ENERGY SENTRY®

Computerized Energy Management

Model 9212 Series 3
Owner's/Installation Manual

BRAYDEN AUTOMATION

Helping you to use energy more efficiently

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Model 9212 *Series 3* Owner/Installation Manual

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Brayden Automation Corporation
6230 Aviation Circle
Loveland, CO 80538
PHONE (970) 461-9600
FAX (970) 461-9605
www.brayden.com

WARNING:

The installation of the Energy Sentry® Demand Controller is required to be done by a duly licensed and qualified electrician or electrical contractor.

Notice to Users

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient the receiving antenna.
2. Relocate the computer with respect to the receiver.
3. Move the computer away from the receiver.
4. Plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402, Stock No. 0004-0000-00345-4.

Operating Instructions

Introduction and Overview of Demand Control

Congratulations on your decision to purchase the Energy Sentry Model 9212 *Series 3* Electric Demand Controller. As the owner of an all-electric home metered under the Demand Billing rate, you are now one of a growing number of consumers who can lower their monthly electric bills by reducing energy demand peaks. The Energy Sentry 9212 Demand Controller enables you to reduce these peaks while maintaining efficient use of energy. Your decision to purchase a 9212 represents a sound and intelligent investment which will repay you for years to come in reduced electric bills, added convenience and peace of mind. The 9212 is without question the finest, most versatile electric demand controller on the market today.

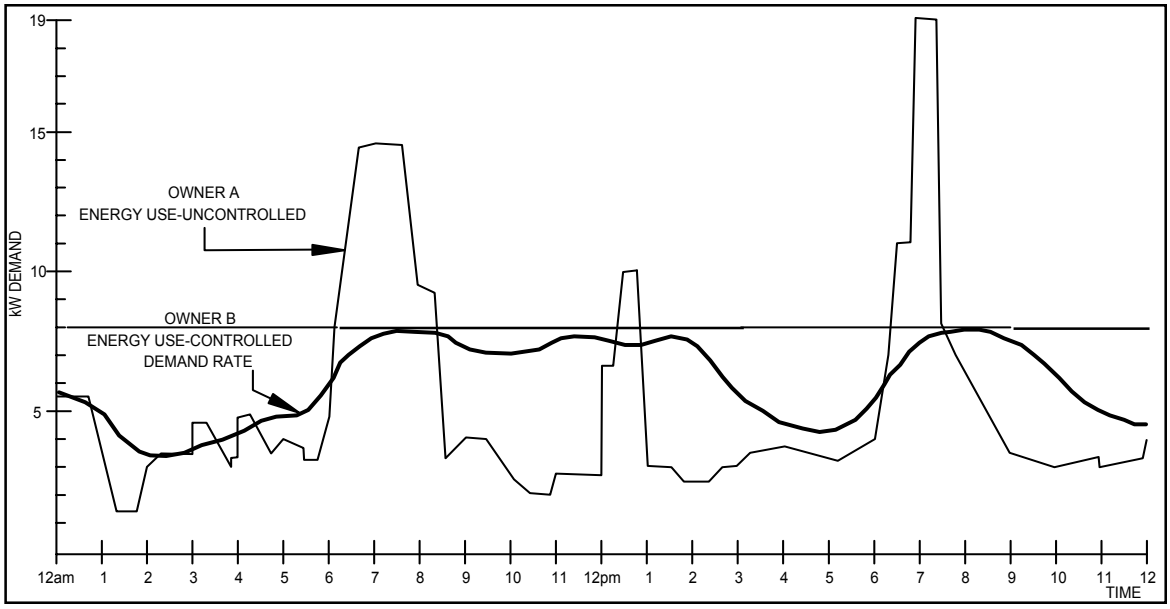
The Demand Billing Rate

Not all electricity costs the same. The reason for this is the billing rates which your utility makes available to you. The most common are the Energy and Block Rates. Under the Energy Rate, you are billed for total energy used per month (total Kwh use) regardless of how you use this energy. Owner A in Figure 1 illustrates a typical daily energy use pattern. Notice the demand peaks in the morning and evening. Under the Energy Rate, these peaks do not affect Owner A's bill since he pays for the total Kwh use only.

Utility companies are concerned about these demand peaks since they increase the costs of supplying electricity to their customers. As a result, some utilities offer a Demand Billing Rate which is a preferred rate to reward customers who control their peak usage of electricity. Billing under the demand rate works like this: Suppose you are heating or cooling your home, washing dishes, drying clothes and cooking the family dinner all at the same time. Chances are your home is at peak energy usage or drawing electricity from the electric company at a maximum rate. This peak energy usage is illustrated by Owner A of Figure 1. Under the Demand Rate you pay for both total energy use (in Kwh like the Energy Rate) and for your highest average peak energy usage during the billing period (highest average KW demand). When compared to the Energy Rate, the Demand Rate offers a much lower charge for total Kwh use. But, since there is also a demand charge for the highest average peak energy usage during the billing period, the savings could be offset if this demand peak is high.

Now refer to Owner B in Figure 1. In this case, Owner B is billed under the Demand Rate but has controlled his peak demand and has correspondingly reduced his demand charge. The result will be a lower electric bill for using the same amount of electricity as Owner A. The key to his savings is in controlling his peak demand and leveling out his energy usage.

Figure 1. The graph shows identical energy consumption over a one day period, but at two different peak demand levels.



Different Meters

Demand rates incorporate the use of a special electric meter which registers not only the total energy consumed, just like the standard watt-hour meter, but also has a separate needle, dial or a register which records and indicates the highest average peak energy usage or demand peak as recorded over a 15, 30 or 60-minute demand interval (depending on the utility). Once this demand peak is registered on the meter, a corresponding demand charge results even if this peak occurred only once during the billing period.

To benefit from your Energy Sentry 9212 Demand Controller you must have a demand measuring electric meter *and* be billed on a demand billing electric rate from your utility. Obtain a free booklet or rate sheet from your power company that describes your electric rate and how to read your electric meter. We recommend that you read your metered demand on the day prior to when the meter is read by the power company, to verify that your setting matches the meter's reading.

Where Energy Sentry® 9212 Technology Comes In

If it were humanly possible to go through your home continuously and manually turn off heating or cooling circuits and major appliances to level out peak demand whenever necessary, you wouldn't need an electric demand controller to take advantage of the demand rate offered by your utility company. But remember, one slip in any one demand interval and your utility bill would reflect a high demand charge.

The 9212 takes over this difficult, continuous burden for you. The 9212 is one of the most sophisticated products available for controlling electric peak demand. When properly used, it can result in average monthly savings of up to 35% and as much as 50% during heavy-use months. The sole purpose of the 9212 is to efficiently allocate electricity usage of electrical loads so that demand peaks are kept below the level you set without changing your lifestyle.

How the 9212 Works

The 9212 contains a microprocessor-based computer which turns certain circuits on and off to keep peak demand below a limit that you preset. Not all circuits need to be controlled by the 9212. Circuits controlled usually include the air conditioner or heat pump, all heating zones, the dryer, the water heater or any other load with some thermal storage capacity.

In a typical all-electric home, the morning routine may involve turning up some thermostats, operating the range, water heater and other appliances. Normally, operation of these loads causes a morning peak (such as that illustrated by Owner A in Figure 1) which registers on the demand meter.

Now, let's put the 9212 to work. There are several optional load control strategies available, but a typical strategy could involve the 9212 recognizing higher priority loads, such as the dryer, thus cutting back on loads of less priority, like the heating or cooling loads for a short period of time, while the higher load or uncontrolled load is on. When the dryer turns off, the power it had been using is channeled back to the heating or cooling loads, thus maintaining comfort but reducing peak demand. The end result is that while you have still used the amount of energy normally called upon by your lifestyle, this usage has been leveled out to reduce the peak demand. This is illustrated by Owner B in Figure 1.

How the 9212 Saves

Now that we've examined how the 9212 enables you to use the energy you are accustomed to, but spreads this usage out by turning off non-critical loads for short periods of time, let's look at how this saves you money. Remember the utility company helps you save by offering the Demand Rate which is a lower rate per unit of total power consumed (Kwh). You can save money under this rate if you control your peak energy usage so as to keep the corresponding demand charge low.

The following hypothetical example illustrates how the Energy Sentry 9212 helps you save. Three cases are presented for a single residence. In all three cases the total energy consumption is the same. The differences are in the utility rate structure and whether or not an Energy Sentry 9212 is installed.

Case I is an all-electric home billed under the Energy Rate. This differs from the Demand Rate, in that there is a higher charge for total energy used. Most homes not under the Demand Rate are billed under the Energy Rate. Reference to Table 1 shows a monthly energy use of 3000 Kwh. Although rates vary from utility to utility, the example electric bill based on actual utility rates for this energy usage level would be $214.80 with 3000 Kwh being a typical usage for a high use month.*

Case II is the same all-electric home billed under the Demand Rate. In this case, peak energy usage plays an important part in determining the total bill. Although energy use peaks will vary from month-to-month, a typical value for a high-use month might be 18 KW. Based on a total usage of 3000 Kwh, the example electric bill based on actual utility rates would be $211.00**. Compared to Case I, use of the Demand Rate results in savings of approximately 2% for the same energy usage. The reason is the demand charge for the high demand peak offsets the savings on energy costs.

* Based on Black Hills Power Schedule RTE-14 Energy Rate, effective January 1, 2007. Does not include fuel cost adjustment and taxes.

Table 1. Customer Bill Comparison

	Case I **Uncontrolled All-Electric Home Energy Rate**	*Case II* **Uncontrolled All-Electric Home Demand Billing Rate**	*Case III* **Energy Sentry® Controlled All-Electric Home Demand Billing Rate**
Energy Use per Month	3000 Kwh	3000 Kwh	3000 Kwh
Peak Demand per Month	N/A	18 KW	8 KW
Electric Bill	$214.80	$211.00	$154.50
Savings Over Energy Rate	————	$3.80 (1.8%)	$60.30 (28.1%)
Savings Over Uncontrolled Demand Rate	————	————	$56.50 (26.8%)

Case III again uses the same all-electric home billed under the Demand Rate. The energy usage is 3000 Kwh which is the same as in Case I and Case II. The difference is that an Energy Sentry 9212 is now installed and peak demand is reduced to a maximum of 8 KW. Based on this peak demand and energy consumption, the electric bill is reduced to $154.50**. This means a savings of 28.1% over the Energy Rate in Case I and a savings of 26.8% over the uncontrolled Demand Rate in Case II. For your home, installing an Energy Sentry 9212 could result in a savings of up to 40% off your monthly utility bill during the heavy-use months with an average annual savings of up to 35%. The added bonus is that you don't have to reduce your overall consumption to save. Rather, just let your Energy Sentry 9212 level out your usage.

Note: *Depending on the application of the 9212 in a residence, the savings are based on the utility rates in effect and by how low the Demand Limit is set. Contact the utility company for the actual rate schedules that apply to your home.*

** Based on Black Hills Power Schedule RD-5 Demand Rate, effective January 1, 2007. Does not include fuel cost adjustment and taxes.

Superior Features of the 9212

Budgeting and Energy Control Display

The 9212 gives you a continuous digital readout of both the demand limit you have set and your actual demand. Your actual demand may be displayed as instantaneous demand, average demand, or your peak demand (similar to what your meter records) over a period of time determined by you. This information enables you to more accurately set your demand limit, monitor your consumption and budget for your future utility expenditures.

The 9212 displays the demand limit in .5 KW increments, while instantaneous, average and peak modes display KW in .1 KW increments.

Eight Separate Control Points

High peak demand occurs when electrical loads are used simultaneously. The 9212 can control up to sixteen individual electrical loads on eight separate control points, usually air conditioning, heating circuits, the clothes dryer and water heater - loads which can be turned off for brief periods with little or no interruption of your lifestyle. On the average, these loads are responsible for 60% to 80% of your electrical consumption. With eight separate control points, the 9212 provides maximum utilization of energy within your chosen demand limit. That's because the loads which are turned on and off are smaller permitting a more regular and even demand level.

Microprocessor for Maximum Accuracy and Reliability

Use of a microprocessor allows the 9212 to precisely measure KW power demand and accurately compute the average KW demand. In addition, by using a microprocessor, the 9212 can be tailored to the user's unique reqirements by allowing virtually unlimited flexibility in choosing load control strategies and minimum on/off times.

