

OPERATING INSTRUCTIONS

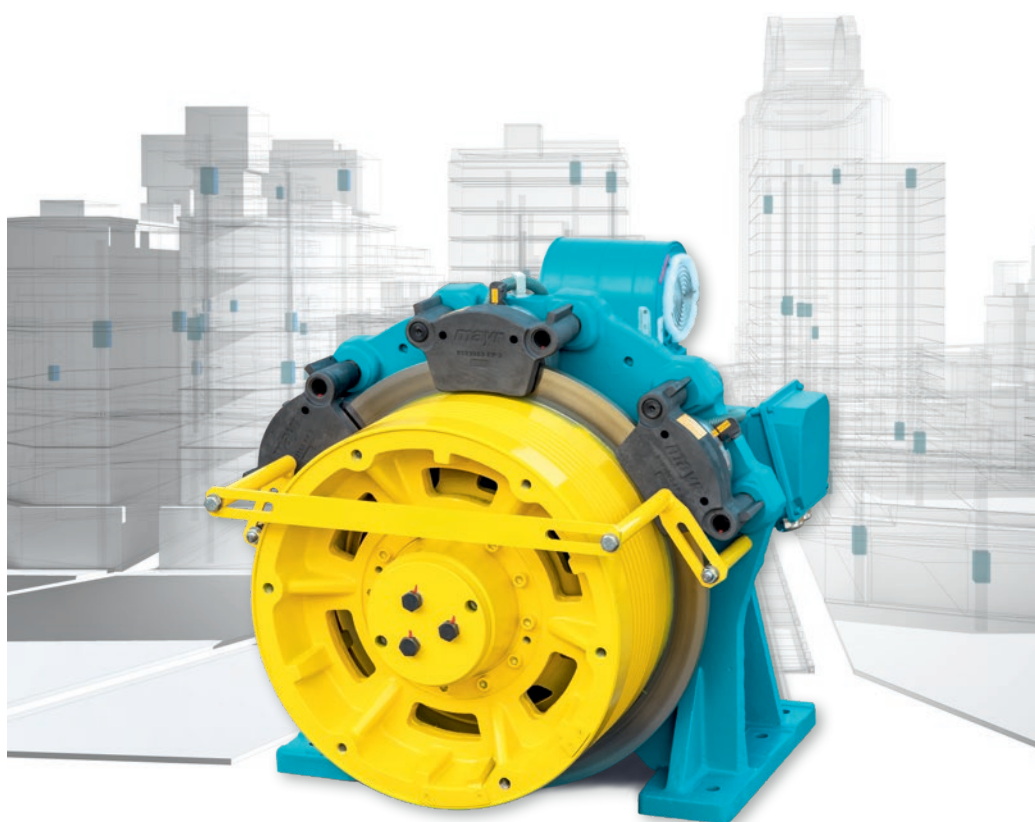
WSG-21

GEARLESS LIFT MACHINE

Code **GM.8.003647.EN**

Version **C15**

Date **06. Feb 2024**



Translation of the Original Operating Instructions

[Download the Operating Instructions](#)

No part of this publication may be reproduced or translated, even in part, without prior written permission from WITTUR.

Subject to change without notice!



info.wed@wittur.com
www.wittur.com

© Copyright WITTUR 2024

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 2

These operating instructions are applicable to lift machines:

WSG - 21.2-

WSG - 21.3-

date: 06. Feb 2024 version: C15

WITTUR Electric Drives GmbH reserves the right to correct or change the contents of this manual and these product details without prior notice. We expressly reserve the right to make technical changes which improve the lift machines or their safety standards without prior notice. No liability can be accepted for damage, injuries or expense arising therefrom. We cannot guarantee the correctness and completeness of the details.



WITTUR Electric
Drives GmbH



Offenburger Str. 3
D-01189 Dresden
Germany

Tel.: +49 (0) 351-40 44-0
Fax: +49 (0) 351-40 44-111

info.wed@wittur.com
www.wittur-edrives.de

Document history

Date	Version	Modifications
14. May 2019	0.13	Complete revision; updated version of the brake operation instructions
04. June 2019	0.14	Lever block (manual release) was extended by protection cover
12. Nov 2019	0.15	Danger if brake air gap is too large (measurement); Update when motors are stored for a long time
23. Mrz 2020	0.16	Motor terminal box with 2xM20 cable entries; Sub item „Earthing, potential equalization, EMC“ added; further small corrections;
10. Jul 2020	0.17	Marking the brake initial position; revision chapter „Electrical Installation“
01. Mrz 2021	0.18	Dimensional drawings of brake control units added; brake control updated; accessories and spare parts added;
20. Sep 2021	0.19	New remote brake control by Bowden cable
08. Apr 2022	0.20	New EU Declaration of Conformity; chapter “Spare parts” - reference to new document “Spare part catalogue”; options for rope slip-off guard
16. May 2022	0.21	Chapter „Special features for use according to ASME 17.1“ added
14. Oct 2022	0.22	Fixing the options “rope slip-off guards” ; Changing the layout
02. Feb 2023	C12	Use of an optimised brake; updated operating instructions/certificate of the brake; updated EU declaration of conformity
27. Jun 2023	C13	Modification of Bowden cables for remote control of the brake
21. Dec 2023	C14	Additions to product description
06. Feb 2024	C15	Recommended installation of the return motion device updated

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 3

Contents

1. General information	4	10. Technical data	30
1.1. About this operating manual	4	11. Dimension drawing	31
1.2. Intended use	4	12. Accessories	32
1.3. Scope of delivery	4	12.1. Connecting cable for measuring systems for ECN 1313 and ERN 1387	32
1.4. Warranty and liability	4	12.2. Potential equalisation	32
2. Safety	5	12.3. Cable set for motor and brake	33
2.1. General safety instructions	5	12.4. Rope clamp	33
2.1.1. Qualified personnel	5	12.5. Remote brake control by Bowden cable	33
2.1.2. Format of the safety instructions	5	12.6. Return motion device	36
2.2. Safety precautions	5	13. Spare parts	39
3. EU Declaration of Conformity	6	14. Annex	39
4. Type code	7	14.1. Special features for use in elevator systems according to ASME A17.1	39
5. Handling	8	14.2. EU type-examination Certificate No. 15656/1	40
5.1. Transport	8	14.3. Brake operating instructions	49
5.2. Storage	8		
5.3. Disposal	8		
6. Product overview	9		
6.1. Product description	9		
6.2. Permissible ambient conditions	10		
7. Installation	11		
7.1. Mechanical installation	11		
7.2. Electrical installation	13		
7.2.1. General	13		
7.2.2. Motor connection / Winding protection / Fan	13		
7.2.3. Speed/Position measuring system	15		
7.2.4. Brake	16		
7.2.5. Earthing, potential equalisation, electromagnetic compatibility (EMC)	19		
7.3. Overview	20		
8. Commissioning and operating	21		
8.1. Important notes	21		
8.2. Emergency evacuation	22		
8.3. Testing the brake system to EN 81	23		
8.4. Trouble shooting	24		
9. Maintenance	25		
9.1. General	25		
9.2. Maintenance intervals	25		
9.3. Regreasing the bearings	26		
9.4. Check brake air gap	27		
9.5. Fan filter mats	27		
9.6. Replacing the traction sheave	28		
9.7. Replacing the measuring system	29		

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 4

1. General information

1.1. About this operating manual

The purpose of this operating manual is to ensure that any work on WSG-21 lift machines is carried out safely. Please regard it as part of the product and keep it within easy reach.

All persons working on or with WSG-21 lift machines must have read and understood this operating manual.

1.2. Intended use

WSG-21 lift machines are intended for use as gearless drives for rope lifts and they must never be connected directly to the mains supply. They may only be used for their intended purpose and with all safety devices in proper working order. WSG-21 lift machines are intended for use in an enclosed, lockable operating area to which only qualified personnel and personnel authorised by the customer have access.

WSG-21 lift machines may only be operated under the conditions described in this manual and with due regard to their performance limits.

WSG-21 lift machines are not ready-to-use products; they may only be operated after they have been installed in lift systems and their safe operation has been ensured by taking the appropriate measures.

1.3. Scope of delivery

The WSG-21 lift machines are customised to meet individual requirements. The exact scope of delivery can be found in the accompanying documentation.

1.4. Warranty and liability

Our „Conditions of Sale and Delivery“ shall apply for all our supplies and services.

Any warranty claims must be made immediately upon discovery of the deficiency or defect.

We do not accept any warranty or liability claims for personal injury or property damage resulting from one or more of the following causes:

- Improper use of the WSG-21 lift machine
- Improper installation, commissioning, operation or maintenance
- Operation of the WSG-21 with defective and/or inoperative safety or protective devices
- Non-compliance with the instructions contained in the operating manual or other documentation supplied
- Unauthorised construction modifications to the WSG-21
- Insufficient monitoring of parts subject to wear
- Repairs carried out improperly
- Emergencies caused by external forces or force majeure.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 5

2. Safety

2.1. General safety instructions

2.1.1. Qualified personnel





Only qualified personnel are authorised to perform any planning, installation or maintenance work, and this must be done in accordance with the relevant instructions. The personnel must be trained for the job and must be familiar with the installation, assembly, commissioning and operation of the product.

2.1.2. Format of the safety instructions

The safety instructions contained in this operating manual are presented in a standardised format.

They comprise a danger symbol + signal word + instruction text. The danger symbol indicates the type of danger, the signal word specifies the severity of the danger, and the instruction text describes the danger and explains how to avoid it.

Danger symbols

	Risk of electric shock		Property damage
	General danger		Information

Signal words

- **DANGER** Serious injuries or death will result.
- **WARNING** Serious injuries or death may result.
- **CAUTION** Minor to moderate injuries may result.
- **NOTICE** Property damage may result.
- **Information** Points out useful information.

2.2. Safety precautions

- Check the proper functioning of the motor and the brake after installing the machine.
- Repairs may only be carried out by the manufacturer or an authorised repair agency. Unauthorised opening and tampering may result in injuries to persons and property.
- The machines are not designed for direct connection to the three-phase system but are to be operated via an electronic frequency inverter. Direct connection to the mains may damage the motor beyond repair.
- High surface temperatures may occur on the external parts of the machine. Therefore, no temperature-sensitive parts may be in contact with these parts or attached to them. Protection against accidental contact should be provided, if required.
- The EU type-examined fail-safe brakes provided are designed only for a limited number of emergency braking operations. They must not be used as working brakes.
- If the brake air gap exceeds the permissible value, the braking torque may be significantly reduced.
- If the motor is not energised, no torque is produced. This may result in uncontrolled acceleration of the lift, if the brakes are released. Therefore, the motor winding should be short-circuited to produce a speed-dependent braking torque while the motor is not supplied with current. (Use the main contacts for short-circuiting as rated motor current may be flowing.) The motor must never be short-circuited while it is energised.
- High voltages are present at the terminal connections during the operation of synchronous motors.


Gearless Lift Machine

WSG-21


Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 6

3. EU Declaration of Conformity



WITTUR Electric
Drives GmbH



EU-Konformitätserklärung

EU Declaration of Conformity

im Sinne der EG-Maschinenrichtlinie (2006/42/EG)
as defined by the EG Machinery Directive (2006/42/EG)

Der Hersteller
The manufacturer

WITTUR Electric Drives GmbH
Offenburger Straße 3
D-01189 Dresden
Deutschland / Germany

erklärt hiermit, dass die folgenden Produkte
certifies that the following products

Produktbezeichnung:
Product designation:

Getriebelose Aufzugsmaschinen vom Typ: WSG-..., WGG-..., WSU-..., WGU-..., OSG-..., OGG-..., HSG-..., HGG-...
Gearless lift machines of the type:

den Bestimmungen der folgenden EU/EG-Richtlinien entsprechen:
are in conformity with the following specification of the EU/EG Directives:

- **Maschinenrichtlinie 2006/42/EG**
Machinery Directive 2006/42/EG
- **EMV-Richtlinie 2014/30/EU**
EMC Directive 2014/30/EU

Folgende Normen sind angewandt:
The following standards are in use:

EN ISO 12100:2010
Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze - Risikobeurteilung und Risikominderung
Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 60034-1:2011
Drehende elektrische Maschinen; Teil 1: Bemessung und Betriebsverhalten
Rotating electrical machines; Part 1: Rating and performance

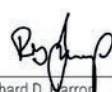
EN 81-20:2020
Sicherheitsregeln für die Konstruktion und den Einbau von Aufzügen - Aufzüge für den Personen- und Gütertransport - Teil 20: Personen- und Lastenaufzüge
Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 20: Passenger and goods passenger lifts

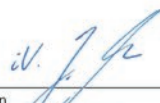
DIN EN 60204-1:2019
Sicherheit von Maschinen; Elektrische Ausrüstung von Maschinen; Teil 1: Allg. Anforderungen
Safety of machinery - Electrical equipment of machines. Part 1: General requirements

EN 12015:2021
Elektromagnetische Verträglichkeit - Produktfamilien-Norm für Aufzüge, Fahrtreppen und Fahrsteige - Störaussendung
Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Emission

Erstmalige Anbringung der CE-Kennzeichnung: 1999
Date of first application of CE-mark: 1999

Dresden, 2023-05-25
(Ort, Datum)
(Place, date)


 Richard D. Herro
Geschäftsführer
Plant Manager


 Jens Martin
Leiter Entwicklung/Vertrieb
Head of Development/Sales

EU-Conformity_WSG_ed25May2023

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 7

4. Type code

Example:	W	S	G-	21	.	2	-	0	0	23	/	6 5 A	-	Z F
Customer specific identifier	W	S	G-	Z1 Z2	.	Z3	-	X1	X2	X3 X4	/	X5 X6 X7	-	X8 X9
S: Synchronous motor														
G = gearless														
U = gearless; UL-CSA approved														
Z1 Z2: Frame size														
Z3: Overall length 2 overall lengths are available; identified by: 2, 3														
X1: Customer specific identifier														
X2: Motor voltage 0 - $U_N = 400 \text{ V} / U_{ZK} = 500...620 \text{ V DC}$														
X3 X4: Rated speed n_N z.B. 11 - 118 rpm (with $D_T = 650 \text{ mm}$ $v = 2,0 \text{ m/s}$; suspension 2:1) 21 - 216 rpm (with $D_T = 530 \text{ mm}$ $v = 3,0 \text{ m/s}$; suspension 2:1) 23 - 235 rpm (with $D_T = 650 \text{ mm}$ $v = 4,0 \text{ m/s}$; suspension 2:1)														
X5 X6 X7: Traction sheave design (Traction sheave diameter; width, groove design, groove geometry)														
X8 X9: Variant code (brake, measuring system, modifications) ZE: 3 clasp brakes; measuring system ECN 1313-2048 incr. - SSI-interface ZF: 3 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface ZG: 3 clasp brakes; measuring system ERN 1387-2048 incr. 2E: 2 clasp brakes; measuring system ECN 1313-2048 incr. - SSI-interface 2F: 2 clasp brakes; measuring system ECN 1313-2048 incr. - ENDAT-interface														

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 8

5. Handling

5.1. Transport

- Climate class: 2K3 according EN 60721
- Transport temperature: -20°C bis +60°C, max. 20 K/hour fluctuated
- Transport air humidity: max. relative humidity 85 % at 20°C (no moisture condensation)
- The lift machines leave the factory in perfect condition after being tested. Make a visual check for any external damage immediately upon their arrival on site. If any damage is found to have occurred in transit, make a notice of claim in the presence of the carrier. If appropriate, do not put these machines into operation.
- Do not expose the motor to any shocks or impact.
- Observe the relevant safety regulations and take the centre of gravity into account when handling the lift machines.
- Check that the eyebolts are tightly fitted before using them and use only suitable lifting equipment.



- ▶ The eyebolts are designed for the specified machine weight, i.e. additional loads must not be applied. Danger of breakage!

5.2. Storage

- Climate class: 2K3 nach EN 60721
- Storage temperature: -20°C to +60°C, max. 20 K/hour fluctuated
- Storage air humidity: max. relative humidity 85 % at 20°C (no moisture condensation)
- Store the motors only in closed, dry, dust-free, well-ventilated and vibration-free rooms. Do not store lift machines in the open air. Bright parts are not sufficiently preserved to withstand extended periods of exposure.



- ▶ Avoid excessive storage periods (recommendation: max. one year).
- ▶ After prolonged storage (>3 months), rotate the motor - **every** three month continuously - in both directions at a low speed (< 20 min⁻¹) to allow the grease to distribute evenly in the bearings. The ropes must not be fitted.

- Measure the insulation resistance before initial operation of the machine. If the value has dropped below 1 kΩ per volt of rated voltage, the winding needs to be dried (insulation meter voltage: 1,000 VDC).

Unpacking

- Dispose of the packaging material in an environmentally friendly manner or reuse it.
- Any special transport aids or shipping braces are left with the customer.

5.3. Disposal

- The lift machines consist of different materials. A waste separation of those different material components has to be done.
- The disposal must be professional and environmentally friendly according to law.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 9

6. Product overview

6.1. Product description

The compact gearless WSG-21 synchronous lift machines are designed for traction sheave lifts. They are distinguished by their high efficiency, extremely low noise and excellent operating characteristics. The machines can be supplied for several rated speeds.

The machine comprises a frame, the synchronous motor with high-efficiency permanent magnets, the traction sheave, and the type-tested safety brakes, which can be used to prevent uncontrolled upward movement of the car. The nameplate of the lift machine is on the motor housing.

Type code of lift machine

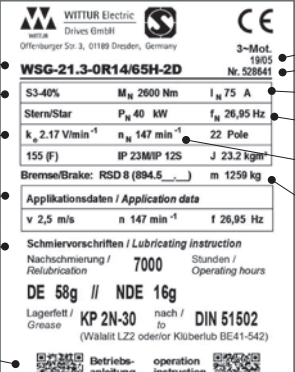
Duty type

Induced voltage k_e

Application data

Lubrication specification

QR-Code (for download this manual)



WITTUR Electric
Drives GmbH
Offenburger Str. 3, 01189 Dresden, Germany

WSG-21.3-0R14/65H-2D

3-Mot. 1905 Nr. 528641

S3-40%	M_N 2000 Nm	I_N 75 A
Stern/Star	P_N 40 kW	f_N 26,95 Hz
k_e 2,17 V/min ⁻¹	n_N 147 min ⁻¹	22 Pole
155 (F)	IP 23MIP 125	J 23,2 kgm ²
Bremsen/Brake: RSD 8 (894,5 ...)		m 1259 kg

Applicationsdaten / Application data

v 2,5 m/s	n 147 min ⁻¹	f 26,95 Hz
-------------	---------------------------	--------------

Schmiervorschriften / Lubricating instruction

Nachschmierung / Relubrication	7000 Stunden / Operating hours
--------------------------------	--------------------------------

DE 58g // NDE 16g

Lagerfett / Grease KP 2N-30 nach / to DIN 51502 (Walait LZ2 oderior Klüberlub BE41-542)

Betriebsanleitung / operation instruction

Year and month of production

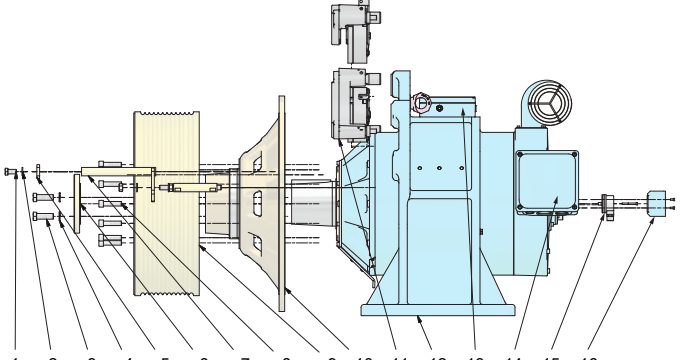
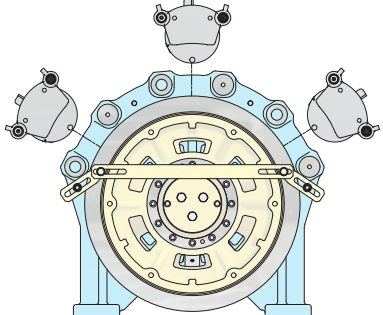
Serial no.

