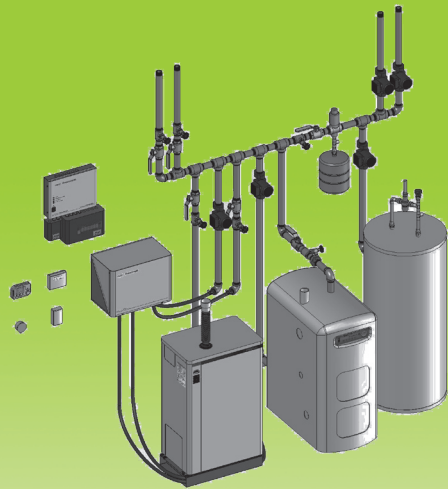


**freewatt®**



# Hydronic freewatt Plus System, Model HDJ

## COMMISSIONING PROCEDURE

CUSTOMER NAME	<b>freewatt</b> System Serial Number

Information and specifications in the manual were in effect at time of printing of this manual. ECR International reserves the right to discontinue, change specifications or system design at any time without notice and without incurring any obligation, whatsoever.

An ISO 9001-2008 Certified Company  
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Utica, NY 13501



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Check our website frequently for updates: [www.freewatt.com](http://www.freewatt.com) [www.ecrinternational.com](http://www.ecrinternational.com)

## HDJ COMMISSIONING PROCEDURE

<b>CHECKLIST</b>	
<input type="checkbox"/>	<b>Purge Air From Hydronic Loop</b>
<input type="checkbox"/>	<b>Check Honda:</b>
	<input type="checkbox"/> Engine Oil Level
	<input type="checkbox"/> Red Shipping Bracket Removed
	<input type="checkbox"/> Condensate Trap Filled With Water
	<input type="checkbox"/> Gas Valve <b>ON</b>
<input type="checkbox"/>	<b>Boiler</b>
	<input type="checkbox"/> Condensate Trap Filled With Water
	<input type="checkbox"/> Gas Valve <b>ON</b>
<input type="checkbox"/>	<b>Hybrid Integration Module</b>
	<input type="checkbox"/> Pump's Power Cable Is Plugged into <b>freewatt</b> Control Module
	<input type="checkbox"/> Check Piping & Connections
<input type="checkbox"/>	<b>Indirect Water Heater</b>
	<input type="checkbox"/> Aquastat Set At 120-125° F
	<input type="checkbox"/> Anti-Scald Mixing Valve Installed
<input type="checkbox"/>	<b>Heat Rejection System</b>
	<input type="checkbox"/> 24V Power Connected From ZV Terminals On freewatt Plus Control Board To Heat Rejection System
	<input type="checkbox"/> Flow Regulator Installed In Correct Orientation (Water Cooled Heat Rejection Only)

### **BOILER**

- Place control module's CHP MODE switch in **OFF** position.
- Ensure 120 VAC power is supplied to control module and boiler.
- Confirm proper operation of boiler and perform boiler commissioning according to boiler IOM, which includes combustion gas analysis (Boiler Startup section of the FW95MC-200 Controls and Troubleshooting Manual).
- Modify boiler parameters as follows:

PARAMETER/DESCRIPTION	FACTORY SETTING	Finned Tube BB, Cast Iron Baseboard or Radiators	Over-Radiated Finned Tube Radiant (Below Floor Stapled)	Radiant (Thin Slab; Above Floor Sleeper System)	Radiant (Slab On-Grade)
1 T3 Set DHW	150	120	120	120	120
4 T1 Top CH-Mode	180	160	160	140	120
5 T1 Foot CH-Mode	120	100	100	100	90
11 Boost Mode	30	0	0	0	0

- Allow water heater's aquastat to signal heat call to control module and boiler.
- Check hot water tap to confirm water heated and mixing valve set properly.

