Operating Manual

Meter Base Transfer Switch

Heartland
RURAL ELECTRIC COOPERATIVE, INC.

Introduction

Your meter base transfer switch is one of the best methods to use a generator to provide backup power. It allows you to utilize your home's existing wiring, while making sure your family and Heartland Rural Electric Cooperative personnel are kept safe.

Your receptacle includes the meter socket at the top and a transfer switch below, behind a protective removable panel. Behind the panel are two sets of breakers. One set of breakers connects to Heartland power. The other set of breakers connects to the external plug and your standby generator. A sliding interlock handle ensures that only one set of breakers is moved to the "on" position at a time.

The transfer switch is located behind the front panel below the meter

Removing the protective door gives Heartland members access to the breakers that control the flow of power from HREC and a standby generator.

Setup Procedures

Carefully read all the instructions before using your transfer switch.

The best time to prepare for a power outage is before there is an actual interruption of utility-supplied power. The following are suggested steps to prepare for an actual power outage using your transfer switch.

• Determine which appliances are on each circuit breaker. *Note: circuit breakers may control more than one appliance. We recommend you affix labels to each circuit breaker listing its appliances.*

Under normal conditions, the "Utility Power" breakers, located on the left side of the panel, are up, allowing Heartland's power to flow through the panel.

• Familiarize yourself with the typical power requirements of the appliances you expect to use during an outage, always taking into consideration the capacity of your generator. **See Sample Worksheets located in this manual.**

Start-Up Procedures

The following are the start-up procedures for your transfer switch. For generator start-up procedures, please refer to the generator manufacturer owner's manual.

STEP 1. Turn off all of the circuit breakers in your home's breaker panel.

STEP 2. Move your generator into position to be connected to your transfer switch.

The power cord connects the generator to the transfer switch.

STEP 3. Turn off the breakers that provide Heartland power to your home.

STEP 4. Using the power cord, insert the plug on the connecting cord into the outlet on the generator.

STEP 5. Plug the generator power cord into the transfer switch and turn on the transfer switch breakers for generator power.

During an outage, the interlock handle should be moved to the left and the "Generator Power" breakers are turned on to allow generator power to flow into the home.

STEP 6. Turn off the idle setting (if present) on your generator. This will ensure that your generator will operate at the correct speed and voltage.

STEP 7. Review the generator starting procedures in the generator owner's manual and then start your generator.

STEP 8. Select the appliances that require emergency power. Note the capacity of your generator and refer to the Appliance Energy Guide in this manual.

STEP 9. Locate the circuit breakers in your home's breaker panel for the appliances you can support and turn them on one at a time. Start with large motor loads first, such as refrigerators. Motors require 2 to 3 times more power to start than other electrical appliances. Allow generator operation to stabilize before starting the next load.

Next, start smaller motors such as a ceiling or ventilating fan. Then start smaller appliances with no motors such as lights.

STEP 10. When it is time to refuel your generator, turn off all of your home's circuit breakers before turning off the generator, and refuel according to your generator owner's manual. Then begin with Step 6 of the Start-Up Procedure to reconnect loads/appliances.

STEP 11. If the generator's circuit breaker trips off during operation or setup, turn off all circuit breakers in the breaker panel, reset the circuit breaker on the generator, and restart the generator if necessary. Select and reconnect loads.

To reconnect to your electric utility:

A. Turn off your generator.

B. Turn off the generator breakers and unplug your generator

C. Slide the interlock handle to the right and turn on the utility power breakers

D. Turn on all the breakers in your home's circuit panel

The Power Cord

To connect your portable generator to your transfer switch a power cord is required. The power cord consists of three components:

A. Transfer switch connector

B. Connector for your generator

C. Power cord

The Generator Connector:

The transfer switch is connected to the generator's 120/240-volt AC receptacle using a power cord with the appropriate generator connection. Generators have different types of receptacles depending on the type of generator, the type of power provided, and the size of the generator. Some generators are rated for only 120-volt or only 240-volt output. Check your generator for one of the receptacles below. These receptacles are rated for 120/240-volt output, which is what you need to run your home. If your generator does not have one of these receptacles your power cord will be fitted with a compatible male plug.

The Connection Cord:

Connection cords are typically 10 feet long, with a maximum recommended length of 65 feet for a 50-amp circuit. To determine the correct cord length, follow these easy steps:

STEP 1. Select a location for your generator when it is being used. Consult your generator manufacturers owner's manual for instructions on the acceptable placement of your generator.

