PHASE CONVERTER GENERAL USAGE GUIDE

This general application guide is intended to be used only as an outline in selecting a phase converter. Because of the variations in applications, the converter required may vary from the units shown in this general guide. All converter quotes must come from the factory to ensure proper sizing and application.

APPLICATION	RECOMMENDED UNITS & SPECIAL NOTES					
	ADD-A-PHASE®	ECONO-PHASE® SHIFTER	ROTO-CON®	ROTO-LOAD CENTER®	ROTOVERTER®	ELECTRO-PHASE®
Air Compressor – Rotary Screw					●	●
Air Compressor – Cycling Piston	●					●
Aircraft Ground Power Unit (GPU)			●			
Aircraft Hydraulic "Mule"			● Oversized			●
Auger (Grain)			● Without fans		● With Fans	
Baler – Hydraulic	● Type AA-HE					●
Battery Charger			●			
Blender – Fertilizer/ Concrete			● Oversized to handle starting load			●
Blower – Axial	●				● Fans with augers	●
Blower – Centrifugal	●				●	●
Blower – Die Bold	●					
Blower – Dust Collector	●		●		●	●
Blower – Exhaust	●				●	●
Blower – HVAC	●			●		●
Blower – Pneumatic Grain Handler			●		●	●

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	ADD-A-PHASE®	ECONO-PHASE® SHIFTER	ROTO-CON®	ROTO-LOAD CENTER®	ROTOVERTER®	ELECTRO-PHASE®
Bridge Crane			● With delta/ wye XFMR	●		
Buffer – Floor			● Single Panel with oversized rotary			
Car Wash – Automatic					●	
Car Wash – Manual Pressure Washer	● If single motor				● If multiple motors	●
Center Pivot – Multiple Tower Motors			● Type CP			
Center Pivot – Hydraulic			●			●
CNC Equipment			● Single panel with oversized rotary	●		
CNC Router with Vacuum Table				●	●	
Compactor – Mechanical			● Oversized			●
Compactor – Hydraulic	● Type AA-HE		● Oversized RC			●
Compressor – HVAC	●			●		
Compressor – Refrigeration Walk-in	●					
Compressor – Refrigeration Truck					●	
Conveyor			● Oversized RC			●
Dialysis Machine	●					
Dishwasher			● Sized for total FLA of machine			

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	ADD-A-PHASE®	ECONO-PHASE® SHIFTER	ROTO-CON®	ROTO-LOAD CENTER®	ROTOVERTER®	ELECTRO-PHASE®
Door Opener	● Type HD					
Dough Mixer			● Oversized			
Drill Press		● Light use, not commercial	●			●
Edge Bander			●			●
Elevator – Cable or Traction			● Type AS-DS - Oversized RC with automatic start & delay stop	● If elevator uses VFD		●
Elevator – Hydraulic	● Type HE-AA					●
Embroidery Machine			● Size by amperage, not motor			
Flood Gate	● Type HD					●
Grain Leg – Bucket			●			●
Grinder – Feed			● Oversized			●
Grinder – Wheel			●			●
Hammer mill			● Oversized RC			●
Hoist – Chain		● PS-OF - Can only be used if hoist brake is mechanical and not electric	● Single panel with oversized rotary must be used if hoist brake is electrical			
Ice Cream Machine – Soft-Serve or Yogurt & Gelato			● Oversized			

APPLICATION	RECOMMENDED UNITS & SPECIAL NOTES					
	ADD-A-PHASE®	ECONO-PHASE® SHIFTER	ROTO-CON®	ROTO-LOAD CENTER®	ROTOVERTER®	ELECTRO-PHASE®
Iron Worker			●			●
Landfill Flare	●					
Lathe		● Light use and single speed motors ≤5 HP	● Commercial use or other 3Ø equipment in shop			●
Lift – Hydraulic • Ball & Screw			● Single panel with oversized rotary			●
Milling Machine		● Light use	● Commercial use or other 3Ø equipment in shop			●
Molding Machine – Plastic Injection			● Single panel with oversized rotary			
Paper Cutter – Hydraulic			● Oversized RC			●
Paper Cutter – Mechanical			● Oversized for hard start conditions			●
Pizza Oven			● Sized for heat load, buck boost transformer may be required			
Planer			● Oversized for hard starting load			
Printing Press or Copier – Electronic				●		
Printing Press – Mechanical			● Oversized			