EEPROM Non-Volatile Memory for Maximum Flexibility

Energy Sentry's EEPROM memory "remembers" all system settings you have entered even when power is lost to your unit. In this way utility power interruptions do not affect the settings in your 9212.

Choice of Load Control Strategies

The choice of load control strategies, made possible by the use of a microprocessor, offers unlimited flexibility as to how loads may be controlled. This means the 9212 can be adapted to almost any application, requirement or user lifestyle.

The 9212's unique programming method allows the user to assign a priority level from 1 through 8, to each control point. For a Rotating Strategy, all control points are programmed with the same priority level. For a Fixed Priority Load Strategy, a different priority level is assigned to each control point. For Combination Strategies, fixed priority loads have a unique priority level assigned to them and rotating loads of equal priority have the same priority level assigned to them.

Minimum On and Off Times to Protect Heat Pump and Air Conditioning Compressors

All eight control points of the 9212 can be programmed with minimum on and off times, each variable from zero to 20 minutes. This feature allows the 9212 to be used with heat pump and air conditioning motor loads by providing compressor time delay protection.

Tamperproof Control Settings

To protect against someone unintentionally increasing your preset demand limit, the 9212 will only register a demand limit setting change when two particular buttons are held down together.

Light and Sound Control

The 9212 lets you control the volume of the warning alarm and the light intensity of the Control/Display Unit. For example, you may wish to increase alarm volume during the times when you will be away from the area where the Control/Display Unit is mounted, or you may wish to turn the alarm completely off. The light intensity of the display can also be adjusted for maximum readability in different ambient lighting conditions.

System Description

Your Energy Sentry 9212 Electrical Demand Controller consists of three basic components: these include the Control/Display Unit, the Relay Unit and the Current Transformers. The systems diagram in Figure 3, page 15 of the installation section of this manual, shows how these components are connected to control loads at the load center. One circuit and controlled load is shown.

Your 9212 controls only those loads to which it is connected. Typically, only deferrable loads such as electric heaters, heat pumps, air conditioners, water heaters and clothes dryer heating elements are controlled. These loads will vary depending on application and should be listed in the space provided inside the door of the Control/Display Unit and in the back of this manual. If you are in doubt as to what loads are controlled, you should ask the electrician who installed your 9212.

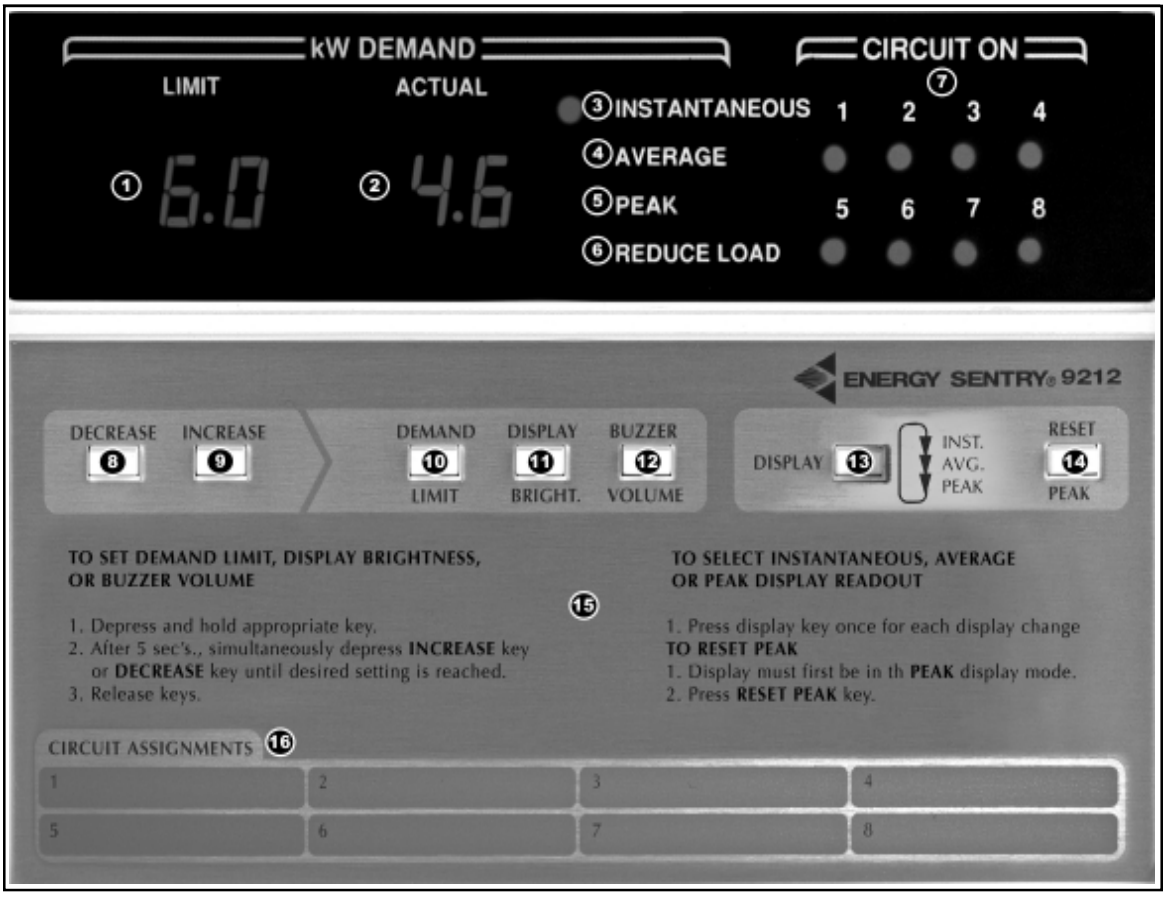
The basic function of your 9212 in controlling these loads is to keep the total electrical demand below a peak value which is set according to your desired level of comfort and minimum load requirements. Each of the three components which make up the 9212 has a separate and unique function in accomplishing this task.

Control/Display Unit

The Control/Display Unit, mounted at a convenient location within your home, contains the 9212's microprocessor-based computer which automatically controls loads connected through the relays in the Relay Unit. Commands to switch these loads originate here and are based on the user-set demand limit and the actual demand as measured by the Current Transformers. The way in which the loads are switched is based upon the load control strategies programmed into your unit according to your requirements. These strategies will be discussed in more detail later.

If power is lost due to utility power interruptions, the 9212's EEPROM non-volatile memory will remember the demand limit that you have set as well as all other system settings and will continue to perform demand control within that limit when power is restored.

Figure 2. 9212 Control/Display Unit



Relay Unit

The Relay Unit, normally mounted near the load center, contains up to eight power relays, capable of switching 16 electrical circuits, which turn the loads controlled by the 9212 on and off. These relays get their commands to turn on and off from the computer in the Control/Display Unit by means of the connecting control cable shown in Figure 3 on page 15.

Current Transformers

Two Current Transformers, usually mounted inside the load center, monitor total electrical load. They tell the computer in the Control/Display Unit how much electricity you are using for all loads, not just those controlled by the 9212. By monitoring the total load, controlled loads may be turned on and off to keep total demand below the limit you set.

System Operation

Control Panel Settings & Displays

Figure 2 shows the front panel of the Control/Display Unit. Each indicator and key serves a specific purpose in providing you with the necessary information and control needed to minimize peak energy usage. Each of these indicators and keys have been numbered and are described on the following pages.

KW Demand Limit (1): This indicator displays user-set kilowatt demand limit in .5 KW increments. The value may be changed from month-to-month depending on seasonal energy use requirements. Typical residential setting ranges are given in Table 2.

KW Demand Actual (2): This indicator displays total household demand in .1 KW increments, which includes both controlled and uncontrolled loads. Actual KW demand may be displayed as **Instantaneous**, **Average** or **Peak**, depending upon the desired display mode. See display key (13).

Instantaneous KW Demand (3): When this mode is selected, the **Actual KW Demand** display will indicate **Instantaneous Demand** showing real-time changes in demand of the total load as it occurs. This is useful for determining how much energy is required to operate various loads so that an understanding of your energy requirements may be achieved. Your actual demand may be compared to the typical residential appliance ratings given in Table 3. The **Instantaneous** LED light will be on when in this mode, as shown above.

Average KW Demand (4): In this mode, the **Actual KW Demand** display will indicate your **Average Demand** over a running 15, 30 or 60 minute interval depending on the interval selected in the system programming mode. This interval is the same as the demand averaging interval used by your utility meter. Therefore the average demand shown on your 9212 is, approximately equal to the demand level your meter is presently recording. The **Average** LED light will be on when in this mode.

Peak KW Demand (5): In this mode the **Actual KW Demand** display will indicate the highest actual average (peak) demand-since-reset. This indicator is intended to allow you to monitor your daily, weekly, or monthly peaks in order to gain an understanding of how and when these peaks occur. In this way, energy use patterns may be modified, if desired, to minimize these peaks. It should be noted that if this indicator is reset only when the utility meter is reset, the value displayed should be approximately the same as the reading on the meter. A slight difference between the utility meter's peak and the **Peak KW Demand** on the 9212 may be observed. This is due to different demand averaging methods, varying line voltages, power outages, measurement accuracy and other factors. The utility meter will remain the final determinate in your electric bill's demand charge. The **Peak** LED light will be on when in the **Peak KW Demand** mode.

Reduce Load (6): The **Reduce Load** indicator will come on and the alarm buzzer will sound when all controlled loads have been turned off, but instantaneous demand is still above the limit. When this occurs, you must either reduce uncontrolled demand (or increase the limit) as suggested in the operating instructions. You will not hear the alarm buzzer sound if the volume is set to OFF.

Circuits On (7): These LED indicators, when lit, tell you which control circuits are enabled. A **Circuits On** indication does not necessarily mean that the controlled load is on, but rather the load is free to go on if the thermostat calls for it.

Decrease Key (8): This key operates in conjunction with the **Demand Limit Key (10)**, **Display Bright Key (11)** and the **Buzzer Volume Key (12)** and is used to decrease the functions controlled by these keys.

Increase Key (9): This key operates in conjunction with the **Demand Limit Key (10)**, **Display Bright Key (11)** and the **Buzzer Volume Key (12)** and is used to increase the functions controlled by these keys.

Demand Limit Key (10): This key is used to set the demand limit and is used in conjunction with the **Decrease Key (8)** or **Increase Key (9)** and allows you to adjust the demand limit up or down to the level which best suits your particular energy requirements.

Display Bright Key (11): This key is used to adjust the display brightness and is used in conjunction with the **Decrease Key (8)** or **Increase Key (9)** to set the display brightness for the best visibility under existing lighting conditions.

Buzzer Volume Key (12): This key is used to control the alarm buzzer volume in conjunction with the **Decrease Key (8)** or **Increase Key (9)** and allows you to adjust buzzer volume to meet various sound conditions.

Display Key (13): This key allows you to display **Actual KW Demand** as an **Instantaneous, Average** or **Peak** value.

Reset Peak Key (14): When in **Peak Demand** mode, this key allows you to reset the highest average (peak) demand recorded since reset, as described above. This can be reset at any time and is for owner information only.

Control Panel Instruction (15): These instructions, printed on the front label of the Control Panel, instruct you how to make all appropriate control settings.

Circuit Assignments (16): This space is used to record the loads controlled by the 9212 and is filled in using the load schedule supplied by the installing electrician on page 31 of this manual.

Basic Operations

Your 9212 has been designed for ease of operation and to provide efficient energy use. Please carefully read the following instructions concerning basic system operation as they will enable you to maximize efficient energy use and minimize your electric bill.

Step 1, Turning On the Unit: Your 9212 should already have been turned on by the installing electrician. If not, there should be a breaker in your electrical load center labeled "9212 Energy Sentry Demand Controller" or similar. If this breaker is off, it should be turned on. If you cannot locate a breaker labeled "9212," you should call your installing electrician.

Step 2, Setting Your Demand Limit: Please refer to the Control/Display Unit pictured in Figure 2 for this and all succeeding steps. To set demand limit:

1. Press and hold the **Demand Limit Key (10)**.

2. Simultaneously press the **Decrease Key (8)** or the **Increase Key (9)** until the desired demand limit is reached. The numbers in the **Limit Display (1)** will count up or down.

