Pensar

SERIES
L1000

INTERLOCK MODULE

OWNER'S / INSTALLATION MANUAL

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Owner's Manual

ORIGINAL PURCHASER

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

SALES, INSTALLATION, AND EQUIPMENT

SoldBy: _____ Organization: _____

Phone#: _____

InstalledBy: _____ Organization: _____

Phone#: _____

DateInstalled: _____ SerialNumber: _____

ModelNumber: _____

INSTALLATION NOTES

MANUFACTURER

ElectroSem, LLC
2600 South Hardy Drive
Tempe, Arizona 85282
Phone#: (602) 955-6566

INTRODUCTION

Congratulations on your purchase of a Pensar energy management system. The name Pensar represents quality and superior technical achievements. Please take the time to carefully read this manual before attempting to make any changes in operation. Keep it handy for future reference.

The Pensar L1000 is an appliance interlock-type electrical demand controller. When the L1000 senses that your monitored device turns on, it automatically "sheds" (turns off) a selected electrical device. When the monitored device turns off, the controlled device is restored approximately 70 seconds later. There are three different models of the series L1000 Appliance Interlocks (L1000, L1010, and L1100). To simplify this manual, they will all be referred to as an L1000.

DEMAND is the amount of power needed to operate all the appliances you have on at one time. PEAK DEMAND is the highest demand for electricity that you require during a billing month. High peak demand is a concern to utilities because they must always have enough energy available to service all of their customers at any given time. The higher the total peak demand, the more costly it is to the utility, and ultimately to you the consumer. In order to encourage customers to lower their peak demand, many utilities have created demand rates which reward you with lower energy bills.

With the help of a Pensar energy management system, thousands of utility customers have been able to reduce their peak demand and take full advantage of the savings potential of these demand rates. Your wise investment in an L1000 makes it possible for you to enjoy these savings, starting today and for many years to come.

The **indicator lamp** (if present) indicates at a glance if the controlled device has been shed (turned off). When the indicator lamp is on, the controlled device has been turned off. If the lamp is not illuminated, the device has power available. However, it may not be operating due to its own controls.

Hardware Installation Manual

PREFACE

Please read all instructions carefully and completely before attempting installation. Certain instructions are accompanied by a **WARNING** or a **CAUTION** note. **Failure to heed these notes may result in equipment failure or damage and exclusion of claims under the terms and conditions of the warranty.**

These instructions are intended only as GENERAL GUIDELINES to be used in conjunction with local and national electrical and building codes. This unit should be installed and serviced by qualified persons only.

A significant amount of time, money, and frustration may be saved by performing the following steps.

1) Check all equipment and be sure that it works before installing the L1000 Interlock Module.

2) If you do not know the control capabilities of the L1000 read through the L1000 Hardware Installation Manual before going to the job site. Further, if this is your first installation you may need to study the entire manual and call your local Pensar dealer.

3) Determine location and method of control for each load to be connected.

4) Inspect optional areas for mounting current transformers, L1000 interlock module, and any additional fixtures. Plan wire and conduit runs for each possibility.

5) Consult with the customer. Ensure he is aware of his options and your professional recommendations.

MOUNTING L1000 INTERLOCK MODULE

1) The L1000 must be mounted in a suitable enclosure. Locate a suitable position adjacent to the main breaker enclosure or the controlled device. Ensure the lead length (4 to 6 feet) of the current transformers is sufficient. The L1100 is suitable for indoor/outdoor applications no additional enclosure is required.

2) Remove required knockouts. Cut any holes required for entry. **CAUTION:** Remove all metal particles.

3) Using the L1000's available mounting holes, securely mount the L1000 interlock module with suitable hardware.

CONNECTION OF CURRENT TRANSFORMER

WARNING: RISK OF INJURY. Current transformer should never be installed over energized conductors. **WARNING:** RISK OF ELECTRIC SHOCK. Energized current transformer produces high voltages when not properly terminated. Exercise caution when handling unterminated current transformer leads. For temporary termination connect the two current transformer leads together.