APPLICATION	RECOMMENDED UNITS & SPECIAL NOTES					
	ADD-A-PHASE®	ECONO-PHASE® SHIFTER	ROTO-CON®	ROTO-LOAD CENTER®	ROTOVERTER®	ELECTRO-PHASE®
Pump Jack	● Any other than D motor (1800 or 3600 RPM)	● Design D Motor (Low PF & RPM)				●
Pump – Centrifugal	●					●
Pump – Fuel/ Propane	● Not explosion proof					●
Pump – Manure • Sewage Lift • Submersible Swimming Pool • Turbine, Vertical Hollow Shaft • Water Booster	●					●
Pump – Positive Displacement					●	●
Punch Press – Hydraulic			●			●
Punch Press – Flywheel			● Oversized RC			●
Router (not CNC)			●			
Saw – Band Saw		● Small, light use	● Commercial use or other 3Ø equipment in shop			●
Saw – Chop • Door Panel • Radial Arm • Stone • Table			●			●
Sewing Machine (Not Embroidery Machine)		●	● For multiple sewing machines			
Shear – Hydraulic Treat like Other Hydraulic Systems						●
Shear – Flywheel • Mechanical			● Oversized			

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Test Bench			● Single panel, unloaded or variable testing		● Single panel, full HP continuous testing	
Tire Changer			●			
Vacuum Packer					● Type D	
Vacuum Table					●	
Valve Actuator (MOV)	● Type HD		●			
Variable Frequency Drive			● Buck boost transformer or 3Ø D-Y transformer usually required		●	
Warning Siren	● Type HD					
Washing Machine			● Oversized			
Welder – Motor Driven			●			
Welder – Resistive			● Sized for resistive load			
Wheel Balancer			● Oversized 2Xs			
Wine Making Equipment			●		●	

Air Compressor – Rotary Screw

The motor will run continuously, loading and unloading to compress air. Max load at max PSI. There will be an unloader valve that loads and unloads the motor. Compressor runs in oil and oil gets thick when cold but motor runs all the time. ROTOVERTER

Air Compressor – Cycling Piston

The motor will turn on to compress air, then shut off. Max load at max PSI. Balance close to max PSI. There will be an unloader valve that keeps back pressure off the motor during start. Compressor runs in oil and oil gets thick when cold. ADD-A-PHASE

Aircraft Ground Power Unit (GPU)

GPU powers up aircraft electrical system for maintenance to work without firing up the engines, usually ~400 Hz.
ROTO-CON - Single panel with oversized base, usually ~2s kVA 2D-l. Disconnect cap to bring down Vab for non-motor load.
RC feeds the GPU and the GPU feeds the aircraft. GPU's are typically portable. RC may be if job requires it.

Aircraft hydraulic "Mule"

It powers the hydraulic systems of an aircraft for maintenance without firing up the engines.
ROTO-CON - Single panel with oversized base.

Auger (Grain)

They are usually not supposed to start with grain in them, but not always. Auxiliary start panel will not guarantee customer to start it with grain in it successfully. Start caps will blow. If the auger plugs, then they must empty manually. Wet grain is higher load than dry. Auxiliary start panel can be quoted for augers starting with grain in them as possible remedy, but no guarantee. Rotary converter sizing usually takes care of this if multiple loads. Augers are small motors with normally larger motor equip also. Larger converter for larger motors helps start augers with grain in them.
ROTO-CON - No fans, Panel #2 on largest motors which is usually to Pneumatic Blower or Grain Leg.
ROTOVERTER - Has fans, Panel #2 (Split) on largest motors which are usually the fans.

Baler – Hydraulic

It will have some type of 1Ø wrapping/binding motor and may over-extend to push finished bale off track.
ADD-A-PHASE Type AA-HE -10 HP to 20 HP usually 230 volt. Baler MUST use A-T-L starter.

