

# Elimia Industrial

Thank you very much for purchasing an Elimia Phase Converter. We sincerely hope that our products provide outstanding service for years to come.

Our company believes in the philosophy of “never stop improving”. We encourage our customers to provide input, opinions and suggestions on our products.

## Phase converter installation instructions:

Your converter should be located indoors at a location dry and easily accessible. You will need to provide suitable wiring and fusing from your existing main service or subpanel. Refer to your schematic for minimal wire fusing sizes. If fed from a circuit breaker the breaker will need to be a double pole type. Your wiring should be protected in conduit as required by national and local electrical codes. If your feed power is located more than 50 feet from the phase converter panel you should up size your feeder wire by one size or more to reduce voltage drop in the fed wiring.

Most Elimia converters use a modular control panel that is connected to the idler motor with flexible conduit. This allows you to locate the control panel on a wall at eye level providing easy access and visibility. There are holes provided in the back of the control panel for wall mounting.

Your power cable should be a 4 conductor cable (2 hot wires, insulated neutral and ground) that is all that will be needed for supply power. Your ground and 2 hot wires should be sized the same, the neutral can be a small wire of 16 gauge or larger. Do not connect the ground wire and neutral wire together in the phase converter panel, two separate connection points will be provided for them.



*Some start stop switches are equipped with quick release adapters. These allow you to easily disconnect the pushbuttons from the actuators so that the cover can be removed during installation. Slide the red tabs to release the switches from the panel cover. When you reassembly your cover make sure the red tab is facing down or else your switch functions will be reversed.*

*The start stop switch on the right can be removed from the cover by loosening the two set screws. The switch front will then twists 45 degrees and allow the cover to release. Make sure when you reassemble to properly orient the switch correct for start stop functions.*



Most Elimia converters use terminal block(s) for all power connections. In the picture below the terminal blocks are labeled and ready for the input power. Don't skimp on wire size! Using wiring that is undersized results in

voltage drop. Voltage drop can greatly affect the operation of your converter and your three phase equipment. Nominal main power is 220 – 240 VAC. If your main's power is on the low end of nominal you should limit voltage drops as much as possible by up sizing your supply power cable. Also, always make good quality wire connections and crimps.

Some converters have been provided with fusing for your machine wiring. Please note that this fusing is intended to protect the wiring to your machine, not the machine itself. It should not be used as a replacement for protection required or already built in to your machine. Please refer to the schematic for sizing wire and fuses, in some cases the fusing provided from the factory may need to be changed based on wire size and load.



*All connections are made on the terminal blocks as labeled. There are two separate power blocks for your connections. The power block on top (3 positions) is for your 3 phase machine power (output). They are labeled L1, L2 and L3. The lower block is for input power. The red and blue wires labeled 240V should connect to your main power from your circuit breaker panel. The yellow wire labeled Neutral in the picture is for the neutral wire from your circuit breaker panel buss bar. Do not use ground for this connection, a separate ground point is provided inside your phase converter panel. Be sure to torque these connections well as Copper relaxes over time.*

If you are running more than one machine from your phase converter, a subpanel should be installed. A subpanel can split your loads up and provide proper fusing for each machine's feeder wires. Elimia offers circuit breaker and fused subpanels and can provide help in determining wire size and protection.

*A fuse holder and fuse is provided to protect the small gauge wiring. In the event this fuse blows you should carefully inspect the control wiring for shorts. Replace with either a 3 Amp or 5 Amp fuse.*



Don't forget to properly ground your control panel. Grounding is required for your protection and can save your life. There will be either a terminal block provided for ground wire connection OR a loose wire may be provided for grounding to your input power with a wire nut or crimp connector.

If you are unsure about the installation please consult a professional electrician.

We are also available for support. Call 256-528-7120 during regular business hours and we can help with your concerns. If we are unavailable or after hours please call 256-490-0388.

**Phase converter operation:**

Elimia converters now use a single “start/stop” switch for operation. The switch is located on the front cover and incorporates a LED run indicator light as well. Before you test your converter you should double check all added wiring and connections. Inspect the on-board connections and verify nothing shook loose during shipping. Make sure components are still firmly mounted and secure and that they’re no wire unconnected. Don’t forget to provide an adequate ground and connection.

