SEW-Eurodrive Brake Notes

1. When working on SEW- Eurodrive brakes we should keep in mind the following:

2. The brake voltage may be 24v dc because the brake system lends itself well to use in process automation system where other components are controlled by 24v dc. Signals. Safety reasons may also dictate the use of a 24v dc brake system.

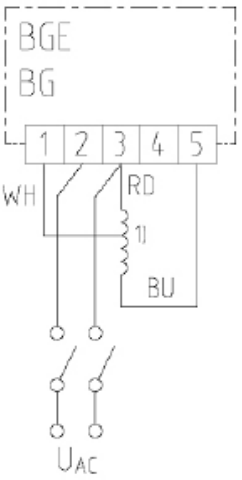
3. The cut-off may be in the AC circuit (standard application of the brake)

4. The cut-off may be in the DC circuit (rapid brake application)

5. The cut-off may be in the DC and AC circuits (rapid brake application)

6. The brake winding is composed of 2 sections, BS and TS. The BS is the Accelerator coil and the TS is the Fractional coil section.

AC	Cut-off in the AC circuit (standard application of the brake)
DC	Cut-off in the DC circuit (rapid brake application)
DC AC	Cut-off in the DC and AC circuits (rapid brake application)
BS TS	Brake BS = Accelerator coil TS = Coil section



Typical Wiring Diagram

The Accelerator coil winding resistance = 1 /4 of winding resistance
The Fractional coil winding resistance = 3 /4 of winding resistance
Total coil winding resistance = sum of Accelerator and holding coil resistance.

Brake Operation

1. Initially the rectifier energizes the Accelerator (BS) coil very quickly due to its low resistance
Low Resistance = High Current = Strong Magnetism = Fast Reaction

2. After 120 ms the rectifier energizes both coils. The combined coils have a higher resistance,allowing the coils to de-energize faster when power is removed.
High Resistance = Low Current = Weak Electromagnetism = Quick Coil Collapse

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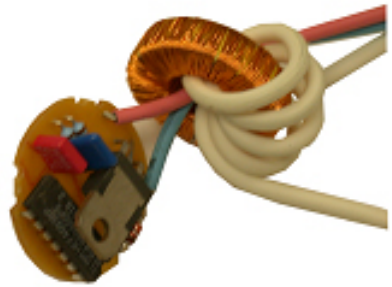
SEW Brakes



Service and Maintenance

Objectives

- Upon completion of this session, you will be able to do the following:

  - Identify the components of an SEW brakemotor
  - Explain the operation of the SEW brakemotor
  - Apply basic troubleshooting procedures

Brake Purpose

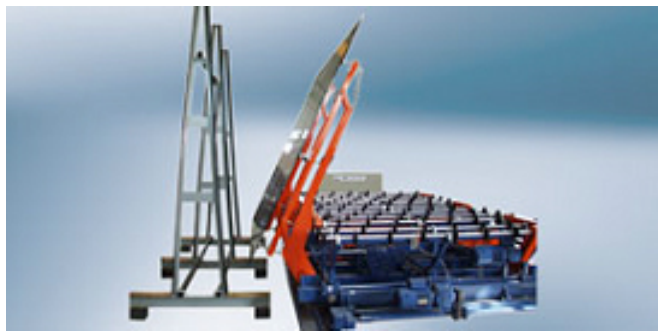
- To Stop Motion
  - The brake engages when power is removed from the motor
  - The brake applies force to an object in motion until friction either slows or stops the motion.
  - Motor slows and finally stops
- To Prevent Motion
  - Brake engages after motor has come to complete stop
  - Brake merely holds motor to prevent rotation.

Brake Features

- SEW features:
  - Fail-safe operation
  - Rectifier for conversion of AC into DC current
  - DC controlled brake coil

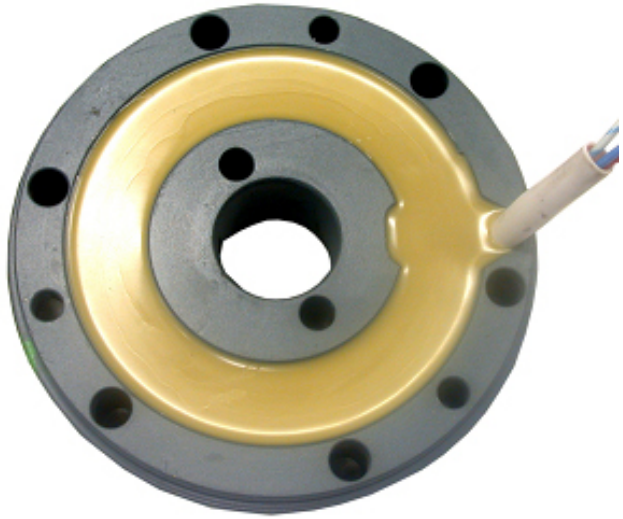
Without a fail-safe brake, what would happen to machinery in the event of a power loss?

What about the product?



Brake Operation

- Coil functions like an electromagnet when energized



Brake Coil

Brake Operation

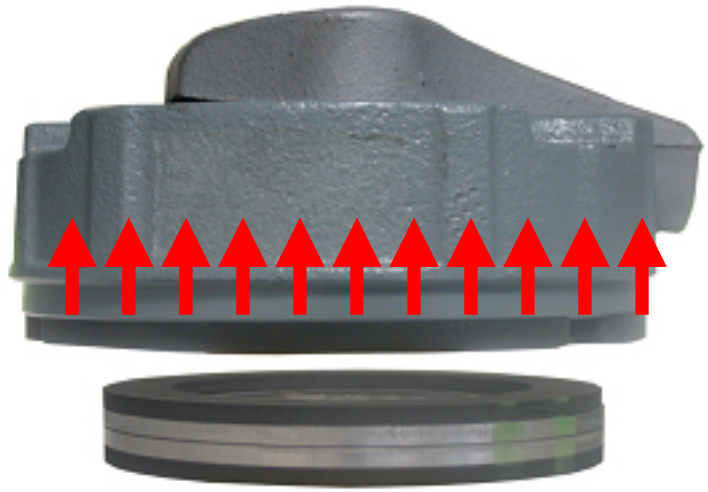
De-energized

When the coil is de-energized, the springs apply force to the stationary plate.

This force presses against the brake disc to create friction.

Friction stops the motor and/or prevents it from rotating.

Energized



When the coil is energized, its magnetic field pulls the plate towards the coil.

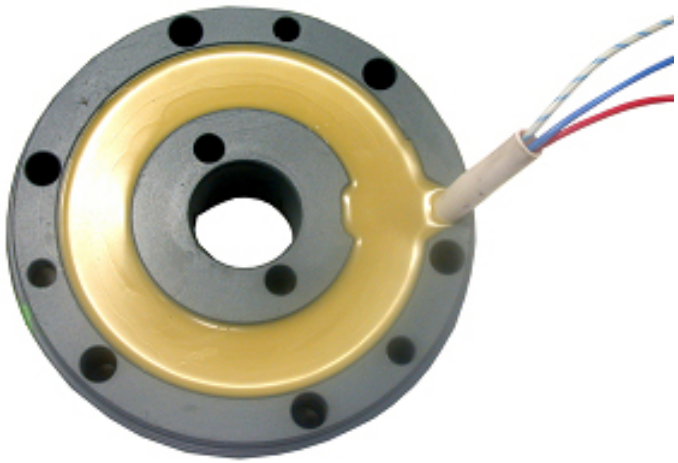
The magnetic force compresses the springs.

The motor can now rotate freely.

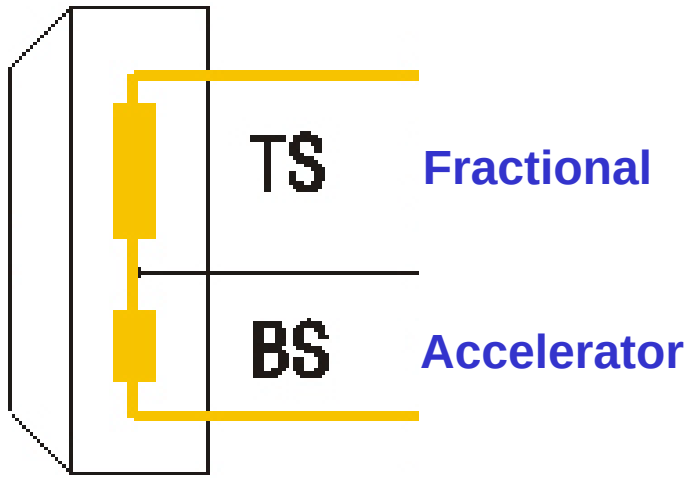
VIDEO

Brake Operation

- Coil:
  - The brake coil actually consists of two separate parts: an Accelerator coil (BS) and a Fractional holding coil (TS).
  - An SEW brake rectifier controls both coils.



Brake Coil



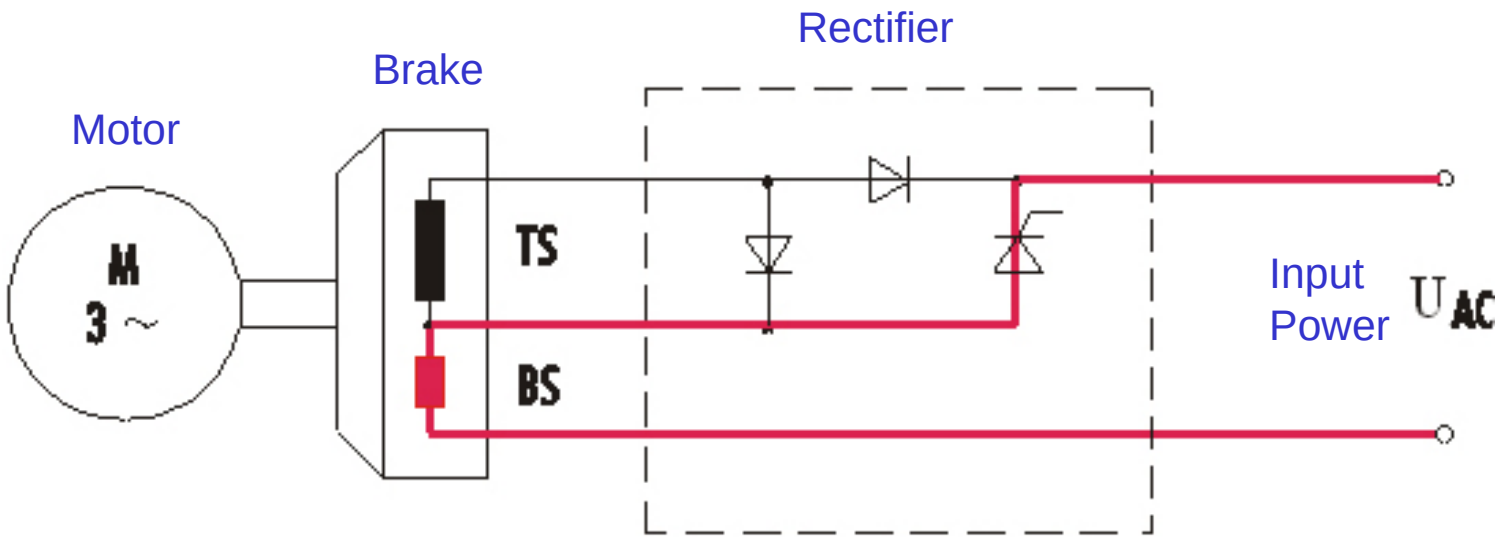
Brake Operation

- Step 1
  - Initially, the rectifier energizes the Accelerator (BS) coil very quickly, due to its low resistance.

Low resistance = High Current

High Current = Strong Electromagnetism

Strong Electromagnetism = Fast Reaction



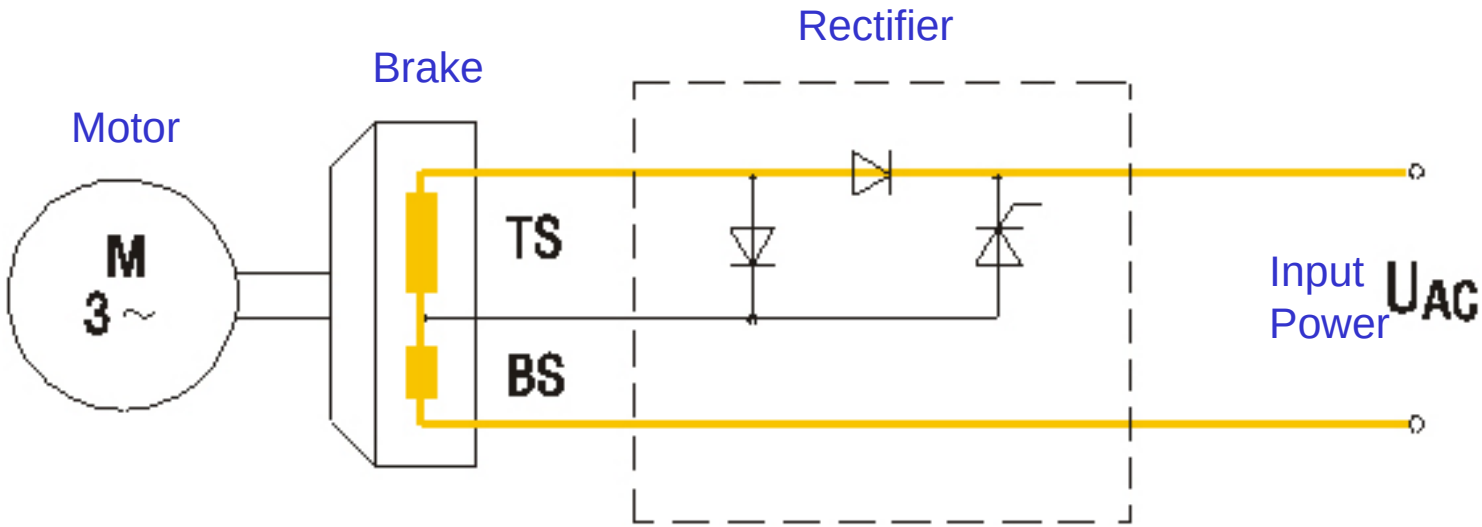
Brake Operation

- Step 2
  - After 120 ms, the rectifier energizes both coils. Combined coils have a higher resistance, allowing the coils to de-energize faster when power is removed.

High resistance = Low Current

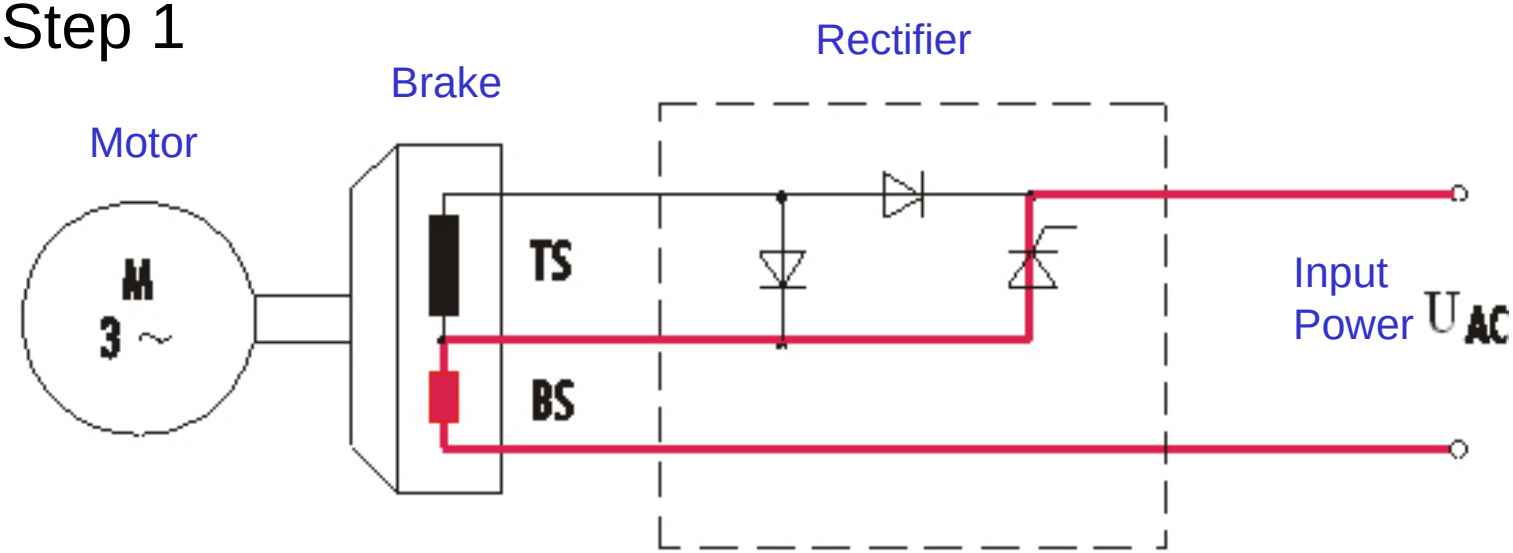
Low Current = Weak Electromagnetism

Weak Electromagnetism = Quick Coil Collapse

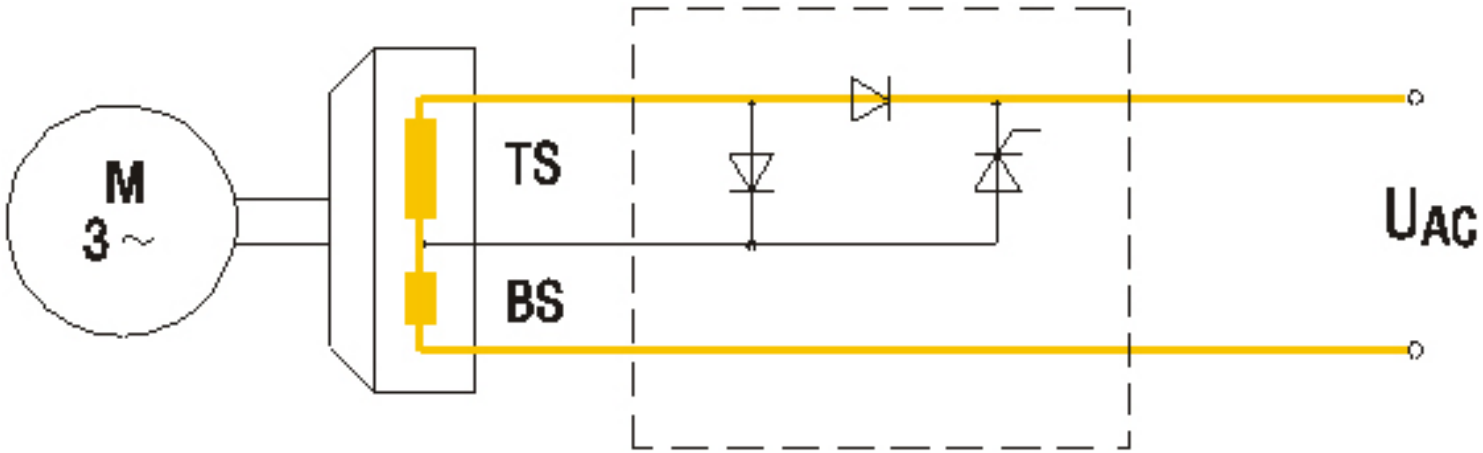


Brake Operation

- Step 1



- Step 2 – 120ms



Brake Operation

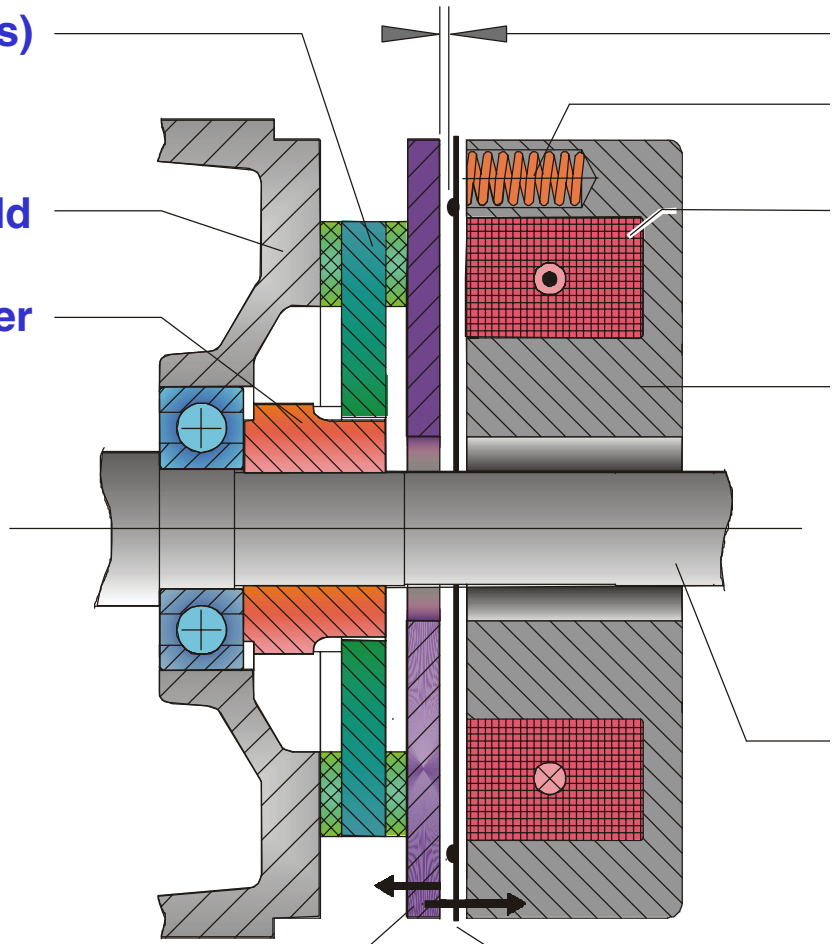
- Starting

  1. The rectifier energizes the brake coil.
  2. The brake coil attracts the stationary disc, removing pressure between stationary disc and brake disc.
  3. Motor rotates freely.

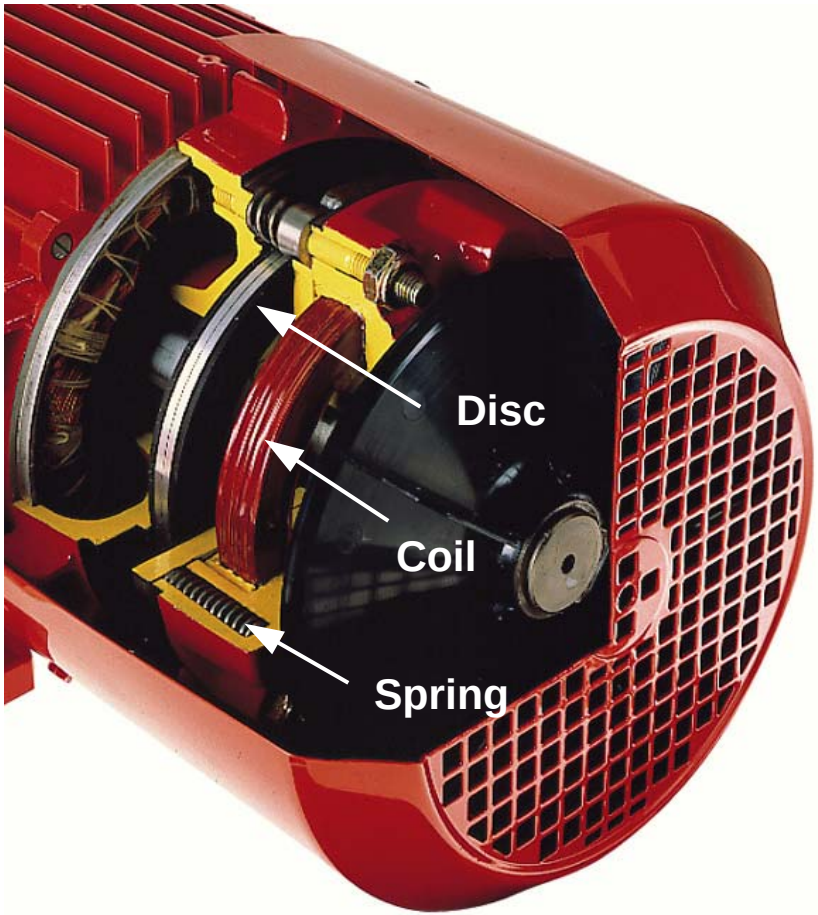
- Stopping

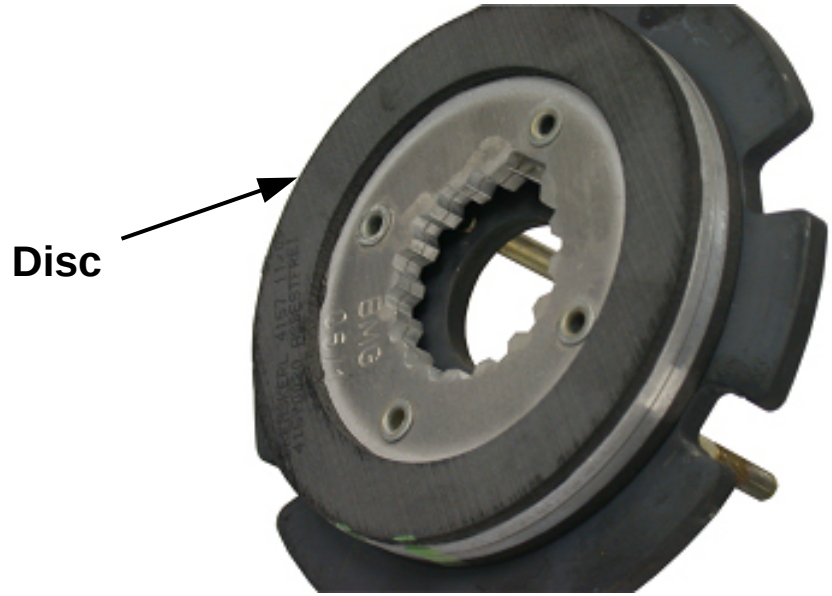
  1. Rectifier de-energizes the coil.
  2. Brake springs create pressure between stationary disc and brake disc.
  3. Friction stops motor and prevents it from rotating.

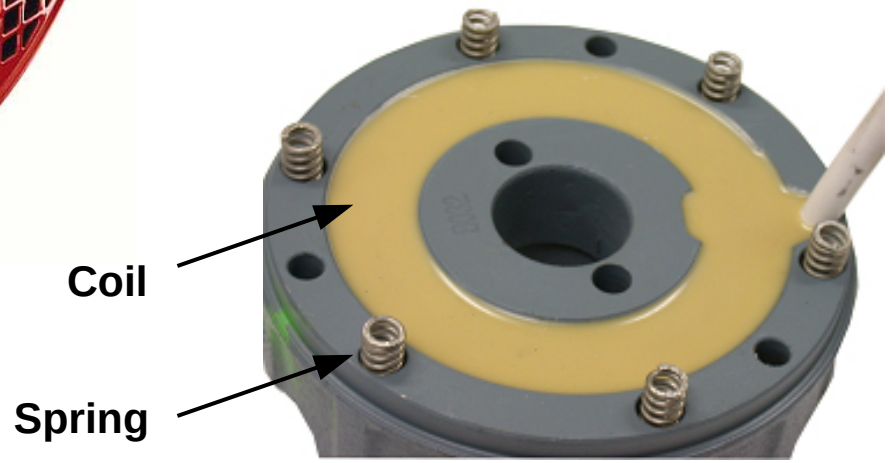
Brake Components



Brake Components





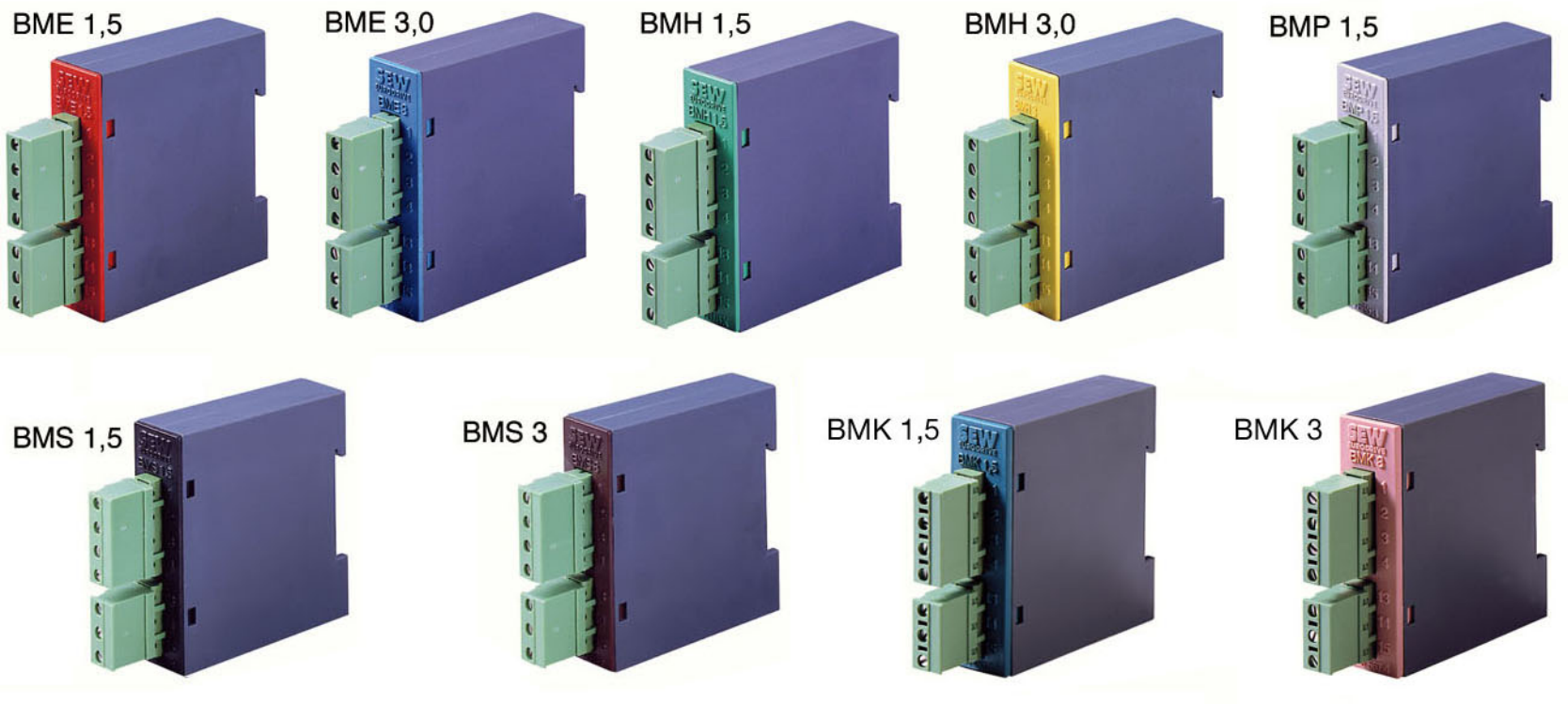


Brake Components

- Rectifiers and relays that mount in Motor Conduit Box

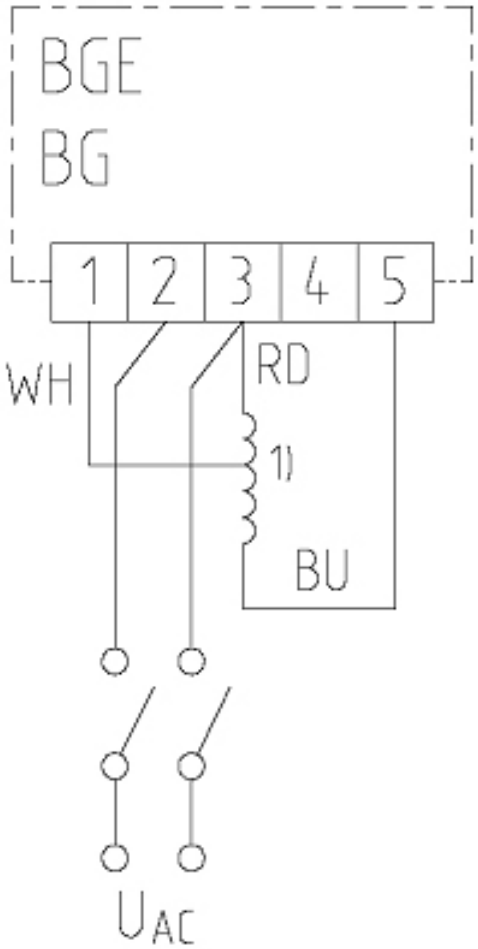
Brake Components

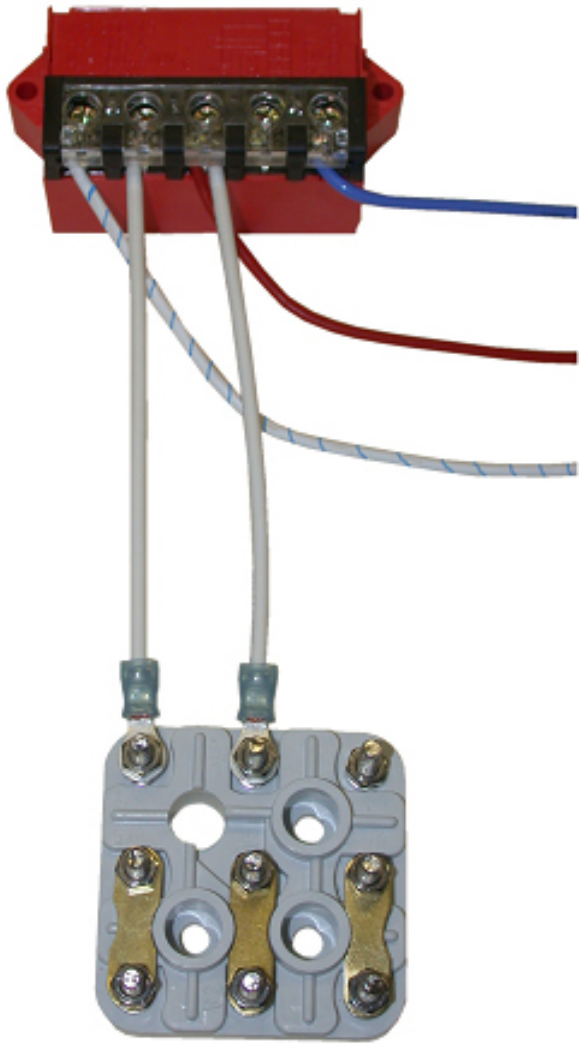
- Rectifiers that mount in Control Panel



Brake Components

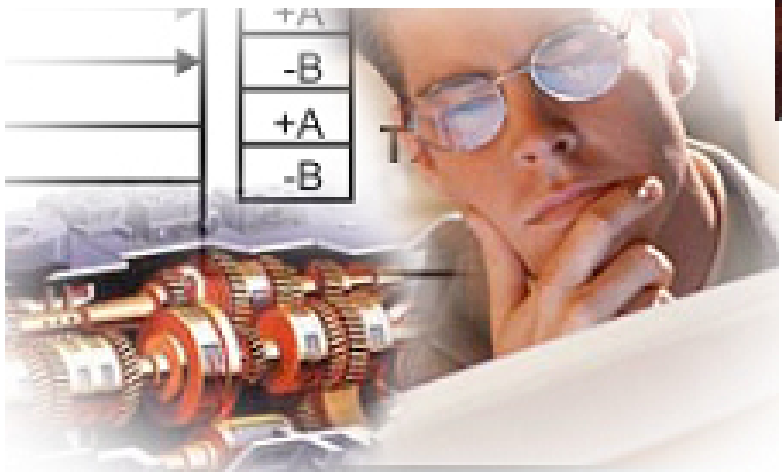
- Typical wiring diagram





Troubleshooting

- Troubleshooting an SEW brake



Troubleshooting

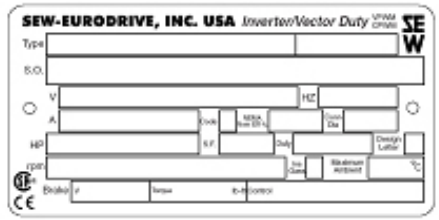
- Always follow the proper lockout/tagout procedures.

