your reliable partner

Safety Brake in Accordance with the Machinery Directive

ROBA®-linearstop electrical
Type 3820.0_ _0_
Sizes 10 – 60

Issue status 2023-12

Original operating instructions
B.3820.EN

Contents

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Please read these Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to brake failure, resulting in damage to other parts. These Operational Instructions are part of the brake delivery.
Please keep them handy and near to the brake at all times.

1 General Guidelines

1.1 Definition of Terms

Term	Meaning
ROBA®-linearstop	Electromagnetically-actuated piston rod brake as a component for holding and deceleration of moved machine parts.
Nominal holding force F_{Nenn}	The theoretical nominal holding force assigned to the designation.
Load mass	Designation of the weight, which must be held by the brake.
Release	Release designates the procedure through which the magnetic coil is energised and therefore no nominal holding force is applied to the brake any more.
Closing	Closing or Cone armature drop-out designates the process through which the magnetic coil is de-energised, the voltage is switched off and the nominal holding force is applied.
Overexcitation	Overexcitation designates when the brake requires a higher supply voltage (= overexcitation voltage) than the coil nominal voltage to release for a short period of time (overexcitation time).
Overexcitation time	The overexcitation voltage must only be available for a short time for release of the brake (see **5.2**)..
Holding voltage	The voltage at which the brake remains permanently released.

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2 Safety

2.1 Safety and Guideline Signs

Symbol	Signal word	Meaning
	**DANGER**	Designates a directly pending danger. If not avoided, death or severe injuries will be the consequence.
	**WARNING**	Designates a possibly hazardous situation. If not avoided, death or severe injuries will be the consequence.
	**CAUTION**	Designates a hazardous situation. If not avoided, slight or minor injuries can be the consequence.
	ATTENTION	Possible property damage can be the consequence.
	**Please Observe**	Designates tips for application and other particularly useful information. Not a signal word for dangerous or damaging situations.

2.2 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.

2.2.1 Personnel Requirements

To prevent injury or damage, only professionals and specialists are allowed to work on the components. They must be familiar with the dimensioning, transport, installation, 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.

- ❒ 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 when the brake is in a de-energised, disengaged condition and secure the system against inadvertent switch-on (acc. EN 50110).

General Guideline:

During the risk assessment required when designing the machine or system, the dangers involved must be evaluated and removed by taking appropriate protective measures in accordance with the Machinery Directive 2006/42/EC.

Brakes for safety-related applications are to be installed singly or as redundant devices in accordance with the required category, in order to fulfil the required Performance Level (PL_r) acc. EN ISO 13849. This is in principle the task of the system manufacturer.

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2.3 Intended Use

Use according to the intended use is prohibited until it has been determined that the machine / system accords with the EC Directive 2006/42/EC (machinery directive).

mayr ®-brakes have been developed, manufactured and tested in compliance with the DIN VDE 0580 standard and in accordance with the EU Low Voltage Directive as electromagnetic components. During installation, operation and maintenance of the product, the requirements for the standard must be observed.

ROBA®-linearstop brakes by *mayr*® power transmission prevent inadvertent dropping or crashing of gravity-loaded axes.

- ❑ For applications in, for example, defence technology or medical products, **please contact *mayr*® power transmission.**
- ❑ Not suitable for operation in areas where there is a danger of explosion

The brakes must only be used in the situations for which they are ordered and confirmed. Using them for any other purpose is not allowed.

2.4 Handling

Before installation, the brake must be inspected and found to be in proper condition (visual inspection). The following are not considered as being representative of a proper condition:

- ❑ External damage
- ❑ External oiling
- ❑ Outer contamination

The brake function must be inspected both **once attachment has taken place** as well as **after longer system downtimes**.

2.5 User-implemented Protective Measures

- ❑ Attach a cover to protect **against injury through high temperatures** on the housing in case high temperatures are generated through incorrect wiring, for example increased switching frequency or excessive overexcitation
- ❑ Protection circuit: see section **7.4**
- ❑ Install additional protective measures **against corrosion** if the brake is subject to extreme ambient conditions or is installed in open air conditions, unprotected from the weather.
- ❑ Please cover moving parts to protect **against injury through seizure.**

2.6 Dimensioning Other Machine Elements

The effects of the maximum and minimum braking force on the other machine components must be observed in order to provide sufficient dimensioning. The ROBA®-linearstop has (at room temperature) a maximum braking force of 2.5 x brake nominal holding force and a minimum braking force of 1 x brake nominal holding force.

If other brakes are positioned behind the ROBA®-linearstop, and if the braking times of the different brakes overlap, the loads will add up.

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3 Legal Provisions

3.1 Directives, Standards and Regulations Used

(also to be observed during installation and operation)

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
UL 508 (Edition 17)	Industrial Control Equipment
EN ISO 12100	Safety of machinery - General principles for design - Risk assessment and risk reduction
DIN EN 61000-6-4	Interference emission
DIN EN 61000-6-2	Interference immunity
EN 60664-1	Insulation coordination for electrical equipment in low voltage installations

3.2 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.

3.3 Guarantee

- ❑ The guarantee conditions correspond with the Chr. Mayr GmbH + Co. KG sales and delivery conditions (www.mayr.com → Service → General Terms and Conditions)
- ❑ Mistakes or deficiencies are to be reported to *mayr*® power transmission at once!

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3.4 Guidelines on CE Identification

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 use 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.

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3.5 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
RoHS II 2011/65/EU	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations UK 2012 No.3032

3.6 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.

3.7 Certification Symbols

C SA US	The installation components used are UL-listed or are applied in conformance with the approval. The CSA conformity marking with the addition of "C" and "US" means that the product has been certified both for the US American market as well as for the Canadian market, and accords with the applicable US American and Canadian standards.

3.8 CE Identification

CE	Identification according to the Machinery Directive 2006/42/EC and / or RoHS Directive 2011/65/EU with 2015/863/EU

3.9 UKCA Identification

UKCA	Identification according to the Machinery Directive UK 2008 No.1597 and/ or RoHS Directive UK 2012 No.3032

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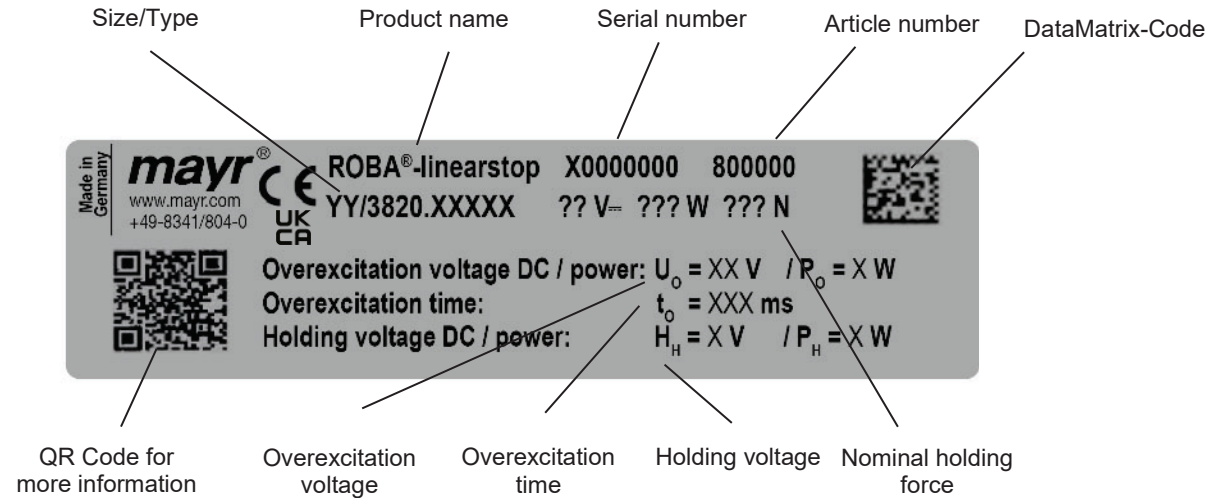
3.10 Identification/ Type Tag

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



Serial number

Year	Code
2000	A
2001	B
2002	C
2003	D
2004	E
2005	F
2006	H
2007	J
2008	K
2009	L
2010	M
2011	N

Year	Code
2012	P
2013	R
2014	S
2015	T
2016	U
2017	V
2018	W
2019	X
2020	Y
2021	Z
2022	G
2023	Q

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4 Product Description

4.1 Scope of Delivery / State of Delivery

- ❑ ROBA®-linearstop brakes are manufacturer-assembled and ready for installation.
- ❑ Please observe the Type tag.
- ❑ Please check the scope of delivery as well as the state of delivery immediately after receiving the goods. *mayr*® power transmission will take no responsibility for belated complaints. Please report transport damage immediately to the supplier. Please report incomplete delivery and obvious defects immediately to the manufacturer.
- ❑ The ROBA®-linearstop is delivered without piston rod. A parallel pin (5) in the collet serves as a transportation lock.

