

# Energy Wise<sup>®</sup> Wiring Diagrams

For technical questions, call  
952-492-8330

To schedule off peak  
meter installation, call  
952-492-2313

# ***MVEC***

---

***Minnesota Valley Electric Cooperative***

Your Touchstone Energy<sup>®</sup> Cooperative 

# ENERGY WISE<sup>®</sup> CONTROLLABLE LOADS



**Water Heaters** – All water heaters are controlled as storage or interruptible. This is determined when there are three or less people who live at the residence, when the structure is less than three thousand square feet, or if the system is designed for storage. All others should be interruptible. The use of multiple water heaters will require two circuits controlled with a separate relay, or unless the manufacturer has provided wiring to interlock the two.



**Heat Pumps and Air Conditioners** are always controlled with the 24-volt system. Refer to the manufacturer or installing HVAC contractor on where you should control. When two-stage units are installed, it may be necessary to control both stages with a double pole relay. All low voltage connections are to be installed in junction boxes or inside equipment.



**Plenum Heaters** are inserts installed in the plenum of a furnace that will heat electrically and switch over to the back-up heat when being controlled. It is installed the same direction as the coil and is normally controlled in the 24-volt system.



**Electric Heat** – Baseboard, cove or wall heaters are normally controlled with line voltage using a relay rated for the purpose. When there are more than two circuits to be controlled, a Peak Interrupter is highly recommended.



**Hot Tubs** – Only indoor units qualify due to the possibility of freeze damage during the times it will be controlled. Please refer to manufacturer's instructions for control applications.



**Boiler** – In-floor heat and dual heat boilers are the most common and require special consideration when looking to control. Most will be controlled with the low voltage system. In-floor heat could be controlled by low voltage or line voltage with the circulating pump circuit depending on the situation.

## Energy Wise® Equipment List

	Receiver	CT	12VDC Relay/DPPDT	240 VAC Relay/Black	Page
Heat on 1 Circuit	x				3
AC & WH	x	x			6
2 AC Circuits/ Low Voltage Control	x	x	x		6
Heat on 1 Circuit & WH	x	x			6, 8
Heat on 2 Circuits	x	x			6, 8
Heat on 2 Circuits & WH	x	x			5, 6, 9
Heat on 5-6 Circuits & WH/AC Optional	x	x			6

Add single meter socket if member does not have a double meter socket  
 Get technical advice if SWH capacity will exceed 170 gallons  
 Get technical advice if any circuit exceeds 30 amps  
 Get technical advice if this chart does not cover the system being installed  
 All recommendations presume installation of a Cannon receiver

# INSTALLATION SPECIFICATIONS

1. The meter and receiver must be mounted outside and always vertically.
2. Meters installed since 1992 are normally double meter sockets that are attached to the house or garage. All others will use Electro Industries EE5062A Single Meter socket in combination with a single main meter on house or when the main meter is on the pole. These meter sockets are available from MVEC.
3. When a current transformer is used for metering, the member or contractor shall supply 2x12x4 junction box to mount the CT and relays. When nipling to your service panel, size generous to allow for future loads. All controlled loads "A" phase wires from the panel breakers must run through the CT one direction and "B" phase wires from panel breakers must run through the CT the opposite direction. Only controlled loads are to be wired through the CT. From CT terminals, two # 12 AWG stranded wires need to run to the meter socket and terminate at the upper left and lower left lugs.
4. When current transformer metering is used, Energy Wise meter potential must always be fused together with the Energy Wise controller. 240 volt power whenever possible will be supplied from the main meter socket load side lugs. Use crimp –on AL/CU barrels when appropriate. And when a single meter is used, an uninterruptible circuit such as a water heater circuit should be used. The meter potential terminals on a CT meter socket are middle left terminal and upper right lug.
5. Energy wise controllers use a 30amp relay with orange wires to control the water Heater circuit and 5amp or 30amp relay with blue wires to control heating loads, when controlling various heating loads refer to the appropriate wiring diagrams. If further questions arise, please contact MVEC.
6. All electric heat that is under control must be hard wired and all backup or standby heat must be permanently installed and is able to be operated automatically.



# Your Top 15 questions about Energy Wise®/off peak installations

by Mike Dietz  
For questions, call our hotline at  
**952.492.8330**



## 1. Can I use a standard 100 amp socket from a wholesale electrical supplier for an off-peak installation?

**The answer is NO:** You must use the socket provided by MVEC because of the fusing requirements for the receiver. Standard sockets don't come equipped with the fuses that are placed in the socket for protection of the receiver.

## 2. Can I break line voltage to a central air unit?

**The answer is YES:** Although we don't suggest this type of installation, if there is no other possible means of breaking the low voltage to the unit, it is allowed to break the 240Volt for control. Some of the newer units will not allow this type of installation as it extends the control time due to time outs within the unit. Make sure you contact the manufacturer to be sure. If it's wrong, we will not put the meter in.

## 3. Can I use the orange pair for something other than water heat?

**The answer is YES:** We try to keep the orange pair for water heat as much as possible, but if the homeowner chooses not to utilize the water heater program, the orange pair can be utilized to control other forms of load. It would be recommended to utilize this as a secondary option to the blue pair preferably for the heat type of loads or a second central air.

## 4. Can I control a 30 amp load with an ice cube relay?

**The answer is NO:** The ice cube relays are intended to be used for a low voltage type of installation only. They're normally utilized when you have multiple loads to be controlled from the blue pair. The ice cube relay can also be utilized for small resistive heat loads (circulation pumps, and small wall heaters.)

## 5. When do I need to use a black relay and how are they controlled?

**The black relays are used on multiple line voltage controlled loads** where any one load does not exceed 30 amps. The control circuit comes from paralleling the line voltage from one of the loads passing one leg through the blue pair and onto the coil of the relay.

## 6. Why do I need to install the ice cube relay in the receiver?

**The answer is YOU DON'T:** Sometimes it's easier to install the ice cube relay in a remote location closer to the source. In this case, the ice cube relay should be mounted inside the CT box. You will need to extend the control wiring inside the relay (22 awg wires controlling the blue pair relay) down to the CT box.

**7. What should I do with the receiver on a peak shave central air unit if the member adds additional off-peak loads?**

**This answer is never easy!** It is in MVEC's best interest to always try to limit each location to one receiver per metering point. If there is any possible way to remove the receiver at the central air and combine the control points at the new receiver location, we want everyone to try and accomplish that. If it's going to affect the integrity of the system by moving it, then leave the receiver in its location and meter the load through the CT at the new metering point. If this type of installation is needed, this should be authorized by MVEC before doing so.

**8. When is it allowed to add a second off-peak meter?**

If you have a facility (detached garage or outbuilding) that has **its own main panel fed from an existing panel that currently has off peak**, it's allowed to install a second meter at the new location of the service panel. If there is absolutely no possible way of getting back to the existing off peak equipment, there maybe an option for adding a second off peak meter to accommodate those loads. These types of installations need to be discussed with MVEC before installing.

**9. I've seen at other cooperatives they meter the whole off-peak panel.**

**MVEC DOES allow this type of installation.**

Remember: if doing this type of installation, be sure all loads in this service panel need to be controlled for off peak. You will need to purchase a single socket and install that before the service panel. In these types of installations, the panels still need to be fed from the load side of the general service meter. In NO case can the off-peak meter be the only meter at a service location.

