

MOUNTING INSTRUCTIONS

Theatre Load Brake



D45

38

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This instruction manual describes the KEB size 09 Combistop Load Brake. Before working with the unit, the user shall familiarize themselves with this instruction manual. This especially pertains to the knowledge and understanding of the following safety and warning icons used in this document. The icons call the user's attention to specific concerns and have the following meanings:



Pay Attention
Important Warning



Information
Help
Tip

1.0 Overview

This instruction manual summarizes the installation of the size 09 Combistop Load Brake. The manual will cover both design styles.

Externally mounted brake basket instructions will be labeled **Design style A**; this design style is usually mounted directly to the bulkhead of the machine and is the easiest to mount. Mounting instructions for Design A start on section 2.1.

Internally mounted brake basket instructions will be labeled **Design style B**; this design style is an alternative if the brake needs to be mounted to the output of a gearbox. Mounting instructions for Design A start on section 2.2.

The manual will also cover the installation of a microswitch and hand release lever as well as explain the different rectifiers available.



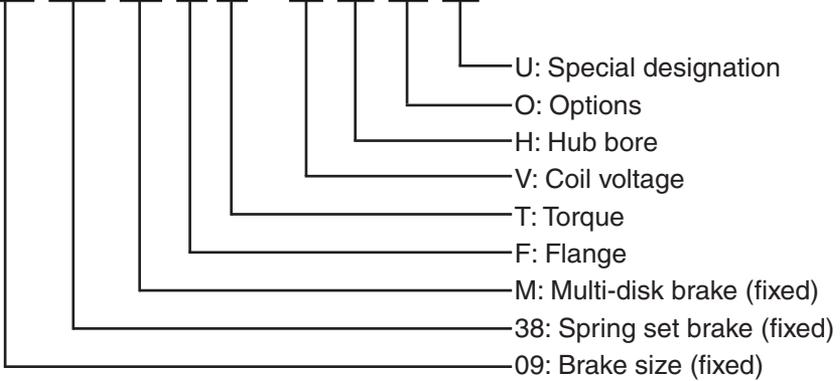
1.0.1 Design Style A



1.0.2 Design Style B

1.1 Brake assembly part numbering scheme

09 38 M F T - V H O U



F: Flange

- 0 = Generic flange
- 1 = KEB F4/K4
- 2 = SEW 57/67 B
- 3 = Torque arm

T: Torque

- 1 = 250 Nm
- 2 = 500 Nm
- 3 = 750 Nm
- 4 = 1000 Nm
- 5 = 1250 Nm
- 6 = 1500 Nm

V: Coil voltage

- 0 = 24 VDC
- 1 = 105 VDC
- 2 = 170 VDC
- 3 = 205 VDC
- 4 = 270 VDC

H: Hub bore*

Metric

- 1 = 35 mm
- 2 = 40 mm
- 3 = 45 mm
- 4 = 50 mm
- 5 = 55 mm
- 6 = 60 mm
- 7 = 65 mm

English

- A = 1.50"
- B = 1.626"
- C = 1.75"
- D = 2.00"
- E = 2.375"
- F = 2.50"

O: Options

- 0 = Bolt Release
- 1 = Hand release
- 2 = Bolt release, microswitch
- 3 = Hand release, microswitch

