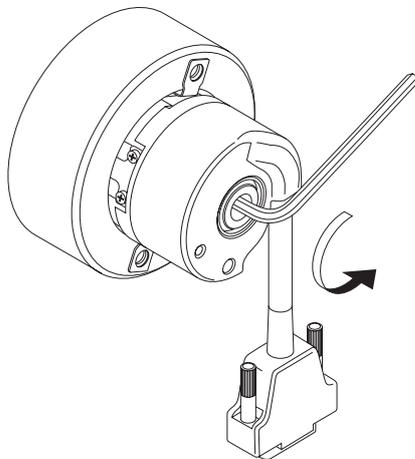
## Demontageanweisung – Drehgeber Typ 5873 mit Konuswelle Disassembly instructions – encoder type 5873 with tapered shaft



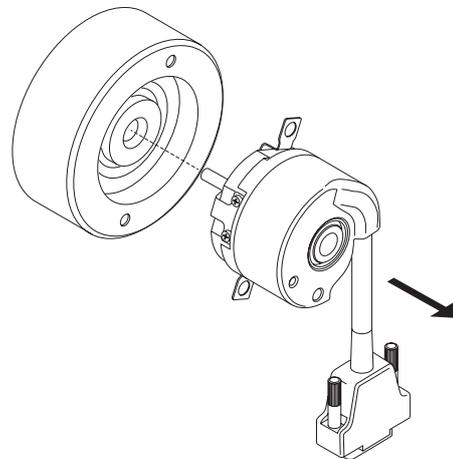
1. 2x Schrauben lösen.  
*Loosen 2 x bolts.*



2. 2x Schrauben mit Unterlegscheiben entfernen.  
*Remove 2 x bolts with washers.*



3. Befestigungsschraube lösen.  
*Loosen fixing bolt.*



4. Durch das Lösen der Befestigungsschraube trennt sich der Drehgeber von der Motorwelle.  
*Unscrewing the fixing bolt causes the encoder to disengage from the motor shaft.*

approval for production:

checked: company & sign date

technical subject to modifications

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**Mechanical characteristics:**

Max. speed up to 70°C: 12000min<sup>-1</sup>, continuous 10000min<sup>-1</sup>  
 Max. speed up to Tmax: 8000min<sup>-1</sup>, continuous 5000min<sup>-1</sup>  
 Starting torque: <0.01 Nm  
 Moment of inertia: 3x10<sup>-9</sup>kgm<sup>2</sup>  
 Radial load capacity of shaft: 80N  
 Axial load capacity of shaft: 40N  
 Weight: approx. 0.35kg  
 Protection acc. to EN 60 529: shaft,side: IP65  
 housing,side: IP67  
 Working temperature: .40°C up to +105°C<sup>1)</sup>  
 Shaft: stainless steel  
 Flange: aluminum,  
 Housing: die cast zinc  
 Shock resistance acc. to DIN.IEC 68.2.27: 2500 m/s<sup>2</sup>, 6 ms  
 Vibration resistance acc. to DIN.IEC 68.2.6: 100 m/s<sup>2</sup>, 55A 2000Hz  
 torque bracket max. axial misalignment: ± 1,5mm  
 torque bracket max. radial misalignment: ± 0,13mm

**General electrical characteristics:**

Supply voltage: 4,5VDC A 5,5VDC  
 Current consumption (w/o output load): 5V DC, max. 70mA  
 Reverse polarity protection at power supply (Ub): no  
 Conforms to CE requirements acc. to EN 61000.6.2, EN 61000.6.3 and EN 61000.6.4

**General Interface characteristics:**

Transceiver type: RS 485  
 Permissible load/channel: max.±25mA  
 Signal level high: typ. 3.8V  
 Signal level low at load=20mA: typ. 1.3V  
 Short circuit proof outputs: yes<sup>1)</sup>

**Interface characteristics BiSS**

Protocol: BiSS C  
 Resolution: 13bit  
 Code: binary  
 Clock rate: up to 10MHz  
 Time jitter: < 1Gs  
 Data update rate: < 10Gs

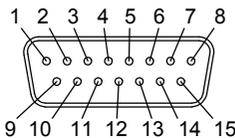
**Output sine/cosine 2048 ppr:**

Max. frequency .3dB: 400kHz  
 Signal level: 1 Vpp (±20%)  
 Short circuit proof: yes<sup>2)</sup>

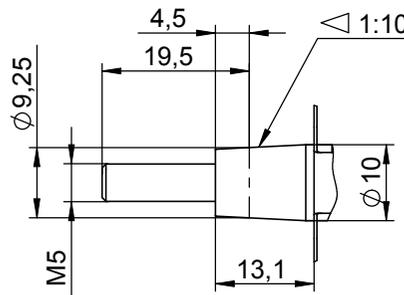
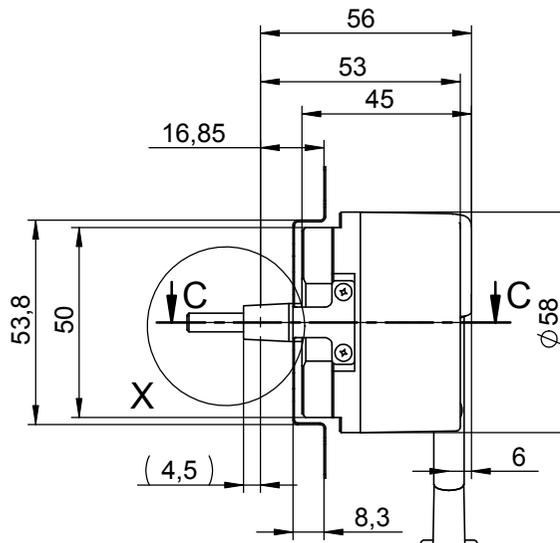
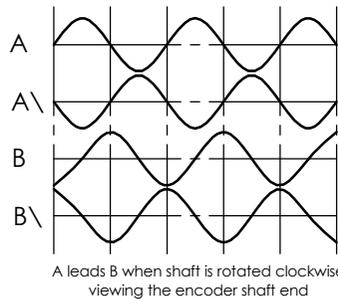
2) Short drcuit to 0V or to output, one channel at a time, supply voltage correctly applied

**Terminal assignment:**

SUB-D connector (male) 15pin	
Pin	Signal
1	A
2	GND
3	B
4	+V
5	+D
6	.
7	.
8	+C
9	A\
10	0V sensor
11	B\
12	+V sensor
13	.D
14	.
15	.C

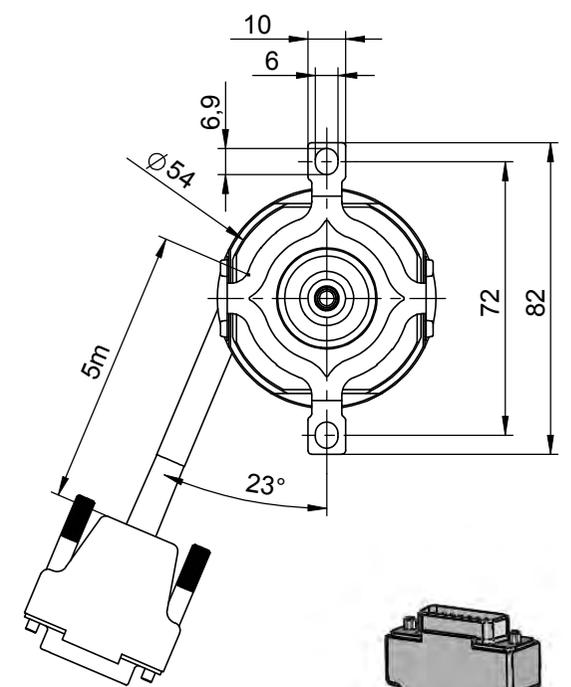
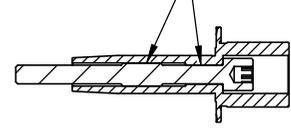


**Signals:**



X  
(1 : 1)

srew and shaft with M6 LH thread for demontation of the encoder



4	22.11.11	ih	Unit of measurement millimeter	ThyssenKrupp	Fritz Kübler GmbH Zähl- und Sensortechnik 78054 VS-Schwenningen
3	22.6.11	tg			
2	9.5.11	df	Tolerances unless otherwise specified ISO 2768 mH	DG1706 scale 1:2	Customer Type: 9950 001 0874 <sup>5)</sup> Absolut Singleturn Encoder
1	16.12.10	df			
0	15.10.10	tg			Kübler Type: Sendix 8.5873.0000.C302.S014 drawing ID. A1796 customer drawing
Index	Date	Name			

approval for production:

checked: company & sign

date

technical subject to modifications

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**Mechanical characteristics:**

Max. speed up to 70°C: 12000min<sup>-1</sup>, continuous 10000min<sup>-1</sup>  
 Max. speed up to Tmax: 8000min<sup>-1</sup>, continuous 5000min<sup>-1</sup>  
 Starting torque: <0,01 Nm  
 Moment of inertia: 3x10<sup>-6</sup> kgm<sup>2</sup>  
 Radial load capacity of shaft: 80N  
 Axial load capacity of shaft: 40N  
 Weight: approx. 0.35kg  
 Protection acc. to EN 60 529: shaft/side: IP65 housing/side: IP67  
 Working temperature: /40°C up to +105°C<sup>1)</sup>  
 Shaft: stainless steel  
 Flange: aluminum,  
 Housing: die cast zinc  
 Shock resistance acc. to DIN/IEC 68/2/27: 2500 m/s<sup>2</sup>, 6 ms  
 Vibration resistance acc. to DIN/IEC 68/2/6: 100 m/s<sup>2</sup>, 55A 2000Hz  
 torque bracket max. axial misalignment: ± 1,5mm  
 torque bracket max. radial misalignment: ± 0,13mm

1) temperature measured on the flange

**General electrical characteristics:**

Supply voltage: 4,5VDC A 5,5VDC  
 Current consumption (w/o output load) 5V DC, max. 70mA  
 Reverse polarity protection at power supply (Ub) no  
 Conforms to CE requirements acc. to EN 61000/6/2, EN 61000/6/3 and EN 61000/6/4

**General Interface characteristics:**

Transceiver type: RS 485  
 Permissible load/channel: max. ±25mA  
 Signal level high: typ. 3.8V  
 Signal level low at load=20mA: typ. 1.3V  
 Short circuit proof outputs: yes<sup>1)</sup>

**Interface characteristics SSI:**

Protocol: SSI  
 Resolution: 13bit (8192)  
 Code: Gray  
 Clock rate: 50KHzA 2MHz  
 Time jitter: < 1Hs  
 Data update rate: < 15Hs

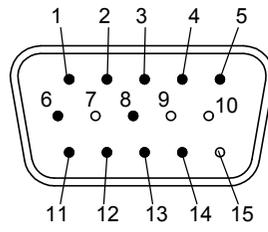
**Output sine/cosine 2048 ppr:**

Max. frequency /3dB: 400kHz  
 Signal level: 1 Vpp (±20%)  
 Short circuit proof: yes<sup>2)</sup>

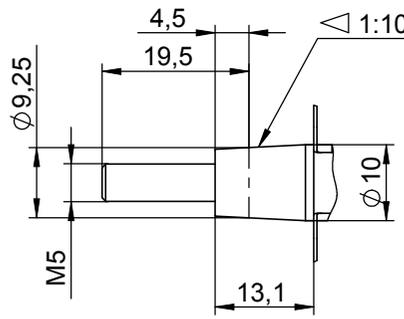
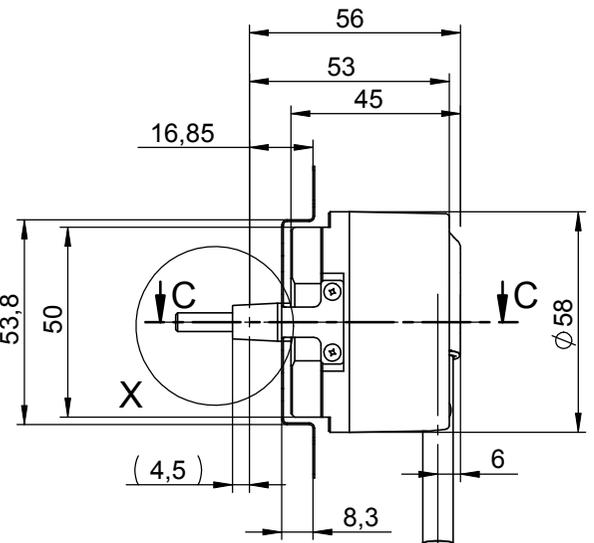
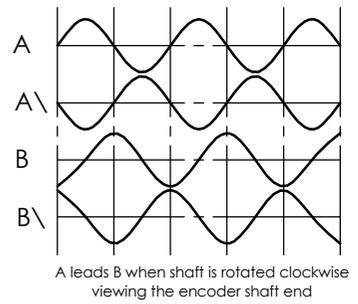
2) Short circuit to 0V or to output, one channel at a time, supply voltage correctly applied

**Terminal assignment:**

SUB-D HD connector (male) 15pin	
Pin	Signal
1	A
2	A\
3	B
4	B\
5	+D
6	/D
7	/
8	SET
9	/
10	/
11	+T
12	/T
13	+V
14	0V
15	/

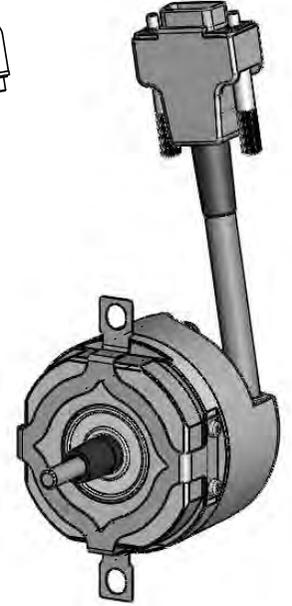
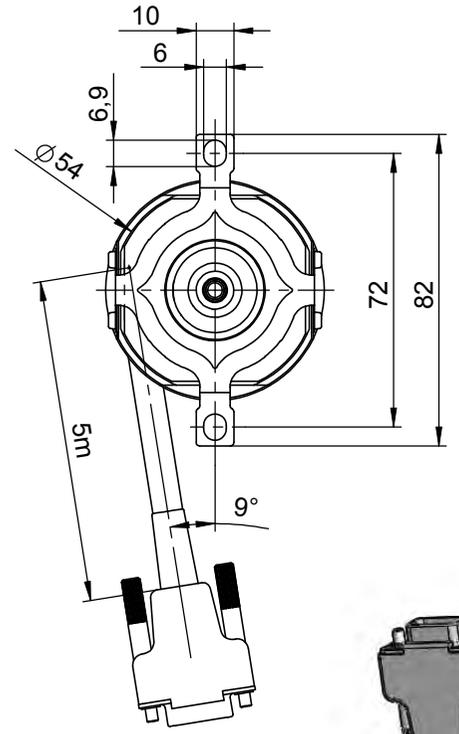
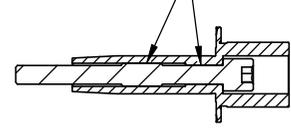


**Signals:**



X (1 : 1)

screw and shaft with M6 LH thread for demontation of the encoder



6	17.4.12	ih	Unit of measurement	Thyssen Krupp	Fritz Kübler GmbH Zähl- und Sensortechnik 78054 VS-Schwenningen	
5	12.3.12	al	millimeter			
4	17.2.12	al	Tolerances unless otherwise specified	Customer Type:	Kübler Type:	
3	22.11.11	ih		ISO 2768 mH	9950 001 0877 (6)	8.5873.0000.G302.S019
2	3.11.11	ih	DG2189 scale 1:2	Absolut Singleturn Encoder	drawing ID.	
Index	Date	Name			A1964	
					customer drawing	Sheet 1/2

**EU-Konformitätserklärung**  
**Declaration of EU-Conformity**  
**Certificat de conformité EU**



Kübler Gruppe  
 Fritz Kübler GmbH  
 Schubertstraße 47  
 D -78054 Villingen-Schwenningen  
 www.kuebler.com

<b>Produktbezeichnung:</b> Product designation: Désignation du produit:	Absolute Encoder Singleturn
---	-----------------------------

<b>Typenreihe:</b> Type code: Type:	Sendix 5853 Sendix 5873
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<b>Hersteller:</b> Manufacturer: Fabricant:	Fritz Kübler GmbH Schubertstraße 47 D-78054 Villingen-Schwenningen
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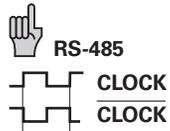
<p><b>Das bezeichnete Produkt stimmt mit der folgenden Europäischen Richtlinie überein:</b></p> <p>We herewith confirm that the above mentioned product meets the requirements of the following european standard:</p> <p><i>Le produit désigné ci-dessus est conforme à la ligne directrice européenne suivante:</i></p>	<p><b>Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der Richtlinie wird nachgewiesen durch die vollständige Einhaltung folgender Normen:</b></p> <p>The correspondance of the above mentioned product with these requirements is proved by the fact that these products meet with the following single standards:</p> <p><i>La conformité du produit désigné aux prescriptions de la ligne directrice est certifiée par la observation totale des normes suivantes:</i></p>
<b>Richtlinien / Directives / Directives</b>	<b>Norm / Standard / Norme</b>
<p><b>EMV Richtlinie: 2014/30/EU</b>                  EMC Directive: 2014/30/EU                  Directive CEM: 2014/30/EU</p>	EN 55011 Klasse B:2009+A1:2010 EN 61000-6-3:2007 + A1:2011 EN 61000-6-2:2005/AC:2005 EN 61326-1:2013
<p><b>ATEX Richtlinie: 2014/34/EU</b>                  ATEX Directive: 2014/34/EU                  Directive ATEX: 2014/34/EU                  II 3G Ex nA IIC T4 Gc X                  II 3D Ex tc IIIC T135°C Dc IP6X X</p>	EN 60079-0:2012+A11:2013 EN 60079-15:2010 EN 60079-28:2007 EN 60079-31:2014
<p><b>RoHS Richtlinie: 2011/65/EU</b>                  RoHS Directive: 2011/65/EU                  Directive RoHS: 2011/65/EU</p>	EN 50581:2012

**Der Hersteller trägt die alleinige Verantwortung für die Ausstellung der Konformitätserklärung.**  
 The manufacturer is solely responsible for issuance of the declaration of conformity.  
*Le fabricant est seul responsable de la délivrance du certificat de conformité.*

Villingen-Schwenningen, 20.04.2016

**Ort und Datum der Ausstellung**  
 Place and date of issue  
*Lieu et date d'établissement*

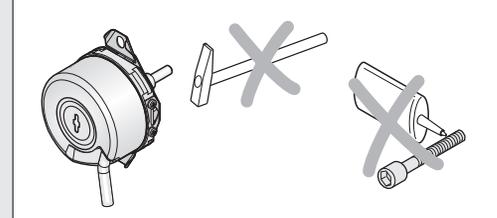
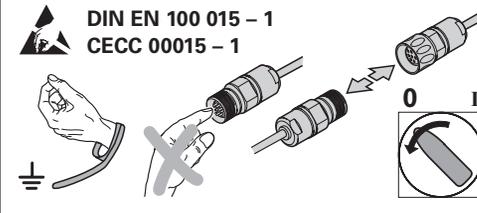
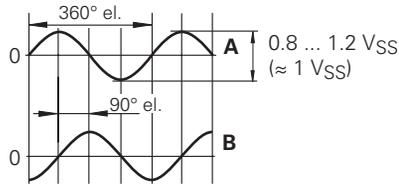
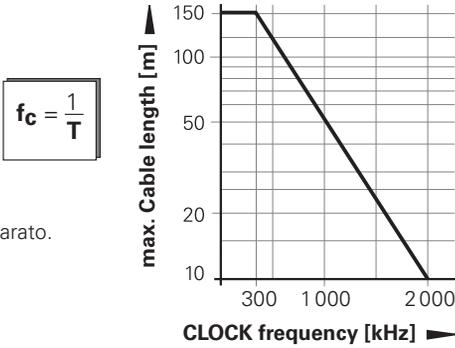
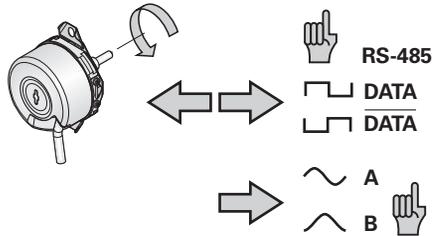
Dr. Jochen Bolte  
 Leiter Entwicklung  
**rechtsverbindliche Unterschrift**  
 Name and signature of authorised person  
*Nom et signature de la personne autorisée*



**Up = 3.6 ... 14 V**

(max. 160 mA)  
am Gerät, at encoder, sur l'appareil, integrato, en el aparato.

