

freewatt®



Transfer Switch Model FTS-1.8

INSTALLATION, OPERATION & MAINTENANCE MANUAL

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1 - SAFETY INFORMATION

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Safety Symbols

Manual contains important safety information. Read all **freewatt PLUS** System manuals for safety information and warnings.

DANGER

Indicates a hazardous situation which, if not avoided, WILL result in death or serious injury

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Used to address practices not related to personal injury.

Safety Information

WARNING

Read and understand following instructions completely before installing.

WARNING

Electric shock hazard. Disconnect power before installing or servicing. Can cause severe personal injury, death or substantial property damage.

WARNING

Instructions intended as aid to qualified, service personnel for proper installation, adjustment and operation of switch. Read instructions before attempting installation or operation. Failure to follow instructions could cause system malfunction resulting in death, serious bodily injury, and property damage. Consult qualified installer, service agency or your freewatt representative for assistance or additional information.

WARNING

Fire or explosion may result, causing personal injury, loss of life or property damage if instructions are not followed exactly.

WARNING

Do not install system in mobile home. Switch is not approved for installation in mobile home. Could cause fire, property damage, personal injury or loss of life.

WARNING

Switch is equipped for residential installations. Additional code requirements must be adhered to for installation when used for commercial applications. Additional controls or system components may be required. Manufacturer is not responsible for any field installation changes made to switch installation not described or acknowledged in this manual.

NOTICE

Switch is manufactured for use with **freewatt PLUS** system and is not intended for emergency backup power applications. Manufacturer is not responsible for use of switch in manner not outlined in manual.

2 - INTRODUCTION

2.1 Use manual in conjunction with following manuals:

- Warm Air (Model WAJ or WDJ) or Hydronic (Model HDJ) **freewatt PLUS** Installation, Operation and Maintenance Manual and User's Information Manual.
- **freewatt PLUS** FW95V Furnace Installation Operation and Maintenance Manual and User's Information Manual.
- **freewatt PLUS** FW95M-200 Boiler Installation, Operation and Maintenance Manual, Parameter Guide, Control Manual & Trouble Shooting Guide.
- HONDA MCHP, Model MCHP1.2D(P), Type UCFJ Installation Manual and Owner's Manual
- HAI Model RC 1000 Thermostat Installation Instructions and Owner's Manual.
- APC Universal Transfer Switch, Model UTS6H Installation Guide.

2.2 Read and understand following instructions before proceeding.

- Before installation check all applicable state, local building codes and utility company requirements. Installation must conform to requirements in entirety. Use NFPA installation codes and good industry practice in absence of these codes.
- Installation, operation and service of equipment by qualified, trained personnel. Perform installation or service operations in strict accordance with authority having jurisdiction.
- Use switch with approved components rated for system's components. Refer to electrical panel and MCHP unit's rating plates.
- Prevent installation or service activities from occurring while standing in water, without proper rubber-soled work shoes or while hands or feet are wet.
- Remove all jewelry before working on switch or any other electrical work.
- Switch enclosure door should be closed and fixed after work or service is completed.
- Follow regular service and maintenance schedule for efficient and safe operation.
- Keep switch area clean and free of debris, combustible and flammable materials.
- Switch purpose to provide backup power for temporary power outages for residential or light commercial applications. Never install switch in off-grid applications requiring full or near full-time power supply from MCHP Unit.
- Switch and related **freewatt PLUS** System components are not do-it-yourself projects. Installation and service by qualified and certified professionals.

2.3 Introduction

- **freewatt** Transfer Switch is integrated into gas-fired micro-combined heat and power (micro-CHP) system suitable for residential and light commercial heating applications from 60,000 to 200,000 Btu/hr with backup power capabilities of up to 1.8 kW. System consists of high efficiency (condensing) heating appliance, hybrid Integration module, MCHP unit, **freewatt** Transfer Switch, Balancing Transformer, APC Universal Transfer Switch (Model UTS 6H) and heat rejection system.
- **freewatt** Transfer Switch provides automatic transfer of electric load from utility power source to the MCHP unit. No manual adjustments or switching are required by homeowner, under normal operation.
- **freewatt** control module and Transfer Switch monitor utility power source for failure and monitor HONDA MCHP power source for electrical power output and proper operating conditions. **freewatt** Transfer Switch provides **freewatt** product line with reliable means of providing back-power to critical loads while preventing electrical feedback to utility from MCHP.
- **freewatt** Product line provides backup power up to 1.8 kW and is limited in type, wattage, and number of loads supported. **freewatt** Transfer Switch is certified for use as part of **freewatt** System and installed with **freewatt** System by qualified, trained installer.

3 - ELECTRICAL SPECIFICATIONS

⚠ WARNING

Electric shock hazard! Disconnect power before installing or servicing. Can cause severe personal injury, death, or substantial property damage, if ignored.

3.1 General Wiring Notice

- Primary wiring minimum 14 AWG.
- Terminal screws torque 6 to 7 inch-pounds.
- Install wiring in accordance with:
- **U.S.A.** – National Electric Code and authority having jurisdiction. Wiring must be N.E.C. Class 1.
- **CANADA** – C.S.A. C22.1 Canadian Electrical Code Part 1 and any authority having jurisdiction. Wiring must be C.S.A. C22.1 C.E.C. Part 1.

freewatt Transfer Switch Electrical Specification	
Manufacturer	ECR Int'L
Model No.	FTS-1.8
Max. Watts	1,800
Max. Single-Pole Circuits	4
Max. Double-Pole Circuits	0
Max. current @ 120VAC	15A
Max. current @ 240VAC	7.5A
Min. Wire Gauge	14AWG
Conduit Trade-Size (diameter)	1/2"

3.2 Load Balancing Transformer Specification:

- Single-phase, 2KVA power-rated, resin-filled, NEMA Type 3, 2:1 transformer that can accept 240VAC on primary and supply 120 VAC on secondary required to support 120VAC loads powered by **freewatt PLUS** System in backup power mode.
- Following transformers, or equivalent which comply with specifications listed and are UL and CSA compliant, are acceptable for use with **freewatt PLUS** System.

240/120 VAC Balancing Transformer Electrical Specification			
Manufacturer	Schneider Electric	Acme Electric Corp.	Jefferson Electric
Brand	Square D	Acme Electric	Jefferson Electric
Catalog No.	2S1F	T-2-53012-S	411-0091-000
Power Rating	2 KVA	2 KVA	2 KVA
Phase	1	1	1
Primary Voltage Rating	480/240 VAC	480/240 VAC	480/240 VAC
Secondary Voltage Rating	240/120 VAC	240/120 VAC	240/120 VAC
Min. Wire Gauge	14 AWG	14 AWG	14 AWG
Conduit Trade-Size (diameter)	1/2"	1/2"	1/2"

Note: Transformers specified above have been tested and certified for use with **freewatt** Transfer Switch to provide acceptable power quality to APC Universal Transfer Switch (UTS6H).

