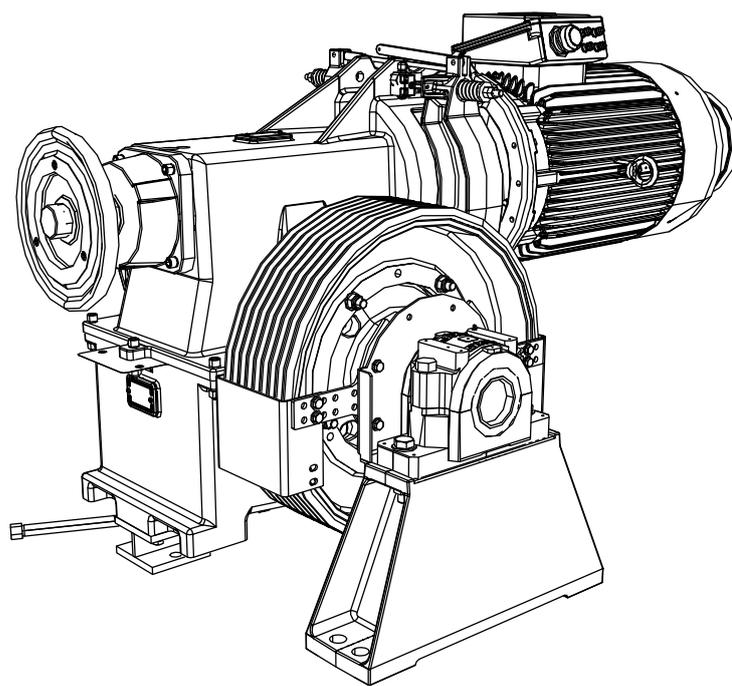


# OPERATING MANUAL

## W332C

Drive  
02/2025



6034002860

**TKE**

# Company and contact information

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## Issued by

TK Aufzugswerke GmbH

Bernhäuser Straße 45

73765 Neuhausen a. d. F.

Germany

Phone: +49 (0) 7158 120

E-mail: [Doku.elevator.plant.de@tkelevator.com](mailto:Doku.elevator.plant.de@tkelevator.com)

Website: [eli.tkelevator.com](https://eli.tkelevator.com)

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# 1 About these instructions

## 1.1 Guide to layout

### Sequence of actions involving several steps

✓ Requirement for the sequence of actions (optional).

1. First action step.
2. Second action.
  - ▷ Interim result (optional)
3. Third action step.
  - ▷ Result of action (optional)

### Sequence of actions involving independent steps

- Action step.
- Action step.
- Action step.

### Information



Information must always be read and followed.

---

### Reference

↗ [Chap. 1 P. 5](#)

### List

- Top item of a list
  - Sub-item of a list
  - Sub-item of a list
- Top item of a list
- Top item of a list

## 2 Safety

### 2.1 Warning notes

- Warning notes are intended for the protection of persons and property.
- Warning notes must be read and observed by every person who works on the product.
- Warning notes precede activities that pose a hazard for people and the product.

#### 2.1.1 Structure

##### ⚠ SIGNAL WORD AND SIGNAL COLOUR



**Type and source of danger**  
Consequences if danger disregarded.  
→ Measures to avert the danger.

#### 2.1.2 Indications of danger to persons

##### ⚠ DANGER



**Danger with a high degree of risk!**  
If ignored, leads to death or serious injury.  
→ Read and comply with the warning.

##### ⚠ WARNING



**Danger with a high degree of risk!**  
If ignored, may lead to death or serious injury.  
→ Read and comply with the warning

##### ⚠ CAUTION



**Danger with a low degree of risk!**  
If ignored, may lead to minor or moderate injury.  
→ Read and comply with the warning.

#### 2.1.3 Indication of possible damage to property

##### NOTICE



**Hazard with possible damage to property!**  
May lead to product function impairments or function loss.  
→ Read and comply with the warning.

## 2.2 Safety requirements

This document contains important information for safe operation of the product.

- Keep this document and all other applicable documents at the location of use for the entire working life of the product.

### 2.2.1 Area of applicability

This document applies only to the product described here.

#### Other applicable documents

- International occupational health and safety regulations

### 2.2.2 Basic requirements for safety

- All existing safety devices are to be tested regularly in accordance with the maintenance schedule.
- This document, in particular the chapter entitled "Safety", together with the warnings and all other applicable documents, must be followed by all persons who work with the product.
- In addition to this document, the rules at the location of use with regard to environmental protection and the occupation health and safety and accident prevention regulations must be followed.
- All safety and hazard warnings on the installation must be kept in legible condition.
- Safety information and instructions required by law must be displayed to users in such a way that they are clearly visible.
- A requirement for safe handling and non-disruptive operation of this product is knowledge of the fundamental safety regulations.

### 2.2.3 Obligations of the operating company and installation firm

- Only deploy trained and instructed qualified personnel.
- Provide personnel with the required personal protective equipment.
- Check personnel at regular intervals to ensure that they follow safety-conscious work practices and comply with national provisions.
- Make all other applicable documents as well as this document available to personnel.

### 2.2.4 Duties of personnel

- Clearly establish all areas of responsibility prior to any activity.
- Always wear the personal protective equipment made available to you.
- Prior to work, make people aware of the dangers of electrical current.

## 2.3 Warranty and liability

The "General Terms of Sale and Delivery" of TK Aufzugswerke GmbH apply.

Warranty and liability claims in the event of personal injury and material damage shall be excluded if they arise due to at least one of the following causes:

- Improper use that is not in line with the intended purpose of the product
- Incorrect installation, commissioning, operation and maintenance of the product
- Operation of the product with defective or inoperative safety and/or protection devices
- Non-observance of the instructions in the operating manual with regard to transport, storage, installation, commissioning, operation and maintenance
- Structural modification to the product without agreement or approval
- Modification to product features without agreement or approval
- Inadequate monitoring of parts that are subject to wear
- Repairs that are carried out improperly
- Cases of catastrophe due to third-party interference or force majeure
- Use of non-approved auxiliary materials and operating fluids

### 2.3.1

#### Structural modification of the product

The product is configured in the factory and delivered ready for operation.

If changes are made to the product, the entire warranty of TK Aufzugswerke GmbH shall become null and void.

### 2.3.2

#### Use in line with intended use

The product has been constructed using state-of-the-art technology and in line with the recognised technical safety regulations. It may only be used in accordance with its intended use and when the technical safety devices are free from defects. Any other or additional form of use shall be regarded as **non-compliant** with the intended use. TK Aufzugswerke GmbH shall **not** be liable for any damage arising from such use and any damage arising due to operator errors.

In order to comply with the intended use of the product:

- Use the product as a Drive of elevators only
- Read and comply with the document, in particular the chapter entitled "Safety", together with the warnings and all other applicable documents
- Comply with the commissioning instructions, the installation description as well as the required inspection and maintenance work

## 2.4 Personal protective equipment

Danger	Cause	Risks	Remedy	Equipment
	<ul style="list-style-type: none"> <li>Unprotected shaft</li> </ul>	Falling		Safety harness
 	<ul style="list-style-type: none"> <li><b>WARNING!</b> Do not walk underneath suspended loads</li> <li>Falling tools</li> <li>Transport of heavy loads</li> <li>Sharp-pointed objects</li> </ul>	Head injury		Head protection
 	<ul style="list-style-type: none"> <li><b>WARNING!</b> Do not walk underneath suspended loads</li> <li>Falling tools</li> <li>Transport of heavy loads</li> <li>Sharp-pointed objects</li> </ul>	Danger of crushing in the foot area Cut or stab injury in the foot area		Foot protection
  	<ul style="list-style-type: none"> <li>Sharp objects</li> <li>Mechanical parts</li> <li>Sharp-pointed objects</li> <li>Caustic substances</li> </ul>	Danger of crushing in the hand area Stab injury in the hand area Acid/alkali burns		Protective gloves
	<ul style="list-style-type: none"> <li>Severe noise pollution</li> </ul>	Noise damage		Ear protection
 	<ul style="list-style-type: none"> <li>Flying parts</li> <li>Flying particles</li> <li>Laser beams</li> <li>Emissions of optical rays</li> </ul>	Eye injury Loss of sight/blinding		Protective goggles
	<ul style="list-style-type: none"> <li>Electrical voltage</li> </ul>	Electric shock		Enable source of energy

## 3 Description

### 3.1 Standards and legal requirements

The product complies with the following regulations:

- Directive 2014/34/EU
- DIN EN 81-20:2020-06
- DIN EN 81-50:2020-06
- DIN EN 81-77:2019-01



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

---

### 3.2 Product

The machine W332C (worm gear/axle distance = 332 mm/generation C = machine with synthetic gear oil) is used within the framework of the W series (machines with worm gear, combined sleeve/anti-friction bearings, lubrication with synthetic gear oil) for traction elevators in the upper range of performance.

The W332B version (generation B with mineral gear oil is replaced by the W332C).

The machine consists of a worm gear with integrated brake, two-part traction sheave (hub with screw-connected traction sheave rim) and a flange-connected IMB5 type three-phase motor.

The traction sheave shaft in this machine is fitted with an additional outside bearing (pillow block housing with self-aligning bearing). Because of this triple bearing arrangement of the drive shaft, compensating supports are provided for statically defined mounting of the machine under the gear box casing which are able to accommodate to a limited extent an offset between the mounting in the outside bearing and the two bearing positions in the gear box casing.

In general, the motor position is horizontal.

By mounting the traction sheave shaft accordingly, it is possible to vary the position of the traction sheave position on the left or right side.

- The machine is exclusively available with frequency-controlled motors (VVVF).

Standard version of W332C (shown is the right-hand traction sheave position)

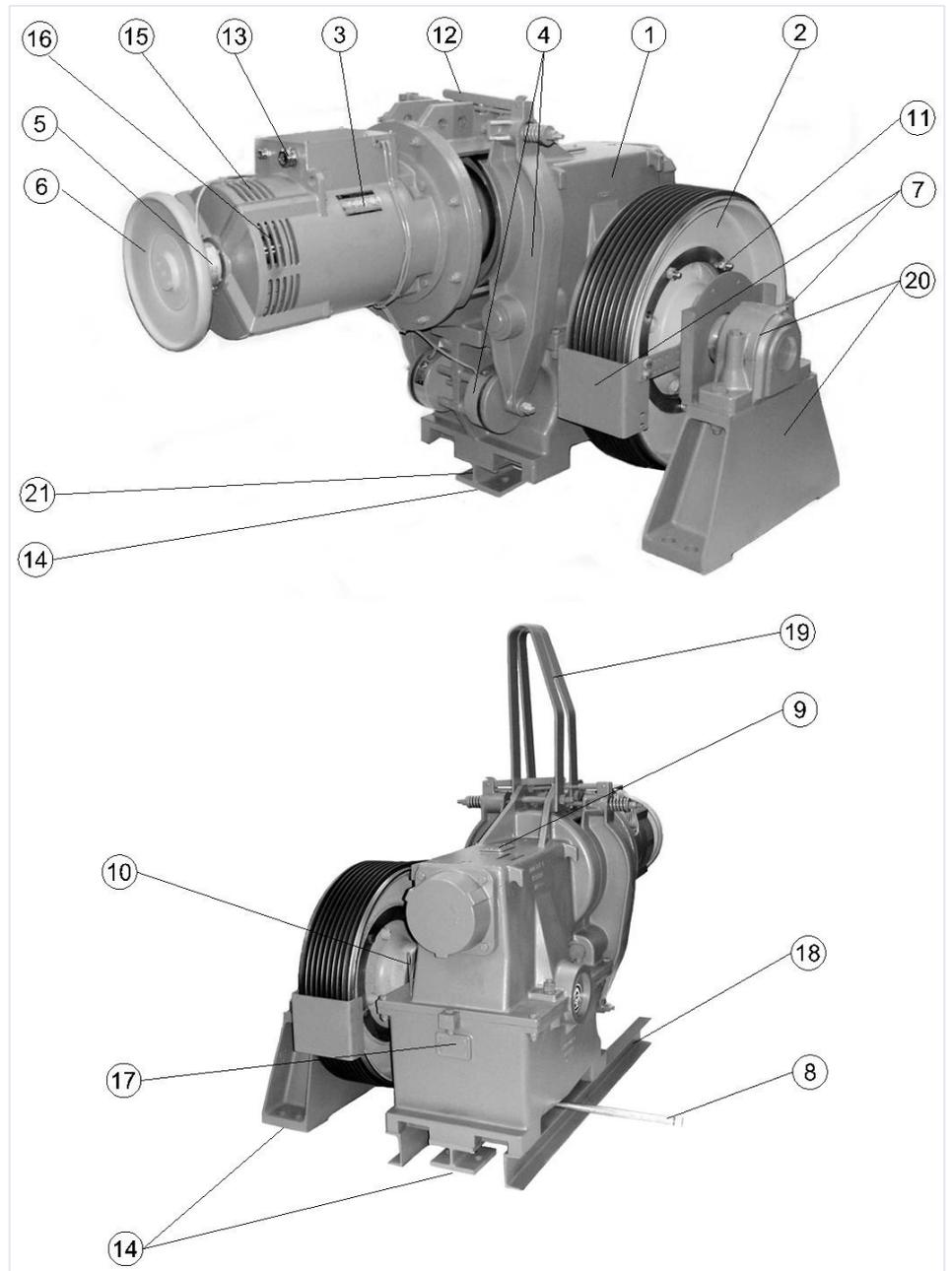


Fig. 1

ATR\_2\_22\_0007\_0

Item	Designation	Item	Designation
1	Driving gear	2	Traction sheave (traction sheave rim with hub)
3	Motor	4	Operational brake
5	Encoder (type WDG100)	6	Handwinding wheel (D360)
7	Rope guard (adjustable)	8	Oil drain (3/4"; not installed during transport)

Item	Designation	Item	Designation
9	Oil filling hole with cover/machine name plate and additional plate with oil reference – SM1/220	10	Oil level monitoring (dipstick)
11	Traction sheave mounting to hub	12	Brake release lever (mounted)
13	Motor terminal box with connection	14	Mounting surface for machine base frame
15	Internal ventilator for motor cooling	16	Air vents for motor
17	Inspection opening with cover for gear teeth check	18	Transport supports (for transport only)
19	Transport hanger (for transport only)	20	Outside bearing with bracket
21	Compensating supports (2 x)		

W332C with special versions SA2/ SA3.1/ SA15

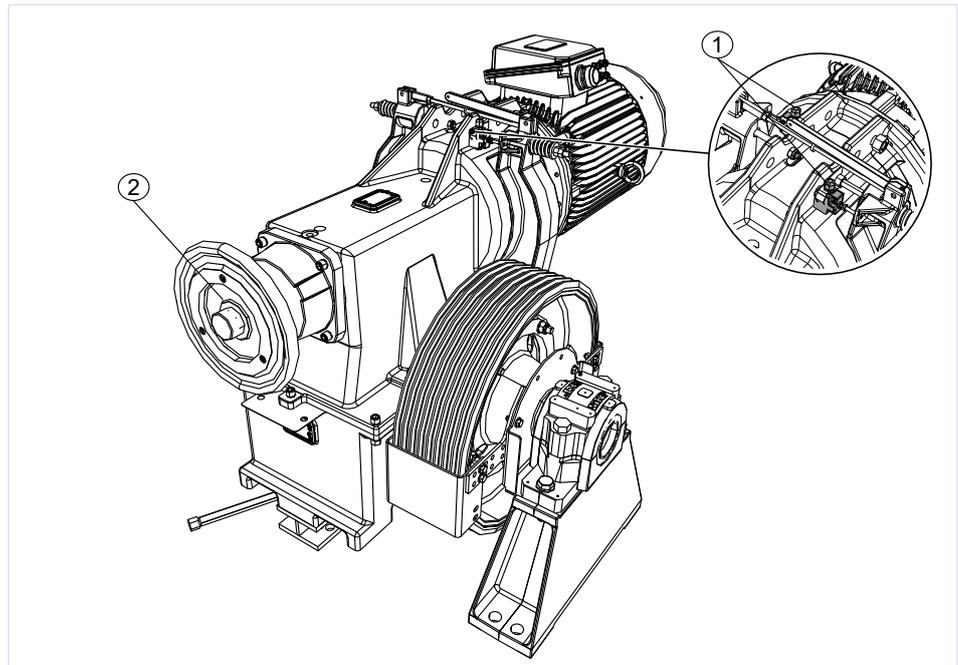


Fig. 2

ATR\_2\_22\_0059\_0

Item	Designation	Item	Designation
1	Brake monitoring SA3.1 and/or brake test switches with SA15	2	Handwinding wheel on gear side – SA2

### W332 with safety measures complying with EN81-77 (shown is diameter D800)

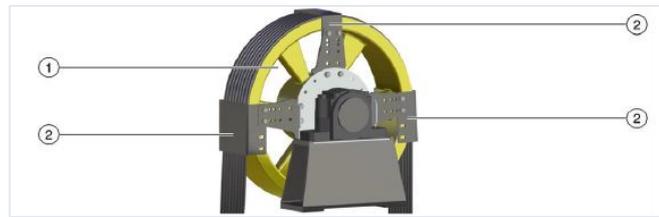


Fig. 3

ATR\_2\_22\_0060\_0

Item	Designation	Item	Designation
1	Traction sheave (D640/D700/D740/D800)	2	Earthquake safeguard in accordance with EN81-77

## 3.2.1

### Machine base frame

The machine base frame and mounting parts (base frame-mounted machine) of the W332B is used for the for the W332C machine.

#### W332B machine base frame – version without rope pulley

Installations with 1:1 rope suspension and direct rope departure for an elevator car – counterweight rope distance ASL diameter (DT + 100) mm depending on the traction sheave diameter.

- Installations with 2:1 or 4:1 rope suspension

The machine base frame consists of welded rolled profiles. Depending on the position of the traction sheave on the machine, the base frame is available in a left- or right-hand design (hole pattern for machine mounting).

- Weight of machine base frame: Approx. 240 kg
- Project planning dimensions for Machine base frame

#### Mounting parts for machine on machine base frame

A set of bolting elements (8 x M24-8.8) is available for mounting the machine W332C, incl. external bearing on the standardised machine base frame with/ without rope pulley.

#### Instructions for setting up machine base frames in the machine room

The machine base frames are set up over impact soundproof elements (rubber block 100 x 100 x 50 mm high) in the machine room.

- Insulation elements without packing for machine room without floor pavement and/or erection of machine base frame directly on floor pavement
- Insulation elements with packing (6030004370) for machine room with floor pavement ( $\leq 60$  mm high); support made from Multiplex laminated wood 140 x 140 / 80 / mm high

#### Version with earthquake safeguard in accordance with EN81-77

Optional components are available for the W332 frame without rope pulley; these meet the requirements for protection devices in accordance with EN81-77.

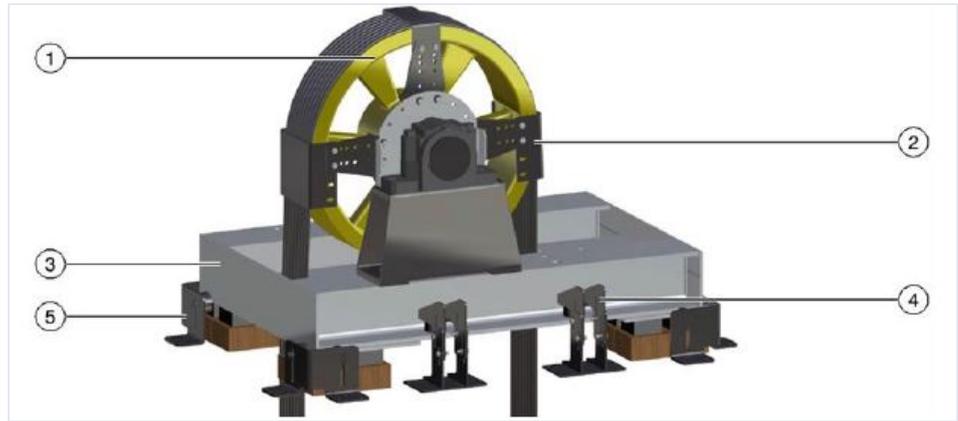


Fig. 4

ATR\_2\_22\_0061\_0

Item	Designation	Item	Designation
1	W332C D800 traction sheave	2	Rope guard in accordance with EN81-77 for Traction sheave
3	W332B machine base frame without rope pulley	4	Tilt protection in accordance with EN81-77
5	Shift protection device in accordance with EN81-77	6	

The safeguard measures are only suitable for machine base frames with locations

in the machine room. They can be used on the W332 machine base frame without rope pulley. The protection device consists of shift protection devices and tilt protection elements that prevent the drive from changing its position.

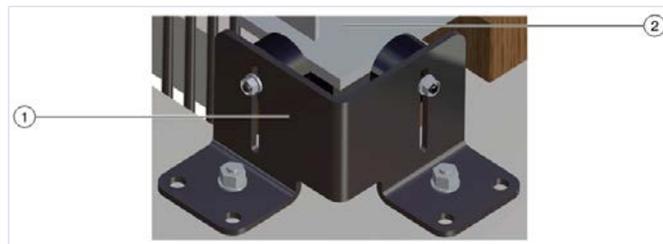


Fig. 5

ATR\_2\_22\_0062\_0

Item	Designation	Item	Designation
1	Shift protection device in accordance with EN81-77	2	W332B machine base frame without rope pulley

The safeguard measure also consists of anti-tip devices that prevent the machine from tilting from the insulation elements.



Fig. 6

ATR\_2\_22\_0063\_0

Item	Designation	Item	Designation
1	W332B machine base frame without rope pulley	2	Tilt protection in accordance with EN81-77

In the case of deployment of the machine in earthquake categories 2 and 3, additional safeguard measures in accordance with EN81-77 are necessary.

### 3.2.2

### Special versions

- SA1 with bearing bushes rotated through 90° on the drive shaft for rope-resultant horizontal  $\pm 45^\circ$
- SA2 extended worm shaft with additionally mounted handwinding wheel (on gear side)
- SA3.1 Brake monitoring (microswitch).
- SA 4 Partial Ex protection (vapour-proof partition).
- SA 9 Traction sheave position in the shaft (extended traction sheave shaft with pedestal bearing and machine on compensating supports for statically defined mounting/mounting of the drive shaft).
- SA15 "Full Ex" protection (including microswitch for brake monitoring).

#### Brake monitoring (special version SA3.1 / SA15)

For monitoring the service brake (function and wear), it is possible to configure the machine with optional brake test switches (version with microswitch - SA3.1) (one switch for each brake circuit).

## i

Brake monitoring is generally to be provided in order to use the machine in combination with TKE frequency inverters of type RPI/MFR. Brake monitoring SA3.1 (microswitch) is generally to be provided in order to use the machine complying with EN81-20/50. Exception: In the case of Full Ex machines, this is already a constituent part of SA15.

Description	Unit	Technical data	
Version		Standard SA3.1	Full Ex (SA15)
Manufacturer		Bernstein	Steute
Switching principle		Switch with contacts (1 break contact / 1 make contact)	
Switching display		-	-
Operating voltage	[V]	240 (AC) / 24 (DC)	250 (AC)
Max. switching current	[A]	3	6
Type of protection		IP65	IP67
Explosion protection		-	EX II 2G Ex db IIC T6, T5 Gb EX II 2D Ex tb IIIC T80°C, T95°C Db
Type approval certificate		-	PTB 03 ATEX 1070 X
Cable entry point		Cable gland M16 x 1.5	Cast connection line 4 x 0.75 mm <sup>2</sup> 5 m length

Tab. 1

ATR\_1\_21\_0038\_0

## "Partial Ex" protection (SA4)

The "Partial Ex" machine version is used in installations in potentially explosive atmospheres in which there is a possibility of dividing the machine room by means of a partition wall into an area for the machine (machine area) and an area which accommodates the traction sheave and the suspension ropes (shaft area).

The partition means that no specially prescribed measures or markings for explosion protection are required for the area housing the machine.

For this version, the machine has an extended traction sheave shaft with an outside bearing, two compensating supports underneath the machine for statically defined mounting, and a special machine base frame (SA4) with a wall duct.

The machine base frame is inserted in the area of the outside bearing into the partition wall, and walled in and sealed by the customer. The machine therefore cannot be erected so that it is insulated to prevent transmission of structure-borne noise to the machine room.

The structural sealing elements on the machine base frame and on the outside bearing and the measures taken by the customer help to provide a vapour-proof partition of the area for the machine.

In addition, suitable ventilation measures must be provided on the installation side to prevent explosive media (gases or dust) from getting into the area housing the machine.

The machine components which are located in the area containing the explosive media (shaft area) and which have been assessed as ignition sources in accordance with DIN EN ISO 80079-36 comply with the requirements of Directive 2014/34/EC.

