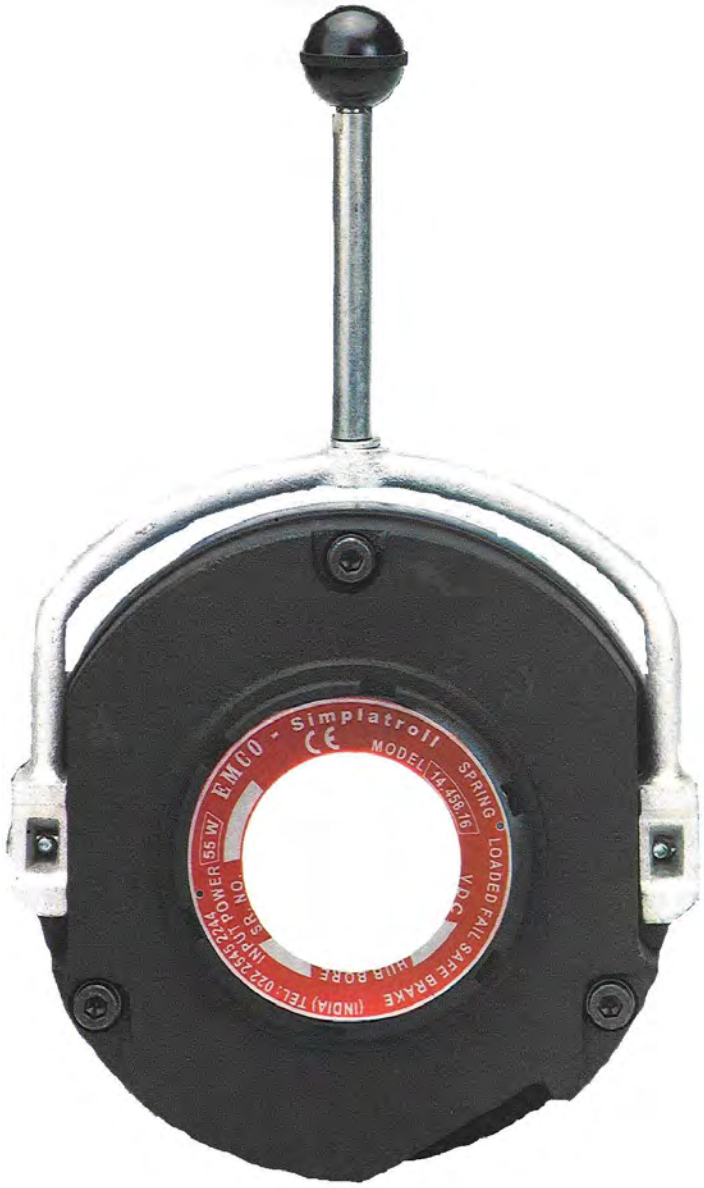
Emco Dynatorq Pvt. Ltd.
(Formerly Emco Lenze Pvt. Ltd.)

Operating, Installation & Servicing Instructions Manual



EMCO – Simplatroll DC Spring Applied Brake Type: - 14.458. [ ]

Contents

PREFACE AND GENERAL INFORMATION

1 Preface and general information

1.1 How to use these operating instructions

- These operating instructions are intended for safety-relevant operations on and with the spring-applied brake with electromagnetic release. They contain safety instructions which must be observed.
- All personnel working on and with the spring-applied brake with electromagnetic release must have the operating instructions available and observe the information and notes relevant for them.
- The operating instructions must always be complete and perfectly readable.

1.1.1 Terminology used

Brake
For “Spring-Applied Brake with electromagnetic release” the term “Spring-Applied Brake” will be used in the following text.

Drive system
For drive systems with spring-applied brake with electromagnetic release and other drive components the term “Drive system” will be used in following text.

1.2 Scope of delivery

- The drive systems are combined individually according to a modular design. The scope of delivery can be obtained form the relevant papers.
- After receipt of the delivery, check immediately whether it corresponds to the accompanying papers. Emco Dynatorq does not grant any warranty for subsequent claims. Please inform

  - Visible transport damage immediately to the forwarder.
  - Visible deficiencies /incompleteness immediately to the responsible Emco-Dynatorq engineer / agency.

1.3 Emco Dynatorq DC spring applied fail safe brake

1.3.1 Manufacturer

Regd. & Marketing office:

EMCO DYNATORQ PVT. LTD.
1ST Floor, Sita Mauli,
above Bank of Maharashtra
Panch Pakhadi, Thane (W)-400 602
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Fax: 022-25452233
E-mail: mktg@emco-dynatorq.in
Website: www.emco-dynatorq.in

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Shivam Industrial Estate, Bldg. No. 3,
Gala No. 12A & 12B Tungareshwar Phata Road,
Sativali, Vasai (E), Thane – 401208
Phone : (0) 250 - 2480489 / 2480490
Fax: (0) 250 – 2481086
E-mail : vasai@emco-dynatorq.in

UNIT – II

1002 – 1003, GIDC Estate, Waghodia,
Dist. Baroda – 391760, Gujarat
Phone : (0) 2668 – 262186 / 263089 / 262187
Fax: (0) 2668 – 262180
E-mail: dynatorq@gmail.com

UNIT – III

Gala No. 6A & 8,
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Sativali, Vasai (E)
Phone : (0) 250 – 2480178 / 2480921

UNIT – IV

Plot No. 1426,
GIDC Estate, Waghodia,
Dist. Baroda – 391760, Gujarat
Phone : (0) 2668 – 290761

1.3.2 Packaging Sticker

1. Manufacturer
2. Name of the item
3. Name of customer
4. Type (see type code)
5. Brake Size
6. Rated voltage
7. Bore of Hub
8. Serial number

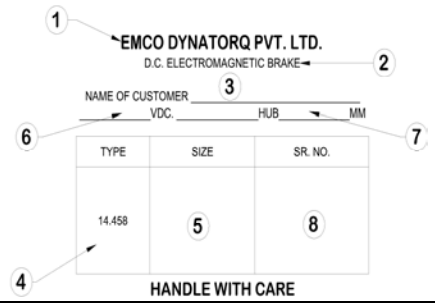


Fig.1: Packaging sticker

1.3.3 Nameplate

1. Manufacturer
2. Type (see Type Code)
3. Rated voltage
4. Bore Hub
5. Serial Number

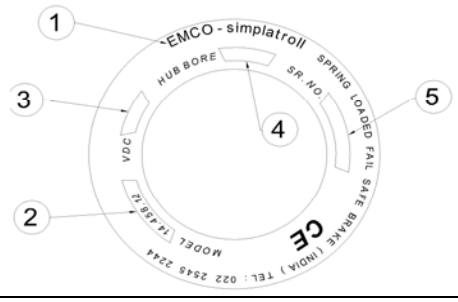


Fig.2: Name plate

1.3.4 Type code (for complete brake assembly only)

1. Type:14.458
2. Size: 06/08/10/12/ 14/16/18/20/23/25/31
3. Rated voltage
4. Bore of hub

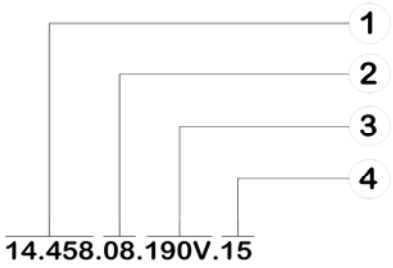


Fig.3: Type code

1.3.5 Application as directed

- Emco- Dynatorq fail safe spring applied brake
  - Are intended for use in machinery and system.
  - Must only be used for the purpose ordered and confirmed.
  - Must only be operated under the ambient conditions prescribed in these Operating instructions.
  - Must not be operated beyond their corresponding power limit.

Any other use shall be deemed inappropriate!

1.3.6 Legal regulations

Liability

- The information, data's and notes in these operating instructions met the state of the art at the time of printing, claims referring to drive systems which have already been supplied cannot be derived from the information, illustrations and descriptions.
- We do not accept any liability for damage or operating interference caused by:
  - inappropriate use
  - unauthorized modifications to the drive system
  - improper working on and with drive system
  - operating faults
  - disregarding these Operating instructions

Warranty

- Conditions of warranty: see General terms & conditions of sale of Emco Dynatorq Pvt. Ltd.
- Warranty claims must be made immediately after detecting defects or faults.
- The warranty is void where liability claims cannot also be made.

2 Safety information

2.1 Personnel responsible for safety

Operator

- An operator is any natural or legal person who uses the drive system or on behalf of whom the drive system is used.
- The operator or his safety officer must ensure
  that all relevant regulations, instructions and legislation are observed.
  that only qualified personnel work with and on the drive system.
  that the personnel have the operating instructions available for corresponding operations.
  that non-qualified personnel are prohibited from working with and on the drive system.

Skilled personnel

Skilled personnel are persons who- because of their education, experience, instructions and knowledge about corresponding standards and regulations, rules for the prevention of accidents and operating conditions are authorized by the person responsible for the safety of the plant to perform the required actions and who are able to recognize potential hazards.

2.2 General safety information

- This safety information is not claimed to be complete. In case of questions and problems please contact your Emco Dynatorq representative.
- At the time of delivery spring-applied brake meets the state of the art and ensures basically safe operation.
- The spring-applied brakes is a source of danger for persons, for the spring applied brakes itself, and for other material assets of the operator, if
  - Unqualified personnel work with and on the spring –applied brakes.
  - The spring-applied brakes are used inappropriately.
- The spring-applied brake must be & Place such that they perform their functions after proper installation and with application as directed for fault free operation and that they do not cause hazards for person. This also applies for their interaction with the complete system.
- Operate the spring-applied brake only when it is in a proper state.
- Retro fittings, modifications; or redesigns of the spring –applied brake are basically prohibited. Emco Dynatorq must be contacted in all cases for advice.
- Protect the mounting flange, friction surfaces and armature against dirt. They must be kept free from oil and grease in all circumstances. Even small dirt particles can considerably reduce the brake torque & its performance.
- Application conditions suitability of the spring-applied brake 14.458
- Not suitable for explosive or aggressive environment.
- Humidity, no restriction.
- Ambient temperature : -5^0C to $+55^0$C
- With high humidity and low temperature:
- Take measures against freezing of armature plate and rotor.
- Cooling –air flow must not be obstructed/Free cooling-air flow.
- Protect the electrical connections against short circuit.