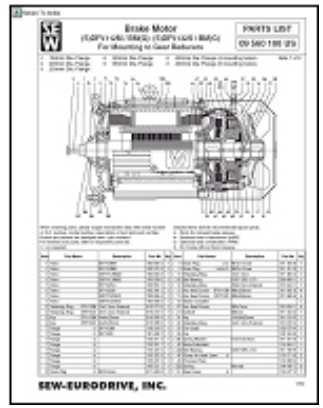
- Use the proper safety equipment at all times

Troubleshooting

- Resources needed

  - Nameplate data from motor
  - Brakemotor operating instructions
  - Motor/Brakemotor parts list
  - Digital multi-meter





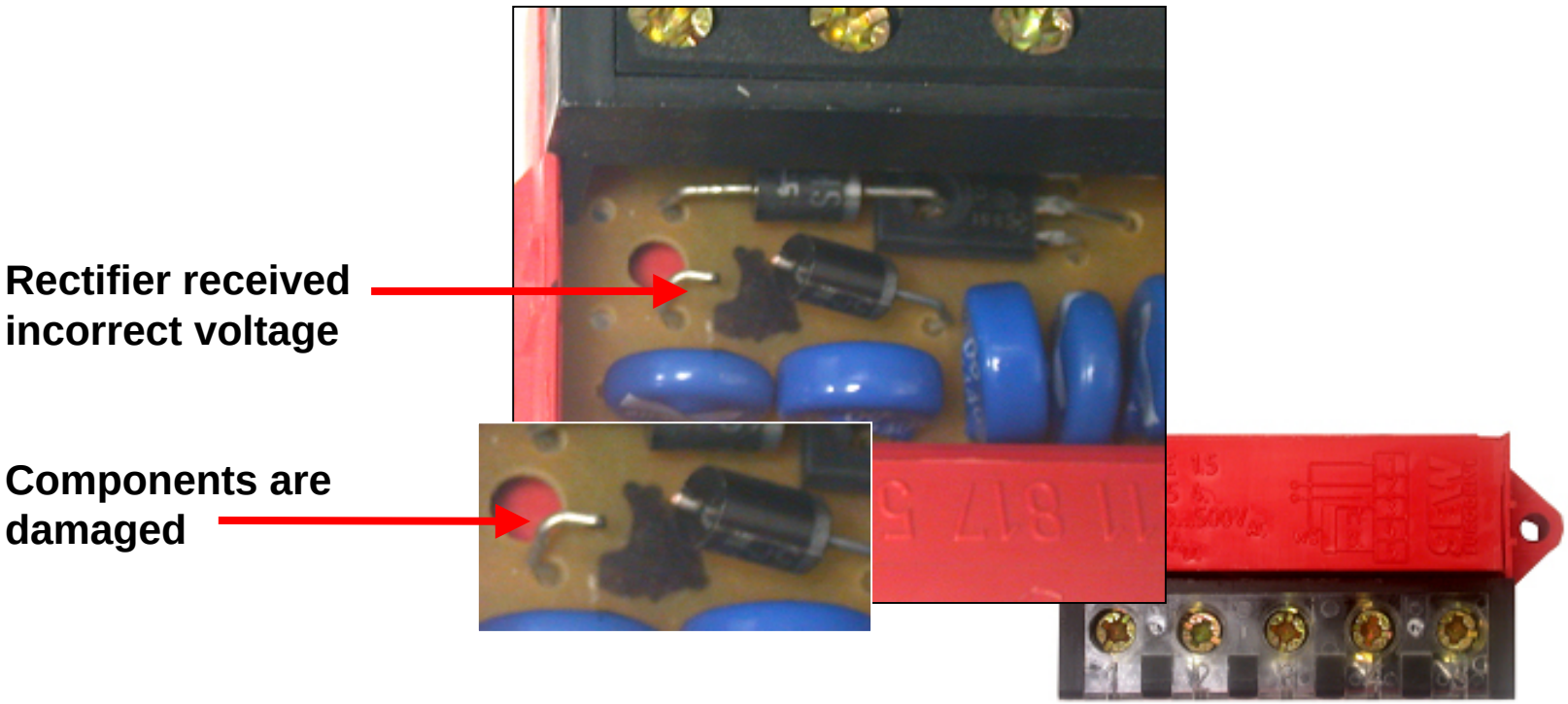
Troubleshooting

- Possible Faults

  - Rectifier is damaged.
  - Rectifier is wired incorrectly.
  - AC brake voltage is incorrect or not applied.
  - Brake coil is damaged or malfunctioning.
  - Brake is mechanically locked.
  - Air gap is outside of tolerance.
  - Brake disc is worn or damaged.

Troubleshooting

- Brake rectifier is damaged
  - Incorrect voltage or wiring of the rectifier causes internal or external damage

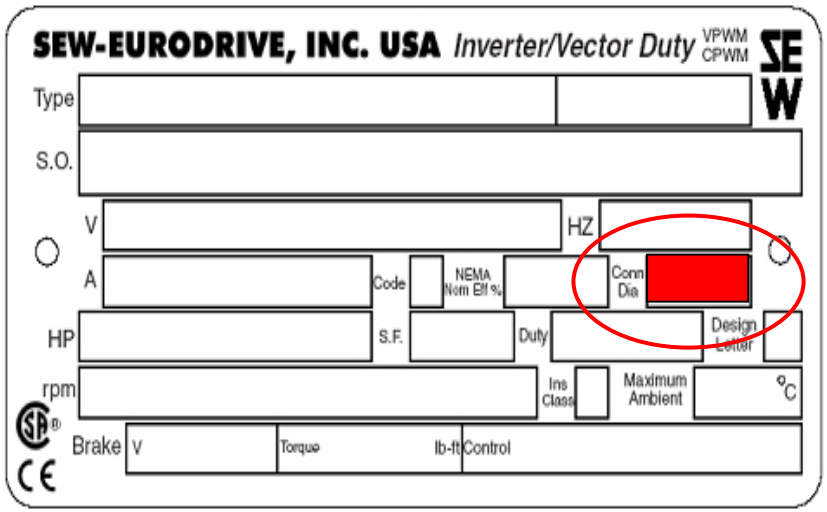


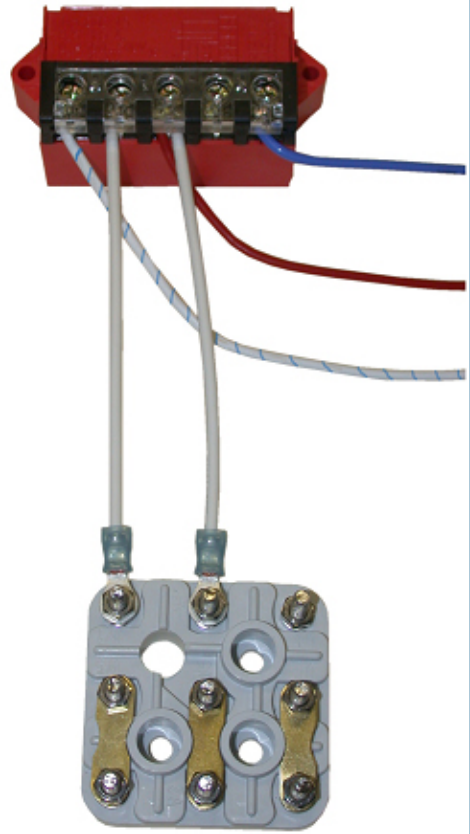
Troubleshooting

- Rectifier is wired incorrectly.

  - Refer to nameplate for correct type of connection (Conn Dia)

  - Refer to the operating instructions for wiring diagrams

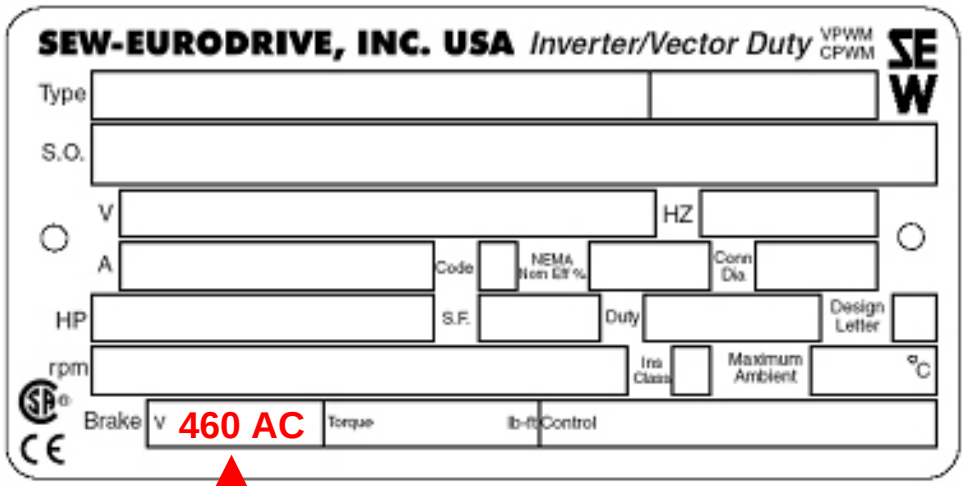




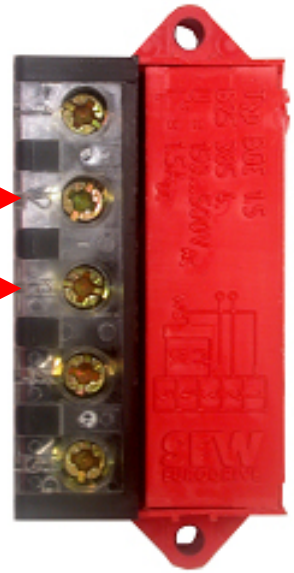
Troubleshooting

- AC brake voltage is incorrect or not applied

  - Refer to nameplate for correct brake voltage



AC Voltage that should be applied to the brake rectifier



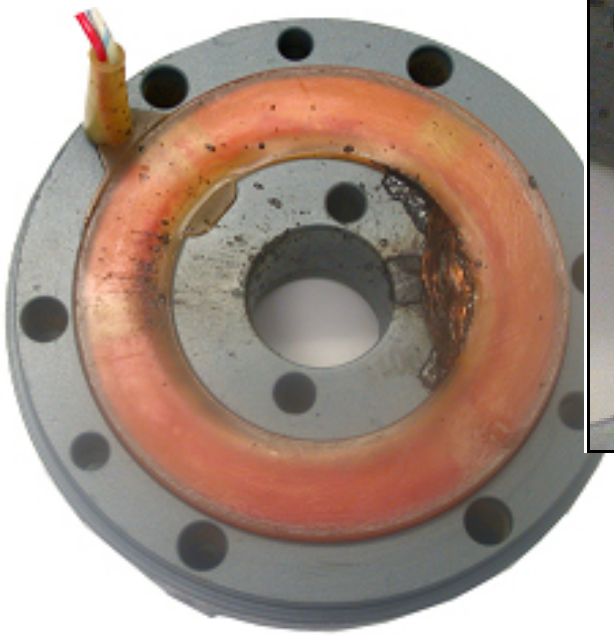
Troubleshooting

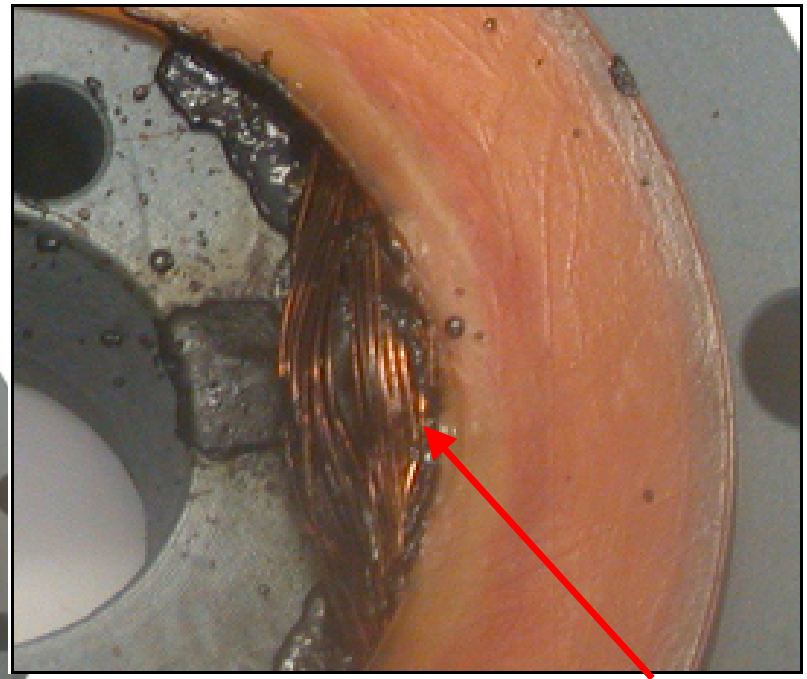
- Check voltage at brake contactor
  - If rectifier power does not come from motor terminals, measure the voltage at the brake contactor

- Check the activation of the brake contactor
  - Verify that the brake contactor functions properly and changes position when energized

Troubleshooting

- Brake coil is damaged or malfunctioning
  - Wrong voltage applied to brake coil causes internal and external damage





Coil received wrong voltage

Troubleshooting

- Obtain normal coil resistances

Look up the correct values in the SEW Brakemotor Operating Instructions.

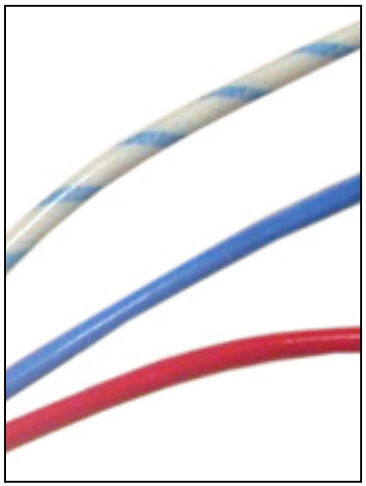
Motor Frame Brake Size Brake Torque (lb-ft)		DT71-80 BM(G)05 0.89 - 3.7	DT80 BM(G)1 4.4 - 7.4	DT90-100 BM(G)2 3.7 - 14.8	DT100 BM(G)4 17.7 - 29.5	DV112-132S BM(G)8 7.00 - 55.3	DV132M-160M BM15 18.4 - 110.6	DV160L-225 BM30/31/32/62 36.9 - 442.5	DV250-280 BMG61/122 147.5 - 885
BRAKE VOLTAGE AC (to rectifier V_c)	DC	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)	R_B(Ω) R_T(Ω)
—	24	4.4 13.4	3.9 12.1	3.4 10.2	2.7 8.2	1.4 7.5	0.8 5.0	0.67 5.0	—
105 - 116	48	17.6 53.4	15.6 48.1	13.6 40.5	10.9 32.7	5.7 29.8	3.1 20.1	2.2 16.8	—
186 - 207	80	55.6 169	49.5 152	42.9 128	34.5 103	17.9 94.2	9.8 63.5	7.1 53.0	—
194 - 217	80	—	—	—	—	—	—	—	4.0 32.6
208 - 233	96	70.0 213	62.3 192	54.0 161	43.4 130	22.5 119	12.4 80.0	8.9 66.7	—
218 - 243	96	—	—	—	—	—	—	—	5.0 41.0
330 - 369	147	176 534	157 481	136 405	109 327	56.5 298	31.1 201	22.3 168	—
344 - 379	147	—	—	—	—	—	—	—	12.6 103
370 - 414	167	221 672	197 606	171 510	137 411	71.2 375	39.2 253	28.1 211	—
380 - 431	167	—	—	—	—	—	—	—	15.8 130
415 - 464	185	279 846	248 762	215 643	173 518	89.6 472	49.3 318	35.4 266	—
432 - 484	185	—	—	—	—	—	—	—	19.9 163
465 - 522	208	351 1066	312 960	271 809	218 652	113 594	62.1 401	44.6 334	—
485 - 542	208	—	—	—	—	—	—	—	25.1 205

Voltage
AC - The voltage shown is the nameplate AC brake voltage supplied to the brake rectifier.
DC - The voltage shown is the effective DC voltage required by the brake coil. The measured voltage from the rectifier will be 10-20% lower than that shown.

Brake Coil Resistance - values must be measured with the brake coil disconnected from the rectifier.
R_B - Accelerator coil resistance in Ω, measured from the red to the white brake coil wire at 20° C.
R_T - Fractional coil resistance in Ω, measured from the white to the blue brake coil wire at 20° C.

Troubleshooting

- Measure the actual resistances of accelerator coil and fractional coil



14-white w/ blue stripe

15-blue

13-red

13-14 (accelerator coil)

14-15 (fractional coil)

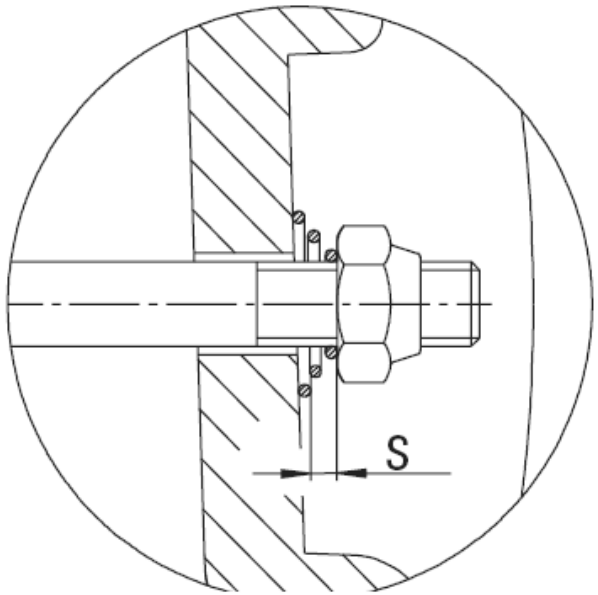
13-15 (total coil)

Accelerator coil winding resistance	**= ¼ of winding resistance**
Fractional coil winding resistance	**= ¾ of winding resistance**
Total coil winding resistance	**= sum of accelerator and holding coil resistance**

Troubleshooting

- Brake is mechanically locked

  - Verify the free play on the release arm. Loosen the locking nuts as needed to achieve 1.5 – 2.0 mm gap. (S Dimension)



Caution!

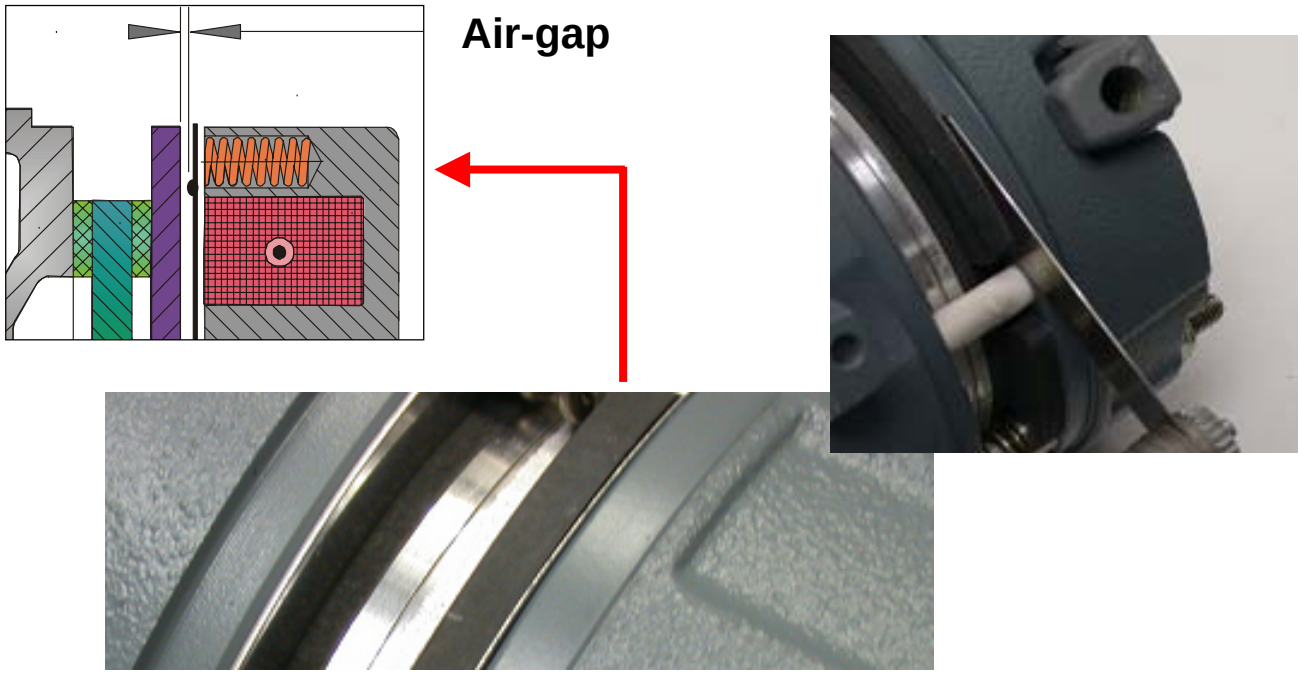
There must always be clearance on the lever.

Note: The brake release mechanism is not used to change the brake's torque setting.

Troubleshooting

- Air gap is outside of tolerance

  - Insufficient air gap between the dampening plate (BMG brakes) and the brake coil. (For BM brakes, there is no dampening plate, so air gap lies between stationary disc and brake coil).



Troubleshooting

- Obtain correct value for air gap.

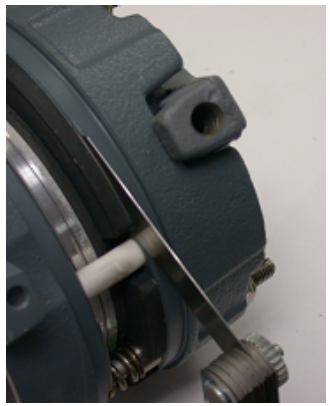
Look up the correct values in the SEW Brakemotor Operating Instructions.

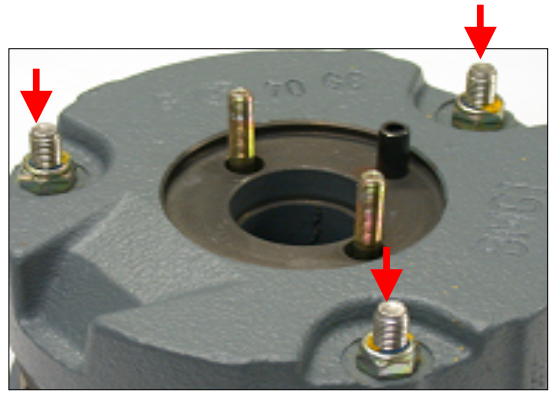
Motor Size	Brake Size	Air Gap
DT71 - DT100	BM(G)05 - BM(G)4	0.010"-0.024" (0.25-0.6 mm)
DV112 - DV225	BM(G)8 - BM31	0.012"-0.047" (0.3-1.2 mm)
DV180 - DV225	BM32-BM62 Double Disc	0.016"-0.047" (0.4-1.2 mm)
DV250 - DV280	BMG61	0.012"-0.047" (0.3mm - 1.2mm)
	BMG122 Double Disk	0.016"-0.047" (0.4mm-1.2mm)

Troubleshooting

Adjust the Brake Air Gap (Method 1)

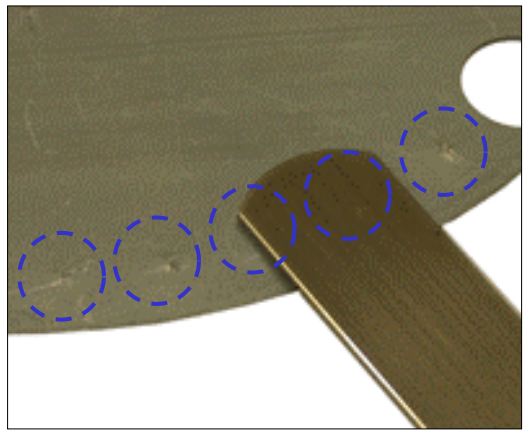
1. Insert feeler gauge between dampening plate and coil (BMG) or between stationary plate and coil (BM).
2. Tighten (3) hex nuts until there is minimal air gap (clearance) equally around the disc





Attention:

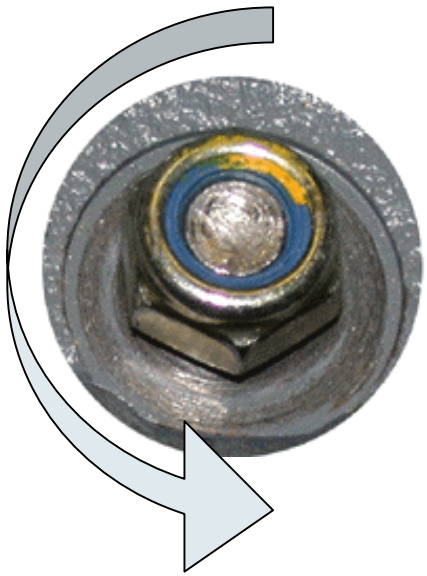
When using a feeler gauge on a BMG brake, measure from a dimple on the dampening plate!



Troubleshooting

- Adjust the Brake Air Gap (Alternate Method 2)

1. Tighten the three adjustment nuts equally to establish zero air gap.
2. Loosen the adjustment nuts according to the figures below.



Brake Size	Degree of Rotation	Approximate Rotation Amount
BM(G)05, BM(G)1	160°	7/16 Turn
BM(G)2, BM4	135°	3/8 Turn
BM(G)8	180°	1/2 Turn
BM15, BM30, BM31	145°	2/5 Turn
BM32, BM62	135°	3/8 Turn
BMG61, BMG122	145°	2/5 Turn

Note: Chart is based on the middle air gap tolerance. However, all SEW brakes fall within the air gap tolerance range if the degree of rotation is ½ turn.

Troubleshooting

- Brake disc is worn or damaged
  - Sliding friction causes carbon-based brake disc to wear
  - High cycle rates require more frequent disc replacement
  - Overheating can cause stationary disc to warp

Troubleshooting

- Check thickness of brake disc

Motor Size	Brake Size	Min. Disc (26) Thickness
DT71 - DT100	BM05 - BM4	0.354" (9mm)
DV112 - DV225	BM8 - BM62	0.394" (10mm)
DV250 - DV280	BMG61 - BMG122	0.472" (12mm)

1. Measure the brake disc with calipers to determine the actual disc thickness.
2. If the disc is below tolerance, replace it.
3. If the disc is acceptable, reinstall it according to the parts list and operating instructions.

Review

- What are the components of an SEW brake?

  SHOW ME

- How does an SEW brake function?

  SHOW ME

- What possible faults could occur when an SEW brake does not operate properly?

  SHOW ME

Brake Operation

- Starting

  1. The rectifier energizes the brake coil.
  2. The brake coil attracts the stationary disc, removing pressure between stationary disc and brake disc.
  3. Motor rotates freely.

- Stopping

  1. Rectifier de-energizes the coil.
  2. Brake springs create pressure between stationary disc and brake disc.
  3. Friction stops motor and prevents it from rotating.

Review

- What are the components of an SEW brake?