4 - freewatt TRANSFER SWITCH FEATURES

4.1 freewatt Transfer Switch Functions

- **freewatt** Transfer Switch (FTS) allows **freewatt PLUS** System to operate Honda MCHP as backup power generator.
- MCHP operates to provide heat in conjunction with furnace or boiler in normal heating operation. MCHP generates 1200 watts of power that can power loads in home, or can flow back to utility if more power is being generated than is being consumed. This is known as "net-metering", and is done with utility approval and permitting, to benefit of homeowner and environment.
- MCHP can be used as modest backup generator to power select loads in home when utility power fails. Primarily, **freewatt PLUS** System is powered in backup mode to keep home heated during power outages. Lighting circuit or convenience outlet can be powered in Backup Mode. Loads are connected to APC Universal Transfer Switch (UTS).
- FTS contains logic/relay board and 12 VDC power supply. Logic/relay board is powered by DC power supply when utility power is available, or from 12VDC battery source supplied by MCHP unit when utility power is not available.

It is imperative, MCHP unit's backup power remain isolated from utility grid to prevent utility workers from being exposed to hazardous voltages back feeding from generator in event of utility failure while in Backup Mode. Several fail safe features are incorporated in FTS, **freewatt** Control Module and MCHP unit to maintain safe and ultra-reliable operation:

- FTS power contactors are powered by 240VAC utility power and re-closure is precisely controlled by redundant micro-controllers using high transfer potential solid state relays. Power contactors can only close when utility power is available, maintaining transfer from utility grid after power outage.
- Two power contactors are used in series. Feature allows **freewatt PLUS** System to check contactor's integrity every time they are opened or closed, continuously checks during backup mode operation, ensuring high degree of safety and reliability. Should one contactor fail, other will maintain transfer and at same time this allows system to detect contactor failure, preventing MCHP unit from operating.
- MCHP unit maintains redundant utility power connection. MCHP unit and **freewatt** Control Module, in conjunction with FTS, monitor utility grid power. Control Module and MCHP have to "agree" to operate in Backup Mode. Prevents accidental system operation from occurring if system or home is damaged.

- Two independent, bidirectional communication channels must be active and must maintain data integrity during all stages of system operation (FTS to/from **freewatt** Control Module and **freewatt** Control Module to/from MCHP). If either communication channel to **freewatt** Control Module is disturbed, **freewatt** Control Module signals MCHP to stop. If MCHP detects disturbance on channel to **freewatt** Control Module, it will stop operation.

4.2 Front Cover LED Indicators

Backup Power LED (YELLOW):

- ON continuously, indicates MCHP unit making Backup Power.
- Slow Flash, indicates MCHP unit has started in Backup Mode, but Backup Power is not yet available.
- Fast flash indicates FTS may not be communicating with **freewatt** Control Module.

Grid Power LED (GREEN):

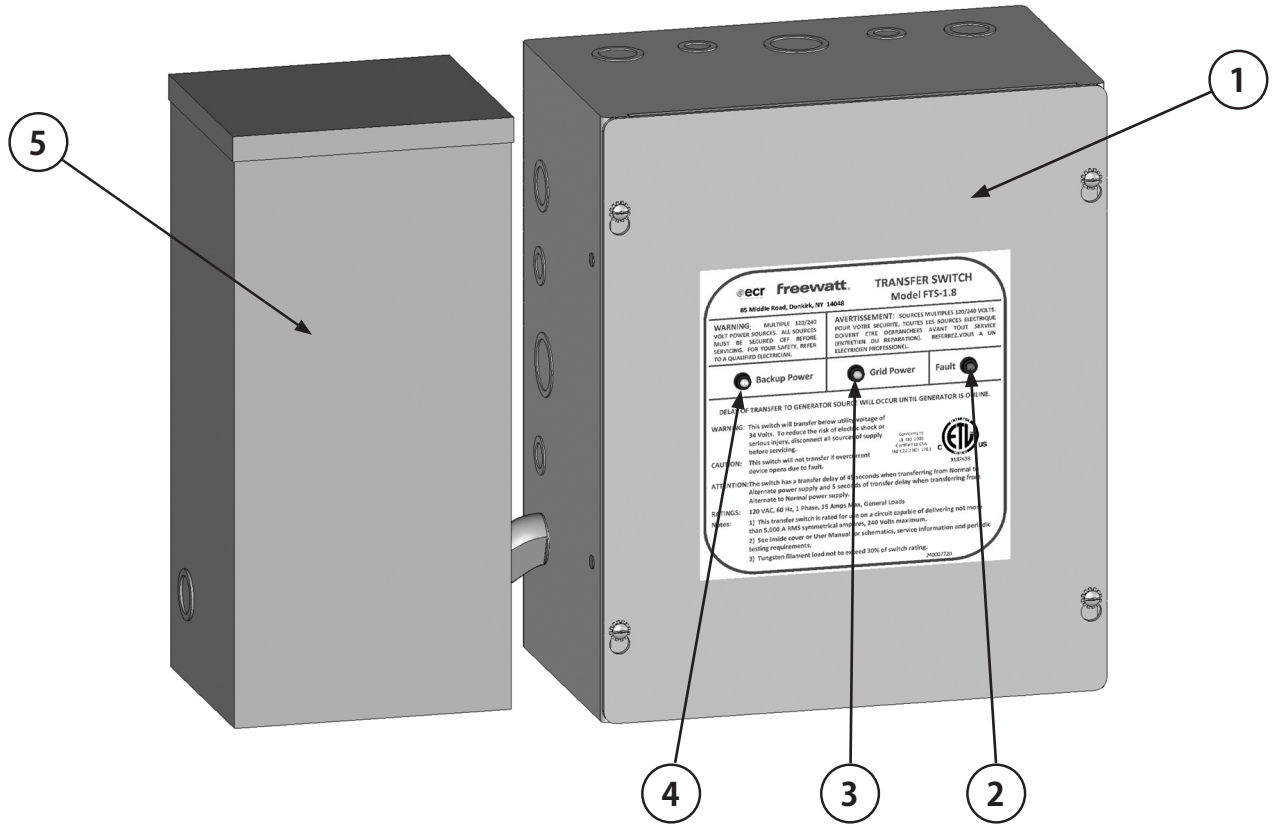
- ON continuously, indicates FTS has utility power.
- Slow Flash, **freewatt PLUS** System is initializing FTS for operation.
- Fast flash indicates FTS may not be communicating with **freewatt** Control Module.

Fault LED (RED):

- On continuously, indicates FTS detected internal error. Check **freewatt** Control Module LEDs for ERROR Code.
- Fast flash indicates FTS may not be communicating with **freewatt** Control Module, or FTS is initializing.

