



# Whole Home Sizing

Version 1.1.2

## Worksheet Purpose/Use:

The Generac PWRcell Whole Home Sizing Worksheet is designed based on NEC requirements and covers the sizing requirements for feeders supplying a residential dwelling unit.

**NOTE:** NEC Article 702.4(B)(2) requires that the calculation of load on the optional system; this worksheet is the PWRcell System, to be in accordance with the requirements in Article 702.4(B)(2).

## Worksheet Instructions:

The following instructions are provided to guide the user on how to properly fill out the Whole Home Sizing Worksheet. It is the responsibility of the user to fill in the proper quantities and information to the best of their knowledge and ability.

**NOTE:** Within the instructions, key terms and section numbers are **BLACK**. User-entered values are in **PURPLE**.

Instructions are sorted by the corresponding section number on the worksheet. Section numbers are in parentheses ["()"] surrounding the section number itself.

Section #	Instructions
(1)	<b>General Loads</b> include <b>General Lighting Loads, Fixed Appliances, and Heat and A/C Loads</b> .
(1a)	<p><b>General Lighting Loads</b> are defined as follows...</p> <ol style="list-style-type: none"> <li><b>General Lighting and Receptacles:</b> Calculated 3VA per square foot (sq. ft.). Enter in the number of square feet. The worksheet calculates the load for all lighting and general use receptacles.</li> <li><b>Small Appliance Circuits:</b> These are 20 A circuits for kitchen counter top and dining room <u>refridgerators and freezers</u>. Each circuit is calculated at 1500 VA. Enter in the total number of circuits.</li> </ol> <p><b>NOTE:</b> A <u>minimum of two</u> small appliance circuits are required to be entered.</p> <ol style="list-style-type: none"> <li><b>Laundry Circuit:</b> This circuit is calculated at 1500 VA. A <u>minimum of one circuit</u> is required if <u>laundry</u> Dryer units are connected to the laundry circuit.</li> </ol>
(1b)	Per <b>NEC Table 220.42</b> , total <b>Adjusted Lighting Load</b> is calculated at <u>100%</u> of the first

	<p><b>unmanaged</b> lighting load and <u>35% of that <b>unmanaged</b> load above 3000 VA.</u></p>
(1c)	<p><b>Fixed Appliances</b> are appliances that are fastened in-place. Enter the quantity of the cases, a quantity of "1" will be entered. If the dwelling does not have a listed appliance Gas Appliances. <u>Do NOT</u> include non-fixed-in-place appliances such as Refrigerator</p> <p>All 240 V electric appliances have the option to be managed or locked out. This is done with Smart Management Modules (SMMs) as part of the load management system. <u>The use of L for system operations. Large loads may also be completed locked out with SMMs.</u> For Load Management, see instructions for <b>Section 4.</b></p>
(1d)	<p><b>Other Appliance Loads</b> should include other fixed appliances that were not captured in this section may opt to use load management.</p> <p>120 V loads entered into this section <u>may not</u> opt to utilize load management. <b>EXCEPT</b> 240 V loads are connected may an utilize an appropriately rated load management device</p>
(1e)	<p>Per <b>NEC Section 220.53</b>, the total <b>Adjusted Fixed Appliance Load</b> is calculated dependent on the number of unmanaged fixed appliances. For dwellings with <u>3 or less unmanaged fixed appliance</u> the unmanaged fixed appliance load is applied. For dwellings with <u>4 or more unmanaged fixed appliance</u> the total of unmanaged fixed appliance load is applied.</p>
(1f)	<p>Per <b>NEC Section 220.53</b>, there are two types of <b>Specifically-Adjusted Appliances</b> (equipment covered in <b>Section 2</b>) that have their load ratings derived unique to fixed appliances: Electric Clothes Dryer and Electric Cooking Appliances which are covered by <b>NEC Section 220.55</b> respectively.</p> <p><b>Electric Clothes Dryer</b> load rating is calculated as the greater of two values: 1) The load rating of the dryer. In other words, the Electric Clothes Dryer load is either 5000 VA or the nameplate rating of the dryer.</p> <p><b>Electric Cooking Appliances</b> (ex. Electric Range, counter-mounted cooktop, etc.) is calculated as the sum of relevant appliances. For calculations in this worksheet, <b>NEC Table 220.55 Column C</b> shall be used. For individual nameplate rating of any appliances covered under section are less than 12000 VA and/or single-phase use the nameplate rating for calculations including loads individually greater than 12000 VA and/or single-phase use the nameplate rating for calculations.</p>
(2)	<p><b>Heat and A/C Loads</b> section has three main considerations: 1) <b>A/C &amp; Heat Pumps</b>, 2) <b>Electric Space Heating</b>.</p> <p>Fill in the information for the equipment that is present in the dwelling. <u>It is highly recommended that all equipment be connected to the load management system.</u> <b>A/C and Heat Pumps</b> can be managed or locked out.</p>

ATS via its Controller board (a.k.a. the Smart A/C Control Management [SACM] board). Electric heating loads should be connected to appropriately sized Generac SMMs.

