

## Installation and Operating Instructions for Brake EV/EH 018/024/028/038 FEM-240/480M

E09.769e



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<b>RINGSPANN</b>	<b>Installation and Operating Instructions for Brake EV/EH 018/024/028/038 FEM, Spring activated - electromagnetically released</b>	<b>E 09.769e</b>			
Date: 26.02.2024	Issue: 4	drawn: MAPM	checked: OHLM	Pages: 28	Page: 2

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## IMPORTANT

Please read these instructions carefully before installing and operating the product. Your particular attention is drawn to the notes on safety.

These installation and operating instructions are valid on condition that the product meets the selection criteria for its proper use. Selection and design of the product is not the subject of these installation and operating instructions.

Disregarding or misinterpreting this installation and operating instructions invalidates any product liability or warranty by RINGSPANN; the same applies if the product is taken apart or changed.

These installation and operating instructions should be kept in a safe place and should accompany the product if it is passed on to others – either on its own or as part of a machine – to make it accessible to the user.

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## Safety Notice

- Installation and operation of this product should only be carried out by skilled personnel.
- Repairs may only be carried out by the manufacturer or accredited RINGSPANN agents.
- If a malfunction is indicated, the product or the machine into which it is installed, should be stopped immediately and either RINGSPANN or an accredited RINGSPANN agent should be informed.
- Switch off the power supply before commencing work on electrical components.
- Rotating machine elements must be protected by the purchaser to prevent accidental contact.
- Supplies abroad are subject to the safety laws prevailing in those countries.

### **This is a translation of the German original version!**

In case of inconsistencies between the German and English version of this installation and operating instruction, the German version shall prevail.

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## 1. General notes

### 1.1 General safety instructions

Please read these installation and operating instructions carefully before installing and operating the brake. Please refer also to the drawings in the various sections. Safety must be given the highest priority during all work performed on the brake. Switch off the drive unit before performing work on the brake. Rotating components (e.g. brake disc) must be secured by the operator to prevent accidental contact.

### 1.2 Special safety instructions

	<p><b>Life-threatening danger!</b></p> <p><b>When assembling, operating and maintaining the brake it is to be ensured that the entire drive train is secured against being switched on unintentionally. Moving parts can cause severe injury. Rotating parts (e.g. brake disc) must be secured by the operator against unintentional touching.</b></p>
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## 2. Design and function, markings, technical data, standards

### 2.1 Function, Operating Principle

The brakes of type EV an EH are machine components, used for the purpose of braking accelerated masses safely and reliably. The combination of brake and brake disc provides a complete brake unit capable of securing machines and equipment system effectively. Thanks to its universal design, it can perform the following functions:

- As a holding or parking brake, it prevents the unintended start of a stationary shaft.
- As a stopping brake, it brings a rotating shaft to a complete standstill.

Braking force is generated by spring force (46), the brake is released electromagnetically (2). If the lining of the friction blocks (1) wears out, the holding or braking torque is reduced because the spring preload is reduced.




### 2.2 Markings




These installation and operating instructions apply to:

- the types EV/EH 018/024/028/038 FEM, each with two separate voltage ranges 240V (220 ... 240VAC) and 480V (380 ... 480VAC).
- installation on horizontal brake discs and vertical brake discs in combination with horizontal shafts
- for models with and without switches
- for different brake pad material and for brake pads with signal cables.
- with cable bushing (cCSAus type) and plug as connection for the supply voltage

Example

Designation

<b>RINGSPANN®</b> www.ringspann.com	
4453-281514-000000	<b>R35</b>
<b>Brake EV 028 FEM-240M-12-C</b>	
220..240VAC - 50/60Hz	
14W / 0,5A (<1s: 1700W / 10A)	
T <sub>A</sub> = 2 Nm, Wiring = 4453-000001	
 IP65	NEMA 3R 

<b>RINGSPANN®</b> www.ringspann.com	
Part number	Production date
Brake designation	
Nominal voltage/ -frequency	
Nominal power/ -current (time for: max. power/ - current)	
T <sub>A</sub> Screw cover electronic box, electr. connection drawing	
 IP65	NEMA 3R 

Only in cCSAus version

### 2.3 Drawings and Parts Lists

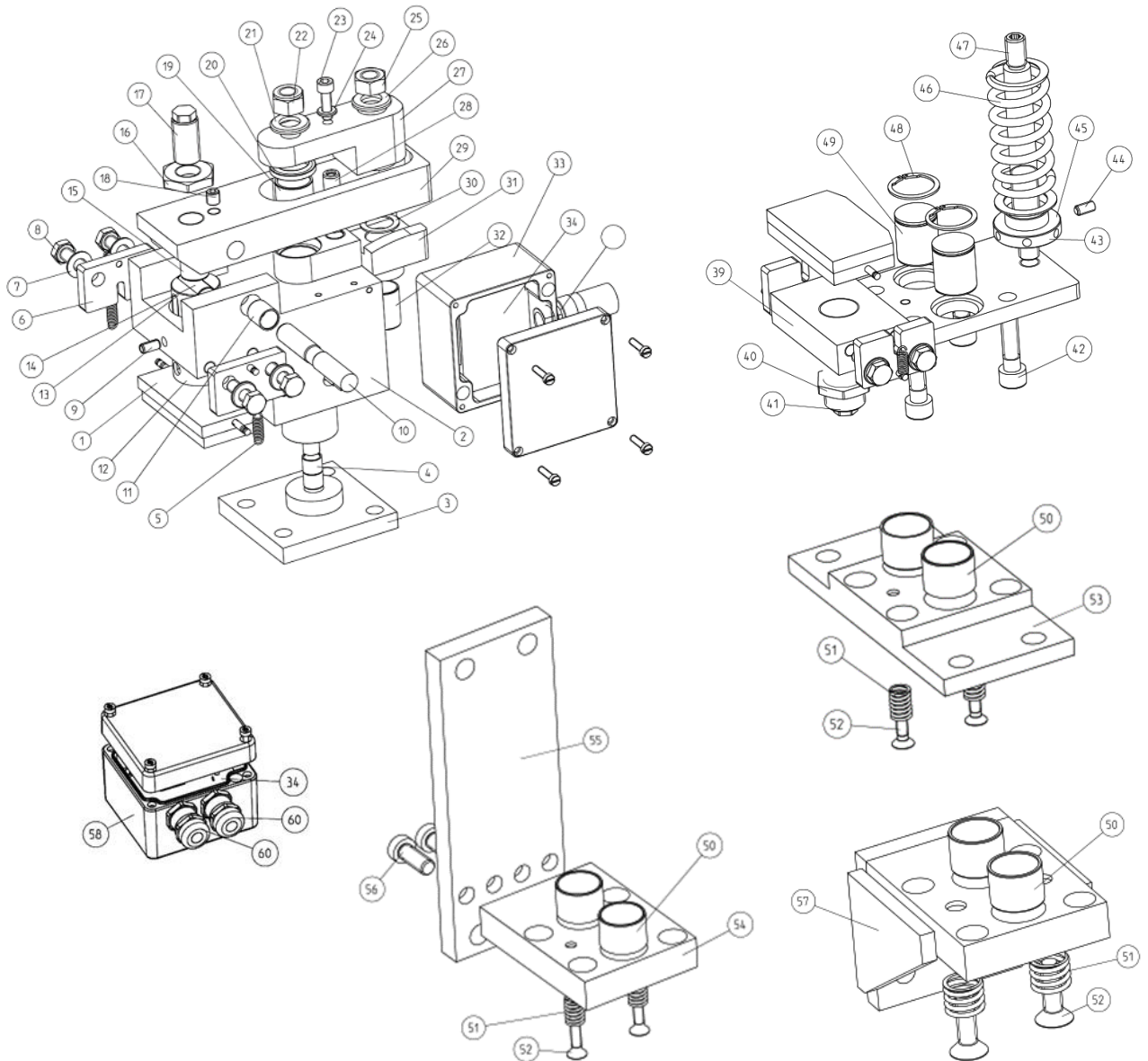


Fig. 2.1

**Information!**

For a clear assignment the 16-digit part number of the brake is necessary.

