

HWFC

HYDRONIC AIR HANDLER FOR BOILER INSTALLATION



INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

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KEEP THIS MANUAL NEAR AIR HANDLER, RETAIN FOR FUTURE REFERENCE

Series HWFC
HYDRONIC AIR HANDLER

INSTALLATION MANUAL AND OPERATING INSTRUCTIONS

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SAFETY SYMBOLS

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.

DANGER

DANGER - Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.

WARNING

WARNING - Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury

CAUTION

CAUTION - Indicates a potential hazardous situation which, if not avoided, MAY result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT!

READ ALL INSTRUCTIONS BEFORE INSTALLING.

WARNING:

- 1) All installations and service must be performed by qualified service contractor. Improper installation, service, adjustments or maintenance can cause injury or property damage.
- 2) Do not use wet or damp electrical components during hydronic testing. Dry moisture from all electrical leads and connections. All electrical connections and circuits should be dry and free of moisture prior to energizing the system.
- 3) Do not use this system if any part has been under water. Call a qualified service contractor to inspect the equipment and replace any electrical components that may have been under water.
- 4) This equipment is not to be utilized during construction or exposed to conditions that may cause damage or injury.
- 5) The heating and optional cooling coil may become damaged if drilling or screwing into the unit. All screws and drill locations should be checked for location in reference to the coil(s) prior to drilling. Penetration of the coil may cause, personal injury or property damage.

CAUTION:

The heating coil and / or optional cooling coil must be cleaned by a qualified contractor.

CAUTION:

When electrical tests are performed, all standard electrical safety and test procedures should be followed.

Please contact professional, qualified service contractor for installation and service on this equipment.

INSTALLATION PROCEDURES

The HWFC series can be utilized in the following installation configurations.

UP-FLOW APPLICATION

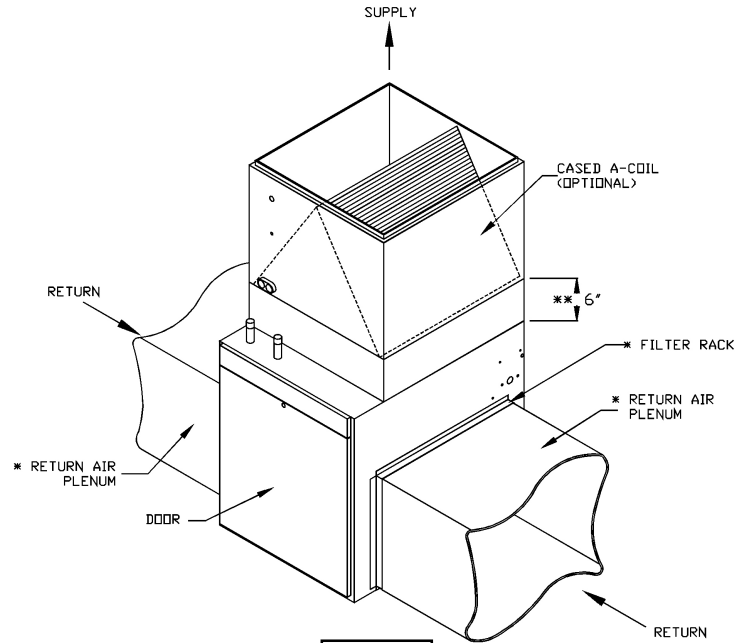


Figure 1

* Double return required for 5 ton cooling or maximum heating airflow applications on the HWFC15