5 - freewatt TRANSFER SWITCH COMPONENTS

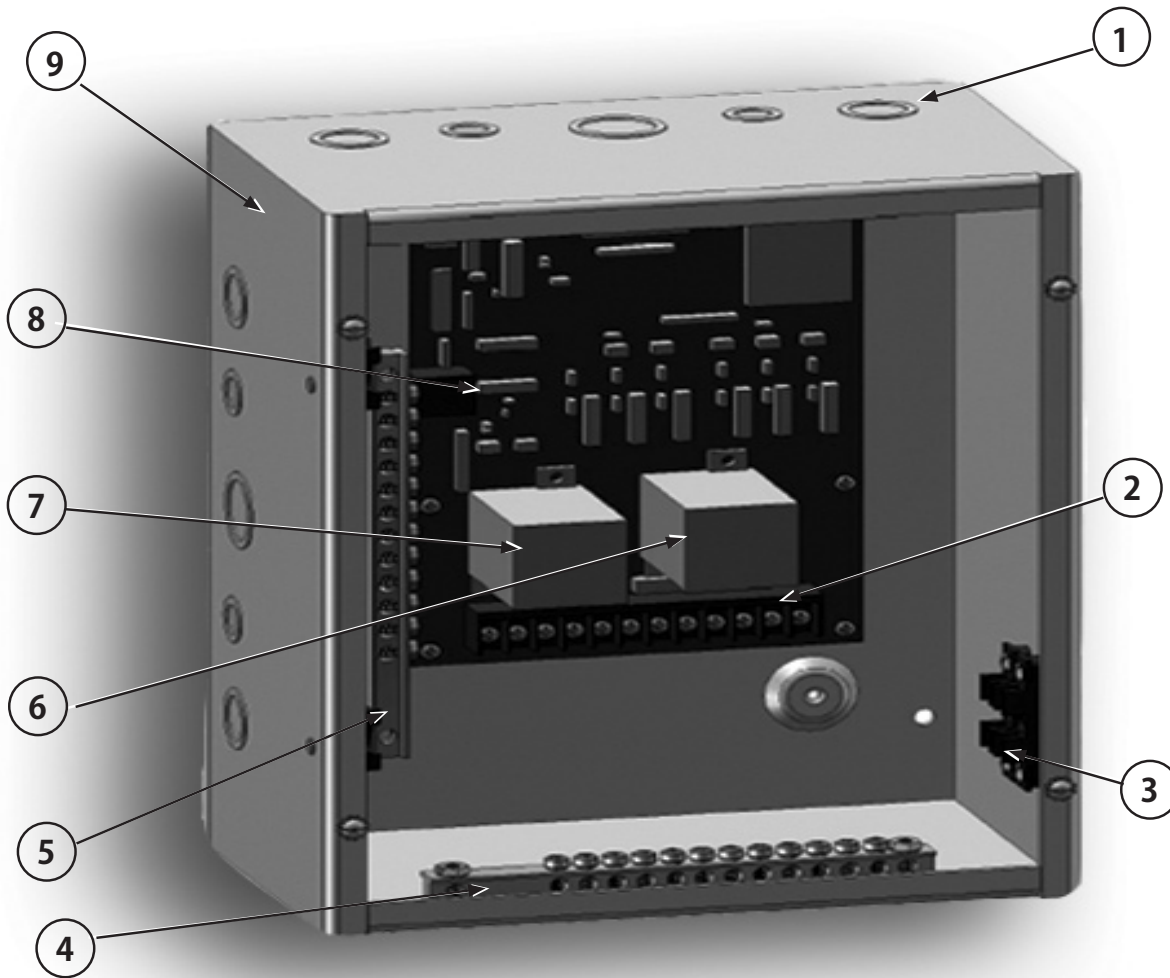
Figure 5-1 freewatt Transfer Switch Control



freewatt Transfer Switch	
Item No.	Description
1	freewatt Transfer Switch
2	Fault LED (red)
3	Grid Power LED (green)
4	Backup Power LED (yellow)
5	Load Balancing Transformer

5 - freewatt TRANSFER SWITCH COMPONENTS

Figure 5-2 freewatt Transfer Switch Components



freewatt Transfer Switch Components List	
Item No.	Description
1	Knockouts
2	Logic PCB Power Terminal
3	Main Fuse Block *
4	Ground_Bar
5	Neutral_Bar
6	3PDT Relay
7	DPDT Relay
8	Logic PCB
9	Enclosure

* Drawing depicts main fuse block (item 3) as used with transfer switch control board REV 2.2.0.
For transfer switch control board REV 2.2.1 main fuse block (item 3) is eliminated and 15A/250VAC main fuses are located on control board.

6 - freewatt TRANSFER SWITCH OPERATION MODES

freewatt Transfer Switch constantly monitors utility grid power and communicates with **freewatt** Control Module.

Following operating modes apply to **freewatt** Transfer Switch:

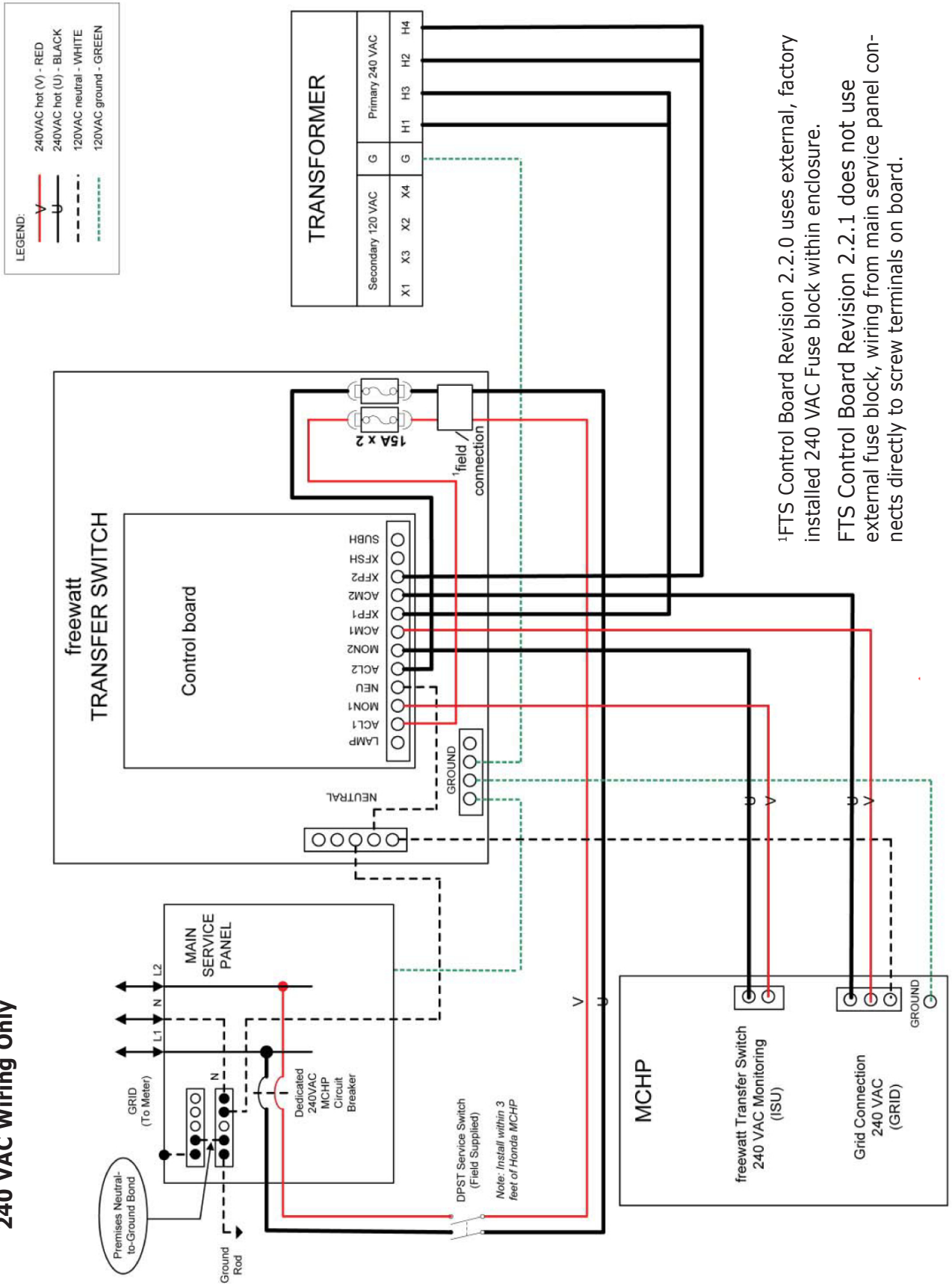
- **Normal Mode:** **freewatt** Transfer Switch will remain closed while utility power is present, allowing power to flow through **freewatt** Transfer Switch and MCHP unit. MCHP unit will generate fixed 1200 watts of power when operating. Power will flow back through **freewatt** Transfer Switch to main utility panel and back to utility if surplus power is being generated. Balancing transformer is not used in this mode.
- **Boost Mode:** Power will flow same as in Normal Mode, except authorized Electric Utility can send remote command to **freewatt PLUS** System requesting Boost Mode operation. Boost Mode temporarily increases power output from fixed 1200 watts to fixed 1800 watts, used with utility demand-response programs. Balancing transformer is not used in this mode.
- **Backup Mode:** **freewatt** Transfer Switch will automatically open and deliver MCHP unit's power into load balancing transformer to create 120 VAC when utility power is not present. 120 VAC power will be delivered to APC Universal Transfer Switch (UTS) and unit will load manage back-up loads. **freewatt** Transfer Switch, **freewatt** Control Module, MCHP unit and APC UTS will monitor state of utility grid, while initiating backup power sequence. MCHP unit starts up in backup power mode and delivers 240 VAC variable output power, to maximum of 1800 watts to **freewatt** Transfer Switch. **freewatt** Transfer Switch will divert 240 VAC power to load balancing transformer to convert MCHP unit's 240VAC power to 120 VAC power compatible with loads on APC UTS.

MCHP unit will continue to operate in Backup 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.

7 - Electrical Schematic

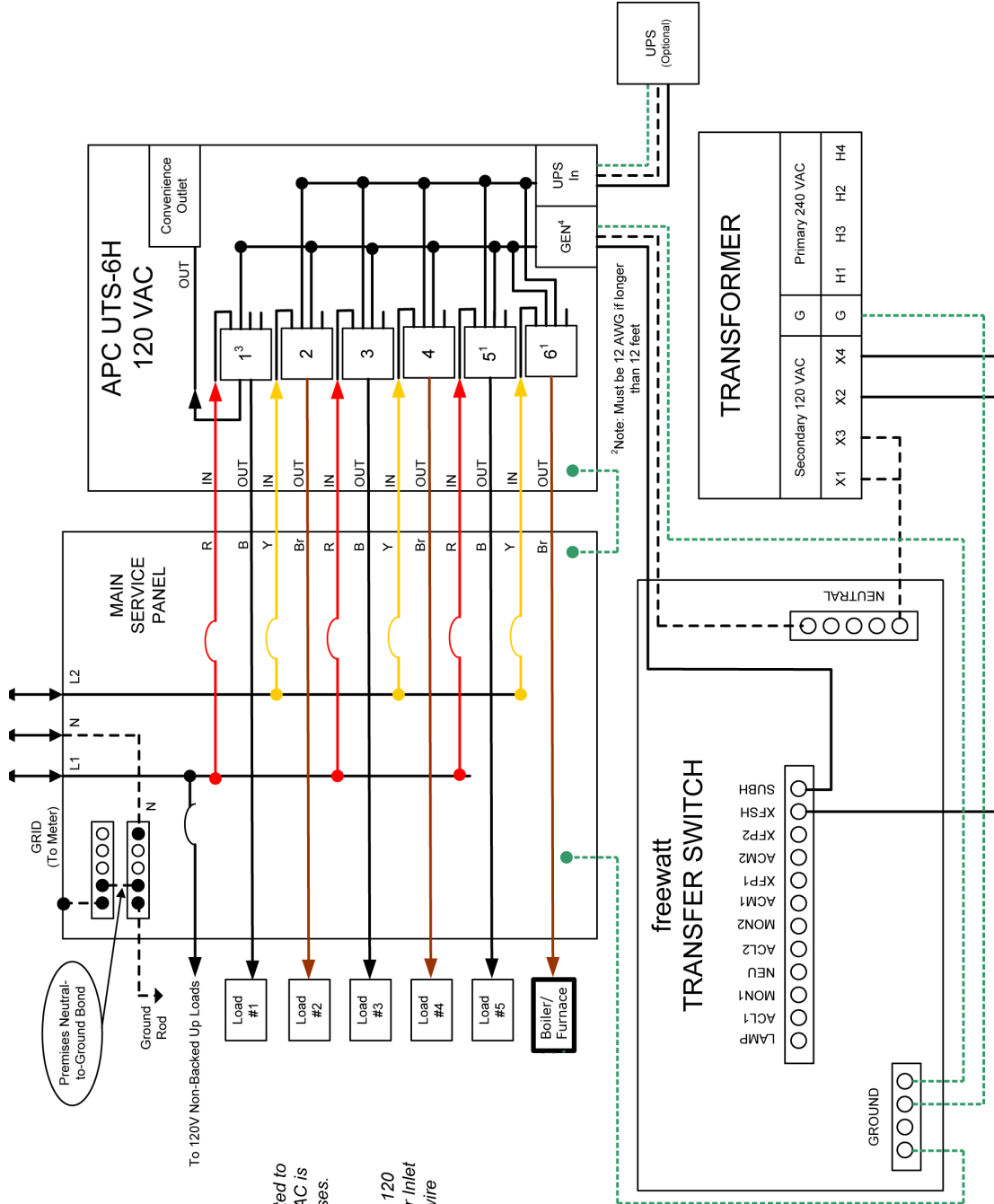
Figure 7-1 240 VAC Wiring Only, freewatt PLUS System, Models WAJ/WDJ/HDJ

