LARSON MTPC-SCHD Series STATIC Phase Converters Instruction Manual

LARSON MTPC-SCHD Series STATIC Phase Converters

Instruction Manual

OPERATION AND INSTALLATION MANUAL

STATIC PHASE CONVERTERS (MTPC-SCHD Series)

WARNING: To reduce the risk of injury, the user must read and understand the operator's manual before using this product.

Thank you for your purchase of a Larson Electronics MTPC-**SCHD series static phase converter.**

WARNING

Standard Warning (General) WARNING:
READ CAREFULLY BEFORE INSTALLING FIXTURE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE. CRITICAL SAFETY INSTRUCTIONS:

- INSTALLATION SHOULD ONLY BE CONDUCTED BY A QUALIFIED ELECTRICIAN IN ACCORDANCE WITH NEC AND ANY
  RELEVANT LOCAL BUILDING CODES.
- RISK OF FIRE OR ELECTRIC SHOCK. FIXTURE INSTALLATION REQUIRES KNOWLEDGE OF FIXTURE'S ELECTRICAL SYSTEMS. IF NOT QUALIFIED, CONTACT A QUALIFIED ELECTRICIAN.
- BE CERTAIN ELECTRICAL POWER IS OFF BEFORE AND DURING INSTALLATION AND MAINTENANCE.
- MAKE SURE THE SUPPLY VOLTAGE IS THE SAME AS THE FIXTURE'S RATED VOLTAGE.
- TO PREVENT WIRING DAMAGE OR ABRASION, DO NOT EXPOSE WIRING TO EDGES OF SHEET METAL OR SHARP OBJECTS. SUITABLE FOR DAMP LOCATIONS.

⚠ **WARNING:** MAKE SURE POWER IS TURNED OFF BEFORE STARTING THE INSTALLATION OR PERFORMING ANY MAINTENANCE.
RISK OF FIRE/ELECTRIC SHOCK DISCONNECT POWER AT BREAKER BEFORE INSTALLING OR SERVICING. RISK OF PERSONAL INJURY FIXTURE MAY BECOME UNSTABLE OR DAMAGED IF NOT INSTALLED PROPERLY. RISK OF BURN ALLOW FIXTURE TO COOL BEFORE SERVICING.

Contents

Introduction and Installation Notes

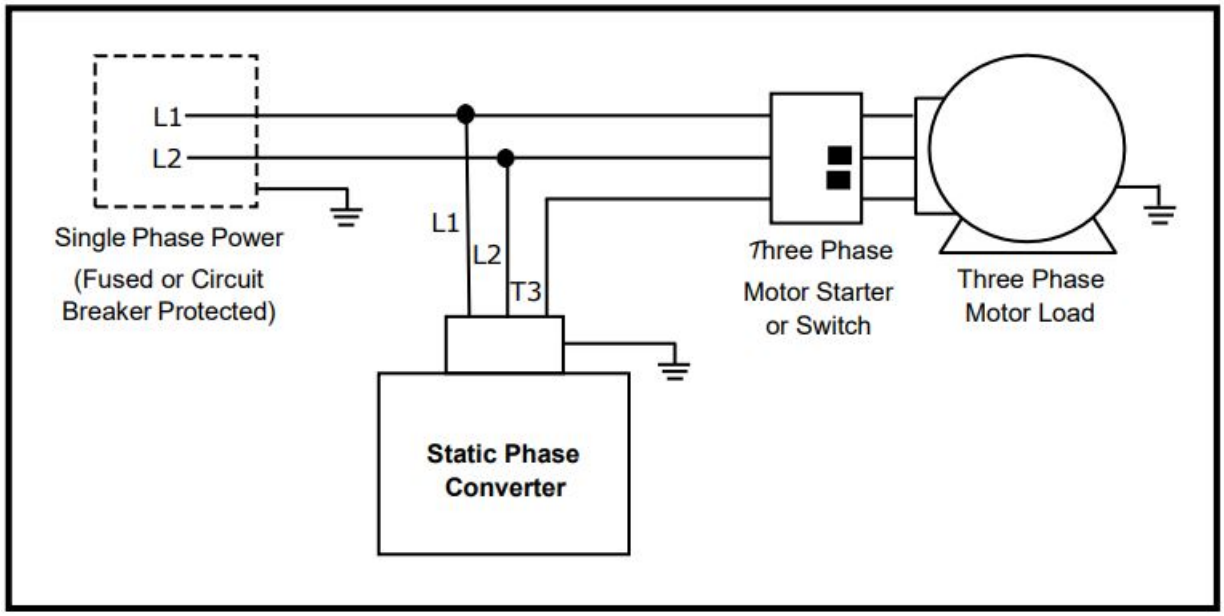
HIGH VOLTAGE - Risk of Electrical Shock. This equipment is connected to line voltage that can create a potentially hazardous situation.