This part of the machine designated "traction sheave unit" in accordance with Directive 2014/34/EU is given the following marking depending on the layer thickness of the paint:

**Ex groups IIC-IIIC** for layer thickness  $\leq 0.2$  mm (standard version):

- II 2 G Ex h IIC T4 Gb
- II 2 D Ex h IIIC T135°C Db

**Ex groups IIB-IIIB** for layer thickness  $> 0.2$  mm /  $\leq 2$  mm:

- II 2 G Ex h IIB T4 Gb
- II 2 D Ex h IIIB T135°C Db

(Equipment group: II = other than mining; category: 2 = Zone 1,21; Ex-atmosphere: G = Gases and D = Dust; Ignition protection type: h (c = constructional safety); gas-explosion-endangered area: Ex groups IIB or IIC; area with danger of dust explosions: Ex groups IIIB or IIIC; temperature class: T4 and/or max. 135°C)

In the case of special paintwork for increased corrosion protection, e.g. C5-M with layer thickness  $\geq 0.24$  mm, only a rating according to IIB and/or IIIB is possible!

The maximum permitted rope speed at the traction sheave is limited to 3.2 m/s.

Related to the rated speed, this means a maximum of 3.2 m/s with 1:1, a maximum of 1.6 m/s with 2:1 and a maximum of 0.8 m/s with 4:1.

## Traction sheave position in the shaft (SA9)

For this version, the machine has an extended traction sheave shaft with an outside bearing and two compensating supports underneath the machine for statically defined mounting. The outside bearing is mounted in a position to suit the rope pull direction (normally in the upward direction).

This version is standardised for traction sheaves with diameters  $DT = 640, 700, 740$  and  $800$  mm.

The components for the rope guard are not an integral part of the machine in this version. Note on the machine base frame (not standardised): The permitted tolerance for the horizontal offset between the plane for the compensating supports and the mounting surface for the outside bearing is  $\pm 1$  mm.

## "Full Ex" protection (special version SA15)

The "Full Ex" machine version is used in installations in which the entire machine room is located in the potentially explosive atmosphere.

The machine (not including the electrical components) has been assessed for potential ignition sources in accordance with DIN EN ISO 80079:-36 and complies with the requirements of Directive 2014/34 EU. The machine (not including the electrical components) is assigned the following identification in accordance with Directive 2014/34/EC:

**Ex groups IIC-IIIC** for layer thickness  $\leq 0.2$  mm (standard version):

- Ex II 2 G Ex h IIC T4 Gb
- Ex II 2 D Ex h IIIC T135°C Db

**Ex groups IIB-IIIB** for layer thickness  $> 0.2$  mm /  $\leq 2$  mm:

- Ex II 2 G Ex h IIB T4 Gb
- Ex II 2 D Ex h IIIB T135°C Db

(Equipment group: II = other than mining; category: 2 = Zone 1, 21; Ex atmosphere: G = Gases and D = Dust; Ignition protection type: h (c = constructional safety and k = liquid encapsulation); area with danger of gas explosions: Ex groups IIB or IIC; area with danger of dust explosions: Ex groups IIIB or IIIC; temperature class: T4 and/or max. 135°C)

- The maximum permitted angle of inclination of the machine in relation to the horizontal is  $2^\circ$  to ensure the type of ignition protection "k" in compliance with DIN EN ISO 80079-37.
- In the case of special paintwork for increased corrosion protection, e.g. C5-M with layer thickness  $\geq 0.24$  mm, only a rating according to IIB and/or IIIB is possible!
- The maximum permitted rope speed at the traction sheave is limited to 3.2 m/s. Related to the rated speed, this means a maximum of 3.2 m/s with 1:1, a maximum of 1.6 m/s with 2:1 and a maximum of 0.8 m/s with 4:1.

The service brake is generally monitored by brake test switches.

Layout of electrical components:

- Brake magnets in Ex data [↗ Chap. 4.1.2 P. 19](#).
- Brake test switch in Ex [↗ Chap. 3.2.2 P. 15](#) (Note: These brake test switches are general constituent parts of SA15).

- The motor and any encoders as well as an additional terminal box for the magnetic clamps depend on the project specs.

### 3.3

### Combination of versions / options

Com- bina- tion	SA1	SA2	SA3.1	SA4	SA9	SA15
SA1						
SA2	X					
SA3.1	X	X				
SA4	O	X	X			
SA9	O	X	X	O		
SA15	X	X	O	X	X	

Tab. 2

ATR\_1.22\_029\_0

X Combination possible  
O Combination not possible  
SA... special versions

# 4 Technology

## 4.1 Mechanical data

### 4.1.1 Gear unit

Single-stage worm gear with:

- Split-type crank housing (upper / lower section) made of EN-GJL 250; integrated motor flange (construction size A550)
- Traction sheave shaft made of tempering steel (C60R+N);
- Traction sheave shaft mounted on plain bearings in the housing (oil lubrication); additional outside bearing (pedestal bearing housing, including self-aligning bearing with grease lubrication; bracket), compensating supports for statically defined mounting of the drive shaft
- Special drive shaft version for traction sheave in the shaft SA9
- Special drive shaft version for vapour-proof partition wall SA4
- Rope guard components in accordance with EN81-1/9.7 and/or EN81-20/5.5.7 or EN81-77
- Contact pattern position of gear teeth adjustable; backlash not adjustable
- Gear teeth run with oil delivered from the oil sump via worm wheel gear teeth
- Inspection openings with covers for checking the contact pattern and for oil filling
- Oil level monitoring by dipstick with casing ventilation; oil drain (R3/4")
- Worm shaft made of case-hardened steel (16MnCrS5), roller bearings (grease/oil lubrication); worm wheel made of centrifugally case bronze (CuSn12Ni-C-GZ) with screw-connected hub
- Machine type plate

Version	Unit	W332C
Axle distance	[mm]	332
Ratio		63:1/47:1/59:2/46:2/57:3
Oil filling	[L]	Approx. 33
Oil grade		SM1/220 (polyalkylene glycol with additives)
Designation		
Backlash	[°]	0.022 - 0.04
Weight	[kg]	-

Tab. 3

ATR\_1\_21\_0005\_0

### 4.1.2 Brake

Redundant electromagnetic dual-circuit outside shoe brake on the motor/worm shaft integrated in the gear or motor flange. The electric release of the brake circuits takes place via magnetic clamps. The magnetic clamps are available in standard and in explosion-proof versions.

A flexible coupling must be integrated on the brake disc to connect the motor and worm shafts.

Designation	Unit	Technical data
Manufacturer		TK Aufzugswerke GmbH
Type		W332C
Braking torque	[Nm]	Max. 2 x 625
Braking torque adjustment		Possible
Design		2-circuit outside brake shoe with brake disc made of EN-GJL 250
Brake linings		Made without asbestos
Brake disc diameter	[mm]	420
Air gap	[mm]	0.4
Air gap setting		Possible
Electrical release		1 magnetic clamp per brake circuit (2 magnetic clamps in series connection)
Magnetic clamp nominal force	[N]	7500
Operating voltage <sup>1)</sup>	[VDC]	180 – overexcitation 90 – holding voltage
Rated current	[A]	2.2/2.2 <sup>2)</sup>
Monitoring devices		Brake test switch
Manual release		Brake release lever (mounted)
Protection type, magnetic clamps		IP65 (standard version) II 2 G Ex mb IIC T4 Gb <sup>2)</sup> II 2 D Ex mb IIIC T105°C Db <sup>2)</sup>
Type approval sign		Without (not required) IBExU17ATEX1137 X <sup>2)</sup>
Length of connection cable	[m]	2.0/1.5 <sup>2)</sup>

Tab. 4

ATR\_1\_22\_026\_0

<sup>1)</sup> Details for magnetic clamps in series connection

<sup>2)</sup> Version for explosion protection

### 4.1.3

### Encoder

The following hollow shaft encoders are available:

Number of pulses	Version	Connection
2x1024	TTL	Line and connector hard-wired
2x4096	TTL	Line and connector hard-wired

Tab. 5

ATR\_1\_21\_0072\_0

### 4.1.4

### Traction sheave

Different versions of traction sheave are used, depending on the location of the machine.

- Standard version – traction sheave position in the machine room

The two-part traction sheaves comprise a traction sheave hub and a traction sheave rim screw-connected to the hub.

In the standard versions and the versions with a vapour-proof partition wall (SA4), the hubs are pressed onto the traction sheave shaft.

Designation	Unit	Technical data							
Machine version		Standard / SA9							
Diameter – DT	[mm]	640		700		740		800	
Rim width – B	[mm]	180	215	180	215	160	215	160	215
Max. possible number of grooves – z x d <sup>2)</sup>		11x10 (10x10)	13x10	11x10 (10x10)	13x10	10x10 (9x10)	13x10	10x10 (9x10)	13x10
		10x11	12x11	10x11	12x11	9x11	12x11	9x11	12x11
		10x12 (9x12)	12x12 (11x12)	10x12 (9x12)	12x12 (11x12)	8x12	12x12 (11x12)	8x12	12x12 (11x12)
		9x13 (8x13)	11x13 (10x13)	9x13 (8x13)	11x13 (10x13)	8x13 (7x13)	11x13 (10x13)	8x13 (7x13)	11x13 (10x13)
		8x1/2"	10x1/2"	8x1/2"	10x1/2"	7x1/2"	10x1/2"	7x1/2"	10x1/2"
		8x14	10x14 (9x14)	8x14	10x14 (9x14)	7x14	10x14 (9x14)	7x14	10x14 (9x14)
		8x15 (7x15)	9x15	8x15 (7x15)	9x15	7x15 (6x15)	9x15	7x15 (6x15)	9x15
		7x16	9x16 (8x16)	7x16	9x16 (8x16)	6x16	9x16 (8x16)	6x16	9x16 (8x16)
		7x5/8"	8x5/8"	7x5/8"	8x5/8"	6x5/8"	8x5/8"	6x5/8"	8x5/8"
		-	-	-	-	5x18	7x18	5x18	7x18
Groove type		Seat/vee groove <sup>1)</sup>							
Vee groove angle	[°]	Depends on project specs <sup>1)</sup>							
Weight incl. hub	[kg]	160	180	185	210	195	230	225	265
Material		Alloyed EN-GJL-250 / EN-GJL-300							

Tab. 6

ATR\_1.22\_027\_0

<sup>1)</sup> Version in accordance with the product description, groove profiles with hardened groove flanks (min. 50 HRC)

<sup>2)</sup> With minimum groove clearance – R<sub>Amin</sub> – in accordance with product description for groove profiles for seat grooves (for vee groove, if deviating)

## 4.1.5 Performance chart

### Applications in the standard

r	v <sub>n</sub>	n <sub>1</sub>	Dt	i	v <sub>n1</sub>	Q <sub>max</sub>	P <sub>max</sub>	q%
1:1	0.63	1250	640	63:1	0.66	3500	4500	45
		1300	740			2950	3500	
	0.80	1380	700		0.80	3000	4000	
		1500	640					
	1.00	1250	740	47:1	1.03	3650	4500	
			700					
		1400	640	63:1	2450	3300		
	1.25	1400	800	47:1	1.25	3100	4000	
			740					

r	v <sub>n</sub>	n <sub>1</sub>	Dt	i	v <sub>n1</sub>	Q <sub>max</sub>	P <sub>max</sub>	q%	
	1.50	1600	700			3250	3600	45	
		1320	640	59:2	1.50	3100			
	1.60	1650	800	47:1	1.47	2750			
		1250	740	59:2	1.64	2750			
		1290	700		1.60	2850			
	1410	640	3000						
	1.75	1250	800	59:2	1.77	2500			
		1330	740		1.75	2650			
		1410	700			2700			
		1540	640			2800			
	2.00	1260	700	46:2		2.00			3250
		1370	640	46:2	3400				
		1410	800	59:2	2300				3200
		1520	740		2380				
	2.50	1370	800	46:2	2.50	2650			3600
		1420	640	57:3		2700			
	1480	740	46:2		2750				
	1570	700			2800				
	1650	640		2.40	3000				
2:1	0.40	1300	740	63:1	0.40	6000	7000		
		1380	700			6200			
		1500	640			6400			
	0.50	1250	740	47:1	0.51	7500	8500		
		1280	700		0.50	7800			
		1400	640	8100					
		1500	800	63:1	5000	6500			
	0.63	1400	800	47:1	0.63	6400	7500		
		1520	740			6600			
		1600	700			6800			
	0.80	1250	740	59:2	0.82	5700	6500		
		1290	700		0.80	6000			
		1410	640			6200			
	1.00	1260	700	46:2	1.00	6700	7500		
		1370	640	59:2		7000			
1410		800	1.00			4800	6000		
1520		740		5000					
1.25	1370	800	46:2	1.25	5400	6500			
	1480	740			5600				
	1570	700			5750				
	1650	640		1.20	6100				
1.50	1650	800		1.50	4750	6000			

r	$v_n$	$n_1$	Dt	i	$v_{n1}$	$Q_{max}$	$P_{max}$	q%
4:1	1.60	1560	700	57:3		4700		
		1450	800		1.60	4200		
		1650	700		1.59	4500		
	1.75	1590	800		1.75	4000		
	0.40	1250	740	59:2	0.41	11500	13000	
		1290	700		0.40	12000		
		1410	640		0.40	12500		
	0.50	1260	700	46:2	0.50	13500	16000	
		1370	640	14000				
		1410	800	59:2		10000	10000	
		1520	740	10000				
	0.63	1380	800	46:2	0.63	11000	13000	
1500		740	11500					
1580		700	11750					
1650		640	12500					
0.80	1450	800	57:3	0.80	9000	9500		
	1650	700			9500			

Tab. 7

ATR\_1\_22\_030\_0

r - Rope suspension  
 $v_n$  fpm (m/s) rated speed  
 $n_1$  (rpm) Motor speed  
Dt in (mm) Diameter of traction sheave  
i - Gear ratio  
 $V_{n1}$  (m/s) Actual speed (at  $n_1$ )  
 $Q'_{max}$  lbs (kg) Rated load (maximum)  
 $F_{max}$  lbs (kg) Mass of car (maximum at  $Q'_{max}$ )  
q (%) counterweight compensation

Performance data, including suspension rope weight MSR for travel height:

- H = 20 m for  $v_n$  to 0.63 m/s
- H = 40 m for  $v_n$  to 1.25 m/s
- H = 60 m for  $v_n$  to 1.60 m/s
- H = 100 m for  $v_n$  to 2.50 m/s

as well from  $v_n = 1.6$  m/s suspension rope compensation MCR (counter ropes etc.)

All specified performance data in [↗ Chap. 4.1.5 P. 21](#) apply to the following application conditions:

- Operating data max. 180 c/h at 40% duty cycle
- Ambient temperature + 5°C to + 40°C
- Frequency-controlled installations (VVVF)  $n_1 = 1250 \div 1650$  rpm

For types of performance not shown in the chart or deviating installation data, there is the possibility to use a calculation program (e.g. TK Liftdesigner) to check the operational safety of the machine.

The machines are conceived for a service life of at least 15 years and/or 20,000 hours of operation.

The maximum permitted rope speed at the traction sheave is limited to 3.2 m/s for versions with EX protection (SA15).

Related to the rated speed, this means a maximum of 3.2 m/s with 1:1, a maximum of 1.6 m/s with 2:1 and a maximum of 0.8 m/s with 4:1.

## 4.1.6 Motor versions

### Standard versions of motors

Flange-mounted IMB5 type three-phase motors are used.

The motor shaft/worm shaft connection is established using a flexible coupling.

All motors provide the possibility of intermediate terminal connection for the magnetic clamps in the motor terminal box.

- The mechanical layout (flange dimensions, AS/BS shaft ends) is in accordance with building code BV 6530-05
- The encoders (for description and technical data, see elevator motors product catalogue) include a 10 m long connection cable including connectors (types 1024/4096 TTL) for connection to TKE frequency inverters etc.

Designation	Unit	Technical data				
Version		Frequency-controlled (frequency inverter)				
Manufacturer		TK Aufzugswerke GmbH			EMOD	
		DTE	DTL	DTE	BG225M/4	
Type		180M	180M	180S	BG 250M/4	
					BG 250M/4a	
					BG 280SM/4 <sup>3)</sup>	
Voltage/frequency	V/Hz	<sup>1)</sup>				
S5 – operation data		240 c/h / 50% DC				
Speed range	rpm	1250–1650		800–1050	1250–1650	
Nominal power	kW	16–20	27/33	37/42	18.5	40–65
Design		IMB5				
Type of protection		IP23			IP55	
Ventilation		Internal ventilator	Forced ventilation <sup>2)</sup>	Internal ventilator		
Handwinding wheel	mm	D360 (plastic)				
kproj.	mm	<sup>1)</sup>				
Actual-value sensor		WDG100-38-1024/4096 TTL				

Tab. 8

ATR\_1.22\_028\_0

<sup>1)</sup> See elevator motors product catalogue

<sup>2)</sup> Type DTL180 with forced ventilation

<sup>3)</sup> The EMOD motor is to be ordered on an individual order basis

The specified electrical data applies to the following site conditions:

- Max. altitude 1000 m amsl
- Max. temperature + 40 °C at max. 50% air humidity

- Max. relative air humidity 70% at 20 °C

If the conditions stated above are exceeded, the deratings in accordance with VDE0530 apply.

Please refer to the product catalogue [↗ Product catalogue for elevator motors](#) for detailed technical data for the motors and encoders.

### Special motors

For areas of application in which a standard version motor cannot be used, a custom-order type IMB5/motor is used, e.g.:

- Special motors for e.g. explosion-proof versions or special customer-requested motors, etc.
- In the case of motors that do not have a possibility in the motor terminal box for intermediate terminal connection of the brake magnets, a suitable terminal box shall be provided if required.
- In the case of Ex motors, if required, a suitable terminal box for the magnetic clamps is to be provided depending on the order.

## 4.1.7

### Load data - traction sheave shaft

The load value  $F_{tzu}$  listed below is the limit value of the permitted radial stress for the traction sheave shaft calculated from the overall mass present on the installation.

The overall mass of the installation is determined and the load is checked as part of the calculation program TK LiftDesigner.

- Traction sheave shaft - standard version:  $F_{tzu} \leq 155 \text{ kN}$
- Traction sheave shaft - SA4  $F_{tzu} \leq 124 \text{ kN}$
- Traction sheave shaft - SA9  $F_{tzu} \leq 124 \text{ kN}$

For the machine with the traction sheave shaft in the standard version or in the versions for partial Ex (SA4), there are restrictions in place for  $F_{tzu}$  for the horizontal and vertical upwards rope departure directions. The permitted loads and any necessary constructive measures are to be clarified with TK Aufzugswerke GmbH on request.

### Machine W332C with horizontal rope force direction:

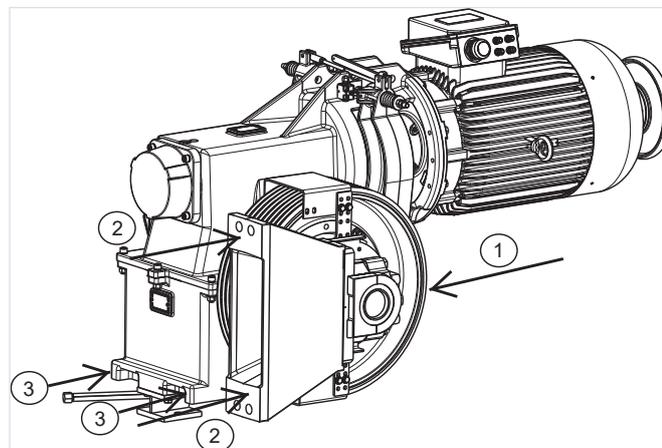


Fig. 7

ATR\_2\_22\_0068\_0

Item	Designation	Item	Designation
1	Rope force - horizontal	2	Outer bearing turned towards direction of load and supported by machine frame
3	additional support of housing feet at machine frame		

#### 4.1.8

### Load data for rope pull direction – vertical upwards or horizontal

For the configuration of the machine with the standard version of the traction sheave shaft or in the version for the emergency brake system, NBS, there are restrictions due to the housing strength for the permitted load  $F_{t_{zul-stat}}$  depending on the installation data for the upward horizontal or vertical rope pull direction.

#### W332C with motor position – horizontal

- Horizontal rope pull:  $F_{t_{zul-stat}} = \leq F_{t_{stat-max}}$
- Upward vertical rope pull:  $F_{t_{zul-stat}} = \leq F_{t_{stat-max}}$

The load  $F_{t_{stat-max}}$  present for the static overload case is determined via the TK-LiftDesigner, etc.

The values for upward horizontal and/or vertical rope pull directions can be used up to  $\pm 45^\circ$  respectively for rope pull directions between upward horizontal and vertical.

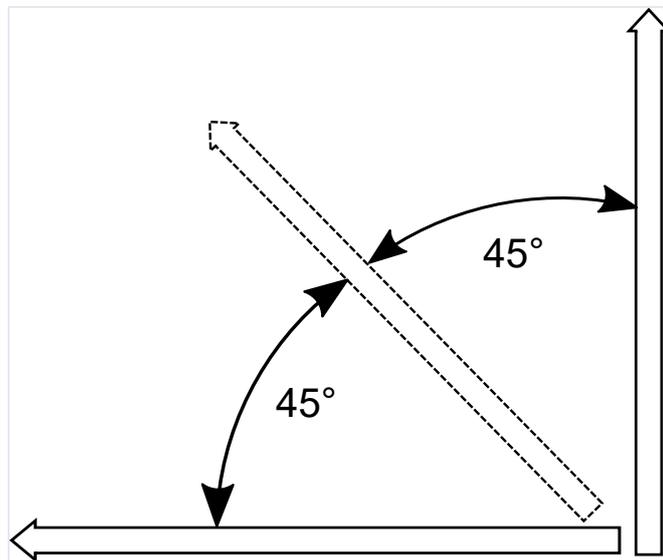


Fig. 8

ATR\_2\_12\_0168\_0

For installations on which  $F_{t_{stat-max}} > F_{t_{zul-stat}}$  the permitted load and possible constructive measures must be clarified with TK Aufzugswerke GmbH on request.

For all versions of the machine and horizontal rope tension ( $\pm 45^\circ$ ), the outside bearing must be turned in the load direction. The intended machine base frame must be appropriately dimensioned and prepared to accommodate the outside bearing so that the occurring forces can be absorbed.

Additional struts must be provided at the feet of the gear box housing in order to relieve the supports under the housing and their screwed connection.

For all versions of the machine and vertical rope tension upwards (+/- 45°), the outside bearing must be turned in the load direction. The intended machine base frame must be appropriately dimensioned and prepared to accommodate the outside bearing so that the occurring forces can be absorbed.

## 4.1.9

### Gear efficiency

The specified gear efficiencies  $\eta_G$  and  $\eta_{G'}$  are extreme values which are to be applied for dimensioning the motor, frequency inverter and braking resistor, etc. The rated efficiency  $\eta_n$  provides information on the value  $\eta_G$  that can be achieved under optimum operating conditions.

The efficiencies  $\eta_{an}$  and  $\eta_{an'}$  describe the state of gear starting (overcoming static friction or build-up of lubricating film in the gear teeth; with  $\eta_{an}$  values < 0.5 - the gear, when stopped, must be viewed as self-inhibiting).

- $\eta_g$ : minimum design efficiency, driving
- $\eta_{g'}$ : maximum design efficiency, driven (braking)
- $\eta_n$ : rated efficiency - driving
- $\eta_{an}$ : starting efficiency – driving
- $\eta_{an'}$ : starting efficiency – driven

Ratio / Speed (rpm)	$\eta_g$		$\eta_{g'}$		$\eta_n$	$\eta_{an}$	$\eta_{an'}$
	800 - 1249	1250 -1800	800 - 1249	1250 -1800	1250 -1800	-	-
63:1	0.61	0.63	0.61	0.63	0.68	0.37	-0.08
47:1	0.63	0.65	0.63	0.65	0.71	0.42	0.16
59:2	0.66	0.68	0.66	0.68	0.74	0.53	0.50
46:2	0.69	0.71	0.69	0.71	0.77	0.57	0.57
57:3	0.72	0.75	0.72	0.75	0.81	0.62	0.67

Tab. 9

ATR\_1.22\_031\_0

## 4.1.10

### Mass moment of inertia

The value for the mass moment of inertia includes the driving gear with brake disc and coupling element as well as a proportion for the traction sheave.

- Mass moment of inertia:  $J_{rot} = 1.52 \text{ kgm}^2$

Not included are the mass moments of inertia for the motor with handwinding wheel.