freewatt Transfer Switch Electrical Schematic 240 VAC Wiring Only



7 - Electrical Schematic

Figure 7-2 120VAC Wiring Only, freewatt PLUS System, Models WAJ/WDJ/HDJ



freewatt Transfer Switch Electrical Schematic 120 VAC Wiring Only

- ¹IMPORTANT:** APC Circuits 5 & 6 must be connected to breakers that are in opposite phases, so that 240 VAC is present across the two circuits for monitoring purposes.
- ²IMPORTANT:** The backup power cable delivering 120 VAC power to the APC UTS6H Backup 1 Generator Inlet must be installed with the supplied APC UTS Hardware Kit.
- ³IMPORTANT:** Circuit 1 combines the convenience outlet and any circuit hard-wired to this breaker (Combined 120 VAC Current Limit = 15 Amps).
- ⁴Note:** Use external hardware kit P/N 240007866 Supplied with system

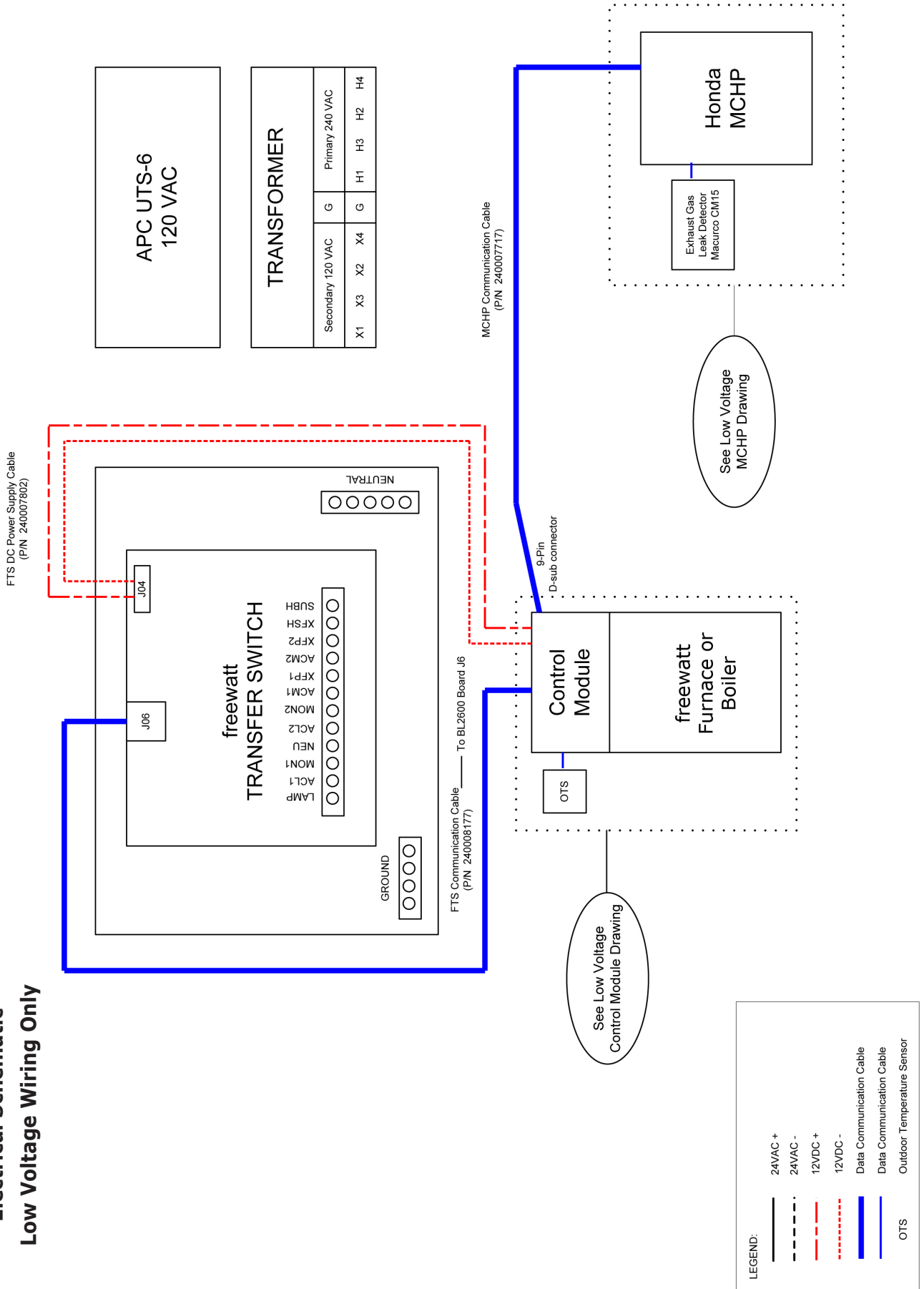
LEGEND:

- 120VAC hot
- - - 120VAC neutral
- · · 120VAC ground

7 - Electrical Schematic

Figure 7-3 Low Voltage Wiring Only, freewatt PLUS System, Models WAJ/WDJ/HDJ

freewatt Transfer Switch Electrical Schematic Low Voltage Wiring Only



8 - Installation

8.1 Installation

Installation of **freewatt** Transfer Switch includes following steps:

- Preparation
- Mounting:
 - **freewatt** Transfer Switch (Model FTS-1.8)
 - Load balancing transformer
 - APC Universal Transfer Switch, Model UTS6H
- Connecting:
 - Load balancing transformer connections
 - APC Universal Transfer Switch connections
 - Power source connections (Utility & MCHP)
 - MCHP utility sensing circuit connections
 - Control Module 12VDC power source cable connections
 - Control Module Communication Cable connection

Follow electrical schematics and instructions found in this manual.

8.2 Preparation

Unpack and inspect **freewatt** Transfer Switch (FTS-1.8) for any damage that may have occurred during transit or handling. Claims for loss or damage occurred during transit must be filed with carrier.

Fully inspect internal components of switch to ensure all packing materials or foreign debris are removed before mounting switch.