Table 2.1

Part	Nomenclature	Quantity			
		018	024	028	038
1	Set brake pad	1	1	1	1
2	Solenoid housing with coil	1	1	1	1
3	Solenoid lid	1	1	1	1
4	Slide bushing	1	2	2	1
5	Tension spring	4	4	4	4
6	Retaining plate	4	4	4	4
7	Washer DIN125	8	8	8	8
8	Hexagon head screw ISO4017	8	8	8	8
9	Coiled spring pin	1	1	1	1
10	Bearing pin	1	1	1	1
11	Slide bushing	2	2	2	2
12	Slide bushing	1	1	1	1
13	Calotte	1	1	1	1
14	Cylindrical roller DIN5402	1	1	1	1
15	Cylindrical roller DIN5402	1	1	1	1
16	Hexagon nut	1	1	1	1
17	Threaded pin with hexagon head	1	1	1	1
18	Threaded pin	1	1	1	1
19	Slide bushing	1	1	1	1
20	Wiper	1	1	1	1
21	Washer DIN125	1	1	1	1
22	Hexagon nut DIN985	1	1	1	1
23	Hexagon socket head cap screw DIN912	1	1	1	1
24	Washer DIN125	1	1	1	1
25	Hexagon nut DIN934	1	1	1	1
26	Washer DIN125	1	1	1	1
27	Spring compressor	1	1	1	1
28	Dowel pin	1	1	1	1
29	Lever	1	1	1	1
30	Washer	1	1	-	-
31	Lever pressure piece	1	1	1	1
32	Slide bushing	1	1	1	2
33	Electronic housing	-	1	1	1
34	Electronic 240VAC / electronic 480VAC	1	1	1	1
39	Base plate	1	1	1	1
40	Hexagon nut	1	1	1	1

41	Threaded pin with hexagon head	1	1	1	1
42	Hexagon socket head cap screw DIN912	4	4	4	4
43	Spring compression nut	1	1	1	1
44	Threaded pin	1	1	1	1
45	Washer	4	4	4	1
46	Compression spring	1	1	1	1
47	Guide rod	1	1	1	1
48	Circlip AV	2	2	2	2
49	Guide rod	2	2	2	2
50	Slide bushing	2	2	2	2
51	Compression spring	2	2	2	2
52	Screw	2	2	2	2
53	Attachment plate V	1	1	1	1
54	Adapter plate H	1	1	-	-
55	Attachment plate H	1	1	-	-
56	Hexagon socket head cap screw DIN6912	3	4	-	-
57	Attachment plate H	-	-	1	1
58	Electronic housing 018	1	-	-	-
60	Cable bushing (cCSAus) or plug	3	1	1	1

## 2.4 Technical details

Table 2.2

		<b>EV / EH 018FEM</b>	<b>EV / EH 024FEM</b>	<b>EV / EH 028FEM</b>	<b>EV / EH 038FEM</b>
Clamping force		3200 N	5000 N	10000 N	20000 N
Nominal air gap each side		0,3 mm	0,3 mm	0,3 mm	0,3 mm
Max. friction pad wear <sup>2)</sup>		5 mm	5 mm	7 mm	7 mm
Friction pad wear without adjustment		0,3 mm	0,3 mm	0,3 mm	0,3 mm
Clamping force / braking torque adjustable		50 – 100%	50 – 100%	60 – 100%	60 – 100%
Weight [kg]		6,5 kg	13 kg	24 kg	50 kg
Smallest brake disc diameter		125 mm	250 mm	300 mm	430 mm
Brake disc thickness	Type 12,5	8 to 15mm	10 to 16 mm	10 to 16 mm	12,5 to 20 mm
	Type 25	16 to 20 mm	18 to 26 mm	18 to 26 mm	22 to 30 mm
Supply voltage <sup>1)</sup> (single phase)	Type 240	220 ... 240 VAC	220 ... 240 VAC	220 ... 240 VAC	220 ... 240 VAC
	Type 480	380 ... 480 VAC	380 ... 480 VAC	380 ... 480 VAC	380 ... 480 VAC
Supply voltage frequency <sup>4)</sup>		50 or 60 Hz	50 or 60 Hz	50 or 60 Hz	50 or 60 Hz
Electric fuse		B10 or C6	B10 or C6	B10 or C6	B10 or C6
Power consumption "brake open"	Type 240	24 W	20 W	15 W	20 W
	Type 480	32 W	20 W	19 W	24 W
Electrical degree of protection		IP 65, 3R	IP 65, 3R	IP 65, 3R	IP 65, 3R
Insulation class		PE conductor	PE conductor	PE conductor	PE conductor
Duty cycle		100 %	100 %	100 %	100 %
Max. switching frequency at 20°C ambient temperature <sup>3)</sup>		360 / h	360 / h	360 / h	360 / h
Sound Level (max at opening) <sup>6)</sup> [dB]		74	76	78	88
Ambient temperature <sup>3) 5)</sup>		0°C ... +40°C	0°C ... +40°C	0°C ... +40°C	0°C ... +40°C

<sup>1)</sup> The nominal value is printed on the label and on a sticker on the electronics. There are two kinds of electronics: type 240 (220 ... 240 VAC) and type 480 (380 ... 480 VAC).

<sup>2)</sup> The max. allowable friction pad wear depends on the brake disc thickness. See also chapter 11.2.

<sup>3)</sup> Higher ambient temperature as 20°C reduces the max. switching frequency per hour.

<sup>4)</sup> No adjustments necessary, the brake can only be used with 50Hz or 60Hz.

<sup>5)</sup> UL508 or CSA c22.2 No14-13 cover only ambient temperatures between 0° and +40°C. Technically lower or higher temperatures are possible, consultation with RINGSPANN is necessary.

<sup>6)</sup> Measured according to IEC 61672-2 "Fast", with max. clamping force.



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## 2.5 Standards, Guidelines, Protection Class and Certification Mark

The following standards and guidelines have been applied:

2011/65/EU	RoHS Directive
2014/35/EU	Low-Voltage Directive
DIN EN 61000-6-2	EMC – Immunity to interference in industrial areas
DIN EN 61000-6-2	EMC - Interference emission for industrial areas (only with RFI filter 3515-190001-0000)
CSA C22.2 No. 14-13	Industrial Control Equipment (cCSAus – type)
UL 508	Industrial Control Equipment (cCSAus – type)
Electrical protection class:	IP65
Mechanical protection class:	IP10



In the sense of the Low-Voltage Directive 2014/35/EU.



cCSAus Type:

Complies with Canadian and US American standards.

## 3. Intended use

The brake may only be connected with the voltage marked on the nameplate and corresponding to the technical details.

240 VAC = 220 ... 240 VAC, single phase
480 VAC = 380 ... 480 VAC, single phase

With 50 Hz or 60 Hz (no adjustment necessary), single phase and corresponding to the technical details. The electrical connection see chapter 8.4.

The brake is designed for use as a holding/parking brake and/or stopping brake.

