

INSPECTION

Upon receiving the Roto-Phase, inspect for damage or missing parts and report such losses to the carriers and to the factory; always quoting the Roto-Phase model and serial number.

INSTALLATION

The Roto-Phase is suitable for mounting in any position either horizontal or vertical. Care must be taken when mounting to wall rafters or wood floors to make sure that normal Roto-Phase vibration is not transmitted with sounding board amplification.

AVOIDING MAINTENANCE

The Roto-Phase is an essentially reliable machine and requires little maintenance; in fact they tend to suffer from over attention more than lack of attention. Avoid whenever possible.

1. Moisture and Chemicals
2. Airborne materials that may cause blocked ventilation, which leads to excessive heat. Cooling air temperatures must not exceed 40 degrees (104 degrees F).

LUBRICATION

ALL MODELS HAVE DOUBLE SHIELDED BEARINGS AND DO NOT NEED LUBRICATION.

GENERAL HOOK-UP

A. FOLLOW ALL LOCAL, STATE, AND NATIONAL ELECTRIC CODES

- B. Connect L1 & L2 from a two pole breaker at the single-phase service through a separate protective device to the Roto-Phase Terminal Block T1 & T2. (For wire sizes see Roto-Phase INPUT CHART)
- C. Connect Roto-Phase lead T3 (mfg. phase) through the separate protective device to the three-phase distribution and/or three-phase motors.
- D. Connect L1 & L2 from a separate two pole breaker (not the same breaker as the one used to feed the converter) at the single-phase service to the three-phase distribution panel and/or three-phase motor load.
- E. If your Roto-Phase contains an auxiliary capacitor panel with connection circuits E and B refer to connection diagram for AUXILIARY BANK for the proper installation.

PRECAUTIONS

- A. DO NOT CONNECT ANY SINGLE-PHASE LOADS OR MAGNETIC CONTROLS TO T3 (mfg. phase).** The line can readily identify T3 with the highest phase-to-ground voltage.
- B. Properly ground all electrical equipment.
- C. Always start the Roto-Phase before energizing the three-phase load.
- D. Because properly maintained voltages on during motor start-up is very important, wire sizing must be carefully followed and wire distances should also be carefully studied.

SPECIAL INSTRUCTIONS

THIS UNIT CONTAINS NON-PCB CAPACITORS

Non-PCB capacitors are standards established by Federal Regulation

The no-load amperage readings are typical of normal operations. They may vary approximately 10% with variation of line voltage. Reasonably close readings insure correct Roto-Phase electrical performance.

T1 = Line current

T2 = Line current

T3 = Capacitor current

At the time of original installation, record the Roto-Phase no-load amperage (no three-phase motors running) as well as the capacitor amperage. To read capacitor amperage, it will be necessary to read the capacitor circuits in the capacitor panel, which will require removing the panel cover. Save this record and periodically, at least once a year, and have a qualified electrician take new readings. The new readings can be compared with the original readings in order to see if the converter is experiencing any problems. If the capacitor amperage is lower than the original readings, then it could mean that a capacitor has probably failed and should be replaced.

Phase converters cannot be made to work equally well on all motors even though the horsepower, voltage, and amperage ratings are the same. Motors of different makes (import brands) and designed for different purposes vary considerably in their electrical characteristics; therefore, it is not always possible to make a universally applicable converter for motors with a given horsepower, voltage, and amperage rating.

CONNECTION OF 2 PIECE ROTARY PHASE CONVERTER WITH SEPARATE CONTROL PANEL

INSTALLATION

All phase converter rotary(s) lead tie-offs are completed at the factory and should not be disturbed. The installer should only be concerned with the phase converter rotary(s) leads marked 1 & 7, 2 & 8, and 3 & 9. If the phase converter's rotary leads consists of two leads, they will be factory connected and common marked as above. Six circuits will be required to connect the rotary phase converter motor to the control panel for the phase converter at either 230 VAC or 460 VAC. Wire size will be determined from the INPUT CHART for the Roto-Phase converter. (SEE INSTALLATION DIAGRAM)

Consult the wire size chart for the converter model being installed. The first 2-pole breaker will be rated at 125% of the recommended fuse protection of the phase converter. The two single-phase circuits L1 and L2 from this breaker will be fed through the Roto-Phase Disconnect, Magnetic Starter, and the control panel of the Roto-Phase. Inside the control panel of the phase converter connect L1 and L2 of the single-phase power to the "line side" of the distribution block labeled L1 and L2. A conductor will need to be connected to the "line side" of the L3 connection on the Roto-Phase distribution block and back fed to the single-phase main service panel.