HORIZONTAL APPLICATION

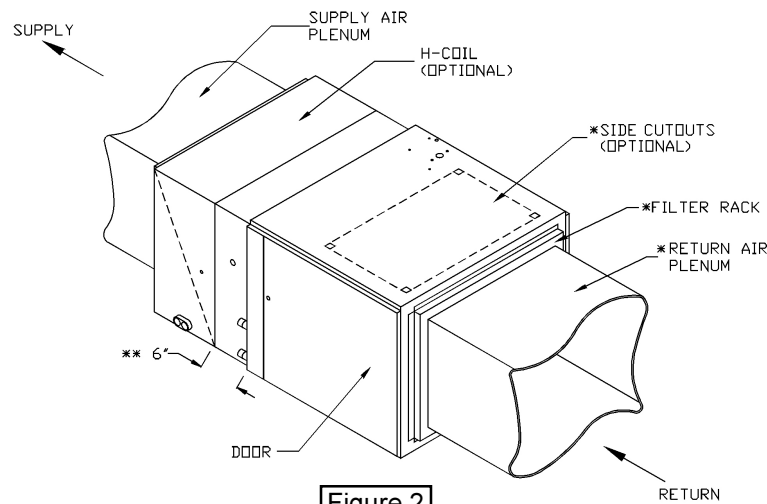


Figure 2

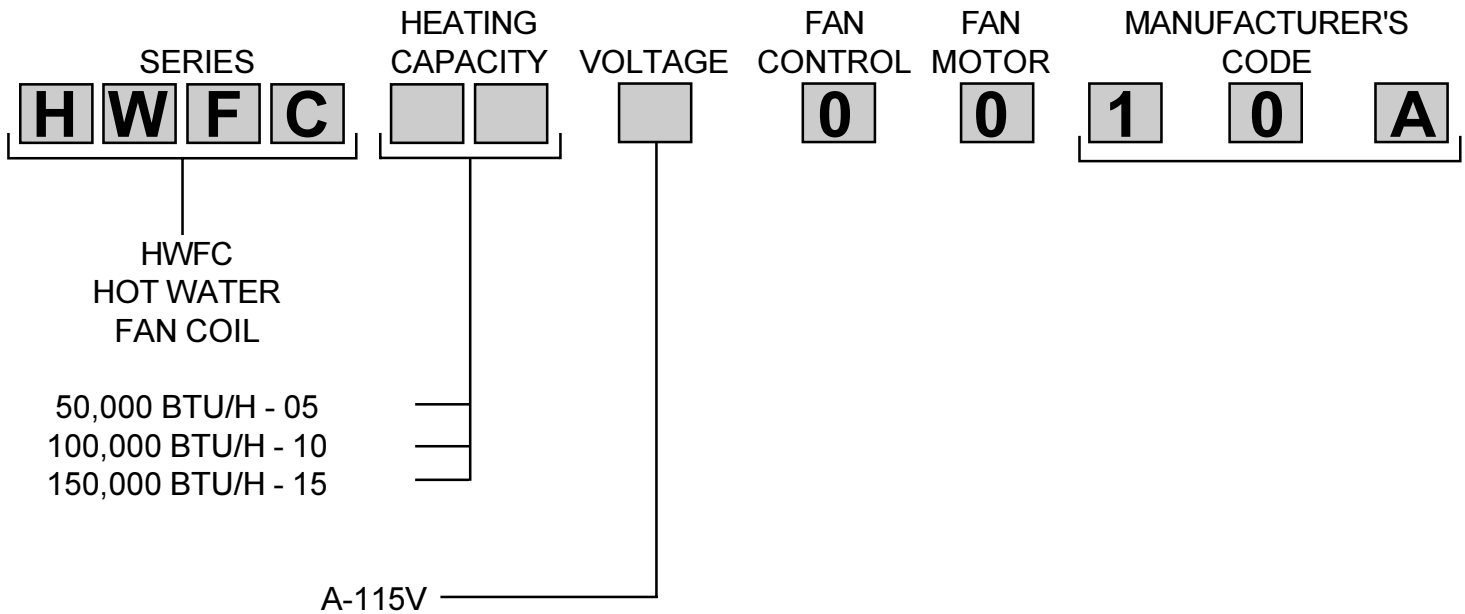
** 6" clearance is suggested between the air conditioning evaporator coil and the hydronic air coil to prevent the hydronic coil from freezing in the event of an evaporator coil freeze up. See page 9 for freeze protection information.

Filter Rack Installation - After location of cold air return for the air handler has been decided, filter rack can be installed on the appropriate side or bottom of air handler. Note, above drawing describes cut out for filter.

BTU/HR RATINGS AT DIFFERENT TEMPERATURES FOR HEATING

MODEL		150°F	160°F	170°F	180°F	190°F	STATIC PRESS. INCHES W.C.	FACTORY SET BLOWER SPEED
HWFC05A0010A	BTU	41,580	46,570	51,559	55,717	61,538	.20"	LOW
	ΔT	50°F	56°F	62°F	67°F	74°F		
HWFC10A0010A	BTU	72,783	81,889	89,463	98,561	103,110	.23"	LOW
	ΔT	48°F	54°F	59°F	65°F	68°F		
HWFC15A0010A	BTU	96,277	106,974	117,671	128,369	141,206	.20"	MEDIUM
	ΔT	45°F	50°F	55°F	60°F	66°F		


MODEL DESCRIPTION BREAKDOWN




SERVICE CLEARANCES

Front	24" minimum
Left side	0
Right side	0
Bottom	0
Back	0

GENERAL INSTRUCTIONS

- 1)  **CAUTION:** Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

- 2)  **WARNING:** Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

- 3) **Location:** When installing the HWFC unit it is important to have the unit installed so it is accessible for future service. Leave room to service and remove the blower and coil if required. The application should allow for access to clean the heating coil or cooling coil if installed into an application.

This model can be installed in any of the following locations:

- Boiler room
- Basement
- Attic
- Crawl space
- Drop ceiling

If the unit is being installed into an enclosed room with a boiler (gas / oil) or a water heater (gas / oil). It is required that you check the room for proper combustion air that is required for the fuel fired appliance(s).

The boiler installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the latest revision of the National Fuel Gas Code, ANSI Z223. (Available from the American Gas Association, 8501 E. Pleasant Valley Road, Cleveland, Ohio 44134). Reference should also be made to local gas utility regulations and other codes in effect in the area in which the installation is to be made. When installed in Canada: The latest revision of the CAN1/CSA-B149.1 and/or B149.2 Installation Codes for Gas-Burning Equipment and/or local codes.

- 4) **Warm air system:** The warm air duct sizing should be in accordance with Air Conditioning Contractors of America (ACCA), American Society of Heating, Refrigeration and Air Conditioning Engineers. (ASHRAE) This duct system shall be designed to handle the required heating or cooling requirements loads for the system. Duct Sizing: Enclosed is a breakdown to help you determine the required airflow for common size duct. When calculating it is best to size the duct system to have an external duct static pressure for the following applications. Refer to tables 1 and 2 on page 8.

CFM REQUIREMENTS

Heat Loss BTU/HR	CFM @ 70°F Delta T
2000	27
4000	53
6000	80
8000	106
10000	133
15000	199
20000	265
25000	331
30000	397
40000	530
50000	662
75000	993
100000	1323
125000	1654
140000	1852

Below is a breakdown by size and airflow for standard rectangular duct @ .10" WC. This represents a system design less filters.

TABLE 1 ROUND DUCT

Max CFM with standard Pipe Size @ .10" W.C.	Diameter Of Round Duct in inches	Area in Square Inches
100	6	28
160	7	38
230	8	50
300	9	64
400	10	78
700	12	113
1000	14	154
1500	16	201
2000	18	254
2600	20	314

Above is a breakdown by size and airflow for standard round duct @ .10" wc. This represents a system design less filters.

The recommended duct external static pressure for the system shall be as follows

Heating @ 0.20" W.C.

Cooling @ 0.50" W.C.