**10. Could I be billed from MVEC if the equipment was not installed correctly?**

**The answer is YES:** We started this a few years ago. We will bill the member if you schedule an appointment for install, we make a trip out there, and the equipment is not ready. Make sure all equipment is operational and ready to be controlled when we get there.

**11. Does the CT need to be grounded?**

**The answer is YES:** Make sure the CT is always grounded on one terminal upon installation.

**12. Can I break a heat pump with high voltage? Can I line meter the heat pump if it's my only load?**

**The first answer is NO. The second answer is YES:** All heat pumps need to be broke with some type of low voltage method. A heat pump - if it's the only load on the system - can be line metered.

**13. I'm installing a wind turbine or solar panels to my existing service. Where do I locate the off-peak meter?**

**At this time MVEC DOES NOT allow** a member to be on this rate with off-peak equipment. The meter will need to be removed by MVEC and the cover shunted. If you are installing some type of renewable energy, please have the member contact MVEC before getting started.

**14. Is the receiver always the problem when out on a service call?**

**This is a myth:** It's usually not the problem when we get there. Be sure you have a good idea of what's wrong before you cycle power to the equipment. The receivers have a built-in timeout that we utilize for system restore during outage situations. Remember, some of our equipment is being powered by the circuit breakers or disconnects of the equipment you're working on. This timeout is usually around 15 minutes before it will restore. Out of the 14,000 receivers that we have on our system, very few fail per year so check the lights before powering down and be willing to wait when you power it back up.

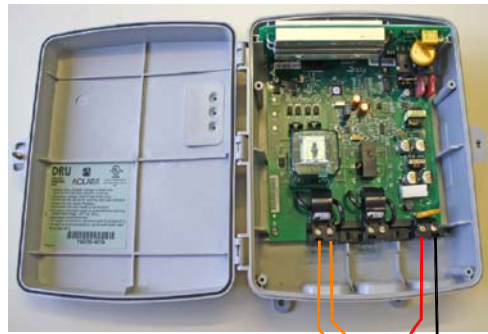
**15. Is there a way to test the receiver to see if it's controlling correctly?**

**YES:** Inside the receiver on the door side there is a little black button that you can press to control the relays. This will allow you to test the relays to make sure all is functioning correctly. If you have any question on where this is, please be sure to ask.

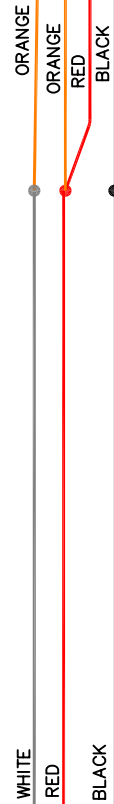
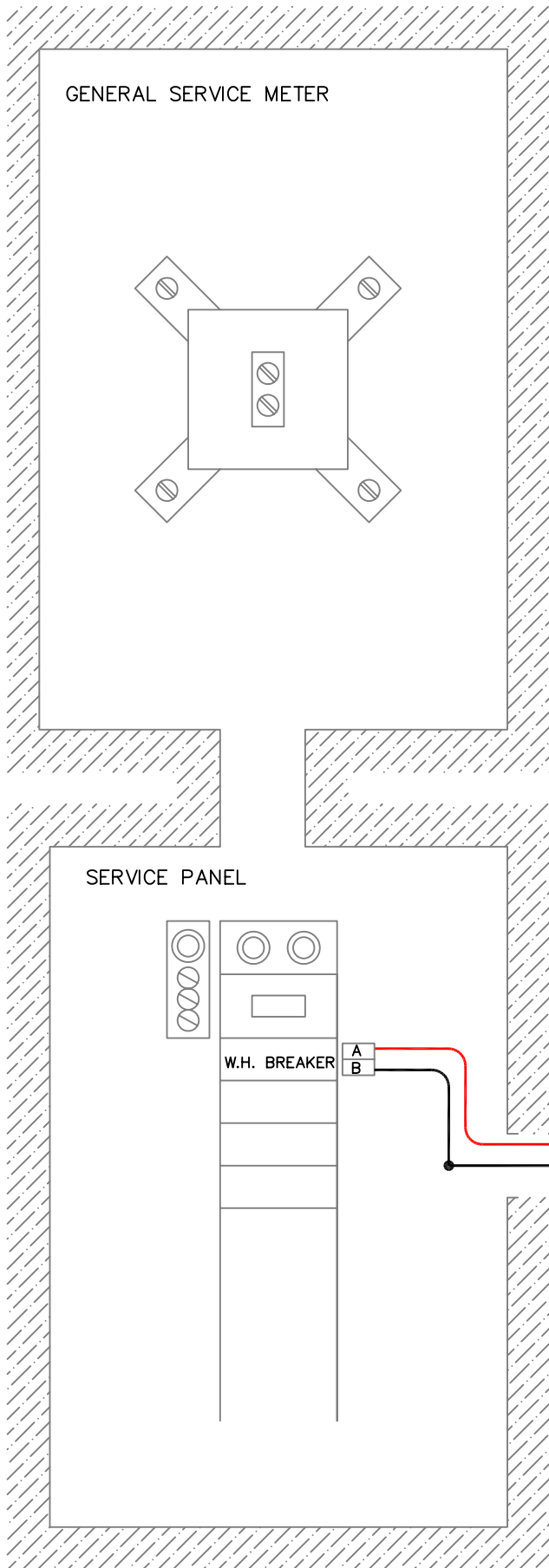


**If you have questions, call our hotline at 952.492.8330**


This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



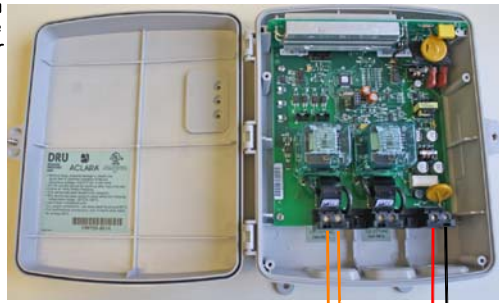
30/5



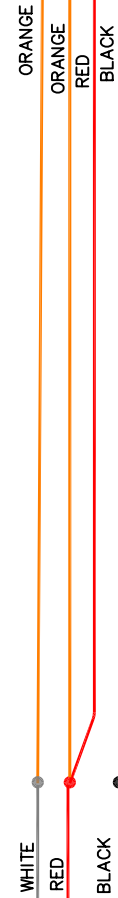
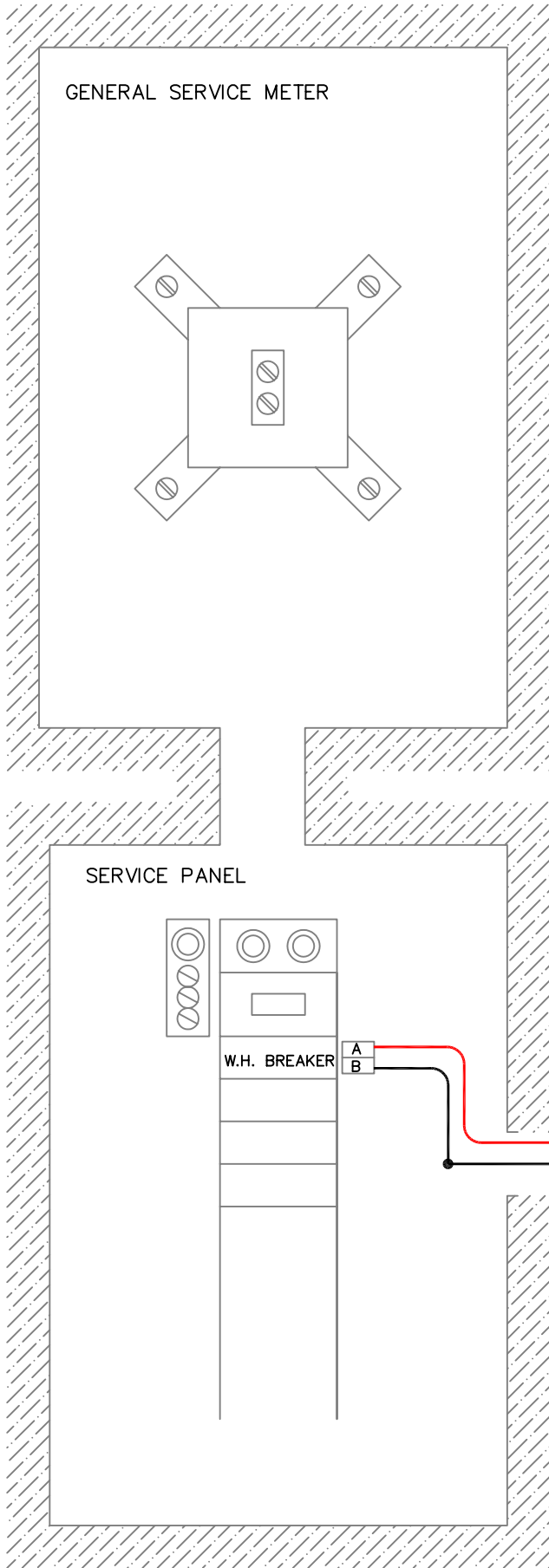
NOTES:  
 ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
 ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