  SHOW ME

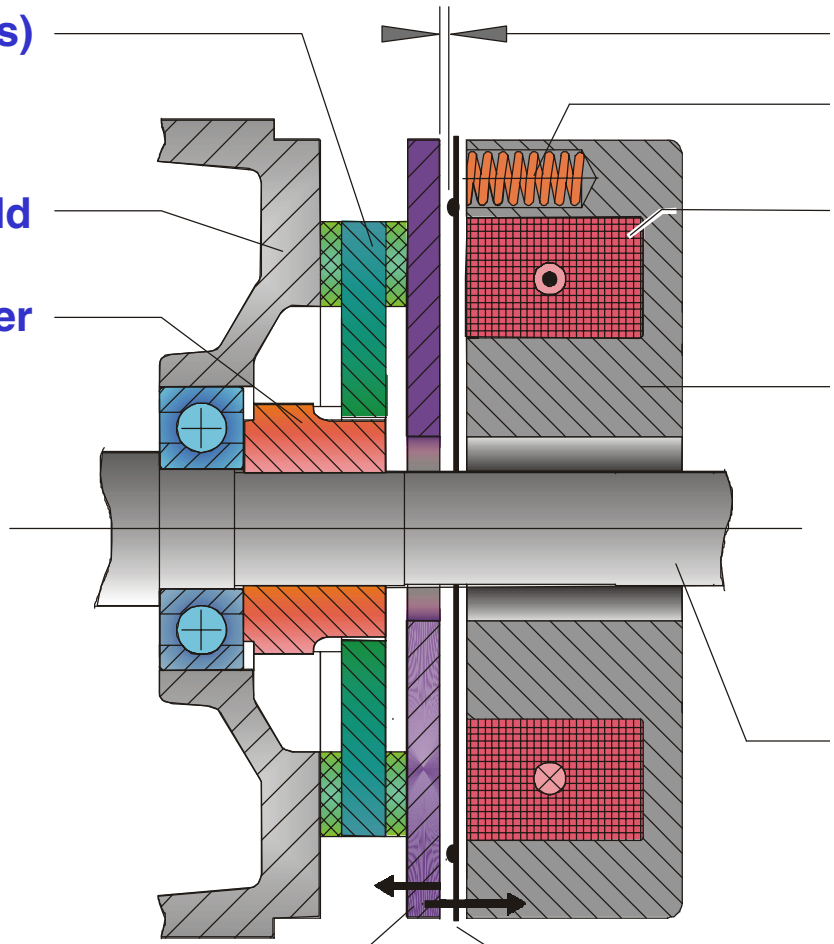
- How does an SEW brake function?

  SHOW ME

- What possible faults could occur when an SEW brake does not operate properly?

  SHOW ME

Brake Components



Review

- What are the components of an SEW brake?

  SHOW ME

- How does an SEW brake function?

  SHOW ME

- What possible faults could occur when an SEW brake does not operate properly?

  SHOW ME

Troubleshooting

- Possible Faults

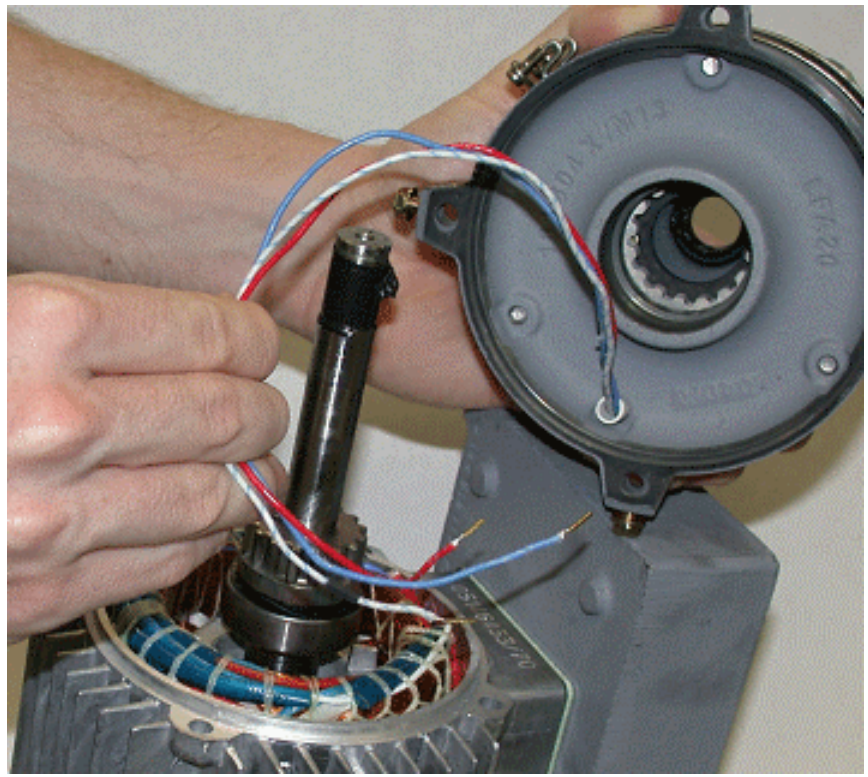
  - Rectifier is damaged.
  - Rectifier is wired incorrectly.
  - AC brake voltage is incorrect or not applied.
  - Brake coil is damaged or malfunctioning.
  - Brake is mechanically locked.
  - Air gap is outside of tolerance.
  - Brake disc is worn or damaged.

SEW Maintenance Series

Complete Brake Replacement

Objectives

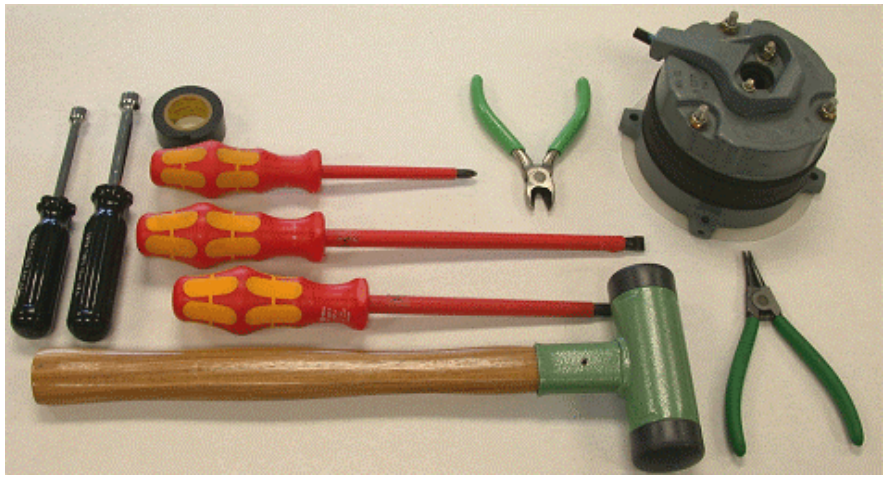
- After studying the contained information you will be able to accomplish the following:
  - Perform the removal of the existing brake
  - Perform the installation of the replacement brake



Tools and Materials

- What you will need:

  - 1 10mm Nut-driver
  - 1 8mm Nut-driver
  - 1 Medium Philips Screwdriver
  - 1 External Snapring Pliers
  - 1 Dead-blow Hammer
  - 1 Cutting Pliers
  - 2 Flat-tip Screw Drivers
  - 1 Replacement Brake
  - 1 Roll of Electrical Tape



Safety

- Always follow the proper lockout/tagout procedures.

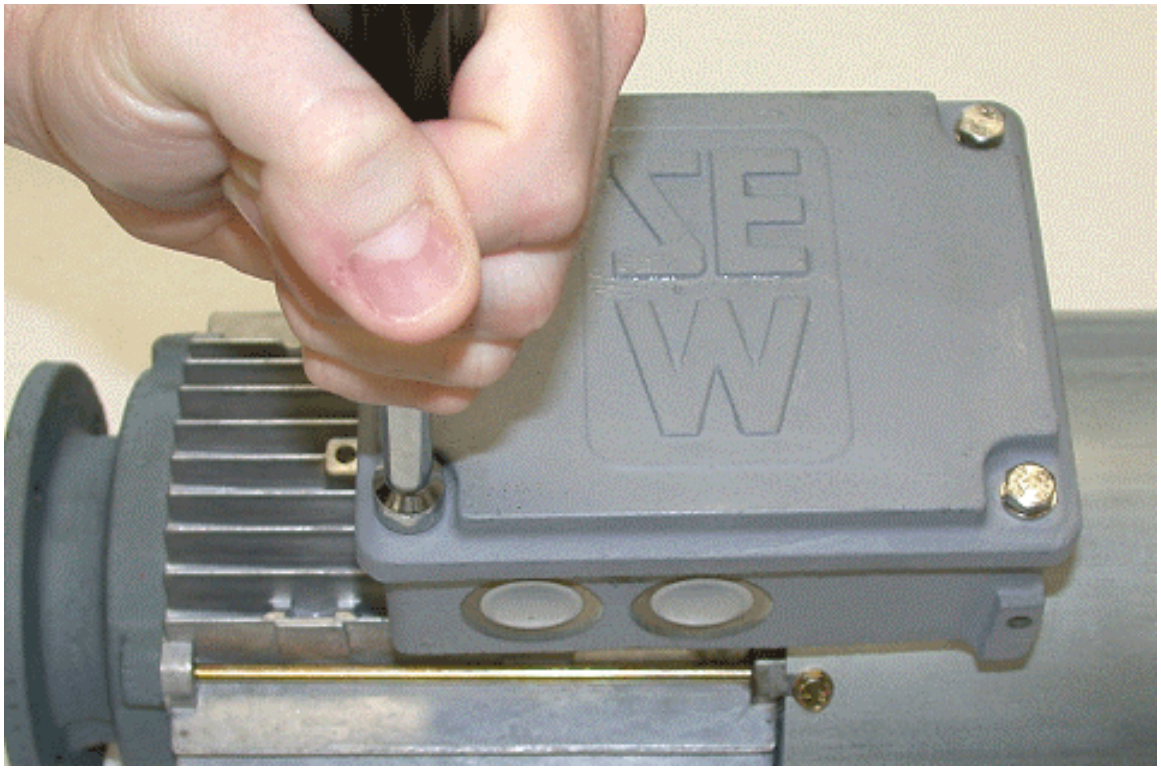
- Make sure to use the proper safety equipment at all times.

Step 1

- Disconnect all power sources to the motor.

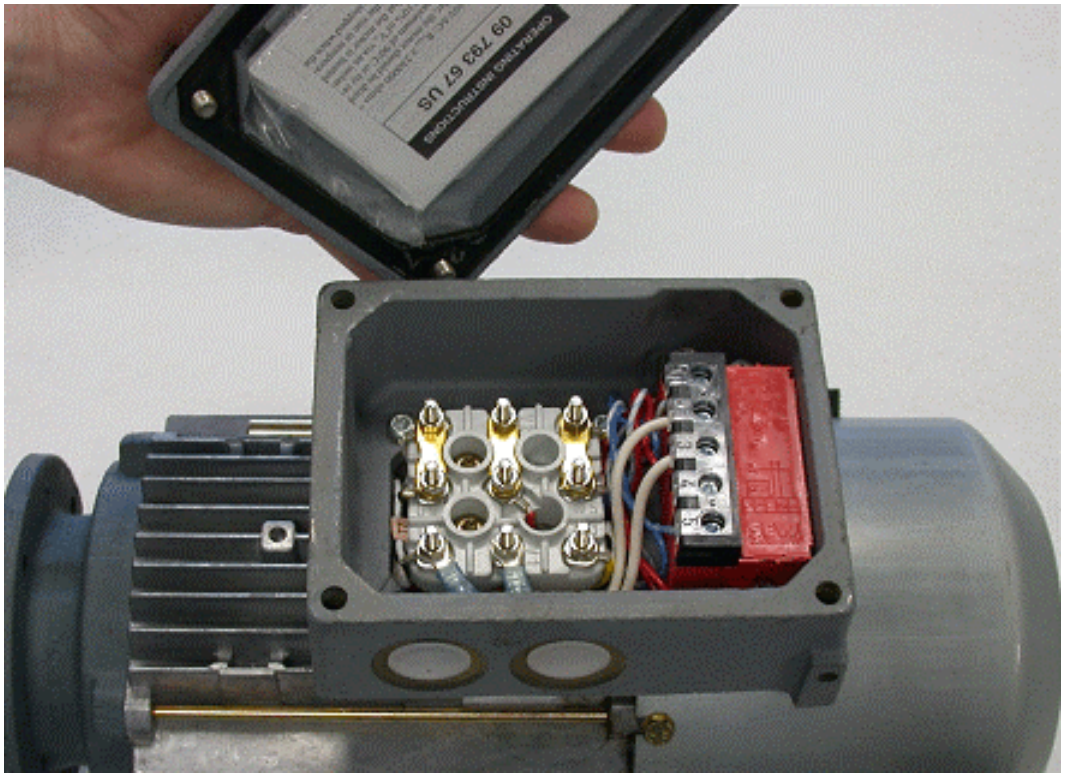
Step 2

- Using the 10mm nut driver, loosen the 4 small screws that hold the conduit box cover into place.



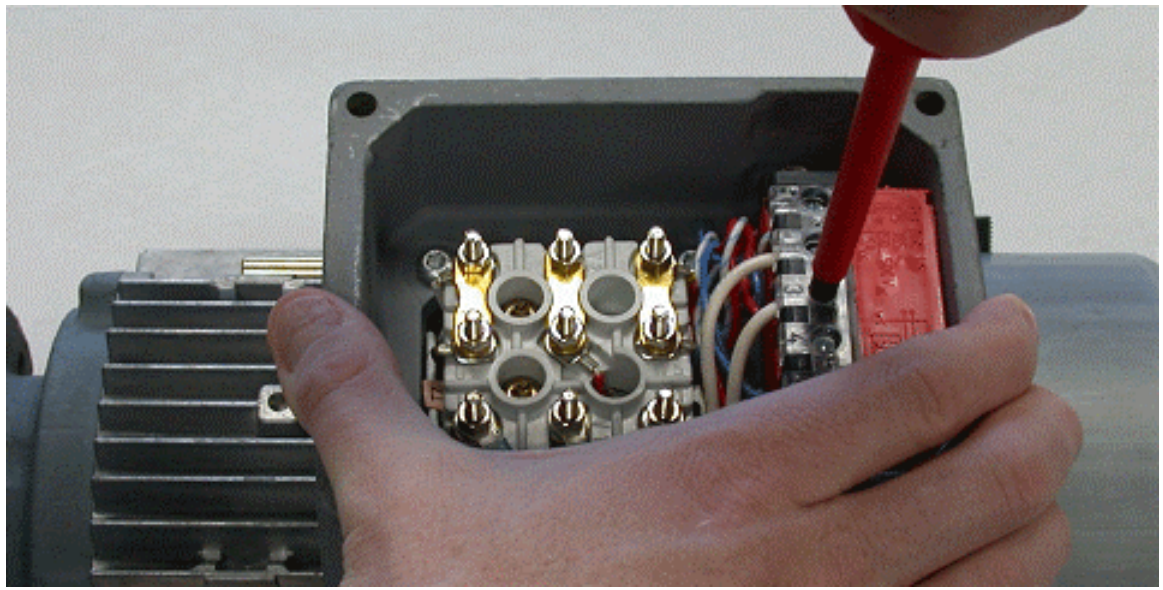
Step 3

- Remove the conduit box lid from the conduit box.



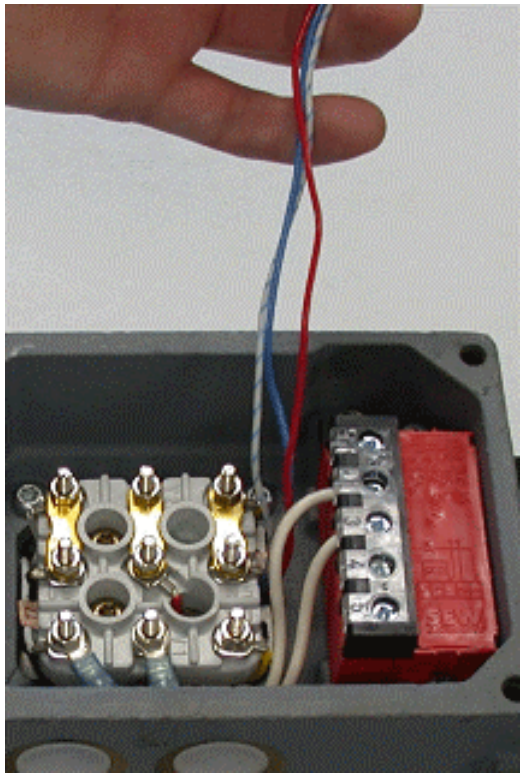
Step 4

- Using a Philips screw driver, remove the three brake wires from the rectifier.



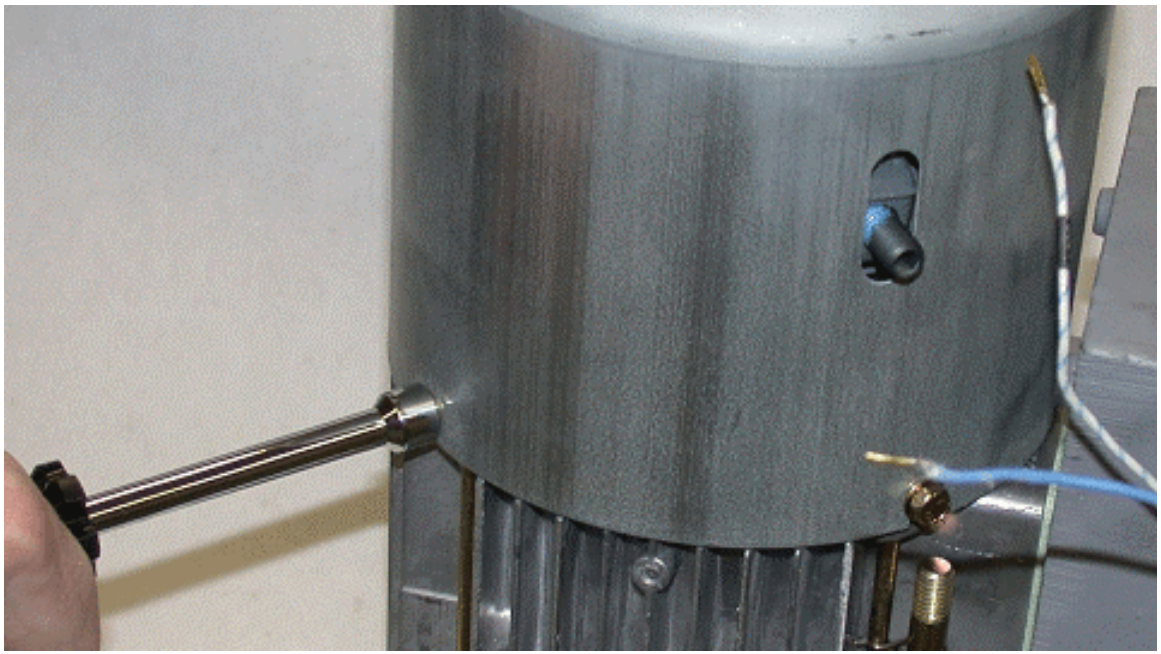
Step 5

- After removing the brake wires, straighten them as shown in the picture.



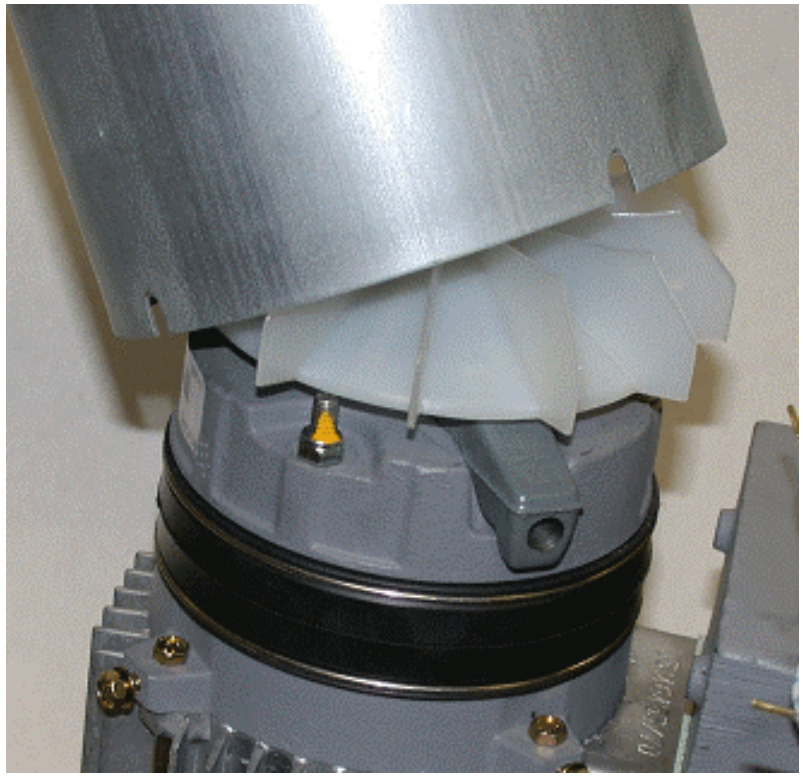
Step 6

- Using the 8mm nut-driver, loosen the 4 screws that hold the motor fan guard into place.



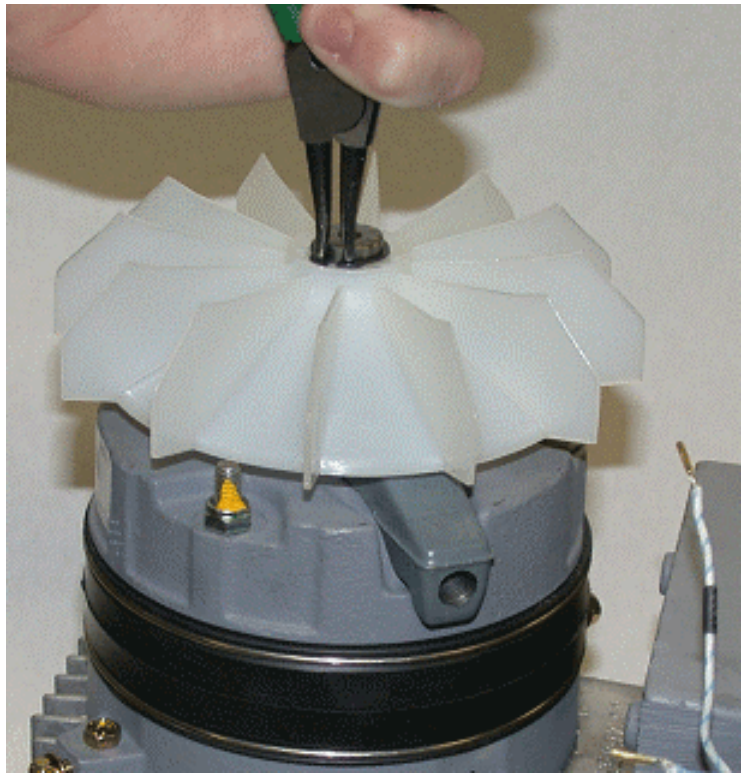
Step 7

- Remove the fan guard from the motor.



Step 8

- Using the small snapring pliers, remove the snapring that secures the motor fan.

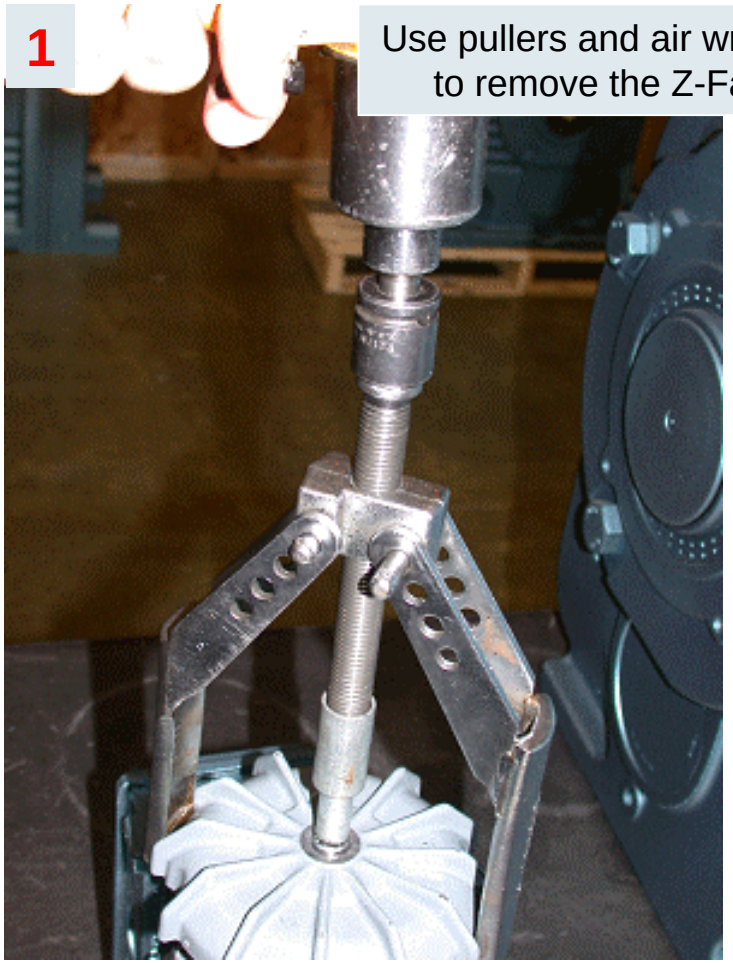


Z-Fan Instructions

Cast Iron Z-Fan Removal Instructions

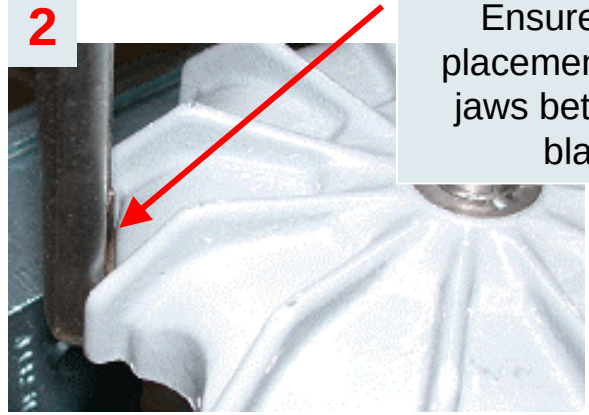
1

Use pullers and air wrench to remove the Z-Fan



2

Ensure proper placement of puller jaws between fan blades



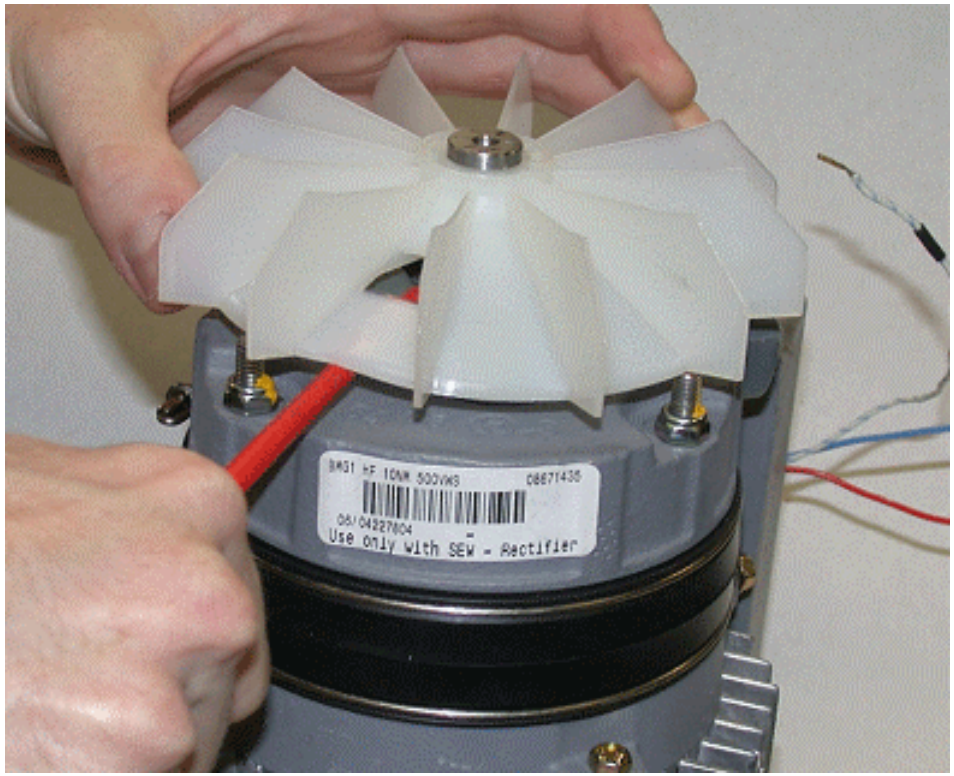
3

Remove the Z-Fan from the motor

Return to Brake Replacement

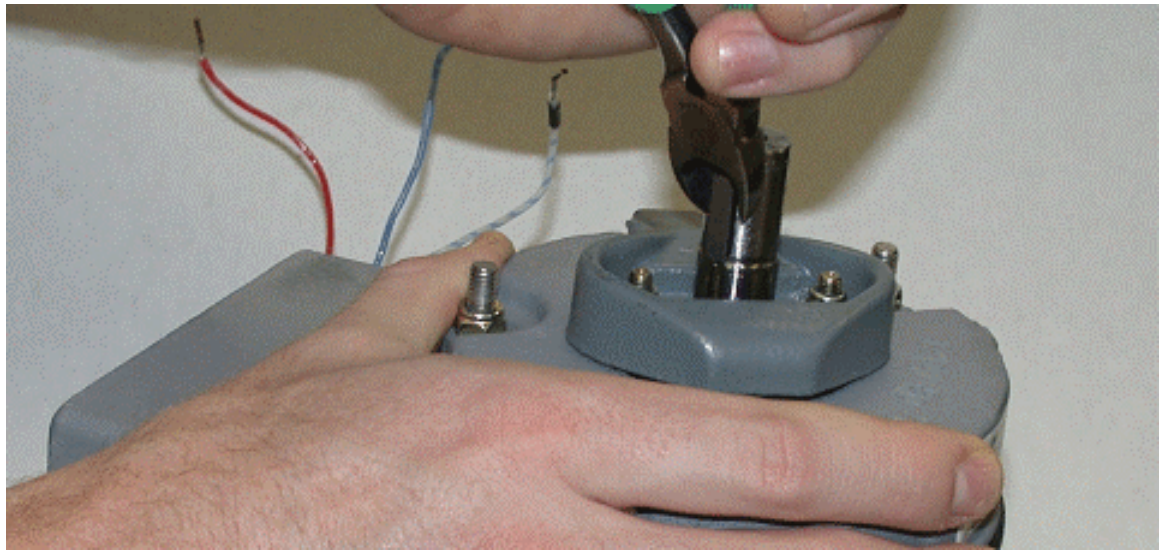
Step 9

- With the flat-tip screwdriver, use a gentle prying action to remove the motor fan, using caution to not damage the fan.



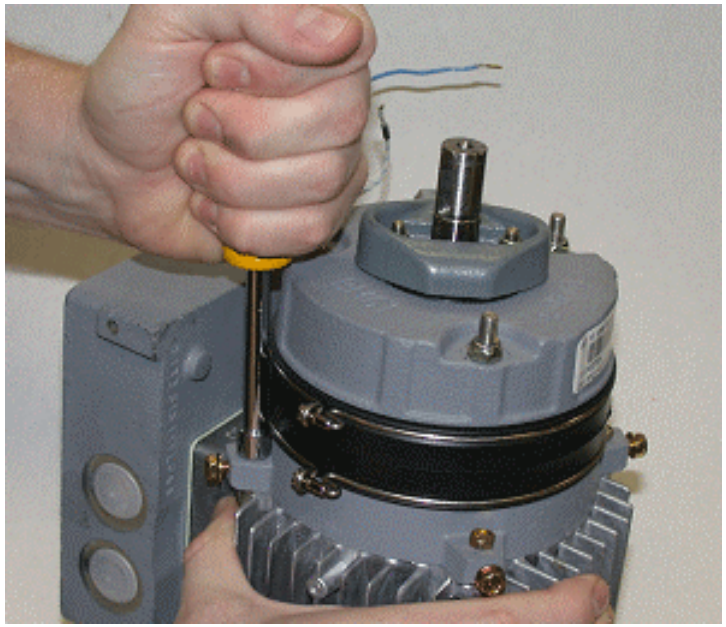
Step 10

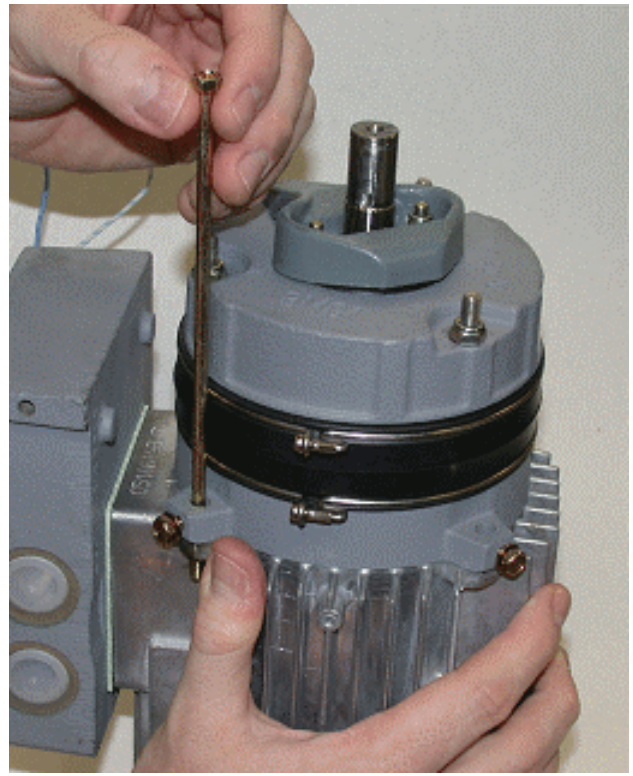
- Using the cutting pliers, remove the fan key from the rotor.