Other uses are improper and incompatible with the specified purpose. RINGSPANN assumes no liability for damages resulting from improper use. The user assumes the risk alone.

## 4. Impermissible use

Operating the brake with other supply voltage as specified on the nameplate is prohibited.

To switch the brake without brake disc is only allowed if the assembly locking nut Pos. 25 in Fig. 5.1 remains on the brake and is loosened not more than 4 mm. Repeated switching without brake disc and without assembly locking nut can damage the brake. Unauthorized constructive modifications of the brake are similarly prohibited. If the grub screw pos. 44 is provided with sealing wax at the factory, the clamping force on the brake cannot be adjusted by the customer!

For damages caused by switching the brake without brake disc or unauthorized constructive modifications RINGSPANN assumes no liability for damages resulting from improper use. The risk is assumed by the user alone.

To protect the brake electronics, the installation of surge protectors is mandatory to control the overvoltage. These surge protectors must be connected between the customer's switching relay and the brake electronics.

It is not allowed to mount the brake with the brake body looking downwards:

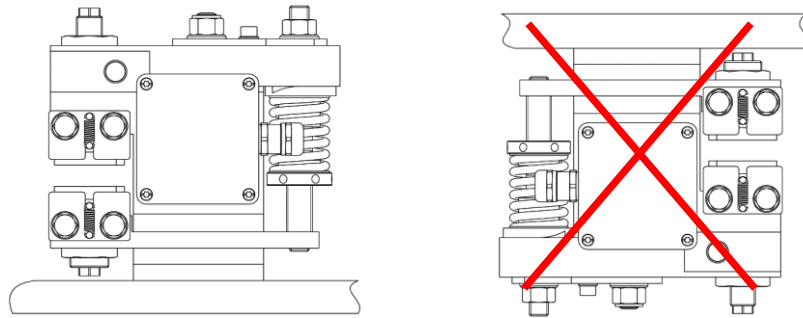



Fig. 4.1

	<p><b>Attention!</b></p> <p>To switch the brake without brake disc is only allowed if the assembly locking nut Pos. 25 in Fig. 5.1 remains on the brake and is loosened not more than 4 mm.</p>
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## 5. Condition as delivered

The brake is tested prior to delivery. The braking force is adjusted to the maximum braking force. The compression spring for the clamping force is fixed in the open position by the assembly locking nut Pos. 25 in Fig. 5.1, to assemble the brake to the disk without supply voltage.

For operation, the mounting lock nut must be removed and the exact air gap has to be adjusted (see section 8.3).

Table 5.1

Size	018	024	028	038
Assembly locking nut	M12	M12	M12	M20

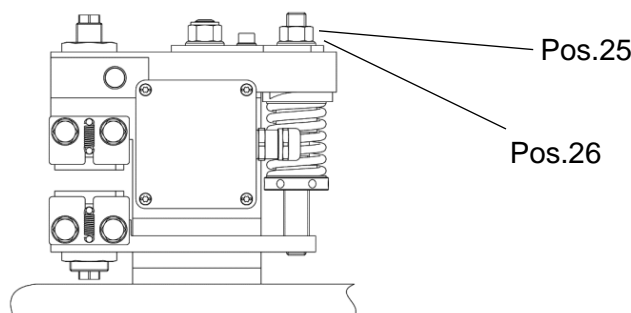


Fig. 5.1

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## 6. Handling and storage

The weight of the brake depends on the size, between 6,5kg and 50kg, see also chapter 2.4. The brake is delivered with anti-corrosion protection and can be stored in an enclosed, dry space for up to 12 months. It is important to prevent condensation from forming. Moist storage areas are unsuitable.

## 7. Technical prerequisite for reliable operation

Mounting the brake to stable, low-vibration machine components ensures low-screech, low-noise braking. To protect the brake electronics, the installation of surge protector is mandatory.

These surge protectors (per phase one) must be connected between the customer's switching relay and the brake electronics. In this case, the surge protector of L1 and L2 is switched to N or PE in order to derive mains disturbances.

For 230 / 400V electric grids e.g., surge protection switches of the brand "Bourns 1250-xS-230" can be used.

In 480V mains surge protectors type "Bourns 1250-2S-400" can be used.



### Attention!

The connection and all work on the brake must be completed by qualified and instructed personnel!

## 8. Installation the RINGSPANN brake

### 8.1 General instructions for assembly and installation

Before installing the brake, the brake disc must be cleaned with alcohol, e.g. ethyl or isopropyl alcohol or a water-based surfactant solution (soapy water, etc.) and then rubbed dry with a clean cloth.

When cleaning the brake disc with a thinner, acetone or a brake cleaning agent, it is important to ensure that neither these cleaners nor any cleaner residues come in contact with the brake pads. This is especially important in the case of brakes used only as parking brakes, as no dynamic braking operations take place during which thinner residues would be rubbed off the brake disc.




### Attention!

Oil and rust-proofing-agent residues reduced friction coefficient and thus diminish transmissible braking torque substantially!

### 8.2 Assembly and installation

Prior to installation, check to ensure that the mounting surface is even and planned run between the brake disc and the mounting surface is within the tolerance range of 0.2 mm.

Check the axial movement of the brake disc. Axial movement must not exceed  $\pm 0.2$  mm. Maximum permissible lateral brake disc wobble is 0.1 mm. Greater wobble may cause rattling and shaking of the brake unit.

	<p><b>Attention!</b></p> <p>Check to ensure that the brake disc rotates freely.</p>
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### 8.3 Setting/ adjusting the brake pad gap

The brake is delivered with a distance between the friction pads of 13,1 or 25,6 mm. You can adjust the distance between the friction pads with the setting screw Pos. 17 and Pos. 41 (see Fig. 8.1 or Fig. 8.2). The adjustment of the air gap between the friction pads and the brake disc is the same as the adjustment of the brake disc thickness. You can adjust the air gap with the setting screw Pos. 17 and Pos. 41 (see Fig. 8.1 or Fig. 8.2). The air gap between the friction pad and the brake disc should be **0,3 mm**. A bigger air gap reduces the braking force!

During installation, ensure that the brake pads are centered and in full contact with the surface of the brake disc. For the distance X and Z see table 8.1 or 8.2. See also Fig. 8.1 or 8.2..

The brake can be hold in position with a lifting belt for the multiple installation positions.

Table 8.1

Type	EV 018..	EV 024..	EV 028..	EV 038..
Distance X	48 mm	64,5mm	79 mm	103 mm
Distance Z	24,5 mm	19 mm	20 mm	27 mm
Rubbing surface Y	42 mm	47 mm	62 mm	72 mm

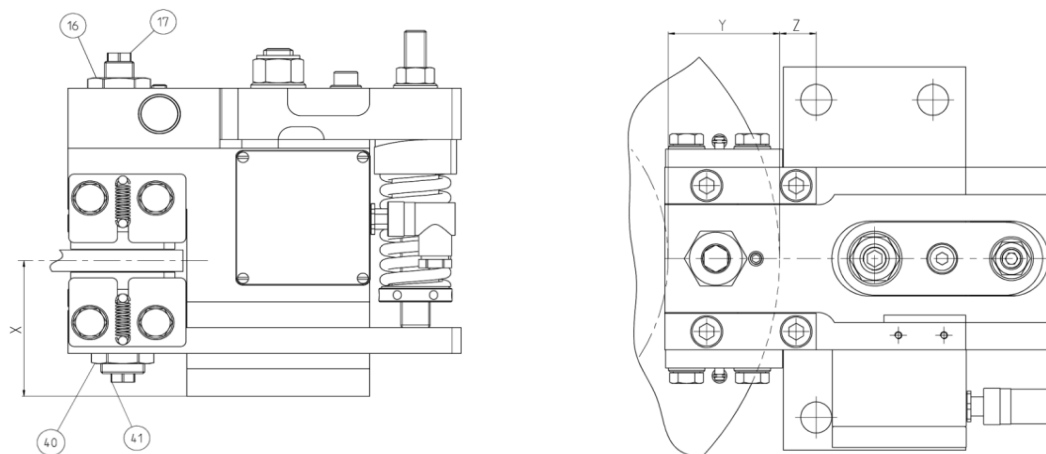


Fig. 8.1 EV..