- Always make certain power is off before servicing this equipment.
- Do not connect control circuits to T3.
- Do not connect a ground or neutral to T3.
- Make sure static phase converter and equipment are properly grounded.
- Wire recommendation is based on the use of copper wire. If using aluminum wire, use the copper equivalent for current amount.
- For indoor use.
- Humming and clicking noise is normal when power is applied to converter.
- Installation of this equipment must comply with all national, state and local electrical codes.
- Installation must be performed by qualified licensed electrician who should have experience working with this line voltage.

Wire and Breaker/Fuse Sizing Refer to the table on page 5.

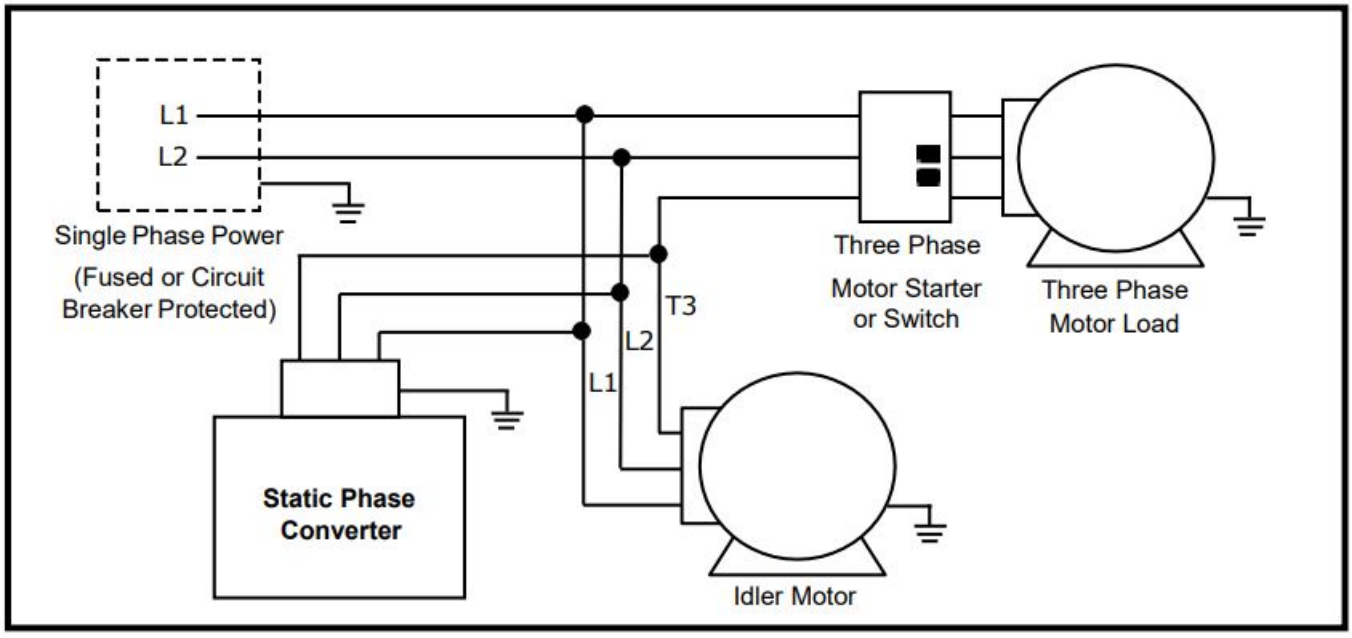
Wiring and Connection

Wiring Method #1



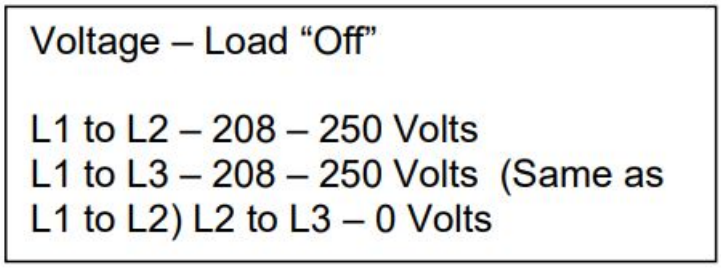
- Single phase power connects through L1 and L2. T3 is the generated phase.
- Equipment with magnetic controls must operate from L1 and L2, the single phase lines. To identify these lines, connect the two (2) single phase lines to any input terminals/lines on the machine and press the start button. When the correct combination is found the magnets work the motor will buzz. Try switching leads until the correct wire combination is found. Then connect T3 to the remaining terminal/line.

Wire Method #2 (Idler Motor Method)



Initial Start Up and Checking Voltage

- Turn power on to the static converter. You may hear a clicking noise from the contactor pulling together. This is normal.
- Check Voltage



- Start load motor. The red indicator light will turn on and remain illuminated until the Off button is pressed.
- If motor runs backwards, switch any two (2) motor leads.
- Always start machine out of gear or in lowest possible speed/gear.
- Always start the largest motor when running multiple motors.
- If motor does not start:

  -Check (L1-L2) input for correct voltage.

  -Static Converter may be too small or too large.

  -Make sure input wire is correct size.

  -Check load motor for correct wiring.
- If you hear a humming noise coming from the static converter, this is normal.