2.3 Layout of the safety information

- All safety information in these operating instructions has a uniform layout;

Signal word notes

-The icon designates the kind of danger.
-The signal word designates the severity of the danger.
-The notes describe the danger and suggest how to avoid the danger.

Warning of personal injury

Icon used		Signal words	
	Warning of Hazardous electrical voltage. Warning of a general danger	**Danger!**	Warns of impending danger. Consequences if disregarded: Death or very severe injuries.
		Warning!	Warns of a potential, very hazardous situation. Consequences if disregarded: Death or very severe injuries.
	Warning of a general danger	**Caution!**	Warns of a potential material damage. Consequences if disregarded: Light or minor injuries.

Warning of material damage

Icon used	Signal words	
	**Stop!**	Warns of potential material damage. Consequences if disregarded: Damage of the drive system/device or its environment.

Other information

Icon used	Signal words	
	**Note!**	Designates a general, useful note. If you observed it, handling of the drive system/device is made easier.

3.1 Product Description

1. Stator
2. Armature plate
3. Compression part
4. Compression spring
5. Torque adjustment ring (**)
6. Adjustment tube
7. Rotor (***)
8. Friction lining (non-asbestos)
9. Hub
10. Mounting flange
11. Allen screw
12. Spring washer
13. Friction plate
    (Optional items for size 06 to16)
14. Bow (for size 06 to 31)
15. H.R. lever (for size 06 to 31)
16. H.R. lever knob (for size 06 to 31)
17. Rubber seal

'a' : airgap

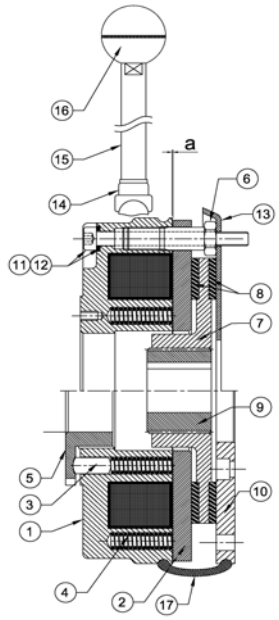


Figure 4: Design of a Spring Applied Brake Type: 14.458(without Hand Release)

3.1.1 General

The spring applied brake type 14.458 is a single disc brake with two friction surfaces. Several springs generate the brake torque by friction. The brake is released electromagnetically.

The spring applied brake type 14.458 is designed for conversion of mechanical work and kinetic energy into heat. By means of the static brake torque it is possible to hold loads without a speed difference. Emergency braking at high speeds is possible; how-ever it results in increased liner wear.

3.1.2 Braking

During braking, the rotor which is axially movable on the hub, is pressed against the friction surface-via the armature plate-by means of inner and outer springs. The friction linings ensure a high brake torque. The brake torque is transmitted between hub and rotor via splines.

3.1.3 Releasing

When the brake is applied, there is an air gap between stator and armature plate. When releasing the brake, a DC voltage is applied to the stator coil. The Magnetic force generated attracts the armature towards the stator closing the airgap against the spring force. The rotor is then released and can rotate freely.

3.1.4 Brake Torque Reduction

By reducing the spring force brake torque can be reduced by unscrewing the torque adjusting ring in anti-clockwise direction.

3.1.5 Option: Micro Switch

The manufacturer offers the micro switch for air gap and wear monitoring. The users must provide the corresponding electrical connection. Circuit diagram can be made available on request.

With air gap monitoring, the motor does not start before the brake has been released. With this Set-up all possible faults are monitored. For Example, in the event of defective rectifiers, interrupted connection cables, defective coil, or excessive air gaps the motor will not start.

When checking the wear, no current will be applied to the brake and motor if the air gap is too large.

3.2 **Rated Data**

Type	Rated Brake Torque (Nm) ***	Rated air gap 'a' (+0.1/-0.05)	Max. airgap 'a'	Excess end Torque Adjustment ring (Max.)	Torque Reduction/ Step (Nm)	Release Gap - U (mm) (+0.1)	Perpendicularity of motor shaft w.r.t end shield
14.458.06	4	0.2	0.5	6	0.1	1	0.04
14.458.08	8			6.5	0.2	1	
14.458.10	16			8.5	0.6	1	
14.458.12	32	0.3	0.75	10	1.2	1	0.06
14.458.14	60			11.5	1.6	1	
14.458.16	100			11.5	2.1	1.5	
14.458.18	150	0.4	1.0	13	1.4	1.5	0.08
14.458.20/23	260 / 315			15	2.0	1.5	
14.458.25	400	0.5	1.25	17	5	2	0.10
14.458.31	600 / 800			17	5	2	

***** Brake torque tolerance +30% / -10%, Torque will be achieved after completion of burnishing operation**

Type	Dimensions (mm)			Brake mounting screw to the flange	Brake flange fixing screws	Screw tightening torque Nm	Counter hole on motor end shield ØA x D mm depth (Fig.- 5)
	Rotor thickness		Mounting PCD				
	Rated	Min					
14.458.06	6	4.5	72	3 x M4 x 35	3 x M4	3.0 (-10%)	3 x Ø5.5 x 3 mm
14.458.08	7	5.5	90	3 x M5 x 40	3 x M5	6.0 (-10%)	3 x Ø6.5 x 3 mm
14.458.10	9	6.0	112	3 x M6 x 50	3 x M6	10.0 (-10%)	3 x Ø8 x 4 mm
14.458.12	10	7.0	132	3 x M6 x 55	3 x M6		
14.458.14	10	7.0	145	3 x M8 x 65	3 x M8	20.0 (-10%)	3 x Ø8 x 5 mm
14.458.16	11.5	8.5	170	3 x M8 x 75	3 x M8		
14.458.18	13	9.5	196	6 x M8 x 80	6 x M8		6 x Ø8 x 5 mm
14.458.20/23	16	10.5	230	6 x M10 x 90	6 x M10	35.0 (-10%)	6 x Ø11 x 5 mm
14.458.25	20	14.0	278	6 x M10 x 100	6 x M10		
14.458.31	20	14.0	278	6 x M10 x 120	6 x M10		

NOTE : SCREW LENGTH DEPENDS ON MATERIAL AND THICKNESS OF THE MOUNTING SURFACE AT CUSTOMER'S END.

Fig. 5

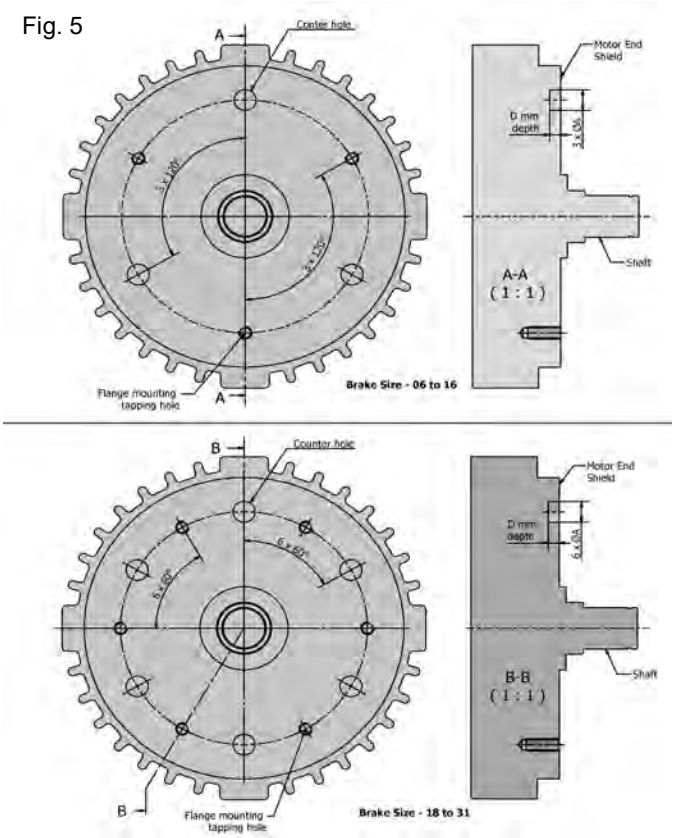
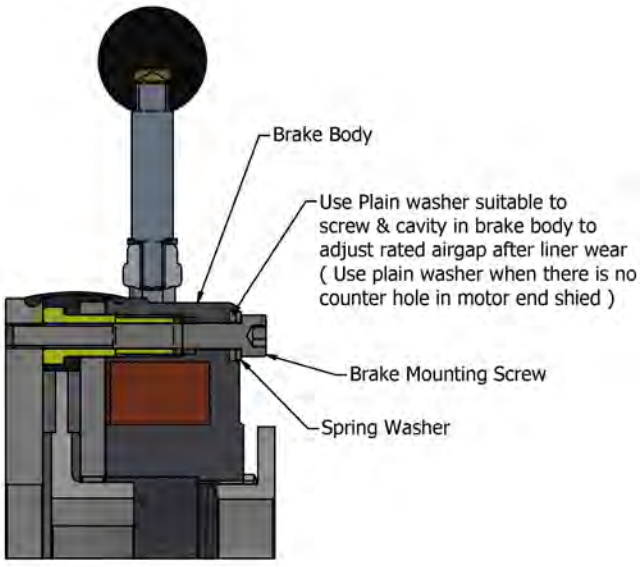
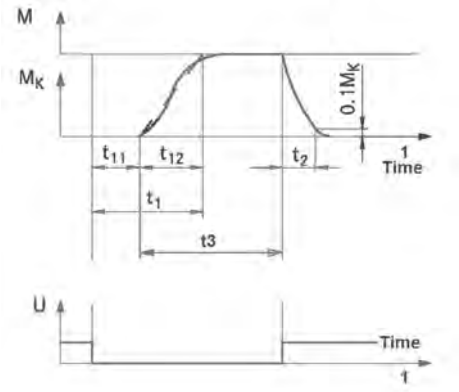