Table 8.2

Type	EH 018..	EH 024..	EH 028..	EH 038..
Distance X	60,5 mm	84,5 mm	99 mm	126 mm
Distance Z	24,5 mm	19 mm	22 mm	29,5 mm
Rubbing surface Y	42 mm	47 mm	62 mm	72 mm

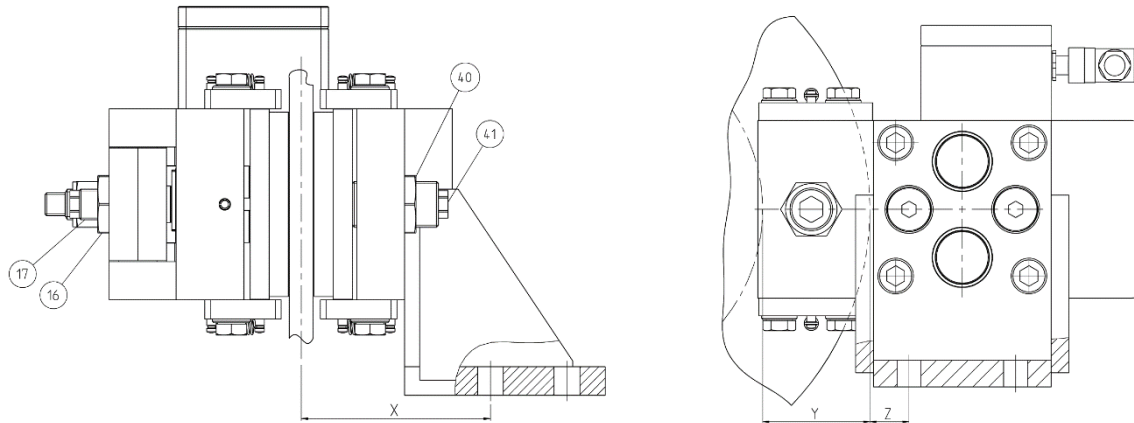


Fig. 8.2 EH..

The brake is attached with 4 screws. The tightening torques refers to screws lubricated with Molycote MoS<sub>2</sub>. So the screws must be lubricated with Molycote MoS<sub>2</sub>.

Table 8.3

Size	EV/EH 018	EV/EH024 / EH028	EV028 / EH038	EV038
Screw size	M10-10.9	M12-10.9	M16-10.9	M20-10.9
Tightening torque (lubricated with MoS <sub>2</sub> )	63 Nm	108 Nm	264 Nm	517 Nm



**Information!**

To facilitate installation, you may fix the brake in position initially with a single screw before swinging it to the point at which the other screws can be inserted as well.



**Attention!**

The air gap between brake pad and brake disc is to be adjusted after the first installation and after replacement of brake pads.

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After the Adjustment of the air gap the setting screw Pos. 17 and Pos. 41 must be fixed with the nut Pos. 16 and Pos. 40, see Fig. 8.1 or Fig. 8.2.

#### 8.4 Electrical connection



##### **Attention!**

To protect the brake electronics, the installation of surge arresters is mandatory to control the overvoltage. These surge arresters must be connected between the customer's switching relay and the brake electronics.



##### **Attention!**

To protect the electronic against too fast switching, a security feature is integrated in the electronic. The security feature locks the supply voltage and the brake cannot be opened. After 40 s the electronic will pass the supply voltage and after a further activation the brake will open.



##### **Attention!**

Only trained electrician are allowed to connect the brake with the supply voltage. The trained electrician must be familiar with the relevant standards (e.g. in Germany DIN VDE 0113).



##### **Attention!**

To use the brake the electronic Pos. 34 (included in the scope of delivery) is mandatory. Do not connect the brake directly to the supply voltage. To switch the brake without brake disk is only allowed if the assembly locking nut Pos. 25 in Fig. 5.1 remains on the brake and is loosened not more than 4 mm.



##### **Attention!**

For higher operating cycles (> 100 / h), the brake can heat up to 65 ° C.


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The following rules must be observed:

- a) It is not allowed to use coiled cables in the supply line. (e.g. cable drum, reserve cable loops or the like)
  - b) For safe operation of the brake a sufficient grid quality is necessary. See also the standards of grid quality.
  - c) Before replacing the electronic, check the coil of the solenoid to be sure that the coil is not damaged. Please consult RINGSPANN.
- Cable bushing or plug is in the scope of delivery.
  - The brake can only be used with 50Hz or 60Hz, single phase, no adjustment is necessary.
  - Only electrical cables with Cu conductors are to be used to connect to the electronics.
  - Strip length for the conductors used with the WAGO connector is 9...10 mm.
  - The cable shall be selected according to the Canadian Electrical Code, part 1 or National Electrical Code (NEC).

#### Brake size 018

For the size 018 the electronic is not attached to the brake, the separate electronic module is to be used.



**Attention – Size 018!**

Do **not** disconnect the cable between the brake and the electronic while the brake is under voltage, **this will destroy the solenoid!** (see Fig. 8.3).

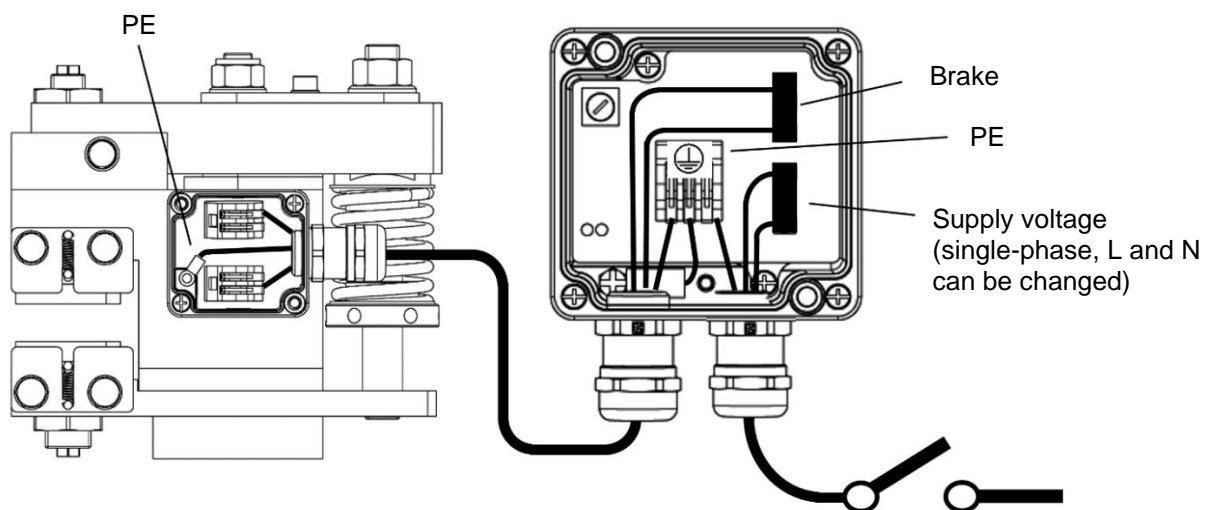


Fig. 8.3

<b>RINGSPANN</b>	<b>Installation and Operating Instructions for Brake EV/EH 018/024/028/038 FEM, Spring activated - electromagnetically released</b>			<b>E 09.769e</b>
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Strip length for the conductors used with the WAGO connector is 9...10 mm.