The current transformer supplied is toroid type for use over conductors of 200 amperes or less. Wires carrying the current to be monitored are passed through the hole in the center of the transformer. The current amps of this device is one two-hundredth of the total current passing through its center.

Place the monitored device's leg through the hole in the current transformer. Ensure the current transformer is protected from sharp protrusions and the insulation is not deformed when connections are tightened. ***CAUTION:High voltage on the current transformer inputs will cause permanent damage to the L1000 which may not be covered in the product warranty.***

Loop the monitored leg through the current transformer to ensure 12 amps is passing through the center. For instance if the monitored leg draws 3 amps, loop the conductor at least four times. If the monitored leg draws 12 amps or more, simply pass it through once.

CONNECTION OF HIGH VOLTAGE (CLASS 1) CIRCUITS

WARNING: RISK OF ELECTRIC SHOCK. Disconnect power to all circuits which are being serviced.

CAUTION: Ensure the rating of the circuit under control does not exceed the rating of the control relay (30 amperes see specifications.) If any specifications are exceeded, use the L1000 relay to drive a slave relay/contactor of the proper rating.

1) Connect the neutral to the white wire of the L1000.

2) Connect the current transformer (part number 903001) to the L1000 matching violet/white to the violet/white and the violet/green to the violet.

3) Disconnect one leg of the device to be controlled from the breaker. Connect this conductor to one of the red 12 AWG wire of the L1000.

4) Connect the other red 12 AWG wire of the L1000 in the breaker of the controlled device.

5) Connect the black 18 AWG wire of the L1000 to a circuit breaker. It is recommended that a separate circuit breaker be installed in the main circuit breaker panel to supply power to the L1000. The circuit breaker must be rated not larger than 20 amperes.

Water Heater Connection

Water heaters are generally the lowest priority items. Disconnect one leg from the circuit breaker and reconnect it through the L1000 relay. **CAUTION:** Ensure The L1000 does not inter-

rupt power to solar pumps and controls related solar system freeze protection.

Clothes Dryer Connection

Disconnect the leg of the supply which allows the motor to run and breaks the heating element. **CAUTION:** Shedding the motor side causes service calls. The only sure way to determine proper connection is by trial and error. Disconnect one leg from the circuit breaker which supplies the heating element and NOT the motor and reconnect it through the L1000 relay. IF THE DRYER IS NOT PRESENT, DO NOT CONNECT L1000 RELAY. In most combination washer/dryer units, it is impossible to break just the heating element. One leg of the supply is the dryer motor. The other leg of the supply is the washer motor. In this case, the element must be controlled inside the combination unit.

Resistive Heating Connections

This section concerns direct control of the heating elements; not class 2 control through the thermostat circuits. Ensure the ampere rating of the power relays is observed (30 amperes see specifications).

Baseboard or radiant heaters can usually be controlled at the breaker panel. Disconnect one leg from the circuit breaker and reconnect it through the L1000.

Spa Heater Connection

Attempt to connect only the heating coil on the spa and allow pumps to run uninterrupted. Some spas may have an accessible thermostat which can be controlled. Others may require a contactor to meet power requirements. Usually a contactor with a 120 V.A.C. coil is selected from a local electrical supply house. The contactor, which is normally-open, is connected through the normally-closed contacts of the L1000.

FINAL INSPECTION AND DOCUMENTATION

1) Ensure the unit sheds and restores the controlled load and that the indicator lamp (if present) works properly.

2) After the system is fully operational, ensure the area is clean of installation debris.

3) Last but most important, educate the customer on control strategies and operation of their new unit. Leave the customer with this manual and a goal to save.

SERVICE

The first step in any trouble-shooting procedure is to clearly define the problem including the possibility of operator error or misconception. This is usually done over the phone. Analysis of this data usually leads directly to the problem.