CAUTION **Please observe the own weight of the brake**

The brake may drop during lifting / transport.

This might lead to crushing or bruising, e.g. of the foot.

4.2 Function

4.2.1 Quiescent Current Principle

The functional principle applied here is the energy-separation principle according to EN ISO 13849-2 Appendix A.2 “List of basic safety principles”. The reliable condition is achieved through separation of the energy source, and thus accords with the required safety aspects, for example during power failure or EMERGENCY STOP.

The spring-loaded, enclosed **ROBA®-linearstop,** which can be opened electrically, clamps a piston rod steplessly and backlash-free.

Due to the spring-loaded system, the fail-safe principle can be guaranteed, the **ROBA®-linearstop** works as a **safety brake.**

- ❑ The brake clamping element (Cone armature item 19) is pulled against the spring though application of the voltage. The piston rod can be moved (Illustration 1).
- ❑ The spring has an effect on the clamping element (Cone armature item 19) of the brake though switch-off the voltage. The piston rod is clamped (Fig. 2).

The max. permitted sliding speed is 2 m/s.

Higher speeds on request!

Please Observe!
Before brake closure, the collet must enclose the piston rod completely.

If the piston rod ends in the collet, the clamping element might get damaged when actuating the brake!

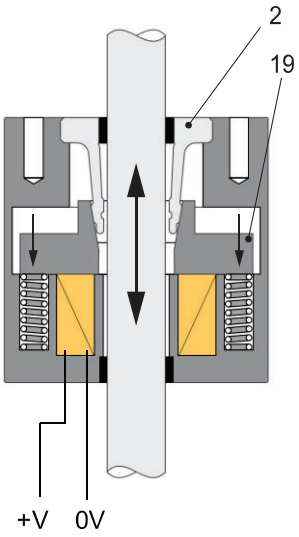

Illustration 1 Movable piston rod on application of the voltage

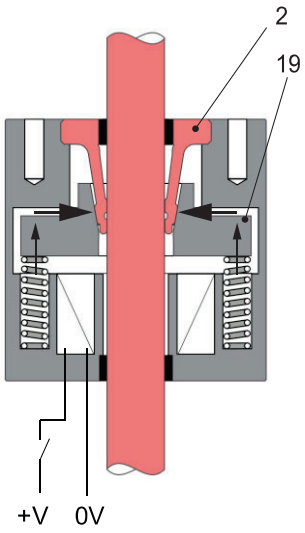

Illustration 2 Clamped piston rod on disconnection of the voltage

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4.3 Views

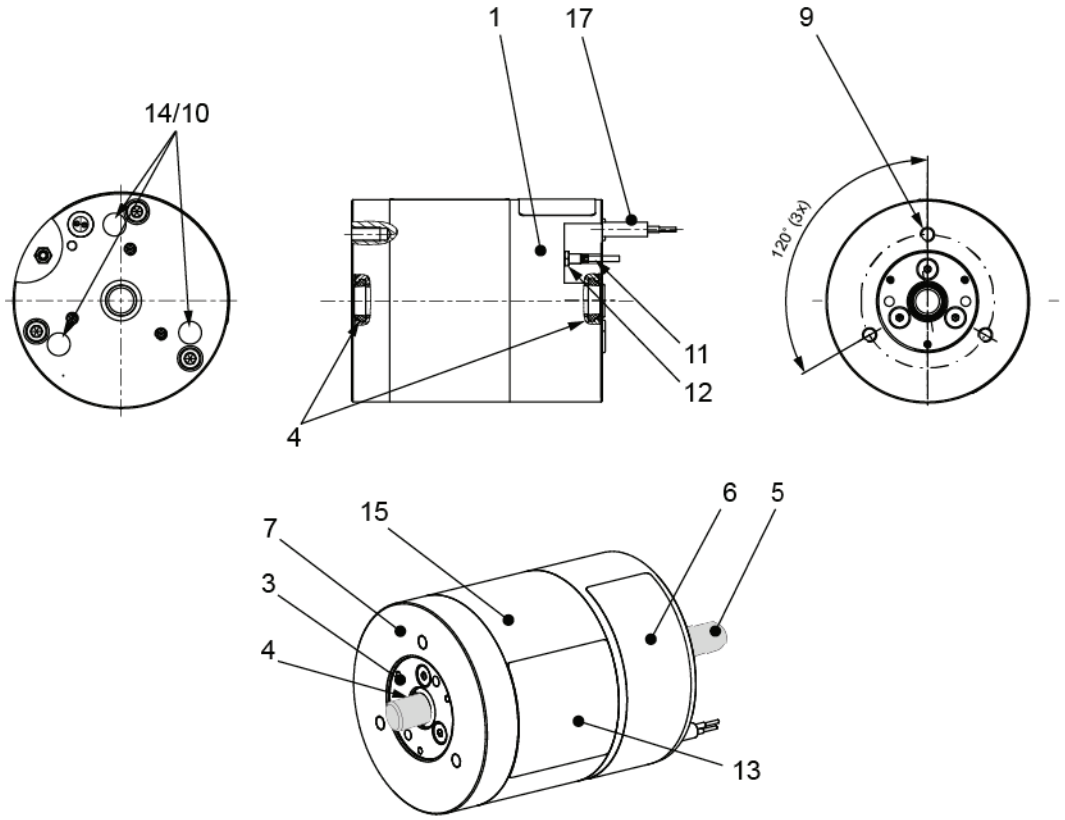

Fig. 1 (Size 20, 40, 60)

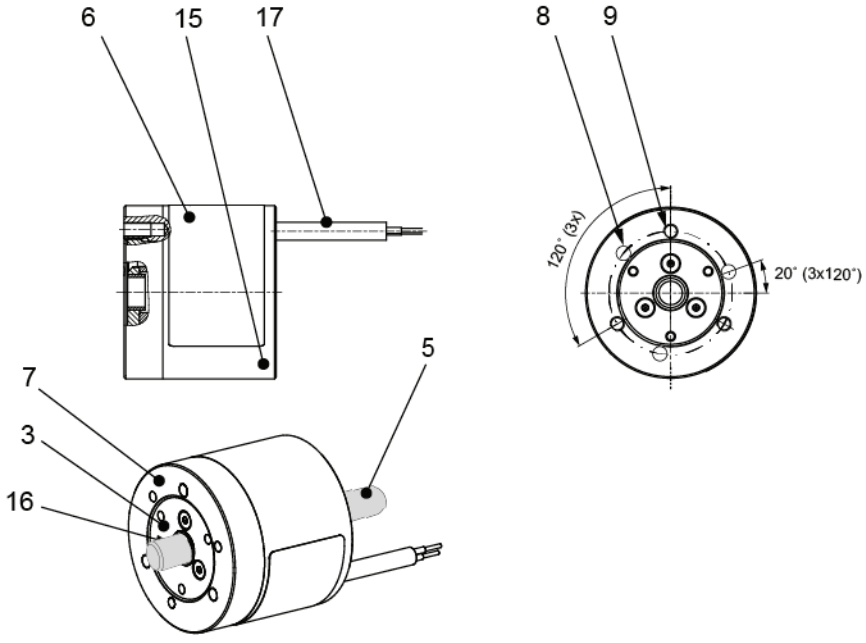

Fig. 2 (Size 10, 15)

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4.4 Parts List

(Only use *mayr*® original parts)

Item	Name
1	Piston housing
2	Collet (see section **4.2**)
3	Adjustment ring
4	Double dirt wiper (optional for size 10, 15, 20) on both sides
5	Transportation lock (parallel pin)
6	Type tag
7	Adaptor
8	Thread für emergency hand release size 10, 15
9	Threaded holes for fixing screws (m)
10	Thread für emergency hand release size 20, 40, 60
11	Switching condition monitoring/ Proximity switch (not on size 10, 15, 20)
12	Hexagon nut
13	Overexcitation/ Power reduction/ Transportation lock guideline sign (from size 20)
14	Sealing plug emergency hand release für item 10
15	Coil carrier
16	Plain bearing
17	Connection cable
19	Cone armature (see section 4.2)

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5 Technical Data

5.1 Guidelines

5.1.1 Application Conditions

The stated 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, permitted friction work and braking distances as well as general ambient conditions can all affect the given values.