Fig. 6



Type & Brake Size	Power Watts	DC Voltage	Coil Resistance (Ω)		Rated torque Nm
			Min	Max	
14.458.06	20	24 96 103 110 190 205 220	27.5 430.8 491 569 1660 1933 2224	30.5 491 570 647 1950 2270 2610	4
14.458.08	25	24 96 103 110 190 205 220	22 346.5 399 456 1336 1555 1782	24.5 391 450 513 1552 1807 2091	8
14.458.10	30	24 96 105 110 190 205 220	18.24 281 313 381.1 1125 1191 1413	20.1 313 350 425.5 1282 1358 1610	16
14.458.12	40	24 96 103 110 190 205 220	13.8 218.8 250.6 287.5 848.4 987.6 1138	15 242.5 279.8 319 956.7 1114 1284	32
14.458.14	50	24 96 103 110 190 205 220	11 175.1 190.2 230.18 682.3 749.3 921	12 193.5 210.2 256.82 761.7 836.5 1017	60
14.458.16	76	24 96 103 110 190 205 220	7.29 116 134 152 456 530 611.5	7.9 126 145 166 494 575 662.5	100
14.458.18	85	24 96 103 110 190 205 220	6.4 103.5 120 133.94 403.5 469.7 540.5	7.1 113.5 130 151 446 519.1 598	150
14.458.20	100	24 96 103 110 190 205 220	5.5 88.0 101.8 112 342.5 399 459.5	6.02 96.5 110.2 131 379.5 441 508.5	260
14.458.23	105	24 96 103 110 190 205 220	5.26 83 96 109 327 380 438	5.75 92 106 121 361 420 484	315
14.458.25	110	24 96 103 110 190 205 220	5.0 80.0 91.5 105 311.8 366.7 413.6	5.5 87.6 101.3 115 341.6 397.2 466.4	400
14.458.31	140	24 96 103 110 190 205 220	3.95 63.1 72.8 83.04 235.65 288 332	4.28 68.4 78.8 90 269.47 312 360	600
14.458.31	180	24 96 103 110 190 205 220	3.07 49.1 56.6 64.6 192 223.6 258.2	3.32 53.2 61.4 70 208 242.3 279.8	800

3.3 Operating Times



t1	Engagement time
t2	Disengagement time
t11	Delay time
t12	Rise time of brake torque
t3	Slipping time

The engagement times are valid for switching on DC side.
The table shows the delay during engagement **t11**,
the rise time of brake torque **t12** and
the engagement time **t1=t11 + t12**.
Disengagement time is not influenced by DC or AC side switching.
However it can be reduced by suitable excitation or over excitation.

Brake size	t11 ms	t12 ms	t1 ms	t2 ms
14.458.06	15	14	29	46
14.458.08	15	16	31	58
14.458.10	29	19	48	76
14.458.12	29	26	55	118
14.458.14	17	28	45	215
14.458.16	29	32	61	228
14.458.18	35	48	83	272
14.458.20 / 23	70	100	170	350
14.458.25	115	128	243	405
14.458.31	130	140	270	510

Disengagement time

The disengagement time is not influenced by DC or AC switching operations. It can only be shortened by special equipment for fast−response excitation or over-excitation.

Engagement time

The engagement time t_1 is apply to DC switching with rated air gap work approximately 8 to 10 times longer for AC switching coil and standard rated torque.

AC side switching

- Low-noise switching of the brake
- No protective measures required for switching contact.
- Slow application of the brake.

DC side switching

- Noisy switching
- Burn-up protection for switching contact required (e.g. varistor, free-wheeling diode)
- Fast application of the brake.

Note: Engagement time is the time when armature is fully released from the brake stator after voltage is withdrawn. Disengagement time is the time when brake is released after voltage is applied to the coil

3.4 force required to release brake with manual hand release (Std. Sizes 06 to 31)

Force at rated T.A. Ring height, rated Airgap & " U " gap.

Brake size	Manual Release force (+ 10 %) Kgf
14.458.06	5
14.458.08	7
14.458.10	14.5
14.458.12	16
14.458.14	20
14.458.16	29
14.458.18	38
14.458.20	44
14.458.25	60
14.458.31-600 Nm	100
14.458.31-800 Nm	120

3.5 Torque v/s Speed data

Torque v/s Speed				
Brake Size	Rated torque (Nm)	Reduction of rated torque at specified speed to x% --- max. speed		
		at 1500 rpm	at 3000 rpm	Max.
14.458.06	4	87 %	80 %	65 %
14.458.08	8	85 %	78 %	66 %
14.458.10	16	83 %	76 %	66 %
14.458.12	32	81 %	74 %	66 %
14.458.14	60	80 %	73 %	67 %
14.458.16	100	79 %	72 %	66 %
14.458.18	150	77 %	70 %	66 %
14.458.20 / 23	260	75 %	68 %	66 %
14.458.25	400	73 %	66 %	66 %
14.458.31	600 / 800	71 %	64 %	66 %

Liner wear increases proportional to speed & liner powder will be observed falling

3.6 Emission

Heat

Since the brake converts kinetic energy as well as mechanical and electrical energy into heat, the surface temperature varies considerably, depending on the operating conditions and the possible heat dissipation. Under unfavorable conditions, the surface temperature can reach 130°C.

Noises

The switching noises during engagement and disengagement depend on the air gap and the brake size.

Depending on the natural oscillation after installation, operating conditions and state of the friction faces, the brake may squeak during braking.

Others

The abrasion of the friction parts produces dust. With large loads, the friction face heats up so strongly, that odors may occur.

Optimizing the coil voltage:

For electromagnetic brake the torque is slightly increased when overvoltage is applied. The maximum permissible coil temperature of 130°C must not be exceeded, however. Under voltage results in a torque reduction. The fast excitation causes the armature plate to be pulled across the airgap to the friction lining. After the fast excitation , the speed slows down with reduced torque or is gradually accelerated. When using spring – loaded brake, we recommend to apply under voltage, since the holding voltage of the released brake corresponds approximately to half of the rated coil voltage. Therefore the power consumption and the magnetic energy in the coil is reduced to 25% of its rating.

Advantage: Reduced switching – off time and improved position accuracy.

4.1 Preparation

1. Unpack spring applied brake.
2. Check if delivery arrived as ordered.
3. Check name plate data, especially rated voltage.
4. Remove the mounting flange by unscrewing the mounting screws (8.1)

4.2 Assembly

4.2.1Assembly of mounting flange on to Motor End Shield.

Stop!
Check the motor end shield. It must be free from Grease and Oil

4.0 Mounting flange
10.0 End Shield (*)

*** Face run-out of motor end shield w.r.t. shaft should not be more than 0.08mm**

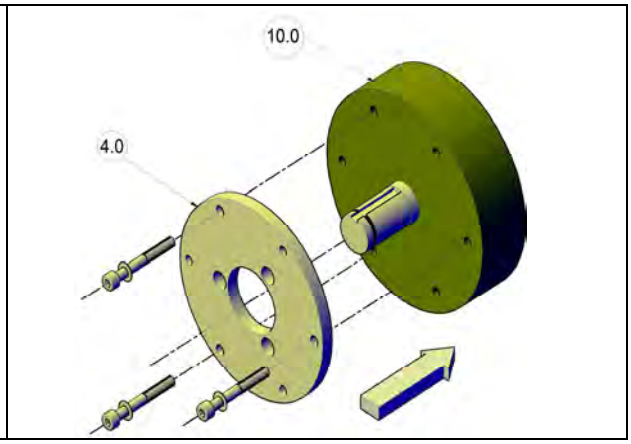


Figure 7: Assembly of mounting flange.

1. The flange should be screwed onto the shield with the inner or outer pitch circle (for dimensions see rated data table 3.2).
   **** If flange is spigot mounted on motor end shield one should ensure that it is seated perfectly butting with motor end shield.**
2. Hold the flange to the end shield and check the pitch circle and the threads of the fastening holes.
3. Push the spring lock washers onto the screws and screw the flange onto the end shield.
4. Tighten the screws evenly.
5. Check the height of the screw heads. On the outer pitch circle the screw heads must not be higher than the minimum rotor thickness. (For dimensions refer rated data table, chapter 3.2)

4.2.2 Mounting the Hub on to Motor Shaft.

3.0 Hub

3.1Circlip

4.0 Mounting Flange

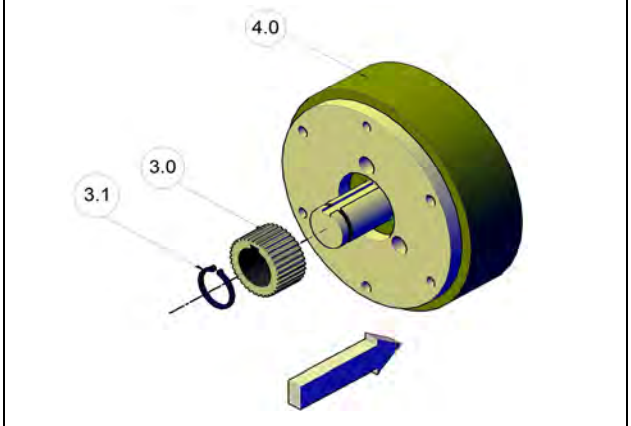


Fig 8: Mounting of Hub

1. Press the hub on the shaft & key. Ensure that hub should not be insert on shaft by hammering. Also ensure that hub should not be loose on motor shaft.
2. Secure the hub against axial movement, e.g. with a circlip. (3.1)

Stop!
Check the motor end shield / flange. It must be free from Grease and Oil.

4.2.3 **Assembly of Rotor**

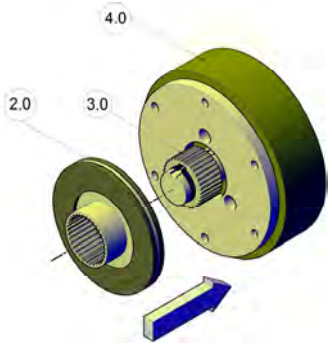
2.0 Complete rotor 3.0 Hub 4.0 Mounting Flange	

Figure 9: Mounting of Rotor

1. Push the rotor onto the hub and check whether it can be moved to and fro freely by hand.
2. Ensure that rotor is not too tight on hub, it should slide on it.