Step 11

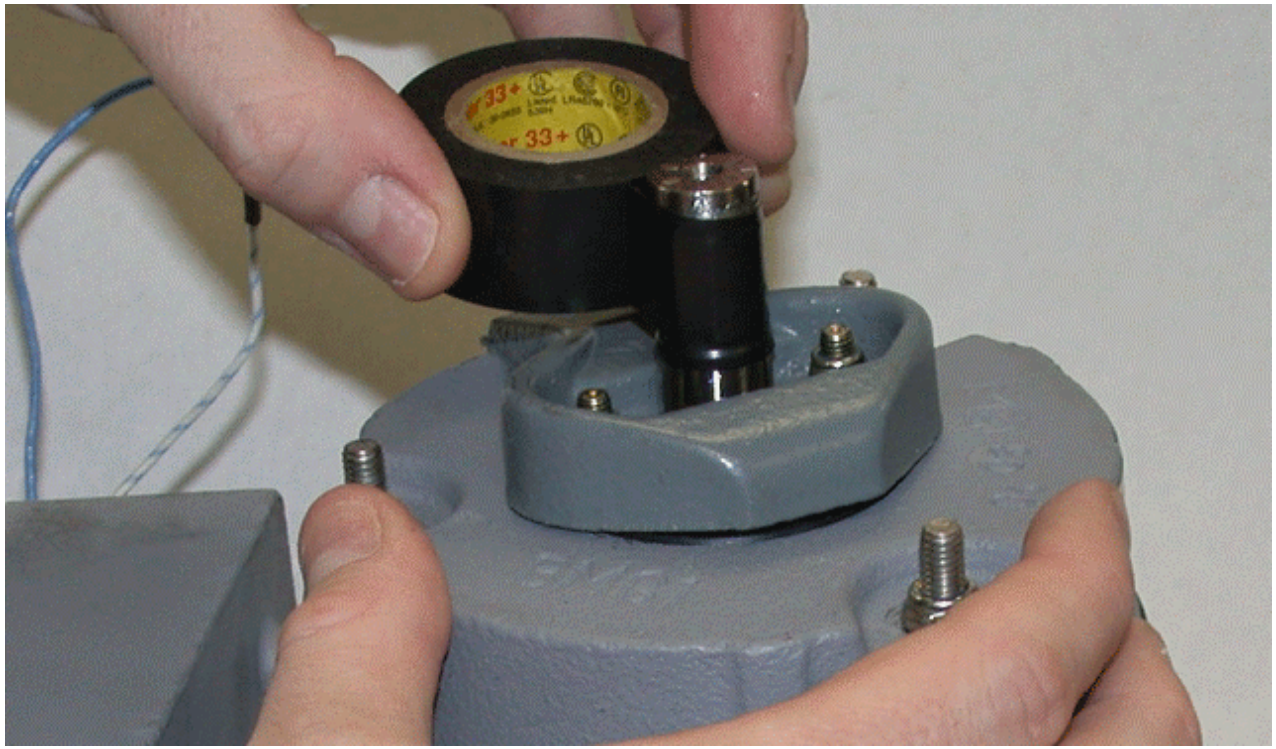
- Using the 8mm nut driver, remove the 4 motor tension rods.





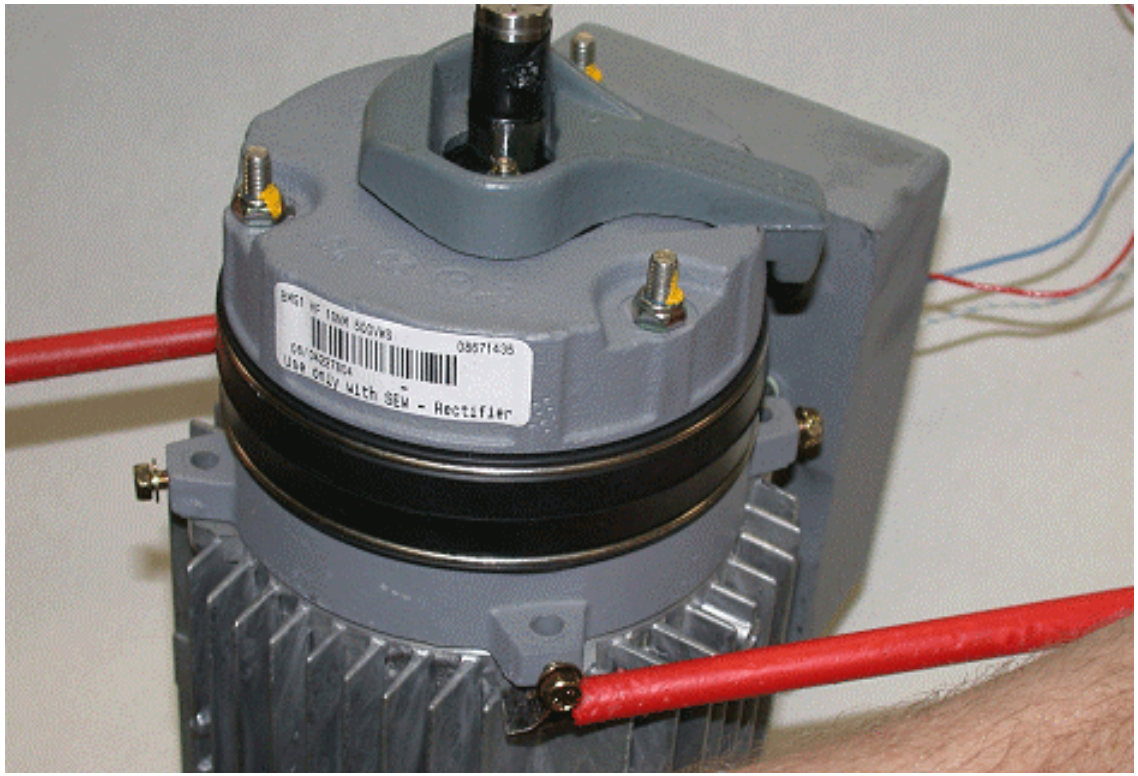
Step 12

- Wrap the rotor end with tape to prevent the keyway from damaging the brake seal.



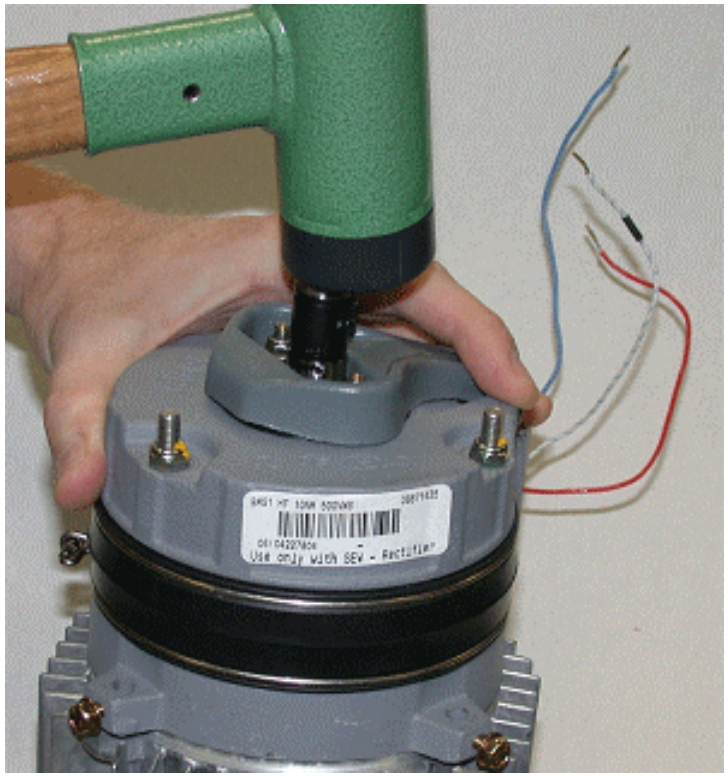
Step 13

- Using both flat head screwdrivers, pry the brake away from the stator



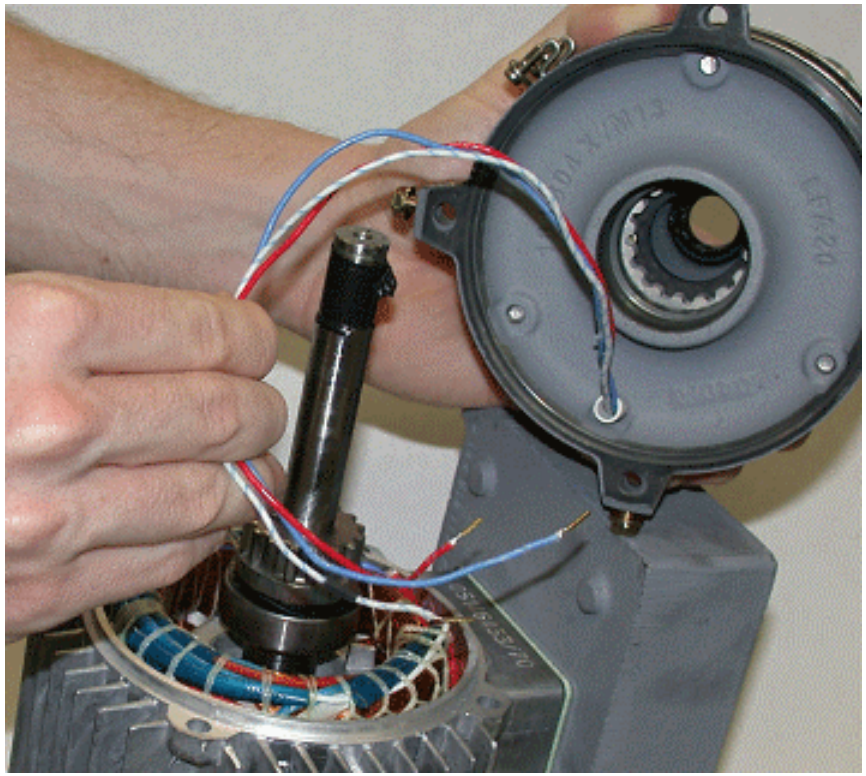
Step 14

- Using a dead blow hammer, lightly tap the end of the rotor shaft to completely disengage the brake from the rotor.



Step 15

- Slide the brake completely off the rotor shaft, ensuring that the brake wires are completely removed from the motor.

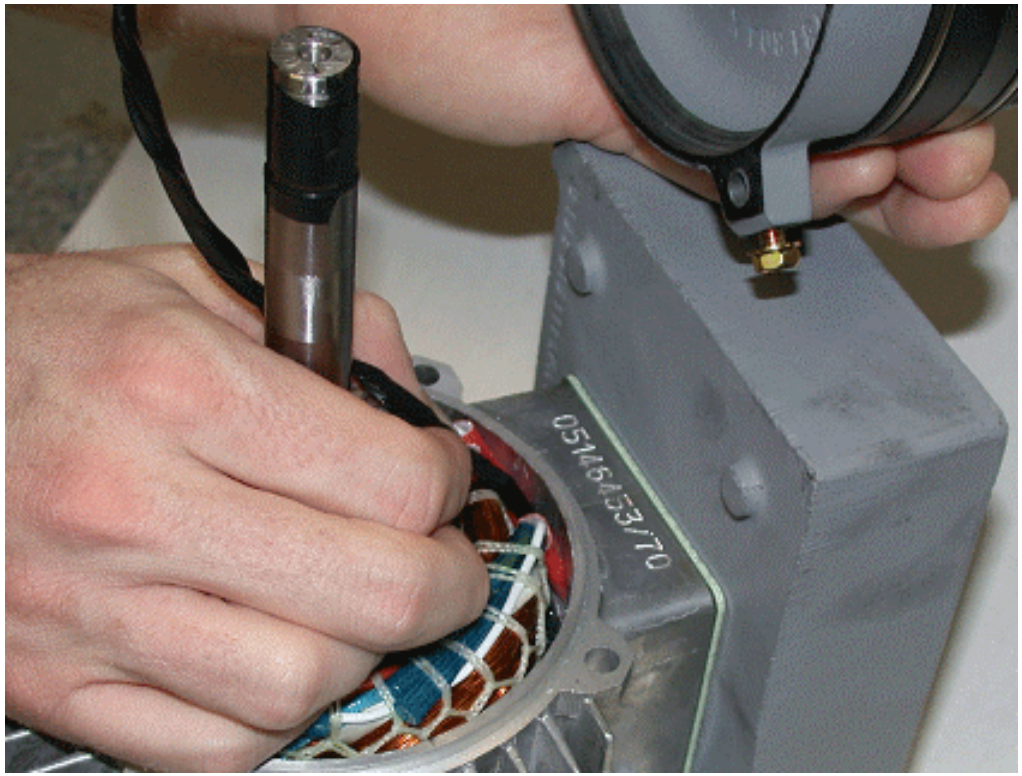


Step 16

- Using the **new** brake, wrap its wires with tape to protect them from damage during re-installation.

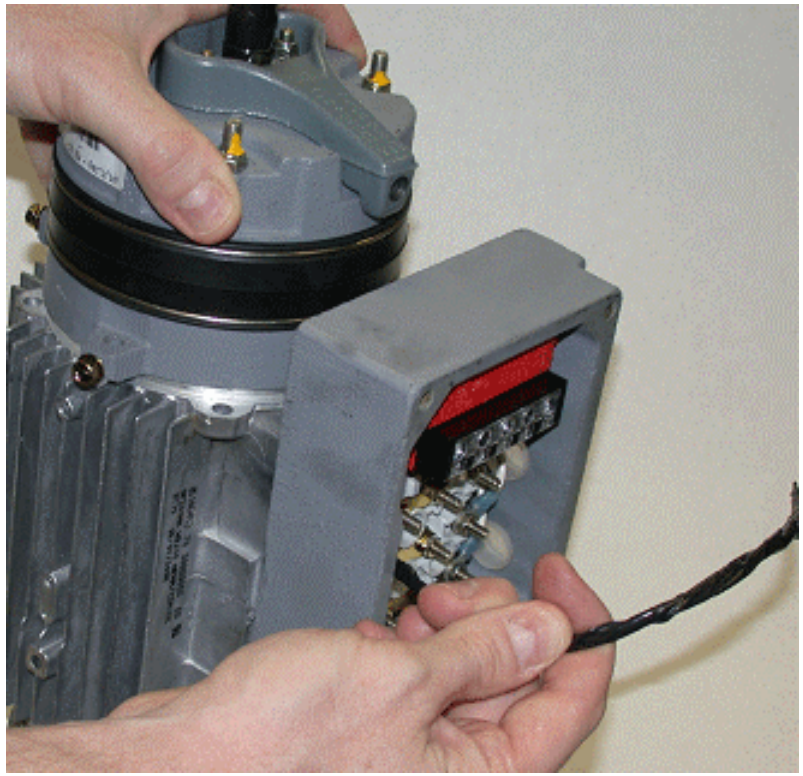
Step 17

- Insert the brake wires into the relief of the stator and into the conduit box.



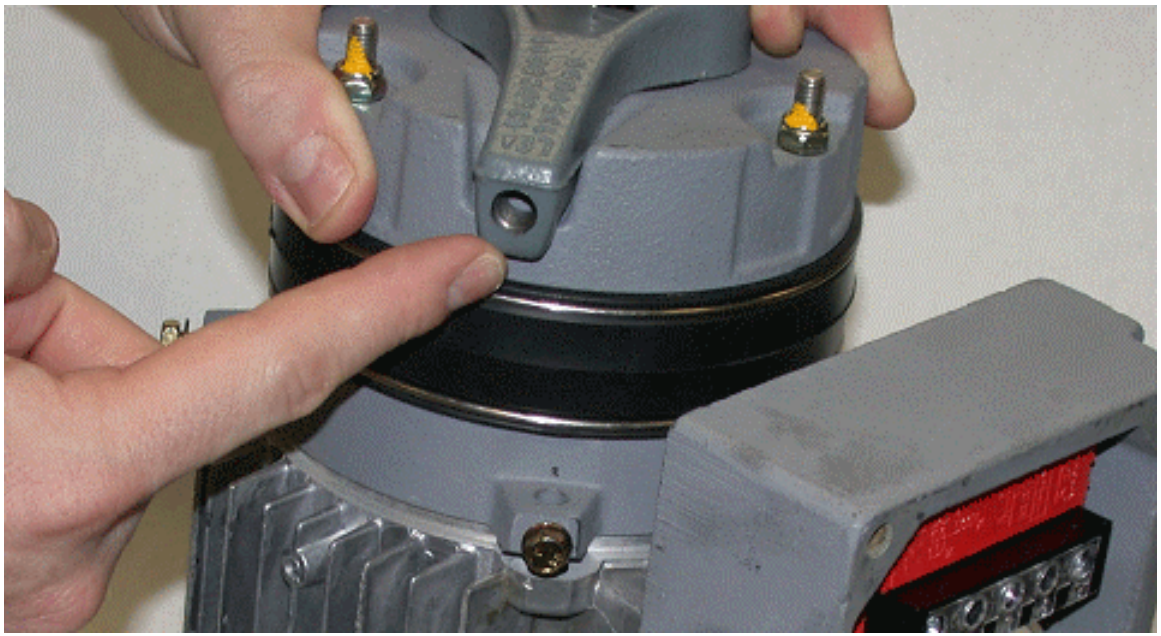
Step 18

- Install the brake onto the rotor shaft while maintaining tension on the brake wires to avoid crimping them.



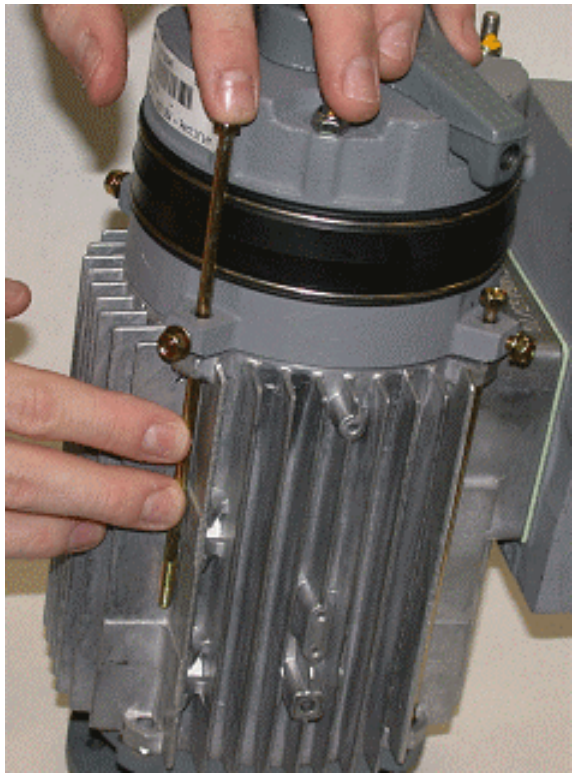
Step 19

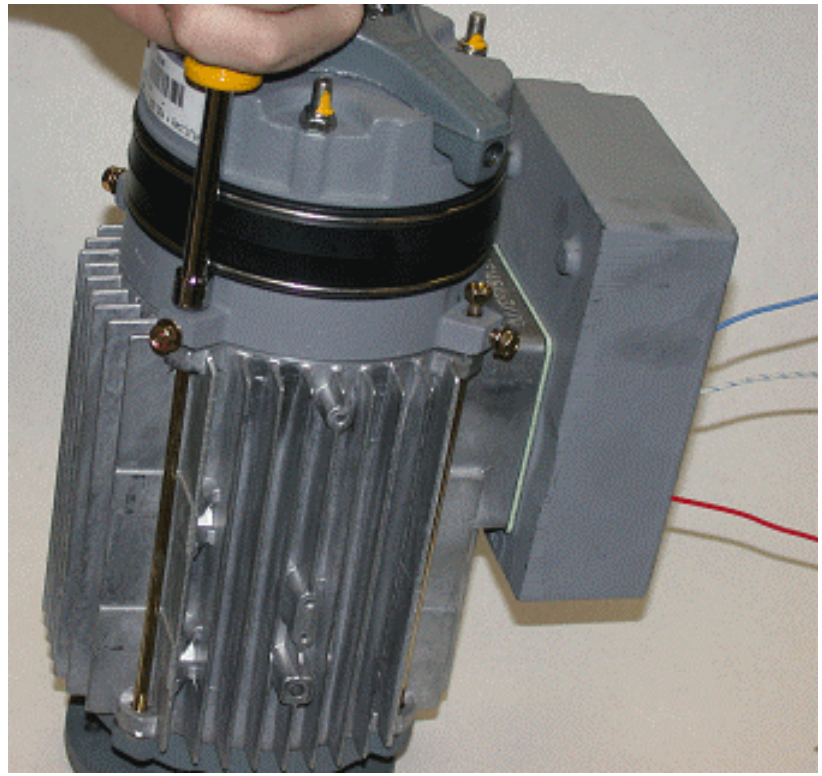
- Ensure that the brake release is aligned to its previous position so that the brake lever remains accessible when the brakemotor is placed back into operation.



Step 20

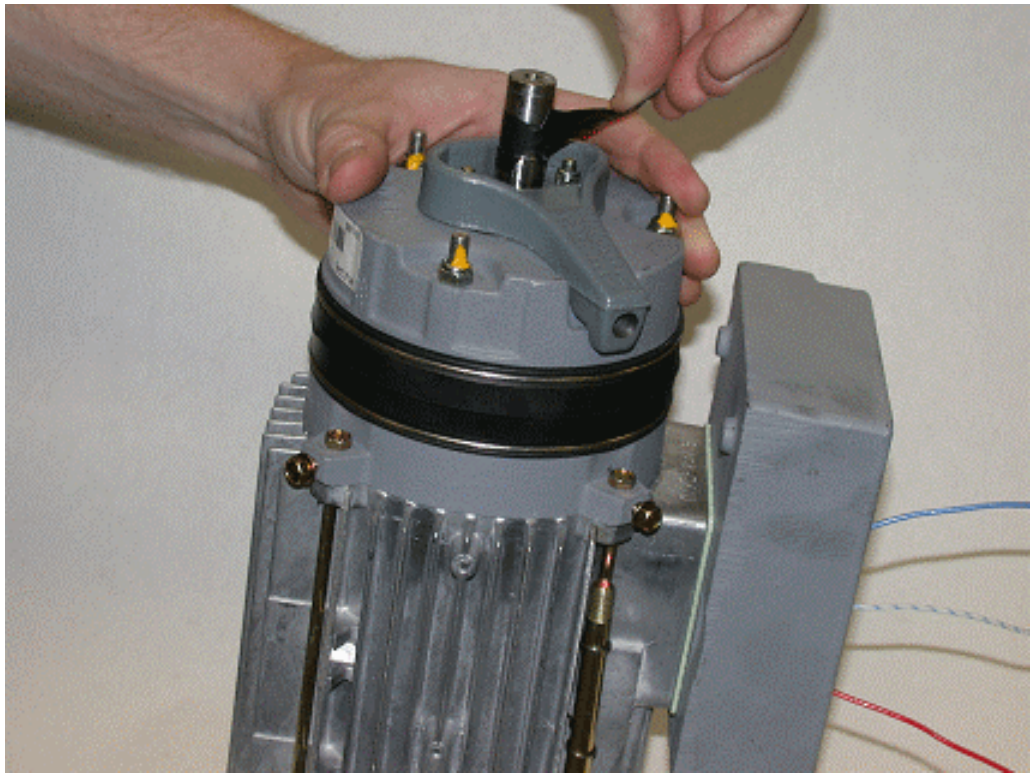
- Insert the 4 tension rods into there respective positions. Tighten them using the 8mm nut driver.





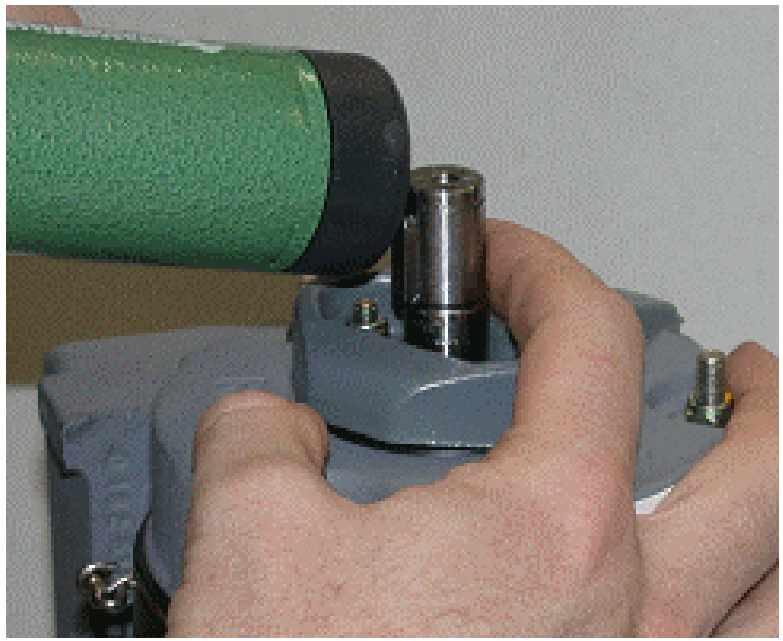
Step 21

- Remove the protective tape from the end of the rotor shaft.



Step 22

- Insert the fan key and lightly tap it into place using the dead-blow hammer or rubber hammer.



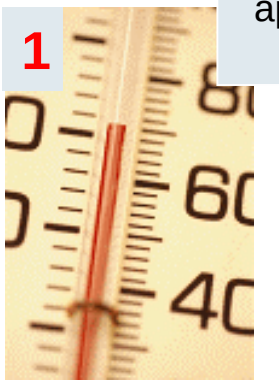
Step 23

- Install the fan onto the end of the rotor, ensuring that it seats completely.

Z-Fan Instructions

Cast Iron Z-Fan Installation Instructions

1



Heat the Z-Fan in an oven to approximately 250 degrees Fahrenheit

2

Lightly coat the rotor end with oil

3

Install the Z-fan

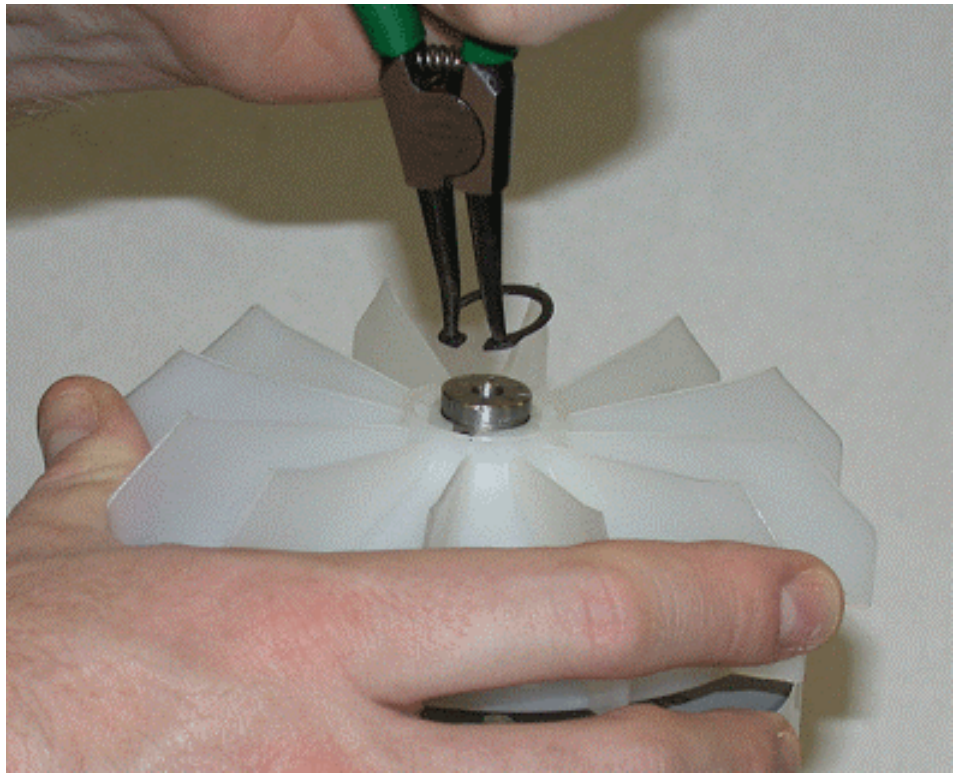
4

Install the Circlip

Return to Brake Replacement

Step 24

- Using the snapring pliers, re-install the snapring onto the end of the rotor shaft.



Step 25

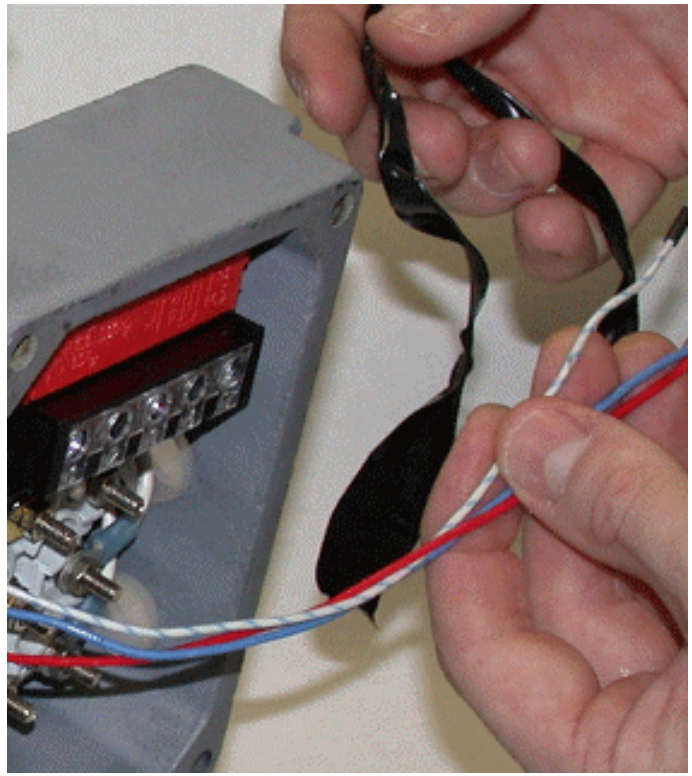
- Install the fan guard, ensuring that the oval relief aligns with the brake release lever.

Step 26

- Using the M8 nut driver, tighten the 4 screws that secure the fan guard.