Rated current

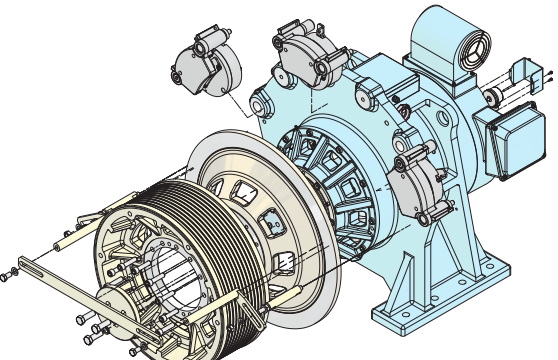
Rated frequency

Rated speed

Weight

Item	Part	WSG-21
1	Bolts (2 x)	ISO 4017 - M16 x 30
2	Washer (2 x)	DIN 125-A17
3	Bolts (3 x)	ISO 4017 - M20 x 60-12.9
4	Lock washers (3x)	NL20 - DIN 25201
5	Rope slip-off guard	
6	Pressure disc	
7	Rope slip-off guard (2x)	
8	Bolts (12 x)	ISO 4762 - M16 x 65-12.9
9	Traction sheave	
10	Brake hub	
11	Brake	RSD 8
12	Motor housing	
13	Brake terminal box	
14	Motor terminal box	
15	Measuring system	
16	Protective cover	



Gearless Lift Machine

WSG-21

Operating Instructions

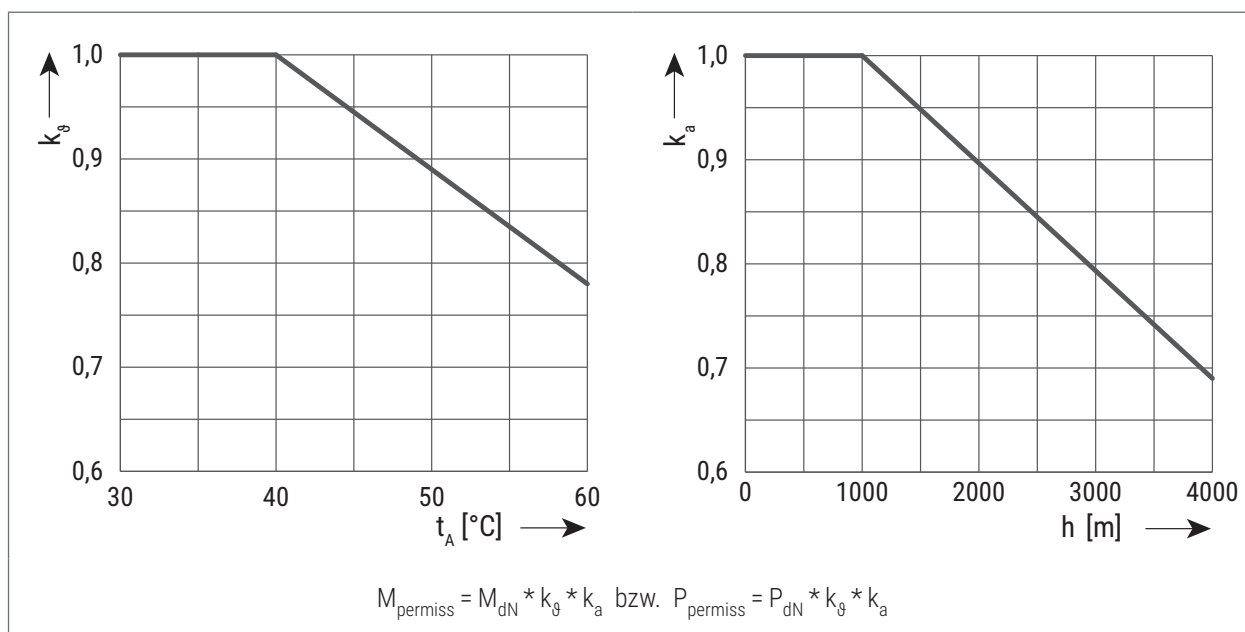
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 10

6.2. Permissible ambient conditions

- Ambient temperature: -5°C to +40°C
- Air humidity: max. relative humidity: 85% at 20°C (no moisture condensation)
- Install the machine so that ventilation is not obstruct and sufficient heat dissipation by convection and radiation must be ensured.

Deviating ambient conditions

At higher temperatures or altitudes, the overload capability of the motors is reduced. In the case of a deviating altitude and/or temperature, the reduction factors k shown in the following diagrams must be used.



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 11

7. Installation

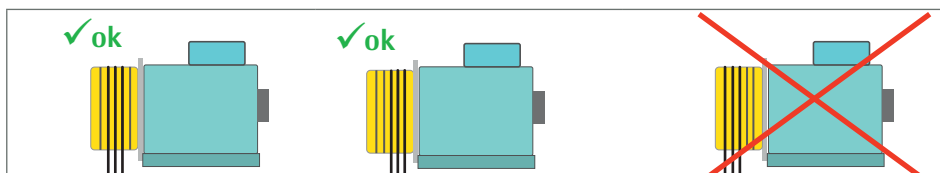
7.1. Mechanical installation

Setting up



- ▶ Be sure to use calculations to check the base frame or foundation loads before installing the lift machine.
- ▶ The lift machines must be installed by trained and qualified personnel with professional knowledge of mechanical engineering and lift construction.

- The machines can be used in lift systems with a machine room.
- The permissible unevenness of the mounting surface is 0.3 mm. The mounting surface must be sufficiently distortion-resistant and stable to accommodate the forces occurring in the system.
- The rope force can be applied to the lift machine in any direction.
- The machine must be mounted on vibration dampers for vibration damping.
- No welding work may be performed on the lift machine, nor is it permissible to use the machine as a mass point for welding work. This might cause irreparable damage to the bearings and magnets.
- If there are more grooves on the traction sheave than the number of ropes used, position the ropes either in the centre of the traction sheave or towards the motor end.



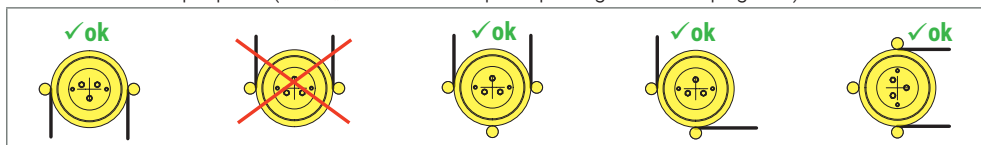
- The measuring system is only accessible from the rear side. Therefore, leave enough space between the wall and the rear side of the machine (recommendation: 500 mm) or ensure that the machine can be moved away from the wall.



- ▶ Cover the machine and especially the brakes when doing any machining or dust-producing work in the shaft or machine room.

Securing the machine

- Fasten the machine using **8 M24 bolts - strength class 8.8 tightening torque: 680 Nm**.
- After completing the adjusting work or after a breakdown, tighten all the fastening bolts of the machine, using the specified torque.
- Lift machines are generally equipped with rope slip-off guards. After putting the ropes in place, adjust them so that the distance between the rope and the rope slip-off guard does not exceed 2 to 3 mm.
- If the lift machine is not installed at the head of the machine room as is usually the case, it may be necessary to modify the fitting of the rope slip-off guard to fulfill the requirements of EN 81-20. Optional rope slip-off guards are available for this purpose (refer „Versions of rope slip-off guards“ on page 12).



Gearless Lift Machine

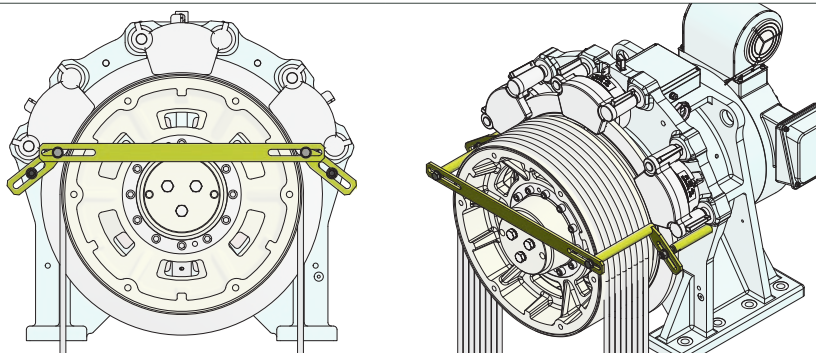
WSG-21

Operating Instructions

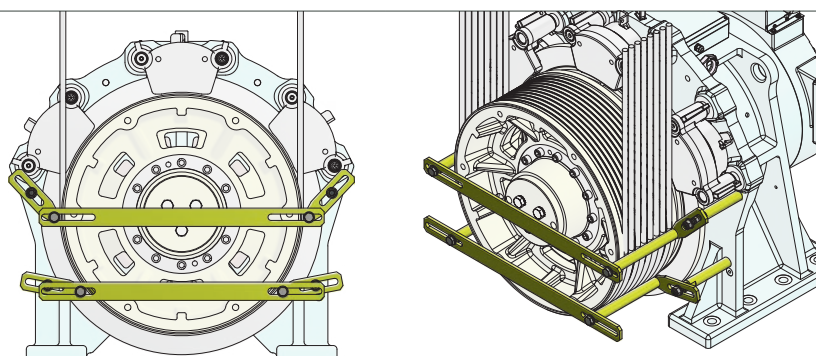
Code: GM.8.003647.EN
 Date: 06. Feb 2024
 Version: C15
 Page: 12

Versions of rope slip-off guards

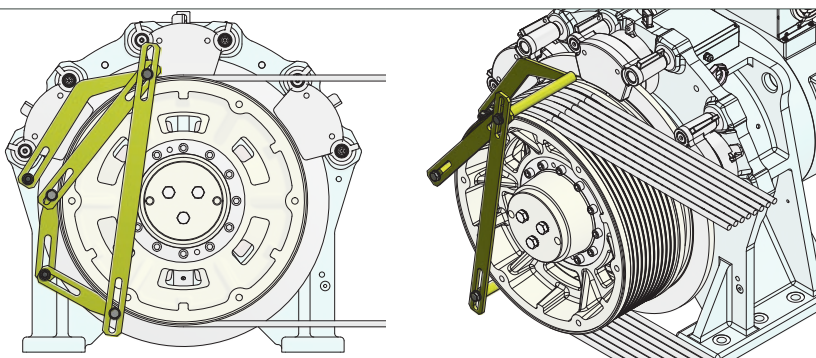
Standard version of the rope slip-off guards
 - Rope direction downwards



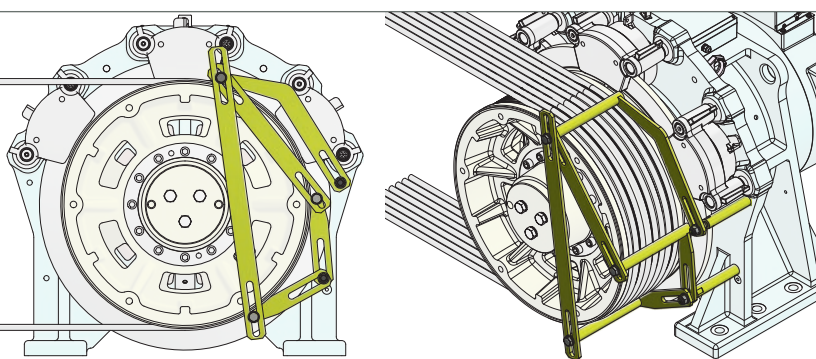
Option
 - Rope direction upwards



Option
 - Rope direction right



Option
 - Rope direction left



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 13

7.2. Electrical installation

7.2.1. General



- ▶ The electrical installation may only be carried out by trained and qualified personnel with professional knowledge of electrical engineering.

- Before starting any work on the machines, ensure that the lift machine or system is properly isolated.
- Before making any electrical connections check that:
 - » the connecting cables are suitable for their specific application and for the relevant voltages and currents
 - » the protective conductor is connected to the earthing terminal
 - » there are no foreign bodies, dirt or moisture in the terminal boxes
 - » cable entries not in use and the terminal box itself are tightly sealed to prevent the ingress of dust
 - » sufficiently dimensioned connecting cables, torsion, strain and shear relief, as well as anti-kink protection are provided.
- The insulation system of the motors is designed such that they can be connected to a inverter with a maximum DC link voltage $U_{link\ max}$ up to max. 700 V DC.



- ▶ $U_{link\ max}$ is the maximum value of the DC link voltage which is only transient and approximately equivalent to the inception voltage of the braking chopper or of the energy recovery unit.



- ▶ The maximum permissible rate of voltage rise (dU/dt) at the motor terminals is 4 kV/ μ s. The overvoltage at the motor terminals must not exceed 1.56 kV. It may be necessary to use motor current filters or reactors to achieve these values.

7.2.2. Motor connection / Winding protection / Fan

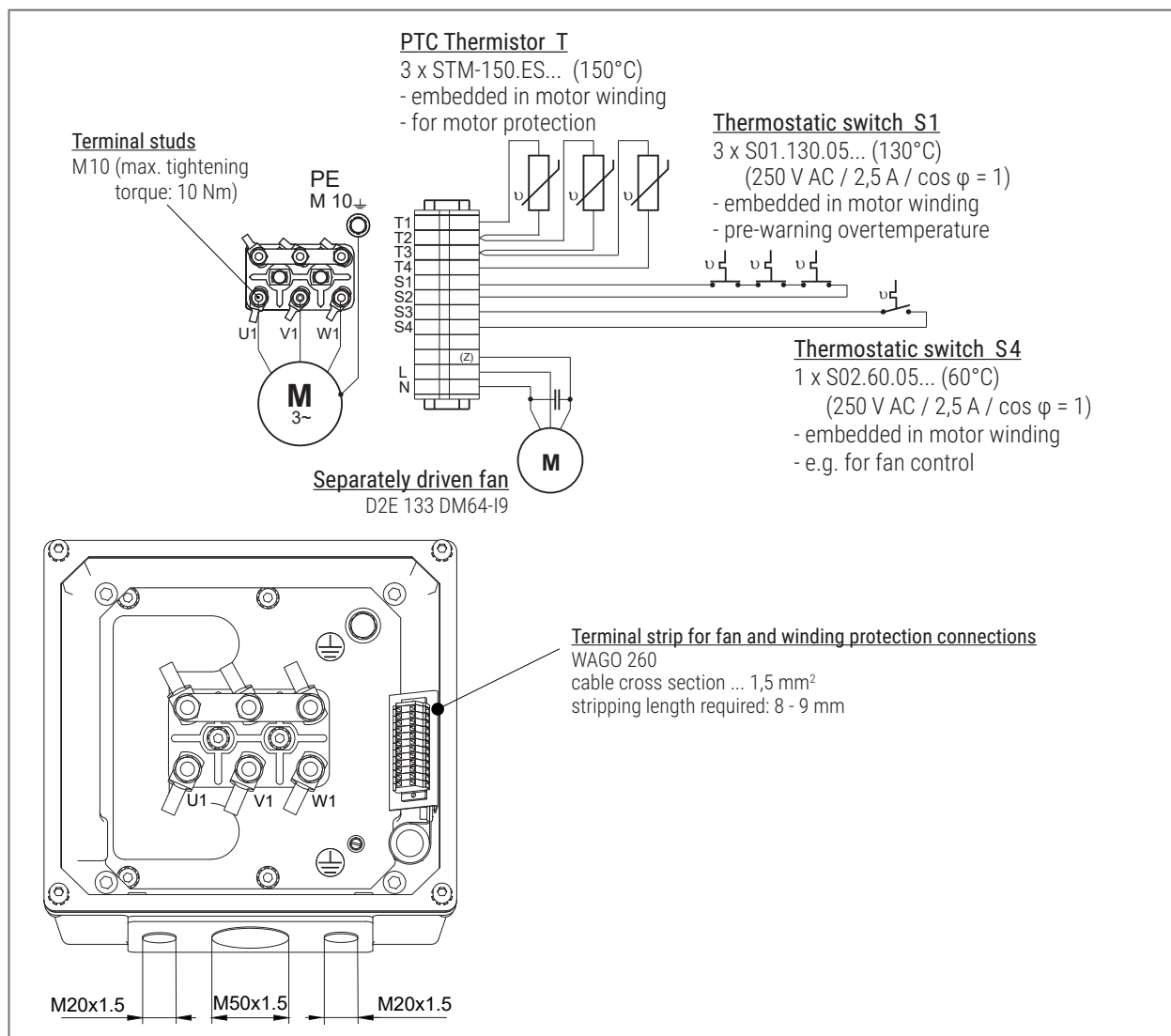
- The electrical connection of the motor, the fan and the winding sensors is made in the motor terminal box on the machine.
- The cable cross-section must be determined in accordance with the applicable regulations, depending on the motor current and the ambient conditions, e.g. temperature and type of installation.
- The motor cable must be shielded. Ensure that the cable shield contacts the frame over a large area at both ends.
- In general, the motor power cable must not exceed a length of 25m. For other lengths, please contact us.
- The motor phases U1, V1 and W1 must be connected correctly to the corresponding phases of the inverter; they must not be interchanged.
- We recommend using a inverter with a switching frequency of 8 kHz.
- The thermocouples installed in the winding such as PTC thermistor detectors and thermostatic switches must be evaluated in the control system or frequency inverter to protect the motor from overtemperature.
- The separately driven fan must be properly connected and operated. If required, it can be switched in dependence of the temperature by means of thermal switch S4 (relay must be used).

Gearless Lift Machine

WSG-21

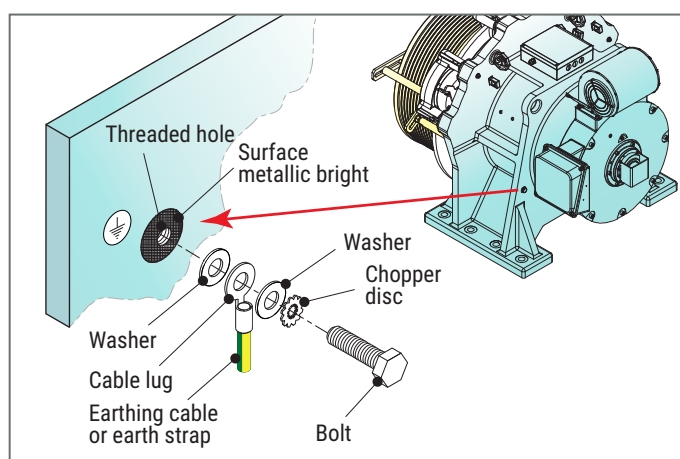
Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 14



Protective earth connection

- The protective earth conductor is made in the motor terminal box.
- If the protective conductor is smaller than 10 mm² in the motor terminal box, an additional protective conductor must be connected. The cross-section must correspond at least to the cross-section of the PE conductor on the motor power cable.
- For this case, an additional protective earth connection is available on the motor housing (see figure opposite).



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 15

PTC thermistors

- The maximum operating voltage of the PTC thermistors is not allowed to exceed 25 V DC
- To achieve the maximum precision, the measurement voltage per PTC thermistor must not exceed 2.5 V DC.

Short-circuiting the motor terminals

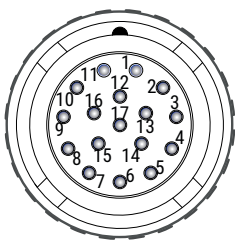
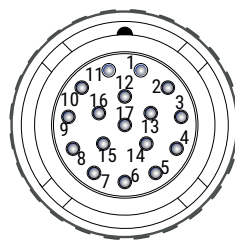
- The motor terminals of the synchronous lift machines, type WSG-21, can be short-circuited, if required, to brake the lift machine faster.
- However, this is only permissible at speeds less than or equal to the rated speed of the respective motor.

7.2.3. Speed/Position measuring system

- The basic version of the lift machines is equipped with an ECN 1313 SineCosine encoder with EnDat- interface from Heidenhain GmbH. The encoder is connected via a 17-pole signal plug connector.
- Alternatively, the machines can be equipped with ERN 1387 encoders (from Heidenhain GmbH). We can also provide other measuring systems on request.
- Use a shielded cable to connect the measuring system to the inverter system. The maximum cable length should not be longer than 25 m. We recommend the use of our cable sets, which can be supplied as an accessory.



- ▶ The measuring system of WSG lift machines with a synchronous motor (WSG) is matched to the associated inverter. Do not change the adjustment, as this may make it impossible to use the motor. On the measuring system housing there is a label showing the „offset angle“ and the inverter type.
- ▶ The offset angle depends on the inverter used.

Measuring system ECN 1313			Measuring system ECN 1387		
Data interface:		EnDat or SSI	Data interface:		Z1 track
Operating voltage:		5 V DC	Operating voltage:		5 V DC
Recommended mating connector:		ASTA 035 NN 00 73 0100 00 (company Intercontec GmbH)	Recommended mating connector:		ASTA 035 NN 00 73 0100 00 (company Intercontec GmbH)
Pin	Signal	 Pin contacts of flanged connector socket (exterior)	Pin	Signal	 Pin contacts of flanged connector socket (exterior)
1	U_p Sensor		1	A +	
4	0 V Sensor		2	A -	
7	U_p		3	R +	
8	Clock +		4	D -	
9	Clock -		5	C +	
10	0 V (U_p)		6	C -	
12	B +		7	0 V (U_p)	
13	B -		10	U_p	
14	DATA +		11	B +	
15	A +		12	B -	
16	A -		13	R -	
17	DATA -		14	D +	
			15	0 V Sensor	
			16	U_p Sensor	

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 16

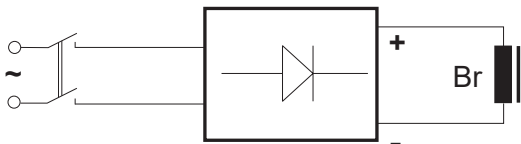
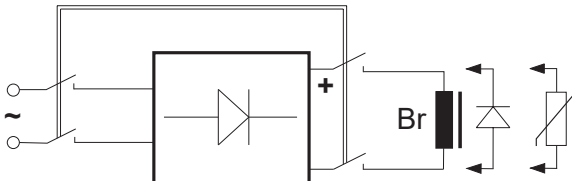
7.2.4. Brake

- Please refer also to the operating instructions for the brake starting on page 49.
- The brakes are supplied with DC voltage by the brake control units, which are fitted in the brake terminal box.
- Only the brake control units which are included in our scope of supply are to be used for the brake activation.
- Repeated switching of the brake magnets during the overexcitation period must be avoided as this will result in overloading of the brake control unit. Therefore, a minimum brake operating time of approx. 1.5 – 2 s should be maintained, especially during an inspection or commissioning drive.
- To reduce the switch-off time, switching can be effected from the DC side. However, switching must also be performed from the AC side at the same time ! (Wiring with a varistor as shown in the „Circuitry suggestion for brake control“ on page 18)
- The brakes must be protected with varistors against overvoltage from switching operations. The varistor must be directly connected to the coil.

Note on the use of DC/AC side switching



- ▶ AC side switching is recommended for normal operation, since the lift machine is then decelerated in a controlled manner to zero speed and the switching noise of the brake is negligible.
- ▶ When braking in the event of a breakdown (emergency stop) or during an inspection drive, the switching should be performed from the DC side, since this ensures a faster braking effect with the car being stopped earlier. We therefore recommend the use of 2 separate contactors for the brake control circuitry, one of which switches at the DC side, the other at the AC side.

