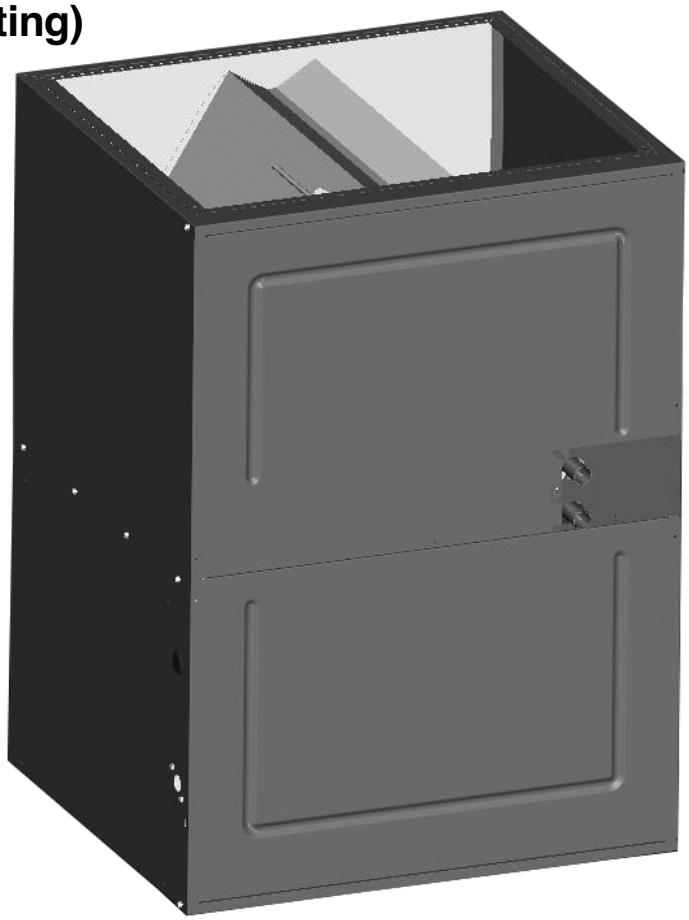
INSTALLATION INSTRUCTIONS

HYDRONIC AIR HANDLER

(-)W1P (PSC Motor)
(-)W1T (EcoTech™ Motor)
(-)WMV (Modulating)



RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠WARNING

PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY QUALIFIED SERVICE PERSONNEL.

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Accredited by the RvA

ABS Quality Evaluations, Inc. Management System Certification

ANAB ACCREDITED

ISO 9001:2008

Certificate Number: 30164

92-24161-150-05
SUPERSEDES 92-24161-150-04

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⚠ WARNING

IMPORTANT: All manufacturer products meet current Federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.

California's Proposition 65 requires warnings for products sold in California that contain, or produce, any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.

All “new equipment” shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know “when, or if” products will be sold in the California market.

You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.

- Glass Wool (Fiberglass) Insulation
- Carbon Monoxide (CO)
- Formaldehyde
- Benzene

More details are available at the Websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

PROHIBITED APPLICATIONS

THESE HYDRONIC AIR HANDLERS ARE EQUIPPED STANDARD WITH STAINLESS STEEL PUMPS AND COMPLY WITH CALIFORNIA PER AB1953 AND VERMONT PER SB152 FOR USE IN AIR HANDLER AND IN AN OPEN SYSTEM WITH POTABLE WATER.

IMPORTANT: TO ENSURE PROPER INSTALLATION AND OPERATION OF THIS PRODUCT, COMPLETELY READ ALL INSTRUCTIONS PRIOR TO ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE, MAINTAIN OR REPAIR THIS PRODUCT. UPON UNPACKING OF THE AIR HANDLER, INSPECT ALL PARTS FOR DAMAGE PRIOR TO INSTALLATION AND START-UP.

1.0 SAFETY INFORMATION & PRECAUTIONS

⚠ WARNING

WHEN AN AIR HANDLER IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE AIR HANDLER TO AREAS OUTSIDE THE SPACE CONTAINING THE AIR HANDLER, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE AIR HANDLER CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE AIR HANDLER.

⚠ WARNING

INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:

- **AIR HANDLER OPERATING UNDER THERMOSTATIC CONTROL;**
- **RETURN AIR DUCT SEALED TO THE AIR HANDLER;**
- **AIR FILTERS IN PLACE;**
- **RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND**
- **CLEAN AIR HANDLER, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY AIR HANDLER OPERATING CONDITIONS INCLUDING FLOW RATE AND TEMPERATURE RISE, ACCORDING TO THE INSTRUCTIONS.**

NOTICE

IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE UNDERWRITERS LABORATORY (UL) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDITIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

⚠ WARNING

DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 2).

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**
- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.**

NOTICE

APPLICATION OF THIS HYDRONIC AIR HANDLER SHOULD BE INDOORS. SPECIAL ATTENTION SHOULD BE GIVEN TO UNIT SIZING AND PIPING, FILLING, AND PURGING.

⚠ CAUTION

FAILURE TO FOLLOW THIS CAUTION MAY RESULT IN PERSONAL INJURY. SHEET METAL PARTS MAY HAVE SHARP EDGES OR BURRS. USE CARE AND WEAR APPROPRIATE PROTECTIVE CLOTHING.

⚠ CAUTION

WHEN USED IN COOLING APPLICATIONS, EXCESSIVE SWEATING MAY OCCUR WHEN UNIT IS INSTALLED IN AN UNCONDITIONED SPACE. THIS CAN RESULT IN PROPERTY DAMAGE.

NOTICE

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS AND UNITS CONTAINING EVAPORATOR COILS AND AIR HANDLERS USED WITH EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN, A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING OR ANY WATER LEAK POTENTIAL FROM THE AIR HANDLER.

⚠ WARNING

DO NOT OPERATE THE SYSTEM WITHOUT FILTERS. A PORTION OF THE DUST ENTRAINED IN THE AIR MAY TEMPORARILY LODGE IN THE DUCT RUNS AND AT THE SUPPLY REGISTERS. THIS RESIDUE COULD SOIL CEILINGS, WALLS, DRAPES, CARPETS AND OTHER ARTICLES IN THE HOUSE.

SOOT DAMAGE MAY OCCUR WITH FILTERS IN PLACE, WHEN CERTAIN TYPES OF CANDLES, OIL LAMPS OR STANDING PILOTS ARE BURNED.

⚠ CAUTION

HORIZONTAL UNITS MUST BE CONFIGURED FOR RIGHT HAND AIR SUPPLY OR LEFT HAND AIR SUPPLY. HORIZONTAL DRAIN PAN MUST BE LOCATED UNDER INDOOR COIL. FAILURE TO USE THE DRAIN PAN CAN RESULT IN PROPERTY DAMAGE.

⚠ NOTICE

CODES AND STANDARDS:
IT IS THE RESPONSIBILITY OF THE INSTALLER TO FOLLOW ALL NATIONAL CODES, STANDARDS AND LOCAL ORDINANCES, IN ADDITION TO INSTRUCTIONS LAID OUT IN THIS MANUAL. THE INSTALLATION MUST COMPLY WITH REGULATIONS OF THE LOCAL BUILDING, HEATING, PLUMBING, AND OTHER CODES. WHERE LOCAL CODES ARE NOT APPLICABLE, THE INSTALLATION MUST COMPLY WITH THE NATIONAL CODES AND ANY AND ALL AUTHORITIES HAVING JURISDICTION.

2.0 GENERAL INFORMATION

2.1 IMPORTANT INFORMATION ABOUT EFFICIENCY AND INDOOR AIR QUALITY

Central cooling and heating equipment is only as efficient as the duct system that carries the cooled or heated air. To maintain efficiency, comfort and good indoor air quality, it is important to have the proper balance between the air being supplied to each room and the air returning to the cooling and heating equipment.

Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and/or equipment is located. The manufacturer and the U.S. Environmental Protection Agency's ENERGY STAR Program recommend that central duct systems be checked by a qualified contractor for proper balance and sealing.

⚠ WARNING

DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 1).

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**
- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.**

NOTICE

IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE UL CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDITIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

NOTICE

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS OR AIR HANDLERS USED WITH EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING.

NOTICE

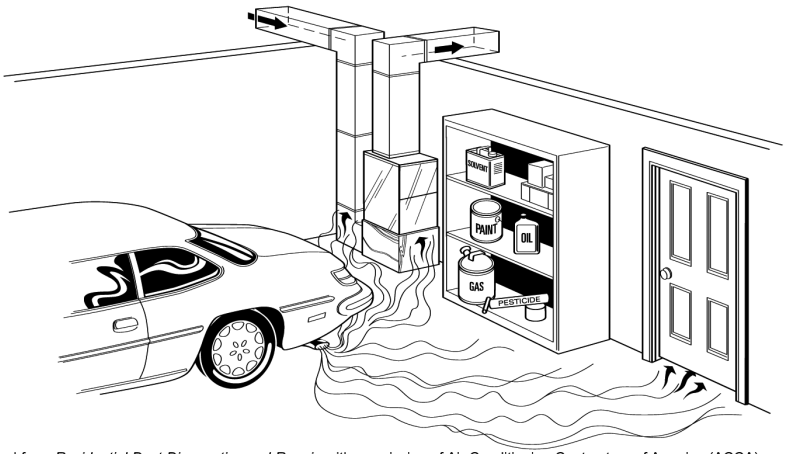
- Read the entire instructions before starting the installation.
- Some building codes require extra cabinet insulation and gasketing when unit is installed in attic applications.
- If installed in an unconditioned space, apply caulking around the power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Caulking is required to prevent air leakage into and condensate from forming inside the unit, control box, and on electrical controls.
- Install the unit in such a way as to allow necessary access to the coil/pump and blower/control compartment.
- Install the unit in a level position to ensure proper condensate drainage. Make sure unit is level in both directions within 1/8".
- Install the unit in accordance with any local code which may apply and the national codes. Latest editions are available from: "National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269." These publications are:
- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- NFPA90A Installation of Air Conditioning and Ventilating Systems.
- NFPA90B Installation of Warm Air Heating and Air Conditioning Systems.
- The equipment has been evaluated in accordance with the Code of Federal Regulations, Chapter XX, Part 3280.

2.2 CHECKING PRODUCT RECEIVED

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery documents and a damage claim filed with the delivering carrier.

After unit has been delivered to the job site, remove the unit from the carton taking care not to damage the unit. Check the unit rating plate for unit model number, unit size, coil model, voltage, phase, etc. to assure the unit matches the job specifications.

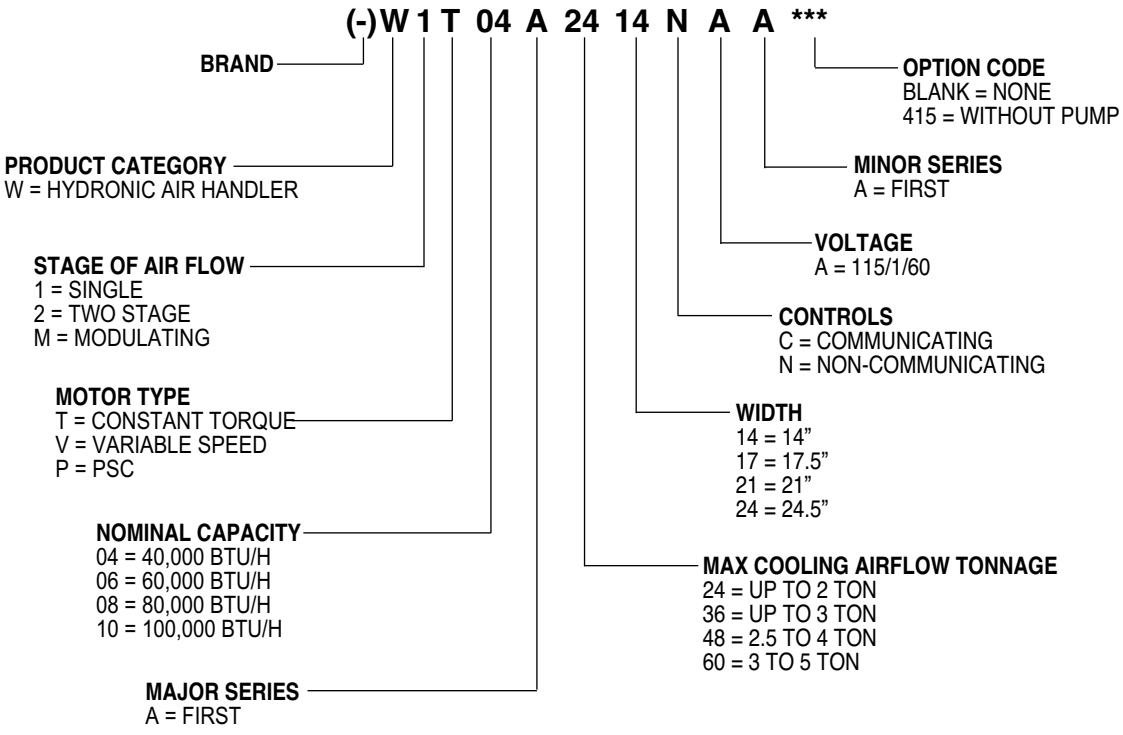
FIGURE 1
MIGRATION OF DANGEROUS SUBSTANCES, FUMES, AND ODORS INTO LIVING SPACES



Adapted from *Residential Duct Diagnostics and Repair,* with permission of Air Conditioning Contractors of America (ACCA).

2.3 MODEL NUMBER NOMENCLATURE

Model Number Nomenclature

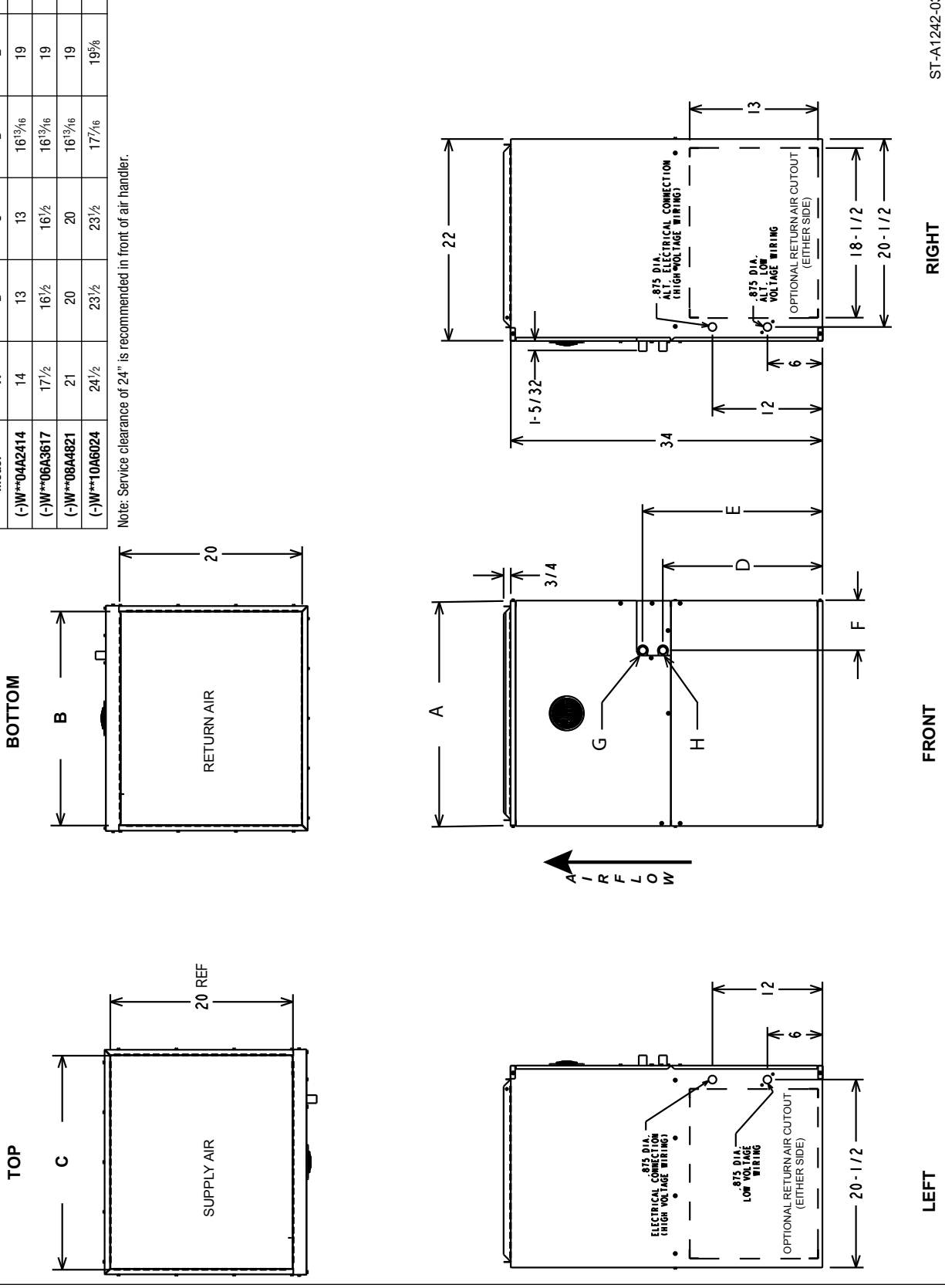


2.4 DIMENSIONAL DATA

FIGURE 2
DIMENSIONAL DATA

Model	A	B	C	D	E	F
(-)W**04A2414	14	13	13	16 3/16	19	3 3/8
(-)W**06A3617	17 1/2	16 1/2	16 1/2	16 13/16	19	4 5/8
(-)W**08A4821	21	20	20	16 13/16	19	4 7/16
(-)W**10A6024	24 1/2	23 1/2	23 1/2	17 7/16	19 5/8	5 7/16

Note: Service clearance of 24" is recommended in front of air handler.