In order to supply power to the three-phase load, a second 2-pole breaker is required. This breaker will feed two single-phase lines along with the T3 conductor that was back fed from the phase converter in order to supply the three power supply lines for the equipment load. The 2-pole circuit breaker in the single-phase main panel for the three-phase load will be sized at 125% of the full load amperage of the three-phase load.

230 VAC CONNECTION OF ROTARY TO PHASE CONVERTER CONTROL PANEL

Rotary Leads 1 and 7 will need to be connected to the load side of the distribution block marked L1; Rotary Leads 2 and 8 to the load side of the distribution block marked L2; Rotary Leads 3 and 9 to the load side of the distribution block marked L3. The Roto-Phase converter is now ready to be energized.

460 VAC CONNECTION OF ROTARY TO PHASE CONVERTER CONTROL PANEL

Rotary Lead 1 will need to be connected to the load side of the distribution block marked L1; Rotary Lead 2 to the load side of the distribution block marked L2; Rotary Lead 3 to the load side of the distribution block marked L3. The Roto-Phase converter is now ready to be energized.

460 VAC UNITS WITH VOLTAGE REGULATION OR START CIRCUIT

Systems incorporating voltage regulation and or start circuit must make connections from the individual pigtail control circuits in the Roto-Phase junction box numbers 4, 5, 6 to the control panel terminal strip numbers 4, 5, 6 using a #18 copper wire per each connection.

INPUT CHART – WIRE SIZE BASED ON 50’ DISTANCE USING COPPER WIRE

MODEL	230V RP POWER INPUT WIRE SIZE L1-L2-L3	230V ROTARY LEADS WIRE SIZE 1,7,2,8,3,9 (6 LEADS)		230V FUZE SIZE	230V RP MAG. STARTER SIZE	230V RP OL PROT.	230V AVE. NO LOAD AMPERAGE	230V AVE. CAPACITOR AMPERAGE
MF	12	12		10	0	6	2.5	3.9
MG	12	12		10	0	7.5	2.5	8.5
M	12	12		15	0	11	3	13
A	8	12		30	1	22	4	22
R	8	12		40	2	30	7	33
B	6	12		50	2	40	7	40
C	4	8		80	3	60	11	61
G	3	8		100	3	75	16	80
P	2	6		125	4	100	18	110
PKT	2	6		125	4	100	18	110
PKO	2	6		125	4	100	18	110
K2G**+	3*	8*		100*	3*	75*	16*	80*
Y2P**+	2*	6*		125*	4*	100*	18*	110*
L2S**+	1/O*	6*		150*	4*	120*	23*	128*
HD2	12	12		15	0	11	3	13
HD3	8	12		30	1	22	4	22
HD5	8	12		40	2	30	7	33
HD7	6	12		50	2	40	7	40
HD10	4	8		80	3	60	11	61
HD15	3	8		100	3	75	16	80
HD20	2	6		125	4	100	18	110
HD25	1/O	6		150	4	120	23	128
HD30+	1/O	6		150	4	120	23	128
HD40+	1/O	6		150	4	120	23	128
HD2P**	2*	6*		125*	4*	100*	18*	110*
HD3P***	2*	6*		125*	4*	100*	18*	110*
HD4P****	2*	6*		125*	4*	100*	18*	110*
CNC1	12	12		15	0	11	5	7
CNC2	8	12		30	1	22	6	11
CNC3	8	12		40	2	30	8	24
CNC5	6	12		50	2	40	10	26
CNC7	4	8		80	3	60	12	28
CNC10	3	8		100	3	75	16	60
CNC15	1/O	6		150	4	120	22	86
CNC20**	3*	8*		100*	3*	75*	16*	60*
CNC25**	2*	6*		125*	4*	100*	20*	78*
CNC30**	1/O*	6*		150*	4*	120*	22*	86*
SP2	10	12		20	0	15	5	16
SP3	8	12		30	1	22	4	22
SP5	8	12		40	2	30	7	33
SP7	6	12		50	2	40	7	40
SP10	4	8		80	3	60	11	61
SP15	2	6		125	4	100	18	110
SP20	1/O	6		150	4	120	23	128
SP25**	3*	8*		100*	3*	75*	16*	80*

(*) Indicates multiple units in electrical parallel. Data represents requirement for each unit.