- ❑ Mounting dimensions and connection dimensions must be adjusted according to the size of the brake at the place of installation.
- ❑ The magnetic coils are designed for a relative duty cycle of 100% on holding voltage.
- ❑ Temperatures of up to 60 °C can occur on the brake housing at an ambient temperature of 20 °C.
  In higher ambient temperatures the brake housing temperature will also increase. Protective measures must be undertaken customer-side against contact burns.
- ❑ If the maximum switching frequency (see section **5.2**) is exceeded, the brake may overheat. The required magnetic force can no longer be reached. The brake first has to cool down
- ❑ The surfaces of the outer components have been phosphated manufacturer-side to form a basic corrosion protection. For brake applications outdoors where the device is subject to weather influences or extreme environmental conditions, additional protective measures, such as for example protective paint, must be provided.

5.1.2 Ambient Temperature

–20 °C up to +40 °C, non-condensing

The Technical Data refer to the stated temperature range.

5.1.3 Class of Insulation F (+155 °C)

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

5.1.4 Protection

(mechanical) IP54: When installed, dust-proof and protected against contact as well as against water spray from any direction (dependent on customer-side mounting method).

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

5.1.5 Noise Emissions

The ROBA®-linearstop is not noise-reduced. When the cone armature (19) is switched, the impact pulse from the cone armature (19) onto the coil carrier (15) generates a switching noise which can reach approx. 90 dB(A). The brake is not suitable for use in noise-sensitive applications.

5.1.6 Installation position

The ROBA®-linearstop can be operated in any installation position.

5.1.7 Pre-requisites for Product Application

Compare the limit values stated in these Installation and Operational Instructions with the actual application, e.g.

- ❑ Clamping / braking forces
- ❑ Braking distance
- ❑ Masses
- ❑ Temperatures etc.

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5.2 Technical Data

				Size						
				10	15	20	40		60	
Nominal holding force [1] (minimum holding force)	Type 3820.0_00_	F_{Nenn}	[N]	70	180	360	1300		4000	
	Type 3820.0_10_			-	-	550	2100		6500	
	Tolerance			0% / +150%						
Electrical power	Type 3820.0_00_ Type 3820.0_10_	P_N [2]	[W]	6	15	21	41	53	64	81
		P_O [3]		94	230	340	650	830	1020	1290
		P_H [4]		3	7	10	18	18	44	48
Electrical voltage [5]	Coil nominal voltage DC	U_N	[V]	6	6		12	52	12	52
	Overexcitation voltage DC	U_O		24	24		48	207	48	207
	Holding voltage DC	U_H		4	4		8	30	10	40
Weight	Type 3820.0_ _0_		[kg]	0.25	1	1.5	4		12.5	
Ambient temperature			[°C]	-20 to +40						
Max. switching frequency		1/min		6	6	6	6		4	
Overexcitation time		t_O	[ms]	150	150	150	150		450	
Screws[6] **for emergency hand release** (see section 15)			[mm]	M3x16	M3x20	M3x25	M4x35		M5x45	

[1] Minimum holding force when the brake is de-energised, and with the piston rod dry or moistened with mineral oil.
[2] Coil nominal capacity
[3] Coil capacity on overexcitation (see section **7**).
[4] Coil capacity at holding voltage
[5] Other voltages available on request
[6] Customer-side screws for assembly/disassembly without energizing the brake.

5.3 Switching Times

Switching times [ms]		Size				
		10	15	20	40	60
t_2	Type 3820.0_00_	15	22	20	40	65
t_{11}	Type 3820.0_00_	10	40	45	25	65
t_2	Type 3820.0_10_	-	-	30	50	115
t_{11}	Type 3820.0_10_	-	-	20	10	10

t_2 Times can increase with wear (number of cycles).
The switching times have been measured with DC-side switching. AC-side switching is significantly slower.

Keys

t_2 = Separation time
t_O = Overexcitation time
t_{11} = Response delay on connection
U_H = Holding voltage
U_N = Coil nominal voltage
U_O = Overexcitation voltage

5.4 Friction work

Friction work			Size				
			10	15	20	40	60
Permitted total friction work up to wear end	$Q_{r\ ges}$	[10^3 J]	10	42	86	290	1308
Maximum permitted friction work per braking action	$Q_{r\ zul.}$	[J]	5	21	43	145	654

Higher friction work on request!

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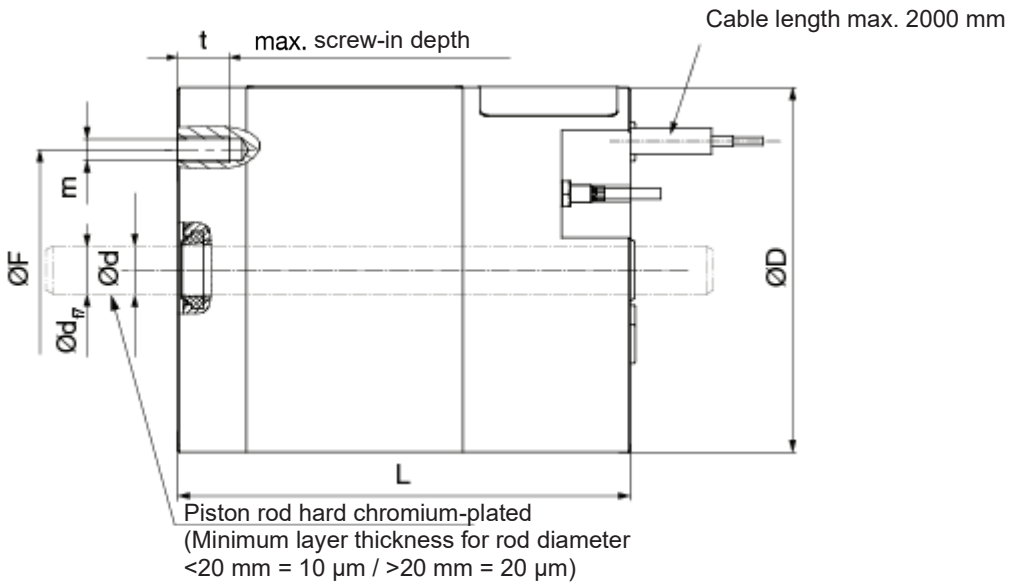

5.5 Dimension Sheet

[mm]	Size				
	10	**15**	**20**	**40**	**60**
D	35	58	58	85	130
d	8	10	10	12	20
F	28	42	42	56	90
L	40	51	83	106	142
m	3xM3	3xM5	3xM5	3xM6	3xM8
t	6	9	9	12	15

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6 Intended Use

See also section **2.3**

6.1 Guidelines for Application

- ❑ Please observe the correct dimensioning of clamping or braking force, friction work and switching frequency at an EMERGENCY STOP for safe holding of the mass and safe compliance of the required braking distance.
- ❑ Static application
  - Holding and clamping in case of power failure
  - on cable breakage
  - EMERGENCY STOP
- ❑ 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.
- ❑ Temperatures over 80 °C on the brake housing when the machine is in use may reduce the magnetic force. Brake does not release properly.
- ❑ Application in clean environments (penetration of coarse-grained dust and liquids such as oils can have a negative effect on the braking function).
- ❑ Application in enclosed buildings
  (In tropical regions, in high humidity with long downtimes and sea climates only after taking special measures).

Please contact *mayr*® power transmission.