8.3 Mounting – freewatt Transfer Switch

Mount **freewatt** Transfer Switch vertically on solid wall or partition. Recommend **freewatt** Transfer Switch placed close to Honda MCHP for ease of wiring and visibility of LED's for service.

- Position switch and mark mounting holes.
- Switch weighs 10.5 lbs use appropriate screws and mounting location to ensure proper mounting.
- Start screws (field sourced) for keyhole mounting holes in upper corners. Tighten screws to 1/8" (3mm) from surface. Switch will require screw in bottom corners after switch is hung and leveled.
- Hang switch on screws, position case and start bottom screws.
- Level and tighten all screws.

8.4 Mounting – Load Balancing Transformer

Mount Load Balancing Transformer vertically on a solid wall or partition. The transformer should be located below or to the left of the switch and connected through provided knockouts on both units. The load balancing transformer should be mounted within 10 feet of **freewatt** Transfer Switch.

- Position transformer and mark mounting holes.
- Transformer weighs 40 lbs. Use screws and mounting location to ensure proper mounting.
- Start screws (field sourced) for keyhole mounting holes in upper corners. Tighten screws to about 1/8" (3mm) from surface. Switch will required screw in bottom corners after switch is hung and leveled.
- Hang switch on screws, position case and start bottom screws.
- Level and tighten all screws.

8.5 Mounting – APC Universal Transfer Switch (UTS)

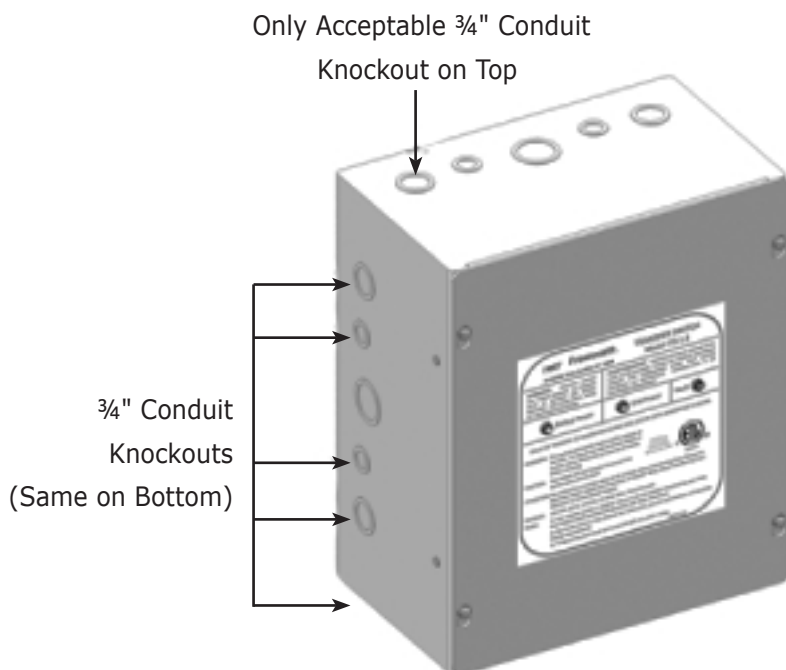
Mount the APC UTS according to the manufacturer's instructions. The UTS should be located in close proximity of the main panel and connected through provided knockouts on both units. Install APC UTS according to electrical schematics found in this manual and **freewatt PLUS** System's manual.

8.6 Knockouts

freewatt Transfer Switch has circuit board mounted on inside of enclosure, only knockouts shown in Figure 8-1 should be used for electrical wiring.

8 - Installation

Figure 8-1 Knockout Locations



8.7 Load Balancing Transformer Connections

Connect Load Balancing Transformer and **freewatt** Transfer Switch according to electrical schematics included in this manual and manuals supplied with Load Balancing Transformer.

Connect power source conductors to marked power terminal lugs found in **freewatt** Transfer Switch (FTS) as follows:

- Connect transformer secondary wires labeled "X2" and "X4" together, connect to FTS terminal block labeled "XFSH".
- Connect transformer secondary wires labeled "X1" and "X3" together, connect to FTS NEUTRAL_BAR.
- Connect transformer primary wires labeled "H1" and "H3" together, connect to FTS terminal block labeled "XFP1".
- Connect transformer primary wires labeled "H2" and "H4" together, connect to FTS terminal block labeled "XFP2".
- Connect two GROUND wires at transformer to transformer chassis ground screw, connect opposite ends of two GROUND wires to ISU GROUND_BAR.

LOAD BALANCING TRANSFORMER 240VAC - Primary	
Transfer Switch Terminal	Transformer Pigtails
XFP1	H1, H3 (Black)
XFP2	H2, H4 (Red)
No Connection	Neutral (White)
Ground_Bar	Ground (Green)

LOAD BALANCING TRANSFORMER 120VAC - Secondary	
Transfer Switch Terminal	Transformer Pigtails
XFSH	X2, X4 (Black)
Neutral_Bar	X1, X3 (White)
Ground_Bar	Ground (Green)

8.8 APC Universal Transfer Switch (UTS) Connections

Electrical schematic for installation of APC UTS found in Section 7. Connect power source and load connections inside enclosure using schematic and instructions supplied with UTS as follows:

APC UNIVERSAL TRANSFER SWITCH 120VAC	
Transfer Switch Terminal	APC-UTS
SUBH	Hot (Black)
Neutral_Bar	Neutral (White)
Ground_Bar	Ground (Green)

8 - Installation

8.9 Connecting the Power Sources (Utility and MCHP)

Make power source and load connections at connections found in Section 7 of this manual.

UTILITY MAIN PANEL 240VAC	
Transfer Switch Terminal	Main Panel
ACL1* (Black)	L1 (Black)
ACL2* (Red)	L2 (Red)
Neutral_Bar	Neutral (White)
Ground_Bar	Ground (Green)

MCHP UNIT- POWER 240VAC	
Transfer Switch Terminal Block	MCHP Unit "GRID" Terminal
ACM1	U (Red)
ACM2	V (Black)
Neutral_Bar	Neutral (White)
Ground_Bar	Ground (Green)

MCHP UNIT- MONITORING 240VAC	
Transfer Switch Terminal	MCHP Unit "FTS" Terminal
MON1	U (Red)
MON2	V(Black)
	No neutral connection required
Ground_Bar	Ground (Green)

ACL1 & ACL2 are connected to fuse terminal block located inside FTS. L1 connects to BLACK wire (ACL1) and L2 connects to RED wire (ACL2).

MCHP unit requires utility sensing connection to detect when utility power present or not. Safety circuit required to sense 240 VAC voltage, if not connected system will not operate. Make connection at locations mentioned (MON1 & MON2), shown in Section 7 of this manual, and MCHP unit IOM.

