

**AVTRON MODEL LPH100
AC LOAD BANK
Part Number LPH100D34963**

100 kW @ 480V, 3-Phase, 60 Hz
93.75 kW @ 240V, 3-Phase, 60 Hz

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Cleveland, Ohio

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PROPRIETARY NOTE

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WARRANTY

The last page of this document contains an express limited warranty. The provisions of this warranty cover any and all rights extended to holders of Avtron equipment.

AVTRON MANUFACTURING, INC.
Cleveland, Ohio

AVTRON MODEL LPH100
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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
I SAFETY CONSIDERATIONS	1-1
II DESCRIPTION	2-1
III INSTALLATION	3-1
IV OPERATION	4-1
V MAINTENANCE.....	5-1
VI REPLACEMENT PARTS LIST.....	6-1

APPENDIX - Avtron Load Bank Troubleshooting Guide

DRAWINGS

SB3192	Outline Drawing, Load Bank
D34965	Schematic
B28571	Cable Set - 20 Ft. (Option 1)
LPH100D34963	Load Bank, Portable, Indoor

VENDOR DATA

Cooper Crouse-Hinds Molded Products	Cam-lok7 Assembly Instructions, Series E1016 & E1018 SAW254, 9/26/01
Multitek	MultiDin M801-MD*, M802-MD* Operating Manual, Revision 4, 10/9/2003

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**SECTION I
SAFETY CONSIDERATIONS**

Throughout this manual, you will find **WARNING** and **CAUTION** statements. Personal injury or death may occur to an operator using or repairing the equipment if a **WARNING** statement is ignored. Damage to the equipment and potentially hazardous conditions for personnel may occur if a **CAUTION** statement is ignored.

Each Avtron unit is safety checked for opens and shorts, and the insulation is high potential tested to ensure safe operation. All fuses, safety interlocks, and related safety equipment have been proven reliable as part of the testing procedure of each unit.

As part of your safety program, an initial inspection after receiving the unit(s) and periodic preventive maintenance and safety inspections should be conducted to ensure the reliability and safety built into your Avtron equipment.

The Model LPH100 Load Bank is an industrial test unit designed to be used indoors. However, because the function of the Load Bank is to dissipate electrical energy, there are inherent dangers to the operator and to the equipment. These dangers shall be outlined in this section.

Electrical energy is transformed into heat by the resistor elements. The heat may be removed from the Load Bank by airflow through the resistor elements. If there are any restrictions or stoppage of airflow, the Load Bank may overheat and may even start a fire. The following recommendations are made:

1. Read the manual before operating the Load Bank.
2. Run an approved ground wire from the Load Bank ground lug located on the customer connection panel to the frame of the power source. Run an approved ground wire from the power source frame to a good earth ground. Size ground wire in accordance with National Electrical Code and any local codes.
3. Do not bypass the temperature sensing switches to prevent nuisance tripping. The switches will drop out the load if insufficient cooling air is reaching the elements.
4. Replace any burned out bulbs on the control panel. Each lamp is an indication that a system is active or has failed and is important to the operation of the unit and safety of the operator.

13. It is the responsibility of the customer to take diligent care in installing the Load Bank. The National Electrical Code (NEC), sound local electrical and safety codes, and the Occupational Safety and Health Act (OSHA) should be followed when installing the equipment to reduce hazards to persons and property.
14. Read and heed all **WARNING** and **CAUTION** statements in the manual.

SECTION II

DESCRIPTION

The Avtron Model LPH100 Load Bank is designed for electrically loading and testing power sources. The Load Bank is designed for production line and job site use.

The loading capability of the Load Bank depends on voltage. At 480 volts, 3-phase, 60 Hz, the total load is 100 kW with fixed load steps of 5, 10, 10, 25, and 50 kW. At 240 volts, 3-phase, 60 Hz, the total loading capability is 93.75 kW with fixed load steps of 3.75, 7.5, 7.5, 25, and 50 kW. Using the toggle switches on the control panel, any combination of the available load steps may be selected to achieve a desired load.

