Wiring Infrared Heaters

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General Information

Northern Lights' parts store sells far infrared panels, rated at 300Watts either for 120 volt or 240 volt. These come with 12" leads and need to be wired in a manner that complies with the electrical code. Typically one would use #18 or #16 AWG 2 conductor cable coming to each one from a junction box and use red butt splice connectors (or twist connectors if you daisy-chain) to connect to the 12" leads. Note that the frame for these heaters is a wood frame and that there is no metal to ground. Thus a ground wire can serve no purpose and is not provided.

We sell the IR heaters as components, not as a complete sauna system. Thus it is up to the customer or the electrician hired to install them in his/her sauna room in a manner that meets code and in a manner that they can be properly controlled.

Far infrared heaters are not designed to directly heat the air, as is the case for normal sauna heaters. Instead the radiant energy strikes a surface and heats that surface, which then indirectly heats the air. If the surface is a person's body, the skin adsorbs some of this radiant energy, causing a sweating reaction. The far infrared frequencies are superior in the depth of penetration than the near infrared frequencies.

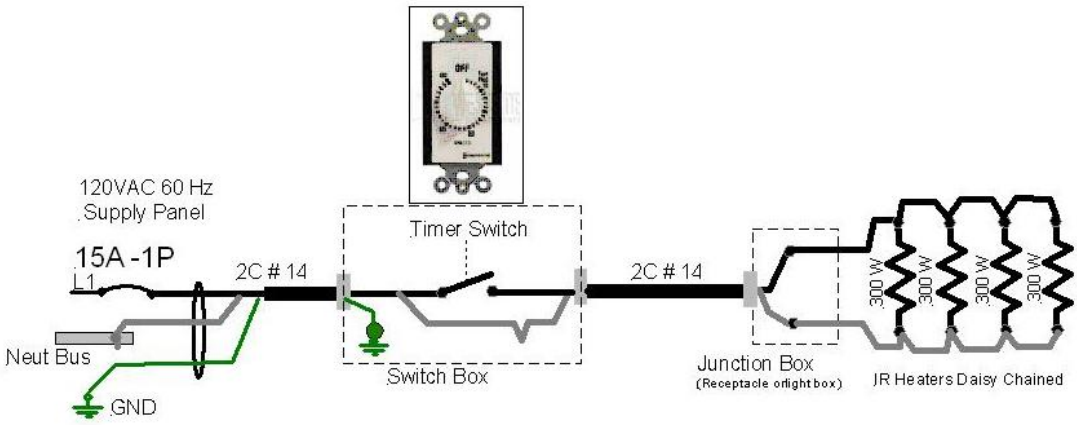
If you wanted the IR panels to raise the air temperature to be hot, as is done with a traditional sauna heater, you would need the same total installed kilowatts as you would install if you used a traditional sauna heater. This could become expensive if a large sauna room is involved, compared to the traditional heaters. Thus IR heaters are most suitable for compact saunas or, when a large sauna room is involved, they can be used to augment traditional sauna heaters. Typically if combined with a traditional wet/dry sauna heater one would size the IR heaters to provide 10 watts/cubic-foot of space. If used alone, one would increase this to 16 Watts/cubic-foot. To work effectively the panel needs to be close to the body and stay low, at the level of the body. Install the panels, either vertically or horizontal, above the seats. You can have some below the seats if there is room. Provide about ½" of space behind the panel to allow for some air circulation behind the panel. Placing the panels, high, wastes the energy. Further it is recommended you restrict the ceiling in the sauna room to 7ft or less. You want to keep the heat in your vicinity and not have it wasted high up.

A common question relates to the wiring information. It is primarily your electrician's responsibility to address this. However here are some guidelines.

Wiring to a Small Number of 120 volt IR Heaters

If you are using a small number of IR heaters, you would have the service cable coming from the service panel, to a switch box. The switch box would contain a 1 hour timer, that then supplies power to IR heaters. In that case typically you would purchase the 120 volt units, and wire them in a parallel daisy chain manner, as you would for example a number of lights that are controlled by the same switch. Wire size would be selected accordingly. For example, you would use #14/2 to the 1st IR heater and then continue with lighter 2 conductor cable. You can if you wish deploy a 2-pin connectors at the IR heater. These do not come with the heaters

Figure 1 - Schematic - Small Number of 120 volt IR Heaters with Timer



Wiring to a Large Number of 120 volt IR Heaters

If you will be using more than 5 IR heaters then you can use the same timer technique but use a contactor to handle the heavier load switching as follows:

Figure 2 - Schematic - 6-10 120 volt IR Heaters with contactor and Timer

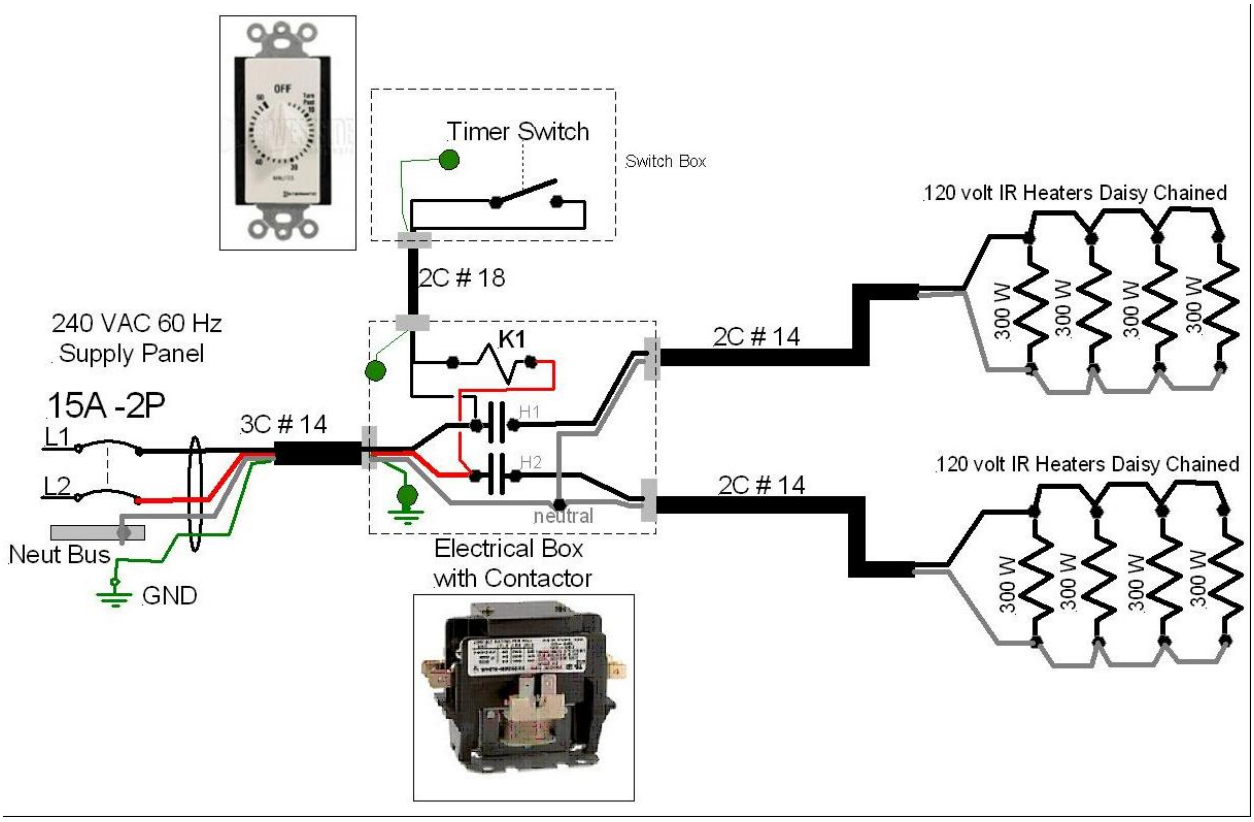
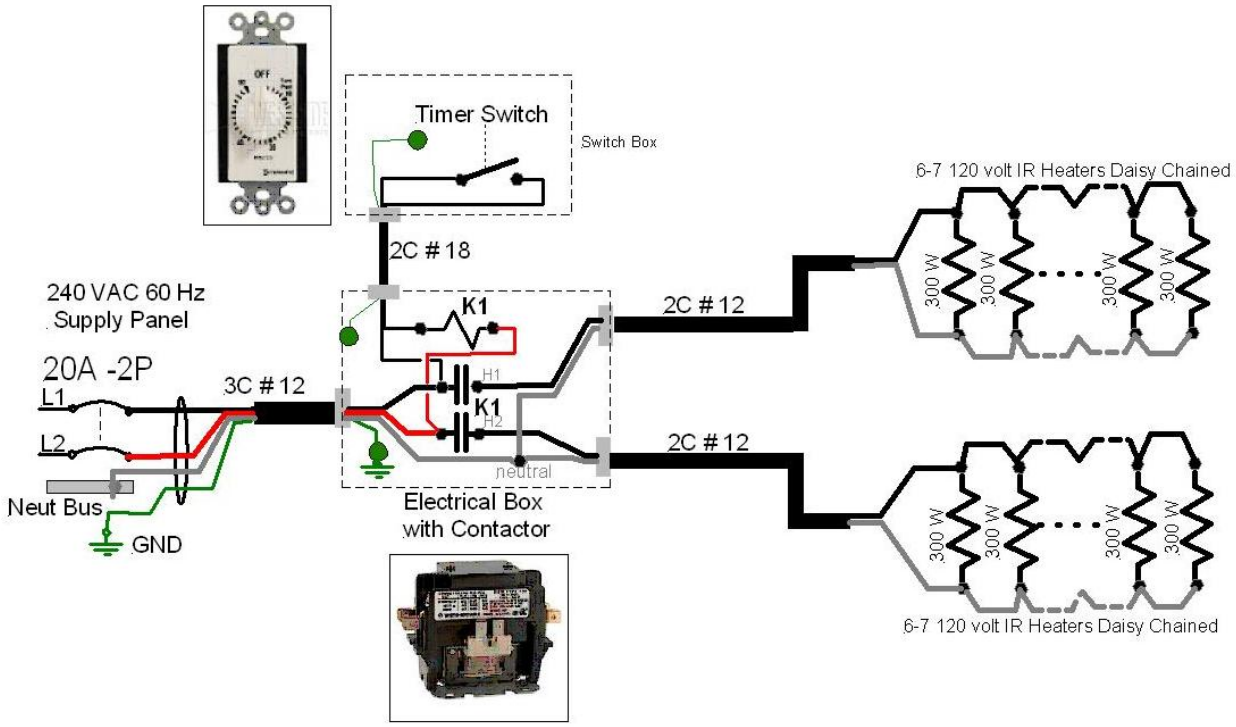