U: Special designation

- 0 = Standard
- X = Special reserved

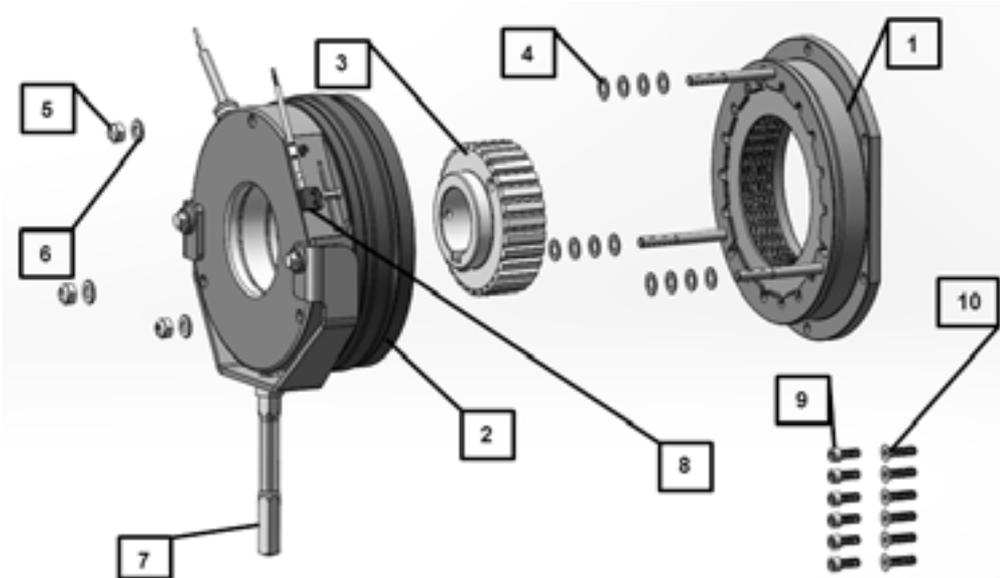
**Note:* Larger bore sizes are available upon request; contact KEB America for details

1.2 Brake specifications

Coil specifications	
Voltage:	Variable
Power:	135 W
Current:	$135\text{W}/(\text{Coil Voltage})$
Can be mounted vertically or horizontally	
Max operating speed: 600 RPM	

Resistance range	
Coil voltage	Resistance (Ω)
24 VDC	3.9 ... 4.5
105 VDC	76 ... 87
170 VDC	199 ... 229
205 VDC	275 ... 317
270 VDC	502 ... 578

1.3 Brake assembly overview



1.3 Brake assembly overview (cont.)

Components

- 1.) Brake basket assembly
- 2.) Magnet assembly
- 3.) Hub
- 4.) Twelve M10 spring washers (*4 per stud*)
- 5.) Three M10 nylon lock-nuts (*1 per stud*)
- 6.) Three M10 washers (*1 per stud*)
- 7.) Hand release lever (*optional*)
- 8.) Micro-switch (*optional*)
- 9.) Six customer supplied cap head screws (*design style A ONLY, not provided by KEB*)
- 10.) Six M12 or eight M10 flat head cap screws (*design style B ONLY, provided by KEB*)

1.4 Tools needed for mounting

- 1.) Customer supplied hex head key (*design style A*)
- 2.) 6mm or 8mm hex head key (*design style B*)
- 3.) 17mm wrench
- 4.) Feeler gauge

Brake with hand release

- 1.) 13mm wrench

Brake with microswitch

- 1.) Small flathead screwdriver
- 2.) 4mm hex head key
- 3.) 8mm wrench
- 4.) Digital multimeter

2.0 Mounting instructions

2.1 Mounting instructions - Style A

2.1.1 Brake unpackaging

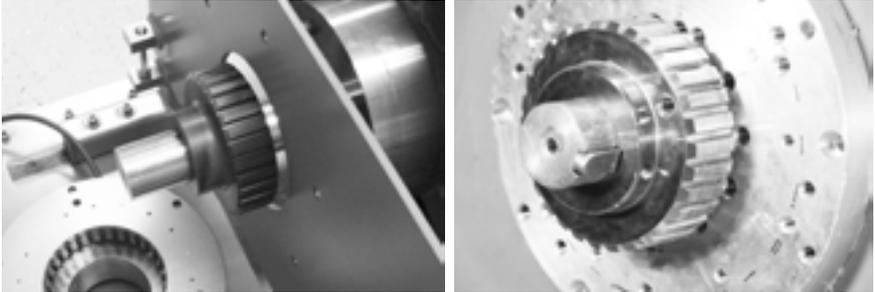
- A.) Remove packaging.
- B.) Inspect complete assembly for damage.
- C.) Remove the rubber dust ring if installed. Remove cardboard packaging strips holding hub in place.



