Warm Air freewatt Plus System, Models WAJ & WDJ

PRODUCT SPECIFICATIONS AND PERFORMANCE GUIDE
This guide will present the end-user, designer and installer with a better understanding of the Warm Air freewatt® PLUS System and its product data. A properly designed warm air heating system should provide comfort, efficiency and optimize equipment durability. The Warm Air freewatt® PLUS system has been developed to replace an existing warm air heating system and provide home energy features and benefits to enhance home comfort and security.

**WHAT IS freewatt®?**
freewatt® is Micro-CHP. CHP is short for Combined Heat and Power. CHP has been widely practiced on an industrial scale for many years. The term Micro-CHP is an industry term used to categorize smaller CHP systems, which are typically smaller than 10 kilowatts electric power output. The freewatt® system is a new integrated approach to small-scale combined heat and power for an individual home.

**WHAT IS freewatt® PLUS?**
freewatt® PLUS brings Micro-CHP to next level. Micro-CHP offers many features and benefits to the homeowner, one major feature not often included is back-up power. Our newest generation of freewatt® PLUS offers the homeowner comfort and security at higher level by providing green back-up power in a quiet and small package.

**WHAT IS ADAPTIVE LOAD MANAGEMENT (ALM™)?**
freewatt® PLUS uses the latest generation of load management to ensure highest energy conservation and reduced environmental impact, while providing back-up power. ALM intelligently monitors power usage and automatically sheds and reconnects loads to prevent generator overload, while maximizing generator operating efficiency.

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GREEN POWER GENERATION

- Honda MCHP power generation technology provides reliable, quiet heat and power for the home. This technology integrates an engine control unit to ensure proper operating characteristics.
- UL 1741 grid-tied inverter is factory-installed within the electronic cabinet and is pre-wired for easy installation of 240 VAC dedicated circuit.
- Engine control unit monitors and controls the engine to optimize its efficiency and ensure proper operating conditions.
- 3-way catalytic converter significantly reduces the unit’s emission levels by reduction or oxidation of the engine’s exhaust product (CO2, NOx and unburned hydrocarbons).
- Oxygen sensor feedback operates the engine at near Stoichiometric conditions to ensure near complete reduction of emission pollutants.
- freewatt® PLUS offers the best value for green back-up power by integrating the power into your home energy system. Green Back-Up Power by freewatt®.

ADVANCED COMFORT

- freewatt® PLUS heating algorithm maximizes heat and power delivered by Honda MCHP unit. Our proprietary heating algorithm is specially engineered for freewatt® PLUS System.
- Low-level heat delivery removes stratification of heat in rooms and provides more comfortable experience for building occupants. Benefits of continuous fan are increased by adding low level of heat.
- MERV 8 air filtration is standard for freewatt® PLUS System, effective at removal of allergens, dust mites and hair spray. MERV 14 air filtration is available and effective at removing all bacteria, most smoke, cooking oil, allergens, dust mites and hair spray.

HIGH EFFICIENCY

- Honda MCHP Unit delivers steady-state efficiency of nearly 90% while producing heat and power, significantly reducing primary energy required to produce your home’s electric power.
- freewatt® PLUS furnace delivers 95% AFUE efficiency with two-stage condensing operation. Furnace is also Energy Star appliance.
- Domestic water heating is integrated into WDJ model to ensure off-heating season operation of Honda MCHP. Independent testing forecasted over 1,000 additional annual operating hours for Honda MCHP.
- Electronically Commutated Motor (ECM) in furnace’s blower assembly reduces electric power consumption by 20% over conventional blower motors in high heat mode and 80% in low heat mode.
- PVC Venting is only permitted for condensing appliances Honda MCHP and furnace use this material for venting.

ADVANCED POWER TECHNOLOGY

- freewatt® Transfer Switch ensures safe grid-connected and back-up power operation. Custom integrated component is UL 1008 Listed and provides 120 VAC power to APC UTS back-up panel.
- APC Universal Transfer Switch (UTS) Back-up Panel provides configurable platform to maximize freewatt® PLUS System’s power generation.
- Adaptive Load Management (ALM™) technology maximizes power generated by Honda MCHP, allowing 1.8 kW to power six critical loads, including your heating system, security system, refrigerator/freezer, sump pump and still have some power left for convenience outlet: Security & Comfort.
- Uninterruptible Power Supplies (UPSs) can also be integrated into UTS to provide uninterrupted power to critical loads such as computers or radios.

COMMUNICATION

- freewatt® PLUS Thermostat has new LCD display that displays inside temperature, heating/cooling setpoint and outdoor temperatures. LCD display shows MCHP operating hours and alerts homeowner to system faults or errors.
- Embedded freewatt® PLUS webpage offers networked homeowners ability to see status of freewatt® PLUS System and change thermostat settings remotely. Depending on your local network settings, homeowners can check on their freewatt® PLUS system at any time and any place.
- freewatt® PLUS remote monitoring is available for customers who wish to have their systems data captured and evaluated by professional freewatt® PLUS technical support team. Please consult your freewatt® PLUS specialist about this exciting new product feature.
freewatt® PLUS Thermostat

- The freewatt® PLUS Thermostat is programmable, communicating thermostat allows freewatt® control module to communicate with it. Provides system control module with thermostat’s room temperature, set points and remote LCD screen to provide MCHP operation to homeowner.

Outdoor Temperature Sensor •

- freewatt® PLUS System includes installation of outdoor temperature sensor. Sensor provides system control module with information to allow for anticipatory heating of dwelling by Honda MCHP unit. Maximizing power production of system.

Air Filters •

- MERV 8 air filtration is standard for freewatt® PLUS System and MERV 14 air filtration is available.

APC UTS Hardwire Kit •

- APC UTS requires Hardwire Kit to permanently connect Back-Up Power Output from freewatt® Transfer Switch to APC UTS. Supplied with freewatt® PLUS system.

TP1 Condensate Pump •

- Suggest TP1 condensate pump for freewatt® PLUS installations because of its low power consumption and small footprint.

**SUPPLIED ACCESSORIES**

**OPTIONAL ACCESSORIES**
PRODUCT DESCRIPTION - MODEL WAJ/WDJ

Figure 5 - freewatt® PLUS Furnace and HI Module

<table>
<thead>
<tr>
<th>MODEL</th>
<th>WIDTH A</th>
<th>DEPTH B</th>
<th>HEIGHT C</th>
<th>VENT H</th>
<th>SUPPLY AIR F x G</th>
<th>RETURN AIR D x G</th>
<th>OVERHANG J</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>27</td>
<td>29</td>
<td>44</td>
<td>2</td>
<td>15-7/8 x 20</td>
<td>14- /4 x 21-1/4</td>
<td>3-1/2 to 5</td>
</tr>
<tr>
<td>80</td>
<td>28-1/2</td>
<td>29</td>
<td>44</td>
<td>2</td>
<td>17-1/2 x 20</td>
<td>14- /4 x 21-1/4</td>
<td>3-1/2 to 5</td>
</tr>
<tr>
<td>100</td>
<td>30-1/2</td>
<td>29</td>
<td>44</td>
<td>2</td>
<td>19-1/2 x 20</td>
<td>14- /4 x 21-1/4</td>
<td>3-1/2 to 5</td>
</tr>
<tr>
<td>120</td>
<td>33-1/2</td>
<td>29</td>
<td>44</td>
<td>2</td>
<td>22-1/2 x 20</td>
<td>14- /4 x 21-1/4</td>
<td>3-1/2 to 5</td>
</tr>
</tbody>
</table>