120V, single phase, 60 Hz, 5 amp power source is required for the fan and control circuits. This power is derived from the control power receptacle located on the side of the unit.

CONTROL PANEL

The loads described above are controlled from a single control panel. The control panel is integrally mounted on the side of the Load Bank. The arrangement of the control panel is:

1. POWER ON/OFF switch - Applies power to the Load Bank and starts the blowers. The CONTROL POWER indicator lights when power is applied.
2. OVER TEMP indicator - Indicates an air failure condition OR insufficient cooling airflow.
3. MASTER LOAD ON/OFF switch - Allows instantaneous connection and disconnection of all switched ON load steps.
4. KW LOAD STEPS switches - Connect and disconnect load steps. Values are shown above each switch.
5. Digital Meter - Monitors volts, amps, kW, and frequency applied to Load Bank.
6. VOLTAGE SELECT switch - Configures load resistor circuit for 240V or 480V application.

SECTION III

INSTALLATION

BEFORE INSTALLATION

Inspect the Load Bank for obvious damage such as broken wires, broken or dented panels, cracked ceramic insulators, or any other component breakage that may have occurred in shipment.

LOCATION

The LPH100 is a portable Load Bank, and should be used in a cool, well-ventilated area. Cool air must be continually available and the hot exhaust air must be dissipated, not recirculated through the unit. Install the Load Bank so that the inlet and exhaust panels have unrestricted airflow clearance.

CAUTION

Installation must prevent hot exhaust air from recirculating into the air intake. Inlet air temperatures exceeding 120°F may cause damage to the Load Bank. After installation, test the unit at full load and verify that the inlet air temperature does not exceed 120°F.

AIRFLOW CONSIDERATIONS

Even with an ample supply of cooling air, the Load Bank may overheat if it is not properly installed. There are two types of airflow problems that should be avoided:

1. Recirculating Airflow - If the hot, exhausted air is permitted to recirculate through the Load Bank, it will reach such a high temperature and low density that it will no longer cool the resistance elements. A Load Bank should not be installed so close to any surface as to reflect the exhausted air back to the air intake. When two or more Load Banks are being used, care must be taken in positioning the Load Banks so that the exhausted air of one unit does not feed the air intake of another.
2. Restriction of Cooling Air - Any obstruction located within three (3) feet of the inlet and eight (8) feet of the exhaust screens will restrict the Load Bank's airflow. Airflow is also

CAUTION

Make sure the top cover panel is securely fastened to the frame.

Never exceed the Load Bank rated voltage as this will cause the Load Bank to overheat.

Lower voltages and different frequencies may be applied to the load circuit of the Load Bank. Frequency change causes no derating of the load; however, the applied kW with a lower voltage is computed by using the following formula:

$$kW_{Applied} = kW_{Rated} \times \frac{(Voltage\ Applied)^2}{(Voltage\ Rated)^2}$$

SECTION IV

OPERATION

PURPOSE AND USE OF CONTROLS

1. POWER ON/OFF switch - Turns on the cooling fans and powers remainder of control circuit. CONTROL POWER light shows ON.
2. OVER TEMP indicator - This lamp should momentarily light when power switch is turned on. This shows the air safety circuit is working. The purpose of the OVER TEMP lamp is to warn the operator to remove the load from the Load Bank in case of improper cooling of the load elements.
3. MASTER LOAD ON/OFF switch - The MASTER LOAD switch connects power to all load steps, thus allowing all load steps which are actuated to load at the same time. It is also a master load disconnect.
4. KW LOAD STEPS switches - The load in kW is marked above each actuating switch. A load step may be turned ON or OFF before or during a test but will load the unit only when the MASTER LOAD switch is ON.
5. Digital Meter - Monitors load characteristics kW, V, A, Hz.
6. VOLTAGE SELECT switch - Configures load resistor circuit for 240V or 480V application.

