Purging The System

1. Open air vent and allow water heater to fill with water. Close air vent when water heater is full and all air has been purged.

2. Ignite water heater. Set thermostat on water heater to 140 degrees.

3. Close the valve on the hot water supply from the water heater ("A") and open the valve on the cold water return to the water heater ("B"). Then open the air vent in the fan coil. Use bucket or hose to discard water during purging process at air bleed valve. Purge air completely from line.

4. Once air is purged, close return valve ("B") and open supply valve ("A"). Purge the coil and lines of air completely.

5. After air is purged from the system and filled with water, open the return valve ("B"). Then close the air vent in the fan coil.

6. Apply power to the fan coil and set the room thermostat on heat. Raise the temperature setting to activate the circulating pump

7. Check the pump to ensure proper operation. The water inlet of the unit should be hot if the water temperature in the water heater has reached the set point. If water is not being circulated through the coil but the pump is running, then open the air bleed valve in the unit and purge any air left in the system.

8. Adjust the water heater thermostat so that the water temperature entering the hot water coils is 120 – 180ºF depending on the amount of heat required by the structure. This is done with the unit energized and operating long enough for all temperatures to stabilize.

After all connections are made, start-up and check-out must be performed before proper evaluation of the entire system can be made. Make sure that heat anticipator is properly set as noted on thermostat instructions.

Load requirements can vary in each residence and it may be necessary for the installer or homeowner to make slight adjustments to the heat anticipator setting for longer or shorter cycles. It is recommended to change the setting no more than plus or minus 0.05 amps at a time. Greater changes can cause the unit to rapid cycle or remain on excessively. To properly check the unit's operation, the installer should have an electrical current measuring device (0-10 amp Amprobe, Fluke), air pressure measuring device (0-1.0 in slope gauge), and a temperature-measuring device (0-200ºF thermometer).

Install the Amprobe to measure blower current, the slope gauge to measure static air pressure at the units and the temperature device to measure unit supply and return air temperature. Before taking measurements, be sure that all registers, grilles and dampers are open or are set to their proper positions. Be sure that clean filters are in place. Temperature measuring device must be installed to obtain average temperature at both inlet and outlet. For outlet, measure temperature of each main trunk at a location far enough away to avoid heater radiation and read the average temperatures. Table 15-1 below shows the CFM that should be achieved at various external static pressures.

MODEL	SPEED TAP	CFM V. External Static Pressure				
		0.10	0.20	0.30	0.40	0.50
AFM18-24	Tap 5	900	853	797	738	673
	Tap 4	670	646	613	592	553
	Tap 3	500	476	452	421	400
	Tap 2	900	853	797	738	673
	Tap 1	400	381	360	339	312
AFM30-36	Tap 5	1150	1087	1030	975	910
	Tap 4	1080	1048	1010	960	895
	Tap 3	900	862	825	796	745
	Tap 2	700	663	632	600	552
	Tap 1	500	473	449	421	395
AFM42-60	Tap 5	1850	1806	1752	1700	1652
	Tap 4	1704	1656	1600	1532	1479
	Tap 3	1494	1461	1426	1400	1364
	Tap 2	1350	1310	1272	1229	1175
	Tap 1	676	652	621	600	559

Table 16-1. - CFM Delivered at Various External Statics

17. Checking Air Flow/Temperature Rise Method

Turn on power supply. Set thermostat fan switch to on. Set the cooling indicator to maximum, heating to minimum. System switch may be on heat or cool. Check slope gauge measurement against appropriate air flow chart. Make damper, register and motor speed adjustments to obtain required airflow.

Set thermostat fan switch to auto, system to heat and thermostat heating indicator to maximum heat. Blower should start and all heat be energized.

Check air flow using temperature rise method.

$$CFM = \frac{OUTPUT(BTUH)}{1.08 \bullet TEMP.RISE}$$

Note: BTUH output should be computed by 500 x Gallons Per Minutes x System Temperature Change = BTUH OUTPUT.

18. Operation and Maintenance

Below are brief descriptions of the key components of the unit and installation. This manual only provides general idea of the components and recommended practices. The installer should use best judgement to ensure safe installation and operation of the unit.

1. Room Thermostat- This is the device that controls that operation of your heating and/or cooling unit. It senses the indoor temperature and signals the equipment to start or stop maintaining the temperature you have selected for your comfort. The room thermostat should be in a central, draft free inside wall location for best operation. Do not place any heat producing apparatus such as lights, radio, etc., near the thermostat as this will cause erratic operation of the comfort system. The thermostat can accumulate dust or lint which can affect its accuracy. It should be cleaned annually.