Model WAJ/WDJ
Typical Warm Air freewatt Plus System Footprint

**Furnace/HI Module**
Electrical: 120 VAC, 60 Hz, 1 phase, < 14 amps
Air Intake/Vent: 2”/3” Sch 40 PVC
Natural Gas: ½” NPT
Condensate Drain: ½” PVC
Internet Connection: RJ45

**Honda MCHP**
Electrical: 240 VAC, 60 Hz, 1 phase, < 8 amps
Vent: 2” Sch 40 PVC
Natural Gas: ½” NPT w/flexible connector
Condensate Drain: ½” Tube

**freewatt** Transfer Switch/APC UTS6H
Electrical: 240 VAC, 60 Hz, 1 phase, < 8 amps
120 VAC, 50 Hz, 1 phase, < 14 amps

Consult Installation Manuals for more details.
Concrete Floor Requirements:
- Thickness: 3" Minimum
- Flatness: 1/2" In 10 Feet Class Cx
- Drop-In Anchor: 3/8" Od X 1.75" Long (5/16"-18 Thread) Quantity 4

Honda MCHP Battery
Honda MCHP1.2D(P) requires battery to provide power to start the engine in backup power mode. Battery is provided for each freewatt® PLUS System, however to insure proper battery storage conditions and charge level, it is not packaged with the system. The battery must be ordered at the time of installation from ECR Customer Service by the certified freewatt® dealer performing the installation. Original battery provided for each freewatt® PLUS system will be shipped to installing dealer at no cost.

**NOTICE**
Honda MCHP will not operate without a battery. Use only a battery specifically designed for use in the Honda MCHP.
PRODUCT DESCRIPTION - MODEL WAJ/WDJ

Figure 7 - freewatt® Transfer Switch

Notes:
- Weight approximately 19 Lbs.
- Specifications subject to change without notice.

Model WAJ/WDJ
Load Balancing Transformer

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square D (2S1F)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>9.56&quot;</td>
</tr>
<tr>
<td>Width</td>
<td>8.68&quot;</td>
</tr>
<tr>
<td>Depth</td>
<td>6.56&quot;</td>
</tr>
<tr>
<td>Weight</td>
<td>39.1 Lbs.</td>
</tr>
<tr>
<td>ACME Electric Corp. (T-2-53012-S)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>12.52&quot;</td>
</tr>
<tr>
<td>Width</td>
<td>5.40&quot;</td>
</tr>
<tr>
<td>Depth</td>
<td>5.13&quot;</td>
</tr>
<tr>
<td>Weight</td>
<td>38.0 Lbs.</td>
</tr>
<tr>
<td>Jefferson Electric (411-0091-000)</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>12.50&quot;</td>
</tr>
<tr>
<td>Width</td>
<td>6.69&quot;</td>
</tr>
<tr>
<td>Depth</td>
<td>5.34&quot;</td>
</tr>
<tr>
<td>Weight</td>
<td>41 Lbs.</td>
</tr>
</tbody>
</table>

Note: Specifications are subject to change without notice.

Figure 8 - Universal Transfer Switch (UTS6H)

Notes:
- Weight approximately 25 Lbs.
- Pigtail factory installed to APC UTS6H.
- Hardwire kit furnished for attaching backup power cable.
- Specifications subject to change without notice.
Figure 9 - freewatt® PLUS Thermostat (Model RC-1000WH - ECR)

Figure 10 - Outdoor Temperature Sensor, Model 070

Figure 11 - Optional - TP1 Condensate Pump
Warm Air freewatt® PLUS System requires evaluation of many site specific conditions, including:
- Heat Loss Calculation
- Fuel Type & Existing Piping
- Existing Gas Appliances
- Footprint Available
- AC Power & Panel
- Existing Heating Appliance
  - A. Asbestos
  - B. Chimney Liner
- Existing A/C
- Existing Humidifier
- Existing Electronic Air Cleaner
- Dampers
- Ductwork Sizing
- System Venting
- Concentric Vent
- Make-up Air
- Condensate Pump
- Condensate Drain
- Internet Connection
- Mounting Location for the APC UTS 6H
- Water Cooled or Air Cooled Heat Rejection System
  (Refer to Selection Example, Section 6)

- Select proper firing rate of Warm Air freewatt® PLUS System (natural gas and propane) after performing heat loss calculation.
- Furnace component of system is available in following firing rates: 60, 80, 100 and 120 btu/hr.
- Size furnace to deliver air required for air conditioning coil (tons of cooling) if cooling is required.

**Not Supplied with System**

**Miscellaneous HVAC Components**

**Ductwork**
- Supply Manifold: Connection to furnace's supply opening
- Return Manifold: Connection to furnace's return opening

**Gas Piping & fittings**
- Furnace gas piping and gas stop valve
- MCHP gas piping and gas stop valve

**Air intake/Exhaust Vent**
- Furnace - 2" or 3" PVC piping & supports
- MCHP - 2" PVC vent piping & supports
- Outside Signage, if required

**Electrical Components**
- 15 AMP 120 VAC Dedicated Circuit w/breaker connected to furnace w/service switch
- 15 or 20 AMP 240 VAC Dedicated Circuit to freewatt® Transfer Switch
- 240 VAC DPST Service Switch at freewatt® Transfer Switch
- Ethernet Cable for internet connection
- 10 conductor Tstat Cable [Honeywell Genesis (22AWG 10/C STR CM-CL2)]
- 2 Conductor Cable for Outdoor Temperature Sensor
- Audible CO Detector and Wiring per local Codes
- External Service Switch (if required)

**DHW Heating Circuit Components (WDJ models only)**
- Water Heater
- 1/2 " Piping and Fittings (approved for potable water use)
- Hot Water Recirculation circulator (Grundfos UP-10 or Taco 003 recommended)
- Mixing Valve for Water Heater's HOT output to ensure anti-scald protection
- 120 VAC Wiring from HI Module to Circulator

**Condensate Pump & Tubing**

**Heat Rejection Piping and Fittings**
Installation Considerations

- Installation of APC UTS6H:
  - 120 VAC wiring from freewatt® Transfer Switch to APC unit must be 12 gauge if run is longer than 12ft (US-NEC)
  - Pigtail for connection to Main Service Panel is factory installed, mount UTS6H in close proximity to Service Panel.
    - Plywood backing and mounting screws are not provided.
  - Hardwire kit supplied, care should be taken to install per instructions for Model UTS6H.

- Installation of freewatt® Transfer Switch and Transformer:
  - Plywood backing and mounting screws are not provided.

- Installation of DHW Heating Circuit: (WDJ Models only)
  - 120 VAC wiring must be run from HI-Module to power circulation pump.

- Installation of Heat Rejection System:
  - Condensate pump is not suitable drain for heat rejection.
  - Heat rejection assembly supplied with 1/2" NPT Inlet, and 1/2" Seatech fitting outlet (easy connection for 1/2" copper tubing (Plain End) or PEX (PE)).