LOAD BANK OPERATION

All tests start with control panel switches in the OFF position.

CAUTION

Before energizing any load, verify that load voltage does not exceed rated voltage of load facility.

The unit is energized by turning the POWER switch ON. This also energizes the cooling fans. Upon energizing the unit, the red OVER TEMP lamp will light momentarily. If, at any time,

11. Monitor load applied with digital meter (V, A, Hz, kW). Press and release the arrow up and arrow down buttons to change function being monitored.
12. After running tests, remove the load by turning off the MASTER LOAD switch.

After running a load test, residual heat may be removed from the Load Bank by allowing the blower to operate for a few minutes after load is removed. This procedure is not required for maintaining Load Bank integrity, but it may guard operating personnel from possible burn injuries.

W A R N I N G

DO NOT touch the exhaust screen during operation. The screen will become hot from the exhausted heat and may cause a serious burn. Refer to the SAFETY CONSIDERATIONS section of this manual.

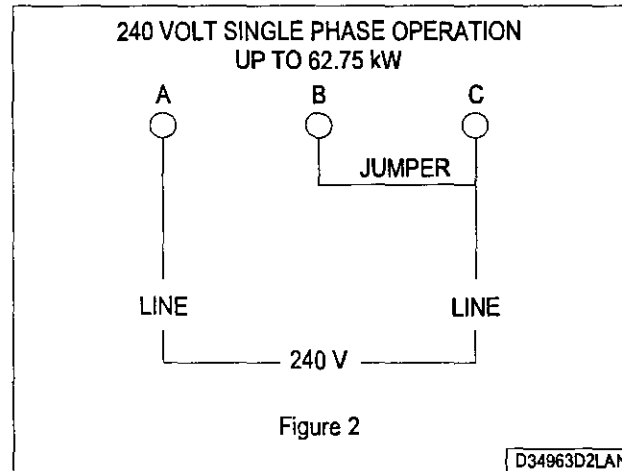
DO NOT allow objects to enter or block screens.

13. Place the POWER switch to the OFF position.
14. Shut down all power sources to the Load Bank.
15. Disconnect the power source cables and the ground connection from the Load Bank.
16. Disconnect the 120V source to the Load Bank.

- B. For 240 volt single phase operation up to 62.75 kW, connect to Load Bank as shown below.

NOTE

Place **VOLTAGE SELECT** switch in the 240V mode.



Load Step Rating:

<u>3-Phase (240V)</u>	<u>1-Phase (240V)</u>
3.75 kW	2.5 kW
7.5 kW	5.0 kW
7.5 kW	5.0 kW
25 kW	16.75 kW
50 kW	33.5 kW

Lower voltages and different frequencies may be applied to the load circuit of the Load Bank. Frequency change causes no derating of the load; however, the applied kW with a lower voltage is computed by using the following formula:

$$kW_{Applied} = kW_{Rated} \times \frac{(Voltage Applied)^2}{(Voltage Rated)^2}$$



ESD PRECAUTIONARY GUIDELINES

C A U T I O N

Certain circuit card assemblies and their components, typically integrated circuits, may be damaged by seemingly undetectable electrostatic discharge (ESD). Care must be exercised during handling/repair of these items. Use electrostatic discharge precautionary procedures.

The following guidelines are not necessarily all inclusive but rather serve as reminders for good shop practices for the handling/repair of ESD sensitive circuit card assemblies and devices.

- Store ESD sensitive items in their original containers. These items are often marked with the symbol shown at the top of this page.
- Put on a grounded wrist strap before handling any ESD sensitive item.
- Clear work area of Styrofoam®, plastic, and vinyl items such as coffee cups.
- Handle ESD items by the body, never the open edge connectors.
- Never slide ESD sensitive items over any surface.
- Transport ESD sensitive items in a static shielding container to a static-free work station.
- If a static-free work station is not available, ground the transport container before removing or inserting an ESD item.
- Electric tools used during repair should be grounded. For example, use only anti-static type solder suckers and grounded tip soldering irons. Discharge non-electric tools before use.
- Pack ESD items in static shielding containers before shipping them to Avtron for repair.