Keep connections tight. It is good practice to ensure all terminal and wire nut connections are secure.

If the L1000 must be removed for service, properly terminate all wires. **WARNING:** Short each current transformer's wires together to prevent high voltages. Reconnect controlled device. There are no user serviceable parts in the L1000. To have the L1000 serviced, contact your local PENSAR dealer. If there is not a dealer near you, contact ElectroSem, LLC at:

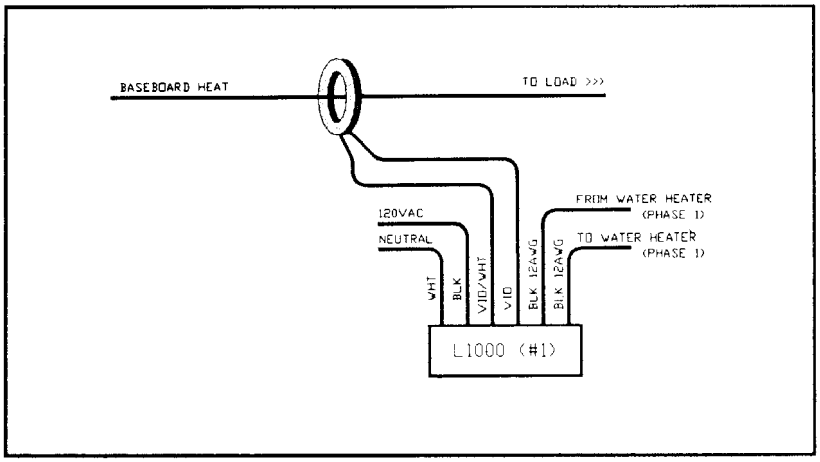
ElectroSem, LLC
2600 South Hardy Drive
Tempe, AZ. 85282

(602) 955-6566

Appendix A Typical Installations

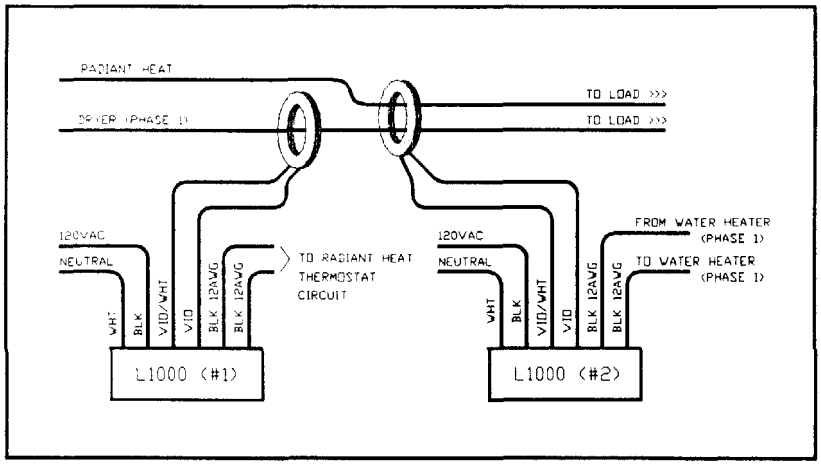
BASEBOARD HEATER AND WATER HEATER

Example 1 illustrates connection of a Baseboard Heater and Water Heater. When the L1000 senses that the Baseboard Heater activates, it disables the water heater.