	PSWH AT SERVICE ENTRANCE 30 AMP MAX NON-METERED DRAWING #PS3	
	MDC	05/30/02
	REV: KJ	05/08/12


This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



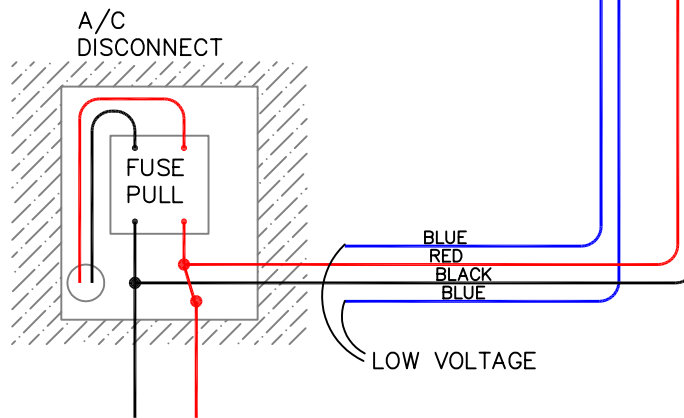
30/30A



NOTES:  
 ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
 ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

	PSWH AT SERVICE ENTRANCE 30 AMP MAX NON-METERED DRAWING #PS3	
	MDC	05/30/02
	REV: KJ	05/8/12





NOTES:

ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.

ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

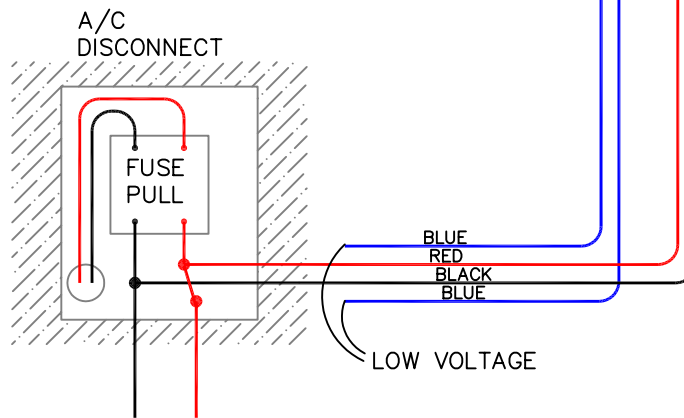
This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



PSAC AT DISCONNECT  
30 AMP MAX NON-METERED  
DRAWING #PS2

MDC 05/30/02

REV: KJ 05/08/12



NOTES:  
 ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
 ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



PSAC AT DISCONNECT  
 30 AMP MAX NON-METERED  
 DRAWING #PS2

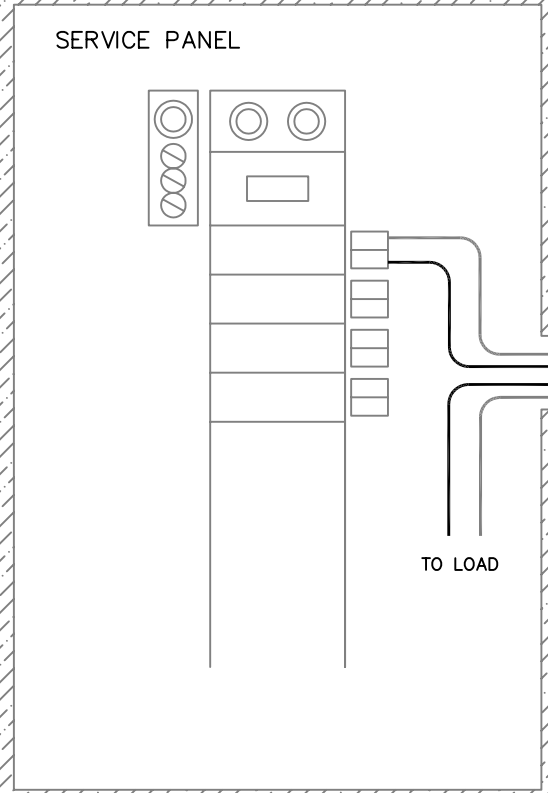
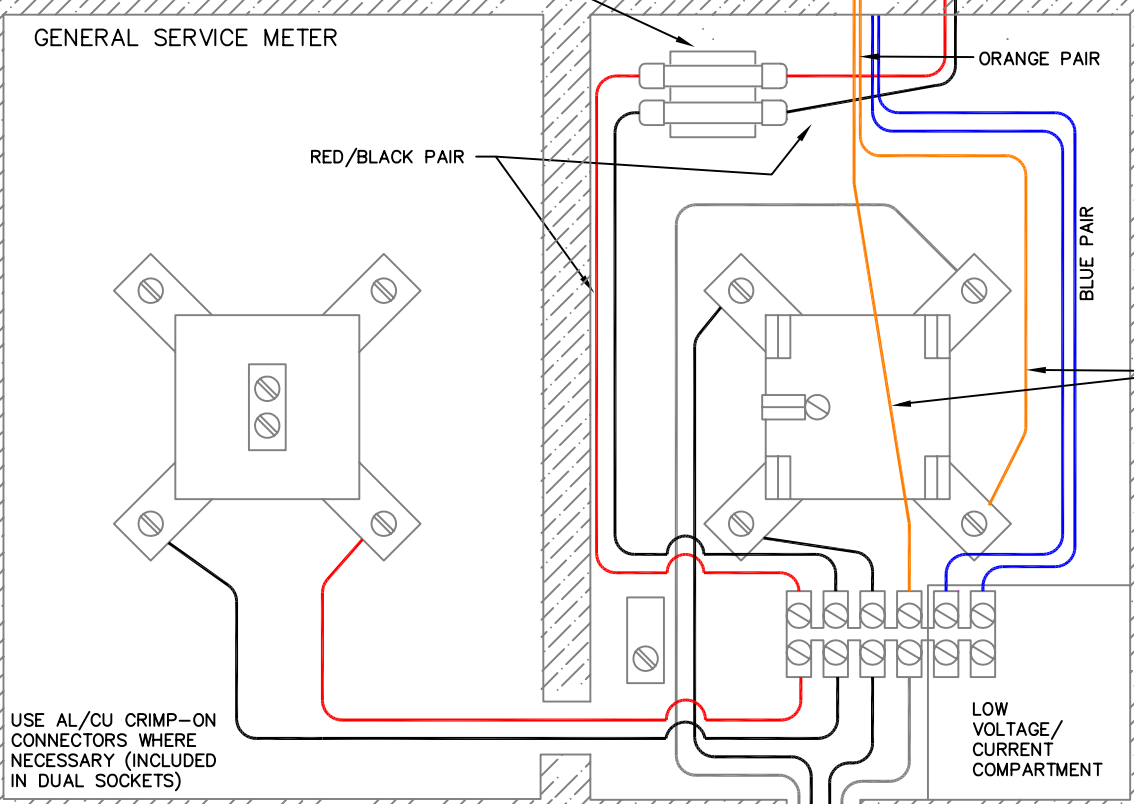
MDC	05/30/02
REV: KJ	05/08/12