(+) Indicates AUXILIARY CAPACITOR BANK with Roto-Phase.

INPUT CHART – WIRE SIZE BASED ON 50’ DISTANCE USING COPPER WIRE

MODEL	230V RP POWER INPUT WIRE SIZE L1-L2-L3	230V ROTARY LEADS WIRE SIZE 1,7,2,8,3,9 (6 LEADS)		230V FUZE SIZE	230V RP MAG. STARTER SIZE	230V RP OL PROT.	230V AVE. NO LOAD AMPERAGE	230V AVE. CAPACITOR AMPERAGE
SP30**	2*	6*		125*	4*	100*	18*	110*
SP40**	1/O*	6*		150*	4*	120*	23*	128*
SP50***	2*	6*		125*	4*	100*	18*	110*
SP60***	1/O*	6*		150*	4*	120*	23*	128*
CHDELV5	8	12		40	2	30	7	33
CHDELV7	6	12		50	2	40	7	40
CHDELV10	4	8		80	3	60	11	61
CHDELV15	3	8		100	3	75	16	80
CHDELV20	2	6		125	4	100	18	110
CHDELV25	1/O	6		150	4	120	23	128
CHDELV30+	1/O	6		150	4	120	23	128
CHDELV40+	1/O	6		150	4	120	23	128
TM5	8	12		40	2	30	7	33
TM7	6	12		50	2	40	7	40
TM10	4	8		80	3	60	11	61
TM15	2	6		125	4	100	18	110
TM20	1/O	6		150	4	120	23	128
HDH1	12	12		15	0	11	3	13
HDH2	8	12		30	1	22	4	22
HDH3	8	12		40	2	30	7	33
HDH5	6	12		50	2	40	7	40
HDH7	4	8		80	3	60	11	61
HDH10	3	8		100	3	75	16	80
HDH15	1/O	6		150	4	120	23	128
CMG	12	12		10	0	7.5	2.5	8.5
CM	12	123		15	0	11	3	13
CA	8	12		30	1	22	4	22
CR	8	12		40	2	30	7	33
CB	6	12		50	2	40	7	40
CC	4	8		80	3	60	11	61
CG	3	8		100	3	75	16	80
CP	2	6		125	4	100	18	110
CS	1/O	6		150	4	120	23	128
DBM	12	12		15	0	11	3	13
DBH	8	12		30	1	22	5	16
DBA	8	12		30	1	22	4	22
DBR	8	12		40	2	30	7	33
DBB	6	12		50	2	40	7	40
DBC	4	8		80	3	60	11	61
DBG	3	8		100	3	75	16	80
DBP	2	6		125	4	100	18	110
DBS	1/O	6		150	4	120	23	128

(*) Indicates multiple units in electrical parallel. Data represents requirement for each unit.

(+) Indicates AUXILIARY CAPACITOR BANK with Roto-Phase.

