

Installation and Operational Instructions for ROBA[®]-quick electromagnetic brake Sizes 3 – 9 Type 520.1__ and Type 520.2___.0

(B.5.2.GB)

Please read the Operational Instructions carefully and follow them accordingly!

Ignoring these Instructions may lead to malfunctions or to brake failure, resulting in damage to other parts.

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Manufacturer's Declaration

This product is intended for installation in a machine or system, based on the machine directive 98/37/EC. It is forbidden to start use of the product until the machine or system into which it should be built is operating in accordance with the EC directives.

The product corresponds to the low voltage directive 73/23/EEC.

The customer is responsible for compliance with the EMC directive 89/336/EEC.

Safety and Guideline Signs



Danger!

Danger of injury to personnel and damage to machines.



Please Observe!

Guidelines on important points.



Please Observe:

According to German notation, decimal points in this document are represented with a comma (e.g. 0,5 instead of 0.5).

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Safety Regulations

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



Danger!

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

To prevent injury or damage, only professionals and specialists should work on the devices.

Danger!

This warning applies if:

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



Warning!

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.

The electromagnetic brakes have been developed in accordance with the latest technology regulations and are, at the point of delivery, operationally safe.

Warning:

Without a conformity inspection, this product is not suitable for use in areas where there is a high danger of explosion. This statement is based on the directive 94/9/EC (ATEX directive).

Please Observe!

- Only specialists who are trained in the transport, installation, operation, maintenance and general operation of these devices and who are aware of the relevant standards should be allowed to carry out this work.
- Technical data and specifications (Type tags and documentation) must be followed.
- The correct connection voltage must be connected according to the Type tag.
- Never loosen electrical connections or carry out installations, maintenance or repairs while the voltage connection is energised!
- Cable connections must not be placed under mechanical strain.
- Check electrical components for signs of damage before putting them into operation. Never bring them into contact with water or other fluids.
- The torque is lost if the friction lining and / or the friction surface come into contact with oil or grease.

Appointed Use

ROBA[®]-quick brakes are for use in machines and systems and must only be used in the situations for which they are ordered and confirmed.

Using them for any other purpose is not allowed!

Guidelines for Electromagnetic Compatibility (EMC)



In accordance with the EMC directives 89/336/EEC, the individual components produce no emissions. However, functional components e.g. rectifiers, phase demodulators, ROBA[®]-switch devices or similar controls for mains-side energisation of the brakes 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.

Device Conditions



The catalogue values are standards which can, in certain cases, vary. When dimensioning the brakes, please remember that installation situations, torque fluctuations, permitted friction work, run-in behaviour 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.

Please Observe!

- Mounting dimensions and connecting dimensions must be adjusted according to the size of the brake at the place of installation.
- The brakes are designed for a relative duty cycle of 100 %.
- 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.
- The torque is dependent on the present run-in condition of the brakes.
- Manufacturer-side corrosion protection of the metallic surface is provided.

Protection Class I

This protection can only be guaranteed if the basic insulation is intact and if all conductive parts are connected to the PE conductor on the permanent installation. Should the basic insulation fail, the contact voltage cannot remain (VDE 0580).

Protection (Electrical) IP 54:

Dust-proof and protected against contact as well as against splashing water from all directions.

Valid for coil, casting compound and connection strands.

On the design with a connection terminal, the connection terminal itself corresponds to Protection Class IP00.

Ambient Temperature –20 °C up to +40 °C

Warning!

At temperatures of around or under freezing point, condensation can strongly reduce the torque. During longer downtimes, the friction surfaces can stick. The user is responsible for taking appropriate counter measures.

Thermic Class F (+155 °C)

The magnetic coil and the casting compound are suitable for use up to a maximum operating temperature of +155 °C.

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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 and catapulted objects.
- Place a cover on the magnetic part to protect against injury through high temperatures.
- Protect against electric shocks by installing a conductive connection between the magnetic component and the PE conductor on the permanent installation (Protection Class I) and by carrying out a standardised inspection of the continuous PE conductor connection to all contactable metal parts.
- Protect against highly inductive switch-off peaks by installing varistors, spark quenching units or similar devices according to VDE 0580/2000-07, Paragraph 4.6, to prevent damage to the coil insulations or switch contact consumption in extreme conditions (this protection is contained in *mayr*[®] rectifiers).
- The connection cable or connection strands on the brakes have a sheathing which is not resistant against all materials. On contact with chemical materials, please check for compatibility.
- 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.
- Take precautions against freeze-up of the armature disk and friction surfaces in high humidity and at low temperatures.