## HDJ COMMISSIONING PROCEDURE

### HI MODULE

1. Fill coolant reservoir with supplied Honda MCHP Long Life Coolant (LLC).
  - A. Continue adding coolant until reservoir is full and coolant level is stable.
  - B. Replace cap on coolant reservoir.
  - C. Check all connections for coolant leaks.

### HONDA MCHP

1. Install Honda Battery in electrical cabinet on bottom, left side of MCHP.
2. Turn power **ON** to Honda MCHP
  - A. Dedicated breaker at electrical service panel
  - B. Outdoor disconnect switch (if present)
  - C. MCHP Local 240v service switch
  - D. If **NO** power present, check electrical wiring
3. Turn MCHP Power **ON**
  - A. Remove small panel on top, left side of MCHP
  - B. Rotate rotary switch to **ON** position
  - C. Switch on top front panel to **ON** position

### HYDRONIC freewatt<sup>®</sup> PLUS SYSTEM, MODEL HDJ

1. Turn all zones **DOWN** or **OFF** except for Smart Zone with HAI Thermostat.
2. Increase set point temperature of HAI Thermostat to 5°F above current room temperature and switch thermostat mode to "Heat" to generate call for heat.
3. If outside temperature is over 40°F, Proceed to step 4. If temperature is below 40°F, turn **OFF** boiler when boiler supply temperature reaches 120°F-130°F.

**Note:** Ensure boiler supply water temperature is between 120°F and 130°F throughout entire commissioning.

4. Connect laptop to **freewatt**<sup>®</sup> PLUS controller with RS-232 serial cable and connect to system using MINT service tool software.
5. Record following information from MINT:

RCC Firmware Revision	RCC Serial Number

6. Check coolant reservoir is full. Add coolant if necessary and replace cap.
7. Check there are no leaks between Honda MCHP and HI-Module or inside HI-Module.

## **HDJ COMMISSIONING PROCEDURE**

### **PURGING AIR FROM COOLANT SYSTEM**

Next several steps require continuous attention to level of coolant in reservoir. Remove cap and add coolant as necessary to prevent level from falling below Minimum mark, once pump turns on first time. Failure to ensure adequate coolant level may result in damage to pump.

1. In MINT, go to Install and Configure → Test → Operate Manually.
2. Click "Turn **ON** Pump" button and run pump until no more air bubbles are displaced from system.
3. Click "Turn **OFF** Pump" button and leave pump OFF until no more air bubbles are displaced from system.
4. Repeat steps 2-3 until as much air as possible has been purged from system.
5. Power **OFF** coolant pump via MINT, after purging air from coolant loop.
6. Close Manual Control window using "Close" button.
7. Disconnect from MINT.

### **MCHP COOLANT TEMPERATURE - MIXING VALVE ADJUSTMENT**

1. Use service switch to switch power OFF to **freewatt**® control module.
2. After 10 seconds, switch power to control module **ON**.
3. Move CHP mode switch on **freewatt**® control module to **ON** position. MCHP should start and operate.
4. Reconnect via MINT tool.
5. Ensure hydronic loop temperature is between 120°F and 130°F.
6. Operate MCHP until INLET MCHP LLC Temperature stabilizes between 152 to 154° F (Wait at least 30 minutes for total purge of air bubbles). LLC Temperature is visible in System Status window or by clicking "Status" button at top of MINT screen.
  - A. If MCHP Inlet Coolant Temperature stabilizes lower than 152°F and MCHP is still operating, increase mixing valve's setting (+). Every full turn of mixing valve is about 10°F.
  - B. If MCHP Inlet Coolant Temperature stabilizes higher than 154°F and MCHP is still operating, check following items in order:
    - i. Coolant Flow: Ensure coolant pump is powered **ON** and flow is occurring (Temperature Differential across MCHP = 10°F or higher)
    - ii. Hydronic Water Flow: Ensure circulator on hydronic loop side of HI-Module is powered **ON** (Relay switch LED & terminal block) and flow is occurring (pump's motor is rotating). Circulator operates based on MCHP Water Temperature, switches **ON** when MCHP Coolant Temperature reaches ~170°F.
    - iii. Plumbing: Ensure coolant tubing is routed appropriately:
      - HI port on MCHP is plumbed to bottom tee, left port of heat exchanger in HI-Module.
      - Hydronic side coolant line closest to zone returns flow to port at right rear of HI-Module heat exchanger.
    - iv. Mixing Valve: Decrease mixing valve's setting (-). Every full turn of mixing valve is about 10° F.

