

Installation & Operation Manual

**Phase Converters
3 Phase Power...
Is Only A Converter Away**

**Phase Converter Installation
Must Be Done By
Licensed Electrician Or
Qualified Motor Service Personnel.
Your Unit Must Be Protected By
Appropriate
Circuit Protection Devices.**

Form #900-101

Static Type Phase Converters

- Series 1B
- Series 3

Rotary Type Phase Converters

- Standard Duty
- Heavy Duty



Features Common To All Models

**Easy Installation • Instant Reversing • Operate On 50/60 Hz
Run More Than One Machine**

Service Line: 651-452-5012
Web site: www.cedarberg.com
e-mail: info@cedarberg.com



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Attention: It is very important that all wiring diagrams and installation procedures spelled out in this manual are followed precisely. Failure to do so will void the Phase Converter warranty!

All Phase Converter Models:

1. Phase Converter installations are to be made by qualified electricians.
2. All wiring must comply with diagrams in the Installation and Operation Manual.
3. Disconnect power prior to servicing Phase Converter.

Heavy Duty Rotary Phase Converters:

4. Check all Capacitor Hold-Down Clamp Nuts monthly and re-tighten as necessary.
5. Check all Capacitor Jumper Wire Connections monthly.
Tighten Female Disconnect Terminals if necessary

INTRODUCTION

CONGRATULATIONS! You have just purchased the finest phase converter available today. Cedarberg Phase Converters permit the operation of three phase motors on single phase current. They are used where three phase current is not available and the cost of bringing in three phase power is prohibitive.

We at Cedarberg Industries are proud of our Phase Converters and we stand behind these products.

To support your needs our services include:

- Inventory control stocking for immediate delivery
- Immediate technical assistance
- 24 hour repair service
- Product exchange programs
- Lease and rental programs

Prior to beginning your installation, we recommend that both you and your electrician read and understand the following installation requirements. A few minutes spent at this point may save hours at a later date. If after this review you have any questions, consult with the factory at (651) 452-5012 for clarification.

* Cedarberg Phase Converters should be installed by a qualified, licensed electrician only.*

Correctly sized and properly installed, a Cedarberg Phase Converter should provide years of trouble free service.

We thank you for selecting a Cedarberg Product and we look forward to a continued business relationship with you in the future.

LIMITATIONS

Cedarberg Static Phase Converters are designed to start motors within a specific horsepower range. Smaller motors may be started one at a time, once you have a motor within the phase converter's horsepower range running, provided that the smaller motors are wired into the same circuit.

Cedarberg Rotary Phase Converters are designed to start any motor from fractional horsepower up to the nameplate rating.

If the motor on your equipment is larger than the phase converter's nameplate rating, you will have to purchase the correct phase converter. Do Not attempt to start a motor that is too large for your converter or damage could occur.

ARCHITECTURAL AND INSTALLATION SPECIFICATIONS

A. Space Requirements

We recommend mounting your Cedarberg Static Phase Converter on a wall adjacent to the equipment to be operated. If this is not practical, the phase converter may be located directly on the equipment, but care must be taken to protect the phase converter from sawdust, dirt, oil, metal chips, etc.

A. Space Requirements (cont.)

Cedarberg Static Phase Converters require electrical power access from the top and should be located in a position where the operator can readily observe the light (s).

Cedarberg Rotary Phase Converters are generally located directly on the floor. We recommend mounting on rails and / or rubber mounts (see Fig. 1, page 7). Front access must be provided for initial installation and in the event future service is required.

Refer to Table 1 for size and weight requirements for all Cedarberg Phase Converters.

Table 1

MODEL	LENGTH (In.)	WIDTH (In.)	HEIGHT (In.)	WEIGHT (Lbs.)
1100B-1600B	6	7	10	3
3100,3200	6	7	10	4
3300	6	7	10	5
3400	8	9	11	7
3500	8	9	11	8
10 (10A)	19 (19)	14 (15)	14 (13)	78 (36)
30 (30A)	19 (19)	14 (14)	14 (14)	95 (64)
50 (50A)	21 (19)	19 (14)	14 (14)	136 (80)
75 (75A)	21 (23)	19 (19)	14 (17)	166 (116)
100 (100A)	21 (23)	21 (19)	16 (17)	212 (145)
150	28	20	22	300
200	30	26	24	325
250	30	26	24	325

Cedarberg Phase Converter Sizes & Shipping Weights

Note: Actual Shipping Weights May Be Subject to Change.

B. Electrical Requirements

Cedarberg Phase Converters require a 220 Volt single phase source of ample capacity for proper operation. It is imperative that sufficient power be available for proper operation. Please refer to Table 3, (below) to determine the electrical service required.

Table 3

3ø Motor Load HP	Comparable 1ø Motor Load Running Current	Starting Current	Minimum Fusing at Power Source	Wire Size & Distance Motor to Power Source (feet)				
				100	150	200	300	500
1	7	Approximately 300% of Running Current	20	10	8	8	6	4
2	11		20	10	8	8	6	4
3	15		30	8	8	6	4	2
5	23		60	6	4	4	2	0
7-1/2	32		100	6	4	4	2	0
10	40		100	4	4	3	1	0
15	62		150	4	2	2	1	000
20	80		200	2	2	2	0	000
25	104		200	2	1	1	00	0000
30	127		200	1	0	00	0000	300
40	165		200	1	0	00	0000	300
50	201		400	0	000	0000	300	500
75	297		400	000	0000	300	500	750
100	396	600	0000	300	500	750	1000	

Use Table 3 as a reference chart to determine the proper wire size and power source fusing required for your installation.

Information on Fusing and Wire Size is Based on Copper Wire & 230 Volts

B. Electrical Requirements (cont.)

Have your electrician verify the following:

1. Sufficient electrical service is available from the power source for the added load you intend to run. If not, have the power company increase the transformer size outside your building and / or increase the wire size of the service drop coming into your building.
2. Sufficient service entrance size to handle the added load you intend to run. If not, have your electrician add a separate service entrance for your phase converter application.
3. Refer to Table 3, (page 4) to determine size of service entrance necessary for your application, minimum fusing recommendation, minimum wire size requirements, etc.
4. All Installations must conform to the National Electrical Code and appropriate local codes. This includes a ground wire or equivalent ground on all installations.
5. Figure 2, (page 8), shows the recommended wiring schematic for a Cedarberg Phase Converter system.