3. Release keys at the desired setting.

Because of the way you are billed by your utility company under the demand rate, you should change the **KW Demand Limit** on your Control/Display Unit once a month or seasonally as appropriate. For best results, you should set the lowest practical demand limit within the suggested range for your home or lifestyle. Typical demand limit ranges, by month, for an average all-electric home are listed in Table 2.

Table 2. Typical KW Values by Month*

Month	Summer (A/C) Area	Winter (Heating) Area
January	4–6 KW	7–10 KW
February	4–6	7–10
March	5–7	6–9
April	5–8	5–7
May	6–10	5–6
June	6–10	5–6
July	6–10	5–6
August	6–10	5–6
September	6–8	5–7
October	5–7	6–8
November	4–6	7–9
December	4–6	7–10

Settings will vary with lifestyle, home construction and climate.
* Typical settings for heat pumps may be 10–40% higher.

Step 3, Monitoring Your Actual Demand: To select **Instantaneous**, **Average** or **Peak** readout of **Actual KW Demand**:

1. Press **Display Key (13)** once for each display change desired.

2. The **Actual KW Demand Display (2)** will show which mode - the **Instantaneous (3)**, **Average (4)** or **Peak (5)** mode - is being displayed and the corresponding indicating LED light will confirm the mode that is being displayed.

Step 4, Reset Peak: This step is optional depending upon the time interval for which a record of your highest average (peak) is desired. To reset peak:

1. Place **Actual KW Demand** display on the **Peak** mode — (See Step 3).

2. Press and release the **Peak Reset Key (14)**. A zero will briefly be displayed in the **Actual KW Demand Display (2)**. This value will then jump to the current average (peak) which becomes yous new peak. As the average (peak) increases, the peak demand will also increase and be recorded.

Step 5, Adjusting Display Brightness: Display brightness may be varied according to existing lighting conditions as follows:

1. Press and hold the **Display Bright Key (11)**.

2. Simultaneously press the **Decrease Key (8)** or the **Increase Key (9)** until the desired intensity is reached.

3. Release keys at the desired display intensity.

Step 6, Adjusting Buzzer Volume: Buzzer volume may be varied depending upon the desired alarm level as follows:

1. Press and hold **Buzzer Volume Key (12)**.

2. Simultaneously press the **Decrease Key (8)** or the **Increase Key (9)**. The buzzer will come on and beep about 6 times at each volume level.

3. Release keys at the desired volume.

Note: *If the user desires to turn off the Buzzer, hold the Buzzer Volume and Decrease keys down until the buzzer stops.*

Step 7, If the Alarm Buzzer Sounds: The alarm buzzer in your Control/Display Unit sounds and the **Reduce Load Indicator (6)** will come on when the 9212 has done all it can do to reduce your electrical demand and actual demand is still greater than the demand limit. That means all circuits that your 9212 has control over have been turned off, but due to high base load, this is not enough. In this situation, your demand limit may be unrealistically low for the level of comfort or appliance use you desire. Loads with minimum on times may cause the buzzer to temporarily sound until the particular "on" time has elapsed.

To silence the buzzer, turn off some unnecessary appliance or load or, if necessary increase the **KW Demand Limit** one number at a time until the buzzer stops. If you choose to turn off an uncontrolled load, you may monitor your actual demand in the **Instantaneous** mode in order to see the effect of each load on overall demand (see Table 3).

Table 3. Typical Residential Appliance Ratings

Stove:	Large Burner	1.5-3 KW
	Small Burner	1-1.4 KW
	Oven or Broiler	5 KW
	Self Clean (Bake & Broil on together)	10 KW
Refrigerator		1.5-2 KW
Dryer		4.5-6 KW
Freezer		1.5-2 KW
Water Heater		3-6 KW
Lighting		0-1.4 KW
Dishwasher		1.2 KW
Waffle Iron		1.2 KW
Toaster		1.1 KW
Hair Dryer		1 KW
Room Air Conditioner		0.9 KW
Vacuum		0.7 KW
Blender		0.3 KW
Mixer		0.15 KW
Television		0.12-0.2 KW
	(instant on is consumption continuously)	0.3 KW
Central Air Conditioning		3-8 KW
	(depending on home size)	

If the alarm buzzer sounds too often, or if heating or cooling levels are inadequate, you may have to increase your demand limit or change your load control strategy. Increase the **KW Demand Limit** by one and note whether that change solves the problem before increasing the limit further. It may take as long as one hour for the new level to be reached.

Load Control Strategies

Your Model 9212 is a versatile electric demand controller offering a virtually unlimited number of load control strategies, allowing you to maximize adaptability to load requirements and user lifestyles. These strategies include the Fixed Priority Strategy, the Rotate Strategy and a wide range of Combination Strategies.

In addition to these strategies, all circuits may be assigned minimum on and off times, variable up to 20 minutes. This is a particularly attractive feature because heat pump and air conditioning compressors requiring time delay protection may be controlled under a strategy to best fit your application, lifestyle or use pattern.

Fixed Priority Strategy: When this strategy is selected, up to eight circuits are turned on and off in order of priority from 1 through 8, where loads controlled by priority level 1 have the highest priority. Loads controlled by priority level 8 are the first off and the last on. The on decision is made and implemented every one minute. This strategy is particularly useful where low priority loads may be turned off without significantly interrupting energy use requirements. Minimum on and off times may be assigned to each circuit if required.

Rotate Strategy: Under this strategy, all eight circuits are assigned an equal (the same) priority, which turns off loads sequentially every one minute as required to maintain demand below the limit. Generally speaking, the first load turned off will be the first one turned back on in one minute intervals. In this way, off time of rotating loads is minimized and roughly equal.

The Rotate Strategy is particularly useful where equal priority rotation may serve several heating loads, minimizing the off time of each load during rotation. Thus, the reduction in demand is shared by several loads and the desired comfort level is maintained throughout the home. Minimum on and off times, usually not required under this strategy, may be assigned to each circuit if required.

Combination Strategies: The 9212 allows the user to program a priority independently for each control level. One or more groups of rotating loads, with or without fixed priority loads are possible. There are virtually an unlimited number of possible combinations.

Changing Load Control Strategies: When your 9212 was installed, the strategy most appropriate to your existing load requirements was selected. If your load requirements have since changed, or if you would like to change your load control strategy, refer to the Installation section of this manual for detailed instructions or contact your Energy Sentry dealer.

Load Shedding Sequence

When your total power consumption starts to exceed the demand setting, the controller sheds the first load. If necessary, additional loads will be shed to keep the average demand below the demand setting. Loads are shed according to the priority strategy selected: the fixed priority strategy, the rotating strategy, or a combination, as described above. See the 9212 Installation section of this manual for an explanation on how to select the load control strategy.

The load shedding strategy selected is based on the type of heating and cooling equipment and the design of your house. If desired, the priorities may be easily changed by you, your dealer or an electrician.

Chart A shows typical priorities for a house with baseboard heating. Chart B shows priorities for a house with heat pump/air conditioning.

Control of Clothes Dryer

The clothes dryer is usually one of the last circuits that the 9212 Load Controller sheds. When the dryer is shed, the dryer motor continues to tumble clothes. Only the heating element is cut off during this brief period. This means that when you are set at 5 or 6 KW and cooking a large meal, the dryer will be shed when the oven element (4.5 KW) is on. When the oven element is off, the dryer element is restored. This may result in slightly longer drying times.

Note: *If the dryer cannot be restarted (or stops) each time it is shed, it is not properly wired to the controller. Have your electrician change it. It will only take a few minutes at the breaker panel.*

Caution: *If you purchase a new dryer or if you move into a home with a demand controller already installed, your dryer's circuit may or may not be wired properly to the system. Since not all dryers are wired the same, the dryer wires in the circuit breaker panel may have to be reversed (see note above).*

Systems Test

To verify that your demand control system is measuring the demand and shedding loads properly, make the following test:

1. Set the demand limit to 2 KW.
2. Turn on oven and all top elements of your stove. Make sure that the instantaneous demand display mode shows the demand at least 6 KW or higher if possible.
3. All controlled loads will shed (turn off). This usually takes only a few minutes, however the A/C may take longer depending on the minimum on times programmed (maximum time will be 20 minutes).
4. Turn off all stove elements and the oven. Instantaneous demand display should drop to near zero to one KW.
5. Raise the demand limit to your normal demand setting.
6. All loads will restore according to the load control strategy and when minimum off times have elapsed (maximum time may be 20 minutes).
7. If these steps are completed, the system is OK.

Chart A. Baseboard Heated Home

Load Control Strategy: ***Combination Fixed/Rotate***

Priority	Shed Sequence	Load	Demand
1 (Highest)	Last	Dryer (Heating Element Only)	5.5 KW
2	Second	Water Heater	4.5 KW
3 (Lowest)*	First*	Living Room Heat	3.5 KW
3 (Lowest)*	First*	Basement Heat	4.0 KW
3 (Lowest)*	First*	Entry Heat	1.5 KW
3 (Lowest)*	First*	Bedroom Heat	2.0 KW
3 (Lowest)*	First*	Bedroom Heat	2.0 KW
3 (Lowest)*	First*	Family Room Heat	3.0 KW

** **NOTE:** Shedding sequence of rotating loads begins with the load which has been restored the longest. When all #3 Priority Loads are all shed, the #2 Priority Load is shed next. #1 Priority Load is shed last, if necessary.*

Chart B. Heat Pump/Air Conditioner Home

Load Control Strategy: ***Fixed Priority***

Priority	Shed Sequence	Load	Demand
1 (Highest)	Last	Dryer (Heating Elements Only)	5.5 KW
2	Seventh	Compressor #1	3.0-7.0 KW
3	Sixth	Compressor #2	3.0-7.0 KW
4	Fifth	Water Heater	4.5 KW
5	Fourth	Strip Heat #1 Elec. Furnace	5.0 KW
6	Third	Strip Heat #2 Elec. Furnace	5.0 KW
7	Second	Strip Heat #3 Elec. Furnace	5.0 KW
8 (Lowest)	First	Strip Heat #4 Elec. Furnace	5.0 KW

NOTE: *(1) Compressor is not shed when outside temperature is below 30°F (when outside thermostat is installed). (2) Compressor cannot be restarted for at least five minutes after it is shed. This delay feature is for compressor protection.*

Hints for Maximum Savings

When the setting is to be decreased, (for example from 10 KW in February to 8 KW in March for heating) the setting should be changed *before* your utility meter is read.

When the setting is to be increased (for example, from 6 KW in May to 7 KW in June for air conditioning), the setting should be changed *after* your utility meter is read.

Meter readings are taken on various days of the month and depend on the billing interval you happen to be on with your utility company. You can check past bills to determine this date or call the utility directly.

Your actual kilowatt demand is displayed on the Control/ Display Unit. If this figure consistently reads 1 KW or more below your demand limit when in the **Average** display mode and the alarm buzzer rarely sounds, you should reduce your demand limit by 1KW for increased savings.

You can help greatly in increasing the effectiveness of your 9212 unit and increase your savings, by trying to avoid turning on two or more major appliances at the same time. For example, homeowners should try to avoid using the clothes dryer and electric range at the same time whenever possible.

Do not use minimum on or off times on any loads other than inductive loads. If used, keep them as short as possible.

Service of Heating/Air Conditioning, Water Heater and Clothes Dryer

When technicians service any electrical equipment that is controlled by the 9212, they should be advised that you have a demand controller. They should also be warned not to disconnect the controller wiring or leave its power supply (circuit breaker) off. Otherwise, they may unknowingly disable your controller which could result in a very high electric bill. Damage could result to your controller by incorrect rewiring of your controller's remote air conditioner relays.

The Energy Sentry 9212 Controller simply acts as another switch on the water heater, dryer or heating/ cooling equipment. It cannot cause damage or premature failure of the equipment it is connected to, when it is installed and set correctly. Nor can it cause a higher electric bill than you would have had without a controller.

When the power to the 9212 Controller is off at the breaker panel, power will be available to all controlled loads as long as the power to the controller is off (contacts close when power is off). Without power, the 9212 Controller cannot control your demand. This is why the power must be restored to the controller after a service call.