2.5 ELECTRICAL AND PHYSICAL SPECIFICATIONS

Model Numbers	(-)W1T04A2414NAA	(-)W1T06A3617NAA	(-)W1T08A4821NAA	(-)W1T10A6024NAA
Nominal Heating Capacity BTU/hr [kw]	40000 [11.7]	60000 [17.6]	80000 [23.4]	100000 [29.3]
Air Side Temperature Rise* °F [°C]	32-53 [17.6-29.2]	24-43 [13.2-23.7]	25-49 [13.8-27.0]	25-46 [13.8-25.3]
Rated Heating CFM [L/s]	800 [378]	1200 [566]	1625 [767]	1800 [850]
Cooling Range CFM [L/s]	600-800 [283-556]	800-1200 [283-612]	1000-1625 [472-775]	1200-1800 [612-804]
Power Supply (V - HZ - PH)		115 - 60 - 1		
Minimum Circuit Ampacity - Amps	8	10	12.9	12.9
Max Rating of Over Current Protective Device - Amps	11.7	18	23.2	23.2
Maximum Fuse or Circuit Breaker Size - Amps	10	15	20	20
Motor HP [W]	1/3 [248]	1/2 [373]	3/4 [559]	3/4 [559]
Blower (D x W) in [mm]	10 x 6 [254 x 152]	10 x 8 [254 x 203]	10 x 10 [254 x 254]	11 x 11 [279 x 279]
Blower Motor Type	EcoTech / ECM Type/Constant Torque			
Pump Type	Wet Rotor			
Pump Power Supply (V - HZ - PH)	115 - 60 - 1			
Pump Motor RLA/LRA - Amps	1.8			
Pump HP [W]	1/8 [.86]			
Pump Maximum Working Pressure psi [kPa]	125 [861]			
Max Working Temperature °F [°C]	160 [71]			
Water Connection Type	Copper Studs			
Inlet Water Connection Diameter in [mm]	3/4 [19]			
Out Water Connection Diameter in [mm]	3/4 [19]			
Shipping Weight LBS [kg]	91 [41]	100 [45]	122 [55]	129 [58]

Model Numbers	(-)W1P04A2414NAA	(-)W1P06A3617NAA	(-)W1P08A4821NAA	(-)W1P10A6024NAA
Nominal Heating Capacity BTU/hr [kw]	40000 [11.7]	60000 [17.6]	80000 [23.4]	100000 [29.3]
Air Side Temperature Rise* °F [°C]	32-53 [17.6-29.2]	24-43 [13.2-23.7]	25-49 [13.8-27.0]	25-46 [13.8-25.3]
Rated Heating CFM [L/s]	800 [378]	1200 [566]	1625 [767]	1800 [850]
Cooling Range CFM [L/s]	600-800 [283-556]	800-1200 [283-612]	900-1625 [424-641]	1050-1850 [472-873]
Power Supply (V - HZ - PH)		115 - 60 - 1		
Minimum Circuit Ampacity - Amps	5	10	11	11
Max Rating of Over Current Protective Device - Amps	7.0	15.3	17.6	18.2
Maximum Fuse or Circuit Breaker Size - Amps	15	15	15	15
Motor HP [W]	1/5 [93]	1/2 [373]	3/4 [559]	3/4 [559]
Blower (D x W) in [mm]	10 x 6 [254 x 152]	10 x 8 [254 x 203]	10 x 10 [254 x 254]	11 x 11 [279 x 279]
Blower Motor Type	PSC			
Pump Type	Wet Rotor			
Pump Power Supply (V - HZ - PH)	115 - 60 - 1			
Pump Motor RLA/LRA - Amps	1.8			
Pump HP [W]	1/8 [.86]			
Pump Maximum Working Pressure psi [kPa]	125 [861]			
Max Working Temperature °F [°C]	160 [71]			
Water Connection Type	Copper Studs			
Inlet Water Connection Diameter in [mm]	3/4 [19]			
Out Water Connection Diameter in [mm]	3/4 [19]			
Shipping Weight LBS [kg]	91 [41]	100 [45]	122 [55]	129 [58]

Model Numbers	(-)WMV04A2414NAA	(-)WMV06A3617NAA	(-)WMV08A4821NAA	(-)WMV10A6024NAA
Nominal Heating Capacity BTU/hur [kW]	40000 [11.7]	60000 [17.6]	80000 [23.4]	100000 [29.3]
Air Side Teperature Rise* ^{O}F [^{O}C]	32-53 [17.6-29.2]	24-43 [13.2-23.7]	25-49 [13.8-27.0]	25-46 [13.8-25.3]
Rate Heating CFM [L/s]	800 [378]	1200 [566]	1625 [767]	1800 [850]
Cooling Rang [L/s]	600-800	600-1200	1000-1600	1200-1800
Power Supply (V - Hz - PH)	115-60-1			
Minimum Circuit Ampacity - Amps	7.5	9.625	12	12
Max Rating of Over Current Protective Device - Amps	11.25	17.325	21.6	21.6
Maximum Fuse of Circuit Breaker Size - Amps	15	20	25	25
Motor HP [W]	1/3 [248]	1/2 [373]	3/4 [559]	3/4 [559]
Blower (D x W) in [mm]	10 x 6 [254 x152]	10 x 8 [254 x 203]	10 x 10 [254 x 254]	11 x 11 [279 x 279]
Blower Motor Type	ECM type/Variable Speed			
Pump Type	Wet Rotor			
Pump Power Supply (V - Hz - PH)	115-60-1			
Pump Motor RLA/LRA - Amps	1.8			
Pump HP [W]	1/8 [.86]			
Pump Maximum Workin Pressure psi [kPa]	125 [861]			
Max Working Temp ^{O}F [^{O}C]	160 [71]			
Water connection Type	Copper Studs			
Inlet Water Connection Diameter in [mm]	3/4 [19]			
Out Water Connection Diameter in [mm]	3/4 [19]			
Shipping Weight LBS [kg]	91 [41]	100 [45]	122 [55]	129 [58]

2.6 HYDRONIC HEATING PERFORMANCE

Air Handler Model	Water Temperature			Water flow rate	Blower Speed	External static pressure	Air flow	Air Temperature			Heat Capacity
	Inlet	Outlet	Delta	(GPM)	(rpm)	(in. w.c.)	(CFM)	Inlet	Outlet	Delta	(Btu/hr)
	(°F)							(°F)			
(-)W**04A	120	109	11	5.0	High	0.54	800	68.00	102	31	26,914
	130	116	14	4.6					108	36	31,488
	140	122	18	4.0					113	41	35,628
	150	129	21	3.8					119	47	40,593
	160	132	28	3.3					120	53	45,454
(-)W**06A	120	96	24	4.0	High	0.59	1200	68.00	104	36	47,040
	130	101	29	3.8					110	42	54,300
	140	105	35	3.3					112	44	57,598
	150	115	35	3.4					114	46	59,348
	160	121	39	3.3					118	50	64,398
(-)W**08A	120	100	20	4.8	High	0.5	1625	68.00	95	27	47,766
	130	103	27	4.2					100	32	55,703
	140	105	35	3.6					104	36	62,341
	150	108	42	3.5					110	42	74,147
	160	106	54	3.0					114	46	80,997
(-)W**10A	120	93	27	4.6	High	0.5	1800	68.00	100	32	62,308
	130	98	32	4.2					103	35	67,635
	140	101	39	3.6					104	36	69,936
	150	103	47	3.6					111	43	84,130
	160	101	59	3.3					118	50	97,514

*NOTE: Capacities are based on a constant inlet water temperature supplied by a tankless water heater and do not apply to storage tank applications.

2.7 UNIT SELECTION PROCEDURE (WITH EXAMPLE)

I. Define hot water load for the total required domestic hot water usage.

As an example, let's assume that the selected Tankless Water Heater for your whole house solution is the RTG-74 and your calculated heat gain and heat loss values are as stated in section II.

II. Determine cooling and heating requirements at design conditions:

The ACCA's Manual J Residential Load Calculation method is the established trade standard, approved by ANSI, for the correct siziing and selection of Heating, Ventilation, Air-Conditioning and Refrigeration (HVACR) equipment in residential homes. The most recent revision is the eight edition, an all-inclusive new approach to ensuring that Indoor Air Quality (IAQ) systems are as efficient, safe, and healthy as possible. Refer to the Air Conditioning Contractors of America website at: **http://www.acca.org/tech/manualj/** or a qualified HVACR contractor for further assistance.

Assumptions:

Required Cooling Capacity . 48,000 BTU/HR (Total Capacity)

Required Heating Capacity . 60,000 BTU/HR

Evaporator Air Quantity. . . . . 1600 CFM

External Static Pressure . . . . . 0.2 in. W.C.

Electrical Characteristics 115-1-60

III. Determine total external static pressure (ESP) at design conditions:

Before using the Airflow Performance Table calculate the total static pressure required. From the given example, note the Wet Coil Pressure Drop (selected from the field supplied Evaporative Cased Coil Installation Instructions), and the Filter Pressure Drop. Determine both static pressures at 1600 CFM:

Wet Coil Pressure Drop . . . .0.3 in. W.C.
(From Coil Manufacturer's Installation Instructions)

External Static Pressure . . . 0.2 in. W.C.
(Ductwork, etc.)

Filter Pressure Drop . . . .08 in. W.C.
(.08 inches if the included filter is used; refer to the filter's manufacturer's instructions if another filter is used.)

Total Static Pressure. . . 0.58 in. W.C.

IV. Select unit based on required cooling capacity airflow:

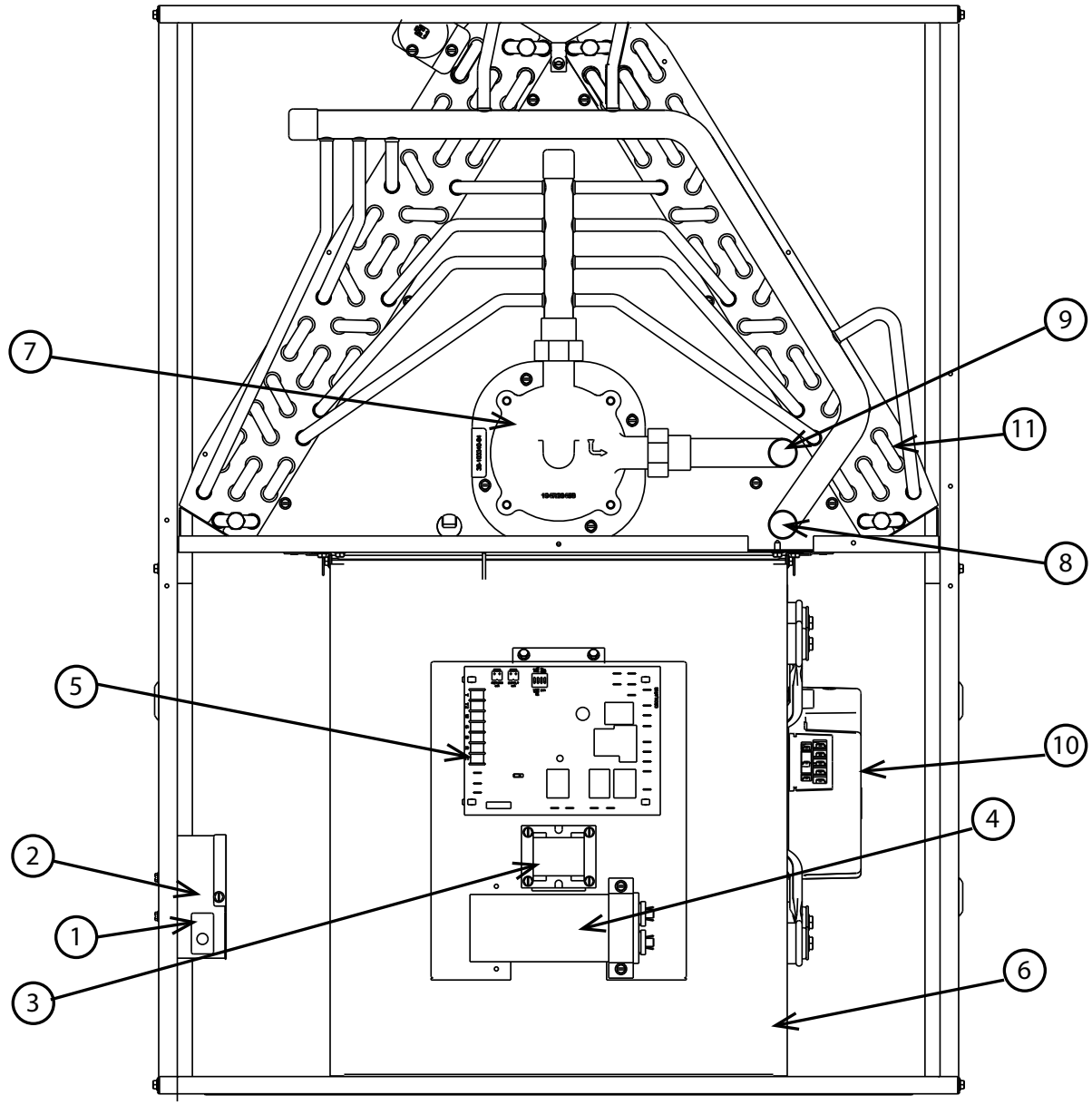
For an initial selection, choose a unit size that will provide the required airflow. Refer to Airflow Performance Table. Note that at 0.6 ESP (external static pressure) the RW1T06A3617NAA unit will deliver 1560 CFM when configured for HIGH speed.

V. Select heating capacity of unit to provide the requisite design condition:

From the Hydronic Air Handler/ Tankless Water Heater, note that the unit RW1T06A3617NAA, (as selected above) when matched with the RTG-95 Tankless Water Heater, will provide 59.2 MBH (59,200 BTU/HR) at an input water temperature (to Air Handler) of 150°F.

2.8 COMPONENTS AND CONTROLS

FIGURE 3
(-)W1P/(-)W1T

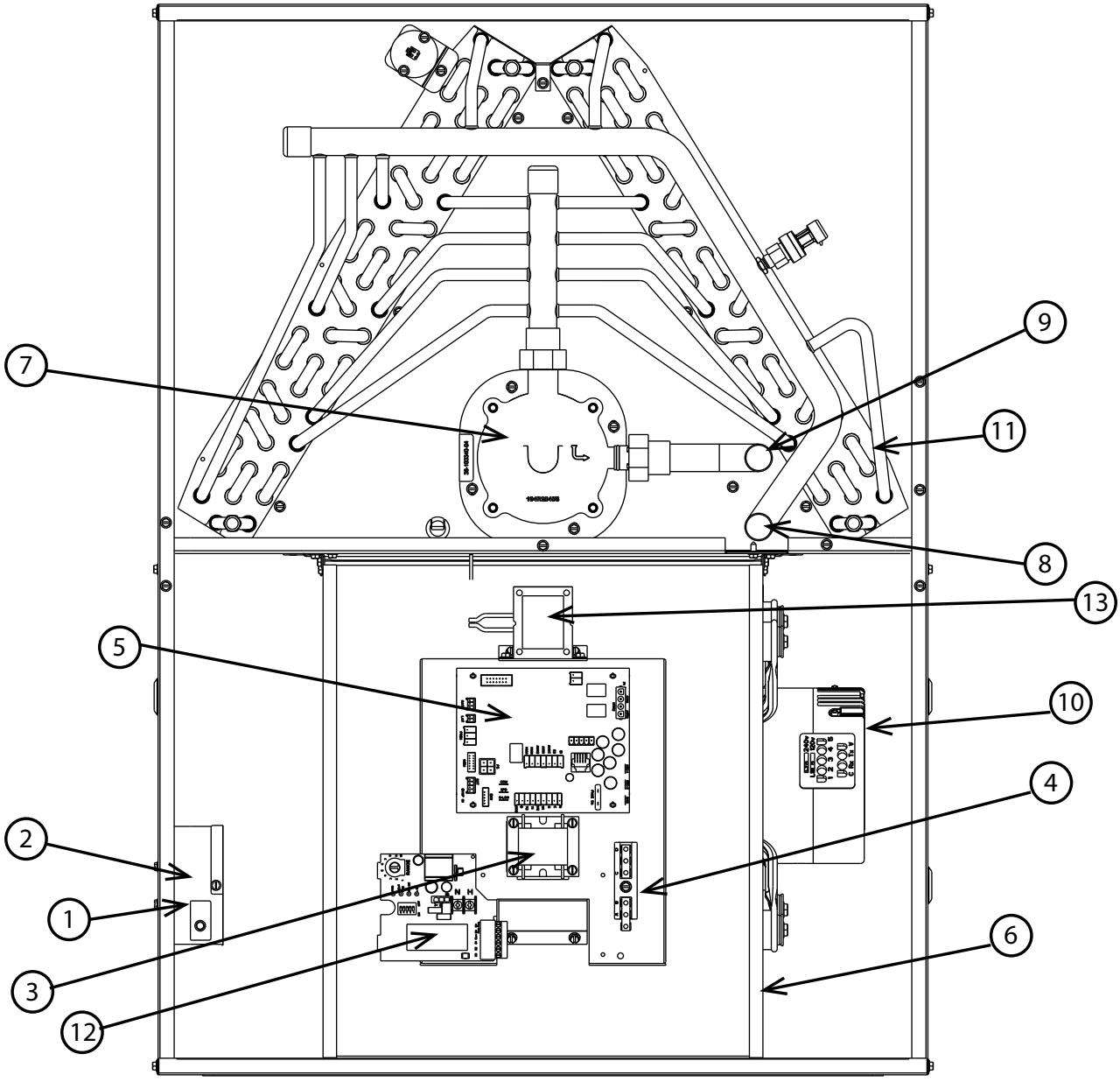


1. DOOR SWITCH
2. JUNCTION BOX
3. TRANSFORMERS
4. CAPACITORS
5. LOW VOLTAGE (THERMOSTAT) TERMINAL
6. BLOWER
7. PUMP (IF REQUIRED)
8. WATER INLET (OUTLET FOR 14" HAH)
9. WATER OUTLET (INLET FOR 14" HAH)
10. BLOWER MOTOR
11. HYDRONIC COIL ASSEMBLY

ST-A1242-01-X1

2.8 COMPONENTS AND CONTROLS – continued

FIGURE 4
THE RWMV SERIES HYDRONIC AIR HANDLERS ARE DESIGN-CERTIFIED BY UL



1. DOOR SWITCH
2. JUNCTION BOX
3. TRANSFORMERS
4. TERMINAL BLOCK
5. CONTROL BOARD
6. BLOWER
7. PUMP (IF REQUIRED)
8. WATER INLET (OUTLET FOR 14" HAH)
9. WATER OUTLET (INLET FOR 14" HAH)
10. BLOWER MOTOR
11. HYDRONIC COIL ASSEMBLY
12. PUMP CONTROL
13. CHOKE (3/4HP ONLY)

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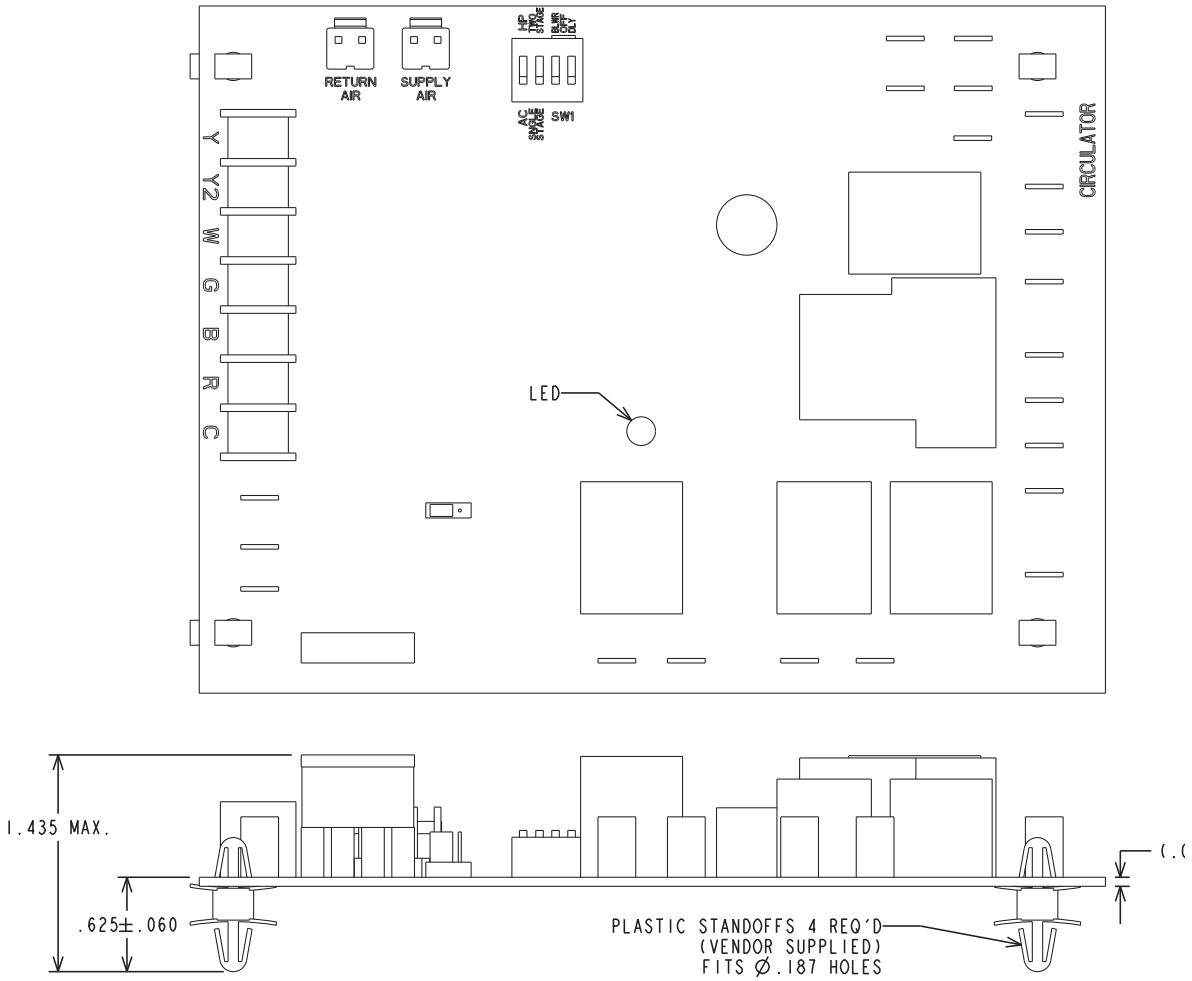
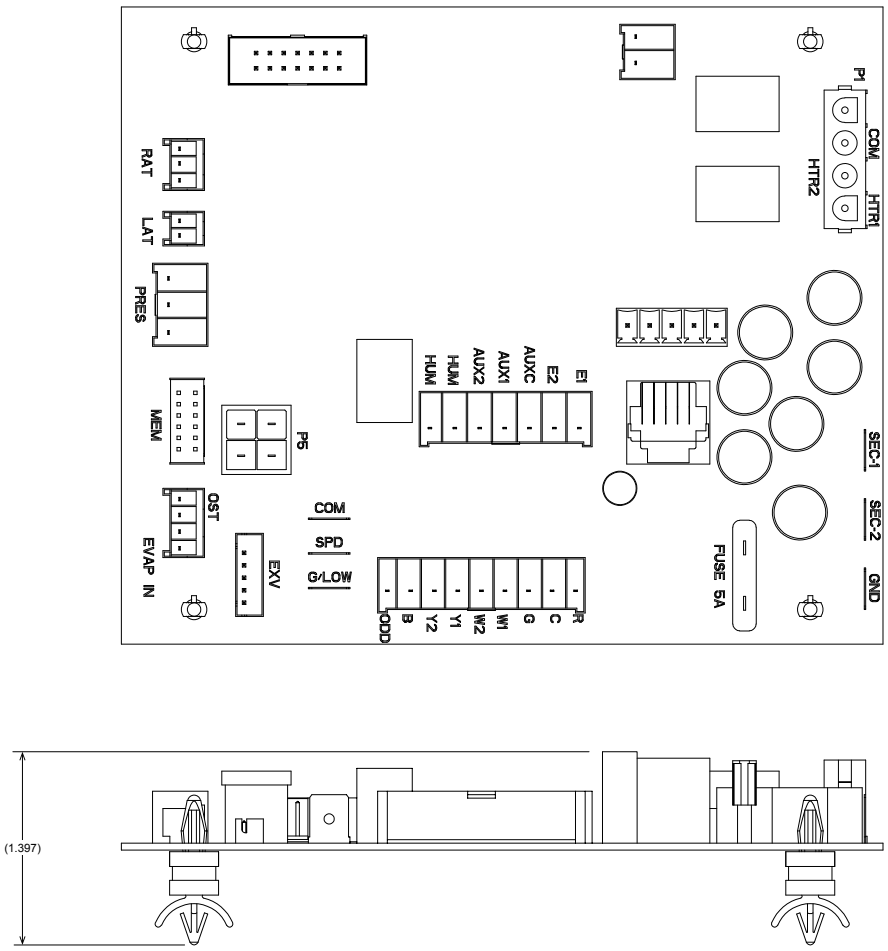
2.8 COMPONENTS AND CONTROLS – continued