TABLE 2 RECTANGULAR DUCT

Max CFM with Standard Duct Size @ .10" wc	x6 Duct Size in inches	Max CFM with Standard Duct Size @ .10" wc	x8 Duct Size in inches	Max CFM with Standard Duct Size @ .10" wc	x10 Duct Size in inches	Max CFM with Standard Duct Size @ .10" wc	x12 Duct Size in inches
130	6 x 6	300	8 x 8	550	10 x 10	850	12 x 12
200	8 x 6	400	10 x 8	700	12 x 10	1050	14 x 12
250	10 x 6	460	12 x 8	800	14 x 10	1150	15 x 12
300	12 x 6	600	14 x 8	900	15 x 10	1200	16 x 12
400	14 x 6	700	16 x 8	1050	17 x 10	1350	17 x 12
460	16 x 6	800	18 x 8	1100	18 x 10	1450	18 x 12
550	18 x 6	900	20 x 8	1275	20 x 10	1550	19 x 12
600	20 x 6	1050	22 x 8	1450	22 x 10	1650	20 x 12
680	22 x 6	1100	24 x 8	1600	24 x 10	1900	22 x 12
750	24 x 6	1275	26 x 8	1800	26 x 10	2100	24 x 12
800	26 x 6	1450	28 x 8	1950	28 x 10	2300	26 x 12
900	28 x 6	1600	30 x 8	2100	30 x 10	2500	28 x 12
1000	32 x 6	1800	32 x 8	2200	32 x 10	2700	30 x 12
1100	34 x 6	1950	34 x 8	2400	34 x 10	3900	40 x 12
1350	40 x 6	2100	36 x 8	2600	36 x 10	5000	50 x 12

5) **Air circulating blower:**

Model Number	Blower Size	H.P.	CFM Range	
			.20"w.c.	.50"w.c.
HWFC05A0010A	10 X 7	1/3	750	1200
HWFC10A0010A	10 X 9	3/4	1350	1450
HWFC15A0010A	10 X 10	3/4	1500	2000

- 6) **Fiberglass air filter:** A single 16" x 25" filter and external filter rack is supplied with the equipment. It is recommended that the HWFC15 series (60,000 Btuh cooling) have two (2) filters installed to accommodate the additional air requirement, in the event air conditioning is being utilized on the installation. Air filters can be installed on the unit's left, right or bottom for easy access on your installation. Replace or clean air filter every month or as required through the heating and cooling seasons.
- 7) **Flow control valves:** There are many different manufacturers available on the market. Before installing a flow control valve in the system, it is recommended that you inspect and adjust the control to be closed during the shut down of the pumping system. Improper closure of this control may result in gravity circulation of the water, with possible temperature override of the system.
- 8) **Zone valve systems:** Installation of electric zone valves in any hot water system adds added resistance to the flow of water and can restrict the flow through the piping system. To help overcome the added resistance of a zone valve with a long pipe run, it may be required to install a larger series pump to overcome the added resistance to the system.
However, it is recommended that a circulator be dedicated to be used on the HWFC air handler in any zone valved system.(See figure 4, page 11)
- 9) **Venting (air) out of the system:** It is important to have adequate air elimination in any hot water system. All vertical drops in the piping should be installed with a vent tee for easy removal of the air in this system. (See enclosed piping diagrams on page 11 to see additional air elimination systems.)
- 10) **How to protect the unit from freezing:** When a HWFC is installed in an unconditioned space, both provisions for freeze protection of the hydronic system must be considered.
- Use of anti-freeze to protect the system.
 - Adding an optional Freeze Stat Control (contact the HWFC manufacturer for part number) to protect the coil from freezing.
- Note: 6" clearance between evaporator coil and hydronic coil. See figures on page 5.

11) **SERVICE (BLOWER / CLEANING THE HYDRONIC COIL):**

All cleaning and service should be performed by a qualified service personal.

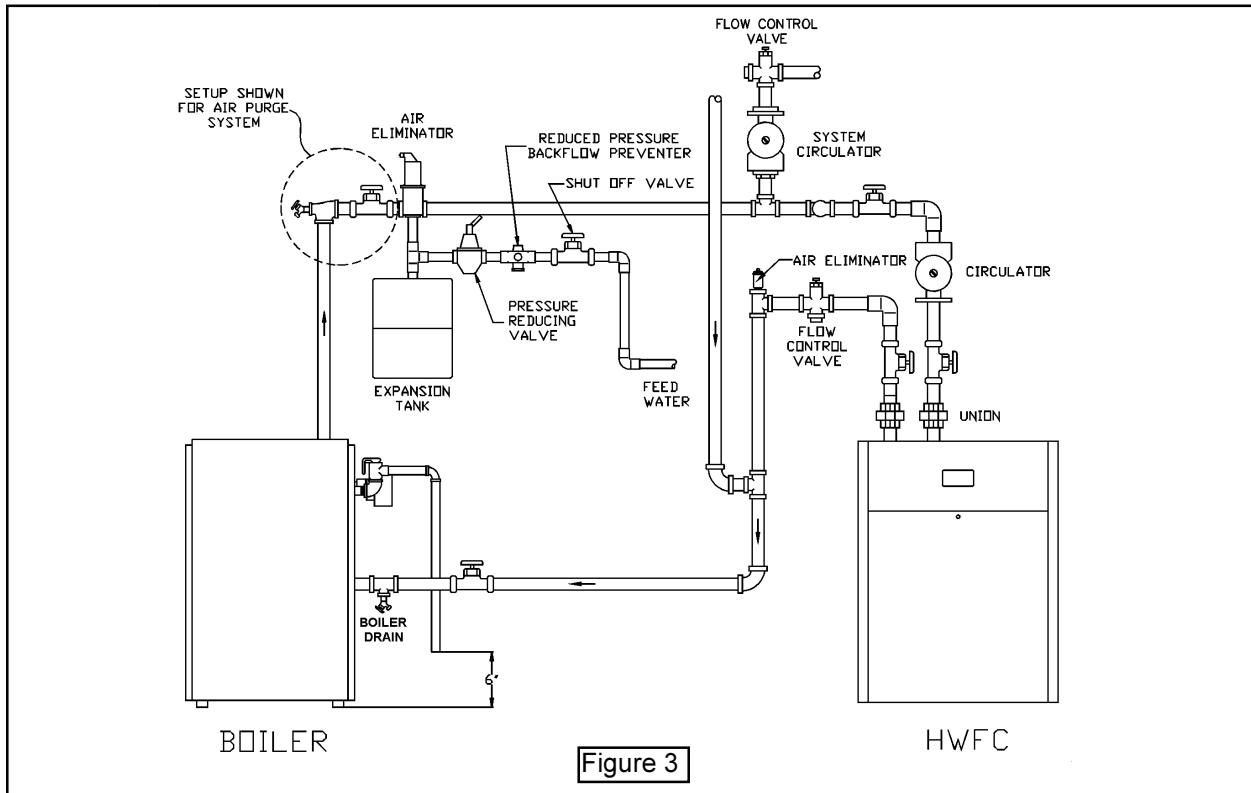
Replace or clean air filter every month or as required through the heating and cooling season.