30/30A

IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.



NOTES:  
ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.



ATTENTION:  
THE OFF PEAK METER IS A SUB-METER. INSTALLERS ARE ENCOURAGED TO SLUG THE OFF PEAK SOCKET SO THE LOAD CAN RUN, AVOIDING INCONVENIENCE TO THE HOME OWNER. THE OFF PEAK METER WILL BE INSTALLED AS SOON AS POSSIBLE AFTER MVEC IS NOTIFIED THAT EVERYTHING IS READY.

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



SINGLE OFF PEAK LOAD  
30 AMP MAX (NOT TO A.C.)  
DRAWING #1

MDC	11/25/98
REV: KJ	5/8/12



30/30A

ORANGE PAIR SHOWN DEPICTS INSTALLATION FOR A WATER HEATER. USE THE BLUE PAIR INSTEAD WHEN CONTROLLING SPACE HEAT OR A.C.

RECEIVER RELAY MUST BE 30 AMP AND #10 GAUGE WIRES.

RED/BLACK PAIR

WIRE NUT OR TAPE

BLUE PAIR

NOTES:

ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.

ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

LOW VOLTAGE/CURRENT COMPARTMENT

LOW VOLTAGE CONTROL

SERVICE PANEL

ATTENTION:  
THE OFF PEAK METER IS A SUB-METER. INSTALLERS ARE ENCOURAGED TO SLUG THE OFF PEAK SOCKET SO THE LOAD CAN RUN, AVOIDING INCONVENIENCE TO THE HOME OWNER. THE OFF PEAK METER WILL BE INSTALLED AS SOON AS POSSIBLE AFTER MVEC IS NOTIFIED THAT EVERYTHING IS READY.

TO LOAD

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



SINGLE HEAT OFF PEAK LOAD  
(HEAT PUMP)  
& ELECTRIC VEHICLE

MDC	11/25/98
REV: KJ	05/08/12

This information is for general purposes only and is not intended to serve as a set of specifications or installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.

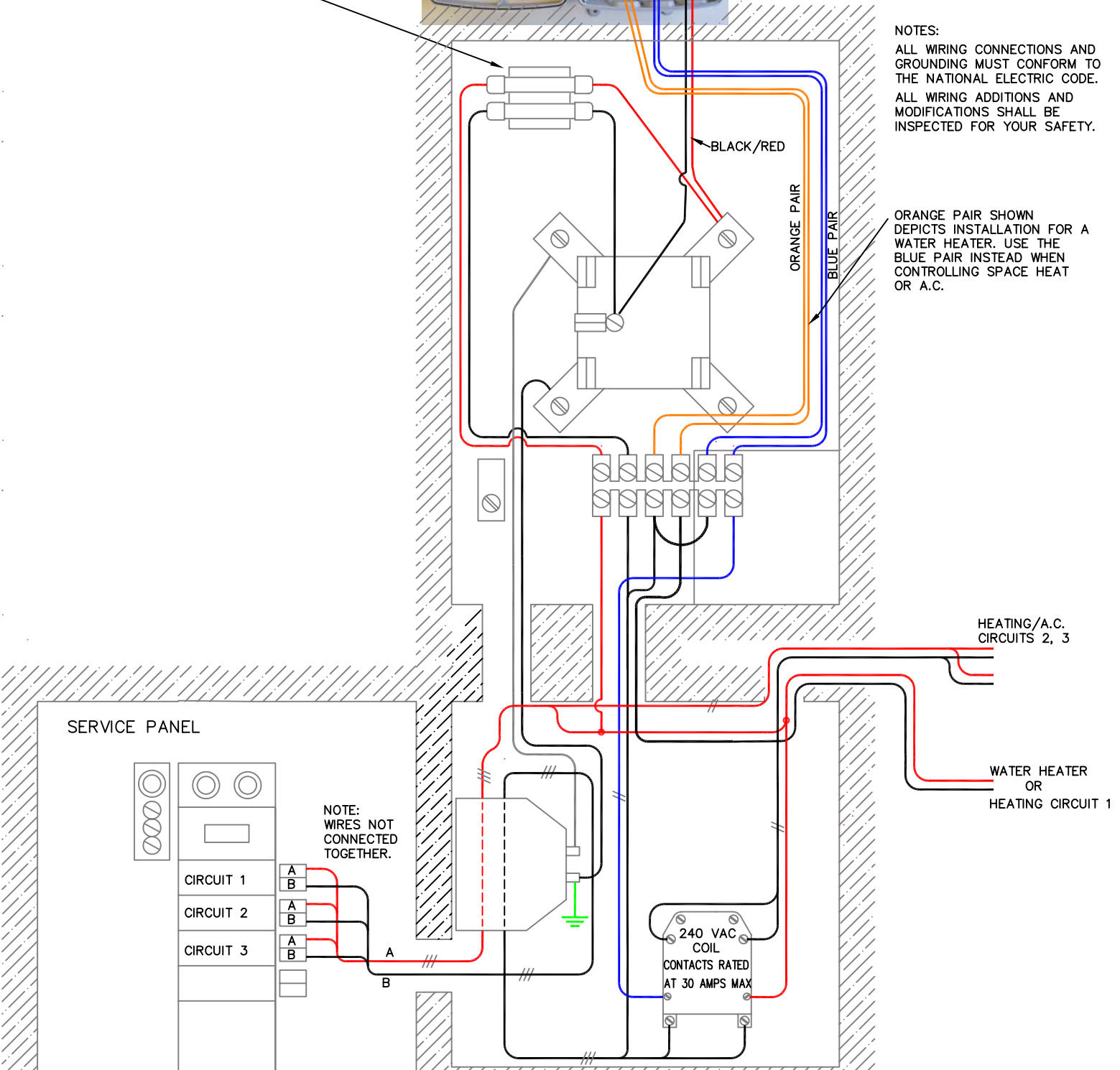


30/30A

IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.

NOTES:  
 ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
 ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.


ORANGE PAIR SHOWN DEPICTS INSTALLATION FOR A WATER HEATER. USE THE BLUE PAIR INSTEAD WHEN CONTROLLING SPACE HEAT OR A.C.