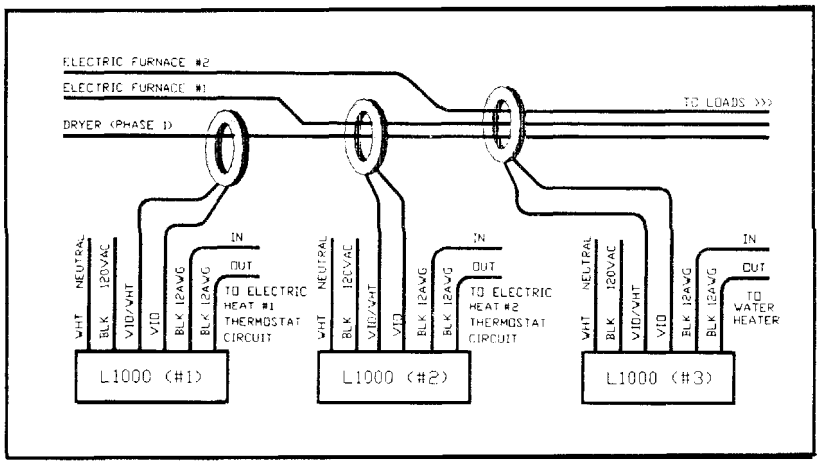
CLOTHES DRYER, RADIANT HEATER, AND WATER HEATER

Example 2 illustrates connection of a clothes dryer, a Radiant Heater, and water heater. When the L1000 (#1) senses the clothes dryer activates, it disables the Radiant Heater. When the L1000 (#2) senses that the clothes dryer or Radiant Heater is activated, it disables the water heater. When the clothes dryer and Radiant Heater are not active, the L1000 (#2) enables the water heater.



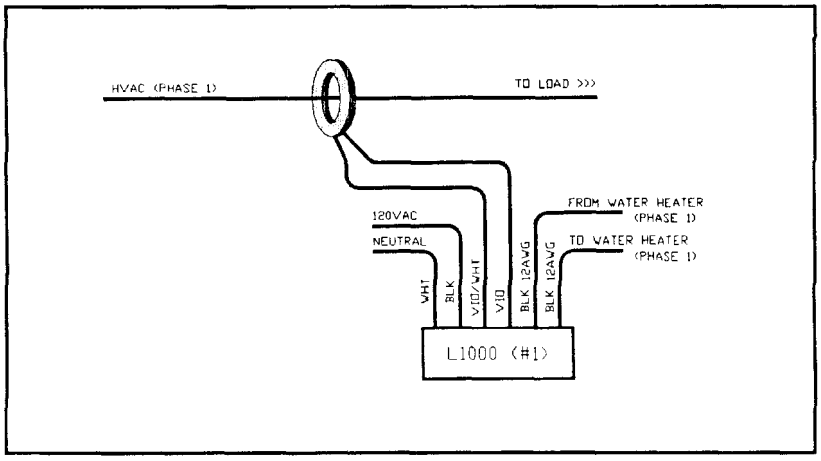
CLOTHES DRYER, TWO ELECTRIC FURNACES, AND WATER HEATER

Example 3 illustrates connection of a clothes dryer, two Electric Furnaces, and water heater. When the L1000 (#1) senses that the clothes dryer is active, it disables Electric Furnace 1. When the L1000 (#2) senses that the clothes dryer or Electric Furnace 1 is active, it disables Electric Furnace 2. When the clothes dryer and Electric Furnace 1 are not active, L1000 (#2) enables Electric Furnace 2. When the L1000 (#3) senses that the clothes dryer, Electric Furnace 1 or Electric Furnace 2 is active, it disables the water heater. When the clothes dryer, Electric Furnace 1, and Electric Furnace 2 are not active the L1000 (#3) enables the water heater.