Battery Charger

3Ø forklift battery chargers charge faster than 1Ø. Usually a single charger is the only load there.
ROTO-CON - Single panel, usually ~30 kVA 2P. Disconnect cap to bring down A-B voltage for non-motor load.

Blender – Fertilizer/Concrete

It can be started with material in it. It can be reversed to unload material in it. It will be in a corrosive environment.
ROTO-CON - Oversized to handle starting load, usually 80 or 100 kVA 2P. Start panels may be used but unreliable, usually lph voltage drop issues, which is a lph service problem and not a converter problem.

Blower – Axial

ADD-A-PHASE - Single or Duo motor application. Provides the most reliable starting scenario but must be A-T-L starter.
ROTOVERTER - Fans with augers. Usually the Panel #2 is on the fans, but fans could have soft-starter. Rarely need Auxiliary Starting Panel.

Blower – Centrifugal

ADD-A-PHASE - Single or Duo motor application. Provides the most reliable starting scenario but must be A-T-L starter.
ROTOVERTER - Fans with augers. Usually the Panel #2 is on the fans, but may have soft-starter. Usually need Auxiliary Starting Panel but may have voltage drop issues also.

Blower – Die Bold

Canister blower system used at banks for the drive-thru. Old OEM, no new installations.
ADD-A-PHASE custom unit. Replace parts to make them work, but no new units. Must get serial number for parts list and wiring diagram.

Blower – Dust Collector

Dust collector alone operates at a minimal load swing. AAP can be used. If dust collector is used with other 3ph load equipment, a rotary converter is used. RC or RV unit depends on other equipment to be operated.

Blower – Exhaust

Typically paint booth or welding booth and explosion proof motors. Converters are NEVER explosion proof. There may be multiple motors, positive or negative displacement. It operates at full HP continuously.
ADD-A-PHASE or ROTOVERTER

Blower – HVAC

Typically it's an indoor fan motor (IFM) of a larger HVAC system. It operates at full HP continuously.
ADD-A-PHASE - Usually Trio AAP for 2 additional HVAC compressors. Outdoor fan motor is 1Ø.
ROTO-LOAD CENTER - Mitsubishi HVAC systems, inverter drive on compressors (We quote but rarely sell RLC.)

Blower – Pneumatic Grain Handler

ROTO-CON - Size for size standard RC. Pneumatic Grain Handlers quite often are used with no other 3ph equip. Motor starter must be NEMA-style A-T-L starter for Panel #2. Normally 60 kVA 2P operating a 30 HP motor. RC can also feed augers but not fans.
ROTOVERTER - If dryer or bin fans used with Pneumatic Grain Handler and other augers.

Bridge Crane

Multiple motors and, if new, will have VFD's on bridge and/or trolley motors and can on some hoist motors plus brake.
ROTO-LOAD CENTER or ROTO-CON - If RC, customer may need to provide their own delta/wye XFMR.

Buffer – Floor

Portable and may not have a "starter", just some type of a switch built into the unit. Variable loading, not full HP.
ROTO-CON - Single panel with oversized rotary.

Car Wash – Automatic

It may have multiple pumps and secondary brush motors, 1Ø or 3Ø.
ROTOVERTER - Can be tricky with #2 panel due to many variations of automatic car washes.

Car Wash – Manual pressure washer

It may have variable pressure adjustment on handle, but the highest load at full pressure.
ADD-A-PHASE - If single motor.
ROTOVERTER - If multiple motors.

Center Pivot – Multiple Tower Motors

They use multiple, small HP, high code letter motors. The motors start and stop, never all run at same time. Outer motors run longer but typically never concerned with amperages. May have end gun or booster pump.
ROTO-CON Type CP - Pivots are always 480 volt, typically no balancing needed but can watch Vab and disconnect if always high. Job may have lph 240v. A 1Ø s/u transformer is required for those jobs, sized to 1Ø FLA of CP.

Center Pivot – Hydraulic

T&L Pivot is the only manufacturer. It has a single hydraulic pump that moves the tower.
ROTO-CON - Typically 15 HP 480v motor on a 30 kVA 4P.