Brakes which are to be used in safety-related applications must be selected, dimensioned and positioned according to the risk assessment DIN EN 12100 and other standards and regulations applicable to the special application. This is in principle the task of the system manufacturer/user.

6.2 Limits

- ❑ The brake is not suitable for use in oily or severely contaminated environments
- ❑ The brake is not suitable for application in high ambient temperatures >40 °C
- ❑ Brake is not suitable in applications with strong vibrations

6.3 Reasonably Foreseeable Misuse

The following uses are prohibited and may generate hazards.

- ❑ Any opening of the screws on the housing.
- ❑ The maximum switching frequency is exceeded
- ❑ Brake is used in oily or heavily contaminated surroundings
- ❑ The overexcitation time is exceeded
- ❑ Incorrect energization: Overexcitation- /holding voltage
- ❑ Brake and piston rod not aligned
- ❑ Transmission of torques and transverse forces

6.4 Duration of Use

20 years or on reaching the T10d (for definition, see EN ISO 13849-1) duration of use.

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6.5 Brake Dimensioning

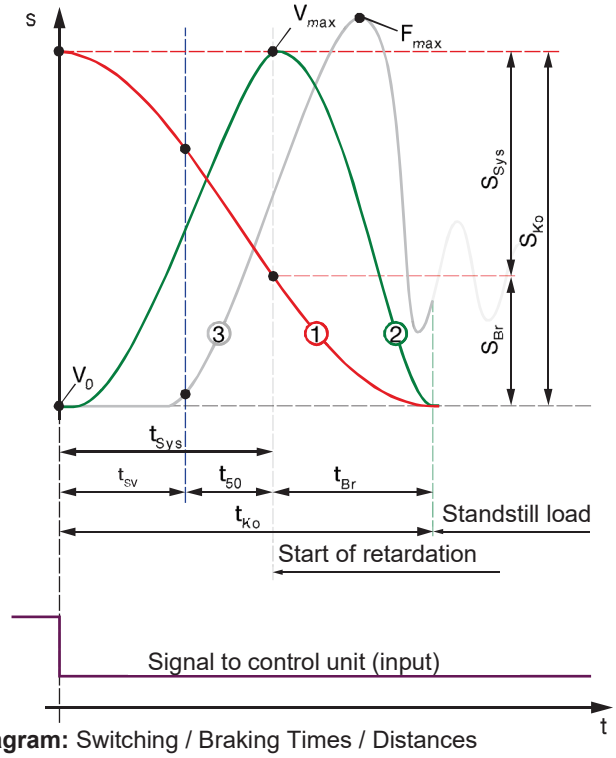

Diagram: Switching / Braking Times / Distances

Name

1		Distance
2		Speed
3		Axial force
β	[°]	Angular position 0° (horizontal) to 90° (vertical)
a	[m/s²]	**Acceleration** of the downward-moving load, dependent on the angular position
a_V	[m/s²]	Retardation
g	[m/s²]	Gravitational acceleration (9.81 m/s²)
F_{Br}	[N]	Braking force for dynamic calculation
$F_{erf.}$	[N]	Required holding force
F_{Nenn}	[N]	Nominal holding force (minimum holding force)
F_{NGes}	[N]	Total nominal holding force (one or more brakes)
F_{max}	[N]	Maximum holding force
m	[kg]	Load mass
S_{Br}	[m]	**Braking distance:** Distance from the beginning of the retardation up to the standstill of the load
S_{Sys}	[m]	**System distance:** Distance travelled by the load until the retardation begins.
S_{Ko}	[m]	**Stopping distance:** Distance from the signal interruption up to standstill of the load
t11	[s]	Brake switching time
t_{SV}	[s]	Switching time control unit (signal processing time)
t_{Sys}	[s]	System switching time
t_{Br}	[s]	Brake braking time

General

When selecting the brake, the nominal holding force must be greater or equal to the required holding force.

F_{Nenn} ≥ $F_{erf.}$ [N]

Dimensioning for dynamic braking (EMERGENCY STOP)

For safety reasons, at least the weight load of the masses to be held +100 % reserve must be provided.

The larger the ratio of the nominal holding force to the required holding force, the shorter the stopping distance (for the same technical conditions)

The minimum required holding force can be calculated with the following formula:

$F_{erf.}$ = m x g x 2 [N]

Dimensioning for static holding (clamping)

For safety reasons, at least the weight load of the masses to be held +50 % reserve must be provided.

The minimum required holding force can be calculated with the following formula:

$F_{erf.}$ = m g x 1.5 [1)] [N]

$F_{erf.}$ = m g x 1.25 x Inspection faktor [2)] [N]

The stopping distance / stopping time of the load to be braked is strongly dependent on the following influences:

- ❑ Switching time control unit (signal processing)
- ❑ Switching time of the control valve [1)]
- ❑ Switching time of the brake
- ❑ Cross-section and length of the lines

The larger the sum of the switching times, the later the retardation of the load occurs (due to longer periods of acceleration). The stopping distance / the stopping time becomes longer (with constant holding force).

Name

t_{Ko}	[s]	**Stopping time:** Time from the signal interruption up to standstill of the load
V_0	[m/s]	Initial speed
V_{max}	[m/s]	Maximum speed

If you have any questions, please contact *mayr*® power transmission.

1) Without cyclical brake test
2) Cyclical brake test with inspection factor. The inspection factor must be determined by the user with the applicable standards. 1.25 × inspection factor must result in at least 1.5. mayr® power transmission recommends ≥1.3 as inspection factor.

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6.5.1 Calculation Example (Dynamic Braking)

Data		
Angular position piston rod	β	= 90° (vertical axis)
Mass	m	= 320 kg
Initial speed	V_0	= 0.5 m/s
Switching time control system	t_{SV}	= 0.020 s

1. Pre-selection of braking force

$F_{erf.} = m \times g \times 2$ [N]

$F_{erf.} = 320 \times 9.81 \times 2 = 6278$ [N]

Selected: ROBA®-linearstop Size 60, Type 3820.*
Nominal holding force F_{Nenn} = 6500 N
(from section **5.2** Table "Technical Data")

2. Calculation of the stopping distance/stopping time
Checking the selected brake size

Acceleration of the load

$a_B = g \times \sin(\beta) = \mathbf{9.81 \times \sin(90°)} = 9.81$ **[m/s²]**

System distance

$\mathbf{S_{Sys} = V_0 \times t_{Sys} + a \times t_{Sys}^2 \times 0.5}$ **[m]**

$S_{Sys} = 0.5 \times 0.055 + 9.81 \times 0.055^2 \times 0.5$ [m]

$S_{Sys} = 0.057$ [m]

$t_{Sys} = t_{11} + t_{SV} = 0.035 + 0.02$

$t_{Sys} = 0.055$ [s]

Braking distance

$$\mathbf{S_{Br} = \frac{V_{max}^2}{2 \times \left(\frac{F_{NGes}}{m} - a_B \right)}} \quad \textbf{[m]}$$

$$S_{Br} = \frac{1.04^2}{2 \times 10.5} = 0.052 \text{ [m]}$$

$V_{max} = V_0 + a_B \times t_{Sys}$ [m/s]

$V_{max} = 0.5 + 9.81 \times 0.055 = 1.04$ [m/s]

Stopping distance

$\mathbf{S_{Ko} = S_{Br} + S_{Sys}}$ **[m]**

$S_{Ko} = 0.052 + 0.057 = 0.109$ [m]

Stopping time

$\mathbf{t_{Ko} = t_{Br} + t_{Sys}}$ **[s]**

$t_{Ko} = 0.099 + 0.055 = 0.154$ [s]

$$t_{Br} = \frac{V_{max}}{\frac{F_{NGes}}{m} - a_B} = \frac{1.04}{10.5} = 0.099 \text{ [s]}$$

Retardation (for system dimensioning)

$$a_V = \frac{F_{Nges} \times 2.5}{m} - g = \frac{6500 \times 2.5}{320} - 9.81 = 40.97 \text{ [m/s}^2\text{]}$$

$$\text{Load} = \frac{a_V}{g} = \frac{40.97}{9.81} = 4.18 \text{ [g]}$$

3. Friction work

Friction work per braking action

$\mathbf{Q_r = m \times a_B \times S_{Br} + 0.5 \times m \times V_{max}^2}$ **[J]**

$Q_r = 320 \times 9.81 \times 0.052 + 0.5 \times 320 \times 1.04^2$ [J]

$Q_r = 336.3$ (< $Q_{r\,zul} = 654$) permitted friction work

Number of braking actions up to wear end

$$Z_{zul.} = \frac{Q_{r\,ges}}{Q_r}$$

$$Z_{zul.} = \frac{1308 \times 10^3}{336.3} = 3890 \text{ dynamic braking actions}$$

The permitted total friction work up to wear end must not be exceeded.