C. Components not supplied with the Cedarberg Phase Converter

Your Cedarberg Phase Converter comes ready for installation. Electrical installation hardware such as disconnect boxes, wire, etc.... and mounting hardware are not provided with the unit.

STANDARD FEATURES

Instant reversal motors present no problem to these converters. For Series 1B and Series 3 converter installations, we recommend that frequent reversing not be done for extended periods of time.

Our Series 1B & Series 3 units will start more than one machine, as long as EACH motor is within the horsepower range of the converter.

When multiple three phase motors are on the same circuit and not within the range of this unit, the following steps must be taken:

- A) Start the largest motor first. (This motor must be within the converter's range).
- B) While allowing this motor to idle, you may start additional, smaller motors one at a time.
- C) The motor that is within the range of the Series 3 converter must remain running throughout the duty cycle of the smaller motors. With the Series 1B converter, the motor that is within the range of the Series 1B converter may be turned off once the smaller motor is running and up to speed.
- D) Rotary Phase Converters are capable of starting any motor from fractional horsepower up to their nameplate rating. They are designed to run total horsepower loads up to three times their nameplate rating on our Heavy Duty Models & up to two times their nameplate rating on our Standard Duty Models.

Two speed electric motors can be operated without difficulty, provided both speed ranges lie within the converter's horsepower range.

Some foreign and special motors require less starting current and therefore may require a static converter one size smaller than normal.

Table 2 is a Simplified Selection Guide listing all the standard features of Cedarberg Phase Converters. (page 6).

Table 2

A
Series 1B
 Permits starting of 220V 3 ϕ motors on 220V 1 ϕ current

B
Series III
 Provides continuous 3 ϕ power to 220V 3 ϕ motors from 220V 1 ϕ current

C
Heavy Duty Rotary
 Produces balanced 3 ϕ power for maximum motor efficiency from 1 ϕ current (manufacturer's statement)

D
Standard Duty Rotary
 Produces continuous 3 ϕ power to 220V 3 ϕ motors from 220V 1 ϕ current

Features Common To All Models:

- Easy Installation
- Instant Reversing
- Operates On 50/60 Hz
- Run More Than One Machine

Simplified Selection Guide

Figure	A	B	C	D
Model Ranges	Fractional to 10 HP	Fractional to 10 HP	1 - 25 HP*	1 - 10 HP
Type of 3 ϕ Conversion	3 ϕ Starting Current	3 ϕ Starting & Running Current	Maximum Balanced 3 ϕ Starting & Running Current	3 ϕ Starting & Running Current
Motor Efficiency and Performance	Up to 70%	Up to 85%	Up to 100%	Up to 100%
Specification Weights & Measures (See table 1)	Maximum size 3" x 6" x 7" Weight 2 - 4 lbs.	Maximum size 7" x 8" x 10" Weight 2 - 10 lbs.	Consult factory for sizes & weights (See table 1)	Consult factory for sizes & weights (See table 1)
Model Selection	Based on HP of largest motor. Once running, additional smaller motors can be started one at a time. Do not size converter to total HP of machines needing conversion.		Manufacturer States: The largest motor you intend to start should not exceed the nameplate rating. These models are designed to run up to 3 times the nameplate rating. Extreme high starting loads may require an oversized converter. Consult factory.	The largest motor you intend to start should not exceed the nameplate rating. These models are designed to run up to 2 times the nameplate rating. Extreme high starting loads may require an oversized converter. Consult factory.
Multiple Speed Motors	All HP ranges must be within the range of the converter used		Produces maximum efficiency of multi-speed motor	Motors may be operated from 0 HP to nameplate HP of the converter used
Using Transformers & Rectifiers	Power source side of the converter		Power source or load side of the converter	Power source or load side of the converter

* Consult factory for larger horsepower Heavy Duty Rotary Phase Converters

INSTALLATION PROCEDURES

NOTE: Pre-plan your installation before beginning work. It will save time and avoid potential problems.

* **IMPORTANT:** Installation should be made by a qualified licensed electrician only.*

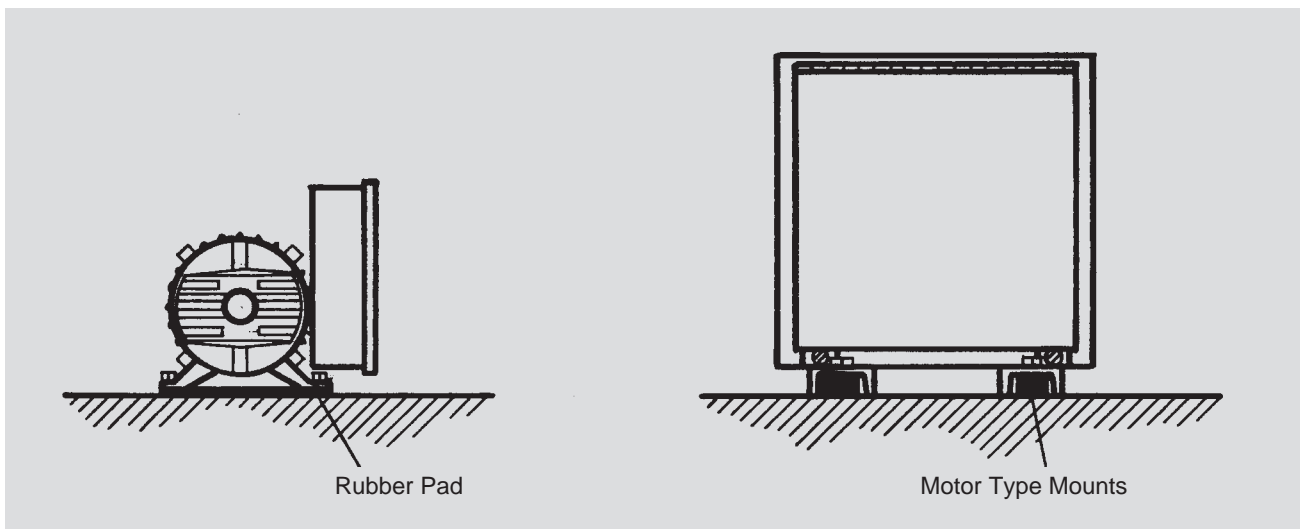
A. Shipping Inspection:

When you receive your Phase Converter, inspect it for damage and report it to the delivering carrier. Contact Cedarberg Companies and advise us of the model and serial number of the damaged unit.