EN 50 178/4.98; 5.2.9.5  
IEC 364-4-41: 1992; 411(PELV/SELV)  
(siehe, see, voir, vedi, véase  
HEIDENHAIN D 231 929)



Im Lieferumfang enthalten  
Included in delivery  
Contenu dans la fourniture  
Standard di forniture  
Elementos suministrados

Fleckbeschichtung  
Patch coating  
Enduit autofreinant  
Rivestimento  
Recubrimiento tintado

M5x50-8.8 DIN 6912  
ID 202 264-36

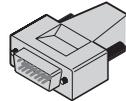
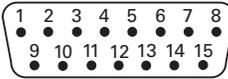


# HEIDENHAIN

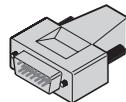
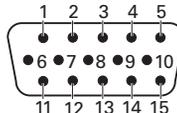
Montageanleitung  
Mounting Instructions  
Instructions de montage  
Istruzioni di montaggio  
Instrucciones de montaje

## ECN 413 EnDat01

11/2007



4	12	2	10	1	9	3	11	5	13	8	15	6
Up	Sensor Up	0V	Sensor 0V	A+	A-	B+	B-	DATA	DATA	CLOCK	CLOCK	1)
BNGN	BU	WHGN	WH	GNBK	YEBK	BUBK	RDBK	GY	PK	VT	YE	



13	14	1	2	3	4	5	6	11	12	14
Up	0V	A+	A-	B+	B-	DATA	DATA	CLOCK	CLOCK	1)
BNGN	WHGN	GNBK	YEBK	BUBK	RDBK	GY	PK	VT	YE	

Kabelschirm mit Gehäuse verbunden  
Cable shield connected to housing  
Blindage du câble relié au boîtier  
Collegare lo schermo del cavo alla carcassa  
Pantalla del cable conectada a carcasa

1) Innenschirm  
Internal shield  
Blindage interne  
Schermo interno  
Blindaje interno

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FAX +49 (8669) 5061  
E-Mail: info@heidenhain.de

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**Measuring systems** ☎ +49 (8669) 31-31 04  
E-Mail: service.ms-support@heidenhain.de  
**TNC support** ☎ +49 (8669) 31-31 01  
E-Mail: service.nc-support@heidenhain.de  
**NC programming** ☎ +49 (8669) 31-31 03  
E-Mail: service.nc-pgm@heidenhain.de  
**PLC programming** ☎ +49 (8669) 31-31 02  
E-Mail: service.plc@heidenhain.de  
**Lathe controls** ☎ +49 (8669) 31-31 05  
E-Mail: service.lathe-support@heidenhain.de

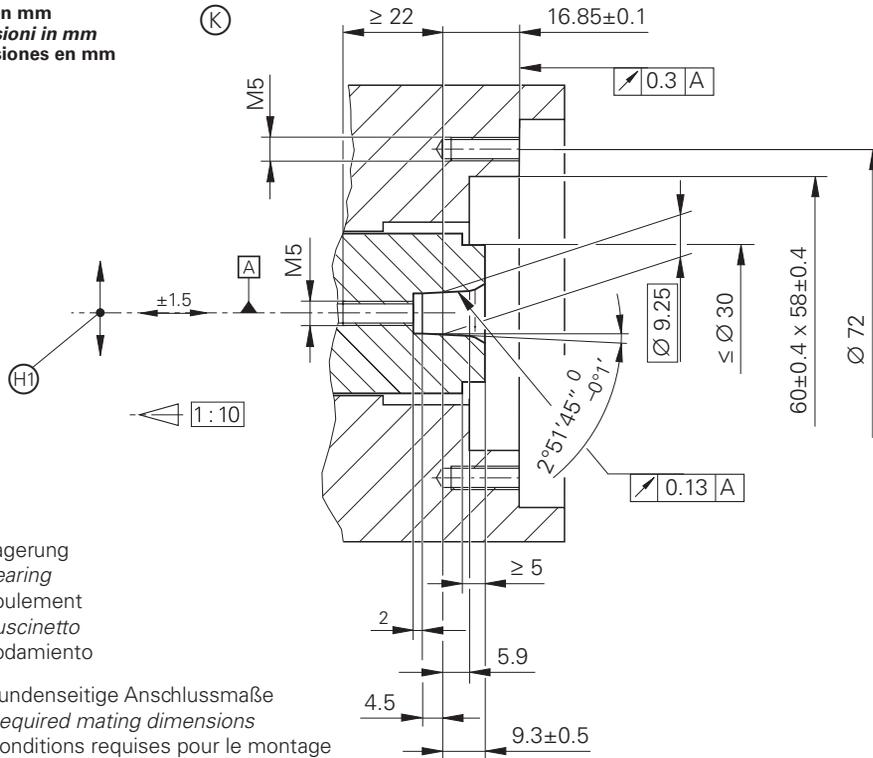
www.heidenhain.de



**WELLA1:65B,**  
**KUPPA1:66A,**  
**ANELA1:16S15, 56S15**  
**BELEA1:58, P5**  
**SPVEA2:37**

# ECN 413 EnDat01

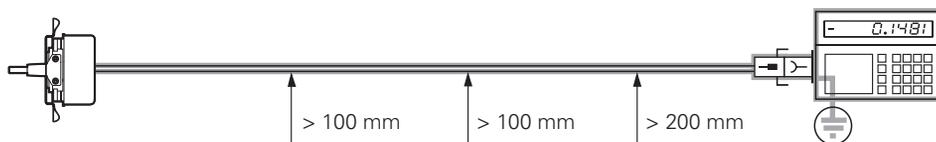
Maße in mm  
Dimensions in mm  
Cotes en mm  
Dimensioni in mm  
Dimensiones en mm



(A) = Lagerung  
Bearing  
Roulement  
Cuscinetto  
Rodamiento

(K) = Kundenseitige Anschlussmaße  
Required mating dimensions  
Conditions requises pour le montage  
Quote per il montaggio  
Cotas de montaje requeridas

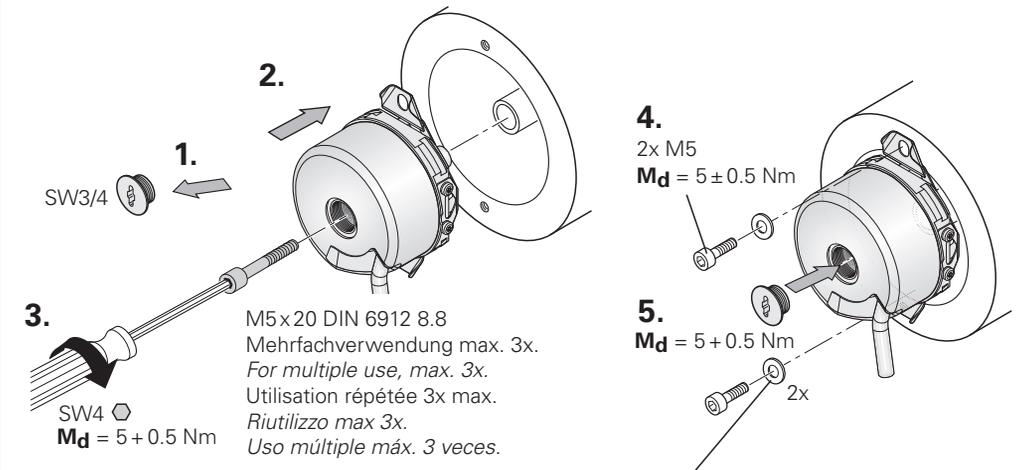
(H) = Max. zul. statischer radialer Versatz der Motorwelle in gezeichneter Richtung ±0,13 mm  
Max. permissible static radial offset of motor shaft in indicated direction ±0,13 mm  
Désaxage radial statique max. adm. de l'arbre moteur dans le sens dessiné ±0,13 mm  
Gioco massimo statico ammissibile nella direzione indicata ±0,13 mm  
Máx. desviación radial estática admisible del eje del motor en la dirección indicada ±0,13 mm



— Schirm auf Gehäuse  
Shield on housing  
Blindage sur boîtier  
Schermo sulla carcassa  
Blindaje a carcasa

Störquellen  
Noise sources  
Sources parasites  
Origine del disturbo  
Fuentes de interferencias

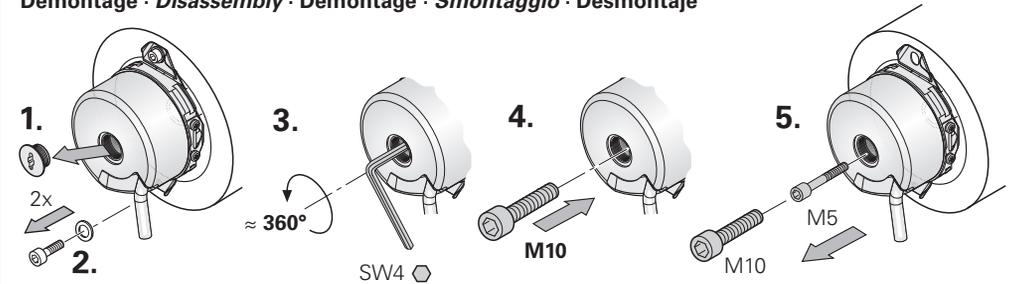
## Montage · Assembly · Montage · Montaggio · Montaje



M5x20 DIN 6912 8.8  
Mehrfachverwendung max. 3x.  
For multiple use, max. 3x.  
Utilisation répétée 3x max.  
Riutilizzo max 3x.  
Usó múltiple máx. 3 veces.

Sperrkantscheibe SKM5 (nicht im Lieferumfang enthalten).  
Lock washer SKM5 (not included in items supplied).  
Rondelle à bord d'arrêt SKM5 (non contenue dans la fourniture).  
Rondelle di sicurezza SKM5 (non inclusa nella fornitura).  
Arandela de bloqueo SKM5 (no incluida en los elementos suministrados).

## Demontage · Disassembly · Démontage · Smontaggio · Desmontaje

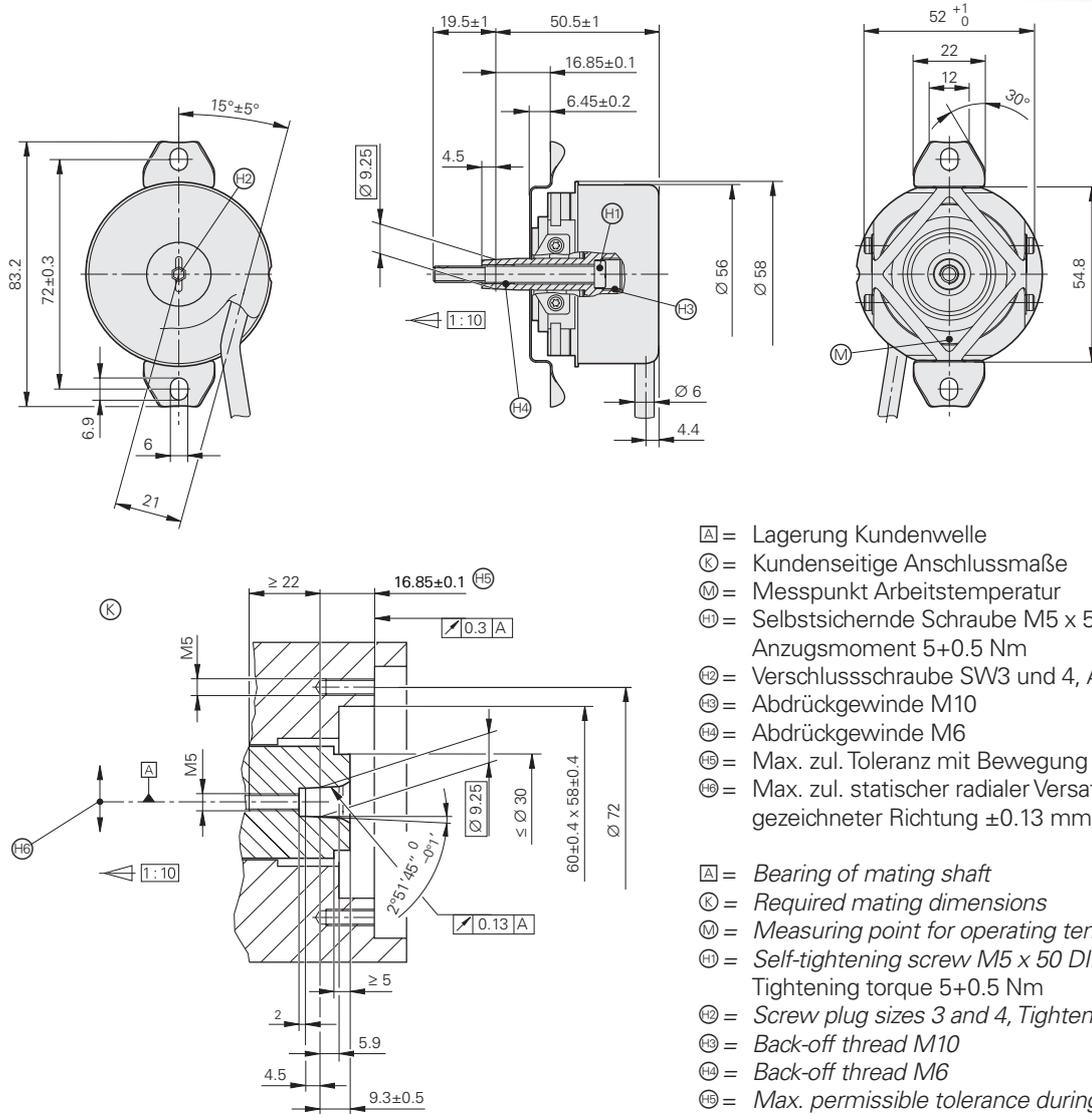


M10 Schraube nur soweit eindrehen, bis sich die Konusverbindung löst.  
Turn the M10 screw only far enough in to release the taper shaft.  
Ne tourner la vis M10 que jusqu'à ce que l'attache du cône se desserre.  
Ruotare la brugola M10 fino al distacco della sede conica dell'albero.  
Apretar el tornillo M10 sólo hasta que la conexión cónica se suelte.

Ø 6 mm	R <sub>1</sub> ≥ 20 mm	R <sub>2</sub> ≥ 75 mm		T ≥ -40 °C (-40 °F)	T ≥ -10 °C (14 °F)
				-30 ... 80 °C (-22 ... 176 °F)	

# ECN 413

- Absoluter Singleturn-Drehgeber/Absolute singleturn encoder
- Version Thyssen
- Konuswelle/Taper shaft



- ⊠ = Lagerung Kundenwelle
  - Ⓚ = Kundenseitige Anschlussmaße
  - Ⓜ = Messpunkt Arbeitstemperatur
  - Ⓢ = Selbstsichernde Schraube M5 x 50 DIN 6912 SW4, Anzugsmoment 5+0.5 Nm
  - Ⓣ = Verschlusschraube SW3 und 4, Anzugsmoment 5+0.5 Nm
  - Ⓤ = Abdrückgewinde M10
  - Ⓥ = Abdrückgewinde M6
  - Ⓦ = Max. zul. Toleranz mit Bewegung der Motorwelle ±1.5 mm
  - Ⓧ = Max. zul. statischer radialer Versatz der Motorwelle in gezeichneter Richtung ±0.13 mm
- 
- ⊠ = Bearing of mating shaft
  - Ⓚ = Required mating dimensions
  - Ⓜ = Measuring point for operating temperature
  - Ⓢ = Self-tightening screw M5 x 50 DIN 6912 width A/F 4 Tightening torque 5+0.5 Nm
  - Ⓣ = Screw plug sizes 3 and 4, Tightening torque 5+0.5 Nm
  - Ⓤ = Back-off thread M10
  - Ⓥ = Back-off thread M6
  - Ⓦ = Max. permissible tolerance during motor shaft rotation ±1.5 mm
  - Ⓧ = Max. permissible static radial offset of motor shaft in indicated direction ±0.13 mm

## Elektrischer Anschluss/Electrical Connection

	4	12	2	10	1	9	3	11	5	13	8	15	6	
	13	/	14	/	1	2	3	4	5	6	11	12	14	
	5V U <sub>P</sub>	5V sensor	0V U <sub>N</sub>	0V sensor	A+	A-	B+	B-	DATA	DATA	CLOCK	CLOCK		<sup>1)</sup>
	br/gn BN/GN	bl BL	ws/gn WH/GN	ws WH	gn/sw GN/BK	ge/sw YL/BK	bl/sw BL/BK	rt/sw RD/BK	gr GY	rs PK	vio VI	ge YL		

Die Sensorleitung ist intern mit der Versorgungsleitung verbunden.  
 The sensor line is connected internally with the power supply.  
 Nicht verwendete Pins oder Litzen dürfen nicht belegt werden!  
 Vacant pins or wires must not be used!