The value for the mass moment of inertia of the motor can be taken in the case of:

- Normalised versions in accordance with product description (see notes in [↗ Chap. 4.1.6 P. 24](#))
- custom-order motors from the manufacturers' motor lists

## 4.1.11

### Weight

Machine version	SA	Unit	Machine <sup>1)</sup>
Standard version	-	[kg]	1700

Machine version	SA	Unit	Machine <sup>1)</sup>
Traction sheave in the shaft	SA9		1700
Vapour-proof partition wall	SA4		1850

Tab. 10

ATR\_1\_22\_032\_0

<sup>1)</sup> including DTE180 motor and traction sheave DT=800 mm

## 4.1.12

### Noise levels

The airborne noise levels in the machine room at a distance of 1 m for the standard version of the machine W332C with operation at normal rating are:

ATR\_1\_22\_032\_0

Version	[dB(A)]
W332C	68 - 74

Tab. 11

ATR\_1\_22\_033\_0



W332C SA4 – vapour-proof partition (machine shown in left traction sheave position)

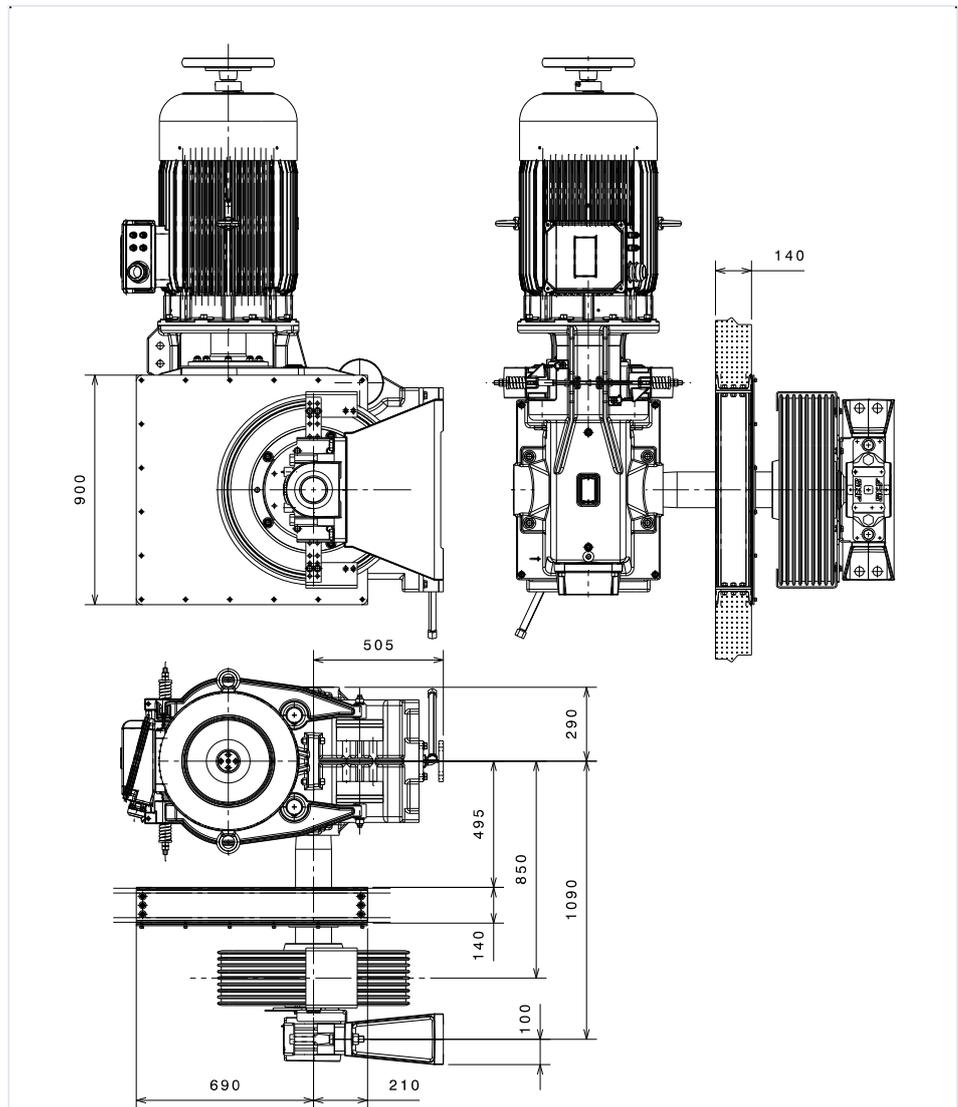


Fig. 10

ATR\_2\_22\_0011\_0

Item	Designation	Item	Designation
1	Bracket	2	Outside bearing
3	Traction sheave	4	Wall duct
5	Transport hanger	6	Oil drain
7	Pedestal support		

W332C SA9 (machine shown in traction sheave position on left and upward support of outside bearing)

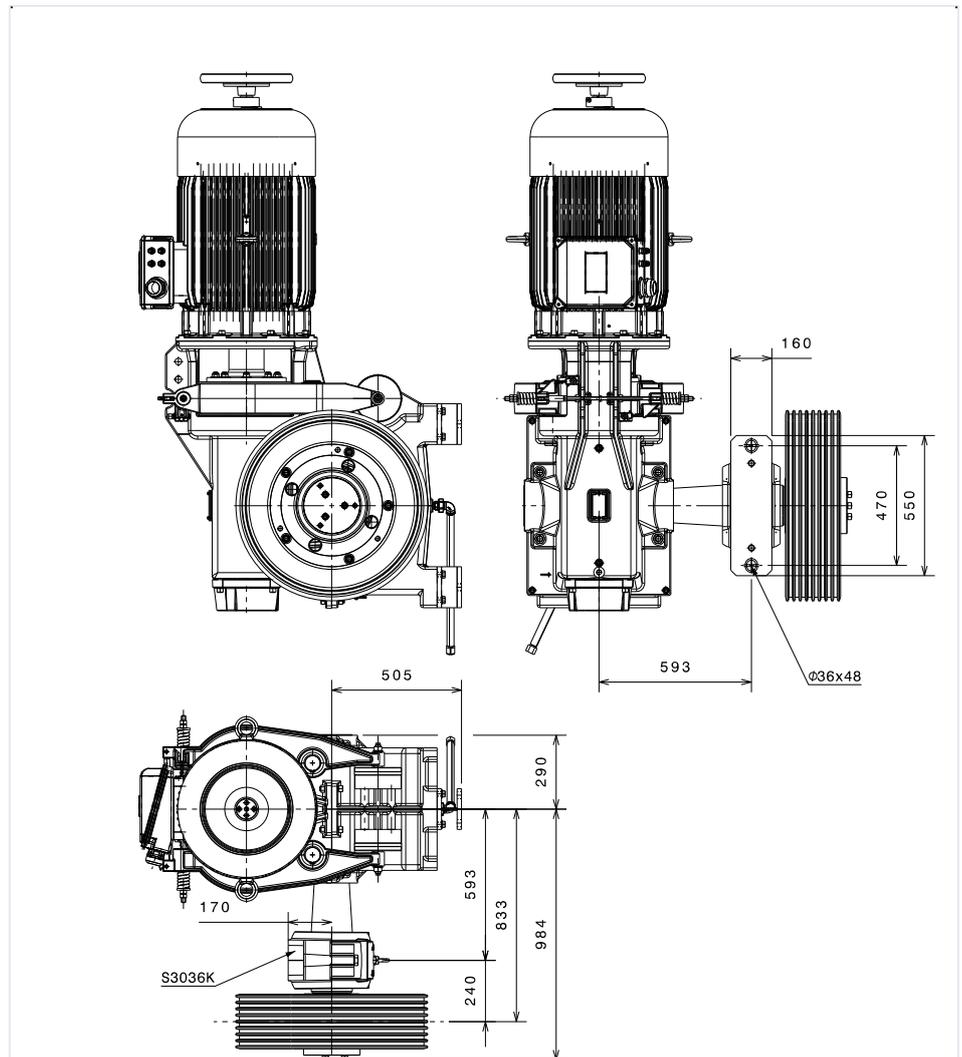


Fig. 11

ATR\_2\_22\_0012\_0

Item	Designation	Item	Designation
S1	Centre of gravity of the machine (with BG 225/250 motor)	S2	Centre of gravity of the machine (with BG 280 motor)

## 4.2.2

### Machine base frame

#### Standardised versions

Without rope pulley: For direct rope departure elevator car – counterweight, or 2:1 suspension.

The left-hand or right-hand design of the machine is determined by the arrangement of the traction sheave viewed from the motor to the machine.

Machine base frame without rope pulley (pictured: Machine with traction sheave position on left and machine base frame on left/right side mirror-inverted to A-A)

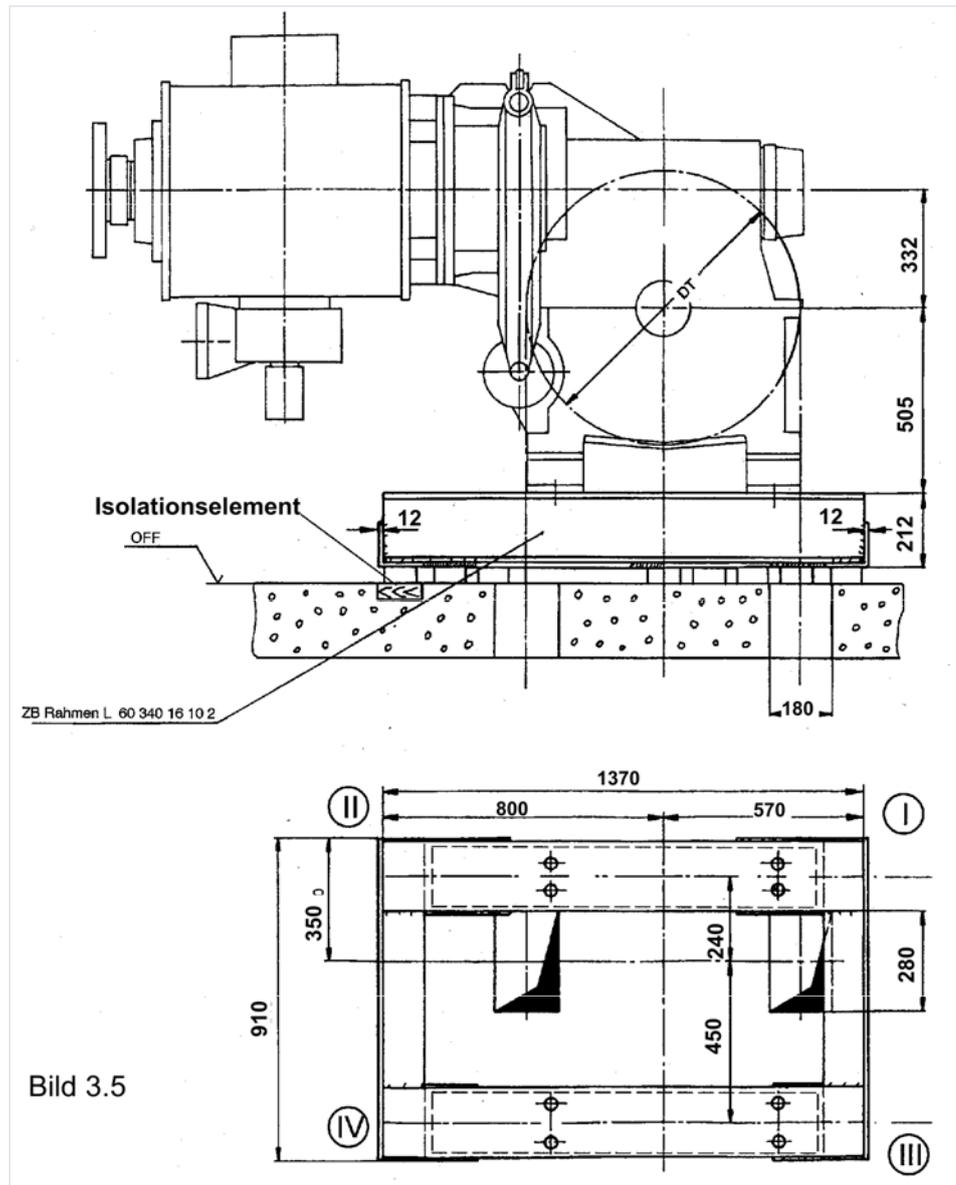


Fig. 12

ATR\_2\_22\_0013\_0

Item	Designation	Item	Designation		
Insulation element number		I	II	III	IV
	150	6	4	4	3
Static shaft load $F_t$ [kN]	120	5	3	3	2
	90	4	2	3	2
	60	3	2	2	2

# 5 Transportation and storage

## 5.1 Packaging



Screwed-on U-profiles are attached under the gear box and the gear box is screw-connected onto the special pallet. Further packaging depends on the order and is country-specific (air/sea/land freight).

- 2100 x 1250 mm standard pallet
- SA4 and SA9 2400 x 1750 mm

## 5.2 Transport

### NOTICE



#### Improper transport!

Damage and possibly loss of function of the product.

- Do not place heavy objects on the assembly when packaged.
- Protect it against impacts and falling.
- Protect it against water and extreme temperatures .
- Comply with safety regulations.
- Pay attention to the centre of gravity of the product.

### 5.2.1 Fork-lift truck transport

#### ⚠ WARNING



#### Protruding or tilting parts.

In the event of impact, transported goods can lead to severe crushing injuries or cuts and possibly fatal injuries.

- When effecting transport with a fork lift, use adequately long forks to prevent tipping over.
- During transport, keep a safe distance to persons.
- Always pick up at the frame or transport pallet with the forks, not the machine itself.

## 5.2.2 Crane transport

### ⚠ WARNING



#### Suspended load!

Falling transported goods can lead to severe crushing injuries or cuts and possibly fatal injuries.

- Do not walk underneath suspended loads.
- Only use tested and adequately dimensioned lifting gear.
- The specified means of transport are only configured for transportation of the machine, the installed brake and traction sheave. Do not use them to transport any other loads.

## 5.3 Checking the delivery

### ⚠ WARNING



#### Severe transport damage to the product.

Can lead to a malfunction of the product and thus to death or serious injury.

- Before commissioning, ensure that there is no severe damage to the product.

1. Check delivery for completeness.
2. Compare with the ordering and delivery documents.
3. Check the packaging for damage and any other conspicuous anomalies.

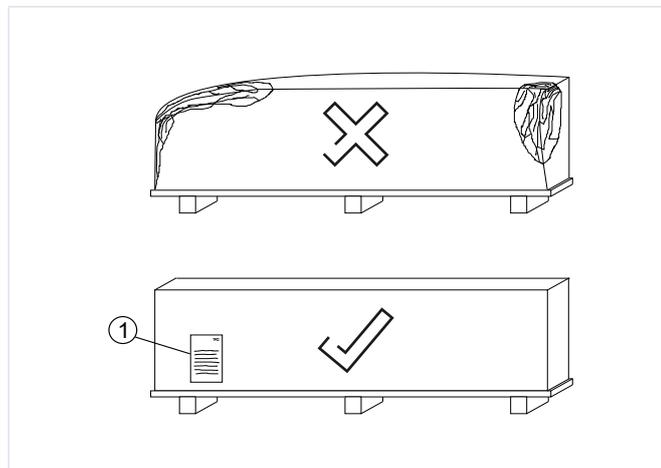


Fig. 13

ASY\_2\_00\_0011\_0

Item	Designation
1	Delivery documents

### In the case of damage

1. Do not commission a damaged product.
2. Any damage that is determined is to be documented immediately by means of a sketch, photo or description of the damage.
3. Report damage to the manufacturer.

## 5.4 Intermediate storage

- Store the product carefully in a protected location:
  - Protect it against the formation of condensation, moisture and dirt.
- The assembly must not be stored outdoors. Bare parts have no application of long-lasting preservative.
- Comply with notes regarding standstill maintenance Standstill maintenance

## 5.5 Optional delivery of the disassembled machine

As an option, the W332C machine can be delivered disassembled. The following variants are available:

- Only motor removed from machine
- Disassembled version (described below)

The motor is packaged in a VCI sack, secured on a Europallet with folding frame.



Fig. 14

ATR\_2\_22\_0064\_0

The worm gear shaft is completely pre-assembled (worm gear, traction sheave including rim as well as outside bearing), also packaged in a VCI sack, secured on a Europallet with folding frame.



Fig. 15

ATR\_2\_22\_0065\_0

The upper housing section is screw-connected with the lower housing section and mounted on a machine pallet. The bracket for the outside bearing is also mounted on this pallet. Brake shoes, including armature base plates, are packaged in a carton.



Fig. 16

ATR\_2\_22\_0066\_0

Accessory parts as well as the remaining disassembled components are packaged in plastic bags and in a carton.



Fig. 17

ATR\_2\_22\_0067\_0

# 6 Installation

## 6.1 Setting up the machine

The machine and the machine base frame of the W332C are delivered separately. If the ASL dimension deviates from the traction sheave diameter, a diverter rope pulley is required at the machine base frame. The frame is set up in the building on the floor of the machine room or on a prefabricated concrete foundation. In order to comply with the regulations for noise abatement and sound transmission, insulation elements must be inserted between the frame supports and the floor. These differ depending on the type of mounting:

1. Insulation element 100 x 100 x 50 high without packing: For mounting the machine on the machine room floor without a cement floor or directly surface-mounted on the cement floor.
2. Insulation element as described under 1), but with additional plywood base 140 x 140 x 80 mm high for mounting on a cement floor, whereby the wooden base is cast in the cement floor (layer thickness of the cement floor < 60 mm)

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### **i**

When designing the insulation, the load per insulation element should be in the range from 7 kN to 12 kN.

---

For the arrangement of the supports, you must take into account that the total centre of gravity lies within the insulation elements (this also applies to the car suspension on the rope pulley side). When mounting on a cement floor (maximum 60 mm layer thickness), the insulation elements with wood (approx. 80 mm high) must be cast downwards in the cement floor.

### Mounting with angle of deflection or rope departure upwards

For the machine, outside bearing and frame mounting, the forces exerted in the pull direction must also be taken into account. If required, the frame must also be supported by insulation elements in the force direction.

### Setting up

In the case of a frame with pulley frame, it is advantageous to mount this first on the machine base frame, install the rope pulley and secure with the axle holder. (Observe the correct mounting side.) Place the insulation elements on the base (floor or concrete base) in accordance with the installation plan. Balance out any differences in the base height by adding to the base and/or using insulation elements with plywood base by removing some of the wooden base. Place the machine base frame on the insulation elements and align. Place the machine, including outside or pedestal bearings, on the machine base frame and attach loosely. The rope departure on the traction sheave must be aligned perpendicular to the elevator car mounting and/or to the car rope pulley. The machine should stand horizontally aligned on the machine base frame. Balance out any unevenness by placing shims or plates under the bolting surfaces. Frame with rope pulley: Align the traction sheave and rope pulley as well as the position of the rope grooves parallel to one another. The

alignment of the grooves of the rope pulley and traction sheave must match exactly. Check the required ASL dimension (parallel clearance of the ropes at the rope departure).

When setting up machines with outside bearings and/or pedestal bearings, you must ensure that:

- The pedestal supports are mounted and secured in accordance with the regulations
- The traction sheave shaft is aligned horizontally in the loaded state
- The traction sheave shaft bearings of the machine and outside bearings and/or pedestal bearings must align (maximum deviation +/- 1 mm)
- Following alignment, the fastening screws must be tightened to the prescribed tightening torque.

### Ex – protection

Setting up machines in partial Ex or full Ex version

A description with the additionally required measures can be found in the separate operating manual "[↗ Ex protection for gear drives](#)".

## 6.2

## Connecting the machine

### NOTICE



#### Incorrectly connected cables!

May lead to impairment or loss of function of the product.

- When connecting the motor, comply with the terminal connecting plan on the back of the cover on the motor terminal box and/or the motor connection terminal diagram.
- In the case of frequency-controlled machines, ensure EMC-compliant installation of the motor and posistor (use suitable shielding).

### DTE180 and EMOD motors

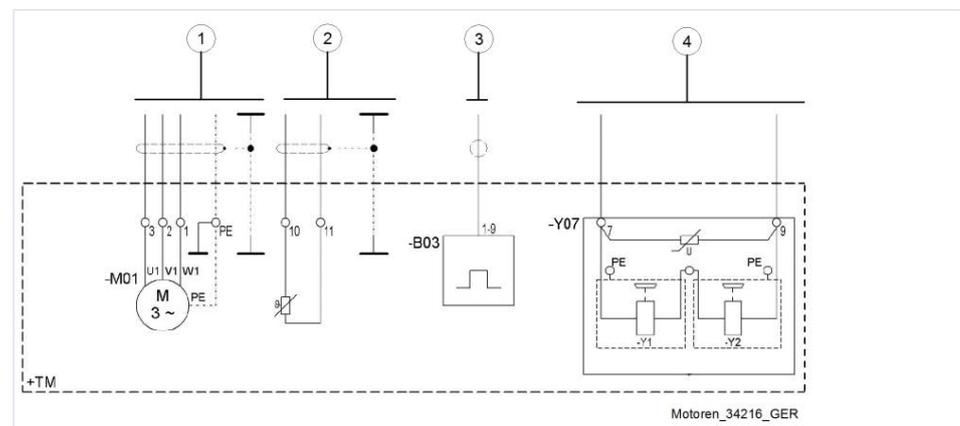


Fig. 18

ATR\_2\_12\_0141\_0

Item	Designation	Item	Designation
1	Motor	2	Posistor
3	Encoder	4	Brake (intermediate clamping)