Make sure the unit received is designed for the horsepower you intend to start. Refer to the nameplate rating for horsepower range of this converter.

B. Mounting and Location:

FIGURE 1



Series 1B and Series 3 models must be mounted in an upright position.

When installing a Series 1B or Series 3:

Remove four screws and pull cover off. Secure phase converter to mounting surface. After wiring, replace cover prior to operating unit.

We recommend that Rotary models be mounted with mounting rails on the bottom and / or rubber mounts to minimize normal vibration and noise. Refer to figure 1, for proper mounting techniques. (Rotary models must be mounted parallel to the floor).

Isolate all Cedarberg Phase Converters from sawdust, dirt, oil, metal chips, etc...

C. Maintenance

Series IB and Series 3 models should be visually inspected each one to three months. There is no lubrication or internal maintenance required on these units. Some rotary models are equipped with grease fittings or plugs. Periodic lubrication should be done once a year for normal operation or every six months for continuous 24 hour a day operation. Use a high quality ball bearing grease. Do not over lubricate.

Lubrication Procedures

- 1 - After stopping Phase Converter and disconnecting power, remove the lower drain or vent plug.
- 2 - Clean area around upper fill hole and remove plug.
- 3 - Using a low pressure grease gun, pump new grease into unit until it appears at the lower drain hole.
- 4 - Run Rotary Converter for several minutes to discharge excessive grease. Shut unit off, replace upper and lower plugs.

IMPORTANT Any tampering with the internal wiring or components of your Cedarberg Phase Converter will void your warranty.

D. Electrical Installation

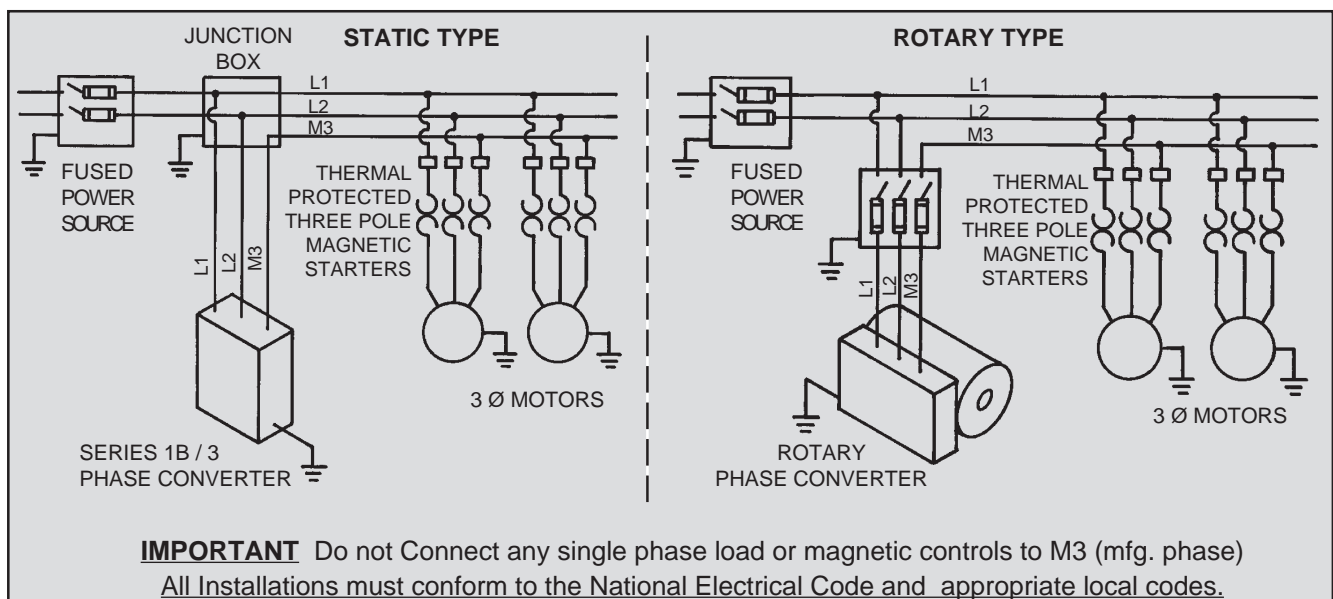
Be sure power is removed from circuit prior to installation of this unit. Install your Cedarberg Phase Converter according to the wiring schematic shown in Figure 2. This unit must be grounded. Do Not ground L1, L2, or M3.

Do Not connect 110 Volt power to the M3 terminal on a Series IB, Series 3 or Rotary as damage to the converter may occur.

On machines using magnetic switches, you must connect the 220 Volt single phase leads to the correct two wires of the three phase magnetic switch. When the magnets work, connect the 3rd wire (M3) to the magnetic switch.

All 110 Volt systems of a machine must be connected to the power source legs L1 or L2. Do Not use M3 to power any single phase loads, lights, coolant pumps, power feed motors, or any magnetic controls. Use M3 to power the motor only.

Figure 2



E. Initial Start up

Series 1B and Series 3

When starting motors for the first time, keep your hand on the off switch and watch the red indicator light. If the light stays on for more than 3-5 seconds while starting motor, or stays on after motor reaches full RPM, shut motor off immediately. Your unit may not be connected correctly or the starting load is too severe for this unit. Consult trouble shooting section for clarification.