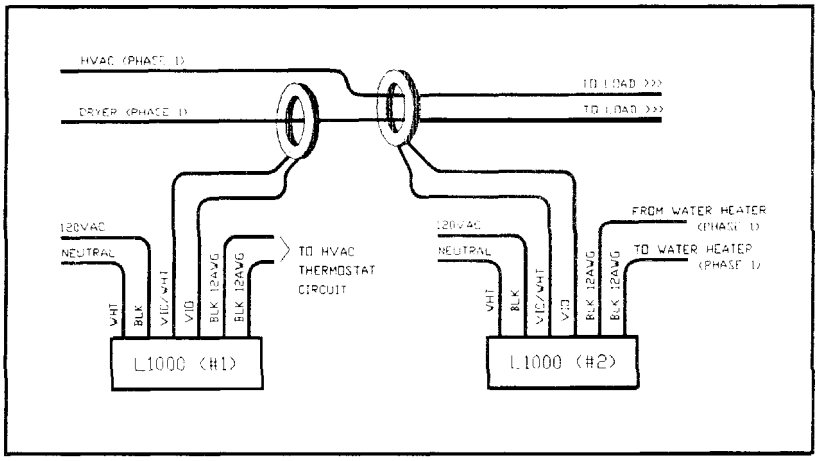
HVAC AND WATER HEATER

Example 4 illustrates connection of a HVAC and Water Heater. When the L1000 senses that the HVAC activates, it disables the water heater.



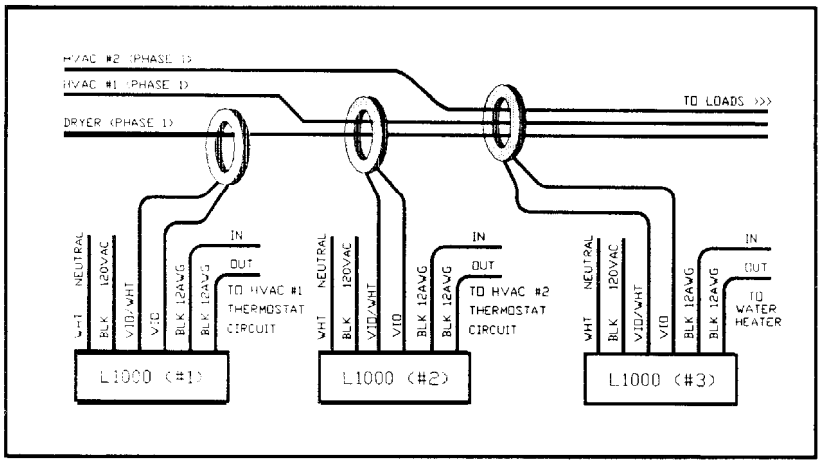
CLOTHES DRYER, HVAC, AND WATER HEATER

Example 5 illustrates connection of a clothes dryer, a HVAC, and water heater. When the L1000 (#1) senses the clothes dryer activates, it disables the HVAC. When the L1000 (#2) senses that the clothes dryer or HVAC is activated, it disables the water heater. When the clothes dryer and HVAC are not active, the L1000 (#2) enables the water heater.



CLOTHES DRYER, TWO HVACS, AND WATER HEATER

Example 6 illustrates connection of a clothes dryer, two HVACs, and a water heater. When the L1000 (#1) senses that the clothes dryer is active, it disables HVAC #1. When the L1000 (#2) senses that the clothes dryer or HVAC #1 is active, it disables HVAC #2. When the clothes dryer and HVAC #1 are not active, L1000 (#2) enables HVAC #2. When the L1000 (#3) senses that the clothes dryer, HVAC #1 or HVAC #2 is active, it disables the water heater. When the clothes dryer, HVAC #1, and HVAC #2 are not active the L1000 (#3) enables the water heater.



Technical Specifications

L1010 INDICATOR LAMP

The **indicator lamp** indicates at a glance if the controlled device has been shed (turned off). When the indicator lamp is on, the controlled device has been turned off. If the lamp is not illuminated, the device has power available. However, it may not be operating due to its own controls.