4.2.4 **Assembly of Stator**

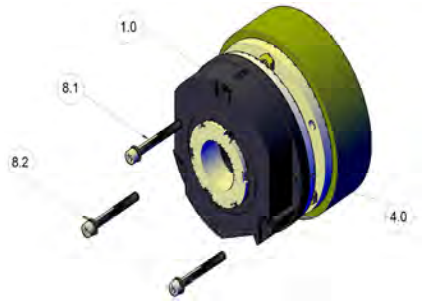
1.0 Complete Stator 4.0 Mounting Flange 8.1 Allen screw 8.2 Spring lock washer	

Figure 10: Mounting of Stator

1. Push the spring lock washers (8.2) on the screws and screw (8.1) the complete stator (1.0) on to the flange/end shield.
2. Tighten the screws (8.1) evenly (Refer data 3.2 on page7 for screw tightening torque)
3. Check the rated air gap near the bolts by means of the feeler gauge (for air gap see rated data table-chapter 3.2)

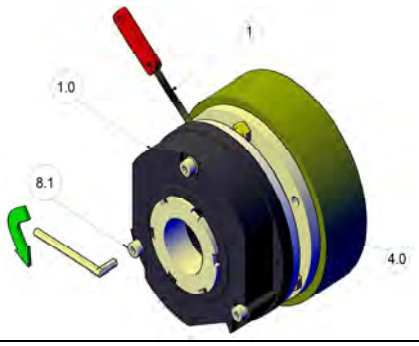
(1) Air gap 'a' feeler gauge 1.0 Complete stator 8.1 Allen screw 4.0 Mounting Flange	

Figure 11: Setting of Air gap.

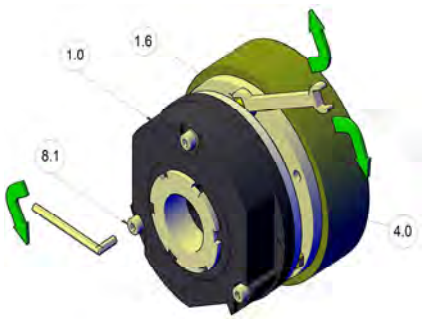
1.0 Complete Stator 1.6 Wear adjustment tube 8.1 Allen Screw	

Figure12: Readjustment of Air gap.

Note: If the air gap deviates too much from rated air gap 'a' re-adjust as follows.

1. Loosen the screws. (8.1) with the help of allen key.
2. Turn the wear adjustment tubes by means of fixed spanner.
   - Screw the adjustment tubes (1.6) into the stator (1.0) (i.e rotate it in clockwise direction) if the air gap is too large.
   - Screw the adjustment tubes (1.6) out of the stator (1.0) (i.e rotate it in anti-clockwise direction) if air gap is too small.
   - The width of the air gap changes by approx 0.15mm when turning the wear adjustment tube by 1/6 revolution.
3. Tighten the screws. (8.1)
4. Check the air gap again by feeler gauge and repeat the adjustment if necessary.

4.2.5 **Assembly of Rubber Seal**

1.0 Complete Stator

4.0 Mounting Flange

8.1 Allen Screws

5.0 Rubber Seal

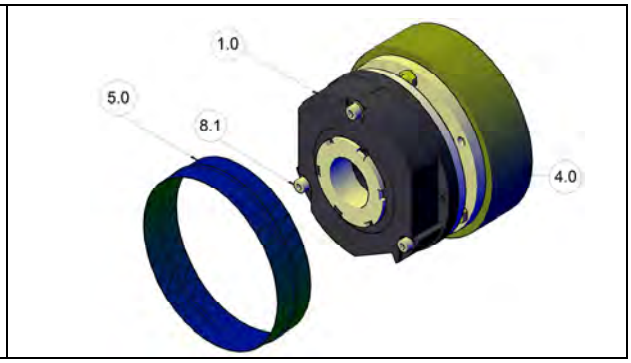


Figure13: Assembly of Rubber seal

1. Pull the cable through the rubber seal (5.0).
2. Push the rubber seal (5.0) over the stator
3. Press the lips of the rubber seal into the groove of the Complete Stator (1.0) and the mounting flange (4.0)

4.2.6 Assembly of manual release (standard sizes 06 to 31)

1.0 Complete Stator

1.2 Armature plate

6.1 Manual Hand-release bow

6.2 Manual Hand-release lever

6.3 Hand-release Screw

6.4 Hand-release Pin

6.5 Hand-release spring

6.6 Hand-release Washer

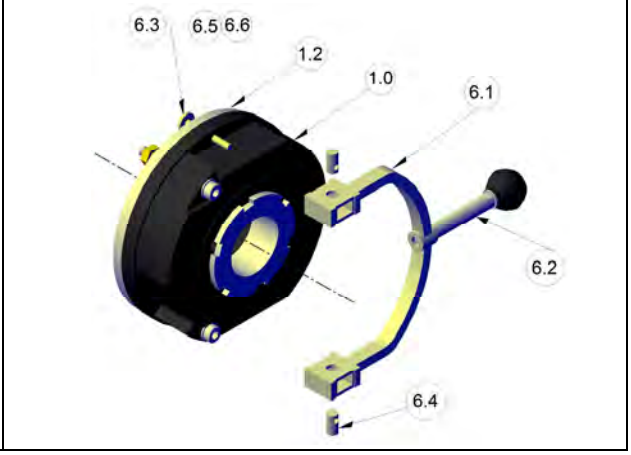


Figure 14: Assembly of manual release

1.0 Complete Stator

1.2 Armature plate

6.3 Hand-release Screw

'U' Hand release gap

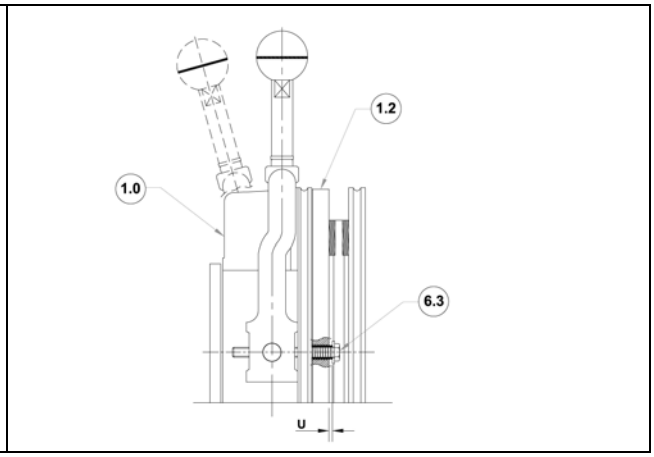
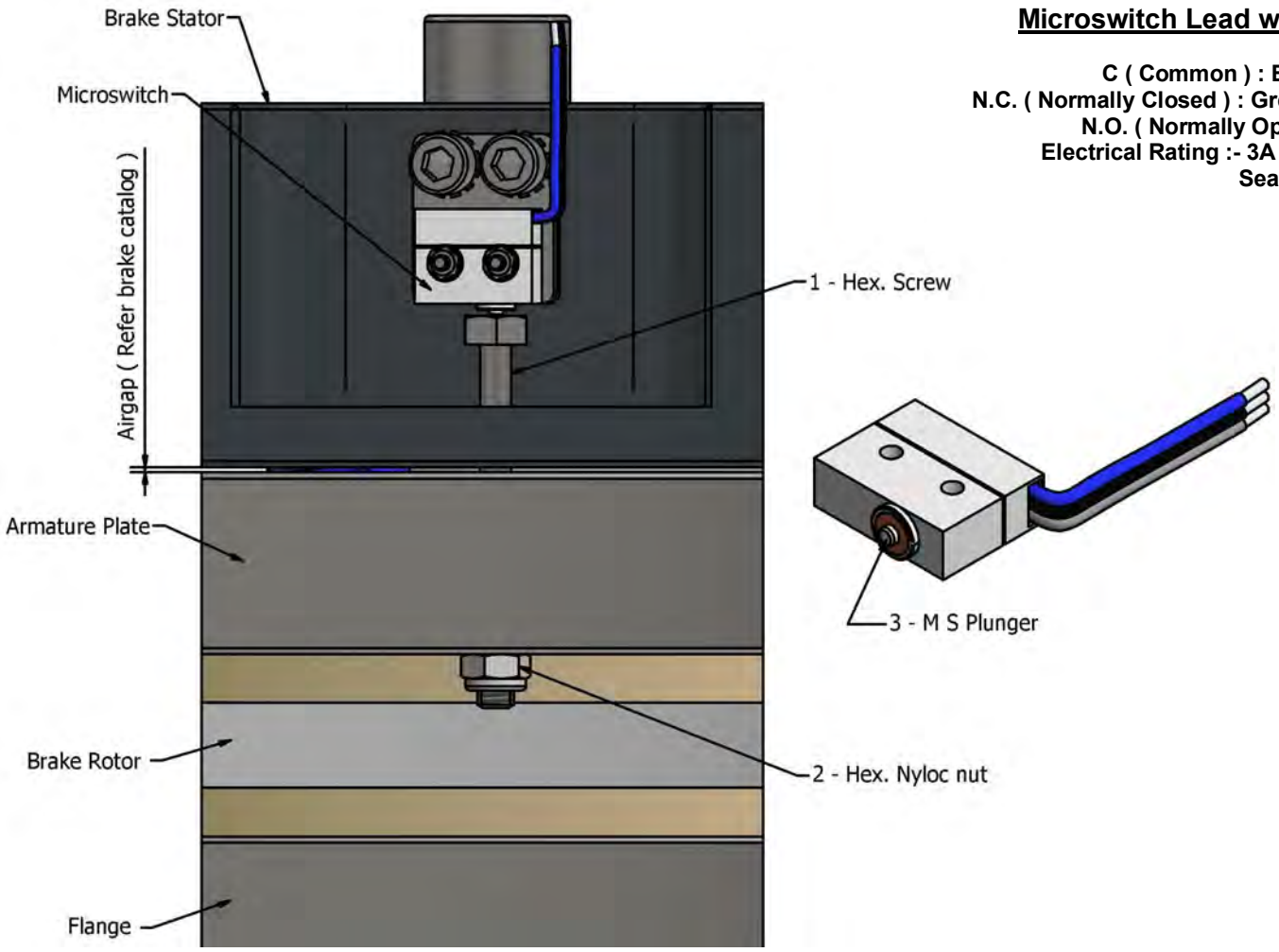


Figure 15: Assembly of Manual release.