INPUT CHART – WIRE SIZE BASED ON 50’ DISTANCE USING COPPER WIRE

MODEL	460V RP POWER INPUT WIRE SIZE L1-L2-L3	460V ROTARY LEADS WIRE SIZE 1,7,2,8,3,9 (6 LEADS)	460V ROTARY LEADS 4,5,6 GROUP (3 LEADS)	460V FUSE SIZE	460V RP MAG. STARTER SIZE	460V RP OL PROT.	460V AVE. NO LOAD AMPERAGE	460V AVE. CAPACITOR AMPERAGE
MF	12	12	0	5	0	3	1.25	1.95
MG	12	12	0	5	0	3.75	1.25	4.25
M	12	12	0	8	0	5.5	1.5	6.5
A	12	12	0	15	0	11	2	11
R	10	10	0	20	1	15	3.5	16.5
B	10	10	0	25	1	20	3.5	20
C	8	8	18	40	2	30	5.5	30.5
G	6	8	18	50	2	37.5	8	40
P	6	6	18	60	3	50	9	55
PKT	6	6	18	60	3	50	9	55
PKO	6	6	18	60	3	50	9	55
K2G**+	6*	8*	18*	50*	2*	37.5*	8*	40*
Y2P**+	6*	6*	18*	60*	3*	50*	9*	55*
L2S**+	4*	6*	18*	75*	3*	60*	11.5*	64*
HD2	12	12	0	8	0	5.5	1.5	6.5
HD3	12	12	0	15	0	11	2	11
HD5	10	10	0	20	1	15	3.5	16.5
HD7	10	10	0	25	1	20	3.5	20
HD10	8	8	18	40	2	30	5.5	30.5
HD15	6	8	18	50	2	37.5	8	40
HD20	6	6	18	60	3	50	9	55
HD25	4	6	18	75	3	60	11.5	64
HD30+	4	6	18	75	3	60	11.5	64
HD40+	4	6	18	75	3	60	11.5	64
HD2P**	6*	6*	18*	60*	3*	50*	9*	55*
HD3P***	6*	6*	18*	60*	3*	50*	9*	55*
HD4P****	6*	6*	18*	60*	3*	50*	9*	55*
CNC1	12	12	0	8	0	5.5	2.5	3.5
CNC2	12	12	0	15	0	11	3	5.5
CNC3	10	10	0	20	0	15	4	12
CNC5	10	10	0	25	1	20	5	13
CNC7	8	8	18	40	2	30	6	14
CNC10	6	8	18	50	2	37.5	8	30
CNC15	4	6	18	75	3	60	11	43
CNC20**	6*	8*	18*	50*	2*	37.5*	8*	30*
CNC25**	6*	6*	18*	60*	3*	50*	10*	39*
CNC30**	4*	6*	18*	75*	3*	60*	11.5*	43*
SP2	12	12	0	10	0	7.5	2.5	8
SP3	12	12	0	15	0	11	2	11
SP5	10	10	0	20	0	15	3.5	16.5
SP7	10	10	0	25	1	20	3.5	20
SP10	8	8	18	40	2	30	5.5	30.5
SP15	6	6	18	60	3	50	9	55
SP20	4	6	18	75	3	60	11.5	64
SP25**	6*	8*	18*	50*	2*	37.5*	8*	40*

(*) Indicates multiple units in electrical parallel. Data represents requirement for each unit.

(+) Indicates AUXILIARY CAPACITOR BANK with Roto-Phase.

INPUT CHART – WIRE SIZE BASED ON 50’ DISTANCE USING COPPER WIRE

MODEL	460V RP POWER INPUT WIRE SIZE L1-L2-L3	460V ROTARY LEADS WIRE SIZE 1,7,2,8,3,9 (6 LEADS)	460V ROTARY LEADS 4,5,6 GROUP (3 LEADS)	460V FUZE SIZE	460V RP MAG. STARTER SIZE	460V RP OL PROT.	460V AVE. NO LOAD AMPERAGE	460V AVE. CAPACITOR AMPERAGE
SP30**	6*	6*	18*	60*	3*	50*	9*	55*
SP40**	4*	6*	18*	75*	3*	60*	11.5*	64*
SP50***	6*	6*	18*	60*	3*	50*	9*	55*
SP60***	4*	6*	18*	75*	3*	60*	11.5*	64*
CHDELV5	10	10	0	20	1	15	3.5	16.5
CHDELV7	10	10	0	25	1	20	3.5	20
CHDELV10	8	8	18	40	2	30	5.5	30.5
CHDELV15	6	8	18	50	2	37.5	8	40
CHDELV20	6	6	18	60	3	50	9	55
CHDELV25	4	6	18	75	3	60	11.5	64
CHDELV30+	4	6	18	75	3	60	11.5	64
CHDELV40+	4	6	18	75	3	60	11.5	64
TM5	10	10	0	20	0	15	3.5	16.5
TM7	10	10	0	25	1	20	3.5	20
TM10	8	8	18	40	2	30	5.5	30.5
TM15	6	6	18	60	3	50	9	55
TM20	4	6	18	75	3	60	11.5	64
HDH1	12	12	0	8	0	5.5	1.5	6.5
HDH2	12	12	0	15	0	11	2	11
HDH3	10	10	0	20	1	15	3.5	16.5
HDH5	10	10	0	25	1	20	3.5	20
HDH7	8	8	18	40	2	30	5.5	30.5
HDH10	6	8	18	50	2	37.5	8	40
HDH15	4	6	18	75	3	60	11.5	64
CMG	12	12	0	5	0	3.75	1.25	4.25
CM	12	12	0	8	0	5.5	1.5	6.5
CA	12	12	0	15	0	11	2	11
CR	10	10	0	20	0	15	3.5	16.5
CB	10	10	0	25	1	20	3.5	20
CC	8	8	18	40	2	30	5.5	30.5
CG	6	8	18	50	2	37.5	8	40
CP	6	6	18	60	3	50	9	55
CS	4	6	18	75	3	60	11.5	64
DBM	12	12	0	8	0	5.5	1.5	6.5
DBH	12	12	0	10	0	7.5	2.5	8
DBA	12	12	0	15	0	11	2	11
DBR	10	10	0	20	0	15	3.5	16.5
DBB	10	10	0	25	1	20	3.5	20
DBC	8	8	18	40	2	30	5.5	30.5
DBG	6	8	18	50	2	37.5	8	40
DBP	6	6	18	60	3	50	9	55
DBS	4	6	18	75	3	60	11.5	64