FIGURE 5
HYDRONIC AIR-HANDLER CONTROL BOARD: (-)W1P/(-)W1T (NON-MODULATING)



2.8 COMPONENTS AND CONTROLS – continued

FIGURE 6
HYDRONIC AIR-HANDLER CONTROL BOARD: (-)WMV (MODULATING)



3.0 INSTALLATION

3.1 IMPORTANCE OF QUALITY INSTALLATION

A quality installation is critical to assure safety, reliability, comfort, and customer satisfaction. Strict adherence to applicable codes, the information in this installation manual, the outdoor unit installation manual, and the thermostat installation manual are key to a quality installation. Read the entire instruction manuals before starting the installation.

Install the unit in accordance with applicable national, state, and local codes. Latest editions are available from: "National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269." These publications are:

- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- NFPA90A Installation of Air Conditioning and Ventilating Systems.
- NFPA90B Installation of warm air heating and air conditioning systems.

Install the unit in such a way as to allow necessary access to the coil/filter rack and blower/control compartment.

3.2 LOCATION REQUIREMENTS AND CONSIDERATIONS

3.2.1 GENERAL INFORMATION

1. **IMPORTANT:** If installing the unit over a finished ceiling or living area, be certain to install an auxiliary condensate drain pan under the entire unit. This auxiliary drain pan should extend under any evaporator coil installed with the air handler and the open portion of the condensate drain assembly.
2. **IMPORTANT:** If using a cooling evaporator coil with this air handler:

   Be sure the air passes over the coil/pump before passing over the cooling coil.

   IMPORTANT: Support this unit when installed. Since this air handler is suitable for attic or crawl space installations, it may be installed on combustible wood flooring or by using support brackets.
5. **IMPORTANT: If installing in a utility room, be sure the door is wide enough to:**
   a. allow the largest part of the air handler to pass; or
   b. allow any other appliance (such as a water heater) to pass.
6. **IMPORTANT:** This air handler is not approved or recommended for installation on its back, with access doors facing upwards (see Figure 7).

3.2.2 CLEARANCE AND ACCESSIBILITY

The design of air handlers with input ratings as listed in the tables under Figure 4 are certified by UL for the clearances to combustible materials shown in inches.

See name/rating plate and clearance label for specific model number and clearance information.

Service clearance of at least 24" is recommended in front of all air handlers.

NOTE: Use recommended 24" clearance if accessibility clearances are greater than fire protection clearances.

Air handlers are shipped with a bottom closure panel installed. When bottom return air is used, remove the panel by removing the two screws attaching the panel to the front base angle.

3.2.3 SITE SELECTION

1. Select a site in the building near the center of the proposed, or existing, duct system.
2. Locate the air handler to maintain proper clearance to combustibles as shown in the following tables.

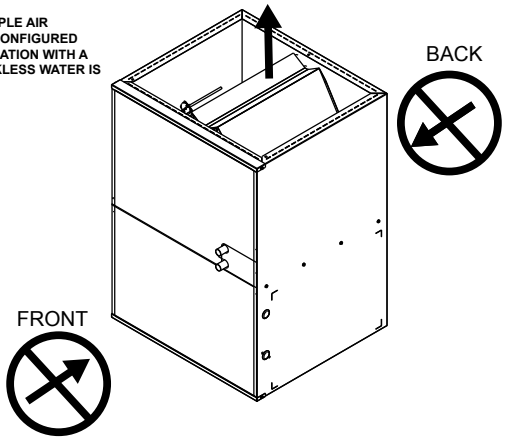
3.2.4 INSTALLATION IN A CORROSIVE ENVIRONMENT

The metal parts of this unit may be subject to rust or deterioration if exposed to a corrosive environment which can shorten its life. In addition to exposure to the exterior of the cabinet, chemical contaminants inside the building that can be drawn into the unit from the return air grille and attack structural metal parts, electrical components and the indoor coil, causing premature failure of the unit. If the unit is to be installed in an area where contaminants are likely to be a problem, special attention should be given to isolate the unit and return grille from contaminants.

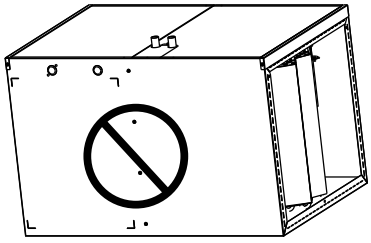
FIGURE 7

PROHIBITED INSTALLATIONS

NOTE: MULTIPLE AIR HANDLERS CONFIGURED FOR INSTALLATION WITH A SINGLE TANKLESS WATER IS PROHIBITED.



THE AIR INLET IS NOT ALLOWED TO BE AT THE FRONT OR BACK OF THE AIR HANDLER.



DO NOT POSITION THE AIR HANDLER ON ITS BACK OR WITH IT FACE DOWN. DO NOT CUT SIDES OF HORIZONTAL APPLICATION.

ST-A1242-02-X0

3.3 SUSPENDED CABINET INSTALLATION

If the cabinet cannot be supported on a frame or supported from the wall, it may be suspended.

Use metal strapping or threaded rod with angle iron supports under cabinet for support. These supports MUST run parallel with the length of the cabinet.

Ensure that there is adequate room to remove service and access panels after installing supporting brackets.

If an auxiliary drain pan is required, the support is to be placed under a drain pan.

⚠ WARNING

IT IS THE INSTALLER'S RESPONSIBILITY TO USE AN APPROPRIATE HANGING METHOD CAPABLE OF SUPPORTING THE UNIT'S WEIGHT. REFER TO THE SPECIFICATION SECTION OF THIS DOCUMENT FOR THE RESPECTIVE UNIT'S INSTALLED WEIGHTS.

NOTICE

FOR SEISMIC HANGING REQUIREMENTS, REFER TO LOCAL CODES.

Attachment Methods Using Straps

Method 1

Use (4) #8 x 3/4 sheet metal screws for each strap. The straps should be vertical against the air handler sides and not pull away from the air handler sides.

Method 2

Fold all straps under the air handler and secure with (4) #8 x 3/4 sheet metal screws (2 screws at the side and 2 screws at the bottom. (Care must be taken not to drive the screw through the coil.)

FIGURE 8
HORIZONTAL UNIT SUSPENSION

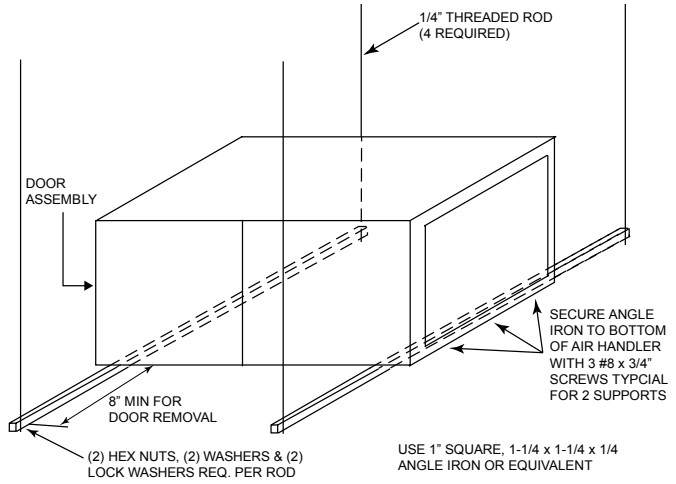
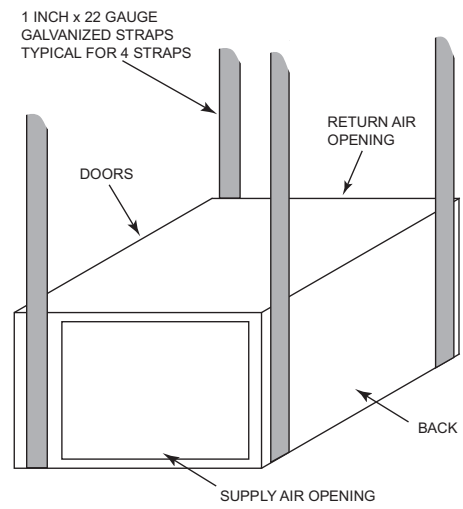


FIGURE 9
HORIZONTAL UNIT SUSPENSION WITH STRAPS



3.4 DUCTING

Proper air flow is required for the correct operation of this air handler. Too little air flow can cause erratic operation and can damage the heat exchanger. The duct system must carry the correct amount of air for heating and cooling if summer air conditioning is used.

Size the ducts according to acceptable industry standards and methods. The total static pressure drop of the air distribution system including filters should not exceed 0.8" w.c.

NOTE: Return air grilles and warm air registers must not be obstructed.

IMPORTANT: When using outside air, design and adjust the system to maintain a return air temperature ABOVE 50° F during the heating season.

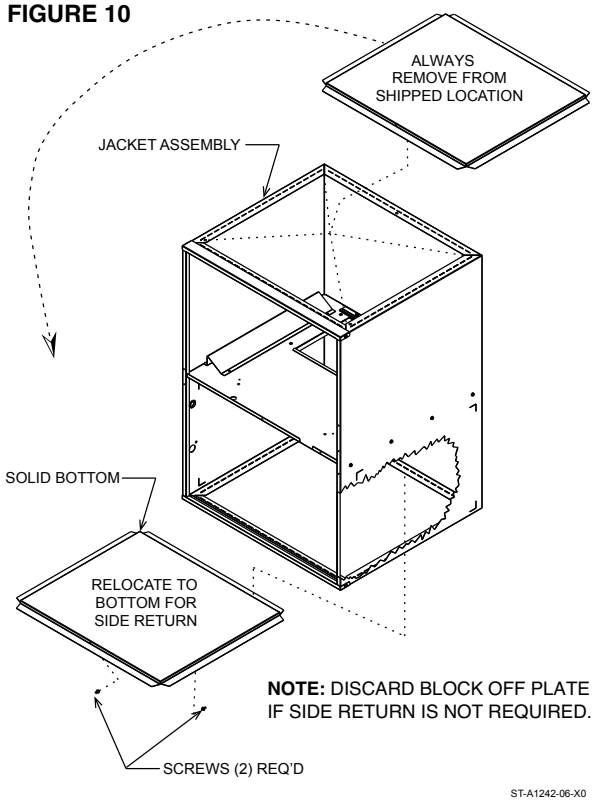
3.4.1 UPFLOW APPLICATIONS

1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.
2. Open the return air compartment.
   a. Cut an opening in the side. The opening should be cut the full width of the knockouts on the unit. See Figure 11.

NOTE: Where the maximum air flow is 1800 CFM or more, both sides or the bottom must be used for return air.

3. Connect the return duct or return air cabinet to the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.
4. **Be sure to have adequate space for the unit filter.**

FIGURE 10



NOTE: DO NOT take return air from bathrooms, kitchens, air handler rooms, garages, utility or laundry rooms, or cold areas.

NOTE: DO NOT use a rear air return.

5. If summer air conditioning (heat pump) is desired, position the indoor coil on the top of the unit. Insure that no air can bypass this coil.
6. Connect the supply air plenum to the air handler plenum opening.

3.4.2 HORIZONTAL APPLICATIONS

1. Position the unit to minimize long runs or runs with many turns and elbows.
2. If summer air conditioning or heat pump is desired, position the indoor coil on the supply air end of the unit. Insure that no air can bypass this coil.
3. Connect the air handler to the supply air plenum.
4. Connect the return air ducting to the return air opening of the unit. Make the connection air tight to prevent pulling combustion gases from an adjacent fuel-burning appliance.
5. **Be sure to have adequate space for the unit filter.**

   NOTE: DO NOT take return air from bathrooms, kitchens, air handler rooms, garages, utility or laundry rooms, or cold areas.

3.4.3 DOWNFLOW APPLICATIONS

1. Position the unit to minimize long runs of duct or runs of duct with many turns and elbows.
2. If summer air conditioning is desired, position the indoor coil on the supply air side of the unit. Insure that no air can bypass this coil.
3. Connect the furnace to the supply air plenum.
4. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.
5. Be sure to have adequate space for the unit filter.

   NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

FIGURE 11
SIDE RETURN

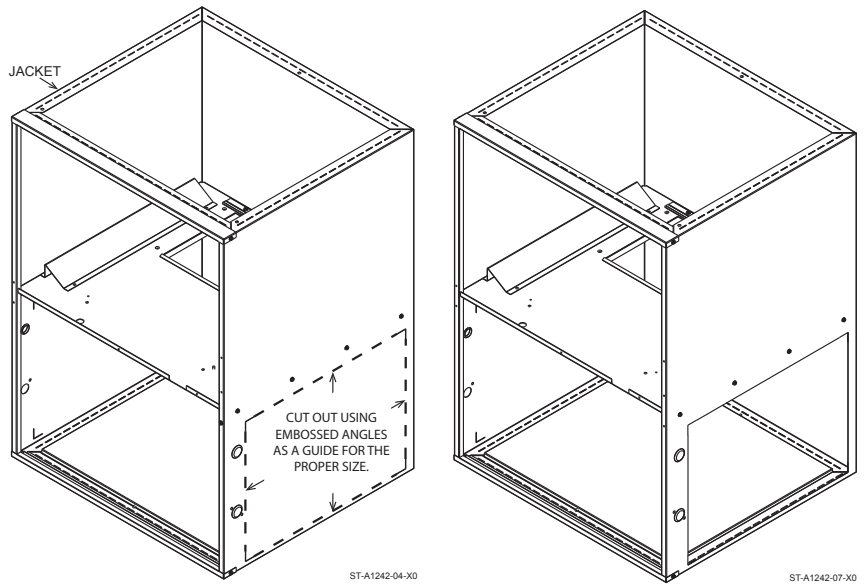
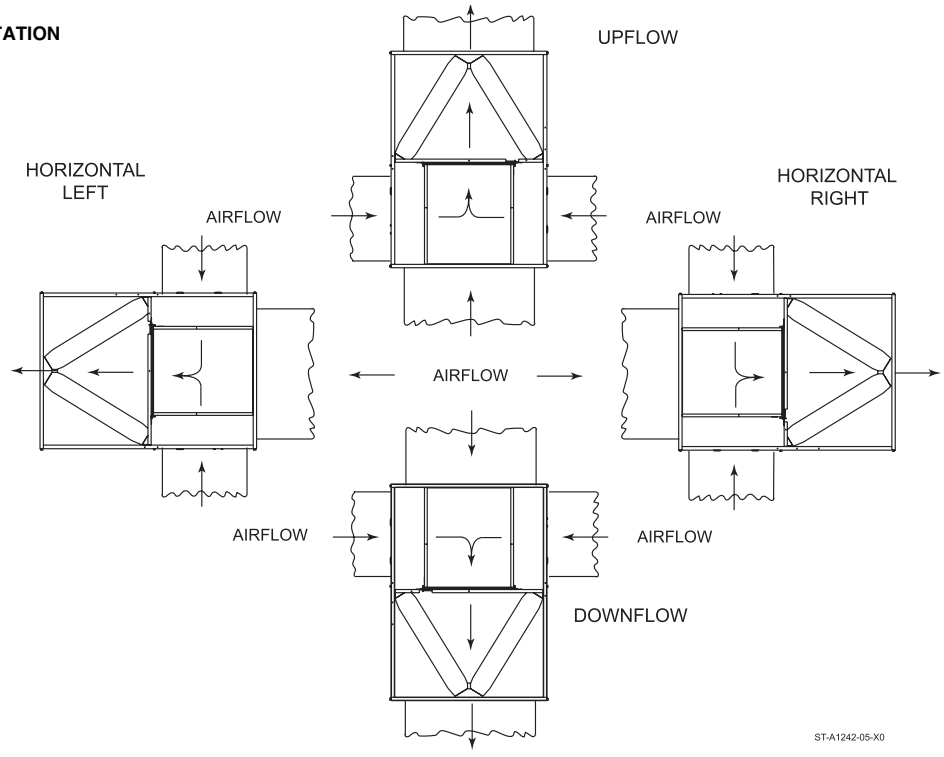


FIGURE 12
POSITION ORIENTATION



3.5 PLUMBING

Codes:

The RW1T air handler is used in potable water systems. Therefore, it is important to observe all local sanitary codes when installing water lines. The water supply mating connection to the Hydronic Air Handler is made via the two 3/4 in. dia. copper stubs labeled “WATER IN” and “WATER OUT” (see Figure 3).

All associated hydronic piping MUST comply with ICC, UPC and any other local codes or ordinances having jurisdiction. USE POTABLE GRADE COPPER PIPING AND BRASS APPURTENANCES ONLY.

Soldering Copper Tubing:

The common method of joining copper tubing in hydronic heating systems is soft soldering. Plumbing codes do not allow solders containing lead to be used for domestic water service. USE ONLY 95/5 tin/antimony solder for all piping systems that incorporate a domestic water supply.

NOTE: Precautions must be taken during soldering to avoid debris or solder from lodging in piping system.

Water Storage Tank:

When connecting directly to a water storage tank it is necessary to ensure the water flow rate does not become excessive. Excessive water flow can result in increased system noise and potential system damage. In order to regulate the flow it is required that an adjustable valve be placed between the air handler outlet and the storage tank Rheem Accessory HC. Furthermore, two pressure taps will need to be installed, the first located between the air handler outlet and the adjustable valve as near as possible to the outlet, and the second on the inlet water attached as near as possible to the inlet. While the water pump is engaged the adjustable valve will be closed until the pressure difference between the outlet and the inlet is greater than 13.5 PSID.

Tubing Insulation:

Any tube-conveying fluid at a temperature greater than that of the surrounding air releases heat.

Insulate all accessible hot water lines and associated valves with material, such as expanded neoprene or polyurethane 3/8-in. to 1⁄2-in. thick.

Match the pipe sleeve’s inside diameter to the pipe’s outside diameter for a snug fit. Place the pipe sleeve so the seam will be face down on the pipe. Tape, wire, or clamp insulation every foot or two to secure it to the pipe. If taping is desired, use acrylic tape instead of duct tape.