If You Need Service

Your Energy Sentry Model 9212 has been carefully assembled and tested at the factory in Loveland, Colorado, USA. Only components having high reliability and long life have been used in its manufacture. In the event that a failure does occur, your 9212 has been designed so household appliances and loads will continue to function. The only difference is that there will be no demand control, and high demand peaks can occur. If a malfunction should occur, you may turn off the 9212 at the breaker labeled "9212" or "Demand Controller," located in the load center (breaker panel). You may control your demand manually, if desired, to avoid unnecessary demand peaks as follows:

1. Heat or cool only those rooms which are occupied by keeping the thermostat set only while you are in each room.
2. When cooking meals, all heating or cooling zones and water heater should be turned off.
3. Avoid using appliances simultaneously. For example, do not use the dryer and the range at the same time.
4. You may monitor your highest demand peak on the utility meter to determine the effectiveness of manual control.
5. Since there are no user serviceable parts or components in the 9212, refer all service to the installing electrician, authorized Energy Sentry dealer or distributor, as described in the Warranty.

Appendix A

Glossary

The following terms are used throughout this manual. They are defined here so as to assist you in understanding their meaning and use.

Average Demand: The average rate of electric usage during the demand averaging period. The average demand is calculated by dividing the total number of kilowatt-hours used by the number of hours in the averaging period. For example, if 2 Kwh's were used during an averaging period of 15 minutes, the average demand would equal 2 divided by .25 (15 minutes) or 8 KW.

Averaging Period: An interval of 15, 30 or 60 minutes over which the average demand is calculated. The demand controller should be set to the same averaging period as the utility's demand meter.

Customer Charge: A flat charge on an energy bill used to help the utility company recover fixed costs associated with serving a customer. It is independent of the demand or consumption of the energy provided. Also called monthly service charge or basic charge.

Declining Block Rate: A method of charging for electric service where the cost per Kwh is usually reduced as the total Kwh use increases.

Demand: The rate of use of electricity during a certain period of time. Demand is measured in kilowatts.

Demand Billing Rate: A method of charging for electric service where the cost of electricity is based on both total energy consumed (Kwh) and peak demand (KW).

Demand Charge: A charge that recovers some of the utility's capital and operating costs based on the customer's highest average use during the billing interval. It appears on an electric bill, along with the customer charge and the energy charge.

Demand Limit: The set point, expressed in KW, below which energy is being consumed at an efficient rate. As this limit is approached, the Energy Sentry Controller begins shutting off predetermined loads to control peak demand.

Demand Meter: A utility meter which measures both total energy consumed in Kwh and the highest average demand (peak) in KW. Most demand meters have a digital readout showing the peak demand register.

Demand Peak: The highest average KW demand over the billing period. Averages may be determined over 15, 30 or 60-minute intervals depending upon the utility.

Energy Charge: A charge that recovers a utility's general and other operating costs. It appears on an electric bill, along with the customer charge and the demand charge.

Energy Rate: A method of charging for electric service where cost of electricity is based only on Kwh consumption multiplied by a fixed cost per Kwh. Kwh cost remains the same regardless of number of Kwh's used. Also called "Flat" Rate.

Instantaneous Demand: The electricity in kilowatts currently being drawn by the electrical service of a building at any instant in time.

Kilowatt (KW): 1,000 watts. A measure of an electric load's size or how much power it demands.

Kilowatt Hour (Kwh): The basic measurement of electric power (energy) consumption as recorded by the electric meter. (If you were to turn on ten 100 watt lights for one hour, you would have consumed one kilowatt hour of electrical energy.)

Load: The amount of electricity used by a particular energy consuming device or group of devices. Usually expressed in watts or kilowatts.

Minimum Off Time: The minimum time that a control point must be shut off before it can be restored by the demand controller. The Minimum Off Time can be set from 0 to 20 minutes. Control Points having a heat pump or air conditioner compressor or other motor load connected to it should have a Minimum Off Time of at least 6 minutes. Resistive loads should not have Minimum Off Times.

Minimum On Time: The minimum time that a control point must be restored before it can be shed by the demand controller. The Minimum On Time can be set from 0 to 20 minutes. Control Points having a heat pump or air conditioner compressor or other motor load connected to it should have a Minimum On Time of at least 5 minutes.

Priority: The relative importance of each controlled load to all other controlled loads, as assigned in the demand controller. As the demand approaches the demand limit, the demand controller uses the priority of each load to determine which loads to shut off first. A load with a priority of "1" is the highest priority and is shed last and restored first. A load with a priority of "8" is the lowest priority and is shed first and restored last. Loads of equal priority will rotate being shed and restored.

Watt: A measure of electrical power or rate of doing work. It is analogous to horsepower where one horsepower is equivalent to approximately 746 watts.

9212 Installation Instructions

1.0 Introduction

This section contains instructions for installation, checkout, and programming the Energy Sentry 9212 Residential Electric Demand Controller. *In order to ensure proper installation and warranty coverage, please read this section thoroughly before actually proceeding with the installation.*

Note: *All wiring must be installed in accordance with national and local electrical codes.*

Important: *If the Energy Sentry 9212 is to be connected to a heat pump compressor or air conditioning compressor, ensure that you complete Section 17, "System Programming."*

2.0 Tools and Materials Required

2.1 Tools Required

- Flat blade type screwdriver
- Phillips head screwdriver
- Drywall Knife
- Pliers
- Amp-Clamp Current Sensor (if available)
- Digital Volt Meter (required for trouble shooting only)

2.2 Material Required (not provided)

- Four 1/4" x 1" lag bolts and/or appropriate hardware for mounting Relay Unit
- 15 Amp single pole circuit breaker for demand controller 120 VAC Power Supply
- Sufficient length of 4 Conductor Control Cable - Energy Sentry P/N - 0715-0009 or Belden #8489 or equivalent. This cable has 4-#18 AWG Conductors, 300V rated. Thermostat Wire is not acceptable and may cause the controller to read power incorrectly. *Use of thermostat wire will void the warranty.*
- Sufficient length of appropriate hookup wire (# 14 AWG) to connect 120 volt power and ground from load center to Relay Unit. Sufficient conduit, #10 AWG or #12 AWG wire (depending on load size), and associated hardware to connect load center to Relay Unit (if required).

3.0 Pre-Installation System Check List

3.1 Parts Check

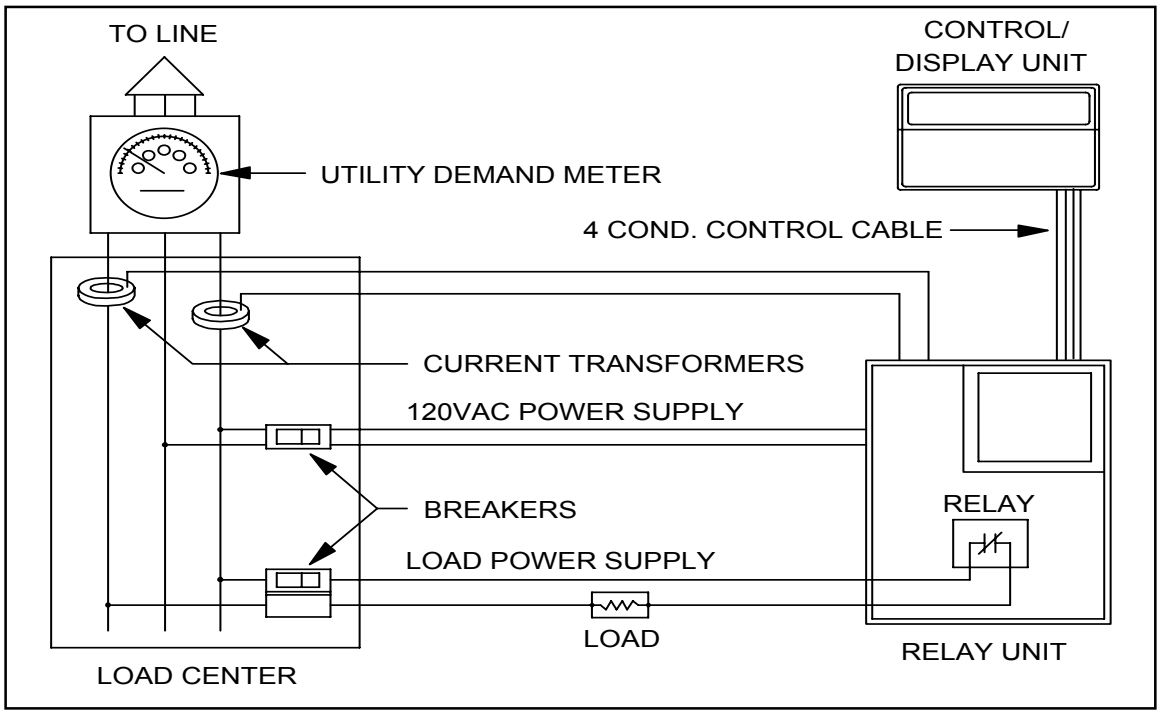
Check package contents to ensure it contains the following parts:

P/N	Qty.	Description
FG9841A	1	9212 Control/Display Unit
8420-3028	2	Current Transformer – One pair of two types:
or		200 Amp Current Transformer
8420-3029		400 Amp Current Transformer
FG9202A-XXXIXXX	1	Relay Unit - one of 2 types
or		Surface Mount Indoor NEMA1
FG9202A-XXXRXXX		Rain Tight Outdoor NEMA-3R
9000-02101	4	Control/Display Unit Mounting Clips
2520-1001	4	Control/Display Unit Mounting Screws
09000-67102	1	Control/Display Unit Mounting Template
9212-94100C	1	Owner's/Installation Manual w/Warranty Registration Card

Note: *Digits marked with "X" may vary depending with the number and type of relays in system, size and type of enclosure, alarm and current transformer options.*

Note: *Notify your Energy Sentry dealer if any parts are missing.*

Figure 3. 9212 Systems Diagram



3.2 System Overview

The Energy Sentry 9212 Demand Controller System consists of three general pieces: the Control/Display (C/D) Unit, the Relay Unit and the Current Transformers. Figure 1 shows the General System Configuration. The C/D Unit mounts inside the home, usually in a general living area such as the kitchen, entry way or family room. The Relay Unit mounts next to the breaker panel. The Current Transformers mount in the breaker panel around the main feeder cables.

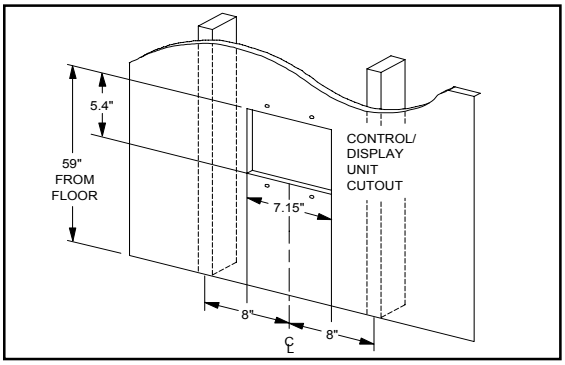
4.0 Locating the Control Unit

4.1

Have the homeowner indicate their preference as to where the Control/Display (C/D) Unit should be mounted. The installer needs to look for a convenient and accessible way to run the control cable from the location of the relay unit to the location of C/D unit. This is normally done through an unfinished basement, crawl space or an attic. The control cable is routed through an "outside" wall from the garage or wherever the breaker panel is located. It can alternately be run through an attic and then dropped down into an interior wall or strung through a crawl space and brought up through an interior wall.

4.2

Figure 4. Locating and Mounting the Control Unit



The C/D unit *should not* be mounted on an exterior wall or any wall which is exposed to the outside air or which may have drafts running through it.

However, if the C/D unit must be mounted on an "outside" or exterior wall which may have cold drafts running through it, insulation must be installed above and below the mounting position so that the cold temperatures will not affect the unit's operation.

4.3

Use the Control/Display Unit mounting template (enclosed) to locate and mark the hole cutout and screw locations or see Figure 4. Be careful to locate the hole between studs—C/D unit will only recess in wall correctly between studs because of the unit's depth. Care should be taken to ensure that there are no wires, cables, pipes or other obstructions in the wall.

4.4

Drill screw holes first with 1/8" drill.

4.5

Cut C/D mounting hole with drywall knife or saw using caution and being careful not to make it too large.

4.6

Install the four C/D unit mounting clips (P/N 09000-02101) by pressing them onto the drywall. In most cases, they should stay in place by themselves. If necessary, pinch the sides together with a pair of pliers so that the clips grab the drywall snugly. Align the clips with the screw holes located and drilled earlier.

4.7

Do not mount C/D unit yet. Continue to Section 5.