* Styrofoam® is a registered trademark of Dow Chemical.

SECTION V

MAINTENANCE

To provide long equipment life and to reduce the chance of electric shock, fires, and personal injury, good maintenance procedures must be used. Before servicing, review the SAFETY CONSIDERATIONS section of this manual.

The following examples of scheduled maintenance procedures are not purported to be all-inclusive, but must be accomplished to maintain the equipment in a good, safe condition. All maintenance work must be done only by qualified personnel.

WARNING

Personal injury from electrical shock or from the moving fan blade may result if ALL sources of power are not disconnected. Refer to the SAFETY CONSIDERATIONS section of this manual.

DAILY

1. Remove any restrictions to airflow through the Load Bank.
2. Check the screens to make sure that no objects have blocked or entered the openings.
3. Verify that the airflow is in the proper direction.
4. Assure that there is no recirculation of the exhaust air through the Load Bank.

SECTION VI

REPLACEMENT PARTS LIST

INTRODUCTION

The parts list in this section contains the description, quantity required, and Avtron part numbers for each listed part. The list also includes, where appropriate, the manufacturer's name and part number, as well as schematic reference designators to facilitate parts identification.

NOTE

Every effort has been made to ensure the accuracy of this information. However, changes are sometimes necessary and revisions to the parts list may be made at any time without notice.

REFERENCE DESIGNATORS

Service personnel may use this parts list along with the Avtron system schematics to identify and order replaceable parts. The reference designators were carefully selected and matched to those on the schematic diagrams and equipment to simplify the troubleshooting and repair process.

NOTE

When ordering replacement parts, be certain to state the part's description and Avtron part number, and the schematic reference designator number if one is available. Also include the model and serial number of the equipment.

APPENDIX

LOAD BANK TROUBLESHOOTING GUIDE

NOTE

Servicing should always be done only by trained, qualified service technicians.

W A R N I N G

Be sure that all sources of power to the Load Bank are disconnected before servicing.

PROBLEM	POSSIBLE CAUSES/REMEDIES
1. Load Bank main power fails to come on.	a. Main switch or circuit breaker is not closed. b. Unit is not connected according to the Schematic/Interconnection Diagram. c. Terminals were damaged during shipment. d. Fuses are blown. (Check and replace as required.)* e. Fuse is blown in Load Bank control circuit. (Check and replace as required.)* f. Dirty or loose connection at Main Power Switch.
2. Blower motor does not operate.	a. Main switch or circuit breaker is not closed. b. Power is not connected to Load Bank blower circuit. c. External power source is inadequate. d. Motor fuses are blown. (Check and replace as required.)*

* When checking fuses for continuity, be sure to remove all fuses from clips (in fuseblock or Disconnect Switch). Test each fuse individually, out of circuit. (If tested in circuit, there is the possibility of feedback which causes false readings. A blown fuse may still check out OK.)

PROBLEM	POSSIBLE CAUSES/REMEDIES
6. Contactor "chattering" exists.	a. Contacts and/or core are dirty or corroded. b. Connections to contactor coil are loose. c. Control circuit line voltage is too low.
7. Load Bank or load step does not give rated load.	a. Applied load voltage is either derated or inadequate. b. Contactor does not close properly. c. Load step resistor element is open. d. One of the individual load branch circuit fuses is blown (if so equipped).
8. Disconnect Switch fuses are blown.	a. Fuses are undersized.* b. A short circuit exists in the blower or control circuit.*

- * When checking fuses for continuity, be sure to remove all fuses from clips (in fuseblock or Disconnect Switch). Test each fuse individually, out of circuit. (If tested in circuit, there is the possibility of feedback which causes false readings. A blown fuse may still check out OK.)