Figure 3 - Schematic -12-14 120 volt IR Heaters with Contactor and Timer

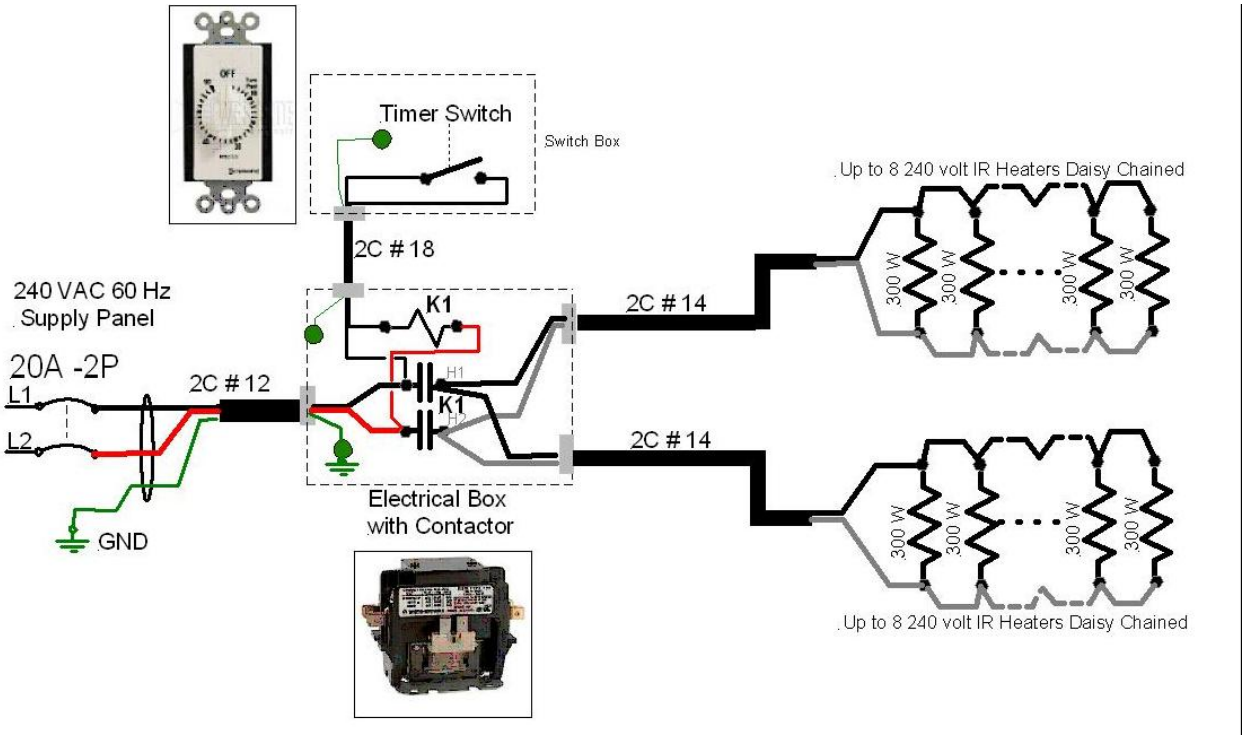


The difference between the Figure 2 and 3 is in the circuit breaker and cable sizes. We can supply the contactor (2-Pole, rated 40 Amp with 240 volt coil) for $49.00 plus shipping. The timer you can purchase at a home improvement or electrical store. We do not supply cables, the electrical box for the contactor (6” x6” x 3”) or the timer and its switch box. Since the contactor has plenty of current head room, you can extend the number of IR panels used, provided the circuit breaker and cabling is also suitable increased in ampacity.