Regulations, Standards and Directives Used:

98/37/EC	Machine directive
73/23/EEC	Low voltage directive
89/336/EEC	EMC directive
DIN VDE 0580	Electromagnetic devices and components, general directives

Please Observe the Following Standards:

DIN EN ISO 12100-1 and 2	Machine safety
DIN EN61000-6-4	Noise emission
DIN EN61000-6-2	Interference immunity
EN60204	Electrical machine equipment

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!

Conformity Markings

The product conforms to the CE according to the low voltage directive 73/23/EEC.

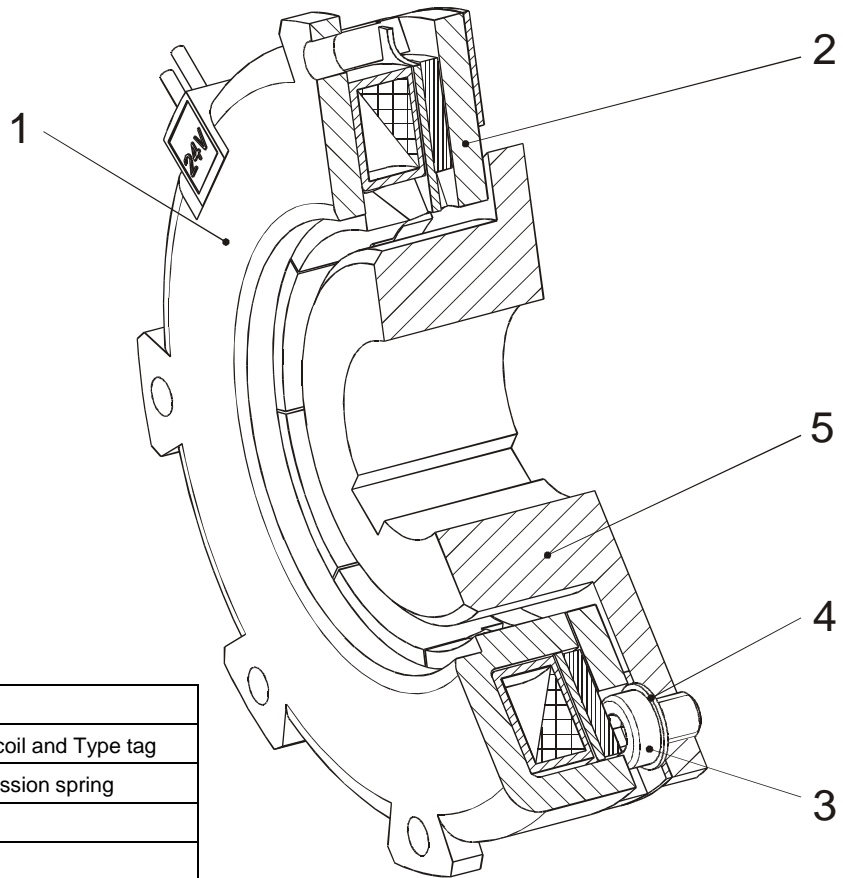
Identification

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

Manufacturer
<i>mayr</i>[®]
Product name / Type
Article number
Serial number

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Parts List

(Only use mayr[®] original parts)

Item	Name
1	Coil carrier assembly with magnetic coil and Type tag
2	Armature disk assembly incl. transmission spring
3	Cap screw
4	Spring washer
5	Flange hub (dependent on Type)