CNC Equipment

Spindle motor is usually on a VFD. The CNC unit may have a built in transformer, otherwise a 3Ø delta -wye transformer is required to get within VFD +/- requirements. Tapping functions may use maximum acceleration & deceleration settings which may drop 1Ø and 3Ø voltage.
ROTO-LOAD CENTER - Will always work but may have issues if max accelerate and decelerate.
ROTO-CON - Single panel with oversized rotary. If CNC uses VFD, and if CNC does not have its own 3ph input XFMR, customer will have to supply a 3ph D/Y XFMR. Most HAAS CNCs have 3ph input XFMR built in. No other XFMR needed.

CNC Router with Vacuum Table

ROTO-LOAD CENTER - Will always work but may have issues if max accelerate and decelerate.

ROTOVERTER - In certain circumstances where vacuum table ALWAYS starts first and always gets #2 panel.

Compactor – Mechanical

Under 10 HP.
ROTO-CON - Oversized RC.

Compactor – Hydraulic

The cylinder to push ram out may be larger than cylinder to pull back resulting in a higher load retracting than compressing. The Run Assist will typically engage to press and then remain engaged for retract.
ADD-A-PHASE Type AA-HE -10 HP to 20 HP usually 230 volt. Motor must use A-T-L starter.
ROTO-CON - Oversized RC.

Compressor – HVAC

There will usually be some fans involved also and may be multiple compressors. Loading will increase with Freon level. Make sure system is properly charged, but the compressor MUST run to charge the system. It may be necessary to drop cap/tap to get all amperages under nameplate in order to charge but re-balance when fully charged.
ADD-A-PHASE - Usually a Trio AAP for 2 compressors & 3Ø indoor fan motor. Outdoor fan motor(s) is 1Ø.
ROTO-LOAD CENTER - Mitsubishi HVAC systems, inverter drive on motors.

Compressor – Refrigeration Walk-in

Walk-in fridge or freezer. Usually there is a 3Ø compressor and maybe a 1Ø condenser motor and/or fan.
ADD-A-PHASE.

Compressor – Refrigeration Truck

Usually converter stays at home base but could be mounted on truck. 1Ø voltage may be an issue if mounted on truck and moving from place to place. These refrig systems can, and usually do, have phase rotation monitors.
ROTOVERTER - Must be single panel "D" model.

Conveyor

Variable loading and may start with stuff on belt. Can have reversing starters.
ROTO-CON - Oversized RC with single panel.

Dialysis Machine

Prepackaged machine with 3Ø pump motor. EC and operator may not be "motor inclined" or understand Aux leads.
ADD-A-PHASE.

Dishwasher

Water pump and heating element. Heat elements may be 1Ø but most likely 3Ø.
ROTO-CON - Sized for total FLA of machine.

Door Opener

Reverses.
ADD-A-PHASE Type HD - Tap 4 runs Tap 1 starts unless better information provided.

Dough Mixer

It will be started with material in bowl. It will have multiple speeds by motor or gearing.
Hobart: If 208 Volt rated, then it is 208 Volt ONLY and must use 1Ø buck boost transformer to drop incoming voltage. ROTO-CON - Oversized, usually 10 kVA 2P or smaller.

Drill Press

Tapping will be done by gears, not reversing the motor. Multiple speeds are usually through gearing and pulleys. It may have a manual starter instead of a contactor. It may be connected by cord and plug.
PHASE-SHIFTER - Light use, not commercial. If connected by plug, then must have a second connection for Aux Leads.

ROTO-CON.

Edge Bander

Can have multiple motors and will have 1Ø or 3Ø heat load.
ROTO-CON.

Elevator – Cable or Traction

Dumbwaiter or freight elevator. Rotary must turn on and come to speed first, then elevator on, then elevator off, then rotary runs for couple min and if elevator not used then rotary shuts off. Caution - These can use VFD.
ROTO-CON Type AS-DS - Oversized RC with Automatic Start & Delay Stop.
ROTO-LOAD CENTER - If elevator uses VFD.