5.0 Locating and Mounting the Relay Unit

Caution: *Remove relay plate before mounting enclosure to avoid vibration, shock or impact (such as hammering) which may damage the electronics enclosed and to avoid metal chips and drywall dust from getting into electronics.*

5.1 General Relay Unit Types

5.1.1 Surface Mount Relay Unit (P/N FG9212A-XXXIXXX) "SM"

This relay unit is equipped with a 18" x 12" x 4" (or larger) NEMA 1 screw cover box with a cover of the same size. It should be surface mounted on a finished wall or recessed in an unfinished stud wall such that future finishing will leave the unit flush mounted. Four screw holes (for 1/4" screws) are provided in each corner of the rear of the unit. Screws, lag bolts or nails could be used to mount unit to adjacent studs.

5.1.2 Rain Tight Relay Unit (P/N FG9212A-XXXRXXX) "RT"

This relay unit is provided with a 12" x 10" x 4" (or larger) NEMA 3R Raintight Enclosure. Four holes for mounting are provided; one in each corner. This unit is surface mounted with four 1/4" x 1" lag bolts or other appropriate hardware.

5.2 General Mounting Procedure

5.2.1

Mount enclosure in an upright vertical position near the load center but no higher than 6' above the ground using four 1/4" x 1" lag bolts or appropriate mounting hardware. The relay plate inside the Relay Unit containing the printed circuit board must be on the upper part of the box. (Mounting bolts not provided.)

Caution: *Outdoor enclosures (NEMA 3R) should be mounted where they will receive the least possible amount of direct sunlight. Flush Mount and Surface Mount Enclosures (NEMA 1) must be mounted indoors only.*

5.2.2

Connect the Relay Unit to the load center with an appropriately sized conduit or offset. A 1-1/4" or appropriately sized conduit should be installed to accommodate two #10-#12 wires per controlled load and three #14 AWG wires for 120V power to unit. A separate conduit or knockout cable clamp is required for the four #18 AWG Current Transformer wires and other additional Class II Low Voltage Field Wiring. A separate cable clamp may be required for the control cable (0.375" diameter maximum).

6.0 Running the Control Cable

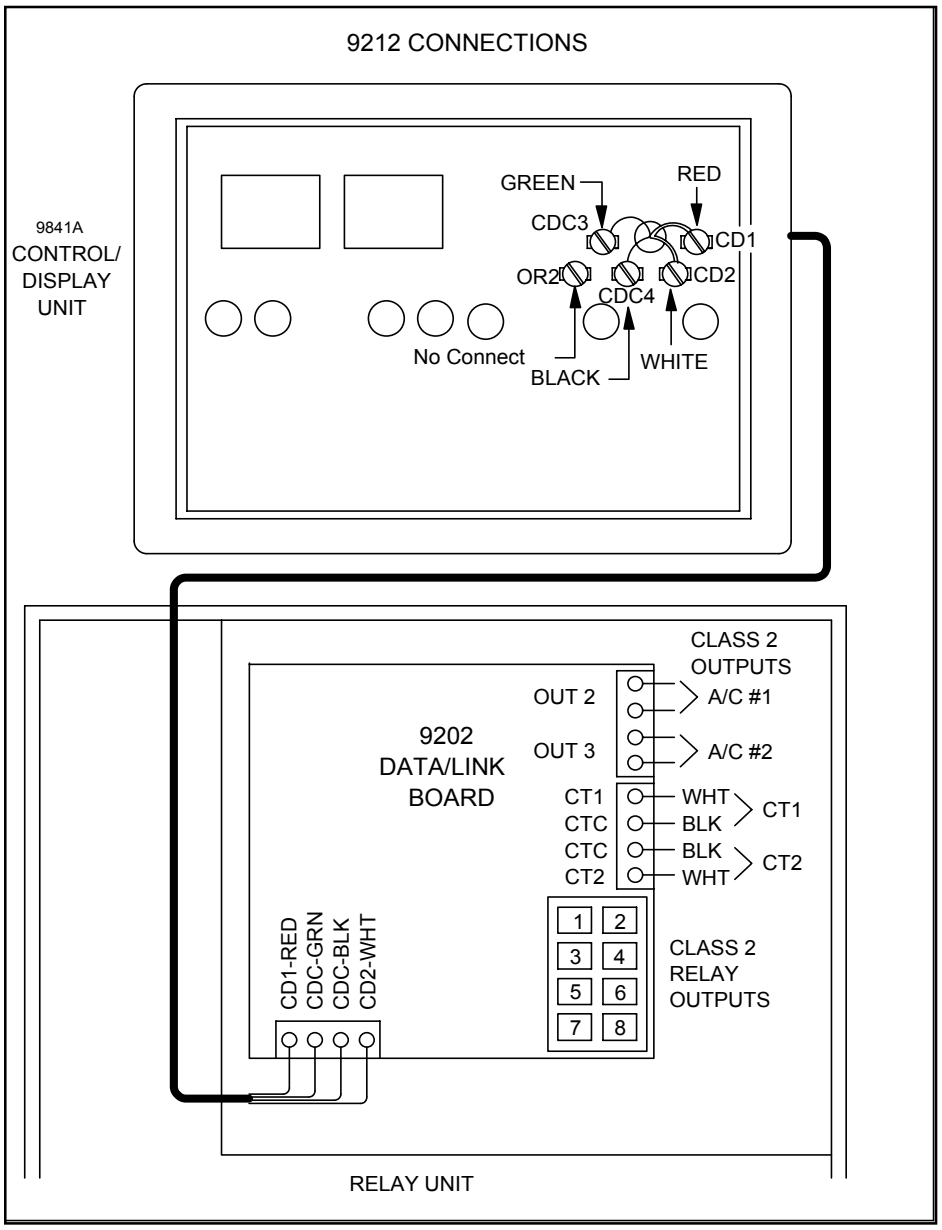
6.1

After the location of the Control/Display Unit and the Relay Unit have been determined and the Relay Unit mounted, run the control cable from the Relay Unit to the C/D unit, leaving sufficient cable length for a 12" service loop at both the C/D unit and the Relay Unit.

To avoid any possible interference, do not run control cable next to or parallel with any high voltage (Class I) wires.

Caution: *Control cable must not run through the main breaker panel or any other Class I wiring compartment.*

Figure 5. Wiring the Control Cable



7.0 Wiring the Control Cable to Control/ Display Unit

7.1

Remove cover from C/D unit by pulling the cover outward first on one side and then the other. Be extremely careful not to damage the hinge posts which protrude out approximately 1/2" on each side of the lower front of the unit.

7.2

Pass the four wires of the control cable through the square hole in the rear of the enclosure and through the 3/8" diameter hole in the printed circuit board (PCB). Strip approximately 1/2" off of each wire end.

7.3

The control cable consists of four #18 AWG Conductors. These are typically black, white, green and red. To insure proper operation and noise immunity, do not run these wires parallel to or next to high voltage (Class I) circuits. Connect the wires as shown in Table 1 and in Figure 5.

Table 4. - Control/Display Unit Connections

Terminal Name	Wire Color
CD1	Red
CD2	White
CDC3	Green
CDC4	Black

7.4

Ensure the Red/Green pair is connected to the top two screw terminals. Red to terminal CD1. Green to terminal CDC3. The White/Black pair is connected to the bottom two terminals. White to terminal CD2. Black to terminal CDC4. Refer to Figure 5 or wiring diagram on Relay Unit cover. After wires are attached, double check to make sure that wires are connected to the proper terminals and that there are no stray strands of wire which may short any of the terminals to each other or any part of the C/D Circuit Board.

8.0 Mounting the C/D Unit

8.1

After all wire connections have been made and screws tightened, pull excess cable back through the rear of the C/D unit so that cable does not stick up.

8.2

Place the C/D unit in the cutout hole and align the four mounting holes in the plastic housing so they line up with the four mounting clips installed earlier.

8.3

With the four #6 X 1-1/4" flat head phillips sheet metal screws provided (P/N 2520-1001), use a Phillips head screwdriver to insert the screw through the plastic housing, through the hole in the short side of the C/D unit mounting clips, through the drywall and into the small hole on the other side of the mounting clip. The sheet metal screw will thread through the small hole and tighten the C/D unit enclosure to the wall. Repeat this procedure with the three remaining screws.

8.4

When all four screws have been installed, the C/D unit should be securely fastened to the wall. Line up the front cover bezel assembly with the enclosure, making sure that the hinge posts line up with the slots that they insert into. Press the assembly gently onto the enclosure. You will hear and feel it snap into place if it has been aligned correctly. When aligned correctly the front door will open and close freely.

9.0 Wiring the Control Cable to the Relay Unit

9.1

Run cable through an unused knockout at bottom or in back of Relay Unit and secure with cable clamp. Leave approximately 6" to 12" of control cable in the relay unit for a service loop.

Note: *Control cable must not run through the load center.*

9.2

Strip back the outer jacket of the control cable about 6 inches.

9.3

Attach the control cable to the relay unit Data/Link PC board as follows:

9.3.1

Run the cable up the right side of the relay box.

9.3.2

Strip each conductor back 1/4".

9.3.3

Connect wires to terminal strip in the lower left hand corner of Data/Link printed circuit board as shown in Figure 5 or the wiring diagram on relay unit inside cover or in Table 4.

10.0 Wiring the 120 VAC Power Supply to the Relay Unit

10.1

Install a single pole 120 volt 15 amp circuit breaker in the breaker panel for the Energy Sentry and mark it "Energy Sentry Demand Controller."

Caution: *Ensure the 15 Amp Circuit Breaker is Off Before Connecting Supply Line.*

10.2

Run a 120 volt supply line (14 AWG copper, 600 volt insulation, with ground line) from the separate 120 volt, 15 Amp single-pole breaker just installed in the load center into the relay unit through the conduit. Connect black to the braker's switched terminal, connect white to neutral, and green to ground.

10.3

Connect the 120 VAC supply to the white and black wires of the power transformer, matching colors from the supply using wire nuts, butt splices or other appropriate connection.

10.4

Connect the green ground wire to the ground bus in the load center and to the grounding lug on the left side of the relay plate.

Caution: *Leave breaker off until installation is complete.*

11.0 Installing and Wiring Current Transformers

Warning: *Current transformers which are not connected to the controller may generate hazardous voltages and currents. Short CT leads together during installation and leave shorted if power is restored before CT's are connected to unit. Once CT's are properly connected to unit, they should no longer be shorted together.*

Note: *Installation of current transformers may need to be coordinated with the local utility company.*

11.1

Disconnect main power to the load center panel by removing the meter or by a main disconnect switch if possible.

11.2

When power is off, install current transformers around main feeder cables between the meter and the main breaker as shown in the wiring diagram on Relay Unit or Figure 3. The current transformers must be installed in the same direction.

11.3

Run current transformer leads into relay unit via the conduit if current transformers are installed within breaker panel and cut the black/white twisted pair of each to a sufficient length to connect to the 4 position terminal block on the right hand side of the Data/Link printed circuit board. Leave about 8-12" extra.

11.4

Strip each conductor back 1/4".

11.5

Connect black and white wires to 4 position terminal block as shown in Table 5 and Figure 5.

Table 5 - Current Transformer Connections To Relay Unit

Terminal #	Terminal Name	Wire Color
1	CT1	White-from CT1
2	CTC	Black-from CT1
3	CTC	Black-from CT2
4	CT2	White-from CT2

11.6

Route current transformer wires and the control cable around the right side of the PC Board and box to avoid close proximity to high voltage (Class 1) wiring.

12.0 Making Up a Load Schedule and Load Assignments

Note: *The 9212 Unit is shipped from the factory ready to operate under the Rotate Load Control Strategy with no preset minimum on/off times on any of the circuits. Changes in load control strategy, minimum on/off times and other system information may be made through the front panel of the Control/ Display Unit. However, all components of the 9212 must first be installed and verified operating properly as set forth in Section 16 of this manual. Instructions for changing load control strategy, minimum on/off times and additional system programming parameters are provided in Section 17 of this manual or may also be obtained from the factory or from your Energy Sentry representative.*

Caution: *Ensure all circuits to be controlled are turned off at the appropriate breaker in the Load Center before proceeding with any wiring.*

Warning: *When controlling heat pump and air conditioning compressor loads, a minimum off time of at least 5 minutes must be programmed. Minimum off times are available on all circuits. (Some manufacturer's may require longer minimum off times for compressor - check with manufacturer.) When installation is complete, minimum on and off times can be programmed in Section 17.*

12.1

Prepare a load schedule identifying which loads will be connected to which circuits. The following are examples only. Your situation may be different and require a variation of these examples. Contact your Energy Sentry representative for applications assistance.