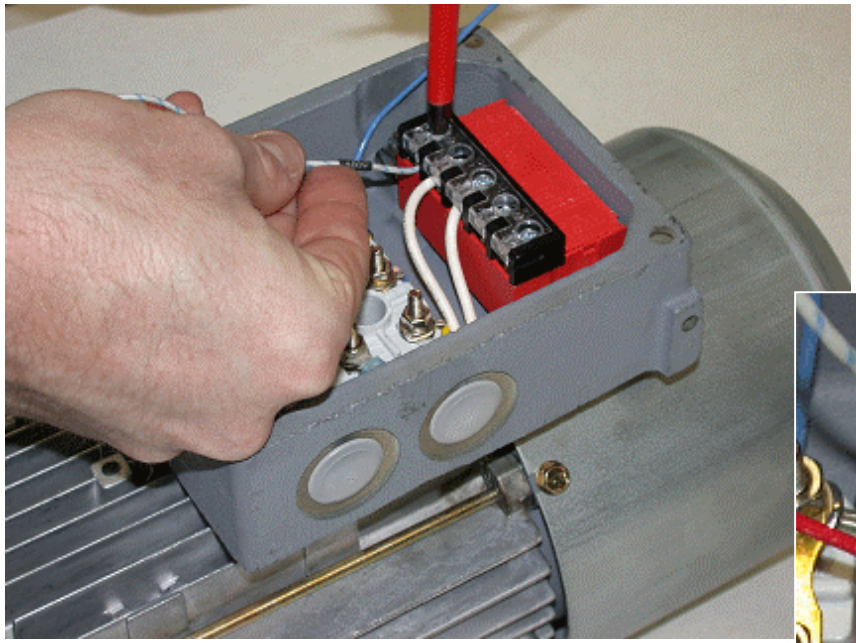
Step 27

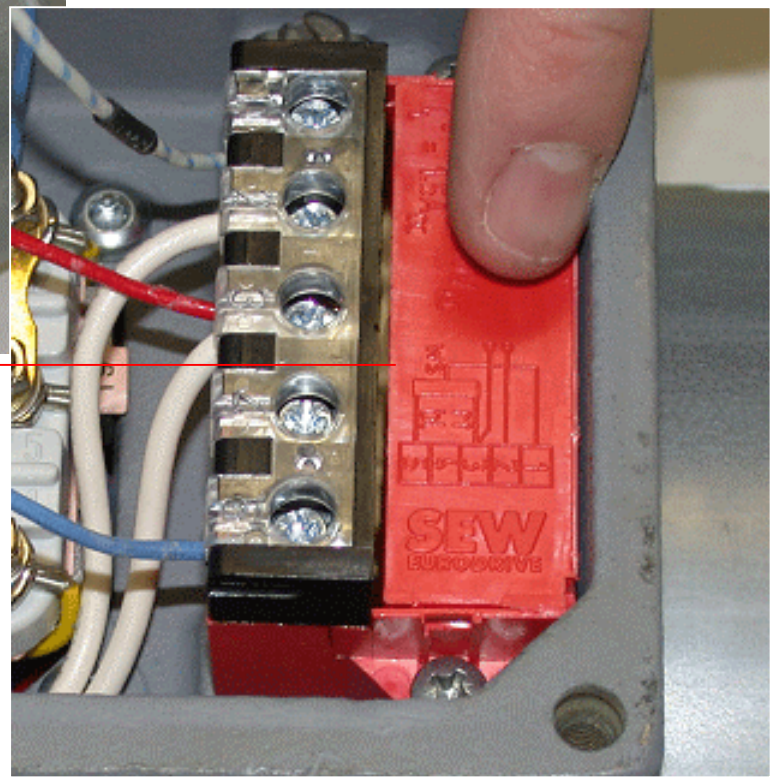
- Remove the protective tape from the 3 brake wires.



Step 28

- Using the Philips screw driver, install the 3 brake wires into the rectifier.

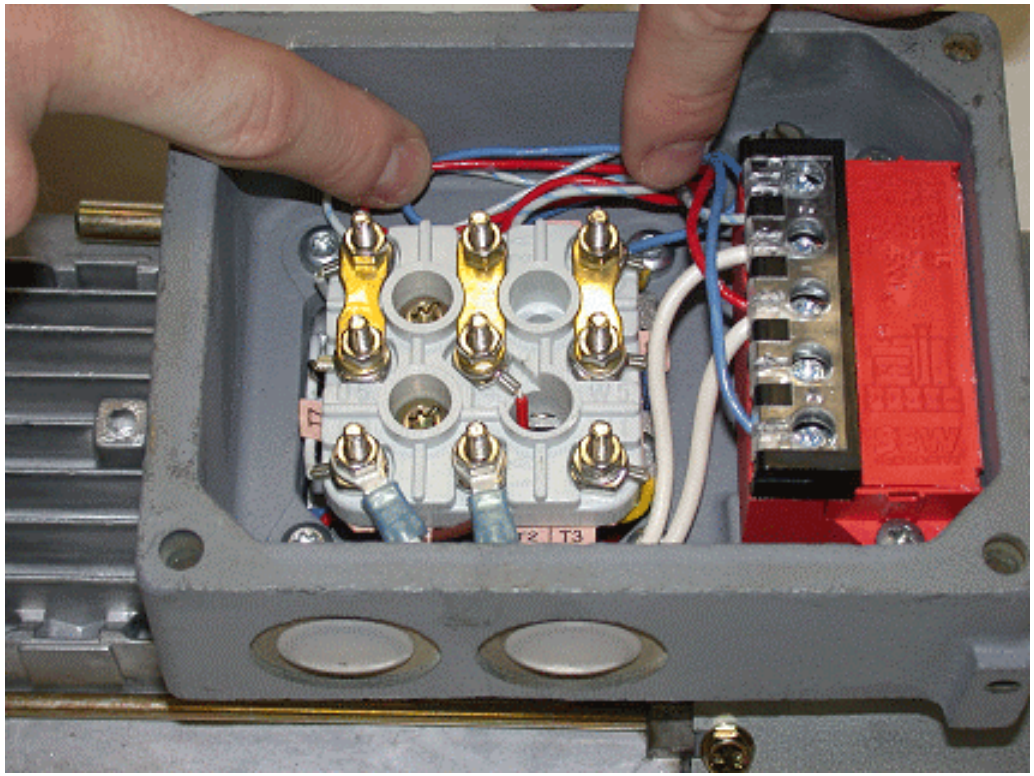




Refer to the wiring diagram found on the rectifier to determine the proper placement of the brake wires.

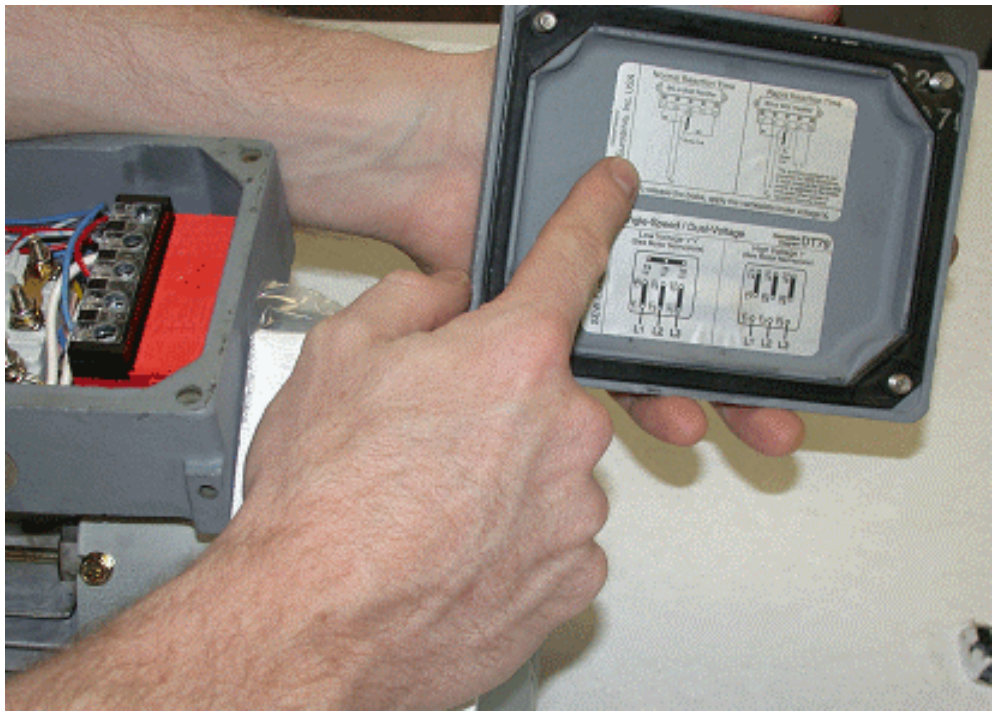
Step 29

- Carefully wrap and tuck the wires out of the way of the terminal block.



Step 30

- Reconnect the input power according to the diagram located on the inside of the conduit box cover.

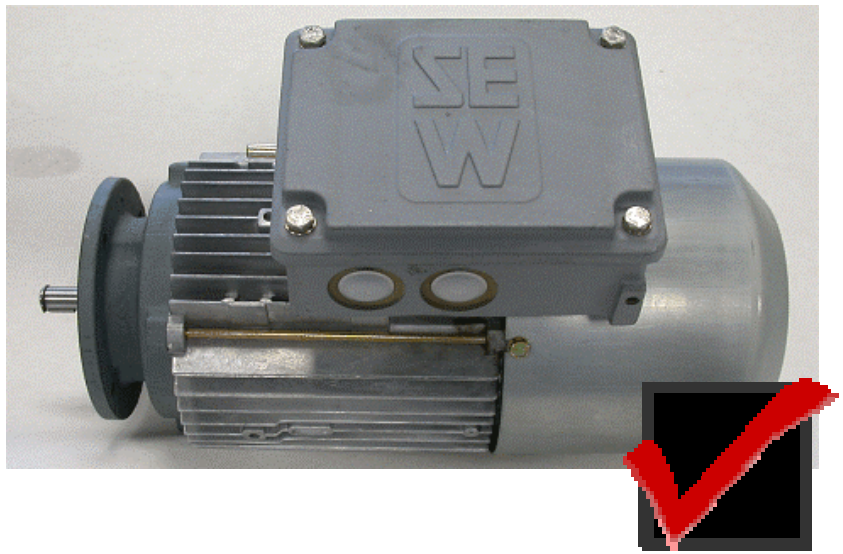


Step 31

- Install the conduit box cover. Use the 10mm nut driver to tighten the 4 bolts.

Step 32

- Reconnect power and confirm the proper operation of the brakemotor and attached equipment.



Keywords:

Notebook:	neilg98's notebook		
Created:	2/12/2013 1:11 PM	**Updated:**	2/12/2013 1:12 PM
URL:	http://www.digikey.com/product-detail/en/S10K300/495-3788-ND/651311?adpos=1o1&...		

Product Index > Circuit Protection > TVS - Varistors, MOVs > S10K300

All prices are in US dollars.

Digi-Key Part Number	495-3788-ND
Quantity Available	Digi-Key Stock: 1,404 Can ship immediately
Manufacturer	EPCOS Inc
Manufacturer Part Number	**S10K300**
Description	VARISTOR 300VRMS 10MM RADIAL
Lead Free Status / RoHS Status	Lead free / RoHS Compliant

Price Break	Unit Price	Extended Price
1	0.51000	0.51
10	0.35900	3.59
100	0.23630	23.63
500	0.17500	87.50
1,000	0.14875	148.75
5,000	0.13125	656.25
10,000	0.12250	1,225.00

Image shown is a representation only. Exact specifications should be obtained from the product data sheet.

Quantity Item Number **Customer Reference**

When requested quantity exceeds displayed pricing table quantities, a lesser unit price may appear on your order.
You may submit a request for quotation on quantities which are greater than those displayed in the pricing table.

Datasheets	Leaded Varistors StandarD Series
Product Photos	Varistor 10mm Series
Product Training Modules	SMD Disk Varistors
Catalog Drawings	S10K Series Front S10K300 Side
Standard Package	500
Category	Circuit Protection
Family	TVS - Varistors, MOVs

Family	~~FVS - Varistors, MOVs~~
Series	~~StandarD~~
Varistor Voltage	470V
Current-Surge	2.5kA
Number of Circuits	1
Maximum AC Volts	300VAC
Maximum DC Volts	385VDC
Energy	47J
Package / Case	Disc 10mm
Dynamic Catalog	~~StandarD Series~~
Other Names	495-3788 B72210S 301K101 B72210S0301K101 B72210S301K101 S10K300-ND

12:11:07 2/12/2013 - ~~Help With This Screen~~

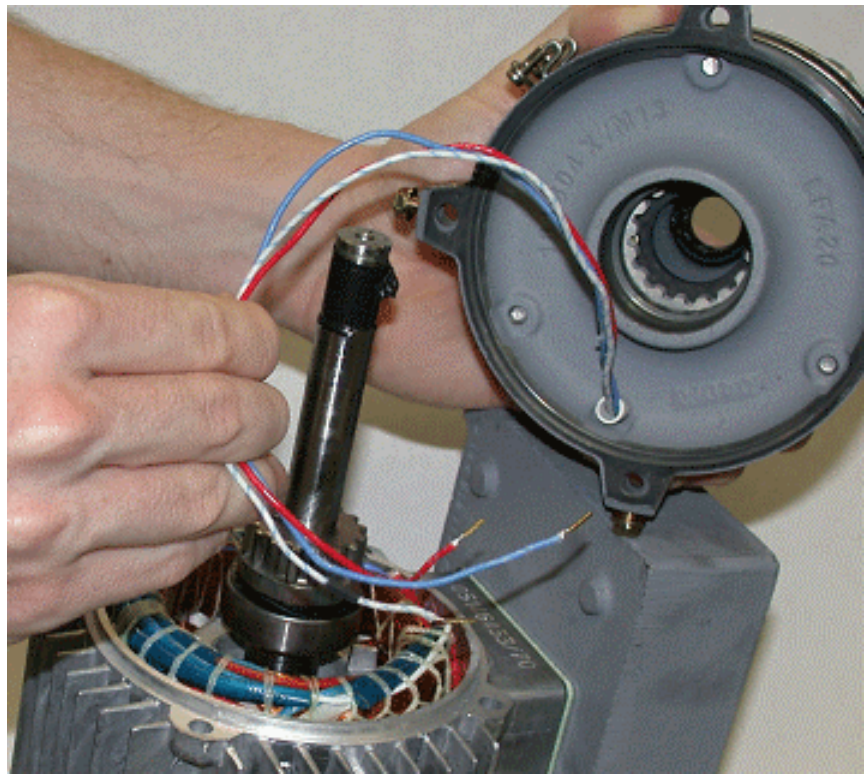
701 Brooks Avenue South, Thief River Falls, MN 56701 USA
Phone: 1-800-344-4539 or 218-681-6674 or Fax: 218-681-3380

SEW Maintenance Series

Complete Brake Replacement

Objectives

- After studying the contained information you will be able to accomplish the following:
  - Perform the removal of the existing brake
  - Perform the installation of the replacement brake



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  - 1 Replacement Brake
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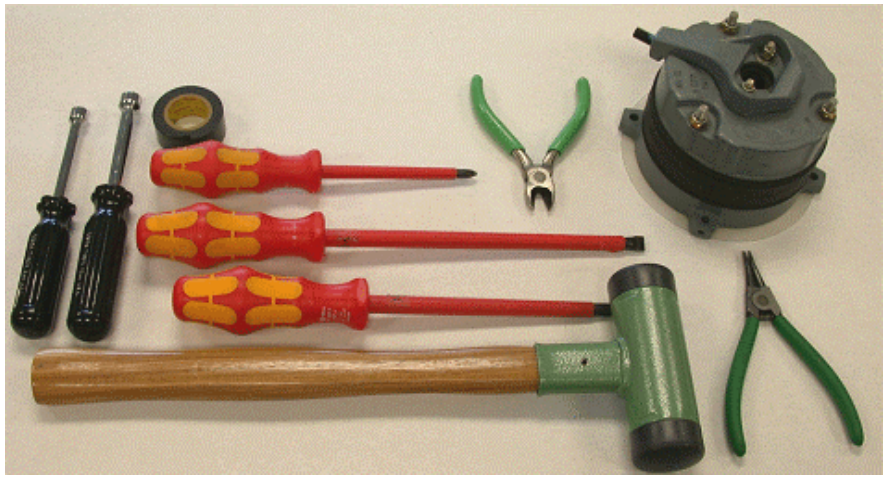


Safety

- Always follow the proper lockout/tagout procedures.

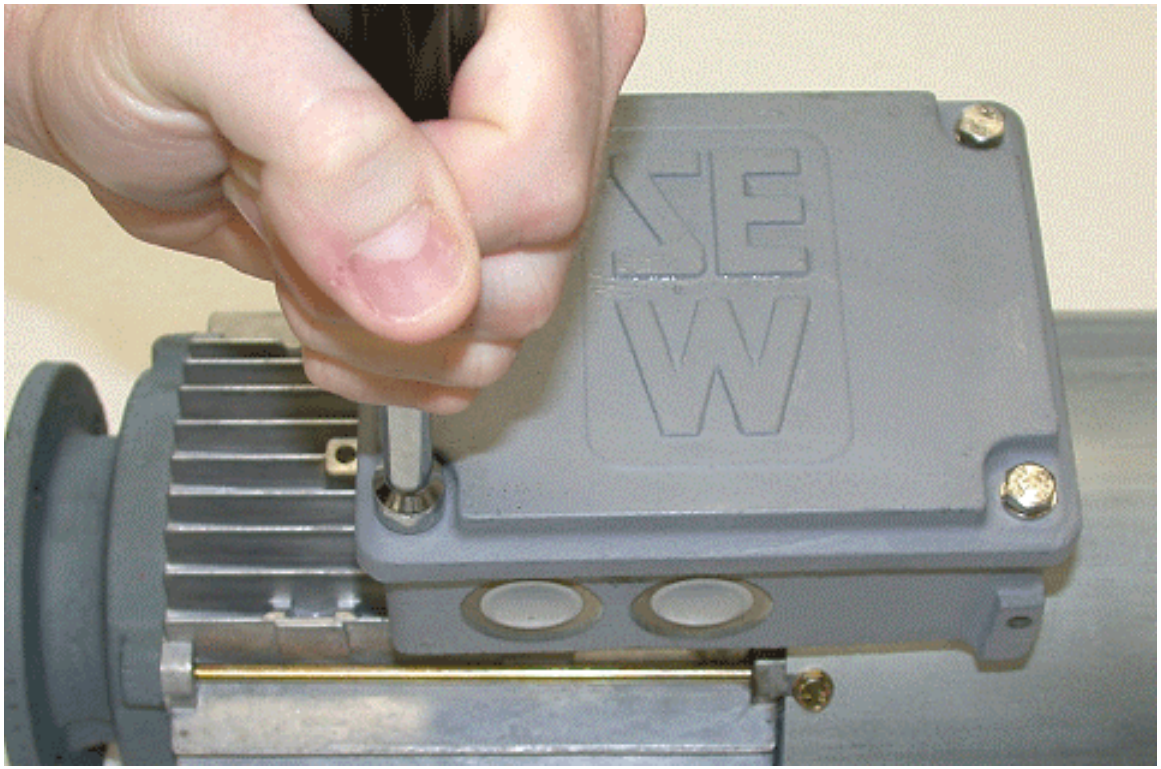
- Make sure to use the proper safety equipment at all times.

Step 1

- Disconnect all power sources to the motor.

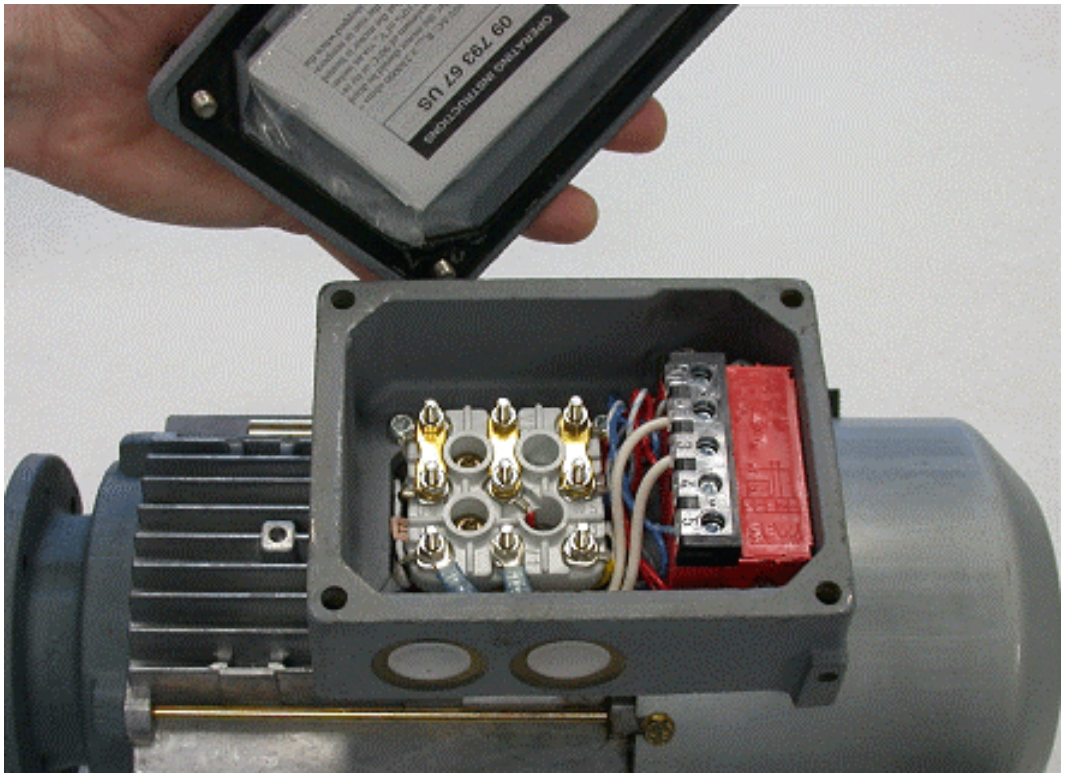
Step 2

- Using the 10mm nut driver, loosen the 4 small screws that hold the conduit box cover into place.



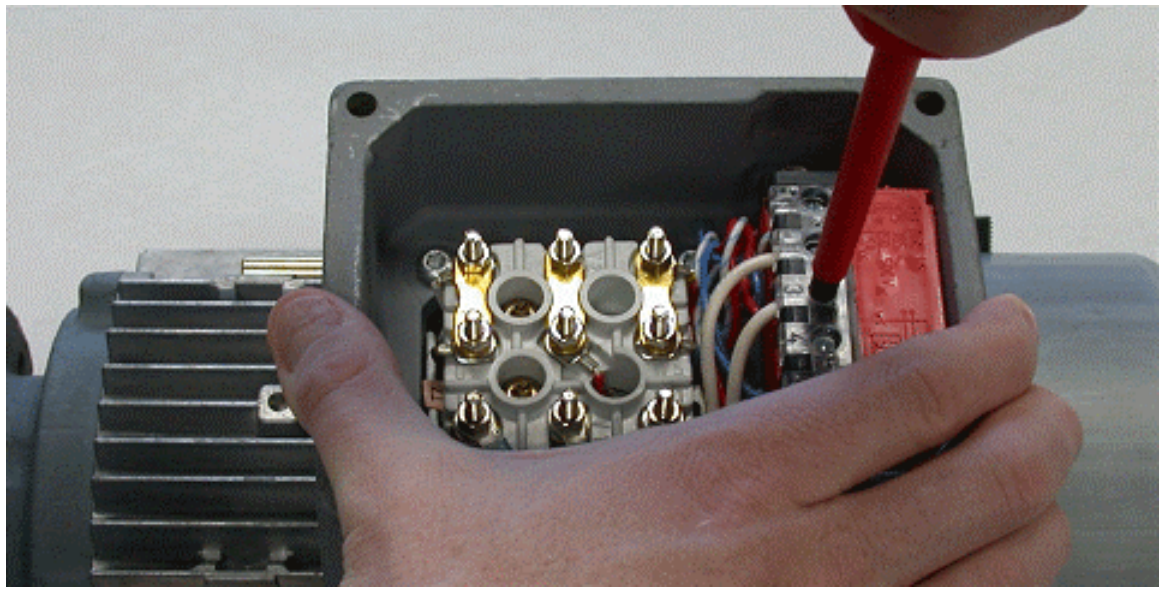
Step 3

- Remove the conduit box lid from the conduit box.



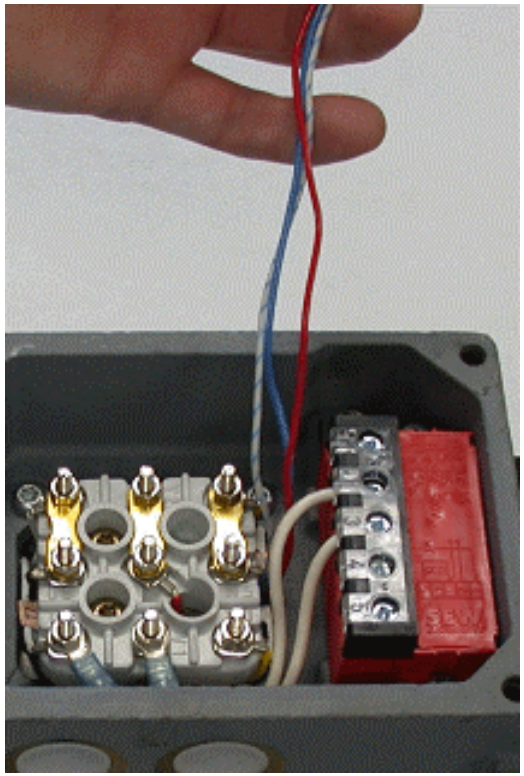
Step 4

- Using a Philips screw driver, remove the three brake wires from the rectifier.



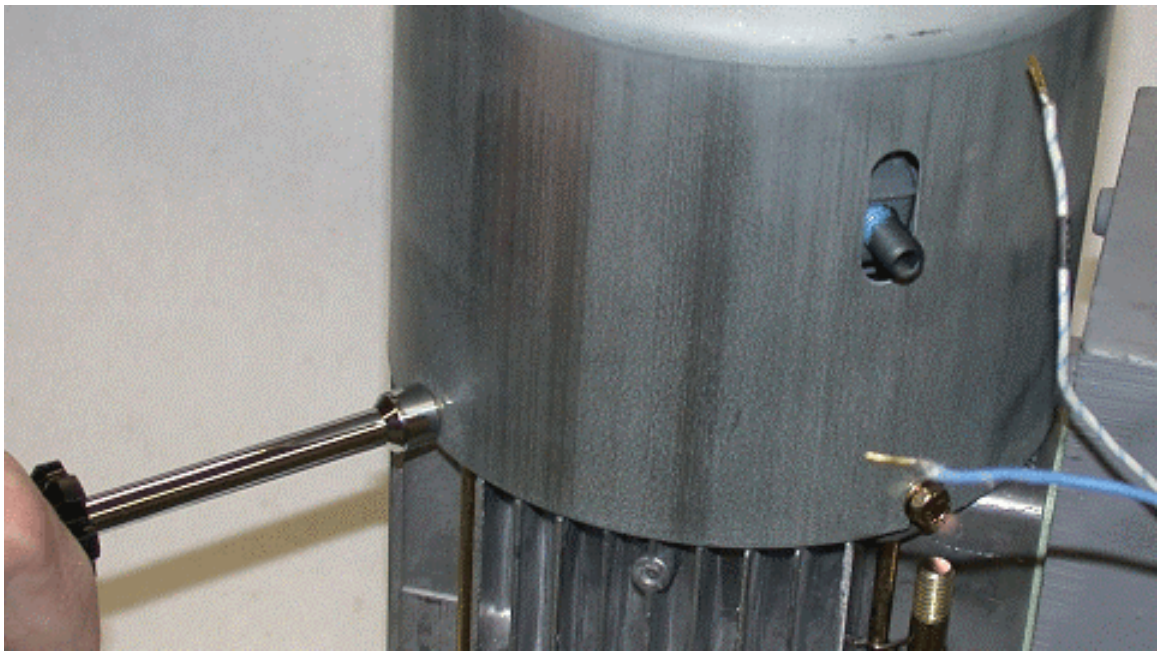
Step 5

- After removing the brake wires, straighten them as shown in the picture.



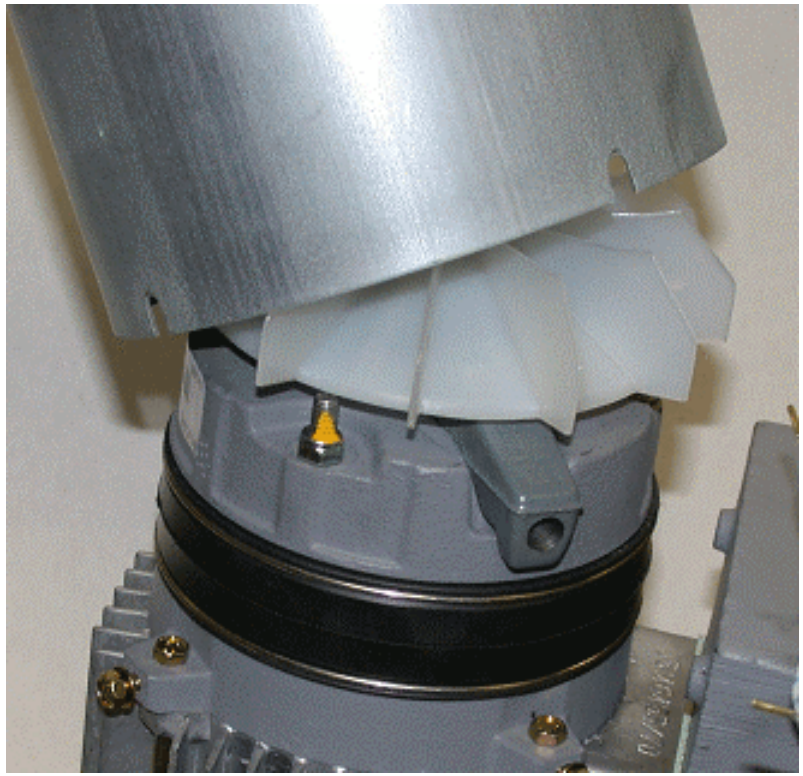
Step 6

- Using the 8mm nut-driver, loosen the 4 screws that hold the motor fan guard into place.



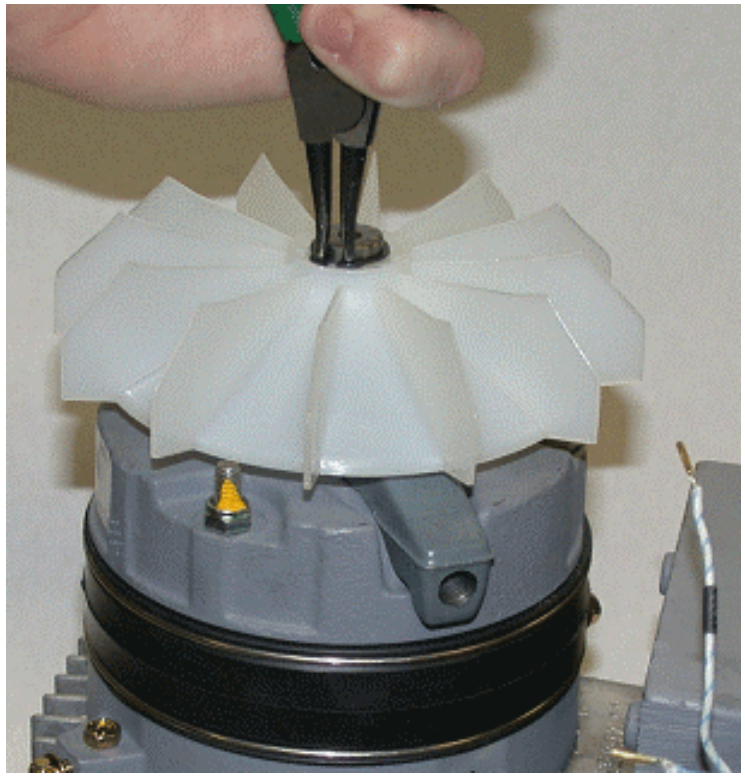
Step 7

- Remove the fan guard from the motor.



Step 8

- Using the small snapring pliers, remove the snapring that secures the motor fan.