Elevator – Hydraulic

Categorized as either Otis or Dover build for board settings and capacitors.
ADD-A-PHASE Type HE-AA.

Embroidery Machine

Has a bunch of smaller motors and electronics.
ROTO-CON - Size by amperage not motor, may need D-Y XFMR.

Flood Gate

Reversing door.
ADD-A-PHASE Type HD - Build with information provided, prefer to have PF's.

Grain Leg – Bucket

They should not be started with grain in the buckets and rarely plug but can break a belt. Typically 20-40 HP motor.
ROTO-CON - Will get Panel #2, usually part of a grain system with other augers.

Grinder – Feed

Treat as a specific purpose hammer mill.
ROTO-CON - Oversized.

Grinder – Wheel

It may be hard to start since getting wheel up to speed. Loading increases with material.
ROTO-CON.

Hammer Mill

It is a crusher that breaks large things into smaller things. Will start and stop with material in it. There may be additional motors to load and unload. Typically 20-30 HP motor.
ROTO-CON - Oversized RC.

Hoist – Chain

It has a single motor to raise and lower a hook. If there are trolley motors, then see Overhead Bridge Crane. For safety feature, there must be a brake. If it is electrical, make sure it is not on created phase. It will be hardwired to the motor starter. Material will be lifted, stopped, and then lifted higher. It will be an increased loading condition to raise something up higher. Jockeying may also occur (frequent starting of the motor, not holding the button down).
PHASE-SHIFTER - Cannot use 2PB (small circuit) on hoist with an electric brake. B & C must be the legs to flip direction.
PHASE-SHIFTER - PS-OF - Can only be used if hoist brake is mechanical and not electrical.
ROTO-CON - Single panel with oversized rotary must be used if hoist brake is electrical.

Ice Cream Machine – Soft-Serve or Yogurt & Gelato

Strip mall shop. Heating questions will arise since unit located in basement, ceiling, or roof. Yogurt & Gelato are not American made (220 volt machines). Usually ran at 208 volt with buck boost transformers & wired by cord and plug. Multiple

beater and blender motors along with compressors. Rarely on some machines, all motors can start at the same time (twist cone). Usually the compressors turn on and off as needed and are not triggered by the “call for ice cream”.
ROTO-CON - Oversized based amperages because of the multiple motor start situations and 208 volt. 15-20 kVA 2P.

Iron Worker

ROTO-CON

Landfill Flare

Burns off the methane gas at a landfill. They are typically in the middle of nowhere with power ran a couple of hundred yards. These are easy to start applications but use 10-20 HP motors so voltage drop may be significant enough to matter. The only motor is a 3Ø fan and it rarely shuts down.
ADD-A-PHASE.

Lathe

Have multiple speeds usually by belt and pulley. Can reverse and have a brake. Loading increases with the size of chunk being cut off, usually very lightly loaded for precise work.
PHASE-SHIFTER - Light use and single speed motors SHP and smaller.
ROTO-CON - Commercial use or other 3Ø equipment in shop.

Lift – Hydraulic

Lifts are usually for vehicles. For safety, there must be some type of a mechanical or electrical brake. Material will be lifted, stopped, and then lifted higher. It will be an increased loading condition to raise something up higher. Motor should always start unloaded, not against back pressure.
ROTO-CON - Single panel with oversized rotary.

Lift – Ball & Screw

Same purpose as hydraulic and it will have a brake. Ball & screw lifts are jerky and tend to have harder starting conditions to overcome the pressure on the system from raised material.
ROTO-CON - Single panel with oversized rotary.

Milling Machine

Has a 1-3 HP motor that reverses and can have a brake. It uses belts and pulleys for multiple speeds. There may be axis motors but usually are 1Ø. Usually, the only 3Ø motor is for the spindle.
PHASE-SHIFTER - Light use.
ROTO-CON - Commercial use or other 3Ø equipment.

Molding Machine – Plastic Injection

They have heating elements and pumps. There may be a conveyor.
ROTO-CON - Single panel with oversized rotary.