SA3.1 and EX version terminal connecting plan

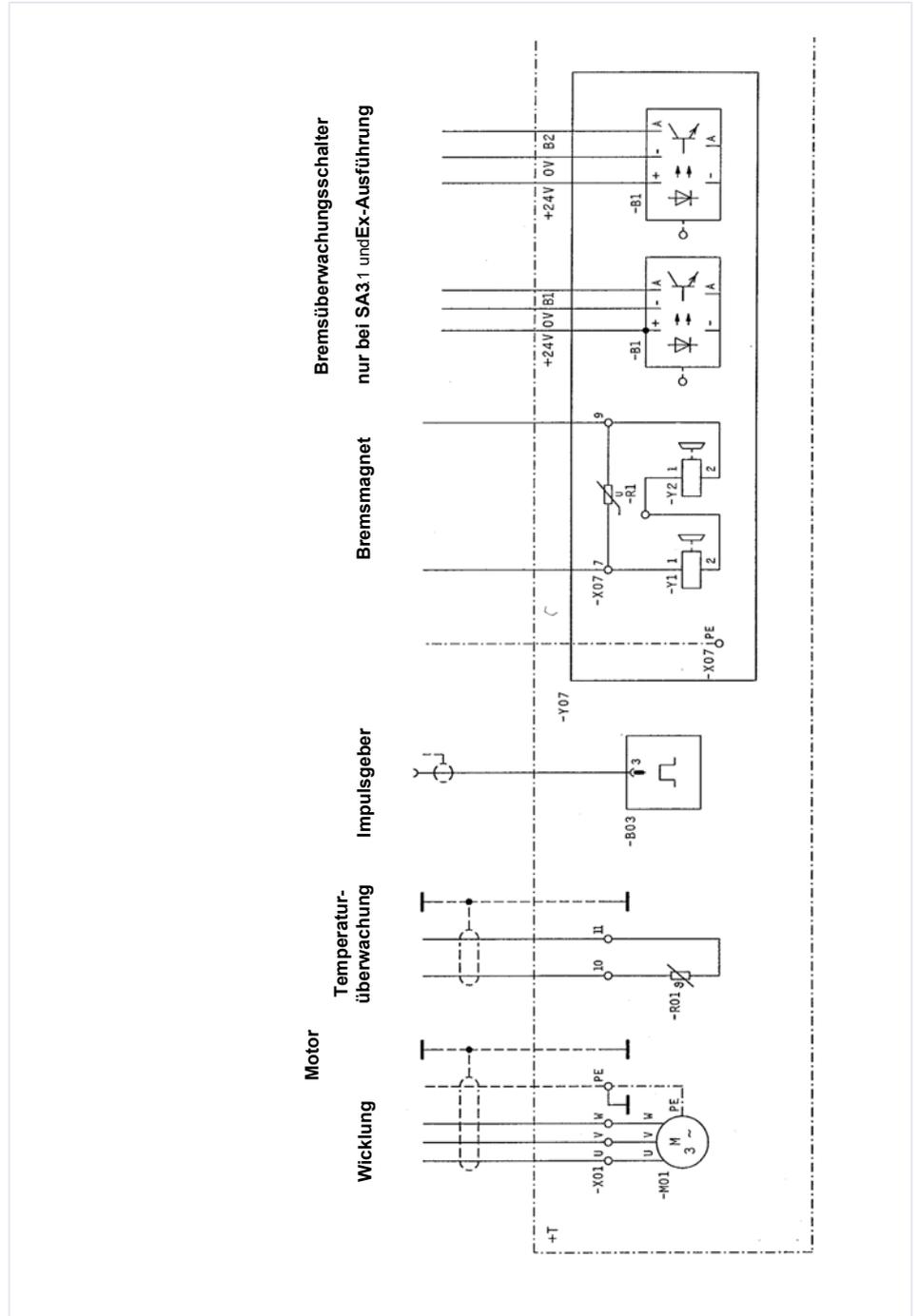


Fig. 19

ATR\_2\_22\_0016\_0

## Terminal connecting plan for gear drive motor and magnetic clamps

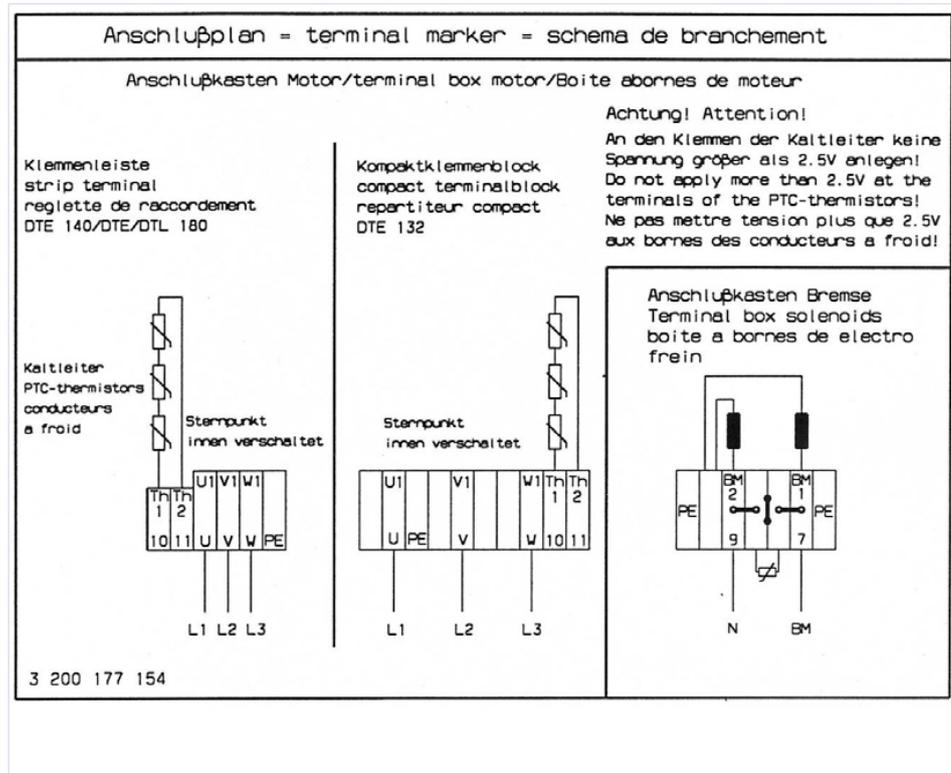


Fig. 20

ATR\_2\_22\_0017\_0

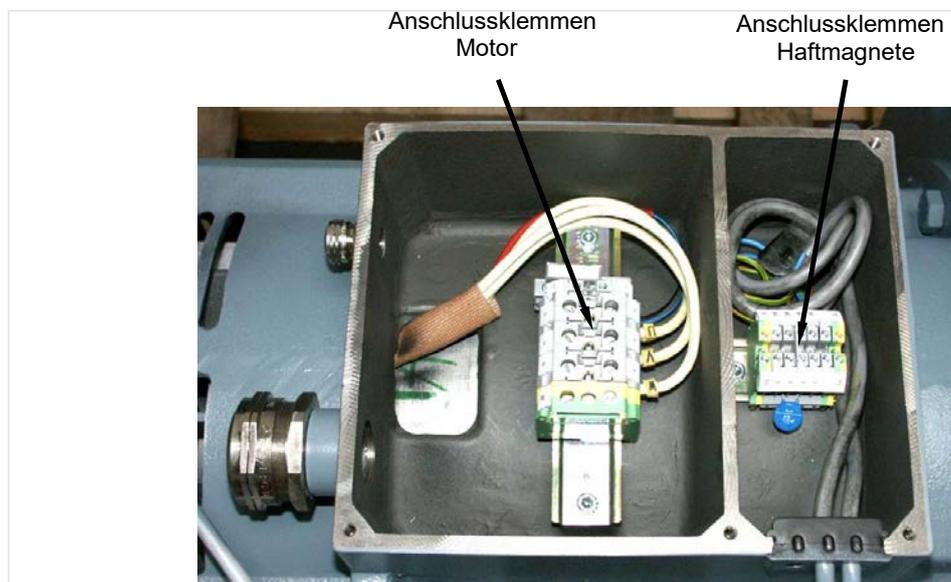


Fig. 21

ATR\_2\_22\_0018\_0

## 6.3

### Encoder for mounting on the motor

Distinction by type depending on the control system deployed

- TTL for TKE control system CPI
- for  $v < 1.5$  m/s with 2 x 1024 pulses
- for  $v > 1.5$  m/s with 2 x 4096 pulses
- Connection is with cable, SUB-D 9 connector and screw lock.

Number of pulses	Version	Connection
2x1024	TTL	Line and connector hard-wired
2x4096	TTL	Line and connector hard-wired

Tab. 12

ATR\_1\_21\_0072\_0

## 6.4

### Brake data

On W332C, the two brake magnets are connected in succession (in series).

Connection values per magnetic clamp:

Rated voltage	50 V
Rated current	2.2 A
Type of protection	IP65

Total connection values for series connection:

Power supply	
for rapid excitation	180 V
for holding voltage	90 V

Magnetic clamp – nominal force: 2 x 7500 N

Max. braking torque: approx. 2 x 625 Nm (adjustable)

Brake disc diameter 420 mm

Brake release gap min. 0.1 mm (adjustable)

Manual release with fitted brake release lever

## 6.5

### Rope guard for traction sheave

Use the enclosed screws, detent edged washers and nuts to bolt the rope guard onto the rope guard carrier. Adjust the side clearance of the rope guard by shifting rope guard carrier axially between the outside bearing and bracket; loosen the M24 screws slightly to do so. (Note: The M24 screws are only pre-assembled at the factory without the corresponding tightening torque.) The clearance between traction sheave edge and inner surface of the rope guard should be approx. 5 mm on the side facing the gear housing. Then tighten the M24 screws with the prescribed torque.

Pivot the rope guard carrier to set the guard in such a way that the gap between the rope and guard on the rope run-in and run-out side of the traction sheave is as small as possible (1 - 2 mm). The guard plates must be arranged parallel to the ropes. With fleet angle, adapt the location of the rope guard carrier by remounting the changed rope pull direction.

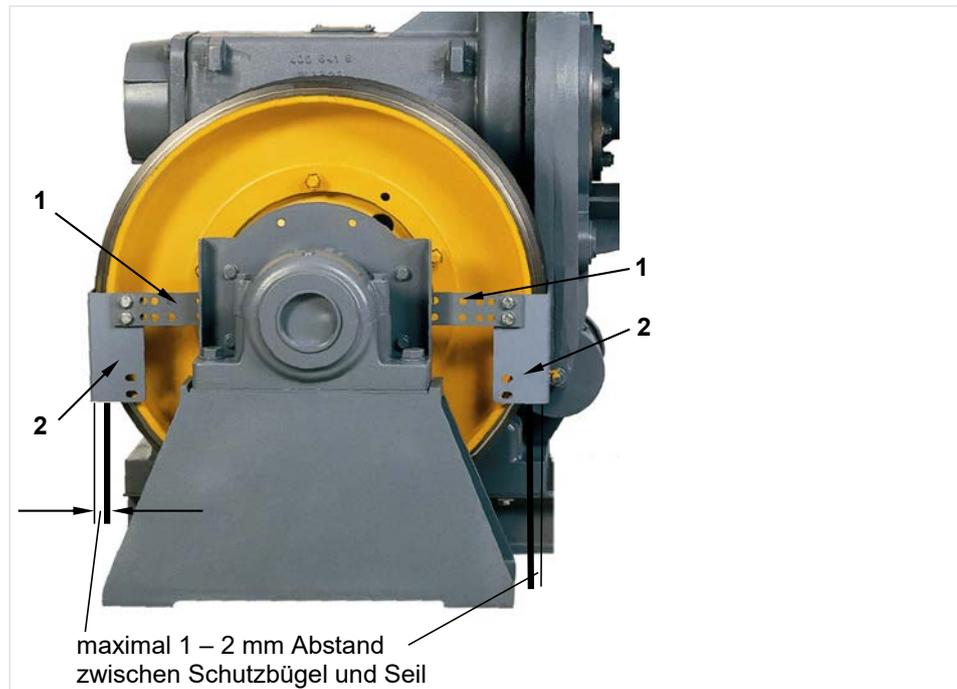


Fig. 22

ATR\_2\_22\_0022\_0

Item	Designation	Item	Designation
1	Rope guard carrier	2	Rope guard

## i

For machines with rope run-in direction of 0 - 90° above the horizontal (e.g.: machine arrangement up/down beside), an additional rope guard is required to prevent foreign bodies entering between the rope and groove. If the rope run-in zone is protected within the machine base frame, the function "protection against injury" is not required. In the case of machines in the special version SA4 or SA9, depending on the danger situation of the installation, ensure the corresponding protection. See supplementary operating manual for Ex-protected installations

# 7

## Work on the product

### 7.1

### Replacing the brake shoes

With a remaining lining thickness of less than 3 mm or if the linings are soiled or damaged (e.g. glazing), the brake shoes, including brake linings, must be replaced.

#### Disassembly

1. Before starting work, secure the counterweight and elevator car; switch off the power to the installation.
2. Undo the two nuts on the traction bolt on which the compression springs are located and remove the compression springs with spring plates.
3. Undo the locknuts on the tie rod and remove the tie rod from the housing.
4. Remove the retaining ring, including thrust washer, on the brake shoe bolts.
5. Push the cover ring over the magnetic clamp and armature base plate.
6. Undo the counter nuts on the anchor bolt and turn the anchor bolt together with the armature base plate slightly back to enlarge the gap between the magnetic clamp and the armature base plate.
7. Remove the brake shoe.

#### Installation

1. Mount the brake linkages and armature base plate on new brake shoes. Check the ease of movement of the armature base plate; adjust if necessary. It should be possible to move the armature base plate with low resistance on the screw.
2. Install the pre-assembled brake shoes and tie rod, and tighten the locknut to secure the housing. Align the brake shoe to the middle of the brake disc by means of the thrust washers. Ensure alignment with the tie rod.
3. Mount the locking ring with thrust washer on the brake shoe pin.
4. Mount the compression springs with spring plates and pre-tension the springs by approx. 19 mm. Secure the setting with the counter nut.
5. Set the brake shoe stroke.
  - ▷ Brake shoe stroke at the narrowest point  $0.1 + 0.05$  mm. This corresponds to approximately 0.35 to max. 0.45 mm in the middle of the brake disc.
6. Push the cover ring over the gap between magnetic clamp and armature base plate.
7. Modify, replace and set the second brake shoe in the same manner.
8. Set the operation position of the brake release lever with  $5-10^\circ$  above the horizontal. After replacement, operate with electrical recall and observe whether both brake shoes open evenly.
9. Check the stroke paths and deceleration; if required, adjust.

## 7.2

## Braking deceleration setting

The brake adjustment is to be carried out only with one effective brake shoe with the elevator car loaded with the rated load on a descending run (full down) or with an empty elevator car on an ascending run (empty up) according to the deceleration values in the table below. The braking torque must be set uniformly on both brake shoes by pre-tensioning the brake springs depending on the installation.

		Machine with handwinding wheel		
		≤	≤	>
V	m/s	0.63	1.25	1.25
- a (full down)	m/s <sup>2</sup>	0.3	0.4	0.50
- a (empty up)	m/s <sup>2</sup>	0.5	0.6	0.75

Tab. 13

ATR\_1.22\_007\_0



If brake test switches SA3.1 and SA15 are present, these must be checked or adjusted after brake adjusting.

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7.3

Setting and checking the brake shoe stroke and armature base plate

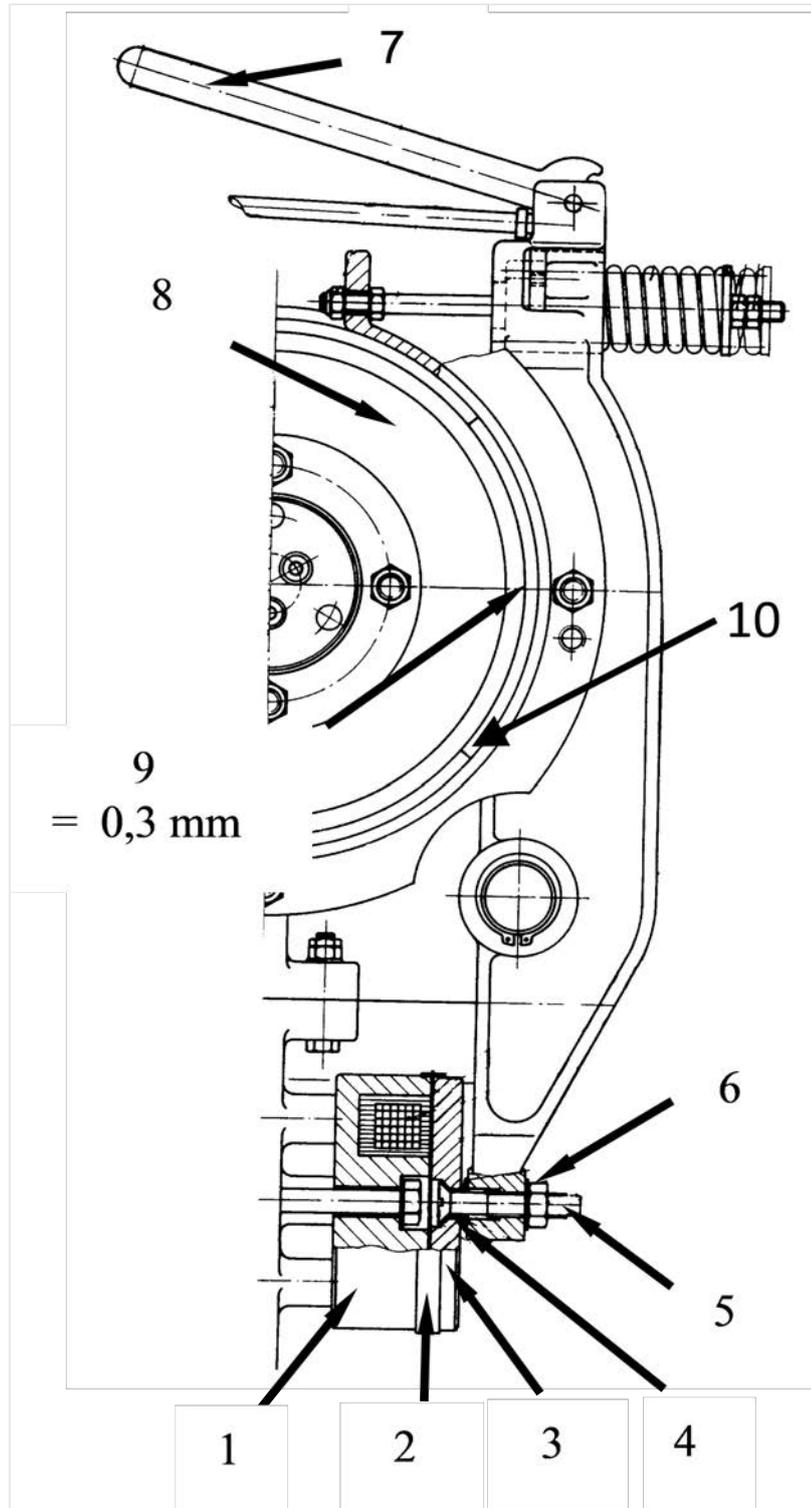


Fig. 23

ATR\_2\_22\_0025\_0

Item	Designation	Item	Designation
1	Magnetic clamp	2	Cover ring
3	Armature base plate	4	Rubber disc + discs for setting the pre-tension

Item	Designation	Item	Designation
5	Anchor bolt	6	Counter nut
7	Brake release lever	8	Brake disc
9	Working stroke of shoes 0.35–0.45 mm	10	Working stroke at the narrowest point 0.1 + 0.05 mm

Before initial operation and during monitoring, the working stroke of the brake shoes, the initial tension and movement of the armature base plates must be checked. The working stroke of the brake shoes is adjusted in the factory via the anchor bolt with the anchor plate. On opening the brakes, make sure that both brake shoes work with the same stroke. To adjust the working stroke, slacken the counter nut of the anchor bolt and turn the bolt to set the prescribed stroke of the brake shoe. After a longer period of use, it can occur that the rubber disc settles between the armature base plate and brake shoe. This means that the initial tension of the armature base plate becomes insufficient. To restore the initial tension, spacer washers must be placed between the armature base plate and brake shoes. Correct initial tension is achieved when the armature base plate can be turned on the armature screw despite light suction.



If brake test switches SA3.1 and SA15 are present, these must be checked or adjusted after brake adjusting.

## 7.4

### Test of one brake circuit

1. Manually open the brake shoe not being tested with a suitable tool.
  - ▷ For example, a nailing tool or a flat spanner on smaller machines.

#### **⚠ WARNING**



#### **Brake malfunction!**

Malfunction/slipping of the brake being tested.

- The tool must not be secured in the brake's open position.
- The installation tool must be operated by a qualified person.
- The brake must be able to re-engage immediately.



Fig. 24

ATR\_2\_22\_0057\_0

2. Carry out a brake test/emergency stop using the brake being tested.

3. Repeat the operation on the other brake.

## 7.5

# Replacing the traction sheave rim

### Disassembly

1. Disconnect the power from the installation and secure the car and counterweight.
2. Take the load off the traction sheave, take off the ropes, and use a rope to secure the traction sheave rim on the lifting tackle.
3. On the standard version, remove the rope guard; remove the mounting bolts on the outside bearing bracket; remove the bracket and pedestal bearing housing (upper and lower section) from the outside bearing. NB: The traction sheave shaft must be supported before removing the outside bearing. With SA9, the outside bearing, including pedestal bearing housing, can remain on the shaft.
4. Cover the roller bearing and adapter sleeve on the shaft end, sealed against dust.
5. Undo the screws on the traction sheave hub and in the same hole circle screw them into the forcing thread of the traction sheave rim.
  - ▷ Screwed connection starting torque 330 Nm.
6. By tightening the screws alternately and evenly, push the traction sheave rim off the hub.
7. Undo the forcing screws; remove the traction sheave rim using lifting tackle hoist from the assembly area.

### **i**

In the case of machines where the clearance available in front of the traction sheave shaft end is not sufficient to enable removal of the traction sheave, the complete machine must be raised and supported accordingly for assembly.

### Installation

1. Place the new traction sheave rim in position; check the data and dimensions.
2. Use lifting gear to transport the traction sheave rim towards the hub.
3. Clean the hub and new traction sheave rim in the area of the locating connection (do not grease or oil).
4. Align the hub mount to the hub fitting and screw holes to the hub threads. (Insert screws in drilled holes).
5. By tightening the screws/nuts diagonally and evenly, hoist the traction sheave onto the hub.
6. Evenly tighten the screws/nuts with a torque wrench (diagonally) and fit new locknuts.
7. Check whether the traction sheave lies flat on the hub.
8. On the standard version: Mount and align the outside bearings, bracket and rope guard.
9. Remove the support from the shaft.
10. Check the installation and machine room before initial operation.

## 7.6 Brake readjustment in the event of brake lining wear

With wear on the brake linings, the stroke of the brake shoes increases compared with the reference state. At a limiting value of 0.6 mm, the following settings on the brake are to be checked and, if necessary, corrected:

1. Armature base plate pre-tension: Check and, if required, adjustment of the pre-tension.
2. Stroke setting for air gap  $0.1 + 0.05$  mm with brake released. This corresponds to a working stroke on the brake shoe in the middle of the brake disc: 0.35 to max. 0.45 mm.
3. Bias voltage of the compression springs: Setting the reference value to max. 19 mm as well as checking the deceleration Braking deceleration setting.
4. Operation position of the brake release lever: Setting to  $5-10^\circ$  above the horizontal. For readjustment, the counter nut on the pressure rod must be released and the rod in the pressure piece adjusted. Subsequently secure the setting by tightening the counter nut.

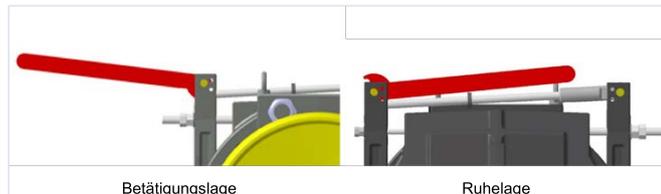


Fig. 25

ATR\_2\_22\_0023\_0

## 7.7 Replacing the motor

### Disassembly

- ✓ Place the new motor ready for use; check the technical data.
1. Disconnect the power from the installation and secure it against reactivation.
  2. Attach and secure the motor to the lifting gear.
  3. Unplug the electrical connections and lines from the motor. (motor magnetic clamp and encoder connections)
  4. Loosen the nuts on the coupling disc and unscrew until the tension disc no longer contacts the coupling rubber. (reduce initial tension of the coupling rubber).

#### **⚠ NOTICE!**

**If the tension discs made of aluminium / steel are removed, they must be refitted at the identical position (balancing!)**

5. Remove the nuts of the motor mounting on the motor flange.
6. Screw 2 hexagon screws into the forcing thread on the mounting flange and press the motor (secured on the lifting gear) off the motor flange.
7. Carefully pull the motor with coupling disc from the coupling on the gear and place on the ground.
8. Remove the forcing screws on the gear flange.

9. • If the replacement motor was delivered without a handwinding wheel and encoder or flywheel rim, remove these and use them for the new motor.

## Installation

1. Attach and secure the motor to the lifting gear.
2. Raise the motor using the lifting gear and align the motor coupling and brake disc.
  - ▷ The positions of the motor mounting holes in relation to the screws on the gear flange, as well as of the drilled holes on the coupling disc in relation to the coupling rubber, must correspond.
  - ▷ If there is an offset, hold the motor and align the position of the coupling holes by turning the handwinding wheel of the motor.
3. Push the motor with coupling halves onto the screws on the motor flange and with the coupling disc over the coupling rubber of the brake disc.
4. Fit the nuts on the threaded bolts on the gear flange and evenly tighten with the prescribed torque.

### **▲ NOTICE!**

**If the tension discs made of aluminium / steel are removed, they must be refitted at the identical position (balancing!)**

5. Tighten (pre-tension) the lock nuts on the coupling pins until the rubber elements are located on the bore hole diameter of the motor coupling half.
  - ▷ It must no longer be possible to turn the tension discs (Item 4) in front of the coupling rubber by hand.