The brake can only be used with 50 Hz or 60 Hz, no adjustment is necessary.

The cable shall be selected according to the Canadian Electrical Code, part 1 or National Electrical Code.

Supply voltage: - Operating voltage (single phase) is marked on the nameplate.

Line protection: - 10 A type B or 6 A type C; **protection must be ensured by the user!**

Supply cable: - 1...1,5 mm<sup>2</sup> flexible.  
- Only Cu conductors shall be used (max. length: 50 m).  
- L and N can be swapped.  
- Do not lay the supply cable together with supply cable from electrical motors in one cable duct.  
- Use surge protectors!  
- Cable length between electronic and brake not longer than 5 m.

Cable entry: - 5...10 mm (cable gland; cCSAus); 8...10 mm (plug).

PE / grounding: - 1...1,5 mm<sup>2</sup>, connected via cable lugs to the electronic box and splicing connector (see picture above).

Switching function: directly on the operating voltage, between electronics and supply voltage, double pole switching! Max. Inrush current 6 A rms (15 A peak) for 0,2 s, then smaller 0,6 A (rms). After the electrical connection you must check the protective earth conductor function (according to DIN VDE 0113 or EN 60204).

#### Brake size 024, 028 and 038:

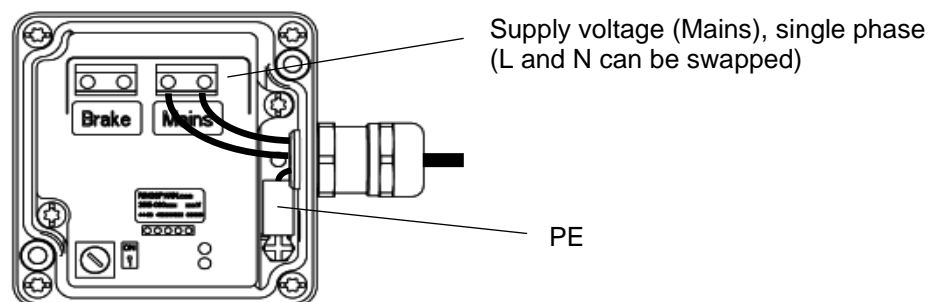


Fig. 8.4

The brake can only be used with 50Hz or 60Hz, no adjustment is necessary.

The cable shall be selected according to the Canadian Electrical Code, part 1 or National Electrical Code.



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- Supply voltage: - Operating voltage (single phase) is printed on the nameplate.
- Line protection: - 10 A type B or 6 A type C; **protection must be ensured by the user!**
- Supply cable: - 1...1,5 mm<sup>2</sup> flexible.  
- Only Cu-conductors shall be used (max. length: 50 m).  
- L and N can be swapped.  
- Do not lay the supply cable together with supply cable from electrical motors in one cable duct.  
- Use surge protectors!
- Cable entry: - 5...10 mm (cable gland; cCSAus); 8...10 mm (plug).
- PE / grounding: - 1...1,5 mm<sup>2</sup>, connected via cable lugs to the electronic box.

Switching function: directly on the operating voltage, between electronics and supply voltage, double pole switching! Max. Inrush current 15 A rms (24 A peak) for 0,2s, then smaller 1 A (rms). After the electrical connection you must check the protective earth conductor function (according to DIN VDE 0113 or EN 60204).

### 8.5 Braking force adjustment

The entire surface of both brake pads must be in contact with the brake disc to achieve the optimum braking effect. The brake pads must be heated briefly to approx. 200°C. Therefore, multiple brief braking operations under low spring force and rotating brake disc are required to heat the brake pads.



#### Attention!

If the brake is used as holding / parking brake, the braking torques specified cannot be achieved. Reductions of up to 50% of the braking torques are possible.



#### Attention!

If the grub screw pos. 44 is provided with sealing wax at the factory, the clamping force on the brake cannot be adjusted by the customer!



#### Attention!

If the brake cannot be run in, the braking torques listed in our catalogue or data sheets cannot be achieved. Reductions of up to 50% are possible.

The braking force is adjusted to the maximum braking force. If the braking force should be reduced, the clamping force can be reduced by reducing the pretension of the spring. Therefore, you must loosen the threaded pin Pos. 44 of the spring compression nut Pos. 43.

With the spring compression nut you can adjust the distance S (see Fig. 8.5) according to the values in table 8.4. If you reduce the clamping force the reaction time of the brake will increase. After the adjustment, lock the spring compression nut with the threaded pin.

Table 8.4

	EV / EH 018	EV / EH 024	EV / EH 028	EV / EH 038
Nominal clamping force (100%) [N]	3.200	5.000	10.000	20.000
<sup>1)</sup> Braking force [N]	2.560	4.000	8.000	16.000
Friction diameter [mm] $D_R =$	$D_A - 46$	$D_A - 51$	$D_A - 66$	$D_A - 76$
<sup>1)2)</sup> Braking torque [Nm] at $D_A = 200$	200	-	-	-
$D_A = 250$	260	400	-	-
$D_A = 300$	330	500	940	-
$D_A = 355$	400	610	1.160	-
$D_A = 430$	490	760	1.460	2.830
$D_A = 520$	610	940	1.820	3.550
$D_A = 630$	750	1.160	2.260	4.430
$D_A = 710$	850	1.320	2.580	5.070
Clamping force, adjustable [%]	50-100	50-100	60-100	60-100
Loss in Braking Force per mm spring preload reduction [N]	75	165	250	400
<sup>3)</sup> Distance S (Fig. 8.5) [mm]	25	28,5	17,5	31

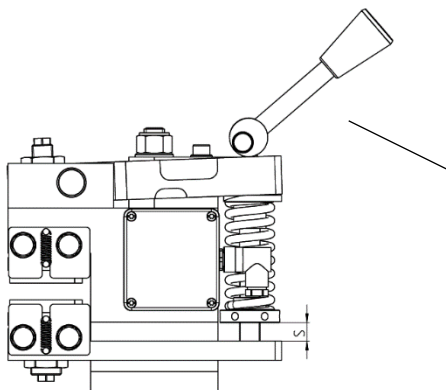
<sup>1)</sup> Braking force and braking torque is calculated with a theoretical friction coefficient of 0,4 and 100% clamping force.

<sup>2)</sup>  $D_A$  = Outer diameter of the brake disc in mm.

<sup>3)</sup> With the distance "S" 100% of clamping force is achieved. Attention: Mechanical wear and noises are increasing when the clamping force is reduced!

## 8.6 Manual brake release

For manual brake release you can use the assembly locking nut Pos. 25 and washer Pos. 26 see Fig. 5.1. To open the brake screw on the nut.



A hand release lever is optionally available for controlled manual opening of the brake. To facilitate assembly, the handle can be screwed out of the eccentric; for safe operation, the hand release lever must be removed again.

Size 018-028: 4453-000002-000000

Size 038: 4453-000003-000000

Fig. 8.5

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### Attention!