### Dual Motor Converters:

For dual motor converters unit #1 or motor #1 is the primary motor. There will be two sets of start/stop switches on dual motor units. Dual motor converters can be operated with either motor #1 active OR with both motor #1 AND motor #2 active. Do not attempt to operate only motor #2. When running in dual mode (both motors running) wait 3 seconds before powering up motor #2. Always power motor #1 prior to activating motor #2. When powering down dual units, always power #2 down prior to motor #1.

### Standard Operation:

Without the load connected, test your converter. When you push the start switch the indicator light should immediately come on and the idler motor should run. You may hear a rumble or a growl for a split second and at the end of this growl you may be able to hear a clip or clap. That is the starting circuit engaging the start capacitors and then disengaging. The starting is done with an electronic device or voltage sensing module. The starting time is set at the factory and should not be adjusted.

Now your converter should be up and running smoothly. If your converter is a TEFC (totally enclosed fan cooled) motor you will notice mainly wind noise from the external motor cooling fan. There should be very little noise from the motor or converter box. If you hear a loud hum, rattle or continuing growl, push the stop switch immediately! Capacitors can explode and cause injury. If this condition occurs contact Elimia for service or instructions. **Never operate or power up the converter or control panel with the cover removed!**

Now that your converter is up and running let it run a few minutes. Then push the stop switch. The converter should immediately shutdown and coast to a stop. Once the shaft is stopped turning push the start switch again and power the idler back on. **Do not restart your converter until the idler motor stops turning.** Repeat the start/stop sequence several times and listen for any unusual sounds. The starting system is designed for a 0 RPM start. With the converter off touch the motor housing. It should only be slightly warmer than ambient temperature. If the motor is so hot that you can’t touch it verify that the fan on the motor is intact and turning with the motor. If no obvious problem exists consult the factory for more information. For motor types ODP (without ribbing) you may here a little rattle or squeak during operation. ODP motors have an open design and can occasionally suck up debris. Don’t be alarmed, from time to time blow out the motor with air pressure. It is also possible that during manufacturing your converter picked up metal shavings while the shaft was being cut off. These small metal flakes usually work themselves out within a few minutes of operation. If the problem continues consult the factory.

Your converter has been designed for flexibility. Some converters may be equipped with a load matching system. This system allows the owner to adjust the converter panel to various load sizing and still maintain peak performance. Converters without this feature are design for optimum performance ¼ to 2/3 loaded. Meaning, a 5 HP converter is designed for match voltages with a medium 1 – 3 HP load. That doesn’t mean you can’t run a smaller or larger load it just means that the voltages your equipment will get from the converter will be slightly different referencing L1/L2/L3. The difference will not be enough to affect operation of most equipment but the difference could affect some voltage sensitive equipment such as CNC drives.

To determine the voltage balance of your machine you should take voltage readings between the phase legs.

Example of typical readings are as follows:

L1 to L2 should be within a few tenths of a volt of nominal input power.

Nominal input on 240V connections= 235 VAC

L1 – L2 = 235 VAC

L2 – L3 = 240 VAC

L1 – L3 = 245 VAC

Please note that actual readings will vary...

If you measure the three phase voltages reference to ground the typical readings are as follows:

L1 – Ground or Neutral = 115 VAC

L2 – Ground or Neutral = 115 VAC

L3 – Ground or Neutral = 220 VAC

**The L3 line is the generated phase and should never be used for 120 VAC power. If your equipment has any electronics or 120 VAC loads you should verify from where the machine gets the 120 VAC power. Only use L1 or L2 for 120 VAC loads!**

Once your machine is wired to the factory supplied fuse block or connections it is time to verify operation. **The converter should ALWAYS be started prior to your machine being started.** If your converter is started under load (your machine already on) it could burn out a relay and or damage the start capacitor(s). We will not replace equipment/parts that exhibit this damage. Also, always kill power to your machine prior to the converter being switched off. Not doing so can damage the converter or blow fuses.

Now that you have verified your converter is running correctly you can power up your 3 phase equipment (machine). With the converter running, power-up your 3 phase machine. Your equipment should sound normal, there should not be any extra humming or growling from your machines motor. If your machine failed to start and only hums, first verify your wiring. Make sure that all three wires are connected to L1/L2/L3 appropriately. Next, verify your machines motor ratings and voltages. Make sure your machine's motor is not wired for 440 VAC operation. Consult factory for more information. If your equipment's motor is turning backwards you will need to inspect your wiring and reverse any two connections on L1/L2/L3 or the take off point from your converter.