<sup>1)</sup> Innenschirm/Internal shield  
 Außenschirm auf Gehäuse/External shield on housing

	<b>ECN 413</b>
<b>Absolute Positionswerte</b> <b>Absolute position values</b>	<b>EnDat 2.2</b>
Bestellbezeichnung/ <i>Ordering designation</i>	EnDat 01
Positionen/U / <i>Positions per revolution</i>	8 192 (13 bit)/8192 (13 bits)
Code/ <i>Code</i>	Dual/ <i>Pure binary</i>
Elektr. zul. Drehzahl/bei Genauigkeit <i>Elec. permissible speed/at accuracy</i>	$\leq 1\,500 \text{ min}^{-1} / \pm 1 \text{ LSB}; \leq 12\,000 \text{ min}^{-1} / \pm 50 \text{ LSB}$ $\leq 1\,500 \text{ rpm} / \pm 1 \text{ LSB}; \leq 12\,000 \text{ rpm} / \pm 50 \text{ LSB}$
Rechenzeit $t_{ca}$ / <i>Calculation time <math>t_{cal}</math></i>	$\leq 5 \mu\text{s}$
<b>Inkrementalsignale/Incremental signals</b>	$\sim 1 V_{SS}^{1)}/\sim 1 V_{PP}^{1)}$
Strichzahlen/ <i>Line counts</i>	2 048
Grenzfrequenz -3 dB/ <i>Cutoff frequency -3 dB</i>	$\geq 400 \text{ kHz}$
<b>Systemgenauigkeit/System accuracy</b>	$\pm 20''$
<b>Spannungsversorgung/Power supply</b> <b>Stromaufnahme/Current consumption</b>	3,6 bis 14 V/3.6 to 14 V $\leq 160 \text{ mA}$ (ohne Last / <i>without load</i> )
<b>Elektrischer Anschluss*</b> <b>Electrical connection*</b>	<ul style="list-style-type: none"> <li>• Kabel 5 m, mit Sub-D-Stecker (Stift), 15-polig, 2-reihig Cable 5 m, with D-sub connector (male), 15-pin, 2-row</li> <li>• Kabel 5 m, mit Sub-D-Stecker (Stift), 15-polig; 3-reihig Cable 5 m, with D-sub connector (male), 15-pin; 3-row</li> </ul>
<b>Welle/Shaft</b>	Konuswelle $\varnothing 9,25 \text{ mm}$ , Konus 1/10/ <i>Taper shaft <math>\varnothing 9.25 \text{ mm}</math>, taper 1:10</i>
<b>Mech. zul. Drehzahl <math>n^{2)}</math>/Mech. perm. speed <math>n^{2)}</math></b>	$\leq 12\,000 \text{ min}^{-1} / \leq 12\,000 \text{ rpm}$
<b>Trägheitsmoment Rotor/Moment of inertia of rotor</b>	$2,6 \cdot 10^{-6} \text{ kgm}^2$
<b>Vibration 55 bis 2 000 Hz/Vibration 55 to 2 000 Hz</b> <b>Stoß 6 ms/2 ms/Shock 6 ms/2 ms</b>	$\leq 300 \text{ m/s}^2$ (EN/IEC 60 068-2-6) $\leq 1\,000 \text{ m/s}^2 / \leq 2\,000 \text{ m/s}^2$ (EN/IEC 60 068-2-27)
<b>Max. Arbeitstemperatur<sup>2)</sup></b> <b>Max. operating temperature<sup>2)</sup></b>	115 °C
<b>Min. Arbeitstemperatur</b> <b>Min. operating temperature</b>	Kabel fest verlegt: -40 °C/ <i>Flange socket or fixed cable: -40 °C</i> Kabel bewegt: -10 °C/ <i>Moving cable: -10 °C</i>
<b>Schutzart EN 60 529/Protection IEC 60 529</b>	IP 67 am Gehäuse; IP 64 am Welleneingang/ <i>IP 67 at housing; IP 64 at shaft inlet</i>
<b>Masse/Weight</b>	ca. 0,3 kg/0.3 kg

1) eingeschränkte Toleranzen: Signalgröße 0,8 bis 1,2  $V_{SS}$

2) Zusammenhang zwischen Arbeitstemperatur und Drehzahl bzw. Versorgungsspannung siehe Katalog *Drehgeber*

\*) bei Bestellung bitte auswählen

1) *Restricted tolerances: Signal amplitude 0.8 to 1.2  $V_{PP}$*

2) *For the correlation between the operating temperature and the shaft speed or supply voltage, see Rotary Encoders catalog*

\*) *Please indicate when ordering*

# HEIDENHAIN

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☎ +49 (86 69) 50 61

E-Mail: info@heidenhain.de

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# EG-Konformitätserklärung

## EC Declaration of Conformity

Die Singleturn-Absolutdrehgeber der Baureihe ECN 413  
*The Absolute Singleturn Rotary Encoders of the ECN 413 Series*

Identnummer Basic part number	Varianten Variant
586 645	01, 02, 10 – 12, 22 - 24

erfüllen die grundlegenden Vorschriften folgender EG Richtlinien:  
*comply with the regulations of the following EC Directive:*

### EMV-Richtlinie 89/336/EWG *EMC Directive 89/336/EEC*

Die Übereinstimmung mit den Vorschriften der oben genannten Richtlinie wird durch die Einhaltung folgender Normen nachgewiesen:

*This product complies with these regulations by meeting the following standards:*

**DIN EN 55022, Klasse B**

**DIN EN 61000-6-1**

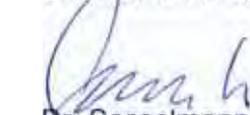
**DIN EN 61000-6-2**

**DIN EN 61000-6-3**

**DIN EN 61000-6-4**

Traunreut, 05.02.2007

DR. JOHANNES HEIDENHAIN GmbH

  
Dr. Sesselmann  
Geschäftsführer  
Managing Director

  
Israel  
Qualitätsbeauftragter  
Quality Officer

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Beschaffenheitsgarantie. Die Sicherheitshinweise der mitgelieferten Produktdokumentationen sind zu beachten.  
*This declaration certifies that this product complies with the above guidelines. It is not, however, a guarantee of quality. Please comply with the safety instructions in the accompanying documentation.*

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

Design according to

Size	Type	Drawing number	Article number	Braking torque
200	8010.00013	E028 01 001 000 214	8238534	2 x 210 Nm
400	8010.20013	E028 02 005 000 214	8239664	2 x 300 Nm
400	8010.10013	E028 02 016 000 114	8247784	2 x 500 Nm

## Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions can lead to lethal accidents, malfunctions, brake failure and damage to other parts.  
These Installation and Operational Instructions (I + O) are part of the brake delivery.  
Please keep them handy and near to the brake at all times.

### Contents:

- Page 1:** - Contents
- Page 2:** - Safety and Guideline Signs  
- Certification  
- Guidelines on EU Directives
- Page 3:** - Safety Regulations
- Page 4:** - Safety Regulations
- Page 5:** - Safety Regulations
- Page 6:** - Brake Illustrations
- Page 7:** - Parts List
- Page 8:** - Technical Data
- Page 9:** - Switching Times  
- Torque-Time Diagram  
- Application  
- Design  
- Function
- Page 10:** - Scope of Delivery / State of Delivery  
- Adjustment  
- Installation Conditions
- Page 11:** - Installation  
- Braking Torque  
- Noise Damping  
- Electrical Connection and Wiring
- Page 12:** - Electrical Connection and Wiring
- Page 13:** - Release Monitoring
- Page 14:** - Brake Inspection (Customer-side after Mounting)  
- Dual Circuit Brake Functional Inspection
- Page 15:** - Maintenance  
- Information on the Components  
- Cleaning the Brake
- Page 16:** - Disposal  
- Malfunctions / Breakdowns
- Attachment:** Assembly Drawing

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Safety and Guideline Signs

### DANGER



Immediate and impending danger, which can lead to severe physical injuries or to death.

### CAUTION



Danger of injury to personnel and damage to machines.



**Please Observe!**  
Guidelines on important points.

## Certification

EU Type Examination Certificate (Elevator Directive): EU-BD 766



### Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product (electromagnetic safety brake) in terms of the EU Low Voltage Directive 2014/35/EU. The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

### Guidelines on the EMC Directive (2014/30/EU)

The product cannot be operated independently according to the EMC directive.

Due to their passive state, brakes are also non-critical equipment according to the EMC.

Only after integration of the product into an overall system can this be evaluated in terms of the EMC.

For electronic equipment, the evaluation has been verified for the individual product in laboratory conditions, but not in the overall system.

### Guidelines on the Machinery Directive (2006/42/EC)

The product is a component for installation into machines according to the machinery directive 2006/42/EC.

The brakes can fulfil the specifications for safety-related applications in coordination with other elements.

The type and scope of the required measures result from the machine risk analysis. The brake then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive.

It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

### Guidelines on the EU Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

The electromagnetic brake as well as the rectifiers / microswitches / proximity switches required for control / self-monitoring fulfil the requirements laid down in the EU Directive 2011/65/EC (RoHS).

(Restrictions on the use of certain hazardous substances, such as lead (0.1 %), mercury (0.1 %), cadmium (0.01 %), hexavalent chromium (0.1 %), polybrominated biphenyls (PBB) (0.1 %), polybrominated diphenylethers (PBDE) (0.1 %))

### Guidelines on the ATEX Directive

Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.

For application of this product in areas where there is a high danger of explosion, it must be classified and marked according to directive 2014/34/EU.

## Safety Regulations

These Safety Regulations are user hints only and may not be complete!

### General Guidelines

#### DANGER



Danger of death!  
Do not touch voltage-carrying cables and components.

Brakes may generate further risks, among other things:



Hand injuries



Danger of seizure



Contact with hot surfaces



Magnetic fields

### Severe injury to people and damage to objects may result if:

- the electromagnetic brake is used incorrectly.
- the electromagnetic brake is modified.
- the relevant standards for safety and / or installation conditions are ignored.

During the required risk assessment when designing the machine or system, the dangers involved must be evaluated and removed by taking appropriate protective measures.

**To prevent injury or damage, only specialist personnel are allowed to work on the components.**

They must be familiar with the dimensioning, transport, installation, inspection of the brake equipment, initial operation, maintenance and disposal according to the relevant standards and regulations.



Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage. At the time these Installation and Operational Instructions go to print, the electromagnetic brakes accord with the known technical specifications and are operationally safe at the time of delivery.

- Technical data and specifications (Type tags and documentation) must be followed.
- The correct connection voltage must be connected according to the Type tag and wiring guidelines.
- Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- Please observe the EN 60204-1 requirements for electrical connection when using in machines.



Only carry out installation, maintenance and repairs in a de-energised, disengaged state and secure the system against inadvertent switch-on.

### Guidelines for Electromagnetic Compatibility (EMC)

In accordance with the EMC directives 2014/30/EU, the individual components produce no emissions. However, functional components e.g. mains-side energisation of the brakes with rectifiers, phase demodulators, ROBA®-switch

devices or similar controls can produce disturbance which lies above the allowed limit values. For this reason it is important to read the Installation and Operational Instructions very carefully and to keep to the EMC directives.

### Application Conditions



The catalogue values are guideline values which have been determined in test facilities. It may be necessary to carry out your own tests for the intended application. When dimensioning the brakes, please remember that installation situations, braking torque fluctuations, permitted friction work, bedding-in condition / conditioning of the brake linings and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly.

- Mounting dimensions and connection dimensions must be adjusted according to the size of the brake at the place of installation.
- Use of the brake in extreme environmental conditions or outdoors, directly exposed to the weather, is not permitted.
- The brakes are designed for a relative duty cycle of 50 %. A duty cycle > 50 % leads to higher temperatures, which cause premature ageing of the noise damping and therefore lead to an increase in switching noises. Furthermore, the switch function of the release monitoring can be impaired. The max. permitted switching frequency is 180 1/h. These values are valid for intermittent periodic duty S3 50 %. The permitted surface temperature on the brake flange must not exceed 80 °C at a max. ambient temperature of 40 °C. For higher requirements on the friction work in case of EMERGENCY STOP or at temperatures of up to 90 °C on the brake flange, special friction materials and noise damping are to be used (see Type key).
- Relative air humidity < 85 %. At relative humidity levels > 50 %, increased corrosion protection is necessary.
- The braking torque is dependent on the current bedding-in condition of the brake. Bedding in / conditioning of the friction linings is necessary.
- The brakes are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or foreign bodies.



Please ensure that the brake is clean and oil-free, as both brake circuits have an effect on the same linings. In particular in gear applications, special sealing measures, among other precautions, may be necessary!

- The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection. The surface is rough-sawn and unprocessed (rolled material).

#### CAUTION



The rotors may rust up and seize up in corrosive ambient conditions and/or after longer downtimes. The user is responsible for taking appropriate countermeasures.

## Safety Regulations

These Safety Regulations are user hints only and may not be complete!

### Dimensioning

#### Attention!

When dimensioning the brake, please take into consideration whether a load torque is present when selecting the protection.

- Load torques reduce the deceleration torque available.
- Load torques may increase the output speed:
  - during a possible processing time in the controls
  - during the brake downtime

When calculating the friction work, please observe that the brake nominal torque is subject to a tolerance.

### Climate Conditions

The electromagnetic brake is suitable for applications with an ambient temperature of between +5 °C and +40 °C.

#### CAUTION



#### Reduction in braking torque possible

Condensation can form on the brake and cause a loss in braking torque:

- due to fast changes in temperature
- at temperatures of around or under freezing point

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

#### CAUTION



#### Brake malfunction possible

Condensation can form on the brake and cause malfunctions:

- at temperatures around or under freezing point, the brake can freeze over and not release any more.

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

The system function must be checked by the user after longer downtimes.



At high temperatures and in high humidity or with occurring dampness, the rotor can seize up to the armature disk or the bearing shield / the flange plate after longer downtimes.

#### CAUTION



Temperatures of over 80 °C on the brake mounting flange can have a negative effect on the switching times, the braking torque levels and the noise damping behaviour.

### Intended Use

This safety brake is intended for use in electrically operated elevators and goods elevators. Furthermore, this brake can be used as a braking device acting on the traction sheave or the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and as a braking element against unintended car movement.

### Earthing Connection

The brake is designed for Protection Class I. This protection covers not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

### Class of Insulation F (+155 °C)

The insulation components on the magnetic coils are manufactured at least to class of insulation F (+155 °C).

### Protection

**(mechanical) IP10:** Protection against large body surfaces and large foreign bodies > 50 mm in diameter. No protection against water.

**(electrical) IP54:** Dust-proof and protected against contact as well as against water spray from any direction.

### Brake Storage

- Store the brakes in a horizontal position, in dry rooms and dust and vibration-free.
- Relative air humidity < 50 %.
- Temperature without major fluctuations within a range from +5 °C up to +40 °C.
- Do not store in direct sunlight or UV light.
- Do not store aggressive, corrosive substances (solvents / acids / lyes / salts / oils / etc.) near to the brakes.

For longer storage of more than 2 years, special measures are required (please contact the manufacturer).

Storage acc. DIN EN 60721-3-1 (including the limitations / additions described above): 1K3; 1Z1; 1B1; 1C2; 1S3; 1M1

### Handling

**Before installation**, the brake must be inspected and found to be in proper condition.

The brake function must be inspected both **once attachment has taken place** as well as **after longer system downtimes**, in order to prevent the drive starting up against possibly seized linings.

## Safety Regulations

These Safety Regulations are user hints only and may not be complete!

### User-implemented Protective Measures:

- Please cover moving parts to protect **against injury through seizure**.
- Place a cover on the magnetic part to protect **against injury through high temperatures**.
- Protection circuit:** When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in *mayr*®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. *mayr*®-spark quenching unit, half-wave and bridge rectifiers), although this may of course then alter the switching times.
- Take precautions **against freeze-up of the friction surfaces** in high humidity and at low temperatures.

EN 81-1	(End of the period of applicability: 31 AUG 2017)
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
EN 12016	Interference immunity (for elevators, escalators and moving walkways)

### Liability

The information, guidelines and technical data in these documents were up to date at the time of printing. Demands on previously delivered brakes are not valid.

Liability for damage and operational malfunctions will not be taken if:

- the Installation and Operational Instructions are ignored or neglected.
- the brakes are used inappropriately.
- the brakes are modified.
- the brakes are worked on unprofessionally.
- the brakes are handled or operated incorrectly.

### Guarantee

- The guarantee conditions correspond with the Chr. Mayr GmbH + Co. KG sales and delivery conditions.
- Mistakes or deficiencies are to be reported to *mayr*® at once!

### CE Identification

 according to the Low Voltage Directive 2014/35/EU and the Elevator Directive 2014/33/EU

### Conformity Markings

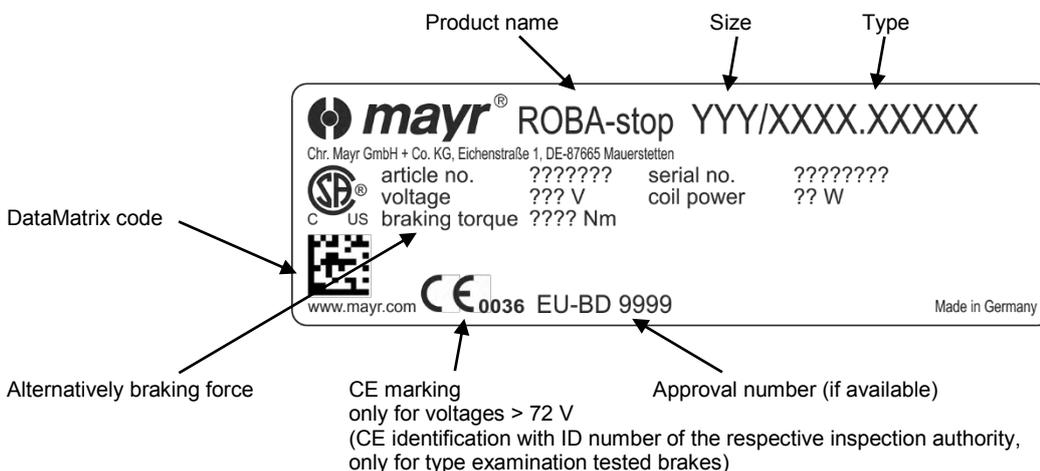
 in terms of the Canadian and American approval

### Standards, Directives and Regulations Used and To Be Applied

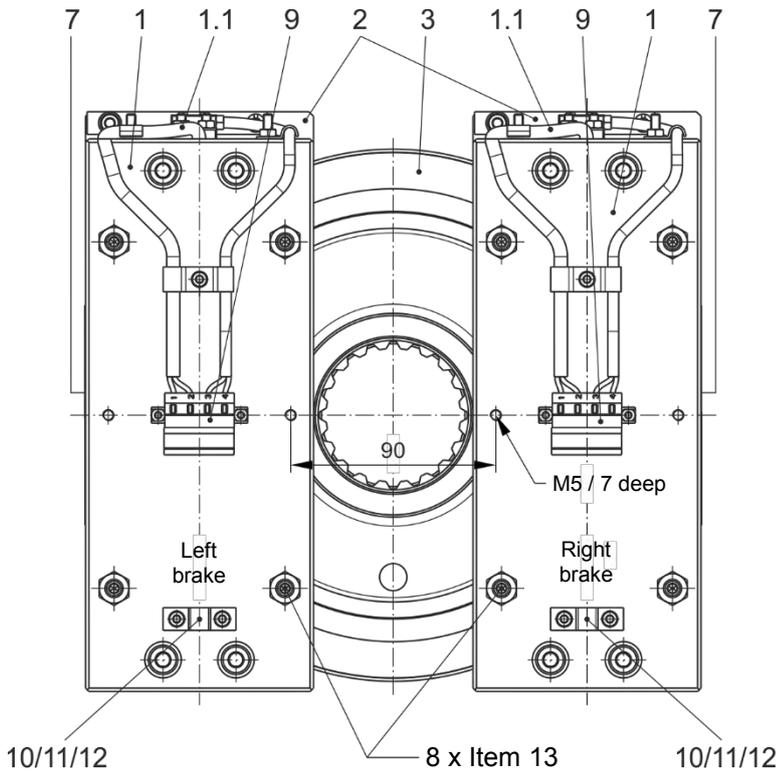
DIN VDE 0580	Electromagnetic devices and components, general specifications
2014/35/EU	Low Voltage Directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
2014/33/EU	Elevator Directive
EN 81-20	Safety rules for the construction and installation of lifts – Part 20: Passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts - Examinations and tests – Part 50: Design rules, calculations, examinations and tests of lift components

### Identification

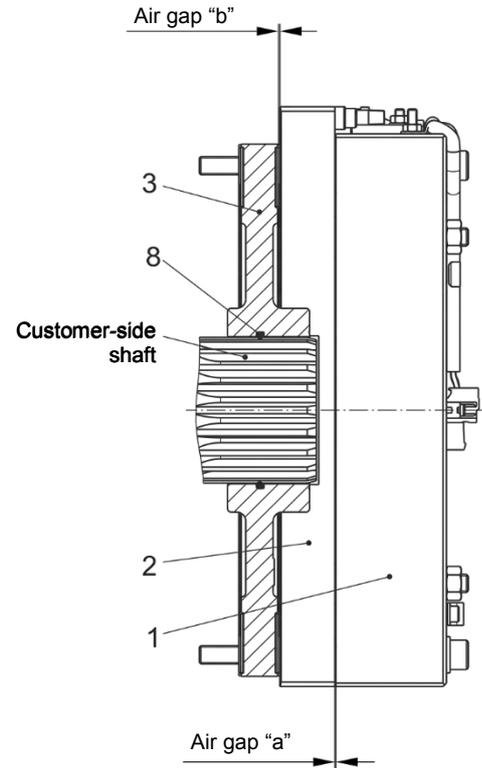
*mayr*® components are clearly marked and described on the Type tag:



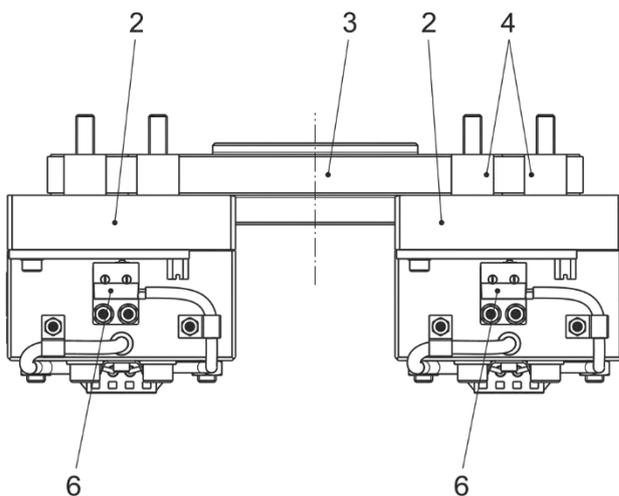
**Brake Illustrations**



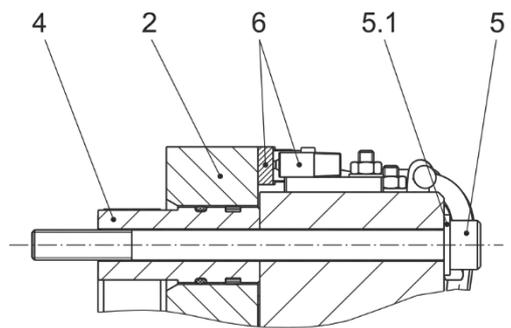
**Fig. 1**



**Fig. 2**



**Fig. 3**



**Fig. 4**

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Parts List (Only use *mayr*® original parts)

Item	Name	Pcs.
1	Coil carrier assembly (incl. magnetic coil)	2
1.1	Connection cable 2-wire; connection coil blue/brown	2
2	Armature disk	2
3	Rotor assembly	1
4	Distance bolt	8
5	Cap screw with a strength of 8.8 DIN EN ISO 4762 (not included in the standard scope of delivery) for Size 200 (210 Nm): M8 x 110 for Size 400 (300 Nm): M10 x 110 for Size 400 (500 Nm): M10 x 120	8
5.1	Washer (not included in the standard scope of delivery)	8
6	Release monitoring assembly	2
6.1	Microswitch incl. adaptor plate (Fig. 6, page 13)	2
6.2	Set screw M4 x 20 (Fig. 6, page 13)	4
6.3	Washer (Fig. 6, page 13)	4
6.4	Hexagon nut M4 (Fig. 6, page 13)	4
6.5	Adjustment lever (Fig. 6, page 13)	2
6.6	Cap screw M5 x 12 (Fig. 6, page 13)	2
6.7	Spring washer A5 (Fig. 6, page 13)	2
6.8	Locking nut (Fig. 6, page 13)	2
6.9	Set screw M4 x 12 (Fig. 6, page 13)	2
7	Type tag	2
8	O-ring	1
9	Wago pin strip, 4-pole (No. 731-604/019-000)	2
10	Contact washer M4	4
11	Cable clamp D6	2
12	Cap screw M4 x 8	4
13	Noise damping	8

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

**Table 1: Technical Data (Independent of Type and Size)**

Nominal voltage $U_N$ :	144 V (2 x 72 V)
Overexcitation voltage $U_O$ :	207 V (2 x 104 V)
Overexcitation time $t_O$ :	approx. 1 s
Max. trigger speed	199 rpm
Nominal air gap <sup>1)</sup> "a" braked (Fig. 2):	0.45 mm
Limit air gap <sup>2)</sup> "a" at nominal torque (Fig. 2):	0.9 mm
Inspection air gap "b" on released brake (Fig. 2):	min. 0.25 mm
Duty cycle / switchings	50 % / 180 1/h
Protection (coil/casting compound):	IP54
Protection (mechanical):	IP10
Protection (switch):	IP67
Ambient temperature:	+5 °C to +40 °C



<sup>1)</sup> Measured in the armature disk (2) area, centre, vertical centre axis.

<sup>2)</sup> Once the maximum air gap has been reached, the rotors must be replaced. However, the brake already becomes louder at an air gap > "a" +0.2 mm.

At temperatures of around or under freezing point, condensation can strongly reduce the braking torque. The user is responsible for taking appropriate countermeasures. The customer is responsible for providing a protective cover against contamination caused by construction sites.

## CAUTION



The rotor (3) must be replaced at the latest when a maximum air gap of 0.9 mm has been reached.

**Table 2: Technical Data**

Size	Article number	Nominal torque <sup>3)</sup> minimal	Max. friction work per brake circuit <sup>4)</sup>	Inductivity	Nominal power $P_N$ (at 20 °C)
200	8238534	2 x 210 Nm	15300 J	2 x 18 H	2 x 70 W
400	8239664	2 x 300 Nm	22800 J	2 x 27 H	2 x 76 W
400	8247784	2 x 500 Nm	15000 J	2 x 21 H	2 x 88 W



<sup>3)</sup> The braking torque (nominal torque) is the torque effective in the shaft train on slipping brakes with a sliding speed of 1 m/s referring to the mean friction radius.

<sup>4)</sup> 1 brake circuit brakes / max. 3 movements one after the other with a 5-minute break each time

**Table 3: Technical Data**

Size	Article number	Coil capacity $P_O$ at overexcitation voltage	Rotor thickness New condition	Tightening torque Fixing screw Item 5	Weight
200	8238534	2 x 146 W	18 <sub>-0.05</sub> mm	21 Nm	27 kg
400	8239664	2 x 158 W	15 <sub>-0.05</sub> mm	43 Nm	37 kg
400	8247784	2 x 184 W	18 <sub>-0.05</sub> mm	43 Nm	40 kg

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

Table 4: Switching Times [ms]

Size	Nominal torque minimal	Attraction $t_2$	Drop-out $t_0$ DC	Drop-out $t_{50}^{5)}$ DC	Drop-out $t_{90}^{6)}$ DC	Drop-out $t_{11}$ AC	Drop-out $t_1$ AC
200	8238534	190	35	85	140	190	620
400	8239664	250	45	105	160	280	800
400	8247784	300	40	80	140	120	550



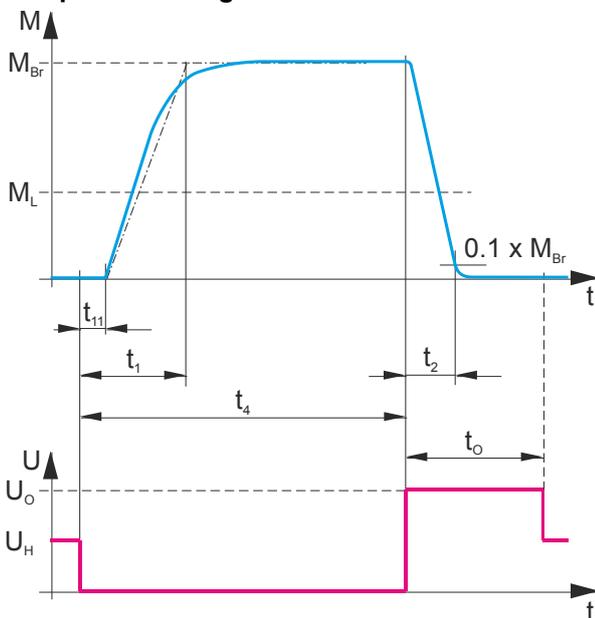
<sup>5)</sup> Referring to the effective braking torque

<sup>6)</sup> Referring to the nominal braking torque

The stated switching times can only be achieved using the respective correct electrical wiring. This also refers to the protection circuit for brake control and the response delay times of all control components. If the brake is operated using overexcitation, the respective switch-on and switch-off times for overexcitation must be taken into account (inadvertent movements of the elevator cage).

The use of varistors for spark quenching increases the DC-side switching times.

## Torque-Time Diagram



### Key

- $M_{Br}$  = Braking torque
- $M_L$  = Load torque
- $t_1$  = Connection time
- $t_{11}$  = Response delay on connection  
( $\approx t_0$  acc. Type Examination Certificate)
- $t_2$  = Separation time
- $t_4$  = Slip time +  $t_{11}$
- $t_0$  = Overexcitation time
- $U_H$  = Holding voltage
- $U_O$  = Overexcitation voltage

### Application

- ROBA®-duplostop® for use as a holding brake with occasional EMERGENCY STOP braking actions
- The max. permitted speed and friction work (see Technical Data, Table 2) must be observed.

## Design

The ROBA®-duplostop® is a spring applied, electromagnetically releasing dual circuit safety brake - a component in terms of DIN VDE 0580.

It is designed for installation into gearless elevator machinery for use as a holding brake with occasional EMERGENCY STOP braking actions.

On dimensioning, the braking torque, the speed as well as the permitted friction work in case of EMERGENCY STOP need to be taken into consideration for safe holding of the load torque and safe compliance with the required braking distance.

Furthermore, the ROBA®-duplostop® can be used as a braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and as a braking element against unintended car movement.

Please also observe the Annex in the EU Type Examination Certificate.

In order to guarantee the maximum braking distance while both brakes act, an inspection of the protection device including all control and brake times (detector / control / brake) is necessary. The respective standards, regulations and directives must be observed.

## Function

ROBA®-duplostop® brakes are spring applied, electromagnetic safety brakes.

### Spring applied function:

In de-energised condition, thrust springs press against the armature disks (2). The rotor (3) with the friction linings is therefore held between the armature disks (2) and the machine screw-on surface.

The motor shaft is braked via the rotor (3).

### Electromagnetic function:

Due to the magnetic force of the coils in the coil carriers (1), the armature disks (2) are attracted against the spring pressure to the coil carrier (1).

The brake is thereby released and the shaft can rotate freely.

### Safety brake function:

The ROBA®-duplostop® brakes reliably and safely in the event of a power switch-off, a power failure or an EMERGENCY STOP.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Scope of Delivery / State of Delivery

The brake bodies are completely manufacturer-assembled with coil carrier (1), armature disks (2), distance bolts (4) and release monitoring (6).

The release monitoring devices (6) are set manufacturer-side. The rotor (3) and the O-ring (8) are included loose in delivery.

Please check the scope of delivery according to the Parts List as well as the state of delivery immediately after receiving the goods.

mayr® will take no responsibility for belated complaints. Please report transport damage immediately to the deliverer. Please report incomplete delivery and obvious defects immediately to the manufacturer.

## Adjustment



The brakes are equipped manufacturer-side with the respective springs for the braking torque stated on the Type tag (7). Adjustment is not necessary. Adaptions or modifications are not permitted as a rule. This rule also applies to the manufacturer-side adjusted noise damping. The microswitches are also adjusted manufacturer-side. Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe. Please also observe the section 'Release Monitoring'.

## Installation Conditions

- The eccentricity of the shaft end in relation to the fixing holes must not exceed 0.3 mm.
- The positional tolerance of the threads for the cap screws (5) must not exceed 0.3 mm.
- The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance of 0.1 mm in the area of the friction surface. Measuring procedure acc. DIN 42955. The shaft bearing is to be designed so that the axial backlash of the shaft (absolute) does not exceed the permitted axial run-out value during operation. Larger deviations can lead to a drop in torque, to continuous grinding of the rotor (3) and to overheating.
- The splined motor shaft should be designed according to the information given in the applicable assembly drawing.



The dimensions stated in the assembly drawings are manufacturer-side recommendations.

- The mounting dimensions and the tapped holes  $s$  with depth  $K + 2$  mm ( $K$  = screw projection) according to the applicable assembly drawing must be given (Fig. 5).
- The O-ring (8) must be lightly greased.
- The rotor and brake surfaces must be oil and grease-free.
- A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surfaces must be avoided. Recommended surface quality in the area of the friction surface  $Ra = 0.8 - 1.6 \mu\text{m}$ . The mounting surface must be turned. The surface must be bare or FE-phosphated (layer thickness approx.  $0.5 \mu\text{m}$ ) without oil. If corrosion protection is applied, the device must be inspected for possible effects on the braking torque. **In particular customer-side mounting surfaces made of grey cast iron are to be rubbed down additionally with sandpaper (grain  $\approx 60$  to  $100$ ).**
- The toothings of the motor shaft and the rotor (3) must not be oiled or greased.
- Please abstain from using cleaning agents containing solvents, as they could affect the friction material.

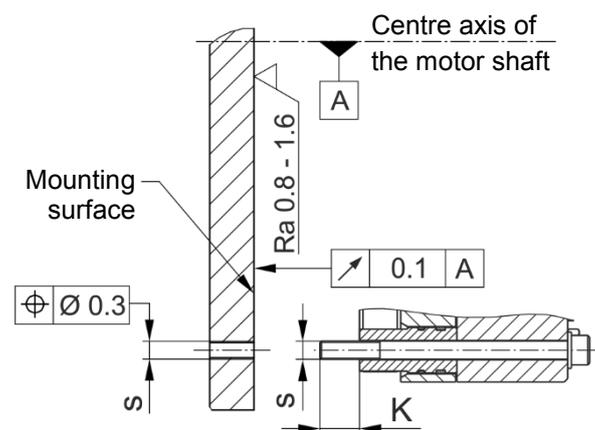


Fig. 5

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Installation (Figs. 1 – 5)

1. Lightly grease the O-ring (8) and insert it into the groove of rotor (3).
2. Push the rotor (3) with the inserted O-ring (8) onto the motor shaft by hand using light pressure.



Please make sure that the installation position of the rotor (3) is correct!

Size 200 (210 Nm): Long rotor collar should be facing away from the machine wall.

Size 400 (300 Nm): Rotor collar with smaller diameter should be facing away from the machine wall.

Size 400 (500 Nm): The installation direction is immaterial because the rotor (3) is symmetrical.

The rotor toothing must lie over the entire length of the shaft.

3. Evenly attach the left brake body with cap screws (provided by the customer, Item 5; 4 pieces) and washers (Item 5.1; 4 pieces) placed under them (we recommend that you secure the screws using Loctite 243 or self-locking screws/washers).

**Tighten the cap screws (5) using a torque wrench and observe the tightening torque acc. Table 3.**

Repeat the procedure with the brake body on the right side.

4. **Check air gap “a” (Fig. 2):**  
**Air gap:  $0.45 \text{ mm} \leq \text{“a”} \leq 0.65 \text{ mm}$**   
This air gap must be given in the armature disk (2) area, centre, vertical centre axis next to the microswitch (6.1) (Fig. 1).
5. Connect the brake electrically.
6. **Check air gap “b” > 0.25 mm in energised state on the rotor (3) (Fig. 2).**  
The inspection air gap must be given.

## Braking Torque

The (nominal) braking torque is the torque effective in the shaft train on slipping brakes, with a sliding speed of 1 m/s referring to the mean friction radius.

The brake is loaded statically when used as a service brake and loaded dynamically in EMERGENCY STOP operation (part of the brake equipment against overspeed or inadvertent movement of the elevator cage). Respectively, there are different speed values for the friction material, which in practice also leads to different friction values and therefore braking torques.

Amongst other things, the braking torque is dependent on the respective quality / condition of the friction surfaces (conditioning). Therefore, bedding in of the brake linings on newly installed brakes or on rotor replacement when mounted onto the motor is required, taking into account the permitted loads. The following applies as a reference value for the bedding in of new brake linings. The load in new condition may not be more than 50 % of the max. friction work per individual circuit (see Table 2). This process is to be carried out at reduced speed, approx. 30 % of the operating speed.

If the bedding in should take place under works-specific conditions, we ask you to contact us, so that we can provide the appropriate parameters.

Friction materials develop their optimum effect only under speed at the appropriate contact pressure, as continuous regeneration of the friction surface then takes place (torque consistency). Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque.

Furthermore, friction materials are subject to ageing, which is also influenced, among other things, by higher temperatures and other ambient influences. We recommend regular inspection of the braking torque (1 x per year) including the respective dynamic braking actions as a refresher.

## Noise Damping (Item 13 / Fig. 1)



The noise damping was set and adjusted manufacturer-side. However, this component is subject to ageing dependent on the application or operating conditions (torque adjustment, switching frequency, ambient conditions, system vibrations etc.). Replacing the damping element is only permitted at the *mayr*® site of manufacture.

## Electrical Connection and Wiring



The brake must only be operated with overexcitation. The required overexcitation time is approx. 1 s.

DC current is necessary for operation of the brake. The coil nominal voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 ( $\pm 10 \%$  tolerance). The brake must only be operated with overexcitation. The connection possibilities can vary dependent on the brake equipment. The manufacturer and the user must observe the applicable regulations and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

## Customer-side Power Supply

Overexcitation 207 V; nominal voltage 144 V; coils are switched in series. This means, every single coil receives 104 V overexcitation for approx. 1 s, followed by 72 V nominal voltage.

## Supply Voltage Requirements



In order to minimise noise development of the released brake, it must only be operated via DC voltage with low ripple content, preferably via bridge rectification. When using switch-mode power supply devices, we recommend a switching frequency of  $\geq 18 \text{ kHz}$ .

## Earthing Connection

The brake is designed for Protection Class I. This protection covers therefore not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

## Device Fuses

To protect against damage from short circuits, please add suitable device fuses to the mains cable.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Switching Behaviour

The reliable operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk and the coil carrier (dependent on the wear condition of the linings).

## Magnetic Field Build-up

When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk to the coil carrier and releases the brake.

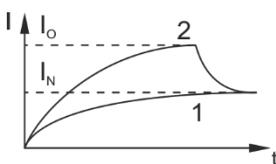
## Field Build-up with Normal Excitation

If the magnetic coil is energised with nominal voltage, the coil current does not immediately reach its nominal value. The coil inductivity causes the current to increase slowly as an exponential function. Accordingly, the build-up of the magnetic field takes place more slowly and the braking torque drop (curve 1) is also delayed.

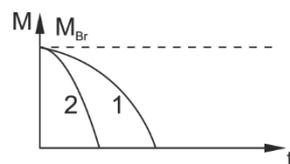
## Field Build-up with Overexcitation

A quicker drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it needs to be switched over to the nominal voltage (curve 2). The ROBA®-(multi)switch fast acting rectifier and phase demodulator work on this principle.

Current path

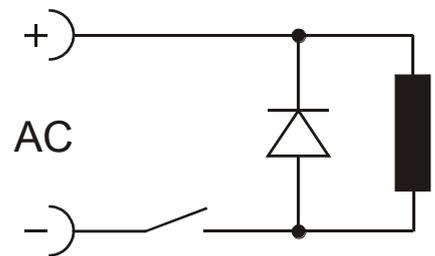


Braking torque path



## Magnetic Field Removal

### Switching with Freewheeling Diode (AC-side Switching)

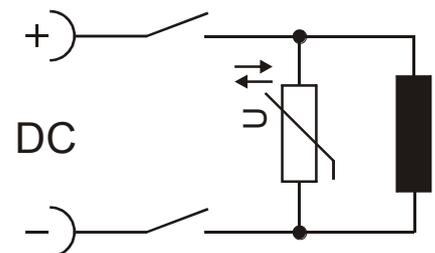


The power circuit is interrupted in front of the freewheeling diode. The magnetic field slowly reduces. This delays the rise in braking torque.

When switching times are not important, please switch AC-side, as no protective measures are necessary for the coil and the switching contacts.

→ **low-noise switching**; however, the brake engagement time is longer (approx. 5-8 times longer than with DC-side switching), use for normal elevator operation.

### DC-side Switching



The power circuit is interrupted between the supply and the coil. The magnetic field reduces extremely quickly. This causes a quick rise in braking torque.

When switching DC-side, high voltage peaks are produced in the coil, which lead to wear on the contacts from sparks and to destruction of the insulation.

→ **short brake engagement times (e.g. for EMERGENCY STOP operation)**; however, louder switching noises.

## Protection circuit

When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in *mayr*®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. *mayr*®-spark quenching unit), although this may of course then alter the switching times.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Release Monitoring (6)

ROBA®-duplostop® brakes are delivered with manufacturer-side installed and adjusted release monitoring devices.

One microswitch (6.1) per brake circuit emits a signal for every brake signal condition change:  
"brake opened" or "brake closed"

**On initial operation:**

**Connection as NC contact (black and grey strands).**

**The customer is responsible for a signal evaluation of both conditions.**

From the point at which the brake is energised, a time span of three times the separation time must pass before the microswitch signal on the release monitoring is evaluated.