2.1.1 Brake assembly

2.1.2 Install the hub on the shaft

- A.) Install the hub on the shaft - position the hub 1mm from the mounting surface. Make sure the hub is oriented with set screws facing out.



2.1.2 Hub is located and installed on the shaft

- B.) Lock the hub in place axially (e.g. with a shaft collar or snap rings). Set screws are included for additional security.
- C.) The hub should rotate with less than .20mm runout on the hub outer diameter and the hub face.

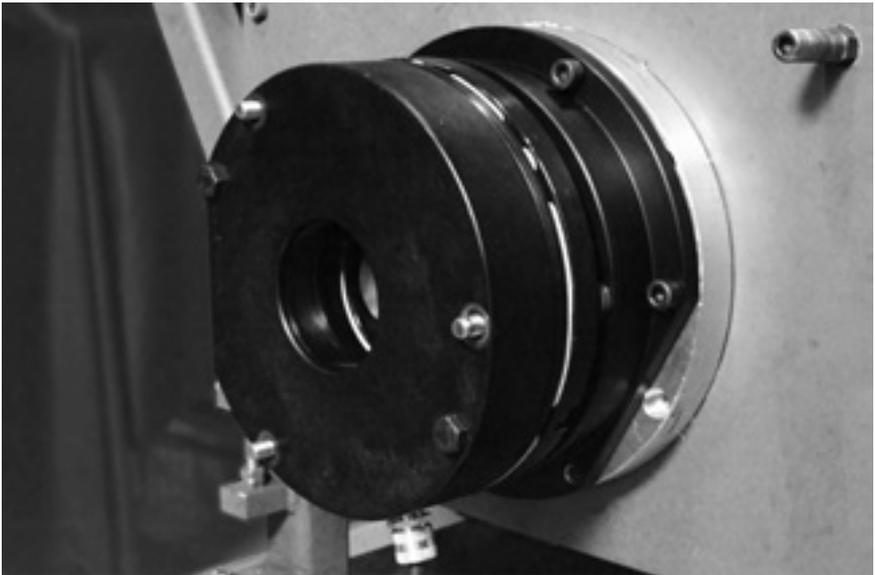
The hub should be centered (concentric) in the brake mounting pattern to less than 0.20mm when measured from the hub to the six mounting holes.

2.1.3 Install the brake on the hub

- A.) Lift the brake assembly (magnet and flange basket) with the help of another person or a lifting strap.
- B.) Select the location where you would like the leadwire to exit and slide the brake over the hub. You might have to wiggle the brake to engage the teeth of the friction discs while sliding on.



WARNING: DO NOT FORCE BRAKE ONTO HUB



2.1.1 Brake assembly is placed over hub and bolts tightened to frame

- C.) Apply LOCTITE® to the threads on the six external customer specific socket head mounting bolts. Start the bolts using the appropriate hex head key.
- D.) Run the bolts equally in two stages until snug. Torque the bolts to 60 – 80 Nm.
- E.) At this point, you are ready to check the airgap (proceed to section 2.3)

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2.2 Mounting instructions - Style B

2.2.1 Brake disassembly

- A.) Remove packaging.
- B.) Inspect complete assembly for damage.
- C.) Remove the rubber dust ring if installed. Remove cardboard packaging strips holding hub in place.
- D.) Place brake on a support.



Note: For design style B ensure the weight of the brake does not rest on the protruding internal mounting bolts.



2.2.1 Proper resting position for design style B

2.2.1 Brake disassembly (cont.)

- E.) Loosen the three M10 lock-nuts holding the magnet housing on the brake using a 17mm wrench.



2.2.2 Loosen lock-nuts

- i** **Note:** Do not turn or remove the two black manual release bolts if you have this style as they hold the magnet assembly together.