- General Installation:
  - Macurco CM-15 is Exhaust Gas Leak Sensor; it is not audible CO Detector. Required to install audible CO detector must be field supplied.
  - GFCI Outlet may be required for condensate pump outlet depending on local codes.
## PERFORMANCE DATA

### Warm Air freewatt® PLUS System

#### freewatt® PLUS HEATING CAPACITIES - NATURAL GAS & PROPANE

<table>
<thead>
<tr>
<th>Model</th>
<th>Natural Gas</th>
<th>Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WAJ060N00A</td>
<td>WAJ060L00A</td>
</tr>
<tr>
<td></td>
<td>WAJ080N00A</td>
<td>WAJ080L00A</td>
</tr>
<tr>
<td></td>
<td>WAJ100N00A</td>
<td>WAJ100L00A</td>
</tr>
<tr>
<td></td>
<td>WAJ120N00A</td>
<td>WAJ120L00A</td>
</tr>
<tr>
<td></td>
<td>WDJ060N00A</td>
<td>WDJ060L00A</td>
</tr>
<tr>
<td></td>
<td>WDJ080N00A</td>
<td>WDJ080L00A</td>
</tr>
<tr>
<td></td>
<td>WDJ100N00A</td>
<td>WDJ100L00A</td>
</tr>
<tr>
<td></td>
<td>WDJ120N00A</td>
<td>WDJ120L00A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Honda MCHP - MCHP Mode</th>
<th>Input (Btu/hr) 0-3,300'</th>
<th>18,420</th>
<th>18,420</th>
<th>18,420</th>
<th>18,420</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output (Btu/hr) 0-3,300'</td>
<td>12,300</td>
<td>12,300</td>
<td>12,300</td>
<td>12,300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Honda MCHP - Back-Up or Grid Boost</th>
<th>Input (Btu/hr) 0-3,300'</th>
<th>26,000</th>
<th>26,000</th>
<th>26,000</th>
<th>26,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output (Btu/hr) 0-3,300'</td>
<td>17,000</td>
<td>17,000</td>
<td>17,000</td>
<td>17,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Furnace</th>
<th>Input (Btu/hr) 0-2,000'</th>
<th>60,000/36,000</th>
<th>80,000/48,000</th>
<th>100,000/60,000</th>
<th>120,000/72,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output (Btu/hr) 0-2,000'</td>
<td>57,000/34,200</td>
<td>76,000/45,600</td>
<td>95,000/57,000</td>
<td>114,000/68,400</td>
</tr>
<tr>
<td></td>
<td>Furnace Efficiency (AFUE)</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
</tbody>
</table>

### HYBRID INTEGRATION MODULE

<table>
<thead>
<tr>
<th>Pump Power (watts)</th>
<th>65</th>
<th>65</th>
<th>65</th>
<th>65</th>
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</thead>
<tbody>
<tr>
<td>Pump Voltage (VDC)</td>
<td>12/24</td>
<td>12/24</td>
<td>12/24</td>
<td>12/24</td>
</tr>
</tbody>
</table>

### MAXIMUM VENTING LENGTHS (EACH ELBOW EQUALS FIVE FEET)

<table>
<thead>
<tr>
<th>Venting Length (ft.) – Furnace (3&quot;)</th>
<th>100 ft.</th>
<th>100 ft.</th>
<th>100 ft.</th>
<th>100 ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venting Length (ft.) – Honda MCHP (2&quot;)</td>
<td>110 ft.</td>
<td>110 ft.</td>
<td>110 ft.</td>
<td>110 ft.</td>
</tr>
</tbody>
</table>

### Furnace

#### freewatt® PLUS FURNACE CAPACITIES - NATURAL GAS & PROPANE

<table>
<thead>
<tr>
<th>Model</th>
<th>Natural Gas</th>
<th>Propane</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WAJ060N00A</td>
<td>WAJ060L00A</td>
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<tr>
<td></td>
<td>WAJ080N00A</td>
<td>WAJ080L00A</td>
</tr>
<tr>
<td></td>
<td>WAJ100N00A</td>
<td>WAJ100L00A</td>
</tr>
<tr>
<td></td>
<td>WAJ120N00A</td>
<td>WAJ120L00A</td>
</tr>
<tr>
<td></td>
<td>WDJ060N00A</td>
<td>WDJ060L00A</td>
</tr>
<tr>
<td></td>
<td>WDJ080N00A</td>
<td>WDJ080L00A</td>
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<tr>
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<td>WDJ100N00A</td>
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<tr>
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<td>WDJ120N00A</td>
<td>WDJ120L00A</td>
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</table>

<table>
<thead>
<tr>
<th>Furnace</th>
<th>Input (Btu/hr) 0-2,000'</th>
<th>60,000/36,000</th>
<th>80,000/48,000</th>
<th>100,000/60,000</th>
<th>120,000/72,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Output (Btu/hr) 0-2,000'</td>
<td>57,000/34,200</td>
<td>76,000/45,600</td>
<td>95,000/57,000</td>
<td>114,000/68,400</td>
</tr>
<tr>
<td></td>
<td>Furnace Efficiency (AFUE)</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
<td>95%</td>
</tr>
</tbody>
</table>

### HEATING AIRFLOW

<table>
<thead>
<tr>
<th>Airflow Range of Low Fire (CFM)</th>
<th>790-1050</th>
<th>1050-1400</th>
<th>1575-2100</th>
<th>1310-1750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airflow Range of High Fire (CFM)</td>
<td>1050-1300</td>
<td>1405-1750</td>
<td>2110-2200</td>
<td>1755-2100</td>
</tr>
<tr>
<td>Motor – ECM Direct Drive</td>
<td>½ hp</td>
<td>¾ hp</td>
<td>1 hp</td>
<td>1 hp</td>
</tr>
</tbody>
</table>

### CONTINUOUS FAN AIRFLOW

| Airflow (CFM) | 600 | 750 | 875 | 875 |

### COOLING CAPACITY AND AIRFLOW

<table>
<thead>
<tr>
<th>CFM Range @ 0.50” WC</th>
<th>600 - 1200</th>
<th>800 - 1600</th>
<th>800 - 2000</th>
<th>800 - 2000</th>
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</thead>
</table>

### DUCTWORK CONNECTION DIMENSIONS

<table>
<thead>
<tr>
<th>Supply Air (F x G)</th>
<th>16 x 20</th>
<th>17.5 x 20</th>
<th>19.5 x 20</th>
<th>22.5 x 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return Air (D x E)</td>
<td>14 x 22</td>
<td>14 x 22</td>
<td>14 x 22</td>
<td>14 x 22</td>
</tr>
</tbody>
</table>

### MAXIMUM VENTING LENGTHS (EACH ELBOW EQUALS FIVE FEET)

| Venting Length (ft.) – Furnace (3") | 100 ft. | 100 ft. | 100 ft. | 100 ft. |
### Honda MCHP, Model MCHP1.2D(P), Type UCFJ

#### Honda MCHP (UCFJ) Heating Capacities – Natural Gas & Propane

<table>
<thead>
<tr>
<th>Model</th>
<th>Natural Gas</th>
<th>Model 1.2D</th>
<th>Propane</th>
<th>Model 1.2DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honda MCHP - MCHP Mode</td>
<td>Input (Btu/hr) 0-3,300’</td>
<td>18,420</td>
<td>Thermal Output (Btu/hr) 0-3,300’</td>
<td>12,300</td>
</tr>
<tr>
<td></td>
<td>Power Output (kW)</td>
<td>1.2</td>
<td>Voltage (V)</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Current (A)</td>
<td>5</td>
<td>Noise Level - dB(A) 1m</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>MCHP Steady State Efficiency</td>
<td>89%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Honda MCHP - Back-Up Mode</th>
<th>Input (Btu/hr) 0-3,300’</th>
<th>18,500-26,000</th>
<th>Thermal Output (Btu/hr) 0-3,300’</th>
<th>12,000-17,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electrical Output (kW)</td>
<td>0 - 1.8*</td>
<td>Voltage (V)</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Current (A)</td>
<td>0-15</td>
<td>Noise Level - dB(A) 1m</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>MCHP Steady State Efficiency</td>
<td>89%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Honda MCHP (UCFJ) - Grid Boost Mode</th>
<th>Input (Btu/hr) 0-3,300’</th>
<th>26,000</th>
<th>Thermal Output (Btu/hr) 0-3,300’</th>
<th>17,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electrical Output (kW)</td>
<td>1.8</td>
<td>Voltage (V)</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Current (A)</td>
<td>7.5</td>
<td>Noise Level - dB(A) 1m</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>MCHP Steady State Efficiency</td>
<td>89%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Maximum Venting Lengths
Reduce Vent length 5 feet for each 90° elbow

| Venting Length (ft.) – Honda MCHP (2”) | 110 ft. |

*Maximum power available to connected loads is 1,700 Watts due to 100 Watt power consumption of load balancing transformer.