AC side switching	DC side switching
<ul style="list-style-type: none"> ▶ Low-noise switching of the brake ▶ No protective measures required for switching contact ▶ Slow application of the brake.  <p>Attention: Schematic diagram!</p>	<ul style="list-style-type: none"> ▶ Noisy switching ▶ Burn-up protection for switching contact required (e.g. varistor, free-wheeling diode) ▶ Fast application of the brake.  <p>Attention: Schematic diagram!</p>

Time-delayed application of a braking circuit



- ▶ Sometimes, when the lift makes an emergency stop, in-admissibly high decelerations occur in the car. This can be remedied by the time-delayed application of the brake circuits, i.e. one brake is applied with a slight delay.
- ▶ To achieve this time delay between the two brake circuits, it is sufficient to use a diode D1 in one of the two brake circuits, as shown in the connection diagram on page 18. Pay attention to the polarity of the diode!
- ▶ Check the function of the diode regularly, as this avoid in-admissibly high deceleration of the car.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 17

Monitoring the brakes

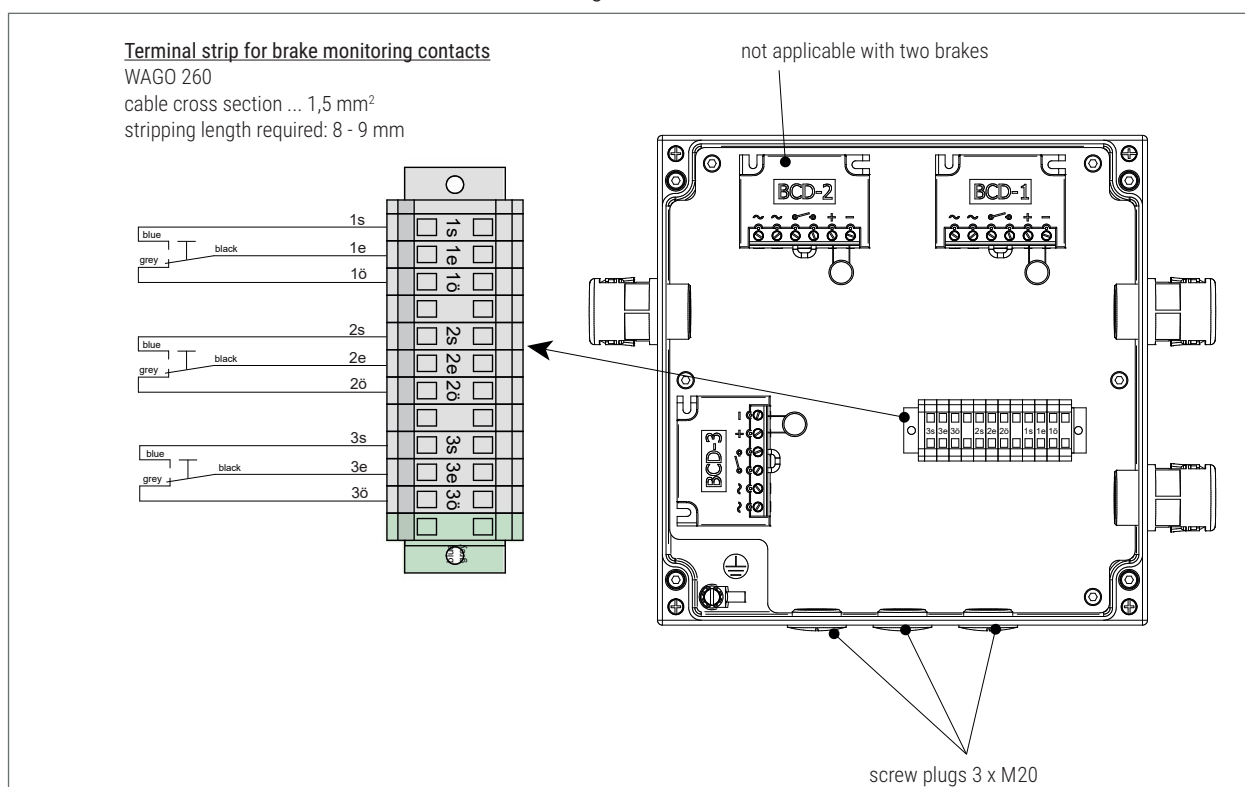
- The switching states of the brakes and the wear of the brake linings are monitored by means of dust-proof microswitches (see wiring diagram).
- Please assure that the contact-current is at least 10 mA to keep the contacts clean.



- The microswitches must be evaluated separately for each partial brake to ensure compliance with the requirements of the type examination.

Connection of the brakes

The brake coils, the brake control units and the monitoring contacts are connected to the mains in the brake terminal box.



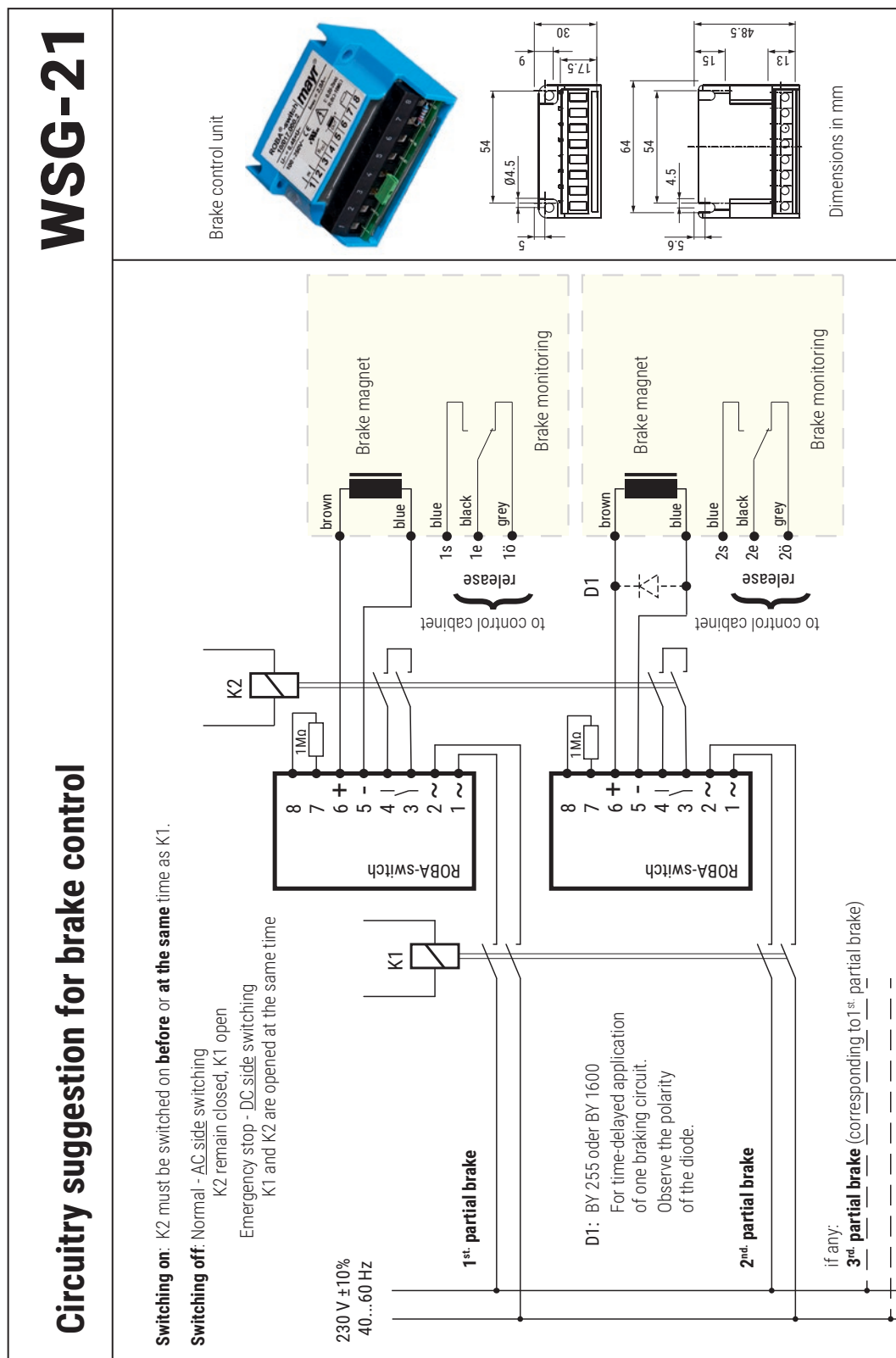
Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 18

Circuitry suggestion for brake control



Gearless Lift Machine

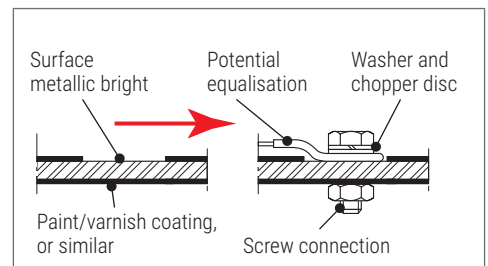
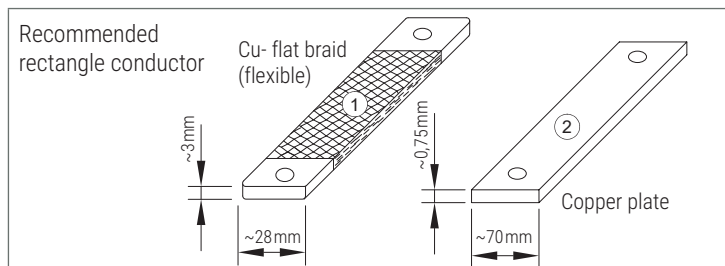
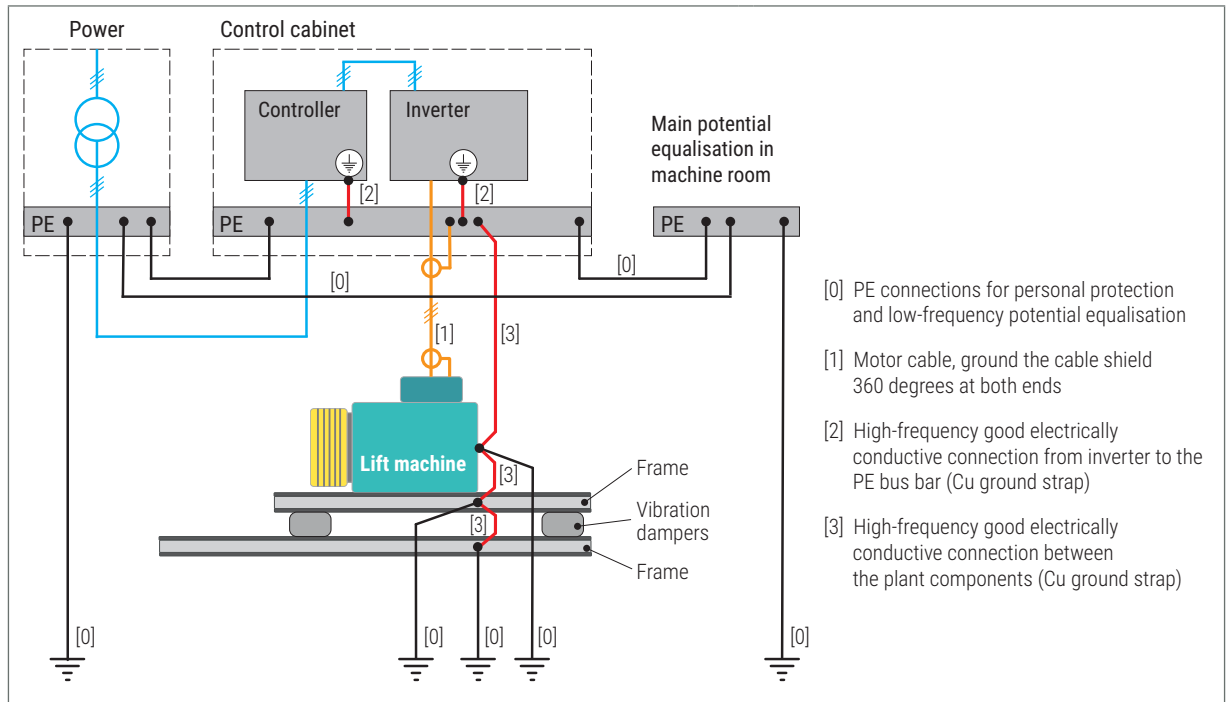
WSG-21

Operating Instructions

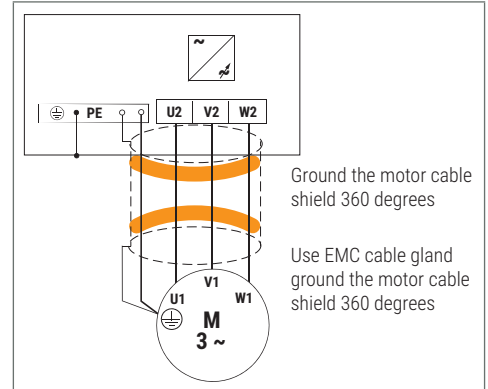
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 19

7.2.5. Earthing, potential equalisation, electromagnetic compatibility (EMC)

- Always keep in mind the generally applicable regulations and the specifications of the inverter manufacturer. The following notes give an overview for the construction of an EMC- compliant installation.
- Ensure proper earthing and comprehensive potential equalisation between the system components, which is also effective at high frequencies - use **rectangle conductors**! Ensure that the connection points are metallic bright!



- The motor cable must be shielded. Ground the motor cable shield 360° at both ends.
- Always connect cable shields 360°. Use suitable cable glands or special cable mounting clamps for shield contact.
- Never connect the shield via a twisted shielding braid (so-called "pigtail") or via a wire extension. This reduces the shielding effect by up to 90 %.
- Keep control cables (e.g. measuring system cables) separately from the mains power and motor cables.
- **Safety always has the highest priority and takes precedence over EMC requirements.**

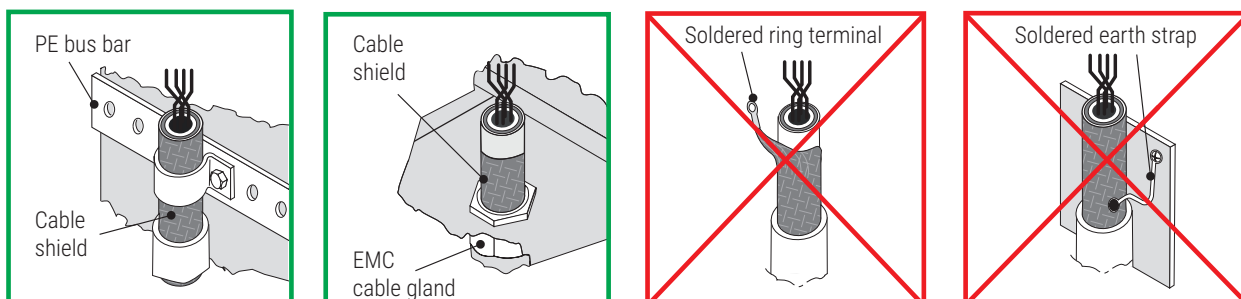


Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 20



7.3. Overview

The following notes should help you to carry out the assembly and wiring in an appropriate sequence, without overlooking anything.

Site	Please note the intended use and the permissible ambient conditions of the machine. The site must be free of conductive and aggressive material.
Ventilation	Install the machine so that ventilation is not obstructed, i.e. sufficient heat dissipation by convection and radiation must be ensured.
Assembly	Be aware of the secure motor fastening and the proper use of vibration dampers.
Cable selection	Select cables and wire cross section in accordance with the binding regulations and law.
Earthing / Shielding	Use correct earthing of machine and machine frame and that all components are installed in accordance with EMC requirements. Important notes can be found in the manual of the inverter manufacturer.
Wiring	We recommend the use of our cable sets, which can be supplied as an accessory. Route power cables as separately as possible from control cables. <ul style="list-style-type: none"> - Connect the motor leads - Connect the measurement system and the winding protection. - Connect the safety brake, the brake control units and the brake monitoring switches - Connect the fan
Check	Final check of the installed wiring, according to the wiring diagram which was used.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 21

8. Commissioning and operating

8.1. Important notes



- ▶ The commissioning may only be carried out by trained and qualified personnel with professional knowledge of electrical engineering and lift construction.
- ▶ Check that all live connection points are safe against accidental contact.
- ▶ During commissioning, unintentional movements of the traction sheave may occur. Make sure that, even if the motor starts to move unintentionally, no danger can result for personnel or machinery.

Before starting up the motor the following points must be checked:



- Check that all performance and application data specified on the name plate of the machine are consistent with your application.
- Have all securing, auxiliary and installation tools been removed from the danger area?
- Check if the lift machine is being used for its intended purpose – comply with the permissible ambient conditions.
- Check if the lift machine has been properly fastened with the fastening bolts – have all the bolts been tightened to the specified torque and secured?
- Has the motor been properly connected, including the motor protection? Has the PE terminal been properly connected? Is the potential equalisation with the machine frame ensured?
- Check the proper functioning of the temperature monitoring devices (e.g. by interrupting the temperature monitoring circuit).
- Has the measuring system been properly connected?
- Check the brake connection and the proper functioning of the brake monitoring switches.
- Ensure that the brake operates correctly; perform a brake test using one partial brake.
- Has the rope slip-off guard been tightly fastened and properly adjusted?



Information

- ▶ An initial function test of the motor and the brake, together with the inverter, should be performed before the ropes are put in place.
- ▶ If the motors are being operated at no shaft load (no ropes put in place) for an extended period of time, abnormal noise may occur resulting from the bearing type used.

Half-load test



Information

- ▶ If the motor winding is short-circuited with the control system deactivated, a speed-dependent braking torque will be produced, even at low speeds. Therefore, the short-circuiting should be deactivated during the half-load test. It is imperative for it to be reactivated after the test.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 22

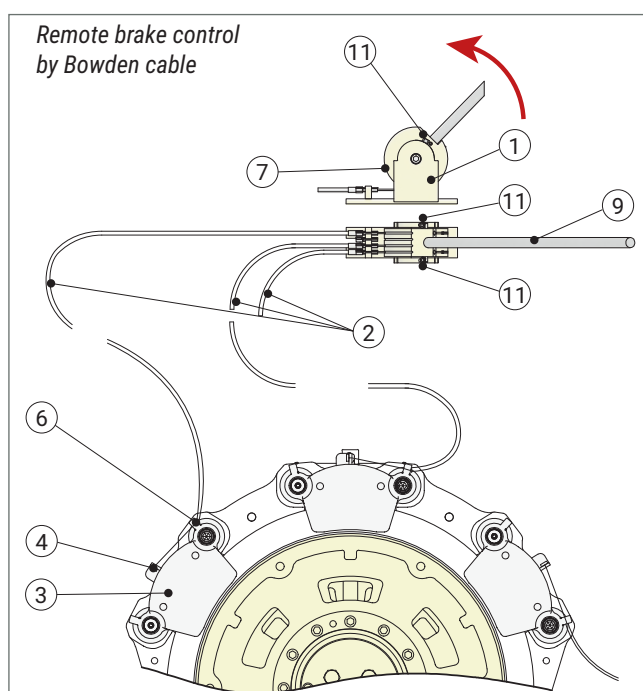
8.2. Emergency evacuation



- ▶ The emergency evacuation procedure must be specified by the installer or operator of the lift system. Only he knows the requirements and special conditions of the system.
- ▶ All actions for evacuation in case of emergency have to be done by qualified service personnel.
- ▶ When attempting an evacuation, the car may not move even when the brakes are released, as a result of load compensation between the car and the counterweight. In this case, add weight to the car by suitable means, e.g. sand bags, or use the mechanical return motion device.

Manually operated evacuation in case of emergency

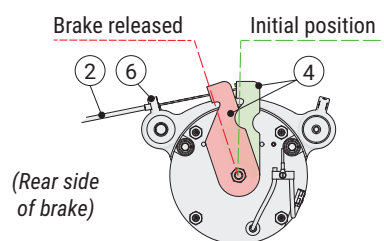
- The brakes (3) can be released remotely by hand using a lever block (1) and Bowden cables (2).
- The installation and operation of this device is described in section „12.5. Remote brake control by Bowden cable“ on page 33. The lever block and the Bowden cables are available separately.
- If the brakes are released manually, the lift car moves in the direction of the higher weight.
- The motor winding should be short-circuited using the motor contactors. This prevents the lift from accelerating in an uncontrolled manner, since the short-circuiting produces a speed-dependent braking torque.
- It may transpire that the braking torque provided by short-circuiting the motor is insufficient to restrict the speed of the lift. You should therefore keep a close eye on the car speed during evacuation and halt the evacuation if necessary.



- Stop the manual release of the brake when the car has reached the next floor. The trapped passengers can now be evacuated.



- ▶ After releasing the brakes manually, check that the manual release levers (4) return to their initial position (identification of the initial position by arrow symbols on each partial brake).



Emergency evacuation by electrical means

- Alternatively, the brakes can be released electrically in an emergency, using the mains or a UPS.
- When resorting to this method of emergency evacuation, refer to the relevant instructions in the operating manual regarding the control system, the inverter and the evacuation unit (with UPS).

Gearless Lift Machine

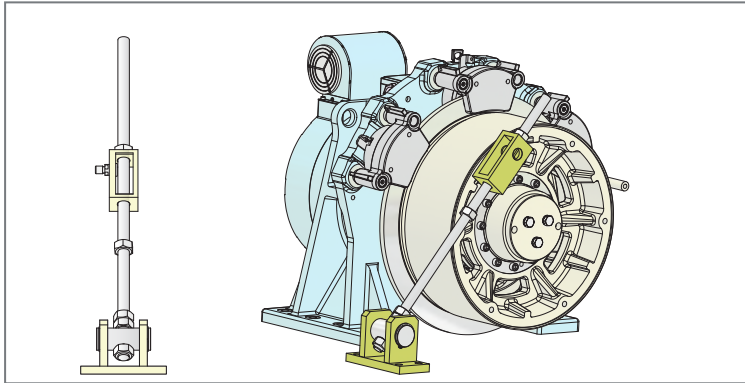
WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 23

Mechanical return motion device

- For cases such as lift failure or the car being retained by the safety device, a mechanical return motion device can be used to move the lift manually. Use of the return motion device is shown in the drawing.
- Instructions for installing and using the return motion device can be found in section „12.6. Return motion device“ on page 36.



- Make sure that you restore the lift system to its original state after completing the emergency evacuation. Take particular care to remove the lever extensions and all parts of the mechanical return motion device.

8.3. Testing the brake system to EN 81



- The brake system should be tested with the car about halfway down the shaft. If any motor short-circuit connections have been made, these should be deactivated so that the brake effect can be tested independently.

Overload

- The brake system should be tested by interrupting the power supply to the motor and brake system with the car moving downward at rated speed and 1.25 times the rated load. The brake system must be capable of decelerating the car.