- F.) Lift the magnet assembly off of the mounting studs and set it aside.
G.) Remove the spline hub from the rotating friction discs and set it aside.

- i** **Note:** Do not disassemble the brake basket assembly.



2.2.3 Remove magnet and hub

2.2.1 Brake disassembly (cont.)

H.) Note the orientation of the spring washer stacks on each stud. A temporary piece of tape can be applied to keep them from falling off. If they do fall off the first washer is installed cone up and then alternated (<><>)

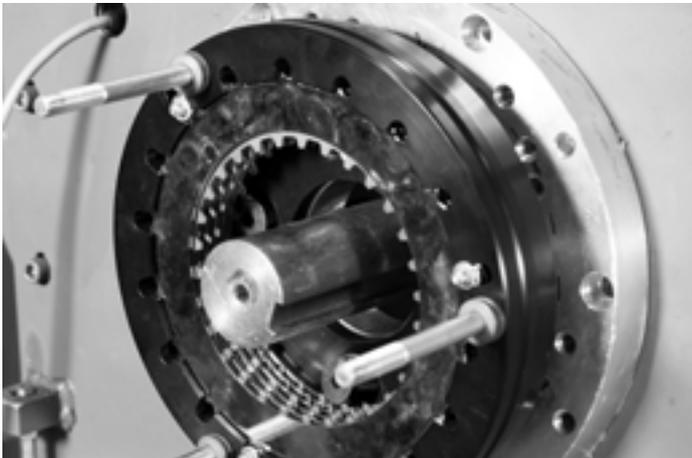


2.2.4 Spring washer sequence (<><>)

2.2.2 Mount brake basket

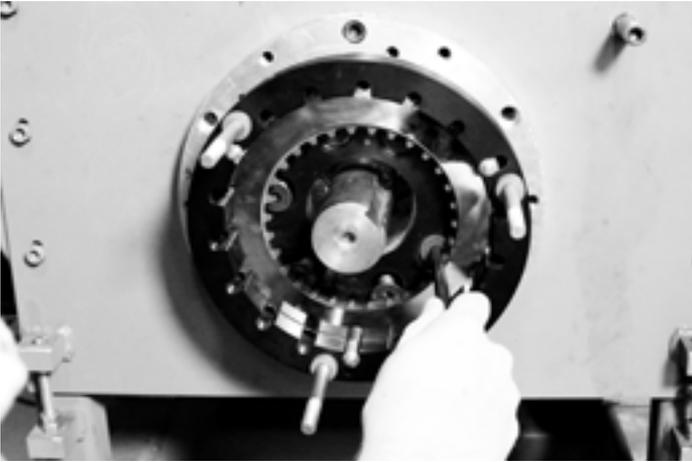
A.) Mount the brake basket.

Apply LOCTITE® to the threads on the internal flat head mounting bolts. Orient the brake basket to the gear motor and start the bolts using the appropriate hex head key.



2.2.5 Mount brake basket (design style A)

2.2.2 Mount brake basket (cont.)



2.2.6 Mount brake basket (design style B)

B.) Run the bolts equally in two stages until snug.



2.2.7 Tighten bolts

C.) Torque the bolts to 60 – 80 Nm.



Note: It is recommended that the brake be mounted to the gear motor in the vertical position if possible for ease of installation.