Wiring to a Large Number of 240 volt IR Heaters

When 240 volt IR heater's are used, the wiring can be somewhat simplified in that no neutral is required. This is illustrated next figure.

Figure 4 Wiring up to 16 240 volt IR Heaters with Timer and Contactor.



Using a Homecraft Digital Sauna Controller with IR Heaters

None of the previous control schemes deploy a temperature controller to limit the upper temperature. That is because for the most part the air temperature does not get that hot and once you have sweated long enough, you would simply turn off the power to the IR heaters. If temperature limiting is required then we can provide a digital sauna controller which performs both the timing function and the temperature limiting function. In order for the temperature sensor to measure the air temperature (rather than being heated by the IR radiation), the senor should be attached to some block that has some heat capacity, such as a piece of metal or a stone, and this be covered. Locate the senor about 9 inches from the ceiling.

The next Figure 5 shows how the Homecraft TKE sauna controller can be utilized to control up to 12 x 240 volt 300 Watt IR heaters. The TKE internal relays (those on the circuit board) can switch up to 30 Amps, so the unit could actually switch more than 12 units, if the circuit breaker and cable size is increased. For more than 12 units we prefer however to then use the TKE/1 which includes a separate 2 pole 40Amp contactor that is more robust. See Figure 6, in that case.

Both the TKE and the TKE/1 sauna controllers come with a supplied electrical box that contains the switching circuit board as well as the contactor (TKE/1) model. Also supplied is the digital control panel, and a washer style thermister (temperature sensor) and a protective shroud. The control panel is in fact the "controller". It sends a signal to the TKE circuit board according to whether or not the relays should or should not be energized. The control panel is normally installed on an outside wall of the sauna. No electrical box is supplied with the kit for this purpose. A 2-gang receptacle box will serve that purpose. Approximately 12 ft of 4-conductor control cable to connect the digital control panel to the TKE circuit board is supplied. Also supplied is 2-conductor control cable to attach the thermister to the control panel. It is recommended that the thermister leads be soldered to this cable.