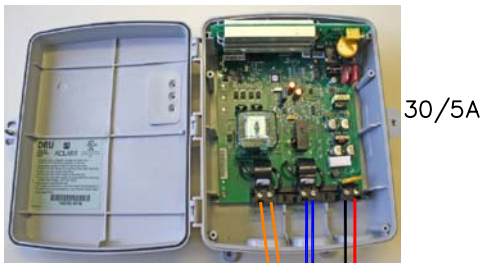


HEATING/A.C. CIRCUITS 2, 3

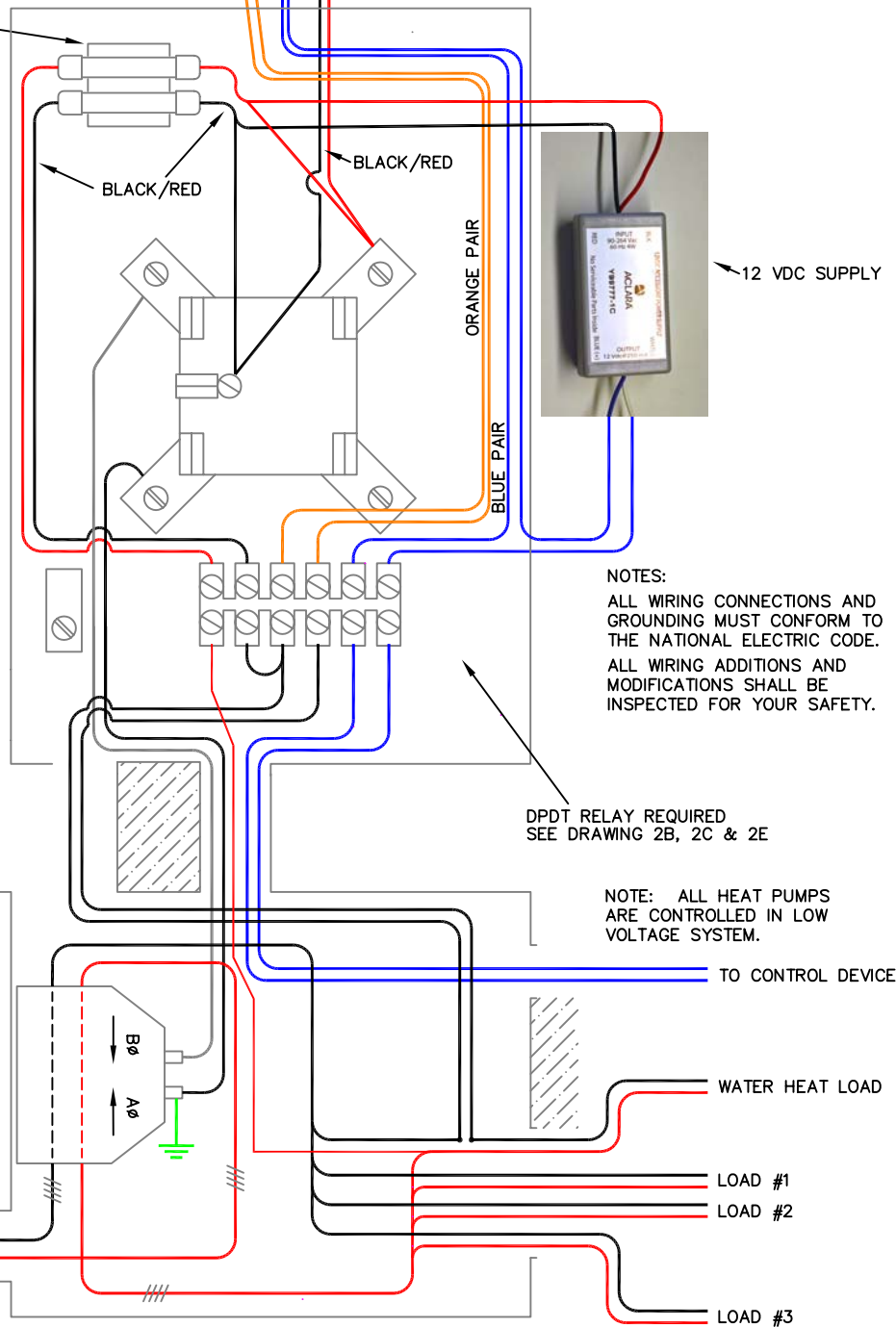
WATER HEATER OR HEATING CIRCUIT 1

// = TWO WIRES  
 /// = THREE WIRES

	WATER HEATER AND 2 HEAT OFF PEAK LOADS MAIN METER ON POLE 25 AMP MAX			
	<table border="0"> <tr> <td>KJ</td> <td>05/08/12</td> </tr> <tr> <td>MDC</td> <td>05/30/02</td> </tr> </table>	KJ	05/08/12	MDC
KJ	05/08/12			
MDC	05/30/02			



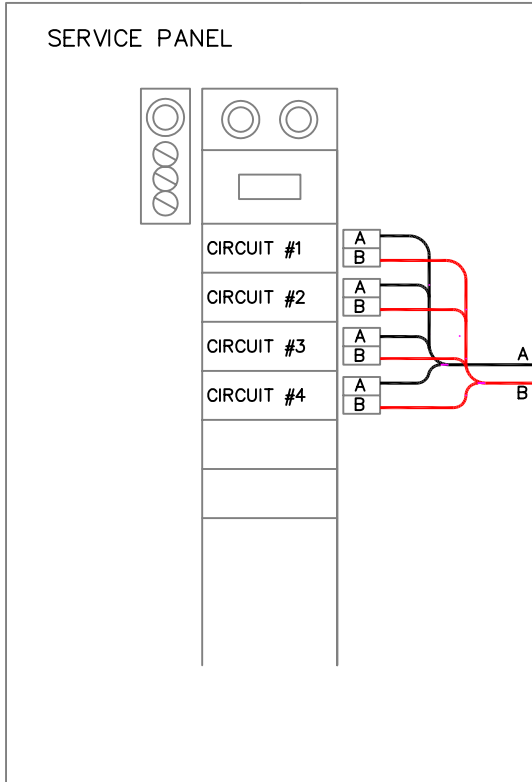
IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.



NOTES:  
ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

DPDT RELAY REQUIRED  
SEE DRAWING 2B, 2C & 2E

NOTE: ALL HEAT PUMPS ARE CONTROLLED IN LOW VOLTAGE SYSTEM.