If the brake is to be released manually at regular intervals, use the hand release lever. If the brake is to be released manually using the assembly lock nut (item 25, Figure 5.1), the brake should first be released electrically and the nut then tightened by hand. If the nut is used to release the brake against the spring force, abrasion particles can be produced which can get stuck in the thread and damage the guide rod (pos. 47, Fig. 2.1).

## 9. Start-up



### Attention!

To switch the brake without brake disc is only allowed if the assembly locking nut Pos. 25 in Fig. 5.1 remains on the brake and is loosened not more than 4 mm.

Before commissioning you must switch on the electric current (the solenoid holds the brake open) and the assembly locking nut Pos. 25, Fig. 5.1 is to be removed. The brake is now ready for operation.

## 10. Disassembling the brake



### Life-threatening danger!

**When disassembling the brake it is essential to ensure that the entire drive train is secured against inadvertent activation. Rotating components can cause severe injuries. Therefore, rotating components (e.g. brake discs) must be secured against accidental contact. To prevent injuries to personnel, secure the brake with the aid of an assembly locking device.**



### Attention – Size 018!

Do not remove the cables between the brake and the electronics as long as the brake is energized, this will destroy the magnet! (see figure 8.3).

Secure the open position with the assembly locking nut Pos. 25 and washer Pos. 26 in Fig. 5.1. Therefore, you must switch on the electric current. After the brake is secured with the assembly locking nut in open position switch off the electric current.

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**Attention!**

Ensure that the brake is de-energized and secure the brake for disassembly.

## 11. Maintenance

### 11.1 General maintenance

Maintenance must be performed on the brake at intervals of 4 weeks up to once a year, depending upon the operating load.

Perform the following checks during every maintenance operation:

- Check brake pads for wear.
- Check the air gap between the brake pad and the brake disk.
- Check the bolt connection between the brake pad and the machine component as well as the bolt connections for the retaining plates for tightness.
- Check the electric supply cables (sight check)

### 11.2 Permissible brake pad wear and replacement of the brake pads

Brake pad wear adjustment:

Before adjusting the brake pads, ensure that the mass held by the brake is secured to prevent movement, as parts of the brake must be loosened/removed for replacement.

To counter brake pad wear you can adjust the distance between brake pad and brake disc with set screws Pos. 41 and Pos. 17 (see Fig. 8.1 or 8.2). Before adjusting the brake pads switch on the power supply (the solenoid opens the brake) and secure the brake with the assembly locking nut Pos. 25 and washer Pos.26 (see Fig. 5.1) by hand.

The gap between brake disc and brake pad on each side should be 0,3 mm. The maximum allowable distance between brake disc and brake pad without adjustment is 0,5 mm. A greater gap will reduce braking force up to a complete loss of braking force.

Consider the maximum permissible wear of the brake pads in table 11.1. After the adjustment of the gap between brake disc and brake pad, lock the set screw Pos. 41 and Pos. 17 with the locking nut Pos. 16 and Pos. 40 (see Fig. 8.1 or 8.2). Remove the assembly locking nut Pos. 25, Fig. 5.1 The brake is now ready for operation again.



**Life-threatening danger!**

**Brake pads may be replaced only when the equipment system and/or the working machine is at a complete standstill!**



**Attention!**

Brake pads must not be worn to a residual thickness (mounting plate thickness plus remaining pad material). Brake pads must always be replaced in pairs.

Only original RINGSPANN brake pads may be used.



**Attention!**

The gap between brake disc and brake pad on each side should be 0,3 mm. A greater gap will reduce braking force. The maximum allowable distance between brake disc and brake pad without adjustment is 0,5 mm (size 018 0,3mm). A greater gap will reduce braking force up to a complete loss of braking force. Consider the maximum permissible wear of the brake pads (see table 11.1).

Permissible pad wear:

Table 11.1

<b>Size 018</b>	Residual thickness <sup>1)</sup>
Brake disc thickness from 8 ... 11 mm and 16 ... 17 mm	9 mm
Brake disc thickness from > 11 ... 15 mm and >17 ... 20 mm	7 mm
<b>Size 024</b>	Residual thickness <sup>1)</sup>
Brake disc thickness 10 mm and 18 ... 19 mm	13 mm
Brake disc thickness from > 10 ... 16 mm and >19 ... 26 mm	11 mm
<b>Size 028</b>	Residual thickness <sup>1)</sup>
Brake disc thickness 10 mm and 18 ... 19 mm	17 mm
Brake disc thickness from > 10 ... 16 mm and >19 ... 26 mm	13 mm
<b>Size 038</b>	Residual thickness <sup>1)</sup>
Brake disc thickness from 22 ... 23 mm	17 mm
Brake disc thickness from 12,5 ... 20 mm and >23 ... 30 mm	15 mm

<sup>1)</sup> Residual thickness = backplate of the brake pad + residual brake pad

Brake pad replacement:

Before replacing the brake pads Pos. 1, ensure that the mass held by the brake is secured to prevent movement, as parts of the brake must be loosened/removed for replacement. Before replacing the brake pads switch on the power supply (the solenoid opens the brake) and secure the brake with the assembly locking nut Pos. 25 and washer Pos.26 (see Fig. 5.1) by hand.

Switch off the electric current, remove all tension springs Pos.5 and one of two retaining plates Pos. 6 each side, see Fig. 11.1

Pull out the old brake pads and screw out the set screws pos. 17 and pos. 41 and Pos. 41, Fig. 8.1 or 8.2, so that the new brake pads can easily inserted. Take care, that the chamfer on the brake pad is on the outer diameter of the brake disc and the friction material of the brake pad is on the brake disc side.

Reattach both retaining plates pos. 6 to the brake housing. Refer to table 11.2 for the tightening torque for the screws pos. 8. The screws must be secured with Loctite 243.

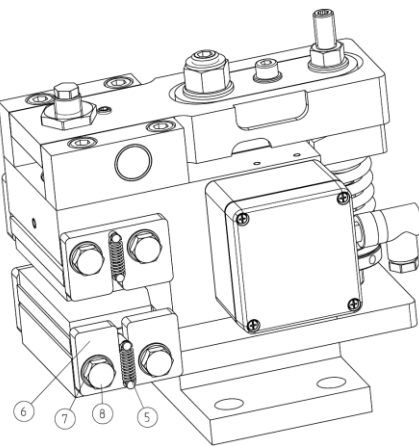


Fig. 11.1

Table 11.2

	<b>Size 018</b>	<b>Size 024</b>	<b>Size 028</b>	<b>Size 038</b>
Screw	M6-8.8	M8-8.8	M10-8.8	M12-8.8
Tightening torques <sup>1)</sup>	11 Nm	27 Nm	54 Nm	93 Nm


1) Screw secured with Loctite 243.


After replacing the brake pads, the air gap between the brake pad and brake disk must be adjusted (see section 11.2 "Friction pad adjustment").

The new brake pads must now be run in by braking briefly several times to ensure full contact with the brake disk and achieve the full braking performance (see the notes in chapter 8.5).

## 12. Options

Mounting and connection of inductive sensors for operating status and wear monitoring

	<p><b>Danger to life and limb!</b></p> <p><b>The inductive proximity switch may be installed and/or replaced only when the equipment system and/or working machine is at a complete standstill!</b></p>
---	---

	<p><b>Danger!</b></p> <p>When switching the brake, the lever Pos. 29 and the spring compressor Pos. 27 will move very fast.</p>
---	---

The inductive proximity switch can only be mounted and adjusted after the brake has been mounted and adjusted (chapter 8 and 9).