Figure 5- Wiring up to 12 240 volt IR Heaters using Homecraft TKE Controller

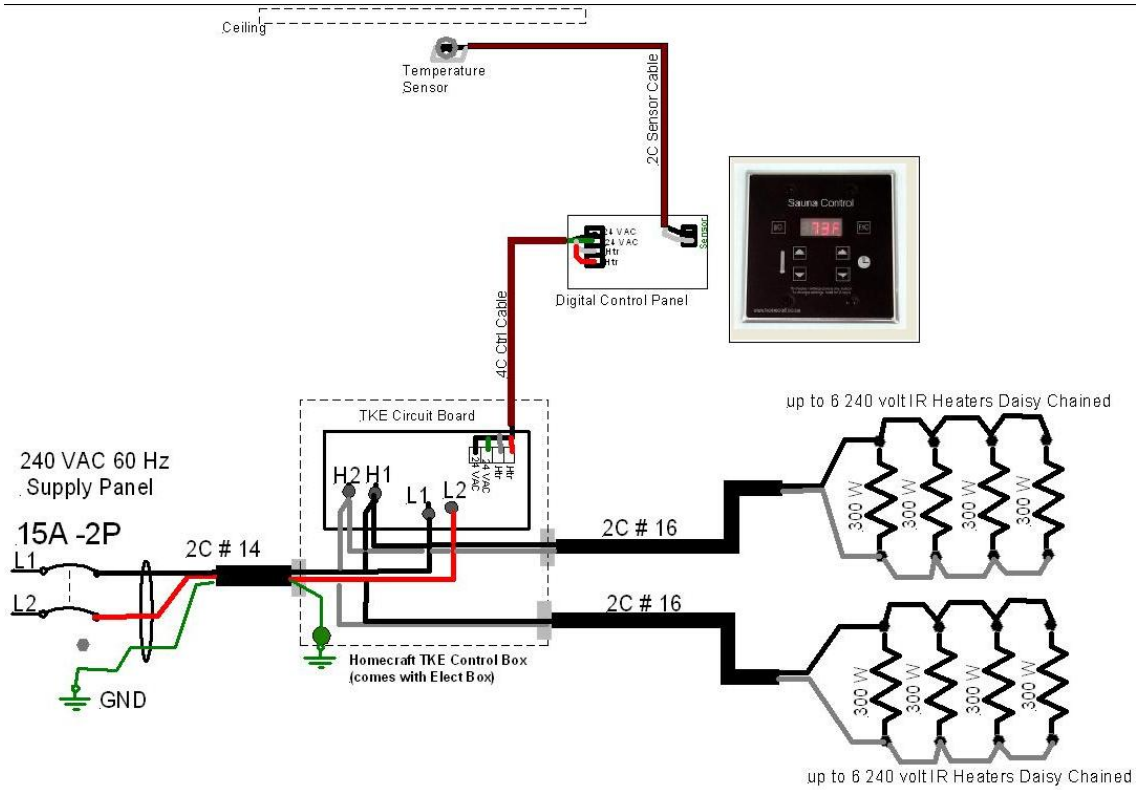
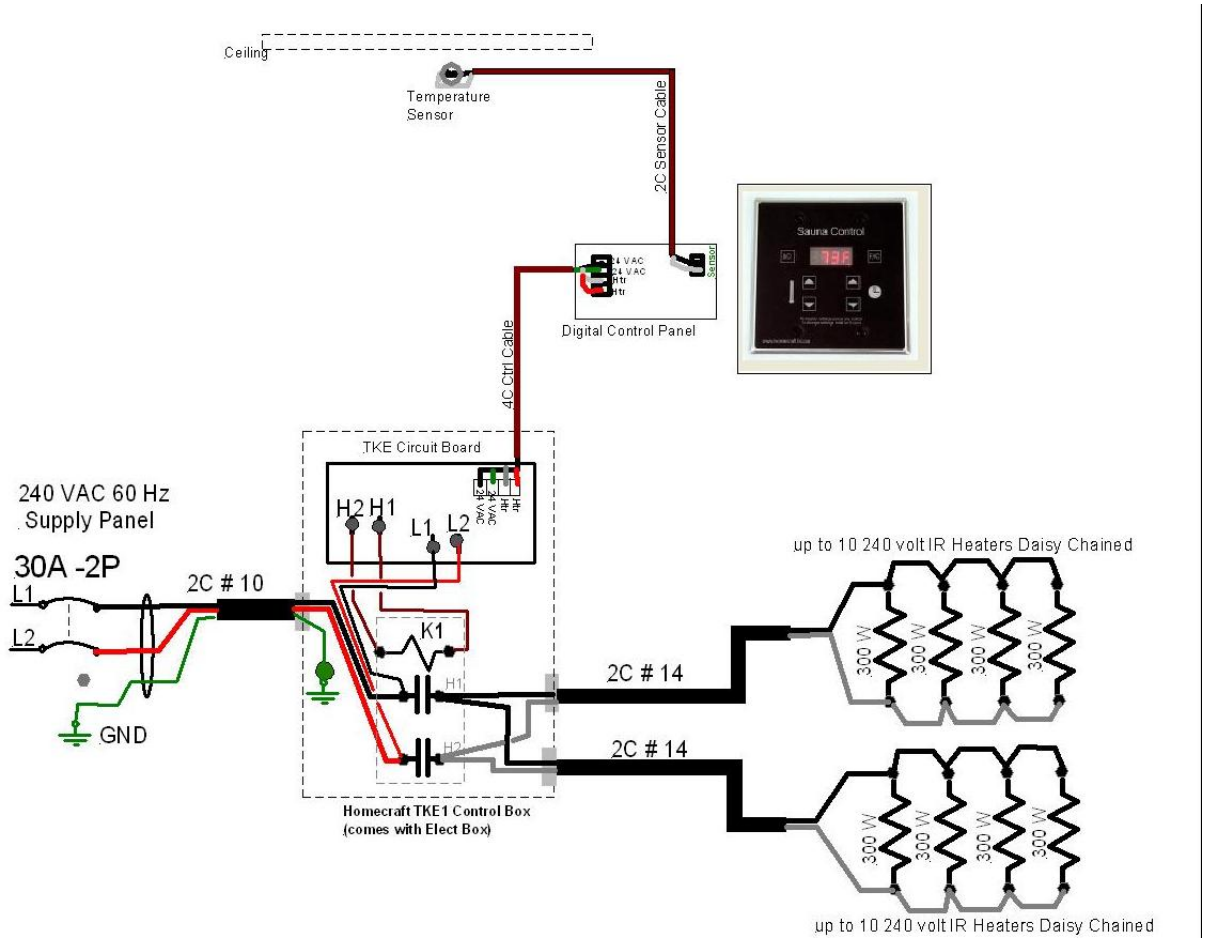


Figure 6 Wiring up to 20 240 volt IR Heaters using Homecraft TKE1 Controller



Using a Saunacore Digital Sauna Controller with IR Heaters

Figures 7 & 8 use the digital Saunacore *"Mercuri"* sauna controller to accomplish the same timer control and high limit air temperature control as was just described for the Homecraft TKE and TKE/1. Again, In order for the temperature sensor to measure the air temperature (rather than being heated by the IR radiation), the senor should be attached to some block that has some heat capacity, such as a piece of metal or a stone, and this be covered (so IR radiation can't strike it directly). You want the air to be heating the thermister not the IR radiation heating the themistor. Locate the senor about 9 inches from the ceiling.