1. Insert the hand release springs (6.5) into the bore holes of the armature plate (1.2).
2. Push the Hand release Screws (6.3) along with Hand release washer (6.6) through hole in the Hand release bow (6.1) and the complete stator (1.0).
3. Screw the Hand release pin (6.4) onto the Hand release screws (6.3).
4. Adjust the gap 'U' between armature plate (1.2) and hand release screw (6.3) as shown in the Figure 13. For 'U' values see rated data table, chapter 3.2.
5. After the assembly of the Rubber seal (5.0) Screw the preassembled.

4.2.8 Work instruction to adjust micro-switch for monitoring brake release (standard sizes 06 to 31)



Microswitch Lead wire detail

C (Common) : Black / Red
N.C. (Normally Closed) : Grey / Yellow
N.O. (Normally Open) : Blue
Electrical Rating :- 3A / 250 V AC
Sealed :- IP 67

To ensure smooth functioning & adjustment of Microswitch below mentioned procedures are to be followed.

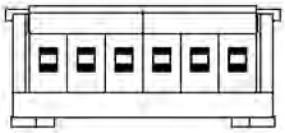
- Rotate hex nyloc nut in anti-clockwise direction to release nut from armature plate.
- Release hex screw (1) from MS plunger (3) by rotating it in clock wise direction.
- Connect micro switch wire black / red (C) & blue (NO) with the continuity tester/multimeter.
- Release brake by applying DC volt to brake coil.
- Rotate hex screw (1) slowly in anti-clockwise direction till it touches & press MS plunger(3) which changes its state from “NO” to “NC”.
- For fine tuning rotate ¼ to1/2 turn of hex screw (1) in clockwise direction which changes microswitch condition from “NO” to “NC”.
- Fix hex screw (1) by tightening nyloc nut (2) so that micro switch setting is fixed & it doesn’t get disturbed on brake operations.
- Now remove DC voltage from brake, micro switch should now show “NO” condition .
- Test the brake for few number of “ON-OFF” operation for ensuring micro switch setting doesn't gets disturbed.

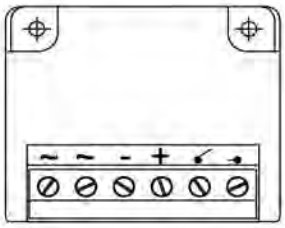
4.3 Electrical Connection

Warning!
The Electrical connection of the brake must only be carried out when no voltage is applied
.
NOTE : INPUT AC VOLTAGE TO BRAKE RECTIFIER SHOULD NOT BE GIVEN FROM MOTOR TERMINALS IF MOTOR IS OPERATED BY VFD

Solid State Rectifier EH 720 Series Mounting Dimension & Connection Diagram

Salient Features :-

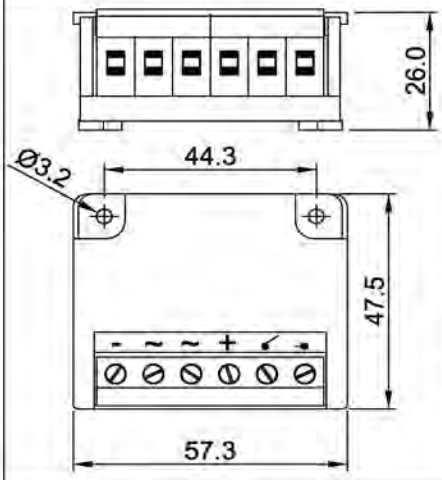




- Compact In Size
- Based on German designs.
- Use of High quality components.
- 6 - Terminals as standard for connections.
- Suitable to mount in standard motor terminal box.
- Standard excitation.
- Available in half wave or full wave configuration.
- Suitable for carrying our AC side switching & DC side switching.
- DC side switching protection included.
- Maximum allowable ambient temperature 85 degree C.
- Current rating :- 2 Amps.

- Type EH 720 Series brake rectifier is used to supply DC voltage to DC operated brakes on electric motors,where standard release reaction time of the brake is required.

Solid State Rectifier EH 720 Series Mounting Dimension

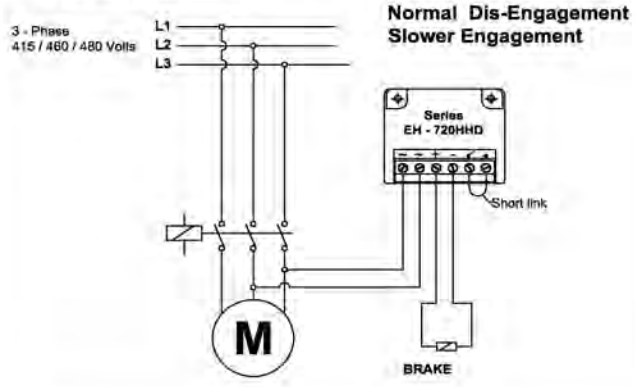


EH Series	Full Wave and Half Wave Rectifiers for 50 / 60 Hz VAC Input	
Model	**Input**	**Output**
EH 720 AD	208 / 230 VAC	190 / 205 VDC, 2 Amp.
EH 720 BD	115 VAC	103 VDC, 2 Amp.
EH 720 CD	208 / 230 VAC	96 / 103 VDC, 2 Amp.
EH 720 HHD	415 VAC	190 VDC, 2 Amp.
EH 720 HHD - AV	415 / 460 VAC	190 / 205 VDC, 2 Amp. max
EH 720 HHD - AVH	480 VAC	215 VDC, 2 Amp. max

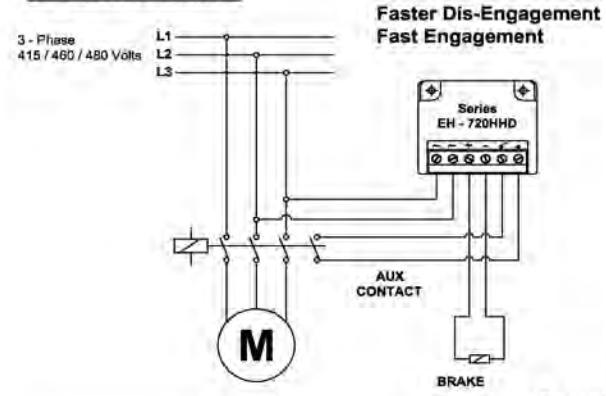
Note :- 103 DC output also sutable for 96 VDC Brakes

Solid State Rectifier " EH 720 HHD / HHD - AV / HHD - AVH " Connection Diagram

- **A.C SWITCHING**



- **D. C. SWITCHING**



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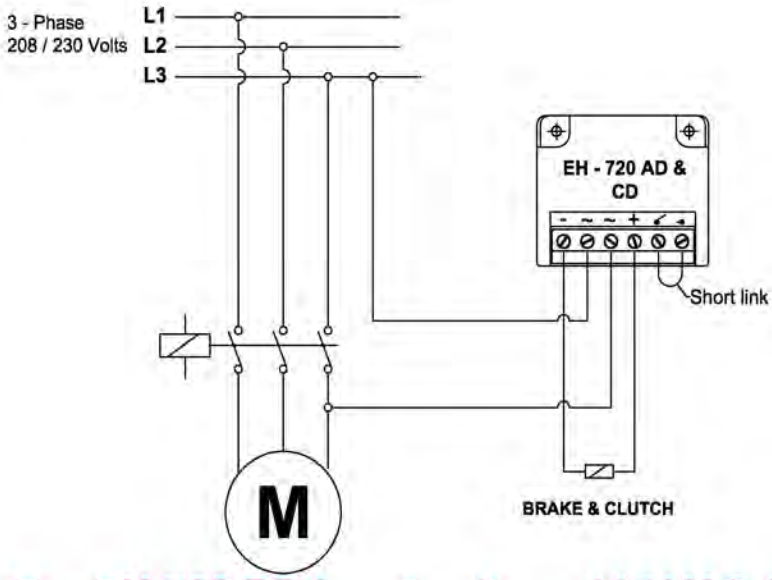
Solid State Rectifier EH 720 Series Mounting Dimension & Connection Diagram

Solid State Rectifier " **EH 720 AD / BD / CD** " Connection Diagram

• A.C SWITCHING

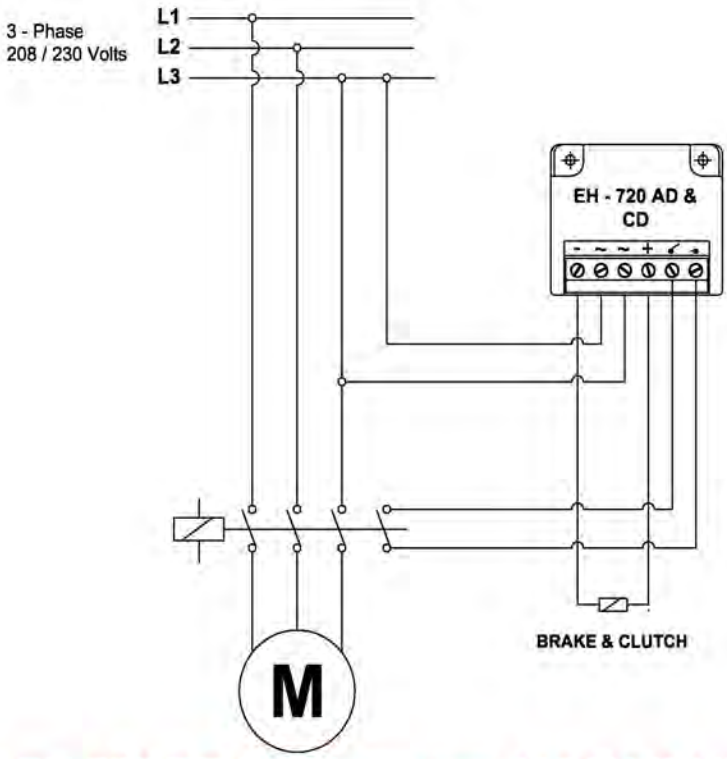
Normal Dis-Engagement
Slower Engagement



Note :- For EH 720 BD input voltage 115 VAC (line to neutral)