Paper Cutter – Hydraulic

Treat like other hydraulic systems. If cutting max thickness of paper and cutting heavy paper, these motors will overload.
ROTO-CON - Oversized RC.

Paper Cutter – Mechanical

It may have a flywheel. The motor will start and stop every cut.
ROTO-CON - Oversized for hard start conditions.

Pizza Oven

Prepackaged machine with fans and heating element that won’t be reconnected.
ROTO-CON - Sized for heat load, buck boost transformer may be required.

Planer

Cutting head with feed motors. Loading depends on wood but typically high load when cutting. Will get customers that really want the maximum board inches per minute that the MFG Rep says they should get.
ROTO-CON - Oversized for hard starting load.

Printing Press or Copier – Electronic

May or may not have large motors but has electronics on all three phases.
ROTO-LOAD CENTER.

Printing Press – Mechanical

Usually only one motor but that motor has double shaft that runs everything on press. Hard starts & usually very old.
ROTO-CON - Oversized RC.

Pump Jack

They are belt driven and have rods and weights. By nature, they will be heavy on one end and will lead into generation on the down stroke. See if always returns to same position when shut off. Design D (low PF, low RPM, high slip) motors should be use. Design B motors can be used (at lower cost to customer) but suffer in performance (torque). The pump jack should be as physically balanced as possible to minimize the load swing (and generation). The weights will require a crane to move. Sometimes oil workers will use whatever motor and/or converter they have on hand at that time and keep up-sizing until it works. Oil wells can build up with paraffin which causes increased loading. Motors can always be operated with the belts off. Get amps rods up and rods down on all three phases. Physical balance minimizes the swing. Adjust caps to put AØ in the middle (few adjustments with PS).
PHASE-SHIFTER - Design D motor (low PF & RPM).
ADD-A-PHASE - Any other than Design D motor (1800 or 3600 RPM).

Pump – Centrifugal

Above ground pump that's usually for water. Make sure operating under the proper loading conditions (not open discharge). Easy to start motor, load increases with cube of RPM.
ADD-A-PHASE.

Pump – Fuel/Propane

There must be a truck there to pump into. Loading increases as the truck fills up (may take 30 min). This is an explosion area and will have long wire runs and explosion proof disconnect at motor (not for starting).
ADD-A-PHASE (not explosion proof).

Pump – Manure

There will be a mix cycle (bypass) and a pump cycle. Sometimes, the motor is operated in both directions. Grinder pump, obstructions are possible. The pit will always be full. Similar to sewage lift station.
ADD-A-PHASE.

Pump – Positive Displacement

Frequently used for soil remediation and may be mounted on a trailer. Temporary jobs with temporary power (couple years) that run 24/7 until done. Liquid ring pumps. If soil remediation, there will be other motors.
ROTOVERTER.

Pump – Sewage Lift

Duplex lift station with grinder pumps, there will be obstructions. Alternator switches between motors. Both motors operate at the high level switch. Usually very easy to start motors, and SUB's are oversized. Some start caps are disconnected from factory, but may need to disconnect more. Try to leave AØ highest to grind through debris.
ADD-A-PHASE - Duo, maybe SUB.

Pump – Submersible

It may be 1000 feet down a hole with a building built on top of it. It is impossible to tell if the motor is actually running. It is possible to pinch the power cable while dropping the motor (broken phase lead) and to snap the shaft (no water). Franklin

does not want their SUB motors to run into the service factor. SUBTROL is a phase monitor that will malfunction when used with ADD-A-PHASE.
ADD-A-PHASE.

Pump – Swimming Pool

The pump will be located in the Pump Room. Chlorine is corrosive and will eat capacitor connectors.
ADD-A-PHASE Pump - Turbine. Vertical Hollow Shaft.
ADD-A-PHASE.

Pump – Water Booster

Pump into pressurized system, clean water.
ADD-A-PHASE.

Punch Press – Hydraulic

Similar to other hydraulics.
ROTO-CON.

Punch Press – Flywheel

High inertia load, the momentum of the wheel carries the press through the stroke.
ROTO-CON - Oversized RC.