- Do not start motor more than six (6) times an hour.

USE AND CARE

Unauthorized modification may impair the function and/or safety of this device and could affect the life of the equipment. Always check for damaged or worn out parts before using the device. Store it in a secure place out of the reach of children when not in use. Inspect for good working condition prior to storage and before re-use.

REPLACEMENT PARTS

The MTPC-SCHD series is designed to provide years of reliable performance. Should the need for replacement parts arise, please contact Larson Electronics.

THESE INSTRUCTIONS MAY NOT COVER ALL DETAILS OR VARIATIONS OF THIS PRODUCT FOR YOUR EQUIPMENT OR INSTALLATION REQUIREMENTS. SHOULD FURTHER INFORMATION NOT COVERED BY THESE INSTRUCTIONS BE REQUIRED, PLEASE CONTACT LARSON ELECTRONICS BY EMAIL AT SALES@LARSONELECTRONICS.COM OR BY PHONE AT 1-877-348-9680 FOR FURTHER ASSISTANCE. PLEASE VISIT LARSONELECTRONICS.COM FOR WARRANTY AND RETURN INFORMATION.

INSTRUCTION SHEET

CAUTION: Read the following carefully before attempting installation.
Using the converter as in Method No. 1 will produce approximately 2/3 rated horsepower.

Heavily loaded applications, such as compressors, blowers, water pumps, hydraulic pumps, etc., a 50% larger motor must be fitted. Otherwise, Method No. 2, shown on reverse side of this page, could be used. Or, use our full power Rotary Phase Converter.

SELECTION:
The horsepower range of the static converter is determined by the minimum and maximum starting current applied to it at any one time. The largest motor on your machine, or the idler motor, if used, must fall within the minimum and maximum horsepower range marked on the static converter. Do not add the horsepower of the power feed,

coolant pump, etc. These rely on the generator effect of the main motor. The only time you would add the horsepower of two or more motors together would be if they always start at exactly the same time. Do not install a larger size or Heavy Duty series static converter thinking it will give you more horsepower. A static converter that is too large will not work properly and may cause damage.