Failure of a brake

- If one brake fails, the brake system must still be capable of decelerating the car sufficiently during its downward travel at rated load and rated speed.
- When simulating the failure of one brake, the other brakes must be kept open separately, even if the safety circuit is open. This should be done using suitable electric circuitry or by hand.
- This state must not be maintained in the long term!
- Observe the lift during this test. If it does not decelerate, close the open brake circuit immediately.

Separate operation of the individual brakes

- The only method by which the partial brakes can be released separately is through electrical control. The brakes can be activated/deactivated quickly using individual control buttons.

Monitoring the brakes

- Check the brake monitoring switches individually. No car travel must be permitted if a microswitch signal is missing or a wrong signal operates.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 24

8.4. Trouble shooting

Fault	Possible cause	Remedy
Motor does not start, operates out of control or develops no torque	Motor not connected in proper phase sequence	Connect motor correctly
	Measuring system not properly connected	Connect measuring system correctly
	Converter parametrisation incorrect	Check inverter parametrisation
	EMC disturbance	Carry out shielding and earthing measures as described by the inverter manufacturer
	Measuring system offset angle incorrectly set	Check measuring system offset angle
	Measuring system defective	Replace measuring system
Motor noise	Converter parametrisation incorrect	Check inverter parametrisation
	Bearing defective	Notify customer service
Motor temperature too high	Motor surface dirty; Filter mats of the forced cooling fan dirty	Clean the motor surface and the fan filter mats
	Forced cooling fan not in operation	Operate forced cooling fan correctly
	Ambient temperature too high	Improve shaft and machine room ventilation
	Converter parametrisation incorrect	Check inverter parametrisation
Braking system does not release	Braking system is not supplied with voltage	Check electrical connection
	Brake shoes mechanically blocked	Remove mechanical blocking
	Brake control unit defective	Replace brake control unit
Delay in braking system release	Brake control unit defective	Replace brake control unit
Braking system does not engage	Brake shoe mechanically blocked	Remove mechanical blocking
Delay in engaging of braking system	Switch-off time too short with AC side switching	Brake control using DC side switching of the overexcitation rectifier
Brake makes loud switching noise	DC side switching of the brake in "normal operation"	Change over to brake control by AC side switching in "normal operation"
	Brake air gap too large	Adjust brake air gap
Braking torque too low	Brake friction surface or brake linings dirty	Clean friction surface / brake linings
	Foreign bodies between friction surface and brake lining	Remove foreign bodies
	Brake friction surface or brake lining have come into contact with oily or greasy materials	Replace brake lining, clean brake drum thoroughly
	Load torque too high	Reduce load torque
Condition monitoring of the brakes does not switch	Micro-switch defective	Replace micro-switch
	Micro-switch adjustment faulty	Adjust micro-switch
	Dirty contacts	Use micro-switch with at least 10mA contact current, Replace micro-switch

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 25

9. Maintenance

9.1. General

- The regulations concerning operation, maintenance and inspection pursuant to the applicable safety regulations for lift construction such as DIN EN 81-20, DIN EN 81-50, LD 2014/33/EU and other relevant regulations are to be strictly observed.
- The operator is responsible for ensuring that the motor is installed properly and in accordance with the safety requirements, as well as for its inspection and maintenance as specified in the applicable regulations.
- The proper maintenance of gearless lift machines requires adequately trained specialist personnel and special devices and tools.
- Repairs other than those described in these operating instructions are not to be carried out by the lift fitter/maintenance technician for liability reasons.

Bolt/screw tightening torques

- When performing any work on the machine or replacing parts, make sure that the specified bolt/screw strength class and the tightening torques are observed (see table).
- Secure the bolts/screws with "omnifit 100" or a similar product against accidental loosening.

Dimension	Tightening torque [Nm]		
Strength class	8.8	10.9	12.9
M 5	5.5	8.1	9.5
M 6	9.6	14	16
M 8	23	34	40
M 10	46	67	79
M 12	79	115	135
M 16	195	290	340
M 20	395	560	660
M 24	680	970	1150
M 30	1,100	1,900	2,150
M 36	2,300	3,300	3,700

9.2. Maintenance intervals

	During commissioning or after the first 3 months	Every year	Note
Check the brake function and brake monitoring switches	x	x	see the brake operating instructions
Check the brake air gap	x	x	see section 9.4.
Check the bearing noise		x	
Regrease the bearings	as required		see section 9.3.
Check the traction sheave for wear		x	
Make a visual check of the fastening bolts/screws on the frame, brake and traction sheave	x	x	
Check the rope slip-off guard	x	x	
Check the electrical cables	x	x	
Check the guards and safety devices for their condition and safe functioning	x	x	
Clean the motor surface and the fan filter mats	as required		see section 9.5.

Gearless Lift Machine

WSG-21

Operating Instructions

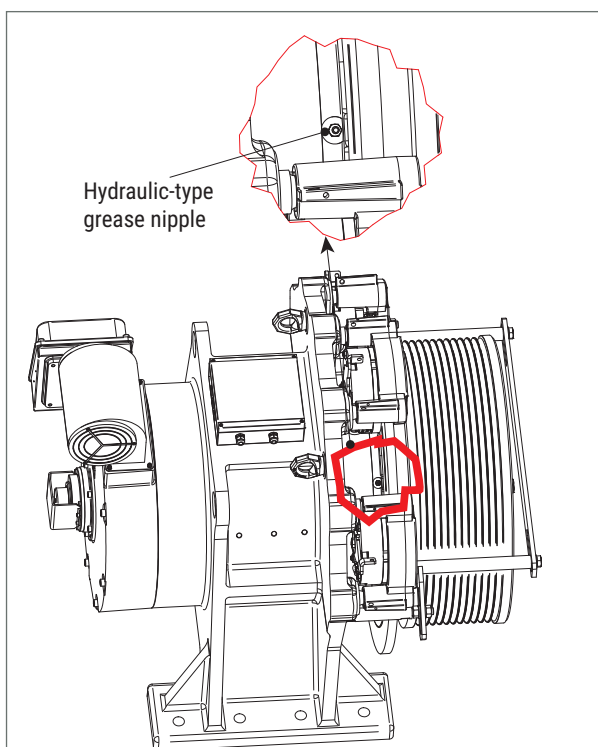
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 26

9.3. Regreasing the bearings

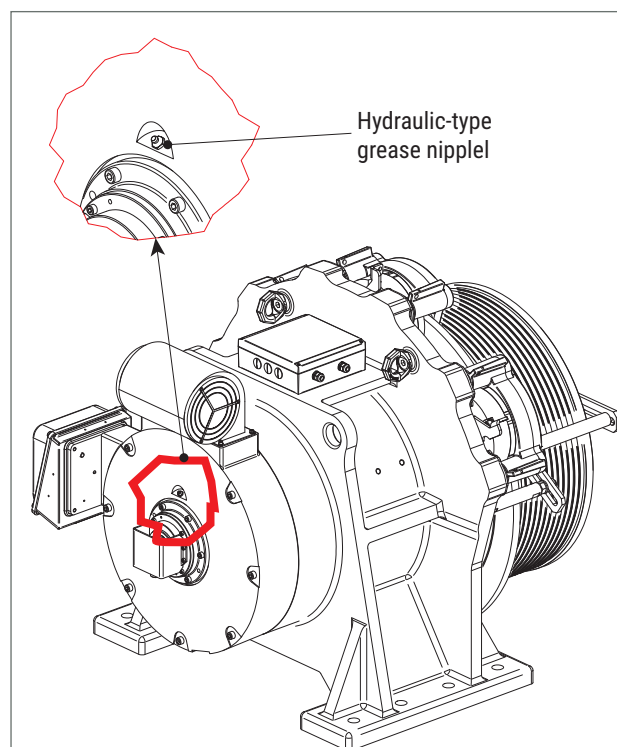
Relubricate the main bearing after about 7,000 hours of operation or every 3 years, using a KPF 2 N-30 to DIN 51 502 grease such as Wälalit LZ 2 or Klüberlub BE 41-542 (approx. 58 g on DE and approx. 16 g on NDE).

Use a conventional grease gun and press the grease into the hydraulic-type grease nipples to DIN 71 412 AM 10x1.

The relubricating points are provided on the D- and N- end shields of the machine. The DE grease nipple is located behind the traction sheave.



DE grease nipple



NDE grease nipple

Further information:



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 27

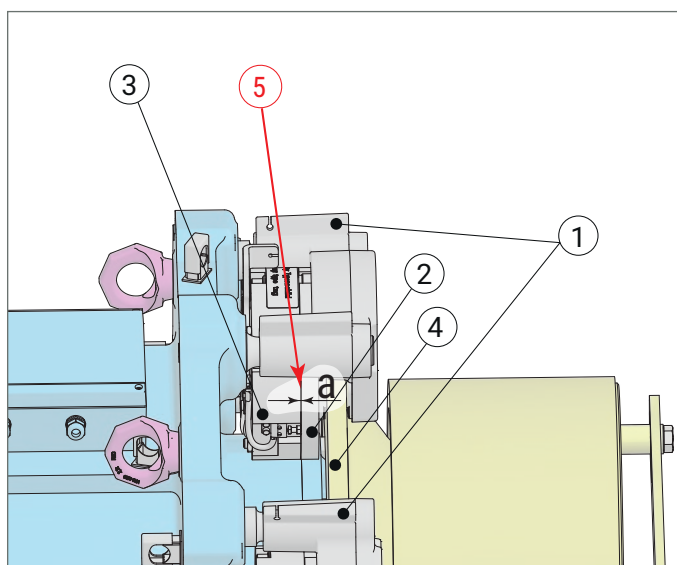
9.4. Check brake air gap



- ▶ If the brake air gap exceeds the permissible value „ a_{max} “, the braking torque may be significantly reduced. Shut down the lift system and inform customer service.
- ▶ Unit-power-off. Lock out and tag out. Motor and brake have to be de-energised!
- ▶ Observe the operating instructions for the brake from page 49.

Necessary tools

- Feeler gauge 0,05 ... 1,0 mm
- Measure the air gap „a“ of all partial brakes (1) between the armature disk (2) and the Coil carrier assembly with coil (3) using a feeler gauge.
 - (1) Partial brakes
 - (2) Armature disk
 - (3) Coil carrier assembly with coil
 - (4) Brake hub
 - (5) Air gap
- Compare the measured air gap with the maximum permissible air gap „ a_{max} “, see section „10. Technical data“ on page 30.
- If the brake air gap exceeds the permissible value „ a_{max} “, shut down the lift system and inform the customer service.



9.5. Fan filter mats

Remove the three screws from the protective screen. Then remove the screen and filter to clean or replace the filter mats.



- ▶ Do this work only with the fan switched off as the rotating fan wheel could be dangerous.
- ▶ Operation of the motor without fan filter mats is not permitted!

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 28

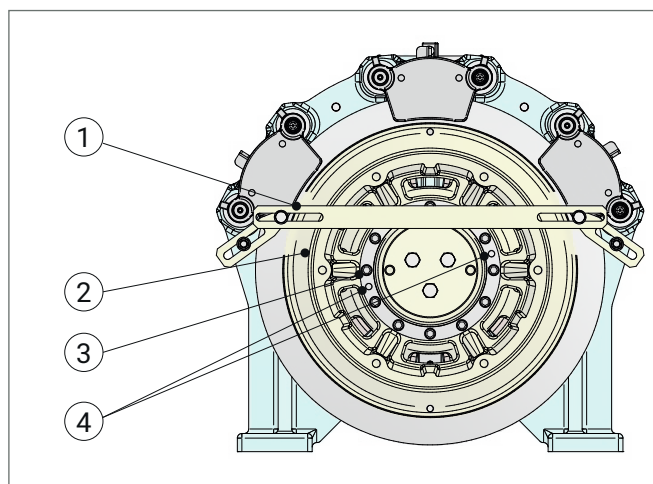
9.6. Replacing the traction sheave



► The traction sheave can work loose if it is not properly installed.

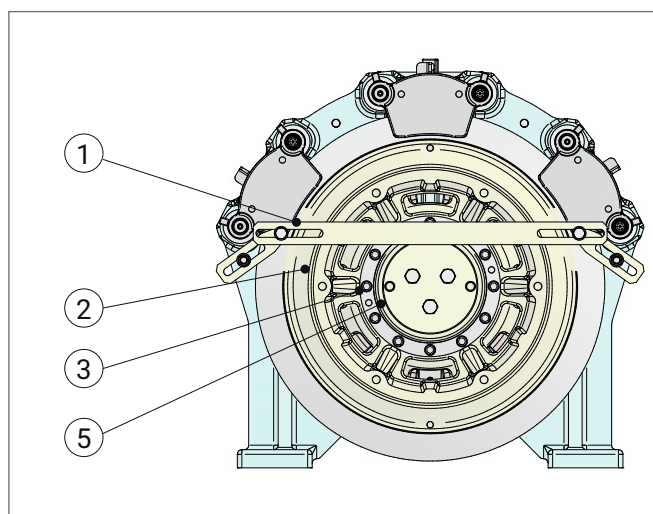
Disassembly

- Unit power-off. Lock out and tag out.
- Secure the car and the counter-weight.
- Remove the rope slip-off guards (1) and the rope guards, if provided.
- Relieve the load on the traction sheave (2); remove the ropes.
- Support the traction sheave (2) by means of a hoisting gear.
- Remove the 12 fastening bolts (3) M16 x 65-12.9.
- Insert the M16 x 70 jack bolts (accessories) into the two threaded forcing holes (4) and force off the traction sheave (2).



Assembly

- Clean the traction sheave (2) and the motor shaft (5).
- For better assembly heat up traction sheave – caution: **very hot – do not touch!**
- Slide the traction sheave (2) onto the rotor flange (5) as far as possible.
- Insert the fastening bolts (3) and tighten diagonally opposite bolts. Use "omnifit 100" or a similar adhesive to secure the bolts. Tighten them along the bolt hole circle ($M_A = 310Nm$) with a torque spanner.
- Measure concentricity (axial and radial) on a rope groove in the traction sheave - maximum permissible: 0.2 mm
- Replace the ropes and reinstall the rope slip-off guard (1).



Gearless Lift Machine

WSG-21

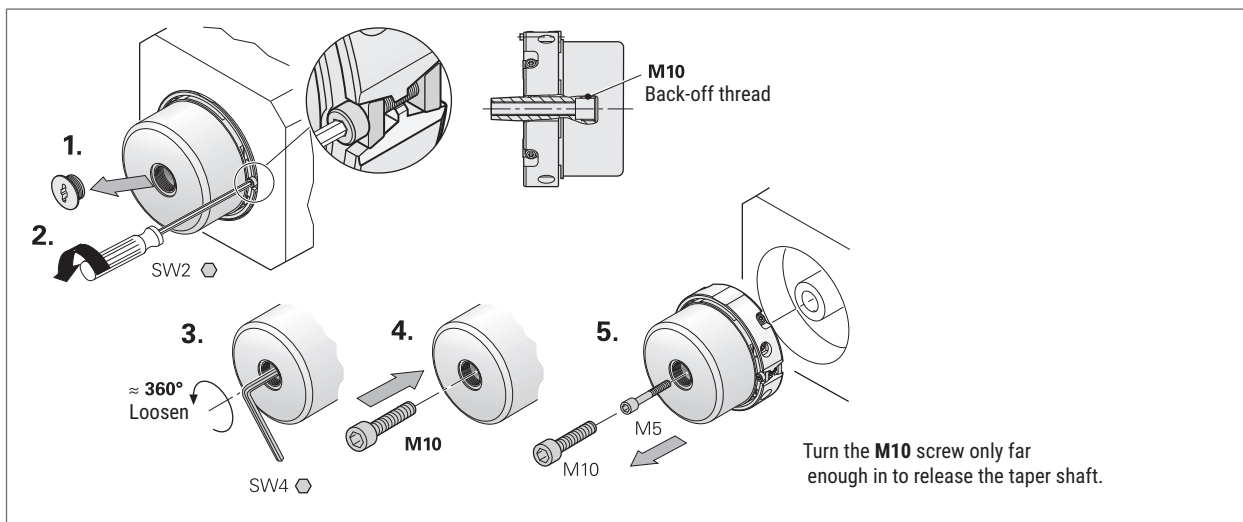
Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 29

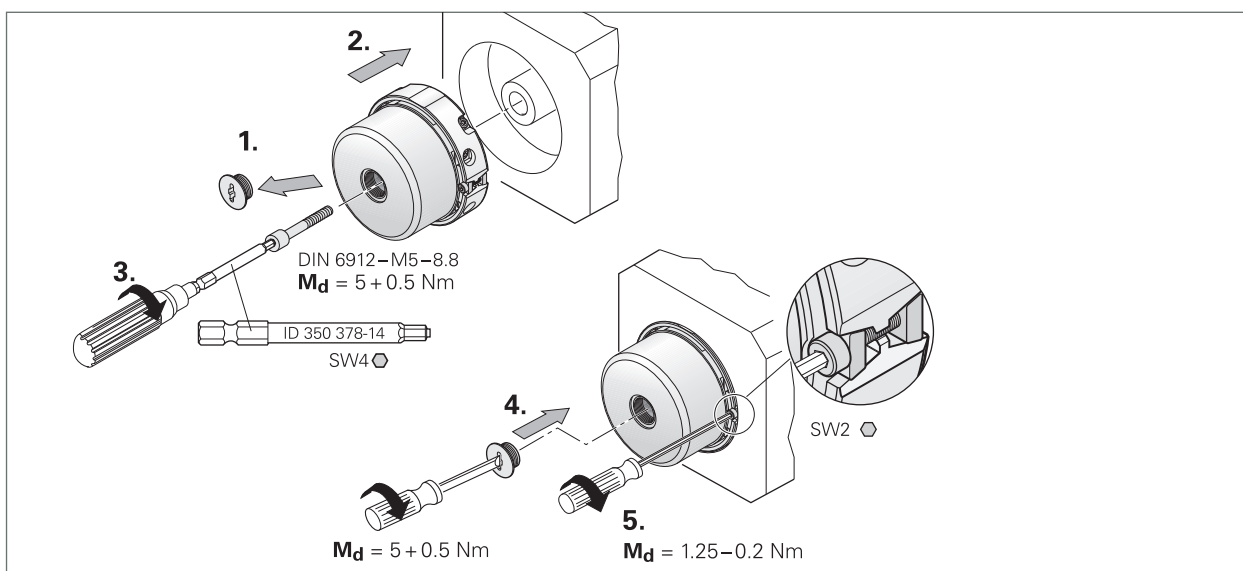
9.7. Replacing the measuring system

- ▶ The measuring system is only accessible from the rear side of the motor.
- ▶ See the mounting instructions for the Heidenhain encoder.
- ▶ Disassemble the measuring system only if this is necessary because of a defect. Remember to readjust the offset value after reassembly (see the inverter operating instructions).

Disassembly



Assembly



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 30

10. Technical data

General	
Duty type:	S3-40% ED
Traction sheave:	dia. 530 mm or dia. 650 mm
Traction sheave hardness:	mind. 220 HB 30
DE bearing:	self-aligning roller bearing
NDE bearing:	self-aligning roller bearing
Drive motor:	synchronous motor
perm. shaft load F_S :	up to 140 kN
Number of pole pairs:	11
Thermal class:	155 (F)
Degree of protection:	IP 23 M / IP 12 S
Winding protection:	triple PTC 150°C; triple therm. switch (NC contact) 130°C; therm. switch (NO contact) 60°C
Site conditions	
Max. altitude:	max. 1,000 m (derating required at higher altitudes)
Ambient temperature:	-5°C ... +40°C
Max. rel. humidity:	85% at 20°C (no moisture condensation)
Separately driven fan	
Type:	D2E 133 DM64-I9
Operating voltage:	230 V AC; 50/60 Hz; 0.84/0.88 A
Capacitor:	7 μ F / 400 V

Dual-circuit fail-safe brake	
Motor:	WSG-21.x
Brake type:	RSD 8
Brake torque:	2/3 x 1,750 Nm
Air gap a:	0,4 \pm 0,05 mm
max. air gap a_{max} :	0,8 mm
Holding voltage:	103 V DC
Holding current:	2/3 x 0.6 A
Overexcitation voltage:	205 V DC
Overexcitation current:	2/3 x 1.2 A

Brake control units	
Type:	ROBA-switch 10/017.000 (from Mayr GmbH, supplied with the machine)
Operating voltage:	230 V AC (\pm 10%); 40...60 Hz
Dimensions:	64 x 49 x 30
$R_{ext.}$ (1 s Overexcitation time):	1 M Ω
Brake monitoring contacts	
Contact rating:	...250 V AC / ...3 A (ohmic load)
Minimum switching power:	12 V, 10 mA DC-12

^{*)} Reference values. Achievable nominal load depends on specific lift system data.

The table is applicable to an overall shaft efficiency of approx. 73..85 % (counterweight: 50 %). It lists a standard selection of machines. The lift and project data will be adapted to actual site conditions and may deviate from the above values.