STEP 2. Measure the length of the cord you will need by calculating the distance from the installed transfer switch to your generator, including the vertical distance from the transfer switch to the ground.

The length of the power cord should always be as close as possible to the actual measured distance from the electric meter in order to maximize your generator's power quality. Additionally, the power cord must be fully unrolled during use.

Safety Tips

Do not wait for an emergency to learn how to connect your generator and select loads to power with your transfer switch. (See Setup Procedures for detailed information.)

- Never connect or disconnect the power cord to/from your portable generator while the generator is operating. Turn off the portable generator and turn off all circuits in your breaker panel before connecting or disconnecting the power cord.
- Before using the power cord, check the cord for exposed wires and/or frayed insulation.
- Keep the power cord stored in a dry, safe location when not in use.
- Ensure that the power cord is in a protected area where it will not be damaged by lawn mowers, power tools or vehicles.
- Never attempt to remove, repair, dismantle, modify, or alter the transfer switch once it has been installed.

Selecting a Portable Generator
What Kind of Generator Do I Need?

There are a wide variety of portable generators available for purchase. Some are more suitable than others for connecting to your house. When selecting a portable generator to connect to your house, you should ensure the generator:

- will not damage sensitive electronic appliances/equipment,
- provides the capacity to start needed motor loads, such as a well or sump pump
- has the necessary four-wire 20-amp or 30-amp or 50-amp receptacle and a 120/240-volt connection.

As a guide, your transfer switch should be used with a generator that has the following features:

- a peak rating sufficient to start the largest motor you will be running
- an automatic voltage regulator
- 'low oil' shut down
- 14-20 or 14-30 locking or 14-50 straight receptacles
- 120/240-volt output

The quality of power produced by a portable generator is also an important factor to consider when selecting your generator. If the voltage output is too low, it could cause motors, such as your refrigerator or furnace motor, to overheat. If the voltage output is too high, it could damage sensitive electronic equipment such as your computer or the digital controls on your heating system.

To maximize your generator's power quality, it is recommended that your generator have automatic voltage regulation. Electronic voltage regulation is preferred over capacitor or condenser type regulation in instances where sensitive electronic equipment is being operated.

What Size Generator Do I Need?

During a power outage, your transfer switch allows you to select the combination of loads/appliances you want to operate by simply switching breakers in the household breaker panel. This flexibility makes generator sizing easy.

You will want a generator that can run the largest appliances and motors you will need during an outage. You can always run other smaller loads/appliances by rotating them on and off as necessary.

For example, if you have a generator with 9600 continuous watts of capacity, during a power outage, you can run the hot water heater (typically 4800 watts) by simply turning off the majority of other household breakers until the water tank heats up. Once the water is heated, shut off the water heater breaker and switch the other household circuit breakers back on.

To determine the loads you can support with a portable generator, you must consider both the "running watt" and the "starting watt" requirements of the loads you want to operate. (See Appliance Energy Guide in this manual)

Notes to Appliance Usage Guide

The wattages on the Appliance Energy Guide are estimates. The estimated wattage required for your appliances can be easily calculated. (NOTE: 1 kW=1000 watts; 2 kW=2000 watts and so on.) The formula for finding wattage is: Volts x Amps = Watts (running). Always use starting factor when calculating electrical load requirements for your generator. Select the appliances you want to operate and add the starting wattages together to determine if they can all be operated at the same time without exceeding the capacity of your generator. NOTE: individual circuit breakers on your breaker panel may control more than one appliance. Always determine which appliances/loads are connected to specific breakers.

Generator and Appliance Worksheet

There are two things to consider when powering appliances with a standby generator. The first is called running wattage, which is a measure of how much power a device uses while running. Adding these wattage figures will help you determine how many items can be powered by your generator. However, the power required to start a motor is frequently two or three times more than the power required to run that motor. This startup power is called the starting factor, and must also be calculated to avoid overloading your generator. While starting several motors at once may overload your generator, starting them one at a time may be feasible. The following worksheets will help you determine what equipment can be started and powered by your generator.

Write down the maximum and continuous wattage output ratings for your generator in the box marked A.

From the Appliance Energy Guide, select the appliances that you wish to operate and write them in column B. For each selected appliance, write its corresponding starting factor and run watts in columns C and D respectively.