2. Air Filter(s) - All central air moving comfort systems must include air filter(s). These filters will be located either in the equipment or in the return air duct system upstream of the equipment. The filter(s) removes dust and debris from the air thus helping to keep your air-conditioned space clean. More important, the filter keeps dust and debris from collecting on the heat transfer surfaces thus maintaining optimum equipment efficiency and performance. Inspect and clean or replace filters every month. This routine maintenance procedure will pay big dividends in reduced operating cost and reduced service expense. Never operate comfort equipment without filter(s).

3. Fuses and/or Circuit Breakers- This comfort equipment should be connected to the building electric service in accordance with local and National Electric codes. This electrical connection will include over-current protection in the form of circuit breakers. Have your contractor identify the circuits and the location of over-current protection so that you will be in a position to make inspections or replacements in the event the equipment fails to operate.

WARNING **4. a) Do not store combustible materials or use gasoline or other flammable liquids or vapors in the vicinity of this appliance.**
b) Do not operate the comfort equipment with panels removed.
c) Have your contractor point out and identify the various cut-off devices, switches, etc., that serve your comfort equipment. There is a main switch that will cut off energy to your heating system. Know where they are so that you may cut off the flow of energy in the event of overheating.

5. Periodic Checkup and Service- This product is designed to provide many years of dependable, trouble-free comfort when properly maintained. Proper maintenance will consist of annual check-ups and cleaning of the internal electrical and heat transfer components by a qualified service technician. Failure to provide periodic checkup and cleaning can result in excessive operating cost and/or equipment malfunction.

6. Lubrication- Direct drive blower motors are equipped with permanently lubricated bearings and do not require further lubrication.

7. Air filter replacement: An air filter can restrict the airflow of air to the fan coil if it is not cleaned or replaced periodically. When replacing the air filter, always replace with the same type and size as originally furnished with the unit.

19. AFM Hydronic Related General Information

1. Equipment Sizing Select an air handler with a heating output that exceeds the space heating loss of the structure and that has a cooling coil sized to match the outdoor condensing unit. Note: The heating output of the air handler or hot water coil will not be greater than the output of the selected hot water heater. Therefore, if the water heater is undersized the heating BTUH of the air handler will be LESS than its rated output.

2. Water Heater Selection ‘
The following sizing information should only be used as a basic guide to adequate water heater sizing because of variations in each family’s domestic hot water requirements. For additional assistance in water heater sizing contact a professional engineer. Proper water heater sizing should consider both the gallon capacity AND the BTU input of the water heater.

a. To determine water heater GALLON CAPACITY: A minimum 40-gallon high recovery and/or high efficiency gas or oil-fired water heater is recommended. The following volume-sizing guide is satisfactory in most areas of the country (Table 19-1):

CFM	Min Water Heater
600-800	40 gal
1000-1200	50 gal
1400-1600	2x40 gallons piped together
	High input 50 gallons (63-75k Btu)
	72-75gallons
2000	105k Btu

Table 19-1.

b. To determine water heater BTU INPUT (assumes a water heater recovery efficiency of 76%): For mild climates: BTU INPUT=structure’s heat loss x 1.51. For colder climates: BTU INPUT=structure’s heat loss x 1.58.

3. Pump Replacement
a. Disconnect electrical power to the unit before servicing.
b. Remove access door to reveal pump. Close supply valve (“A”) and return valve (“B”). Open the air bleed valve to de-pressurize the system and drain water.
c. Remove the metal pump housing by loosening the four screws on the pump. DO NOT UN-SOLDER PUMP.
d. Replace the new pump housing assembly and reconnect components to the pump. Before assembling, make sure that the runner on the o-ring is in place on the pump housing.
e. Purge the system of the air as described earlier and re-connect the electrical power.

20. Common Problems and Solutions

1. Noisy Pump
System may not be totally purged of air. Purge the system again as described in the start up section above.

2. T&P valve on water heater weeps This normally occurs when a backflow preventer has been installed in the cold water supply line to the water heater. An expansion tank may be necessary to correct this problem. Please contact a qualified plumbing professional for assistance.

3. Hot water is circulating through the water coil during cooling cycle The check valve may be stuck open and allowing hot water to circulate through the coil.