Two-speed motors are dual horsepower. Select the static phase converter with minimum and maximum horsepower ratings, which fall within or very close to the minimum and maximum horsepower of the motor. For example: A 1.5 HP 3450 RPM motor is ¾ HP at 1725 RPM.

Some European soft-start motors draw less starting current than normal and therefore require a smaller than normal converter. Most Taiwanese and Chinese motors draw greater amperage to start than normal. Therefore, for these motors we recommend a 3 HP motor; a 5 HP motor; a 7.5 HP motor, etc.

WHEN TO USE HEAVY DUTY SERIES
Lathes above 3 HP not fitted with a clutch.
Air compressors, the motor pulley diameter must be reduced by 1/3, or a 50% larger motor must be fitted.
Long, heavy starting cycles, frequent starting or instant reversing, unattended motors, if jogging is required, or if there is a chance of the motor being stalled during use.

Static Phase Converter used to start the load motor

1. 220V single-phase lines L1 and L2 are connected to the A and B terminals of the converter.
2. Do not connect 220V power, or a ground or neutral wire from the utility, to the C terminal of the converter, as the resulting dead short would damage it instantly. The single-phase neutral wire is not required for operation of the converter.
3. Properly ground all electrical equipment for safety. Use a grounding clip to attach the ground wire to the conduit box.
4. Fuses should not be used on the three-phase lines between the static phase converter and the motor. A blown fuse still leaves two lines to conduct, which can damage the converter. Magnetic starters are preferred. Fuses can be used on the single-phase lines L1 and L2 from the utility power to the converter. Single-phase wires and fuses should be sized as appropriate for the rated amperage of the motor. See chart below.
5. Size the breaker on the single-phase approximately twice the amperage rating of the motor at the 220V configuration. See chart below.
6. For machines with magnetic switchgear, resistive or singlephase load: Resistive or single-phase loads and/or magnetic switchgear must be connected only to lines A and C from the converter. DO NOT connect the static phase converter until you identify which two wires operate the magnetics. To easily locate these two wires, connect 220V single-phase power to any 2 of the 3 wires on the machine and press the start button. When the correct combination is found the magnetics will work. Connect these two wires to the outside terminals of the converter, terminals A and C, and the third wire to the center terminal, B. The magnetics should still work with the center terminal (line B) disconnected. Your motor's magnetic overload protection remains the same; no

changes are necessary.

7. For indoor use only. Do not use in wet or damp locations.
8. Do not mount on equipment with excessive vibrations.
9. Refer to NEC Code #455 for details on field installation issues.

Breaker & Wire Size - Refer to NEC Code #430 C												
HP	1	2	3	5	7.5	10	15	20	25	30	40	50
Breaker Amps	15	15	20	30	40	60	100	125	160	200	250	300
Wire Size Gauge	14	14	12	10	8	6	3	1	1/O	3/O	4/O	300 mcm
Fuses*	10	10	15	30	40	45	60	80	100	125	150	200
Conduit Size In.	1/2	1/2	1/2	1/2	1/2	1/2	3/4	1	1	1-1/4	1-1/4	1-1/2
***Fuses**, if used, are *time delay, dual element* for 1-phase lines L-1 and L-2 only; do not use on 3-phase lines to the motor.												

STATIC PHASE CONVERTER INSTRUCTION SHEET

OPERATION

For multiple motor applications, the largest motor must always start first, and it must be at least 50% larger than any other motor starting on the same converter, or if they start simultaneously the combined horsepower of all the motors must fall within the rating of the converter.

Always start a machine out of gear or in lowest spindle speed at initial hook-up to reduce load. The static converter has a built-in weak link, which is designed to fail rapidly if hooked to a higher horsepower motor. On lower horsepower motors the light could stay on after the motor is running, causing rapid failure of the converter, thus providing protection against possible motor da mage.

The red indicator light should turn on once the motor starts and remain on until the OFF button is pressed. When testing the static converter for the first few times after installation, keep your hand near the off switch of the machine, ready to turn it off to prevent damage to the converter due to a wrong or loose connection.