Copper Tubing Support:

Copper tubing must be properly supported to prevent sagging or buckling. On horizontal runs with hard temper tubing, the following maximum support spacing is suggested:

- 1/2 in. to 3/4 in. tube: 5 feet maximum spacing
- 1 in. to 1-1/4 in. tube: 6 feet maximum spacing

The above suggested spacing does not account for extra weight of piping components such as an expansion tank, etc. When such components are present, the piping should be supported immediately adjacent to the component.

On vertical runs, copper tubing should be supported at each floor level or at a maximum of every 10 feet.

Thermal Expansion of Piping:

In all hydronic systems, piping undergoes temperature swings as the system operates. This causes changes in the length of the piping due to thermal expansion.

If the piping is rigidly mounted, this expansion can cause annoying popping or squeaking sounds and, in extreme cases, the piping can even buckle.

To counter expansion movement, design piping circuits with sufficient elbows, tees or expansion loops (only used in large systems) or piping supports that allow the tubing to expand and contract freely.

Another alternative is to install an expansion compensator fitting capable of absorbing the movement.

Hydronic Resistance of Fittings, Valves, and Other Devices:

Before the total hydronic resistance of a piping circuit can be found, the individual hydronic resistances of all fittings, valves, or other such components must be determined. One approach is to consider each fitting, valve, or other device as an equivalent length of copper tube of the same pipe size (see Table 1).

By using the equivalent length of piping for all components in the circuit, the circuit can be treated as if it were a single piece of pipe having a length equal to the sum of the actual pipe length, the total equivalent lengths of all fittings, valves, or other devices. Refer to Figure 9 and the calculation of equivalent lengths.

Pipe Sizing Considerations:

When selecting a pipe size for a given flow rate, the resulting average flow velocity should be between 2 and 4 feet per second.

At water flow velocities of approximately 2 feet per second, flowing water will carry air bubbles along a vertical pipe. Average flow velocities of 2 feet per second or higher can draw along air bubbles in a downward flow. At the above stated velocities air bubbles shall be routed to an air separator where they can be collected and discharged from the system. Use Taco 4900 series air separator, Model 49-075, or equivalent (field supplied).

Average flow velocities higher than 4 feet per second could cause flow noise and should be avoided.

Expansion Tank:

All liquids used in hydronic heating systems expand when heated. For all practical purposes, liquids are incompressible. Any container completely filled with a liquid and sealed from the atmosphere will experience a rapid increase in pressure as the liquid is heated.

To prevent this from occurring, all closed-loop hydronic systems MUST be equipped with an expansion tank. Refer to expansion tank manufacturer’s instructions for proper sizing and installation.

Water circulation:

The hydronic air handler has a strict in press cycle which will circulate the water in the coil for 6 minutes per day to prevent water stagnation.

PROCEDURE FOR CALCULATING THE TOTAL EQUIVALENT LENGTH OF PIPE

Given piping assembly as shown in Figure 13 below, what is the total equivalent length of the system?

First determine the total straight pipe lengths; next refer to Table 1 to determine the equivalent straight pipe length for each fitting shown. Add together the equivalent lengths of piping and fittings.

(3/4") Tubing 24 ft.

7 (3/4") 90 deg. Elbows 7 (1.9) = 13.3 ft.

5 (3/4") Side Port Tees 5 (3.8) = 19.0 ft.

1 (3/4") Taco air separator = .3 ft.
2 (3/4") Ball Valve 2 (.2) = .4 ft.

Total Equivalent Length . . . . . = 57 ft.

NOTICE

WHERE POSSIBLE THE LENGTH OF PIPE SHOULD NOT EXCEED 100 FEET TOTAL EQUIVALENT LENGTH.

ANY PIPING RUNNING THROUGH UNCONDITIONED SPACE MUST BE INSULATED TO PREVENT HEAT LOSS, AND POSSIBLE FREEZING OF THE LINE.

STICKERS INDICATING DIRECTION OF FLOW (WATER IN AND WATER OUT) ARE LABELED ON THE OUTSIDE OF THE CABINET. DO NOT REVERSE THESE LINES, AS THIS WILL CAUSE THE UNIT TO MALFUNCTION.

Piping Configuration

When employing a Tankless Water Heater in a hydronic system, the system is considered an open-loop system when configured to simultaneously deliver both domestic hot water and space heating. By definition, if the circuit is sealed off from the atmosphere at all locations (as is true for most modern hydronic systems), it is called a **closed-loop system**. If the circuit is open to the atmosphere at *any point*, it is called an **open-loop system**.

FIGURE 13
EQUIVALENT LENGTH CALCULATION

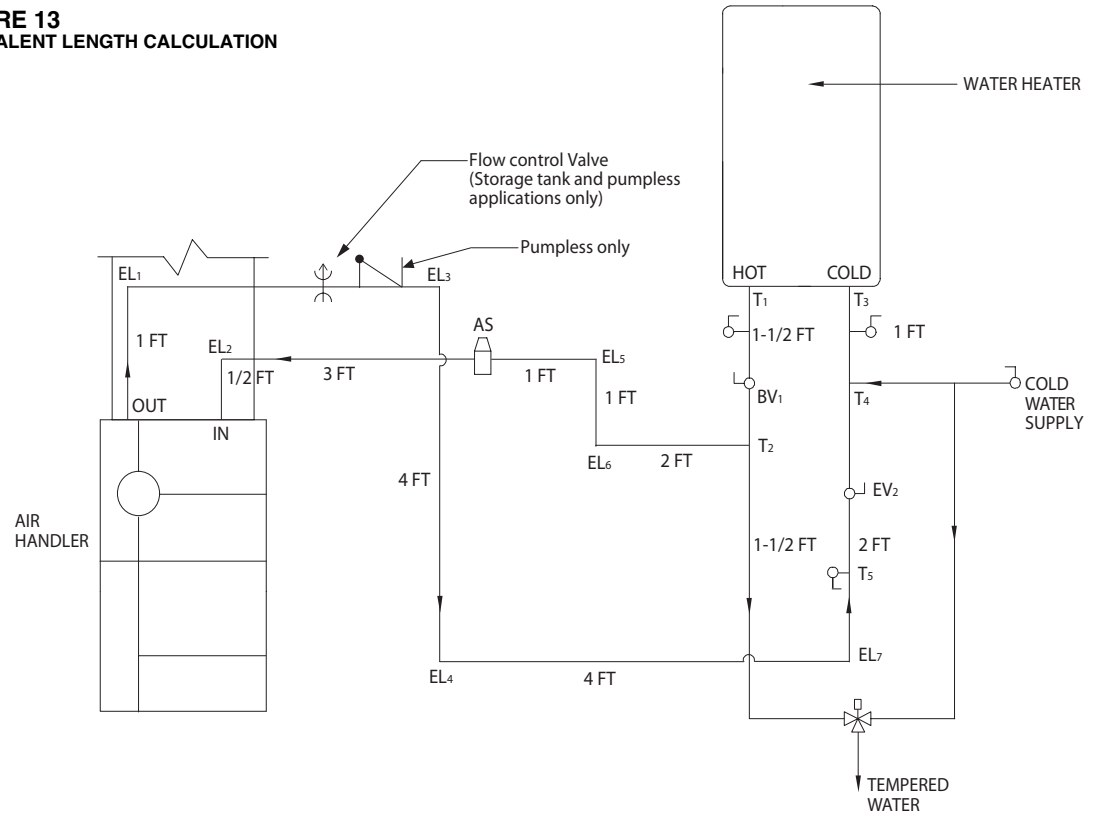


Table 1 – Equivalent Length of Straight Pipe for Valves and Fittings (ft)

	Diameter (in.)					
	0.375	0.5	0.75	1	1.25	1.5
Globe Valve	14.1	18.8	28.1	37.5	46.9	56.3
Angle Valve	6.3	8.3	12.5	16.7	20.8	25.0
Gate Valve	0.5	0.7	1.1	1.4	1.8	2.1
Ball Valve (BV)	0.1	0.1	0.2	0.3	0.3	0.4
90 Degree Standard Elbow	0.9	1.3	1.9	2.5	3.1	3.8
45 Degree Standard Elbow	0.5	0.7	1.0	1.3	1.7	2.0
Standard Tee with flow through run	0.6	0.8	1.3	1.7	2.1	2.5
Standard Tee with flow through branch	1.9	2.5	3.8	5.0	6.3	7.5

*Optional for pump only and storage tank water heaters.

Open-Loop System

If piping is done in accordance with the recommended schematic diagram shown in Figure 13, the following purge and priming procedure applies.

PURGING AND PRIMING THE SYSTEM:

The following procedure describes how the system may be piped to eliminate the need for a “purge cart” to fill the system and remove entrapped air bubbles.

STEP 1: CLOSE the air separator venting valve.

STEP 2: CLOSE ball valve 3 (BV_3);

STEP 3: OPEN drain valve 3 (DV_3) to which a hose MUST be connected and draining to a sink, drain or outdoors.

STEP 4: CLOSE drain valves 1 & 2 (DV_1 and DV_2) and OPEN ball valve 2 (BV_2).

STEP 5: OPEN cold water supply main valve (ball valve 1 - BV_1). The system will begin the prime/purge process using the street pressure. Entrapped air bubbles being pushed out of the system will be evident by a slight vibration of the discharge hose connected to drain valve 3 (DV_3). The hose will stop vibrating when laminar flow is achieved.

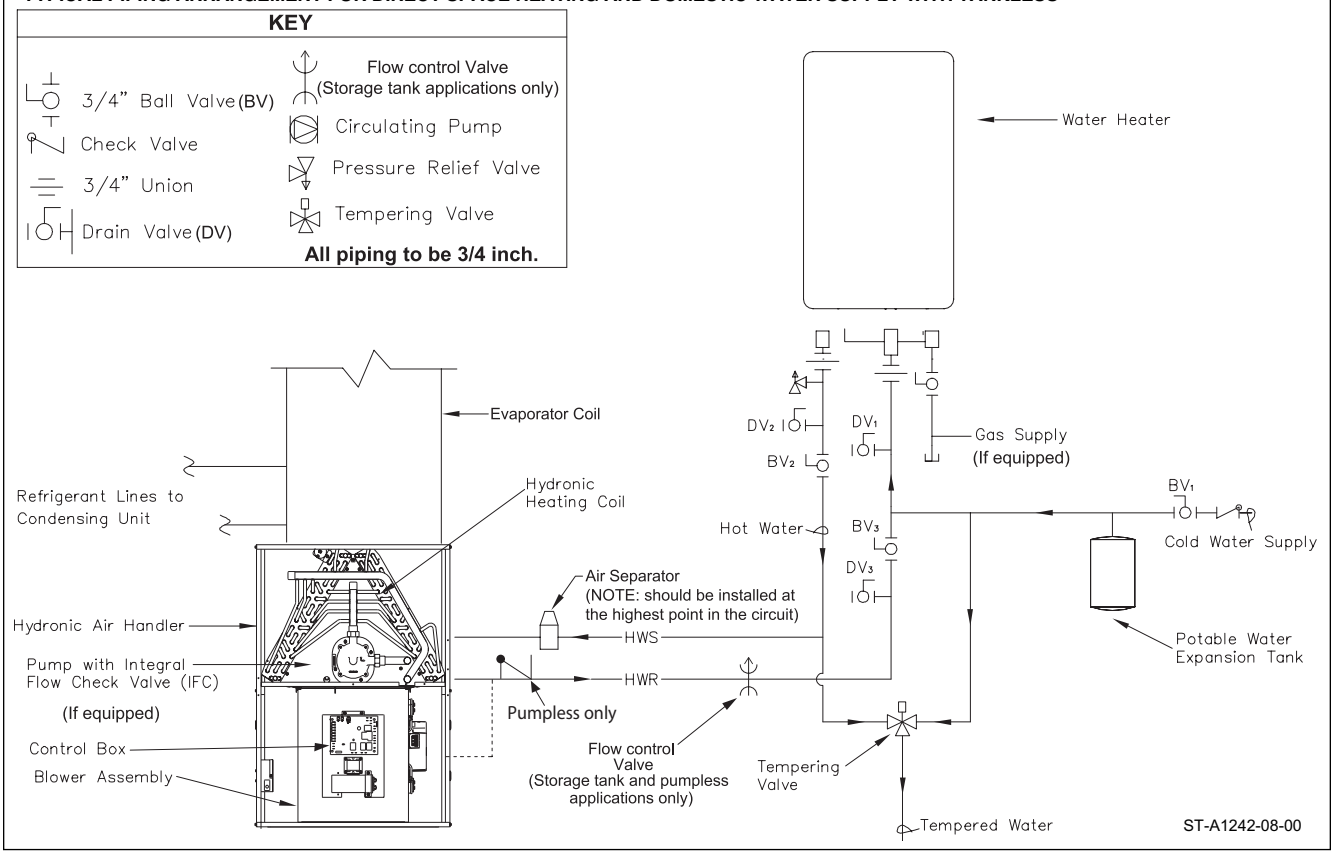
STEP 6: CLOSE drain valve 3 (DV_3);

STEP 7: OPEN ball valve 3 (BV_3). The system is now purged, primed and ready to go.

STEP 8: OPEN the air separator venting valve.

NOTE: For an open-loop system, use expansion tank approved for potable water use only.

FIGURE 14
TYPICAL PIPING ARRANGEMENT FOR DIRECT SPACE HEATING AND DOMESTIC WATER SUPPLY WITH TANKLESS



3.6 RETURN AIR FILTER

An internal filter rack is not provided with this unit. Therefore, an external means of filtering the return air is required. External filters should be sized for a maximum of 300 feet/min air velocity or the maximum velocity recommended by the type of filter installed. One or more return air filter grilles, a filter rack attached to unit return air intake, or a filter rack installed between a sealed return air platform and the return duct are all acceptable means of filtration. All return ducts must be filtered, either at each return grille or at a common filter near the unit.

Important: Do not install a return air filter grille **and** a filter rack at the unit and do not install a filter in the supply duct system.

Filter type, sizing, and placement are critical to heating and cooling system performance. Reduced air-flow can shorten the life of system components such as the compressor, indoor coil, heater elements, over temperature limits, and relays. As filters near the end of their useful life, the pressure drop through them increases. Therefore, it is important to factor the “end of life” (dirty) pressure drop filters the external static pressure of the duct system when selecting blower speeds and designing ductwork to assure the system is operating at the design CFM and system reliability is not compromised. Always verify that the system’s air-flow is within specifications by performing a temperature rise (heating mode) and temperature drop (cooling mode) with all filters in place.

Important: High efficiency pleated filters and electronic air cleaners typically have significantly higher pressure drop than standard efficiency fiberglass filters, especially when they get dirty. Do not use high efficiency filters or electronic air cleaners unless adequate filter area is provided to lower the filter pressure drop to an acceptable level.

3.7 AUXILIARY OVERFLOW PAN

If an indoor coil is installed with this air-handler and it located in any area of a structure where damage to the building or building contents may occur as a result of an overflow of the coil drain pan or a stoppage in the primary condensate drain piping, local building codes require the installation of an auxiliary overflow pan under the equipment.

3.8 ELECTRICAL WIRING AND THERMOSTAT

⚠ WARNING

TURN OFF ELECTRIC POWER AT FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

THE CABINET MUST HAVE AN UNINTERRUPTED GROUND ACCORDING TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC), ANSI/ NFPA70- OR IN CANADA, THE CANADIAN ELECTRICAL CODE, CSA-C221 OR LOCAL CODES THAT APPLY. DO NOT USE GAS PIPING AS AN ELECTRICAL GROUND. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK, RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

THIS AIR HANDLER IS EQUIPPED WITH A BLOWER DOOR SAFETY SWITCH. DO NOT DISABLE THIS SWITCH. FAILURE TO FOLLOW THIS WARNING CAN RESULT IN ELECTRICAL SHOCK, PERSONAL INJURY OR DEATH.

IMPORTANT: The air handler must be installed so that the electrical components are protected from water (condensate).

Before proceeding with the electrical connections, be certain that the voltage, frequency and phase corresponds to that specified on the air handler rating plate. For single air handler application, maximum over-current protection is 15 amperes.

⚠ CAUTION

IF A DISCONNECT SWITCH IS TO BE MOUNTED ON THE UNIT, SELECT A LOCATION WHERE A DRILL OR FASTENER WILL NOT CONTACT ELECTRICAL OR HYDRONIC COMPONENTS. ELECTRICAL SHOCK CAN CAUSE PERSONAL INJURY OR DEATH.

NOTE: Prior to making any electrical connections, ensure that supply voltage, frequency, and phase are as specified on unit rating plate.

Check to ensure that the existing electrical service is adequate to handle the additional load imposed by the Hydronic Air Handler. Refer to unit wiring diagram for proper electrical connections.

All electrical connections MUST comply with NEC and any other local codes or ordinances having jurisdiction. USE COPPER WIRE ONLY. Provide separate branch electric circuit with field supplied disconnect switch.

Location of disconnect switch to be in clear site, accessible and in close proximity to the unit.

Correct polarity MUST be maintained for 115 V wiring. If polarity is incorrect, unit will NOT operate.

Use a separate fused branch electrical circuit containing a properly sized fuse or circuit breaker. Run this circuit directly from the main switch box to an electrical disconnect that is readily accessible and located near the air handler. Connect from the electrical disconnect to the junction box on the left side of the air handler, inside the blower compartment. For the proper connection, refer to the appropriate wiring diagram located on the inside cover of the air handler control box and in these instructions.

The electrical junction box may be moved to the right side if necessary. A knockout is provided. Seal the opposite hole with plug provided.

Make all electrical connections in accordance with the latest edition of the National Electrical Code, ANSI/NFPA70 and local codes having jurisdiction.

These may be obtained from:

National Fire Protection
Association, Inc.
Batterymarch Park
Quincy, MA 02269

CSA - International
178 Rexdale Blvd.
Etobicoke (Toronto), Ontario
Canada M9W, 1R3

THERMOSTAT

The room thermostat must be compatible with the electronic air handler control on the air handler. Generally, all thermostats that are not of the “current robbing” type are compatible with the integrated air handler control. The low voltage wiring should be sized as shown (see Figures 15 and 18, 16 and 19).

NOTE: Do not use 24 volt control wiring smaller than No. 18 AWG.

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat.
Run the thermostat lead wires inside the blower compartment and connect to low voltage terminals as shown on the wiring diagram. Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers. Refer to instructions packed with the thermostat for “heater” selection or adjustment.