---

### freewatt® Transfer Switch (Model FTS-1.8)

#### freewatt® Transfer Switch Electrical Specification

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>ECR Int’l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model No.</td>
<td>FTS-1.8</td>
</tr>
<tr>
<td>Max. Watts</td>
<td>1,800</td>
</tr>
<tr>
<td>Max. Single-Pole Circuits</td>
<td>4</td>
</tr>
<tr>
<td>Max. Double-Pole Circuits</td>
<td>0</td>
</tr>
<tr>
<td>Max. current@ 120VAC</td>
<td>15A</td>
</tr>
<tr>
<td>Max. current@240VAC</td>
<td>7.5A</td>
</tr>
<tr>
<td>Minimum Wire Gauge</td>
<td>14AWG</td>
</tr>
<tr>
<td>Conduit Trade-Size (diameter)</td>
<td>$\frac{1}{2}”$</td>
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</table>
Load Balancing Transformer

<table>
<thead>
<tr>
<th>240/120 VAC BALANCING TRANSFORMER ELECTRICAL SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
</tr>
<tr>
<td>Brand</td>
</tr>
<tr>
<td>Catalog No.</td>
</tr>
<tr>
<td>Power Rating</td>
</tr>
<tr>
<td>Phase</td>
</tr>
<tr>
<td>Primary Voltage Rating</td>
</tr>
<tr>
<td>Secondary Voltage Rating</td>
</tr>
<tr>
<td>Minimum Wire Gauge</td>
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<tr>
<td>Conduit Trade-Size (diameter)</td>
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freewatt® Thermostat (RC-1000WH-ECR)

<table>
<thead>
<tr>
<th>freewatt® THERMOSTAT Model RC-1000 WH-ECR</th>
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</thead>
<tbody>
<tr>
<td>Manufacturer</td>
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<tr>
<td>Model No.</td>
</tr>
<tr>
<td>Voltage</td>
</tr>
<tr>
<td>Current</td>
</tr>
<tr>
<td>Maximum Current (any circuit/total)</td>
</tr>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Cable Specification</td>
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</table>

freewatt® Air Filters

<table>
<thead>
<tr>
<th>FILTER EFFICIENCY &amp; APPLICATION GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>MERV8 Filter</td>
</tr>
<tr>
<td>Typical Applications:</td>
</tr>
<tr>
<td>Typical Contaminants:</td>
</tr>
<tr>
<td>Arrestance:</td>
</tr>
<tr>
<td>Dust Spot Efficiency:</td>
</tr>
<tr>
<td>MERV14 Filter</td>
</tr>
<tr>
<td>Typical Applications:</td>
</tr>
<tr>
<td>Typical Contaminants:</td>
</tr>
<tr>
<td>Arrestance:</td>
</tr>
<tr>
<td>Dust Spot Efficiency:</td>
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</tbody>
</table>

Source: ASHRAE Standard 52.2 - 1999
## PERFORMANCE DATA

**APC Universal Transfer Switch (UTS6H w/ Hardwire Kit)**

<table>
<thead>
<tr>
<th><strong>APC UNIVERSAL TRANSFER SWITCH</strong></th>
<th>Model UTS6H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturer</strong></td>
<td>American Power Conversion</td>
</tr>
<tr>
<td><strong>Model No.</strong></td>
<td>UTS6H</td>
</tr>
</tbody>
</table>

### INPUT - UTILITY
- **Voltage Range**: 84 to 142 Vac
- **Nominal Voltage**: 120 Vac Single Phase
- **Allowable Frequency**: 47 Hz to 63 Hz
- **Rated Current**: 20 A per circuit

### INPUT - Backup1 (MCHP GENERATOR)
- **Input Line**: Hardwire Kit
- **Nominal Voltage**: 120 Vac Single Phase
- **Rated Voltage**: 120 Vac
- **Allowable Frequency**: 47 Hz to 63 Hz
- **Rated Current**: 30 A per circuit
- **Maximum Voltage**: 84 to 142 Vrms

### INPUT - Backup2 (UPS)
- **Input Line**: IEC 320 Male
- **Nominal Voltage**: 120 Vac Single Phase
- **Rated Voltage**: 120 Vac
- **Allowable Frequency**: 47 Hz to 63 Hz
- **Rated Current**: 15 A per circuit
- **Maximum Voltage**: 84 to 142 Vrms

### OUTPUT
- **Nominal Voltage**: 120 Vac (Six Total)
- **Current Per Circuit**: 20 A Maximum
- **Current for Circuits Combined**: 60 A Maximum
- **Convenience Outlet Type**: NEMA 5-15 Female (120V 15A)
- **Protection**: UL-Listed Class CC Branch rated fuses
- **Recommended 15 Amp Fuses**:
  - Ferraz-Shawmut ATMR15
  - Littelfuse KLKR015
  - Bussman LP-CC-15
1. Determine cooling and heating requirements at design conditions:
   Site Data:
   Required Heating Capacity 68,000 Btu/hr
   (Based on Design temperature = 0°F)
   Required Cooling Capacity 36,000 Btu/hr
   (Based on existing 3-Ton system design)

2. Select system based on required heating capacity:
   See table for proper system size and select WAJ080-N00A with Heating Capacity of 76,000 Btu/hr.

3. Site Evaluation
   Evaluate following system components after selecting firing rate for system:
   • Ductwork: Properly sized for new airflow & distribution at MCHP Mode & furnace Heat Mode
   • Smart Zone Thermostat Location: Locate Smart Zone in large zone in close proximity of freewatt® PLUS System. Will facilitate installation of 10 conductor cable from thermostat to system.
   • Make-Up Air Calculation: Ensure Honda MCHP has adequate make-up air for its 27,000 Btu/hr firing rate.
   • Electrical Requirements: Ensure main electrical panel has two open breaker slots for 240 VAC MCHP breaker.
   • Utility Requirements: Grid interconnection, net metering and disconnect switch requirements differ from utility to utility. Review your utility’s requirements and how they impact installation.
   • Condensate Removal: Furnace and Honda MCHP create condensate drain for this fluid is required. Follow local codes for condensate removal.
   • Internet Connection: freewatt® System control module is internet-ready and has embedded web-page. Remote monitoring of system can be performed by ECR International.
   • Heat Rejection System: Evaluate whether water cooled or air cooled heat rejection system (HRS) is applicable for site and logistics involved with their installation. The air cooled HRS is located outdoors and the water cooled HRS is located indoors. Refer to section 6 for additional details.