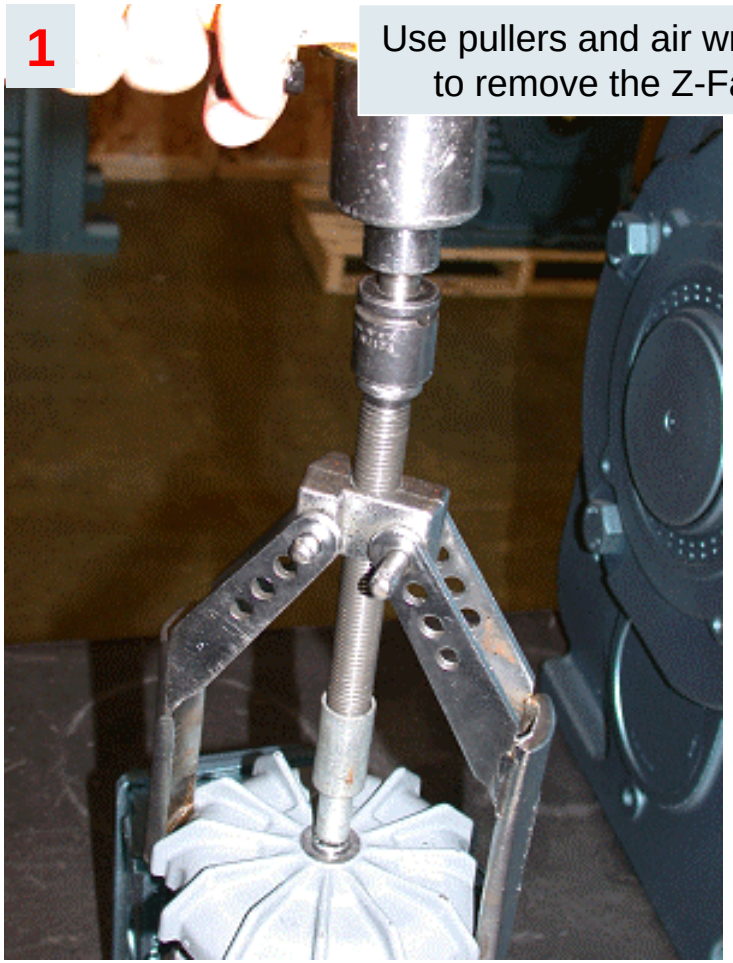


Z-Fan Instructions

Cast Iron Z-Fan Removal Instructions

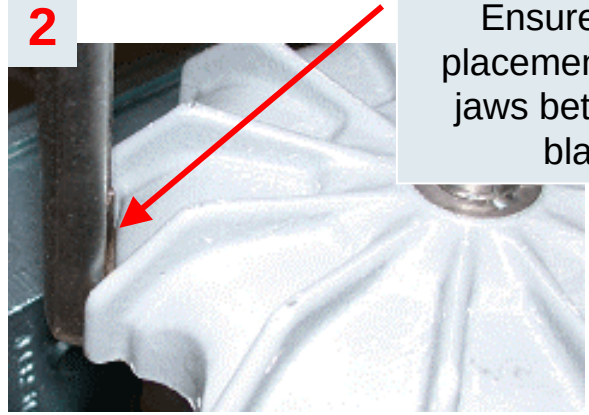
1

Use pullers and air wrench to remove the Z-Fan



2

Ensure proper placement of puller jaws between fan blades



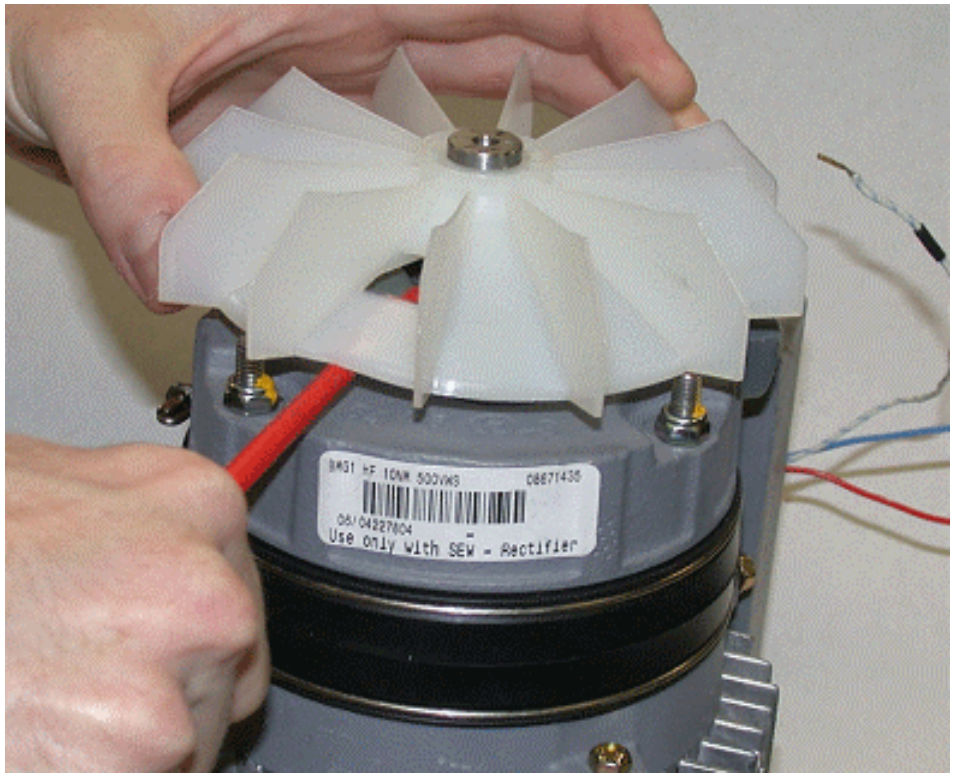
3

Remove the Z-Fan from the motor

Return to Brake Replacement

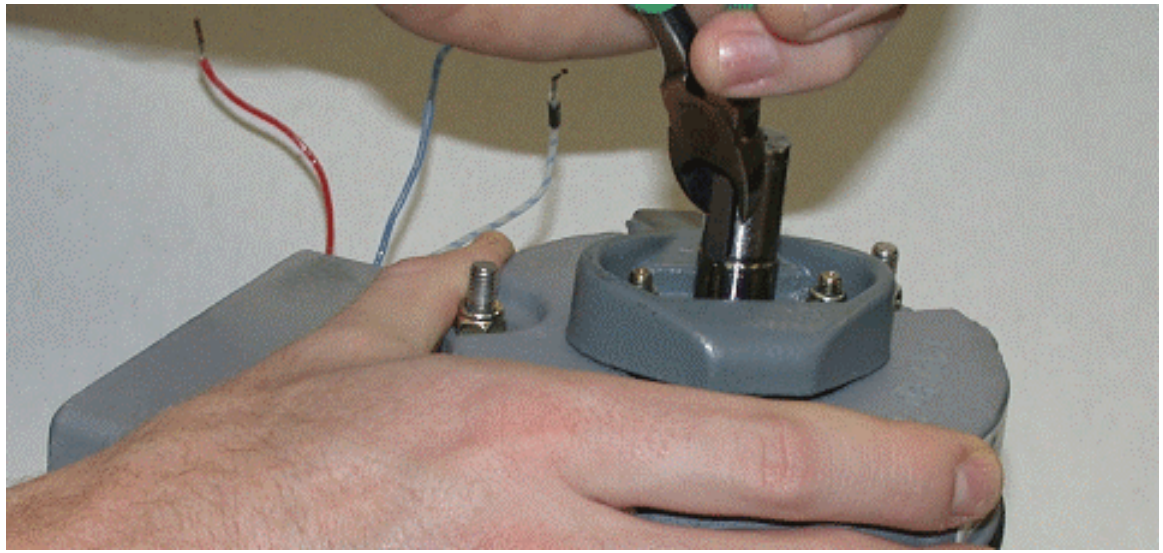
Step 9

- With the flat-tip screwdriver, use a gentle prying action to remove the motor fan, using caution to not damage the fan.



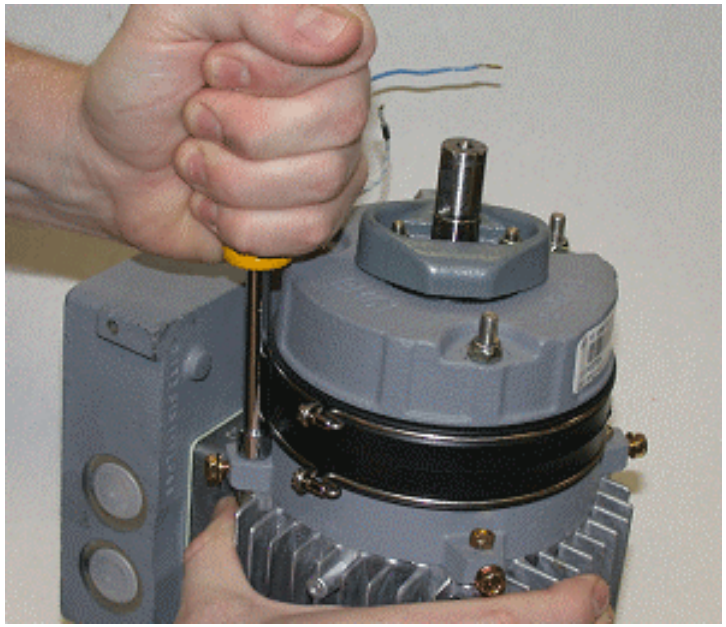
Step 10

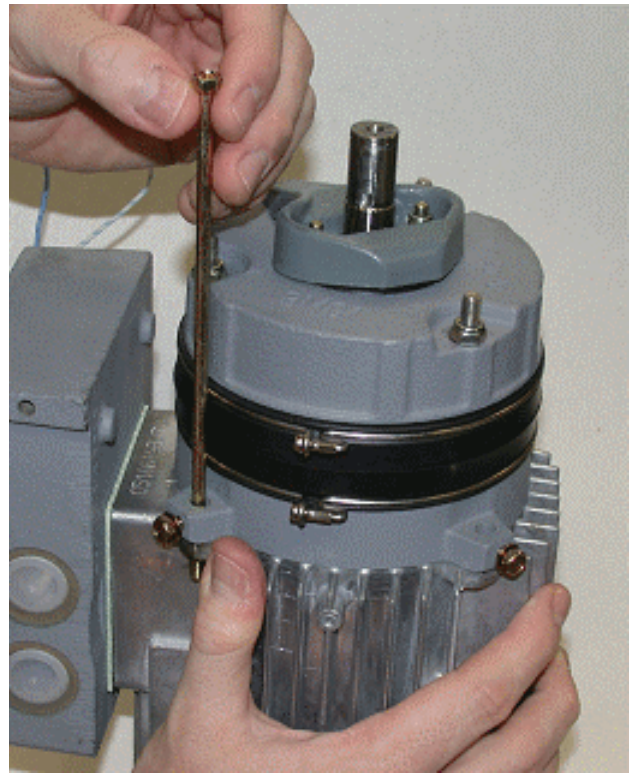
- Using the cutting pliers, remove the fan key from the rotor.



Step 11

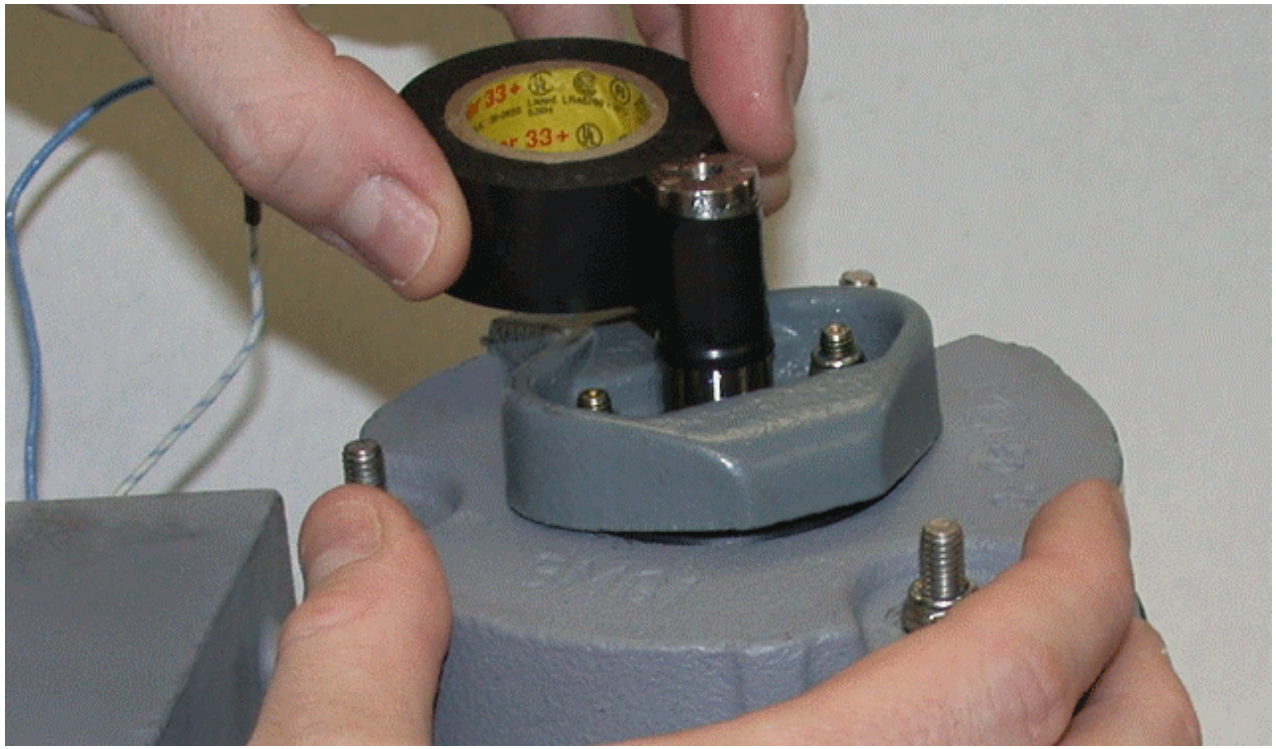
- Using the 8mm nut driver, remove the 4 motor tension rods.





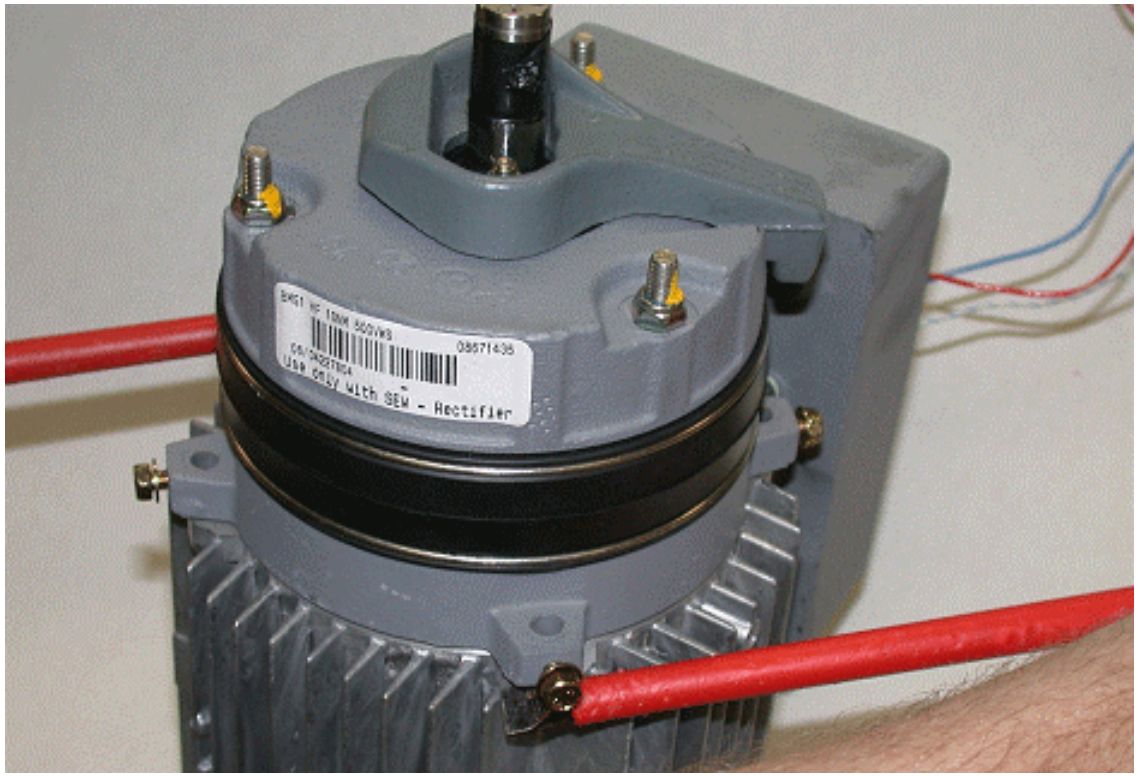
Step 12

- Wrap the rotor end with tape to prevent the keyway from damaging the brake seal.



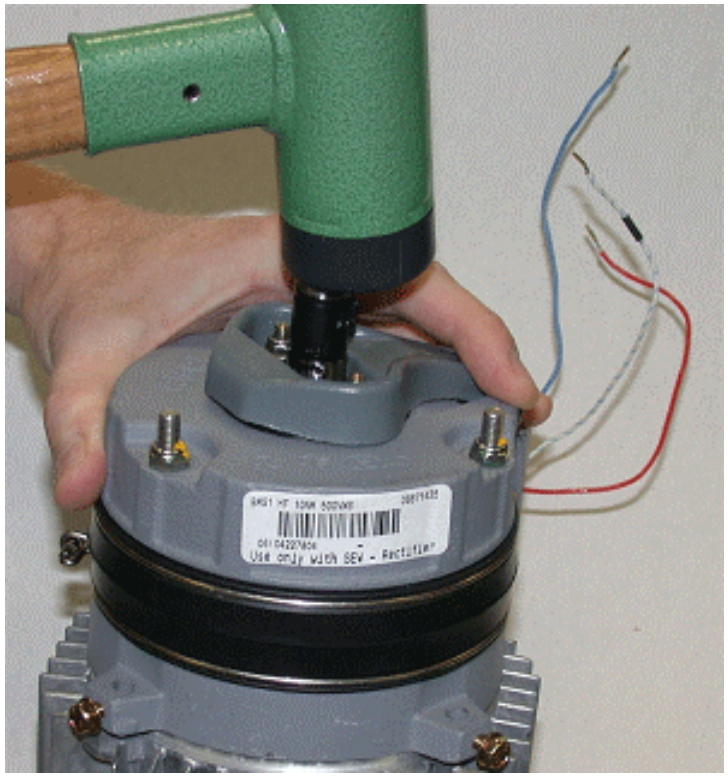
Step 13

- Using both flat head screwdrivers, pry the brake away from the stator



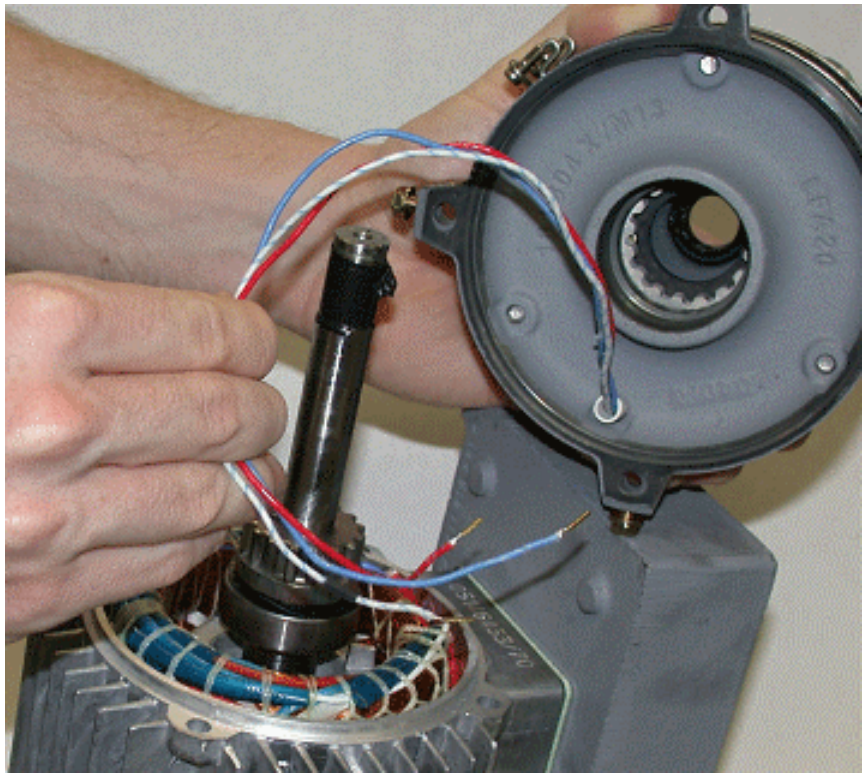
Step 14

- Using a dead blow hammer, lightly tap the end of the rotor shaft to completely disengage the brake from the rotor.



Step 15

- Slide the brake completely off the rotor shaft, ensuring that the brake wires are completely removed from the motor.

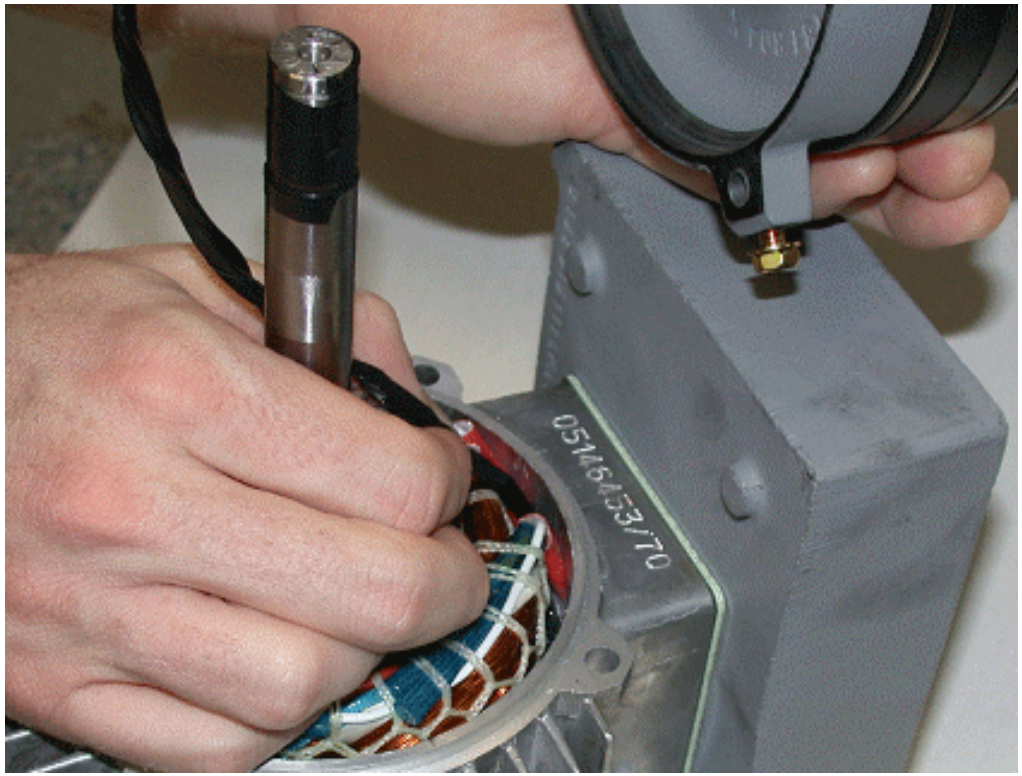


Step 16

- Using the **new** brake, wrap its wires with tape to protect them from damage during re-installation.

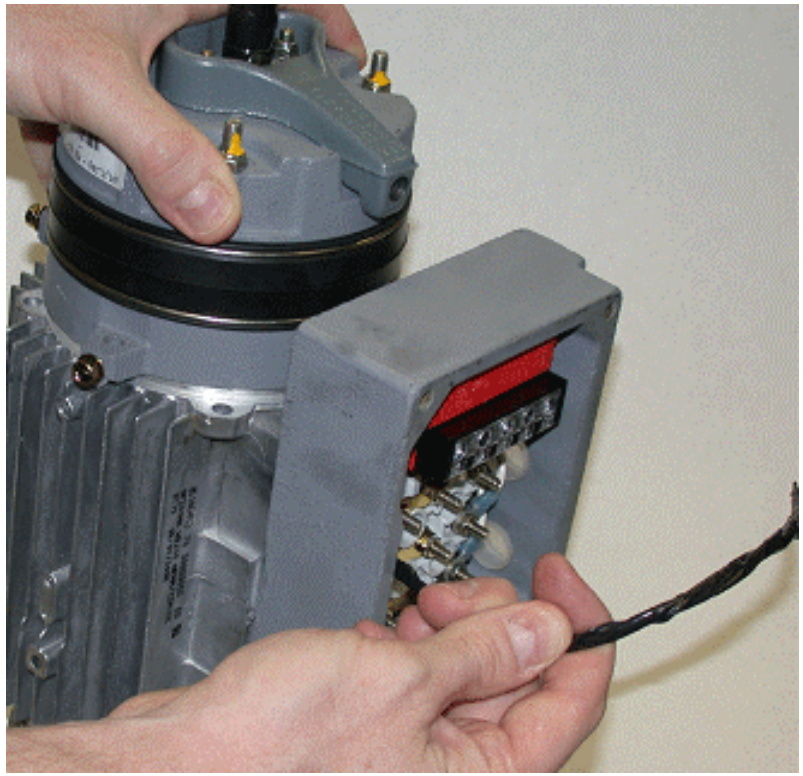
Step 17

- Insert the brake wires into the relief of the stator and into the conduit box.



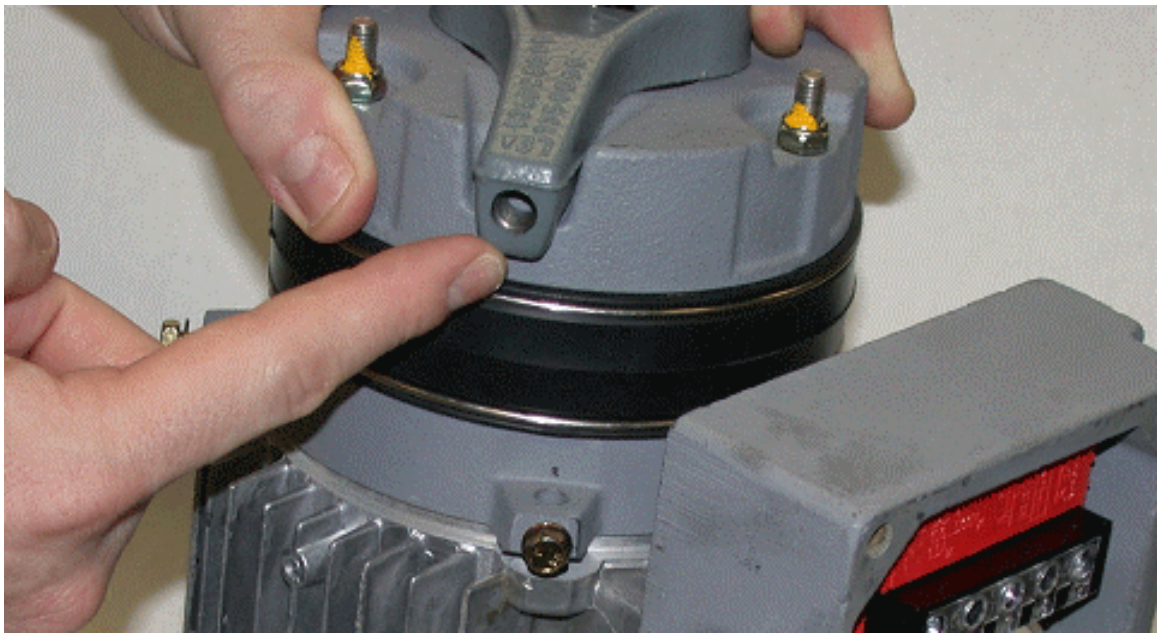
Step 18

- Install the brake onto the rotor shaft while maintaining tension on the brake wires to avoid crimping them.



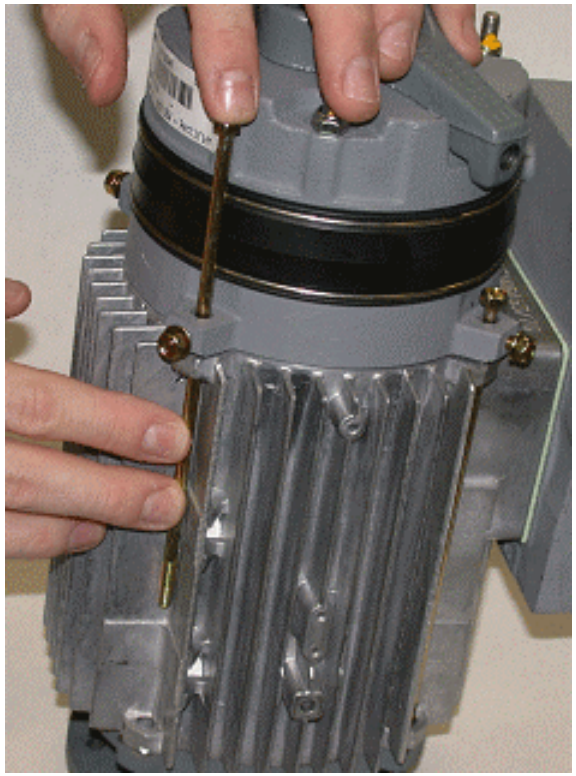
Step 19

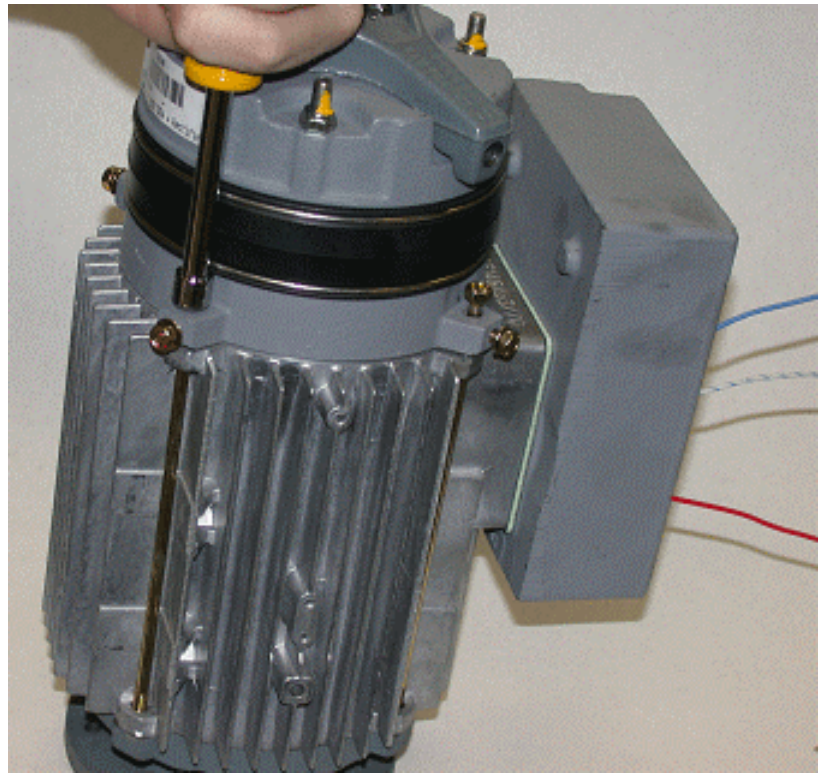
- Ensure that the brake release is aligned to its previous position so that the brake lever remains accessible when the brakemotor is placed back into operation.