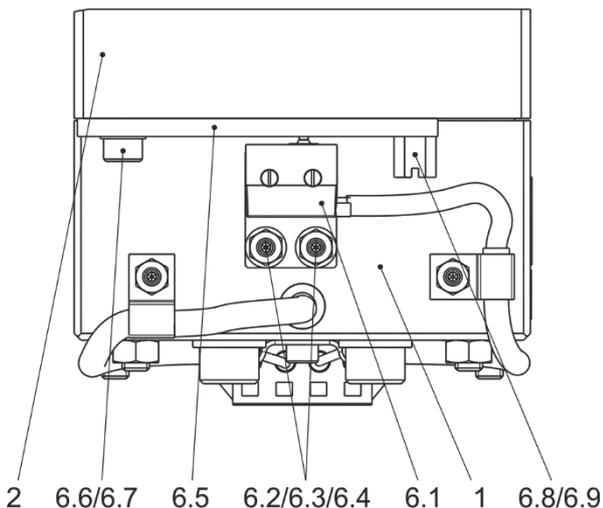
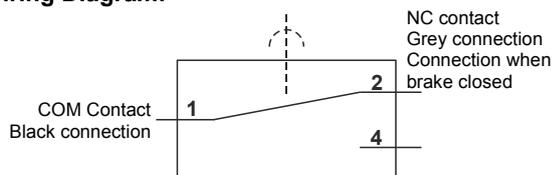


Fig. 6

## Function

When the magnetic coils are energised in the coil carriers (1), the armature disks (2) are attracted to the coil carrier (1). The microswitches (6.1) emit a signal and the brake is released.

## Wiring Diagram:



Re-adjustment is possible via the set screws (6.9) and the self-locking nuts (6.8).

## Microswitch Specification

<b>Characteristic values for measurement:</b>	250 V~ / 3 A
<b>Minimum switching power:</b>	12 V, 10 mA DC-12
<b>Recommended switching power: for maximum lifetime and reliability</b>	24 V, 10...50 mA DC-12 DC-13 with freewheeling diode!

Usage category acc. IEC 60947-5-1:  
DC-12 (resistance load), DC-13 (inductive load)

## Customer-side Inspection after Mounting onto the Elevator Machinery

The customer-side connection is an NC contact.  
Please inspect the release monitoring on both circuits:

Brake de-energised → Signal "ON",  
Brake energised → Signal "OFF"



Microswitches cannot be guaranteed fail-safe. Therefore, please ensure appropriate access for replacement or adjustment. The switching contacts are designed so that they can be used for both small switching powers and medium ones. However, after switching a medium switching power, small switching powers are no longer reliably possible. In order to switch inductive, capacitive and non-linear loads, please use the appropriate protection circuit to protect against electric arcs and unpermitted loads!

## Customer-side Replacement of the Microswitch and New Adjustment in the Elevator Machinery



Brake de-energised.

## Replacement of the microswitch (6.1)

- Loosen the hexagon nut of the cable clamp for the microswitch cable and lay the hexagon nut with the cable clamp aside.
- Disconnect the microswitch (6.1) from the pin strip (9)
- Loosen both hexagon nuts (6.4), lay them aside with the washers (6.3) and remove the microswitch (6.1).
- Loosen the self-locking nut (6.8) with a screwdriver and unscrew the set screw (6.9) using a hexagon socket wrench, wrench opening 2, with T-grip by approx. 2 turns, so that the adjusting lever (6.5) springs back in the direction of the armature disk (2).
- Mount the new microswitch (6.1).

## New adjustment of the microswitch (6.1)

- Connect the inspection lamp (alternative: multi-meter). NC contact connected → Signal "ON". Screw in the set screw (6.9) up to signal "OFF".
- Turn back the set screw (6.9) again slowly, up to signal "ON".
- Continue turning the set screw (6.9) back by 180° to 190° and counter it using a self-locking nut (6.8).
- Mount the cable clamp for the microswitch cable again
- Connect the microswitch (6.1) to the pin strip (9).

## Brake Inspection

(Customer-side after Mounting onto the Elevator Machinery)

- ❑ **Inspection of the individual air gaps (Fig. 2)**  
Air gaps "a" of both brake circuits (brake de-energised):  
Air gap  $0.45 \text{ mm} \leq "a" \leq 0.65 \text{ mm}$  This air gap must be given in the armature disk (2) area, centre, vertical centre axis next to the microswitch (6.1) (Fig. 1).  
Air gaps "b" of both brake circuits (brake energised):  
Air gap "b"  $> 0.25 \text{ mm}$ .
- ❑ **Braking torque inspection:**  
Please compare the requested braking torque with the torque stated on the Type tag.
- ❑ **Release function inspection**  
By energising the brake via battery operation, to guarantee emergency escape for passengers during a power failure.
- ❑ **Switch function inspection of the release monitoring (NC contact)**  
Brake energised → Signal "OFF"  
Brake de-energised → Signal "ON"

## Dual Circuit Brake Functional Inspection

The ROBA®-duplostop® brake is equipped with a double safety (redundant) braking system.  
This means that, should one brake circuit fail, the braking effect is still maintained.

### DANGER



Should the elevator begin to move after release of one brake circuit or should it fail to react to the braking procedure, the energised coil must be switched off immediately!  
The dual circuit braking function is not guaranteed.  
Shut down the elevator, lower and secure the load, remove and inspect the brake.  
Please observe the installation guidelines of the elevator manufacturer as well as the accident prevention regulations.

The individual circuit inspection is carried out by energising the individual circuits with nominal voltage. The braking effect sufficient for the retardation of the elevator cage, which is loaded with nominal load and moving downwards at nominal speed, must be maintained (please observe the permitted friction work acc. Technical data).

### Inspection left brake circuit:

1. Energise the right and left brake circuits and put the drive into operation.
2. De-energise the left brake circuit (= EMERGENCY STOP) and inspect the stopping distance according to the elevator regulations.
3. De-energise the right brake circuit.

### Inspection right brake circuit:

1. Energise the right and left brake circuits and put the drive into operation.
2. De-energise the right brake circuit (= EMERGENCY STOP) and inspect the stopping distance according to the elevator regulations.
3. De-energise the left brake circuit.

### Inspection of both brake circuits:

Energise both brake circuits and put the drive into operation. Trigger an EMERGENCY STOP and inspect the stopping distance. The stopping distance must be much shorter than the stopping distance for an individual circuit.

If the brake is used as part of the protection device against unintended car movement, the functionality of the protection device must be verified using the type examination (compliance of the entire concept - detector/control/brake element - for the elevator system).

The inspection proves that the brake element (both brake circuits work together) releases correctly. Furthermore, it must be confirmed that the travelled distance does not exceed the stated value.

If the brake is normally released using overexcitation, brake release during the inspection must be carried out via DC-side switch-off from the overexcitation voltage.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Maintenance

ROBA®-duplostop® brakes are mainly maintenance-free. The friction lining pairing is robust and wear-resistant. This ensures a particularly long service lifetime of the brake.

However, the friction lining is subject to operational wear on frequent EMERGENCY STOP braking actions. Normally, such occurrences are recorded and saved by the elevator control, or they require the intervention of qualified personnel. When carrying out this maintenance work (especially when taking DIN EN 13015 Appendix A into account), the causes of the malfunction must be determined, assessed and removed by specialist personnel. Causal events such as the air gap can be checked and respective measures can be taken.

The brakes on the elevator system must be maintained and repaired by a **specialist employee**, taking into consideration the type and intensity of use of the system.

The following inspections / tests are to be conducted within the scope of the defined elevator maintenance interval during maintenance and repairs.

1. Visual inspection
  - Inspection of condition in accordance with the regulations
  - Brake rotor: in particular the exterior appearance of the brake surfaces
    - wear
    - free of oil / lubricants
    - sticking of linings
2. Tightening torque inspection of the fixing screws on the brakes. If the brake fixing screws are covered with sealing lacquer, a visual inspection for damage of the sealing is sufficient.
3. Inspection of the air gap – braked (both brake circuits)
4. Inspection of toothing backlash from the splined motor shaft to the rotor (3).  
Max. permitted toothing backlash 0.5 °
5. Running noise (brake rotor) during operation  
**Attention:** Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque. If such indications are present, it is essential that the braking torque is checked and the rotor replaced if required independent of the inspection or the determined wear value!
6. Braking torque or delay inspection (individual brake circuits) at least once per year (within the scope of the maintenance / main inspection)



In order to inspect the wear condition of the rotor (3), please measure the air gap "a", see Fig. 2.  
If the brake limit air gap (0.9 mm) has been reached, meaning that the friction linings are worn down, the braking torque is lost and the rotor (3) must be replaced.  
Brake de-installation is carried out by following the instructions in the section Installation (page 11) backwards.

## Replacing the Rotor (3)

### Before Replacing the Rotor

- Clean the brake.



Please observe the "Cleaning the Brake" section, see below.

- Measure the rotor thickness "new" (nominal dimension acc. Table 3).

Replace the rotor (3) by following the Brake Installation instructions backwards.



**DANGER**

The drive-brake must be load-free on hoist drives.  
Otherwise there is a danger of load crashes!

## Information on the Components

The **friction material** contains different inorganic and organic compounds, which are integrated into a system of hardened binding agents and fibres.

### Possible hazards:

No potential dangers have been recognised so far when the brake is used according to its intended purpose. When grinding in the friction linings (new condition) and also in case of EMERGENCY STOP braking actions, functional wear can occur (wear on the friction linings); on open brake designs, fine dust can be emitted.

**Classification: Hazardous property**

**Attention: H-classification: H372**



### Protective measures and rules of behaviour:

Do not inhale dusts

Vacuum the dusts at the point of origin (tested suction devices, tested filters acc. DIN EN 60335-2-69 for dust classes H; maintenance of the suction devices and filter replacement at regular intervals).

If local dust suction is not possible or is insufficient, the entire work area must be ventilated using appropriate technology.

### Additional information:

This friction lining (asbestos free) is not a dangerous product in terms of the EU Directive

## Cleaning the Brake



Do not clean the brake using compressed air, brushes or similar devices!

- Use a suction system or wet towels to clean off the brake dust.
- Do not inhale brake dust (wear safety gloves / safety goggles)
- In case of dust formation, a dust mask FFP 2 is recommended.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_0013 Sizes 200 and 400

(E028 01 001 002 4 EN)

## Disposal

Our electromagnetic brake components must be disposed of separately as they consist of different materials. Please also observe the relevant authority regulations. Code numbers may vary according to the disassembling process (metal, plastic and cables).

### Electronic components

(Rectifier / ROBA®-switch / Microswitch):

Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216, or can be disposed of by a certified disposal firm.

### Brake bodies made of steel with coil/cable and all other steel components:

Steel scrap (Code No. 160117)

### All aluminium components:

Non-ferrous metals (Code No. 160118)

### Brake rotor (steel or aluminium pads with friction linings):

Brake linings (Code No. 160112)

### Seals, O-rings, V-seals, elastomers, terminal boxes (PVC):

Plastic (Code No. 160119)

## Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	<input type="checkbox"/> Incorrect voltage on rectifier <input type="checkbox"/> Rectifier failure <input type="checkbox"/> Air gap too large (worn rotor) <input type="checkbox"/> Coil interrupted	<input type="checkbox"/> Apply correct voltage <input type="checkbox"/> Replace rectifier <input type="checkbox"/> Replace the rotor <input type="checkbox"/> Replace the brake
Release monitoring does not switch	<input type="checkbox"/> Brake does not release <input type="checkbox"/> Defective microswitch	<input type="checkbox"/> Solution as above <input type="checkbox"/> Replace the microswitch (manufacturer-side)

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

(E028 01 001 003 4 EN)

Design according to

Size	Type	Drawing number	Article number	Braking torque
200	8010.12013	E028 01 001 000 219	8257698	2 x 250 Nm
400	8010.22013	E028 02 005 000 219	8257699	2 x 350 Nm
400	8010.12013	E028 02 016 000 117	8257713	2 x 550 Nm

## Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions can lead to lethal accidents, malfunctions, brake failure and damage to other parts.  
These Installation and Operational Instructions (I + O) are part of the brake delivery.  
Please keep them handy and near to the brake at all times.

### Contents:

- Page 1:** - Contents
- Page 2:** - Safety and Guideline Signs  
- Certification  
- Guidelines on EU Directives
- Page 3:** - Safety Regulations
- Page 4:** - Safety Regulations
- Page 5:** - Safety Regulations
- Page 6:** - Brake Illustrations
- Page 7:** - Parts List
- Page 8:** - Technical Data
- Page 9:** - Switching Times  
- Torque-Time Diagram  
- Application  
- Design  
- Function
- Page 10:** - Scope of Delivery / State of Delivery  
- Adjustment  
- Installation Conditions
- Page 11:** - Installation  
- Braking Torque  
- Noise Damping  
- Electrical Connection and Wiring
- Page 12:** - Electrical Connection and Wiring
- Page 13:** - Release Monitoring
- Page 14:** - Brake Inspection (Customer-side after Mounting)  
- Dual Circuit Brake Functional Inspection
- Page 15:** - Maintenance  
- Information on the Components  
- Cleaning the Brake
- Page 16:** - Disposal  
- Malfunctions / Breakdowns
- Attachment:** Assembly Drawing

## Safety and Guideline Signs

### DANGER



Immediate and impending danger, which can lead to severe physical injuries or to death.

### CAUTION



Danger of injury to personnel and damage to machines.



**Please Observe!**  
Guidelines on important points.

## Certification

EU Type Examination Certificate (Elevator Directive): EU-BD 766



### Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product (electromagnetic safety brake) in terms of the EU Low Voltage Directive 2014/35/EU. The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

### Guidelines on the EMC Directive (2014/30/EU)

The product cannot be operated independently according to the EMC directive.

Due to their passive state, brakes are also non-critical equipment according to the EMC.

Only after integration of the product into an overall system can this be evaluated in terms of the EMC.

For electronic equipment, the evaluation has been verified for the individual product in laboratory conditions, but not in the overall system.

### Guidelines on the Machinery Directive (2006/42/EC)

The product is a component for installation into machines according to the Machinery Directive 2006/42/EC.

The brakes can fulfil the specifications for safety-related applications in coordination with other elements.

The type and scope of the required measures result from the machine risk analysis. The brake then becomes a machine component and the machine manufacturer assesses the conformity of the safety device to the directive.

It is forbidden to start use of the product until you have ensured that the machine accords with the regulations stated in the directive.

### Guidelines on the EU Directive on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

The electromagnetic brake as well as the rectifiers / microswitches / proximity switches required for control / self-monitoring fulfil the requirements laid down in the EU Directive 2011/65/EC (RoHS).

(Restrictions on the use of certain hazardous substances, such as lead (0.1 %), mercury (0.1 %), cadmium (0.01 %), hexavalent chromium (0.1 %), polybrominated biphenyls (PBB) (0.1 %), polybrominated diphenylethers (PBDE) (0.1 %))

### Guidelines on the ATEX Directive

Without a conformity evaluation, this product is not suitable for use in areas where there is a high danger of explosion.

For application of this product in areas where there is a high danger of explosion, it must be classified and marked according to Directive 2014/34/EU.

## Safety Regulations

These Safety Regulations are user hints only and may not be complete!

### General Guidelines

#### DANGER



Danger of death!  
Do not touch voltage-carrying cables and components.

Brakes may generate further risks, among other things:



Hand injuries



Danger of seizure



Contact with hot surfaces



Magnetic fields

### Severe injury to people and damage to objects may result if:

- the electromagnetic brake is used incorrectly.
- the electromagnetic brake is modified.
- the relevant standards for safety and / or installation conditions are ignored.

During the required risk assessment when designing the machine or system, the dangers involved must be evaluated and removed by taking appropriate protective measures.

**To prevent injury or damage, only specialist personnel are allowed to work on the components.**

They must be familiar with the dimensioning, transport, installation, inspection of the brake equipment, initial operation, maintenance and disposal according to the relevant standards and regulations.



Before product installation and initial operation, please read the Installation and Operational Instructions carefully and observe the Safety Regulations. Incorrect operation can cause injury or damage. At the time these Installation and

Operational Instructions go to print, the electromagnetic brakes accord with the known technical specifications and are operationally safe at the time of delivery.

- Technical data and specifications (Type tags and documentation) must be followed.
- The correct connection voltage must be connected according to the Type tag and wiring guidelines.
- Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- Please observe the EN 60204-1 requirements for electrical connection when using in machines.



Only carry out installation, maintenance and repairs in a de-energised, disengaged state and secure the system against inadvertent switch-on.

### Guidelines for Electromagnetic Compatibility (EMC)

In accordance with the EMC directives 2014/30/EU, the individual components produce no emissions. However, functional components e.g. mains-side energisation of the

brakes with rectifiers, phase demodulators, ROBA®-switch devices or similar controls can produce disturbance which lies above the allowed limit values. For this reason it is important to read the Installation and Operational Instructions very carefully and to keep to the EMC directives.

### Application Conditions



The catalogue values are guideline values which have been determined in test facilities. It may be necessary to carry out your own tests for the intended application. When dimensioning the brakes, please remember that installation situations, braking torque fluctuations, permitted friction work, bedding-in condition / conditioning of the brake linings and wear as well as general ambient conditions can all affect the given values. These factors should therefore be carefully assessed, and alignments made accordingly.

- Mounting dimensions and connection dimensions must be adjusted according to the size of the brake at the place of installation.
- Use of the brake in extreme environmental conditions or outdoors, directly exposed to the weather, is not permitted.
- The brakes are designed for a relative duty cycle of 50 %. A duty cycle > 50 % leads to higher temperatures, which cause premature ageing of the noise damping and therefore lead to an increase in switching noises. Furthermore, the switch function of the release monitoring can be impaired. The max. permitted switching frequency is 240 1/h. These values are valid for intermittent periodic duty S3 50 %. The permitted surface temperature on the brake flange must not exceed 80 °C at a max. ambient temperature of 40 °C. For higher requirements on the friction work in case of EMERGENCY STOP or at temperatures of up to 90 °C on the brake flange, special friction materials and noise damping are to be used (see Type key).
- Relative air humidity < 85 %. At relative humidity levels > 50 %, increased corrosion protection is necessary.
- The braking torque is dependent on the current bedding-in condition of the brake. Bedding in / conditioning of the friction linings is necessary.
- The brakes are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or foreign bodies.



Please ensure that the brake is clean and oil-free, as both brake circuits have an effect on the same linings. In particular in gear applications, special sealing measures, among other precautions, may be necessary!

- The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection. The surface is rough-sawn and unprocessed (rolled material)

#### CAUTION



The rotors may rust up and seize up in corrosive ambient conditions and / or after longer downtimes. The user is responsible for taking appropriate countermeasures.

## Safety Regulations

These Safety Regulations are user hints only and may not be complete!

### Dimensioning

#### Attention!

When dimensioning the brake, please take into consideration whether a load torque is present when selecting the protection.

- Load torques reduce the deceleration torque available.
- Load torques may increase the output speed:
  - during a possible processing time in the controls
  - during the brake downtime

When calculating the friction work, please observe that the brake nominal torque is subject to a tolerance.

### Climate Conditions

The electromagnetic brake is suitable for applications with an ambient temperature of between +5 °C and +40 °C.

#### CAUTION



#### Reduction in braking torque possible

Condensation can form on the brake and cause a loss in braking torque:

- due to fast changes in temperature
- at temperatures of around or under freezing point

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

#### CAUTION



#### Brake malfunction possible

Condensation can form on the brake and cause malfunctions:

- at temperatures around or under freezing point, the brake can freeze over and not release any more.

The user is responsible for taking appropriate countermeasures (e.g. forced convection, heating, drain screw).

The system function must be checked by the user after longer downtimes.



At high temperatures and in high humidity or with occurring dampness, the rotor can seize up to the armature disk or the bearing shield / the flange plate after longer downtimes.

#### CAUTION



Temperatures of over 80 °C on the brake mounting flange can have a negative effect on the switching times, the braking torque levels and the noise damping behaviour.

### Intended Use

This safety brake is intended for use in electrically operated elevators and goods elevators. Furthermore, this brake can be used as a braking device acting on the traction sheave or the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and as a braking element against unintended car movement.