Hydronic coil:

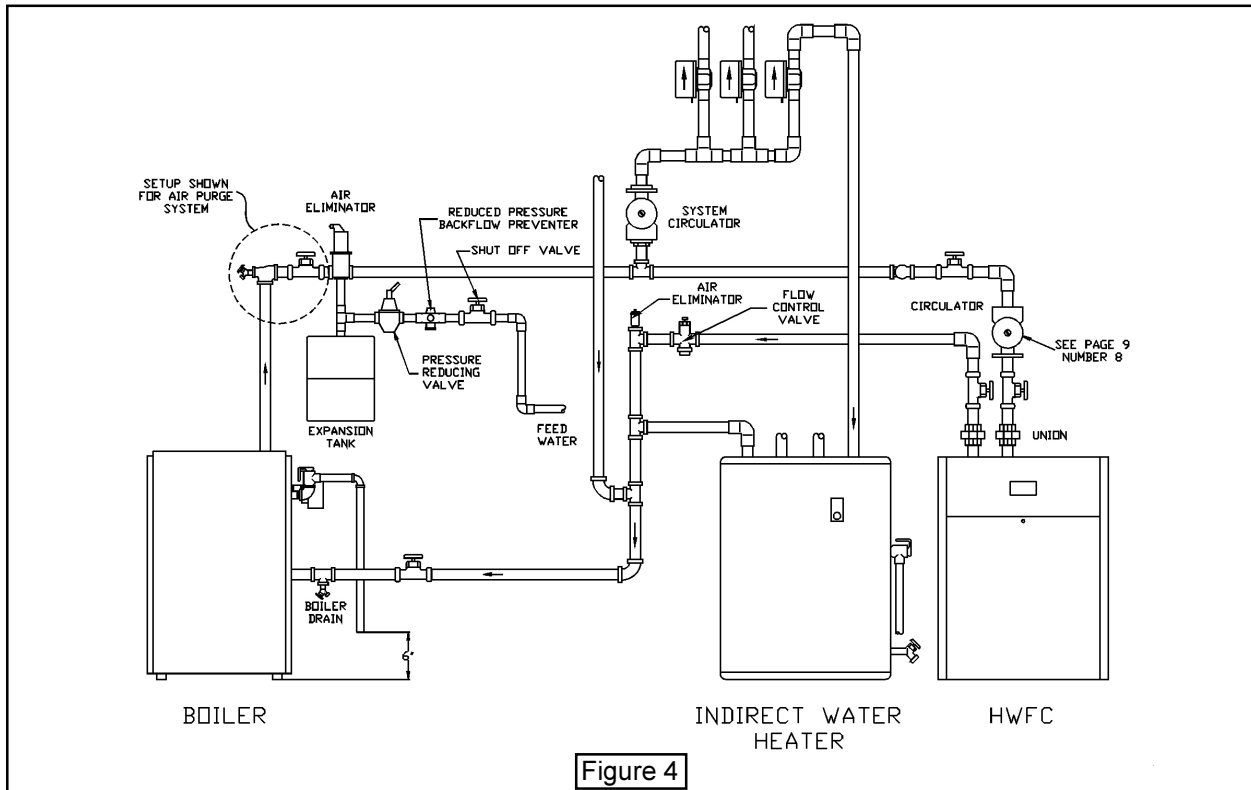
- A) Turn off all power to the unit.
- B) Shut off water supply to coil. This should be both the water supply to the system and any valves to the coil zone.
- C) Break unions on both supply and return to gain access to the coil
- D) Make certain that the water does not get into the electrical controls or wiring of the equipment.
- E) Remove blower door.
- F) Remove sheet metal screws on coil access panel.
- G) Remove limit and clip off from coil heater. Make certain the retainer clip is not lost.
- H) Remove coil from cabinet
- I) Clean coil with water and dry exterior of coil prior to re-installing
- J) Re-install clean coil and reverse above steps.
- K) Turn water supply to coil back on.
- L) Check for leaks
- M) Turn electrical supply back on to appliance.

HEATING UNIT (BOILER) PIPING

HWFC & BOILER



HWFC, BOILER, & INDIRECT WATER TANK



ELECTRICAL WIRING

All electrical should be in compliance with the National Electrical Code. It is important to have this unit's electrical performed by a qualified electrician for safety reasons.