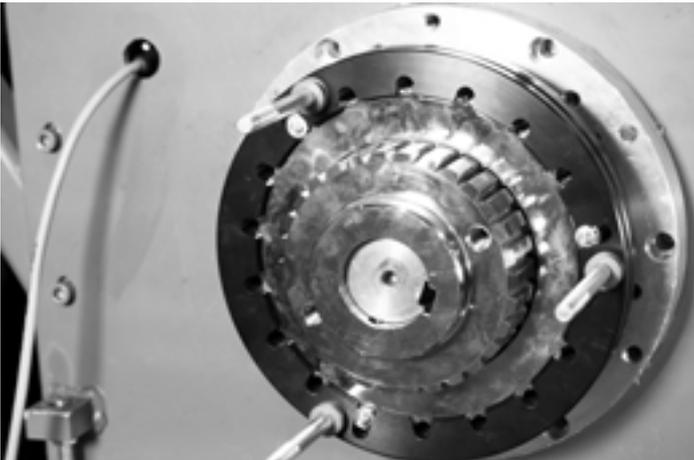
2.2.3 Mount hub

- A.) Align the friction disk teeth inside of the brake basket to ease hub installation.
- B.) Start the hub on to the shaft; make sure the hub is oriented with set screws facing out.



2.2.8 Align friction disk teeth

- C.) Start the hub into the first of the teeth on the first of the friction disks.



2.2.9 Start hub into first teeth

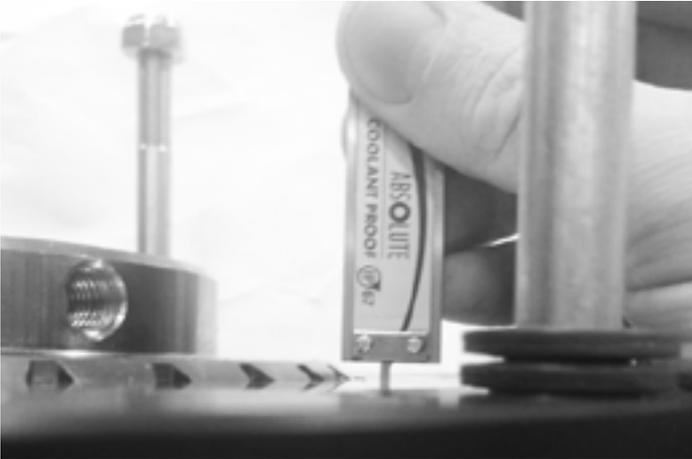
2.2.3 Mount hub (cont.)

- D.) Slide the hub on through the subsequent disks; some turning and wiggling may be necessary to align the teeth.



2.2.10 Mount hub

- E.) Locate the hub axially on the shaft according to the KEB drawing specifications.



2.2.11 Locate hub per the brake print

- F.) Tighten set screws, clamping collar, or snap rings.

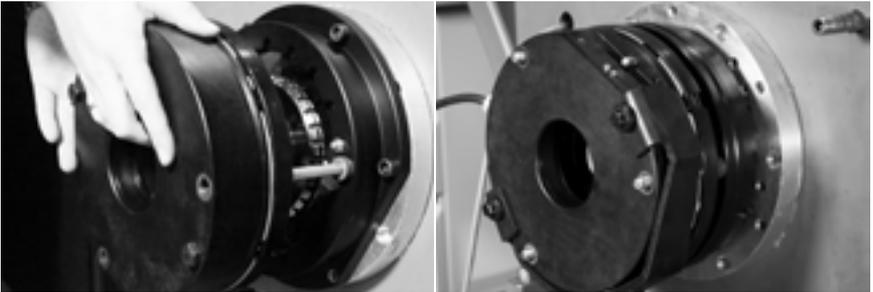
2.2.4 Mount magnet

A.) Orient the magnet so that the lead wire exits at the desired position.



2.2.12 Locate lead wire position

B.) Slide the magnet onto the three M10 mounting studs.



2.2.13 Mount magnet

2.2.4 Mount magnet (cont.)

C.) Apply washers and start the nylon lock-nuts on the three studs.



2.2.14 Start lock-nuts

D.) Tighten the nuts equally in stages of compressing the pressure springs and reducing the airgap between the magnet and the armature.



2.2.15 Tighten lock-nuts

E.) At this point, you are ready to do the final airgap adjustment (proceed to 2.3).

2.3 Set air gap

- A.) The airgap should be between 0.9 - 1.0mm. Place a feeler gauge between the armature and magnet. The measurement can be taken between the paper washer and the magnet.