Fig. 1

Table 1: Technical Data

	Size	3	4	5	6	7	8	9
Nominal torque M_2 ¹⁾	[Nm]	8,5	17	45	80	160	320	640
Air gap "a" (Figs. 2 / 3)	[mm]	0,2 ^{+0,1} _{-0,05}	0,2 ^{+0,15} _{-0,05}	0,2 ^{+0,15} _{-0,05}	0,3 ^{+0,15} _{-0,05}	0,3 ^{+0,15} _{-0,05}	0,5 ^{+0,15} _{-0,1}	0,5 ^{+0,15} _{-0,1}
Max. permitted working air gap "a"	[mm]	0,6	0,8	1,0	1,2	1,5	1,8	2,0
Max. permitted centre offset "V" (Figs. 4 / 5)	[mm]	0,05	0,05	0,05	0,05	0,1	0,1	0,1
Max. permitted "V ₁ " (Fig. 4)	[mm]	0,1	0,15	0,15	0,15	0,2	0,2	0,25
Tightening torques (±10 %) for fixing screws (cap screws Item 3) for the armature disk (Item 2)								
Type 520.1__	[Nm]	1,1	2,9	5,7	9,9	24	48	83
Type 520.20__	[Nm]	2,9	5,7	9,9	24	24	-	-
Type 520.21__	[Nm]	1,1	2,9	5,7	9,9	24	-	-
Tightening torques (±10 %) for fixing screws²⁾ for the coil carrier (Item 1)								
All Types	[Nm]	2,9	5,7	9,9	9,9	24	24	48

¹⁾ Please observe run-in specifications and minimum speed acc. Table 2

²⁾ Not included in standard delivery

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State of Delivery

Please check the state of delivery immediately according to the Parts List!

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

Function

ROBA[®]-quick brakes are energised to engage, electromagnetic pole face brakes.

By applying DC voltage to the magnetic coil in the coil carrier (1), a magnetic field is built up. This pulls the armature disk (2) against the coil carrier (1).

The braking torque is transmitted by the armature disk (2) rubbing against the iron poles and the coil carrier (1) friction lining.

The coil carrier (1) is screwed onto the machine wall, centred on the shaft bearing (Figs. 2 and 3).

The air gap "a" is defined via a distance ring between the shaft bearing and the drive element (Fig. 2) or inner hub (Fig. 3).



Please Observe:

In new condition, torque transmission first takes place via the metal outer pole on the coil carrier (1) and, after a short operation period, then additionally via the inner pole. After the entire run-in procedure, an even frictional combination occurs on the metal poles and on the friction lining lying between them.

Design

ROBA[®]-quick brakes have Electrical Protection IP 54 and Insulation Class F (up to 155 °C) for coil, casting compound and connection strands. On the design with a connection terminal, the connection terminal itself corresponds to Protection Class IP00.

The surfaces on the coil carrier (1) and flange hub (5) are phosphated, the armature disk (2) is gas nitro-carburized (friction surfaces are ground), and the transmission spring is made of stainless steel.

The drive elements should be made from a material which is a poor magnetic conductor in order to prevent magnetic loss due to leaking flux and therefore loss of force.

Explanation of Terms

The **nominal torque** M_2 is the largest transmittable torque (after run-in has been completed), with which the closed brake can be loaded without slipping occurring.

The **relative duty cycle** is the ratio of duty cycle to backlash duration in percent (% duty cycle).

Torque Characteristics

In new condition, c. 50 % of the catalogue nominal torque (M_2) is transmitted.

The components reach the catalogue nominal torque when the friction surfaces are run in. Please take c. 100 – 200 switchings in dynamic operation, a typical speed of c. 500 to 1000 rpm and a medium friction work (see Table 2) as rough reference values. Longer slipping on the brake, especially at low speeds, is to be avoided, as this can lead to scoring and therefore to damage to the friction surfaces.

Brakes used in static or virtually static operation do not reach the nominal torque (M_2) shown in the Technical Data (Table 1).

On request, the brake can also be run in manufacturer-side. In this case, please ensure that the customer-side installation is carried out exactly according to the specifications, in order to re-create the best possible friction conditions. Also, the "friction carbon" must not be wiped away.

If the brakes are run in manufacturer-side to the nominal torque and then run in static or virtually static operation, please expect a reduction in nominal torque of c. 60 to 70 %. This is the case if the brake under-runs the speed or friction work (Q_a) given in Table 2.

Table 2:

Size	Friction work Q_a [J]	Brake speed n_{min} [rpm]
3	16	300
4	29	250
5	55	200
6	105	160
7	200	130
8	380	120
9	600	100

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Run-in Conditions

Please Observe: The Items 6 to 9 are customer-side mounting parts which are not included in standard delivery.

On different Type designs, the run-in procedure can be approached in different ways. The respective application should always be taken individually into account.

Please carry out an "artificial" run-in if a run-in procedure on the machine is not possible for the application (see section Torque Characteristics). This is the case e.g. when the friction work, the speed or the switching frequencies are too low.