Power may be left on the converter without the load applied. Current draw is approximately 8mA (.008 amp). The converter operates best when mounted vertically. Installation should be performed by a qualified electrician. Refer to local codes for proper wire sizing. Wires and fuses should be sized as appropriate for the motor's rated amperage.

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TROUBLESHOOTING

- A. If the motor fails to start and any of the following symptoms occur: clicking noises from the static converter, light flashes on and off and motor just hums or buzzes, motor starts intermittently; this could indicate that either the motor is wired for 460V or the static converter being used is too high in horsepower for the motor, and a smaller size converter should be tried.
- B. No voltage when measured across lines B and C without motor running: Normal indication.
- C. Converter occasionally hums when motor is off: Normal.

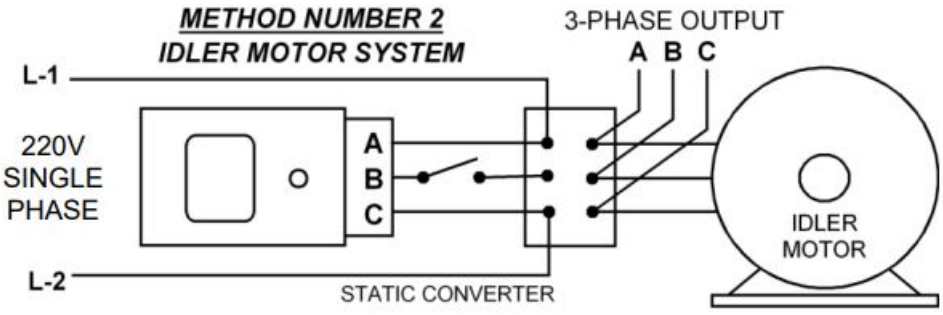
Static Phase Converter used to start an Idler Motor, Idler Motor to power the load motor.

Full or close to full horsepower (HP) can usually be obtained by powering the load motor through a 3-phase motor that runs on single-phase. A static phase converter is used to start the idler motor. The idler motor windings act as a rotary transformer or generator and consume little power when running unloaded. Used motors are inexpensive and readily available. A single machine or complete shop can be operated with great flexibility using this method. The idler motor should be at least 50% larger than the largest motor you want to run to accommodate the higher starting current. A good quality 3450 RPM, Y-wound, 3 phase, 220V motor is the best choice. A 1725 RPM motor can be used on applications not heavily loaded.

1. Wire the static phase converter to the idler motor as described in Method No. 1, side 1.
2. Size fuses and wires on the single-phase side as appropriate for the motor's rated amperage. Once running, the idler motor can then power the load motor. Wire the load motor in parallel to the idler motor as per Method No. 2 diagram below. Size fuses and wires on the 3-phase side as appropriate for the motor's rated amperage.
3. Resistive or single-phase loads and/or magnetic switch gear must be energized only by lines A and C from the converter.

Extra Precautions for Idler Motor System
Heavy starting load motor(s) may cause the output voltage of the idler motor on line B to drop sufficiently to cause the static converter to return to the start-up mode. At this point, the converter's start circuit has the combined horsepower of the idler motor and load motor(s). This will be indicated by the light on the converter coming on when the load motor is started. If the combined HP is greater than the converter's max. HP range, DAMAGE TO THE CONVERTER MAY OCCUR.

To prevent damage to the converter, install a heavy-duty, singlepole switch on line B between the static phase converter and the 3pole switch – refer to Method No. 2 diagram below. Switch should be rated the same amperage as the idler motor, or greater. The switch must be in the "ON" (closed) position before the idler motor is started, and turned to the "OFF" (open) position after the light on the converter has gone out. This will prevent the converter from switching to the start-up mode and from being damaged by an overload. Never turn the single-pole switch to the "ON" position while the Idler Motor is running. Doing so could do damage to the converter.



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.