P/N 315001

(12)

P.S. 27054 m21

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ASSEMBLY INSTRUCTIONS
Series E1016 & E1018

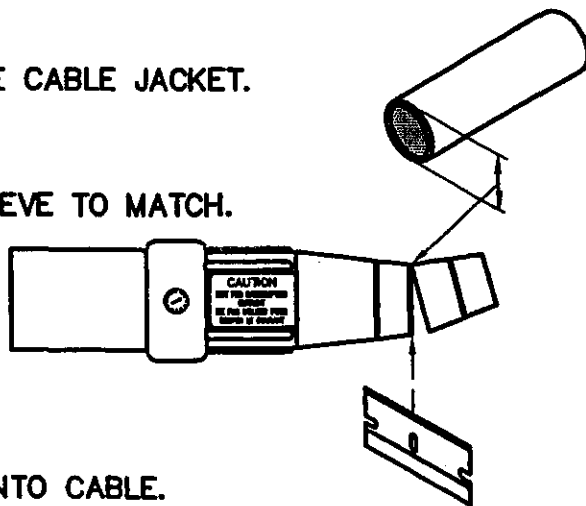
EB 9

Page 1

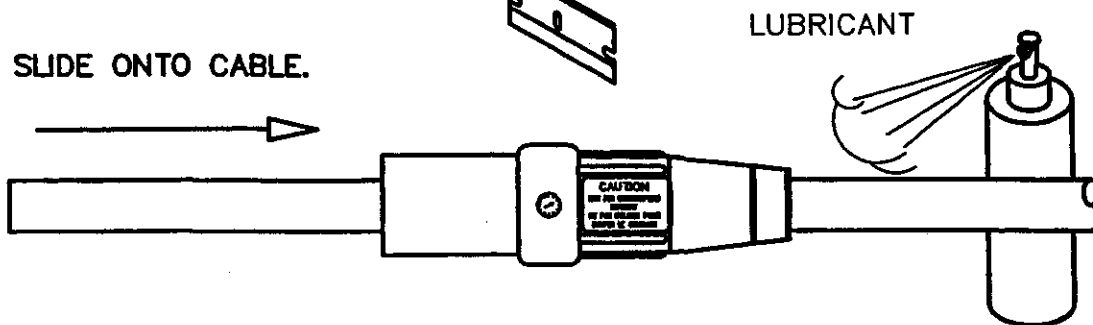
**NOTE: USE COPPER (CU)
CONDUCTORS ONLY.**

1. MEASURE CABLE JACKET.

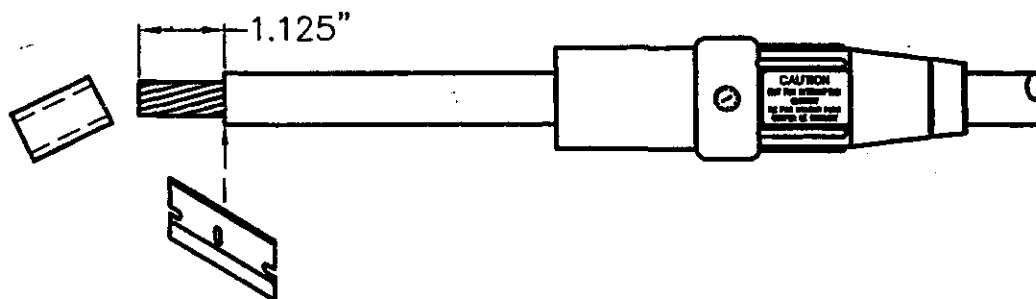
2. CUT SLEEVE TO MATCH.



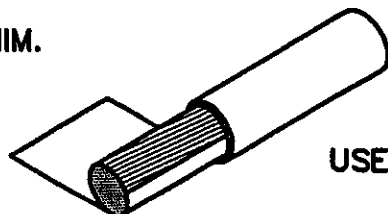
3. SLIDE ONTO CABLE.