L1000 MODEL NUMBERS

L1000

Indicator Lamp:	No
Dimensions:	4"w x 2"h x 1.6"d
Enclosure Type:	Indoor
Part Number:	600217

L1010

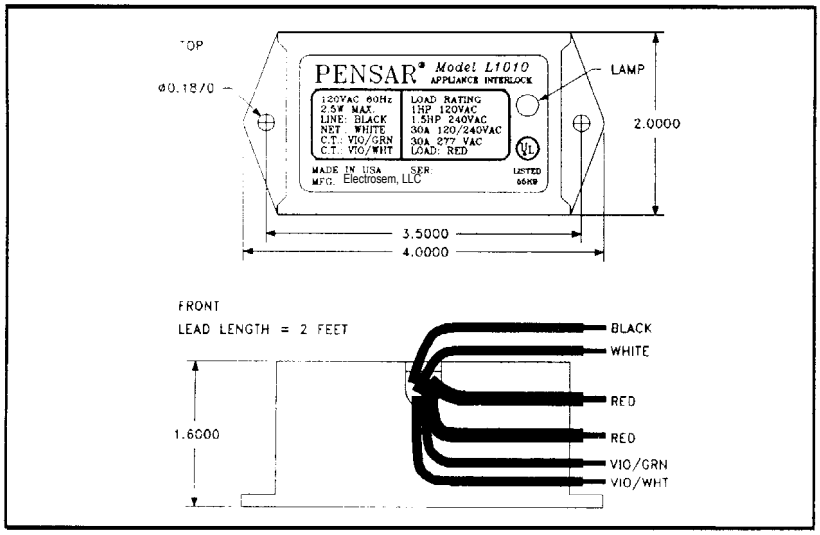
Indicator Lamp:	Yes
Dimensions:	4"w x 2"h x 1.6"d
Enclosure Type:	Indoor
Part Number:	600218

L1100

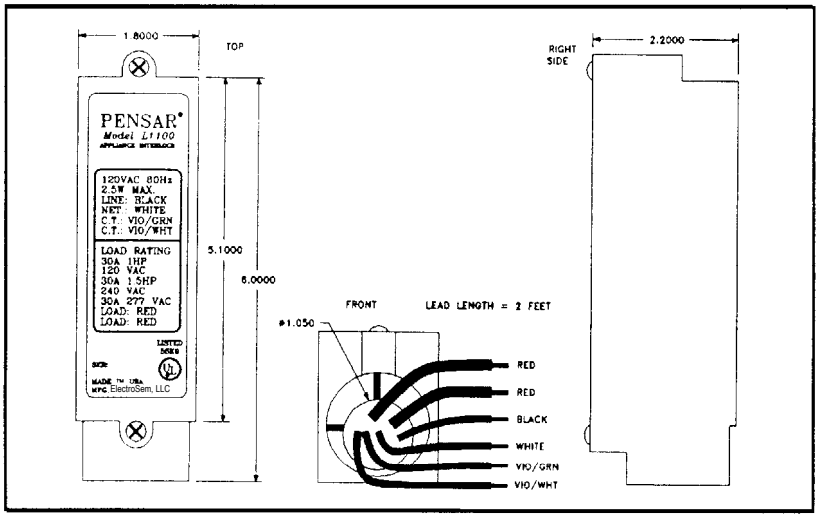
Indicator Lamp:	No
Dimensions:	1.8"w x 6"h x 2.2"d
Enclosure Type:	Outdoor for 3/4" PVC Conduit
Part Number:	600219

TECHNICAL REPRESENTATIONS

L1000 and L1010



L1100



ELECTRICAL RATINGS

Operating Temperature:	-40F to +170F (-40C to +85C).
Power Requirements:	120 V.A.C., 60 Hz.
	4 watts maximum .5 watt standby
Contact Ratings:	Electromechanical type.
	30 ampere 1 HP 120 VAC
	30 ampere 1.5 HP 240 VAC
	30 ampere 277 VAC
Trip Specifications:	9 amperes
	1.1 kw @ 120 volts
	2.2 kw @ 240 volts

CURRENT TRANSFORMER

Ring type with 48" 600 volt leads
Amperage Ratio: 200 : 1 ampere
Dimensions: 2.4" O.D. x 1.4" I.D. x 0.5" width typical.
ElectroSempart number: 903001 or 900004

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.