FIGURE 15
FIELD WIRING DIAGRAM
(-)W1P/(-)W1T
(-)WMV (NON-MODULATING CAPACITY)

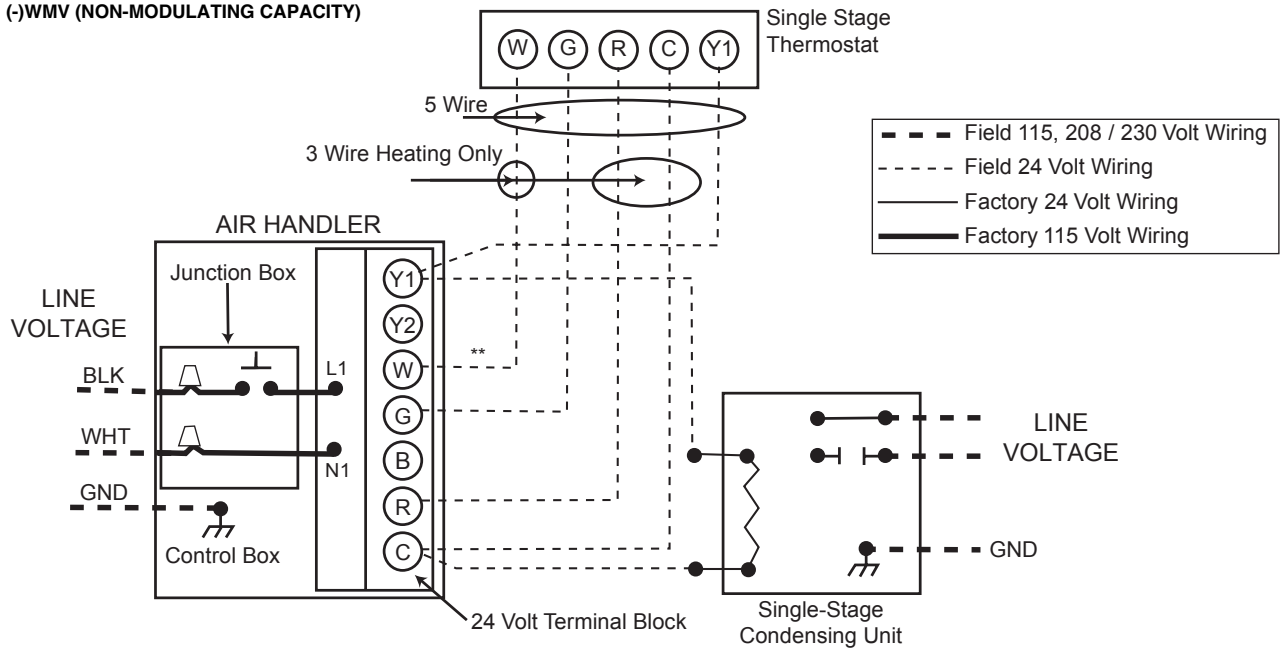


FIGURE 16
THERMOSTAT WIRING DIAGRAMS
(-)W1P/(-)W1T/(-)WMV AIR HANDLER W/SINGLE STAGE A/C

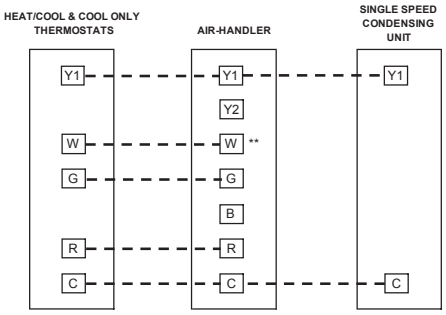
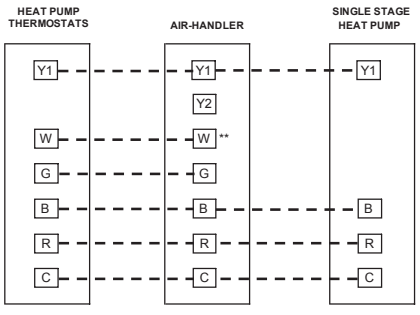


FIGURE 17
THERMOSTAT WIRING DIAGRAMS
(-)W1P/(-)W1T/(-)WMV AIR HANDLER W/SINGLE STAGE HEAT PUMP*



*Requires Fossil Fuel Kit.
Refer to Kit for further wiring instructions.
**W1 for (-)WMV

FIGURE 18
FIELD WIRING DIAGRAM
(-)WMV MODULATING CAPACITY

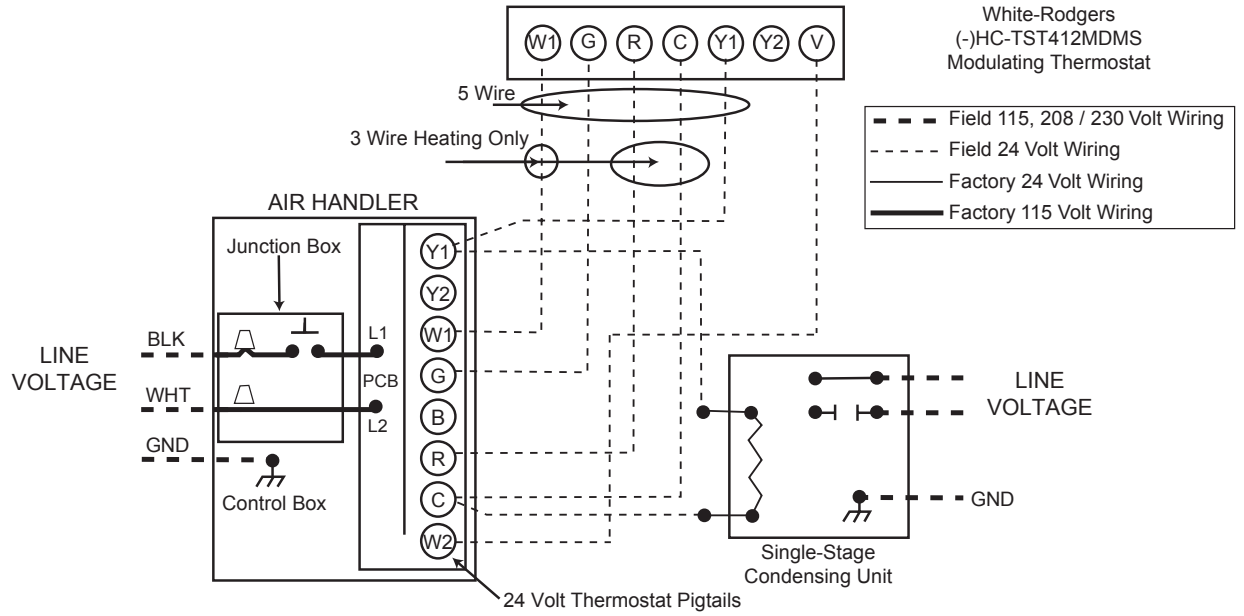
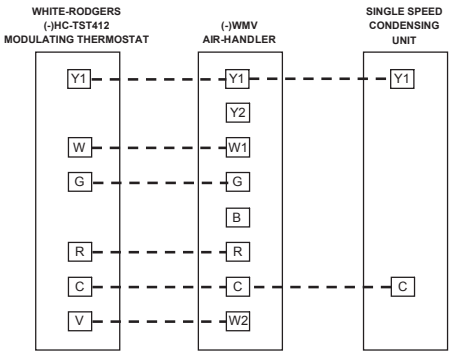


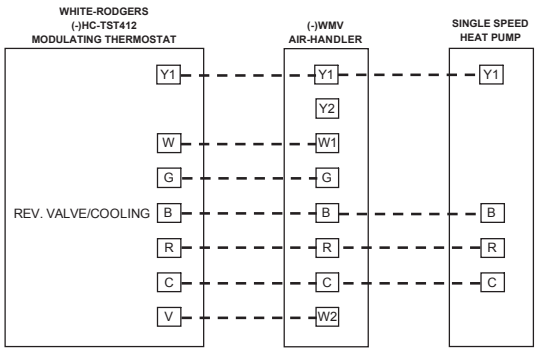
FIGURE 19
THERMOSTAT WIRING DIAGRAMS
MODULATING AIR HANDLER W/SINGLE STAGE A/C*



NOTE: The White-Rodgers (-)HC-TST412 thermostat is required if capacity modulation from 40%-100% based on demand is desired.

*Configure modulating thermostat for single stage cooling and gas heat (SS1, GAS)

FIGURE 20
THERMOSTAT WIRING DIAGRAMS
HANDLER W/SINGLE STAGE HEAT PUMP**



**Configure 412 modulating thermostat for dual fuel (HP1, GAS)

System Low Voltage Wiring Diagrams

NOTE: Local codes may require thermostat wiring to be routed through conduit or raceways. In such instances splices can be made inside the Hydronic Air Handler. All wiring must be NEC Class I and must be separated from incoming power leads.

Provide field-supplied disconnect for maximum fuse or circuit breaker sizes, as required by code.

Transformer is factory wired for 115V operation.

The secondary circuit of the transformer is protected by a 3-amp fuse mounted on the printed circuit board.

THERMOSTAT INSTALLATION:

Thermostat should be mounted:

- approximately 5 ft. (1.5 m) from floor .
- close to or in a frequently used room, preferably on an inside, partitioning wall.
- on a section of wall without pipes or duct work.

Thermostat should NOT be mounted:

- close to a window, on an outside wall, or next to a door leading to the outside.
- exposed to direct light and heat from a lamp, sun, fireplace, or other heat-radiating object which may cause a false reading.
- close to or in direct airflow from supply registers and return-air grilles.
- In areas with poor air circulation, such as behind a door or in an alcove.

Refer to thermostat wiring diagram and thermostat installation instructions for further details.

TABLE 2

Wire Gauge	Maximum Distance (ft)
18 gauge	60
16 gauge	100
14 gauge	160
12 gauge	250

3.9 AIR-FLOW AND BLOWER MOTOR SPEED SELECTION

⚠ WARNING

DISCONNECT THE ELECTRICAL SUPPLY TO THE AIR HANDLER BEFORE ATTEMPTING TO CHANGE THE BLOWER SPEED. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

The (-)W1P, (-)W1T, and (-)WMV air-handlers must be configured in the field to assure proper air-flow is delivered for the particular application it is being used in. The following 2 sections provide details on how to make speed tap or DIP switch selections to suit the application.

IMPORTANT: The pressure drop through the required external filter and indoor coil is not included in the external static pressure shown in the (-)W1P and (-)W1T air-flow performance tables. The filter and coil pressure drops must be added to the duct system pressure drop to determine total external static pressure. Filter pressure drop increases as the filter becomes dirty and must be considered when calculating worst case external static pressure. Refer to the filter and coil specifications for pressure drop data. (-)WMV are equipped with constant CFM motors that automatically compensate for changes in external static pressure as long as the motor torque limit is not exceeded which occurs at approximately 1.0” W.C. total external static pressure (duct system + return air filter + indoor coil) at the maximum air-flow setting.

3.9.1 (-)W1P/(-)W1T MOTOR SPEED SELECTION

(-)W1P and (-)W1T models have 4 available blower motor speed taps (low, med-low, med-high, high). These models are shipped for high speed operation in the and cooling/heat pump heating mode (black motor lead connected to COOL_HI terminal on the control board) and med-high speed for the hydronic heating mode (blue motor lead connected to HEAT terminal on the control board). The unused low (red) and med-low (yellow) motor leads are connected to the M1 and M2 park terminals on the control board. If the factory speed selections are not suitable for the applications, reposition the motor leads as needed to provide the correct air-flow level for the application. Refer to Table 2 for air-flow performance data for each model. Reconnect the unused motor leads to the M1 and M2 park terminals to prevent them from shorting against a grounded surface.

IMPORTANT

- The hydronic heating speed must not be reduced to the point that the heating temperature rise exceeds the maximum outlet air temperature specified in the Electrical Physical Specifications in Section 2.5 of this manual.
- The AC/HP DIP switch on the control board must be switched to the HP mode for heat pump applications. Also, a fossil fuel kit or a dual fuel enabled thermostat is required for heat pump systems. Otherwise, simultaneous operation of the hydronic heat and compressor will result in excessive compressor head pressures and the high pressure switch tripping and system lock-out.

3.9.2 (-)W1P/(-)W1T AIR-FLOW PERFORMANCE TABLES

(-)W1T HYDRONIC AIR HANDLER AIR FLOW PERFORMANCE - ECHO TECH MODELS

Model	Blower Size in [mm]	Motor HP [Watt]	Blower Speed	CFM [L/s] Air Delivery External Static Pressure Inches Water Column [kPa]																	
				0.1	[.02]	0.2	[.05]	0.3	[.07]	0.4	[.10]	0.5	[.12]	0.6	[.15]	0.7	[.17]	0.8	[.19]	0.9	[.22
RW1T04A2414NAA	10 x 6 [254 x 152]	1/3 [248]	Low	686	[324]	634	[299]	582	[275]	530	[250]	-		-		-		-		-	
			Med-low	723	[341]	688	[325]	617	[291]	567	[268]	512	[242]	459	[217]	-		-		-	
			Med	748	[353]	697	[329]	648	[306]	597	[282]	548	[259]	491	[232]	445	[210]	-		-	
			Med-high	922	[435]	885	[418]	849	[401]	811	[383]	775	[366]	733	[346]	695	[328]	644	[304]	645	[304]
			High	940	[444]	917	[433]	875	[413]	838	[395]	799	[377]	760	[359]	716	[338]	673	[318]	628	[296]
RW1T06A3617NAA	10 x 8 [254 x 203]	1/2 [373]	Low	646	[305]	582	[275]	517	[244]	436	[206]	-		-		-		-		-	
			Med-low	984	[464]	937	[442]	894	[422]	846	[399]	798	[377]	757	[357]	710	[335]	-		-	
			Med	1037	[489]	995	[470]	953	[450]	910	[429]	868	[410]	821	[387]	781	[369]	737	[348]	-	
			Med-high	1161	[548]	1020	[481]	1078	[509]	1040	[491]	999	[471]	963	[454]	920	[434]	873	[412]	753	[355]
			High	1397	[659]	1354	[639]	1321	[623]	1279	[604]	1238	[584]	1193	[563]	1157	[546]	1068	[504]	956	[451]
RW1T08A4821NAA	10 x 10 [254 x 254]	3/4 [559]	Low	815	[385]	765	[361]	715	[337]	665	[314]	614	[290]	558	[263]	514	[243]	-		-	
			Med-low	1284	[606]	1233	[582]	1178	[556]	1129	[533]	1070	[505]	999	[471]	927	[437]	876	[413]	823	[388]
			Med	1419	[670]	1373	[648]	1323	[624]	1282	[605]	1228	[580]	1180	[557]	1129	[533]	1054	[497]	981	[463]
			Med-high	1485	[701]	1452	[685]	1418	[669]	1386	[654]	1346	[635]	1313	[620]	1272	[600]	1222	[577]	1195	[564]
			High	1745	[824]	1722	[813]	1692	[799]	1664	[785]	1630	[769]	1599	[755]	1566	[739]	1504	[710]	1356	[640]
RW1T10A6024NAA	11 x 11 [279 x 279]	3/4 [559]	Low	1044	[493]	953	[450]	867	[409]	767	[362]	667	[315]	579	[273]	501	[236]	-		-	
			Med-low	1010	[477]	970	[458]	936	[442]	902	[426]	867	[409]	832	[393]	798	[377]	766	[362]	725	[342]
			Med	1247	[589]	1183	[558]	1121	[529]	1064	[502]	999	[471]	933	[440]	864	[408]	797	[376]	735	[347]
			Med-high	1834	[866]	1768	[834]	1697	[801]	1639	[774]	1585	[748]	1539	[726]	1478	[698]	1427	[673]	1370	[647]
			High	2008	[948]	1956	[923]	1905	[899]	1844	[870]	1802	[850]	1750	[826]	1698	[801]	1655	[781]	1604	[757]

Blower performance measured without filter in place

(-)W1P HYDRONIC AIR HANDLER AIR FLOW PERFORMANCE -PSC MODELS

Model	Blower Size in [mm]	Motor HP [Watt]	Blower Speed	CFM [L/s] Air Delivery External Static Pressure Inches Water Column [kPa]																	
				0.1	[.02]	0.2	[.05]	0.3	[.07]	0.4	[.10]	0.5	[.12]	0.6	[.15]	0.7	[.17]	0.8	[.17]	0.9	[.22]
RW1P04A2414NAA	10 x 6 [254 x 152]	1/5 [93]	Low	642	[339]	612	[322]	591	[311]	524	[273]	—		—		—		—		—	
			Med-low	711	[377]	684	[362	655	[346]	624	[329]	578	[303]	526	[274]	—		—		—	
			Med-high	890	[477]	853	[456]	821	[438]	786	[419]	744	[396]	694	[368]	633	[334]	549	[287]	—	
			High	950	[510]	917	[492]	880	[471]	843	[451]	803	[428]	752	[400]	689	[365]	690	[366]	604	[318]
RW1P06A3617NAA	10 x 8 [254 x 203]	1/2 [373]	Low	900	[482]	882	[472]	865	[463]	843	[451]	806	[430]	759	[404]	687	[364]	617	[325]	—	
			Med-low	1135	[613]	1101	[594]	1073	[578]	1050	[566]	1012	[544]	960	[516]	889	[476]	801	[427]	700	[371]
			Med-high	1260	[682]	1231	[666]	1199	[648]	1154	[623]	1113	[601]	1060	[571]	978	[526]	895	[479]	767	[408]
			High	1397	[758]	1363	[739]	1314	[712]	1268	[687]	1209	[654]	1148	[620]	1077	[581]	980	[527]	829	[443]
RW1P08A4821NAA	10 x 10 [254 x 254]	1/2 [373]	Low	947	[508]	943	[506]	940	[504]	926	[497]	897	[481]	857	[458]	784	[418]	711	[377]	—	
			Med-low	1200	[649]	1193	[645]	1183	[639]	1163	[628]	1137	[614]	1084	[584]	1025	[552]	917	[492]	769	[409]
			Med-high	1493	[812]	1481	[805]	1452	[789]	1411	[766]	1365	[741]	1220	[660]	1124	[607]	957	[514]	—	
			High	1865	[1018]	1810	[988]	1737	[947]	1671	[911]	1608	[876]	1533	[834]	1457	[792]	1292	[700]	1135	[613]
RW1P10A4821NAA	11 x 11 [279 x 279]	3/4 [559]	Low	904	[484]	875	[468]	845	[452]	798	[426]	735	[391]	688	[364]	643	[339]	593	[312]	539	[282]
			Med-low	1189	[643]	1165	[629]	1114	[601]	1092	[589]	1057	[569]	1005	[541]	947	[508]	879	[471]	821	[438]
			Med-high	1326	[719]	1304	[707]	1286	[697]	1266	[686]	1244	[673]	1217	[658]	1189	[643]	1140	[616]	1060	[571]
			High	1970	[1077]	1951	[1066]	1937	[1058]	1926	[1052]	1895	[1035]	1865	[1018]	1759	[959]	1673	[912]	1624	[884]

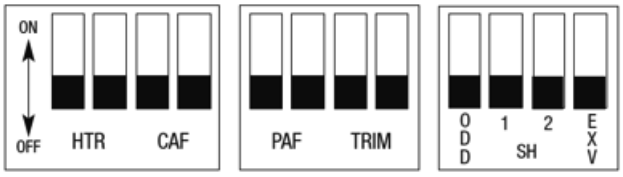
Blower performance measured without filter in place

3.9.3 (-)WMV AIR-FLOW CONFIGURATION

(-)WMV models are equipped with a communicating variable speed ECM motor that is controlled by the air-handler control board. A memory card is connected to the control board that has the model data and motor operating parameters for that particular model. DIP switches are provided on the control board that are used to select a specific CFM [L/s] for the cooling, heat pump heating, and hydronic heating modes. DIP switches are available for making +/-10% trim adjustments to the cooling air-flow level should that be necessary for the application. A DIP switch is available to activate “On-Demand Cooling Dehumidification” should additional dehumidification be required. The following sections provide details on how to configure the DIP switches to suit specific applications. Figure 20 shows the available DIP switch functions on the control board.

FIGURE 21
(-)HMV DIP SWITCH FUNCTIONS

Switch	Function
HTR (pair)	Hydronic Heat Air-Flow Settings
CAF (pair)	Cooling Air-Flow Settings
PAF (pair)	Heat Pump Heating Air-Flow Settings
TRIM (pair)	Cooling Air-Flow Trim Adjustment
ODD	On-Demand Dehumidification Selection
SH (pair)	Cooling Superheat Offset Settings (Not Used)
EXV	EXV Step Settings (Not Used)



All switches shipped from factory in OFF position as shown

3.9.4 (-)WMV COOLING AND HEATING AIR-FLOW DIP SWITCH SETTINGS

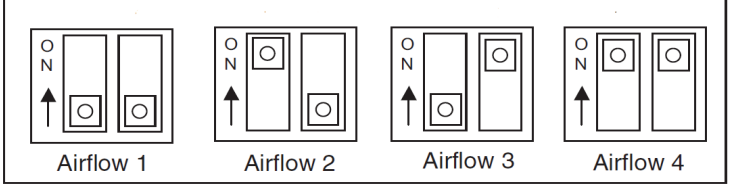
Refer to Table 3 below to select the proper cooling, heat pump heating, and hydronic heat air-flow settings for a specific application. The unit is shipped from the factory to deliver "Air-Flow 1" in the table for cooling, heat pump heating, and for hydronic heat. "Air-Flow 1" for hydronic heat is equal to the rated hydronic heat CFM [L/s] shown in the Electrical and Physical Specifications on page 7 of this manual.