To indicate „Brake open“, „Brake closed“ or “Brake pad adjustment necessary” an inductive proximity switch for each request is to assemble. The inductive proximity switch is part of a sensor kit and supplied loose as accessory. The sensor kit consists of an inductive proximity switch with two fastening nuts, a sensor plate, fastening screws and washers to assemble the sensor plate to the brake housing..

On the brake housing you can find two threads to fasten the sensor plate (see Fig. 12.1). On the sensor plate you have different assembling possibilities for “Brake open”, “Brake closed” and “Brake pad wear adjustment necessary” (see Tab. 12.1). You always get one signal for brake status per sensor. To monitor multiple operating states, sensors can be combined (see Figure 12.2 to Figure 12.4).

The appropriate sensor kits for the individual operating states are listed in Table 12.1. An additional sensor is required for further monitoring. For sensor kits with more than one sensor or for special requirements, such as other voltage ranges or low temperatures below -25°C, please contact RINGSPANN.

Sensor kits:

Table 12.1

size 018	Brake open (NC) 3500-112005-000000	Brake closed (NO) 3500-112004-000000	Adjust brake pad wear (NO) 3500-112004-000000
size 024	Brake open (NC) 3500-112005-000000	Brake closed (NO) 3500-112004-000000	Adjust brake pad wear (NO) 3500-112004-000000
size 028	Brake open (NO) 3500-112002-000000	Brake closed (NO) 3500-112002-000000	Adjust brake pad wear (NO) 3500-112002-000000
size 038	Brake open (NO) 3500-112003-000000	Brake closed (NO) 3500-112003-000000	Adjust brake pad wear (NO) 3500-112003-000000

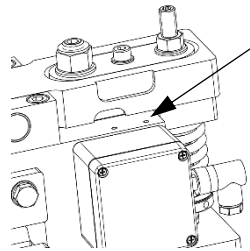


Fig. 12.1

To adjust the inductive proximity switch for brake pad wear, you can increase the airgap between brake disc and brake pad on each side to a value of 0,6mm. Then switch off the brake (brake is closed). Then fasten the inductive proximity switch in a way that the LED is almost glowing. Then reduce the airgap to 0,3mm again. Switch on the brake, the LED must not glow after the brake is in open position. Test the proper function by switching the brake. The LED of the proximity switch must glow, if the brake status you want to detect is reached.

Brake status indication size 018 and 024:

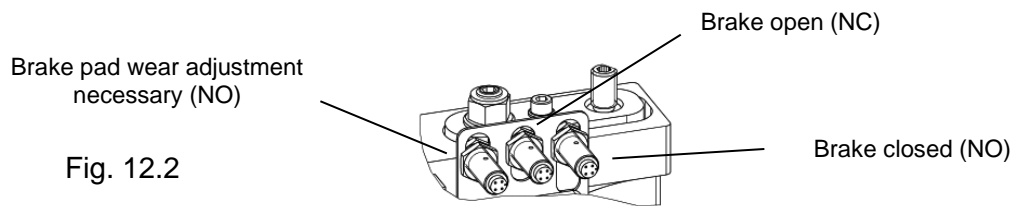


Fig. 12.2

Brake status indication size 028:

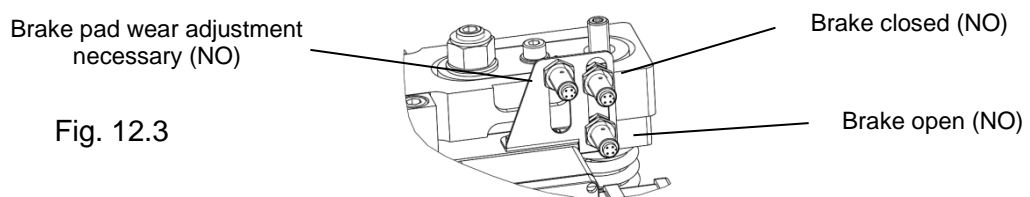


Fig. 12.3

Brake status indication size 038:

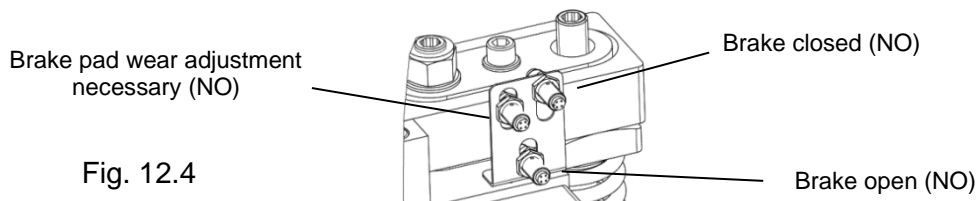


Fig. 12.4

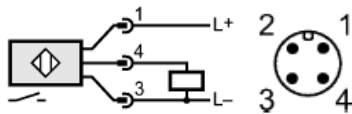


Technical details of the inductive proximity switch (optinal):

For inductive proximity switch 3504-000070-000000:

Switching function	: <b>PNP (Closer, NO)</b>	Sensing range	: 4 mm, non-flush
Operating voltage	: 10....36 V DC	Current rating	: 150 mA
Current consumption	: < or = 15 mA	Voltage drop	: < 2,5 V
Polarity protect	: yes	Status indication LED	: yellow
Housing	: brass, coated	Protection	: IP 67
Connection	: M12 connector	Ambient temperature:	-25°C to +80°C
Short-circuit protection	: yes, pulsed		

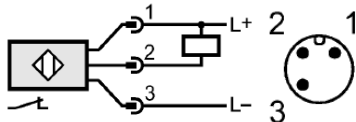
Wiring



For inductive proximity switch 3504-000071-000000:

Switching function	: <b>NPN (Opener, NC)</b>	Sensing range	: 4 mm, flush
Operating voltage	: 10....30 V DC	Current rating	: 100 mA
Current consumption	: < or = 10 mA	Voltage drop	: < 2,5 V
Polarity protect	: yes	Status indication LED	: yellow
Housing	: brass, coated	Protection	: IP 68
Connection	: M12 connector	Ambient temperature	: -40°C to +85°C
Short-circuit protection	: yes, snapping		

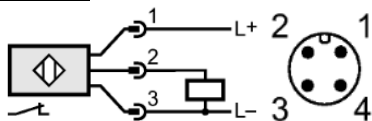
Wiring



For inductive proximity switch 3504-000099-000000 (Special):

Switching function	: <b>PNP (Opener, NC)</b>	Sensing range	: 4 mm, non- flush
Operating voltage	: 10....36 V DC	Current rating	: 150 mA
Current consumption	: < or = 15 mA	Voltage drop	: < 2,5 V
Polarity protect	: yes	Status indication LED	: yellow
Housing	: brass, coated	Protection	: IP 67
Connection	: M12 connector	Ambient temperature	: -25°C to+80°C
Short-circuit protection	: yes, pulsed		

Wiring:

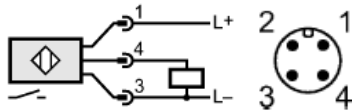


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For inductive proximity switch 3504-000100-000000 (Special):

Switching function	: <b>PNP (Closer, NO)</b>	Sensing range	: 4 mm, non-flush
Operating voltage	: 9...32 V DC	Current rating	: 150 mA
Current consumption	: < or = 15 mA	Voltage drop	: < 2,5 V
Polarity protect	: yes	Status indication LED	: yellow
Housing	: brass, coated	Protection	: IP 67
Connection	: M12 connector	Ambient temperature	: -40°C bis +80°C
Short-circuit protection	: yes, pulsed		

Wiring:



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### 13. EC-Declaration of Conformity

Note regarding EMC Directive 2014/30/EU

The brake is an uncritical equipment according to the EMC-Directive because of its passive operation. The brake can not be operated independently. After integration into a complete system, the brake can be evaluated according to EMC-Directive. To comply with DIN EN 61000-6-4, the mounting of a line filter (up to 250VAC = 3515-090001-000000, from 3515-190001-000000) is required as a general rule.