Figure 7 shows how the *Mercuri* sauna controller can be utilized to control up to 12 x 240 volt 300 Watt IR heaters. The *Mercuri* internal relays (those on the circuit board) can switch up to 30 Amps, so the unit could actually switch more than 12 units, if the circuit breaker and cable size is increased. For more than 12 units, we prefer however to do the load switching via a separate 2 pole 40Amp contactor, that is more robust. See Figure 8, in that case.

The *Mercuri* sauna controller and the separate contactor (when used) are required to be mounted in electrical boxes. These are not supplied and must be procured from a home improvement or electrical parts distributor by the customer or electrician. The Mercuri controller needs a 3-gang masonry style electrical box (3.5"deep). The contactor (when used) needs a 6" x 6" x 3" electrical (junction) box. The thermister temperature sensor comes assembled with a 10ft cable and plug which inserts into the *Mercuri* controller. All other cable and control wires between the controller, the contactor and the IR panels need to be supplied by the electrician.

You will note that auxiliary contacts, controlled by the aux button on the panel are available. This can be used to control a light for example, but would require bringing in a neutral wire from the circuit panel, so that 120 volts can be made available.

Figure 7 - Wiring up to 12 240 volt IR Heaters using Saunacore Mercuri Controller

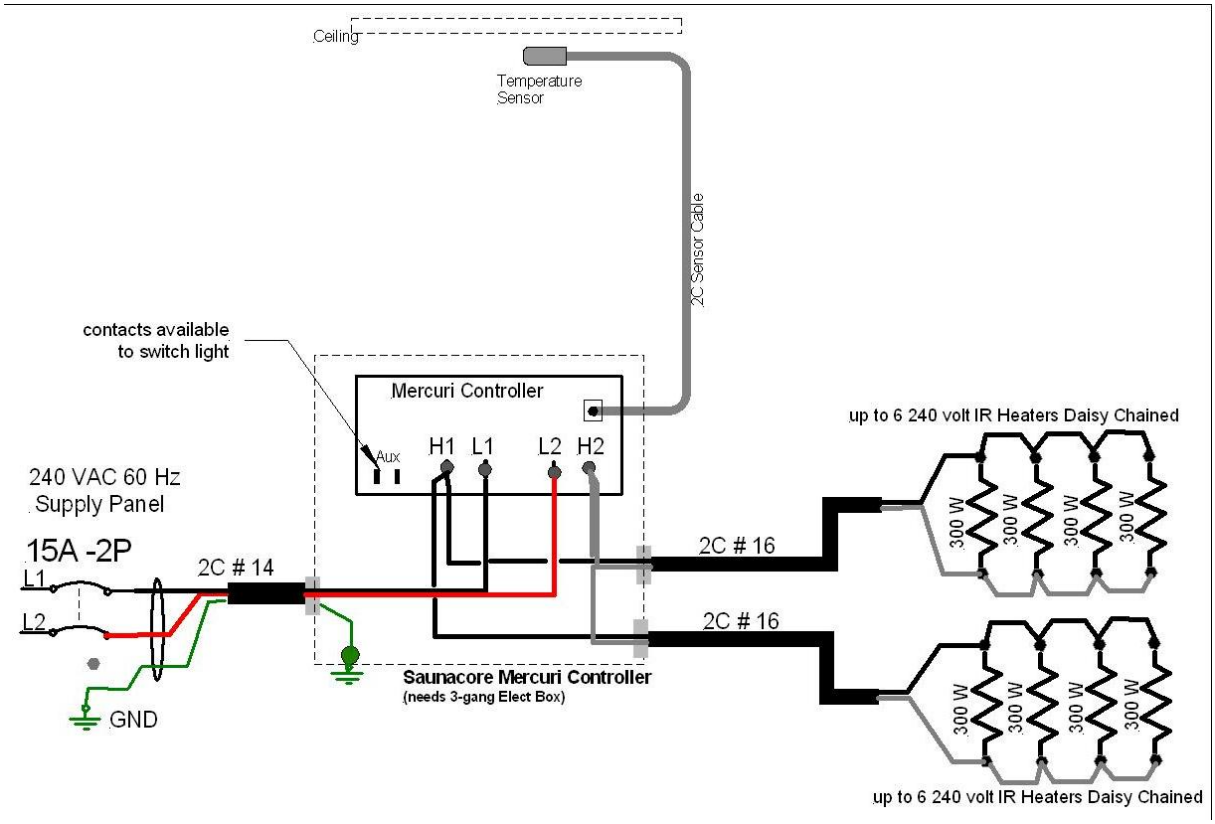
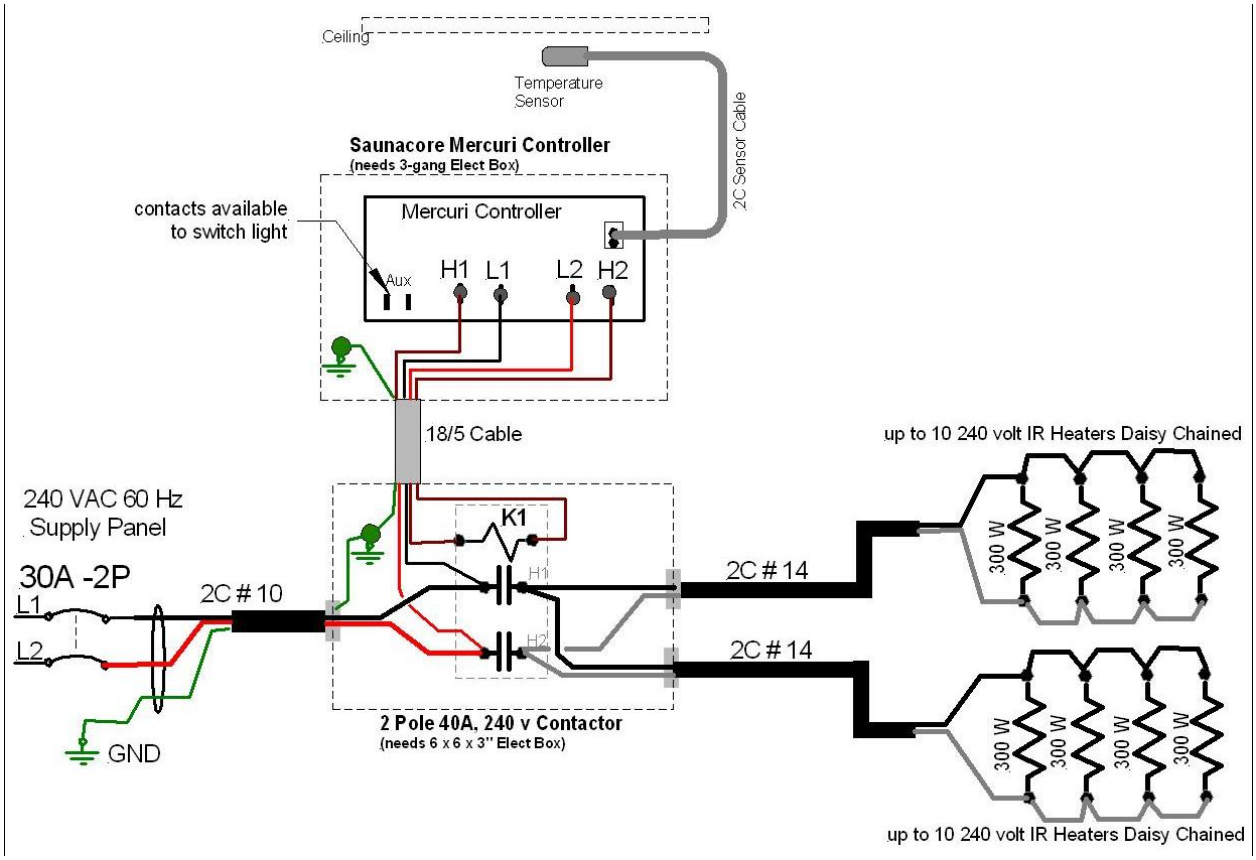
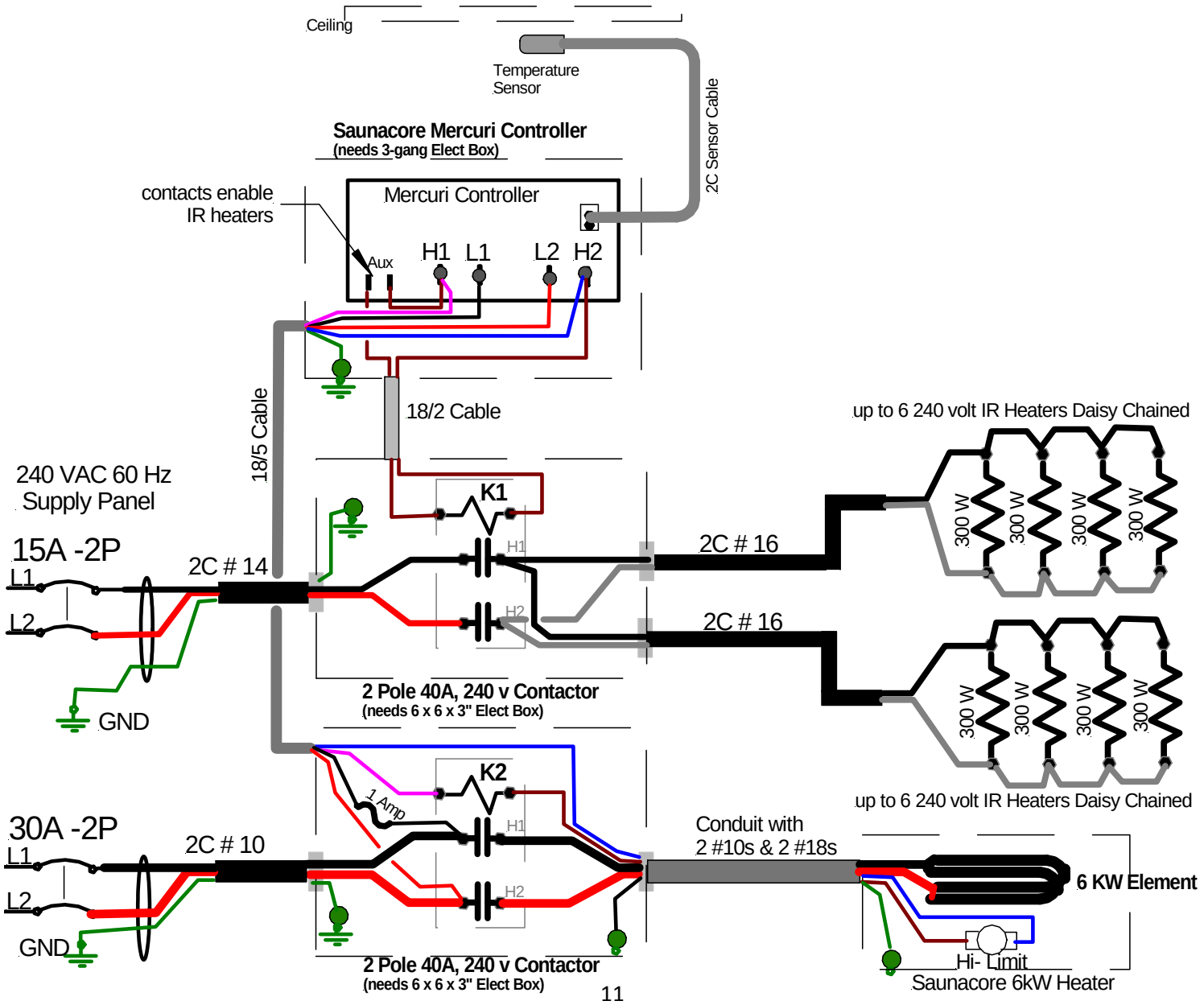