HEATING AND COOLING SYSTEM

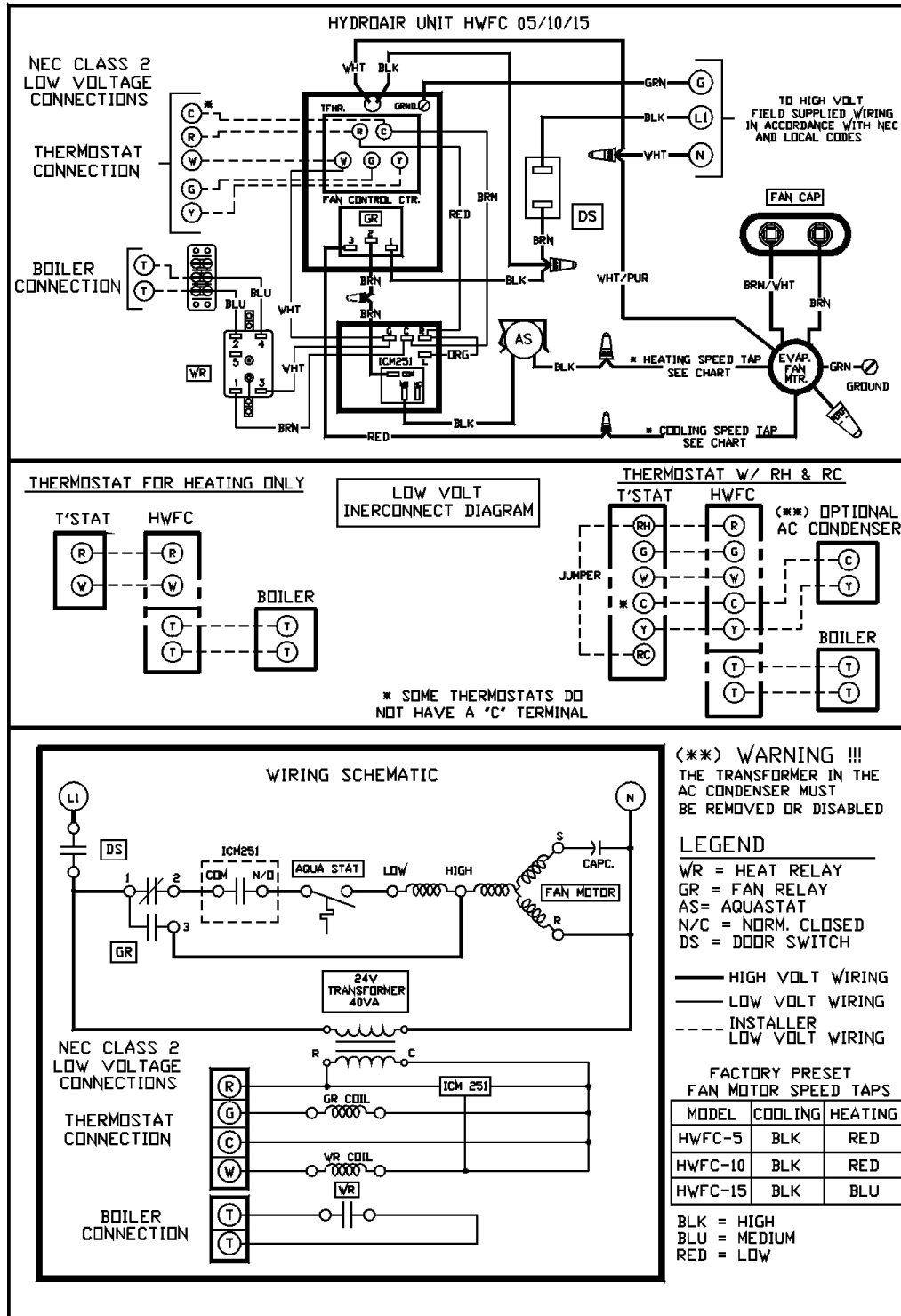


Figure 5

HEATING SYSTEM

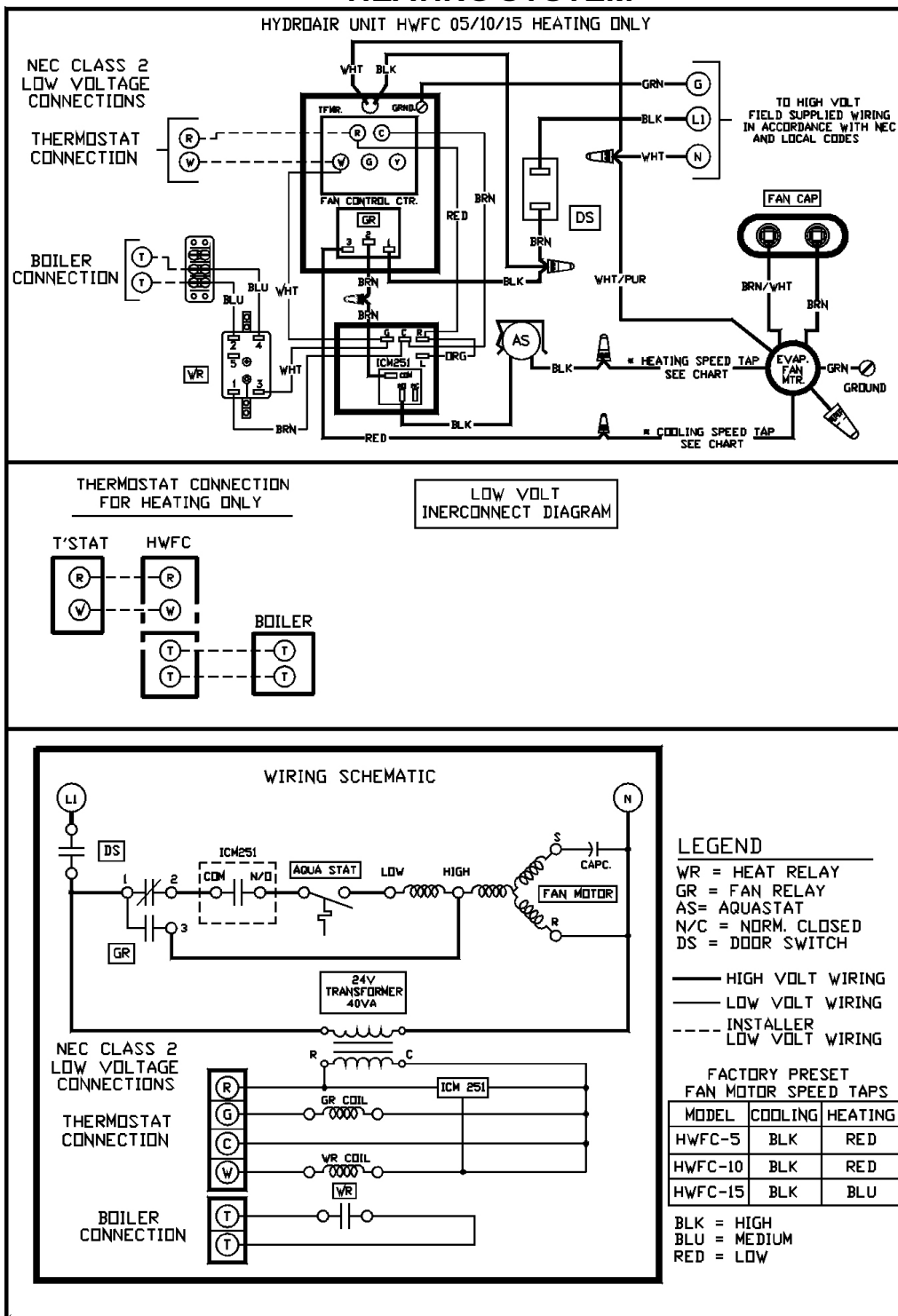


Figure 6

TROUBLESHOOTING GUIDE - HWFC

No Fan Operation	Possible Cause	Remedy/Action
	No main power 115V	Check breakers
	No fan signal from thermostat	Check thermostat
	No 24V at R and C on fan center	Check fan center
	Front access panel open	Close access panel
	Door switch tripped	Normally closed opens with access
	Boiler's aquastat not allowing the fan to operate	Water not hot or to temperature in coil
	HWFC coil thermostat switch aquastat (#240-3083) not allowing the fan to operate	Check water temperature, or thermostat location and/or replace thermostat switch (#240-3083)
	Fan timer operating	Timer timing out Timer operates after heating is satisfied
	Faulty motor/capacitor	Check and replace

Low Airflow	Possible Cause	Remedy/Action
	Dirty filter(s)	Clean/Replace
	HWFC15 only may require additional return air inlet	Add return air inlet
	Excessive external static in ductwork	Check ductwork for obstructions, damper or insufficient ductwork
	Motor speed set too low	Alter speed tap
	Faulty motor/Capacitor	Check RPM and replace if required

Poor performance	Possible Cause	Remedy/Action
	Low airflow	See previous
	Low entering water temperature	Check operation of boiler/heat source
	Low water flow through HWFC coil	Check flow control operation/other control valves, circulators, etc.
	Air in the system Supply/Return piping incorrectly installed	Vent system piping Refer to this manual for correct information

NORMAL SEQUENCE OF OPERATION

On a call for heat:

- 1) Thermostat will actuate, completing the circuit between the terminals T and T on the boiler aquastat and the R and W terminals on the HWFC.
- 2) Boiler will be activated and the circulator will start.
- 3) Warm water will begin to circulate through the HWFC coil.
- 4) When the coil temperature reaches 145°F to 150°F degrees the coil thermostat (part number 240-3083) switch will activate and energize the blower.
- 5) Hot air will then be delivered to living space or room where installed.
- 6) Once thermostat has been satisfied the boiler and circulator will shut down.
- 7) The HFWC blower will continue to operate for a period of time, which is determined by the fan timer setting (set at the factory for 20 seconds). The fan timer can be adjusted to maximize or minimize the blower cycle time to achieve the desired level of comfort.

HOW TO INSTALL AN AIR CONDITIONING EVAPORATOR COIL ONTO THE AIR HANDLER

Installation of A/C coil on a HWFC

Information for installing air conditioning to system consult air conditioning, condensing equipment manufacturers installation manual.

The cased coil should be installed 6" from the top of the duct opening. (See page 5, figures 1 & 2) Care should be taken to ensure that the coil is level, and that condensate drains away from the coil.

Care should be taken to route the refrigeration and condensate piping away from the access panels and wiring required for the HWFC unit. All condensate piping must be run from both the upper and lower drain stub connections. All piping must be run to all applicable local and national codes.

For field wiring of air conditioning system see wiring diagram on page 12 for system connections.