For Types 520.2__0:

Run-in Possibility 1

- Apply a voltage c. 1/3 of U_{Nom}
- Speed c. 200 - 500 rpm
- Synchronise against blocked output
cycle c. 50 – 100 ms (dependent on size);
no prolonged slipping; break c. 200 ms;
Synchronise c. 2 – 3 minutes (100 – 200 cycles)

Please Observe: Only carry out the torque inspection in static operation – no slipping (danger of scoring)

Run-in Possibility 2

- Synchronise against unblocked output by producing a larger rotating mass and / or by synchronising at higher speed (values should lie above the minimum values, Table 2)
- Allow to synchronize c. 2 – 3 minutes.

For Types 520.1__ :

Run-in Possibility 1

- Apply a voltage c. 1/3 of U_{Nom}
(do not apply nominal voltage!)
- Speed on sizes 3 – 6: c. 50 rpm
on sizes 7 – 9: c. 30 rpm
- c. 2 – 3 minutes slipping against blocked output

Run-in Possibility 2

- Synchronise against unblocked output by producing a larger rotating mass and / or by synchronising at higher speed (values should lie above the minimum values, Table 2)
- Allow to synchronise c. 2 – 3 minutes.

Installation Examples (Figs. 2 and 3)

In operation, the armature disk (2) is pulled against the coil carrier (1). The braking torque is transmitted via frictional locking from the coil carrier (1) via the armature disk (2) with the transmission spring and the V-belt disk (Item 6 / Fig. 3) or the flange hub (Item 5 / Fig. 4) onto the input shaft (7).

The coil carrier (1) is screwed onto the machine wall, centred onto the shaft bearing (8).

The air gap "a" between the coil carrier (1) and the armature disk (2) is defined via the distance ring (9) between the shaft bearing (8) and the V-belt disk (6) or flange hub (5).

Axial securement of the V-belt disk (6) or flange hub (6) takes place via a press cover and a screw, screwed into the shaft threaded center hole.