4. Load Selection
   Select up to six (6) loads to be placed on APC UTS6H back-up panel. Loads need to be 120 VAC and each load should be less than 15 amps. Sheets on following pages outline circuit plan for back-up panel.
   Ensure each load be on dedicated circuit, and total load of each circuit is known to be less than 15 amps.
   Required loads for this panel include:
   • Furnace (Hot Air) [freewatt® PLUS System]
   Suggested additional loads for this panel include:
   • Lighting Circuit
   • Garage Door Opener (Low Power)
   • Freezer
   • Air Conditioner [Low Power, Dedicated 120 VAC circuit]
   • None (If less than 6 loads required)
   • Other (Computer/TV/Radio)
   • Sump Pump (Low Power)
   • Sprinkler System
   • Security System
   • Refrigerator [NAECA 2001 Compliant recommended]
   • Well Pump [Low Power, 120 VAC]
   • Microwave Oven (Low Power)

5. Backup Power Source
   Next level of selection is backup power source, the Honda MCHP. Honda MCHP provides 1,800 watts of power in backup power mode, however only 1,700 watts is available to serve connected loads due to the 100 Watt power consumption of the load balancing transformer. The Honda MCHP should be placed in BACKUP1 Power Source Configuration.
   freewatt® PLUS System has approximately 90 second delay before power is supplied to back up loads.
   Homeowner has option to connect Uninterruptible Power Supply (UPS) to APC UTS6H and allow selected loads to have power throughout power outage. If UPS is included in system design, recommend computer,
TV and radio circuits be configured to use proper-sized and installed UPS. Please follow instructions in UTS6H manual for UPS’s sizing and installation.

6. Heat Rejection System

Heat rejection kit (sold separately) is required for backup mode operation during times when no space heating or water heating is required.

- A water cooled heat rejection system is available for installations where there is uninterrupted supply of water during power outage (city water). Kit ties into main water supply line and discharges water to appropriate drain. Drain must be suitable for 0.35 GPM at 180° F. Kit contains ball valve, pressure reducer, electronic ball valve, and flow reducer. Installer must supply piping to tie into main water line, and deliver water to appropriate drain.

- Installations without uninterrupted supply of water during power outage (most houses with well pumps) air cooled heat rejection system is available. Contains vertically arranged side discharge fan-coil unit installed outside, and is connected to HI Module through closed coolant loop. Dimensions of unit are 24" Length, 15" Width, and 36" Height.

- Air cooled heat rejection system installer must supply secure mounting pad or foundation, power wiring, low voltage wiring (18 AWG minimum), and closed Propylene Glycol coolant loop from HI Module to unit (3/4" piping, circulator, air separator, pressure relief valve, expansion tank, flow check, and purge valve). See FWHRJ Air cooled heat rejection system Installation, Operation, Maintenance manual for specific installation instructions.
## UTS Wiring Plan

<table>
<thead>
<tr>
<th>Load Description</th>
<th>Load Voltage 120V/204V</th>
<th>Breaker Number</th>
<th>Load Power Watts or Amps</th>
<th>UTS Circuits Even</th>
<th>UTS Circuits Odd</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Even Circuits Total:

### Odd Circuits Total:

### Total Power:

## Backup Power Sources Configuration

<table>
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<tr>
<th>Type</th>
<th>Power</th>
<th>Make/Model</th>
<th>Overload Delay 1</th>
<th>Start Relay 2</th>
<th>Stop Relay 2</th>
<th>Start Delay 2</th>
<th>Stop Delay 2</th>
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</thead>
<tbody>
<tr>
<td>UPS/Gen/Other</td>
<td>Watts</td>
<td>-</td>
<td>Seconds</td>
<td>Normally open/closed</td>
<td>Seconds or Minutes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Refer to the system Configuration and Setup section in the Operation Manual.

**Note 2:** These entries apply only to auto start generators.
Circuit Assignments
Tables on this page and previous page are intended to be filled in and taped to inside cover of building circuit breaker panel enclosure.

UTS6/UTS6H

<table>
<thead>
<tr>
<th>Circuit No.</th>
<th>Load Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
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</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Circuit 1
Circuit 1 includes load attached to Circuit 1 connection plus convenience outlet on front of UTS6H, together must consume less than 15 amps. Recommended to use Circuit 1 to power freewatt® System's low power condensate pump.

Circuits 5 & 6
Although all UTS circuits do not need to be used, Circuits 5 & 6 must be connected to main circuit panel and must receive power for UTS to function. Circuits 5 & 6 must be connected to circuits that are in opposite phases, so 240V is present across two circuits. Allows UTS6H to monitor utility power supply.

Uninterruptible Power Supply (UPS)
If using UPS to power "uninterruptible" loads, plug UPS's AC power cord into convenience outlet to charge UPS batteries when MCHP backup power is available. Note: UPS batteries will be charged from convenience outlet when grid power is available.

Follow UPS and UTS6H instructions for sizing UPS for loads configured to be powered in backup mode. Low power circuits, such as computers or security systems, are typically configured for use with UPS.

Non-Delayable & Delayable Circuits
Circuit assigned to freewatt® furnace must be configured as "Delayable-NO" to ensure freewatt® system always has power when in backup mode, otherwise system may not operate correctly.

All other circuits must be configured as "Delayable- Yes" except in case where UPS is used and circuit source is configured as "UPS".
TYPICAL CONFIGURATION

Warm Air freewatt® PLUS System

1. freewatt® PLUS Furnace
2. HI Module
3. Honda MCHP Unit
4. freewatt® Transfer Switch
5. Load Balancing Transformer
Potable water connections are for two separate and distinct purposes.

Heat Rejection System connection is to single wall brazed plated heat exchanger downstream of 3-way mixing valve. Water is used to cool Honda MCHP’s coolant during Grid Boost or Back-Up mode. In DHW Boost mode, Honda MCHP’s heat is transferred into potable water. Direct-fired water heater is connected to double-walled brazed plate heat exchanger with ½” piping and includes Hot Water Recirculation Circulator (Grundfos UP-10 or Taco 003 recommended). If equivalent length of recirculation piping system is over 100 feet, it is recommended use ¾” piping system.
WDJ series Warm Air freewatt® PLUS System is designed to work with any direct fired, power vented, non-condensing, storage tank type water heater. Based on specifications available at time of publication, ECR International has determined water heaters listed above should be compatible with WDJ series freewatt® PLUS models. Listing is simply for specifier’s convenience and is representative sampling of available models. It is not an all inclusive list. It is understood there are other compatible brands and models.
Configuration
Warm Air freewatt® PLUS System can be installed in several different configurations as long as installer adheres to appliance clearances. Typical configuration is explained below:

Furnace, HI Module and Honda MCHP: Typical system configuration has Honda MCHP next to furnace, MCHP can be located on other side of return ductwork or behind furnace, if required. In some cases, MCHP has been installed on other side of a wall.

freewatt® Transfer Switch and Load Balancing Transformer: freewatt® transfer switch (FTS) and load balancing transformer are typically located on wall behind or next to Honda MCHP unit. Location allows for short connections between FTS and Honda MCHP and system controller.

APC Universal Transfer Switch (UTS6H): APC UTS6H supplied with factory-supplied pig-tail easing unit’s installation next to Main Electrical Service panel. Pig-tail connects directly to Main Service Panel and includes supply and return leads.

Thermostat: Install thermostat in large zone on first floor. Facilitates installation of 10-conductor cable to system controller.

Heat Rejection System: Water-cooled heat rejection system (HRS) can be installed on wall besides Warm Air freewatt® PLUS System with potable water supply piped through punch-outs in back of HI module. Cooling water discharge tubing, which should be capable of delivering 180° F water, should discharge into appropriate drain. Air-Cooled heat rejection system must be installed outside within 100' of freewatt® PLUS System with coolant loop piped through punch-outs on back of HI Module.

Controls
Warm Air freewatt® PLUS System has its own system control module that monitors and controls operation of system. Unit is factory-installed on top of HI module and connects directly to furnace, Honda MCHP, freewatt® Transfer Switch, heat rejection system, thermostat, outdoor temperature sensor and internet.