Note regarding EC-Machinery Directive 2006/42/EC

The product is a component for installation in a machine according to the EC-Machinery Directive 2006/42/EC. Together with other components, the product can meet safety-related applications. The necessary measures will emerge from the risk analysis of the machine. Built-in, the brake is part of the machine and the machine manufacturer assesses the conformity of the safety device on the Machinery Directive. The commissioning of the brake is only permitted if the machine fulfills the Machine Directive.

Note regarding REACH Directive No. 1907/2006

The brake is considered as a "product" and not as a "substance", and as such are not subjected to registration.

## EC-Declaration of Conformity

For the purpose of EC-Low voltage directive 2014/35/EU

We hereby declare that the following products, developed, designed and manufactured by our own responsibility, are in accordance with the EC-Low voltage directive 2014/35 / EU

RINGSPANN GmbH  
Schaberweg 30-38  
D-61348 Bad Homburg

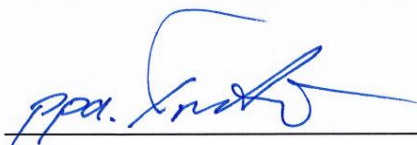
Product: Electromagnetic released, spring activated disc brake  
Designation: EV/EH..FEM  
Sizes: 018/024/028/038  
Types: 4453-xxxxxx-xxxxxx

Following standards and directives have been applied and complied with:

2014/35/EU	Low-Voltage Directive
DIN EN 61000-6-2	EMC – Immunity to interference in industrial areas
DIN EN 61000-6-4	EMC – Emission standard for industrial areas (with RFI filter)
2011/65/EU	RoHS Directive
1907/2006	REACH
CSA C22.2 No. 14-13	Industrial Control Equipment (cCSAus type)
UL 508	Industrial Control Equipment (cCSAus type)

The commissioning of the brake is only permitted when the machine complies with the EC-Machinery Directive 2006/42 / EC.

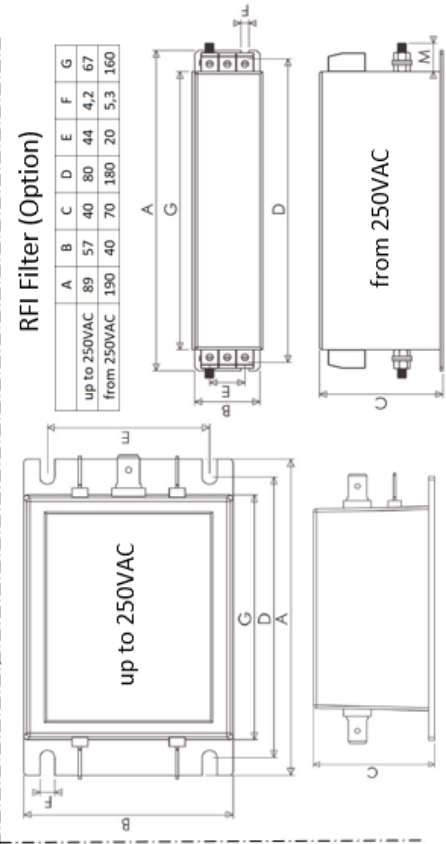
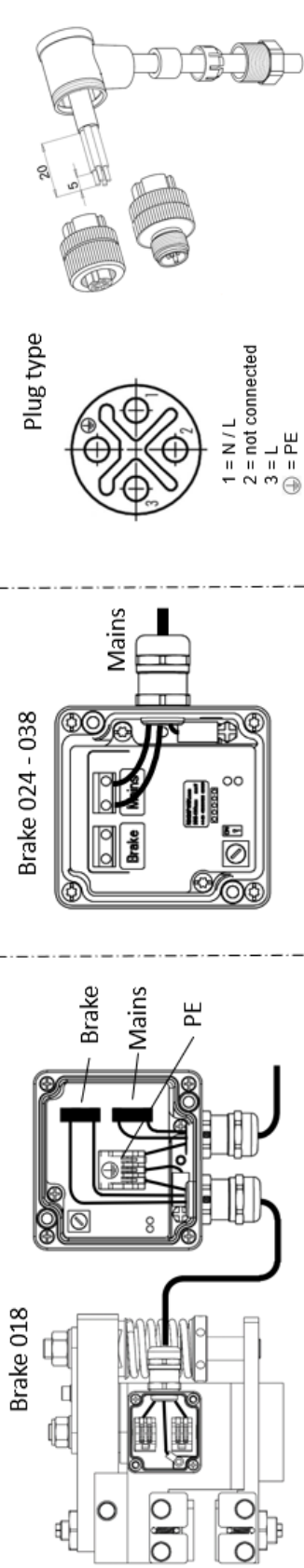
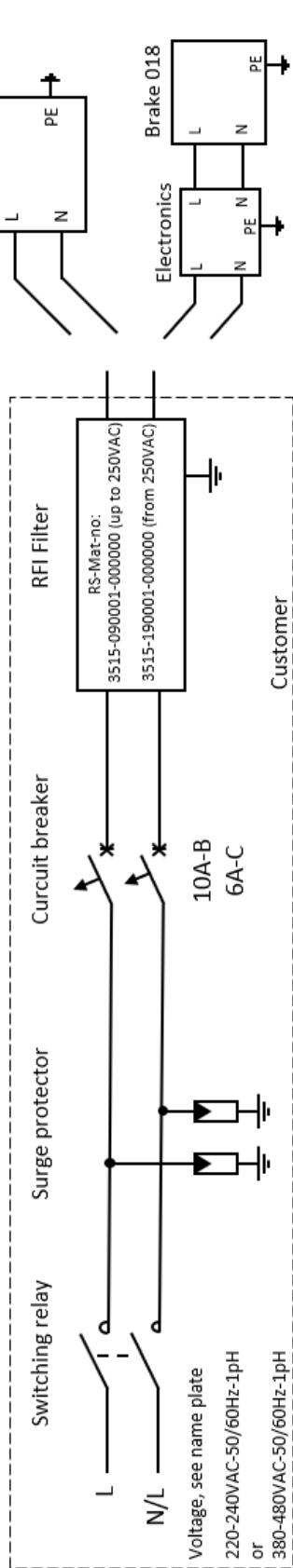
ppa. Ernst Fritzemeier  
RINGSPANN GmbH  
Schaberweg 30-38  
D-61348 Bad Homburg



Bad Homburg, 17.06.2020

**14. Electrical Connection, Drawing No. 4453-000001**

**Electrical Connection, Drawing No. 4453-000001**



- N and L can be exchanged, PE is screwed to the electronics box, resp. connect with the WAGO connector or the plug
- Cable diameter: cable gland = 5 – 10mm ; plug type = 8-10mm.
- Conductor cross section: 1 – 1,5mm<sup>2</sup> (AWG 18 - 16), fine wire strands.
- cCSAus-Type: The cables must be selected in accordance with the Canadian Electrical Code-Part 1, or the National Electrical Code (NEC). Only Cu cables may be used.
- See also chapter "8.4 Electrical connection" in the installation and operating instructions.