4. Little or no heat from water coil.
a. Purge the system.
b. The inlet connections may be reversed at the fan coil.
c. Water heater thermostat is not set at proper temp.
d. Water heater thermostat is not calibrated.
e. Dip tube in the water heater may not be installed correctly or could be restricted.
f. Look for restrictions in heating system from water heater to fan coil. Some water heaters are supplier with check valves, remove any extra check valves except for the one supplied with the fan coil.
g. The air handler is undersized for space being heated.
h. Water heater is undersized.

Note: All units installed in Massachusetts are required to be in compliance with CMR 248 Massachusetts State Plumbing Code and/or Massachusetts Fuel Gas Code.

These codes require the use of an optional pump timer to circulate the hydronic loop independent of the thermostat.

21. Final System Checkout

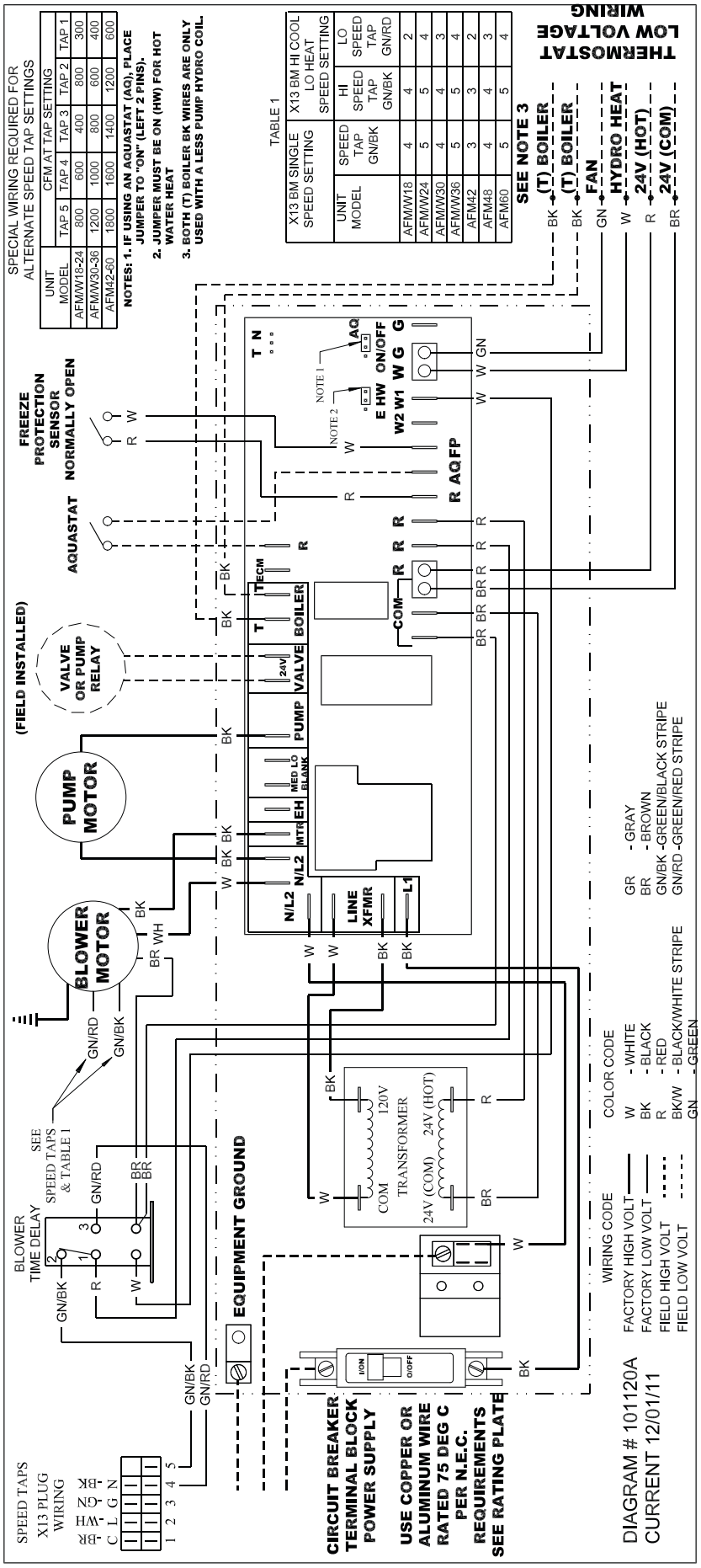
1. Make certain all cabinet openings are properly sealed and any grommets moved during installation are moved into proper place.