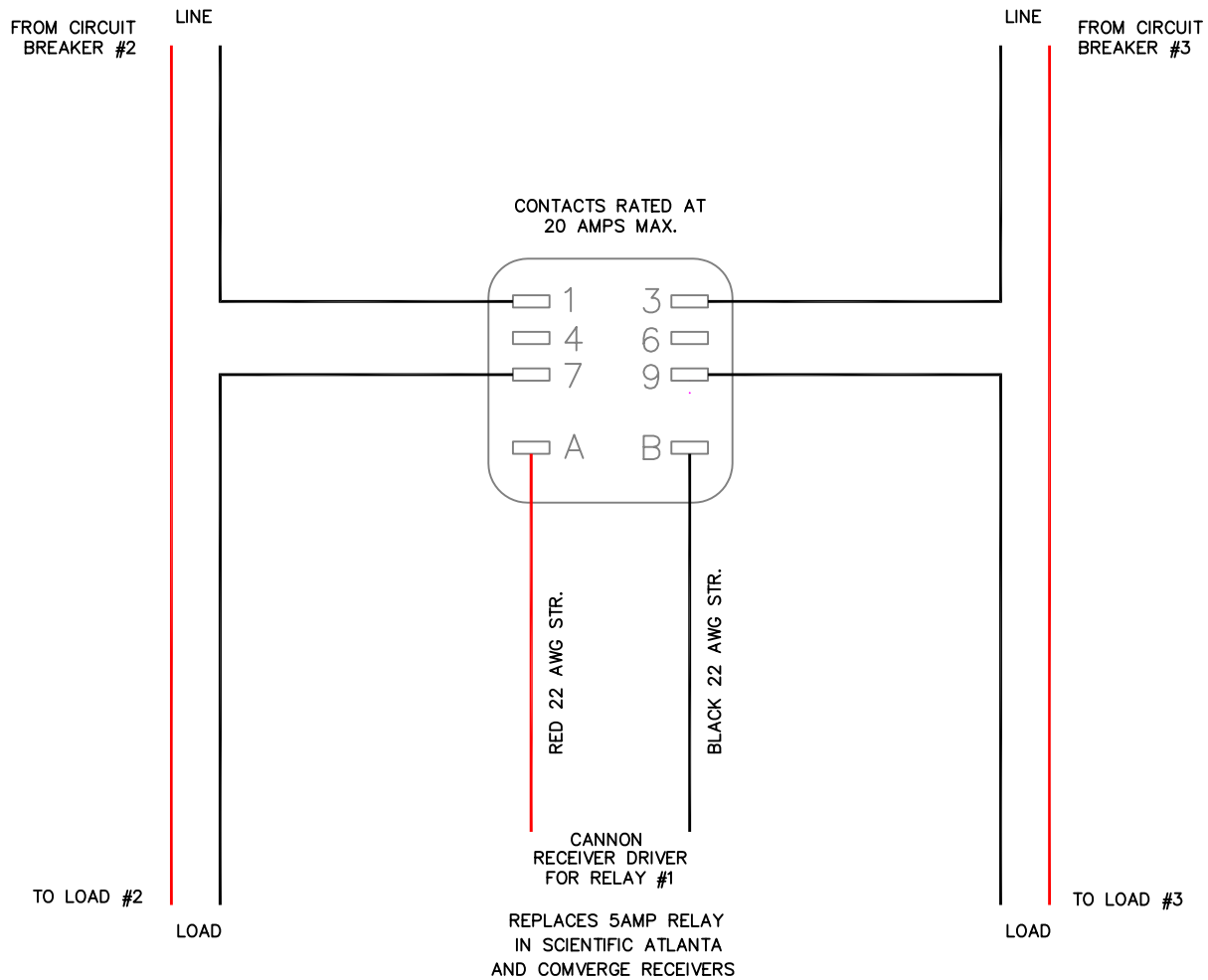
REQUIRED BOX 12"x 12", 4" DEEP

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



MULTIPLE ENERGYWISE LOADS  
GS METER ON POLE  
DRAWING #2D

MDC	05/30/02
REV: KJ	05/8/12



NOTES:

ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.

ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

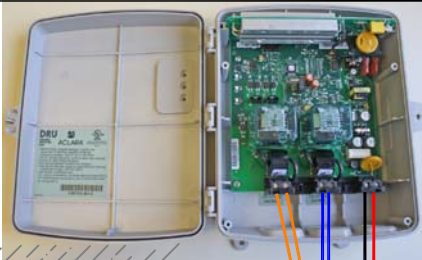
FOR LOAD MANAGEMENT PURPOSES IT IS NECESSARY TO INTERRUPT ONLY ONE LEG OF A 240 VOLT CIRCUIT.

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



12 VDC RELAY  
WIRING DETAIL  
DRAWING #2A

MDC	05/30/02
REV: HJN	12/07/05

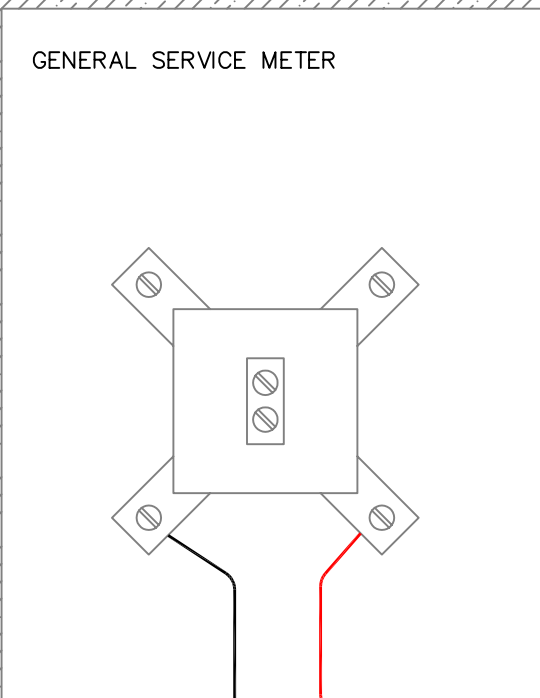


30/30A

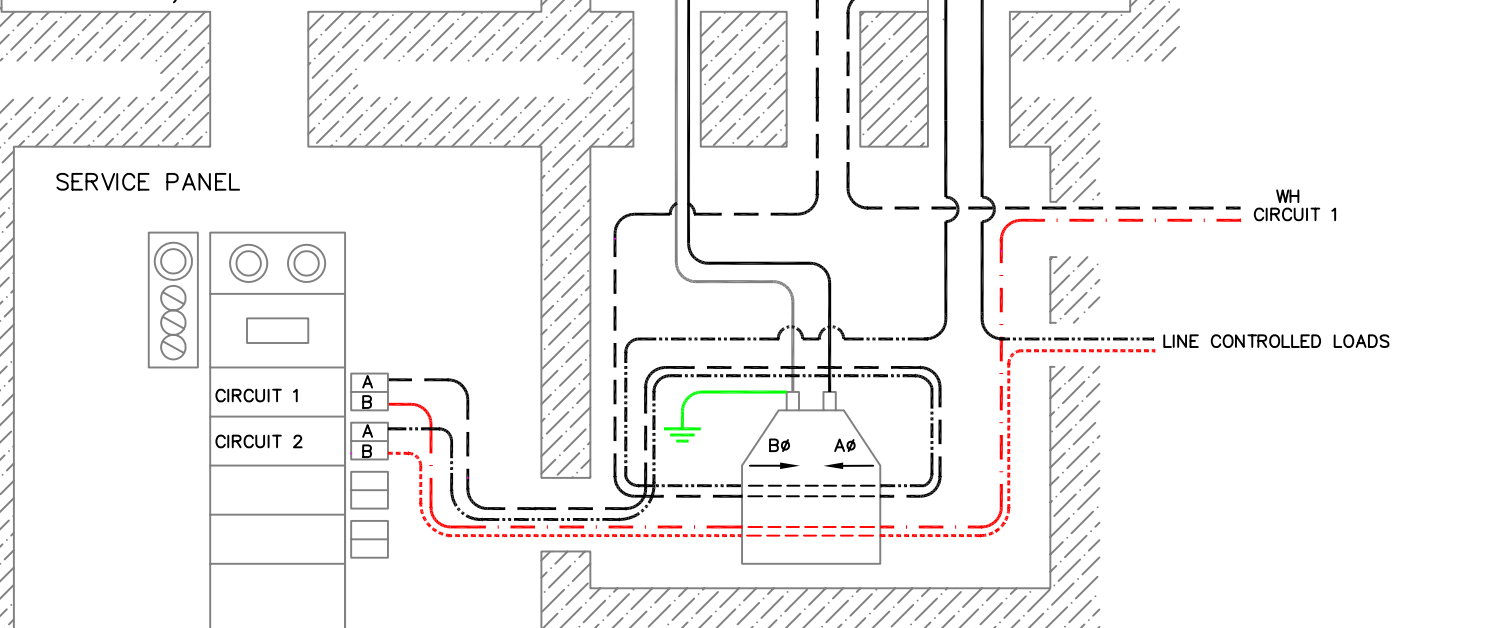
IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.