Motor starting capabilities for these Heat and HVAC Loads must be taken into consideration. See instructions for **Section 5**. The maximum rated motor starting capability of a fully loaded demand seen from loads for a value above 50 A cannot and will not be achievable via a soft starter. It is highly recommended for HVAC equipment to lower the required in-rush current (a.k.a. LRA) by considering baseloading in addition to the LRA values provided as they contribute to the total load. The recommended soft starter is the Sure Start by Hyper Engineering. For A/Cs and Heat Pumps, a soft starter will ensure the PWRcell system can start the equipment. For A/C and Heat Pumps, it is recommended to enter the actual locked rotor amps (LRA) from the equipment data plate in **Section 5**.

**(2a)** For A/C units & Heat Pumps, enter the number of units based on the tonnage of the units. Tonnages should always be rounded up to the next highest tonnage.  
Ex. A 2.5 ton A/C unit should be entered in as a 3 ton A/C unit.

**(2b)** For Supplemental Electric Heat (electric heat strips), enter the quantity as a count in the quantity field.  
Ex. 12.5 kW worth of electric heat strips should be entered as a quantity of 2.5.

**(2c)** For Electric Heating, enter in the total feet of baseboard heat in the quantity field. Fixtures are rated at 250 watts per foot.

**(3)**

The total **NEC Calculated Load** value is the combined total of all unmanaged load. It does not necessarily dictate the actual load demand on the PWRcell system while in operation. The (red) of this cell reflects whether the **NEC Calculated Load** can be supported continuously. This is determined based on the maximum continuous AC power specification of the system battery modules selected **Section 7**. In the event that the **NEC Calculated Load** exceeds the capacity selected made in **Section 7**, the **NEC Calculated Load** value will read "TOO HIGH". If this occurs, the **NEC Calculated Load** must be utilized OR more unmanaged load must be managed.

**NOTE:** Total phase imbalance of loads being supported by the inverter during an outage must be within the inverter's capabilities.

**(4)**

Managed and Locked Out Loads are loads that were selected to be connected to the PWRcell system. These loads will appear in the list in **Section 4**. A Managed or Locked Out Load is required to be connected to the Controller board (known as the Smart A/C Control Management [SACM] board) inside the rated Generac SMM. Managed loads will only be energized if the inverter has the capacity to support the load. Loads may or may not be energized during a power outage depending on the load profile and the inverter's capabilities. The inverter also has the capability to control its backfeed current during a power outage should the connected loads exceed the inverter's capabilities.

A/C and Heat Pumps can be managed with the Controller board inside the PWRcell A/C Control Management board in other Generac ATSS). All other 240 V electric heating loads should be connected to Generac SMMs.

A Generac SMM is designed for the load management or load lockout of 240 VAC loads.

	<p>loads is possible with a subpanel for 120 V loads managed by SMMs. The "Priority" s which the manged loads are re-energized following an overload condition, with Priorit Priority 8 loads being last to energize. Where more than 4 SMM's are required, it is re manage an entire subpanel. SMMs that are set to LOCK OUT will not allow the connec PWRcell inverter is in island mode during a power outage.</p>
(5)	<p><b>The maximum rated motor starting capability of a fully populated PWRcell Battery</b> is value above 50 A cannot and will not be achievable via the PWRcell System. <u>Soft Start equipment</u> to lower the required in-rush current (a.k.a surge current) for motor startin Sure Start devices made by Hyper Engineering.</p> <p><u>Please consider baseload in addition to LRA for their contribution to max. required st rated 3 tons or less</u>, the use of a soft starter will ensure the PWRcell system can start <u>rated greater than 3 tons</u>, it is recommended to enter the actual locked rotor amps (L the "<u>Actual Nameplate LRA</u>" field in <b>Section 5</b>. The resulting value of "With Soft Starte product by Hyper Engineering and the manufacturer cited highest possible LRA supp</p>
(7)	<p>The <b>Battery Module Model</b> is chosen from the drop down list of certified battery moc modules are to be ordered using Generac SKUs (via a Generac distributor) as only sp recognized components of the Generac PWRcell Battery.</p>
(8)	<p>The <b>Battery Module Quantity</b> is the count of battery modules expected to be populat backup of dwelling loads during power outages. The total value range is between 3 to between 3 to 6 modules per PWRcell Battery and with up to two PWRcell Batteries cc two PWRcell Batteries are commonly attached to the inverter in practical applications</p>
(9)	<p>The <b>Estimated Backup Duration</b> is the time, in hours, the PWRcell system is expectec assumes that the continuous load is <u>20% of the NEC calculated load</u> and the PWRcel charge (SoC) at the start of the outage. This value is based on the NEC Calculated Lo module model from <b>Section 7</b>, and battery module quantity from <b>Section 7</b>.</p>