(*) Indicates multiple units in electrical parallel. Data represents requirement for each unit.

(+) Indicates AUXILIARY CAPACITOR BANK with Roto-Phase.

INPUT CHART – WIRE SIZE BASED ON 50’ DISTANCE USING COPPER WIRE

MODEL	460V RP POWER INPUT WIRE SIZE L1-L2-L3	460V ROTARY LEADS WIRE SIZE 1,7,2,8,3,9 (6 LEADS)	460V ROTARY LEADS 4,5,6 GROUP (3 LEADS)	460V FUSE SIZE	460V RP MAG. STARTER SIZE	460V RP OL PROT.	460V AVE. NO LOAD AMPERAGE	460V AVE. CAPACITOR AMPERAGE
PV0	12	12	0	8	0	5.5	1.5	6.5
PV1	12	12	0	15	0	11	2	11
PV2	10	10	0	20	1	15	3.5	16.5
PV3	10	10	0	25	1	20	3.5	20
PV4	8	8	18	40	2	30	5.5	30.5
PV5	6	8	18	50	2	37.5	8	40
PV6	6	6	18	60	3	50	9	55
PV7	4	6	18	75	3	60	11.5	64
PV8+	4	6	18	75	3	60	11.5	64
PV9+	4	6	18	75	3	60	11.5	64

(*) Indicates multiple units in electrical parallel. Data represents requirement for each unit.

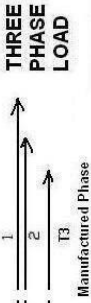
(+) Indicates AUXILIARY CAPACITOR BANK with Roto-Phase.

SAMPLE DIAGRAM

FOR THE ROTO-PHASE AND THE
3 PHASE EQUIPMENT LOAD

ROTO-PHASE MUST BE FED BY A
CIRCUIT BREAKER OR FUSED
DISCONNECT SWITCH AND A
MAGNETIC STARTER WITH
OVERLOAD PROTECTION
(Ref. NEC Article 455.7 & 455.8)

SINGLE PHASE MAIN



ROTO-PHASE
DISCONNECT SWITCH

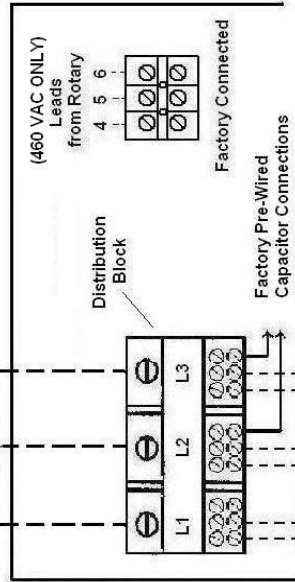
Furnished by End-User
unless ordered as a part of
the converter package

ROTO-PHASE
MAGNETIC STARTER

Furnished by End-User
unless ordered as a part of
the converter package

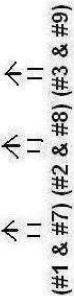
SAME CONDUIT

ROTO-PHASE CONVERTER
CONTROL PANEL

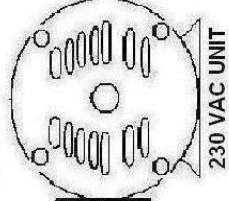


Load Side of
Distribution Block

Wire Motor Leads to
Load Side of Distribution Block
in Roto-Phase Control Panel



Factory
Connected



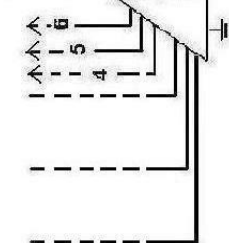
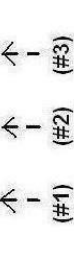
230 VAC UNIT

460 VAC UNITS ONLY

ON LARGER HP MODELS
A connection will need to be made from the
4, 5, 6 motor leads on the Roto-Phase converter
motor to the line side of the white terminal block
in the Roto-Phase control panel.