The green light on the Series 3, indicates the converter is providing continuous three phase to your machine. Volt readings with a properly installed Series 1B, or Series 3 should be as shown in Figure 3.

Rotary

Upon initial installation this unit should be hooked up temporarily to insure proper operation of your equipment prior to punching, drilling, cutting or any other physical changes to this unit.

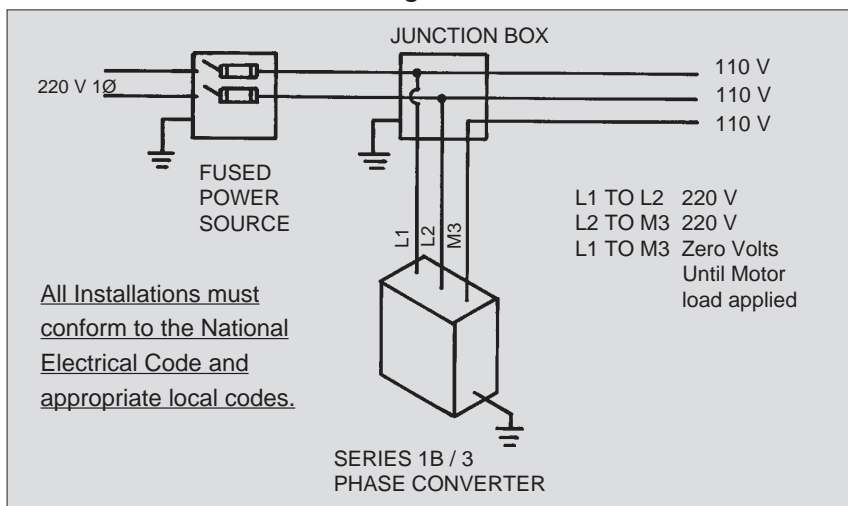
If your rotary has a toggle switch, this switch must be in the "ON" position to start the phase converter. After the rotary phase converter comes up to full RPM, switch to the "OFF" position.

Table 4

Model Number	Nameplate Rating	Fuse Amp Rating
10 - 10A	1 HP	15A
30 - 30A	3 HP	15A
50 - 50A	5 HP	20A
75 - 75A	7 1/2 HP	30A
100 - 100A	10 HP	30A
150	15 HP	45A
200	20 HP	60A
250	25 HP	60A
300	30 HP	100A
400	40 HP	100A
500	50 HP	135A
1000	100 HP	300A

Use Table 4 as a reference chart to determine the proper fuse size required for the fused disconnect switch shown in figure 2. (page 8) Time delay fuses are recommended.

Figure 3



Amp readings on (mfd leg) with a properly installed Series 1B should be seen during start up and then read 0 amps after the motor has reached full RPM. Series 3 nominal amp. on M3 (mfd leg) should be as shown in Table 5 (below).

Table 5

MODEL NUMBER	M3 AMPS
3100	1/2
3200	1
3300	3 - 4
3400	7 1/2 - 9
3500	10-12

WARRANTY

Cedarberg warrants all equipment manufactured by it to be free from defects in workmanship or material under normal use and service. If any part of the equipment proves to be defective in workmanship or material and if such part is, within 12 months of the date of shipment from the Manufacturer's factory, returned to such factory, transportation charges prepaid, and if the same is found by the Manufacturer to be defective in workmanship or material, it will be replaced or repaired, free of charge, f.o.b. the Manufacturer's factory. The Manufacturer assumes no liability for consequential damages of any kind, and the Buyer by acceptance of this equipment will assume all liability for the consequences of its use or misuse by the Buyer, his employees or others. A defect within the meaning of this warranty in any part or any piece of equipment shall not, when such part is capable of being renewed, repaired or replaced operate to condemn such piece of equipment.

This warranty is in lieu of all other warranties (including without limiting the generality of the foregoing warranties of merchantability and fitness for a particular purpose), guarantees, obligations, or liabilities expressed or implied by the Manufacturer or its representatives and by the statute or rule of law.

Series 1B and Series 3 Phase Converters

If your unit is determined to be defective or if it has been damaged as a result of incorrect installation or use, we will send and exchange unit immediately for a C.O.D. charge plus shipping and return of the damaged unit. This deposit will be refunded, less any charges that may be applicable. (See below for items not covered under warranty.)

Consult with factory at (651) 452-5012 for exchange price applicable to your unit.

Cedarberg Companies will provide field service for Rotary Phase Converters on customers site for a service fee. Consult factory.

Items Not Covered Under Warranty

- 1) Tampering with unit.
- 2) Improper use, abuse or improper installation.
- 3) Units altered or modified so as to adversely affect their operation and performance.
- 4) Freight expense of returning unit to our factory and the expense of delivering it back to the owner.
- 5) Normal reconditioning work over and above the repair and replacement of defective parts.
- 6) Abrasive materials or sawdust found inside of unit.
- 7) Freight damage (Customer responsible for all freight damage claims with common carrier).

TERMS OF SALE:

1. **Terms:** Customers of satisfactory credit: Net 10 days.
2. **Minimum Billing:** \$ 50.00
3. **Initial Order:** Customers may be subject to a minimum quantity order. The first order must be sent C.O.D. unless prior credit application has been approved. (References must include Bank etc...)
4. **Overdue Accounts:** A 1 1/2% carrying charge will be added and enforced with accounts over 30 days.
5. **Shipping:** All products F.O.B. factory.
6. **Cancellations:** Subject to Cedarberg Companies consent and terms that will indemnify Cedarberg Companies against loss.
7. **Returned Goods:** Tools and accessories may be returned for credit only upon prior written approval from Cedarberg Companies subject to the following conditions:
 - 1) Must be like-new saleable condition and of current manufacture.
 - 2) Units must be returned complete.
 - 3) Return transportation charges must be prepaid
 - 4) All returns are subject to restocking charge.
 - 5) All returns must be accompanied with an order of equal value.
8. **Damage Claims:** Upon acceptance by common carrier, the carrier will be liable for all claims. Cedarberg Companies will aid in collecting.
9. **Waiver:** Waiver by Cedarberg Companies of one or more of the conditions of the TERMS OF SALE is not to be considered waiver of any other clause(s) of the TERMS OF SALE.
10. **Responsibility:** Cedarberg Companies is not responsible for damage through improper installation or use, intentional or otherwise. Under no circumstances shall Cedarberg Companies be liable for loss of profit or special damages.