Please Observe!
Once the total friction work up to wear end $Q_{r\,ges}$ has been reached, the brake must be replaced.

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7 Electrical Connection and Wiring

The brake must only be operated with overexcitation and holding voltage. For the required overexcitation time, see 5.2 or type tag.

ROBA®-linearstop		Nominal holding force	U	U_N	U_H	U_O	DC voltage module / Article number	Monitoring
Size	Type	[N]	[V]	[V] 5)				
10, 15, 20	3820.0_ _0_	Standard/Increased	24 5)	6	4	24	ROBA®-brake-checker / 8288568	Integrated 2)
40	3820.0_00_	Standard	230 6)	52	30	207	ROBA®-multiswitch / 8225580	Proximity Switch 3)
40	3820.0_10_	Increased	230 6)	52	28	207	Supply unit 1) 4) / 8295035	Proximity Switch 3)
40	3820.0_ _0_	Standard/Increased	48 5)	12	8	48	ROBA®-brake-checker / 8294506	Integrated 4)
60	3820.0_ _0_	Standard/Increased	230 6)	52	40	207	ROBA®-multiswitch / 7078520	Proximity Switch 3)
60	3820.0_ _0_	Standard/Increased	48 5)	12	10	48	ROBA®-brake-checker / 8289287	Integrated 2)
80 3)	-							

1) Supply unit consists of ROBA®-multiswitch, power supply, diode nmodul, wiring diagram, additional Instructions
2) Monitoring of the switching condition is integrated in the DC voltage module
3) Monitoring of the switching condition is realised with a separate proximity switch on the brake
4) Under special conditions, a ROBA®-multiswitch is also possible. Please contact mayr® power transmission.
5) DC = direct voltage
6) AC = AC voltage

Applies to brakes with DC voltage module ROBA®-brake-checker:
Possible problem: During initial start-up (energizing), the brake closes again immediately.
Measure: Deactivate the condition recognition of the cone armature by the ROBA®-brake-checker (see in the appropriate installation and operational instructions).

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 (± 10 % tolerance).
Please follow the exact connections according to the section **10.3**. 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!

7.1 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 standardised inspection of the protective conductor connections to all contactable metal parts (see section **10.3.1**).

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7.2 Fuse Element

Short-circuits or earth short-circuits can lead to DC voltage module failures. After fuse elements have reacted to a malfunction, the DC voltage module must be checked for functional and operational safety (overexcitation voltage, switch-off voltage, response delay time and holding voltage).

The same procedure is to be carried out after brake failure. As a measure, disconnect the brake from the power supply and carry out an insulation resistance test with 500 V.

Recommendation:
In case of failure of the DC voltage module, please protect the brake from permanent overexcitation:
Measure:
Installation of a circuit breaker into the power supply cable or supply line of the DC voltage module.
The measure fulfills the device fuse requirements for the DC voltage module.

7.2.1 Rated current of the circuit breaker:

The specifications only apply when using the recommended *mayr*®-DC voltage modules (see section **7**).

ROBA®-linearstop		Nominal holding force	U	U_N	U_H	U_O	DC voltage module / Article number	Fuse / Circuit breaker
Size	Type	[N]	[V]	[V] 5)				
10	3820.0_ _0_	Standard/Increased	24 5)	6	4	24	ROBA®-brake-checker / 8288568	Z3
15								Z6
20								Z6
40	3820.0_00_	Standard	230 6)	52	30	207	ROBA®-multiswitch / 8225580	C1
40	3820.0_10_	Increased	230 6)	52	28	207	Supply unit / 8295035	C1
40	3820.0_ _0_	Standard/Increased	48 5)	12	8	48	ROBA®-brake-checker / 8294506	Z6
60	3820.0_ _0_	Standard/Increased	230 6)	52	40	207	ROBA®-multiswitch / 7078520	C1.6
60	3820.0_ _0_	Standard/Increased	48 5)	12	10	48	ROBA®-brake-checker / 8289287	Z10

5) DC = direct voltage
6) AC = AC voltage

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7.3 Switching Behavior

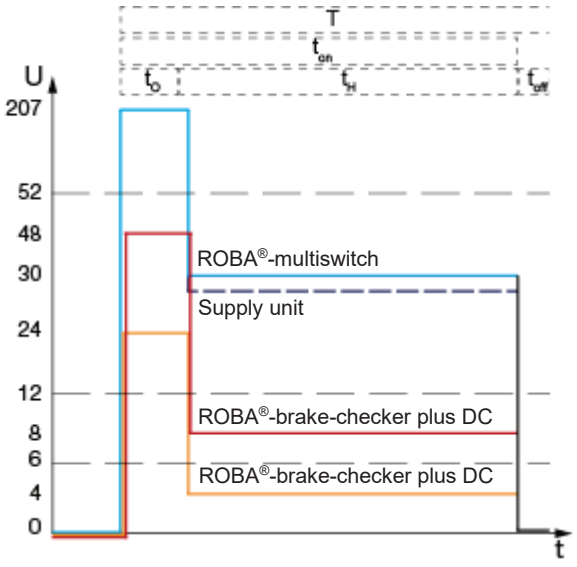
The reliable operational behaviour of a brake is to a large extent dependent on the correct wiring and the temperature.

Key and Calculations:

P	[W]	RMS coil capacity dependent on switching frequency [1], overexcitation, reduction in capacity and duty cycle $P = \frac{P_O \times t_O + P_H \times t_H}{T}$
P_N	[W]	Coil nominal capacity (Technical Data, type tag)
P_O	[W]	Coil power on overexcitation (Technical Data) $P_O = \left(\frac{U_O}{U_N}\right)^2 \times P_N$
P_H	[W]	Coil power on power reduction (Technical Data, type tag) $P_H = \left(\frac{U_H}{U_N}\right)^2 \times P_N$
t_O	[s]	Overexcitation time
t_H	[s]	Holding time
t_{on}	[s]	Time with voltage
t_{off}	[s]	Time without voltage
T	[s]	Total time ($t_O + t_H + t_{off}$)
U_O	[V]	Overexcitation voltage
U_H	[V]	Holding voltage
U_N	[V]	Coil nominal voltage
I_O	[A]	Overexcitation current
I_N	[A]	Nominal current

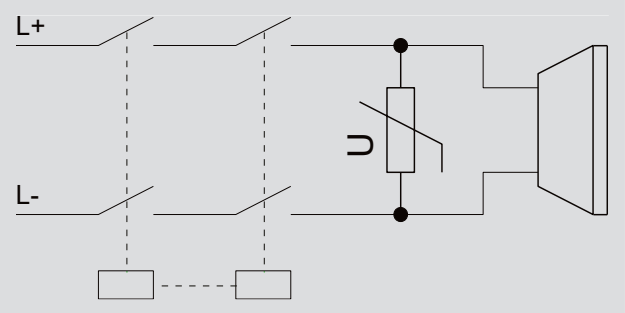
1) See section **5.2**

7.3.1.1 Time Diagram:



Please Observe!
Safety switch-off

In applications with a necessarily short switching time for short braking distances and fast take-over of loads, reliable DC-side switch-off is required e.g. through redundant, monitored contactors (see schematic wiring diagram).



Schematic wiring diagram

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

The following parameters can be changed through suitable adaptations of the protection circuit.

- ❑ Contact lifetime
- ❑ Switching times
- ❑ Voltage peaks or level of switch-off voltage

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8 Functional Safety Parameters

Consideration of the mean time to dangerous failure for ROBA®-topstop® brake systems in accordance with DIN EN ISO 13849-1 Safety of machinery – Safety related parts of control systems

The value B10d states the number of cycles until 10% of the components have suffered dangerous failures (definition acc. EN ISO 13849-1).
With regard to the brakes, these are:

- ❑ The mechanical switching process.
- ❑ The movement of the cone armature.