Router (not CNC)

Has a brake. Loading will increase with material being cut off, lightly loaded. Typically other woodworking equipment also involved.
ROTO-CON.

Saw – Band Saw

If a meat saw then it may also be powered by cord and plug.
PHASE-SHIFTER - Small, light use.
ROTO-CON - Commercial use with other 3Ø equipment.

Saw – Chop

Can be hard starting since getting head up to speed.
ROTO-CON.

Saw – Door Panel

ROTO-CON.

Saw – Radial Arm

There will be a brake.
ROTO-CON.

Saw – Stone

Will be Italian and may be a wet saw. Some of these can have real large motors.
ROTO-CON.

Saw – Table

There will be a brake.
ROTO-CON.

Sewing Machine (not embroidery machine)

Usually fractional HP motors.

PHASE-SHIFTER.
ROTO-CON - If multiple sewing machines like in a sweat shop. (Yes, we do get calls occasionally).

Shear – Hydraulic

Treat like other hydraulic systems.

Shear – Flywheel

High inertia load, the momentum of the wheel carries the blade through the material.
ROTO-CON - Oversized RC.

Shear – Mechanical

The motor stops and starts every cut. RC has to handle constantly being hit with LRA.
ROTO-CON - Oversized as much as 2X's for commercial use.

Test Bench

Repair shop that fixes something and needs to make sure they work. Multiple motor sizes and voltages. Motors are usually not operated under load. Customer must test good motors first to establish a base line of "GOOD". Wired up to a panel board, may not have a motor starter with overloads. If changing voltages, they must use 3Ø XFMR.
ROTO-CON - Single panel, unloaded or variable testing.
ROTOVERTER - Single panel, full HP continuous testing (not common).

Tire Changer

Reverses, takes the tire off of the rim. Commonly has two motors.
ROTO-CON.

Vacuum Packer

ROTOVERTER Type D.

Vacuum Table

It holds material down to a table, usually with another machine that works on the material being held.
ROTOVERTER - If this is only 3Ø load.

Valve Actuator (MOV)

Need starting power factor, running power factor, starting amps, and running amps. May also get torque amps but otherwise just assume 130%. Some MOVs have the starters build integral to the motor. There will not be any place to put the Auxiliary Leads. Need Start PF, LRA, Run PF, & Run Amps (can estimate Torque Amps).
ADD-A-PHASE Type HD - Standard A-T-L starter.
ROTO-CON - Integral starter or phase monitor required.

Variable Frequency Drive

They can be used on any motor under any circumstance and are used to vary the speed of the motor to affect loading and startup. They will have +/- voltage tolerances and should return "Bus overvoltage error" if too high. Some fry instead. Electronic loads must be powered by a rotary converter and they receive no benefit from the offset Tap of the ROTOVERTER. Always use ROTO-CON. A buck boost transformer or 3Ø D-Y transformer is usually required.

Warning Siren

It can't reverse. Difficult to test and troubleshoot without upsetting the community served.
ADD-A-PHASE Type HD - Tap 4 runs Tap 1 starts unless better information provided.

Washing Machine

Can use multiple speed motors. Spin cycle is a high load starting issue.
ROTO-CON - Oversized for spin cycle hard starting.

Welder – Motor Driven

Basically the same thing as a generator if it was gas powered. Motor loads up with amperage draw to the welder.
ROTO-CON.

Welder – Resistive

Usually cost prohibitive due to the very large amperage requirement. Welders must have a dedicated converter. Other equipment turning off and on will alter the characteristics of the weld (EXTREMELY BAD).
ROTO-CON - Sized for resistive load, dedicated to welder only.

Wheel Balancer

Hard starting and can reverse spinning tire for braking. Can also put DC volts to motor to stop wheel spin.
ROTO-CON - Oversized RC 2X's.

Wine Making Equipment

Not made in America and probably 220 volt or kW rated. Prepackaged equipment so it may be difficult to isolate controls or identify 3 phase electronics. Will have multiple motors to process the grapes.
ROTO-CON or ROTOVERTER (depending on equip info) may need s/d XMFR.

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