Motor / motor			WSG-21.2					WSG-21.3						
Drehmoment / torque S3-40 %	M _N [Nm]		1.950					2.600						
max. Drehmoment / max. torque	M _{max} [Nm]		3.900					5.200						
Bremsmoment / brake torque	M _{br} [Nm]		2 x 1.750 / 3 x 1.750					2 x 1.750 / 3 x 1.750						
Treibscheibe / traction sheave	D _T [mm]		530		650			530		650				
für Nennlasten bis *) for loads up to *)	Q [kg]		2.000		1.600			3.000		2.500				
Aufhängung / suspension			Tabelle gilt für / table applies for 2 : 1											
Motorströme gelten für 500...620 V Zwischenkreisspannung Motor currents applicable to 500...620 V d.c. link voltage	v [ms]	n _N [rpm]	P _N [kW]	I _N [A]	n _N [rpm]	P _N [kW]	I _N [A]	n _N [rpm]	P _N [kW]	I _N [A]	n _N [rpm]	P _N [kW]	I _N [A]	
	1,0	72	14,7	42	59	12,0	42	72	19,6	61	59	16,1	61	
	1,6	115	23,5	65	94	19,2	53	115	31,3	98	94	25,6	75	
	2,0	144	29,4	93	118	24,1	65	144	39,2	140	118	32,1	98	
	2,5	180	36,8	93	147	30,0	93	180	49,0	140	147	40,0	140	
	3,0	216	44,1	120	176	35,9	93	216	58,8	166	176	47,9	140	
	4,0	288	58,8	140	235	48,0	120	288	78,4	196	235	64,0	166	
5,0	-			294	60,0	140	-			294	80,0	196		

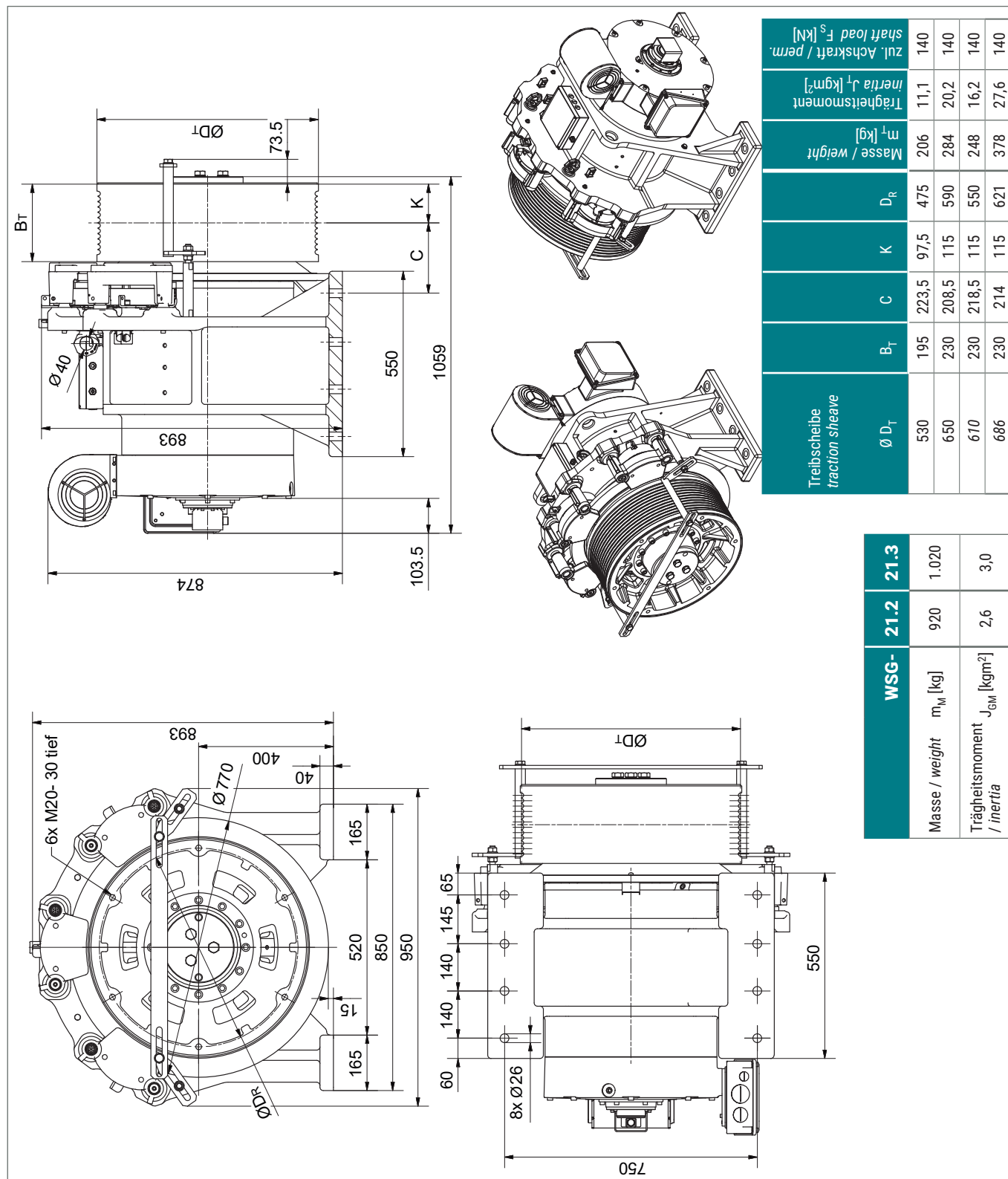
Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
 Date: 06. Feb 2024
 Version: C15
 Page: 31

11. Dimension drawing



Gearless Lift Machine

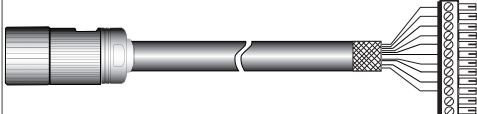
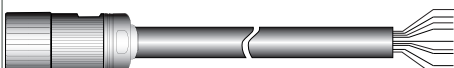

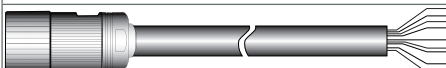


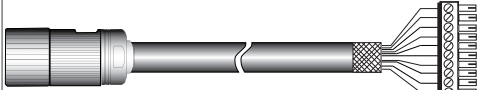
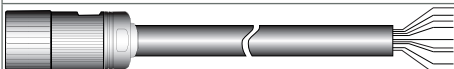


WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 32

12. Accessories

12.1. Connecting cable for measuring systems for ECN 1313 and ERN 1387

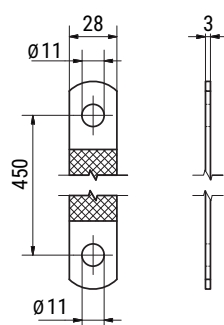
	Inverter type	Recommended encoder system	Recommended measurement system cable
	F-Pack WLD 302	ECN 1313 - EnDat	K 514 273 022-xx
	E-Pack Arkel ARCODE	ECN 1313 - (EnDat/SSI)	K 503 325 021-xx
	D-Pack Arkel ADrive CT unidrive SP / E	ECN 1313 - (EnDat/SSI)	K 502 452 021-xx
	Fuji Frenic	ECN 1313 - (EnDat/SSI)	K 502 679 022-xx
	RST Elektronik FRC	ECN 1313 - EnDat	K 508 752 022-xx
	GEFRAN (SIEI) AVY-L-M	ERN 1387	K 502 599 022-xx
	Vacon NXP	ECN 1313 - EnDat	K 503 289 021-xx
	Yaskawa/Omron L7 Telemecanique/Schneider Altivar 71	ECN 1313 - EnDat	K 503 715 022-xx
	KW Goliath Ziehl-Abegg 3C	ECN 1313 - EnDat	K 508 749 022-xx
	Ziehl-Abegg 4C	ECN 1313 - (EnDat/SSI)	K 504 503 022-xx

xx .. cable length [m]

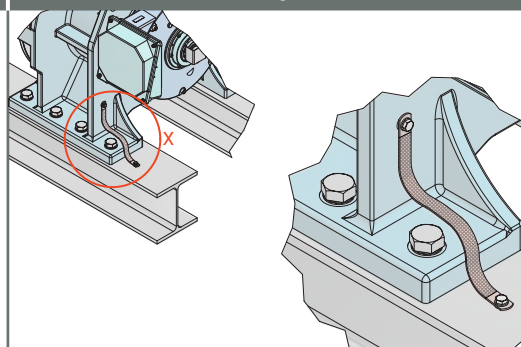
12.2. Potential equalisation

The rectangle conductor (ET K829712-450) is used for potential equalisation between the motor and the machine frame. Ensure that the connection points are metallic bright when using it.

Cu-flat braid (flexible)



Usage



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 33

12.3. Cable set for motor and brake

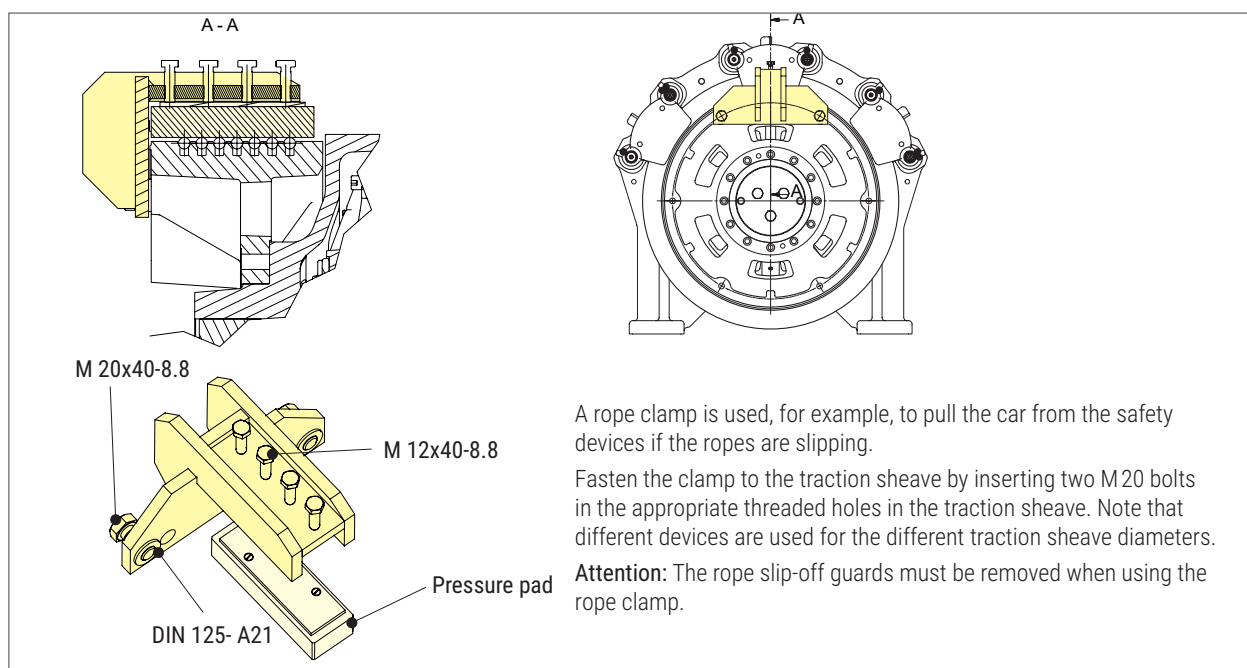
Motor cable set

- KS 503 461 621-xx - motor cable 4x6 mm²
- KS 503 461 921-xx - motor cable 4x10 mm²
- KS 503 461 E21-xx - motor cable 4x16 mm²
- KS 503 461 G21-xx - motor cable 4x35 mm²
- KS 503 461 H21-xx - motor cable 4x50 mm²

with xx...cable length [m]



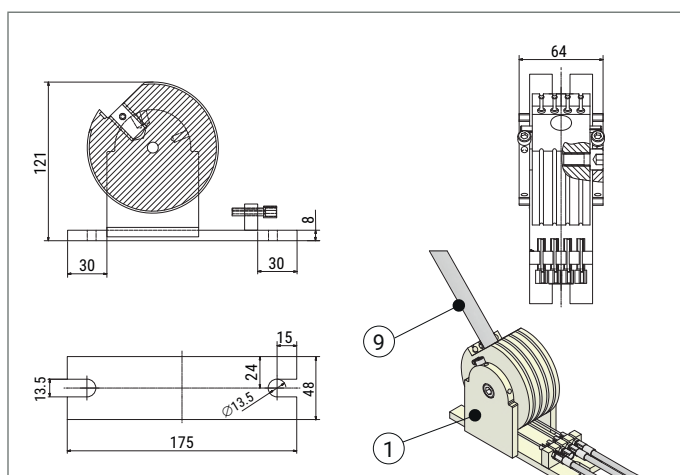
12.4. Rope clamp



12.5. Remote brake control by Bowden cable

The Bowden cable remote control is used to release the brakes mechanically in the event of an emergency. See section „8.2. Emergency evacuation“ on page 22 for details.

The standard length of the Bowden cable is 3m. Other lengths are available on request.



Gearless Lift Machine

WSG-21

Operating Instructions

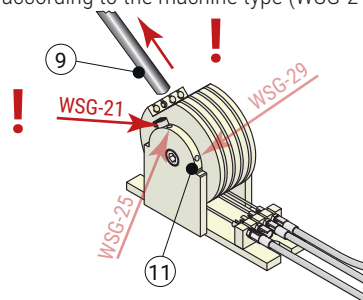
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 34

Installation

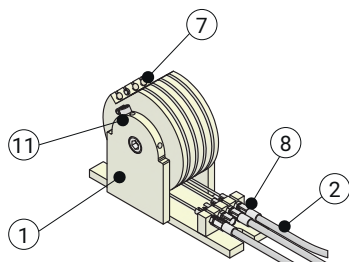


- ▶ Lock the car and the counterweight and ensure that all of the necessary safety precautions are observed for the lift system. The lift may move in an uncontrolled manner.
- ▶ Ideally, the manual releasing device should be installed without the ropes in place.
- ▶ Install the manual releasing device while the brake is disconnected from the power supply.

1. Install the lever block (1) with two M12 bolts (16) in a suitable location in the vicinity of the lift machine, e.g. on the machine frame.
2. For installation, remove the lever (9) from the lever block (1) and make sure that the rotatable eccentric (7) is not mechanically blocked.
3. Check the correct fit of the two stop screws (11) on each side according to the machine type (WSG-21).



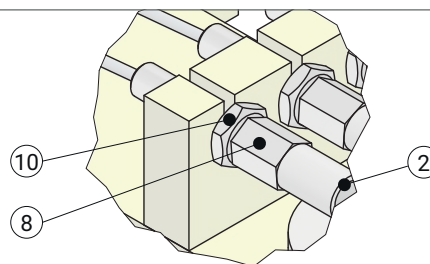
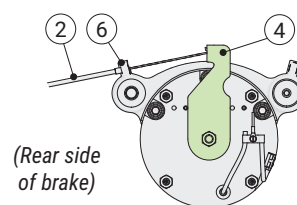
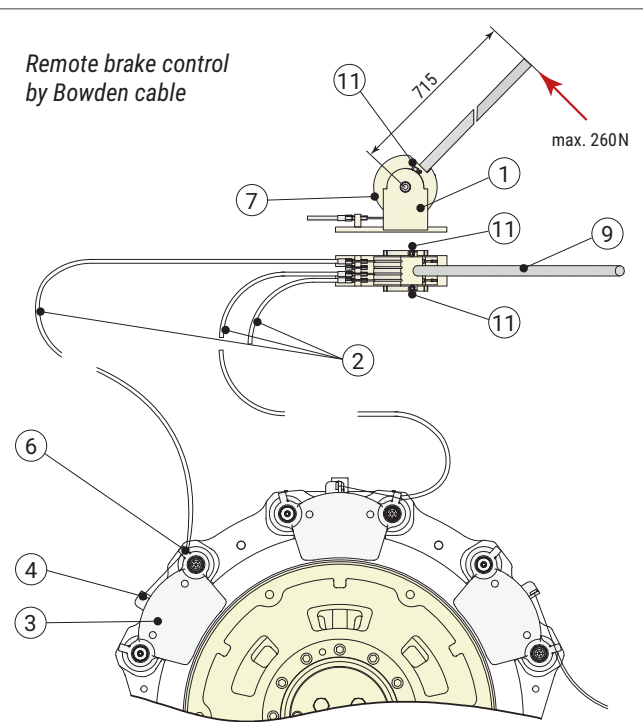
4. Insert the Bowden cables (2) – side with set screw (8) – into the lever bracket (1). Screw in the set screw (8) with nut (10) as far as it will go.



5. Insert the second side of the Bowden cables (2) into the manual release lever (4) and the counter-holder (6) of the brake (3).
6. Tension the Bowden cables on the lever block (1) using the set screw (8).
When doing so, the manual release levers (4) of the brakes (3) must not move - the brakes must not be released!
After the adjustment has been completed, secure the set screw (8) with the help of the nut (10).
7. Perform at least three functional tests.

To do this, insert the lever (9) into the lever bracket (1) and operate it until the brakes release (visual inspection of the brake air gap; check that the traction sheave can be turned freely). A force of max. 260 N (at 0.715 m lever length) is required to release the brake (with 3 partial brakes). If the required force is greater, check the installation.

Remote brake control by Bowden cable



Gearless Lift Machine

WSG-21

Operating Instructions

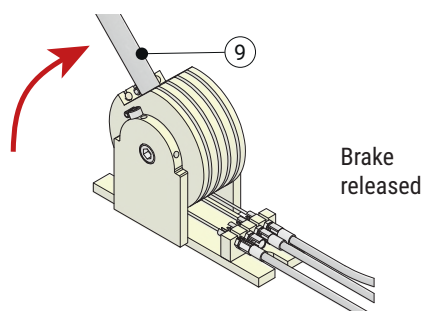
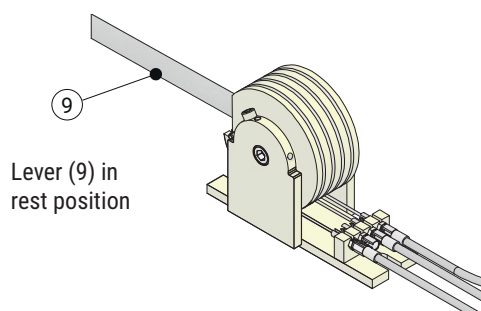
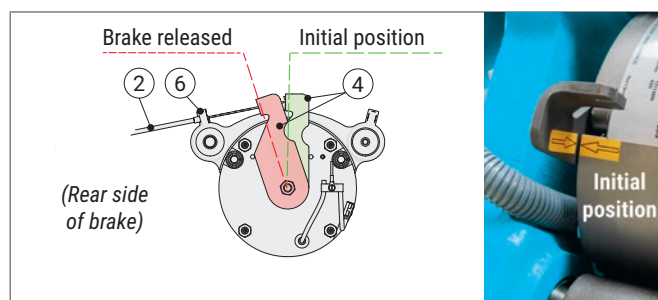
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 35



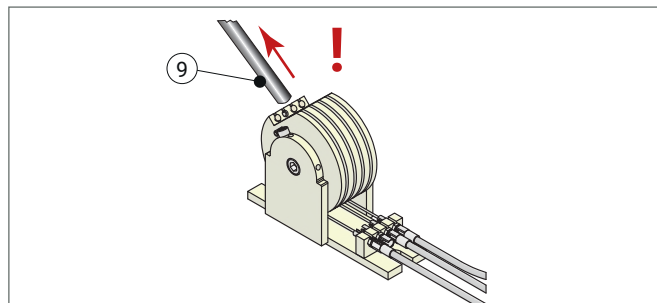
- More excessive force (> 300 N with a 0.715 m lever length) is unacceptable, as it can damage the brakes beyond repair.

- Set the lever (9) back to its rest position once the test is completed (check the air gap with the traction sheave locked).

Ensure that the manual release levers (4) on the individual partial brakes are back to their initial positions (identification by arrow symbols).



- After manual brake release has been performed, be sure to remove the lever (9) from the lever block.



- Install the Bowden cables only with large radii (bending radius > 0.5m, if possible). Do not allow any loops to be formed.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 36

12.6. Return motion device



► Only qualified service personnel are permitted to take any evacuation measures in the event of an emergency.

The return motion device is used to move the lift manually in an emergency, such as if the car is retained by the safety device.

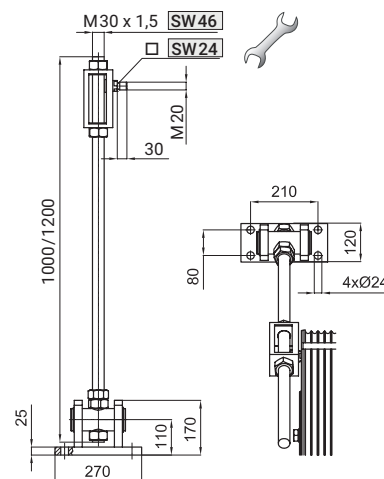
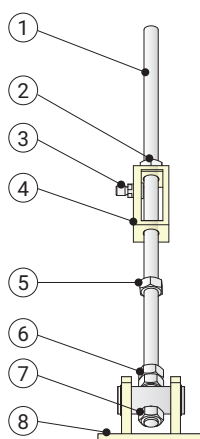


Caution. When using the return motion device, beware of the potential risk of collision with parts of the lift machine or other safety devices, such as the rope slip-off guards.