Tighten/loosen the nuts equally until the air gap measures 0.9mm to 1mm. The air gap should be equal throughout the entire brake circumference to ensure proper functionality.



2.3.1 Set air gap

- B.) Re-install dust protection ring over lead wire cable and stretch into place in the grooves.

 **Note:** It is recommended to power the brake to nominal voltage after installation to verify the armature disengages. It is also recommended to check for free rotation while the brake is powered on.

 **WARNING: AFTER PERFORMING AN EMERGENCY STOP INSPECT BRAKE COMPONENTS AND TEST BRAKE PERFORMANCE BEFORE CONTINUED USE.**

3.0 Accessories

3.1 Hand release

KEB part #0938520-M01U

- A.) In order to install the manual hand release remove the two black manual release bolts.

- Kit includes:
- Handle
- Yoke
- 2x bolt/washer



3.1.1 Mount hand release lever

- B.) Mount the hand release yoke. Start the kit-specific manual spherical release bolts and spherical washers.



3.1.2 Mount hand release flange

3.1 Hand release (cont.)

C.) Tighten the bolts to 60 – 80 Nm with a 13mm wrench.



3.1.3 Tighten bolts

D.) Screw on the hand release lever.

E.) Ensure that the lever is screwed on tight before use.



Note: A pull force of 70 lbs. is required to release the hand brake.



3.1.4 Screw on hand release lever



3.1.5 Tighten hand release lever

F.) Test hand release lever before using brake.

3.2 Microswitch

KEB part #0938270-M01U

Kit includes:
Anti-rotation wire
Precision microswitch
Plunger
Pipeclip and hardware

- A.) Install the anti-rotation wire to the magnet housing holes. This keeps the plunger from rotating out of alignment.



3.2.1 Install wire

- B.) Start the plunger on to the M6 screw.



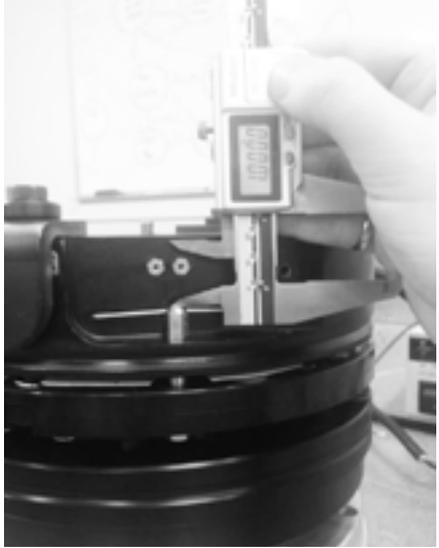
3.2.2 Start plunger

3.2 Microswitch (cont.)

- C.) Tighten the plunger with an 8mm wrench until there is at least a one inch gap from the plunger tip to the top of the magnet.



3.2.3 Tighten plunger



3.2.4 Set plunger gap

- D.) Install microswitch wire on the outside of the magnet housing by fastening the pipe clip with a 4mm hex head key.



3.2.5 Fasten pipe clip

3.2 Microswitch (cont.)

- E.) Apply purple LOCTITE® to the threads on the two M2 screws. Mount the microswitch to the magnet housing with a small flathead screwdriver.