4. REMOVE JACKET.



5. WRAP COPPER SHIM.



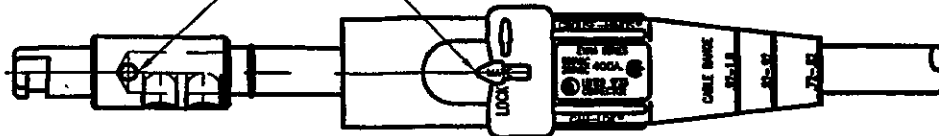
USE TWO FOR SMALLER CABLES.

cam-lok® ASSEMBLY INSTRUCTIONS Series E1016 & E1018

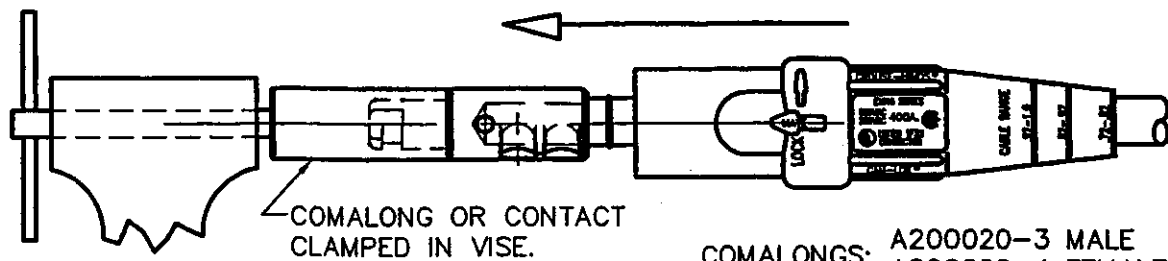
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Page 3