Here dangerous failures means that the brake does not engage on request and therefore does not generate the required nominal holding force.

The wear has no influence on this value (e.g. the wear during a dynamic braking action).

8.1.1 Functional Safety Regulations

The brake safety is generated through the nominal holding force.
For safe and reliable braking and for error-free operation of the **ROBA®-linearstop** brakes, the following points are required:

- ❑ Sufficient dimensioning
- ❑ Intended use
- ❑ Maintenance of the application limits
- ❑ Maintenance of the technical fringe parameters

Brake dimensioning see section **6.5**

8.1.2 Condition

Brakes which are used in safety-related applications are to be selected in accordance with the risk assessment EN ISO 12100 and furthermore in accordance with EN ISO 13849-1 through identification of the safety function. This is in principle the task of the system manufacturer.

The Performance Level (PL) can only be determined on consideration of all safety-related parts of the safety channel such as the control and additional braking or holding devices etc. in accordance with EN ISO 13849-1.

9 Storage

9.1.1 Brake Storage

- ❑ Store the brakes in a upright position, in dry rooms and dust and vibration-free.
- ❑ Relative air humidity < 50 %.
- ❑ Temperature without major fluctuations within a range from 10 °C up to +40 °C.
- ❑ Do not store in direct sunlight or UV light.
- ❑ Do not store aggressive, corrosive substances (solvents / acids / lyes / salts etc.) near to the brakes.

For longer storage lasting more than 2 years, special measures are required.

► Please contact *mayr*® power transmission.

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10 Installation

10.1 Installation Conditions

Please observe before installation!

10.1.1 General

- ❑ The brake is delivered assembled ready for installation.

Please Observe!
Leave the brake in its installed condition!

Proximity switches are subject to a failure rate. For the switching condition monitoring device, a proximity switch with a very high reliability and a high MTBF value (Mean Time Between Failure) is used.

Proximity switches are components according to IEC60947-5-2 and are to be used according to the standard. They are electrically specified for applications in well protected (controlled) operating environment (par. 8.2.6). The power supply must be selected accordingly. Additional measures, such as separate cable routing and shielded cables, may be necessary for EMC-compliant installation in machines and systems, especially for long cables.

10.1.2 Piston Rod

Requirements on the piston rod

- ❑ For brake installation, we recommend an insertion chamfer on the piston rod of min. 3 x 20°.
- ❑ The piston rod should be installed at one end as a floating bearing.
- ❑ We recommend to stress the piston rod with tension.

Please Observe!
The piston rod must only be loaded in the direction of motion.

Please Observe!
Please pay attention to the buckling safety on pressure-loaded piston rods!

Please observe the stroke length, the load and cylinder mounting to prevent bending or buckling of the piston rod in any stroke position.

$F_{max} = 2.5 \times F_{Nenn}$

Please Observe!
The **ROBA®-linearstop** function can only be guaranteed on a proper rod surface.

Please Observe!
The piston rod must not be composed of several individual piston rods.

- The piston rod must be manufactured of one piece.

Rod quality

The company *mayr®* power transmission recommends the use of hard chromium-plated piston rods (induction hardened).

Steel, hard chromium-plated	
Layer thickness	Minimum layer thickness for rod diameter <20 mm = 10 µm / >20 mm = 20 µm
hardness	At least HRC 56
Diameter tolerance	f7
Surface quality	Ra < 0.4 µm
Yield point	min. 400 N/mm² (e.g. C45)

CAUTION

The clamping effect is impaired by friction-reducing substances such as viscous lubricants, greases or release agents introduced into the system (brake and piston rod). If contamination has occurred, the system must be cleaned see section **13.4**

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10.2 Installation

10.2.1 Pre-requisites

- ❑ Unpack the brake
- ❑ Check for completeness
- ❑ Check the data on the Type tag
- ❑ Visual inspection (e.g. after longer storage period)

CAUTION **Please observe the own weight of the brake**

The brake may drop during lifting / disassemble. The consequences may be crush injuries and impact injuries.

10.2.2 Preparation

- ❑ Have the necessary tools ready
  - Spanners etc.
  - Torque wrenches
- ❑ Provide fixing screws (not included in the standard scope of delivery)

Fixing screw sizes and tightening torques				
Size	**Thread**	**Tightening torque**	**Property class**	**Screw-in depth t**
10	3 x M3	1.3 Nm	8.8	6 mm
15/20	3 x M5	5.1 Nm	8.8	9 mm
40	3 x M6	9 Nm	8.8	12 mm
60	3 x M8	21 Nm	8.8	15 mm

All tightening torques are recommendations only. These data do not relieve the user from checking the data regarding the actual installation situation.

10.2.3 Installation Procedure

The piston rod support (Fig. 3 Item 5) and the piston rod (Fig. 3 Item 3) (customer-side) must be exactly aligned with one another. Max. Deviation to 0.3 m = 0.1 mm

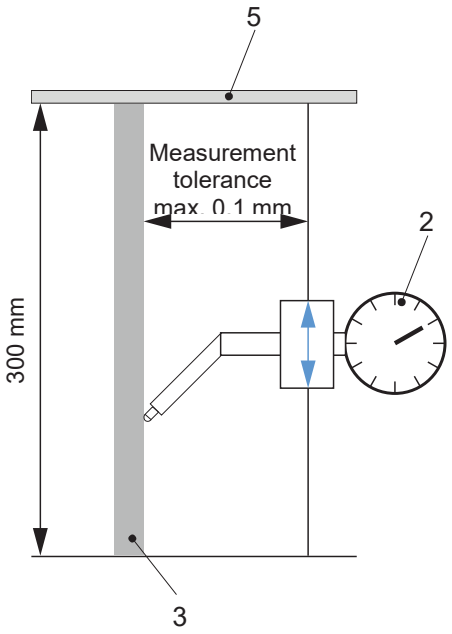

Fig. 3: Alignment piston rod

1. Position the mounting flange (Fig. 4 Item 1) (customer-side) at the fixed bearing of the piston rod.
2. Connect the brake acc. the Wiring Diagram **10.3.1**
3. Energise the brake

The brake only opens on overexcitation (se section 7).

4. Remove the transportation lock (5)
5. Push the brake onto the piston rod.

Please Observe!
Tilted insertion of the piston rod might cause damage to the double wiper and seals (not on size 10, 15, 20).

Push the brake onto the piston rod carefully.

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6. Bring the brake up to contact to the mounting flange (customer-side).
7. Screw in the fixing screws (without torque).
8. Screw securement with Loctite 243

Please Observe!
Before brake closure, the collet must enclose the piston rod completely.
If the piston rod ends in the collet, the clamping element might get damaged when actuating the brake!

Please Observe!
To check the angular misalignment of the mounting flange (Fig. 4 Item 1) to the brake (Fig. 4 Item 4), the distance of the brake to the mounting flange at the circumference of the brake is measured. Maximum gap B = 0.05 mm

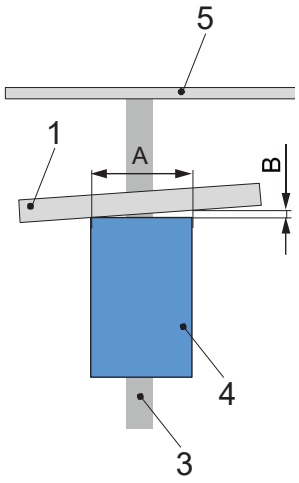

Fig. 4: Alignment of brake to the flange

9. Switch the brake in de-energised state, thereby placing it under tension (centring).
10. Tighten the fixing screws using the tightening torque.

Item	
1	Mounting flange
2	Dial gauge
3	Piston Rod
4	Brake
5	Piston rod support

Please Observe!
The following signs of use/conditions may indicate an incorrectly installed brake:
- ❑ Abraded particles on the piston rod
- ❑ Pulled out double dirt wiper
- ❑ Strong movement of the piston rod at the floating bearing when switching or moving the brake

10.3 Electrical Connection

DANGER

Carry out electrical connection only in de-energised condition.
Electrical shock possible.
Only trained personnel should carry out the connection.