All Prices And Discounts Are Subject To Change Without Notice

Warranty Service

- Proof of purchase is required to substantiate any warranty claim.
- Feel free to contact us if you have any questions on the application, service or repair of our products.
- Cedarberg Companies now has warehouse locations and stocking dealers nationwide.

Service and Repair Policy

- Cedarberg Companies warrants its products to be free from defects in workmanship or materials under normal use and service for a period of 12 months from the date of shipment from our factory.
- Transportation charges must be prepaid for all products returned.
- All service and repair of our products is provided by Cedarberg Companies.
- Units returned to us for repair will be serviced and reshipped within 24 hours, excluding weekends and holidays.

TROUBLESHOOTING PROCEDURES

As with any troubleshooting procedure, there is no substitute for a clear understanding of the installation procedures involved. The contents of this manual should be studied and THOROUGHLY UNDERSTOOD.

Make absolutely certain that all factory installation procedures regarding physical mounting, protection from foreign material, wire sizing, fuse protection, etc..., have been followed. Check all connections to be certain that they are tight.

The following troubleshooting chart is divided into two sections, one for Series 1B & Series 3 Static Converters and one for Rotary Converters. This chart should be helpful in isolating problems. Please refer to this chart prior to contacting the factory.

CAUTION - This is a high voltage (220V) device. Disconnect power prior to installing or removing the phase converter or attempting to troubleshoot the installation.



Series 1B
Permits starting of
220V 3 ϕ motors on
220V 1 ϕ current



Series 3
Provides continuous 3 ϕ power to
220V 3 ϕ motors from
220V 1 ϕ current

TROUBLESHOOTING PROCEDURES FOR STATIC PHASE CONVERTERS

Prior to discussing troubleshooting of Cedarberg Static Phase Converters, it is important to understand the principal of operation of a static phase converter, Cedarberg Static Phase Converters are designed to start 220V three phase motors within a specified horsepower range on 220V single phase current. Before referring to the following troubleshooting guide, make ABSOLUTELY CERTAIN that:

1. The horsepower starting of the motor you are attempting to start is within the specified nameplate horsepower range of your converter.
2. The motor you are attempting to start is wired for 220V and not 440V.
3. Always check the incoming voltage. Voltage must be - 10 % of rated voltage. If not, contact your power company.

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>I. Motor will not start.</p>	<p>A. Is your motor single phasing? (Is your motor turning very slowly and / or making a growling or grinding sound?)</p> <p>1. No You do not have single phase power to your machine.</p> <p>2. Yes Single phase power is reaching your machine. Refer to symptom B, below.</p> <p>B. What is the red light doing?</p> <p>1. Light is flashing on & off? There is a clicking sound in the converter.</p> <p>2. Light stays on over 3-5 seconds.</p> <p>3. Light does not come on.</p>	<p>a) You have an open circuit. Check all switches, starters, fuses & breakers.</p> <p>b) Your system is wired incorrectly. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures. Make <u>absolutely certain</u> that M3 (mfg leg) is used to power motor only.</p> <p>a) Your motor may be wired for 440V. Check to determine that the motor is wired for 220V.</p> <p>b) You may have a bad connection. Check that all connections are tight. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures.</p> <p>c) The starting characteristics of your motor may not be compatible with this phase converter. Some motors have special or unique starting requirements and a one size smaller converter is necessary.</p> <p>Disconnect power immediately or damage could occur to your converter.</p> <p>a) You may have (mfg leg) connected to a transformer load or improperly wired. Check internal machine wiring. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures.</p> <p>b) The starting load is too severe for this type of converter.</p> <p>Solutions are:</p> <ol style="list-style-type: none"> 1. Upgrade your installation to a Cedarberg Rotary Phase Converter. 2. Install an idler motor into the circuit. Refer to diagram on page 17 for proper wiring procedures. 3. Use a larger (approximately 1/3) three phase motor on your machine. <p>a) You may have a bad connection or an open fuse. Check all fuses and connections. Re-read Section D, Electrical Installation (page 8) for proper wiring procedures.</p>