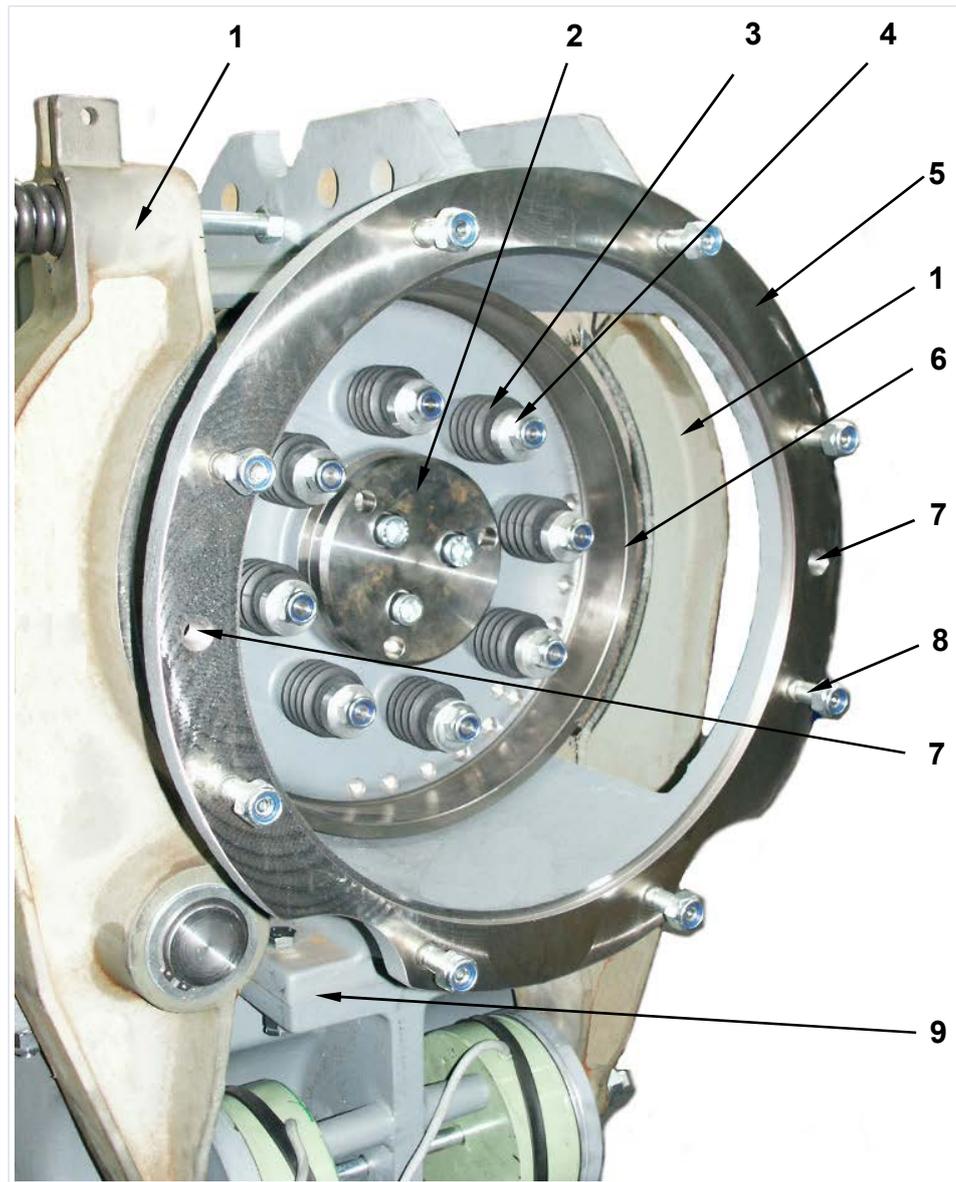


Fig. 26

ATR\_2\_22\_0025\_0

Item	Designation	Item	Designation
1	Brake shoes	2	Disc on worm shaft
3	Dutch rubber	4	Tension disc
5	Motor flange	6	Brake coupling disc
7	Forcing thread	8	Stud
9	Gear box		

## 7.8

### Replacing the encoder

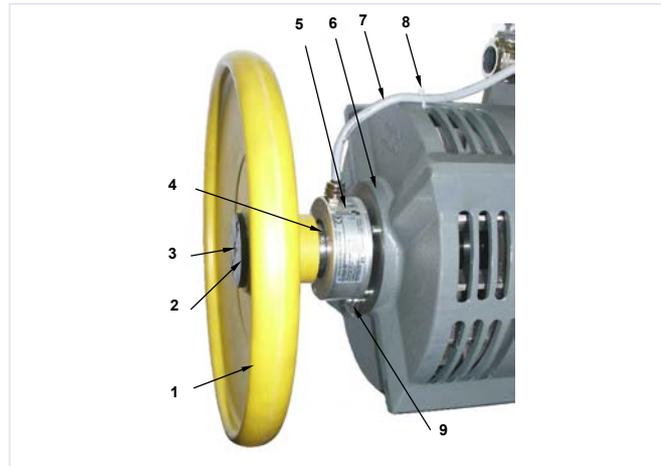


Fig. 27

ATR\_2\_22\_0026\_0

Item	Designation	Item	Designation
1	Handwinding wheel (D360 shown)	2	Locking washer
3	Flat countersunk nib bolt	4	Headless set screw
5	Encoder type WDG100	6	Motor
7	Encoder connection cable	8	Cable ties
9	Encoder mount		

#### Disassembly

##### Preparatory measures

1. Disconnect the power from the installation and secure it against reactivation.
2. Unplug the encoder connection cable at the frequency inverter.
3. Remove the central screwed connection in the middle of the handwinding wheel hub or the handwinding wheel.
4. Remove the feather key from the shaft on the D360 handwinding wheel.
5. Release the two headless set screws at the collar of the encoder inner ring (do not remove completely).
6. Unscrew the slotted pan head tapping screw at the bracket of the encoder mount.
7. Remove the cable ties holding back the cables.
8. Pull the encoder off the end of the motor shaft.
9. Check that the technical data of the new encoder matches

#### Installation

1. Fit the encoder mount (spring plate) of the removed encoder onto the new encoder.
2. Push the new encoder onto the cleaned shaft end of the motor until it makes contact with the shaft collar.
3. The mounting collar must point towards the shaft end.

4. Screw on the encoder mount at the motor.
5. Secure the encoder inner ring by tightening the headless set screw on the motor shaft.
6. Disengage the feather key from the shaft on the D360 handwinding wheel.
7. Align the D360 handwinding wheel on the feather key and fit together with the disc then tighten to 20 Nm.
8. Secure the connection line to the motor using cable ties.
9. Connect the encoder connection cable to the frequency inverter.

## 7.9

### Checking the backlash

Natural wear enlarges the backlash on the worm drive between the worm wheel and worm shaft. If the wear limit value (backlash) of 2.5 mm is reached, the gear drive can no longer be deployed for safety reasons. The gear set (worm wheel and worm shaft) is to be replaced or the gear drive is to be replaced.

#### Measurement possibility:

1. Take the load off the gear drive; (remove ropes from the traction sheave)
2. Run the measuring operation with the brake closed
3. Secure the brake disc against axial movement (bearing clearance)
4. Attach a dial gauge with magnet stator at the gear drive housing and align to the measuring point (M).
5. Define the measured radius (M) and mark the measuring point; the radius (r) for the W332C = 284 mm
6. Turn the traction sheave by hand until the dial gauge pointer moves. Move the traction sheave back and forth until resistance is felt. The tooth flanks of the worm wheel should be applied a load of approx. 20 - 50 N.
7. Read off the dial gauge (ME).
8. Use the formula below to calculate the backlash.

9. This measurement is to be carried out in at least three different positions!

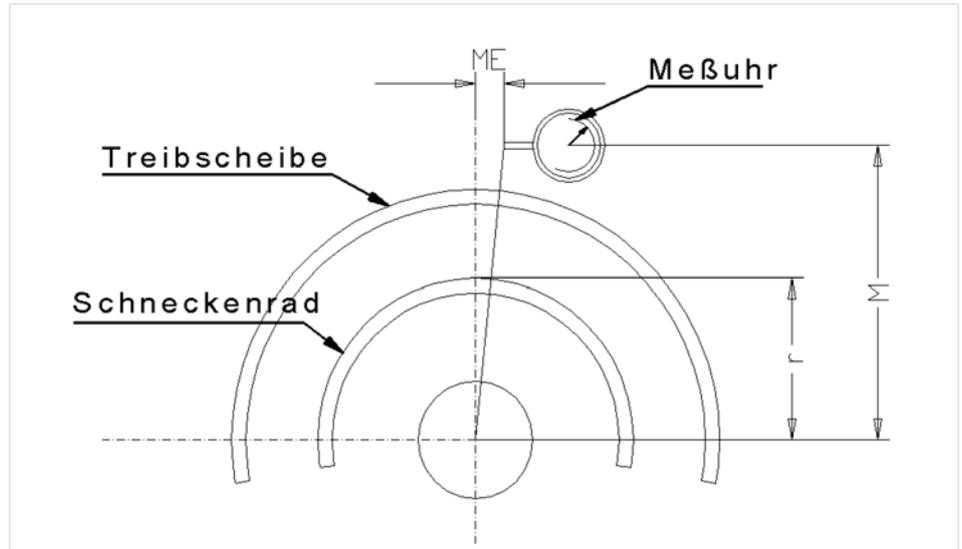


Fig. 28

ATR\_2\_22\_0027\_0

Item	Designation	Item	Designation
M	Radius	ME	Measurement result
R	Radius – worm wheel, all dimensions in mm		

$$\text{Backlash} = (ME \cdot r) / 2$$

## 7.10

## Bearing replacement at the outside bearing

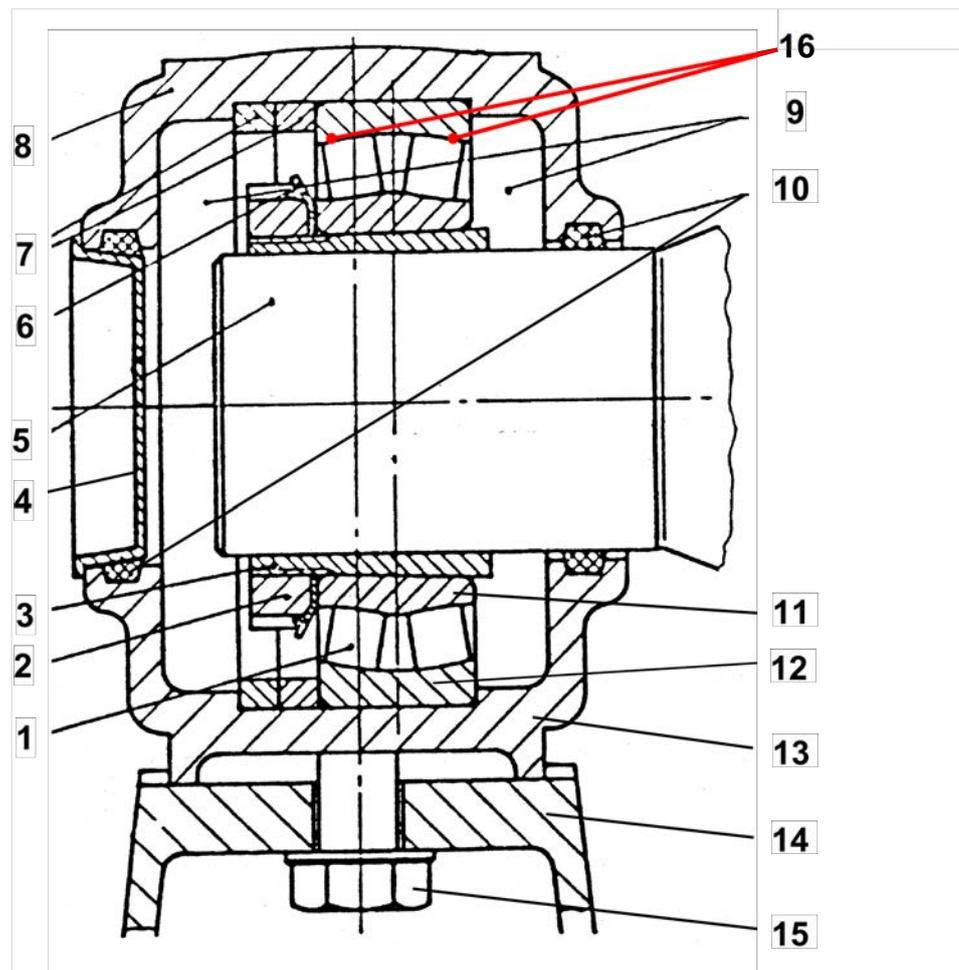


Fig. 29

ATR\_2\_22\_0028\_0

Item	Designation	Item	Designation
1	Self-aligning bearings	2	Groove nut and retaining plate
3	Adapter sleeve	4	Bearing cover
5	Traction sheave shaft	6	Retaining plate
7	Fixed rings	8	Housing upper section
9	Grease chamber	10	Sealing ring (felt or similar)
11	Bearing inner ring	12	Bearing outer ring
13	Lower housing section	14	Bracket
15	Bearing housing screwed connection on bracket	16	Bearing play

Due to the different bearing dimensions, different setting and control values for the minimum permitted radial clearance after installation also apply to the different versions (normal, SA4/SA9).

### Disassembly

1. Support the gear shaft on a base or using lifting tackle (two points of contact pedestal supports).
2. Remove the traction sheave on the shaft end (only with version in SA9).
3. Remove the outside bearing bracket (not with SA9).

4. Unscrew at the bearing housing upper section.
5. Wipe off the grease and remove the two spacer rings.
6. Bend the bent tooth of the star washer into the groove of the groove nut.
7. Loosen the groove nut with C-wrench A135-145; for SA9 with A 205-220.
8. Loosen the adapter sleeve with light blows.

▷ **NOTICE!**

**Do not damage the seals on the bearing housing.**

9. Push the housing half and bearing to the shaft end and remove

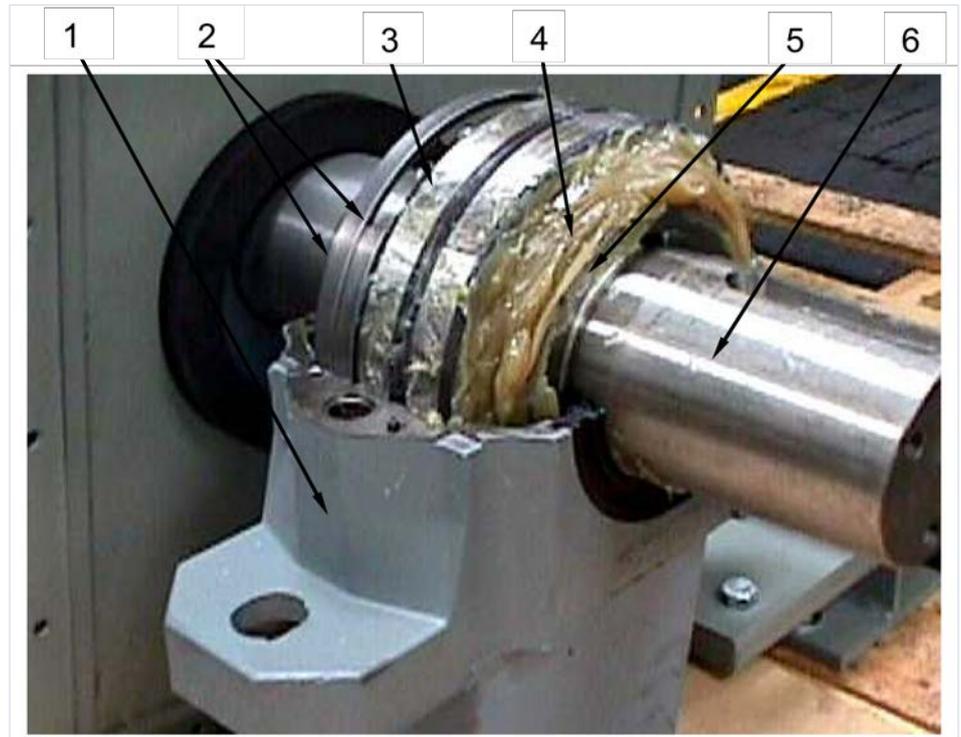


Fig. 30

ATR\_2\_22\_0029\_0

Item	Designation	Item	Designation
1	Bearing housing lower part	2	Fixed rings
3	Self-aligning bearings	4	Star washer
5	Adapter sleeve	6	Traction sheave shaft

### Installation

#### NOTICE



**Use of too much oil!**

The bearing fixed ring and adapter sleeve can shift during operation.

- Only oil the washed bearing bore as well as the seat of the shaft and adapter sleeve very thinly.

1. Push the rope guard carrier onto the shaft. (Observe the installation direction!)
2. With the collar side aligned to the machine, push the adapter sleeve onto the shaft end of the gear shaft
3. Measure the radial bearing clearance of the new self-aligning bearing

4. Push the bearing and groove nut onto the adapter sleeve. Lightly tighten groove nut with C-wrench (A 135 -145 and/or A 205–220 or SA9) to pre-tension the bearing.
5. Check the clearance dimension of the bearing seat to the traction sheave hub (85 mm). See Figure 7.7. For SA9, check the seating of the supporting bearing in relation to the shaft end = 290 mm.
6. If required, correct the clearance dimension. Here, the adapter sleeve can be shifted on the shaft with light blows.
7. Remove the groove nut, insert the retaining plate and screw the groove nut back on.
8. Tighten the groove nut with the C-wrench to reduce the bearing clearance to the specified value.
  - ▷ Check compliance with the minimum permissible radial bearing clearance.
9. Secure this setting by bending a tooth of the star washer into the groove of the groove nut.
10. Insert seals into the outer ring grooves on the lower housing section of the pedestal bearing.
11. Lift the lower housing section and join with the bearing from below.
12. Push the bracket under the lower housing section and align to the mounting holes on the lower housing section.
13. Insert two fixed rings in the lower housing section in front of the self-aligning bearing. Check the arrangement in accordance with the plan for standard/SA4 and SA9.
14. Oil the felt packing (if available) and align in the outer ring grooves in the housing upper section. In the case of double lip seals, fill the gap with grease.
15. Fill the bearing and the space next to the bearing with F1 type roller bearing grease.
16. Fit the outside bearing housing upper section and bolt to the lower section.
17. Remove the support of the traction sheave shaft, check the horizontal position and, if required, correct by adding to the compensating supports and/or outside bearing. For SA9, before checking, mount the traction sheave on the shaft end and secure by bolting the tension disc with new microencapsulated screws.
18. Secure the bracket, tighten the bearing housing bolted connection, mount the traction sheave rope guard.

Arrangement of outside bearing for standard version – and partial Ex

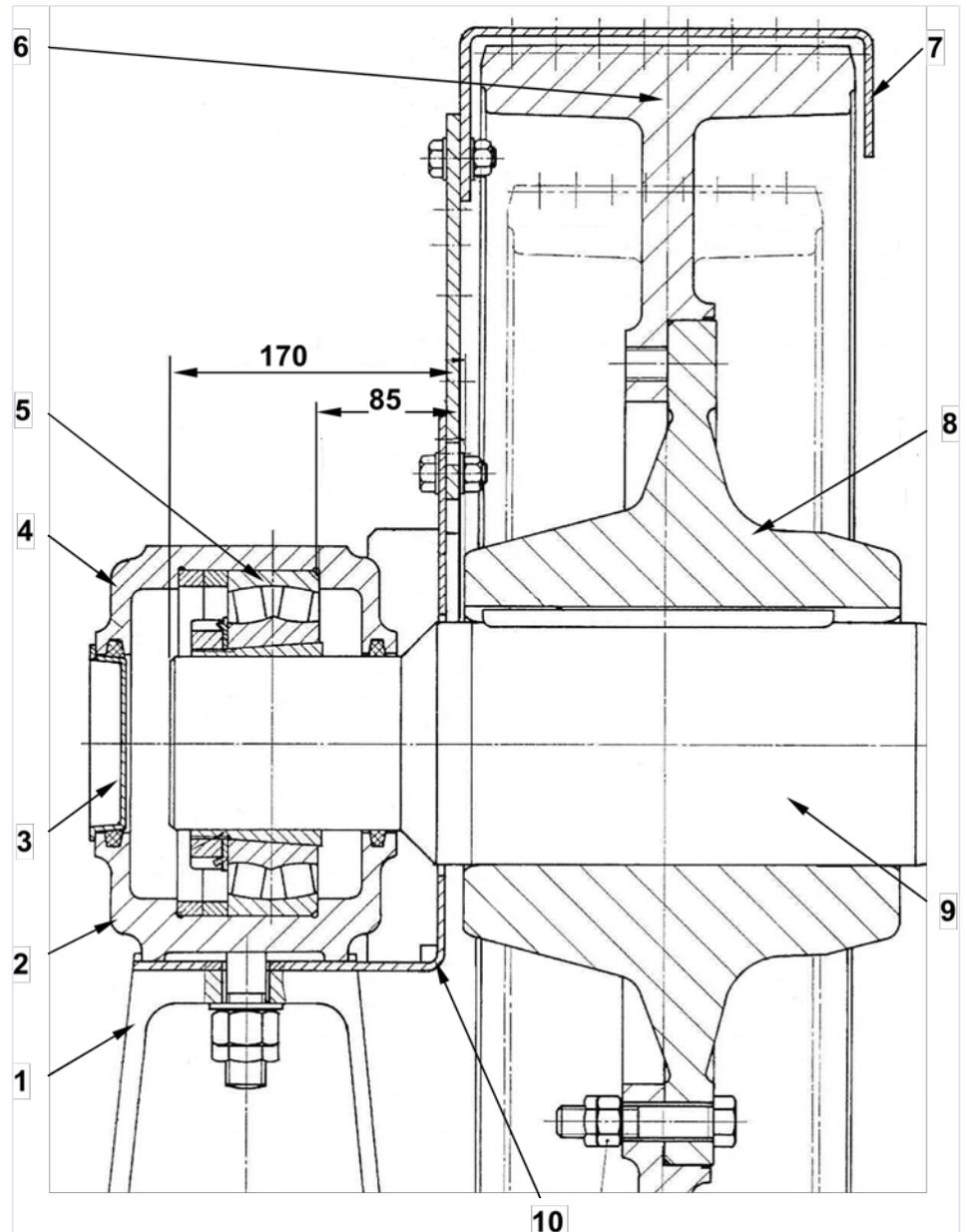


Fig. 31

ATR\_2\_22\_0030\_0

Item	Designation	Item	Designation
1	Bracket	2	Lower housing section
3	Protective cover	4	Housing upper section
5	Housing upper section	6	Traction sheave rim
7	Rope guard carrier	8	Traction sheave hub
9	Gear shaft	10	Rope guard carrier

## Arrangement of the supporting bearing for SA9 version

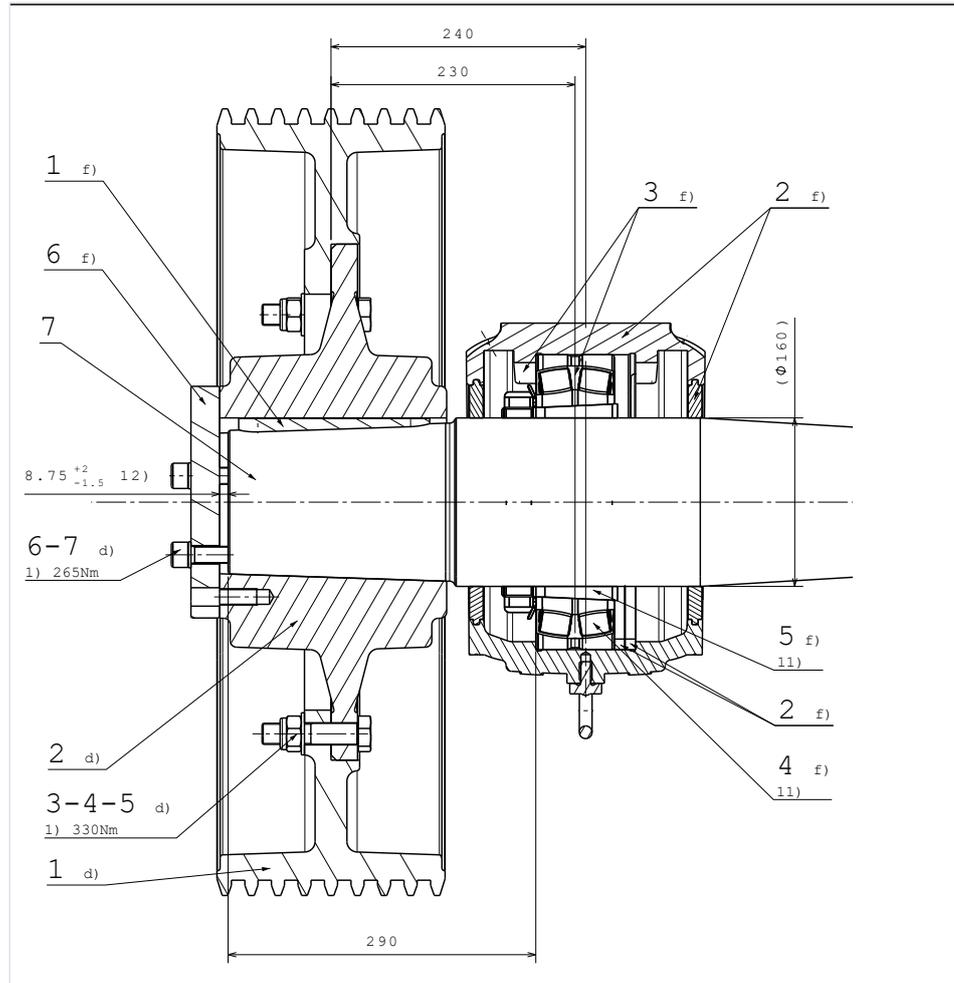


Fig. 32

ATR\_2\_22\_0031\_0

Item	Designation	Item	Designation
1	Gear box housing	7	SA9 traction sheave shaft
1d	Traction sheave rim	2d	Traction sheave hub
3,4, 5d	M20x90 8.8 hex screw vz; M20 8 hex nut vz; M20 spring steel locknut vz	6,7d	M16x60 10.9 slotted pan head tapping screw mikroverk; detent edged washer SKZ 16
1f	A36x20x180 feather key	2f	Pedestal bearing housing
3f	F1 roller bearing grease	4f	Self-aligning bearings
5f	Clamping sleeve	6f	Tension disc

## Measuring the radial clearance

The radial clearance must be measured simultaneously on both roller body rows. To measure the clearance reduction, use feeler gauges with measuring sheets of different thicknesses. The bearing clearance is measured during and after installation of the bearing and worm wheel (reduction of the bearing clearance) and always between the outer ring and the unloaded roller. Before measuring, the bearing must be rotated a few times so that the rollers are in the correct position. The same clearance values must be obtained on both roller rows to ensure that the inner ring is not offset to the side of the outer ring. Bearing clearance see table.