## HDJ COMMISSIONING PROCEDURE

v. Please record:

Coolant Flow Issues	Hydronic Water Flow Issues	Mixing Valve Turns (+/-)

7. Check level of coolant in reservoir and fill to Maximum indicator. Close cap tightly.
8. Recheck for leaks at all coolant tubing connections.

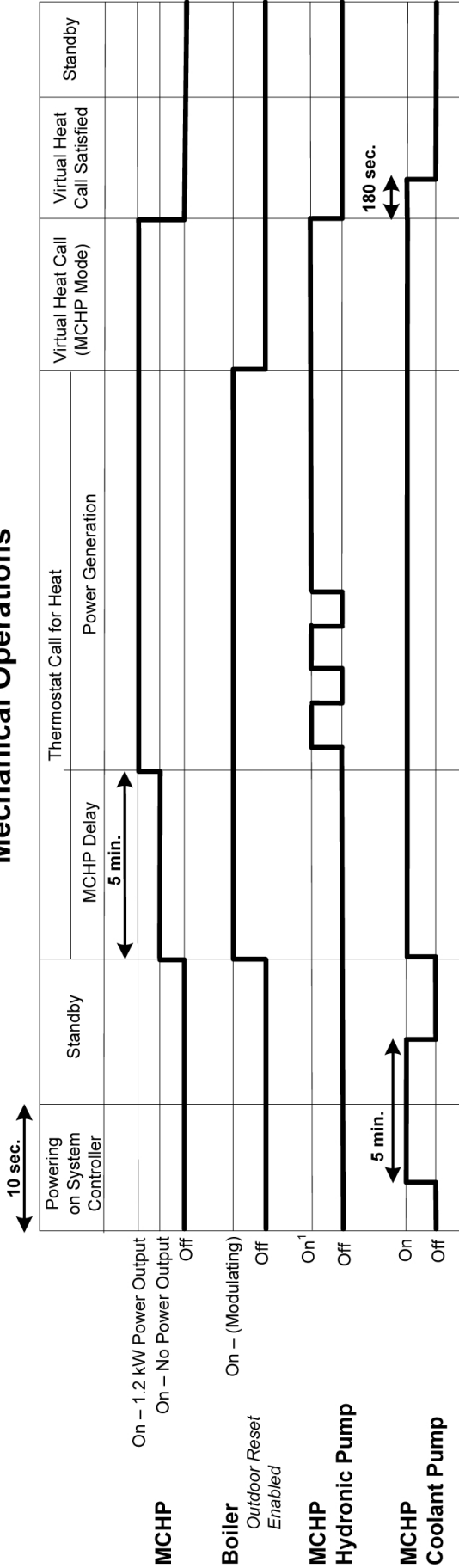
### **BACKUP POWER TEST**

1. Ensure APC UTS6H is configured per HDJ Installation, Operation and Maintenance Manual.
2. Ensure no call for heat from thermostat or aquastat, MCHP is not running, and CHP MODE switch is ON.
3. Locate main power panel where backed up loads are located.
  - A. Each backed up load should be marked in panel corresponding to circuit numbers on APC.
  - B. Turn breakers **OFF** for circuits 1-4.
  - C. Turn breakers **OFF** for circuits 5 and 6, and MCHP breaker
  - D. MCHP should start in Back up power mode. See sequence of operation (page 6):
  - E. Verify heat rejection system is energized and water is flowing
  - F. Check heat rejection piping and HI Module for water leaks
  - G. Switch all circuits back to **ON** position.
  - H. MCHP will shut down. MCHP will turn back **ON** to satisfy 30 minute runtime requirement, if MCHP was in back up mode for less than 30 minutes.
    - i. Coolant pump and heat rejection will remain **ON** to cool MCHP, if MCHP was operating for over 30 minutes.