Operation
Outline of Warm Air freewatt® PLUS System’s modes of operation:

Normal Mode
In Normal Mode, system operates on “Call for Heat” as typical heating system would operate. “Call for Heat” is initiated by thermostat and sends signal to Honda MCHP and furnace to provide heat to conditioned space. When thermostat signals system control module “Call for Heat” is satisfied, furnace is signaled to power OFF and Honda MCHP continues to operate. Control module continues to monitor room temperature and allows Honda MCHP to produce power, while delivering low level of heat to room.

While utility power is present, freewatt® transfer switch remains closed, allowing power to flow through freewatt® transfer switch from MCHP unit to main electrical panel. MCHP unit, when operating, will generate fixed 1200 watts of power. Power will flow back through freewatt® transfer switch to main utility panel and back to utility if surplus power is being generated. Balancing transformer is not used in this mode.

Virtual Heat Mode
Virtual Heat Mode operates system to provide heat to conditioned space in anticipation of heat requirement. freewatt® heating algorithm in system control module firmware monitors room temperature and outdoor temperature to optimize Honda MCHP’s operation. Allowing MCHP’s low level of heat to act as first stage and furnace’s higher levels of heat to act as second and third stage.

Bypass Mode
Bypass Mode is utilized when Honda MCHP is not installed or operational. Mode directly connects thermostat to furnace and only supplies furnace’s heat to conditioned space. Mode is normally initiated by installer or homeowner when MCHP is not installed or operational and home still needs heat. System control module automatically switches to this mode when Honda MCHP has fault or error condition, switching “Call for Heat” to furnace.

Since MCHP will not be operating, no power is generated and system is high efficiency home heating appliance in this mode.
Domestic Hot Water (DHW) Boost Mode (WDJ Only)
DHW Boost Mode activates Honda MCHP unit to heat water at the same time as the water heater burner, if freewatt® PLUS System is not already operating in space-heating mode.

DHW Auto Heat Mode (WDJ Only)
If Honda MCHP unit is not satisfying any normal calls for heat, freewatt® PLUS System will activate DHW Auto Heat Mode. Mode activates Honda MCHP unit to heat water before the water heater would activate, maximizing the use of fuel through the Honda MCHP unit. Smaller use of water and water heater standby losses do not lower the tank temperature enough to activate the water heater’s burner.

Post-Run Mode
If Honda MCHP has been started in Back-Up Power or Grid Boost Modes and has not operated for minimum of 30 minutes, freewatt® PLUS System will restart MCHP unit in normal operation and operate unit until it reaches 30 minutes of runtime.

Grid Boost Mode
If Owner and Electric Utility have signed an agreement, Electric Utility can send remote command to initiate freewatt® PLUS System to operate Grid Boost Mode and generate power in distributed generation mode. Power will flow the same way as Normal Mode, except Boost Mode temporarily increases power output from fixed 1200 watts to fixed 1800 watts. Higher power output optimizes the benefit of freewatt® PLUS System and is useful for utility demand/response energy programs. Balancing transformer is not used in this mode.

Back-Up Mode
When utility power is not present, freewatt® Transfer Switch will automatically open and deliver MCHP unit’s 240 VAC power into load balancing transformer to create 120 VAC. 120 VAC power will be delivered to APC Universal Transfer Switch (UTS6H) and unit will load manage back-up loads. freewatt® Transfer Switch, freewatt® control module, MCHP unit and APC UTS will monitor the state of the utility grid, while initiating backup power sequence.

MCHP unit will continue to operate in Back-up Mode until freewatt® Transfer Switch senses return of utility power. freewatt® control module will safely command freewatt® Transfer Switch to re-close to utility power after MCHP unit ceases backup mode operation, and system will subsequently return to Normal Mode.

Communications

Warm Air freewatt® PLUS System uses several levels of communication to allow homeowner, service technician and dealer to monitor and control system’s operation. Several levels of communication allow system to be properly commissioned, operated, monitored, and serviced to ensure proper operation.

First level is LED lights found on front of HI module. Signal homeowner or service technician status of operation and error mode.

Second level is freewatt® PLUS thermostat. Thermostat is the latest generation of programmable communicating thermostat that combines advanced digital technology with an easy-to-use interface. Scroll wheel allows homeowner multiple levels of programming and menus to display operating information. Thermostat displays MCHP runtime and outdoor temperature on scrolling line at the top as well as system error messages.

Third level available for service technician involves a laptop computer connected to system control module for diagnostic troubleshooting. freewatt® PLUS MINT tool, proprietary software program, queries system control module for status information, operating characteristics and error codes as well as allowing manual control of system for troubleshooting activities.

Fourth level is embedded webpage on system control module. When Warm Air freewatt® PLUS System is installed, connect system control module to local area network. Allowing homeowner to access the webpage on system control module, monitor system operation and modify thermostat settings.

APPLICATION DATA
**APPLICATION DATA**

_Fifth level_ involves configuring your system control module for remote access. Level allows your freewatt® PLUS dealer to remotely monitor, troubleshoot and diagnose your system’s operation. Homeowner benefits from level of communication because freewatt® PLUS dealer will be remotely signaled about maintenance requirements, abnormal operating conditions and any system errors before homeowner notices these conditions. Homeowner benefits because freewatt® PLUS dealer will know error and system’s operating characteristics and what service is required and required parts/tools for site visit.

---

**LEED Information**

The following table outlines potential LEED points for the Warm Air freewatt® PLUS System.

<table>
<thead>
<tr>
<th>Section</th>
<th>Number</th>
<th>Credit</th>
<th>Description</th>
<th>Max. Points</th>
</tr>
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<tbody>
<tr>
<td>Indoor Environmental Quality</td>
<td>EQ1</td>
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<td>Combustion Venting</td>
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<tr>
<td>EQ1</td>
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<td>Return Air Flow/Room by Room Controls/Thermal Comfort</td>
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<td>EQ1</td>
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<td>Supply Air Filtering</td>
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<td>Energy and Atmosphere</td>
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<td>Space Heating and Cooling</td>
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<td>10</td>
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<td>Renewable Energy</td>
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</tr>
</tbody>
</table>
TYPICAL ELECTRICAL SCHEMATICS

Electrical Schematic
240 VAC WIRING ONLY
Warm Air freewatt® PLUS System, WAJ/WDJ

F-TS Control Board Revision 2.2.0 uses an external, factory installed 240VAC Fuse block within the enclosure. F-TS Control Board Revision 2.2.1 does not use an external fuse block. Wiring from the main service panel connects directly to the screw terminals on the board.
Electrical Schematic
120 VAC WIRING ONLY
Warm Air freewatt® PLUS System, WAJ/WDJ
Control Module & Controls

TYPICAL ELECTRICAL SCHEMATICS

3-way valve
Located on top of BPHX
(WDJ Only)

CSP Mode Switch

System Power Switch

3-way/DHW Cable
(WDJ Only)
*See footnote below

Furnace AG Cable
(P/N: 2400078445)

Freewatt AC Power Cable
(P/N: 240007822)

*See footnote below

Power Supply

120VAC hot
120VAC neutral
120VAC ground

Footnote:
1 Control Board Revision E5.0.8 Uses external 250VAC 0.5A DHW Fuse; Use 3-WayDHW Cable P/N: 240008447
Control Board Revision E5.0.8b does not use external fuse; Use 3-way/DHW Cable P/N: 240007994
TYPICAL ELECTRICAL SCHEMATICS

Low Voltage Wiring, Warm Air freewatt® PLUS System, WAJ/WDJ - Control Module & Controls

Electrical Schematic for Warm Air freewatt® PLUS System, WAJ/WDJ - Control Module & Controls
Low Voltage Wiring, Warm Air freewatt® PLUS System, WAJ/WDJ

Electrical Schematic
MCHP LOW VOLTAGE WIRING
Warm Air freewatt Plus System, WAJ/WDJ

Macurco/3M CM-15 Exhaust Leak Sensor Wiring

Terminal Screw
Green Jumper Wire
Brown
White
Yellow
Refer to MCHP Installation Manual for instructions

Note:
CM-15 should be mounted approximately 5ft above floor level and at least 5ft away from a fuel gas burning appliance.