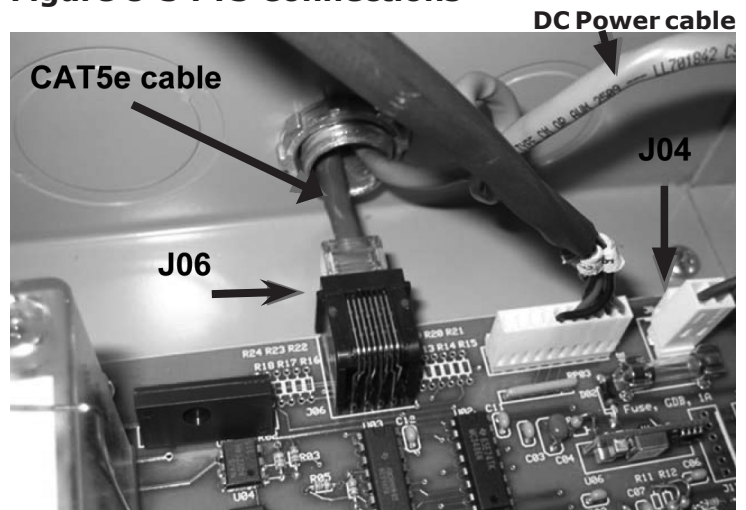
8.10 FTS DC Power Cable and Data Cable:

- **freewatt** Transfer Switch (FTS) and **freewatt** Control Module both require battery-supplied DC power and data communication cable to operate properly in back-up power mode.
- Remove one of enclosure knockouts (right or bottom side), attach appropriate cable grip or Romex connector (**Figure 8-2**). Refer to **Figures 8-3, 4 and 5**.
- Route DC power cable and CAT5e cable thru opening to FTS. FTS DC power cable must connect to FTS connector J04, and other end to **freewatt** Control Module connector J10.
- Attach CAT5e Data Cable between FTS RJ-45 connector J06 and RJ-45 connector J6 of **freewatt** Control Module CPU board.

Figure 8-2



Figure 8-3 FTS Connections



8 - Installation

Figure 8-4 Warm Air Control Module Connections

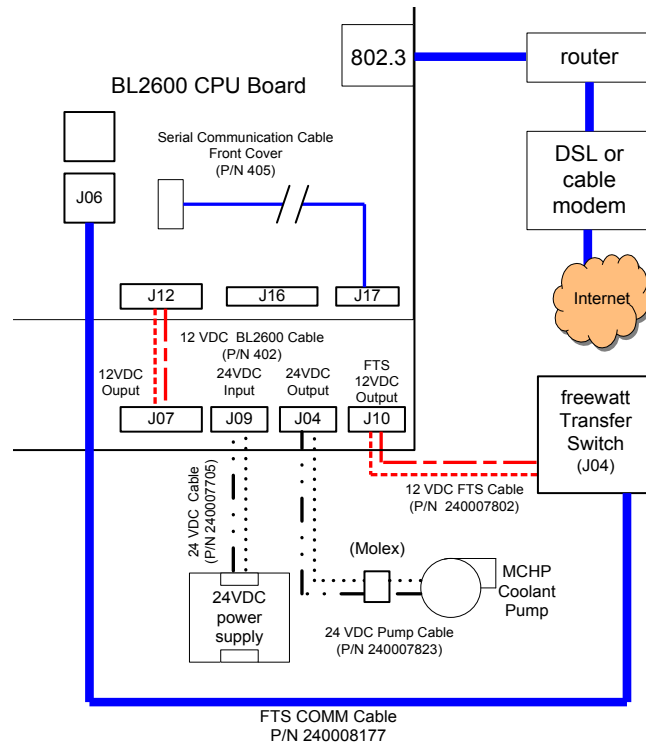
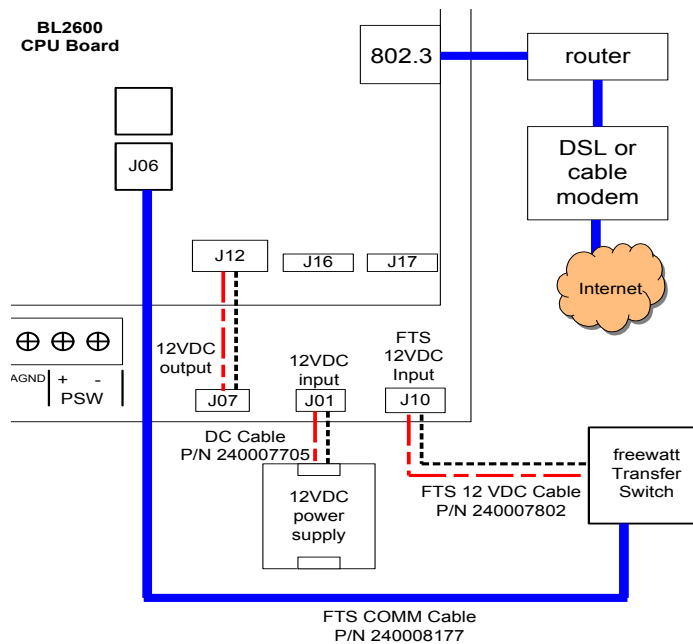


Figure 8-5 Hydronic Control Module Connections



9 - Checkout Procedures And Adjustments

WARNING

Electrical shock may cause serious injury or death. Following procedures may expose you to dangerous line voltage. Use caution to avoid touching live electrical contacts. All service must be performed by trained, experienced service technician.

NOTICE

Disconnect all power to freewatt Transfer Switch before starting checkout procedures.

9.1 Checkout procedures for freewatt Transfer Switch:

- **Inspect All Electrical Connections.** Verify all electrical connections are properly tightened and installed per Electrical Schematic.
- **Inspect Grounding Terminal Block.** Verify all electrical connections are properly tightened and installed per Electrical Schematic. Verify grounding terminal block is properly grounded.
- **Inspect Common Terminal Block.** Verify all electrical connections are properly tightened and installed per Electrical Schematic.
- **Inspect CAT5e Communication Cable & DC Power Cable.** Verify all low voltage communication connections and 12 DC power connections are properly installed per Electrical Schematic.
- **Inspect Fuses.** Verify fuses are properly installed and intact.
- **Verify Sequence of Operation.** Verify sequence of operation follows flow chart shown in **freewatt PLUS** System IOM.

10 - Operating Instructions

Homeowner should enjoy secure comfort by knowing heating and light circuits in their home will be powered in event of utility power outage. Perform checkout procedures outlined in section 9 before operating FTS.

Following operational tests should be performed after installation and annual inspections to ensure system is operating properly and will perform in backup power mode. Refer to sequence of operation in **freewatt PLUS** System IOM while performing test.