REPLACEMENT PARTS LIST

ITEM NO.	PART NO.	DESCRIPTION	QUANTITY
1	109004028	PANEL TOP TIE HWFC05	1
	109004029	PANEL TOP TIE HWFC10	
	109004030	PANEL TOP TIE HWFC015	
2	104000251	COIL HYD HWFC05	1
	104000252	COIL HYD HWFC10	
	104000253	COIL HYD HWFC15	
3	109004016	PANEL DIVIDER BLOWER HWFC05	1
	109004017	PANEL DIVIDER BLOWER HWFC10	
	109004018	PANEL DIVIDER BLOWER HWFC15	
4	109004007	PANEL REAR HWFC05	1
	109004008	PANEL REAR HWFC10	
	109004009	PANEL REAR HWFC15	
5	109004001	PANEL LEFT SIDE HWFC05	1
	109004002	PANEL LEFT SIDE HWFC10	
	109004003	PANEL LEFT SIDE HWFC15	
6	240003102	FILTER	1
7	109004085	FILTER RACK ASSEMBLY	1
8	109004010	PANEL BASE HWFC05	1
	109004011	PANEL BASE HWFC10	
	109004012	PANEL BASE HWFC15	
9	109004013	PANEL BLOWER DOOR HWFC05	1
	109004014	PANEL BLOWER DOOR HWFC10	
	109004015	PANEL BLOWER DOOR HWFC15	
10	109004025	PANEL TOP FRONT TIE HWFC05	1
	109004026	PANEL TOP FRONT TIE HWFC10	
	109004027	PANEL TOP FRONT TIE HWFC15	
11	240003125	DOOR SWITCH	1
12	109004059	DOOR SWITCH BRACKET	1
13	240003274	FAN TIMER	1
14	109004019	PANEL DIVIDER FRONT HWFC05	1
	109004020	PANEL DIVIDER FRONT HWFC10	
	109004021	PANEL DIVIDER FRONT HWFC15	
15	109004004	PANEL RIGHT SIDE HWFC05	1
	109004005	PANEL RIGHT SIDE HWFC10	
	109004006	PANEL RIGHT SIDE HWFC15	
16	240003083	THERMOSTAT SWITCH	1
17	240003087	J-BOX	1
18	240003089	FAN CONTROL CENTER	1
19	109004022	LEG BLOWER HWFC05	1
	109004023	LEG BLOWER HWFC10	
	109004023	LEG BLOWER HWFC15	
20	240000007	RELAY 24V SPDT	1
21	102000101	MOTOR 1/3HP 115V HWFC05	1
	102000102	MOTOR 3/4HP 115V HWFC10/15	
22	212000021	TERM BLOCK 3 POSITION	1
23	240003080	BLOWER HWFC05	1
	240003081	BLOWER HWFC10	
	240003082	BLOWER HWFC15	
24	126000003	CAPACITOR HWFC05	1
	126000015	CAPACITOR HWFC10/15	