TABLE 3

AIR-FLOW DIP SWITCH SETTINGS FOR (-)WMV Air-Handlers

Air-Handler Model	DIP Switch Setting (CAF & PAF)	Cooling or Heat Pump Heating Modes CFM [L/s]
(-)WMV04A2414	Air-Flow 1 *	800
(-)WMV04A2414	Air-Flow 2	600
(-)WMV04A2414	Air-Flow 3	800
(-)WMV04A2414	Air-Flow 4	600
(-)WMV06A3617	Air-Flow 1 *	1200
(-)WMV06A3617	Air-Flow 2	1000
(-)WMV06A3617	Air-Flow 3	800
(-)WMV06A3617	Air-Flow 4	600
(-)WMV08A4821	Air-Flow 1 *	1600
(-)WMV08A4821	Air-Flow 2	1400
(-)WMV08A4821	Air-Flow 3	1200
(-)WMV08A4821	Air-Flow 4	1000
(-)WMV10A6024	Air-Flow 1 *	1800
(-)WMV10A6024	Air-Flow 2	1600
(-)WMV10A6024	Air-Flow 3	1400
(-)WMV10A6024	Air-Flow 4	1200

Air-Handler Model	DIP Switch Setting (HTR)	Hydronic Heating Mode CFM [L/s]
(-)WMV04A2414	Air-Flow 1 *	800
(-)WMV04A2414	Air-Flow 2	600
(-)WMV04A2414	Air-Flow 3	800
(-)WMV04A2414	Air-Flow 4	600
(-)WMV06A3617	Air-Flow 1 *	1200
(-)WMV06A3617	Air-Flow 2	1000
(-)WMV06A3617	Air-Flow 3	1200
(-)WMV06A3617	Air-Flow 4	1000
(-)WMV08A4821	Air-Flow 1 *	1625
(-)WMV08A4821	Air-Flow 2	1400
(-)WMV08A4821	Air-Flow 3	1625
(-)WMV08A4821	Air-Flow 4	1400
(-)WMV10A6024	Air-Flow 1 *	1800
(-)WMV10A6024	Air-Flow 2	1600
(-)WMV10A6024	Air-Flow 3	1800
(-)WMV10A6024	Air-Flow 4	1600

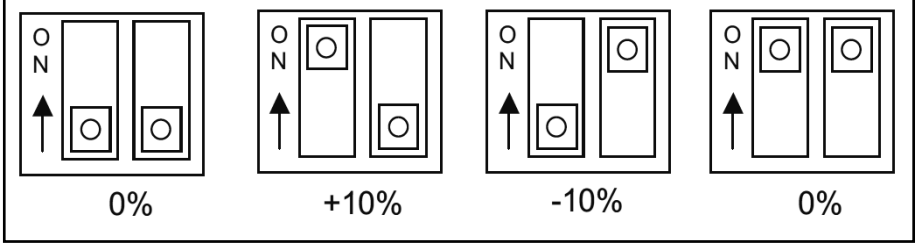


***Factory Setting is Air-Flow 1**

3.9.5 (-)WMV COOLING AIR-FLOW TRIM ADJUSTMENT

The TRIM DIP switches on the (-)WMV air-handler allow the installer to increase or decrease the cooling air-flow by 10% if the application can benefit from a small adjustment in air-flow. The unit is shipped from the factory with both of the TRIM DIP switches in the OFF position which is for 0% adjustment. Figure 22 shows the position of the DIP switches for each percentage TRIM adjustment setting.

FIGURE 22
COOLING TRIM ADJUSTMENT DIP SWITCH SETTINGS



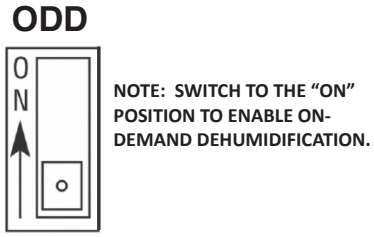
3.9.6 (-)WMV ON-DEMAND COOLING DEHUMIDIFICATION

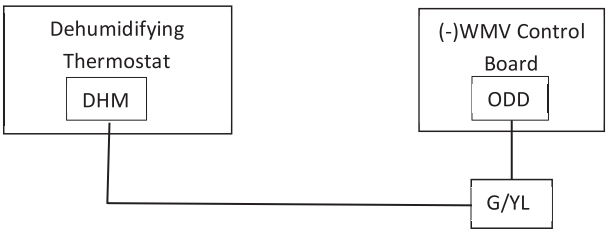
Switching the ODD DIP switch to the ON position enables the "On-Demand cooling Dehumidification" feature that reduces the cooling air-flow by 15% when the humidity in the conditioned space rises above the set point of a humidistat, thus increasing the ability of the cooling system to dehumidify the space. A dehumidifying thermostat or a humidistat must be used to control the system for this feature to work. When 24VAC is applied to the thermostat pigtail (Green/Yellow) that is connected to the ODD terminal on the (-)WMV control board, the air-handler delivers full air-flow. When there is no voltage applied to the ODD terminal, the cooling air-flow is reduced by 15%.

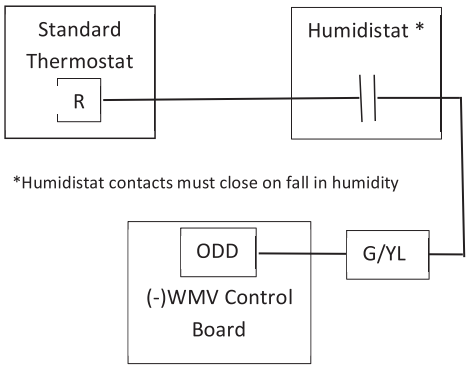
IMPORTANT: Moving the ODD DIP switch to the ON position without a dehumidifying thermostat or humidistat being properly wired into the control system will cause the cooling air-flow to always be reduced by 15% regardless of the indoor humidity. This must never be done.

A dehumidifying thermostat must be of the type that applies 24VAC to its DHM terminal as the humidity falls below the humidity set point. A wire must be connected from the DHM terminal of the thermostat to the Green/Yellow thermostat pigtail of the air-handler. If a separate humidistat is used, it must be of the type that closes its contacts as the humidity falls below the humidity set point. A wire from the R thermostat circuit must be connected to one side of the humidistat and another wire must be run from the other side of the humidistat to the Green/Yellow thermostat pigtail on the air-handler that is connected to the ODD terminal on the air-handler control board. The ODD DIP switch must be switched to the ON position for On-Demand Dehumidification to function. See wiring schematics at right.

FIGURE 23
ON-DEMAND DEHUMIDIFICATION DIP SWITCH







Normal Humidity (humidity BELOW the thermostat set point):

Normal Humidity	Result
A 24VAC signal is applied to the ODD terminal	Full rated airflow is delivered by the blower

High Humidity (humidity ABOVE the thermostat set point):

High Humidity	Result
No signal applied to the ODD terminal	Airflow is reduced by a preset amount to increase latent capacity

4.0 START-UP PROCEDURE

4.1 HYDRONIC HEATING

The following conditions must be met prior to unit start-up.

Debris from soldering and/or other installation activities can cause equipment failure. Ensure that all associated lines and appurtenances are free of debris.

Check to ensure that unit is secure.

Check that blower wheel rotates freely within the scroll housing.

Check all wiring to ensure that connections are tight.

Check all ductwork and pipe connections to ensure proper seal.

Check to ensure that all packaging wraps are removed from equipment.

Ensure that front access doors are properly installed.

Check to ensure proper connection(s) to the appropriate blower speed tap (RWIP/RWIT) or proper air-flow DIP switch settings are selected (RWMV). Refer to Dry Air Delivery Table and/or the appropriate wiring diagram(s) in this manual.

Perform all safety and start-up checks for Tankless Water Heater as per manufacturer's instructions.

Having verified all preceding checks, the Air Handler's Start-Up Procedure is as follows:

STEP 1: Purge and fill system; follow appropriate purging procedure as laid out in this manual in section titled "Purging and Priming the System".

STEP 2: Turn on power supply to air handler. Caution: blower and/or circulator may start to operate if thermostat is on and a call is present.

STEP 3: Turn thermostat ON and switch system to the heating mode. The thermostat shall be set higher than the actual room temperature; this will cause the circulator to energize and initiate the heating cycle. (If the pump does not start, or the Air Handler is not producing heat, refer to the Troubleshooting Section, in this manual).

STEP 4: Program room thermostat as desired by homeowner.

4.2 AC OR HEAT PUMP SYSTEM

Refer to field-supplied evaporator coil and outdoor unit manufacturer's Installation Instructions for system hook-up, start-up instructions and refrigerant-charging method details.

5.0 SEQUENCE OF OPERATION

5.1 COOLING MODE

When the thermostat calls for cooling, the G and Y1 terminals on the air-handler control board are energized which in turn energizes the indoor blower motor to operate on the cooling speed. This causes the indoor blower to circulate air through the air-handler and duct system during the cooling cycle. When the thermostat call is satisfied or turned to the off position. The G and Y1 terminals on the blower control board are de-energized. A blower off-delay programmed into the (-)W1P/(-)W1T control board keeps the blower motor energized for an additional 30 to extract the residual cooling from the cold indoor coil. The blower off-delay can be increased to 60, 90, or 120 seconds on the (-)W1P and (-)W1T models using DIP switches on the control board (See Figure 24). The blower off-delay is a fixed 45 seconds on (-)WMV models.

(-)W1P and (-)W1T models can be configured for 2-stage cooling air-flow by configuring the appropriate DIP switch settings on the control board (See Figure 24) and connecting the appropriate motor lead to the COOL_LO terminal on the control board. The (-)WMV is not currently configurable for 2-stage air-flow and delivers the same air-flow when Y1 or Y2 is energized.

5.2 HYDRONIC HEAT MODE: (-)W1P/(-)W1V

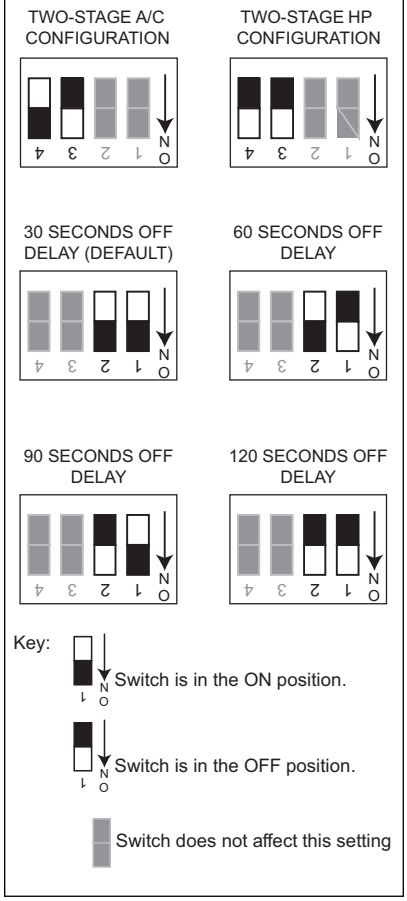
One a call for heating, the thermostat energizes the W terminal on the control board and the pump will start. If after a 60 second delay, the supply air temperature is sensing an air temperature greater than 85°F (29.4°C), the indoor blower will be energized on the heating speed for 30 seconds at which the supply temperature is again checked to confirm it is above 85°F (29.4°C). If the supply temperature is above 85°F (29.4°C), the unit will continue in the heating mode. If the sensed temperature is less than 85°F (29.4°C) in either case, the control will shut the pump off for a 5 minute delay before the process repeats.

There must always be a minimum of a 10°F (5.6°C) differential between the supply air temperature and return air temperature for the unit to remain in the heating mode.

When the call for heating ends and the W terminal on the control board is no longer energized, the pump will shut down and the blower will continue operating for a 30 second off-delay to extract the residual heat from the heating coil. The blower off-delay can be increased to 60, 90, or 120 seconds using DIP switches on the control board (See Figure 24).

NOTE: Placing a jumper across the FS terminals on the control board will cause the control to ignore the temperature sensors and will allow the unit to operate in the heating mode regardless of the supply and return air-temperatures. Models shipped without a pump come from the factory with a jumper across the FS terminals and there are no supply and return air sensors since the system water flow functions are controlled externally.

FIGURE 24
DIP SWITCH POSITIONS
(-)W1P/(-)W1T ONLY



5.3 HYDRONIC HEAT MODE: (-)WMV

One a call for heating, the thermostat energizes the W1 terminal on the control board and the pump will start. If after a 2 minute delay, the supply air temperature is sensing an air temperature greater than 85°F (29.4°C), the indoor blower will be energized and will operate at the hydronic heating air-flow level. If the sensed temperature is less than 85°F (29.4°C), the control will shut the pump off for a 5 minute delay before the process repeats. If the supply temperature is above 85°F (29.4°C), the unit will continue in the heating mode and will control the pump speed to maintain a preset temperature differential between the inlet water temperature and the supply air-temperature There is an adjustment dial on the pump control board with settings from 1 - 10. Each number represents a temperature differential of 5°F (2.8°C). A setting of 4 will provide a 20°F (11.1°C) differential between the inlet water temperature and supply air temperature. The adjustment range is 5 - 50°F (2.8 – 27.8°C).

Example: If the inlet water temperature is 120°F (48.9°C), a setting of 4 will result in a supply air temperature of 100°F (37.8°C).

If the supply air temperature drops ever drops below 85°F (29.4°C) for 30 seconds, the pump will shut down for a 5 minute delay at which time the above heating cycle process will repeat.

Modulating Heat Mode: The White Rodgers (-)HC-TST412MDMS thermostat has a PWM (Pulse Width Modulation) output that when connected to the W2 thermostat pigtail (W/BL), the indoor air-flow will modulate between 40% and 100% of the selected hydronic heat air-flow level depending on how large the differential is between the room temperature and thermostat heating set point. If the temperature differential is large, the air-flow will be closer to 100% and if the differential is small, the air-flow will closer to 40%. As the indoor air-flow varies, the pump control will maintain a constant inlet water temperature and supply air temperature differential based on the 1 – 10 dial setting on the pump control board mentioned above. The thermostat, variable speed indoor motor, and variable speed pump therefore work in conjunction with each other to provide modulating capacity from 40% - 100% of maximum capacity based on the heating load of the conditioned space.

5.4 HEAT PUMP HEATING MODE (HEAT PUMP IS PRIMARY SOURCE OF HEAT)

When the heat pump thermostat is set to “heat” mode, the “B” terminal on the outdoor unit is energized which energizes the reversing valve and switches it to the heating position. When the thermostat calls for heat, the G and Y1 terminals on the blower control board are energized which in turn energizes the indoor blower motor to operate on the same speed as the cooling mode. This causes the indoor blower to circulate air through the air-handler and duct system during the heating cycle.

Should the room temperature continue to fall when the system is operating in the heat pump heating mode, the thermostat will shut the compressor off and will switch to back-up hydronic heat if a fossil fuel kit or dual fuel enabled thermostat is controlling the system.

When the call for heat is satisfied. The G and Y1 terminals on the air-handler control board are de-energized. A time delay programmed into the (-)W1P/ (-)W1T blower control board keeps the blower motor energized for an additional 30 seconds to extract the residual heat from the warm indoor coil. The blower off-delay can be increased to 60, 90, or 120 seconds on the (-)W1P and (-)W1T models using DIP switches on the control board (See Figure 24). The blower off-delay is a fixed 45 seconds on (-)WMV models.

IMPORTANT: The AC/HP DIP switch on the control board must be switched to the HP mode for heat pump applications. Also, a fossil fuel kit or a dual fuel enabled thermostat is required for heat pump systems. Otherwise, simultaneous operation of the hydronic heat and compressor will result in excessive compressor head pressures and the high pressure switch tripping and system lock-out.

5.5 SUPPLEMENTAL HYDRONIC HEAT DURING HEAT PUMP DEFROST

Supplemental electric heat during the defrost cycle can be provided by running a wire from the purple pigtail wire (from D terminal on defrost control) on the outdoor heat pump unit to the W terminal on the control board for (-)W1P and (-)W1T or the W1 thermostat pigtail (W/BK) on the air-handler. This will energize hydronic heat during the defrost cycle to prevent cold air from being discharged from the supply registers in the home. For the most economical operation and if cold discharge air is not a concern, do not run the wire from the purple pigtail on the outdoor unit to the W terminal or W1 pigtail on the air-handler.

5.6 EMERGENCY HYDRONIC HEAT FOR HEAT PUMPS

If heat pump thermostat is set to the “Emergency Heat” mode, the outdoor unit will be prevented from operating and heat will be provided solely by hydronic heat. Hydronic heat will be energized any time there is a call for heat with no compressor and outdoor fan operation. A jumper should be installed between the W2 and E terminals on the thermostat sub-base so the heat control will be transferred to hydronic heat by the thermostat if Emergency Heat is selected.

5.7 THERMOSTAT FAN SETTING

If the thermostat “FAN” setting is adjusted to the “AUTO” position, the indoor blower motor will only operate when there is a call for cooling or heating. If the setting is adjusted to the “ON” position, the indoor blower motor will operate continuously. On (-)WMV models, the indoor blower motor will operate at a reduced speed when there is no call for cooling and heating and FAN is set to the ON position.

6.0 ACCESSORIES

FIELD-INSTALLED OPTION ACCESSORIES

ELECTRONIC AIR CLEANER

Line voltage power can be supplied from the screw terminal “EAC” and a line voltage neutral screw terminal on the control board. This will power the electronic air cleaner whenever the circulating air blower is in operation.

Expansion Tank:

Expansion tank for closed systems air separator – TACO Model 49-075.

7.0 MAINTENANCE

⚠ WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTE-NANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

⚠ CAUTION

DO NOT OPERATE THE SYSTEM FOR EXTENDED PERIODS WITHOUT FILTERS.
A PORTION OF THE DUST ENTRAINED IN THE AIR MAY TEMPORARILY LODGE IN THE AIR DUCT RUNS AND AT THE SUPPLY REGISTERS. THIS RESIDUE CAN SOIL CEILINGS, WALLS, DRAPES, CARPETS AND OTHER HOUSEHOLD ARTICLES.

LUBRICATION

IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are permanently lubricated by the manufacturer and do not require further attention.

The blower motor and induced draft blower motor must be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean. Dirty filters can restrict airflow. The motor depends upon sufficient air flowing across and through it to keep from overheating.

SYSTEM OPERATION INFORMATION

Advise the Customer

1. Keep the return air filters clean. The system will operate better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This will reduce the heating load on the system.
4. Avoid excessive use of kitchen exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles 3 feet from the air handler and vent system.
7. **IMPORTANT:** Replace all blower doors and compartment covers after servicing the air handler. Do not operate the unit without all panels and doors securely in place.
8. Explain proper operation of the system with constant air circulation.

8.0 REPLACEMENT PARTS

Any replacement part used to replace parts originally supplied on this equipment must be the same as or an approved substitute to the original part supplied. The manufacturer will not be responsible for replacement parts not designed to physically fit or operate within the design parameters the original parts were selected for.

These parts include but are not limited to controls, motors, capacitors, transformers, blower wheel, pumps, sensors, coils, and sheet metal parts.

When ordering replacement parts, it is necessary to order by the part number and include when ordering the complete model number and serial number from the unit data plate. Refer to the unit Parts List for the component part numbers.

9.0 TROUBLESHOOTING

The following information is provided to assist the field technician in troubleshooting operational problems.

9.1 TROUBLESHOOTING BLOWER MOTOR, PUMP MOTOR, AND CONTROLS

If blower and/or pump motor does not run:

Turn OFF power and check the following:

1. Check that door switch is in the CLOSED position.
2. Check 3 amp fuse on control board.
3. Check for 24 VAC between COM and 24 VAC on control board. If no voltage is present, check transformer.
4. Check all connections for kinks which could cause loose connections. Ensure connections are secure.
5. Verify that approximately 115 VAC is present across L1 and N1.

9.2 LED FAULT CODES ON (-)W1P/(-)W1T CONTROL BOARD

The (-)W1P/(-)W1T control board has an LED light that flashes in a number sequence for a given fault condition. In the next column is a summary of what the flash codes mean.

1 - Fault displayed when supply sensor open or shorted.

2 - Fault displayed when return sensor open or shorted.

3 - Fault displayed when heat mode active.

4 - Displayed when in five minute delay.

9.3 LED FAULT CODES ON (-)WMV CONTROL BOARD

The RWMV control board has an LED light that flashes in a number sequence for a given fault condition. Table 4 below provides a summary of what the flash codes mean.