- Open main circuit breaker at main panel. Relays in FTS will open, isolating APC Universal Transfer Switch (UTS) from utility power and other loads in home.
- Switch has transfer delay of 45 seconds when transferring from Normal to Alternate power supply. Transfer delay includes operation of system control module, FTS and MCHP unit. MCHP unit should start, and after warm up period, MCHP unit will turn on backup power to FTS and APC UTS. Backup Power LED on FTS and Backup Power LED on **freewatt PLUS** System front panel will illuminate. If space heating required, **freewatt PLUS** System will deliver MCHP unit's heat to building. If space heating not required, heat rejection system will energize to cool MCHP unit.

- Close main breaker at main panel. MCHP will stop, and relays in FTS will close, reconnecting utility power. Switch has transfer delay of 5 seconds when transferring from Alternate to Normal power supply.
- If MCHP runs for less than 30 minutes in Backup Mode it will start and run for up to 30 minutes after reconnecting to utility power. Heat rejection system or space heating system will continue to operate during this period of operation.

Once Grid Power is re-established, **freewatt** Transfer Switch will continue to operate and green LED signifying Grid Power will be illuminated on front cover.

11 - Service Hints

WARNING

Electrical shock may cause serious injury or death. The following procedures may expose you to dangerous line voltage so use caution to avoid touching live electrical contacts. All service must be performed by a trained, experienced service technician.

WARNING

Fire, explosion or risk of shock hazard may cause property damage, severe injury or death. Do not attempt to modify characteristics of this appliance in any way.

11.1 Service Hints

freewatt Transfer Switch is connected to main panel, MCHP unit, APC Universal Transfer Switch (UTS) and Load Balancing Transformer. Warm Air or Hydronic **freewatt PLUS** Systems, furnace, boiler and MCHP unit have installation and service manuals outlining specific troubleshooting information. **freewatt** Transfer Switch troubleshooting information is outlined in this manual.

- If any component does not function properly, verify it is correctly installed and wired before replacing it.
- Touch metal surface to discharge static electricity before touching the control. Static electricity discharge can damage control board.
- Switch's control board cannot be repaired. If control malfunctions, control board must be replaced.
- Only trained, experienced service technicians should service **freewatt** Transfer Switch. Follow "Sequence of Operation" in **freewatt PLUS** System IOM, for normal light OFF sequence, after troubleshooting.
- If either control is suspected to be defective, read "Checkout Procedures" see section Section 9 before replacing control. All switches are factory tested in assembly process, defective control is generally least likely cause.
- If two consecutive controls appear to be failing or defective, chances are control is not defective and another problem is causing control to appear defective or fail (for example, electrical short burning out transformer).

11.2 Troubleshooting Tools

Following tools should be available prior to troubleshooting system:

- Voltmeter with settings to check: 240 VAC, 120 VAC, 24 VAC and 12 VDC
- Continuity Tester
- Contact Thermometer

11.3 Initial Service Checks

Following tasks should be performed prior to troubleshooting:

- Verify circuit breaker is ON or fuse is properly functioning at electrical panel.
- Verify electrical service switch is powered ON.
- Verify all system or unit switches are powered ON.
- Check for 120 VAC (minimum 108 VAC to 132 VAC) to Transfer Switch Unit.
- Check for 240 VAC (minimum 216 VAC to 264 VAC) to Honda MCHP.
- Check all communication cables for proper connections.
- Check 12 VDC cables for proper connections.
- Follow Service Checks suggested in **freewatt PLUS** manuals.
- Check wire connections within Main Panel, **freewatt** Transfer Switch, Load Balancing Transformer, APC UTS6H, Honda MCHP and Hybrid Integration Module.
- Check Ground on Grounding Terminal Block in **freewatt** Transfer Switch.

12 - Troubleshooting

Figure 12-1 General Troubleshooting

IF	AND	CHECK OR REPAIR
No 240VAC power to ACM1, ACM2, MON1, or MON2	Grid power and Fault LED's Flashing	CAT5E Communication Cable between FTS and Control board Check power to HI Module
No LED's on front panel		Fuse F02 Fuse F03
No LED's on front panel	FTS power supply flashing	Open Neutral DC Power cable short
No LED's on front panel when grid power is not present		MCHP Battery Voltage 12VDC Connection
Error code 23 or 24		Fuse F07 Fuse F08 Connections from FTS to MCHP
MCHP shuts down after grid connecting in backup mode	Error code 23 or 24	Crossed connections between ACM1, ACM2, MON1, MON2
MCHP shuts down after grid connecting in backup mode	Grid power and fault LED's both on	Fuse F08
No 120V power from SUBH		Fuse F04 Fuse F09 Fuse F10
FTS will not reconnect coming out of backup mode		Fuse F05 Fuse F06

12.1 Alarm Codes

freewatt Transfer Switch's fault LED will flash when error is detected. Consult **freewatt** System Installation, Operation and Maintenance Manual for more information on Error Flash Codes.

WARNING

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Disconnect power to system before servicing. Failure to comply could result in severe personal injury, death or substantial property damage.

Never jumper (bypass) any device except for testing as outlined on following pages of this manual. Severe personal injury, death or substantial property damage can result.

12 - Troubleshooting

WARNING

Do not jumper fuse or replace with any fuse except as specified. Failure to comply could result in severe personal injury, death or substantial property damage.

12.2 Fuses

Check fuses before servicing or replacing any **freewatt PLUS** system appliances or major components (pump, motor, etc.). If fuse is blown, it can prevent major system appliances or other components from operating.

- Turn off power to **freewatt** Transfer Switch at external line switch.
- Remove front panel from FTS.
- Test and replace affected fuse with fuse of identical type and rating (see chart).
- Install front panel after fuse inspection.
- Restore power to system at external line switch.
- Verify system operation after completing system service.

freewatt PLUS Transfer Switch Fuses		
Device ID	Cooper-Bussman 5mm x 20mm	Littlefuse 5mm x 20mm
F01, F02	GDB1A 1A, Fast Acting	0235001HXP 1A, Fast Acting
F03,F04, F05, F06, F07,F08	GDB-500- mA 500mA, Fast Acting	0235.500HXP 500mA, Fast Acting
F09, F10	GMA15-R 15A, Fast Acting	0217015,MXP 15A, Fast Acting
Control Board Rev. 2.2.1		
F11, F12	GMA15-R 15A, Fast Acting	0217015,MXP 15A, Fast Acting
Device ID	Cooper-Bussman 1/4" x 1 -1/4"	Littlefuse 1/4"x1-1/4"
Control Board Rev. 2.2.0		
Main Fuse Block	BK/ABC-15-R 15A, 250VAC	314015.HXP 15A, 250VAC

13 - Technical Support

13.1 Technical Support

Contact ECR International **freewatt** Technical Support at 1-877-622-8934. Have your model and serial number available when calling for technical support on **freewatt PLUS** products.

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