3.2.6 Fasten microswitch

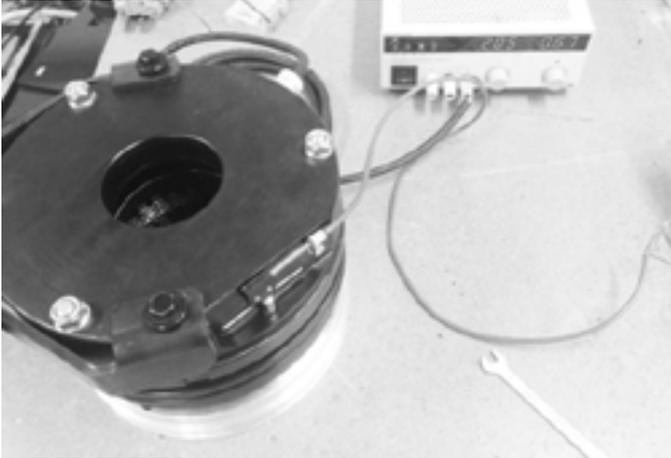
- F.) Connect the microswitch leads to a digital multimeter (microswitch black to red = normally open) and set meter to diode test setting. The multimeter should read OL indicating there is an open switch connection.



3.2.7 Connect multimeter leads

3.2 Microswitch (cont.)

G.) Attach the brake power leads to the power supply and power brake on.



3.2.8 Power brake on

H.) Begin to adjust the plunger out with an 8 mm wrench; the plunger is to be loosened until the contact is made with the switch.



3.2.9 Loosen plug

3.2 Microswitch (cont.)

- I.) Continue to adjust until the switch trips and the multimeter begins to beep. Adjust out the plunger 1/6 turn more. At this point the microswitch is set.
- J.) Test microswitch before using brake.



3.2.10 Trip switch



Note: It is recommended to cycle power several times to ensure microswitch resets.

3.3 Rectifier

Several rectifiers are available for the Combistop Load Brake. Size 04 KEB rectifiers can be used and wired on the AC side or simultaneous AC and DC side switching. An overexcitation or OEX switch is also available and also switches simultaneously on the AC and DC sides.

Switching simultaneously on the AC and DC sides guarantees short disconnecting times and reduces contact erosion. For simultaneous switching it is recommended to also use an MOV on the DC side. AC side switching will yield slower switching times but requires no protective measurement for the coil and switching contacts.

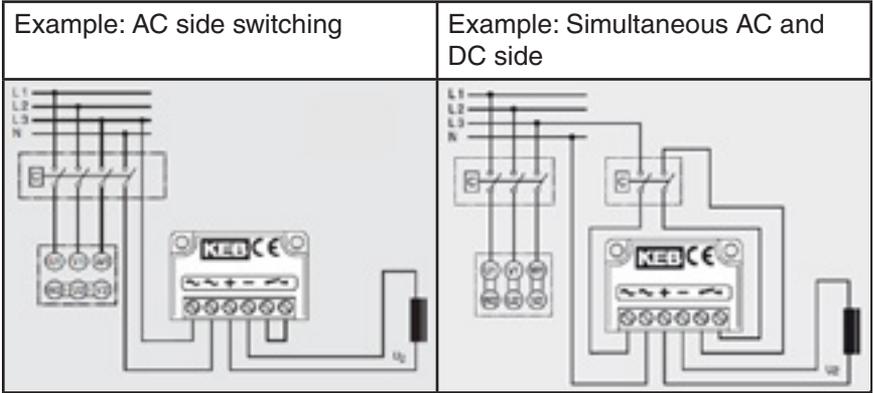
KEB Half Wave Rectifier Part Number: 0491010-CE07

$$V_{\text{out}} = V_{\text{in}} * 0.45$$

KEB Full Wave Rectifier Part Number: 0491020-CE07

$$V_{\text{out}} = V_{\text{in}} * 0.90$$

Rectifier specifications	
Rated current	1.2 A
Rated temperature	45° C
Max input voltage	500 VAC



Terminal Cross Section = $2.5\text{mm}^2 = \text{AWG } 16$

i This is a wiring suggestion. Other solutions are possible. Please consult KEB America for any questions.