TABLE 4
LED FAULT CODES ON (-)WMV CONTROL BOARD

LED Flash Code	Fault	Fault Severity (0=minor, 1=critical)	Status/Possible Cause – Troubleshooting Information
2	No model data present	1	•Replace memory card with correct system information.
3	Motor size is not correct for model of air handler	1	•Replace the motor with correct horsepower motor. •Replace the memory card with correct system information.
4	Blower fault – Run The ECM motor is running but has a fault	1	• TEST the ECM for proper operation.
4	Motor no run fault – No Run The ECM motor is not operating	1	• Make sure the ECM motor wiring harness is plugged into the ECM motor and control board. •Test the ECM motor for proper operation.
4	Blower motor is not communicating The ECM motor is not communicating to the air handler control board.	1	•Make sure the ECM motor wiring harness is plugged into the ECM motor and control board. •Test the ECM motor proper operation using a service tool.
5	Return sensor out of range The resistance of the sensor out of range for normal operation.	0	•Make sure the sensor is plugged into the air handler control board. • Check the resistance of the sensor. Replace if it is out of tolerance.
6	Leaving air sensor out of range The resistance of the sensor out of range for normal operation.	0	• Make sure the sensor is plugged into the air handler control board.
7	Evaporator thermistor failure		•Check the evaporator thermistor to ensure a proper connection to the control is present. •This occurs only on air handlers not equipped with a low pressure transducer.
8	No Valid Suction Temp	1	•Make sure the sensor is plugged into the air handler control board. • Check the resistance of the sensor. Replace if it is out of tolerance.
10	Suction pressure out of range	0	•Check the suction pressure transducer to ensure a proper connection to the control is present. •If operating in heating mode this flash code is normal.
11	Control fault The air handler control is not functioning.	1	•Check for proper system operation. • Replace control.

9.4 GENERAL TROUBLESHOOTING CHART

Warning: Disconnect all power to unit before servicing. Failure to shut off power can cause electrical shock resulting in personal injury or death.		
Symptom	Possible Cause	Remedy
Unit will not run	Power off or loosen electrical connection	Check for correct voltage at control
	Thermostat out of calibration - set too high	Check for correct voltage at control
	Call for domestic hot water - air handler disabled until call ends. Unit is operating as designed.	Unit is operating as designed
	Blown fuses / tripped breaker	Replace fuses / reset breaker
	Transformer defective	Check wiring–replace transformer
Insufficient heating	Improperly sized air handler or water heater	Recalculate load
	Improper indoor air flow	Check motor speed tap setting
Pump does not run	Call for domestic hot water–air handler disabled until call ends. Unit is operating as designed.	Unit is operating as designed
	Power off or loosen electrical connection	Check line voltage at pump
		Check wires and connectors
		Check pump capacitor
Blower does not run	Call for domestic hot water - air handler disabled until call ends. Unit is operating as designed.	Unit is operating as designed
	Power off or loosen electrical connection	Check line voltage at blower motor
		Check wires and connectors
		Check blower motor capacitor
Water does not flow	Water lines are air locked	Purge air from lines

10.0 WIRING DIAGRAMS

FIGURE 25
ELECTRICAL WIRING DIAGRAM – ECO TECH™ MODELS: (-)W1T

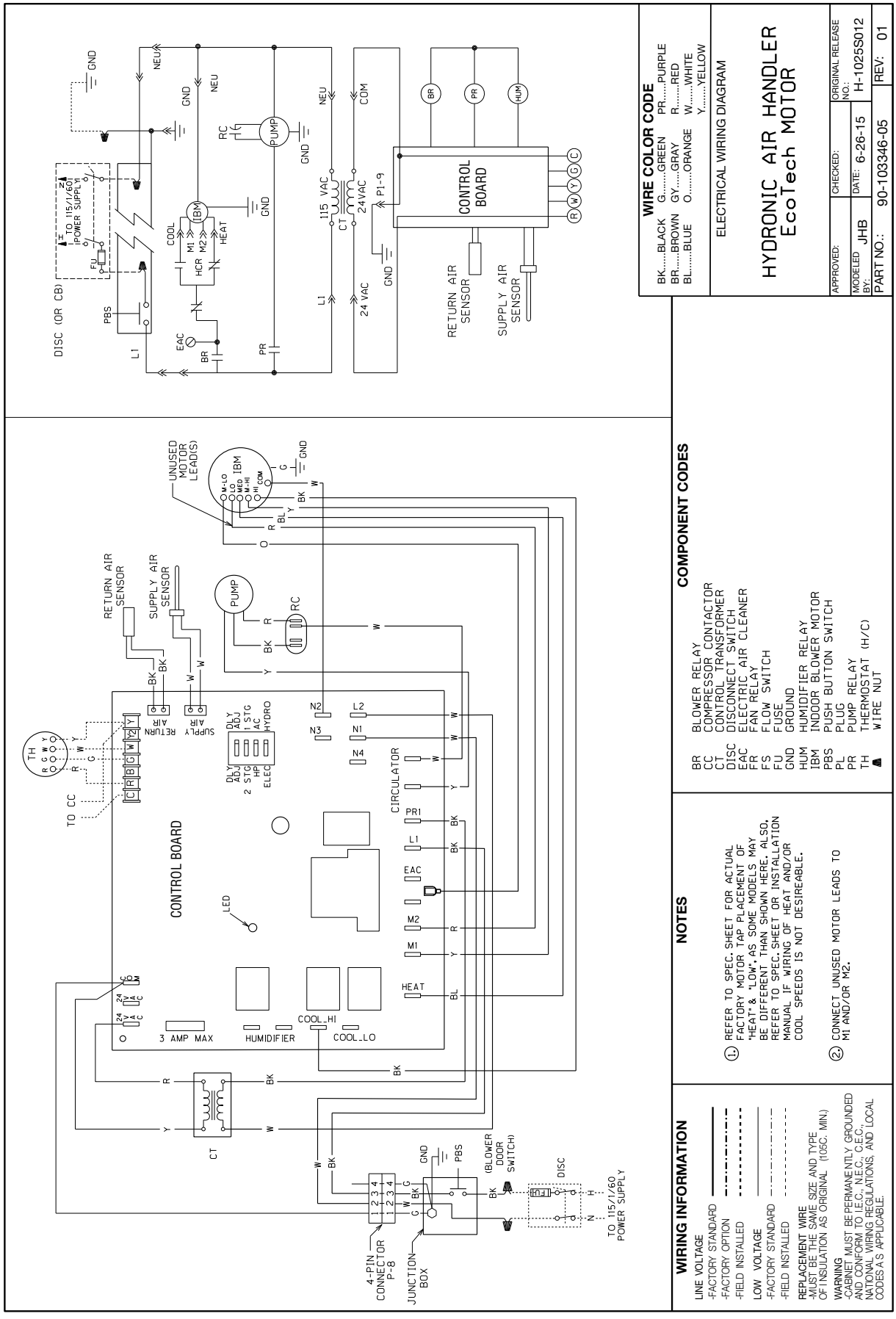


FIGURE 26
ELECTRICAL WIRING DIAGRAM – PSC MOTORS: (-)W1P

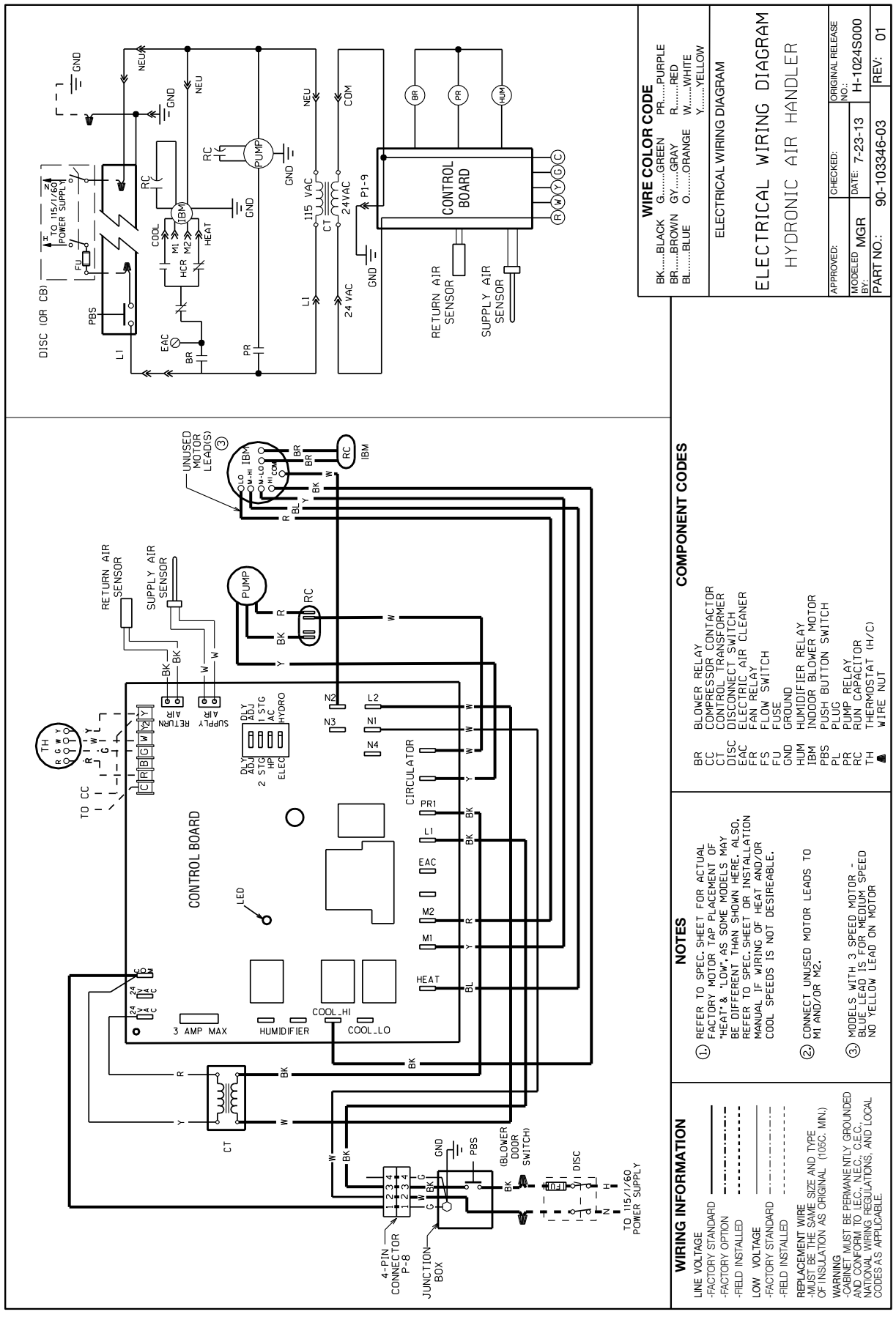


FIGURE 27
ELECTRICAL WIRING DIAGRAM: (-)W1T (NO PUMP MODEL)

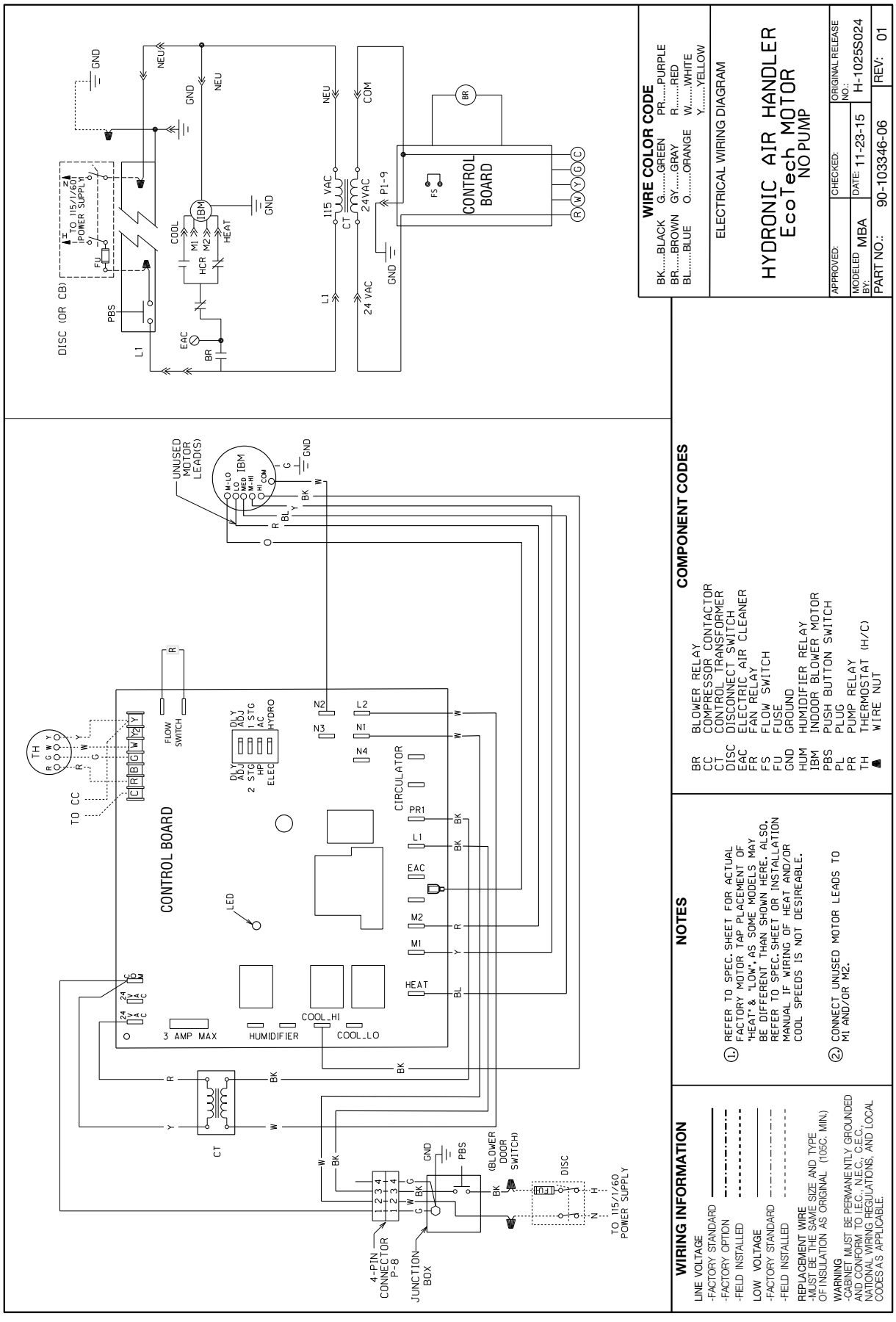
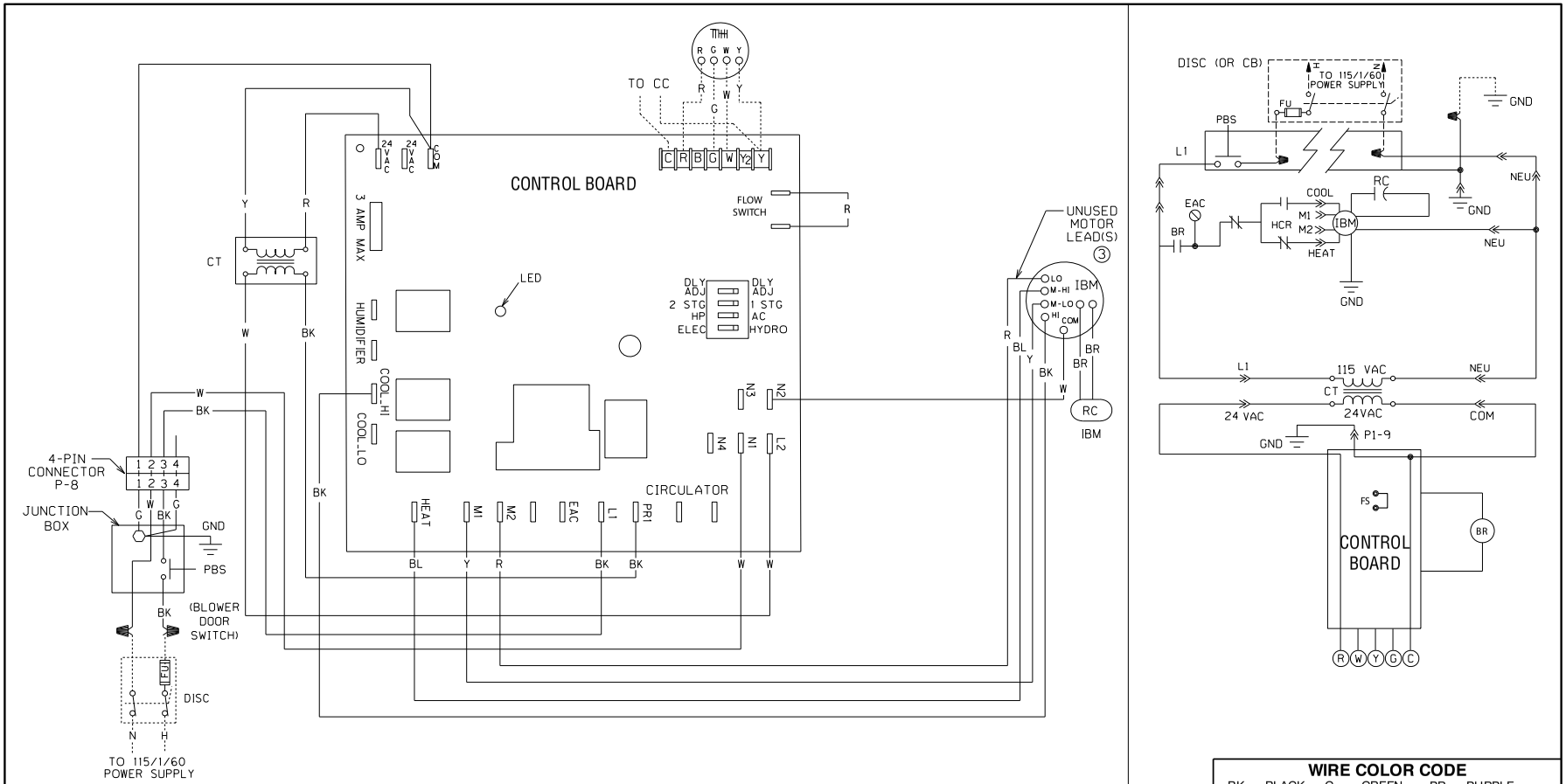


FIGURE 28
ELECTRICAL WIRING DIAGRAM: (-)W1P (NO PUMP MODEL)



WIRING INFORMATION

LINE VOLTAGE
-FACTORY STANDARD
-FACTORY OPTION
-FIELD INSTALLED

LOW VOLTAGE
-FACTORY STANDARD
-FIELD INSTALLED

REPLACEMENT WIRE
-MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105C. MIN.)

WARNING
-CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C., NATIONAL WIRING REGULATIONS, AND LOCAL CODES AS APPLICABLE.