Radial clearance group	Normal and SA4		SA9	
	min.	max.	min.	max.
CO [mm]	0.08	0.11	0.13	0.18
Reduction of radial bearing clearance [mm]	0.05–0.07		0.08–0.11	

Tab. 14

ATR\_1\_22\_009\_0

Check values for the lowest permitted bearing clearance before installation:

Radial clearance group	Normal and SA4	SA9
CO [mm]	0.05	0.06

Tab. 15

ATR\_1\_22\_010\_0

Checking the radial clearance with feeler gauge

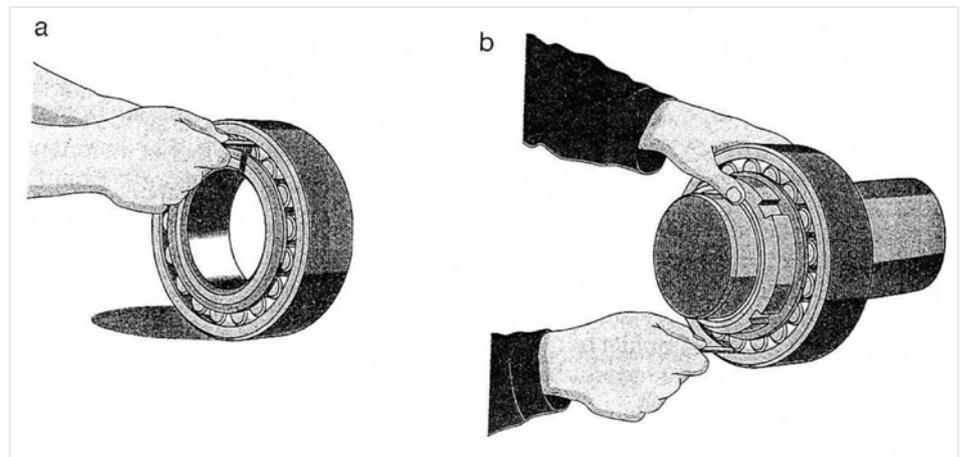


Fig. 33

ATR\_2\_22\_0032\_0

## 7.11

### Checking for grease/oil leakage

Examine the area around the bearing cover, brake drum and brake linings for traces of oil. A small amount of escaping oil means individual drops of oil or traces of oil in the area of the bearing seal.

Contamination level	Procedure	
No oil leakage determined	Check regularly within the framework of maintenance	Every 3 months (6 months if elevator used infrequently, < 50,000 runs per year)
If a small amount of escaping oil is determined	Clean and check regularly within the framework of maintenance	Every 3 months (6 months if elevator used infrequently, < 50,000 runs per year)
If a large amount of leaking oil is determined or oil is leaking from the brake disc / brake linings	Clean the drive and, if necessary, the brake, and carry out short-term repairs. Before continuing operation, carry out a brake test until modification. If the braking effect is inadequate, shut down the installation	Repair after 4 weeks at the latest

Tab. 16

ATR\_1\_22\_011\_0

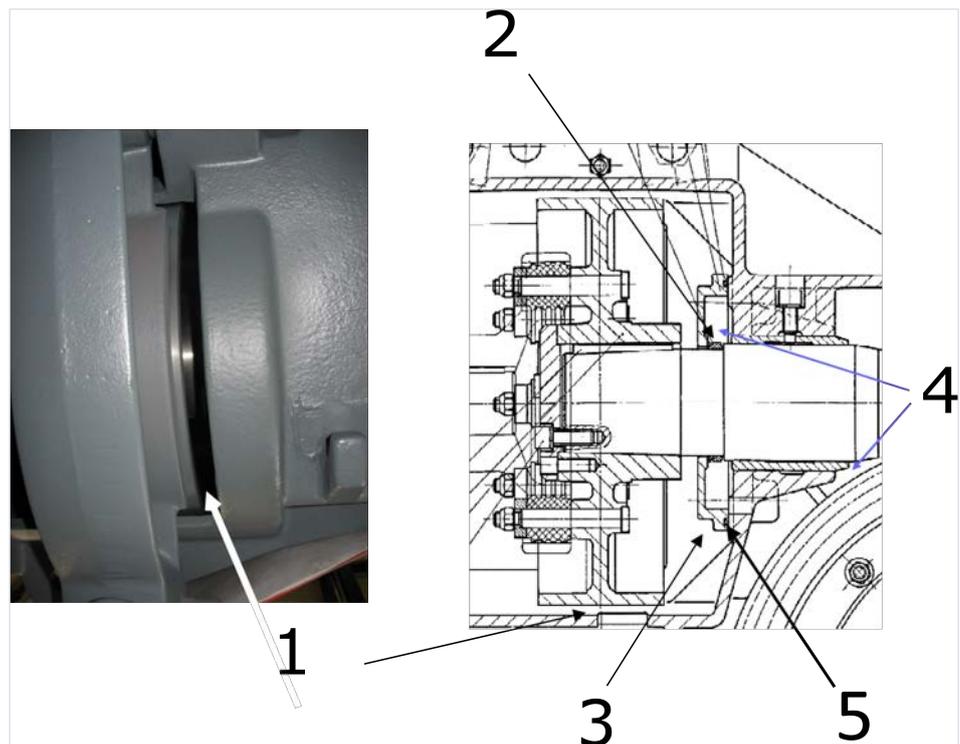


Fig. 34

ATR\_2\_22\_0033\_0

Item	Designation	Item	Designation
1	Brake drum	2	Seal V ring
3	Bearing cover	4	Oil
5	O-ring		

## 7.12

### Check of the brake linkage

The brake linkages could chafe against the cast edge of the brake shoe. In the process, material could be removed and the braking effect impaired. Attention should be paid to ensuring that the brake linkages are "free" and unable to chafe.

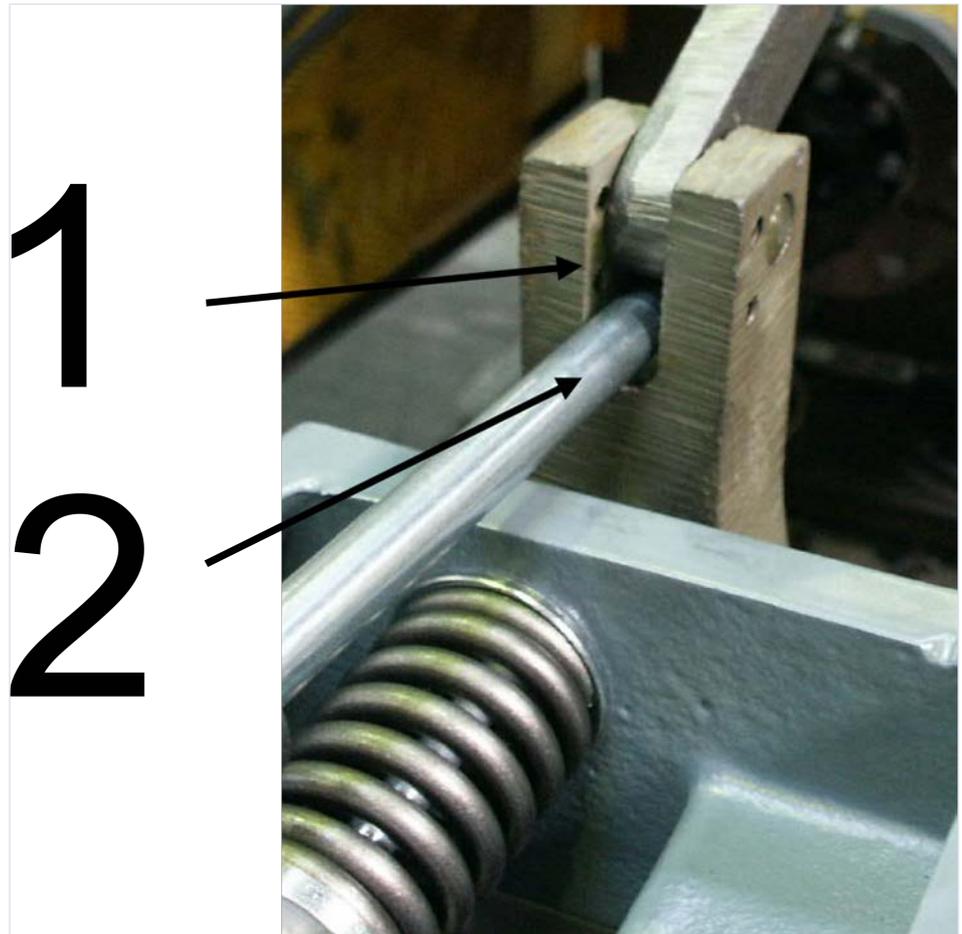


Fig. 35

ATR\_2\_22\_0034\_0

Item	Designation	Item	Designation
1	Break the cast edge at the brake shoe (deburr or radius)	2	Examine the brake release rod for traces of chafing; grease if necessary

- If necessary, deburr the cast edge with a file so that there is no longer a sharp edge at this position and the brake linkage cannot get stuck.
  - ▷ If necessary, twist, align or grease the brake linkage.

## 7.13

### Blocking clamp

A blocking clamp that matches the traction sheave (rim width and design) is part of each machine

#### Deployment of the blocking clamp

Use the blocking clamp to prevent movements due to slipping ropes during installation work on the elevator car or counterweight or during work where the rope traction of the installation is insufficient (e.g. pulling out of the safety gear).

#### NOTICE!

**The blocking clamp is to be pre-tensioned by evenly tightening the clip bolts until it is excluded that ropes will slip.**

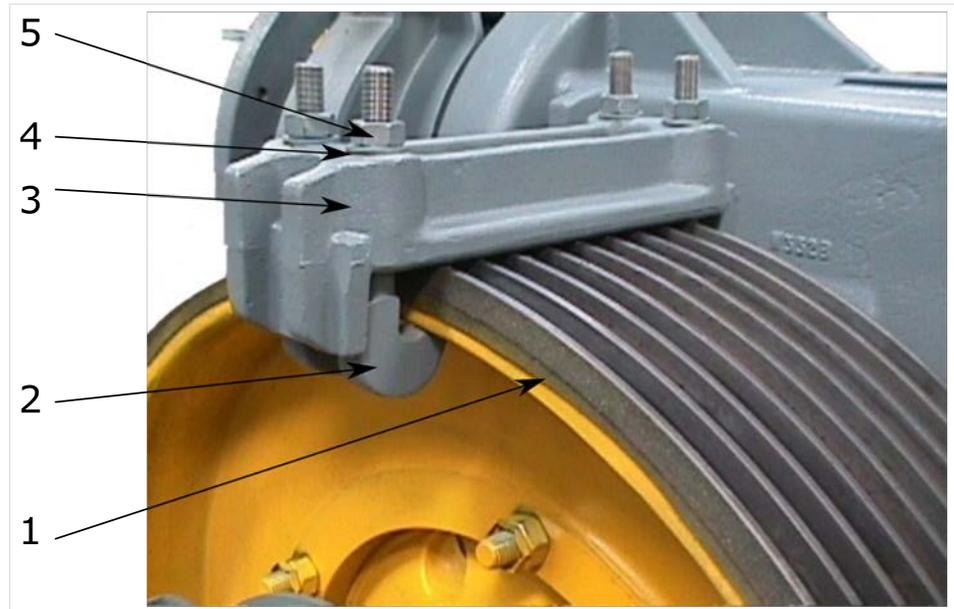


Fig. 36

ATR\_2\_22\_0047\_0

Item	Designation	Item	Designation
1	Traction sheave	2	Clip bolt
3	Clamping saddle	4	Washer
5	Hexagon nut		

**NOTICE!**

**After completion of the installation work, remove the blocking clamp, as otherwise the installation will be damaged.**

## 7.14

## Brake monitoring circuit

**Installation**

1. If not included in the scope of supply, make two lines of 0.75 mm<sup>2</sup> for SA3.1 (with PVC sheaths) for direct connection of the switches to the control system.
2. Secure the switches with elbows on the pressure rod for the brake spring.
3. Install both hexagon adjusting screws with counter nuts into the brake shoes.
4. Removal of both transport hangers.
5. Secure the switch to the switch plate using M4 screws, discs and nuts.
6. The switch tappet must be opposite the adjusting screw, but should not make contact with it.
7. Knock out the relevant opening on the switch for the cable gland and install the cable gland.
8. Connect the cable to the switch.

### Terminal connecting plan for brake test switch SA 3.1

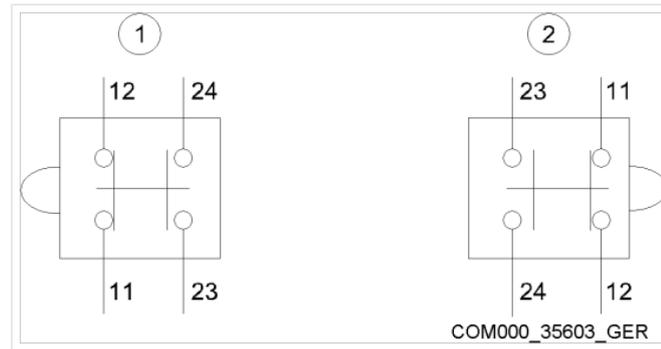


Fig. 37

ATR\_2\_22\_0042\_0

Item	Designation	Item	Designation
1	Button for brake circuit 1	2	Button for brake circuit 2

### Setting SA3.1 for monitoring the brake release with wear detection

The break contact with contacts 11 and 12 is used to monitor the position of the brake shoes. With the brake open, the switch is closed. The make contact only closes contacts 23/24 when the wear limit of the brake linings has been reached and the brake is closed. The contacts must be switched in such a way that, when one contact for both switches is closed, the drive is prevented from starting up. With correctly set brake test switches, all switch contacts must be interrupted with a closed brake. Before starting to set the switch, the stroke of the brake shoes must be adjusted.

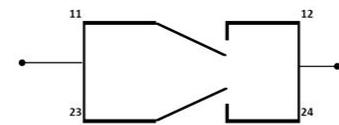


Fig. 38

ATR\_2\_22\_0058\_0

1. Switch on emergency operation switch and elevator control unit.
2. Connect the continuity test device to contacts 23–24.
3. Adjust the adjusting screw towards the switch until the continuity test device indicates continuity of 23–24.
4. Turn the screw back slowly until the continuity test device no longer indicates continuity of 23–24.
5. Move the adjusting screw by ¼ turn (corresponds to approx. 0.3 mm) in the direction of the switch and secure.
6. Continuity test device indicates constant continuity of 23–24.
7. Continue unscrewing the adjusting screw a further approx. 1/4 revolution.
8. Open and close the brakes by switching the motor
9. Check the switch change at the switches between the opened and closed brake.
10. Perform the setting on both switches in the same way.

### Setting SA3.1 for monitoring the brake release without wear detection

Before starting to set the switch, the stroke of the brake shoes must be adjusted.

1. Connect the continuity test device to contacts 11 and 12 of the break contact. The adjusting screw must not touch the switch tappet.

2. In the drive's home position (brake magnet without current), unscrew the adjusting screw for the brake test from the brake shoe in the direction of the switch tappet until opening of the contact is indicated by a signal interruption at the continuity test device.
3. Continue unscrewing the adjusting screw a further approx. 1/4 revolution.
4. Secure the setting by tightening the counter nuts.
5. Repeat the setting procedure at the second brake test switch.

### Checking the setting

Open and close the brakes by switching the motor. In doing so, observe whether the switch change at the contacts corresponds to the procedure described above. Push the feeler gauge between the adjusting screw and the switch tappet. Select the thickness of the feeler so that contact 23/24 is closed. If one of the contacts is closed, the drive must not be activated.

### SA3.1 switch mounting

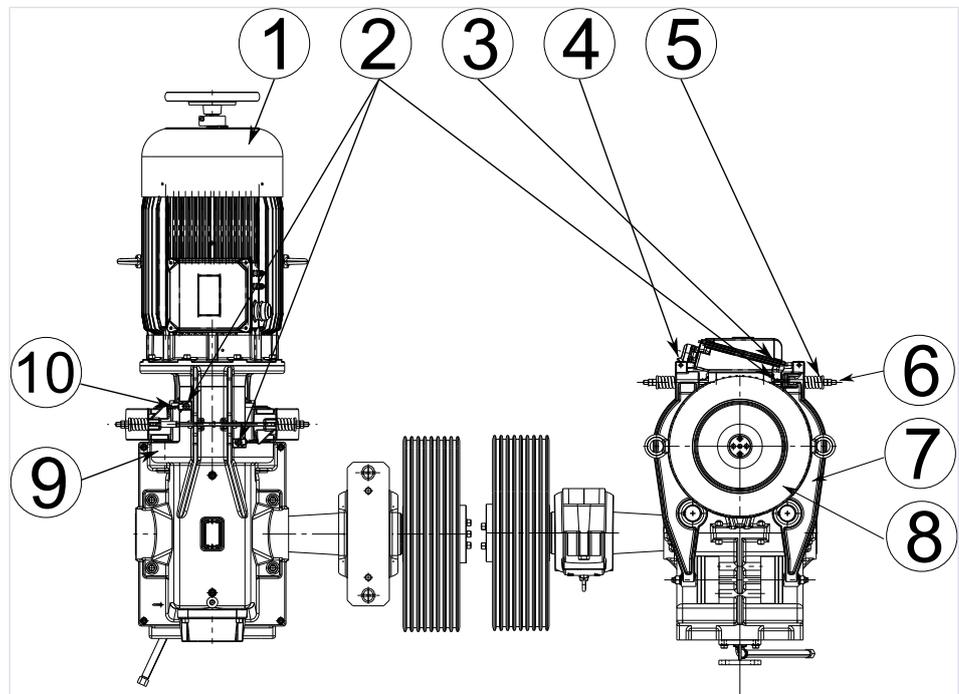


Fig. 39

ATR\_2\_22\_0044\_0

Item	Designation	Item	Designation
1	Motor	2	Test switch
3	Pressure rod	4	Brake release lever
5	Compression spring	6	Spring tension screw
7	Brake shoes	8	Brake disc
9	Gear drive	10	Adjusting screw

### Switch mounting and setting for SA15 (full Ex)



Fig. 40

ATR\_2\_22\_0043\_0

Item	Designation	Item	Designation
1	Button for brake circuit 1	2	Button for brake circuit 2

- Operation: Monitoring of the brake release **without** wear monitoring of the brake lining

Only contacts 23–24 are used for this function.

The break contact with contacts 23–24 is used to monitor the position of the brake shoe. With the brake open, the switch is also open.

- Operation: Monitoring of the brake release **and** wear monitoring of the brake lining

The break contact with contacts 11–12 is used to monitor the position of the brake shoe. With the brake open, the switch is closed. The make contact only closes contacts 23–24 when the wear limit of the brake linings has been reached and the brake is closed. The contacts must be switched in such a way that, when one contact for both switches is closed, the drive is prevented from starting up. With correctly set brake test switches, all switch contacts must be interrupted with a closed brake.

Circuitry of the contacts:

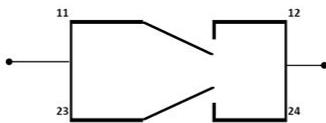


Fig. 41

ATR\_2\_22\_0058\_0

# 8 Commissioning

## 8.1 Work steps

### NOTICE



#### Time exceeded for use of inspection operation.

Lubrication is no longer sufficient.

- Machine W332C must only be operated in inspection operation for a short time

Before the machine can be put into operation, the following steps must be performed:

1. Safety, auxiliary and installation tools removed from the danger zone.
2. Setup of the machine, base frame, base and rope departure checked.
3. Oil drain pipe mounted and drain opening closed off with cap.
4. Gear oil filled and oil level checked.
5. Before the first run, oil must be added to the upper side pockets at the height of the worm shaft. (See label on the cover of the upper gear opening).
6. Outside bearing filled with grease (initial filling at the factory).
7. Mounting of the machine and outside bearing checked.
8. If present, the mountings of frame connections – pulley frame with rope pulley and wall duct and wall bearing – must be checked.
9. Bolts/screws must be tightened to the prescribed torque and secured.
10. Brake shoes, stroke and setting checked.
11. With SA3.1 and SA15, check the setting and function of the brake test switches.
12. Brake test carried out with one brake shoe in each case.
13. Function of manual release of brake checked.
14. Clearance of rope guard to traction sheave/to rope adjusted.
15. Power connections and earthing of motor, forced ventilation and brake magnet connected and secured.
16. Direction arrow (up/down) attached to the motor, clearly visible near the handwinding wheel.

## 8.2 Ambient conditions

The environment at the location of the drive (moisture, temperature) must correspond to normal indoor climate conditions for machine rooms. (As per EN 81 between +5°C and +40°C.) The relative humidity should not exceed 70%.

## 8.3 Acoustic specifications

The airborne noise levels in the machine room at a distance of 1 m for the standard version of the machine during operation at normal rating are  $\leq 74$  dB(A)

## 8.4 Emergency operation

### **⚠ WARNING**



#### **Elevator car movement by means of specific brake release.**

The elevator car can move in an uncontrolled manner through the shaft.

- Be prepared to brake at all times.
- Regulate the travel speed of the elevator car by opening/closing the brake manually if manual brake release is present.
- The movement of the elevator car must be slow (0.3 m/s).

For emergency operation, the gear drive is equipped with a handwinding wheel and a brake release lever. The brake release lever and pressure piece with pressure rod are mounted on the brake shoes with notched impact pins. The brake lever is set in the operation position approx. 5–10° above the horizontal as shown in the following illustration:

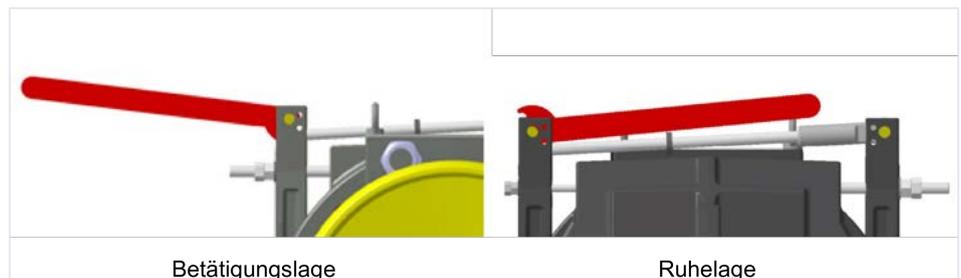


Fig. 42

ATR\_2\_22\_0023\_0

### Rescue operation to rescue trapped persons

### **⚠ CAUTION**



#### **Rapid movement of the elevator car!**

Abrasion injuries.

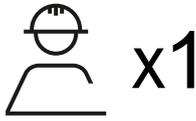
- Only use the handwinding wheel for assembly and maintenance purposes with a safe stance.
- In the event of uncontrolled elevator car movement, let go of the handwinding wheel immediately.

1. To open the brake, check that the brake release lever is in the direction of the motor.
2. The handwinding wheel might also have to be moved to bring the elevator car into the nearest landing.
3. Depending on the load, the elevator car can begin to move quickly after opening the brake.

4. Immediately let go of the handwinding wheel and control the speed of the elevator car by pressing the brake release lever with varying degrees of force.

# 9 Maintenance

## 9.1 Required qualified personnel



One skilled person is required for the operations described in this chapter. Separate mention is made of operations that require a different number of qualified personnel.

## 9.2 Maintenance

Maintenance period: Maintenance of the machine should take place within the framework of central maintenance of the elevator, at least once a year

1. Check the oil level; top up if necessary.
2. Check the brake shoes for wear; the remaining lining thickness must be at least 3 mm.
3. Check the brake adjustment.
4. Check the armature base plate setting (initial tension) and ease of movement.
5. Check the braking deceleration.
6. Check the worm gear toothing for wear.
7. Check the backlash between the worm shaft and worm wheel.
8. Check the groove profile on the traction sheave for damage and wear.
9. Check that the screws of the traction sheave mount are securely seated.
10. Check the rope pulley grooves for damage and wear.
11. Check the motor bearings for wear (noise, backlash).
12. Top up if required and/or tighten the outside bearing grease filling (type F1\*); .
13. Check that the electrical connections are in proper and adequate condition, and check that they are securely attached.
14. Check that protective and safety devices are present and correctly set.

## 9.3 Lubrication

### Outside bearing

On delivery, the initial filling took place at the plant.

Designation	Supplement
AY multipurpose grease F1	Annual re-lubrication quantity
400 g cartridge	100 g housing, SN522
	200 g housing, S3036

## Gear

The gear is filled on site with the supplied oil (8 x 5-litre container). Lubricant	Replacement interval	Filling amount
Synthetic gear oil, SM1/220 <sup>1)</sup>	For the first time after three years Then every six years	36 litres

<sup>1)</sup> For machines as of year of manufacture beginning/mid-2011 (see marking SM1/220 on the machine's name plate, as well as oil information sign "SM1/220")

### 9.3.1

## Oil change

### WARNING



#### Danger of scalding

Long-term car operation heats up the oil!