### Earthing Connection

The brake is designed for Protection Class I. This protection covers not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

### Class of Insulation F (+155 °C)

The insulation components on the magnetic coils are manufactured at least to class of insulation F (+155 °C).

### Protection

**(mechanical) IP10:** Protection against large body surfaces and large foreign bodies > 50 mm in diameter. No protection against water.

#### (electrical)

=> **IP54** for coil, casting compound and connection cable:  
Dust-proof and protected against contact as well as against water spray from any direction.

=> **IP67** specially for the microswitch:

Dust-proof and protected against contact as well as against temporary submersion under water.

=> **IP20** specially for the connector:

Protection against fingers or similar-sized objects, against medium-sized foreign bodies > 12 mm in diameter. No protection against water.

### Brake Storage

- Store the brakes in a horizontal position, in dry rooms and dust and vibration-free.
- Relative air humidity < 50 %.
- Temperature without major fluctuations within a range from +5 °C up to +40 °C.
- Do not store in direct sunlight or UV light.
- Do not store aggressive, corrosive substances (solvents / acids / lyes / salts / oils / etc.) near to the brakes.

For longer storage of more than 2 years, special measures are required (please contact the manufacturer).

Storage acc. DIN EN 60721-3-1 (including the limitations / additions described above): 1K3; 1Z1; 1B1; 1C2; 1S3; 1M1

### Handling

**Before installation**, the brake must be inspected and found to be in proper condition.

The brake function must be inspected both **once attachment has taken place** as well as **after longer system downtimes**, in order to prevent the drive starting up against possibly seized linings.

## Safety Regulations

These Safety Regulations are user hints only and may not be complete!

### User-implemented Protective Measures:

- Please cover moving parts to protect **against injury through seizure**.
- Place a cover on the magnetic part to protect **against injury through high temperatures**.
- Protection circuit:** When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in *mayr*®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. *mayr*®-spark quenching unit, half-wave and bridge rectifiers), although this may of course then alter the switching times.
- Take precautions **against freeze-up of the friction surfaces** in high humidity and at low temperatures.

EN 81-1	(End of the period of applicability: 31 AUG 2017)
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
EN 12016	Interference immunity (for elevators, escalators and moving walkways)

### Liability

The information, guidelines and technical data in these documents were up to date at the time of printing. Demands on previously delivered brakes are not valid.

Liability for damage and operational malfunctions will not be taken if:

- the Installation and Operational Instructions are ignored or neglected.
- the brakes are used inappropriately.
- the brakes are modified.
- the brakes are worked on unprofessionally.
- the brakes are handled or operated incorrectly.

### Standards, Directives and Regulations Used and To Be Applied

DIN VDE 0580	Electromagnetic devices and components, general specifications
2014/35/EU	Low Voltage Directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
2014/33/EU	Elevator Directive
EN 81-20	Safety rules for the construction and installation of lifts – Part 20: Passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts - Examinations and tests – Part 50: Design rules, calculations, examinations and tests of lift components

### Guarantee

- The guarantee conditions correspond with the Chr. Mayr GmbH + Co. KG sales and delivery conditions.
- Mistakes or deficiencies are to be reported to *mayr*® at once!

### CE Identification

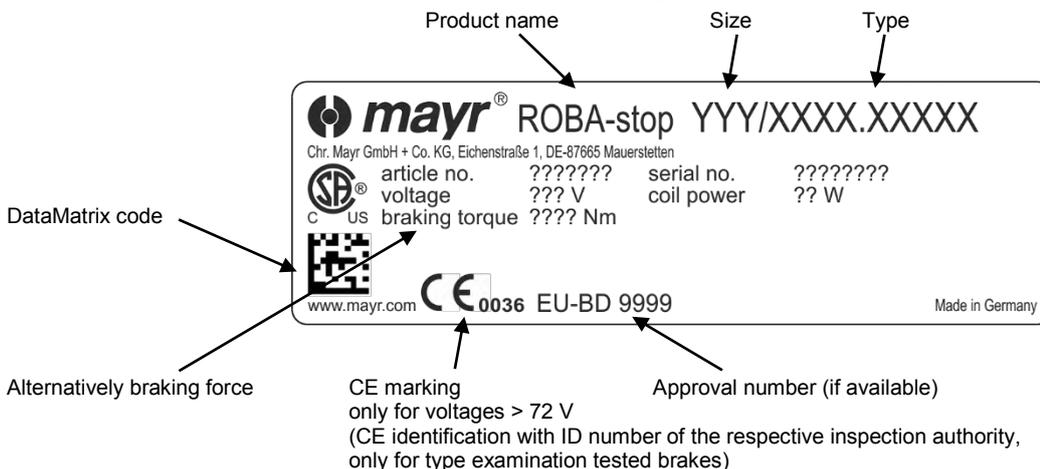
 according to the Low Voltage Directive 2014/35/EU and the Elevator Directive 2014/33/EU

### Conformity Markings

 in terms of the Canadian and American approval

### Identification

*mayr*® components are clearly marked and described on the Type tag:



# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

(E028 01 001 003 4 EN)

## Brake Illustrations

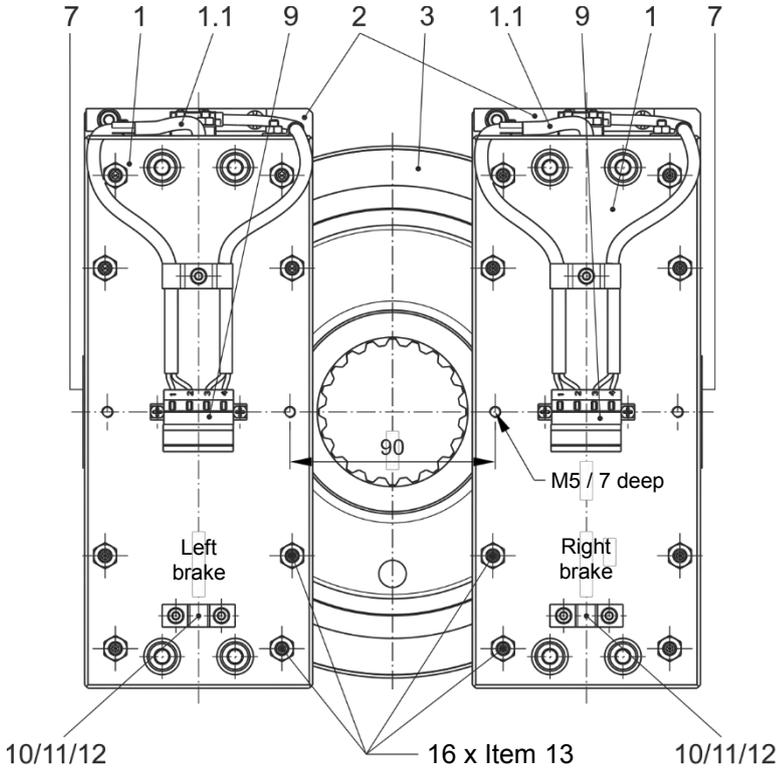


Fig. 1

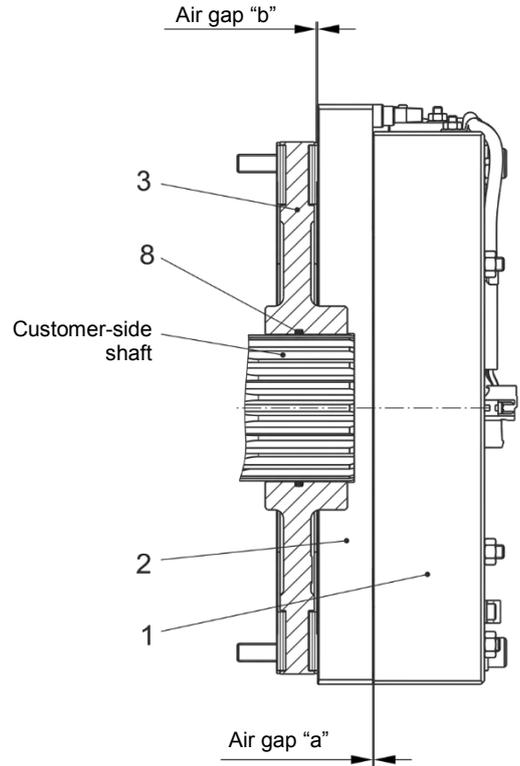


Fig. 2

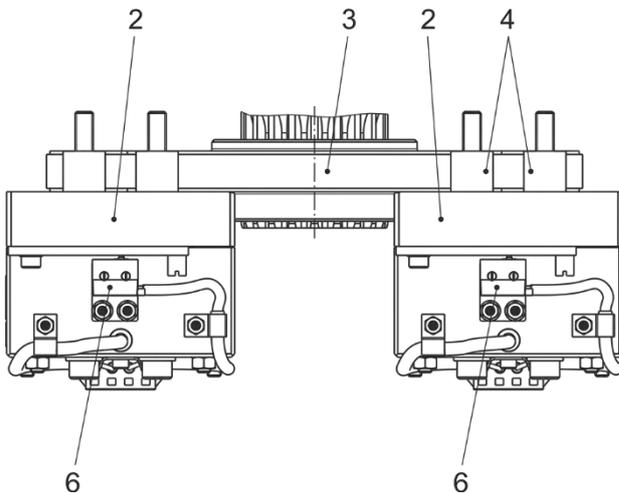


Fig. 3

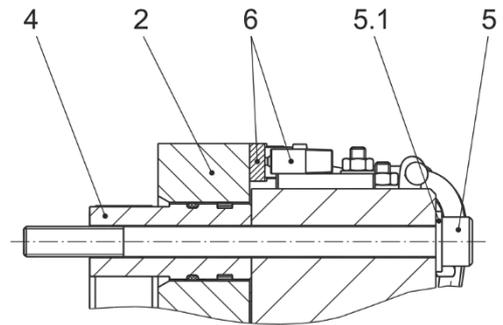


Fig. 4

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

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## Parts List (Only use *mayr*® original parts)

Item	Name	Pcs.
1	Coil carrier assembly (incl. magnetic coil)	2
1.1	Connection cable 2-wire; connection coil blue/brown	2
2	Armature disk	2
3	Rotor assembly	1
4	Distance bolt	8
5	Cap screw with a strength of 8.8 DIN EN ISO 4762 (not included in the standard scope of delivery) for Size 200 (250 Nm): M8 x 110 for Size 400 (350 Nm): M10 x 110 for Size 400 (550 Nm): M10 x 120	8
5.1	Washer (not included in the standard scope of delivery)	8
6	Release monitoring assembly	2
6.1	Microswitch incl. adaptor plate (Fig. 6, page 13)	2
6.2	Set screw M4 x 20 (Fig. 6, page 13)	4
6.3	Washer (Fig. 6, page 13)	4
6.4	Hexagon nut M4 (Fig. 6, page 13)	4
6.5	Adjustment lever (Fig. 6, page 13)	2
6.6	Cap screw M5 x 12 (Fig. 6, page 13)	2
6.7	Spring washer A5 (Fig. 6, page 13)	2
6.8	Locking nut (Fig. 6, page 13)	2
6.9	Set screw M4 x 12 (Fig. 6, page 13)	2
7	Type tag	2
8	O-ring	1
9	Wago pin strip, 4-pole (No. 731-604/019-000)	2
10	Contact washer M4	4
11	Cable clamp D6	2
12	Cap screw M4 x 8	4
13	Noise damping	16

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

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**Table 1: Technical Data (Independent of Type and Size)**

Nominal voltage $U_N$ :	144 V (2 x 72 V)
Overexcitation voltage $U_O$ :	207 V (2 x 104 V)
Overexcitation time $t_O$ :	approx. 1 s
Nominal air gap <sup>1)</sup> "a" braked (Fig. 2):	0.45 mm
Limit air gap <sup>2)</sup> "a" at nominal torque (Fig. 2):	0.9 mm
Inspection air gap "b" on released brake (Fig. 2):	min. 0.25 mm
Duty cycle / switchings	50 % / 240 1/h
Protection (mechanical):	IP10
Protection (coil/casting compound/connection cable):	IP54
Protection (switch):	IP67
Protection (connector):	IP20
Ambient temperature:	+5 °C to +40 °C



<sup>1)</sup> Measured in the armature disk (2) area, centre, vertical centre axis.

<sup>2)</sup> Once the maximum air gap has been reached, the rotors must be replaced. However, the brake already becomes louder at an air gap > "a" +0.2 mm.

At temperatures of around or under freezing point, condensation can strongly reduce the braking torque. The user is responsible for taking appropriate countermeasures. The customer is responsible for providing a protective cover against contamination caused by construction sites.

## CAUTION



The rotor (3) must be replaced at the latest when a maximum air gap of 0.9 mm has been reached.

**Table 2: Technical Data**

Size	Article number	Nominal torque <sup>3)</sup> minimal	Permitted friction work <sup>4)</sup>	Permitted friction work per brake circuit <sup>5)</sup> for max. 1 braking action	Max. operating speed	Max. trigger speed
200	8257698	2 x 250 Nm	17000 J	31500 J	255 rpm	344 rpm
400	8257699	2 x 350 Nm	26500 J	47000 J	279 rpm	273 rpm
400	8257713	2 x 550 Nm	37000 J	74000 J	279 rpm	371 rpm



<sup>3)</sup> The braking torque (nominal torque) is the torque effective in the shaft train on slipping brakes with a sliding speed of 1 m/s referring to the mean friction radius.

<sup>4)</sup> Values for 115 % of the max. operating speed if 1 brake circuit brakes or for the max. trigger speed if both brake circuits brake. Max. 3 braking actions one after the other with a 5-minute break each time.

<sup>5)</sup> 1 brake circuit brakes. Values for max. trigger speed. Rotor replacement is necessary after 1 braking action. A temporary drop of the dynamic braking torque to 80% of the nominal torque is possible.

**Table 3: Technical Data**

Size	Article number	Inductivity	Nominal power $P_N$ (at 20 °C)	Coil capacity $P_O$ at overexcitation voltage	Rotor thickness New condition	Tightening torque Fixing screw Item 5	Weight
200	8257698	2 x 18 H	2 x 70 W	2 x 146 W	18 <sub>-0.05</sub> mm	21 Nm	29.6 kg
400	8257699	2 x 27 H	2 x 76 W	2 x 158 W	15 <sub>-0.05</sub> mm	43 Nm	37.4 kg
400	8257713	2 x 21 H	2 x 88 W	2 x 184 W	18 <sub>-0.05</sub> mm	43 Nm	43.3 kg

Table 4: Switching Times [ms]

Size	Article number	Attraction $t_2$	Drop-out $t_0$ DC	Drop-out $t_{50}^{6)}$ DC	Drop-out $t_{90}^{6)}$ DC	Drop-out $t_{11}$ AC	Drop-out $t_1^{7)}$ AC
200	8257698	190	35	85	140	190	620
400	8257699	250	40	100	150	280	800
400	8257713	350	40	75	120	220	550



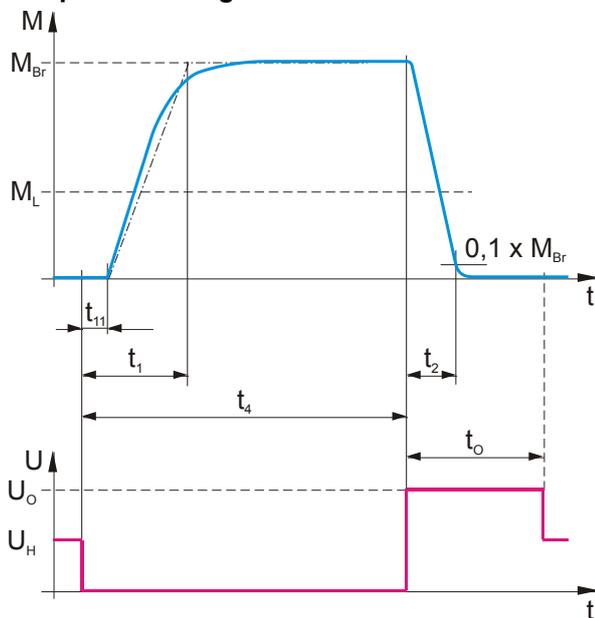
6) Referring to the nominal braking torque

7) Referring to the effective braking torque

The stated switching times can only be achieved using the respective correct electrical wiring. This also refers to the protection circuit for brake control and the response delay times of all control components. If the brake is operated using overexcitation, the respective switch-on and switch-off times for overexcitation must be taken into account (inadvertent movements of the elevator cage).

The use of varistors for spark quenching increases the DC-side switching times.

## Torque-Time Diagram



### Key

- $M_{Br}$  = Braking torque
- $M_L$  = Load torque
- $t_1$  = Connection time
- $t_{11}$  = Response delay on connection  
( $\triangleq t_0$  acc. Type Examination Certificate)
- $t_2$  = Separation time
- $t_4$  = Slip time +  $t_{11}$
- $t_0$  = Overexcitation time
- $U_H$  = Holding voltage
- $U_O$  = Overexcitation voltage

### Application

- ROBA®-duplostop® for use as a holding brake with occasional EMERGENCY STOP braking actions
- The max. permitted speed and friction work (see Technical Data, Table 2) must be observed.

## Design

The ROBA®-duplostop® is a spring applied, electromagnetically releasing dual circuit safety brake - a component in terms of DIN VDE 0580.

It is designed for installation into gearless elevator machinery for use as a holding brake with occasional EMERGENCY STOP braking actions.

On dimensioning, the braking torque, the speed as well as the permitted friction work in case of EMERGENCY STOP need to be taken into consideration for safe holding of the load torque and safe compliance with the required braking distance.

Furthermore, the ROBA®-duplostop® can be used as a braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and as a braking element against unintended car movement.

Please also observe the Annex in the EU Type Examination Certificate.

In order to guarantee the maximum braking distance while both brakes act, an inspection of the protection device including all control and brake times (detector / control / brake) is necessary. The respective standards, regulations and directives must be observed.

## Function

ROBA®-duplostop® brakes are spring applied, electromagnetic safety brakes.

### Spring applied function:

In de-energised condition, thrust springs press against the armature disks (2). The rotor (3) with the friction linings is therefore held between the armature disks (2) and the machine screw-on surface.

The motor shaft is braked via the rotor (3).

### Electromagnetic function:

Due to the magnetic force of the coils in the coil carriers (1), the armature disks (2) are attracted against the spring pressure to the coil carrier (1).

The brake is thereby released and the shaft can rotate freely.

### Safety brake function:

The ROBA®-duplostop® brakes reliably and safely in the event of a power switch-off, a power failure or an EMERGENCY STOP.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

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## Scope of Delivery / State of Delivery

The brake bodies are completely manufacturer-assembled with coil carrier (1), armature disks (2), distance bolts (4) and release monitoring (6).

The release monitoring devices (6) are set manufacturer-side. The rotor (3) and the O-ring (8) are included loose in delivery.

Please check the scope of delivery according to the Parts List as well as the state of delivery immediately after receiving the goods.

mayr® will take no responsibility for belated complaints. Please report transport damage immediately to the deliverer. Please report incomplete delivery and obvious defects immediately to the manufacturer.

## Adjustment



The brakes are equipped manufacturer-side with the respective springs for the braking torque stated on the Type tag (7). Adjustment is not necessary. Adaptions or modifications are not permitted as a rule. This rule also applies to the manufacturer-side adjusted noise damping. The microswitches are also adjusted manufacturer-side. Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe. Please also observe the section 'Release Monitoring'.

## Installation Conditions

- The eccentricity of the shaft end in relation to the fixing holes must not exceed 0.3 mm.
- The positional tolerance of the threads for the cap screws (5) must not exceed 0.3 mm.
- The axial run-out deviation of the screw-on surface to the shaft must not exceed the permitted axial run-out tolerance of 0.1 mm in the area of the friction surface. Measuring procedure acc. DIN 42955. The shaft bearing is to be designed so that the axial backlash of the shaft (absolute) does not exceed the permitted axial run-out value during operation. Larger deviations can lead to a drop in torque, to continuous grinding of the rotor (3) and to overheating.
- The splined motor shaft should be designed according to the information given in the applicable assembly drawing.