4 Pin Exhaust Leak Sensor Cable (supplied from Honda)
Communication and Exhaust Leak Sensor Cable Routed Through Lower Grommet

YM2J Communication Cable
PN# 240007717

freewatt Hi Module Electrical Enclosure (Rear Panel)

9-Pin D-sub connector

MCHP Electrical Cabinet

Battery

250V AC, 20A Fuse
250V AC, 20A Fuse

Terminal Block

Battery Large Connector

Exhaust Leak Sensor

Battery Small Connector

MCHP 9-pin
PART 1 – GENERAL

1.01 SUMMARY
A. Section Includes: Warm Air Micro-CHP System using fuel gas (natural gas or liquid propane) to heat indoor spaces and generate power, while also providing on-demand power for grid boost or back-up power conditions. System can also integrate conventional air conditioning equipment for summer time cooling operation.

B. Related Sections:
   a. Other Division 23 HVAC Sections

1.E.1 1.02 REFERENCES
A. ANSI:
   b. 10 CFR Part 430 Method of Testing for Annual Fuel Utilization Efficiency or Residential Central Furnaces and Boilers

B. UL:
   a. UL 2200 Standard for Stationary Engine Generator Assemblies
   b. UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distribute Energy Resources

C. NFPA:
   b. NFPA 54-2006 National Fuel Gas Code
   c. NFPA 70-2005 National Electric Code

1.E.2 1.03 SYSTEM DESCRIPTION
A. Performance Requirements:
   a. Furnace
      i. Firing Rates: 60, 80, 100 or 120 Btu/hr
      ii. Annual Fuel Utilization Efficiency: 95%
      iii. Stages of Combustion and Air Flow: Two (2)
      iv. ECM Blower Motor Efficiency: 70% or higher
      v. Cooling: 1 - 5 Tons (Capability if outfitted with Air Conditioning Equipment)
   b. MCHP Unit
      i. Steady State Efficiency: 89% or higher
      ii. Power Output:
         1. MCHP Mode = 1.2 kW
         2. Grid Boost Mode = 1.8 kW
         3. Back-up Mode = 0.2 – 1.8 kW
      iii. Noise: Under 50 dBA at 3 feet
      iv. Emissions: Under 400 ppm CO and NOx
      v. Grid Interconnection: Provide an MCHP unit that meets or exceeds the performance requirements outlined in UL 1741
   c. Power Management
i. System shall optimize power output with power management equipment.
ii. Configuration of power management equipment shall allow for pre-selected loads to have
delayable, non-delayable, interruptible and non-interruptible settings.

1.E.3  1.04  SUBMITTALS
A. General: Submit listed submittals in accordance with Conditions of Contract and Section [01 33 00 –
   Submittal Procedures]
B. Product Data: Submit product data, including manufacturer’s technical specification sheets and User Guides.
C. Load Calculation: Submit a residential load calculation performed by ACCA’s Manual J7.
D. Shop Drawings: Submit installation manuals for system components.

1.E.4  1.05  QUALITY ASSURANCE
A. Regulatory Requirements:
      for Gas-Fired Central Furnaces
   d. MCHP Unit: Certified to UL 2200 Standard for Stationary Engine Generator Assemblies and UL 1741
      Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with
      Distributed Energy Resources
   b. All system components must be approved for installation in the State of Massachusetts by the State
      Plumbing Board.
B. Manufacturer Qualifications:
   a. Minimum of 5 years experience in design and manufacture of micro-combined heat and power systems.

1.E.5  1.06  DELIVERY, STORAGE & HANDLING
A. General: Comply with Division 01 Product Requirements Section
B. Delivery: Deliver equipment in manufacturer’s original, unopened, undamaged containers with identification
   labels and installation/owner manuals intact.
C. Storage and Protection: Store equipment protected from exposure to harmful environmental conditions.

1.E.6  1.07  WARRANTY
A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
B. Manufacturer’s Warranty: Submit in accordance with Section [01 78 36 – Warranties] for Owner’s acceptance
   manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is
   in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
   a. Warranty Period:
      i. System: 24 months from the date of installation or 27 months from the date of shipment,
         whichever comes first.

PART 2 – PRODUCTS
2.01  WARM AIR MICRO-CHP SYSTEM
A. Manufacturer: ECR International
   a. Contact: 2201 Dwyer Avenue, Utica, NY 13501; phone (315) 797-1310; fax (315) 797-3762; Website:
      www.ecrinternational.com
B. Warm Air freewatt® PLUS System:
   a. Models:
      i. Natural Gas: WAJ060N00A, WAJ080N00A, WAJ100N00A, WAJ120N00A
      ii. Propane: WAJ060L00A, WAJ080L00A, WAJ100L00A, WAJ120L00A
   b. System shall include:
      i. High-efficiency, gas furnace (ANSI Z21.47/CSA 2.3):
GUIDE SPECIFICATION

1. Triple-pass tubular primary heat exchanger
2. Stainless steel heat recovery coil
3. Silicone nitride hot surface igniter
4. Self diagnostic two stage integrated furnace control
5. Electronically commutated motor (ECM)
6. Energy Star Compliant

ii. Hybrid Integration Module
1. Coolant system
2. Air coil heat exchanger
3. High efficiency MERV 8 air filtration
4. Integrated heat rejection capability

iii. Micro-combined heat & power (MCHP) unit (UL 2200 & UL 1741):
   1. 4-cycle, single-cylinder OHV natural-gas fired engine
      a. Rated Speed: 1,950 rpm
      b. Long-life liquid cooling system
   2. Power Generation
      a. Permanent magnet generator
      b. Power output: 1.2 kW
      c. Voltage: 240 Volts AC
      d. Current: 5 Amps
      e. Power Factor: 1
      f. Frequency: 60 Hz
   3. Inverter
      a. Self-exciting voltage-type current control
      b. Voltage regulation system: Pulse width modulation system
      c. Insulation system: Non-isolated transformer-less
      d. Electrical system: Single phase 3-wire
      e. Power control system: Voltage-type current control system
      f. Meets UL 1741 standard for construction and performance
   4. Air intake/Exhaust
      a. Air cleaner
      b. Three-way catalytic converter for emissions control
      c. Muffler system for low noise

iv. System controller
   1. Micro-processor based with heating algorithm
   2. Internet connector (RJ 45 compatible)
   3. Outdoor temperature sensor (10 ohm) with outdoor mounting box

v. Thermostat
   1. 24 Volt AC
   2. Programmable, communicating-type w/ LCD Screen
   3. Non-volatile program and setting memory: no batteries required for long-term operation
   4. Energy Star compliant
2.02 ACCESSORIES
   A. Condensate Removal: Supply approved means to remove condensate for the furnace and MCHP.

PART 3 – EXECUTION
3.01 MANUFACTURER’S INSTRUCTIONS
   A. Compliance: Comply with manufacturer’s product data, including product technical bulletins, product catalog installation drawings and instructions.
   B. Coordination: Coordinate electrical or mechanical requirements for these connections.

3.02 EXAMINATION
   A. Site Verification or Conditions: Verify that floor conditions are acceptable for product installation in accordance with manufacturer’s instructions.
   B. Footprint: Verify that floor space is acceptable for product installation in accordance with manufacturer’s instructions.
   C. Intake/Vent Pipe Routing: Verify that air intake and vent pipe chases and termination locations are acceptable for product installation in accordance with manufacturer’s instructions.
   D. Condensate Removal: Verify that condensate removal locations are acceptable for product installation in accordance with manufacturer’s instructions.