10.3.1 Wiring diagram brake

Cable	
Black	+V
Blue	0 V

M4 thread on the back side of the brake:

Protective grounding for size 40/60 with U_O = 207 V

Functional grounding for size 40/60 with U_O = 48 V and sizes 10, 15, 20 with U_O = 24 V

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11 Options (not on size 10, 15 and 20)

11.1 Switching Condition Monitoring (NC Contact)

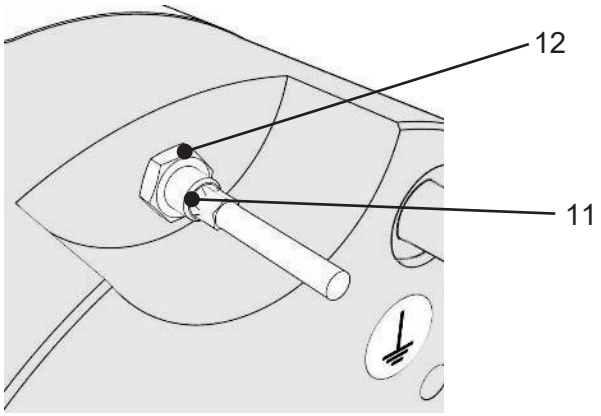


Fig. 4

Please Observe!
The switching condition monitoring is installed and set manufacturer-side.

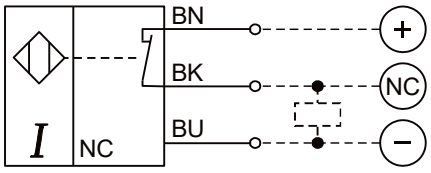
A proximity switch (11) emits a signal for every brake condition change.

Plausibility check

Brake opened	Brake energised	**Signal "OFF"**
Brake closed	Brake de-energised	**Signal "ON"**

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

Wiring Diagram:



Technical Data	
PNP/NC contact	
Rated operating voltage DC:	U_e = 24 V
Operating voltage DC:	U_B = 10...30 V
Rated operating current	Ie= 100 mA
Cable length:	2000 mm

Replacement of the proximity switch (11)

Please Observe!
Proximity switches cannot be guaranteed fail-safe. Therefore, please ensure appropriate access for replacement or adjustment.

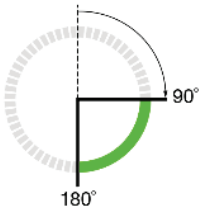
Pre-requisites

WARNING **Load crash possible**
Gravity-loaded axes must be secured before beginning the work: this secures them against dropping.

❑ Brake is without power (enclosed) **on the** piston rod.

De-installation
Unscrew the hexagon nut (12), unscrew and remove the proximity switch (11).

Installation and Adjustment
Initial position: Proximity switch (11) is not connected

Activity		Result
1.	Energise the brake	
2.	Screw in the proximity switch (11) up to the stop.	
3.	Connect the proximity switch (11) (see wiring diagram)	**Signal "OFF"**
4.	Unscrew the proximity switch (11) carefully until the signal changes.	**Signal "ON"**
5.	Screw in proximity switch (11) up to the range between 90° and 180°. **Do not screw in over 180°!** 	**Signal "OFF"**
6.	Counter the proximity switch (11) using the hexagon nut (12) ❑ Tightening torque: 2 Nm ❑ Thread: M4x0.5 (wrench opening 6)	
7.	Carry out a functional inspection	
7.1	Close brake	**Signal "ON"**
7.2	Open brake	**Signal "OFF"**

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12 Initial Operation

12.1 Brake Inspection (before initial operation)

- ❑ Check all fixing screws for the required tightening torque.
- ❑ Function test after completed assembly and electrical connection of the brake

12.2 Brake Test (initial operation)

CAUTION

During the Brake Test danger to personnel and damage to machines cannot be ruled out in case of malfunctions (incorrect installation, control errors etc.). Risks to personnel and machine damage cannot be ruled out.

Do not enter the danger zone.

Possibly take measures for catching or damping the load.

► Check dimensioning!

12.2.1 (Static) Brake Inspection

- ❑ On vertical axes, a brake inspection is carried out via load assumption or via the drive.

Recommendation!
Test the brake using the nominal holding force or the maximum load mass.

12.2.2 Regular Function Inspection (static)

Recommendation!
A test must be carried out to guarantee the necessary holding force with all control and brake times if a risk is generated by gravity-loaded axes. A cyclic brake inspection during running operation provides additional safety. Depending on the danger, please observe the respective regulations and standards.

- ❑ Depending on the application requirements, we recommend carrying out regular braking force inspections (depending on the application), e.g. check the static holding force 1 x per shift with nominal holding force or with maximum load mass.
- ❑ In addition to the regular inspection of the holding force, we recommend the application of a switching condition monitoring device (option), in order to request the brake switching condition or to prevent a possible load crash on vertical installation.

Recommendation!
The holding force is reduced by friction value-reducing materials. If the brake during the functional inspection does not achieve the nominal holding force, repeat using 90 % of the nominal holding force and clean the piston rod at the next opportunity (see section **13.4**).

If the malfunction reoccurs, check the brake (see section **12**)

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13 Maintenance / Inspection / Number of switchings

13.1 Number of Switchings

The **ROBA®-linearstop** is designed for a switching frequency of up to 200.000 switching actions.

At a switching frequency > 200.000 please contact ***mayr®*** power transmission.

13.2 Inspection

Check the condition

Measure	Condition		Interval	Implementation
Visual inspection	Double wiper	The wiper must not show any signs of wear, as otherwise there might be a risk of dirt penetration	To be determined by machine operator depending on the installation situation If you have any questions, please contact *mayr®* power transmission.	Qualified personnel
	Piston Rod	Check the piston rod for wear.	After every EMERGENCY STOP occurrence.	
	Wear indicators	Nominal holding force is not reached (slipping). Replace brake	To be determined by machine operator depending on the installation situation If you have any questions, please contact *mayr®* transmission.	***mayr®* power transmission**

13.3 Maintenance

The **ROBA®-linearstop** is mainly maintenance-free.

Measure	Note/Comment	Interval	Implementation
Functional Inspection	Carry out a regular functional inspection	see section **12.2.2**.	Qualified personnel
Check the piston rod	The piston rod must be checked regularly for contamination with friction value-reducing materials; it must be cleaned, if necessary (see section **13.4**). Special measures may be necessary if the device is subject to large amounts of dirt or dust or is operating in extreme ambient conditions. **Please contact *mayr®* power transmission.**	at least every 6 months	

Should the **ROBA®-linearstop** no longer meet the required characteristics or should the necessary safety for work on the machine or system no longer be given, the brake must be checked at ***mayr®* power transmission** and, if necessary, professionally repaired and approved.

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13.4 Cleaning:

Clean piston rod with ethanol (spirit) wetted cloth. If heavily contaminated, clean also the inside of the brake (collet Item 2) (see section **14**: De-installation).

14 De-installation

WARNING **Load crash possible**

The brake must be load-free.
Please check that it is load-free before de-installation.

- ❑ Provide security in the danger zone.
- ❑ Support the load

CAUTION **Please observe the own weight of the brake**

The brake may drop during lifting / disassemble.

The consequences may be crush injuries and impact injuries.

De-installation takes place by following the "Installation procedure" section **10.2.3** backwards.

Please Observe!

- ❑ Energise the brake
- ❑ Move the brake away from the piston rod
- ❑ Insert parallel pin transportation lock (5)
- ❑ Disconnect voltage

15 Emergency Hand Release

WARNING **Danger of load crashes**

The brake must be load-free.
Check the load-free condition before starting work.

- ❑ Provide security in the danger zone.
- ❑ Support the load

Mechanical opening of the brake with an emergency hand release (screws provided by the customer see section **5.2**):
- on power failure
- Brake cannot be opened despite energization

Position thread für emergency hand release:

On size 10, 15: Thread (8) for screws in the adaptor (7)
From Size 20: Thread (10) for screws in piston housing (1)

Emergency hand release actuation:

WARNING **Danger of load crashes**

With the screws for the emergency hand release screwed in, the brake has no function

On size 10, 15, 20:
1. Tighten the screws one after the other until the brake can be moved on the piston rod.
2. After finishing the procedure:
   ► Unscrew the screws for emergency hand release

Please Observe!
Please Observe: For size 10, 15, bores in the mounting flange for the threads of the emergency hand release if required.