Contactor must have minimum AC-1 rating of 25A or minimum AC-3 rating of 9A
 Optional MOV for DC coil and contact protection
 For coil voltages $\geq 180\text{VDC}$



KEB MOV Part Number:
 0090045-6255 or 22900456255

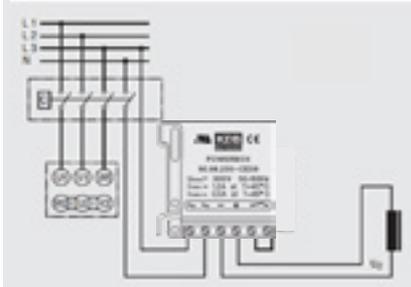
- V_{rms} : 625
- V_{DC} : 825
- W_{max} (2ms): 595
- P_{max} : 1.00W

Overexcitation switch KEB Part Number: 9098200-CE09

230VAC install (105VDC coil)

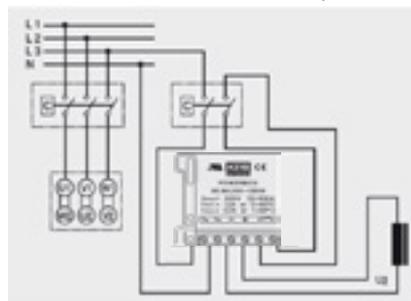
Wiring diagram

AC side switching



AC and DC side switching

At this voltage it is recommended to use a MOV for DC coil and contact protection



230VAC FULL WAVE (205VDC) FOR 0.35s THEN 230VAC HALF WAVE (105VDC) HOLDING VOLTAGE



This is a wiring suggestion.
Other solutions are possible.
Please consult KEB America for any questions.

Rectifier specifications

Rated input voltage: 180 - 300 VAC 50/60 Hz \pm 10%

Full wave \rightarrow half wave rectification

Full Wave for 300ms (VDC = VAC x 0.9)

UL Rated currents:

Full Wave UL current rating: 2.4A

Half Wave UL current rating: 1.2A

Max operating temperature: 0 - 75°C

Terminal maximum wire size: 1.5mm² or 15 AWG

Contactor must have minimum AC-1 rating of 25A or minimum AC-3 rating of 9A MOV for DC coil and contact protection

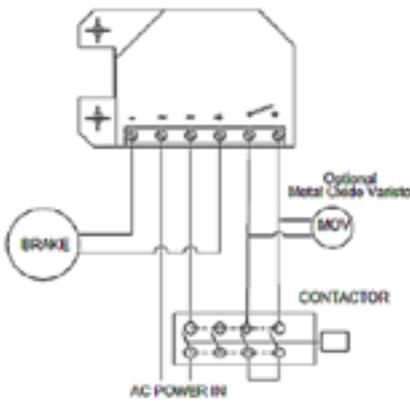


*KEB MOV Part Number:
0090045-6255 or 22900456255*

- Vrms: 625
- VDC: 825
- Wmax (2ms): 595
- Pmax: 1.00W

Overexcitation switch KEB Part Number: 9098200-001U

460VAC install (205VDC coil)

Wiring diagram	Rectifier specifications
 <p>480VAC FULL WAVE (432VDC) FOR 0.3s THEN 480VAC HALF WAVE (216VDC) HOLDING VOLTAGE</p>	<p>Rated input voltage: 250-500 VAC 50/60 Hz \pm 10%</p> <p>Full wave \rightarrow half wave rectification</p> <p>Full Wave for 300ms (VDC = VAC x 0.9)</p> <p>UL Rated currents:</p> <p>Full Wave UL current rating: 1.2A</p> <p>Half Wave UL current rating: 0.6A</p> <p>Rated operating temperature: 0 - 80°C</p> <p>Terminal maximum wire size: 1.5mm² or 15 AWG</p> <p>Contactor must have minimum AC-1 rating of 25A or minimum AC-3 rating of 9A</p> <p>Optional MOV for DC coil and contact protection</p> <p>For coil voltages \geq 180VDC</p>  <p><i>KEB MOV Part Number: 0090045-6255 or 22900456255</i></p> <ul style="list-style-type: none"> • Vrms: 625 • VDC: 825 • Wmax (2ms): 595 • Pmax: 1.00W

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