For each appliance that you have selected, multiply the starting factor by the run watts and write the results or the load watts in column E. NOTE: Only items that start simultaneously should be tallied in column D.

Finally, sum up all of the load wattages for each appliance and lights in column E. Add each appliances load watts and write the number in box G. The number in box G represents the total amount of load you plan to run on your portable generator. Be sure that the total in box G does not exceed the generator size in box A.

Equipment	Starting Factor	Running Wattage (avg.)
Water Heater (50 gallon)	1	4500-5000
Portable Heater with fan	2	500-1500
Furnace Fan (Central) - 1/4 HP	3	400
1/3 HP	3	450
1/2 HP	3	600
Computer	1	200
Fax Machine	1	50-1000
Space Heater	1	500-1500
Refrigerator/Freezer	3	750
Home Security System	1	200
Lights	1	40-150
Range w/Oven	1	12200
- Small Burner	1	1300
- Large Burner	1	2400
Garage Door Opener - 1/3 HP	3	750
- 1/2 HP	3	1050
Well Pump - 1/3 HP	3	750
1/2 HP	3	1000
3/4 HP	3	1500
Submersible Sump Pump - 1/2 HP	3	1000
Electric Heat Pump	3	6000
Central A/C 3 ton	3	6000
Dishwasher w/o hot water	2	1200
Television	1	150-400
Radio	1	70-200
Microwave	1	600-1500
Coffee maker	1	750-1200
Toaster	1	1100
Hair Dryer	2	600-1400
Washing Machine w/o Hot Water	2	1000
Clothes Dryer	2	4850
Air Cleaner	2	50
Dehumidifier	2	840
Humidifier	1	177
Vacuum Cleaner	1	800

	A
Generator Size: (Watts)	*7200*

B	C		D		E
Load	**Start Factor**	**X**	**Run Watts**	**=**	**Load Watts**
Refrigerator	*3*	**X**	*1000*	=	*3000*
Sump Pump	*2*	**X**	*1000*	=	*2000*
Computer	*1*	**X**	*200*	=	*200*
Fan (central) ¼ hp	*3*	**X**	*400*	=	*1200*
		X		=	
		X		=	

		F		
Lights	**Wattage**	**Number**		
	60	**X**	*5*	= *300*
	100	**X**	*1*	= *100*
	150	**X**	*0*	= *0*

Total: *6800* **G**

Generator Size: (Watts) **A** [ ]

B Load	C Start Factor	X	D Run Watts	=	E Load Watts
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	
		X		=	

Lights	Wattage	F Number		
	60	X		=
	100	X		=
	150	X		=

Total: [ ] **G**

Frequently Asked Questions

Q. Do I need a generator in order to use the transfer switch?

A. Yes. Your transfer switch is an interconnection device that enables you to connect your portable generator directly to your home's wiring system. During a power outage, your generator becomes your source of emergency back-up power. Your combination switch and receptacle is designed as an alternative to expensive transfer switches and hazardous extension cords.

You have the flexibility of selecting the appliances you want to run from your home's breaker panel, up to the capacity of your generator. .

Your transfer switch uses your existing breaker panel, and can run any large 120 or 240-volt appliance up to your generator's capacity. Your well pump, water heater, sump pump, electric range, clothes dryer and electric baseboard heat are just some of the appliances that can be run on a rotation basis.

Q. Is there any potential for damage to my appliances?

A. Your transfer switch is designed to function as an interconnection device and serves to connect your generator to your home. There is no risk of damage to your appliances created by the device. You should exercise care when selecting your generator to ensure you are buying a high quality generator.

Q. Why can't I run my whole house from a portable generator?

A. The appliances in the average home consume relatively low amounts of electricity to operate once they are started. However, many of them require a significant amount of electricity to start up the appliances. Please review the appliance guide to determine the start-up wattage required for individual appliances.

Q. What happens when the utility power is restored and my generator is operating through the transfer switch?

A. Your generator continues to power your home until you turn it off. Once you turn off your generator, switch your home back to utility power. Your transfer switch prevents back feeding the generator's power into the utility lines, eliminating hazardous conditions for you and for utility service personnel.

Q. Does my utility meter continue to run when using my generator?

A. No, your utility meter will only run when the utility is providing electric power to your home.

Q. Can I use the transfer switch during inclement weather?

A. Yes. The transfer switch is protected by the covering panel, and the plug and cover are designed to withstand the elements. Please consult your generator manufacturer, distributor and/or owner's manual for instructions on the safe operation of your generator.