NOTES:  
 ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
 ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

ORANGE PAIR SHOWN DEPICTS INSTALLATION FOR A WATER HEATER. USE THE BLUE PAIR INSTEAD WHEN CONTROLLING SPACE HEAT OR A.C.



USE AL/CU CRIMP-ON CONNECTORS WHERE NECESSARY (INCLUDED IN DUAL SOCKETS)



This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.



WATER HEATER & 1 HEATING LOAD DRAWING #2	25A MAX.
MDC	05/30/02
REV: HJN	02/22/06



This information is for general purposes only and is not intended to serve as a set of specifications or installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.

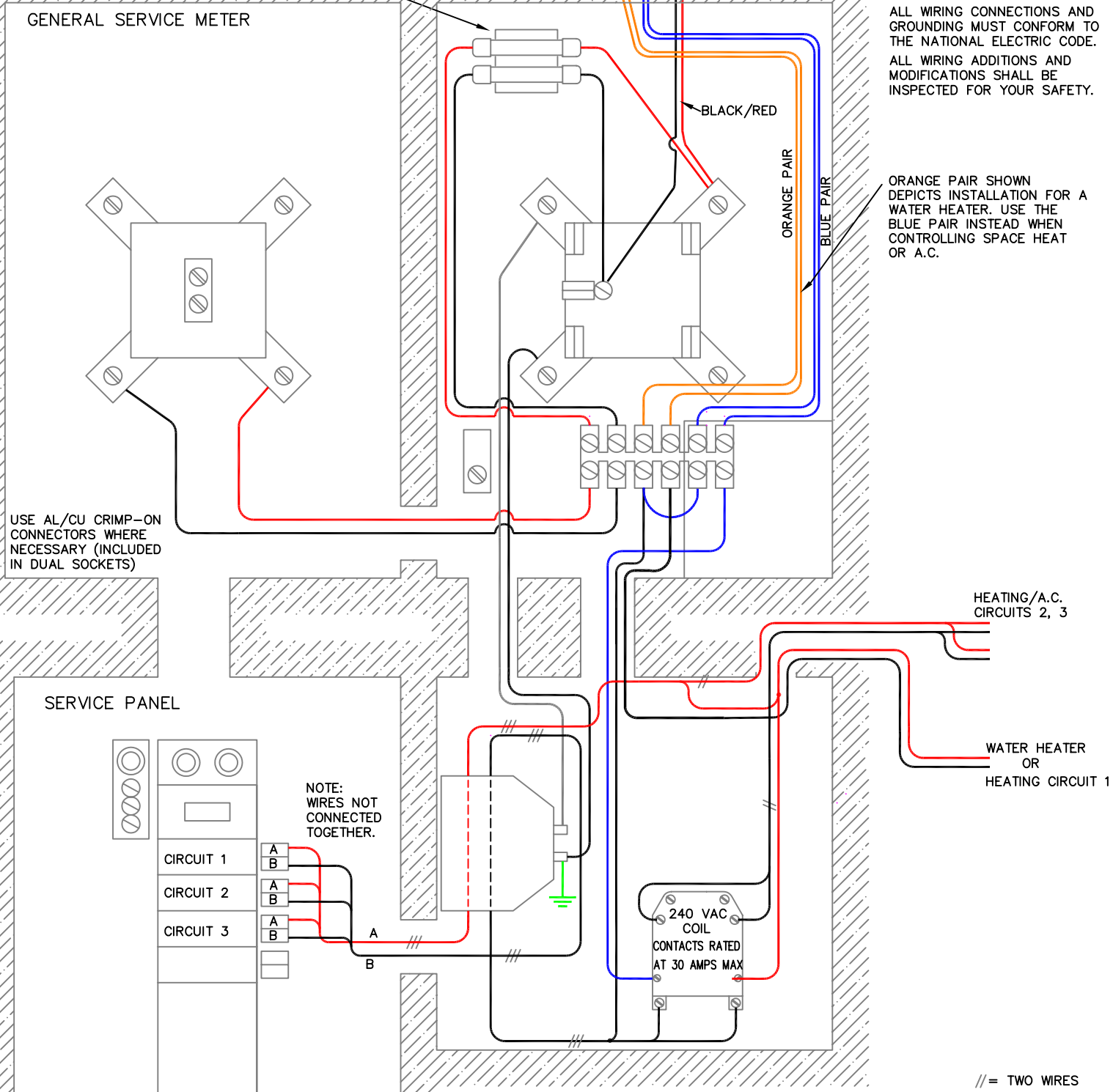


30/30A

IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.

NOTES:  
ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.

ORANGE PAIR SHOWN DEPICTS INSTALLATION FOR A WATER HEATER. USE THE BLUE PAIR INSTEAD WHEN CONTROLLING SPACE HEAT OR A.C.



USE AL/CU CRIMP-ON CONNECTORS WHERE NECESSARY (INCLUDED IN DUAL SOCKETS)

NOTE: WIRES NOT CONNECTED TOGETHER.

HEATING/A.C. CIRCUITS 2, 3

WATER HEATER OR HEATING CIRCUIT 1

240 VAC COIL CONTACTS RATED AT 30 AMPS MAX

// = TWO WIRES  
/// = THREE WIRES



WATER HEATER AND 2 HEAT LOADS WITH C.T.

KJ	05/03/12
MDC	05/30/02

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.