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

Problem	Symptom	Corrective Action
1. Motor will not start	A. Is your motor single phasing? (Is your motor turning very slowly and / or making a growling or grinding sound?)	
	a. **No.** You do not have single phase power to your machine.	1. You have an open circuit. Check all switches, starters, fuses & breakers. 2. Your system is wired incorrectly. Make **absolutely certain** that M3 (mfg leg) is used to power motor only.
	b. **Yes.** Single phase power is reaching your machine. Refer to Symptom B below.	
	B. What is the red light doing?	
	a. Light is flashing on and off? There is a clicking sound in the converter.	1. Your motor may be wired for 440V. Check to determine that the motor is wired for 220V. 2. You may have a bad connection. Check that all connections are tight. 3. 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.
	b. Light does not come on.	1. You may have a bad connection or an open fuse. Check all fuses and connections. 2. 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.
2. Motor starts but will not come up to full RPM	A. Motor slows down. Red light turns on. Motor RPM increases Red light turns off. Unit cycles as above.	1. 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. 2. Starting load is too severe for this type of converter. Solutions Are: a. Upgrade your installation to a Rotary Phase Converter. b. Use a larger (approximately 1 /3) three phase motor on your machine.

3. Motor starts and comes up to full RPM but…	A. Converter pulsates on/off at regular intervals.	1. The running load may be too severe for this type of converter. Disconnect motor drives and if problem is eliminated: a. Upgrade your installation to a Rotary Phase Converter. b. Use a larger (approximately 1/3) three phase motor on your machine.
	B. Motor suffers an RPM loss under load.	1. Your load requires a higher running efficiency than your converter is allowing. **Solutions Are:** a. Upgrade your installation to a Rotary Phase Converter. b. Install an idler motor into the circuit.
4. Motor is running backwards.	A. Improper rotation.	1. Line leads are hooked up wrong for proper rotation. Reverse any two lines at the motor only.
5. Motor is running hot.	A. Are your thermal overloads tripping?	
	a. No.	1. Your motor is running within accepted NEMA specifications.
	b. Yes.	1. Your thermal overloads may be set too close to nominal. Check trip point and readjust if necessary. 2. You may have a loose connection. Check that all connections are tight. 3. You may have used insufficient wire size for the installation. 4. You may have insufficient motor ventilation. Check and provide ample ventilation for the motor. 5. Motor may be dirty. Check & clean motor. 6. You may have a bad motor. Have motor checked and repaired as required. 7. Your motor load may require a higher motor efficiency than the converter is allowing. **Solutions Are:** a. Upgrade your installation to a Rotary Phase Converter.

		b. Install an idler motor into the circuit. c. Use a larger (approximately 1/3) three phase motor on your machine.
6. Multiple speed motor will not start at all speeds.	A. Motor starts and runs fine at one speed but will not start at other speeds.	1. One or more motor speeds is not within the horsepower range of the converter. **Solutions Are:** a. Upgrade your installation to a Rotary Phase Converter. b. Install an idler motor into the circuit.
7. Magnetic switch chatters or does not close.	A. Chattering.	1. You may have a M3 (mfg leg) wired to your magnetic coil. M3 (mfg leg) must be used to power the motor only.
8. Excessive blowing of fuses, circuit breakers, or heaters.	A. Instant blowing of fuses or circuit breakers. B. Nuisance tripping of fuses, circuit breakers, or heaters.	1. You have a short circuit. Check circuit for broken or loose wires. Check motor for shorts. Check **all** connections. 1. You have a bad connection. Check that all connections are clean and tight. 2. You may have used insufficient wire size for the installation. 3. You may have used insufficient fuse sizing for the installation. 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. 4. Your motor load may require a higher motor efficiency than the converter is allowing. **Solutions Are:** a. Upgrade your installation to a Rotary Phase Converter. b. Install an idler motor into the circuit.

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.

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Documents / Resources

LARSON MTPC-SCHD Series STATIC Phase Converters [pdf] Instruction Manual
MTPC-SCHD Series STATIC Phase Converters, MTPC-SCHD Series, MTPC-SCHD Series Converters, STATIC Phase Converters, STATIC Converters, Phase Converters, Converters