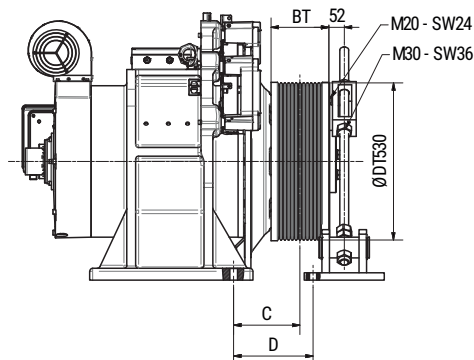
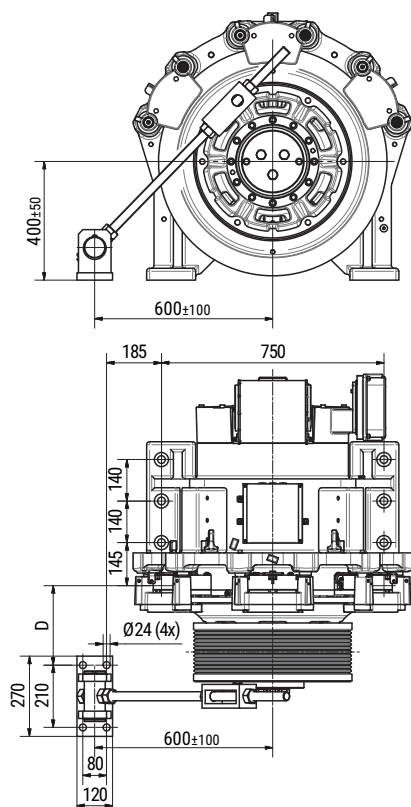
Special tools required

- 24 mm jaw spanner
- 46 mm jaw spanner



Recommended installation of the return motion device

Recommended installation of the return motion device



ØDT	BT	C	D
530	195	223.5	268
610	230	218.5	280.5
650	230	208.5	270.5
686	230	214	276

dargestellt / shown
WSG-21.3 (ØDT=530)

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 37

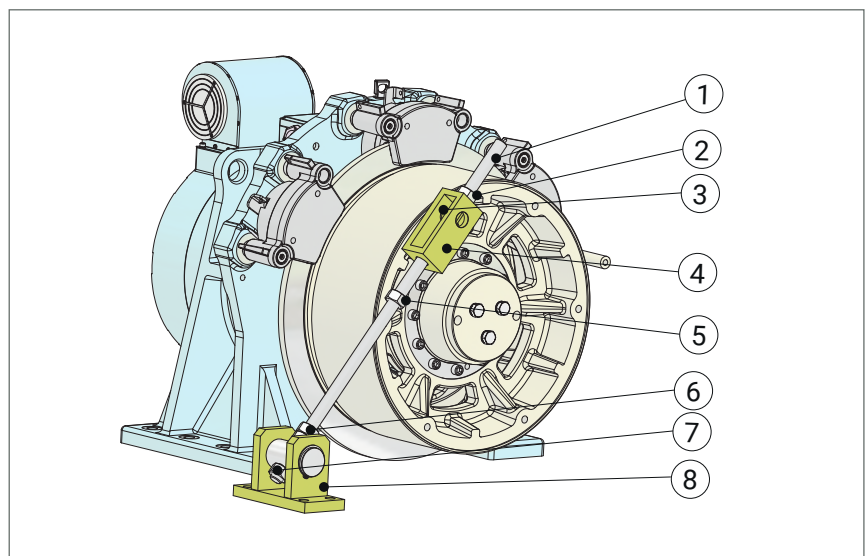
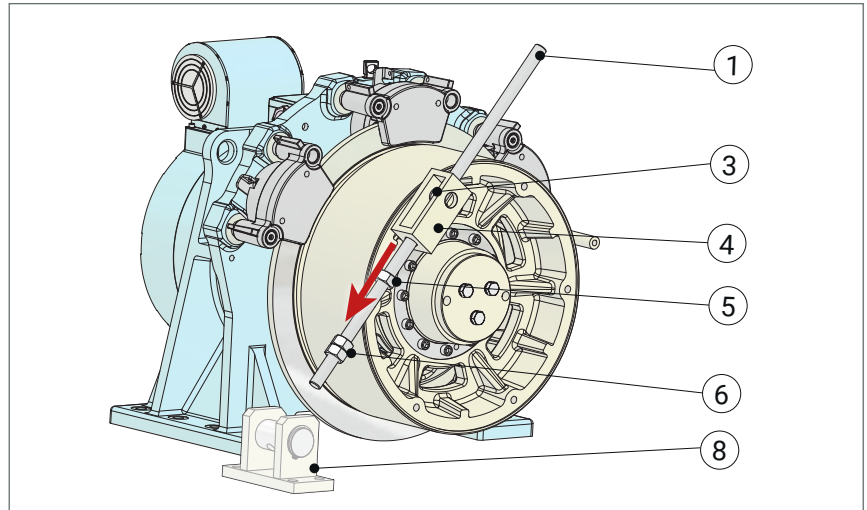
Installation

1. Slacken the nut (7) and remove the bearing block (8) from the threaded rod (1), which is provided with a fine thread (M30 x 1,5).
2. Install the bearing block (8) as recommended in the drawing on the machine frame. It can be mounted to the left or right-hand side of the machine.



Warning: Ensure that the safety circuit of the lift system is interrupted by a switching contact while mounting the bearing block (8), to prevent any unintentional electric operation of the machine.

3. Remove nut (2) from the threaded rod (1) and turn nut (5) towards nuts (6).
4. Screw the slide block (4) into a suitably located threaded hole in the traction sheave with the threaded bolt (3); the threaded rod (1) should be loosely inserted into the slide block (4).
5. Insert the threaded rod (1) into the bearing block (8) and fasten it using the nut (7).
Ensure that the nut (7) is completely screwed onto the threaded rod (1) with 2-4 mm of thread left protruding beyond the nut. The turning movement of the lever must not be obstructed.
6. Screw the nut (2) onto the threaded rod (1) flush with the slide block (4).
The return motion device is now ready for use.



Gearless Lift Machine

WSG-21

Operating Instructions

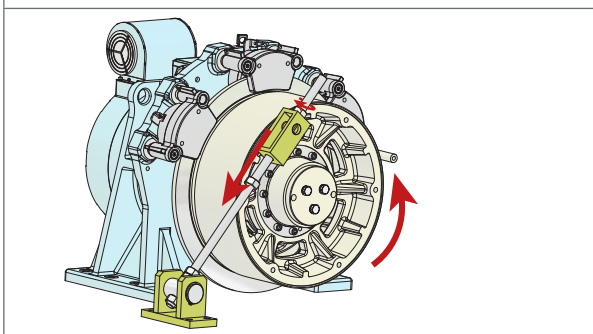
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 38



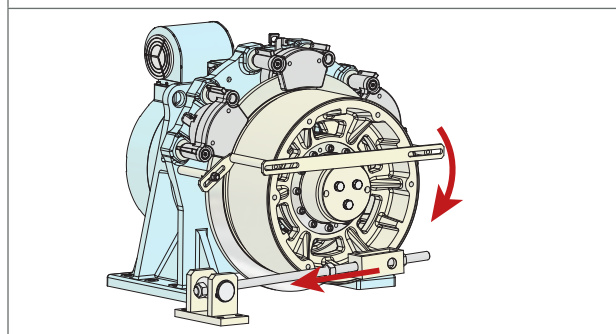
Information

- ▶ As a rule, the threaded rod (1) may only be subjected to compressive load.
- ▶ This causes the traction sheave to rotate anti-clockwise in the version shown above.

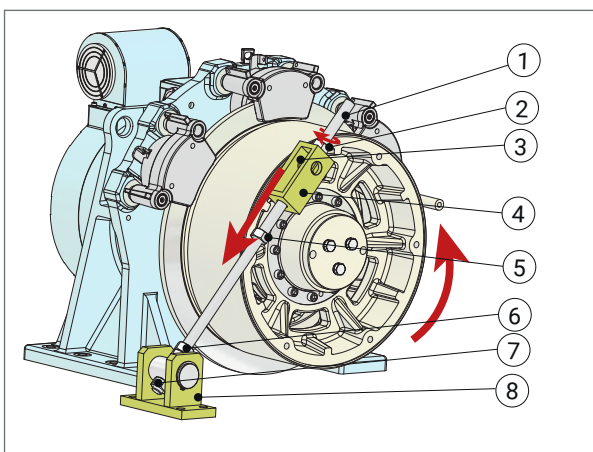
Anti-clockwise rotation of the traction sheave



Alternative position of the return motion device for clockwise rotation of the traction sheave



Use of the return motion device



1. Once the return motion device has been installed correctly, the brakes of the lift machine can be released by means of the hand release lever or electrically.
2. Turn the nut (2) clockwise; the traction sheave will rotate anti-clockwise.
Make sure that the nut (5) does not obstruct the movement of the slide block (4).
3. If necessary, the slide block (4) can be repositioned by inserting the threaded bolt (3) into a subsequent hole in the traction sheave.



DANGER

- ▶ When changing the position of the threaded bolt in the holes, the lift must be secured by its brakes.



DANGER

- ▶ Make sure that you restore the lift system to its original state after completing the emergency evacuation. Take particular care to remove the lever extensions and all parts of the mechanical return motion device.

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 39

13. Spare parts



Information

- For the spare parts refer to "Spare Part Document SM.8.006018.EN"



14. Annex

14.1. Special features for use in elevator systems according to ASME A17.1



DANGER

- Please note that in the case of elevator systems according to ASME 17.1, in contrast to EN 81, the machine fastening must be done as follows:

» **8 M 24 bolts - strength class 12.9 - tightening torque 1,150 Nm**

Gearless Lift Machine
WSG-21
Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 40

14.2. EU type-examination Certificate No. 15656/1





EU-type examination certificate
15656/1

Inspecta Tarkastus Oy as Notified Body No. 0424 has granted this certificate
as proof that the EU-type examination to

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

has been assessed in accordance with the requirements of the

Directive 2014/33/EU
EN 81-20:2020 clauses 5.6.6 and 5.6.7
EN 81-50:2020 clauses 5.7 and 5.8

Product EU-type examined

**Stopping devices to prevent uncontrolled car movements (UCM) and for
Ascending car overspeed protection means, disk type brake
ROBA diskstop type 894.5__ size 6,7,8 and type 894.6__ size 6**

Manufactured by

Chr. Mayr GmbH + Co. KG Eichenstraße 1 D-87665 Mauerstetten	Mayr Power Transmission Co., Ltd. 1298 Fuxin Road Jiangsu Province, PR China 215637 Zhangjiagang	Mayr Polska sp. z o.o Rojow, ul. Hetmanska 1 PL-63-500 Ostrzeszow Poland
--	--	--

Date of submission for 15656 EU-type examination: 07.12.2015
Date of submission for 15656/1 EU-type examination: 07.07.2022

Certification is based on reports 08495-01 – 08495-06, 15656-01 and 15656-02

Documents annexed to this certificate: Annex 1, Annex 2, Additional Annex A1 and drawings
E08806001000430, E08807000000330 and E08808000000430

Date of issue 2022-08-08


Jukka Vinnari
Leading Engineer





Inspecta Tarkastus Oy
P.O. Box 1000
Sörnäistenkatu 2
FI-00581 HELSINKI
Finland
Tel. +358 10 521 600

Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 41

1 / 3

Annex 1 to EU-type examination certificate number 15656/1

Type of safety device: Two disk type brakes acting to machinery brake disk. The brake disk is attached to the traction sheave. The brakes are activated by an overspeed monitoring device.

The overspeed monitoring device is subject to EU-type examination according to directive 2014/33/EU (not part of this EU-type examination).

Conditions:

Disk brakes must be assembled and adjusted correctly according to manufacturer's instructions. Brake disk used for the disk type brake must fulfil following conditions:

- Material; steel or cast iron
- Friction surface quality: Ra 3,2 µm or better
- Shaft run-out deviation: max 0,25 mm
- Brake disk width:

Size	Disk width
6/894.6, 6/894.5	10 - 15 mm
7/894.5	15 - 20 mm
8/894.5	15 - 25 mm
- Required brake torque can be calculated according to Formula 1 in Table 1 of Annex 1.

Table 1 Brake size/type -table

Brake configuration – braking force – eff. friction diameter			
brake size /type	brake configuration	nominal braking force F_{Br}	effective friction diameter
6/894.6_ _ _ _	minimum force	1724 N	$d_{eff} = d - 0,004$ possible deviations marked in drawing
	maximum force	2873 N	
6/894.5_ _ _ _	minimum force	1939 N	
	maximum force	3232 N	
7/894.5_ _ _ _	minimum force	2180 N	$d_{eff} = d - 0,005$ possible deviations marked in drawing
	maximum force	3735 N	
8/894.5_ _ _ _	minimum force	2984 N	
	maximum force	4973 N	

Nominal brake torque in [Nm]

$$M_{Br} = F_{Br} * d_{eff} / 2 \quad (\text{Formula 1})$$

Maximum sliding speed referred to effective friction diameter (max. tripping speed)

Sizes 6/894.5, 6/894.6, 7/894.5: 15 m/s
Size 8/894.5: 20 m/s



Inspecta Tarkastus Oy
P.O. Box 1000
FI-00581 Helsinki, Finland
Tel. +358 10 521 600
fi.asiakaspalvelu@kiwa.com

Visiting address
Sörnäistenkatu 2
00580 Helsinki, Finland
www.kiwa.com

Business ID
2047308-3



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 42

2 / 3

Annex 1 to EU-type examination certificate number 15656/1

Nominal speed v in [m/s]

Sizes 6/894.5, 6/894.6, 7/894.5: 12 m/s
Size 8/894.5: 16 m/s

Nominal speed of sheave n in [$1/min$]

$$n = (60 * v) / (\pi * d_{eff}) \quad (\text{Formula 2})$$

Cabin speed depends on roping transmission and diameter ratio of brake disc and grooves

Technical issues concerning nominal braking force, maximum tripping speed and response times for the one disk type brake are

Table 2 Single brake DC-side cut-off from nominal voltage

Brake	nominal braking force maximum tripping speed		t_0	t_{50}	t_{90}
	N	m/s	ms	ms	ms
			max.	max.	max.
RSD 6/894.5_ _ _ _	1939	15	80	160	200
RSD 6/894.5_ _ _ _	3232	15	40	100	150
RSD 6/894.6_ _ _ _	1724	15	80	160	190
RSD 6/894.6_ _ _ _	2873	15	40	85	115
RSD 7/894.5_ _ _ _	2180	15	95	170	215
RSD 7/894.5_ _ _ _	3735	15	45	100	135
RSD 8/894.5_ _ _ _	2984	20	80	160	210
RSD 8/894.5_ _ _ _	4973	20	40	95	160

Table 3 Single brake DC-side cut-off from overexcitation voltage

Brake	nominal braking force maximum tripping speed		t_0	t_{50}	t_{90}
	N	m/s	ms	ms	ms
			max.	max.	max.
RSD 8/894.5_ _ _ _	2984	20	100	180	230
RSD 8/894.5_ _ _ _	4973	20	50	110	190

Table 4 Single brake AC-side cut-off from nominal voltage

Brake	nominal braking force maximum tripping speed		t_0	t_{50}	t_{90}
	N	m/s	ms	ms	ms
			max.	max.	max.
RSD 8/894.5_ _ _ _	2984	20	430	680	1000
RSD 8/894.5_ _ _ _	4973	20	210	450	800

t_0 : time from switching off power supply until start of brake torque rise

t_{50} : time from switching off power supply until 50 % of nominal brake torque

t_{90} : time from switching off power supply until 90 % of nominal brake torque



Inspecta Tarkastus Oy
P.O. Box 1000
FI-00581 Helsinki, Finland
Tel. +358 10 521 600
fi.asiakaspalvelu@kiwa.com

Visiting address
Sörnäistenkatu 2
00580 Helsinki, Finland
www.kiwa.com

Business ID
2047308-3



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 43

3 / 3

Annex 1 to EU-type examination certificate number 15656/1

Response time of the brake is the part of the overall delay time of the UCM protection system. The braking forces and response times of the brakes mentioned in this EU-type examination certificate can be used as a part of the evaluation of the whole UCM protection system.

Maximum tripping speed means brake gliding speed.

Nominal brake torque for a certain brake disk diameter can be calculated by the formula on table 1 on this Annex.

Always minimum 2 disk type brakes must be assembled to the brake disk to fulfil the requirement of redundancy.

Monitoring of the brakes shall be performed

- a) by micro switches or proximity switches of both brakes connected to the lift control unit.
Assembling of the switches is shown in following drawings: E08806001000430,
E08807000000330, E08808000000430

or

- b) by built-in brake monitoring system of the lift control unit to ensure at least correct lifting or dropping of the both brakes before every start or stop of the lift

or

- c) by automatic built-in system of lift control unit defined by lift manufacturer
to ensure the right braking force. This testing period shall be at least once in day.

Checking of the function of the brake monitoring system shall be verified during examinations and tests according EN 81-20 clause 6.3.



Inspecta Tarkastus Oy
P.O. Box 1000
FI-00581 Helsinki, Finland
Tel. +358 10 521 600
fi.asiakaspalvelu@kiwa.com

Visiting address
Sörnäistenkatu 2
00580 Helsinki, Finland
www.kiwa.com

Business ID
2047308-3



Gearless Lift Machine

WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 44

1 / 1

Annex 2 to EU-type examination certificate number 15656/1

In addition to Annex 1 of EU-type examination certificate 15656/1 technical issues concerning nominal braking forces and response times for combination of two disk type brakes in application in which the other brake is controlled by using AC and the other by using DC are

Table 5 Two disk type brakes AC & DC cut-off

RSD 8/894.5	2x 4973 N braking force	2x 2984 N braking force
Percentage of brake force of 2 brakes	Time from power cut-off	Time from power cut-off
[%]	[ms]	[ms]
0	40	80
25	95	160
45	160	210
45	210	430
70	450	680
90	800	1000

NOTE! Evaluation of brake control is not part of this certification. The brake control must be evaluated for each application. The design of the brake control must meet the requirements set in EN 81-20:2020 clause 5.9.2.2.



Inspecta Tarkastus Oy
P.O. Box 1000
FI-00581 Helsinki, Finland
Tel. +358 10 521 600
fi.asiakaspalvelu@kiwa.com

Visiting address
Sörnäistenkatu 2
00580 Helsinki, Finland
www.kiwa.com

Business ID
2047308-3



Gearless Lift Machine

WSG-21

Operating Instructions

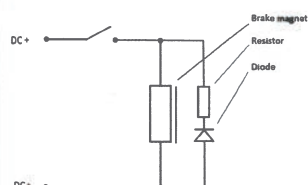
Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 45



Additional Annex 15656/A1 to EU Type-Examination Certificate 15656



This additional annex 15656/A1 verify response times of the ROBA RSD6 brake mentioned in EU Type-Examination certificate 15656 with a brake operation circuit described in picture 1. Response time of the brake is the part of the overall delay time of the UCM protection system. The braking forces and response times of the brake can be used as a part of the evaluation of the whole UCM protection system. The whole UCM safety system is the matter of the separate conformity assessment process described in LD 2014/33/EU.



Picture 1 Wiring diagram of a special brake operation circuit

Components of the wiring diagram

- Diode:
 - Repetitive peak reverse voltage, $V_{RRM} \geq 2000 \text{ V}$
 - Max average forward rectified current, R-load $I_{FAM} \geq 1 \text{ A}$
- 100 Ohm Resistor:
 - Power Rating at 70°C , $P_{70} \geq 4 \text{ W}$
 - Maximum working voltage, $U_{rms,max} \geq 750 \text{ V}$
- 150 Ohm Resistor:
 - Power Rating at 70°C , $P_{70} \geq 4 \text{ W}$
 - Maximum working voltage, $U_{rms,max} \geq 750 \text{ V}$

Changes of the components mentioned above are permitted if the change won't affect response times described in following table.

Special response times for Mayr ROBA brake RSD6 with the brake operation circuit described in picture 1:

	100 Ohm resistor	150 Ohm resistor
t_0	135 ms	110 ms
t_{50}	390 ms	320 ms
t_{90}	550 ms	480 ms

t_0 : time from switching off power supply until start of brake torque rise (0% torque)

t_{50} : time from switching off power supply until 50% of nominal brake torque

t_{90} : time from switching off power supply until 90% of nominal brake torque

Date of issue 2018-02-16



Jukka Vinnari
Leading Engineer

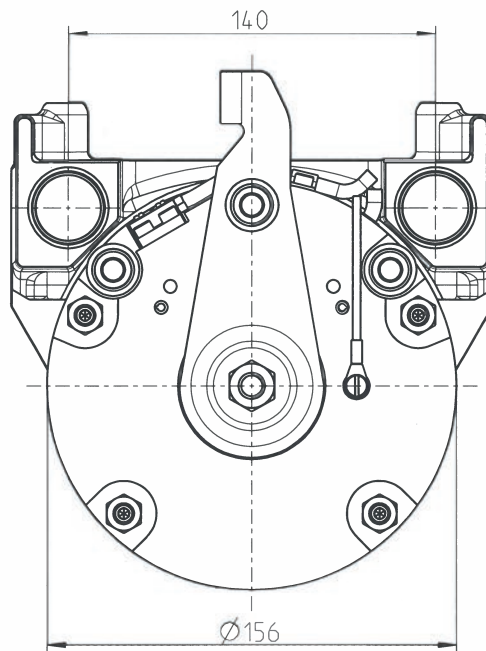


Gearless Lift Machine

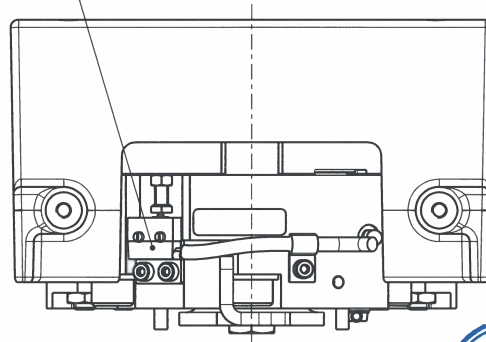
WSG-21

Operating Instructions

Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 46





Lüftüberwachung /
release monitoring



Weitergabe sowie Vervielfältigung dieses Dokuments, Verwertung und Mitteilung seines Inhalts sind verboten, soweit nicht ausdrücklich gestattet. Zuwiderhandlungen verpflichten zu Schadenersatz. Alle Rechte für den Fall der Patent-, Gebrauchsmuster- oder Geschmacksustereinfügung vorbehalten.

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without explicit authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.