# HDJ SEQUENCE OF OPERATION

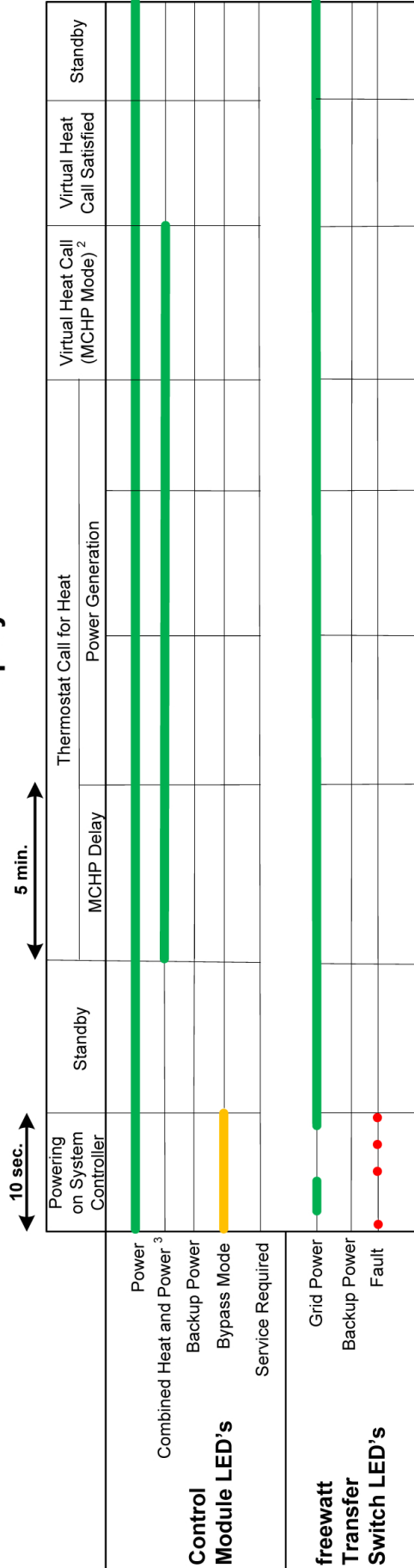
## HYDRONIC FREEWATT SYSTEM MODEL HDJ Sequence of Operation/Timeline: Normal MCHP Mode

### Mechanical Operations



<sup>1</sup>The System Controller will cycle the MCHP hydronic pump to maintain MCHP coolant temperatures

### LED Display



<sup>2</sup>If every 2 minutes the Zone Controller turns OFF for 2 seconds and back ON, this is a normal function to inspect an expansion module for "Heat Call" activity during a Virtual Space Heating Call or Virtual Domestic Hot Water Call.