REPLACEMENT PARTS

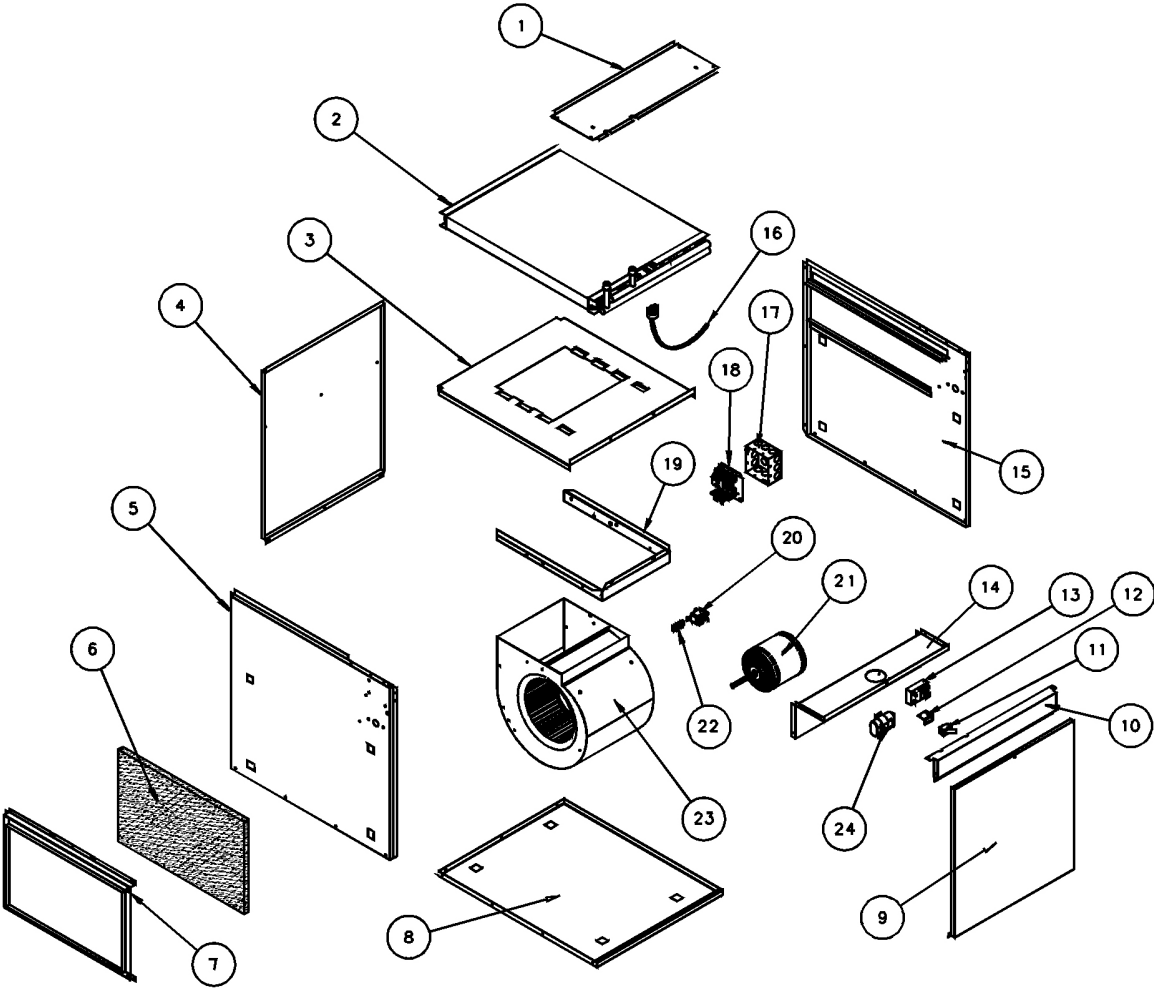


Figure 7

OVERALL DIMENSIONS

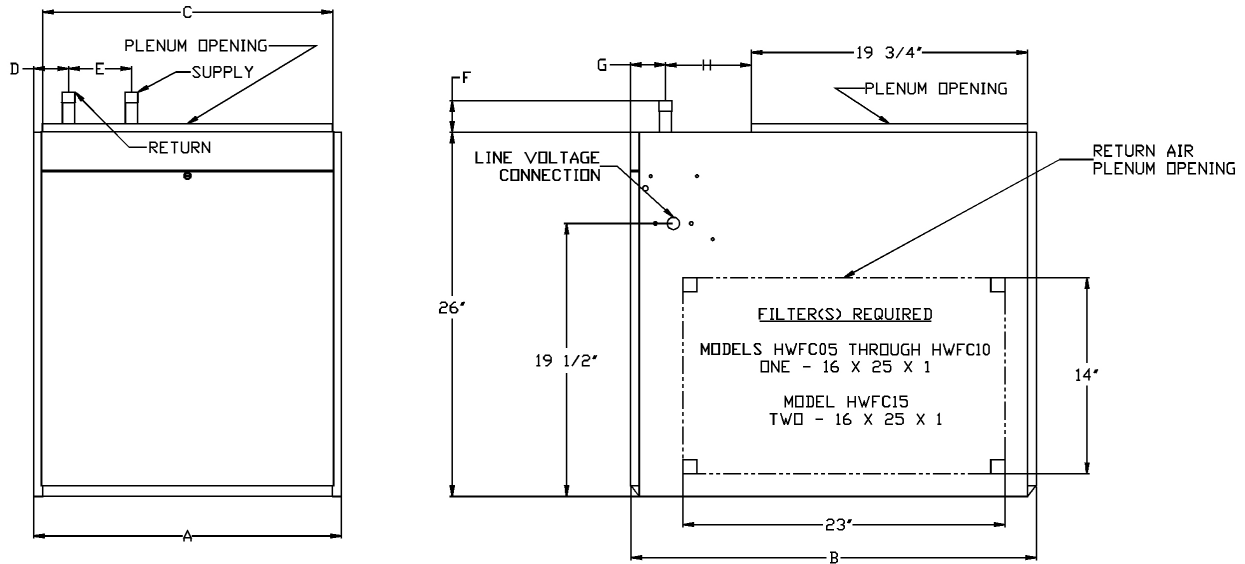


Figure 8

Dimensions

MODEL	A	B	C	D	E	F	G
HWFC05	17.1/2"	27"	16.1/4"	2.1/4"	3.1/2"	2.1/4"	4"
HWFC10	22"	29"	20.3/4"	2.1/2"	4.1/2"	2.1/4"	1.1/2"
HWFC15	26.1/2"	29"	25.1/4"	2.3/4"	4.1/2"	2"	1.1/2"

RECOMMENDED PIPE LENGTH AND CIRCULATOR PUMP SELECTION

MODEL NUMBER	HYDRONIC COIL SUPPLY & RETURN CONNECTIONS	RECOMMENDED		
		SUPPLY & RETURN PIPING SIZE *	PIPE LENGTH	CIRCULATOR MODEL
HWFC05	1/2"	3/4"	100' OR LESS	Taco 007
HWFC10	3/4"	1"	100' OR LESS	Taco 007
HWFC15	1"	1.1/4"	100' OR LESS	Taco 007

* Note: Charted results are laboratory tested with a 007 Taco circulator or equivalent and less than 100 ft. of equivalent pipe length.

RATINGS AND DATA

BLOWER DATA

Unit Model	Motor HP	Blower Size	Motor Amps (120V)	Speed (120V)	CFM vs. External Static Pressure			
					.2" w.c.	.3" w.c.	.4" w.c.	.5" w.c.
HWFC05	1/3	10-7	5.2	HIGH	1350	1300	1250	1200
				MEDIUM	910	910	900	875
				LOW	750	745	740	720
HWFC10	3/4	10-9	9.1	HIGH	1910	1850	1700	1620
				MEDIUM	1660	1650	1540	1465
				LOW	1400	1380	1330	1260
HWFC15	3/4	10-10	9.1	HIGH	2300	2220	2100	2000
				MEDIUM	1920	1880	1830	1765
				LOW	1500	1500	1480	1445

PERFORMANCE DATA

HEATING

Unit Model	Tons Cooling Capacity	Heating Fan Speed	Heating BTUH (1000) at °F Boiler Water			
			140°F	160°F	180°F	190°F
HWFC05	3.0	Low	36,600	46,600	55,700	61,550
		Med	45,000	55,500	67,000	72,300
HWFC10	4.0	Low	65,200	81,900	98,600	103,100
		Med	71,600	89,500	107,400	114,550
HWFC15	5.0	Med	88,300	114,400	139,000	141,200
		High	96,700	125,400	147,250	157,250

FLOW RATE, PRESSURE, & CIRCULATOR

Unit Model	Tons Cooling Capacity	GPM Heating	Coil Press. Drop Ft. of Head	*Recommended Circulator
HWFC05	3.0	6.0	6.4	Taco 007
		4.4	3.6	Taco 007
HWFC10	4.0	8.7	6.0	Taco 007
		6.0	3.0	Taco 007
HWFC15	5.0	12.2	5.0	Taco 007
		8.7	2.7	Taco 007

* With less than 100 ft equivalent length of piping.

INSTALLATION RECORD

Date of Installation: _____

Installed By: _____

Model #: _____