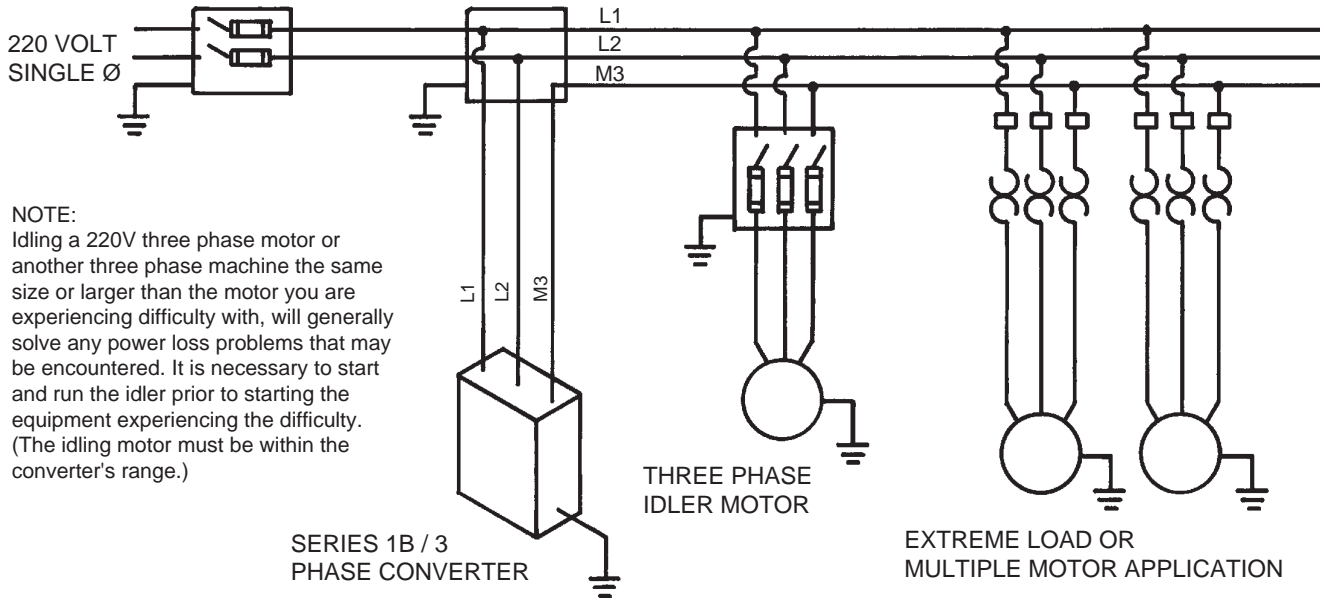
PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>I. Motor will not start. (cont.)</p> <p>II. Motor starts but will not come up to full RPM.</p> <p>III. Motor Starts & comes up to full RPM but...</p>	<p>3. Light does not come on. (cont.)</p> <p>A. Motor slows down. Red light turns on. Motor RPM increases Red light turns off. Unit cycles as above.</p> <p>A. Converter pulsates on-off at regular intervals.</p> <p>B. Motor suffers a RPM loss under load.</p>	<p>b) You may have the wrong converter. Check to see that the motor you are attempting to start is within the horsepower range of your converter; i.e., a converter that is too large for your motor will not work.</p> <p>a) You may have the wrong size converter. Check to see that the motor you are attempting to start is within the horsepower range of the converter you are using.</p> <p>b) Starting load is too severe for this type of converter.</p> <p>Solutions are:</p> <ol style="list-style-type: none"> 1. Upgrade your installation to a Cedarberg Rotary Phase Converter. 2. Install an idler motor into the circuit. Refer to (page 17) for proper wiring procedures. 3. Use a larger (approximately 1/3) three phase motor on your machine. <p>a) The running load may be too severe for this type of converter. Disconnect motor drives and if problem is eliminated:</p> <ol style="list-style-type: none"> 1. Upgrade your installation to a Cedarberg Rotary Phase Converter. 2. Install an idler motor into the circuit. Refer to (page 17) for proper wiring procedures. 3. Use a larger (approximately 1/3) three phase motor on your machine. <p>a) Your load requires a higher running efficiency than your converter is allowing.</p> <p>Solutions are:</p> <ol style="list-style-type: none"> 1. Upgrade your installation to a Cedarberg Rotary Phase Converter. 2. Install an idler motor into the circuit. Refer to (page 17) for proper wiring procedures.

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>IV. Motor is running backwards.</p> <p>V. Motor is running hot.</p>	<p>A. Improper rotation.</p> <p>A. Are your thermal overloads tripping?</p> <p>2. Yes.</p>	<p>a) Line leads are hooked up wrong for proper rotation. Reverse any two lines at the motor only.</p> <p>1. No.</p> <p>a) Your motor is operating within accepted NEMA specifications.</p> <p>a) Your thermal overloads may be set too close to nominal. Check trip point and readjust if necessary,</p> <p>b) You may have a loose connection. Check that <u>all</u> connections are tight.</p> <p>c) You may have used insufficient wire size for the installation. Re-read Section D, Electrical Installation (page 8) for proper wiring procedures.</p> <p>d) You may have insufficient motor ventilation. Check and provide ample ventilation for the motor.</p> <p>e) Motor may be dirty. Check & clean motor.</p> <p>f) You may have a bad motor. Have motor checked and repaired as required.</p> <p>g) Your motor load may require a higher motor efficiency than the converter is allowing,</p> <p>Solutions are:</p> <ol style="list-style-type: none"> 1. Upgrade your installation to a Cedarberg Rotary Phase Converter. 2. Install an idler motor into the circuit. Refer to (page 17) for proper wiring procedures. 3. Use a larger (approximately 1/3) three phase motor on your machine.
<p>VI. Multiple speed motor will not start at all speeds.</p>	<p>A. Motor starts & runs fine at one speed, but will not start at other speeds</p>	<p>a) One or more motor speed is not within the horsepower range of the converter.</p> <p>Solutions are:</p> <ol style="list-style-type: none"> 1. Upgrade your installation to a Cedarberg Rotary Phase Converter.

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>VI. Multiple speed motor will not start at all speeds. (cont.)</p> <p>VII. Magnetic switch chatters or does not close.</p> <p>VIII. Excessive blowing of fuses, circuit breakers or heaters.</p>	<p>A. Motor starts & runs fine at one speed, but will not start at other speeds. (cont.)</p> <p>A. Chattering.</p> <p>A. Instant blowing of fuses or circuit breakers.</p> <p>B. Nuisance tripping of fuses, circuit breakers or heaters.</p>	<p>2. Install an idler motor into the circuit. Refer to (page 17) for proper wiring procedures.</p> <p>a) You may have a M3 (mfg leg) wired to your magnetic coil. Re-read Section D, Electrical Installations (page 8) for proper wiring procedures. M3 (mfg leg) must be used to power the motor only.</p> <p>a) You have a short circuit. Check circuit for broken or loose wires. Check motor for shorts. Check <u>all</u> connections.</p> <p>a) You have a bad connection. Check that all connections are clean and tight. Re-read Section D, Electrical Installations (page 8) for proper wiring procedures.</p> <p>b) You may have used insufficient wire size for the installation. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures.</p> <p>c) You may have used insufficient fuse sizing for the installation. Re-read Section D, Electrical Installations (page 8) for proper wiring procedures. You are not running on true three phase, the starting & running amperage is often higher than it would normally be. To solve the problem, go to one step higher fuse or breaker or adjust the heater to compensate.</p> <p>d) Your motor load may require a higher motor efficiency than the converter is allowing.</p> <p>Solutions are:</p> <p>1. Upgrade your installation to a Cedarberg Rotary Phase Converter</p> <p>2. Install an idler motor into the circuit. Refer to (page 17) for proper wiring procedures.</p>

If at any time you experience a popping sound, see smoke or liquid coming from within the converter, you can assume that the converter has internal damage and will have to be returned to the factory for repair.