• D.C. SWITCHING

Faster Dis-Engagement
Fast Engagement



Note :- For EH 720 BD input voltage 115 VAC (line to neutral)

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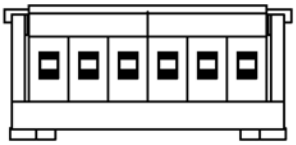
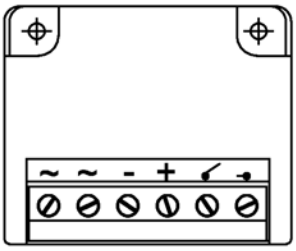
Solid State Rectifier UM-101 Series Mounting Dimension & Connection Diagram

Rev. - 02/Date - 14-08-2021



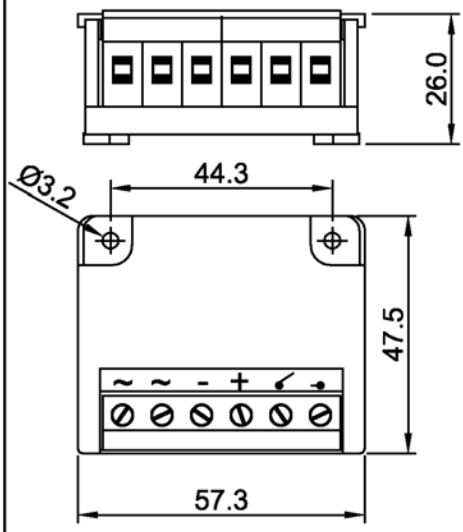


Salient Features :-

- Compact In Size
- Based on German designs.
- Use of High quality components.
- 6 - Terminals as standard for connections.
- Double voltage over excitation for 300 m.sec.
- Recommended for brakes size 18 to 31, for quick dis-engagement.
- Suitable for carrying our AC side switching & DC side switching.
- Available in half wave configuration.
- DC side switching protection included.
- Maximum allowable ambient temperature 70 degree C.
- Current rating :- 2 Amps.

- Type UM - 101 Series brake rectifier is used to supply DC voltage to DC operated brakes on electric motors,where quick release reaction time of the brake is required.

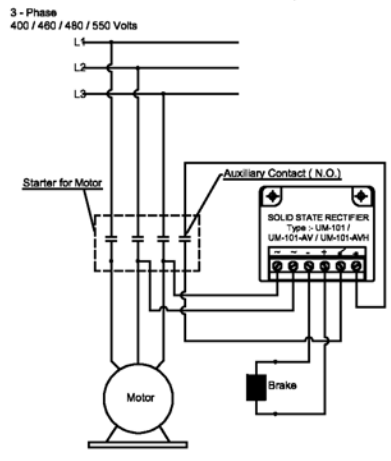
Solid State Rectifier UM-101 Series Mounting Dimension



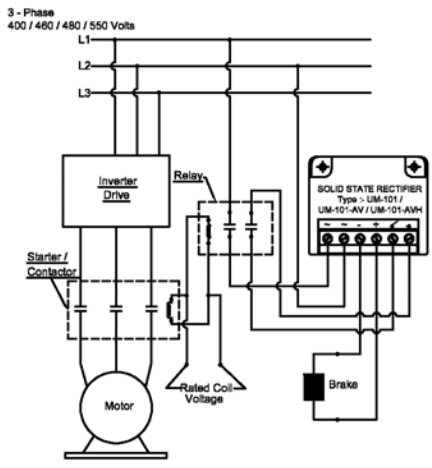
UM-101 Series	With over-excitation for fast release of normally on brake or fast engagement of normally off brake or clutch, 50/60 Hz VAC input	
Model	**Input**	**Output**
UM-101	415 VAC	190 VDC, 2 Amp.
UM-101-AV	415 / 460 VAC	190 / 205 VDC, 2 Amp. max
UM-101-AVH	480 / 500 VAC	215 / 225 VDC, 2 Amp. max
UM-101-AVH	525 / 550 VAC	235 / 245 VDC, 2 Amp. max
UM-101 - A	208 / 230 VAC	96 / 103 VDC, 2 Amp.
INPUT VOLTAGE SHOWN ABOVE IS MAXIMUM ALLOWABLE VOLTAGE		

Solid State Rectifier " UM-101 / UM-101-AV / UM-101-AVH " Connection Diagram

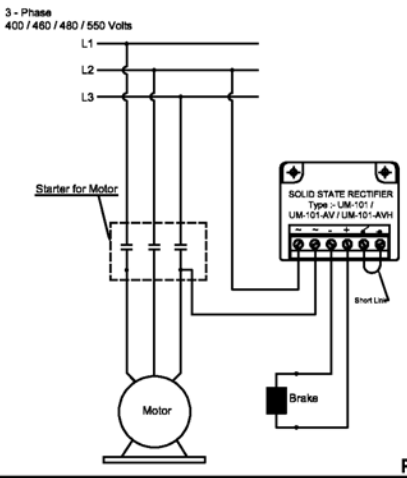
DC side switching



DC side switching (with inverter drive)



Connection schematic with purely AC switching



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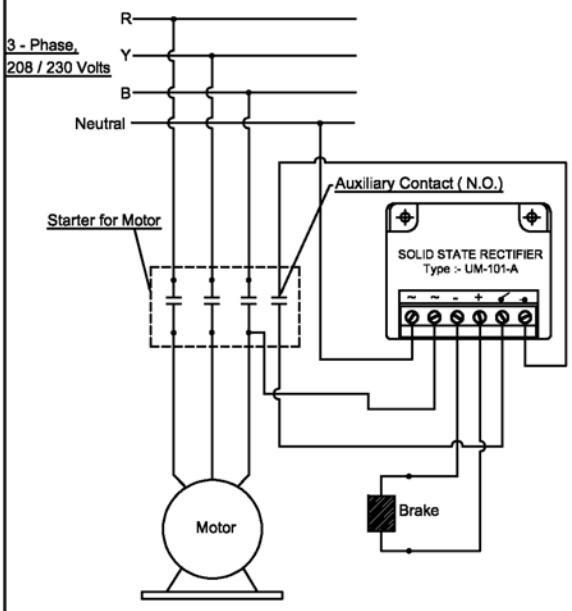
Solid State Rectifier UM-101-A Connection Diagram

Solid State Rectifier " **UM-101-A** "
Connection Diagram



DC side switching

Please read the instructions before using the rectifier

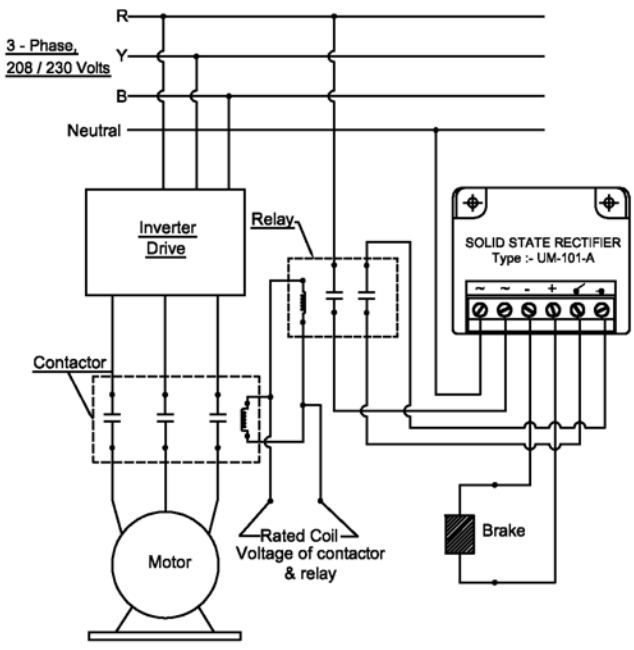
- **Rectifier UM-101, UM-101-AV & UM-101-A is a fast acting rectifier which initially gives higher dc voltage for a few milliseconds. By using this rectifier the spring loaded brakes are disengaged much faster. For fast engagement of the brake dc switching (option provided) should also be used.**

IMPORTANT :- With switching on DC side, switching must also be done on the AC side, otherwise no over - excitation can take place when the brake is switched on again and fast disengagement of brake will not take place.

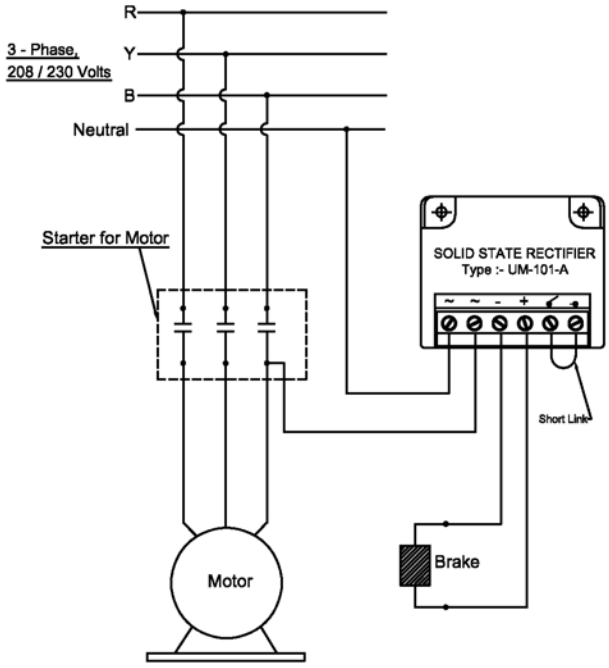
Note :- As per the circuit diagram connection must be made so that AC input to the rectifier is from the load side. Reason being after AC is applied to the rectifier with in 200 ms the rectifier cuts out over excitation by output getting converted from full wave to half wave DC. Caution: Applying from line side would only operate as half wave to function without over excitation.

- **Above schematics are with AC and DC switching for fast disengagement and fast engagement of the brake.**

Model	Input	Output
UM-101 - A	208 / 230 VAC	96 / 103 VDC, 2 Amp.