→ During work on the drive, wait until the housing has cooled down, if necessary.

1. Heat the gear to operating temperature (approx. 35 °C) before changing the oil.
2. Drain off the gear oil by removing the cap on the oil drain pipe.
3. Collect the old oil in a container specifically designed for the purpose.
4. Empty the gear and close off the cap on the oil drain pipe with PTFE sealing tape.
  - ▷ Check for leakage.
5. Remove upper handhole cover and fill the gear housing until the prescribed oil quantity is reached.
6. Use the dipstick to check the level.
7. Never mix different types of oil
8. Do not dispose of oil where it can enter the groundwater.
9. Dispose of old oil as well as cloths contaminated with oil and grease according to prevailing regional regulations.
10. Use of gear oil approved by TK Aufzugswerke GmbH.
11. TK Aufzugswerke GmbH will not be held liable for damage resulting from the use of non-approved lubricants.

### Oil level monitoring

Pull out the oil dipstick to check the oil level, clean and reinsert. Pull the oil dipstick out again. The oil on the dipstick should be within the markings.

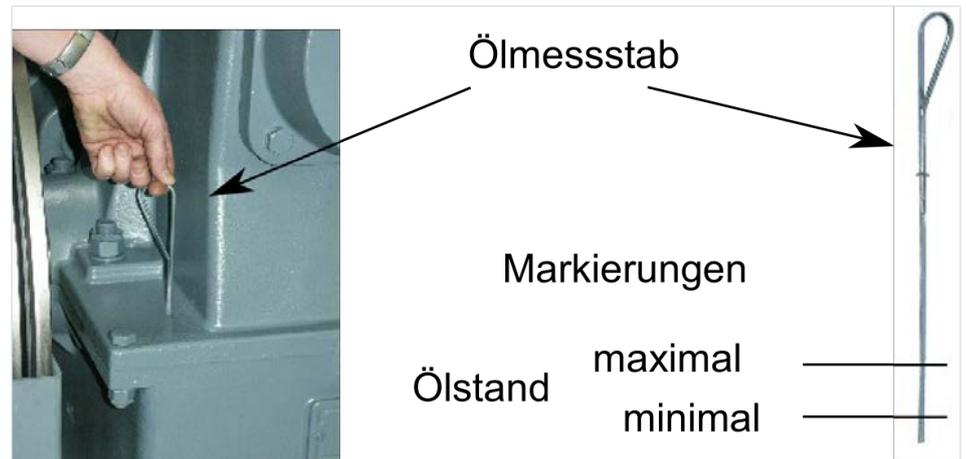


Fig. 43

ATR\_2\_22\_0024\_0

## 9.4

### Check of outside bearings

1. Check clearance between pedestal bearing housing and traction sheave shaft.
    - ▷ Check housing and shafts for signs of chafing.
  2. Check side clearance of the rope guard to the traction sheave.
    - ▷ Check housing and shafts for signs of chafing.
  3. Check right angle between pedestal bearing with bracket and shaft.
    - ▷ Only necessary for installations commissioned before 2004.
- ▷ Anomaly of the above work steps
- Check the bearing of the warehouse with adapter sleeve on the shafts, correct if necessary.
- ▷ ↗ [Chap. 7.10 P. 54](#)

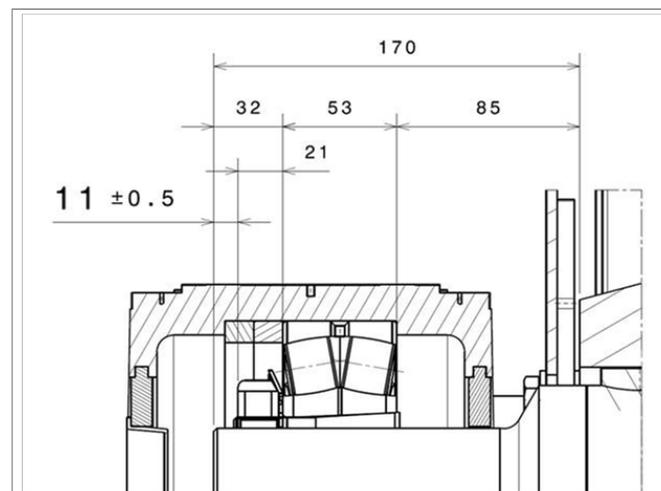


Fig. 44

ATR\_2\_22\_0052\_0

# 10 Appendix

## 10.1 Tightening torques

### DANGER



#### Insecure threaded connection.

Death or severe physical injury due to parts coming loose.

- When working on the machine or replacing parts, care must be taken to ensure that the prescribed bolt/screw strength and tightening torques are complied with.
- Only use suitable tools (torque wrench).

The values listed below apply to screwed connections with **regular threads** (not fine threads):

- Slotted pan head tapping screws DIN 912 ISO 4762
- Hexagon head bolts DIN 931/933 ISO 4014/4017
- These specifications do not apply to microencapsulated bolts/nuts. The specifications of the manufacturer apply here.



If other tightening torques are specified in the drawings or elsewhere in the document for each screw size, these are to be complied with.

Tightness	8.8	10.9	12.9
Screw/bolt size	Tightening torque [Nm]		
M4	2.6	-	-
M5	5.3	-	-
M6	9.0	12	15
M8	20	30	35
M10	40	60	75
M12	75	105	130
M14	120	170	205
M16	190	265	320
M20	370	520	620
M24	640	900	1080
M30	1300	1800	2150

Tab. 17

ASY\_1\_00\_0001\_0

## 10.2 Tightening torques, strength values

	Strength	DIN/ISO	Tightening torque Nm
<b>Disc to worm shaft (brake disc side)</b>			
Cylinder head screw M16 * 40	8.8	4762	150
Detent edged washer SKZ 16			
<b>Disc to worm shaft (bearing cover)</b>			
Cylinder head screw M16 * 40	8.8	4762	180
Detent edged washer SKZ 16			
<b>Motor to gear drive</b>			
Stud M16FO * 40	8.8	939	190
M16 hexagon nut	8	934	190
Detent edged washer SKZ 16			
<b>Brake magnet to housing</b>			
Hexagon screw M16 * 260	8.8	4014	150
M16 hexagon nut		10511	150
<b>Front bearing cover to housing</b>			
Slotted pan head tapping screw M16x60	8.8	4762	120
Detent edged washer SKZ 16			
<b>Rear bearing cover to housing</b>			
Slotted pan head tapping screw M16x60	8.8	4762	150
Detent edged washer SKZ 16			
<b>SA9 Disc to end face of traction sheave</b>			
Cylinder head screw M16 * 60 microencapsulated	10.9	4762	300
Detent edged washer SKZ16			
<b>Outside bearing housing to bracket</b>			
Hexagon screw M24 * 120	8.8	4014	200
Detent edged washer SK M24			
M24 hexagon nut	8	4032	
Bracket to machine base frame			
Hexagon screw M24 * 100		4017	200
Disc A25		7089/ 125	
M24 hexagon nut	8	4032/ 7967	
<b>Pedestal support to gear drive housing</b>			
Hexagon screw M16 * 40	8.8	4017	190
Detent edged washer NSK L 16			
Square taper washer for channels 18		434	
<b>Pedestal support to machine base frame</b>			
Hexagon screw M24 * 80		4017	200
Disc 25		7089	

	Strength	DIN/ISO	Tightening torque Nm
M24 hexagon nut	8	24032	
<b>Traction sheave rim to hub</b>			
Hexagon screw M20 * 90	8.8	4014	330
Hexagon nut M20	8	4032	
Locknut M20		7967	

Tab. 18

ATR\_1.22\_023\_0

## 10.3

## Manufacturer information

Also see about this

➤ [Wachendorff encoder WDG100H--xx-yyyy-ABN-IO5-K3-D56 - assembly instructions P. 75](#)

➤ [Drehgeber Wachendorf WDG 100H - Datenblatt P. 76](#)

WDG100H-xx-yyyy-ABN-I05-K3-D56-zzz  
 xx = Ø 25, 25.4, 28, 30, 38, 40, 42, 45  
 yyyy = PPR = 1024, 2048, 4096  
 zzz = 130 = 13m, 200 = 20m, blank = 10m

**Wachendorff Automation GmbH & Co. KG**  
 Industriestraße 7 • D-65366 Geisenheim  
 Tel.: +49(0)6722/99 65-25  
 Fax: +49(0)6722/99 65-70  
 eMail: wdg@wachendorff.de  
 www.wachendorff-automation.de

### Montageanleitung Hohlwellengeber, D56

Assembly instructions hollowshaft encoder, Notice de montage codeur rotatif à arbre creux, Instrucciones de montaje encoder ad albero cavo, istruzioni di montaggio encoders de eje hueco

(-30 °C ... +80 °C  
 -22 °F ... +176 °F)  
 (-20 °C ... +70 °C  
 -4 °F ... +158 °F)

**Montage nur qualifiziertes Personal**  
 Assembly only qualified personnel  
 Montage par qualifié personnel  
 Montaje solamente personal calificado  
 Montaggio solo personal qualificato

**DIN EN 100015-1**

Kabel ø cable, Câble, Cable, cavo	R1	R2	Temperatur Temperature, Température, Temperatura, Temperatura
6,3 mm	31,5 mm	94,5 mm	T > -20 °C (-4 °F)
8,3 mm	41,5 mm	124,5 mm	T > -20 °C (-4 °F)

	Kabel, cable, Câble, Cable, cavo
	SUBD9 9-pin
	K3
Minus U-	7
Plus U+	9
A	2
B	3
N	5
A inv.	1
B inv.	4
N inv.	6
n. c.	-

**Steckergehäuse/Schirm mit Gebergehäuse leitend verbunden**  
 Connector housing/shield electrically connected to encoder housing  
 Bâtier de connexion/Ecran avec boîtier d'ementeur liés de manière conductrice  
 Caja de conector/Pantalls conectada en conductancia con caja de transmisor  
 scatola prese/Schemo con scatola trasmettitore collegata da condurre

**WH: weiss**, white, blanc, bianco  
**BN: braun**, brown, brun, marrón, marrone  
**GN: grün**, green, vert, verde, verde  
**YE: gelb**, yellow, jaune, amarillo, giallo  
**GY: grau**, grey, gris, gris, grigio  
**PK: rosa**, pink, rose, rosa, rosso  
**RD: rot**, red, rouge, rojo, rosso  
**BK: schwarz**, black, noir, negro, nero  
**BL: blau**, blue, bleu, azul, blu  
**VT: violett**, violet, violet, violeta, violetto  
**Litze: Litze**, Flex, Toron, Cordon, Cavetto

**100H**

d/mm	WDG 100H
25,25.4,28,30,38,40,42,45	

$\frac{t_L}{T} = \frac{t_H}{T} = 50\% \pm 4,2\% *$   
 $360^\circ \text{el} = \frac{360^\circ \text{mech}}{n \text{ Imp.}}$

**alle % bezogen auf 360°el**  
 all % refer to 360°el  
 tous les % se réfèrent à 360°el  
 todos los % se refieren a 360°el  
 tutta la % riferita a 360°el

	Vcc	I <sub>supply</sub>	Output TTL / RS422	I <sub>OUT,max</sub>
<b>G05, H05, I05, R05</b>	4,75...5,5VDC	≤70mA	V <sub>H</sub> >2,5V <sub>DC</sub> V <sub>L</sub> <0,5V <sub>DC</sub>	40mA
<b>Bemerkungen</b> Remarks Notas Observaciones osservazioni			<b>Ohne Last</b> Without load resistance Sans charge Sin carga senza carico	<b>Pro Kanal</b> Per channel Par canal Por canal Per canale

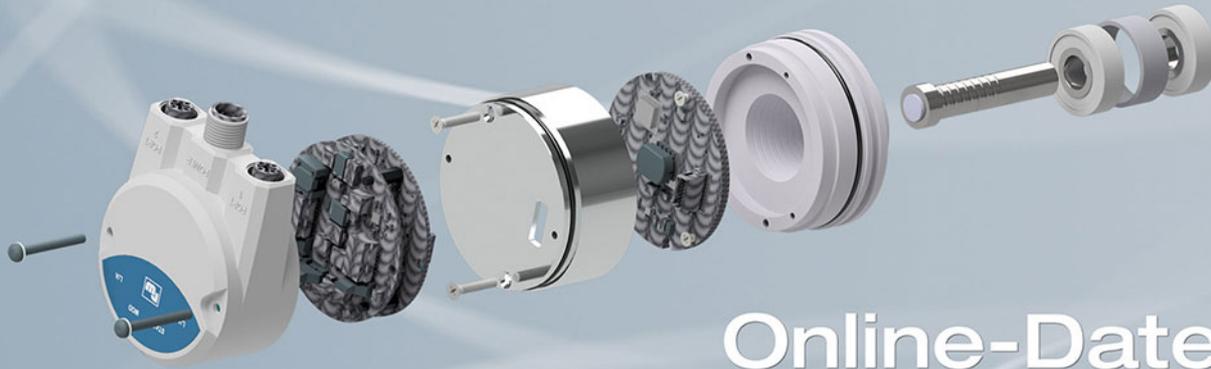
**Abstand zu Störquellen!**  
 Distance to sources of interference!  
 Distance aux source des parasites!  
 Distancia a las fuentes de interferencias!  
 Distanza dalle fonti di disturbo!

$L \leq L_{MAX}$

**\*Nur, only, seulement, solamente, soltanto G24, H24, I24, R24, 245:**  
 hat Verpolschutz, ist kurzschlussfest;  
 Protection against polarity reversal, short circuit protection;  
 Proteccion contro l'inversion de polarité, Protection court-circuit;  
 Protegido contra inversion de polaridad,protección contra cortocircuito;  
 protezione contro inversione di polarità, protezione contro corto circuito

**Technical Support**  
 Germany:  
 Tel.: +49 (0) 67 22 / 99 65 131  
 Fax: +49 (0) 67 22 / 99 65 70  
 email: support-wdgi@wachendorff.de

Other countries, please contact your distributor.  
 Autres pays, veuillez contacter votre distributeur.  
 Otros países, rogamos contacten a su distribuidor.  
 Per gli altri paesi si prega di contattare il vostro distributore.



# Online-Datenblatt

## Drehgeber WDG 100H

[www.wachendorff-automation.de/wdg100h](http://www.wachendorff-automation.de/wdg100h)

### Wachendorff Automation

#### ... Systeme und Drehgeber

- Komplette Systeme
- Industrierobuste Drehgeber für Ihren Anwendungsfall
- Standardprogramm und Kundenversionen
- Höchste zulässige Lasten
- 48 Stunden Eilproduktion
- Fertigung in Deutschland
- Weltweites Distributoren-Netzwerk

# Drehgeber WDG 100H



- Robuster und extrem flacher Hohlwellengeber für den Anbau an Leistungsmotoren
- Durchgehende Hohlwelle mit max. 45 mm Bohrung
- Voller Anschlussschutz bei 10 VDC bis 30 VDC
- Einfache Montage
- Hohe Schutzart IP54
- Bis zu 20.480 I/U
- Optional: -40 °C bis +80 °C, Schutzart IP55 rundum

[www.wachendorff-automation.de/wdg100h](http://www.wachendorff-automation.de/wdg100h)

Auflösung	
Max. Impulszahl	bis 20480 I/U
Mechanische Daten	
Gehäuse	
Flanschtyp	Hohlwelle (durchgehend)
Flanschmaterial	Aluminium
Flanschmaterial Rückseite	Aluminium, beschichtet
Drehmomentstütze	inkl. 1 Drehmomentstütze WDGDS10001
- 1. Federblechausgleich	axial: ±0,8 mm, radial: ±0,2 mm
Gehäusedurchmesser	Ø 100 mm
Welle(n)	
Wellenmaterial	Edelstahl
Anlaufdrehmoment	ca. 1,5 Ncm bei Raumtemperatur
Befestigung	2 x M4, DIN 913; Anzugsdrehmoment: 2,5 Nm
Wellendurchmesser	Ø 25 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 25,4 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 28 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 30 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 32 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N

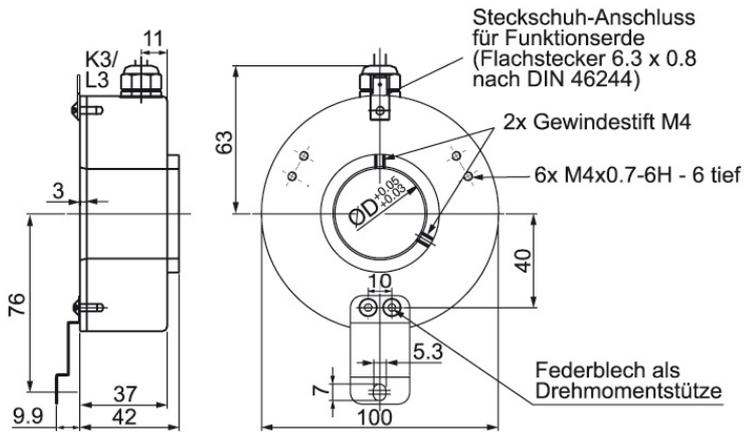
Wellendurchmesser	Ø 35 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 36 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 38 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 40 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 42 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Wellendurchmesser	Ø 45 mm
Wellenlänge	L: 42 mm
Max. Wellenbelastung radial	200 N
Max. Wellenbelastung axial	100 N
Lager	
Lagertyp	2 Präzisionskugellager
Lebensdauer	3 x 10 <sup>10</sup> U bei 100 % Lagerlast 1 x 10 <sup>11</sup> U bei 40 % Lagerlast 1 x 10 <sup>12</sup> U bei 20 % Lagerlast
Max. Betriebsdrehzahl	3500 min <sup>-1</sup>
Kenndaten für funktionale Sicherheit	
MTTF <sub>d</sub>	200 a
Gebrauchsdauer (TM)	25 a
Lebensdauer Lager (L10h)	1 x 10 <sup>12</sup> U bei 20 % Lagerlast und 3500 min <sup>-1</sup>
Diagnosedeckungsgrad (DC)	0 %

<b>Elektrische Daten</b>	
Betriebsspannung/ Eigenstromaufnahme	4,75 VDC bis 5,5 VDC: typ. 100 mA
Betriebsspannung/ Eigenstromaufnahme	5 VDC bis 30 VDC: typ. 70 mA
Betriebsspannung/ Eigenstromaufnahme	10 VDC bis 30 VDC: typ. 100 mA
Ausgangsschaltung	TTL TTL, RS422 kompatibel, inv. HTL HTL, inv. 1 Vss Sin/Cos
Impulsfrequenz	TTL bis 5000 I/U: max. 200 kHz HTL bis 5000 I/U: max. 200 kHz TTL über 1200 I/U: max. 2 MHz HTL über 1200 I/U: max. 600 kHz 1 Vss Sin/Cos: max. 100 kHz
Kanäle	AB ABN und invertierte Signale
Belastung	max. 40 mA / Kanal bei 1 Vss Sin/Cos: min. 120 Ohm
Anschlussschutz	nur bei H24 und R24

<b>Genauigkeit</b>	
Phasenversatz	90° ± max. 7,5 % einer Teilungslänge
Impuls-/Pausenverhältnis	5000 I/U: 50 % ± max. 7 % Ausgangsschaltungen F24, P24, F05, P05, 645: 50 % max. ±10 %

<b>Allgemeine Daten</b>	
Gewicht	ca. 720 g
Anschluss	radialer Kabel- oder Steckerabgang
Schutzart (EN 60529)	IP54
Arbeitstemperatur	-20 °C bis +80 °C 1 Vss: -10 °C bis +70 °C
Lagerungstemperatur	-30 °C bis +80 °C

<b>Weitere Informationen</b>	
Allgemein technische Daten und Sicherheitshinweise <a href="http://www.wachendorff-automation.de/atd">http://www.wachendorff-automation.de/atd</a>	
Passendes Zubehör <a href="http://www.wachendorff-automation.de/zub">http://www.wachendorff-automation.de/zub</a>	

**Kabelanschluss K3, L3 mit 2 m Kabel**

**Beschreibung**
**ABN inv. möglich**
**K3** radial, Schirm offen

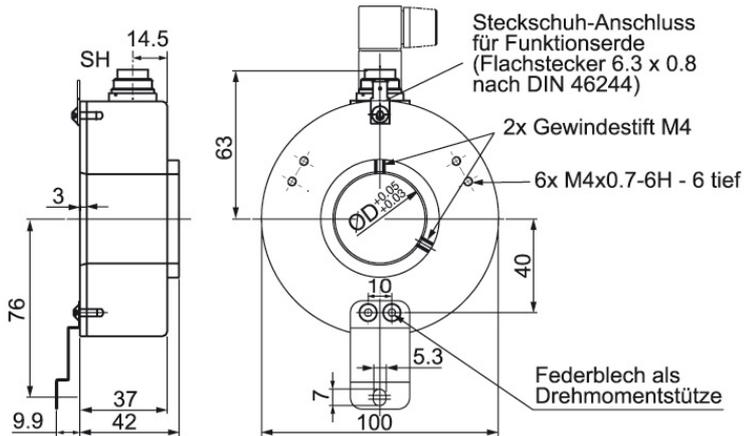
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**L3** radial, Schirm mit Gebergehäuse leitend verbunden

•

**Anschlussbelegungen**

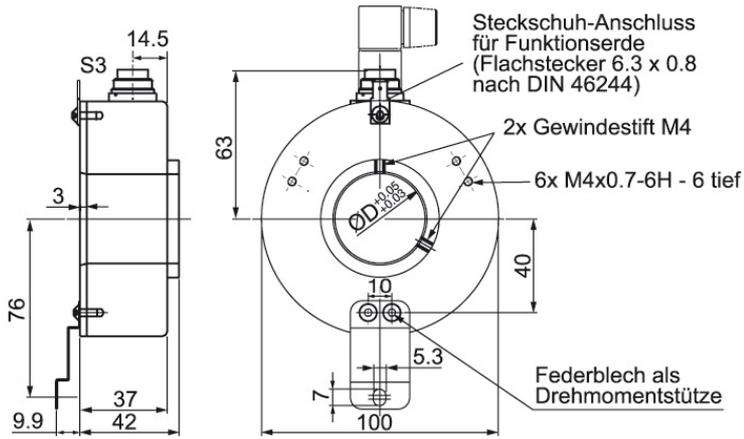
	K3, L3	K3, L3	L3	L3
<b>Schaltung</b>	F05, H05, F24, H24, H30	P05, R05, P24, R24, 245, 645, R30	SIN	SIF
<b>GND</b>	WH	WH	WH	WH
<b>+UB</b>	BN	BN	BN	BN
<b>A</b>	GN	GN	GN	GN
<b>B</b>	YE	YE	GY	GY
<b>N</b>	GY	GY	BK	BK
<b>Frühwarnausgang</b>	-	-	-	RD
<b>A inv.</b>	-	RD	YE	YE
<b>B inv.</b>	-	BK, (BU bei ACA)	PK	PK
<b>N inv.</b>	-	VT	VT	VT
<b>Schirm</b>	Litze	Litze	Litze	Litze

**Stecker (M16x0,75) SH, 5-, 6-, 8-, 12-polig**

**Beschreibung**
**ABN inv. möglich**

<b>SH5</b>	radial, 5-polig, Stecker mit Gebergehäuse leitend verbunden	-
<b>SH6</b>	radial, 6-polig, Stecker mit Gebergehäuse leitend verbunden	-
<b>SH8</b>	radial, 8-polig, Stecker mit Gebergehäuse leitend verbunden	•
<b>SH12</b>	radial, 12-polig, Stecker mit Gebergehäuse leitend verbunden	•