With your machine running normal operate it as usual. As long as the converter is not overloaded you will not notice the converter change in sound or motor speed. You may be able to notice that the converter runs slightly quieter with your machine on. This is normal. The converter should run quieter when the optimum load (your machine) is on. This is because the capacitance is balanced for a load.

#### **Operation of automatic/unattended rotary phase converters:**

If your Elimia phase converter is designed for automatic or unattended operation it will be equipped with additional status lights and functions. Examples of unattended operation are, air compressors, refrigeration equipment radio transmission equipment and irrigation systems. Our most common unattended phase converters operate as follows: The normal start/stop switches are replaced by a single on/off toggle switch. The single status light is replaced with three status lights. After installation, activate the toggle switch to start the phase converter. The power and run status lights will immediately activate and the idler motor will start. Approximately two seconds later the "load" power light will activate indicating that the converter is supplying power to your machine. The phase converter will continue to run until the toggle switch is placed off or until power is interrupted. *Additionally, units may be equipped with remote activation wiring. This is the case with air compressors and pumps. Separate wiring will be stubbed out from the converter control panel to connect to your equipment. This is a pilot signal only. This wiring should be connected to a dry contact that closes upon activation request, or normally open. Please consult factory for details. Don't guess at this, it could damage your converter or equipment.*

If power to unattended phase converter drops the idler motor will shut down as expected but the phase converter will now enter a two stage protected restart. When the power returns the phase converter will restart and the power and run lights will illuminate. As above after a couple of seconds the load light will come on and restart your equipment. **In order to protect the phase converter and your equipment the phase converter has a built in short cycle lockout. This lockout will prevent the phase converter from restarting for approximately 1 minute after the main power dropped out. During this lockout period the power light will be illuminated, indicating the phase converter is ready to start once the lockout time is complete.** Do not make any adjustments to the short cycle lockout or output delay modules. These special features allow the unattended phase converter run equipment in a controlled manner.

**Your Machine:**

It is highly recommended that your machinery utilizes a magnetic starting system. Equipment that uses a rotary switch, push button that maintains position, toggle or lever is probably not a magnetic latching switch. A magnetic switch or starter will drop out if the main power is shut off or blinks. The most common failure we see is due to manual type switches. Your converter has a magnetic switch that latches in after the push button is depressed. In the event that the main power drops out, the phase converter will shut down. But equipment with manual type switches will remain “closed” and waiting for power.... When the phase converter is restarted after the main power has returned and if your equipment has remained engaged, failure can occur. Your phase converter starting system is designed to start the idler motor only. Trying to start your equipment simultaneously can/will cause the start capacitors to fall.

It is very difficult in a multi-man shop to prevent the above from occurring. Elimia has a special option that can be added to your phase converter to prevent this failure.

Please note: Elimia Industrial is not responsible for any damages contributed from misapplication of its products. It is your responsibility to verify our products meet the specifications for your equipment and application.

**Troubleshooting:**

Condition	Resolution
<p>Phase Converter Idler Motor Did Not Start</p>	<p>Check the obvious first: main power circuit breaker on; neutral connected etc...</p> <ol style="list-style-type: none"> <li>1) When you pushed the start switch did you hear any clicking inside the control panel? You should hear a clap and then within 1 second you hear another click or clap. If not do the following: Verify with a voltmeter that you have main power on the terminal block. Measure between the two connections labeled 240V. You should read about 230 – 245 Volts. If no problem found, measure between the 120V and neutral, you should see 115 – 123 Volts. If you did not hear clicking when then start switch was pushed most likely you have one of the two powers missing.</li> <li>2) When you pushed the start switch you heard clicking and clapping but nothing else happen... The motor made no noise and did not try to start. Inspect the wiring between the idler motor and control panel.</li> <li>3) When you pushed the start switch the idler motor tried to start but did not... <b>Very important, if the idler motor tried to start and failed to come up to speed the stop switch should be pressed immediately.</b></li> </ol> <p>Possible causes are: starting capacitor failure, starting module failure, starting contactor failure, open wiring in start circuit, idler motor bearing failure or idler motor winding shorted or open. Before doing anything else try to start the phase converter again. If it does not start immediately (within 2 seconds) press the stop button. If the converter does not start within 1 second, it is not going to start. Allowing the start system to remain engaged will destroy the motor or components. Try starting the converter a couple of times as cold motors and start capacitors can affect starting. If the phase converter still failed to start check the following: Incoming voltage is present and good; Idler motor shaft turns easily. With main power switched off, check the contactors for continuity. L1 – T1, L2 – T2 and L3 T3. The contactors have a tab button in the center for manual operation testing. You should see near</p>