12.1.1 Electric Baseboard Or Radiant Ceiling Heat Homes

Example only. It is recommended that for best results with these types of heating systems, the loads be connected as shown in Example 1.

Example 1. ***Load Control Strategy: Fixed/Rotate***

Circuit #	Load	Priority
1	Dryer	1
2	Hot Water Heater	2
3	Heat #1	3
4	Heat #2	3
5	Heat #3	3
6	Heat #4	3
7	Heat #5	3
8	Heat #6	3

Schedules may be altered as necessary to suit the needs of the particular home and user. This is an example only. For applications assistance, contact your Energy Sentry representative.

12.1.2 Homes with Heat Pumps without Compressor Connected

Example Only. In some heating climates, it may be preferable not to connect the heat pump compressor to the demand controller. Check with your local utility and/or heating contractor to determine whether your compressor should be controlled. If you decide to control your compressor, please refer to Section 12.1.3. Electric forced air furnace strips should be controlled. See Example 2.

Example 2. ***Load Control Strategy: Fixed Priority***

Circuit #	Load	Priority
1	Dryer	1
2	Heat #1 (1A)	2
3	Heat #2 (1B)	3
4	Hot Water Heater	4
5	Heat #3 (2A)	5
6	Heat #4 (2B)	6
7	Heat #5 (3A) (if needed)	7
8	Heat #6 (3B) (if needed)	8

12.1.3 Homes with Heat Pumps with Compressor Connected

Example only. When assigning loads for homes with heat pumps or air conditioners with the compressor connected, compressors should be connected to Circuits 1, 2, 3 and so on as discussed above. See Examples 3 and 4 (on page 21). If multiple compressors are controlled *and* an equal level of comfort is desired, set compressor control points to the same priority level.

12.2

Use the form on page 31 to record the load schedule.

13.0 Wiring Power Relays to Heat Circuits and Hot Water Heater

13.1

Turn off all breakers of loads which are going to be connected to the controller.

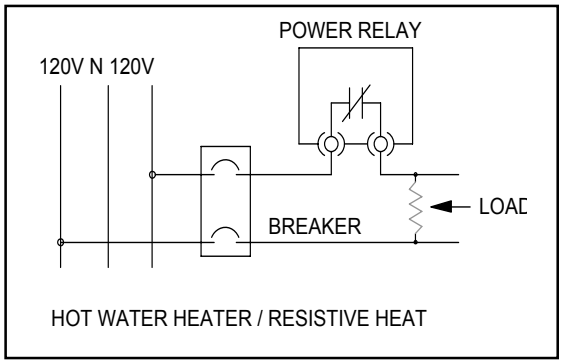
13.2

Heat circuits and the hot water heater are connected to the breaker panel as shown in Figure 6. Both wires are connected to a 240 VAC double pole breaker.

13.3

The relay is inserted in series with the load on one side of the load only as shown in Figure 6.

Figure 6. Typical Power Relay Load Interconnection



Examples 3 and 4.

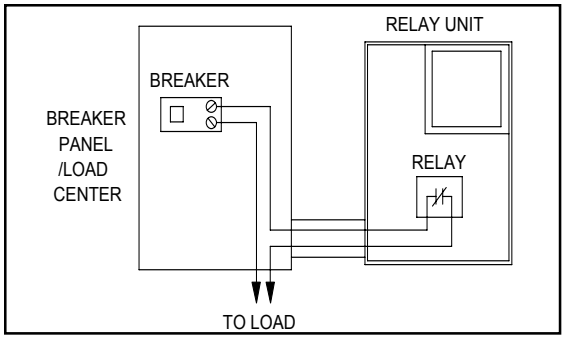
Load Control Strategy:	***Fixed Priority***		***Fixed/Rotate***	
Circuit #	**Example 1 Load Schedule A**	**Priority**	**Example 2 Load Schedule B**	**Priority**
1	Dryer	1	Dryer	1
2	Compressor (A/C)	2	Compressor A(A/C#1)	2
3	Water Heater	3	Compressor B(A/C#2)	2
4	Heat #1	4	Water Heater	3
5	Heat #2	5	Heat #1A	4
6	Heat #3	6	Heat #1B	4
7	Heat #4	7	Heat #2A	4
8	Not Used	-	Heat #2B	4

This schedule may be altered as necessary to suit the needs of the particular home and user. This is an example only. Your situation may be different. For assistance contact your Energy Sentry® representative. Circuits with compressors must have minimum off and minimum on times programmed in. See Section 17 for system programming procedure.

13.4

Remove either one of the two wires from the load's breaker, and wire-nut this lead to a short length of #10 or #12 AWG (depending on load size) wire which runs into the Relay unit. Wire-nut this length of wire to one lead of the relay's contact. With another short length of the appropriately sized wire, wire-nut it to the other lead of the relay's contact. Connect the other end of this short length of wire back to the circuit breaker's terminal where the wire was originally removed as shown in Figure 7.

Figure 7. Power Relay Interconnection Schematic



13.5

Repeat this procedure for the remainder of the heat circuits and hot water heater(s). Heat circuits are normally on 20 Amp circuit breakers and require #12 AWG wire. Hot water heaters are normally on a 30 Amp breaker and require #10 AWG wire. All Energy Sentry relays are equipped with #10 AWG Red lead wire.

14.0 Wiring Power Relays to Dryer

14.1

Turn off dryer circuit breaker.

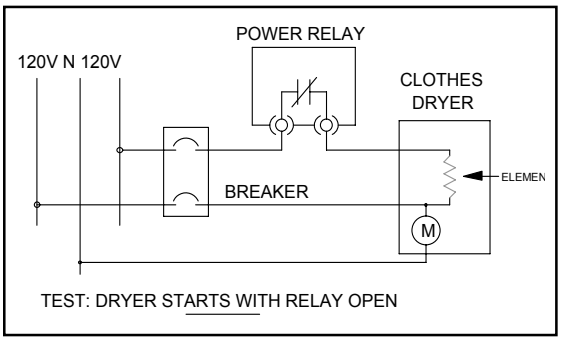
14.2

The dryer is connected to the breaker panel as shown in Figure 8. Both wires are connected to a 30 Amp, 240 VAC double pole breaker.

14.3

The relay is inserted in series on the heating element side of the load only, as shown in Figure 8. The motor of the dryer is not connected. Care must be taken to insure that the dryer is connected properly since improper connection may damage the dryer.

Figure 8. Typical Clothes Dryer Interconnection



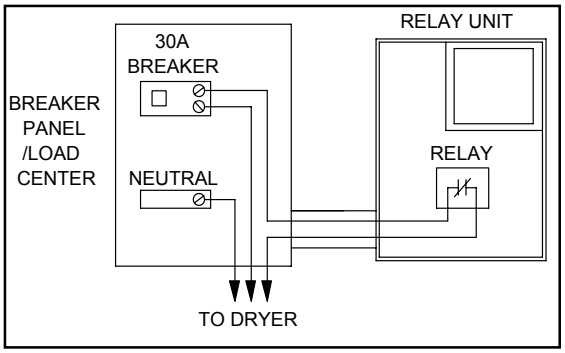
14.4

Turn off breaker. Remove one of the two wires from the dryer and cap with wirenut. Turn on breaker. Turn on dryer and suspend this wire such that it will not short to anything. Turn on dryer to see if the motor starts. If so, this is the correct wire to attach to the power relay. To verify this, turn off breaker, reattach this wire to the breaker and remove the other wire from the breaker. Turn on breaker. Start the dryer again and this time the dryer's motor should not start. If it does, (dryer starts with either wire disconnected) your dryer may require some internal wiring modifications before it can be connected to the load controller. Contact the dryer manufacturer or consult the dryer 's wiring diagram.

14.5

Turn off dryer breaker. Remove the proper wire from the breaker (with the proper wire removed, the dryer motor should start). Run two lengths of #10 AWG wire between the breaker panel and the relay unit. Wire-nut the disconnected length of wire to one of the lengths of wire in the breaker panel. Wire-nut the other end of this wire to one red lead of the relay's contact. From the relay's other red lead of the contact, wire-nut this to the other short length of wire that returns into the breaker panel. Connect the other end of the wire back to the dryer's circuit breaker panel as shown in Figure 9.

Figure 9. Dryer Interconnection Schematic



15.0 Wiring Power Relays to Heat Pumps and Air Conditioners

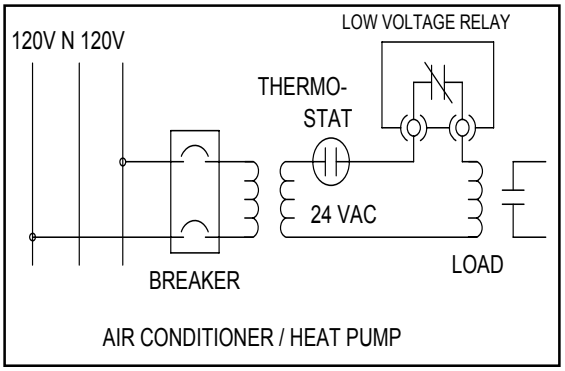
15.1

Turn off breakers of loads which are going to be connected to the controller.

15.2

Connecting air conditioners and/or heat pump compressors to the Energy Sentry unit is normally accomplished by inserting a relay in series with the low voltage 24 VAC thermostat control loop as shown in Figure 10 (generalized drawing).

Figure 10. Typical Low Voltage Load Interconnection



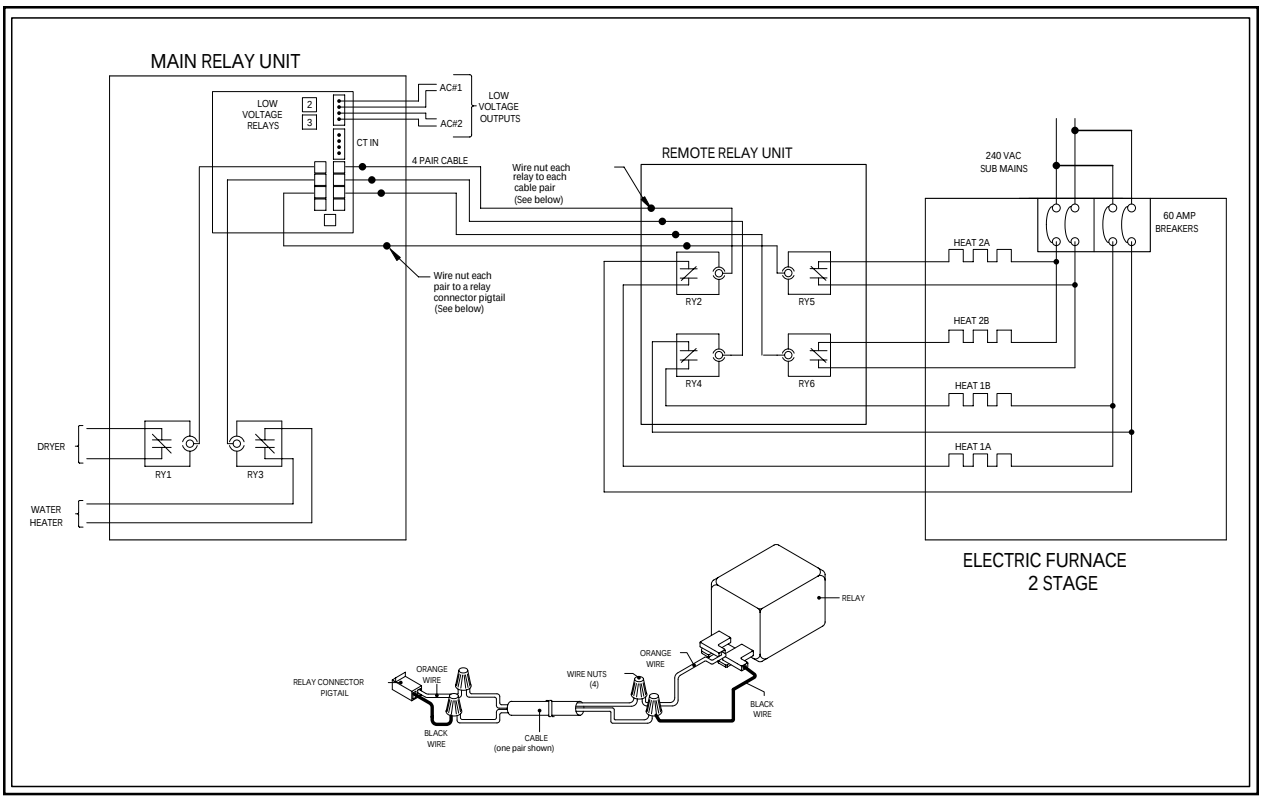
15.3 Connecting Demand Controller to an Electric Furnace

When connecting an electric furnace to the demand controller, the simplest, most economical method is to install a remote relay box at the furnace. This relay box usually contains 3 to 6 relays for connection to each individual heat strip in the furnace. These relays are connected to the main relay unit by means of a multiconductor cable, normally one pair per relay. For example, for 4 remote relays, a #18 AWG eight conductor cable is required. Twisted pair or color coded wire is recommended for this application for convenience. Relay connector pigtails (optional) should be used with the unit for connection at the main relay unit to the multi-conductor cable. At the remote relay unit, relay leads are wire-nutted to the multiconductor cable as shown in Figure 11.