The dimensions stated in the assembly drawings are manufacturer-side recommendations.

- The mounting dimensions and the tapped holes  $s$  with depth  $K + 2$  mm ( $K$  = screw projection) according to the applicable assembly drawing must be given (Fig. 5).
- The O-ring (8) must be lightly greased.
- The rotor and brake surfaces must be oil and grease-free.
- A suitable counter friction surface (steel or cast iron) must be used. Sharp-edged interruptions on the friction surfaces must be avoided. Recommended surface quality in the area of the friction surface  $Ra = 0.8 - 1.6 \mu\text{m}$ . The mounting surface must be turned. The surface must be bare or FE-phosphated (layer thickness approx.  $0.5 \mu\text{m}$ ) without oil. If corrosion protection is applied, the device must be inspected for possible effects on the braking torque. **In particular customer-side mounting surfaces made of grey cast iron are to be rubbed down additionally with sandpaper (grain  $\approx 60$  to  $100$ ).**
- The toothings of the motor shaft and the rotor (3) must not be oiled or greased.
- Please abstain from using cleaning agents containing solvents, as they could affect the friction material.

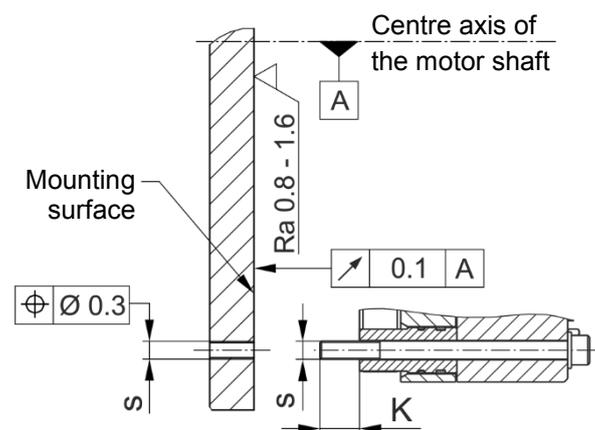


Fig. 5

## Installation (Figs. 1 – 5)

1. Lightly grease the O-ring (8) and insert it into the groove of rotor (3).
2. Push the rotor (3) with the inserted O-ring (8) onto the motor shaft by hand using light pressure.



Please make sure that the installation position of the rotor (3) is correct!

Size 200 (250 Nm): Long rotor collar should be facing away from the machine wall.

Size 400 (350 Nm): Rotor collar with smaller diameter should be facing away from the machine wall.

Size 400 (550 Nm): The installation direction is immaterial because the rotor (3) is symmetrical.

The rotor toothing must lie over the entire length of the shaft.

3. Evenly attach the left brake body with cap screws (provided by the customer, Item 5; 4 pieces) and washers (Item 5.1; 4 pieces) placed under them (we recommend that you secure the screws using Loctite 243 or self-locking screws/washers).

**Tighten the cap screws (5) using a torque wrench and observe the tightening torque acc. Table 3.**

Repeat the procedure with the brake body on the right side.

4. **Check air gap “a” (Fig. 2):**

**Air gap:  $0.45 \text{ mm} \leq \text{“a”} \leq 0.65 \text{ mm}$**

This air gap must be given in the armature disk (2) area, centre, vertical centre axis next to the microswitch (6.1) (Fig. 1).

5. Connect the brake electrically.
6. **Check air gap “b” > 0.25 mm in energised state on the rotor (3) (Fig. 2).**  
The inspection air gap must be given.

## Braking Torque

The (nominal) braking torque is the torque effective in the shaft train on slipping brakes, with a sliding speed of 1 m/s referring to the mean friction radius.

The brake is loaded statically when used as a service brake and loaded dynamically in EMERGENCY STOP operation (part of the brake equipment against overspeed or inadvertent movement of the elevator cage). Respectively, there are different speed values for the friction material, which in practice also leads to different friction values and therefore braking torques.

Amongst other things, the braking torque is dependent on the respective quality / condition of the friction surfaces (conditioning). Therefore, bedding in of the brake linings on newly installed brakes or on rotor replacement when mounted onto the motor is required, taking into account the permitted loads. The following applies as a reference value for the bedding in of new brake linings. The load in new condition may not be more than 50 % of the max. friction work per individual circuit (see Table 2). This process is to be carried out at reduced speed, approx. 30 % of the operating speed.

If the bedding in should take place under works-specific conditions, we ask you to contact us, so that we can provide the appropriate parameters.

Friction materials develop their optimum effect only under speed at the appropriate contact pressure, as continuous regeneration of the friction surface then takes place (torque consistency). Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque.

Furthermore, friction materials are subject to ageing, which is also influenced, among other things, by higher temperatures and other ambient influences. We recommend regular inspection of the braking torque (1 x per year) including the respective dynamic braking actions as a refresher.

## Noise Damping (Item 13 / Fig. 1)



The noise damping was set and adjusted manufacturer-side. However, this component is subject to ageing dependent on the application or operating conditions (torque adjustment, switching frequency, ambient conditions, system vibrations etc.). Replacing the damping element is only permitted at the *mayr*® site of manufacture.

## Electrical Connection and Wiring



The brake must only be operated with overexcitation. The required overexcitation time is approx. 1 s.

DC current is necessary for operation of the brake. The coil nominal voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 ( $\pm 10 \%$  tolerance). The brake must only be operated with overexcitation. The connection possibilities can vary dependent on the brake equipment. The manufacturer and the user must observe the applicable regulations and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

## Customer-side Power Supply

Overexcitation 207 V; nominal voltage 144 V; coils are switched in series. This means, every single coil receives 104 V overexcitation for approx. 1 s, followed by 72 V nominal voltage.

## Supply Voltage Requirements



In order to minimise noise development of the released brake, it must only be operated via DC voltage with low ripple content, preferably via bridge rectification. When using switch-mode power supply devices, we recommend a switching frequency of  $\geq 18 \text{ kHz}$ .

## Earthing Connection

The brake is designed for Protection Class I. This protection covers therefore not only the basic insulation, but also the connection of all conductive parts to the protective conductor (PE) on the fixed installation. If the basic insulation fails, no contact voltage will remain. Please carry out a standardised inspection of the protective conductor connections to all contactable metal parts!

## Device Fuses

To protect against damage from short circuits, please add suitable device fuses to the mains cable.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

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## Switching Behaviour

The reliable operational behaviour of a brake is to a large extent dependent on the switching mode used. Furthermore, the switching times are influenced by the temperature and the air gap between the armature disk and the coil carrier (dependent on the wear condition of the linings).

## Magnetic Field Build-up

When the voltage is switched on, a magnetic field is built up in the brake coil, which attracts the armature disk to the coil carrier and releases the brake.

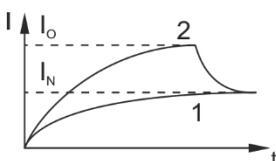
## Field Build-up with Normal Excitation

If the magnetic coil is energised with nominal voltage, the coil current does not immediately reach its nominal value. The coil inductivity causes the current to increase slowly as an exponential function. Accordingly, the build-up of the magnetic field takes place more slowly and the braking torque drop (curve 1) is also delayed.

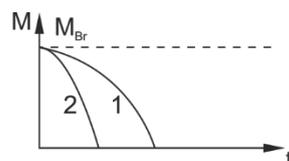
## Field Build-up with Overexcitation

A quicker drop in braking torque is achieved if the coil is temporarily placed under a higher voltage than the nominal voltage, as the current then increases more quickly. Once the brake is released, it needs to be switched over to the nominal voltage (curve 2). The ROBA®-(multi)switch fast acting rectifier and phase demodulator work on this principle.

Current path

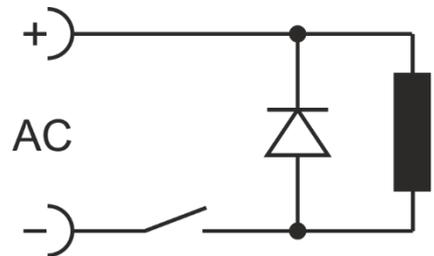


Braking torque path



## Magnetic Field Removal

### Switching with Freewheeling Diode (AC-side Switching)

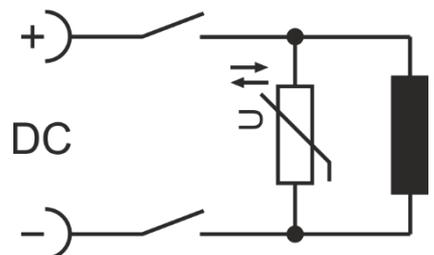


The power circuit is interrupted in front of the freewheeling diode. The magnetic field slowly reduces. This delays the rise in braking torque.

When switching times are not important, please switch AC-side, as no protective measures are necessary for the coil and the switching contacts.

→ **low-noise switching**; however, the brake engagement time is longer (approx. 5-8 times longer than with DC-side switching), use for normal elevator operation.

### DC-side Switching



The power circuit is interrupted between the supply and the coil. The magnetic field reduces extremely quickly. This causes a quick rise in braking torque.

When switching DC-side, high voltage peaks are produced in the coil, which lead to wear on the contacts from sparks and to destruction of the insulation.

→ **short brake engagement times (e.g. for EMERGENCY STOP operation)**; however, louder switching noises.

## Protection circuit

When using DC-side switching, the coil must be protected by a suitable protection circuit according to VDE 0580, which is integrated in mayr®-rectifiers. To protect the switching contact from consumption when using DC-side switching, additional protective measures are necessary (e.g. series connection of switching contacts). The switching contacts used should have a minimum contact opening of 3 mm and should be suitable for inductive load switching. Please make sure on selection that the rated voltage and the rated operating current are sufficient. Depending on the application, the switching contact can also be protected by other protection circuits (e.g. mayr®-spark quenching unit), although this may of course then alter the switching times.

## Release Monitoring (6)

ROBA®-duplostop® brakes are delivered with manufacturer-side installed and adjusted release monitoring devices.

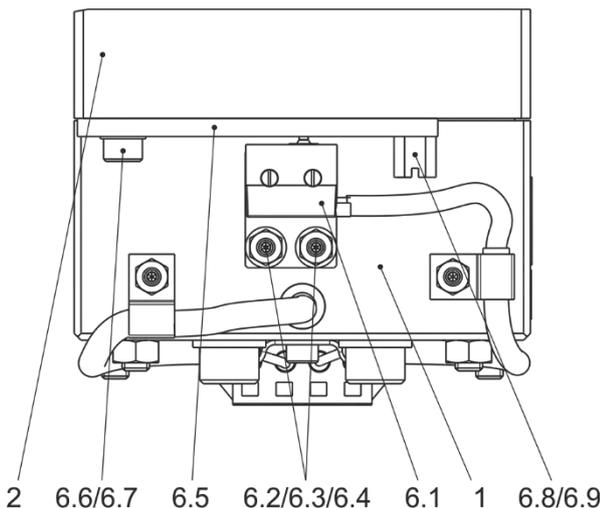
One microswitch (6.1) per brake circuit emits a signal for every brake signal condition change:  
"brake opened" or "brake closed"

**On initial operation:**

**Connection as NC contact (black and grey strands).**

**The customer is responsible for a signal evaluation of both conditions.**

From the point at which the brake is energised, a time span of three times the separation time must pass before the microswitch signal on the release monitoring is evaluated.

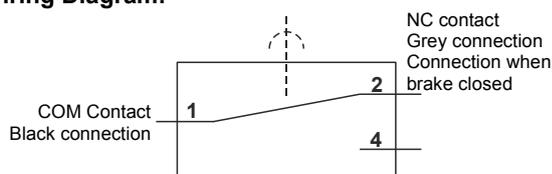


**Fig. 6**

## Function

When the magnetic coils are energised in the coil carriers (1), the armature disks (2) are attracted to the coil carrier (1). The microswitches (6.1) emit a signal and the brake is released.

## Wiring Diagram:



Re-adjustment is possible via the set screws (6.9) and the self-locking nuts (6.8).

## Microswitch Specification

<b>Characteristic values for measurement:</b>	250 V~ / 3 A
<b>Minimum switching power:</b>	12 V, 10 mA DC-12
<b>Recommended switching power: for maximum lifetime and reliability</b>	24 V, 10...50 mA DC-12 DC-13 with freewheeling diode!

Usage category acc. IEC 60947-5-1:  
DC-12 (resistance load), DC-13 (inductive load)

## Customer-side Inspection after Mounting onto the Elevator Machinery

The customer-side connection is an NC contact.  
Please inspect the release monitoring on both circuits:

Brake de-energised → Signal "ON",  
Brake energised → Signal "OFF"



Microswitches cannot be guaranteed fail-safe. Therefore, please ensure appropriate access for replacement or adjustment. The switching contacts are designed so that they can be used for both small switching powers and medium ones. However, after switching a medium switching power, small switching powers are no longer reliably possible. In order to switch inductive, capacitive and non-linear loads, please use the appropriate protection circuit to protect against electric arcs and unpermitted loads!

## Customer-side Replacement of the Microswitch and New Adjustment in the Elevator Machinery



Brake de-energised.

## Replacement of the microswitch (6.1)

- Loosen the hexagon nut of the cable clamp for the microswitch cable and lay the hexagon nut with the cable clamp aside.
- Disconnect the microswitch (6.1) from the pin strip (9)
- Loosen both hexagon nuts (6.4), lay them aside with the washers (6.3) and remove the microswitch (6.1).
- Loosen the self-locking nut (6.8) with a screwdriver and unscrew the set screw (6.9) using a hexagon socket wrench, wrench opening 2, with T-grip by approx. 2 turns, so that the adjusting lever (6.5) springs back in the direction of the armature disk (2).
- Mount the new microswitch (6.1).

## New adjustment of the microswitch (6.1)

- Connect the inspection lamp (alternative: multi-meter). NC contact connected → Signal "ON". Screw in the set screw (6.9) up to signal "OFF".
- Turn back the set screw (6.9) again slowly, up to signal "ON".
- Continue turning the set screw (6.9) back by 180° to 190° and counter it using a self-locking nut (6.8).
- Mount the cable clamp for the microswitch cable again
- Connect the microswitch (6.1) to the pin strip (9).

## Brake Inspection

(Customer-side after Mounting onto the Elevator Machinery)

- ❑ **Inspection of the individual air gaps (Fig. 2)**  
Air gaps "a" of both brake circuits (brake de-energised):  
Air gap  $0.45 \text{ mm} \leq "a" \leq 0.65 \text{ mm}$  This air gap must be given in the armature disk (2) area, centre, vertical centre axis next to the microswitch (6.1) (Fig. 1).  
Air gaps "b" of both brake circuits (brake energised):  
Air gap "b"  $> 0.25 \text{ mm}$ .
- ❑ **Braking torque inspection:**  
Please compare the requested braking torque with the torque stated on the Type tag.
- ❑ **Release function inspection**  
By energising the brake via battery operation, to guarantee emergency escape for passengers during a power failure.
- ❑ **Switch function inspection of the release monitoring (NC contact)**  
Brake energised → Signal "OFF"  
Brake de-energised → Signal "ON"

## Dual Circuit Brake Functional Inspection

The ROBA®-duplostop® brake is equipped with a double safety (redundant) braking system.  
This means that, should one brake circuit fail, the braking effect is still maintained.

### DANGER



Should the elevator begin to move after release of one brake circuit or should it fail to react to the braking procedure, the energised coil must be switched off immediately!  
The dual circuit braking function is not guaranteed.  
Shut down the elevator, lower and secure the load, remove and inspect the brake.  
Please observe the installation guidelines of the elevator manufacturer as well as the accident prevention regulations.

The individual circuit inspection is carried out by energising the individual circuits. The braking effect sufficient for the retardation of the elevator cage, which is loaded with nominal load and moving downwards at nominal speed, must be maintained (please observe the permitted friction work acc. Technical data).

### Inspection left brake circuit:

1. Energise the right and left brake circuits and put the drive into operation.
2. De-energise the left brake circuit (= EMERGENCY STOP) and inspect the stopping distance according to the elevator regulations.
3. De-energise the right brake circuit.

### Inspection right brake circuit:

1. Energise the right and left brake circuits and put the drive into operation.
2. De-energise the right brake circuit (= EMERGENCY STOP) and inspect the stopping distance according to the elevator regulations.
3. De-energise the left brake circuit.

### Inspection of both brake circuits:

Energise both brake circuits and put the drive into operation. Trigger an EMERGENCY STOP and inspect the stopping distance. The stopping distance must be much shorter than the stopping distance for an individual circuit.

If the brake is used as part of the protection device against unintended car movement, the functionality of the protection device must be verified using the type examination (compliance of the entire concept - detector/control/brake element - for the elevator system).

The inspection proves that the brake element (both brake circuits work together) releases correctly. Furthermore, it must be confirmed that the travelled distance does not exceed the stated value.

If the brake is normally released using overexcitation, brake release during the inspection must be carried out via DC-side switch-off from the overexcitation voltage.

## Maintenance

ROBA®-duplostop® brakes are mainly maintenance-free. The friction lining pairing is robust and wear-resistant. This ensures a particularly long service lifetime of the brake.

However, the friction lining is subject to operational wear on frequent EMERGENCY STOP braking actions. Normally, such occurrences are recorded and saved by the elevator control, or they require the intervention of qualified personnel. When carrying out this maintenance work (especially when taking DIN EN 13015 Appendix A into account), the causes of the malfunction must be determined, assessed and removed by specialist personnel. Causal events such as the air gap can be checked and respective measures can be taken.

The brakes on the elevator system must be maintained and repaired by a **specialist employee**, taking into consideration the type and intensity of use of the system.

The following inspections / tests are to be conducted within the scope of the defined elevator maintenance interval during maintenance and repairs.

1. Visual inspection
  - Inspection of condition in accordance with the regulations
  - Brake rotor: in particular the exterior appearance of the brake surfaces
    - wear
    - free of oil / lubricants
    - sticking of linings
2. Tightening torque inspection of the fixing screws on the brakes. If the brake fixing screws are covered with sealing lacquer, a visual inspection for damage of the sealing is sufficient.
3. Inspection of the air gap – braked (both brake circuits)
4. Inspection of toothing backlash from the splined motor shaft to the rotor (3).  
Max. permitted toothing backlash 0.5 °
5. Running noise (brake rotor) during operation  
**Attention:** Permanent grinding of the rotor can lead to overheating / damage to the brake linings, and therefore to a drop in braking torque. If such indications are present, it is essential that the braking torque is checked and the rotor replaced if required independent of the inspection or the determined wear value!
6. Braking torque or delay inspection (individual brake circuits) at least once per year (within the scope of the maintenance / main inspection)



In order to inspect the wear condition of the rotor (3), please measure the air gap "a", see Fig. 2.

If the brake limit air gap (0.9 mm) has been reached, meaning that the friction linings are worn down, the braking torque is lost and the rotor (3) must be replaced.  
Brake de-installation is carried out by following the instructions in the section Installation (page 11) backwards.

## Replacing the Rotor (3)

### Before Replacing the Rotor

- Clean the brake.



Please observe the "Cleaning the Brake" section, see below.

- Measure the rotor thickness "new" (nominal dimension acc. Table 3).

Replace the rotor (3) by following the Brake Installation instructions backwards.



### DANGER

The drive-brake must be load-free on hoist drives.  
Otherwise there is a danger of load crashes!

## Information on the Components

The **friction material** contains different inorganic and organic compounds, which are integrated into a system of hardened binding agents and fibres.

### Possible hazards:

No potential dangers have been recognised so far when the brake is used according to its intended purpose. When grinding in the friction linings (new condition) and also in case of EMERGENCY STOP braking actions, functional wear can occur (wear on the friction linings); on open brake designs, fine dust can be emitted.

**Classification: Hazardous property**

**Attention: H-classification: H372**



### Protective measures and rules of behaviour:

Do not inhale dusts

Vacuum the dusts at the point of origin (tested suction devices, tested filters acc. DIN EN 60335-2-69 for dust classes H; maintenance of the suction devices and filter replacement at regular intervals).