ON SMALLER UNITS
The 4, 5, 6 motors leads grouped and terminated
in the Roto-Phase converter motor terminal box.

Wire Motor Leads to
Load Side of Distribution Block
in Roto-Phase Control Panel



460 VAC UNIT

1. "NOTICE" DO NOT USE THE T3 MANUFACTURED PHASE FOR POWERING ANY 1 PH LOADS! (EXAMPLE: CONTROL TRANSFORMERS, CONTROL LIGHTS, SWITCHES, ETC.)
2. ALWAYS USE THE CORRECT SIZE PROTECTION ON ALL LOADS
3. ALWAYS TURN ON THE ROTO-PHASE CONVERTER BEFORE TRYING TO START ANY 3 PH LOADS
4. FOLLOW ALL LOCAL, STATE, AND NATIONAL ELECTRIC CODES WHEN INSTALLING EQUIPMENT

REVISIONS:	ARCO Electric Products Shelbyville, IN 46176
Drawn By:	T. Drake
Date:	5/7/2010
Description:	ROTO-PHASE 2 PC UNIT
Drawing #:	2PC WIRING DIAGRAM
SCALE:	NONE

“HELPFUL HINTS”

NOTE: All ROTO-PHASE models should be up to full speed within 3 seconds

If nothing starts:

- A. Check single-phase voltage supply source with voltmeter.
- B. Check protection-reset breaker or replace fuse.
- C. Check for loose connections.

If ROTO-PHASE will not start; or comes up to speed slowly:

- A. Check single-phase power supply lines (L1 & L2) for misconnection. (L1 & L2 must be connected to ROTO-PHASE terminal block on the line side of T1 & T2).
- B. Capacitors may be disconnected from the T2 & T3 circuit or defective.
- C. Check for the correct supply voltage; Example: 460 VAC rated converter connected to a 230 VAC single-phase power supply.
- D. Check for locked bearings.

If fuses blow or circuit breaker trips on ROTO-PHASE start-up:

- A. Check to be sure fuses are “time-lag” (dual element) and the correct size.
- B. Check to be sure the circuit breakers are designed to handle high starting currents (35,000 or 65,000 AIC rated).

If ROTO-PHASE is “noisy”:

- A. Check for loose panel or panel lid.
- B. Be sure the unit is mounted on a level floor or surface.
- C. Sometimes grease in the bearings can make intermittent noise which sounds like a bearing; but really isn't and it usually smoothes out after a short running period of 10 to 15 minutes.

If three-phase motor does not come up to full speed:

- A. Excessive single-phase voltage drop from the utility service lines on start-up of the motor may be present – check single-phase voltage drop at the main service during start-up of the three-phase motor. The voltage on the single-phase power should not drop below 220 VAC during start-up of the ROTO-PHASE or the three-phase motor. A voltage loss could be affected by undersized wiring to the ROTO-PHASE or the three-phase motor, single-phase service size is inadequate, or the utility service transformer is too small (approximately 1 KVA per operated HP is required).
- B. Check the three-phase motor lead connections – motor could be dual voltage rated 230/460 VAC and misconnected at the wrong voltage for operation.
- C. Starting torque required is too great:
 - 1. Mechanical problems with the three-phase motor.
 - 2. In case of compressors, the air-unloading device on the compressor cylinders may be inoperative, starting against head pressure.

-RECORD NO-LOAD ROTO-PHASE ELECTRICAL READINGS AT DATE OF INSTALLATION-

DATE OF INSTALLATION	_____	
MODEL NUMBER	_____	
SERIAL NUMBER	_____	
PHASE 1 TO GROUND	_____	VAC
PHASE 2 TO GROUND	_____	VAC
PHASE 3 TO GROUND	_____	VAC
PHASE 1 TO PHASE 2	_____	VAC
PHASE 1 TO PHASE 3	_____	VAC
PHASE 2 TO PHASE 3	_____	VAC
PHASE 1 AMPERAGE	_____	
PHASE 2 AMPERAGE	_____	
CAPACITOR AMPERAGE	_____	