NOTES

1. REFER TO SPEC. SHEET FOR ACTUAL FACTORY MOTOR TAP PLACEMENT OF "HEAT" & "LOW". AS SOME MODELS MAY BE DIFFERENT THAN SHOWN HERE. ALSO, REFER TO SPEC. SHEET OR INSTALLATION MANUAL IF WIRING OF HEAT AND/OR COOL SPEEDS IS NOT DESIREABLE.
2. CONNECT UNUSED MOTOR LEADS TO M1 AND/OR M2.
3. MODELS WITH 3 SPEED MOTOR - BLUE LEAD IS FOR MEDIUM SPEED NO YELLOW LEAD ON MOTOR

COMPONENT CODES

BR	BLOWER RELAY
CC	COMPRESSOR CONTACTOR
CT	CONTROL TRANSFORMER
DISC	DISCONNECT SWITCH
EAC	ELECTRIC AIR CLEANER
FR	FAN RELAY
FS	FLOW SWITCH
FU	FUSE
GND	GROUND
HUM	HUMIDIFIER RELAY
IBM	INDOOR BLOWER MOTOR
PBS	PUSH BUTTON SWITCH
PL	PLUG
PR	PUMP RELAY
RC	RUN CAPACITOR
TH	THERMOSTAT (H/C)
⏚	WIRE NUT

WIRE COLOR CODE

BK.....BLACK	G.....GREEN	PR.....PURPLE
BR.....BROWN	GY.....GRAY	R.....RED
BL.....BLUE	O.....ORANGE	W.....WHITE
		Y.....YELLOW

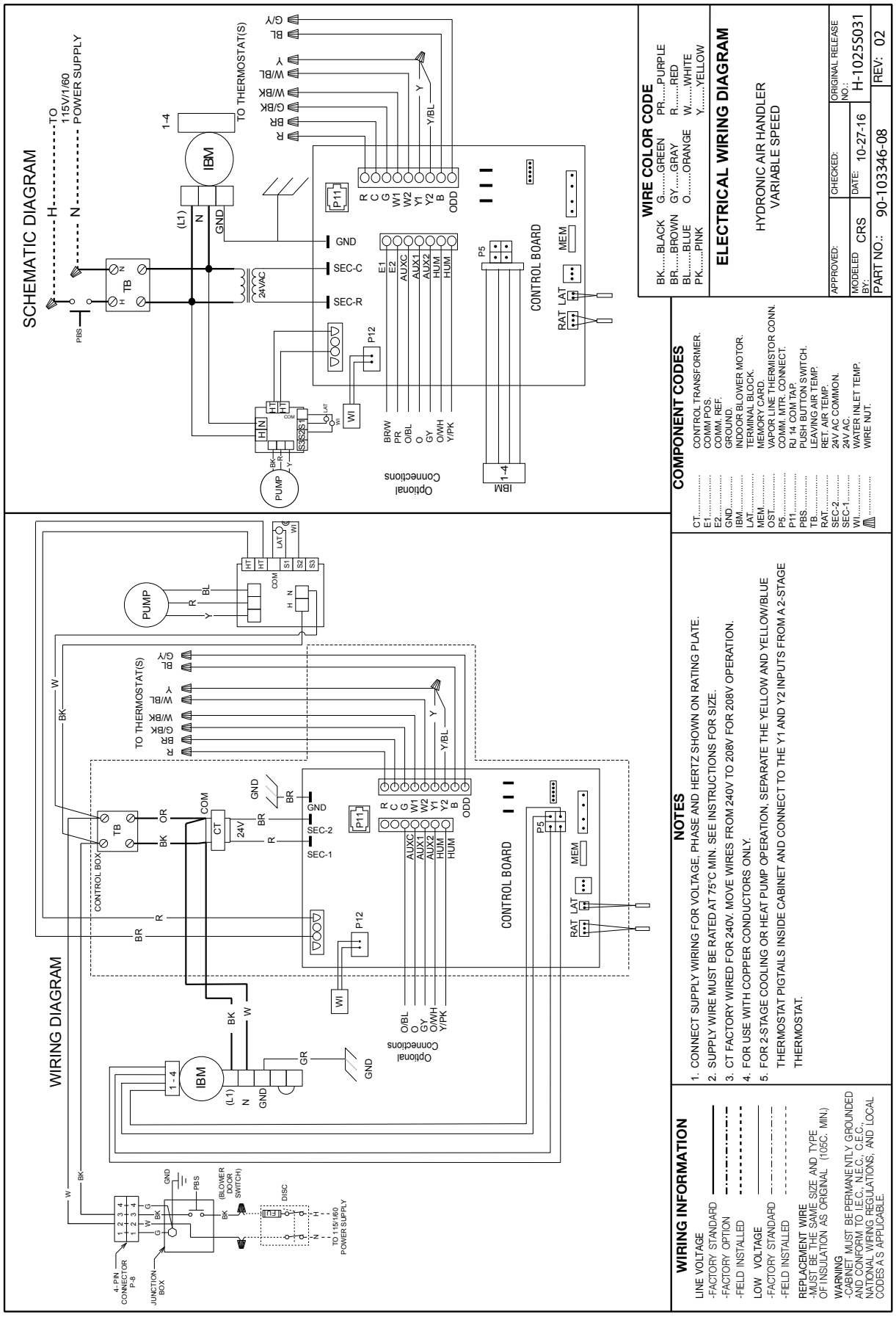
ELECTRICAL WIRING DIAGRAM

ELECTRICAL WIRING DIAGRAM

HYDRONIC AIR HANDLER
PSC MOTOR
NO PUMP

APPROVED:	CHECKED:	ORIGINAL RELEASE NO.: H-1025S024
MODELED BY: MBA	DATE: 11-24-15	
PART NO.: 90-103346-07		REV: 02

FIGURE 29
ELECTRICAL WIRING DIAGRAM: (-)WMV



11.0 APPENDIX: TACO VARIABLE SPEED PUMP INSTRUCTIONS

Taco®

Instruction Sheet

102-359

00® Variable Speed Delta T (00-VDT)

SUPERSEDES: May 1, 2010 EFFECTIVE: October 1, 2010

Plant ID# 001-3927

The Variable Speed Delta T 00® Cartridge Circulator (00-VDT) is a microprocessor-based pump which automatically adjusts its performance to deliver the optimal heat transfer based on the actual operation of the system. The 00-VDT regulates the temperature to provide a fixed temperature difference (ΔT) of between 5 - 50°F between two field installed sensors.

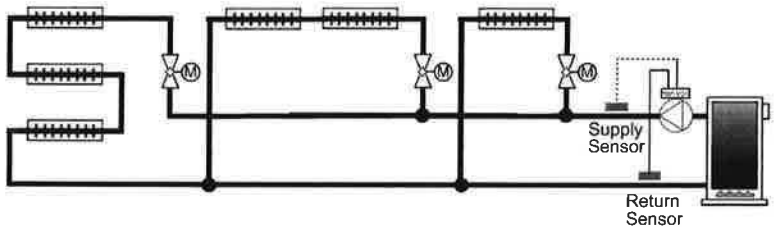
Variable Speed Differential Temperature Control

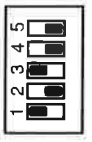
Variable speed pumping to maintain a set differential temperature (delta T or ΔT) between two sensors allows for automatic adjustment of the pump's performance to match the load of the system or zone, eliminate velocity noise in zone valve systems and conserve energy.

Since delta T is directly related to flow rate, the pump's speed continually adjusts to the required BTU per hour. In almost all applications the design of the system was based on being able to maintain a certain delta T and figured by using the universal hydronics equation of BTU/hr = GPM x 500 x ΔT. Given that, any time there is a change to the heat load (i.e. warmer day or greater heat loss from a structure) then the GPM should change to match the required BTU/hr. This is achieved when the variable speed 00-VDT Circulators automatically and continually adjust their GPM output (by varying speed) to match the required BTU/hr output of the system, no matter the changes in heat load, while always maintaining the designed delta T between a supply and return sensor.

Applications

Delta T Across a Series Loop System Using Zone Valves

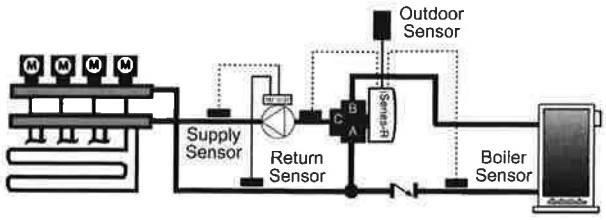


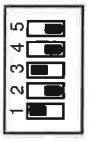


DIP 5 = Off
DIP 4 = Off
DIP 3 = On
DIP 2 = Off or On
DIP 1 = On

The 00-VDT Variable Speed Circulator adjusts its speed to maintain the differential temperature (based on the RANGE dial setting) between the supply sensor and the return sensor whenever a heat demand is present. This will increase overall comfort and sharply reduce boiler short-cycling. The 00-VDT will also control velocity noise issues in the system, eliminating the need for a pressure differential bypass valve.

Delta T Across Multi-Zone Radiant Manifolds with Loop Actuators





DIP 5 = Off
DIP 4 = Off
DIP 3 = On
DIP 2 = Off or On
DIP 1 = On

The 00-VDT Variable Speed Circulator adjusts its speed to maintain the differential temperature (based on the RANGE dial setting) between the supply sensor and the return sensor whenever a heat demand is present. The 00-VDT will also eliminate velocity noise by slowing the actual flow rate through the zone to the minimum required to deliver proper heat. If other zones on the manifold open, the 00-VDT will increase its speed to deliver the required BTU's, while at the same time maintaining the designed for delta T across the radiant system.

See **www.taco-hvac.com** for additional applications for the 00-VDT circulators.

e-smart

A Taco resource – saving product

Pump Selection

The circulator should be sized, using conventional sizing practices, based on the required head and flow for the system or zone on which the circulator is being installed.

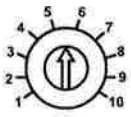
Sequence of Operation

Power Up and Heat Request

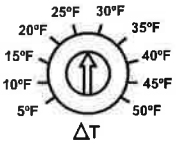
Whenever the 00-VDT is powered up, the green PWR LED turns on. The 00-VDT starts operating once a heat request signal is present at the Heat Request (Ht Req) terminals. The heat request terminals come factory jumpered so the pump will start as soon as it is powered up. The jumper may be removed and a heat request signal may be provided by external end switches from zone valves or Taco ZVC/SR series zone controls, applying a dry contact closure or a powered 24 V (ac) signal across the Ht Req terminals. Once a heat request signal is present, the green HEAT REQ LED turns on.

Delta T Setting and Operation

Once a heat request is present, the 00-VDT operates to provide a fixed ΔT between the supply sensor (S2) and the return sensor (S1). The fixed ΔT is set using the RANGE dial, where 5°F and 50°F corresponds to 1 and 10 respectively on the RANGE dial, with the temperature increasing in 5°F increments. The percent output (% OUT) LED flashes at different rates based on the speed of the pump.

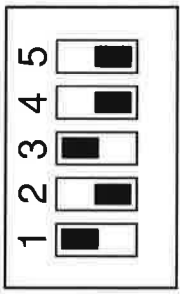


RANGE



ΔT

Dip Switch Settings



DIP Switch 5: Output Characteristic = Off or On

DIP Switch 4: Output Response = Off

DIP Switch 3: Mode of Operation = On

DIP Switch 2: Minimum Speed = Off or On

DIP Switch 1: ΔT Operation = On

Minimum Variable Speed Output

When the 00-VDT is configured for reverse acting mode (ΔT operation), a minimum variable speed ouput is incorporated during operation to insure proper flow across both sensors. In this case, the variable speed output is adjusted between the selected minimum variable speed output percentage and full output. Depending on the amount of system resistance in your application, select the preferred minimum variable speed output from the table to the right. The 00-VDT also provides full output for 30 seconds when the Heat Request appears, then resumes normal operation.

Minimum Variable Speed Output	
DIP switch 2 = Off	DIP switch 2 = On
Normal (default)	Lower

Note: Minimum variable speed output is not available when configured for Direct Acting Mode (DIP switch 3 set to Off).

Pump Start-up

When the 00-VDT is powered up, the circulator operates at full speed for 30 seconds before varying its speed anywhere between minimum and full speed as required to maintain the selected differential temperature.

In Direct Acting Mode (DIP switch 3 = Off) the speed of the circulator will ramp up as required to maintain the selected differential temperature.

Exercising

Every 72 hours of no operation, the 00-VDT is designed to exercise for 10 seconds in order to prevent precipitate build-up in the pump. The % OUT LED turns on during the exercising function.

Wiring and Sensor Installation

WARNING: Wiring connections must be made in accordance with all applicable electrical codes.

CAUTION: To prevent electrical shock, disconnect electric power to system at main fuse or circuit breaker box until installation is complete. When a service switch is installed, more than one disconnect switch may be required to deenergize this device for servicing.

Powering the Control

Insert the line voltage wires through the knockout of the enclosure and connect the live wire to the H terminal and the neutral wire to the N terminal on the PC Board. Ensure that no power is present during this process.

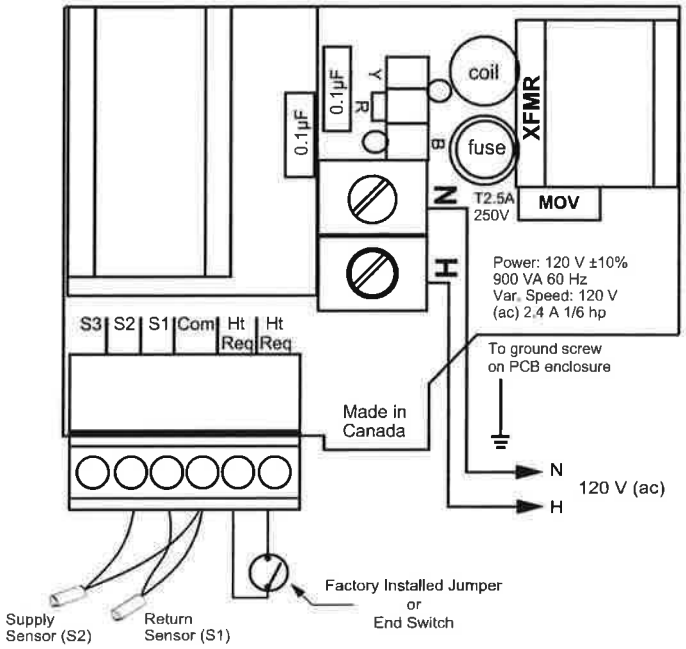
Heat Request

The heat request signal may be provided by the factory installed jumper or the jumper can be removed and a heat request signal may be provided by external end switches from zone valves or Taco ZVC/SR series zone controls, applying a dry contact closure or a powered 24 V (ac) signal across the Ht Req terminals.

Sensors

Do not apply power to these terminals as this will damage the PC Board. The wiring terminals for the sensors may be removed for ease of installation.

Do not run the wires parallel to telephone or power cables. If the sensor wires are located in an area with strong sources of electromagnetic interference (EMI), shielded cable or twisted pair should be used or the wires can be run in a grounded metal conduit. If using shielded cable, the shield wire should be connected to the Com terminal on the PC Board and not to earth ground.



Sensor Installation and Placement

The sensors can be strapped directly to the pipe using a cable tie. Insulation should be placed around the sensor to reduce the effect of air currents on the sensor measurement. The sensors should be placed downstream of a pump or after an elbow or similar fitting. This is especially important if large diameter pipes are used because the thermal stratifcation within the pipe can result in erroneous sensor readings. Proper sensor location requires that the fluid is thoroughly mixed within the pipe before it reaches the sensor.

If the system sensor is used to measure duct (air) temperature, the sensor should be mounted in such a manner that it measures the average duct outlet temperature.

Return Sensor (S1)

Connect the two wires from the return sensor (S1) directly into the Com and S1 terminals on the PC Board.

Supply Sensor (S2)

Connect the two wires from the supply sensor (S2) directly into the Com and S2 terminals on the PC Board.

Troubleshooting

As in any troubleshooting procedure, it is important to isolate a problem as much as possible before proceeding. The error messages greatly simplify troubleshooting of the 00-VDT. When the 00-VDT flashes an error message, identify the fault and follow standard testing procedures to confirm the problem. If you suspect a wiring fault, return to the wiring section on this brochure and carefully check all external wiring and wiring connections.

For your safety and protection from permanent damage to the microprocessor, the 00-VDT includes a 2.5 A (250 VAC) field replaceable fuse.

Multi-Status LED

LED	LED Status	OO-VDT Status
PWR	Solid	Power On
HEAT REQ	Solid	Heat Request
% OUT	Flash (Solid)	Variable Speed Output
HEAT REQ	Flash	System Sensor S1 Fault. 00-VDT does not operate.
RED OUT	Flash	System Sensor S2 Fault. 00-VDT does not operate.
HEAT REQ and RED OUT	Flash	Boiler Sensor S3 Fault. No sensor should be connected to S3. 00-VDT does not provide boiler protection.
POWER, HEAT REQ and RED OUT	Flash	No sensors connected, or incompatible mode and sensor combination.

Testing the Sensors

A good quality test meter capable of measuring up to 5,000 kΩ (1 kΩ = 1000Ω) is required to measure the sensor resistance. In addition to this, the actual temperature must be measured with a good quality digital thermometer.

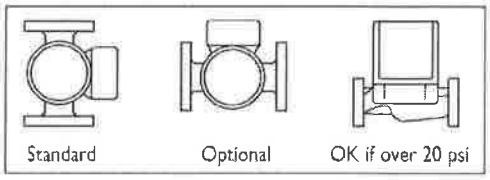
First measure the temperature using the thermometer and then measure the resistance of the sensor at the 00-VDT. The wires from the sensor must not be connected to the PC Board while this test is performed. The wiring terminals are easily removed by pulling them from the PC Board. Using the chart below, estimate the temperature measured by the sensor. The sensor and thermometer readings should be close. If the test meter reads a very high resistance, there may be a broken wire, a poor wiring connection or a defective sensor. If the resistance is very low, the wiring may be shorted, there may be moisture in the sensor or the sensor may be defective. To test for a defective sensor, measure the resistance directly at the sensor location.

Temperature		Resistance	Temperature		Resistance	Temperature		Resistance	Temperature		Resistance
°F	°C	Ω	°F	°C	Ω	°F	°C	Ω	°F	°C	Ω
-30	-34	234,196	30	-1	34,558	90	32	7,334	150	66	2,045
-20	-29	165,180	40	4	26,099	100	38	5,828	160	71	1,689
-10	-23	118,018	50	10	19,900	110	43	4,665	170	77	1,403
0	-18	85,362	60	16	15,311	120	49	3,760	180	82	1,172
10	-12	62,465	70	21	11,883	130	54	3,050	190	88	983
20	-7	46,218	80	27	9,299	140	60	2,490	200	93	829

Application

1. Maximum operating pressure: 125 psi (862 kPa) on all "00" Series Circulators.
2. Maximum water temperature not to exceed nameplate rating.
3. Cast iron circulators are to be used for closed loop systems. Bronze circulators are to be used for open loop, fresh water, or potable water systems.
4. Taco Cartridge circulator pumps are for indoor use only – employer uniquement a l'interieur.

Installation



1. Mounting position – Circulator must be mounted with the motor in a horizontal position. It may be mounted vertically with the motor up, provided that the system pressure is at least 20 psi (138 kPa).
2. Rotating body – Body has an arrow on the front that indicates direction of flow. To rotate body, remove the four body bolts, rotate body and replace bolts. Make sure that the junction box is **NOT** located underneath the circulator. (The junction box must **NOT** be located in the 6 o'clock position, as viewed from the motor end.)
3. Electrical connections – Observe all applicable codes when connecting to power supply. The motor is impedance protected, and does not require overload protection. The pump cannot run backwards.

WARNING: Do not use in swimming pool or spa areas; pump has not been investigated for this application.

WARNING: In the event the retaining screws have been pulled out of the housing, DO NOT replace them. Use of any other screw may short out the stator windings, creating a risk of electrical shock.

CAUTION: When installing electrical connections, do not apply mechanical loads to the capacitor box; otherwise, retaining screws may be pulled out of the housing, making circulator unusable.

4. Fill system with tap water – The system must be filled before operating the circulator. The bearings are water lubricated and should not be allowed to operate dry. Filling the system will result in immediate lubrication of the bearings. It is always good practice to flush a new system of foreign matter before starting the circulator.
5. Circulator operation – Operate the circulator for 5 minutes immediately after filling system to purge remaining air from the bearing chamber. This is especially important when installing the circulator during the off-season.

CAUTION: The addition of petroleum based fluids or certain chemical additives to systems utilizing TACO equipment voids the warranty.

CAUTION: Use supply wires suitable for 90°C – ATTENTION: Employer des fils d´alimentation adequats pour 90°C.

WARNING: To avoid electrical shock, disconnect the power supply to the circulator and the main electrical unit.

Replacing Cartridge Assembly

1. Disconnect the electrical supply.
2. Reduce system pressure to 0 psi and allow system to return to room temperature. Isolate the circulator by closing the service valves or draining the system.
3. Remove the body bolts and swing motor assembly away from the body.
4. Pull cartridge out of the motor housing.
5. Install replacement cartridge, making sure that the cover plate is between the cartridge flange and motor.
6. Make sure the replacement cartridge corresponds to the full circulator product number. A complete parts list is available from your local plumbing supply wholesaler.
7. Reassemble the circulator using the new gasket and bolts supplied.
8. Follow the "Installation" procedure to start up the circulator.

Replacing Integral Flow Check (IFC) Assembly (if applicable)

1. Disconnect the electrical supply.
2. Reduce system pressure to 0 psi and allow system to return to room temperature. Isolate the circulator by closing the service valves or draining the system.
3. Loosen flange bolts and remove entire circulator from the system to access the flange mounted IFC.
4. Remove IFC, using needle nose pliers.
5. Install replacement IFC by pressing valve into casing until it is firmly seated.
6. Follow the "Installation" procedure to start up the circulator.

Replacing Circuit Board

1. Disconnect the electrical supply and all field wiring to the circuit board.
2. Unplug the 3-pin plastic connector that connects the motor to the circuit board.
3. Bend the lip of the capacitor base to ease the removal of the circuit board. Pull the circuit board up and out.
4. Reverse directions to install the new circuit board.

Notes