10. LINE UP PIN WITH ARROW.

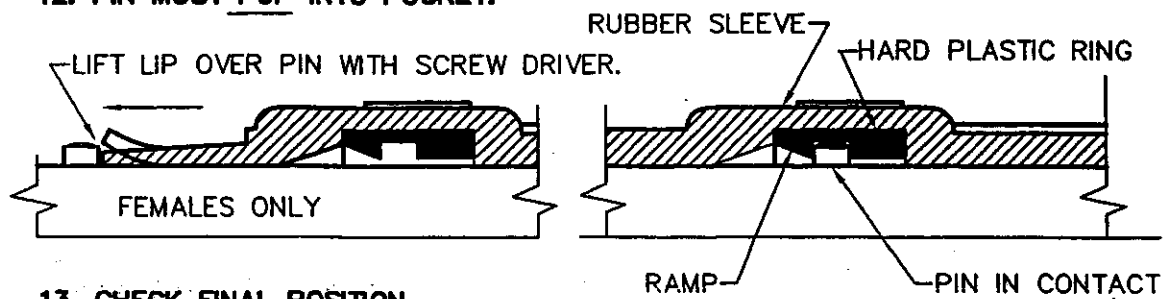


11. PUSH SLEEVE OVER CONTACT.

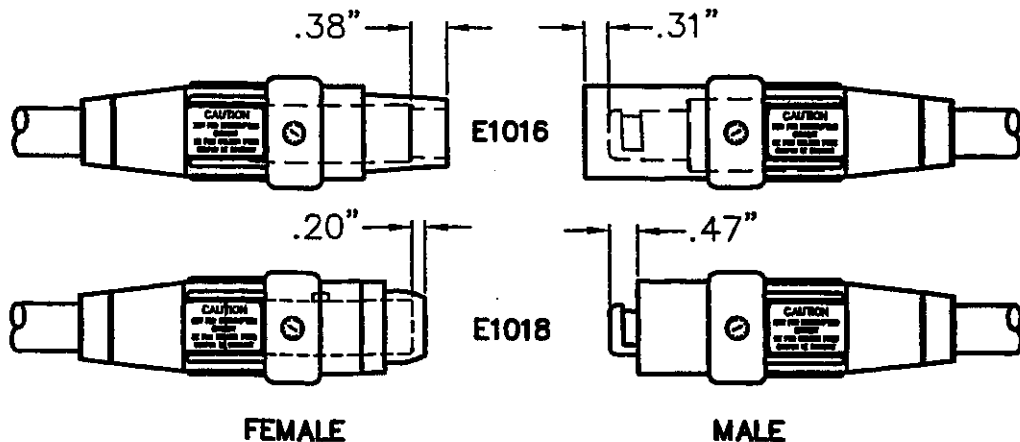


COMALONGS: A200020-3 MALE
A200020-4 FEMALE

12. PIN MUST POP INTO POCKET.



13. CHECK FINAL POSITION.



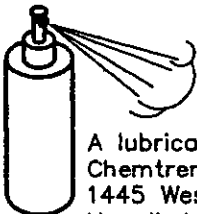
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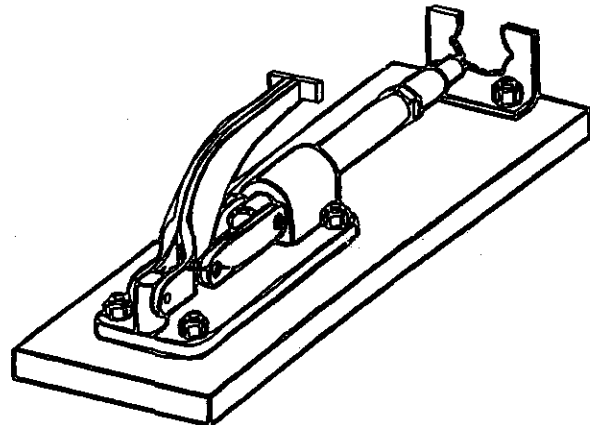
Page 5

CONTACT AND CONDUCTOR SIZE INFORMATION						
Series	Style	Conductor Size	Continuous Amp Rating	Conductor Entrance Diameter	Contact	
					Male	Female
E1016	CRIMP	#2-#1	170	.402	A200036-18	A200037-23
E1016	CRIMP	1/0-2/0	235	.495	A200036-19	A200037-24
E1016	CRIMP	1/0-2/0 HD	235	.495	A200038-11B	A200035-17B
E1016	CRIMP	3/0-4/0	315	.620	A200038-6B	A200035-14B
E1016	SINGLE SET SCREW	#2-2/0	235	.578	A200065-1	A200067-3
E1016	SINGLE SET SCREW	3/0-4/0	315	.656	A200064-1	A200090-1
E1016	DOUBLE SET SCREW	#2-2/0	235	.578	A200630-1	A200640-3
E1016	DOUBLE SET SCREW	3/0-4/0	400--USE 105°C CABLE	.656	A200639-1	A200641-1
E1018	CRIMP	#2-#1	170	.402	A200036-2	A200037-6
E1018	CRIMP	1/0-2/0	235	.495	A200036-3	A200037-7
E1018	CRIMP	3/0-4/0	400	.620	A200038-2	A200035-4

For high volume or frequent installation, use the Lektralink assembly tool as shown below. The part number is A400001. Complete instructions for use are included with tool.



A lubricant is available from:
 Chemtrend, Inc.
 1445 West McPherson Park Drive
 Howell, Michigan 48844-0860
 Their part number is CT-39F.



COOPER Crouse-Hinds

Crouse-Hinds Molded Products

UNITED STATES:

4756 Washington Street • LaGrange, North Carolina 28561
 Phone (252) 566-3014 • FSCM-90129 • FAX (252) 566-9337

CANADA:

Crouse-Hinds Canada Ltd.
 5025 McLaughlin Road • Mississauga, Ontario L5R 1B8
 Phone (905) 507-4187 • FAX (905) 501-4078