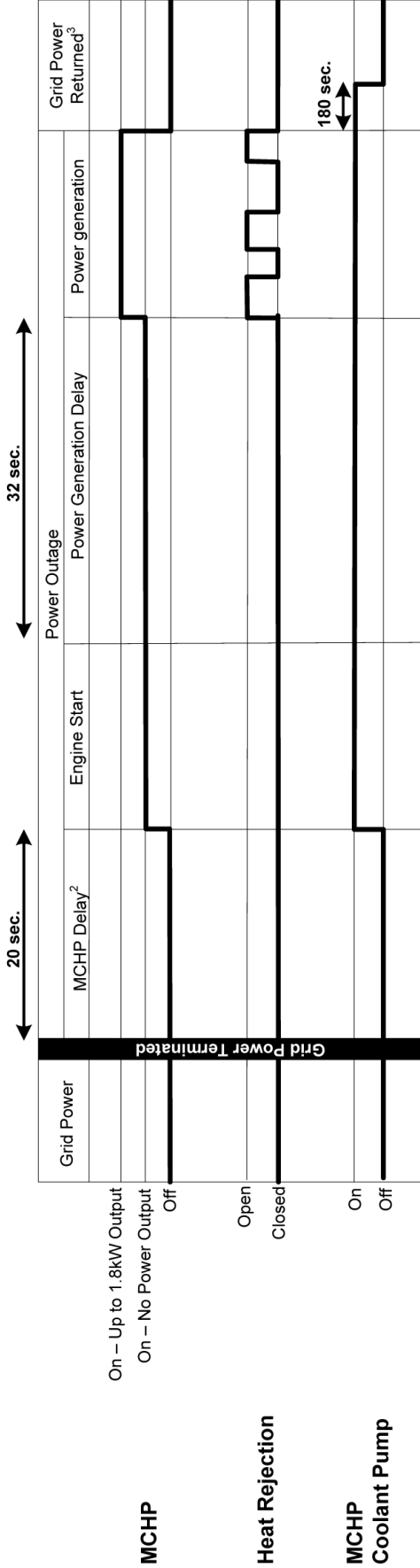
<sup>3</sup>If the CHP LED (Green) is flashing, this is a safety mode of operation that turns off the MCHP based on a spike of the coolant temperature above its recommended range of normal operation. In most cases, this mode will be temporary, but if it persists, please contact your dealer.

# HDJ SEQUENCE OF OPERATION

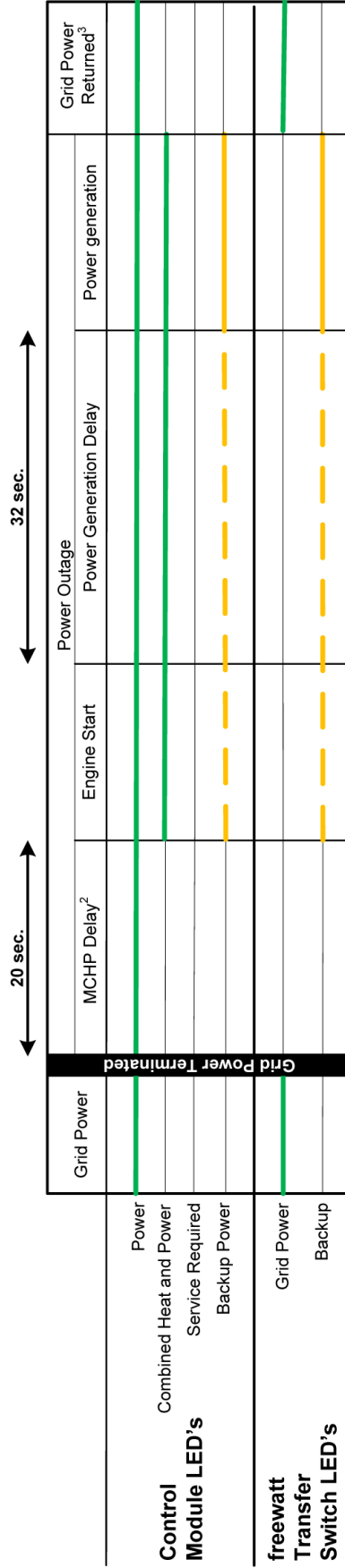
HYDRONIC FREEWATT SYSTEM Model HDJ

Sequence of Operation/Timeline: Backup Mode

## Mechanical Operations<sup>1</sup>



## LED Display<sup>1</sup>



<sup>1</sup> This sequence of operation assumes no thermostat or aquastat heat call. If there is a call for heat, the heat rejection will turn off and MCHP heat will be directed to the hydronic heating loop and appropriate heating zone. Heat calls are handled in the order of priority as shown below:

1. Actual Domestic hot water call
2. Actual Space Heating call
3. Virtual Domestic hot water call
4. Virtual Space Heating Call

*In the absence of a heating load, the heat rejection will be turned on for thermal management during backup mode and boost mode.*

<sup>2</sup> If the MCHP is running while grid power is terminated, the MCHP will remain running for 15 seconds (Engine ON; No power Generation) during the MCHP delay.