On size 40, 60:
1. Unscrew and remove the proximity switch (11) see section **11** „de-installation“
   Attention! If the proximity switch (11) is not unscrewed, this can lead to damage and loss of function.
2. Tighten the screws one after the other until the brake can be moved on the piston rod.
3. After finishing the procedure:
   ► Unscrew the screws for emergency hand release
4. Mount the proximity switch (11) see section **11** „Installation and adjustment“

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16 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

(DC voltage modules / ROBA®-switch / proximity 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 pads with coil /cable and all other steel components:
Steel scrap (Code No. 160117)

All aluminum components:
Non-ferrous metals (Code No. 160118)

Seals, O-rings, V-seals, elastomers:
Plastic (Code No. 160119)

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17 Malfunctions / Breakdowns

Malfunction	Possible Causes	Solutions	Implementation
Brake does not release	Brake was switched off without piston rod / transportation lock (5)	Carefully screw in the screws for emergency hand release until the brake opens.	Qualified personnel
	Incorrect voltage, no DC voltage	Check voltage, observe the wiring guidelines	
	Defective electrical wiring	Check electrical wiring	
	Defective coil, coil is thermally overloaded	Check coil capacity, check insulation resistance	
	Wear too big	Send the device	***mayr*® power transmission**
Brake does not brake	Piston rod too small	Check dimensioning, check technical data	Qualified personnel
	Defective electrical wiring	Check electrical wiring	
Braking distance too long / Braking force too low	Friction value-reducing materials on the piston rod	Clean the piston rod	
	Friction value-reducing materials in the brake	Disassemble and clean brake (see section 9: De-installation)	
	Incorrect dimensioning	Check dimensioning, check technical data	

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

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18 Declarations of Conformity

18.1 EU Declaration of Conformity

EU Konformitätserklärung

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

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D	erklärt folgende Konformität gemäß EU-Richtlinie und Normen für Artikel	I	dichiara la seguente conformità secondo la direttiva UE e le norme per l'articolo
EN	explains the following conformity according to EU directives and norms for the following product	ES	declara la siguiente conformidad a tenor de la directiva y normas de la UE para el artículo
F	déclare la conformité suivante selon la directive CE et les normes concernant l'article	PT	declara a seguinte conformidade, de acordo com as diretiva CE e normas para o artigo

Elektromagnetische Kolbenstangenbremse / Electromagnetic piston rod brake / Frein électromagnétique à tige de piston / Freno a stantuffo elettromagnetico / Freno de vástago electromagnético / Travão electromagnético de haste de pistão

Produkt / Product / Produit / Prodotto / Producto / Produto	**Größen** / Sizes / Tailles / Grandezze / Dimensión / Dimensão	**Typen** / *Types / Types / Serie / Tipos / Tipos*
ROBA®-linearstop®	**10/15/20/40/60/80**	**3820.____**

X	**2006/42/EG**	X	**2011/65/EU (RoHs II) incl. 2015/863/EU (RoHs III)**
	2014/35/EU		**2014/33/EU**
	2014/30/EU		

Certification	*Monitoring of production (Deviating from the certifier)*
Notified Body:	**Notified Body:**
Reg. No.:	**Reg. No.:**
Certificate No.	**Certificate No.:**

Normen Referenz / Standards reference / Référence normes / Riferimenti norme / Referencia normas / Referência padrões:

DIN EN ISO 12100: 2004-04 / EN ISO 13849-2: 2013-02 / DIN VDE 0580: 2000-07 / DIN EN IEC 63000:2019-05 / VDE 0042-12:2019-05

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

D	**Elektromagnetisches Haltebremssystem für linear bewegte Massen und Lasten mit vereinzelten Not-Stop Bremsungen. Sicherheitsbremssystem für dynamische Bremsungen mit geringer Reibarbeit geeignet.**
EN	Electromagnetic holding brake system for linear moving masses and loads with isolated emergency stop braking. Safety brake system suitable for dynamic braking with low friction work.
F	Système de freinage de maintien électromagnétique pour masses et charges en mouvement linéaire avec freinages d'urgence isolés. Système de freinage de sécurité adapté aux freinages dynamiques avec un faible travail de friction.
I	Sistema di freno di stazionamento elettromagnetico per masse e carichi in movimento lineare con frenata d'emergenza isolata. Sistema frenante di sicurezza adatto alla frenata dinamica con lavoro a basso attrito.
ES	Sistema de freno de retención electromagnético para masas y cargas en movimiento lineal con frenado de emergencia aislado. Sistema de freno de seguridad adecuado para el frenado dinámico con trabajo de baja fricción.
PT	Sistema de travagem electromagnética de retenção para massas e cargas em movimento linear com travagem de paragem de emergência isolada. Sistema de travagem de segurança adequado para travagem dinâmica com trabalho de baixa fricção.

Identification:	**Jahr der Herstellung:** *Année de production:* *Año de fabricación:*	**Siehe Typenschild am Produkt** *Voir l'étiquette sur le produit* *ver placa de identificación del produto*	*Year of manufacture:* *Anno di produzione:* *Ano de fabricação:*	*see product label* *vedi l'etichetta sul prodotto* *Ver placa do produto*

Dokumentationsbeauftragter /documentation officer / Spécialiste documentation / ufficiale documentazione / oficial documentación / oficial documentação

Thomas Huber
Qualitätsmanagement

Mauerstetten, 07.11.2022
Ort und Datum / place and date / Lieu et date / luogo – data / fecha y lugar / Lugar e data

Geschäftsführer / Managing Director
Ferdinand Mayr M.Sc

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18.2 UKCA Declaration of Conformity

UKCA – Declaration of conformity

UKCA - Konformitätserklärung

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D erklärt folgende Konformität gemäß EU-Richtlinie und Normen für Artikel	**EN** explains the following conformity according to EU directives and norms for the following product

Elektromagnetische Kolbenstangenbremse/ Electromagnetic rod brake

Produkt / Product	Größen / Sizes	Typen / *Types*
ROBA®-linearstop®	**10,15,20,40,60,80**	**3820._ _ _ _**

X	**2008 No. 1597**	**x**	**RoHS Regulations 2012 No. 3032**
	2016 No. 1101		**2016 No. 1093**
	2016 No. 1091		

Certification	***Monitoring of production*** *(Deviating from the certifier)*
Notified Body:	**Notified Body:**
Reg. No.:	**Reg. No.:**
Certificate No. UKCA – Report number	**Certificate No.:**

Normen Referenz / Standards reference: EN ISO 4414 – 04/2011 / EN ISO 12100 – 03/2011 / EN ISO 13849-2 – 02/2013 / EN 60664-1 – 01/2008 / EN 60529 – 09/2014 / EN 61140 – 11/2016 / EN IEC 63000 – 05/2019

Sicherheitsfunktion / *Safety function*

D **Das elektromagnetische Haltebremssystem ist für linear bewegte Massen und Lasten (381.0____) bzw. für das Halten und Verzögern linear bewegter Massen und Lasten (381.1____) im Einsatz in Maschinen und Anlagen bestimmt.**

EN The electromagnetic holding brake system is intended for linearly moving masses and loads (381.0____) or for holding and decelerating linearly moving masses and loads (381.1____), in use in machines and systems.

Identification: **Jahr der Herstellung:** **Siehe Typenschild am Produkt** *Year of manufacture:* *see product label*

Dokumentationsbeauftragter / Documentation keep by (for UKCA only): **Mr. Andrew Nicoll**	Authorised representative and Importer contact details: **Mayr Transmissions Ltd.** Valley Road, Keighley, West Yorkshire, BD21 4LZ www.mayr.com
For the manufacturer: Mauerstetten, 07.11.2022 (Ort und Datum / place and date)	Geschäftsführer / Managing Director Ferdinand Mayr M.Sc
For the representaive of the manufacturer / importer: West Yorkshire, 07.11.2022 (Ort und Datum / place and date)	Geschäftsführer / Managing Director Andrew Nicoll

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