Step 20

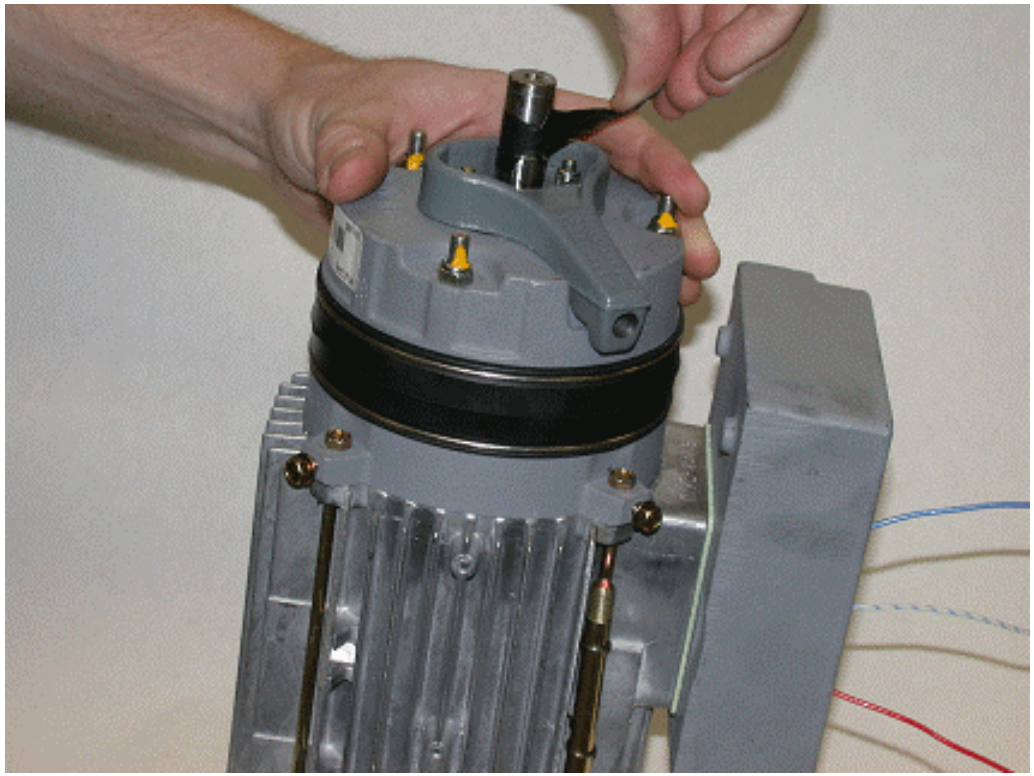
- Insert the 4 tension rods into there respective positions. Tighten them using the 8mm nut driver.





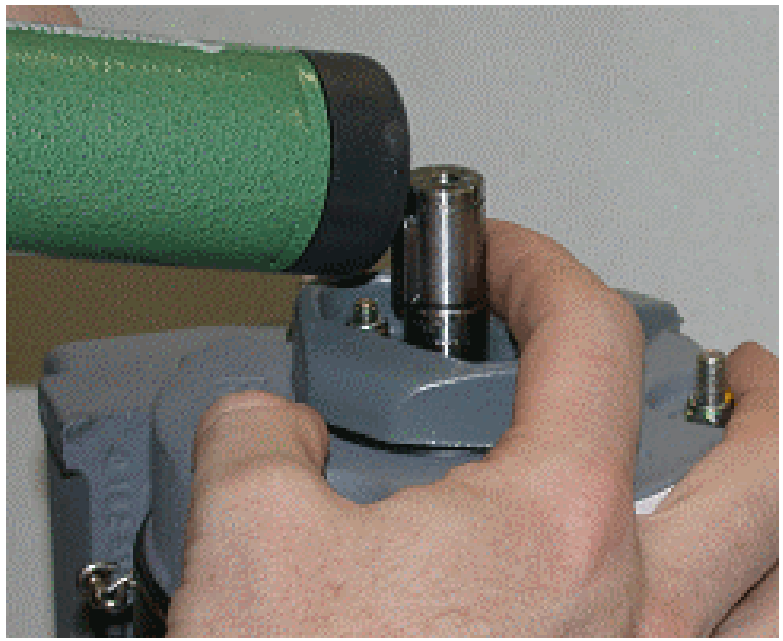
Step 21

- Remove the protective tape from the end of the rotor shaft.



Step 22

- Insert the fan key and lightly tap it into place using the dead-blow hammer or rubber hammer.



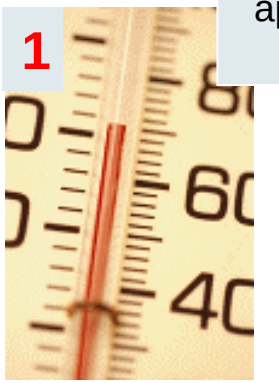
Step 23

- Install the fan onto the end of the rotor, ensuring that it seats completely.

Z-Fan Instructions

Cast Iron Z-Fan Installation Instructions

1



Heat the Z-Fan in an oven to approximately 250 degrees Fahrenheit

2

Lightly coat the rotor end with oil

3

Install the Z-fan

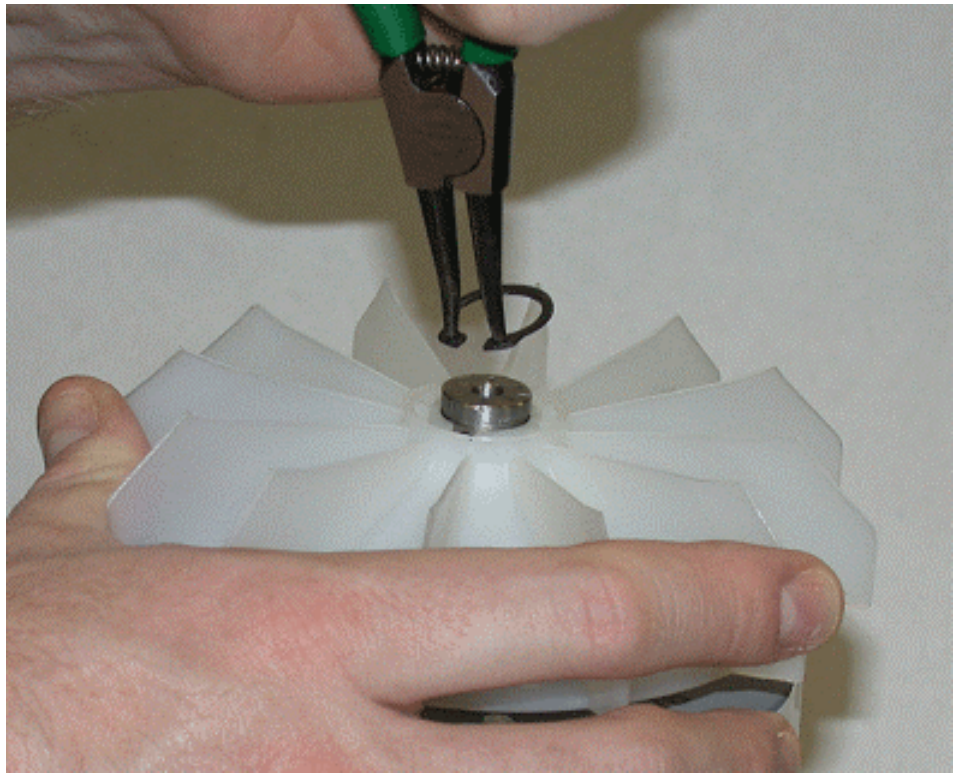
4

Install the Circlip

Return to Brake Replacement

Step 24

- Using the snapring pliers, re-install the snapring onto the end of the rotor shaft.



Step 25

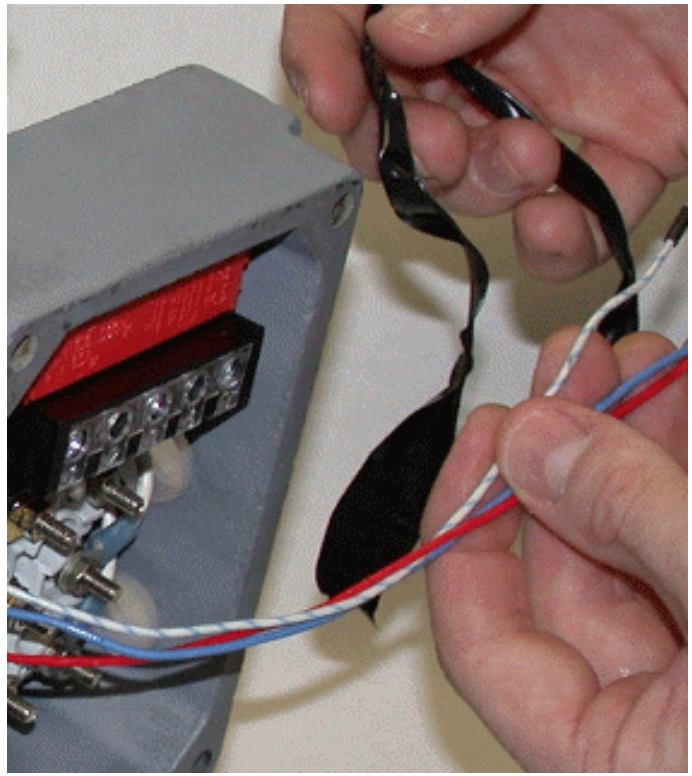
- Install the fan guard, ensuring that the oval relief aligns with the brake release lever.

Step 26

- Using the M8 nut driver, tighten the 4 screws that secure the fan guard.

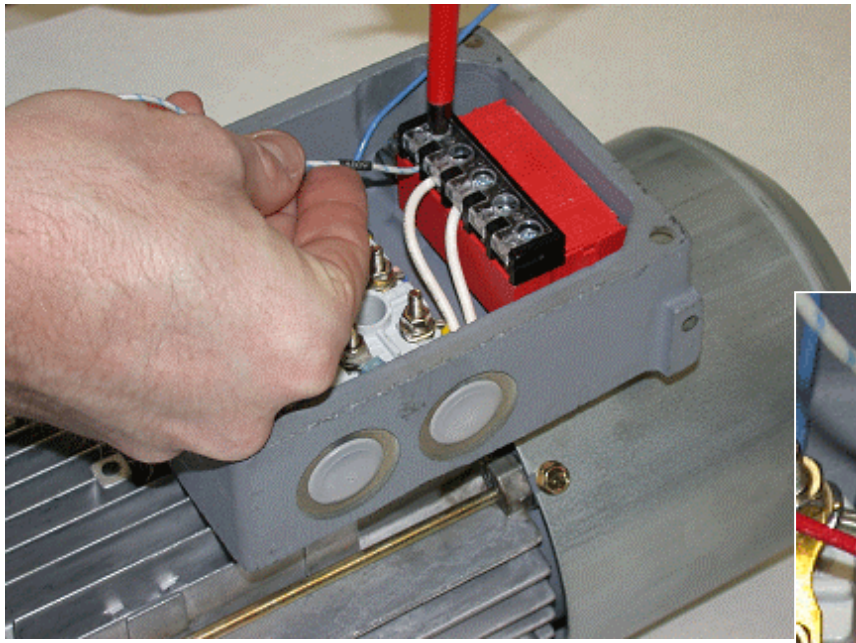
Step 27

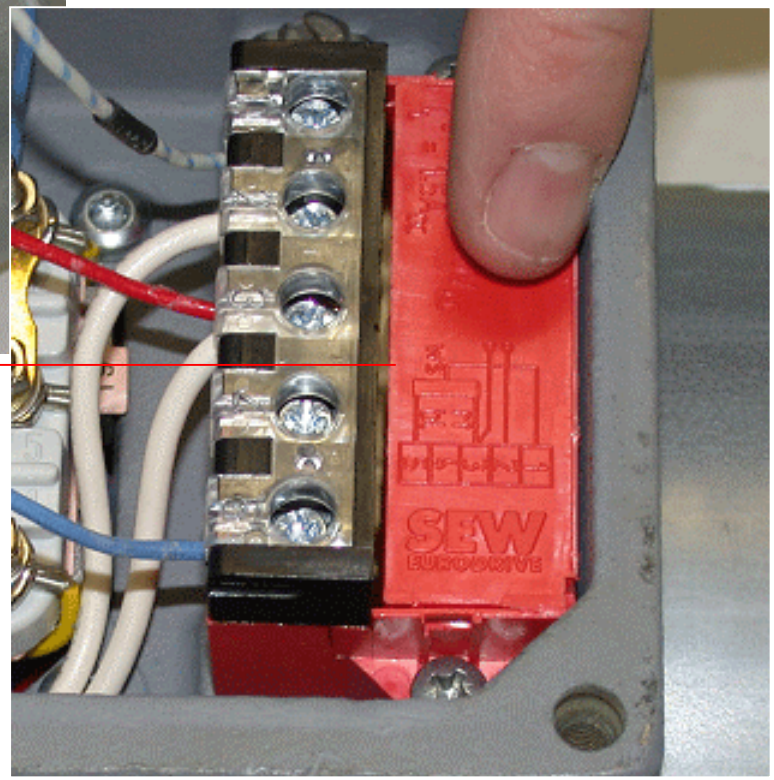
- Remove the protective tape from the 3 brake wires.



Step 28

- Using the Philips screw driver, install the 3 brake wires into the rectifier.

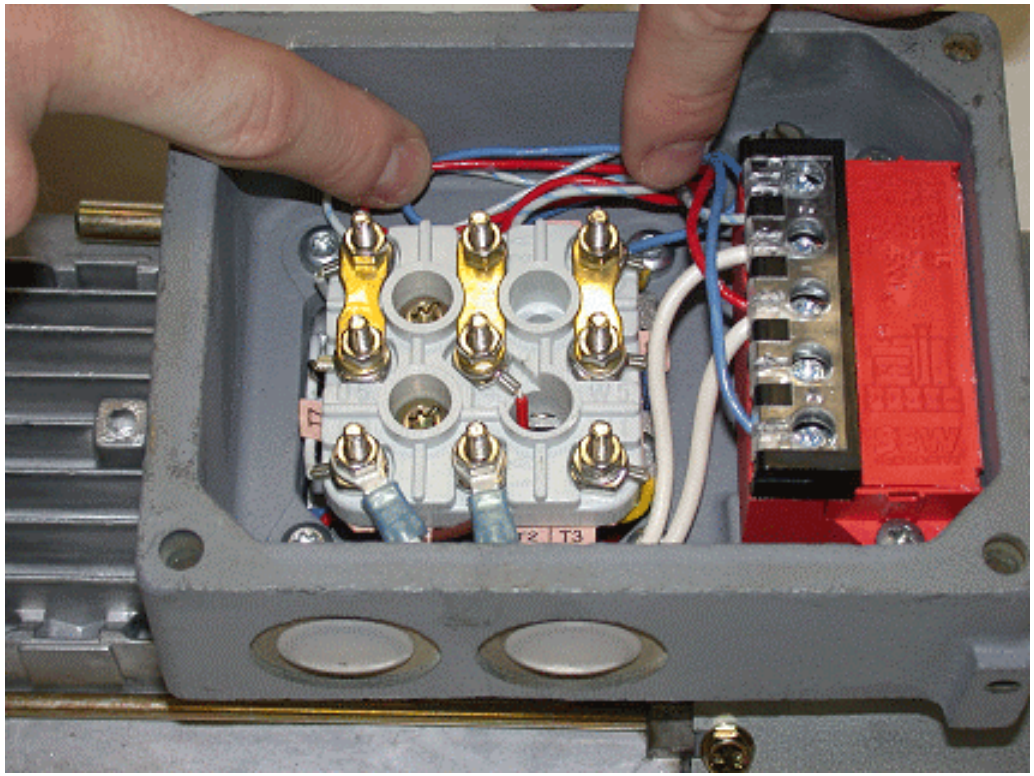




Refer to the wiring diagram found on the rectifier to determine the proper placement of the brake wires.

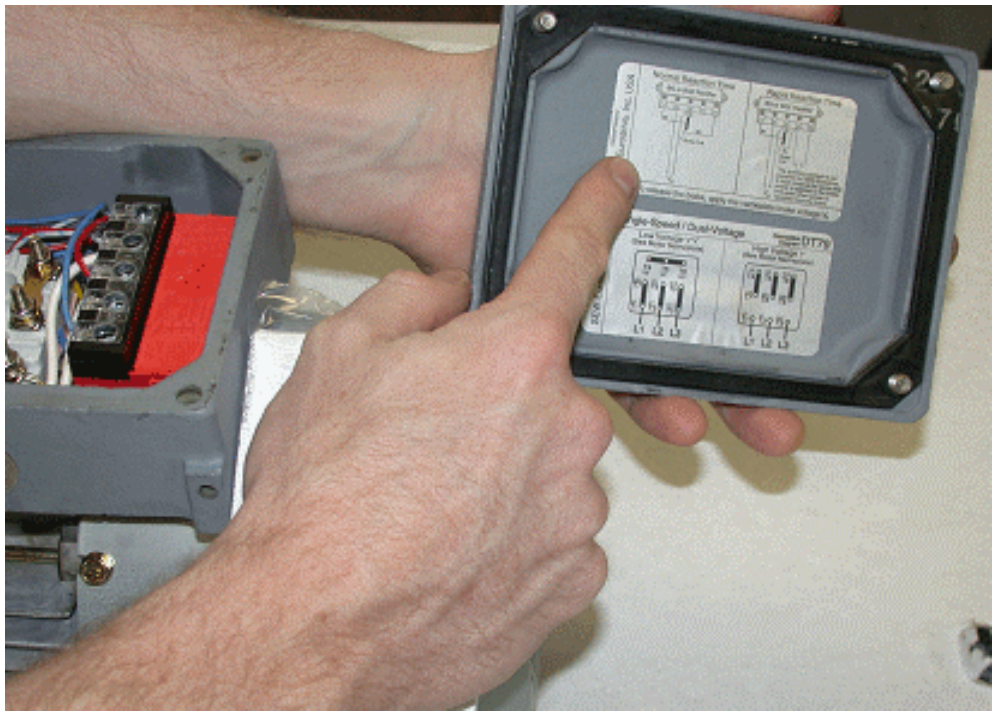
Step 29

- Carefully wrap and tuck the wires out of the way of the terminal block.



Step 30

- Reconnect the input power according to the diagram located on the inside of the conduit box cover.

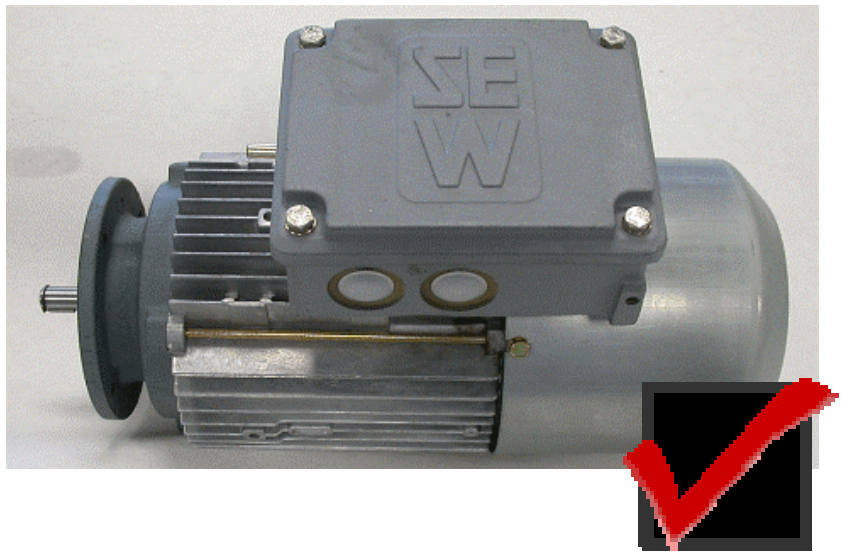


Step 31

- Install the conduit box cover. Use the 10mm nut driver to tighten the 4 bolts.

Step 32

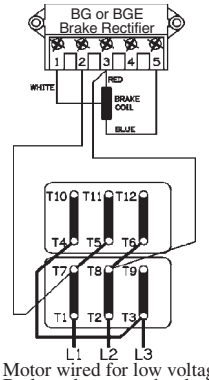
- Reconnect power and confirm the proper operation of the brakemotor and attached equipment.



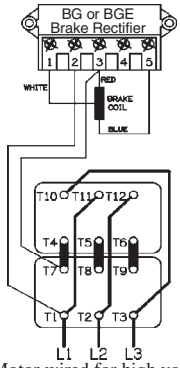
Brake Voltage Supplied from the Motor

There are specific instances when the brake voltage can be tapped from the motor's terminal block. The advantage of brake systems wired in this way is when power is applied to the motor, the brake releases, (requiring no additional brake supply power wiring). The brake can be wired to the motor terminal block under the following conditions: a single speed motor; the motor is started and run across the line (i.e., no inverter or electronic soft start). The connections shown on this page are for normal brake reaction time. For rapid brake reaction time, incorporate the contact as shown on the brake diagram located on the inside of the motor conduit box lid.

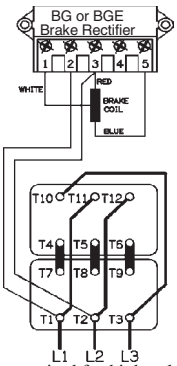
Brake Motor Connection
Single Speed Dual Voltage - ΔΔ/Δ
Connection Diagram DT72
Example Motor Voltages:
230ΔΔ/460Δ Volts - 60 Hz



Motor wired for low voltage.
Brake voltage matches low motor voltage.
Example: 230/460V Motor
Motor wired 230V
Brake voltage 230V

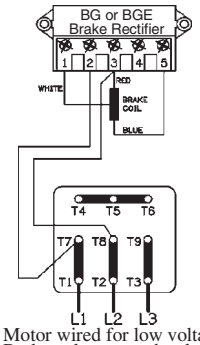


Motor wired for high voltage.
Brake voltage matches low motor voltage.
Example: 230/460V Motor
Motor wired 460V
Brake voltage 230V

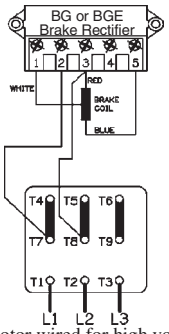


Motor wired for high voltage.
Brake voltage matches high motor voltage.
Example: 230/460V Motor
Motor wired 460V
Brake voltage 460V

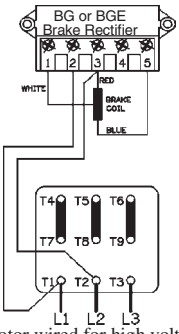
Brake Motor Connection
Single Speed Dual Voltage - YY/Y
Connection Diagram DT79
Example Motor Voltages:
230YY/460Y Volts - 60 Hz
200YY/400Y Volts - 50 Hz



Motor wired for low voltage.
Brake voltage matches low motor voltage.
Example: 230/460V Motor
Motor wired 230V
Brake voltage 230V

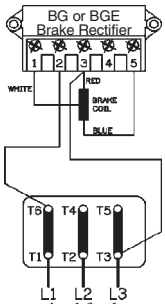


Motor wired for high voltage.
Brake voltage matches low motor voltage.
Example: 230/460V Motor
Motor wired 460V
Brake voltage 230V

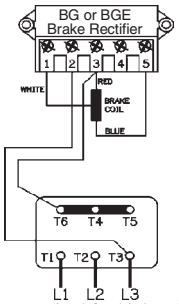


Motor wired for high voltage.
Brake voltage matches high motor voltage.
Example: 230/460V Motor
Motor wired 460V
Brake voltage 460V

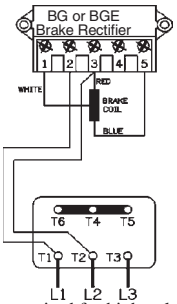
Brake Motor Connection
Single Speed Dual Voltage - Δ/Y
Connection Diagram DT13
Examples Motor Voltages:
200Δ/346Y Volts - 60 Hz
330Δ/575Y Volts - 60 Hz
220Δ/380Y Volts - 50 Hz



Motor wired for low voltage.
Brake voltage matches low motor voltage
Example: 200/346V Motor
Motor wired 200V
Brake voltage 200V



Motor wired for high voltage.
Brake voltage matches low motor voltage.
Example: 220/380V Motor
Motor wired 380V
Brake voltage 220V



Motor wired for high voltage.
Brake voltage matches high motor voltage.
Example: 220/380V Motor
Motor wired 380V
Brake voltage 380V

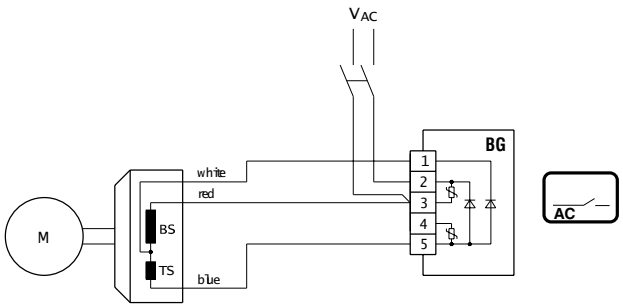
Brake Type BM(G)

The BG Brake Rectifier - Standard for frame sizes up to 100, not available on frame sizes above 100

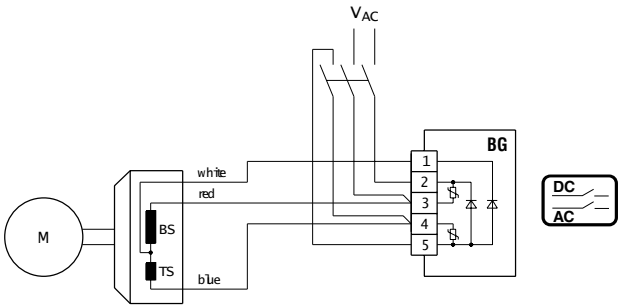
The brake rectifier BG is a half-wave rectifier with overvoltage protection.

This rectifier is used on small motors if no special requirements are needed with respect to the release reaction times of the brake. It cannot be used at elevated ambient temperatures or with unfavorable cooling conditions for the brake.

BG Normal Reaction Time



BG Rapid Reaction Time



The BGE Brake Rectifier - Standard for motor frame sizes 112M and larger, optional on frame sizes 71 to 100

The BGE brake rectifier is a half-wave rectifier with over-voltage protection elements and electronic control for reducing the brake release reaction times.

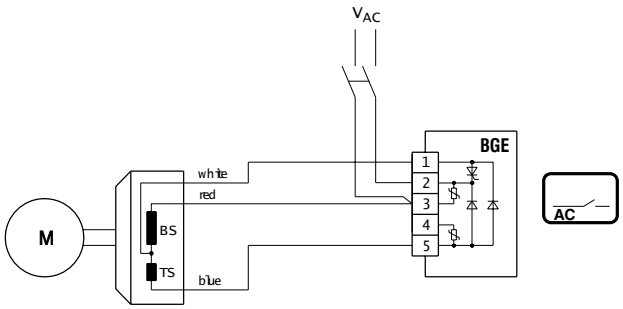
The brake operation is improved by the BGE rectifier in that it releases the brake initially by super-magnetization and then holds the stationary disc securely with reduced magnetization. Due to the exceedingly reduced brake release reaction time t_1 the brake is released before the motor can build up torque and begin to rotate. Minimum wear with maximum service life and excellent switching ability are the outstanding features of the brake system.

In the continuous released state the current losses are reduced to the necessary minimum so the thermal loading of the brake is very low.

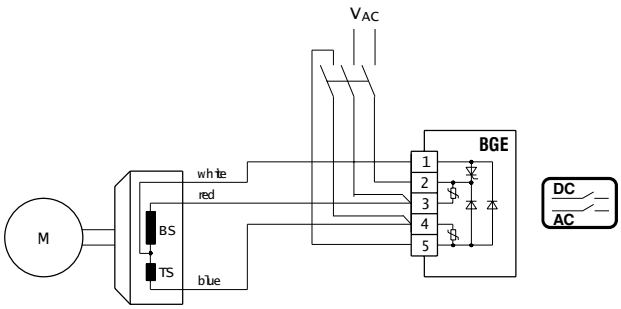
The use of the BGE Brake Rectifier is recommended if:

- Short brake release reaction times are required.
- High starting frequencies are encountered.
- High ambient temperature is present or the brake is required to be in the continuous released state while the motor is at rest or operating at low speeds.

BGE Normal Reaction Time



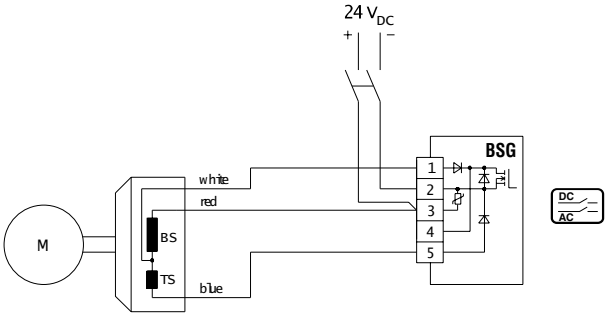
BGE Rapid Reaction Time



The BSG Brake Control Unit - Standard for motor frame sizes 112M and larger, optional on frame sizes 71 to 100

For 24VDC power supply to the brake the control unit BSG is available. With this control unit the same brake release reaction times as with the brake rectifier BGE are attained. If no BSG brake control system is installed a customer provided overvoltage protection must be provided.

BSG Rapid Reaction Time

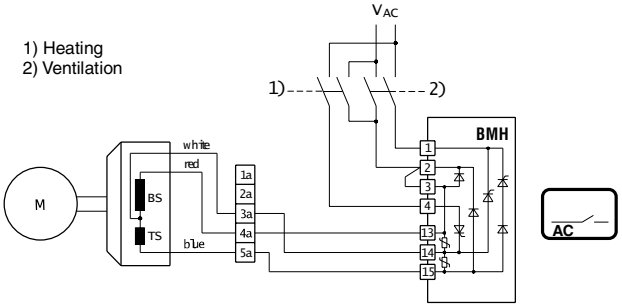


The BMH Brake Rectifier - Optional for frame sizes 71 to 225

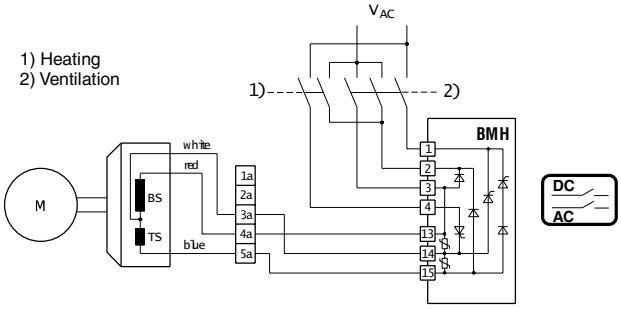
For low ambient temperatures the BMH Brake Rectifier with a heating current is available for heating the brake while the motor is at rest. Electric heating is always recommended where moisture condensation followed by frost may occur or where wet corrosive atmosphere with long periods of rest are to be expected. The BMH unit has the same electronic circuitry as the BGE and thus provides the same short reaction times for the BM(G) brake.

The BMH is designed as a module in a DIN rail housing with plug-in connections for control cabinet installation.

BMH Normal Reaction Time



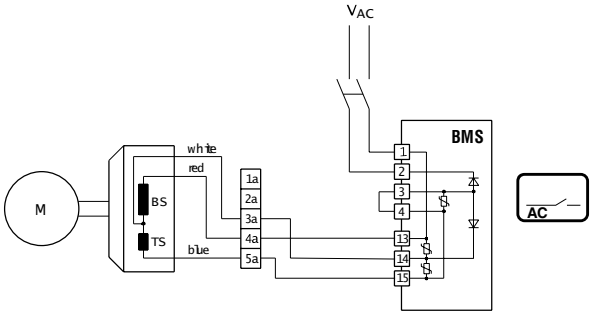
BMH Rapid Reaction Time



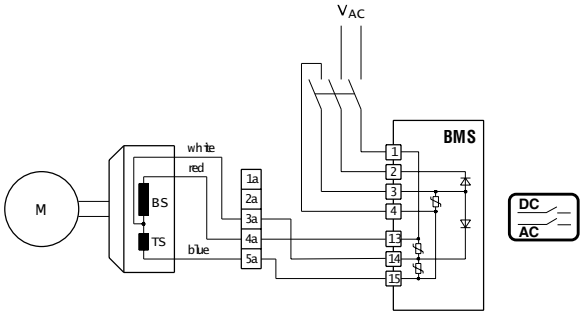
The BMS Brake Rectifier - Optional for frame sizes up to 100, not available on frame sizes above 100

The brake rectifier BMS is a half-wave rectifier with protective elements against overvoltage. It functions like the rectifier type BG, however, it is designed to be mounted in a control panel on DIN rail and not in the motors conduit box. The BMS can be wired to operate for normal or rapid brake reaction times. The BMS rectifier is primarily used when the ambient conditions of the motor preclude the use of the BG rectifier mounted in the motors terminal box.