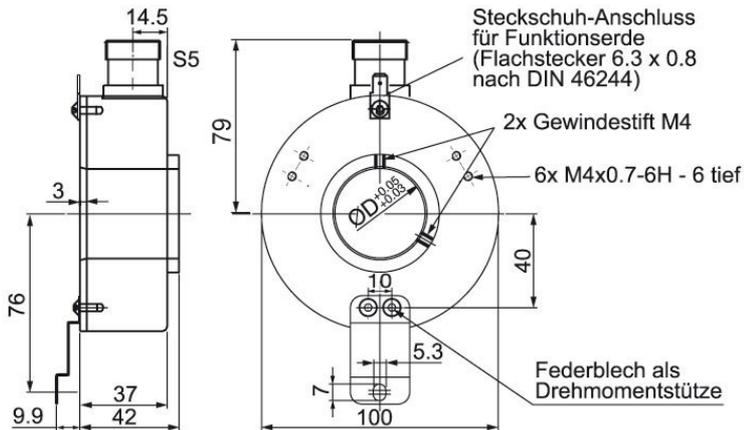
**Anschlussbelegungen**

	SH5	SH6	SH8	SH8	SH8	SH12	SH12	SH12
	5-polig	6-polig	8-polig	8-polig	8-polig	12-polig	12-polig	12-polig
<b>Schaltung</b>	F05, H05, F24, H24, H30	F05, H05, F24, H24, H30	F05, H05, F24, H24, H30	P05, R05, P24, R24, R30, 245, 645	SIN	P05, R05, P24, R24, 245, 645, R30	F05, H05, F24, H24, H30	SIN
<b>GND</b>	1	6	1	1	1	K, L	K, L	K, L
<b>+UB</b>	2	1	2	2	2	M, B	M, B	M, B
<b>A</b>	3	2	3	3	3	E	E	E
<b>B</b>	4	4	4	4	4	H	H	H
<b>N</b>	5	3	5	5	5	C	C	C
<b>Frühwarnausgang</b>	-	-	-	-	-	-	-	-
<b>A inv.</b>	-	-	-	6	6	F	-	F
<b>B inv.</b>	-	-	-	7	7	A	-	A
<b>N inv.</b>	-	-	-	8	8	D	-	D
<b>n. c.</b>	-	5	6, 7, 8	-	-	G, J	A, D, F, G, J	G, J
<b>Schirm</b>	-	-	-	-	-	-	-	-

**Stecker (M16x0,75) S3, 7-polig**

**Beschreibung**
**ABN inv. möglich**
**S3** radial, 7-polig, Stecker mit Gebergehäuse leitend verbunden

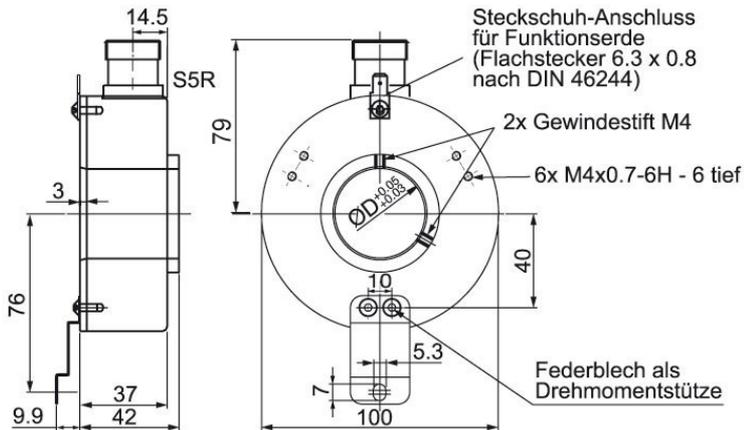
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Anschlussbelegungen	
	<b>S3</b>
	<b>7-polig</b>
	
<b>Schaltung</b>	F05, H05, F24, H24, H30
<b>GND</b>	1
<b>+UB</b>	2
<b>A</b>	3
<b>B</b>	4
<b>N</b>	5
<b>Frühwarnausgang</b>	-
<b>A inv.</b>	-
<b>B inv.</b>	-
<b>N inv.</b>	-
<b>n. c.</b>	6, 7
<b>Schirm</b>	-

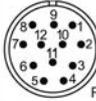
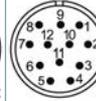
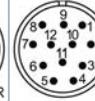
**Stecker (M23) S5, 12-polig**

**Beschreibung**
**ABN inv. möglich**
**S5** radial, 12-polig, Stecker mit Gebergehäuse leitend verbunden

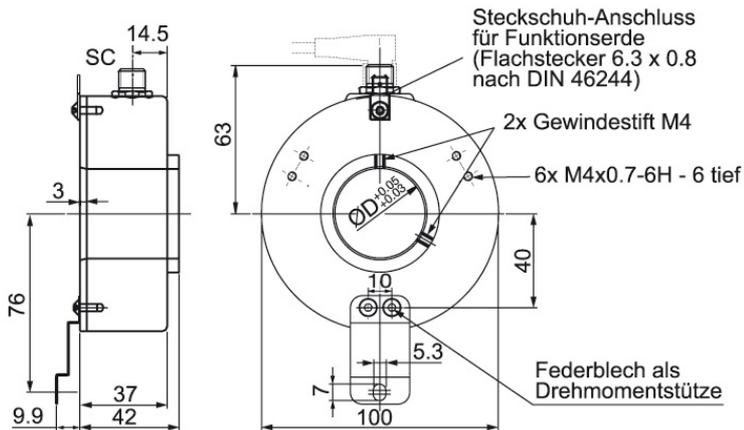
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Anschlussbelegungen				
	S5	S5	S5	S5
	12-polig	12-polig	12-polig	12-polig
				
<b>Schaltung</b>	F05, H05, F24, H24, H30	P05, R05, P24, R24, 245, 645, R30	SIN	SIF
<b>GND</b>	10	10	10	10
<b>+UB</b>	12	12	12	12
<b>A</b>	5	5	5	5
<b>B</b>	8	8	8	8
<b>N</b>	3	3	3	3
<b>Frühwarnausgang</b>	-	-	-	7
<b>A inv.</b>	-	6	6	6
<b>B inv.</b>	-	1	1	1
<b>N inv.</b>	-	4	4	4
<b>n. c.</b>	1, 2, 4, 6, 7, 9, 11	2, 7, 9, 11	2, 7, 9, 11	2, 9, 11
<b>Schirm</b>	-	-	-	-

**Stecker (M23) S5R, 12-polig (rechtsdrehend)**

**Beschreibung**
**ABN inv. möglich**
**S5R** radial, 12-polig, Stecker mit Gebergehäuse leitend verbunden

•

Anschlussbelegungen				
	S5R	S5R	S5R	S5R
	12-polig	12-polig	12-polig	12-polig
				
<b>Schaltung</b>	F05, H05, F24, H24, H30	P05, R05, P24, R24, 245, 645, R30	SIN	SIF
<b>GND</b>	10	10	10	10
<b>+UB</b>	12	12	12	12
<b>A</b>	5	5	5	5
<b>B</b>	8	8	8	8
<b>N</b>	3	3	3	3
<b>Frühwarnausgang</b>	-	-	-	7
<b>A inv.</b>	-	6	6	6
<b>B inv.</b>	-	1	1	1
<b>N inv.</b>	-	4	4	4
<b>n. c.</b>	1, 2, 4, 6, 7, 9, 11	2, 7, 9, 11	2, 7, 9, 11	2, 9, 11
<b>Schirm</b>	-	-	-	-

**Sensor-Stecker (M12x1) SC, 4-, 5-, 8-polig**

**Beschreibung**
**ABN inv. möglich**

<b>SC4</b>	radial, 4-polig, Stecker mit Gebergehäuse leitend verbunden	-
<b>SC5</b>	radial, 5-polig, Stecker mit Gebergehäuse leitend verbunden	-
<b>SC8</b>	radial, 8-polig, Stecker mit Gebergehäuse leitend verbunden	•

**Anschlussbelegungen**

	<b>SC4</b>	<b>SC5</b>	<b>SC8</b>	<b>SC8</b>	<b>SC8</b>
	<b>4-polig</b>	<b>5-polig</b>	<b>8-polig</b>	<b>8-polig</b>	<b>8-polig</b>
					
<b>Schaltung</b>	F05, H05, F24, H24, H30	F05, H05, F24, H24, H30	F05, H05, F24, H24, H30	P05, R05, P24, R24, R30, 245, 645	SIN
<b>GND</b>	3	3	1	1	1
<b>+UB</b>	1	1	2	2	2
<b>A</b>	2	4	3	3	3
<b>B</b>	4	2	4	4	5
<b>N</b>	-	5	5	5	7
<b>Frühwarnausgang</b>	-	-	-	-	-
<b>A inv.</b>	-	-	-	6	4
<b>B inv.</b>	-	-	-	7	6
<b>N inv.</b>	-	-	-	8	8
<b>n. c.</b>	-	-	6, 7, 8	-	-
<b>Schirm</b>	-	-	-	-	-

## Optionen

### Niedrig Temperatur

### Bestell-Code

Der Drehgeber WDG 100H mit den Ausgangsschaltungen F24, H24, P24, R24, F05, H05, P05, R05, 245, 645 ist auch mit dem erweiterten Temperaturbereich -40 °C bis +80 °C (gemessen am Flansch) lieferbar.

**ACA**

### IP55 rundum (nicht bei 1 Vss Sin/Cos)

### Bestell-Code

Der Drehgeber WDG 100H ist auch mit der hohen Schutzart IP55 rundum lieferbar.

**ACP**

Max. Betriebsdrehzahl: 1500 min<sup>-1</sup>

Zulässige Wellenbelastung, axial: 100 N

Zulässige Wellenbelastung, radial: 120 N

Max. Impulszahl: 5000 I/U

Anlaufdrehmoment: ca. 5 Ncm bei Raumtemperatur

### Kabellänge

### Bestell-Code

Der Drehgeber WDG 100H ist auch mit mehr als 2 m Kabel erhältlich. Die max. Kabellänge ist abhängig von der Betriebsspannung und der Frequenz; siehe [www.wachendorff-automation.de/atd](http://www.wachendorff-automation.de/atd)

**XXX = Dezimeter**

Bei der Bestellung ergänzen Sie bitte die Bestellnummer mit einer 3-stelligen Ziffer welche die Länge in Dezimeter angibt.

Beispiel: 5 m Kabellänge = 050

Beispl. Bestell-Nr.	Typ		Ihr Drehgeber		
WDG 100H	WDG 100H		WDG 100H		
	<b>Hohlwellendurchmesser</b>				
25	25; 1Z=Ø 25,4 mm, Ø 1"; 28; 30; 32; 35; 36; 38; 40; 42; 45				
	<b>Impulszahlen:</b>				
1024	512, 1024, 2048, 2500, 3600, 4096, 4500, 5000, 8192, 10240, 16384, 20480 1 Vss Sin/Cos nur bei 1024, 2048 Andere Impulszahlen auf Anfrage				
	<b>Impulsfolge:</b>				
ABN	AB, ABN				
	<b>Ausgangsschaltung</b>				
H24	<b>Auflösung I/U</b>	<b>Betriebsspannung VDC</b>	<b>Ausgangsschaltung</b>	<b>Frühwarnausgang</b>	<b>Bestellschlüssel</b>
	bis 2500	5 - 30	HTL	-	H30
		5 - 30	HTL invertiert	-	R30
	bis 5000	4,75 - 5,5	TTL	-	H05
		4,75 - 5,5	TTL, RS422 komp., invertiert	-	R05
		10 - 30	HTL	-	H24
		10 - 30	HTL invertiert	-	R24
	8192 bis 20480	10 - 30	TTL, RS422 komp., invertiert	-	245
		4,75 - 5,5	TTL	-	F05
		4,75 - 5,5	TTL, RS422 komp., invertiert	-	P05
		10 - 30	HTL	-	F24
	1024, 2048	10 - 30	HTL invertiert	-	P24
		10 - 30	TTL, RS422 komp., invertiert	-	645
		4,75 - 5,5	1 Vss Sin/Cos	•	SIF
		4,75 - 5,5	1 Vss Sin/Cos	-	SIN
		<b>Elektrischer Anschluss</b>			
K3	<b>Beschreibung</b>			<b>ABN inv. mögl.</b>	<b>Bestellschlüssel</b>
	<b>Kabel: Länge (2 m Standard, WDG 58T: 1 m)</b>				
	radial, Schirm offen			•	K3
	radial, Schirm mit Gebergehäuse leitend verbunden			•	L3
	<b>Stecker: (Stecker mit Gebergehäuse leitend verbunden)</b>				
	Stecker, M16x0,75, 5-polig, radial			-	SH5
	Stecker, M16x0,75, 6-polig, radial			-	SH6
	Stecker, M16x0,75, 8-polig, radial			•	SH8
	Stecker, M16x0,75, 12-polig, radial			•	SH12
	Stecker, M16x0,75, 7-polig, radial			-	S3
	Stecker, M23, 12-polig, radial			•	S5
	Stecker, rechtsdrehend, M23, 12-polig, radial			•	S5R
	Sensorstecker, M12x1, 4-polig, radial			-	SC4
	Sensorstecker, M12x1, 5-polig, radial			-	SC5
Sensorstecker, M12x1, 8-polig, radial			•	SC8	
	<b>Optionen</b>				
	<b>Beschreibung</b>			<b>Bestellschlüssel</b>	
	Keine Option gewählt			Leer	
	Niedrig Temperatur			ACA	
	IP55			ACP	
Kabellänge			XXX = Dezimeter		

<b>Bsp-Bestell-Nr. =</b>	WDG 100H	25	1024	ABN	H24	K3		WDG 100H						<b>Ihr Drehgeber</b>
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## Ansprechpartner



Für technische Fragen  
(Anwendungsberatung, Anpassungsentwicklung, inkrementale Drehgeberauswahl)  
wenden Sie sich bitte an:

Technische Anwendungsberatung inkrementale Drehgeber

**Thomas Post**

Tel: +49 6722 9965131

Fax: +49 6722 996570

E-Mail: [support-wdgi@wachendorff.de](mailto:support-wdgi@wachendorff.de)



Für kaufmännische Fragen und Angebote  
wenden Sie sich bitte an:

Vertriebsinnendienst

**Tatjana Weigelt**

Tel: +49 6722 9965242

Fax: +49 6722 996570

E-Mail: [sales-wa@wachendorff.de](mailto:sales-wa@wachendorff.de)



Im deutschsprachigen Ausland  
wenden Sie sich bitte an:

Ihren Distributor

<https://www.wachendorff-automation.de/distributoren.html>



Wachendorff Automation GmbH & Co. KG  
Industriestrasse 7 • D-65366 Geisenheim

Tel: +49 67 22 / 99 65 25

Fax: +49 67 22 / 99 65 70

E-Mail: [wdg@wachendorff.de](mailto:wdg@wachendorff.de)

[www.wachendorff-automation.de](http://www.wachendorff-automation.de)



# List of abbreviations

## A

$\alpha$	Wrap angle [°]
A	Clearance dimension, elevator car to rail head
AB	Mounting / exceptional load
AE	Support level
$A_{GES}$	Available area
ak	Edge clearance, groove hardening with double inductor vee groove
as	Edge clearance, groove hardening with double inductor, seat groove
ASL	Distance between rope departures
ass	Clearance support to pit bottom

## B

b	Total width of traction sheave
B	Undercut width
$b_E$	Width of traction sheave minus effective edge take-in
BDM	Inlet diameter
BELAG	Flooring material
bk	Auxiliary variable b for vee grooves
Bko	Width of bracket
BL	Plate version
bs	Auxiliary variable b for seat grooves
BS	Flooring material thickness
$B_{Trav}$	Width of bracket / cross-beam
BT	Mounting part
BT-S	Mounting part – shaft wall D = wall plug / A = anchor rail

## C

c/h	Number of runs/hour
CAR	Elevator car
CD-A-fix	Car door toeguard fixed upright
CD-A-tel	Car door, telescopic toeguard
CR	Compensation ropes / chains
CS	Safety gear frame [-]
CSA	Canadian Standards Association
CWT	Counterweight - type

## D

DBR	Diameter of governor wheel
$D_p/DA$	Pulley / axle diameter
dRS	Diameter of rope pulley groove
IWRC	<b>I</b> ndependent <b>W</b> ire <b>R</b> ope <b>C</b> ore
dR	Seat groove diameter

$d / d_r$	Suspension rope diameter
$D_s$	Rope diameter
$D_T$	Effective traction sheave diameter
$D_p / D_{SR}$	Pulley diameter
DW	Double wrap
dRT	Diameter of traction sheave groove
<b>E</b>	
E	Door recess
ED	Duty cycle
E/LF	Deployment / load case
EM	Setting dimension back of the rail / leading edge of adjustable bracket to shaft wall
ESD	Duty cycle
EVO	System Evolution
<b>F</b>	
F	No (False)
F	Clearance of rail to headroom ceiling
$F_{pmin\_required}$	Minimum required load applied on rope pulley
$F_{pzul}$	Permitted axle load of the rope pulley
$F_t$	Shaft load of the traction sheave
$F_{t\ zul}$	Permitted radial shaft load
$F_{t\_dyn\_perm\_DW}$	Permitted dynamic double wrap shaft load
$F_{t\_dyn\_perm\_SW}$	Permitted dynamic single wrap shaft load
$F_{t\_stat\_perm\_DW}$	Permitted static double wrap shaft load
$F_{t\_stat\_perm\_SW}$	Permitted static single wrap shaft load
FA	Guide mounting (not integrated)
FBOH	Car floor height
FBEH	Elevator car mounting height
FC	Fibre core
FEDER	Spring buffer
fGG	Buffer stroke counterweight
FH / H / afh	Travel height
FI	Frequency inverter
FKBODRH	
FKF-INT-GF	Car guide rail, integrated sliding guide
FKF-INT-RF	Car guide rail, integrated pulley guide
FKU	Distance car floor to safety gear buffer plate
FK	Car
fFK	Buffer stroke elevator car
FKSTM	Car gauge between rails
FKTYP	Elevator car type
$F_k$	Buckling force [N]
FLOH	Flat top beam
$F_p$	Push-through force of all mounting levels per rail [N]

FS <sub>A</sub>	Guide shoe clearance
F-Typ	Guide type
FV	Safety gear
<b>G</b>	
G	Cast iron
GBS	Rope for speed governor
g <sub>n</sub>	Normal acceleration [m/s <sup>2</sup> ]
GBS	Rope for speed governor
GF	Sliding guide
GFH	Counterweight filler weight height
GG	Counterweight
GGB	Counterweight width
GGH	Counterweight height
GG <sub>Opti</sub>	flat counterweight
GGR	Counterweight guide clearance
GGSTM	Counterweight gauge
GGT	Counterweight depth
GH max	Railing height max.
GH min	Minimum railing height
<b>H</b>	
h	Stroke
H	Buffer height
H <sub>OS</sub>	Distance from the upper edge of the top beam to the rope pulley cover
H <sub>US</sub>	Distance from the upper edge of the top beam to the rope pulley protection
h1	Rail height, mounting rail clip
hFK	Elevator car guide clearance
hGG	Counterweight guide clearance
h1	Rail height, mounting rail clip
HF	Height of bottom guide connection
HGE	Height buffer and guide base
HO	Distance car ceiling to lower edge of top beam
HP	Height of buffer
HRc	Rockwell hardness
HST	Landing
HU	Height of bottom beam
HUP	Height of bottom beam with buffer plates
<b>I</b>	
I RED-SK	Headroom reduction
I <sub>max.</sub>	Maximum distance between fastenings
I-FA	Integrated guide mounting
i <sub>pcar</sub>	Number of pulleys on elevator car side [-]
<b>J</b>	

**K**

K1	Plastic
KB (akb)	Car width
KH	Car height
$k_i$	Impact factor with different load cases [-]
KL	Folding ladder
KT	Car depth
KTv	Car depth, front
KTh	Car depth, rear

**L**

L	Left-hand version
LB	Clear width
LHW	Length of vertical angle

**M**

M	Middle offset
$M_{aux}$	Force from auxiliary or extra equipment on a rail [N]
$M_B$	Braking torque
MBL	Length of magnetic tape
$M_{Comp}$	Mass of compensating rope tensioning device with diverter pulleys / mass of the compensating parts or chains
$M_{CR}$	Mass of compensating ropes / chains, return side
$M_{CAR}$	Mass of the empty driving unit without attached masses
$M_{CWT}$	Mass of counterweight with diverter pulleys
$M_{cwt\ max}$	Counterweight - max. mass
$m_{FREGEL}$	Mass of control device
$M_A$	Starting torque
Mat	Material
Mat.-Dt	Material - traction sheave diameter;
$M_g$	Mass of a rail track [kg]
$m_{GES}$	Maximum carried mass
$m_{GG}$	Permitted overall mass of counterweight
$M_{TRAV}$	Mass of travelling cables
MT/MTR	Machine carrier
$m_{T,BI}$	Mass of fastening panel
M-Typ	Motor type
Motor type	Drive type
MR	Machine base frame
MR Typ	Machine base frame type
MR Version	Machine base frame version (L = left, R = right, V = front, H = rear)
MRE	Machine room unit
MRL	Machine-room-less

**N**

n	Number
$n_{M\_ISO}$	Number of machine insulation elements
$n \times d_r$	Number x diameter of traction sheave
$n_B$	Number of buffers
n.a.	as per design
(N)	Normal travel
NB	Normal load
NC	Normally closed (break contact)
nCR	Number of compensating / compensation chains
$n_{F\_SEA\_GG}$	Number of elastomer spring counterweight rope anchorage
NO	Normally open (make contact)
$n_P$	Number of buffers [-] / number of rope pulleys
$n_r$	Number of suspension ropes [-]
$n_{r\ max.}$	Maximum number of ropes
$n_S$	Number of suspension ropes
ns - Typ	Suspension rope – number - type
$n_T$	Number of travelling cables [-]
$n_{WAB}$	Number of wall connection points
$n_{WB}$	Number of wall connection points
$n_{WB}$	Number of wall fastening points D = wall plug
<b>O</b>	
$O_{1-n}$	Load points [kN]
OEL	Oil buffer
OFF	Finished floor level/upper edge
$OH_F$	Flat top beam
ÖÜF	Upper total overtravel elevator car
<b>P</b>	
P	Mass empty of car (including parts hanging on elevator car)
$P_{1-n}$	Load points [kN]
PA	Distance of the buffers
PFF	Activation of buffer, elevator car
PFG	Activation of buffer, counterweight
$P_{max.}$	Max. mass of car
PP	Buffer plates
<b>Q</b>	
Q	Rated load
q	Counterweight compensation, in %
<b>R</b>	
r (R)	Suspension
r	Reeving factor [-]
R	Right-hand version
RA	(rope pulley) axle distance

RA	Groove gap dimension (centre-to-centre distance between ropes)
Red Typ	Reduction type
RF	Pulley guide
RS-RC	Rope suspension with rear counterweight
RS-SC	Rope suspension with side counterweight
RT	Rail type [-]
RT <sub>car</sub>	Rail type, elevator car
RT <sub>cwtr</sub>	Rail type, counterweight
RUS	Russia
<b>S</b>	
S	Stopping distance max.
SB	Shaft width
SBL	Shaft width, left
SBR	Shaft width, right
SC	Synchron Compact
SEA	Rope anchorage
SEB	Rope end fastening
SET	Cable end carrier
SF	Synchronous Fast
SG	Shaft pit
SG min.	Shaft pit min.
S <sub>ges</sub>	Total stopping distance
SK	Shaft headroom
SK <sub>min.</sub>	Min. headroom
SKE	Shaft headroom unit
SPR	Safety gear frame interlock
SR	Safety clearance
SRISO	Rope pulleys, insulated
SRISO-OH	Rope pulley isolation, top beam
ST	Shaft depth
STA	Brace mounting (on FleCS F4) -> T/F = True / False (yes / no)
STM	Distance between rails
STM <sub>max1</sub>	Elevator car gauge, limit value 1
STRG	Control system generation
STWH	Minimum floor height [m] for door mounting
SW	Single wrap
<b>T</b>	
T	Yes (True)
t	Duration of creepage
t	Dimension for protrusion or negative protrusion of outermost diameter of rope pulley or traction sheave in relation to their nominal diameter

$T_{ABV}$	Door offset
$T_{nom}$	Undercut depth – for unhardened traction sheaves
$T_{min}$	Undercut depth - minimum permissible value: for hardened traction sheaves (standard)
TB	Door width
TBv	Door offset
TH	Door height
TH max.	Max. door height
TLD	Program for the calculation of elevator specifications
TM	Door dimension
TR	Friction system
TT	Door depth
T-Typ	Door type
<b>U</b>	
UCM	Unintended elevator car movement
UHP	Buffer on bottom beam
UK (Comp.)	Balance chain
UKA	Balance chain mounting
UKF	Balance chain guide
USA	Mounting under ropes
USPV	Tensioner device for compensation rope
U type / UT	Inverter type
<b>V</b>	
$v_N$	Rated speed
VCI	Volatile Corrosion Inhibitor
$v_{insp}$	Inspection speed including monitoring
VZ	Preferred value
<b>W</b>	
WA (awand)	Space between walls
WB	Wall fastening
w-cr/wo-cr	with/without current regeneration
WS	Wall thickness
<b>X</b>	
<b>Y</b>	
<b>Z</b>	
z	Number of grooves or ropes
Z	Additional dimension
Z/D	Push / pull
$z_F$	Additional distance spring clip



TK Aufzugswerke GmbH  
Bernhäuser Straße 45  
73765 Neuhausen a.d.F., Germany  
P: +49 7158 12-0  
[doku.elevator.plant.de@tkelevator.com](mailto:doku.elevator.plant.de@tkelevator.com)

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