Q. What happens if the generator gets overloaded?

A. Your generator should have a circuit breaker that will activate in the event of an overload. . If the generator's circuit breaker trips, turn off all the household circuit breakers in your breaker panel, reset the circuit breaker on the generator, and restart the generator. Please refer to your generator owner's manual for complete instructions on the safe operation of your generator.

Q. Where should the generator be placed?

A. Remember, generator exhaust gases contain deadly carbon monoxide. The generator should never be operated inside, this includes basements, crawl spaces and/or attached garages. Please consult your generator owner's manual for complete instructions on the safe location for and operation of your generator.

Q. What is a power cord?

A. A power cord consists of:

• a standard connector that will attach to the transfer switch,

• a four wire cord that is

• insulated, heavy duty, outdoor rated, water-resistant and

• an appropriate NEMA connector for your generator.

Your generator may have a 20-amp, 30-amp, or 50-amp 120/240-volt output that will require a 20-amp, 30-amp, or 50-amp NEMA connector. The length of the power cord should be as close to the actual measured distance from the meter to the generator as possible in order to maintain your generator's power quality.

Q. What gauge wire is used to make the cord?

A. 6 or 10 gauge wire is used. The cord is heavy duty, outdoor rated, fire and water resistant and is appropriate for cords up to 65 feet for a 50- amp circuit.

Q. What if my generator connector does not have a straight or locking 14-20,14-30, or 14-50 connector?

A. Some generators are fitted with connectors that are not 14-20, 14-30 or 14-50. Consult with Heartland Rural Electric Cooperative to determine if your generator can be used.

Definitions

Amp (Ampere): The amount of electricity or current flowing through a wire, similar to the flow of water through a pipe.

Back feed: A condition where electricity is being generated from a source outside the utility power grid and is feeding/traveling back into the power lines.

Breaker Panel: The main circuit breaker panel (or fuse box) is where all the circuits/fuses connect to the incoming electrical supply line from the utility.

Breakers: See Circuit Breaker

Capacity: The amount of power, expressed in watts, kilowatts or megawatts, that a device can provide at any given instant.or The maximum load of electricity that equipment can carry.

Circuit: A continuous loop of current.

Circuit Breaker: The most common type of "overcurrent protection." A resettable switch that trips when a circuit becomes overloaded or shorts out.

Connection Cord: An electrical receptacle and plug wired to a length of flexible electrical cord.

Continuous: Output The amount of power produced continuously as opposed to the maximum output, which can only be produced for short periods of time.

Current: The rate at which electricity flows, measured in amperes.

Electric Panel: See Breaker Panel

Fuses: Removable devices that link a circuit at the fuse box. A non-resettable overcurrent device.

Generator: A machine that converts mechanical energy into electrical energy.

Hardwire: Process of wiring electric appliances directly into the electric power supply.

Load Watts: See Start-up Wattage

Loads: A source drives a load. An appliance, component or other device that requires current to operate.

Meter: Any electrical or electronic device used to measure the amount of electricity consumed.

NEMA: National Electrical Manufacturers Association. A standard which specifies the electrical connectors used on plug-in equipment.

Overload: A condition that occurs when the load is greater than the system/device is designed to handle.

Power Cord: See Connection Cord

Power Outage: A temporary loss of electric power or temporary disconnection from the electric utility.

Running Wattage: The amount of energy necessary to continue running an appliance once it has started.

Start-up Wattage: The amount of energy needed to first start an appliance.
This amount is usually larger than the running wattage for appliances with motors (refrigerator). It is usually the same for appliances without motors (lights).

Sub Panel: Device used in connection with a transfer switch designed to bypass a breaker panel and limits the amount of load or number of appliances that can be placed on a generator.

Surge: A power disturbance known also as a transient voltage.or A brief but extreme burst of energy.

Surge Protection: Any device designed to limit or eliminate transient voltages from entering power, signal, telephone or data lines.

Transfer Switch: Used in conjunction with a sub panel. Device installed by a licensed electrician designed to allow interconnection of a portable generator with limited appliance availability.

Utility's Electric Distribution System: A network of power lines and associated equipment used to transmit and distribute electricity over a geographic area.

Voltage: Electrical potential or force that causes current to flow through a conductor.

Watt: A unit that measures the amount of electrical power. watts = volts x amps