Idler Motor Schematic Diagram



NOTE:
 Idling a 220V three phase motor or another three phase machine the same size or larger than the motor you are experiencing difficulty with, will generally solve any power loss problems that may be encountered. It is necessary to start and run the idler prior to starting the equipment experiencing the difficulty. (The idling motor must be within the converter's range.)

All Installations must conform to the National Electrical Code and appropriate local codes.

If you are unable to determine the cause of your problem, contact our Service & Repair department for assistance, our telephone is:

Cedarberg Companies
Service & Repair Department
(651) 452-5012

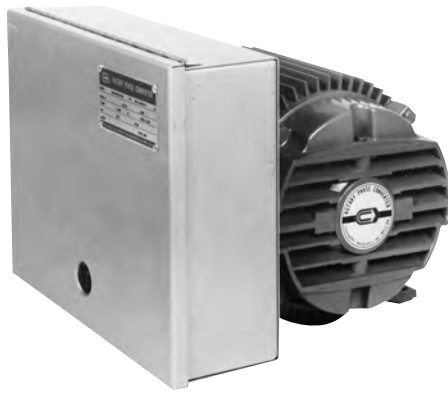
IMPORTANT! Prior to contacting the factory please assemble the following information. This information will assist the technician in helping you and may eliminate the need for a follow-up call later.

Phase Converter Details

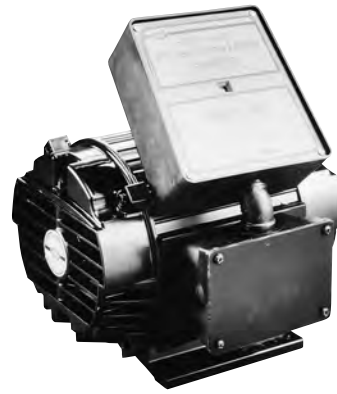
Model # _____
 Serial # _____
 Where Purchased _____
 When Purchased _____
 HP range of converter _____
 Machine being started _____
 Manufacturer _____
 HP Rating _____

Installation Details

Service entrance size _____
 Phase Converter circuit size _____
 Power source fusing _____
 Distance:
 Service entrance
 to converter _____
 Converter to machine _____
 Wire size:
 Service entrance
 to converter _____
 Converter to machine _____
 Fused disconnect sizing _____



Heavy Duty Rotary
Produces balanced 3 ϕ power
for maximum motor efficiency
from 1 ϕ current
(manufacturer's statement)



Standard Duty Rotary
Produces continuous
3 ϕ power to 220 3 ϕ motors
from 220V 1 ϕ current

TROUBLESHOOTING SECTION FOR ROTARY PHASE CONVERTERS

Prior to discussing troubleshooting of a Cedarberg Rotary Phase Converter, it is **IMPORTANT** to understand one basic concept. If your Cedarberg Rotary Phase Converter starts and runs, it is in fact producing three phase current. If under these conditions you are still having problems with your machine, the problem does not lie in the phase converter. Your problem is either internal to your machine or lies somewhere in the wiring of the circuit.

Cedarberg Rotary Phase Converters are designed to start 220V three phase motors within a specified horsepower range on 220V single phase current. Before referring to the following troubleshooting guide, make **ABSOLUTELY CERTAIN** that:

1. The horsepower of the motor you are attempting to start is within the specified nameplate horsepower range of your converter.
2. The motor you are attempting to start is wired for 220V and not 440V.
3. Always check the incoming voltage. Voltage must be – 10 % of rated voltage. If not contact your power company.

Carefully read and understand this entire manual.

Scrutinize your installation to make Absolutely Certain that all factory installation requirements and recommendations have been adhered to. If you are still unable to locate your problem, the following guide should be helpful.

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>I. Phase converter motor will not start.</p>	<p>A. Is your phase converter motor single phasing? (Is the motor turning very slowly and / or making a growling or grinding sound?)</p> <p>1. No. You do not have single phase power to your converter.</p> <p>2. Yes. You have single phase power to your converter.</p>	<p>a) You have an open circuit. Check all fuses and breakers. Check all connections to be certain they are tight.</p> <p>b) Your system is wired incorrectly. Re-read Section D, Electrical Installations (page 8) for proper wiring procedures.</p> <p>a) You may have an open circuit. Check all fuses, wires and connections.</p> <p>b) Visually inspect internal phase converter wiring for bad connections, loose wires, etc. Connect as required.</p> <p>c) Visually inspect phase converter internal components for apparent damage. Call factory at (651) 452-5012 for replacement of defective parts.</p> <p>d) If you have a Model 50, 75, or 100, is the toggle switch in the "on" position? Toggle switch must be "on" to start the converter.</p> <p>e) You may have a faulty mercury relay switch. Gently tap or shake mercury relay switch. If phase converter starts your switch is defective and must be replaced.</p>
<p>II. Phase converter starts and runs but motor on my machine will not start.</p>	<p>A. Is your motor single phasing? (Is your motor turning real slow and / or making a growling sound?)</p> <p>1. No. You do not have single phase power to your machine.</p> <p>2. Yes. Single phase power is reaching your machine.</p>	<p>a) You have an open circuit. Check all fuses and breakers.</p> <p>b) Your system is wired incorrectly. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures. Make <u>Absolutely certain</u> that M3 (mfg leg) is used to power the motor only.</p> <p>a) You may have an open circuit. Check all fuses and connections especially on M3 (mfg leg).</p> <p>b) Your system may be wired incorrectly, Check that M3 (mfg leg) is used to power the motor only. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures.</p>