BMS Normal Reaction Time



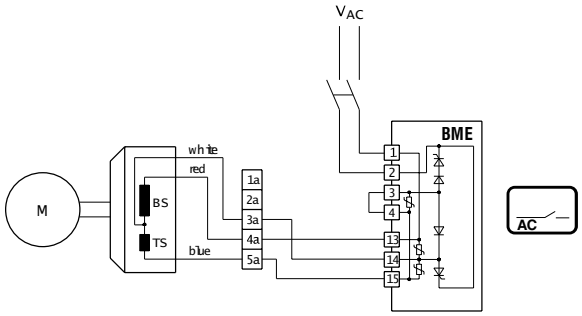
BMS Rapid Reaction Time



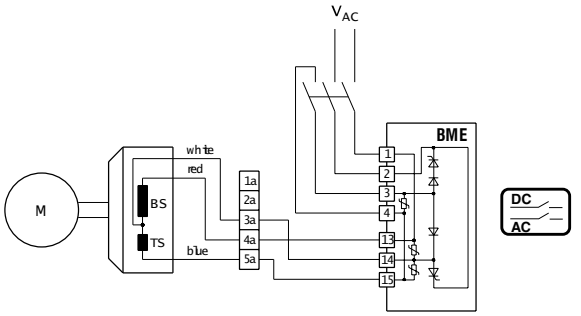
The BME Brake Rectifier - Optional for frame sizes 71 to 225

The BME brake rectifier is a half-wave rectifier with overvoltage protection elements and electronic control for reducing the brake release reaction times. It functions like the rectifier type BGE, however, it is designed to be mounted in a control panel on DIN rail and not in the motors conduit box. The BME has the same high performance functions as the BGE for rapid brake release, which allow the motor brake system to cycle at a very high rate. The BME can we wired to operate for normal or rapid brake reaction times. The BME is primarily used when the ambient conditions of the motor preclude the use of the BGE rectifier mounted in the motors terminal box.

BME Normal Reaction Time



BME Rapid Reaction Time



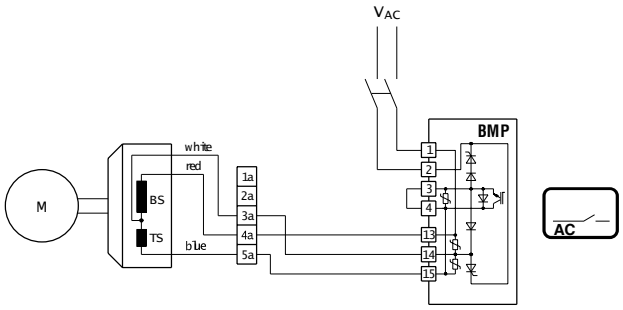
SEW EURODRIVE

Brake Type BM(G)

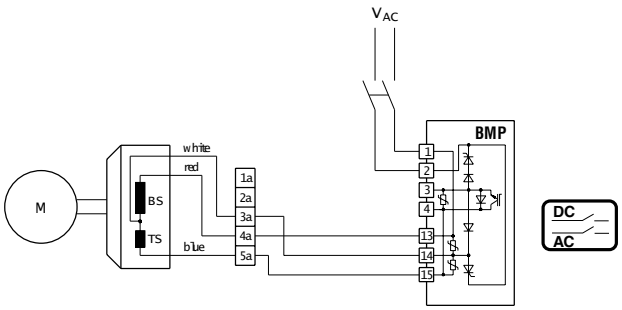
The BMP Brake Control System - Optional for frame sizes 71 to 225

The BMP control system is a BME brake rectifier with an integrated voltage relay. The BMP minimizes response and reaction times and reduces cabling between the switch cabinet and the brake motor. It functions like the rectifier type BGE and the voltage relay UR combined into one device. It is designed to be mounted in a control panel on DIN rail and not in the motors conduit box. The BMP has the same high performance functions as the BGE for fast rake release, which allow the motor brake system to cycle at a very high rate. The BMP rectifier will automatically provide the fast brake reaction function of the UR relay without the requirement of external wiring.

BMP Normal Reaction Time



BMP Rapid Reaction Time



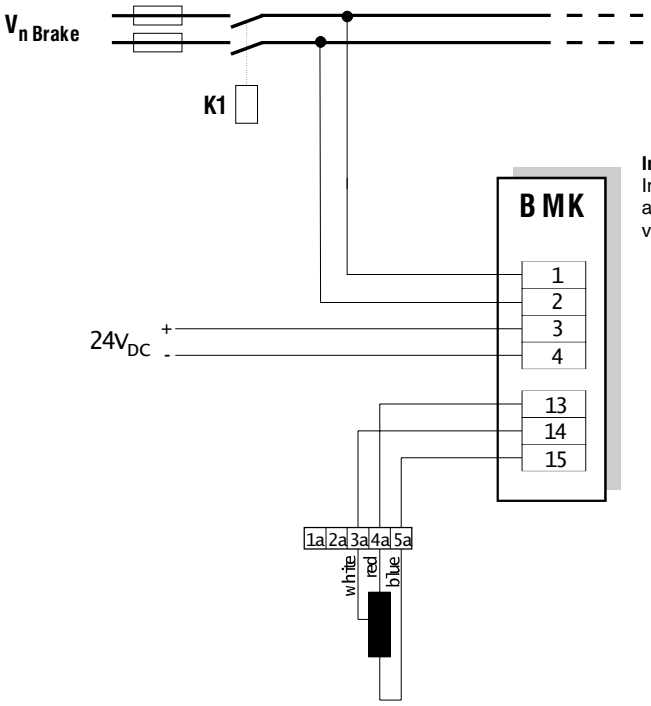
The BMK Brake Control System - Optional for frame sizes 71 to 225

The BMK rectifier functions like the rectifier type BGE, however, it is controlled directly by a 24V $_{DC}$ control signal. The BMK is powered with the required AC supply voltage to operate the brake but the brake release is controlled by a 24V $_{DC}$ control signal. It is designed to be mounted in a control panel on DIN rail and not in the motors conduit box.

Benefits:

- Direct control using 24V$_{DC}$ output signal from a PLC
- Direct control of the brake from an inverter (MOVITRAC®, MOVIDRIVE®, MOVIDYN®) output signal
- Eliminates the need for a brake control brake power contact in most PLC and inverter installations

The BMK has the same high performance functions as the BGE for fast brake release, which allow the motor brake system to cycle at a very high rate.



Important:
In the case of an EMERGENCY stop, an all-pole disconnection of the supply voltage is absolutely necessary!

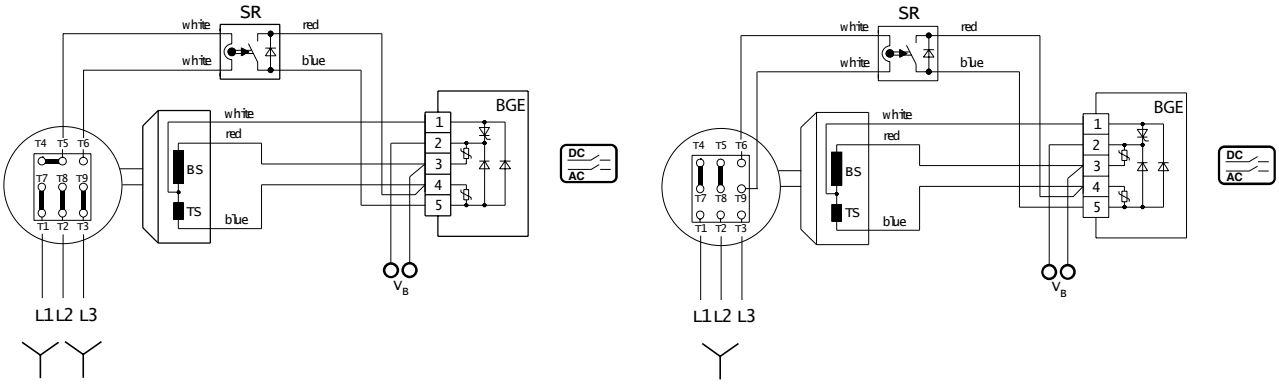
The BSR Brake Control System

The BSR control system achieves the shortest brake reaction and brake release reaction times without any external control equipment or additional wiring leads. The BSR brake control system combines the brake rectifier BGE (for motor frame sizes 71 to 225) with an electronic, current relay SR, which is mounted in the terminal box. The SR takes care of the task of rapidly demagnetizing the brake.

The SR current relay is fed with current from a voltage phase feeding the motor while the motor is running. When the motor is switched off, the current relay, SR, switches instantly to cause the rectifier to demagnetize the brake.

The BSR system is only suitable for single speed motors with current ratings up to 50 Amps.

In general, the white-black leads of the SR relay replace a brass jumper bar on the terminal block of any single speed motor



The BUR Brake Actuator

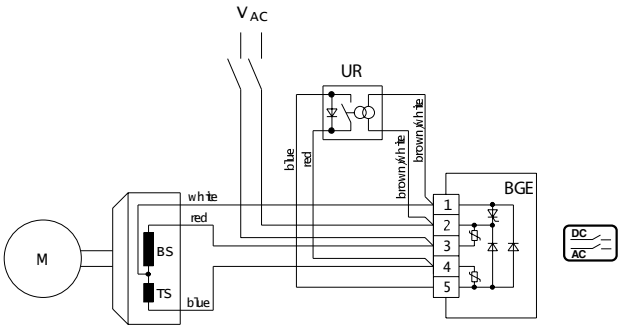
The control system BUR is an integrated combination, in the terminal box, of the brake rectifier BGE (for motor frame sizes 71 through 200), BG (for motor frame size 63) and the voltage relay UR. It is specially suited for two-speed or speed controlled AC squirrel-cage motors or DC motors, which require a very rapid brake reaction time. For these applications it is a characteristic that the AC supply for the brake rectifier is run separately to the terminal box.

The voltage relay UR with power supply interruption separates the DC circuit of the brake and thereby ensures a rapid demagnetizing of the brake.

The control system BUR achieves the shortest brake reaction and brake release reaction times without additional conductor leads requirement between the switch cabinet and brake motor and also without external contactors.

The control system BUR is available for power supplies 42V through 500V and a maximum holding current of 1 A.

The BSR and BUR engage a PG threaded conduit aperature of the terminal box. Should the standard four PG threaded conduit aperatures not be sufficient for the cabling, please consult us.



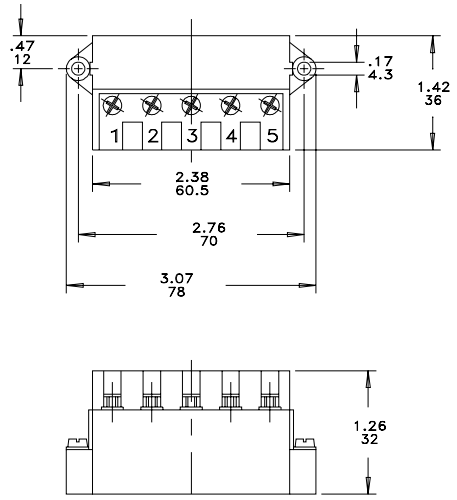
Caution:
The power supply is with separate supply leads. The connection to the terminal board of the motor is not permissible.

Brake Type BM(G)

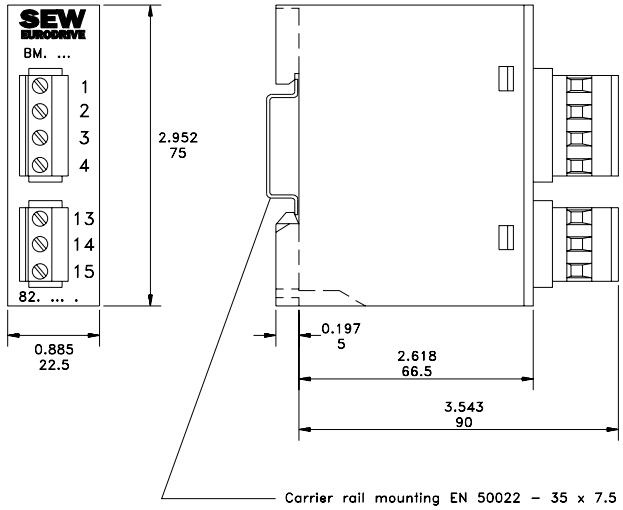
Mechanical Features of the Brake Rectifier and Brake Control Systems

All brake rectifiers for the BM(G) brake have the same external dimensions (except for the DIN rail mounted units). The BG and BGE units are preferably mounted in the motor terminal box, but can also be supplied for switch cabinet installation. The BMS, BME, BMH, BMP and BMK units are for DIN rail mounting.

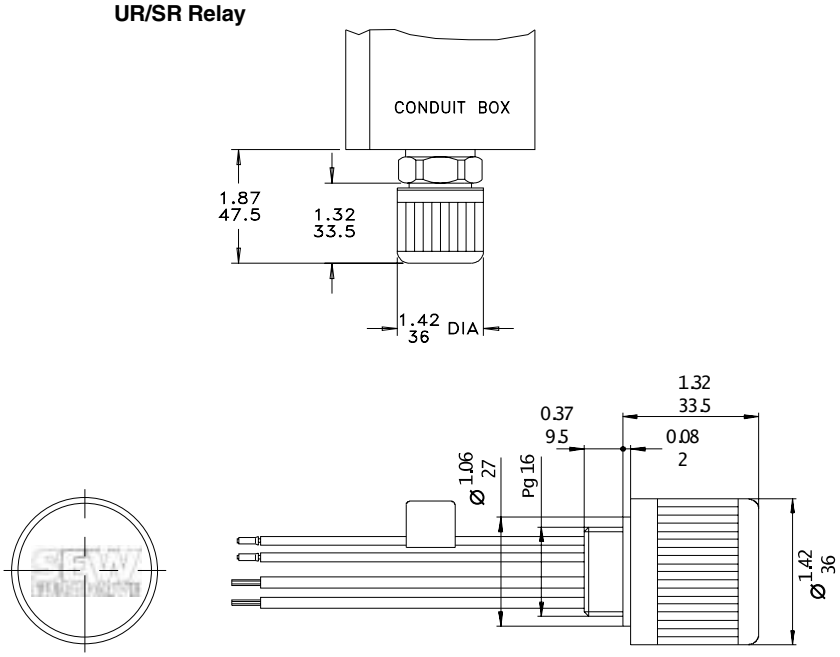
BG, BGE, BSG Brake Rectifiers



BMS, BME, BMH, BMP, BMK Brake Rectifiers



UR/SR Relay



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Brake Coil Resistance

Motor Frame Brake Size Brake Torque (lb-ft)		DT71-80 BM(G)05 0.89 - 3.7	DT80 BM(G)1 4.4 - 7.4	DT90-100 BM(G)2 3.7 - 14.8	DT100 BM(G)4 17.7 - 29.5	DV112-132S BM(G)8 7.00 - 55.3	DV132M-160M BM15 18.4 - 110.6	DV160L-225 BM30/31/32/62 36.9 - 442.5	DV250-280 BMG61/122 147.5 - 885
BRAKE VOLTAGE **AC (to rectifier V_B)**	**DC**	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$	$R_B(\Omega)$ $R_T(\Omega)$
—	24	4.4 13.4	3.9 12.1	3.4 10.2	2.7 8.2	1.4 7.5	0.8 5.0	0.67 5.0	—
105 - 116	48	17.6 53.4	15.6 48.1	13.6 40.5	10.9 32.7	5.7 29.8	3.1 20.1	2.2 16.8	—
186 - 207	80	55.6 169	49.5 152	42.9 128	34.5 103	17.9 94.2	9.8 63.5	7.1 53.0	—
194 - 217	80	—	—	—	—	—	—	—	4.0 32.6
208 - 233	96	70.0 213	62.3 192	54.0 161	43.4 130	22.5 119	12.4 80.0	8.9 66.7	—
218 - 243	96	—	—	—	—	—	—	—	5.0 41.0
330 - 369	147	176 534	157 481	136 405	109 327	56.5 298	31.1 201	22.3 168	—
344 - 379	147	—	—	—	—	—	—	—	12.6 103
370 - 414	167	221 672	197 606	171 510	137 411	71.2 375	39.2 253	28.1 211	—
380 - 431	167	—	—	—	—	—	—	—	15.8 130
415 - 464	185	279 846	248 762	215 643	173 518	89.6 472	49.3 318	35.4 266	—
432 - 484	185	—	—	—	—	—	—	—	19.9 163
465 - 522	208	351 1066	312 960	271 809	218 652	113 594	62.1 401	44.6 334	—
485 - 542	208	—	—	—	—	—	—	—	25.1 205

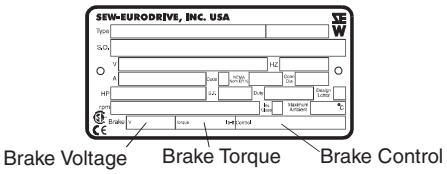
Voltage AC - The voltage shown is the nameplate AC brake voltage supplied to the brake rectifier.
DC - The voltage shown is the effective DC voltage required by the brake coil. The measured voltage from the rectifier will be 10-20% lower than that shown.

Brake Coil Resistance - values must be measured with the brake coil disconnected from the rectifier.
R_B - Accelerator coil resistance in Ω, measured from the red to the white brake coil wire at 20° C.
R_T - Fractional coil resistance in Ω, measured from the white to the blue brake coil wire at 20° C.

Brake Connection (AC Voltage)

SEW-Eurodrive motor brakes can be connected in a number of different ways. In order to connect the brake for each application, it is important to refer to the data on the motor nameplate that describes the brake system. The brake fields are: brake voltage, brake torque and brake control.

This operating instruction covers AC brake voltages with the following brake control components. If the brake voltage is DC, or if the brake control components differ from those listed below, an additional operating instruction must be consulted for connection information.



SEW-Eurodrive fail-safe mechanical brakes are DC controlled. Standardly, a brake rectifier (halfwave) is provided to convert the AC line voltage to the DC voltage required to drive the brake. 24VDC brakes do not include a rectifier. When voltage (V_B) is applied to the brake, it will release. When voltage (V_B) is removed from the brake, it will set.

The brake rectifier can be wired either for normal brake reaction time (setting, stopping) or fast brake reaction time.

Brake Control (Rectifier)	Part Number
BG1.5	825 384 6
BG3.0	825 386 2
BGE1.5	825 385 4
BGE3.0	825 387 0

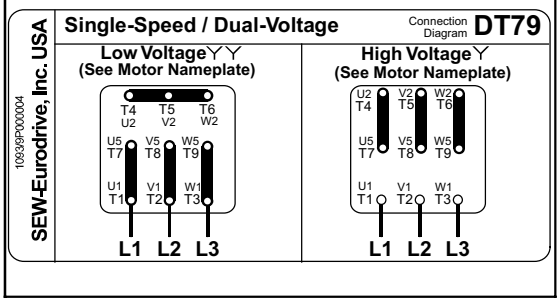
The fast brake reaction will set the brake more quickly which will provide a shorter and more repeatable stopping distance. There are two basic types of brake rectifiers, BG and BGE. The BG brake rectifier is standard on motor sizes DT71 - DT100. The BGE rectifier is standard on motor sizes DV112 - DV280. The BGE rectifier can be ordered with motor sizes DT71 - DT100 and will provide faster brake release times allowing the motor to cycle more frequently.

The wiring diagrams for brake connections are located on the inside of the motor conduit box lid. The brake will release and allow the motor to rotate when the nameplate AC brake voltage V_B is supplied to the brake rectifier terminals. There are certain cases where the brake rectifier can receive its voltage from the motor's terminal block, meaning that when power is applied to the motor it will simultaneously release the brake and start the motor. See page 3 for this description.

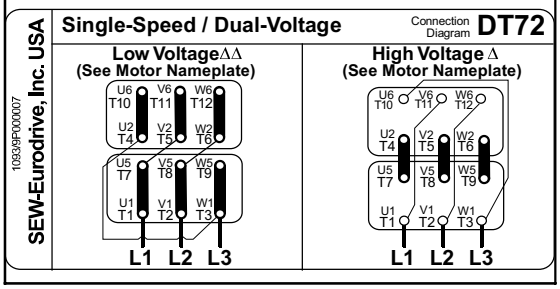
Motor Connection Diagrams

Dual-Voltage Motors
(single-speed)

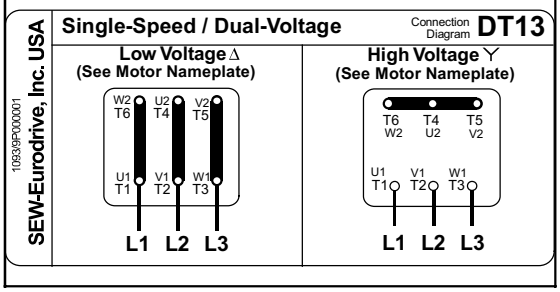
Frame Size	Low Voltage	High Voltage
DT71 thru DV180	230V - 60Hz	460V - 60Hz
	200V - 50Hz	400V - 50Hz



Frame Size	Low Voltage	High Voltage
DV200 thru DV225	230V - 60Hz	460V - 60Hz

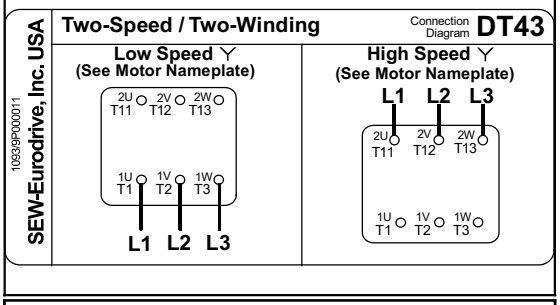


Frame Size	Low Voltage	High Voltage
DT71 thru DV225	200V - 50Hz	346V - 50Hz
	208V - 60Hz	360V - 60Hz
	220V - 50Hz	380V - 50Hz
	230V - 50Hz	400V - 50Hz
	240V - 50Hz	415V - 50Hz
	330V - 60Hz	575V - 60Hz

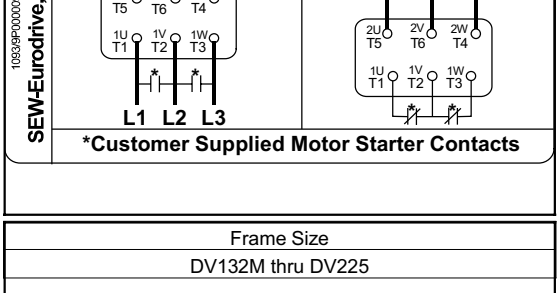


Single-Voltage Motors
(two-speed)

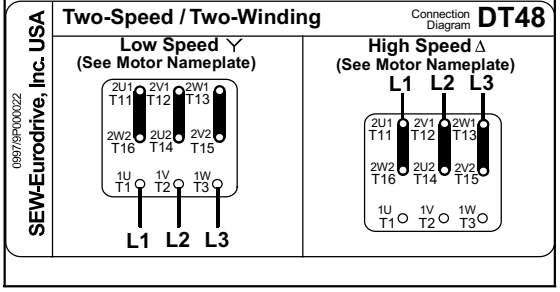
Frame Size
DT71 thru DV225



Frame Size
DT71 thru DV132S



Frame Size
DV132M thru DV225



Type BM Brakes
with 24 VDC Control

OPERATING INSTRUCTIONS

09 757 12 US

GENERAL

SEW-Eurodrive brakes are available for use with a 24 VDC source voltage. A 24 VDC brake system lends itself well to use in process automation systems where other components are controlled by 24 VDC signals. Safety reasons may also dictate the use of a 24 VDC brake system. See the motor nameplate for the required brake voltage.

These operating instructions should be used together with the general operating instructions "Motors and Brakemotors Type BM Brakes." This sheet replaces the section "BRAKE CONNECTION (AC VOLTAGE)" and "BRAKE VOLTAGE SUPPLIED FROM THE MOTOR" in the general operating instructions.

BRAKE FUNCTION

SEW-Eurodrive fail-safe mechanical brakes are DC voltage controlled. To release the brake and allow the motor to rotate, 24 VDC is applied to the brake system. To set the brake and hold the motor, 24 VDC is removed from the brake system. In the small frame size motors (DT71-DT100) the brake coil can be connected directly to the 24 VDC supply. In the larger frame size motors (DV112-DV225) a brake control module (type BSG) is required to operate the brake. The brake control module BSG can optionally be used with the smaller frame motors (DT71-DT100) and it will improve the brake's performance. The BSG control module with motors sizes (DT71-DT100) will provide faster brake release times allowing the motor to cycle more frequently.

BRAKE CONNECTION

The general wiring diagrams for the brake type BM controlled by a 24 VDC signal are given on the back side of this sheet. On motor frame sizes DT71-DT100 the brake can be released by applying 24 VDC directly across the brake coil (the red and blue wires). The brake is set by removing the 24 VDC from the brake coil. As standard the brake coil wires are connected to a terminal strip in the motor's conduit box. It is recommended that a varistor be put in parallel across the brake coil to protect the brake coil and the contacts from overvoltage caused by switching the brake on or off. Suitable varistors for this protection are:

Manufacturer	Varistor Type
Siemens	SIO V-S10 K300
GE	V275LA10
Panasonic	ERZ-C10DK471

The BSG brake control module is supplied as standard equipment on motor frame sizes DV112-DV225 and optionally on motor frame sizes DT71-DT100. The BS24 is supplied as a standard on sizes DT71-DT100. To release the brake 24 VDC is applied to terminals 2 and 3 on the BSG control module. To set the brake the 24 VDC power is removed from the brake control module. The BSG unit incorporates overvoltage protection so no external varistor is required.

A common sequence of operation is to apply 24VDC to release the brake at the same time as power is applied to start the motor. Typically power is removed from the brake and motor simultaneously to stop the motor.

Brake Current Draw							
Brake Type	BM05	BM1	BM2	BM4	BM8	BM15	BM30 - BM62
Motor Type (DT/DV)	71 - 80	80	90 - 100	100	112 - 132S	132M - 160M	160L - 225M
Continuous Current (Amps DC)	1.38	1.54	1.77	2.20	2.45	4.15	4.00
Inrush Current (Amps DC)	5.52*	6.16*	7.08*	8.80*	15.4	31.1	34.0

***The inrush current occurs only if the BSG brake control module is used.**

SEW EURODRIVE

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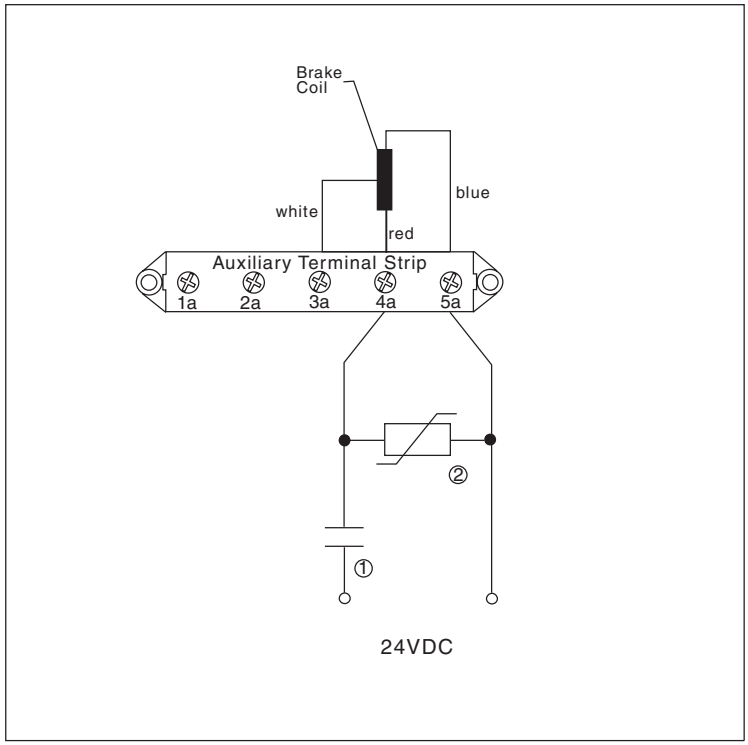

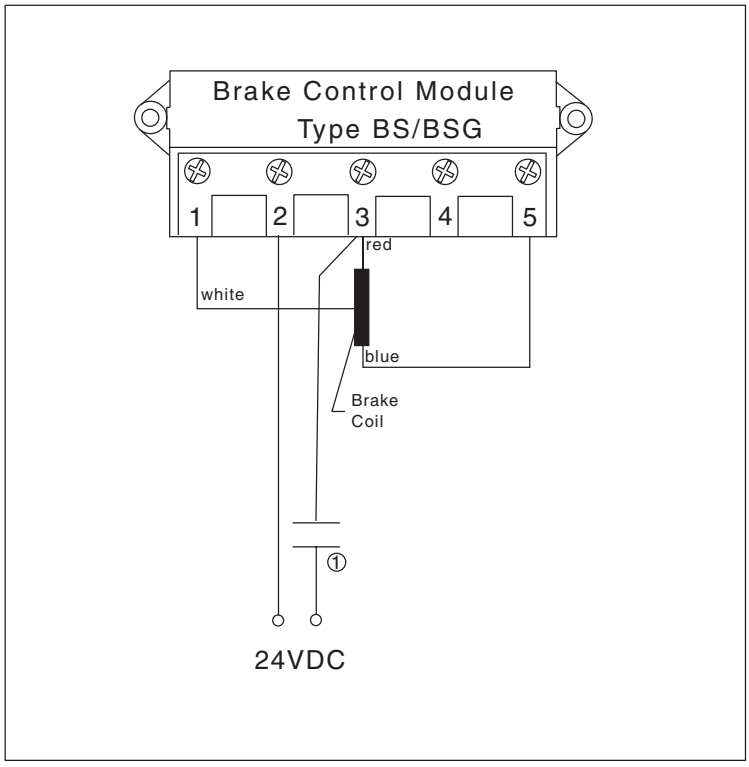

1) The contacts shown are not SEW-Eurodrive Supplied

2) The recommended varistor is not SEW-Eurodrive supplied.

SEW EURODRIVE

Keywords:

Notebook:	neilg98's notebook		
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URL:	http://www.digikey.com/product-detail/en/S10K300/495-3788-ND/651311?adpos=1o1&...		

Product Index > Circuit Protection > TVS - Varistors, MOVs > S10K300

All prices are in US dollars.

Digi-Key Part Number	495-3788-ND
Quantity Available	Digi-Key Stock: 1,404 Can ship immediately
Manufacturer	EPCOS Inc
Manufacturer Part Number	**S10K300**
Description	VARISTOR 300VRMS 10MM RADIAL
Lead Free Status / RoHS Status	Lead free / RoHS Compliant

Price Break	Unit Price	Extended Price
1	0.51000	0.51
10	0.35900	3.59
100	0.23630	23.63
500	0.17500	87.50
1,000	0.14875	148.75
5,000	0.13125	656.25
10,000	0.12250	1,225.00

Image shown is a representation only. Exact specifications should be obtained from the product data sheet.

Quantity Item Number **Customer Reference**

When requested quantity exceeds displayed pricing table quantities, a lesser unit price may appear on your order.
You may submit a request for quotation on quantities which are greater than those displayed in the pricing table.

Datasheets	Leaded Varistors StandarD Series
Product Photos	Varistor 10mm Series
Product Training Modules	SMD Disk Varistors
Catalog Drawings	S10K Series Front S10K300 Side
Standard Package	500
Category	Circuit Protection
Family	TVS - Varistors, MOVs

Family	~~FVS - Varistors, MOVs~~
Series	~~StandarD~~
Varistor Voltage	470V
Current-Surge	2.5kA
Number of Circuits	1
Maximum AC Volts	300VAC
Maximum DC Volts	385VDC
Energy	47J
Package / Case	Disc 10mm
Dynamic Catalog	~~StandarD Series~~
Other Names	495-3788 B72210S 301K101 B72210S0301K101 B72210S301K101 S10K300-ND

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