If local dust suction is not possible or is insufficient, the entire work area must be ventilated using appropriate technology.

### Additional information:

This friction lining (asbestos free) is not a dangerous product in terms of the EU Directive

## Cleaning the Brake



Do not clean the brake using compressed air, brushes or similar devices!

- Use a suction system or wet towels to clean off the brake dust.
- Do not inhale brake dust (wear safety gloves / safety goggles)
- In case of dust formation, a dust mask FFP 2 is recommended.

# Installation and Operational Instructions for ROBA®-duplostop® Type RSR 8010.\_2013 Sizes 200 and 400

(E028 01 001 003 4 EN)

## Disposal

Our electromagnetic brake components must be disposed of separately as they consist of different materials. Please also observe the relevant authority regulations. Code numbers may vary according to the disassembling process (metal, plastic and cables).

### Electronic components

(Rectifier / ROBA®-switch / Switch):

Products which have not been disassembled can be disposed of under Code No. 160214 (mixed materials) or components under Code No. 160216, or can be disposed of by a certified disposal firm.

### Brake bodies made of steel with coil/cable and all other steel components:

Steel scrap (Code No. 160117)

### All aluminium components:

Non-ferrous metals (Code No. 160118)

### Brake rotor (steel or aluminium pads with friction linings):

Brake linings (Code No. 160112)

### Seals, O-rings, V-seals, elastomers, terminal boxes (PVC):

Plastic (Code No. 160119)

## Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	<input type="checkbox"/> Incorrect voltage on rectifier <input type="checkbox"/> Rectifier failure <input type="checkbox"/> Air gap too large (worn rotor) <input type="checkbox"/> Coil interrupted	<input type="checkbox"/> Apply correct voltage <input type="checkbox"/> Replace rectifier <input type="checkbox"/> Replace the rotor <input type="checkbox"/> Replace brake
Release monitoring does not switch	<input type="checkbox"/> Brake does not release <input type="checkbox"/> Defective switch	<input type="checkbox"/> Solution as above <input type="checkbox"/> Replace the switch (manufacturer-side)



# EU TYPE-EXAMINATION CERTIFICATE

According to Annex IV, Part A of 2014/33/EU Directive

**Certificate No.:** EU-BD 766

**Certification Body of the Notified Body:** TÜV SÜD Industrie Service GmbH  
Westendstr. 199  
80686 Munich - Germany  
Identification No. 0036

**Certificate Holder:** Chr. Mayr GmbH & Co. KG  
Eichenstr. 1  
87665 Mauerstetten - Germany

**Manufacturer of the Test Sample:** Chr. Mayr GmbH & Co. KG  
Eichenstr. 1  
87665 Mauerstetten - Germany  
(Manufacturer of Serial Production – see Enclosure)

**Product:** Braking device acting on the shaft of the traction sheave, as part of the protection device against overspeed for the car moving in upwards direction and braking element against unintended car movement

**Type:** RSR/8010.\_\_\_\_\_, Size 200, 400, 600, 800, 1000, 1500

**Directive:** 2014/33/EU

**Reference Standards:** EN 81-20:2014  
EN 81-50:2014  
EN 81-1:1998+A3:2009

**Test Report:** EU-BD 766 of 2015-09-30

**Outcome:** The safety component conforms to the essential health and safety requirements of the mentioned Directive as long as the requirements of the annex of this certificate are kept.

**Date of Issue:** 2015-09-30

**Date of Validity:** from 2016-04-20

Achim Janocha  
Certification Body "lifts and cranes"



**1 Scope of application**

**1.1 Use as braking device – part of the the protection device against overspeed for the car moving in upwards direction – permissible brake torques and tripping rotary speeds**

1.1.1 Permissible brake torques and maximum tripping rotary speeds of the traction sheave when the brake device acts on the shaft of the traction sheave while the car is moving upward

Size	Permissible brake torque [Nm]	Max. tripping rotary speed of the traction sheave [rpm]
200	200 - 560	811
200 „lang“	500 - 700	820
400 „kurz“	420 - 840	708
400 „lang“	750 - 1200	1011
600	1000 - 1600	500
800	1300 - 1900	400
1000	1840 - 2400	400
1500	2400 - 3600	400

1.1.2 Maximum tripping speed of the overspeed governor and maximum rated speed of the lift

The maximum tripping speed of the overspeed governor and the maximum rated speed of the lift must be calculated on the basis of the traction sheave's maximum tripping rotary speed as outlined above taking into account traction sheave diameter and car suspension.

$$v = \frac{D_{TS} \times \pi \times n}{60 \times i}$$

$v$  = Tripping (rated) speed (m/s)  
 $D_{TS}$  = Diameter of the traction sheave from rope's center to rope's center (m)  
 $\pi$  = 3,14  
 $n$  = Rotary speed (rpm)  
 $i$  = Ratio of the car suspension

**1.2 Use as braking element – part of the protection device against unintended car movement (acting in up and down direction) – permissible brake torques, tripping rotary speeds and characteristics**

1.2.1 Nominal brake torques and response times with relation to a brand-new brake element

Size	Min. nominal brake torque* [Nm]	Max. nominal brake torque* [Nm]	Max. tripping rotary speed [rpm]	Maximum response times** [ms]		
				parallel without overexcitation / seriell with overexcitation		
				$t_0$	$t_{50}$	$t_{90}$
200	2 x 100 = 200		820	100 / 110	160 / 230	230 / 330
200		2 x 280 = 560	820	25 / 30	60 / 80	110 / 135
200 „lang“	2 x 250 = 500		820	25 / 30	50 / 65	110 / 135
200 „lang“		2 x 350 = 700	820	15 / 20	30 / 50	80 / 100
400 „kurz“	2 x 210 = 420		710	135 / 140	185 / 265	240 / 340
400 „kurz“		2 x 420 = 840	710	50 / 55	90 / 130	160 / 230
400 „kurz“ - leistungsoptimiert		2 x 350 = 700	335	30 / 40	80 / 100	100 / 150
400 „lang“	2 x 375 = 750		500	40 / 45	75 / 105	135 / 190
400 „lang“		2 x 550 = 1100	500	25 / 40	60 / 75	100 / 120
600	2 x 500 = 1000		500	85 / 100	140 / 200	185 / 260

**Annex to the EC Type-Examination Certificate  
No. EU-BD 766 of 2015-09-30**



Industrie Service

600		2 x 800 = 1600	500	30 / 40	70 / 100	120 / 170
800	2 x 650 = 1300		400	80 / 100	145 / 180	170 / 230
800		2 x 950 = 1900	400	35 / 45	80 / 115	120 / 160
1000	2 x 920 = 1840		400	80 / 95	125 / 180	180 / 250
1000		2 x 1200 = 2400	400	40 / 50	95 / 130	150 / 210
1500	2 x 1200 = 2400		400	75 / 90	160 / 190	270 / 310
1500		2 x 1800 = 3600	400	35 / 40	105 / 115	180 / 240

Interim values can be interpolated

**Explanations:**

- \* **Nominal brake torque:** Brake torque assured for installation operation by the safety component manufacturer.
- \*\* **Response times:**  $t_x$  time difference between the drop of the braking power until establishing X% of the nominal brake torque,  $t_{50}$  optionally calculated  $t_{50} = (t_{10} + t_{90})/2$  or value taken from the examination recording

1.2.2 Assigned execution features

Type of powering / deactivation	continuous current / continuous current end
Brake control	parallel or serial
Nominal air gap	0.45 mm
Damping elements	YES
Overexcitation (Seize 200 – 1000)	at 1.5 non-release voltage
Overexcitation (Seize 1500)	at double non-release voltage

**2 Conditions**

- 2.1 Above mentioned safety component represents only a part at the protection device against over-speed for the car moving in upwards direction and unintended car movement. Only in combination with a detecting and triggering component in accordance with the standard (two separate components also possible), which must be subjected to an own type-examination, can the system created fulfil the requirements for a protection device.
- 2.2 The installer of a lift must create an examination instruction to fulfil the overall concept, add it to the lift documentation and provide any necessary tools or measuring devices, which allow a safe examination (e. g. with closed shaft doors).
- 2.3 The manufacturer of the drive unit must provide calculation evidence that the connection traction sheave – shaft – brake disc and the shaft itself is sufficiently safe, if the brake disc is not a direct component of the traction sheave (e. g. casted on). The shaft itself has to be statically supported in two points.  
The calculation evidence must be enclosed with the technical documentation of the lift.
- 2.4 The setting of the brake torque has to be secured against unauthorized adjustment (e. g. sealing lacquer).
- 2.5 The identification drawing no. E02801000000161 including stamp dated 2015-09-30 shall be included to the EU type-examination for the identification and information of the general construction and operation and distinctness of the approved type.
- 2.6 The EU type-examination certificate may only be used in combination with the corresponding annex and enclosure (List of authorized manufacturer of the serial production). The enclosure will be updated immediately after any change by the certification holder.

**Annex to the EC Type-Examination Certificate  
No. EU-BD 766 of 2015-09-30**



Industrie Service

**3 Remarks**

- 3.1 A code number for the brake moment effectively adjusted will be marked at the first blank in the type designation 8010. \_\_ . \_\_ within the permissible scope of application. A code number for design characteristics which are not directly part of the type-examination will be marked at the rest of the blanks (e. g. in the second blank: with flange plate, in the third blank: with hand release; in the fourth blank: release control and/or wear control; in the fifth blank: characteristics for electrical connection).
- 3.2 In the scope of this type-examination it was found out, that the brake device also functions as a brake for normal operation, is designed as a redundant system and therefore meets the requirements to be used also as a part of the protection device against overspeed for the car moving in upwards direction and as braking element as part of the protection device against unintended car movement.
- 3.3 Checking whether the requirements as per section 5.9.2.2 of EN 81-20:2014 (D) have been complied with is not part of this type examination.
- 3.4 Other requirements of the standard, such as reduction of brake moment respectively brake force due to wear or operational caused changes of traction are not part of this type examination.
- 3.5 This EU type-examination certificate was issued according to the following standards:
- EN 81-1:1998 + A3:2009 (D), Annex F.7 and F.8
  - EN 81-20:2014 (D), part 5.6.6.11, 5.6.7.13
  - EN 81-50:2014 (D), part 5.7 and 5.8
- 3.6 A revision of this EU type-examination certificate is inevitable in case of changes or additions of the above mentioned standards or of changes of state of the art.

**Enclosure to the EU Type-Examination Certificate  
No. EU-BD 766 of 2015-09-30**



**Authorised Manufacturer of Serial Production – Production Sites (valid from: 2016-01-13):**

**Company  
Address** Chr. Mayr GmbH & Co. KG  
Eichenstr. 1  
87665 Mauerstetten - Germany

**Company  
Address** Mayr Power Transmission Co. Ltd.  
7 Fuxin Road, Jiangsu Province  
215637 Zhangjiagang - P.R. China

**Company  
Address** Mayr Polska Sp. z. o. o.  
Rojów, ul. Hetmanska 1  
63-500 Ostrzesów - Poland

- END OF DOCUMENT -



**EU – Konformitätserklärung**  
*EU – Declaration of conformity*  
**Déclaration de conformité UE**  
*Dichiarazione di conformità UE*  
**Declaración de conformidad de la UE**  
*Declaração de conformidade da UE*

**Im Sinne der Richtlinie Aufzüge 2014/33/EU erklären wir**  
*In terms of the Directive 2014/33/EU relating to lifts, we*  
**Conformément à la directive 2014/33/UE sur les ascenseurs, nous déclarons par la présente,**  
*Secondo la Direttiva per ascensori 2014/33/UE, la presente*  
**En el sentido de la Directiva 2014/33/UE sobre ascensores**  
*Nos termos da diretiva 2014/33/UE declaramos*

**Chr. Mayr GmbH + Co. KG**  
**Eichenstraße 1**  
**D-87665 Mauerstetten**

**dass die angeführten Produkte den Anforderungen der oben genannten EU-Richtlinie entsprechen.**  
*declare that the listed products meet the requirements of the above mentioned EU Directive.*  
**que les produits décrits satisfont aux exigences de la directive UE susmentionnée.**  
*dichiara che i prodotti sotto elencati soddisfano i requisiti della suddetta Direttiva UE.*  
**declaramos que los productos indicados arriba cumplen los requisitos de la Directiva UE.**  
*que os produtos abaixo mencionados correspondem às exigências da diretiva UE supramencionada.*

**Elektromagnetische Federdruckbremse / Electromagnetic spring applied brakes / Freins électromagnétiques à ressort de pression / Freni elettromagnetici a molle compresse / Frenos de muelles electromagnéticos / Freio eletromagnético de molas**

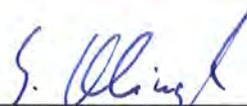
Produkt / Product / Produit / Prodotto / Producto / Produto	Größen / Sizes / Tailles / Grandezze / Dimensión / Dimensão	Typen / Types / Tipos / Serie / Tipos	ANVP
ROBA®-duplostop®	200/400/600/800/1000/1500	8010.____	1, **, ***

**Jahr der Herstellung:**  
*Year of manufacture:*  
**Année de production:**  
*Anno di produzione:*  
**Año de fabricación:**  
*Ano de fabricação:*

**Siehe Typenschild am Produkt**  
*see product label*  
**Voir l'étiquette sur le produit**  
*vedi l'etichetta sul prodotto*  
**ver placa de identificación del producto**  
*Ver placa do produto*

**Mauerstetten, gültig ab dem 20.4.2016**

Ort und Datum / place and date / Lieu et date /  
 luogo – data / fecha y lugar / Lugar e data

  
 Dipl. Ing. (FH) / graduate engineer / Engenheiro graduado  
 Geschäftsführer / Managing Director / Directeur Général / Gerente / Gerente  
 Günther Klingler

**Angewendete Normen, Vorschriften und Prüfungen (ANVP) / Applied standards, regulations and inspections (ANVP) / Normes, prescriptions et contrôles appliqués (ANVP) / In conformità alle direttive UE di norme, specifiche e controlli (ANVP) / Normas, regulaciones e inspecciones aplicadas (ANVP) / Normas, regulamentações e inspeções aplicadas (ANVP)**

1	EN 81-20:2014 / EN 81-50:2014 / EN 81-1:1998 + A3:2009	Sicherheitsregeln – Konstruktion u. Einbau von Aufzügen Safety rules – Construction and installation of lifts Règles de sécurité – construction et installation d’ascenseurs Regole di sicurezza per la costruzione e il montaggio di ascensori Reglas de seguridad – Construcción y montaje de ascensores Regras de segurança – Construção e instalação de elevadores	2014/33/EU 2014/33/EU 2014/33/UE 2014/33/UE 2014/33/UE 2014/33/UE
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**Zertifizierungsstelle für Aufzüge und Sicherheitsbauteile, Überwachung gemäß Aufzugsrichtlinie:**

*Certification body for lifts and safety components, monitoring of production acc. lifts directive:*

**Organisme de certification pour ascenseurs et composants de sécurité, contrôle de production selon la directive sur les ascenseurs:**

*Organismo di certificazione per ascensori e componenti di sicurezza, controllo di produzione secondo la Direttiva per ascensori :*

**Centro de certificación para ascensores y componentes de seguridad, supervisión según la directiva de ascensores:**

*Centro de certificação para elevadores e componentes de segurança, monitoramento conforme a diretiva para elevadores:*

**© TÜV SÜD Industrie Service GmbH  
Westendstraße 199  
D-80686 München**

Kennnummer 0036 / Identification number 0036 / Numéro d'identification 0036 / Numero d'identificazione 0036 / Número de identificación 0036 / Número de identificação 0036 /

**Sicherheitsfunktion / Safety function / Fonction de sécurité / Funzione di sicurezza / Función de seguridad / Função de segurança**

Bremseinrichtung, als Teil der Schutzeinrichtung für den aufwärtsfahrenden Fahrkorb gegen Übergeschwindigkeit und Bremselent gegen unbeabsichtigte Bewegung des Fahrkorbs.

*Braking device as part of the protection device against over speed for the car moving in upwards direction and braking element against unintended car movement.*

Dispositif de freinage faisant partie d'un système de protection contre la survitesse en montée de la cabine d'ascenseur et élément de freinage contre le déplacement involontaire de la cabine d'ascenseur.

*Dispositivo di frenatura come parte del dispositivo di protezione contro la fuga verso l'alto della cabina e elemento di frenatura contro i movimenti incontrollati della cabina.*

Dispositivo de frenado como parte de un dispositivo de seguridad contra la sobrevelocidad de la cabina en movimiento ascendente y como elemento de frenado contra movimientos incontrolados de la cabina.

*Dispositivo de freio para ser usado como parte da unidade de proteção para prevenir excesso de velocidade da cabine elevadora em movimento ascendente e elemento de freio contra movimentos inadvertidos da cabine elevadora.*

**EU-Baumusterprüfbescheinigung / EU type examination certificate / Certificate d'examen de type UE / Certificato di omologazione UE / Certificado de examen UE / Certificado de exame UE**

**EU-BD 766**

	<ul style="list-style-type: none"> <li>* EG-Maschinenrichtlinie 2006/42/EG</li> <li>* Directive 2006/42/CE sur les machines</li> <li>* Directiva de Máquinas 2006/42/CE</li> </ul>	<ul style="list-style-type: none"> <li>* EC-Machinery directive 2006/42/EC</li> <li>* Direttiva macchine 2006/42/CE</li> <li>* Diretiva para maquinaria 2006/42/CE</li> </ul>
<b>X</b>	<ul style="list-style-type: none"> <li>** Richtlinie Niederspannung 2014/35/EU</li> <li>** Directive 2014/35/UE sur les basses tensions</li> <li>** Directivas de Baja Tensión 2014/35/UE</li> </ul>	<ul style="list-style-type: none"> <li>** EC-Low voltage directive 2014/35/EU</li> <li>** Direttiva per il basso voltaggio 2014/35/UE</li> <li>** Diretiva de baixa voltagem 2014/35/UE</li> </ul>
<b>X</b>	<ul style="list-style-type: none"> <li>*** Elektromagnetische Verträglichkeit 2014/30/EU</li> <li>*** Directive 2014/30/UE sur la compatibilité électromagnétique</li> <li>*** Compatibilidad Electromagnética 2014/30/UE</li> </ul>	<ul style="list-style-type: none"> <li>*** Electromagnetic compatibility directive 2014/30/EU</li> <li>*** Direttiva per la compatibilità elettromagnetica 2014/30/UE</li> <li>*** Diretiva de compatibilidade eletromagnética 2014/30/UE</li> </ul>

Mauerstetten, gültig ab dem 20.4.2016

Ort und Datum / place and date / Lieu et date /  
luogo – data / fecha y lugar / Lugar e data

  
Dipl. Ing. (FH) / graduate engineer / Engenheiro graduado  
Geschäftsführer / Managing Director / Directeur Général / Gerente / Gerente  
Günther Klingler

## List of abbreviations

<b>A</b>	
ASL	Distance between rope departures
<b>C</b>	
CSA	Canadian Standards Association
<b>D</b>	
$D_s$	Rope diameter
$D_t$	Traction sheave diameter
$D_p/D_{SR}$	Pulley diameter
DW	Double wrap
<b>E</b>	
ED	Duty cycle
EM	Setting gauge
<b>F</b>	
$F_t$	Resulting load on the traction sheave
<b>H</b>	
HRc	Rockwell hardness
<b>L</b>	
L	Left-hand version
<b>M</b>	
M	Middle offset
MRE	Machine room unit
<b>N</b>	
NC	Normally closed (break contact)
NO	Normally open (make contact)
<b>Q</b>	
Q	Rated load
<b>R</b>	
R	Right-hand version
$R_A$	Groove gap dimension (centre-to-centre distance between ropes)
RS-RC	Rope suspension with rear counterweight
RS-SC	Rope suspension with side counterweight
<b>S</b>	
SC	Synchron Compact
SW	Single wrap
<b>T</b>	
TLD	Program for the calculation of elevator specifications (thyssenkrupp Lift Designer)
<b>U</b>	
UCM	Unintended elevator car movement





## Elevator Technology

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04/2018