<sup>3</sup> If the MCHP runs for less than 30 minutes in backup mode, the MCHP will run to complete 30 minutes minimum post-run mode. If there is no serviceable call for heat, the heat rejection will be turned on.

## HDJ COMMISSIONING PROCEDURE

### GRID INTERCONNECTION/INTERNET CONNECTION

1. If grid interconnect permit has not yet been obtained:
  - A. Set Control Module's CHP Mode switch to **OFF** position.
  - B. Show homeowner CHP Mode switch and how to turn system **ON**, after receiving grid interconnection approval from UTILITY.
2. Set up internet connection:
  - A. Refer to instructions in **freewatt**® PLUS System Installation Manual.
  - B. Apply IP Address, Netmask, Router, and DNS information in Network Setup tab of MINT.
3. Turn **ON** reporting from **freewatt**® PLUS System, if homeowner has signed monitoring consent form or consented to monitoring online:
  - A. Click Alerting Setup in MINT
  - B. Verify:
    - i. Database Address is telemetry.freewatt.com
    - ii. Sampling rate is 86400 (this is one report per day)
  - C. Click Enable Sampling check box
  - D. Click Update
4. Disconnect MINT tool from Control Module.

Commissioning procedure is complete, store this sheet in Hydronic HI Module for future reference:

<b>DATE</b>	<b>freewatt<sup>®</sup> PLUS TECHNICIAN</b>



## HDJ COMMISSIONING PROCEDURE - TROUBLESHOOTING

ERROR CODE	INDICATES	CHECK OR REPAIR
<b>1</b>	THERMOSTAT COMMUNICATIONS ERROR	1. CHP MODE SWITCH IN <b>ON</b> POSITION 2. CABLES AND CONNECTIONS BETWEEN THE THERMOSTAT AND THE HI MODULE 3. LOWER FURNACE ACCESS PANEL INSTALLED 4. IMPROPERLY PROGRAMMED THERMOSTAT
<b>2</b>	OUTDOOR SENSOR ERROR	1. CHECK OUTDOOR SENSOR AND CONNECTION OR INTERNAL 20k OHM DEFAULT RESISTOR
<b>3</b>	MCHP COMMUNICATIONS ERROR	1. RESET SYSTEM POWER 2. POWER TO MCHP 3. CABLES AND CONNECTIONS BETWEEN HONDA MCHP AND HI MODULE
<b>4</b>	MCHP DEVICE ERROR (MCHP ASSERTING "FAILURE" STATUS, IE. A HARD ERROR)	CHECK HONDA MCHP DIAGNOSTICS
<b>5</b>	MCHP DEVICE WARNING (MCHP ASSERTING "WARNING" STATUS, IE. A SOFT ERROR)	
<b>6</b>	<b>freewatt PLUS</b> FLASH PARAMETER INTEGRITY CHECK ERROR	SERVICE REQUIRED
<b>7</b>	SYSTEM POWER SWITCH OFF, UNABLE TO ENTER BACKUP MODE (NOTE: NOT DEFINED IN HYDRONIC SYSTEM)	
<b>8</b>	MCHP PLACED IN LOCKED MODE BY SERVICE TECH, PREVENTS MCHP OPERATION	
<b>9</b>	RESERVED FOR FUTURE USE	
<b>10</b>	ERROR CODE 10 NOT USED	
<b>11</b>	LOW DWELLING TEMPERATURE. BOILER DOWN OR THERMOSTAT "OFF" BY MISTAKE	
<b>12</b>	RESERVED FOR FUTURE USE	
<b>13</b>	VIRTUAL WATCHDOG TIME-OUT. AN UNEXPECTED FIRMWARE EXECUTION ERROR OCCURRED.	REPLACE CONTROLLER MODULE
<b>14</b>	EXHAUST GAS LEAK SENSOR FAILURE, HONDA MCHP ERROR 39.0 (EX_SENS_FAIL)	
<b>15</b>	EXHAUST GAS LEAK SENSOR POWER FAILURE, HONDA MCHP ERROR 39.1,(EX_SENS_POWER_FAIL)	
<b>16</b>	EXHAUST GAS LEAK SENSOR ALARM, COMBUSTION GAS DETECTED, HONDA MCHP ERROR 10.1, (EX_LEAKAGE_FAIL)	
<b>17</b>	NO DC POWER SUPPLY VOLTAGE DETECTED IN BACKUP MODE. (LOAD_PWR_FAULT)	INDICATES A FAULT IN 120V LOAD CIRCUIT
<b>18</b>	DETECTED A <b>freewatt PLUS</b> TRANSFER SWITCH COMMUNICATIONS FAILURE	Check FTS communications cable
<b>19</b>	DETECTED A <b>freewatt PLUS</b> TRANSFER SWITCH DEVICE ERROR	see <b>freewatt</b> transfer switch IOM
<b>20</b>	ERROR CODE 20 NOT USED	
<b>21</b>	DETECTED A <b>freewatt PLUS</b> TRANSFER SWITCH STATE ERROR	see <b>freewatt</b> transfer switch IOM
<b>22</b>	RESERVED FOR FUTURE USE	
<b>23</b>	DETECTED A <b>freewatt PLUS</b> TRANSFER SWITCH CONTACTOR #1 ERROR	see <b>freewatt</b> transfer switch IOM
<b>24</b>	DETECTED A <b>freewatt PLUS</b> TRANSFER SWITCH CONTACTOR #2 ERROR	see <b>freewatt</b> transfer switch IOM
<b>25</b>	EXHAUST GAS LEAK SENSOR TEST BUTTON PRESSED	
<b>26</b>	VOLTAGE DETECTED ON THE <b>freewatt PLUS</b> TRANSFER SWITCH ISLAND NODES (I1 OR I2) IN BACKUP POWER MODE	see <b>freewatt</b> transfer switch IOM
<b>27</b>	RESERVED FOR FUTURE USE	
<b>28</b>	MISSING L1 OR L2 OF AC POWER (FTS_AC_FAULT)	BLOWN FUSE, FAULTY WIRING, UTILITY FAULT
<b>29-98</b>	RESERVED FOR FUTURE USE	
<b>99</b>	VIRTUAL WATCHDOG TIME-OUT OCCURRED 5 OR MORE TIMES. MULTIPLE UNEXPECTED FIRMWARE EXECUTION ERRORS OCCURRED.	REPLACE CONTROL MODULE

## **HDJ COMMISSIONING PROCEDURE - TROUBLESHOOTING**

### **HONDA MCHP NOT STARTING**

Press white "Trial" button located next to rotary power switch on Honda MCHP.

- A. Honda MCHP will try to start as it purges gas through its internal piping.
  - ii. Check 240v Single Phase wiring to Honda if it does not attempt to start.
- C. Check gas supply if Honda tries to start, but fails after several attempts,
  - i. Gas valve is **ON**.
  - ii. Gas is purged through external piping.
  - iii. Press white "Trial" Button after gas supply is confirmed.
- D. Proper wiring and gas flow to unit is confirmed if Honda starts.

Confirms proper line voltage wiring and fuel gas supply. Check communications cable and exhaust gas sensor cable.

### **HONDA MCHP OVERHEAT**

Check following items in order:

- i. Coolant Flow: Ensure coolant pump is powered **ON** and flow is occurring (Temperature Differential across MCHP = 10°F or higher)
- ii. Hydronic Water Flow: Ensure circulator on hydronic loop side of Hi-Module is powered **ON** (relay switch LED & terminal block) and flow is occurring (pump's motor is rotating). Circulator operates based on MCHP Water Temperature and does not switch **ON** until MCHP Water Temperature reaches ~170°F.
- iii. Plumbing: Ensure coolant tubing is routed appropriately:
  - MCHP Coolant Piping: MCHP coolant pump inside HI Module connects to lower inlet port on MCHP. MCHP's top outlet port connects to hot connection of HI Module's mixing valve.
  - Hydronic MCHP Piping: Return from hydronic manifold connects to right rear port on HI Module brazed plate heat exchanger. Supply to hydronic manifold connects to right front outlet on HI Module brazed plate heat exchanger back to hydronic manifold.
- iv. Mixing Valve: Decrease mixing valve's setting (-). Every full turn of mixing valve is about 10° F.