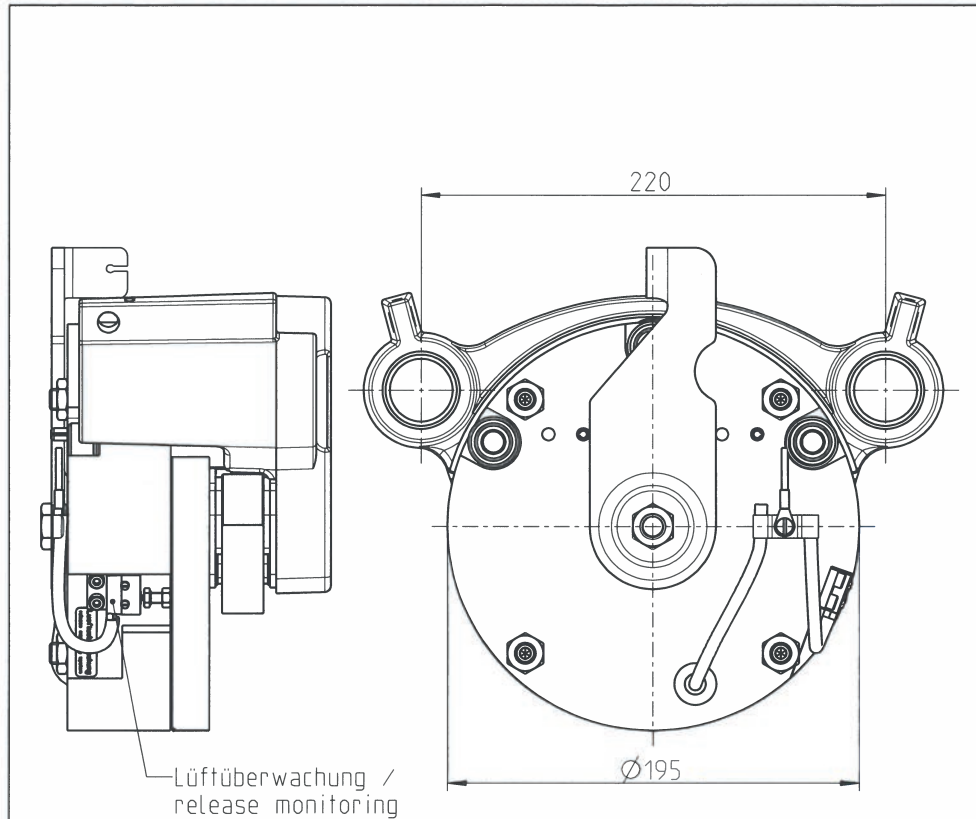
	Datum / date:	Name / name:	Werkstoff-Nr./material-no.:		Schutzvermerk / protection notice DIN ISO 16016	 CHR. MAYR GMBH • CO.KG Eichenstraße 1 87665 Mauerstetten www.mayr.com
Gezeichnet / drawn:	20.08.2015	Melzer	Werkstoff / material:		Tolerierungsgrundsatz / fundamental tolerancing principle DIN EN ISO 8015:2011	
Gepüft / checked:			alternativ / alternative:		Allgem.-Toleranzen / general tolerance DIN ISO 2768-mH	
Genehmigt / approved:	.	.				
Oberfläche / surface DIN EN ISO 1302 Ra = µm(✓)	Werkstückkanten / edges DIN ISO 13715 					
Benennung / part name: ROBA-diskstop 894.- Size 6						Ersatz für / replacement for:
						Artikelnummer / part number:
						Dokumentnummer / document number:
						4715148
Maßstab / scale:		Type / type:	Größe / size:	Gewicht / weight:	Zeichnungsnummer / drawing number:	
			6	kg	E08806001000430	

Gearless Lift Machine

WSG-21

Operating Instructions


Code: GM.8.003647.EN
Date: 06. Feb 2024
Version: C15
Page: 48



Weitergabe sowie Vervielfältigung dieses Dokuments, Verwertung und Mitteilung seines Inhalts sind verboten, soweit nicht ausdrücklich gestattet. Zuwiderhandlungen verpflichten zu Schadenersatz. Alle Rechte für den Fall der Patent-, Gebrauchsmuster- oder Geschmacksustereintragung vorbehalten.

The reproduction, distribution and utilization of this document as well as the communication of its contents to others without explicit authorization is prohibited. Offenders will be held liable for the payment of damages. All rights reserved in the event of the grant of a patent, utility model or design.



Gezeichnet / drawn:	Datum / date:	Name / name:	Werkstoff-Nr./material-no.:	Schutzvermerk / protection notice	 CHR. MAYR GMBH • CO.KG Eichenstraße 1 87665 Mauerstetten www.mayr.com
Geprüft / checked:	20.08.2015	Melzer		DIN ISO 16016	
Genehmigt / approved:			Werkstoff / material:	Tolerierungsgrundsatz / fundamental tolerancing principle	Ersatz für / replacement for:
Oberfläche / surface	Werkstückkanten / edges		alternativ / alternative:	DIN EN ISO 8015:2011	
DIN EN ISO 1302	DIN ISO 13715			Allgem.-Toleranzen / general tolerance DIN ISO 2768-mH	Artikelnummer / part number:
Ra = µm(✓)					Dokumentnummer / document number:
Benennung / part name:	ROBA-diskstop 894.-			4715156	
	Size 8			E088080000000430	
Maßstab / scale:	Type / type:	Größe / size:	Gewicht / weight:		
		8	kg		

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Translation of the Original Operational Instructions

Design according to
Drawing number: E089 08 009 000 210

Please read these Operational Instructions carefully and follow them accordingly!

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

Contents:

- Page 1:** - Contents
- Safety and Guideline Signs
- Approvals
- Page 2:** - Guidelines on EU Directives
- Page 3:** - Guidelines on UK Directives / Conformity
- Guidelines on EU and UK REACH
- Page 4:** - Safety Regulations
- Page 5:** - Safety Regulations
- Page 6:** - Safety Regulations
- Page 7:** - Identification
- Page 8:** - Brake Illustrations
- Page 9:** - Parts List
- Page 10:** - Technical Data
- Page 11:** - Switching Times
- Torque-Time Diagram
- Page 12:** - Application
- Design
- Function
- Scope of Delivery / State of Delivery
- Brake Temperature
- Adjustment
- Noise Damping
- Page 13:** - Installation Conditions
- Brake Installation
- Transverse Forces (at max. Spring Force)
- Page 14:** - Installation of Bowden Cable Hand Release
- Page 15:** - Brake Inspection
- Braking Torque
- Release Monitoring
- Page 16:** - Electrical Connection and Wiring
- Page 17:** - Maintenance
- Information on the Components
- Cleaning the Brake
- Disposal
- Page 18:** - Malfunctions / Breakdowns

Safety and Guideline Signs

DANGER



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

CAUTION



Danger of injury to personnel and damage to machines.



Please Observe!
Guidelines on important points

Approvals

EU Type Examination Certificate
(Elevator Directive):

- Certificate No. 15656/1 (15656)

Guidelines on EU Directives



Guidelines on the Declaration of Conformity

A conformity evaluation has been carried out for the product (electromagnetic safety brake) in terms of the EU Low Voltage Directive 2014/35/EU and the RoHS 2011/65/EU with 2015/863/EU. The Declaration of Conformity is laid out in writing in a separate document and can be requested if required.

Guidelines on the EMC Directive 2014/30/EU

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

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

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

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

Guidelines on the Machinery Directive 2006/42/EC

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

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

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

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

Guidelines on the EU Directive 2011/65/EU (RoHS II) with 2015/863/EU (RoHS III – from 22 July 2019)

These restrict the use of certain hazardous substances in electrical and electronic devices as well as in products / components (category 11), the proper operation of which is dependent on electric currents and electromagnetic fields.

Our electromagnetic products / components fulfill the requirements laid down in the RoHS Directive(s), taking into account the valid exceptions (according to Appendix III and IV RoHS (2011/65/EU) with delegated Directives (EU) 2018/739-741 from 01.03.2018 for Category 11 – until 21 July 2024) and comply with the RoHS.

Guidelines on the ATEX Directive

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

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

Guidelines on the REACH Regulation (EC) No. 1907/2006

of the European Parliament and of the Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). This regulation governs the manufacture, placing on the market and use of chemical substances in preparations and, under certain conditions, also of substances in finished products.

mayr® power transmission exclusively manufactures products (articles: overload clutches, shaft couplings, electromagnetic brakes / clutches, permanent magnet motors and the appropriate control modules / rectifiers) in accordance with the definition in Article 3 of the REACH Regulation.

mayr® power transmission is aware of its responsibility towards the environment and society. As a matter of precaution, we pay attention to particularly critical substances in the supply chain and strive to avoid using any such substances completely or to replace them in the near future.

In compliance with Article 33 of the REACH Regulation, we would like to inform you that in our overload clutches and shaft couplings, electromagnetic brakes / clutches as well as permanent magnet motors, subcomponents with a lead content of > 0.1% are or may be used. These are manufactured from raw materials such as machining steel / copper alloys (e.g. brass, bronze) or aluminum alloys.

Besides high-melting-point (HMP) solders (electronics), this also affects integrated machine elements as well as standard parts (screws / nuts / set screws / pins / etc.) among others, provided that the relevant standards allow this.

For example, lead can occur as an alloying element with more than 0.1 mass percent, based on the respective total mass, in screws and set screws of the following property classes: 4.6, 4.8, 5.8, 6.8, 04, 4, 5, 6, 14H, 17H, 22H, 33H, 45H.

Products made from copper and copper alloys do not fall within the area of applicability of Regulation (EC) No. 1272/2008 of the European Parliament and Council on the Classification, Labeling and Packaging of Substances and Mixtures (CLP Regulation) and are therefore not subject to the classification and labeling obligations.

To our knowledge, when used for their intended purpose and disposed of correctly (recycling), the contained substances pose no threat to health or environment.

We would like to point out that the proportion of lead used here is not prohibited according to the REACH Regulation. It is merely necessary to declare the use of this substance.

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Guidelines on UK Directives / Conformity

Products / components from *mayr*® power transmission fulfill the requirements for the British economic area due to currently identical UK and EU directives.

In addition to the CE identification, the UKCA identification is attached to the product.

The UK Declaration of Conformity is available in a separate document.

Directives under EU Law	Directives under UK Law
Machinery Directive 2006/42/EC	Supply of Machinery (Safety) Regulations UK 2008 No. 1597
EMC Directive 2014/30/EU	Electromagnetic Compatibility Regulations UK 2016 No. 1091
EU Low Voltage Directive 2014/35/EU	Electrical Equipment (Safety) Regulations UK 2016 No. 1101
RoHS II 2011/65/EU	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations UK 2012 No. 3032
Elevator Directive 2014/33/EU	Lifts Regulations UK 2016 No. 1093

Guidelines on EU and UK REACH

According to the European Union (Withdrawal) Act 2018, the EU REACH Regulation was transposed into UK law on January 1, 2021, and is known as UK REACH.

REACH and related legislation have been replicated in the UK with the necessary changes to make it workable in a domestic context.

The fundamental principles of the EU REACH Regulation have been retained in UK REACH.

The remarks on the information obligation according to UK-REACH correspond in content to the REACH Regulation (EC) No. 1907/2006.

Safety Regulations

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

General Guidelines

DANGER



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

Brakes may generate further risks, among other things:



Hand injuries



Danger of seizure



Contact with hot surfaces



Magnetic fields

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

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

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

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

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



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

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

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



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

Guidelines for Electromagnetic Compatibility (EMC)

In accordance with the EMC directive 2014/30/EU, the individual components produce no emissions. However, functional components e.g. mains-side energization of the brakes with rectifiers, phase demodulators, ROBA®-switch devices or similar controls can produce disturbance which lies above the allowed limit values. For this reason it is important to read the Installation and Operational Instructions very carefully and to keep to the EMC directives.

Application Conditions



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

- ☐ Mounting dimensions and connection dimensions must be adjusted according to the size of the brake at the place of installation.
- ☐ Use of the brake in extreme environmental conditions or outdoors, directly exposed to the weather, is not permitted.
- ☐ The brakes are designed for a relative duty cycle of 60 %. A duty cycle > 60 % leads to higher temperatures, which cause premature aging of the noise damping and therefore lead to an increase in switching noises. Furthermore, the switch function of the release monitoring can be impaired. The max. permitted switching frequency is 180 1/h. These values are valid for intermittent periodic duty S3 60 %. The permitted surface temperature on the mounting surface must not exceed 80 °C at a max. ambient temperature of 40 °C.
- ☐ The braking torque is dependent on the current bedding-in condition of the brake. Bedding in / conditioning of the friction linings is necessary.
- ☐ The brakes are only designed for dry running. The torque is lost if the friction surfaces come into contact with oil, grease, water or similar substances or any other foreign bodies.



Please ensure that the brake is clean and oil-free. In particular in gear applications, special sealing measures, among other precautions, may be necessary!

- ☐ The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection.

CAUTION



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

Safety Regulations

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

Dimensioning

Attention!

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

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

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

Climate Conditions

The electromagnetic brake is suitable for mounting / operation on electromotive elevator machinery in enclosed places of installation with an ambient temperature of between -5 °C and +40 °C.

CAUTION



Reduction in braking torque possible

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

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

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

CAUTION



Brake malfunction possible

Condensation can form on the brake and cause malfunctions:

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

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

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



At high temperatures and in high humidity or with occurring dampness, the friction linings can seize up to the brake disk after longer downtimes.

CAUTION



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

Intended Use

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

Grounding Connection

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

Class of Insulation F (+155 °C)

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

Protection

(mechanical) IP10:

Protection against large body surfaces and large foreign bodies > 50 mm in diameter. No protection against water.

(electrical) IP54:

Dust-proof and protected against contact as well as against water spray from any direction.

Brake Storage

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

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

Storage acc. DIN EN 60721-3-1 (including the limitations / additions described above): classes 1K21; 1Z1; 1B1; 1C2; 1S11; 1M11

Handling

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

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

Safety Regulations

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

User-implemented Protective Measures:

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

Liability

The information, guidelines and technical data in these documents were up to date at the time of printing. Demands on previously delivered brakes are not valid. Liability for damage and operational malfunctions will not be taken if:

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

Guarantee

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

Standards, Directives and Regulations Used and To Be Applied

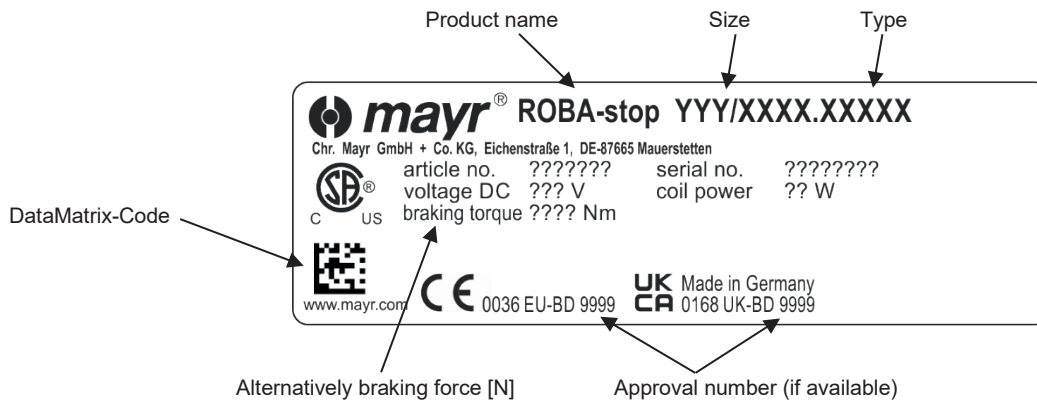
DIN VDE 0580	Electromagnetic devices and components, general specifications
DIN EN 61140	Protection against electric shock - Common aspects for installation and equipment
DIN EN IEC 63000	Technical documentation for the assessment of electrical and electronic equipment regarding the restriction of hazardous substances
DIN EN IEC 60529	Degrees of protection provided by enclosures (IP Code)
2014/35/EU	Low Voltage Directive
2011/65/EU	RoHS II - Directive
2015/863/EU	RoHS III- Directive
CSA C22.2 No. 14-2010	Industrial Control Equipment
UL 508 (Edition 17)	Industrial Control Equipment
2014/33/EU	Elevator Directive
EN 81-20	Safety rules for the construction and installation of lifts – Part 20: Passenger and goods passenger lifts
EN 81-50	Safety rules for the construction and installation of lifts - Examinations and tests – Part 50: Design rules, calculations, examinations and tests of lift components
EN ISO 12100	Safety of machinery – General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
EN 12016	Interference immunity (for elevators, escalators and moving walkways)

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Identification

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



CE Identification



according to the Low Voltage Directive 2014/35/EU (only for DC voltage > 75 V) and/or RoHS Directive 2011/65/EU with 2015/863/EU, and the Elevator Directive 2014/33/EU (with the ID number of the respective inspection authority, for type examination tested brakes only)

UKCA Identification



according to the Low Voltage Directive UK 2016 No. 1101 (only for DC voltage > 75 V) and/or RoHS Directive UK 2012 No. 3032, and the Elevator Directive UK 2016 No. 1093 (with the ID number of the respective inspection authority, for type examination tested brakes only)

Conformity Markings



in terms of the Canadian and American approval

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Brake Illustrations

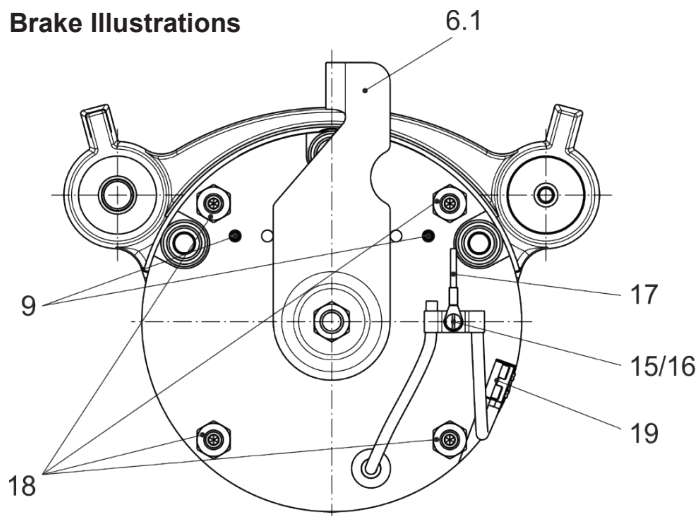


Fig. 1

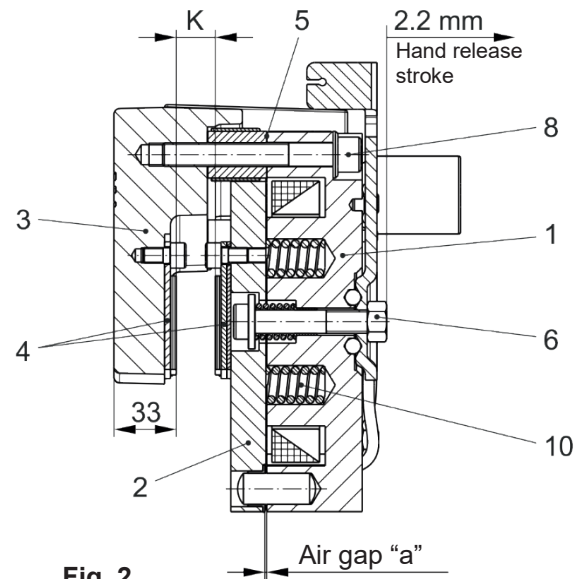


Fig. 2

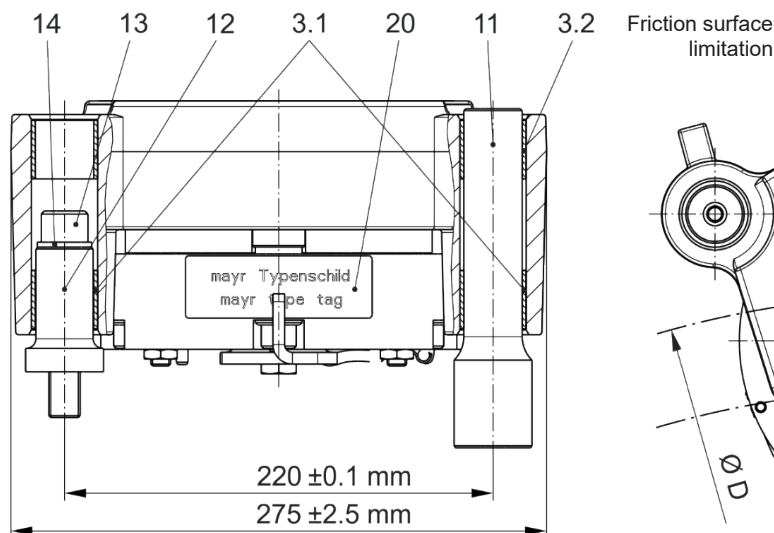


Fig. 3

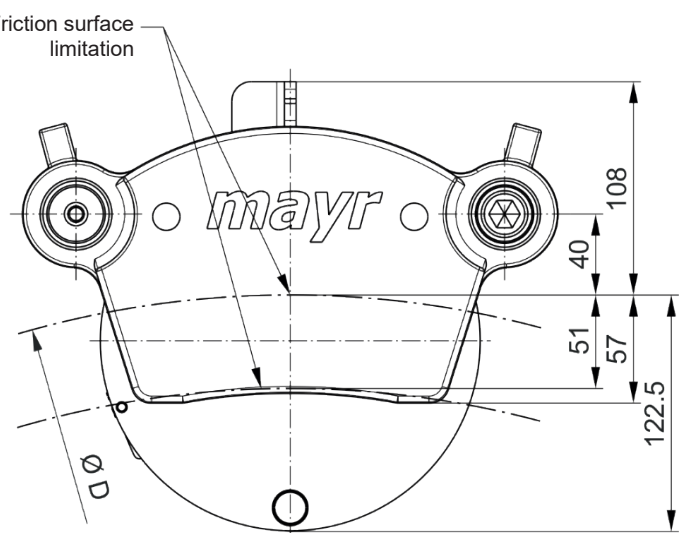


Fig. 4

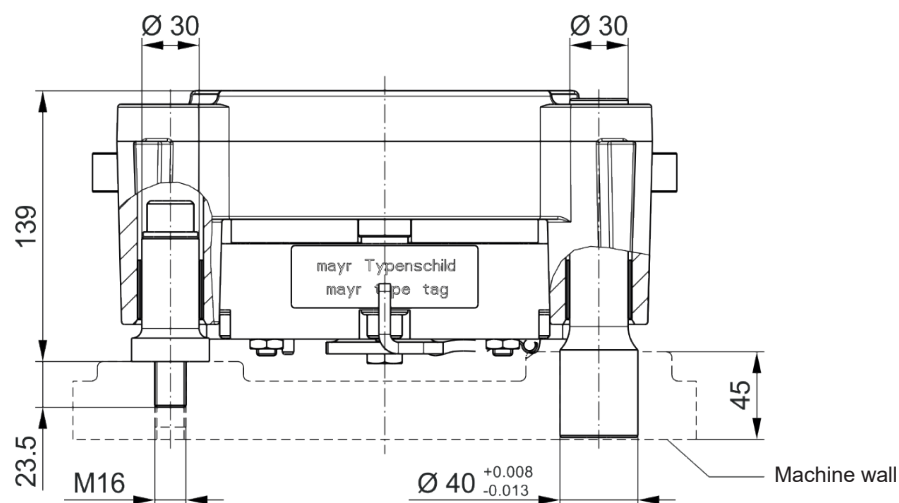


Fig. 5

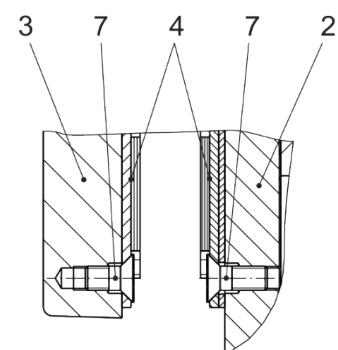


Fig. 6

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

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

Item	Name
1	Coil carrier assembly with coil
2	Armature disk
3	Brake caliper
3.1	Bearing bushing 1
3.2	Bearing bushing 2
4	Friction pad assembly
5	Shim rings (if necessary)
6	Hand release assembly
6.1	Hand release lever
7	Countersunk screw
8	Cap screw
9	Spring pin
10	Thrust spring
11	Guide bolt 1
12	Guide bolt 2
13	Cap screw
14	Washer
15	Contact washer
16	Cap screw
17	Strand tailored (green/yellow)
18	Noise damping assembly
19	Release monitoring assembly
20	Type tag

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Table 1: Technical Data

Braking force $F_{Br.}$:	4973 N	4209 N	3978 N	2984 N
Nominal voltage U_N (DC):	104 V			
Overexcitation voltage U_O (DC):	207 V			
Overexcitation time t_O :	≥ 1 s			
Coil capacity at nominal voltage P_N :	63 W			
Coil power at overexcitation P_O :	249 W			
Max. circumferential speed:	15 m/s			
Hand release stroke $H1$:	2.2 mm			
Brake disk width $K - 0.05$ ¹⁾ :	15 mm			
Effective friction diameter:	$D_{eff} = D^{2)} - 50$ mm			
Max. air gap "a" (Fig. 2) after wear:	0.8 mm			
Duty cycle:	60 %			
Electrical connection:	2 x 0.88 mm ²			
Max. hand release force:	600 N			
Max. friction work ³⁾ $Q_{f max.}$ per braking action:	130000 J			
Tightening torque Item 13:	210 Nm			
Mass:	25.5 kg			

¹⁾ Other brake disk widths available on request.