15.3.1

Determine the staging sequence of the electric furnace. For example, many furnaces have 3 stages of heat. Stage #1 consists of two 5 KW heating elements. Stage #2 many times also consists of two 5 KW heating elements and Stage #3 has one 5 KW heating element.

Figure 11. Electric Furnace Application



15.3.2
Wire the heating elements of Stage #1 to the first two available demand controller relays. See Section 12.1.2 for an example. The heating elements, Heat 1A and Heat 1B are wired to relays #2 and #3. Heating elements #2A and #2B are wired to Relays #5 and #6. Heating element #3 is wired to Relay #7, etc. The dryer would be wired to Relay #1 and water heater to Relay #4.

15.3.3
Run the multi-conductor cable from the main relay box to the remote relay box. Use the optional relay connector pigtails (P/N 09000-65001) to connect each conductor pair to the Relay Output Jacks in the main relay unit. In the remote relay unit, wire nut the opposite end of these conductors to the relay. Make sure the color code is observed. The orange wire of each relay should go back to the top pin of each 2 pin relay output jack.

15.3.4
Do the remaining relays similar to the first making sure that each relay has it's own pair of wires. Do not common any wires together.

16.0 System Checkout

16.1 Prior to Test

16.1.1
Turn off all breakers in the load center which are connected to controlled loads. The demand controller's breaker should also be off at this time.

16.1.2
Replace cover on relay unit. Do not tighten screws yet.

16.1.3
Be sure all thermostats or switches for controlled loads are on.

16.2 Conduct Initial Operation Test

16.2.1
Turn on the 15 Amp 120 VAC breaker labeled "Energy Sentry Demand Controller."

16.2.2
The Control/Display unit should turn on, beep once, and light up with the factory set "6" in the "KW Demand Limit" window. If unit fails to light up or if you do not hear the relays "click" open, turn power off immediately. Check wiring and connections to make sure that the unit is wired properly. Try powering unit up again as before. All relays will open approximately one-half second after power is restored. If problems still arise, call your Energy Sentry representative.

16.2.3
All eight "Circuits On" indicator lights should be off after power up. The first relay will turn on about 8 seconds after power up. Then every minute thereafter one circuit indicator light will come on.

16.3 Conduct Power Off Test

16.3.1
All "Circuts On" LED lights should now be on.

16.3.2
Set demand limit to 1 KW according to the instructions on the front panel of the Control/Display Unit.

16.3.3
Place actual demand in the “Instantaneous” Mode.

16.3.4
Turn on a large (greater than 1 KW) uncontrolled load such as the kitchen range. Leave all controlled loads off.

16.3.5
Within a minute or two, all “Circuits On” lights on the Control/Display unit should turn off (unless minimum on times are programmed) and the alarm buzzer should sound (unless alarm volume is turned off).

16.3.6
Increase the demand limit setting 1 KW at a time until the alarm buzzer stops. The demand limit should be slightly larger than the uncontrolled load. This verifies that the unit is measuring power properly.

16.3.7
Turn off uncontrolled load.

16.4 Conduct Power On Test

16.4.1
Insure all controlled load breakers in the load center are off except for the 15 Amp “Energy Sentry Demand Controller” breaker. Observe the Instantaneous Demand in the Control/Display Unit while in the Instantaneous Mode. This should show a very low value for consumption.

16.4.2
Set the demand limit to a number 2-3 times higher than the estimated demand limit of the installation.

16.4.3
Turn up (for heating) or down (for air conditioning) all thermostats.

16.4.4
Turn on all controlled load breakers (i.e. start dryer and run hot water). This demand limit will allow all of the circuits to be turned on in about 8 minutes (1 minute per circuit). This verifies that all relays are actually closed and each circuit is providing power to the load.

Caution: *Do not leave controlled loads on for more than a few minutes as this may cause the electric meter to register a high demand peak.*

Note: *If minimum on and off times have been programmed into the unit, then loads controlled under these times will switch only when the appropriate time intervals have elapsed.*

16.5

Restore household loads to the desired condition. The circuit breaker marked “Energy Sentry Demand Controller” should be left on with desired demand limit set into the Control/Display Unit.

17.0 System Programming

17.1

The System Programming Mode of the 9212 is designed to give the user ultimate flexibility in “tailoring” the controller’s operation to the user’s exact requirements. In this mode, the user programs the controller at the Control/Display front panel and answers a series of questions which tell the controller: 1.) How many relays are connected to the system; 2.) What load control strategy it will operate under; and 3.) The minimum on and minimum off times for all 8 control points, if times are required. 4.) Miscellaneous system information. The system programming mode consists of a series of up to 28 “questions or settings” in seven different groups. The question is designated by the Alpha-numeric symbol (“mnemonic”) or abbreviation. The questions are stepped through one at a time using the Demand Limit key. The “answer” or data is programmed into the “actual” display window using the “up” or “down” keys.

The six groups of questions are as follows:

Group #	Function	# of Questions
1	Off-Peak Set Point	1
2	Sets the **Number of Relays Connected "nr"**	1
3	Sets **Priority** for each load	8 Max*
4	Sets **Minimum On Time** for each load.	8 Max*
5	**Sets Minimum Off Time** for each load	8 Max*
6	**Sets the Average Period "AP"** (15, 30, or 60 min.)	1
7	**Sets the Demand Range "dr"** (40 OR 80 KW)	1

*Only the number of control points selected appear in each of these sequences.

Step 1. To enter the system programming mode depress the "Buzzer Volume" and "Reset Peak" keys for about 5 seconds. The controller will turn off the Instantaneous, Average, Peak and Reduce Load LEDs.

Step 2. An "oL" will appear in the left window. This is the off-peak demand limit setting which is essential when your 9212 is controlled by an external signal, such as a utility load management switch. This should be set to "OFF" in the right window. If an actual Off-Peak demand limit is desired, press the up or down keys until the desired number is reached. Ignore this setting for normal stand-alone use. Press the "Demand Limit" key to proceed to the next setting.

Step 3. **Number Of Relays Connected (nr).** This question tells the controller how many relays the system actually has. This is important so the controller does not spend time trying to turn on and off relays (and loads) on unused control points. The system should be factory programmed with eight relays (control points) enabled regardless of the number of relays included in the system. This will need to be set for the number of relays in the system once installation is complete. To determine the number of relays connected, count the number of relays mounted in the system, including the low-voltage relays on control points 2 and 3, if used. The number of relays must be sequential starting with control point/relay #1. If nr=4, relay control points 1-4 will be enabled. If nr=7, relay control points 1-7 will be enabled.

Use the Increase or Decrease Key to enter the appropriate number of relays into the system. Then press the "Demand Limit" key to proceed to the next setting.

Step 4. **Programming the Load Priorities (Pr)** "Pr1" should appear in Demand Limit display window and the corresponding priority setting should appear in the Actual display window. Read across the display as follows: the Priority (Pr) for Circuit #1 is Priority 1. (All units are factory set with all loads programmed for fixed priority by setting them sequentially from 1 to 8. You may wish to change Load #1 to a lower priority. If so, push the Increase Key until the priority level desired (1 to *) is reached. (Higher numbers are actually lower priorities).

Step 5. Press the Demand Limit Key once. "Pr2" will to be displayed in the Demand Limit display window. The Priority for circuit #2 will be displayed in the Actual display window. If you wish to change the priority of Circuit #2 press the Increase or Decrease Key until the desired priority is displayed in the Actual display window.

Step 6. Repeat Step 5 for Circuit #3.

Step 7. Repeat Step 5 for Circuit #4.

Step 8. Repeat Step 5 for Circuit #5.

Step 9. Repeat Step 5 for Circuit #6.

Step 10. Repeat Step 5 for Circuit #7.

Step 11. Repeat Step 5 for Circuit #8.

Press the "Demand Limit" key to proceed to the next setting.

This completes the programming of the Priorities and the Load Control Strategy.

Step 12. **Programming the Minimum On Times (on).** The Minimum On Times are programmed much the same way the Priorities were programmed above. Press the Demand Limit Key. The letters "on1" should appear in the Demand Limit display window. The current Minimum On Time for control point #1 will appear in the Actual display window. The controller should be factory set for zero "0" minutes Minimum On Time. If a Minimum On Time for Circuit #1 is desired, press the Increase or Decrease Key until the desired Minimum On Time is desired. Press the Demand Limit Key to proceed to the next setting.

Step 13. Repeat Step 12 for Circuit #2 Minimum On Time.

Step 14. Repeat Step 12 for Circuit #3 Minimum On Time.

Step 15. Repeat Step 12 for Circuit #4 Minimum On Time.

Step 16. Repeat Step 12 for Circuit #5 Minimum On Time.

Step 17. Repeat Step 12 for Circuit #6 Minimum On Time.

Step 18. Repeat Step 12 for Circuit #7 Minimum On Time.

Step 19. Repeat Step 12 for Circuit #8 Minimum On Time.

Press the "Demand Limit" key to proceed to the next setting.

This completes the programming of the Minimum On Times.

Step 20. Programming the Minimum Off Times (oF). The Minimum Off Times are programmed much the same way as the Mini mum On Times were programmed above. Press the Demand Limit Key. The letters "oF1" should appear in the Demand Limit display window. The current Minimum Off Time for control point #1 will appear in the Actual display window. The controller should be factory set for zero “0” minutes Minimum Off Time. If a Minimum Off Time for Circuit #1 is desired, press the Increase or Decrease Key until the desired Minimum Off Time setting is reached. Press the Demand Limit Key to proceed to the next setting.

Step 21. Repeat Step 20 for Circuit #2 Minimum Off Time.

Step 22. Repeat Step 20 for Circuit #3 Minimum Off Time.

Step 23. Repeat Step 20 for Circuit #4 Minimum Off Time.

Step 24. Repeat Step 20 for Circuit #5 Minimum Off Time.

Step 25. Repeat Step 20 for Circuit #6 Minimum Off Time.

Step 26. Repeat Step 20 for Circuit #7 Minimum Off Time.

Step 27. Repeat Step 20 for Circuit #8 Minimum Off Time.

Press the "Demand Limit" key to proceed to the next setting.

This completes programming of the Minimum Off Times.

Step 28. Set the **Averaging Period (AP).** This question sets the Averaging Period of the demand controller so it is the same as the demand meter on the home. An "AP" will appear in the Demand Limit display window. The Averaging Period of 15, 30 or 60 minutes will appear in the Actual display window. The controller is normally factory set for a 15-minute averaging period. If a change of the Averaging Period is needed, press the Increase or Decrease Key until the appropriate Averaging Period is displayed. When the proper averaging period is entered, press the Demand Limit Key to proceed to the next setting.

Step 29. Set the **Demand Range (dr).** This setting sets the controller for the proper size of Current Transformers that the unit is equipped with. The controller is normally equipped with two 200 Amp current transformers and factory pro grammed for the 40 KW Demand Range. If 400 Amp current transformers are used, 80 KW Demand Range *must* be used to measure power correctly. To change the Demand Range, press the Increase or Decrease Key until the proper demand range is selected.