2. With cooling system operating, check for condensate leakage.

3. Perform leak detection inspection of refrigerant circuit and connecting piping.

4. Secure all cabinet doors

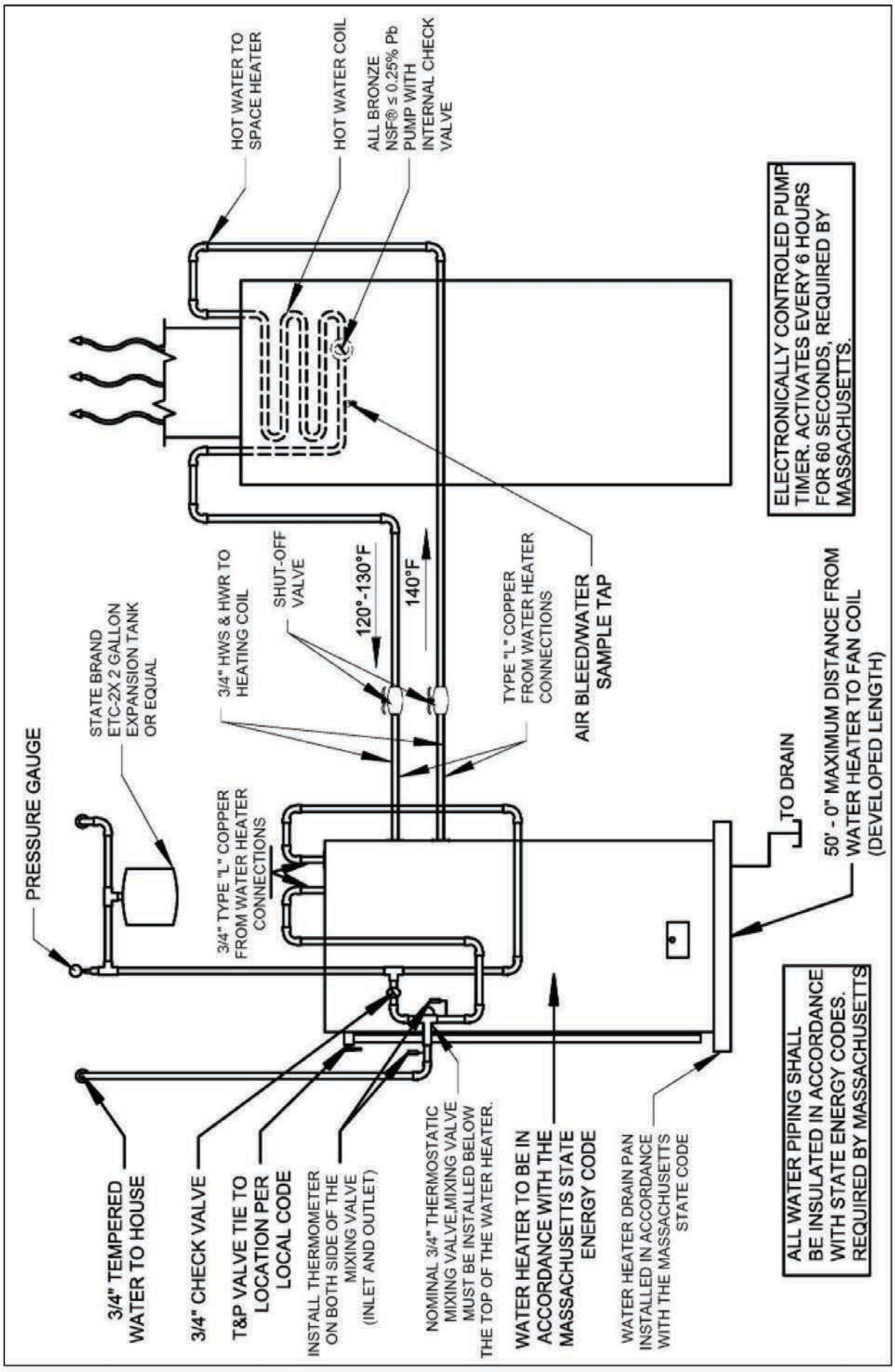
22. Wiring diagram for AFM models



HIGH VOLTAGE disconnect all power sources prior to servicing. Failure might lead to safety hazard

Fig 21-1.

23. Massachusetts Applicable Installation Diagram



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