²⁾ D = brake disk diameter (Fig. 4)



³⁾ The thermal load for a brake cannot be stated.
Most of the brake energy is transferred onto the brake disk.
The thermal load capability is dependent on the heat dissipation capacities of the brake disk.

DANGER

If the brake is operated with an air gap "a" > 1.0 mm, it becomes a **safety risk** as the braking effect is no longer given because the armature disk (2) lies again the hand release (6).

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Table 2: Switching Times [ms]

Braking force	Attraction t_2	Drop-out t_0 DC	Drop-out $t_{50}^{4)}$ DC	Drop-out $t_{90}^{4)}$ DC	Drop-out t_{11} AC	Drop-out $t_1^{5)}$ AC
4973 N	300	40	95	160	125	400
4209 N	260	55	120	180	150	440
3978 N	250	60	130	185	160	450
2984 N	200	80	160	210	190	500

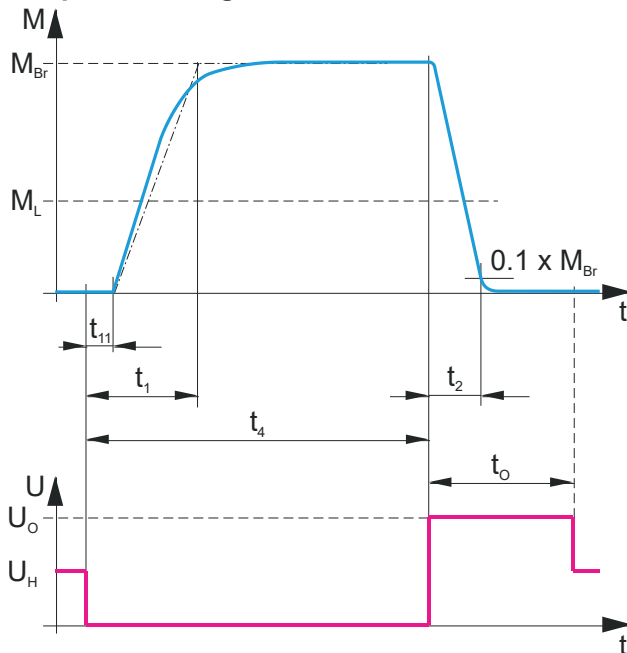


⁴⁾ Referring to the nominal braking force

⁵⁾ Referring to the effective braking force

The stated switching times can only be achieved using the respective correct electrical wiring. This also refers to the protection circuit for brake control and the response delay times of all control components.
The use of varistors for spark quenching increases the DC-side switching times.

Torque-Time Diagram



Key

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



The switching times are dependent on the respective spring pressure.

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Application

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

Design

The ROBA®-diskstop® is a spring applied, electromagnetically releasing safety brake - a component in terms of DIN VDE 0580. It is designed for installation into gearless elevator machinery for use as a holding brake with occasional EMERGENCY STOP braking actions.

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

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

For a dual-circuit brake system, at least two brakes are necessary.

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

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

Function

The ROBA®-diskstop® brake is a spring applied, electromagnetic safety brake.

Spring applied function:

In de-energized condition, thrust springs (10) press the armature disk (2) against the brake disk. The brake disk is held between the friction pads (4).

Electromagnetic function:

Due to the magnetic force of the coil in the coil carrier (1), the armature disk (2) is attracted against the spring pressure to the coil carrier (1).

The brake is released and the brake disk can rotate freely.

Safety brake function:

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

Scope of Delivery / State of Delivery:

The brake is pre-assembled.

The following are included loose in delivery:

- Guide bolt 1 (Item 11)
- Guide bolt 2 (Item 12),
- Cap screw (13)
- Washer (14)

Please check the scope of delivery according to the Parts List as well as the state of delivery immediately after receiving the goods. *mayr*® will take no responsibility for belated complaints.

Please report transport damage immediately to the deliverer.

Please report incomplete delivery and obvious defects immediately to the manufacturer.

Brake Temperature

DANGER



At an ambient temperature of +40 °C and a duty cycle of 60 %, the brake can heat up to +65 °C.

Do not touch the brake
=> Danger of burns!

Adjustment



The brakes are equipped manufacturer-side with the respective springs for the braking force stated on the Type tag. Adjustment is not necessary. Adaptions or modifications are not

permitted as a rule. This rule also applies to the manufacturer-side adjusted noise damping.

The microswitches are also adjusted manufacturer-side.

Despite great care during the manufacturer-side adjustment, re-adjustment might be necessary after installation due to transportation and handling. Furthermore, such switches cannot be considered fail-safe.

Please also observe the section 'Release Monitoring'.

Noise Damping (Item 18 / Fig. 1):



The noise damping was set and adjusted manufacturer-side. However, this component is subject to aging dependent on the application or operating conditions (torque adjustment, switching frequency, ambient conditions, system vibrations etc.).

Replacing the damping element is only permitted at the *mayr*® site of manufacture.

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Installation Conditions

Before mounting the brake, please observe:

- ❑ Axial run-out deviation of the brake disk: max. 0.25 mm



Due to axial run-out deviations or tilting between the brake and the brake disk, the brake disk may rub against the friction linings.

- ❑ Brake disk surface quality (friction surfaces): $R_a = 3.2 \mu\text{m}$
- ❑ Brake disk material: steel or cast iron.
- ❑ For brake disk width K, see Table 1.
- ❑ Please keep to the distance of 87 mm (Fig. 7) between the screw-on surface of guide bolt 2 and the brake disk.
- ❑ Brake disk deformation or bearing backlash must not influence the set air gap.
- ❑ In order to guarantee rub-free operation, a perpendicularity of 0.04 mm to the brake disk must be maintained on guide bolt 1 or on the bore axes.
- ❑ The screw-on surface of guide bolt 2 in the $\varnothing 50$ mm range (Fig. 7) must be 0.04 mm parallel to the brake disk.
- ❑ Keep the brake surfaces and the friction linings grease-free at all times.
- ❑ Please ensure a suitable protective cover on the open brake.
- ❑ Please produce the adaptor bore for guide bolt 1 as follows: $\varnothing 40$ P7 with surface quality $R_a 0.8$.
- ❑ The distance dimension 220 mm of the bores for the guide bolts must have a tolerance of ± 0.1 mm.
- ❑ The guide bolts must transmit the occurring transverse forces safely. The stability of the attachment wall must also be observed.
- ❑ The transverse force (Table 3) occurs on the guide bolt of the bearing bushing 1 (3.1). The lever arm which is responsible for the effect on the guide bolt is 30 mm long for guide bolt 1 and 68.5 mm long for guide bolt 2 (Fig. 7).
- ❑ After mounting the brake to the machine wall, check the axial mobility of the brake.

Brake Installation (Figs. 1 to 7)

The brake is pre-assembled manufacturer-side.

Prerequisite: Tensile strength of the machine wall material $R_m \geq 500 \text{ N/mm}^2$

1. Press in the guide bolt 1 (11) and screw it on from the back via the thread M8 (Fig. 7) with a **tightening torque of 24 Nm**. Please make sure that guide bolt 1 (11) is inserted into the bore up to its limit.
2. Insert guide bolt 2 (12) into the brake caliper (3).
3. Release the brake mechanically, if necessary using a suitable device.
4. Push the released brake over guide bolt 1 (11) and slew it over the brake disk.
5. Insert the cap screw (13) with mounted washer (14) into guide bolt 2 (12) and screw the brake onto the machine wall. **Tightening torque 210 Nm, screw securement with Loctite 243!**
6. **Check the brake for axial smooth running on the guide bolts!**
7. Turn the brake disk, making sure that the brake disk does not rub.

Table 3:
Transverse Forces (Fig. 7 / at max. Spring Force)

Transverse force F1 (on bolt 1):	8297 Nm
Transverse force F2 (on bolt 2):	2351 Nm

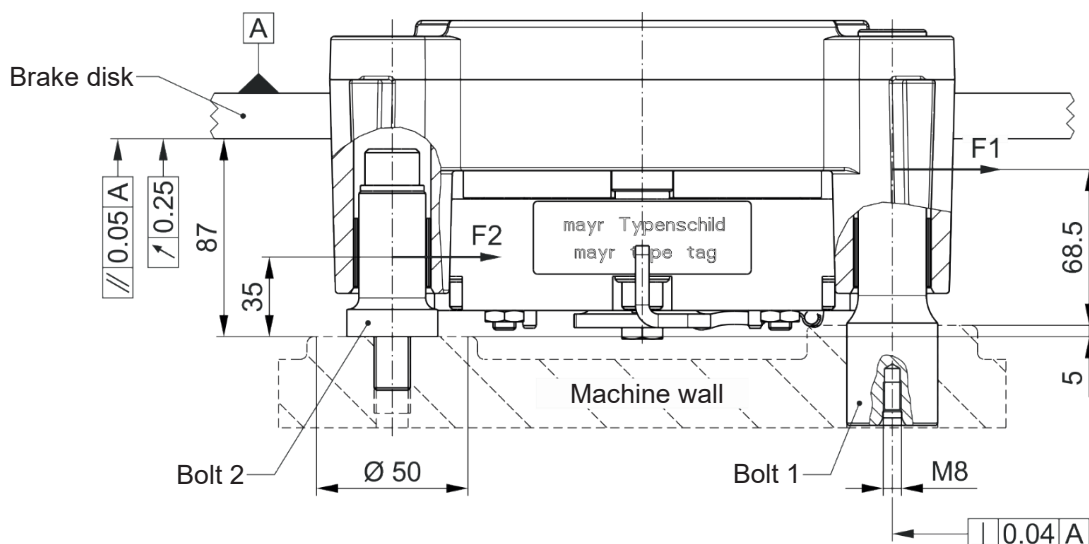


Fig. 7

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Installation of Bowden Cable Hand Release

The hand release is pre-assembled manufacturer-side.

Max. hand release force: 600 N.

For the Bowden cable installation, a bore is provided on the brake caliper (3) and on the hand release lever (6.1). The hand release can be moved by approx. 18°, at the latest until the spring pins (9) limit the stroke.

Adjust the Bowden cable so that the hand release (after actuation) can pivot back to the unreleased neutral position
=> **functional inspection**.

DANGER



Please actuate the hand release carefully. Any existing loads are put into motion when the hand release is actuated.



Do not push the hand release lever (6.1) up to the stop pins (spring pins Item 9), but carefully only to the point, at which the traction sheave or the car starts moving.

The stop pins are only used to prevent blockage of the hand release.

A substantially increased force acting on the hand release lever (6.1) may lead to component destruction.

Bowden cable designs must be designed with an end stop for the Bowden cable lever as soon as release of the brake is residual torque-free.

In addition, a suitable return spring must be installed by the customer on Bowden cable designs in order to compensate for friction forces in the Bowden cable.

Adjust the Bowden cable length so that the hand release lever (6.1), after actuation, pivots back to the unreleased neutral position.



When actuating the hand release, a switching signal of the release monitoring device cannot be guaranteed.

The hand release is subject to wear and is not suitable for constant release.

A sufficient number of emergency releases is possible (approx. 1000 x).

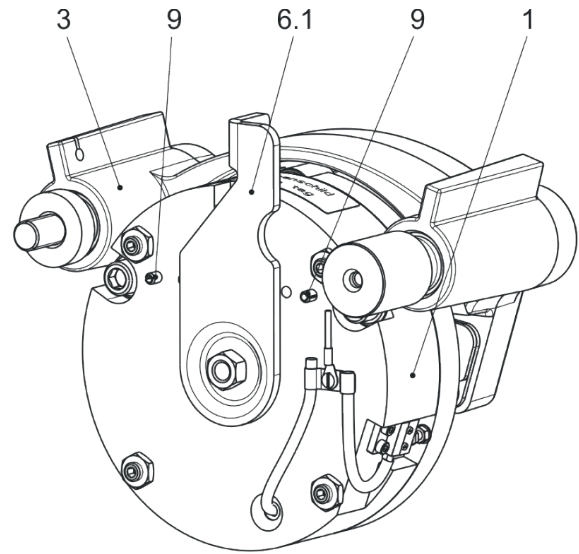


Fig. 8 (Depicted in the unreleased neutral position)

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Brake Inspection (before brake initial operation)

- **Visual inspection:**
for proper condition of the brake (rust etc.) and no grinding
- **Carry out a release inspection:**
by energizing the brake or manually by actuating the hand release.
- **Switch functions inspection of the release monitoring / for connection as NC contact:**
Brake energized Signal "OFF"
Brake de-energized Signal "ON"
- for connection as NO contact:**
Brake energized Signal "ON"
Brake de-energized Signal "OFF"

The braking torque is not achieved until after the run-in procedure has been carried out.

The run-in conditions must be aligned with the manufacturer.

Braking Torque

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

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

The braking torque is dependent on the respective run-in condition of the friction surfaces.

We recommend allowing the friction surfaces to run in when installed and under permitted loads.

Friction materials develop their optimum effect only under speed at the appropriate contact pressure, as continuous regeneration of the friction surface then takes place (torque consistency).

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

Release Monitoring (Item 19 / Fig. 1)



Please observe that the microswitches may only be connected to the secondary circuit (requirement resulting from CSA / UL approval).

Please carry out a functional inspection before brake initial operation!

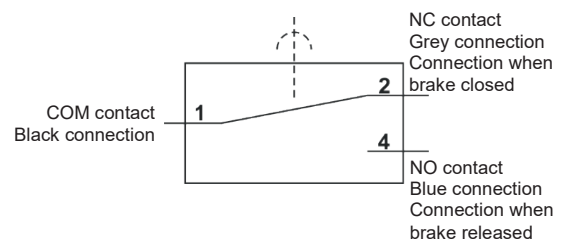
The ROBA®-diskstop® brakes are supplied with manufacturer-side installed and adjusted release monitoring device.

A microswitch emits a signal for every brake condition change: "brake opened" or "brake closed".

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

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

Microswitch Wiring Diagram:



Function

When the magnetic coil is energized in the coil carrier (1), the armature disk (2) is attracted to the coil carrier (1), the microswitch emits a signal, the brake is released.

Microswitch Specification

Minimum switching power:	12 V, 10 mA DC-12
Recommended switching power: for maximum lifetime and reliability	24 V, 10...50 mA DC-12 DC-13 with freewheeling diode!

Usage category acc. IEC 60947-5-1:

DC-12 (resistance load), DC-13 (inductive load)



Microswitches cannot be guaranteed fail-safe. Therefore, please ensure appropriate access for replacement or adjustment.

The switching contacts are designed so that they can be used for both small switching powers and medium ones. However, after switching a medium switching power, small switching powers are no longer reliably possible. In order to switch inductive, capacitive and non-linear loads, please use the appropriate protection circuit to protect against electric arcs and unpermitted loads!

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Electrical Connection and Wiring



The brake must only be operated with overexcitation acc. Table 1.

DC current is necessary for operation of the brake. The coil nominal voltage is indicated on the Type tag as well as on the brake body and is designed according to the DIN IEC 60038 ($\pm 10\%$ tolerance). The brake must only be operated with overexcitation (e.g. using a ROBA®-switch or -multiswitch fast acting rectifier or phase demodulator). The connection possibilities can vary dependent on the brake equipment. Please follow the exact connections according to the Wiring Diagram. The manufacturer and the user must observe the applicable regulations and standards (e.g. DIN EN 60204-1 and DIN VDE 0580). Their observance must be guaranteed and double-checked!

Grounding Connection

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

Device Fuses

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

Switching Behavior

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

Magnetic Field Build-up

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

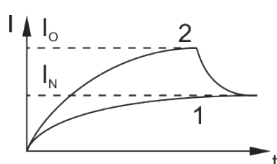
Field build-up with normal excitation

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

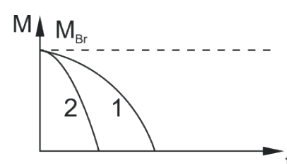
Field build-up with overexcitation

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

Current path

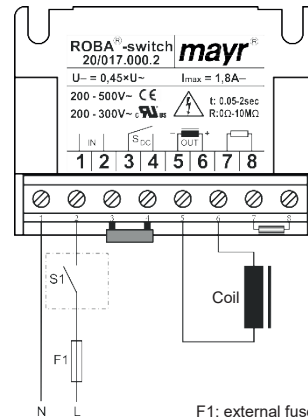


Braking torque path



Magnetic Field Removal

AC-side switching

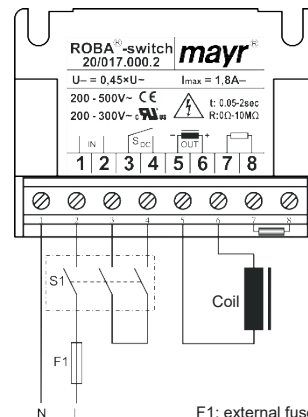


The power circuit is interrupted in front of the rectifier. The magnetic field slowly reduces. This delays the rise in braking torque.

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

AC-side switching means **low-noise switching**; however, the brake engagement time is longer (approx. 6-10 times longer than with DC-side disconnection), use for non-critical braking times.

DC-side switching



The power circuit is interrupted between the rectifier and the coil as well as mains-side. The magnetic field reduces extremely quickly. This causes a quick rise in braking torque.

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

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

Protection Circuit

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

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Maintenance

The ROBA®-diskstop® is largely maintenance-free.
The friction lining pairing is robust and wear-resistant. This ensures a particularly long service lifetime of the brake.
However, the friction linings are subject to functional wear. Therefore, please carry out regular friction lining inspections.



The friction pads (4) must be replaced when air gap "a" > 0.8 mm (Fig. 2) is reached between the coil carrier (1) and the armature disk (2) on a warm brake.

Replacement of the friction pads (4) and all other maintenance work must be carried out at the place of manufacture.

Information on the Components

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

Possible hazards:

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

Classification: Hazardous property
Attention: H-classification: H372



Protective measures and rules of behavior:

Do not inhale dusts.

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

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

Additional information:

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

Disposal

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

Electronic Components (Rectifier / Switch):

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

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

Steel scrap (Code No. 160117)

All aluminum components:

Non-ferrous metals (Code No. 160118)

Brake lining carrier (steel or aluminum pads with friction linings):

Brake linings (Code No. 160112)

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

Plastic (Code No. 160119)

Guidelines on the WEEE Directive 2012/19/EU

Avoidance of waste from electrical and electronic devices and the reduction of such waste through recycling.

Our electromagnetic products (brakes, clutches) as well as the components required to control them (rectifiers) are frequently used in electrical and electronic devices within the appropriate area of application of WEEE, independent of the applicable product categories.

The stated products do not fall within the area of application of this Directive. They have been classified as electromagnetic / electronic components (VDE 0580) or as electronic equipment (DIN EN 50178), and have been determined for installation in devices for "use in accordance with the intended purpose". Only products which are to be viewed as devices in terms of the Directive and not as parts or components are subject to registration obligations.

Cleaning the Brake



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

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

Installation and Operational Instructions for ROBA®-diskstop® Type 894.5_0.03 Size 8

(E089 08 009 000 4 EN)

Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not release	<ul style="list-style-type: none"><input type="checkbox"/> Incorrect voltage on rectifier<input type="checkbox"/> Rectifier failure<input type="checkbox"/> Air gap too large (worn friction lining)<input type="checkbox"/> Coil interrupted<input type="checkbox"/> Incorrect rectifier (e.g. normal rectifier without overexcitation)	<ul style="list-style-type: none"><input type="checkbox"/> Apply correct voltage<input type="checkbox"/> Replace rectifier<input type="checkbox"/> Replace the friction pads<input type="checkbox"/> Replace brake<input type="checkbox"/> Use the correct, appropriate rectifier



mayr® will take no responsibility or guarantee for replacement parts and accessories which have not been delivered by mayr®, or for damage resulting from the use of these products.



WITTUR

YOUR GLOBAL PARTNER FOR COMPONENTS,
MODULES AND SYSTEMS IN THE ELEVATOR INDUSTRY



WITTUR.COM



ADVANCING THE ELEVATOR INDUSTRY