### **14/15 FLASHES OF RED LED ON freewatt<sup>®</sup> SYSTEM CONTROLLER: ERROR CODE 14 OR 15**

Exhaust Gas Leak Sensor issues. Check following items in order:

- i. Exhaust Gas Leak Sensor: Check and verify proper connections of cable on Sensor.
- ii. System Controller: Check and verify proper connections of cable on control module.
- iii. Exhaust Gas Leak Sensor Cable: Check cable for continuity and integrity.

If error persists, replace Sensor or cable.

## **HDJ INSTALLATION CHECK LIST**

### **1 FLASH OF RED LED ON freewatt® SYSTEM CONTROLLER: ERROR CODE 1**

No communication to Thermostat. Check the following items in order:

- i. CHP Mode Switch: Verify in **ON** Position.
- ii. Thermostat/Control Module: Check cables and connections between components.
- iii. 24 VAC Power: Check 24 VAC power supply for control module.

If error persists, replace thermostat or cable.

### **INSTALLATION CHECKLIST**

#### *Placing The System*

- MCHP Stand Installed

#### *Connections*

- Coolant Piping (Max Length = 20 ft.)
- Proper Condensate Drain Piping ("Y")

#### *Combustion Air and Vent Pipe*

- Installed per Boiler Instructions
- Installed per Honda MCHP Instructions
- Installed per AHJ's Requirements

#### *Electrical Wiring & Connections*

- Installed per **freewatt** System Instructions
- Installed per Boiler Instructions
- Installed per Honda MCHP Instructions
- Installed per FTS Instructions
- Installed per APC UTS6H Instructions
- Installed per AHJ's Requirements

#### *Thermostat Wiring & Connections*

- Thermostat (10-cond) Wire Installed
- Properly Connected at Both Ends
- Program Thermostat
- Outdoor Reset Sensors Installed

#### *Internet Connection*

- Cat 5 Cable Connected
- Network Setup through MINT
- Port Forwarding on Router
- Check Embedded **freewatt** Webpage
- Homeowner Signed and /or Accepted Monitoring Consent Form

#### *Safety Systems*

- Test Exhaust Gas Leak System
- Operational Check (Boiler & MCHP)

#### *Start-Up Procedures*

- Fill MCHP and Boiler Condensate Traps
- Coolant Level Acceptable

#### *Grid Interconnect*

- Electrical Inspector Signature (Certificate of completion)
- Picture of MCHP with and without cover
- Picture of Panel with Generator Warning Sticker
- Picture of Outdoor Disconnect (if applicable)

#### *Commissioning Checkout*

- Confirm Boiler Parameter Settings
- Verify Sequence of Operation
- Inspect Venting and Air Intake
- Inspect Condensate Drain
- Inspect System Piping & Connections
- Inspect Coolant Reservoir
- Measure Gas Input Rate
- Confirm Internet Connected
- Perform 300 second delay verification test

#### *Documentation*

- IOM & Users Manual
- Website Information
- Service Information

#### *Honda MCHP*

- Strain Relief
- Y in Condensate Drain Tube

**HDJ SERVICE NOTES**

Date: \_\_\_\_\_

Service Technician: \_\_\_\_\_

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Date: \_\_\_\_\_

Service Technician: \_\_\_\_\_

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Service Technician: \_\_\_\_\_

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Check our website frequently for updates: [www.freewatt.com](http://www.freewatt.com) [www.ecrinternational.com](http://www.ecrinternational.com)