Step 30. To return the controller to normal operation, press the “Demand Limit” Key one more time and the current Demand Limit and Actual Demand should appear in the display window.

Step 31. This completes the System Programming mode of the 9212. If you need additional information or assistance in programming the 9212, contact your Energy Sentry representative.

Note: *To excape from the system programming mode at any point, press the Display Mode Key.*

17.2 Examples of Programs

17.2.1

For the load schedule shown in Section 12.1.1 the following system program is recommended:

System Program 1

Selected Load Control Strategy: Fixed/Rotate Combination.

System Configuration: Eight relays installed.

Installed Heating System: Six circuits, electric baseboard or radiant ceiling; dryer (#1) and hot water heater (#2), connected to unit, 2 circuits.

Electrical Service Size: 40 KW.

Averaging Period: 15 minutes.

"Limit"		Question	"Actual" Display Answer
oL		Off-peak demand limit	oFF
nr		# of Relays	8
Pr1		Priority for Load #1	1
Pr2		Priority for Load #2	2
Pr3		Priority for Load #3	3
Pr4		Priority for Load #4	3
Pr5		Priority for Load #5	3
Pr6		Priority for Load #6	3
Pr7		Priority for Load #7	3
Pr8		Priority for Load #8	3
on1		Min. On Time Load #1	0
on2		Min. On Time Load #2	0
on3		Min. On Time Load #3	0
on4		Min. On Time Load #4	0
on5		Min. On Time Load #5	0
on6		Min. On Time Load #6	0
on7		Min. On Time Load #7	0
on8		Min. On Time Load #8	0
oF1		Min. Off Time Load #1	0
oF2		Min. Off Time Load #2	0
oF3		Min. Off Time Load #3	0
oF4		Min. Off Time Load #4	0
oF5		Min. Off Time Load #5	0
oF6		Min. Off Time Load #6	0
oF7		Min. Off Time Load #7	0
oF8		Min. Off Time Load #8	0
AP	—	Averaging Period	15
dr	—	Demand Range	40

17.2.2

For the load schedule shown in Section 12.1.2, the following system program is recommended:

System Program 2

Selected Load Control Strategy: Fixed Priority.

System Configuration: Six relays installed.

Heating System: Four circuits: heat pump with electric forced air furnace, forced air furnace controls heat in fixed sequence. Hot water heater (#2) and dryer (#1) connected to unit, 2 circuits. Heat pump compressor not connected.

Electrical Service Size: 40 KW.

Demand Averaging Period: 30 minutes.

"Limit"	Question	"Actual" Display Answer
oL	Off-peak demand limit	oFF
nr	# of Relays	6
Pr1	Priority for Load #1	1
Pr2	Priority for Load #2	2
Pr3	Priority for Load #3	3
Pr4	Priority for Load #4	4
Pr5	Priority for Load #5	5
Pr6	Priority for Load #6	6
on1	Min. On Time Load #1	0
on2	Min. On Time Load #2	0
on3	Min. On Time Load #3	0
on4	Min. On Time Load #4	0
on5	Min. On Time Load #5	0
on6	Min. On Time Load #6	0
oF1	Min. Off Time Load #1	0
oF2	Min. Off Time Load #2	0
oF3	Min. Off Time Load #3	0
oF4	Min. Off Time Load #4	0
oF5	Min. Off Time Load #5	0
oF6	Min. Off Time Load #6	0
AP	Averaging Period	30
dr	Demand range	40

17.2.3

For the load schedule shown in 12.1.3, the following program is recommended:

System Program 3

Selected Load Control Strategy: Fixed Priority.

System Configuration: Seven Relays installed.

Heating System: Five circuits: heat pump with electric forced air furnace, forced air furnace controls heat in

fixed sequence. Hot water heater (#3) and dryer (#1) connected to unit, 2 circuits. Heat pump compressor connected to unit on circuit #2.

Electrical Service Size: 80 KW.

Demand Averaging Period: 60 minutes.

"Limit"	Question	"Actual" Display Answer
oL	Off-peak demand limit	oFF
nr	# of Relays	7
Pr1	Priority for Load #1	1
Pr2	Priority for Load #2	2
Pr3	Priority for Load #3	3
Pr4	Priority for Load #4	4
Pr5	Priority for Load #5	5
Pr6	Priority for Load #6	6
Pr7	Priority for Load #7	7
on1	Min. On Time Load #1	0
on2	Min. On Time Load #2	12
on3	Min. On Time Load #3	0
on4	Min. On Time Load #4	0
on5	Min. On Time Load #5	0
on6	Min. On Time Load #6	0
on7	Min. On Time Load #7	0
oF1	Min. Off Time Load #1	0
oF2	Min. Off Time Load #2	6
oF3	Min. Off Time Load #3	0
oF4	Min. Off Time Load #4	0
oF5	Min. Off Time Load #5	0
oF6	Min. Off Time Load #6	0
oF7	Min. Off Time Load #7	0
AP	Averaging Period	60
dr	Demand range	80

The twelve minute minimum-on time is recommended for efficiency. The six minute minimum-off time is required to prevent short cycling of the compressor. Minimum-off times of less than 4 minutes are not recommended, unless the compressor has its own short cycle protection time delay. For shorter demand average periods, a shorter minimum-on time is recommended. For example, for a 15 minute averaging period a minimum-off time of 4 or 5 minutes and a minimum-on time of 6 or 7 minutes would be preferable.

17.2.4

For the load schedule shown in Section 12.1.3 Example #2, the following system program is recommended:

System Program 4

Selected Load Control Strategy: Rotate/Fixed Priority

System Configuration: Eight relays installed

Heating System: Two heat pumps, each with electric forced air furnaces with four circuits of heat. Forced air furnaces control heat in alternating sequence. Hot water heater (#3) and dryer (#1) connected to unit, 2 circuits. Two heat pump compressors connected to unit on circuits #2 and #3, equal priority.

Electrical Service Size: 40 KW

Averaging Period: 60 minutes

"Limit"	Question	"Actual" Display Answer
oL	Off-peak demand limit	oFF
nr	# of Relays	8
Pr1	Priority for Load #1	1
Pr2	Priority for Load #2	2
Pr3	Priority for Load #3	2
Pr4	Priority for Load #4	3
Pr5	Priority for Load #5	4
Pr6	Priority for Load #6	4
Pr7	Priority for Load #7	4
Pr8	Priority for Load #8	4
on1	Min. On Time Load #1	0
on2	Min. On Time Load #2	10
on3	Min. On Time Load #3	12
on4	Min. On Time Load #4	0
on5	Min. On Time Load #5	0
on6	Min. On Time Load #6	0
on7	Min. On Time Load #7	0
on8	Min. On Time Load #8	0
oF1	Min. Off Time Load #1	0
oF2	Min. Off Time Load #2	5
oF3	Min. Off Time Load #3	6
oF4	Min. Off Time Load #4	0
oF5	Min. Off Time Load #5	0
oF6	Min. Off Time Load #6	0
oF7	Min. Off Time Load #7	0
oF8	Min. Off Time Load #8	0
AP	Averaging Period	60
dr	Demand range	40

18.0 Wrap-Up

18.1

The Energy Sentry Demand Controller unit should now be ON and all breakers for loads controlled by the Energy Sentry should also be ON.

18.2

The Energy Sentry should be programmed with the proper System Program in it.

18.3

Control/Display Unit should display Instantaneous, Average and Peak Kilowatt power readings. "Circuits On" LED indicator lights should show which loads are enabled.

18.4

Relays in relay unit should be turning loads on and off as necessary.

18.5

Replace the cover on the Energy Sentry and on the breaker panel.

18.6

Turn to the back page of this manual. Record the following information in the spaces provided:

- Load control strategy selected.
- Circuit or load assignments.
- Load Priorities.
- Minimum on/off times for all circuits if changed, otherwise write zero.
- Date of installation.
- Name of Energy Sentry dealer or installing electrical contractor.
- Complete warranty card and drop in mail to Brayden Automation Corporation.

Note: *Warranty card must be sent in for proper registration of unit. Warranty is not valid unless warranty card has been received, and unit has been registered. Serial number must be included on warranty card.*

18.7

Leave the Owner's/Installation Manual in a convenient location near the Control/Display Unit. If install is new construction, place manual in kitchen drawer with appliance manuals.

18.8

This concludes the installation of the Energy Sentry 9212 *Series 3* Demand Controller.

Thanks for choosing Energy Sentry®!

Limited Three-Year Warranty

Energy Sentry Demand Controllers and their components are warrantied by Brayden Automation Corporation against defects in materials and workmanship for three (3) years from the date of original installation, provided that the original date of installation is within one year from date of manufacture. This warranty is further conditioned upon the Energy Sentry Demand Controllers being properly installed and used for their ordinary and intended purposes. During the term of this warranty, Brayden Automation Corporation, through its authorized representative, will repair, or at its option, replace at no charge an Energy Sentry Controller or its components that proves to be defective, provided that you comply with the requirements set forth in this warranty.

Requirements and Conditions of Warranty

1) The limited warranties contained herein extend exclusively to the original purchaser of the Energy Sentry Controllers and members of purchaser's immediate household. If you sell your house after installation of the Energy Sentry Controller, this warranty is non-transferable to the new owner(s).

2) The controller must be installed by a duly qualified and licensed electrical contractor or authorized dealer representative. Any removal and /or reinstallation must be done by a duly qualified and licensed electrical contractor or authorized dealer representative.

3) Repairs or replacement shall be undertaken by duly authorized service dealers or Brayden Automation Corporation. If you or any member of your family or any other unauthorized person manipulates, moves, alters, damages or attempts to repair or replace the Energy Sentry Controller, the warranty shall be void and of no effect.

4) Notification to Brayden Automation Corporation or its authorized dealer under this warranty must be received within one week after discovering any defect in materials or workmanship.

5) If the Energy Sentry Controller is removed and returned to the authorized service dealer or "Brayden Automation Corporation, 6230 Aviation Circle, Loveland, Colorado, 80538" for repair or replacement under this warranty, all shipping and handling charges must be prepaid by you. Transit damage is not covered by the warranty and Brayden Automation Corporation suggests you insure shipments to the service dealer or to the factory. Remember to send proof of date of installation as well as the serial number of the unit which is located on the inside of the relay unit.

6) The warranty does not apply if the Energy Sentry Controller has been damaged by accident, alterations, abuse, misuse, improper installation, act of nature or as a result of service or modifications by someone other than an authorized service representative.

7) In no event will Brayden Automation Corporation be liable for any lost profits, lost savings, incidental damages or other economic consequential damages, even if Brayden Automation Corporation has been advised of the possibility of such damages due to the proper or improper workings of the Energy Sentry Controller.

8) This warranty is for factory service only. Brayden Automation Corporation will not be responsible for any field service expense for a licensed electrician or authorized service representative to service the demand controller during or after the warranty period is in effect.

This warranty is expressly made in lieu of any other warranties expressed or implied specifically including any warranty of merchantability or fitness for a particular purpose.

This warranty is further conditioned on the return and receipt of the warranty registration card.

This warranty gives you specific legal rights, and you may have other rights which vary from state to state.

Required Warranty Information

Installing Electrician: Fill out applicable information on this page & items 5, 6, 7 and 8 on warranty card.

1. Strategy Load Schedule and Control (check applicable strategy):

☐ Fixed ☐ Rotating ☐ Combination Fixed/Rotate

Control Circuit	Household Circuit Assignment/Description	Priority (if applicable)	Minimum "On/Off" Time*
1	_____	_____	mins on____/off____
2	_____	_____	mins on____/off____
3	_____	_____	mins on____/off____
4	_____	_____	mins on____/off____
5	_____	_____	mins on____/off____
6	_____	_____	mins on____/off____
7	_____	_____	mins on____/off____
8	_____	_____	mins on____/off____

** Minimum "On/Off" Times on all control circuits are selectable — see Section 17.0 of this manual or contact your dealer for more information.*

Homeowner:

1. Record circuit assignments above inside the door of the Control/Display Unit.
2. Fill out items 1-4 on warranty card and mail today!
3. Record items 5, 6 and 7 from warranty card below for your records.

Date of installation: _____

Serial number: _____

Installing electrical contractor: _____ Phone: _____

Brayden Automation Corp.
6230 Aviation Cicrle
Loveland, CO 80538
(970) 461-9600
FAX (970) 461-9605
www.brayden.com

P/N 09212-94100E