	<p>zero resistance, when the contactor is manually pushed, across the contacts and open circuit when released. If not, contact the factory. Next, visual inspect the start capacitors (black round), if they smell or have smoked residue around the top, consult factory.</p> <p>4) Your phase converter might be equipped with a short cycle lock out. This will prevent your converter from restarting for approximately 1 minute after shutdown</p>
<p>Phase Converter Starts and Runs but 3 Phase Machine will not Start</p>	<p>Check the obvious first: machine is set up for 480 Volt operation; machine is too large for phase converter...</p> <ol style="list-style-type: none"> <li>1) Typically, your phase converter idler motor HP should be 1.25% larger than your 3 phase load in HP or KW ratings. For some loads it may need to be 200% larger. Other factors should also be considered like: wire run distance; 3 phase load starting time; motor load RPMs etc... Voltage drop in wiring is one aspect that can be reduced. Always use wire of proper AWG size for your loads. Voltage drop in wiring is not usually noticeable until the 3 phase load is applied.</li> <li>2) If your 3 phase load did try to start and no other obvious solution exist check the wiring in the motor starter. If your motor starter uses direct 240V power for the contactor coil voltage you will need to verify the wiring. The L3 phase from Elimia converters is the generated phase. L3 should not be used for ANY 120V single phase loads AND should NOT be used for any 240V single phase loads in the machine starting circuit. It is now common in Asian produced machinery that they use L1 and L3 for the 240V contactor coil control voltage. If your 3 phase machine utilizes L3 you should move that connection to L2. This issue is very common especially if your equipment load is near the phase converter's capacity. If your machine's motor starter clicked and clapped while trying to start verify the coil voltage wiring in the motor starter. Consult factory for help if needed.</li> </ol>
<p>My 3 phase load runs but is turning in reverse</p>	<ol style="list-style-type: none"> <li>1) Likely, at least two of your three wire connections between your phase converter and load are swapped. Three phase motors can be reversed by swapping two connections of L1, L2 and L3. You should always verify the L1, L2 and L3 are connected correctly to avoid sending single phase power to electronic loads buried in your machine's wiring.</li> </ol>
<p>My Start and Stop Switches have Reversed Functions</p>	<ol style="list-style-type: none"> <li>1) The start stop switch has been reconnected upside down. Slide the red tab on the back of the switch connector, rotate 180 degrees and reconnect.</li> </ol>

## Things to remember:

Never operate or power the converter with the cover off

Do not engage the converter with a load (your equipment) already on

Never disengage the converter with a load left on

Never run the converter without proper fusing

Do not leave the converter running unattended

Do not reengage the converter until the converter motor has stopped turning

Do not use the L3 wiring for 120 Volt loads

*Please consult the factory if additional instructions are needed.*

*The design of this system is the sole property of Elimia Industrial and cannot be reproduced or copied in anyway, under penalty of law. Elimia Industrial is a licensed and insured company.*

## Elimia Industrial

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### ***Limited 10 year Warranty***

*Thank you for purchasing an Elimia Industrial phase converter. Elimia converters are built to last and we are confident you will receive excellent service from the converter for years to come! In the event of an unlikely system failure to any part of the converter we shall replace the failed part free of charge for up to 10 years. If a failed part cannot be identified, some or all of your system must be sent back to the factory for support. Warranty shall not cover shipping cost to or from our factory, fuses, motors, motor parts and indicator lights. Additionally, Elimia Industrial shall not be liable for subsequent damages to equipment or real estate. We reserve the right to replace part(s) with the same or compatible replacement(s). Your converter and warranty are identified by the model on the front of the control panel.*

*Again, we appreciate your business!*

*Ken Fowler, President, Elimia Industrial*

**STOP!**

**Do not attempt to  
install your converter  
without reading this  
manual!**