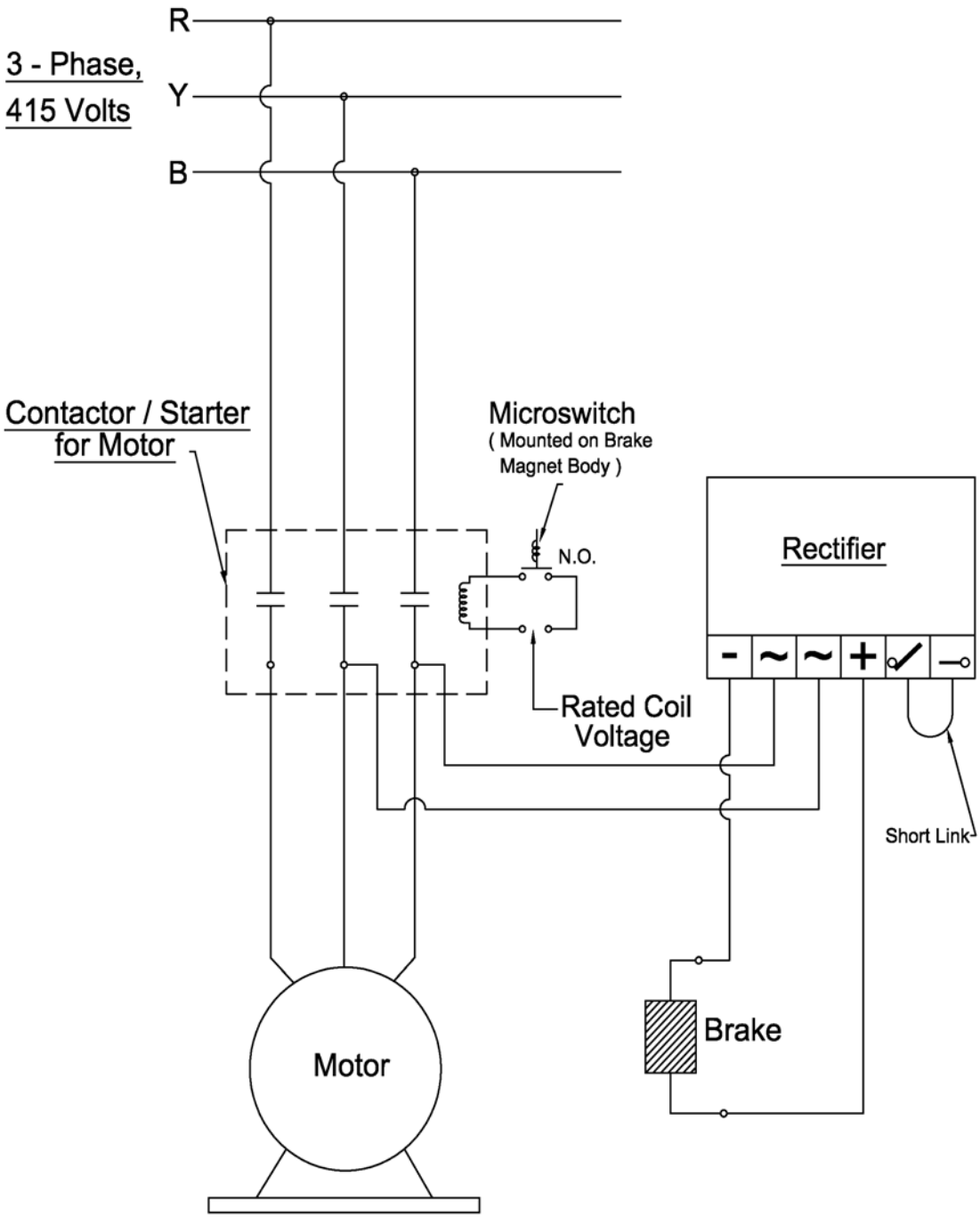
DC side switching (with inverter drive)



Connection schematic with
purely AC switching

Manufactured by **USHA MEDISALES**, Waghodia Dist. Vadodara - 391760, Gujarat, INDIA

4.4 Microswitch Connection diagram for release / wear monitoring



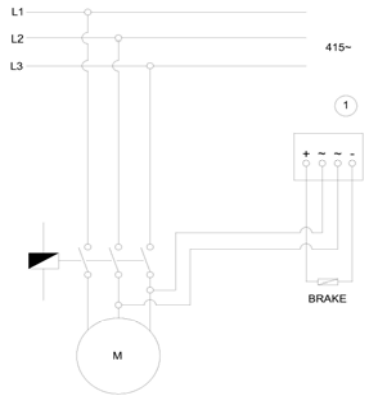
(1) Transformer Rectifier	

Figure 22: Separate DC voltage- Switching on the AC side extremely delayed disengagement.

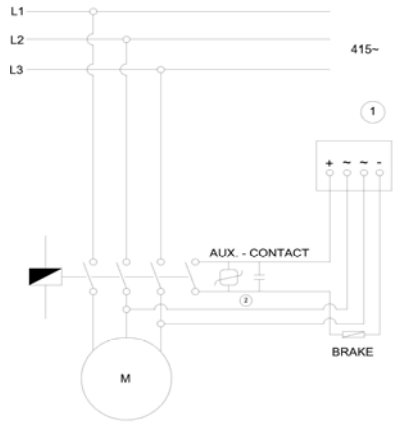
(1) Transformer Rectifier (2) Spark Suppressor & Capacitor	

Figure 23: Separate DC voltage- Switching on DC Side – fast engagement, slightly delayed disengagement

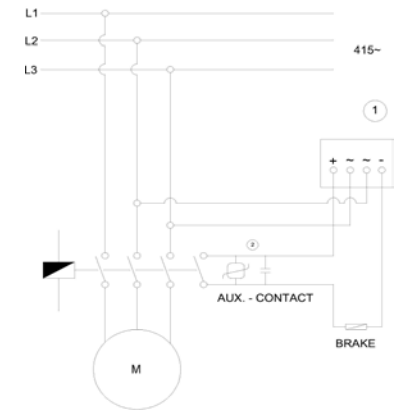
(1) Transformer Rectifier (2) Spark Suppressor & Capacitor	

Figure 24: Separate DC voltage: Switching on DC side- fast engagement, fast disengagement

Note!

1. Install the rectifier in the terminal box (not applicable to Transformer Rectifier). For motors with insulation class H, the rectifiers must be installed in the control cabinet. The permissible ambient temperature for the rectifier should not exceed 60^0 c.
2. Compare the coil voltage of the stator (1.1) to the DC voltage of installed rectifier.
3. Select the suitable circuit diagram considering input & output of Rectifier & Brake coil operating voltage.
4. Motor and brake must be wired according to the requirements of engagement time.

5. Set up and Operation

Warning!
The live connections and the rotating rotor must not be touched! The rotor must not rotate while checking the brake operation.

5.1 Operation Test.

For Faults see chapter7- Trouble shooting and Fault Elimination
Release/ voltage check.
Only for brakes without micro-switch.

Warning!
Live connection must not be touched.

1. Remove two of the links to the motor terminals. Do not switch off the voltage for the brake.
2. Connect the main supply.
3. Measure the DC voltage at the brake
4. Compare the measured DC voltage indicated on the name plate. A deviation of max 10% is permissible.
5. Check the air gap ‘a’. It must be zero and the rotor must rotate freely.
6. Disconnect the mains supply.
7. Bolt the links to the motor terminals

5.1.2 Manual Release

This operational test is to be carried out additionally.

Warning!
Disconnect the mains supply. The motor must not rotate

1. Pull the manual release lever towards you until the resistance increases strongly.
2. The rotor must rotate freely by hand. Small residual torque is permissible.
3. Release the lever.

5.2 Brake Torque Adjustment.

The brakes are only designed for dry running.

The torque is lost if the friction surfaces come

into contact with oil, grease, water or similar

substances or foreign bodies.

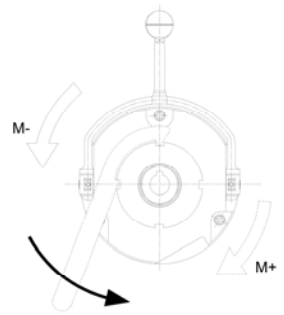


Figure 25

1.1 Stator

1.5 Torque adjustment ring

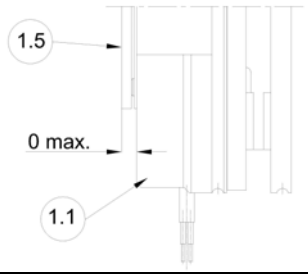


Figure 26

1. Turn the torque adjustment ring in Anti clockwise or clockwise direction using a wrench. Turning ACW reduces the torque, whereas in CW direction increases the torque.
2. Observe the detents. Positions between the detents are inadmissible. For brake torque reduction values per detent see data table chapter 3.2
3. Observe the maximum permissible excess end Omax of the adjustment ring. (For O max value refer rated data table chapter 3.2)
4. The maximum permissible air gap should not be enlarged.
5. The Manual release setting must not be changed.

5.3 During Operation

Check your brake regularly during operation. Please pay attention to
-Unusual noises or temperature
-Loose fixing elements.
- The cables

In the event of faults, read the chapter 7. “Trouble shooting & Faults Elimination” If the faults cannot be eliminated contact – Emco Dynatorq Pvt. Ltd.

6. Maintenance/ repair

Inspection intervals

The wear of the rotor friction, lining depends upon the operating conditions. The Time until readjustment, does not only depends on the friction work. The friction work per operation decreases steadily until readjustment takes place. High speed differences additionally reduce the friction work until readjustment. The inspection intervals must be adapted to the operating conditions and can be prolonged if the wear is small.

6.2 Inspection

6.2.1 Rotor thickness

Warning!
The motor must not rotate while checking the rotor thickness. The rotors may rust up and block in corrosive ambient conditions and/or after long periods of storage.

1. Remove the motor cover and the rubber seal of the brake.
2. Measure the rotor thickness by using a vernier caliper.
3. Compare the measured rotor thickness to the minimum permissible rotor thickness (for values refer rated data table chapter 3.2)
4. If necessary, replace the rotor. For Description see chapter 6.3.2.

6.2.2 Air gap

Warning!
The motor must not rotate while checking the air gap.