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>II. Phase converter starts and runs but motor on my machine will not start. (cont.)</p>	<p>3. - Yes. Motor is trying to start but lacks power.</p>	<p>a) If you have a Model 50, 75, or 100, try leaving the toggle switch in the "on" position. This will not harm your phase converter.</p> <p>b) Your load requirements may be too severe for your converter. Check to determine that the phase converter is rated to start motors this size. If it is, your application may require and oversized converter.</p>
<p>III. Phase converter starts and runs. Motor starts and runs. but...</p>	<p>A. Phase converters vibrates excessively.</p> <p>Some vibration is normal especially during rotary start-up and shutdown and as machine loads are activated.</p> <p>B. Machine does not perform under load conditions.</p>	<p>a) Your unit may not be properly installed. Re-read Section B (page 7) Mounting and Location, to determine proper installation.</p> <p>b) Your load requirements may be too severe for your application and may require an oversized rotary converter.</p> <p>a) Your system may be wired incorrectly. Re-read Section D, Electrical Installation (page 8) for proper wiring procedures.</p> <p>b) Your load requirements may be too severe for your application and may require an oversized rotary converter.</p>
<p>IV. Phase converter starts and runs, but...</p>	<p>A. Voltage is low and current draw is high at the machine.</p>	<p>a) You have a bad connection. Check <u>all</u> connections to be certain they are clean and tight.</p> <p>b) Your system is wired incorrectly. Re-read Section D, Electrical Installations,(page 8) for proper wiring procedures.</p>
<p>V. Motor is running backward.</p>	<p>A. Improper rotation.</p>	<p>a) Line leads are hooked up wrong for proper rotation. Reverse any two lines at the motor only.</p>
<p>VI. Motor is running hot.</p>	<p>A. Are your thermal overloads tripping?</p> <p>1. No.</p> <p>2. Yes.</p>	<p>a) Your motor is operating within accepted NEMA specifications.</p> <p>a) Your thermal overloads may be set too close to nominal. Check trip point and re-adjust if necessary.</p>

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>VI. Motor is running hot. (cont.)</p>	<p>A. Are your thermal overloads tripping? (cont.)</p> <p>2. Yes. (cont.)</p>	<p>b) You may have a loose connection. Check that <u>all</u> connections are tight.</p> <p>c) You may have used insufficient wire size for the installation. Re-read Section D, Electrical Installation, (page 8) for proper wiring procedures.</p> <p>d) You may have insufficient motor ventilation. Check and provide ample ventilation for motor.</p> <p>e) Motor may be dirty. Check and clean motor.</p> <p>f) You may have a bad motor. Have motor checked and repaired as required.</p>
<p>VII. Multiple speed motor will not start at all speeds.</p>	<p>A. Motor starts and runs fine at one speed, but will not start at other speeds.</p>	<p>a) One or more motor speed is not within the horsepower range of the converter. Size rotary phase converter for largest horsepower requirement. If you have sized the converter to the largest HP, you may need to oversize Rotary due to high starting load demand.</p> <p>b) If you have a Model 50, 75, or 100, try leaving the toggle switch in the "on" position. This will not harm your phase converter.</p>
<p>VIII. Magnetic switch chatters or does not close.</p>	<p>A. Chattering</p>	<p>a) You may have M3 (mfg leg) wired to your magnetic coil. Re-read Section D, Electrical Installation (page 8) for proper wiring procedures. M3 (mfg leg) must be used to power the motor load only.</p>
<p>IX. Excessive blowing of fuses, circuit breakers or heaters.</p>	<p>A. Instant blowing of fuses, or circuit breakers.</p> <p>B. Nuisance tripping of fuses, circuit breaker or heaters.</p>	<p>a) You have a short circuit. Check circuit for broken or loose wires. Check motor for shorts. Check all connections.</p> <p>a) You may have used insufficient wire size for the installation. Re-read Section D, Electrical Installation (page 8) for proper wiring procedures.</p> <p>b) You may have used insufficient fuse sizing for the installation. Re-read Section D, Electrical installation,(page 8) for proper wiring procedures. You are not running on true three phase, the starting & running amperage is often higher than it would normally be.</p>

PROBLEM	SYMPTOM	CORRECTIVE ACTION
<p>IX. Excessive blowing of fuses, circuit breakers or heaters. (cont.)</p>	<p>B. Nuisance tripping of fuses, circuit breaker or heaters. (cont.)</p>	<p>To solve the problem, go to one step higher fuse or breaker or adjust the heater to compensate.</p> <p>c) Your motor load may require a higher efficiency than the converter is allowing.</p> <p>Solutions are:</p> <ol style="list-style-type: none"> 1. Install the next larger size Cedarberg Rotary Phase Converter.

If at any time you experience a popping sound, see smoke or liquid coming from within the converter, you can assume that the converter has internal damage and you will need to contact the factory for repair assistance.

NOTES:

MINIMUM ORDER \$ 50.00 NET

F.O.B. Factory All prices subject to change without notice.

If you are unable to determine the cause of your problem, contact our Service & Repair department for assistance, our telephone is:

Cedarberg Companies
Service & Repair Department
(651) 452-5012

IMPORTANT! Prior to contacting the factory please assemble the following information. This information will assist the technician in helping you and may eliminate the need for a follow-up call later.

Phase Converter Details

Model # _____
Serial # _____
Where Purchased _____
When Purchased _____
HP range of converter _____
Machine being started _____
Manufacturer _____
HP Rating _____

Installation Details

Service entrance size _____
Phase Converter circuit size _____
Power source fusing _____
Distance:
Service entrance
to converter _____
Converter to machine _____
Wire size:
Service entrance
to converter _____
Converter to machine _____
Fused disconnect sizing _____

We Appreciate Your Business!

Phone, Fax or E-Mail for any of our catalogs.



Order Line: 800-328-2279 Service & Repair: 651-452-5012
Fax: 651-452-5350 Website: www.cedarberg.com
e-mail: info@cedarberg.com

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