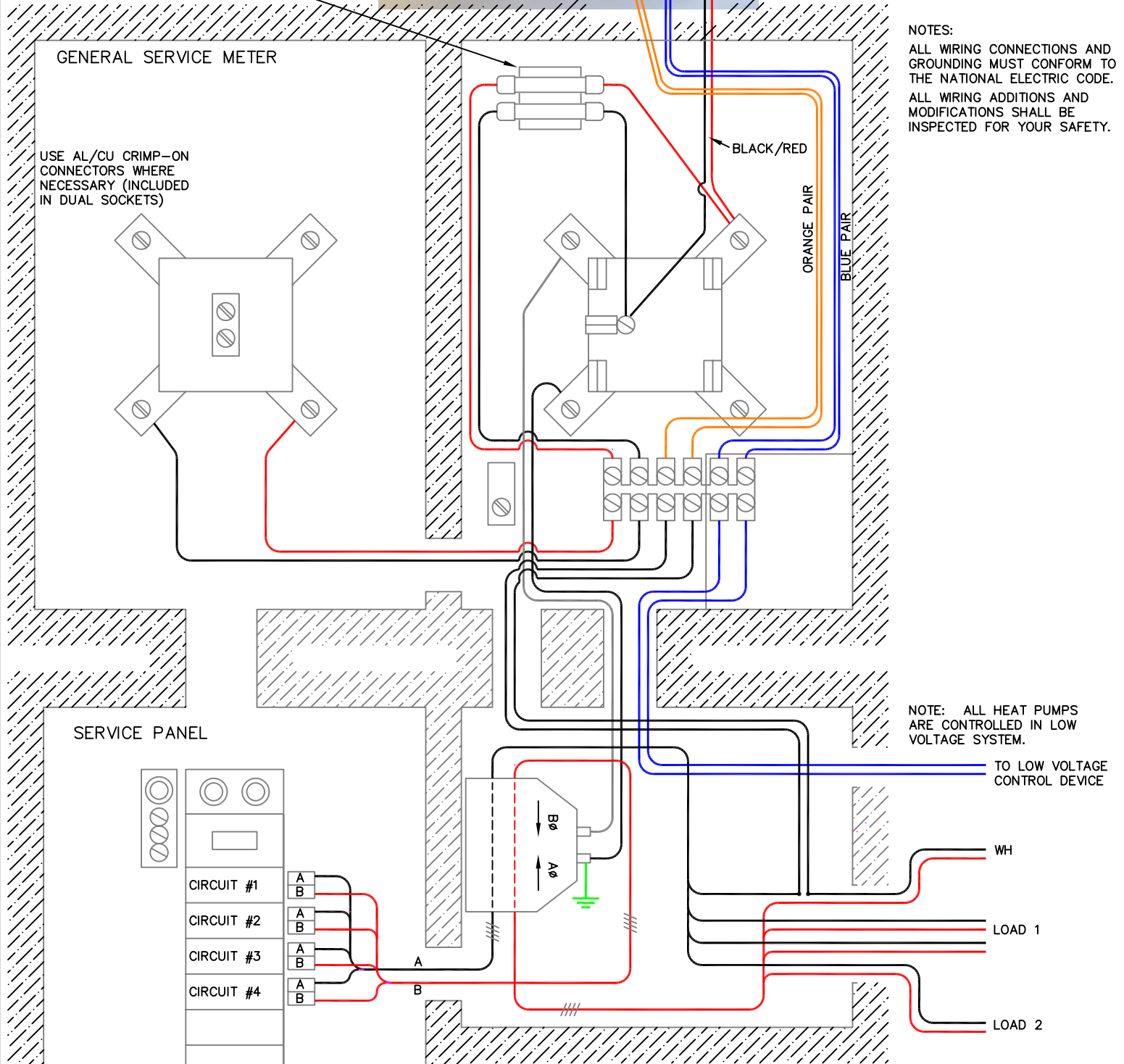


30/30A

LOW VOLTAGE CONTACTS IN RADIO RECEIVER ARE RATED AT 5 AMPS 24 V.

IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.

NOTES:  
 ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
 ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.



NOTE: ALL HEAT PUMPS ARE CONTROLLED IN LOW VOLTAGE SYSTEM.

TO LOW VOLTAGE CONTROL DEVICE

WH

LOAD 1

LOAD 2

REQUIRED BOX 12" x12", 4" DEEP



Water Heater & Multiple OP Loads

This information is for general purposes only and is not intended to serve as a set of specifications for installation of the equipment. MVEC is not responsible for installations which it has not specifically approved. Please contact MVEC or your electrical contractor for further information.

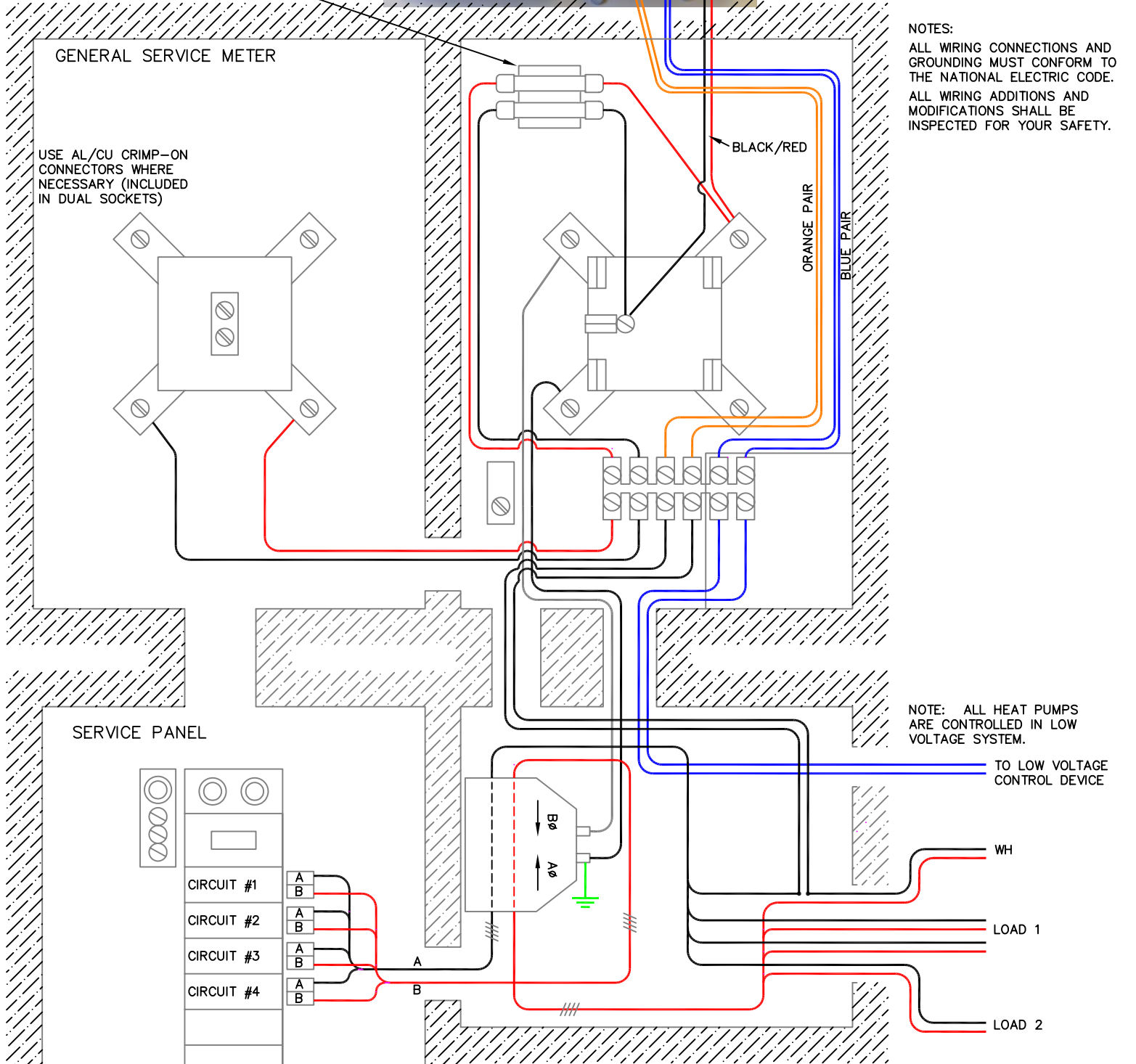


30/5A

LOW VOLTAGE CONTACTS IN RADIO RECEIVER ARE RATED AT 5 AMPS 24 V.

IN DUAL SOCKETS, FUSES ARE LOCATED ON GENERAL SERVICE SIDE OF COMMON WALL ABOVE KNOCKOUT.

NOTES:  
ALL WIRING CONNECTIONS AND GROUNDING MUST CONFORM TO THE NATIONAL ELECTRIC CODE.  
ALL WIRING ADDITIONS AND MODIFICATIONS SHALL BE INSPECTED FOR YOUR SAFETY.



NOTE: ALL HEAT PUMPS ARE CONTROLLED IN LOW VOLTAGE SYSTEM.

REQUIRED BOX 12" x12", 4" DEEP



Water Heater & Multiple OP Loads