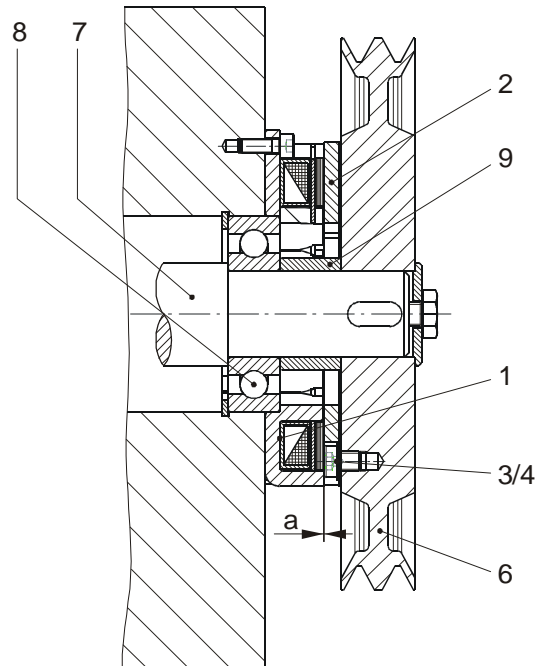


Fig. 2

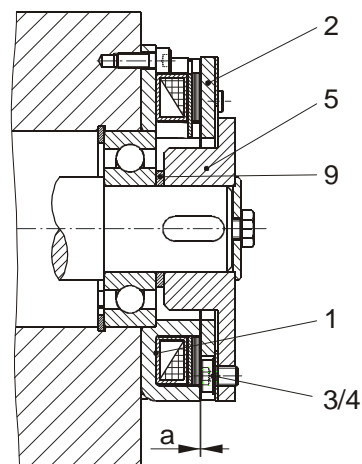


Fig. 3

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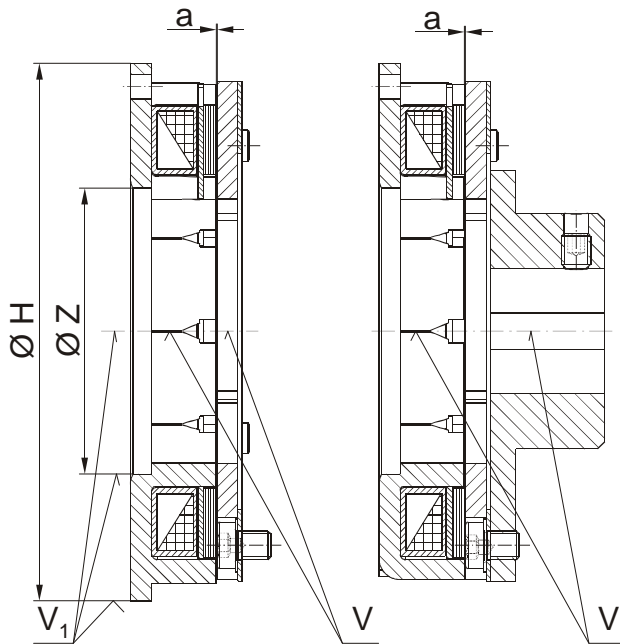


Fig. 4

Fig. 5

Installation

1. Mounting the coil carrier (1):

Screw the coil carrier (1) onto the machine wall (observe the tightening torque acc. Table 1).

- Centred by a ball bearing (8), Figs. 2/3.
- Centred on diameter "Z", Fig. 4.
- Centred on outer diameter "H", Fig. 4.

The maximum permitted centre offset "V₁" acc. Table 1 may not be exceeded (Figs. 4 and 5).

3. Installation of the armature disk (2):

- 2.1. Lay the spring washers (4) under the cap screws (3).
The cap screws (3) must be secured with Loctite 243.
- 2.2. Mount the armature disk (2) onto the mounting part or onto the flange hub (5) (observe the tightening torque acc. Table 1).
- 2.3. Align the armature disk (2)
(max. permitted radial run-out 0,15 mm).

Please Observe:

The armature disk (2) must be kept grease-free.

3. Installation of the mounting part or the flange hub (5):

- 3.1. Adjust the air gap "a" according to Table 1 and Figs. 2/3.
- 3.2. Secure the mounting part or flange hub (5) axially backlash-free.
Axial backlash changes the air gap "a" and can lead to the armature disk (2) rubbing against the coil carrier (1) (see Installation Examples Figs. 2 and 3).
Please observe the maximum permitted centre offset "V" according to Table 1 and Figs. 4 and 5.

Electrical Connection

The brake magnetic coil is connected to a DC voltage supply. The coil voltage value is imprinted into the coil carrier (1).

A 24 V coil is integrated into the brake on standard designs.

When switching off electromagnetic devices, switch-off peaks can occur. These can lead to destruction of the device, and should therefore be damped.

This damping can have a negative effect on the connection times given in the catalogue.

Please provide a fuse for the voltage supply according to the current values.

The brakes are designed for a relative duty cycle of 100 %.

Maintenance and Inspection

The friction surfaces must be kept free of grease and oil, otherwise the torque drops drastically!

Please inspect the air gap "a" and the permitted centre offsets "V" and "V₁" (Figs. 4 and 5) at regular intervals.

Bearing backlash and wear on the friction surfaces alter the permitted Table values, and can stop the brake functioning. Apart from this, ROBA[®]-quick electromagnetic brakes are maintenance-free.

Disposal

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

Electronic components

(Rectifier / ROBA[®]-switch):

Products which have not been dismantled can be disposed of under the Code No. 160214 (Mixed Materials) or Components under Code No. 160216; or the objects can be disposed of by a certified waste disposal firm.

Steel components:

Steel scrap (Code No. 160117)

Coil carriers (coil carriers with friction linings):

Brake linings (Code No. 160112)

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Malfunctions / Breakdowns:

Malfunction	Possible Causes	Solutions
Brake does not brake	<input type="checkbox"/> Incorrect voltage applied on rectifier <input type="checkbox"/> Rectifier failure <input type="checkbox"/> Air gap too large <input type="checkbox"/> Grease and / or oil on the friction surfaces <input type="checkbox"/> Interrupted coil	<input type="checkbox"/> Apply correct voltage <input type="checkbox"/> Replace rectifier <input type="checkbox"/> Re-adjust air gap <input type="checkbox"/> De-grease friction surfaces <input type="checkbox"/> Replace brake
Brake does not disengage	<input type="checkbox"/> Air gap too small or no air gap present	<input type="checkbox"/> Adjust air gap