3.03 INSTALLATION
   A. Certification: Verify that installers have valid certification from the manufacturer to install and service the Warm Air Micro-CHP System.
   B. Warm Air Micro-CHP System: Install in accordance with manufacturer’s installation instructions.
   C. Accessories: Install in accordance with manufacturer’s installation instructions.

END OF SECTION
PART 1 – GENERAL

1.01 SUMMARY

C. Section Includes: Fully-integrated Warm Air Micro-CHP System using fuel gas (natural gas or liquid propane) to heat indoor spaces/domestic water and generate power, while also providing on-demand power for grid boost or back-up power conditions. System can also integrate conventional air conditioning equipment for summer time cooling operation.

D. Related Sections:
   a. Other Division 23 HVAC Sections

1.E.7 1.02 REFERENCES

D. ANSI:
   b. 10 CFR Part 430 Method of Testing for Annual Fuel Utilization Efficiency or Residential Central Furnaces and Boilers

E. UL:
   a. UL 2200 Standard for Stationary Engine Generator Assemblies
   b. UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources

F. NFPA:
   b. NFPA 54-2006 National Fuel Gas Code
   c. NFPA 70-2005 National Electric Code

1.E.8 1.03 SYSTEM DESCRIPTION

B. Performance Requirements:

   a. Furnace
      i. Firing Rates: 60, 80, 100 or 120 Btu/hr
      ii. Annual Fuel Utilization Efficiency: 95%
      iii. Stages of Combustion and Air Flow: Two (2)
      iv. ECM Blower Motor Efficiency: 70% or higher
      v. Cooling: 1 - 5 Tons (Capability if outfitted with Air Conditioning Equipment)

   b. MCHP Unit
      i. Steady State Efficiency: 89% or higher
      ii. Power Output:
          1. MCHP Mode = 1.2 kW
          2. DHW Mode = 1.2 kW
          3. Grid Boost Mode = 1.8 kW
          4. Back-up Mode = 0.2 – 1.8 kW
      iii. Noise: Under 50 dBA at 3 feet
      iv. Emissions: Under 400 ppm CO and NOx
v. Grid Interconnection: Provide an MCHP unit that meets or exceeds the performance requirements outlined in UL 1741.

c. Power Management
   i. System shall optimize power output with power management equipment.
   ii. Configuration of power management equipment shall allow for pre-selected loads to have delayable, non-delayable, interruptible and non-interruptible settings.

1.E.9 1.04 SUBMITTALS

E. General: Submit listed submittals in accordance with Conditions of the Contract and Section [01 33 00 – Submittal Procedures]

F. Product Data: Submit product data, including manufacturer’s technical specification sheets and User Guides.

G. Load Calculation: Submit a residential load calculation performed by ACCA’s Manual J7.

H. Shop Drawings: Submit installation manuals for system components.

1.E.10 1.05 QUALITY ASSURANCE

C. Regulatory Requirements:
   d. MCHP Unit: Certified to UL 2200 Standard for Stationary Engine Generator Assemblies and UL 1741 Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources
   b. All system components must be approved for installation in the State of Massachusetts by the State Plumbing Board.

D. Manufacturer Qualifications:
   a. Minimum of 5 years experience in the design and manufacture of fully integrated micro-combined heat and power systems.

1.E.11 1.06 DELIVERY, STORAGE & HANDLING

D. General: Comply with Division 01 Product Requirements Section

E. Delivery: Deliver equipment in manufacturer’s original, unopened, undamaged containers with identification labels and installation/owner manuals intact.

F. Storage and Protection: Store equipment protected from exposure to harmful environmental conditions.

1.E.12 1.07 WARRANTY

C. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

D. Manufacturer’s Warranty: Submit in accordance with Section [01 78 36 – Warranties] for Owner’s acceptance manufacturer’s standard warranty document executed by authorized company official. Manufacturer’s warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
PART 2 – PRODUCTS

2.01 WARM AIR MICRO-CHP SYSTEM

C. Manufacturer: ECR International
   a. Contact: 2201 Dwyer Avenue, Utica, NY 13501; phone (315) 797-1310; fax (315) 797-3762; Website: www.ecrinternational.com

D. Warm Air freewatt® PLUS System:
   a. Models:
      i. Natural Gas: WDJ060N00A, WDJ080N00A, WDJ100N00A, WDJ120N00A
      ii. Propane: WDJ060L00A, WDJ080L00A, WDJ100L00A, WDJ120L00A
   b. System shall include:
      i. High-efficiency, gas furnace (ANSI Z21.47/CSA 2.3):
         1. Triple-pass tubular primary heat exchanger
         2. Stainless steel heat recovery coil
         3. Silicone nitride hot surface igniter
         4. Self diagnostic two stage integrated furnace control
         5. Electronically commutated motor (ECM)
         6. Energy Star Compliant
      ii. Hybrid Integration Module
         1. Coolant system
         2. Air coil heat exchanger
         3. High efficiency MERV 8 air filtration
         4. Integrated heat rejection capability
         5. Integrated domestic water heating capability
      iii. Micro-combined heat & power (MCHP) unit (UL 2200 & UL 1741-Certified):
         1. 4-cycle, single-cylinder OHV natural-gas fired engine
            a. Rated Speed: 1,950 rpm
            b. Long-life liquid cooling system
         2. Power Generation
            a. Permanent magnet generator
            b. Power output: 1.2 kW
            c. Voltage: 240 Volts AC
            d. Current: 5 Amps
            e. Power Factor: 1
            f. Frequency: 60 Hz
         3. Inverter
            a. Self-exciting voltage-type current control
            b. Voltage regulation system: Pulse width modulation system
            c. Insulation system: Non-isolated transformer-less
            d. Electrical system: Single phase 3-wire
            e. Power control system: Voltage-type current control system
            f. Meets UL 1741 standard for construction and performance
         4. Air intake/Exhaust
            a. Air cleaner
            b. Three-way catalytic converter for emissions control
            c. Muffler system for low noise
iv. System controller
1. Micro-processor based with heating algorithm
2. Internet connector (RJ 45 compatible)
3. Outdoor temperature sensor (10 ohm) with outdoor mounting box

v. Thermostat
1. 24 Volt AC
2. Programmable, communicating-type w/ LCD screen
3. Non-volatile program and setting memory: no batteries required for long-term operation
4. Energy Star compliant

2.02 ACCESSORIES
B. Condensate Removal: Supply approved means to remove condensate for the furnace and MCHP.

PART 3 – EXECUTION

3.01 MANUFACTURER’S INSTRUCTIONS
C. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation drawings and instructions.
D. Coordination: Coordinate any electrical or mechanical requirements for these connections.

3.02 EXAMINATION
E. Site Verification or Conditions: Verify that floor conditions are acceptable for product installation in accordance with manufacturer’s instructions.
F. Footprint: Verify that floor space is acceptable for product installation in accordance with manufacturer’s instructions.
G. Intake/Vent Pipe Routing: Verify that air intake and vent pipe chases and termination locations are acceptable for product installation in accordance with manufacturer’s instructions.
H. Condensate Removal: Verify that condensate removal locations are acceptable for product installation in accordance with manufacturer’s instructions.

3.04 INSTALLATION
D. Certification: Verify that installers have valid certification from the manufacturer to install and service the Warm Air Micro-CHP System.
E. Warm Air Micro-CHP System: Install in accordance with manufacturer’s installation instructions.
F. Accessories: Install in accordance with manufacturer’s installation instructions.

END OF SECTION