Figure 8 - Wiring up to 20 240 volt IR Heaters using Saunacore Mercuri Controller



Combining a Wet/Dry Traditional Sauna Heater with IR Heaters

Persons often wish to have the benefits of a traditional sauna heater (that has rocks on which you can splash water to create steam) with IR heaters. The traditional heater will come with controls and this need to be wired so the IR heaters can also be turned on and off. The controls with a traditional sauna heater can be mechanical, in which case they may be contained within the bottom of the heater, or if they are digital, then separate electrical boxes are used to switch both the electric element(s) and the IR elements. We illustrate only one situation, which uses a Saunacore *Mercuri* controller to switch power to both the traditional Sauna heater and the IR heaters by using two separate contactors. While we show the two contactors mounted in separate electrical boxes, it would be possible to locate both in one box, provided it is sized appropriately.


Ceiling
Temperature Sensor
2C Sensor Cable
Saunacore Mercuri Controller
(needs 3-gang Elect Box)
contacts enable IR heaters
Mercuri Controller
Aux
H1
L1
L2
H2
18/5 Cable
18/2 Cable
up to 6 240 volt IR Heaters Daisy Chained
240 VAC 60 Hz Supply Panel
15A -2P
L1
L2
GND
2C # 14
K1
H1
H2
2C # 16
300 W
2 Pole 40A, 240 v Contactor
(needs 6 x 6 x 3" Elect Box)
K2
1 Amp
30A -2P
2C # 10
Conduit with 2 #10s & 2 #18s
6 KW Element
Hi- Limit
Saunacore 6kW Heater