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# Worksheet

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Requirements in Part III of Article 220 and

and by source, which for the purposes of Article 220.

the General PWRcell Residential Whole and, where applicable, load

red values are **BLUE**. NEC references are

on numbers are **ORANGE** in color with

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## Loads.

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in the home's square footage. This

g area receptacles. These circuits include number of these circuits.

required to be entered. Washer and Gas

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: 3000 VA of the cumulative total of

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se loads in the "Quantity" field. In most  
e, leave the field blank. Do NOT include  
rs or Freezers.

ne in practice using a Generac Smart  
oad management is highly recommend  
or more information about Load

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in **Section 1c**. 240 V loads entered into

**PTION:** A 240 V subpanel where these 120  
e to manage the entire subpanel.

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nding on the number of connected and  
es, 100% of the cumulative total of  
l fixed appliances, 75% of the cumulative

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cluding heating or air-conditioning  
appliance loads. These loads are the  
**ction 220.54** and **Section 220.55**,

oad rating of the equipment or 2) 5000 VA.  
ngs, whichever is higher.

alculated depending on the number of  
is used. Therefore, it is assumed that the  
000 VA and are 240 V units. For  
units, please refer to **NEC Section 220.55**.

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Supplemental Electric Heat, and 3) Fixed

ommended that all Heat and A/C loads  
ed with the circuits inside the PWRcell

and in other Generac ATSS). All other 240 V

consideration as well. For more information,  
the maximum required current for a fully loaded PWRcell Battery is 50 A. Any  
equipment connected to the PWRcell Battery. Soft Starters are  
designed to limit the surge current (surge current) for motor starting. Please  
refer to the manufacturer's data for the maximum required current. A  
Pumps rated 3 tons or less, the use of a  
soft starter is recommended. For Pumps rated greater than 3 tons, it is  
recommended to consult the manufacturer's data plate into the corresponding field in

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Equipment rated between whole

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increments of 5 kVA.

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Estimated electric space heating is estimated at

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assumes a worst case scenario which  
occurs in island mode. The color coding (green or  
yellow) is determined by the PWRcell system. This is  
determined based on the number of  
modules. This is determined based on the number of  
modules. PWRcell system capabilities based on  
this occurs, either more battery modules

Load (islanding) must not exceed 30%.

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load management system. These loads  
connected to either a PWRcell ATS  
(other Generac ATSS) or an appropriately  
sized generator. The PWRcell system has the  
ability to energize the load. Managed  
loads are programmed into the PWRcell  
software profile on the inverter. Managed loads will  
share the available output power sent to the connected  
loads as the PWRcell Battery is discharged.

A PWRcell ATS (known as the Smart A/C Control  
System) could be connected to appropriately sized

loads. Load management for 120 VAC

etting of the SMM determines the order in  
ty 1 loads being first to energize and  
commended to use the 100 A SMM to  
cted load to be energized while the

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s **50 A**. Any demand seen from loads for a  
rters are highly recommended for HVAC  
ig. Recommended soft starters are the

starting current. For A/Cs and Heat Pumps  
t the equipment. For A/C and Heat Pumps  
RA) from the equipment dataplate into  
er" fields assume the use of a Sure Start  
ression value of 60%.

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ules compatible for use. These battery  
ecific models of these modules are

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ed in PWRcell Battery/ies to support the  
o 12 modules. This is to account for  
onected to one PWRcell Inverter. Up to  
s that also include solar/PV.

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l to support the dwelling loads. This value  
l Battery/ies is/are at 100% state of  
oad from **Section 3** and the battery

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