1. Measure the air gap between the armature plate and stator by means of a feeler gauge.
2. Compare the measured air gap to the maximum permissible air gap (for values refer rated data table chapter 3.2).
3. If necessary, adjust the air gap to the rated air gap. For description on how to re-adjust the air gap chapter 6.3.1

6.2.3 Release/ voltage

Warning!
The rotating rotor must not be touched.

Warning!
The live connections must not be touched.

1. Observe the air gap “a” during operation. It must be zero.
2. Measure the DC voltage at the brake during operation. It must be the same as the voltage indicated on the name plate. A deviation of maximum 10% is permissible.

6.3 Maintenance

6.3.1 Readjustment of Air gap

Warning!
Disconnect the brake from Mains.The motor must not rotate.

1. Loosen the allen screws.
2. Turn the wear adjustment tubes by means of a spanner.
   - Screw the adjustment tubes into the stator if the air gap is too large.
   - Screw the adjustment tubes out of the stator if air gap is too small.
   - The width of the air gap changes by appprox. 0.15 mm when turning wear adjustment screw by 1/6 revolution.
3. Tighten the screws.
4. Check the air gap again and repeat the adjustment if necessary.

6.3.2 Replacement of rotor

Warning!
Disconnect the brake from Mains.The motor must not rotate.

1. Disconnect the supply cable.
2. Loosen the allen screws evenly and remove them.
3. Completely remove the stator from the end shield. Take necessary precaution to avoid damage to lead wire.
4. Pull the rotor from the hub.
5. Check the splines of the hub- In case of wear, the hub must also be replaced.
6. Check the flange. In case of strong scoring at flange, replace flange.
7. Measure the rotor thickness (new) and head height of the threaded wear adjustment tubes by means of vernier caliper.
8. Calculate the distance between stator and armature plate as follows:
   Distance= Rotor thickness + Rated air gap- head height (For rated air gap see rated data table chapter 3.2)
9. Loosen the threaded adjustment tubes until the calculated distance between stator and armature plate is reached.
10. Install and adjust the new rotor and brake (see Chapter 4.2.3)
11. Reconnect the mains supply cable.

6.3.3 Replacement of Armature Plate

Warning!
Disconnect the brake from Mains.The motor must not rotate.

1. Disconnect the supply Cable.
2. Loosen the allen screws evenly and remove them.
3. Completely remove the complete stator (1.0) from the end shield. Observe the supply cable.
4. Completely unscrew the wear adjustment tubes from the stator assembly (1.0).
5. Also remove the manual hand release assembly.
6. Remove the armature plate.
7. Check the compression springs. If any are broken or damaged replace it.
8. Insert the compression spring into the outer bore holes of the outer stator pole.
   Insert the compression parts and compression spring into the inner pole of the stator.
9. Put the new armature plate on the compression spring. Observe the pitch circle of stator and armature plate and ensure tapped holes of stator are matched with armature plate holes.
10. Mount the Hand release in the same way as it was removed.
11. Measure the rotor thickness and head height of the threaded wear adjustment tubes by means of a vernier caliper.
12. Calculate the distance between stator and armature plate as follows:
    Distance= Rotor thickness + Rated air gap – head height. (For rated air gap see rated data table chapter 3.2)
13. Loosen the wear adjustment tubes until the calculated distance between stator and armature plate is reached.
14. Install and adjust the new rotor and brake (see chapter 4.2.3)
15. Reconnect the mains supply cable.

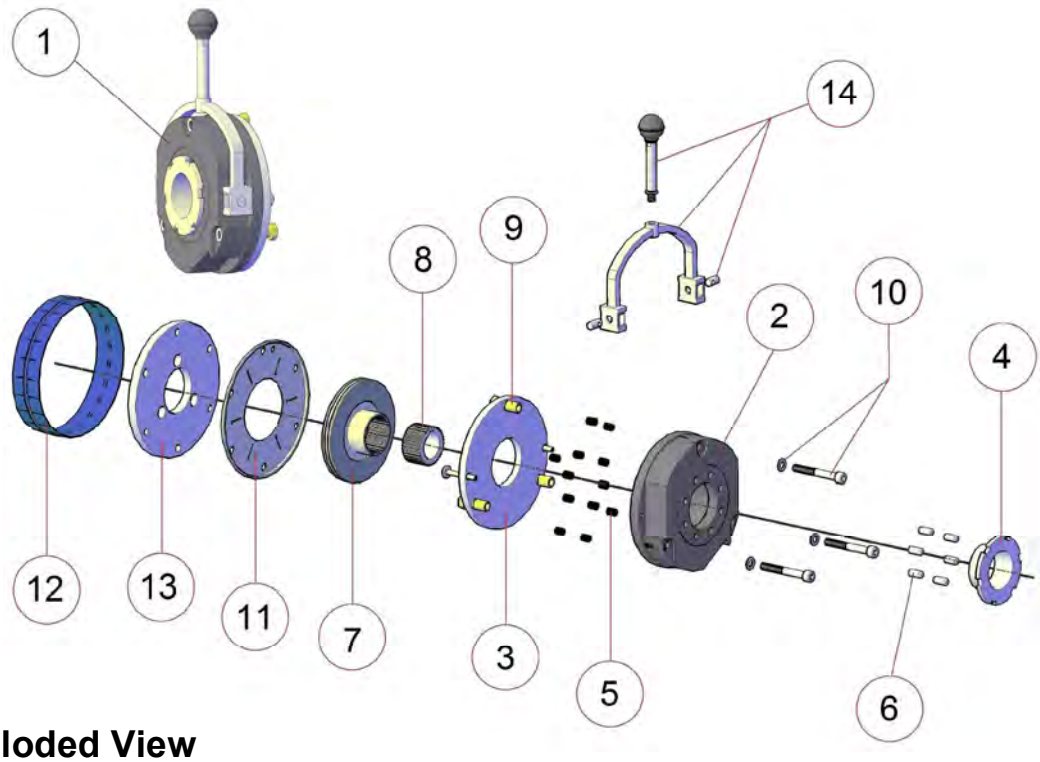
6.4 Spare- parts list

Only parts with order numbers are available.

The order numbers are valid only for the standard design.

Spares- parts list for size 06 to 31

Brake parts Name	Brake size									
	06	08	10	12	14	16	18	20	25	31
1) Stator – armature assembly	1	1	1	1	1	1	1	1	1	1
2) Stator	1	1	1	1	1	1	1	1	1	1
3) Armature plate	1	1	1	1	1	1	1	1	1	1
4) Torque adjustment ring	1	1	1	1	1	1	1	1	1	1
5) Compression spring	7	7	7	7	9	10	9	9	9	9
6) Compression parts	4	4	4	4	6	6	6	6	6	6
7) Rotor	1	1	1	1	1	1	1	1	1	1
8) Hub	1	1	1	1	1	1	1	1	1	1
9) Adjustment tube	3	3	3	3	3	3	6	6	6	6
10) A/B, Mounting bolt washer	3	3	3	3	3	3	6	6	6	6
11) Friction plate (Optional)	1	1	1	1	1	1	---	---	---	---
12) Rubber seal	1	1	1	1	1	1	1	1	1	1
13) Mounting flange	1	1	1	1	1	1	1	1	1	1
14) A-J hand release assembly	1	1	1	1	1	1	1	1	1	1



Exploded View

7. Troubleshooting

Problem	Cause	Remedy
Brake does not release, air gap is not zero	Coil open	• Measure coil resistance using a multimeter. If resistance is too large replace the entire stator.
	Coil has contact to ground or between the winding	• Measure coil resistance using a multimeter compare measured resistance to rated resistance for values see chapter 1.2. If resistance is too low replace. • Check the coil for contact to ground using a multimeter in case of contact to ground, replace entire stator. • Check the brake voltage-rectifier defectives/ voltage too low.
	Writing wrong or defective	• Check wiring and correct it. • Check cable for continuity using a multimeter replace defective cable
	Rectifier defective or wrong	• Measure DC voltage at rectifier using multimeter. If voltage is zero. • Measure AC voltage at rectifier. If AC voltage is zero, Apply voltage, check fuse, check wiring If AC voltage is okay: check rectifier, replace defective rectifier If DC voltage is too low : check rectifier use half wave rectifier instead of bridge rectifier if diode is defective use suitable new rectifier. • Check coil for contact to ground or between windings. • If a rectifier defect occurs several times replace entire stator, even if a contact to ground or between windings cannot be measured. The fault may occur only in warm state.
	Air gap too large	• Readjust the air gap.(chap. 6.3.1)
Rotor cannot rotate freely	Incorrect adjustment of manual release	• Check ‘u’ gap at manual release when current applied to brake. It should be same at both ends. Correct if necessary.
	Air gap too small	• Check and adjust if necessary. (chapter 6.3.1)
Rotor thickness too small	Rotor was not replaced in time	• Replace the rotor(Chapter 6.3.2)
Voltage too high	Brake voltage does not match with rectifier	• Match brake voltage and rectifier to each other.
Voltage too low	Brake voltage does not match with rectifier	• Match brake voltage and rectifier to each other.
	Diode in the rectifier is defective	• Replace rectifier by suitable new one.
AC voltage is not mains voltage	Fuse is missing or defective	• Select connection where fuse is not missing or defective.

Do's and Don'ts to get an optimum performance of the Brakes

Do's	Don'ts
1. Brake manual release should be free of the motor	Don't operate brake if manual release is not operating.
2. Air gap adjustment has to be done when armature plate touches washer of hand release because of excessive wear. Delay in engagement or disengagement time should be observed.	Don't operate the Brake without adjusting/resetting the Air gap.
3. Checking the Air gap at regular interval.	Don't operate the brake if specified air gap is not present or the gap is totally closed.
4. Adjust the air gap to rated air gap as per table 3.2.	Don't let armature plate to be uneven i.e. one side totally closed while another open beyond permissible limit.
5. Required DC supply voltage to be checked.	Don't operate the brake once DC supply is +10% or -10% of the rated voltage
6. Check the linear part of the brakes since they should run dry. Use only sealed Ball Bearing	Don't use any oil, grease, lubricant or any foreign material for lubrication. Friction surface should be free from all the above substances.

Notes

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